

Nov. 4, 1952

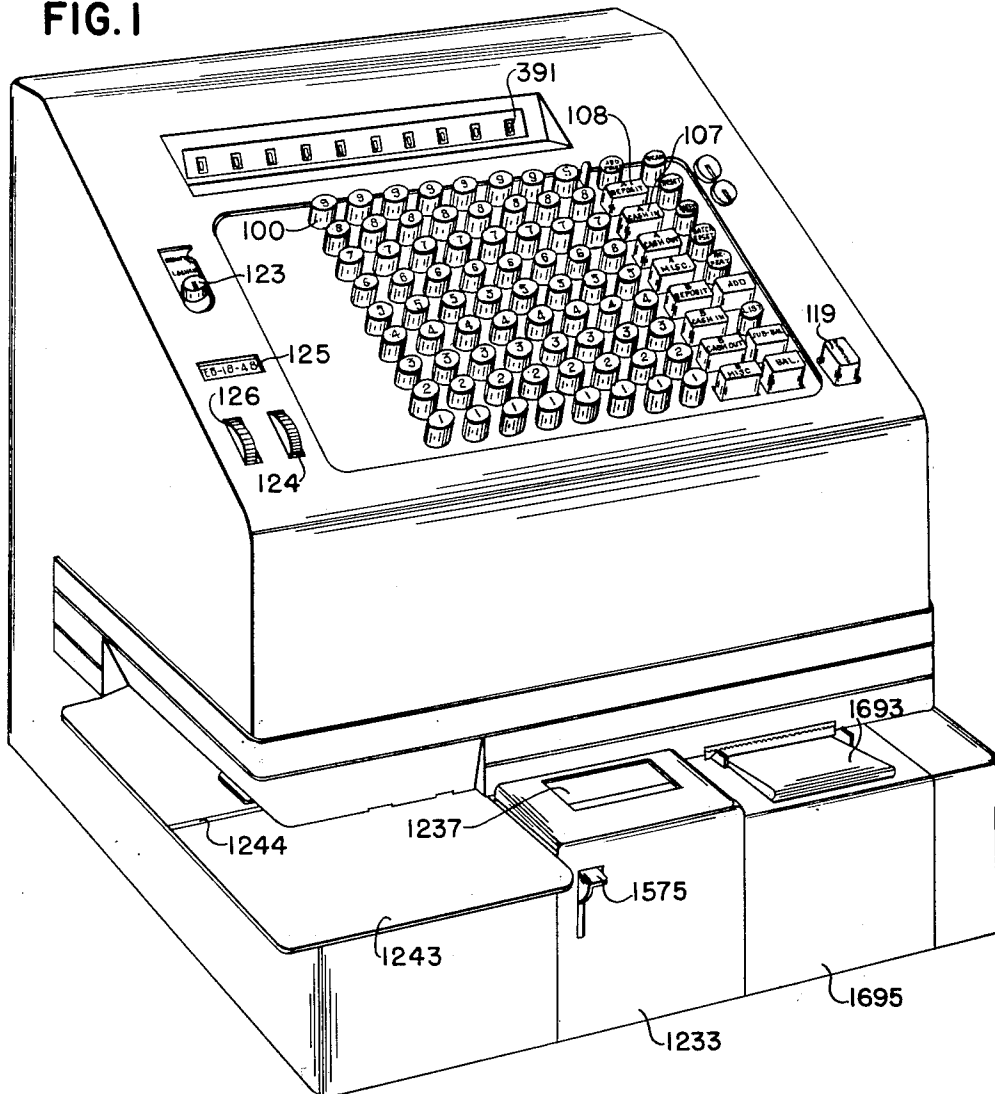
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FIG. 1



INVENTORS
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Nov. 4, 1952

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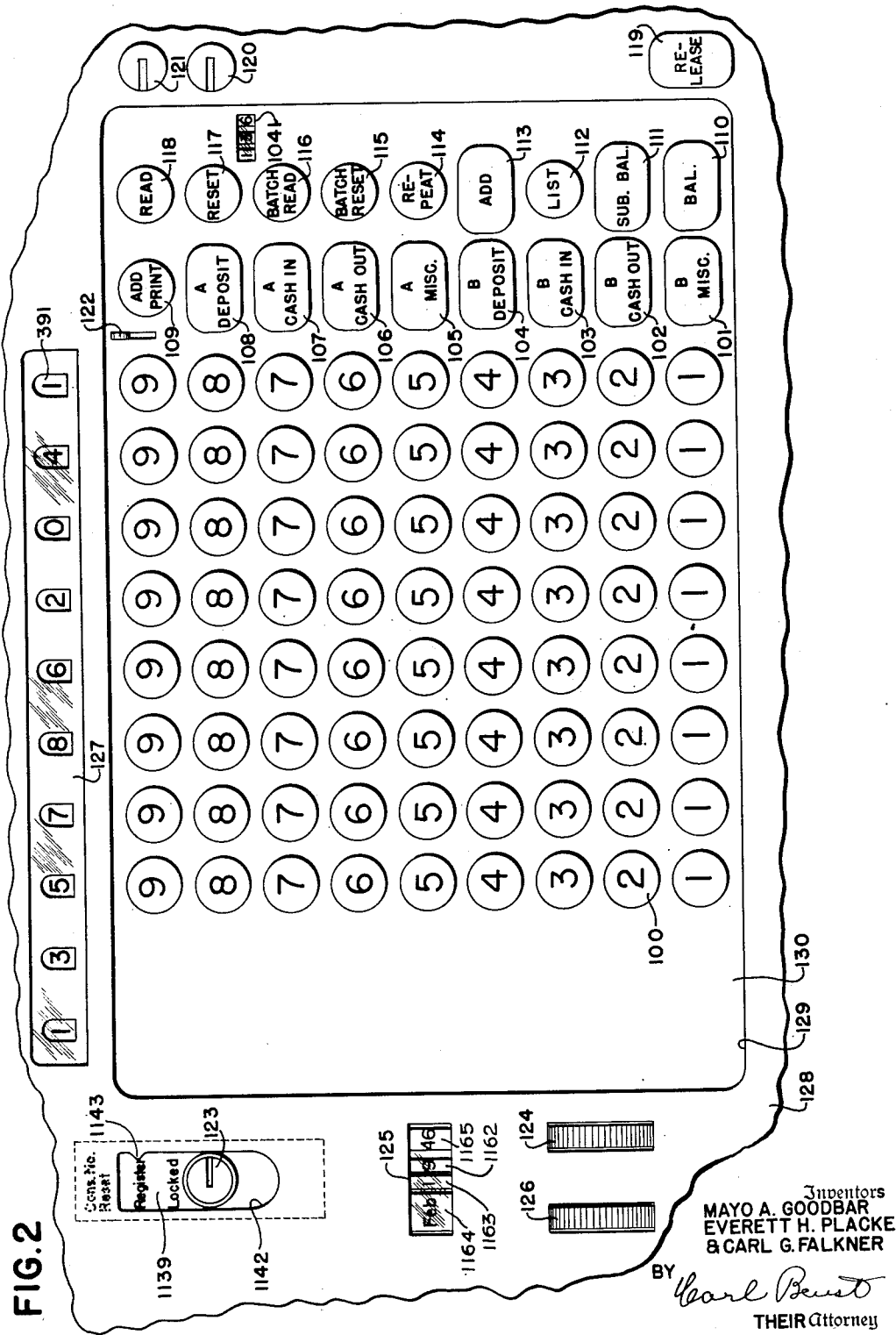
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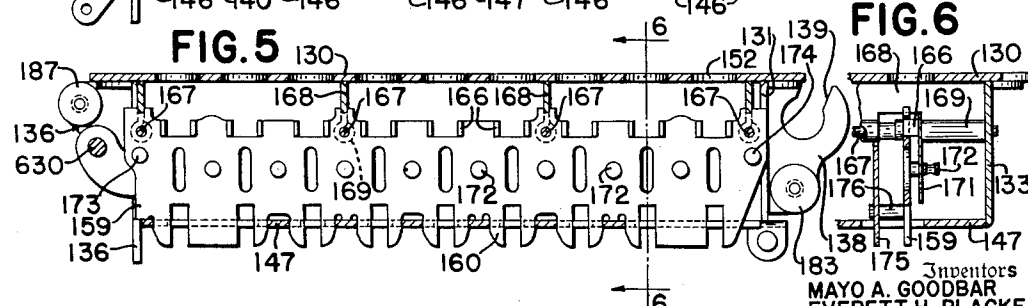
37 Sheets-Sheet 2

FIG. 2



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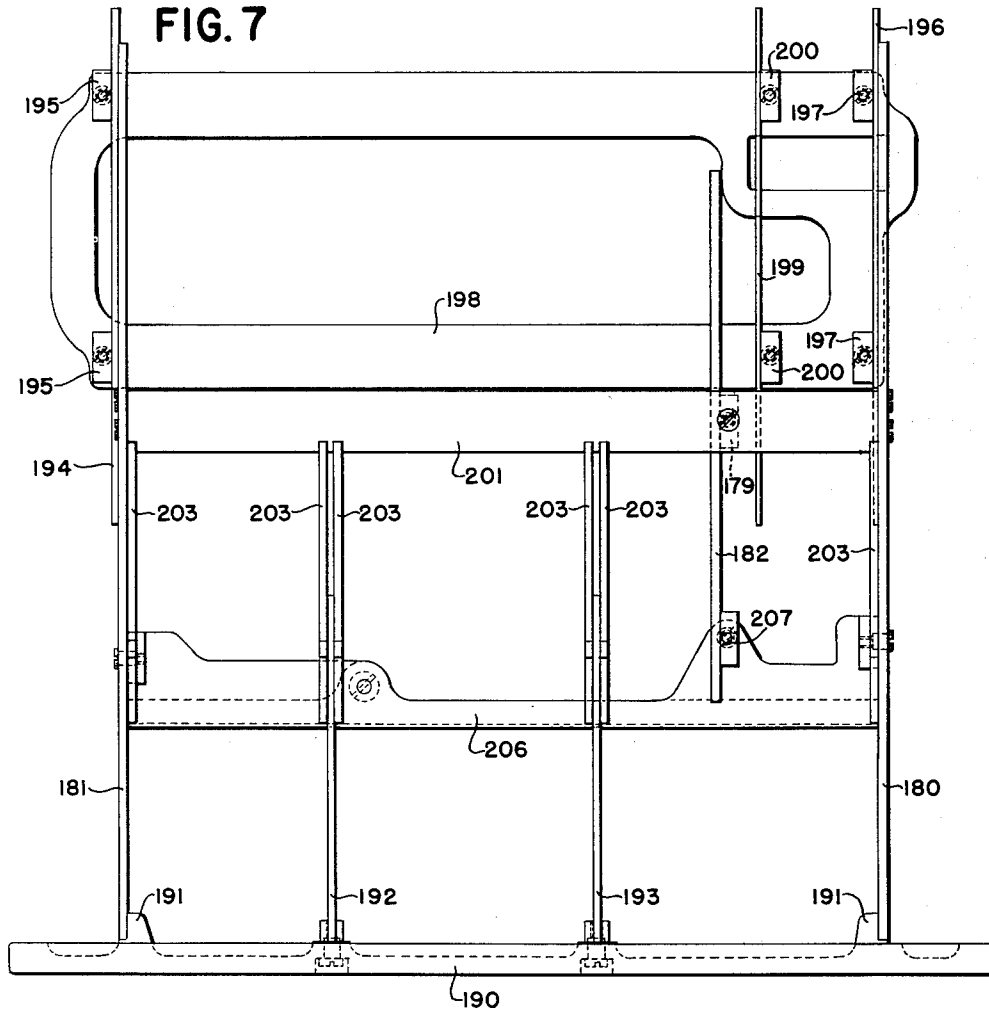
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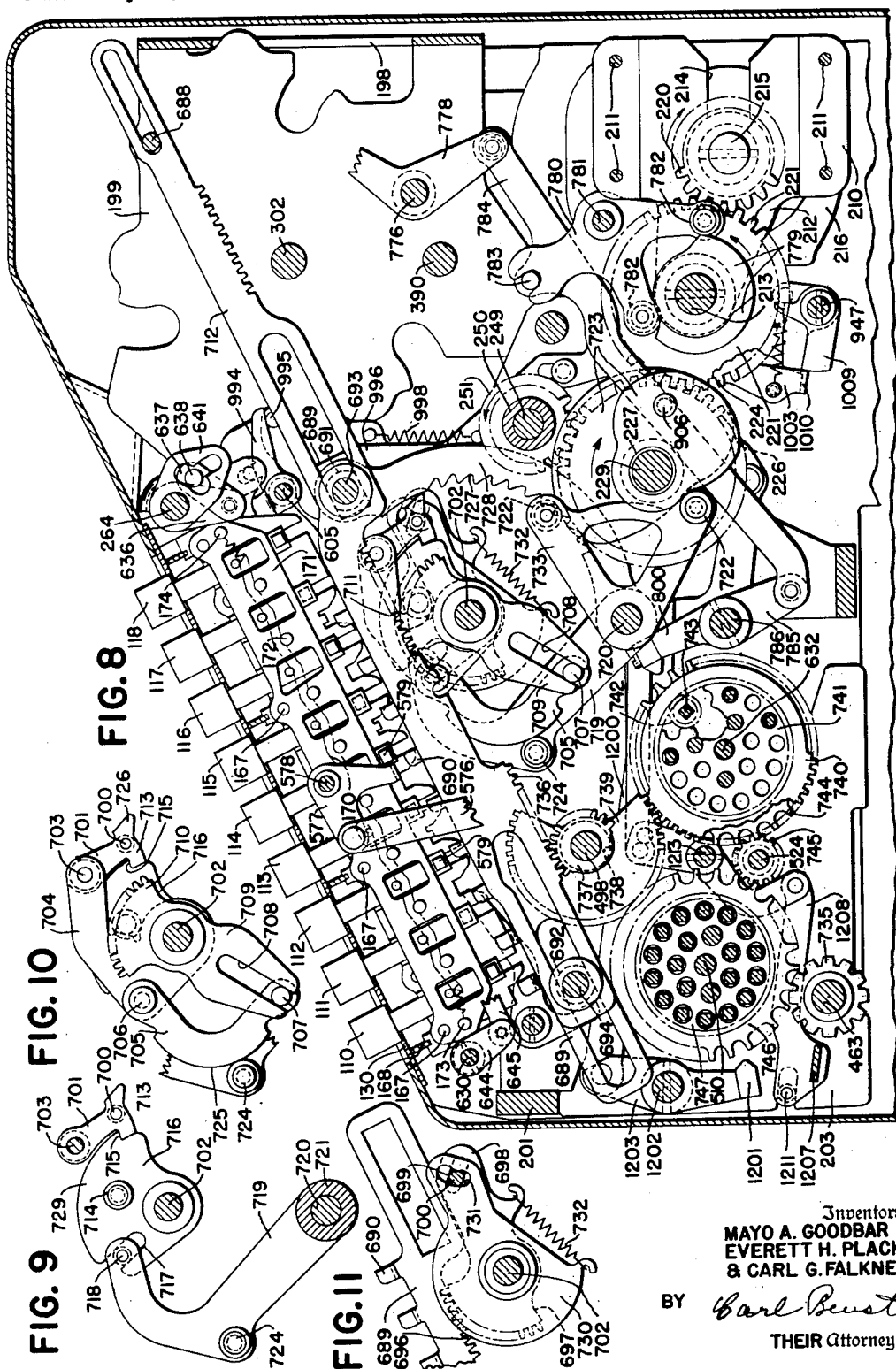
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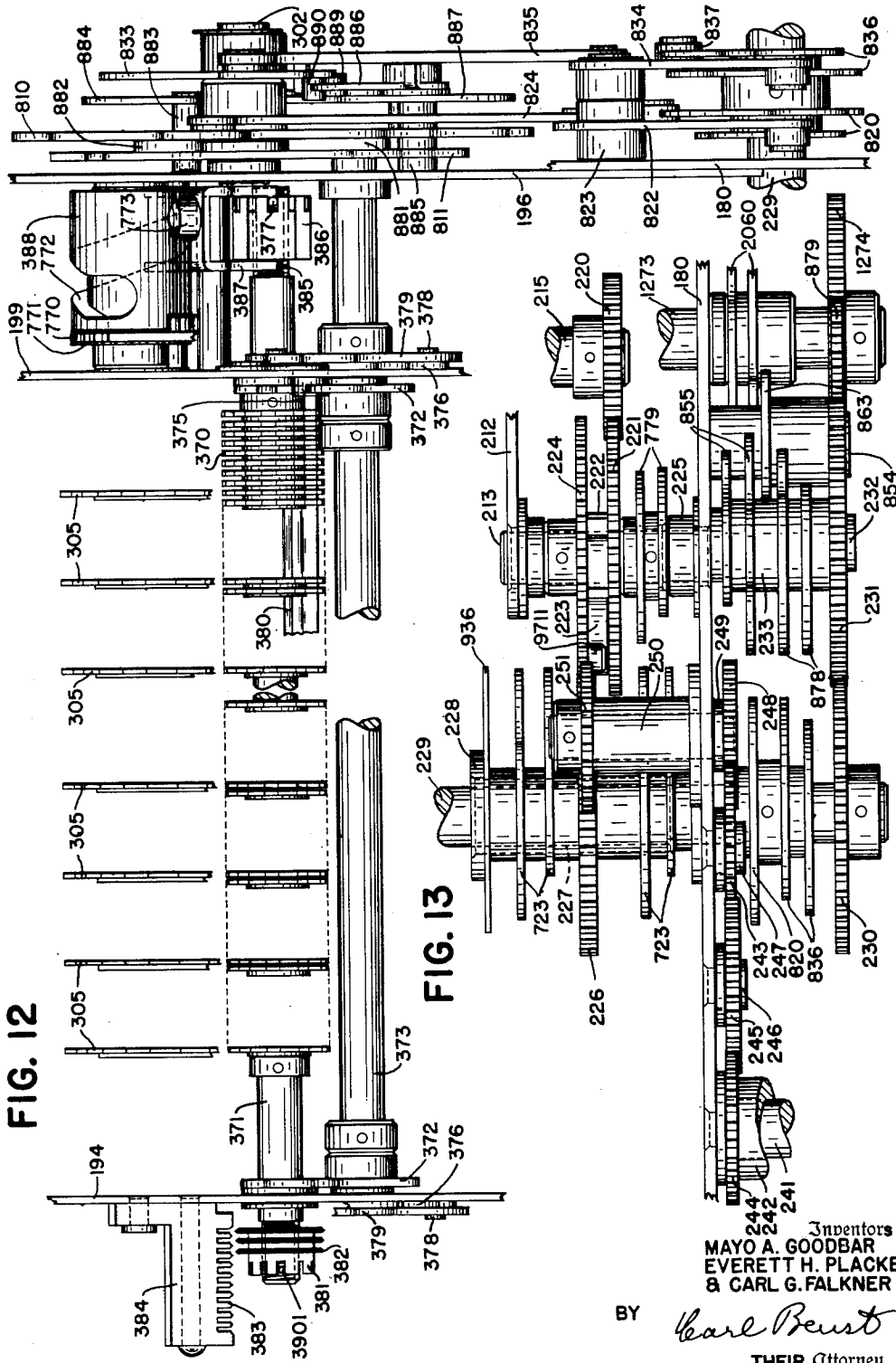
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Inventors
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FIG. 15

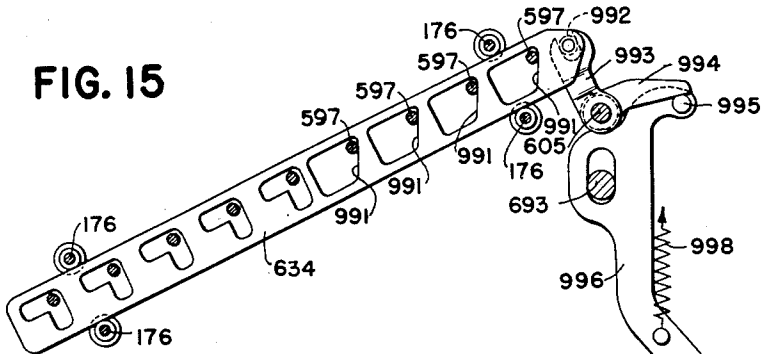


FIG. 14

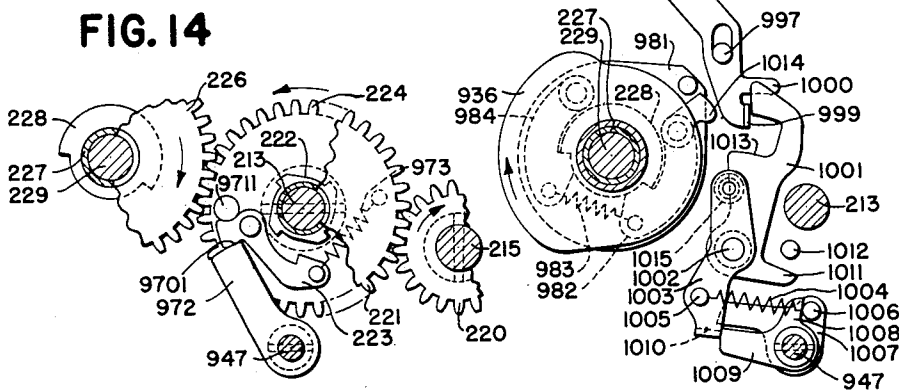


FIG. 16

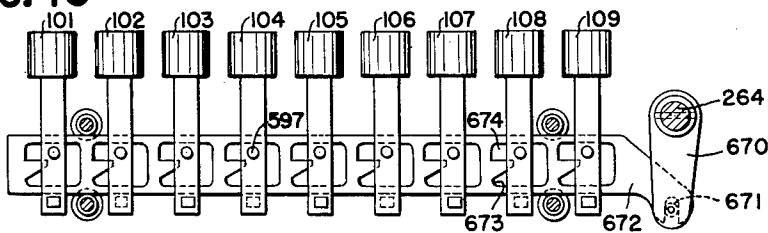


FIG. 17

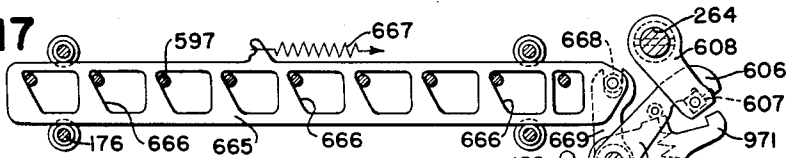
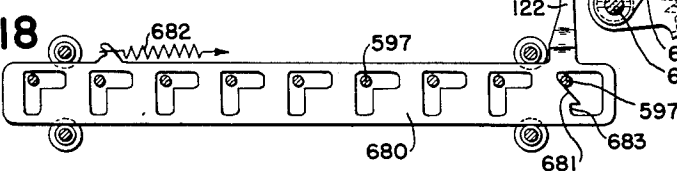


FIG. 18



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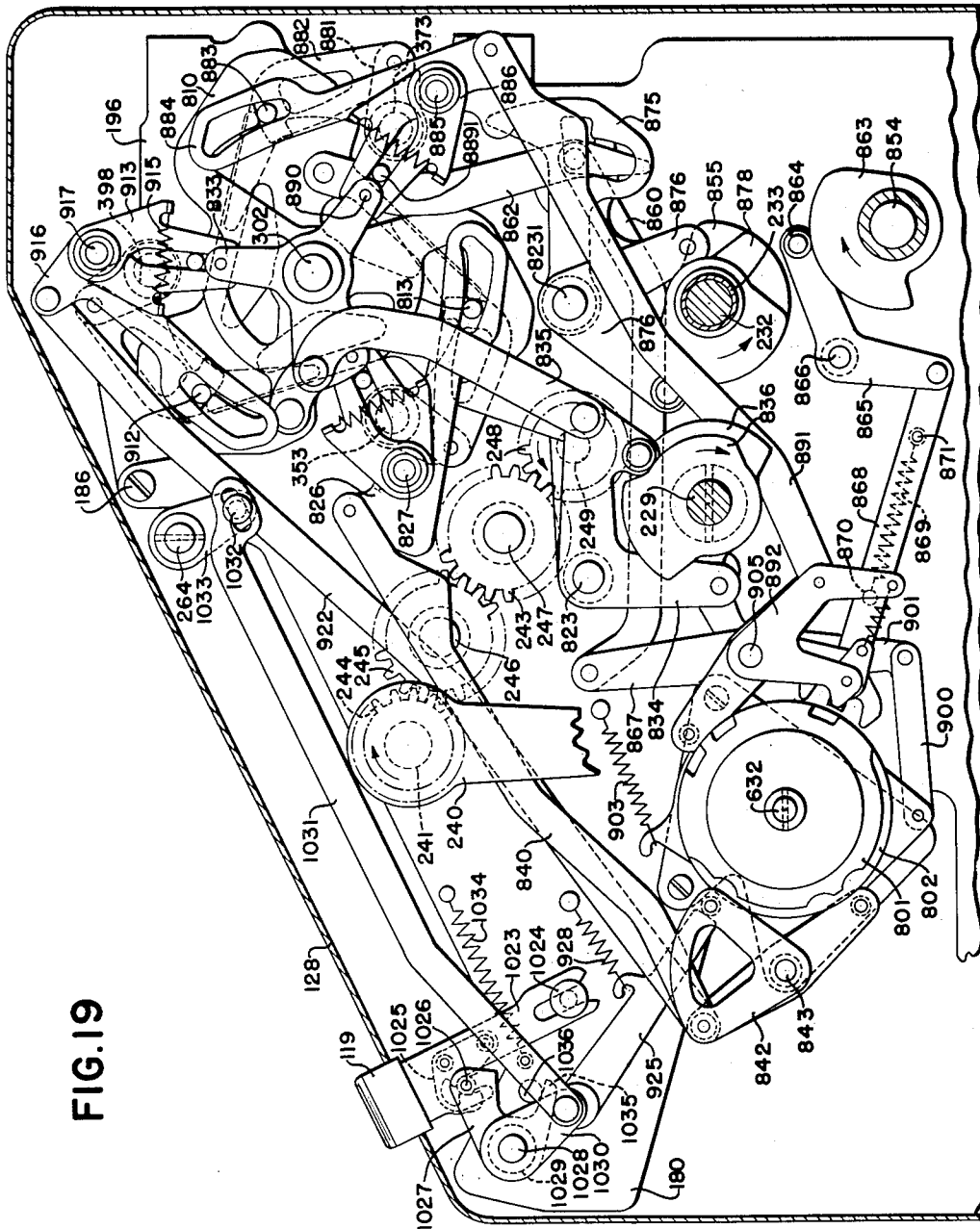
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FIG. 19



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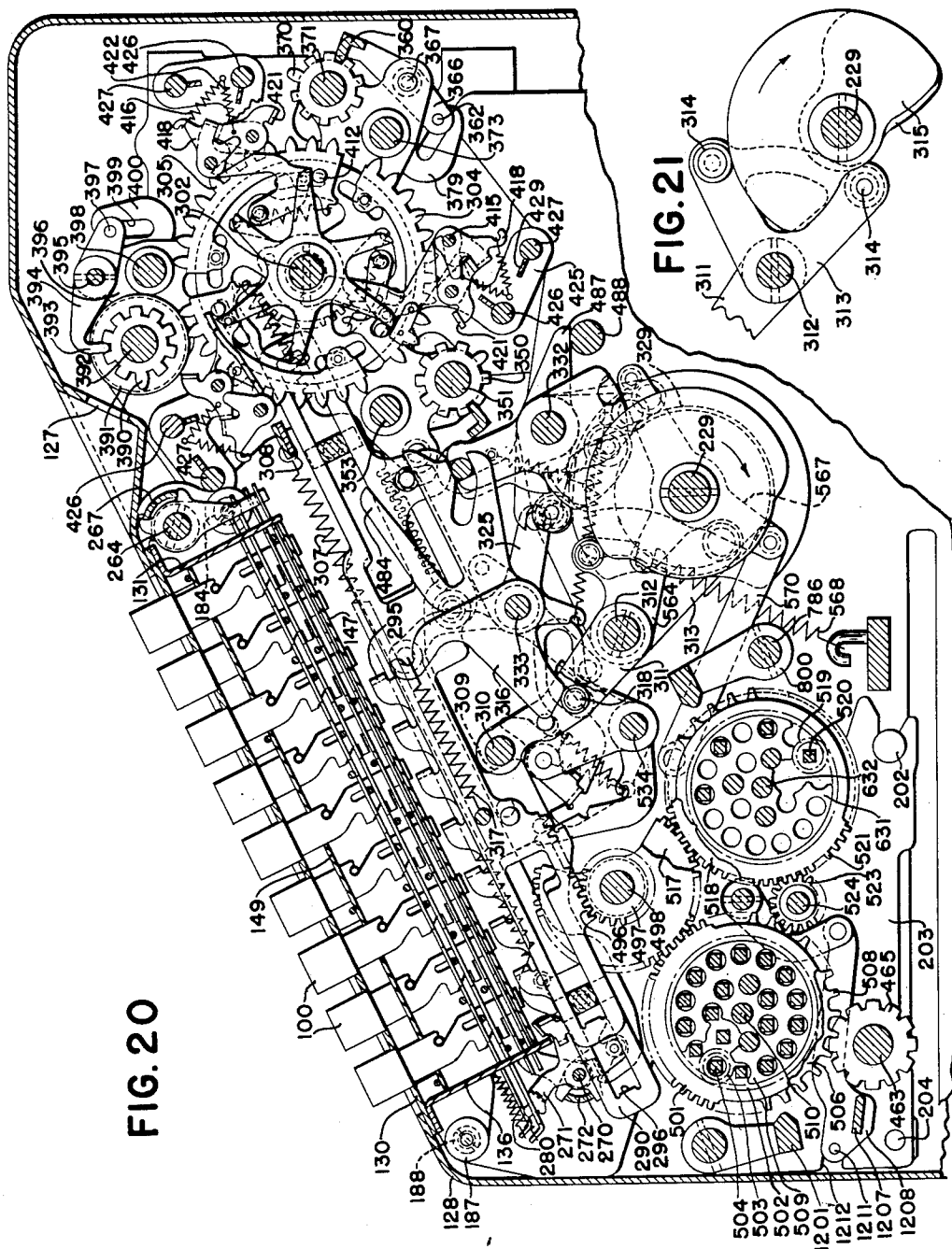


FIG. 20

FIG. 21

Inventors
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Nov. 4, 1952

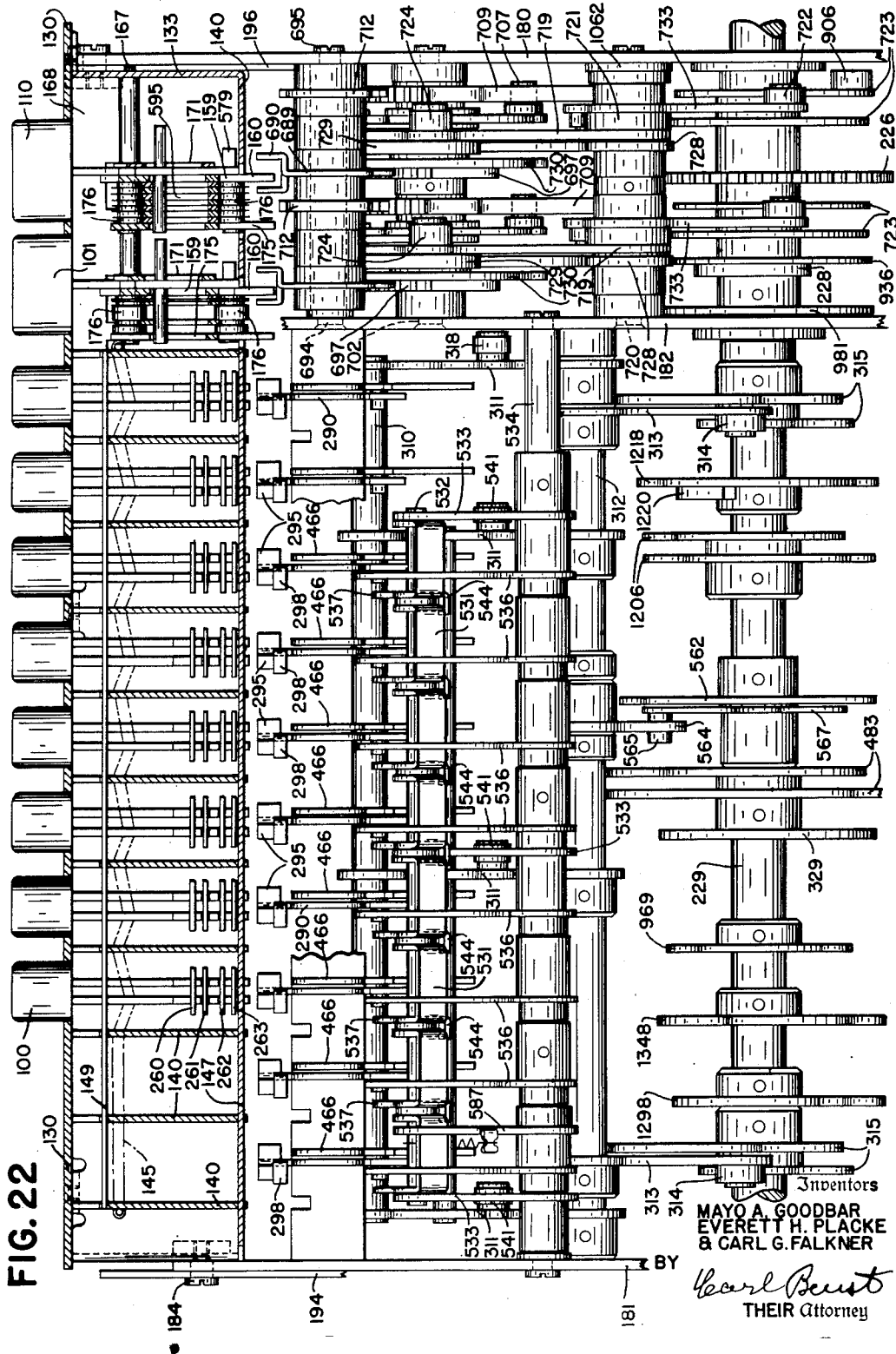
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FIG.23

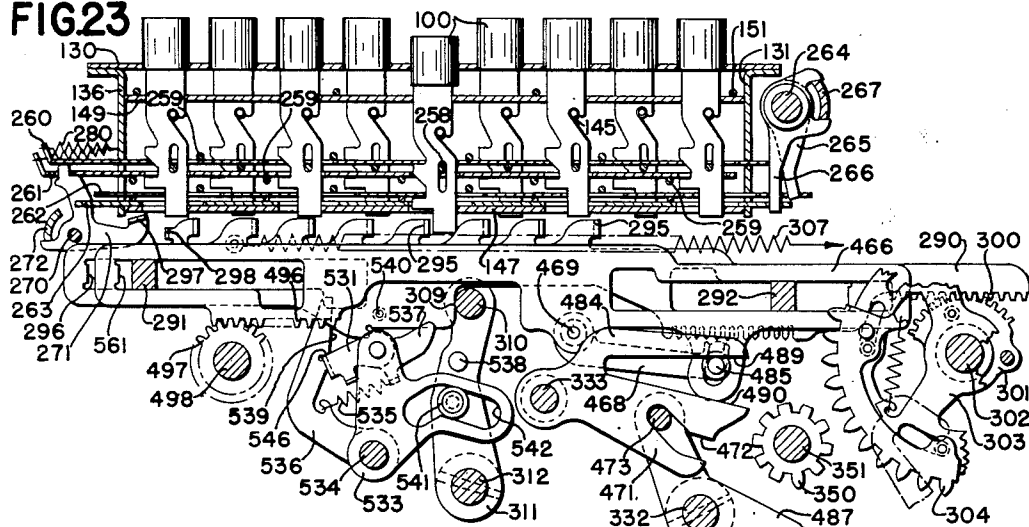


FIG. 24

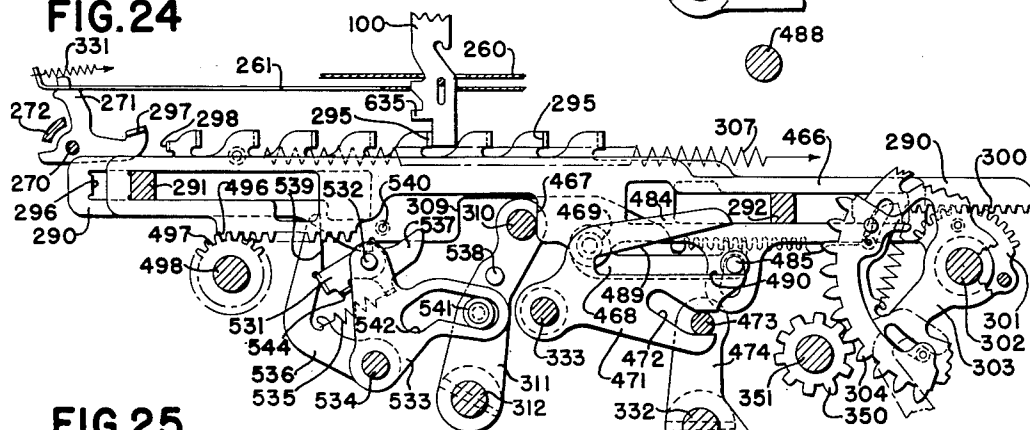
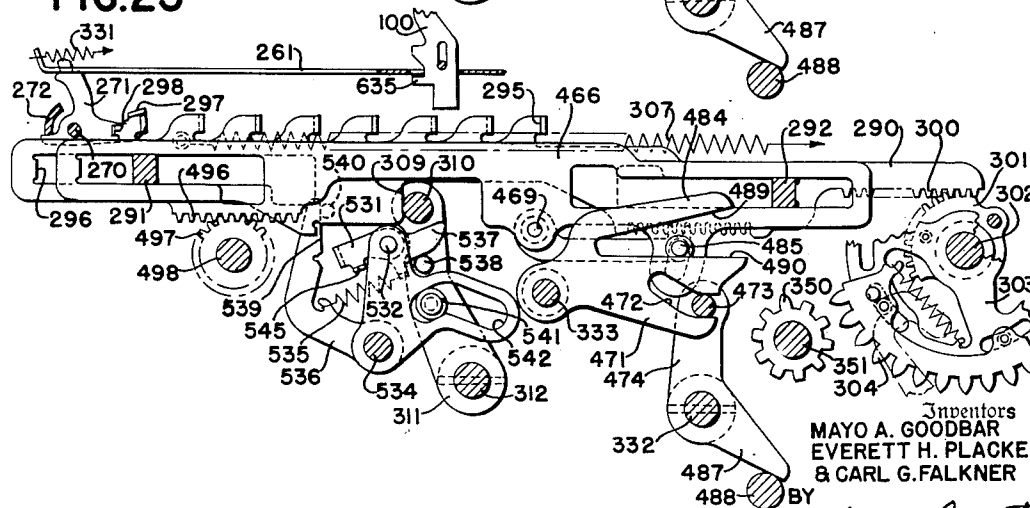


FIG.25



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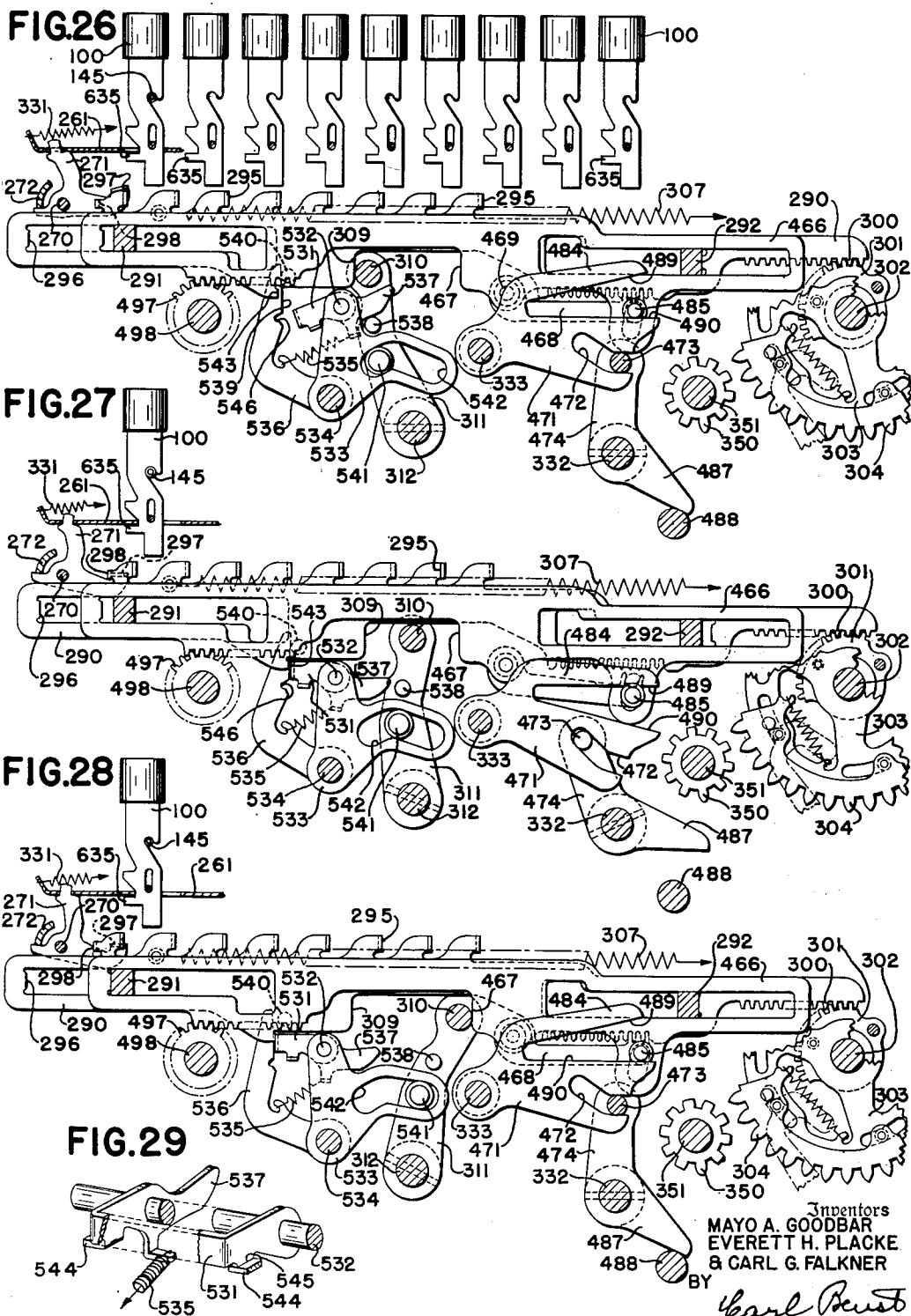
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FIG.35

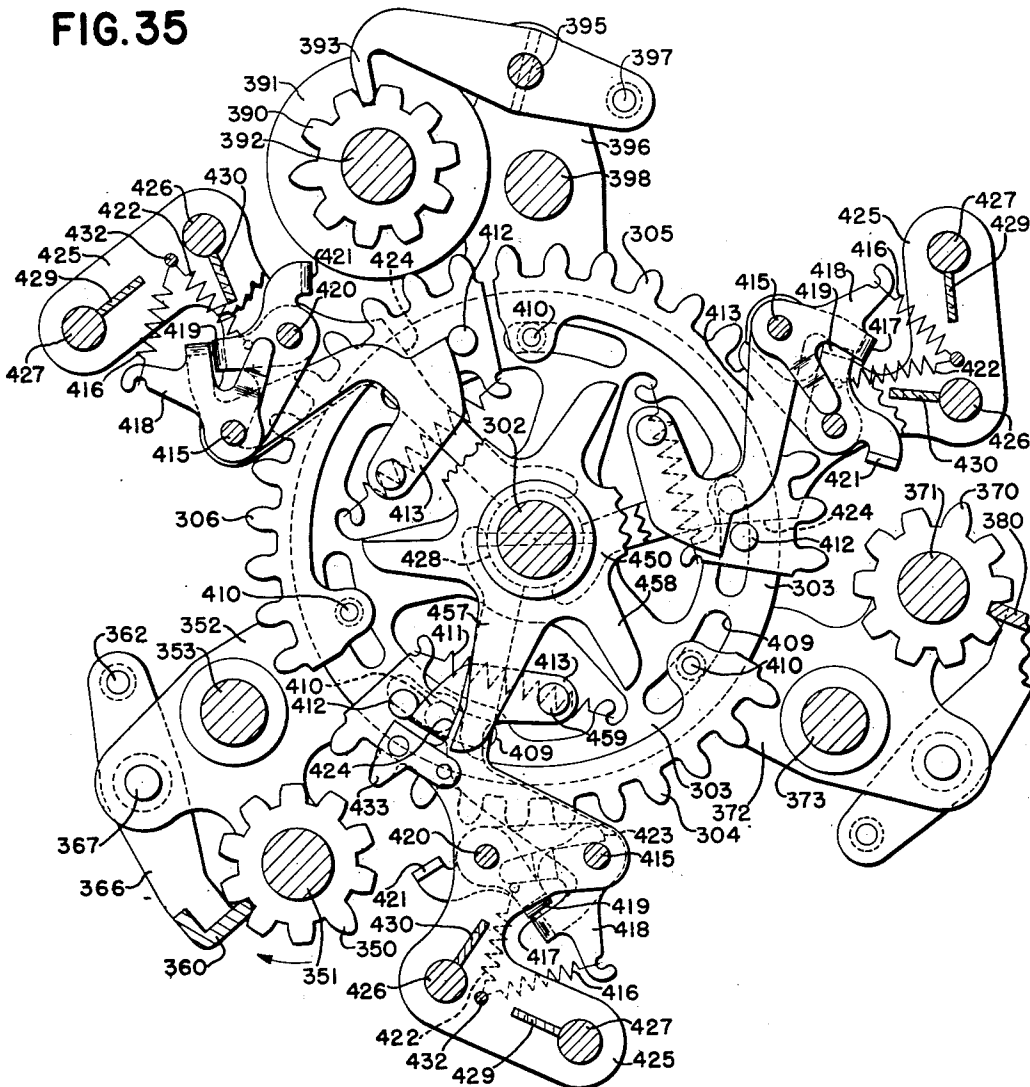
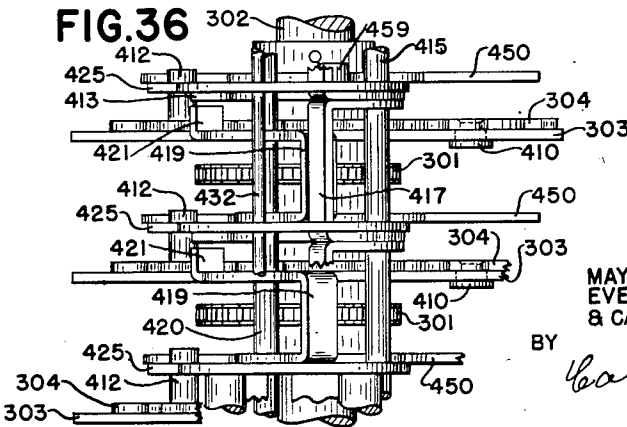


FIG.36



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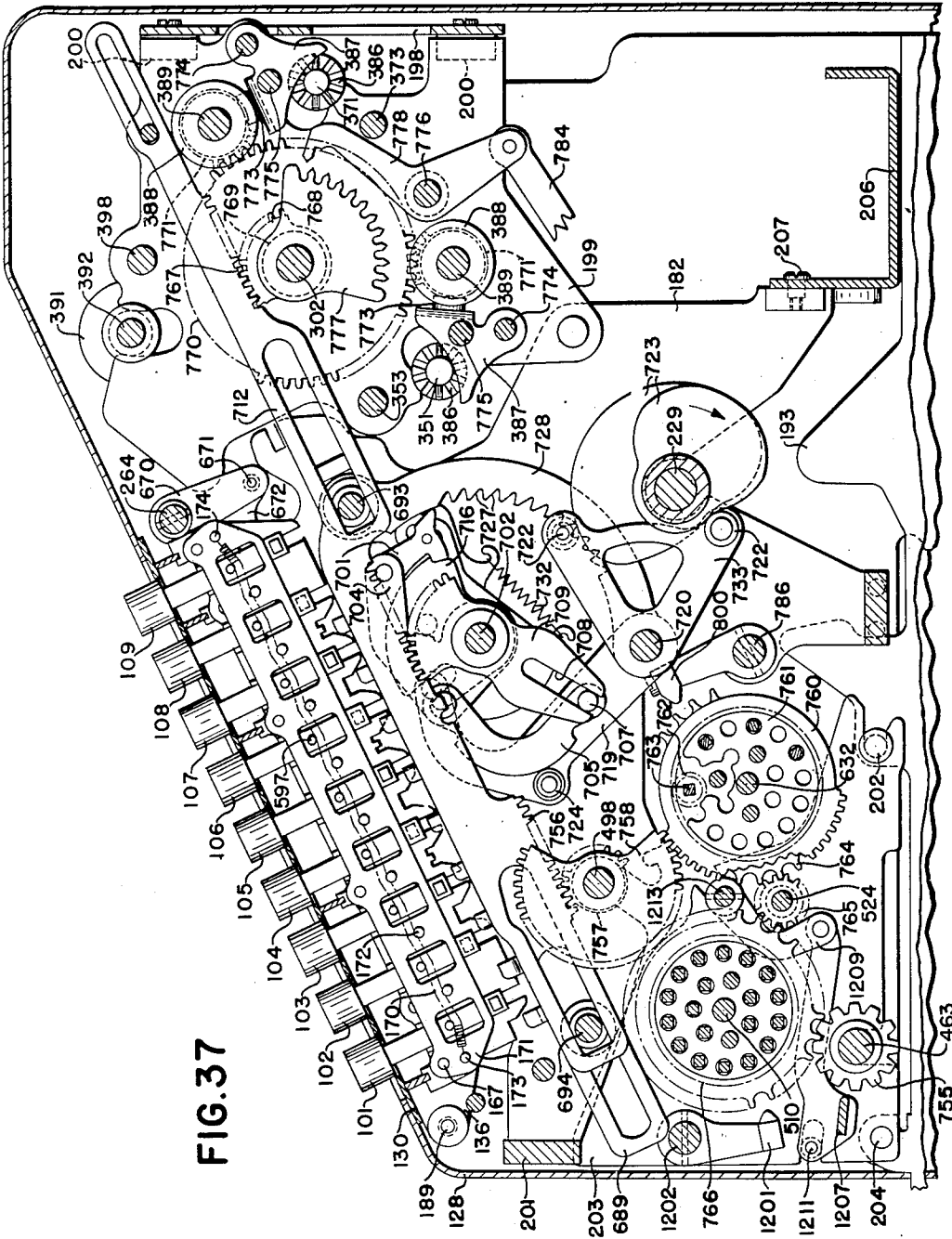
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FIG. 37



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FIG. 38

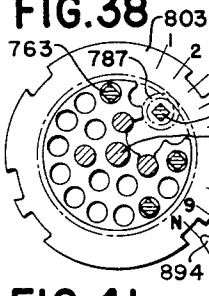


FIG. 39

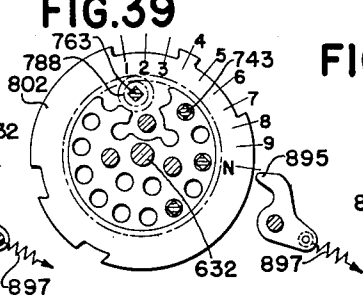


FIG. 40

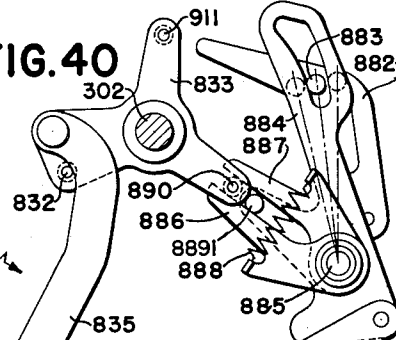


FIG. 41

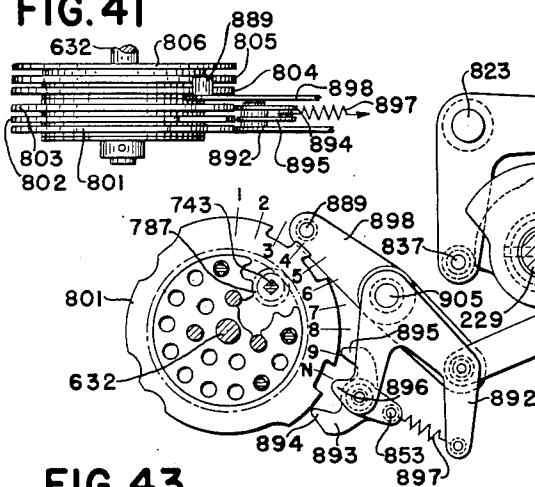


FIG. 42

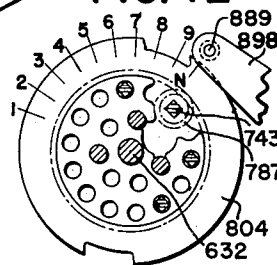


FIG. 43

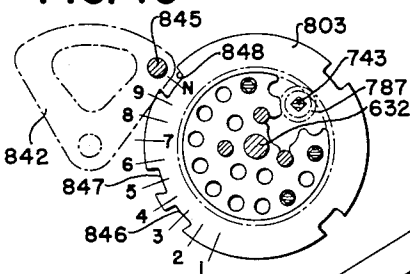


FIG. 44

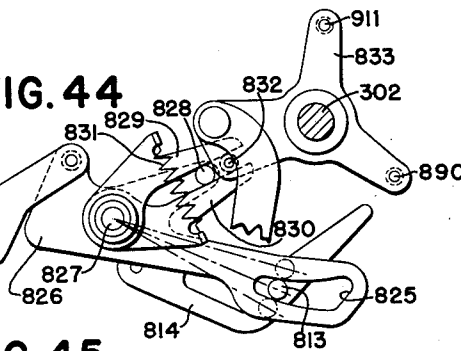
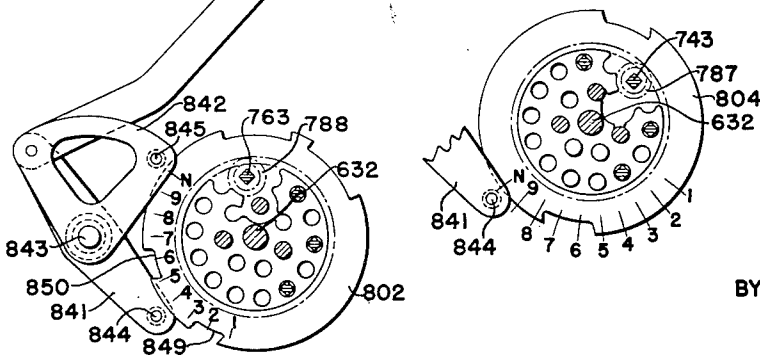


FIG. 45



Inventors
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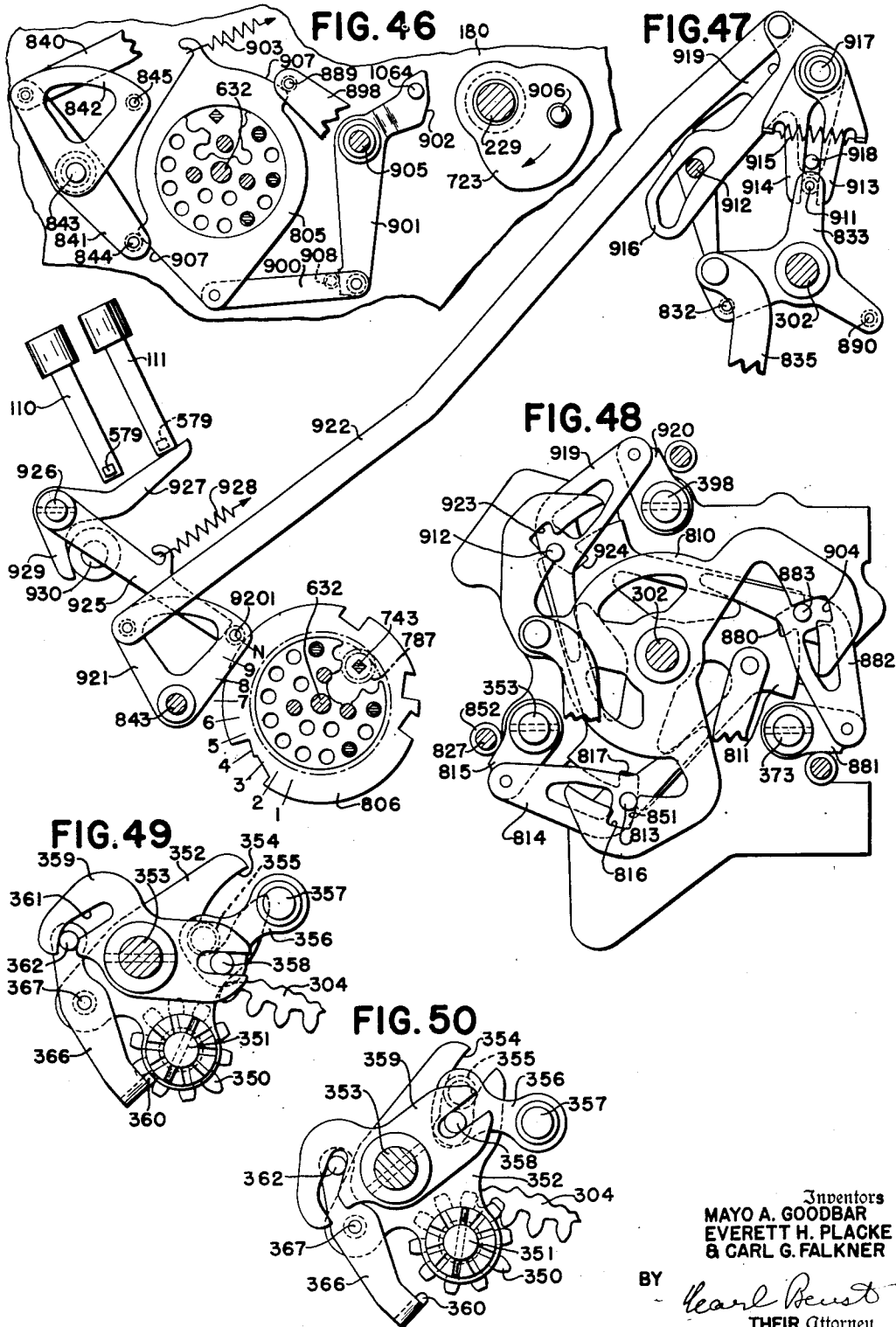
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FIG. 51

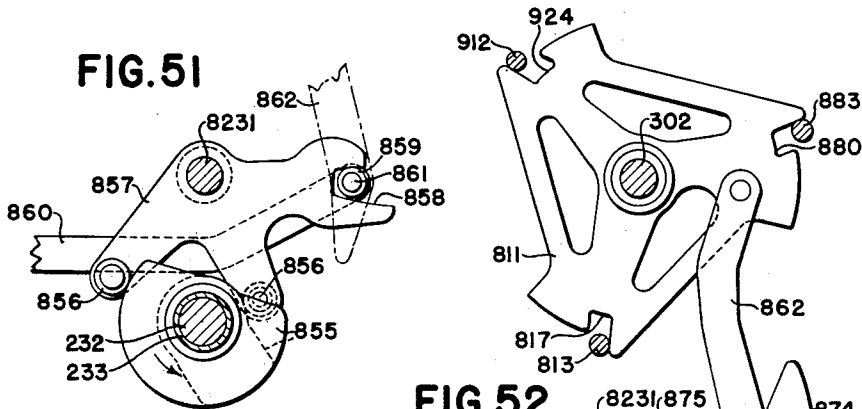


FIG. 52

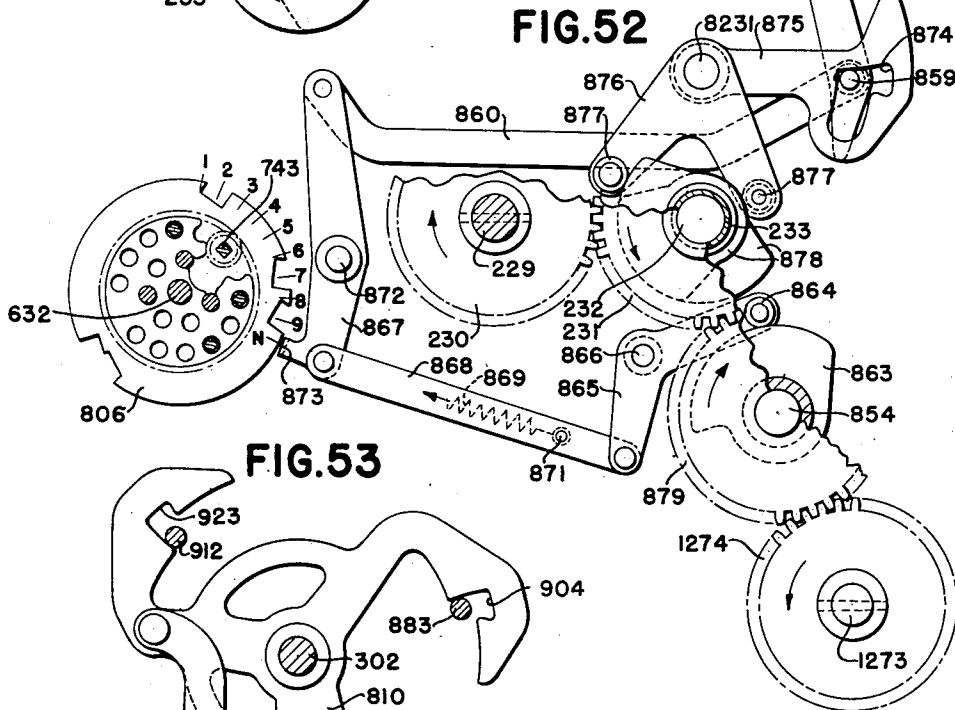
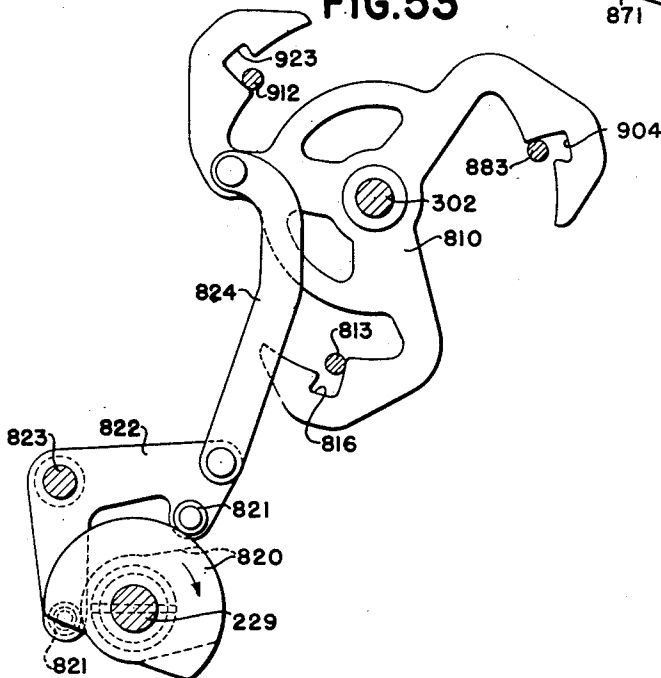


FIG. 53



Inventors
MAYO A. GOODBAR
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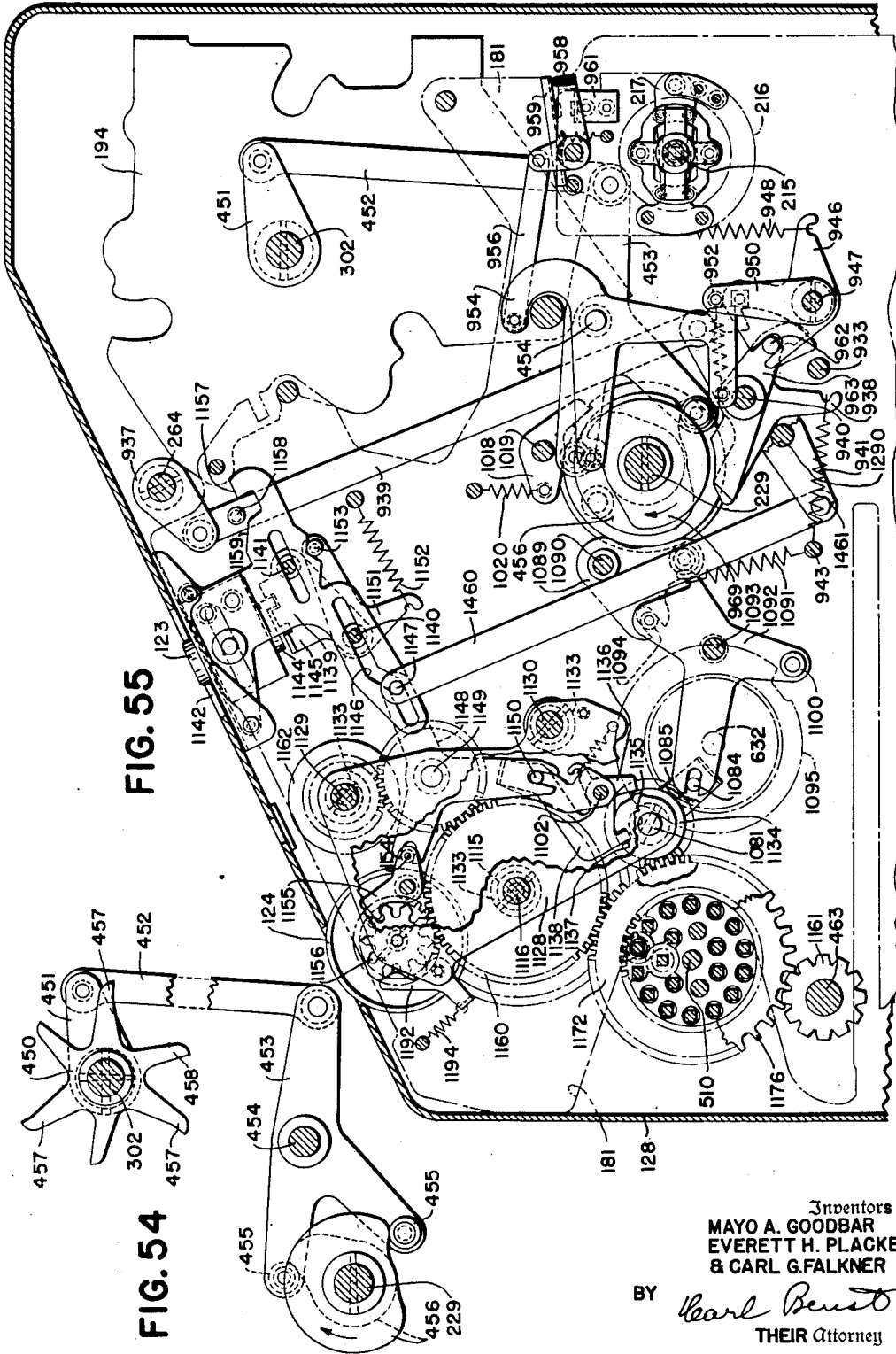
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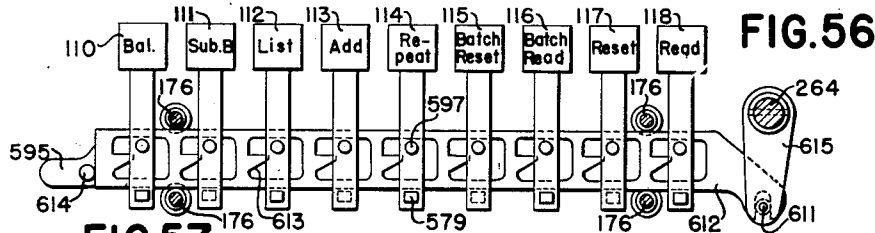
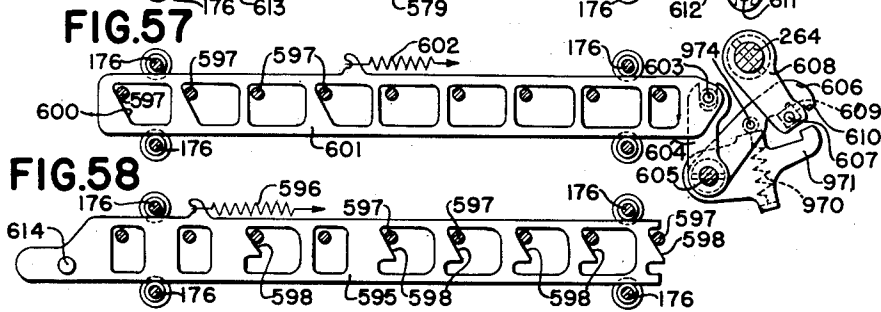
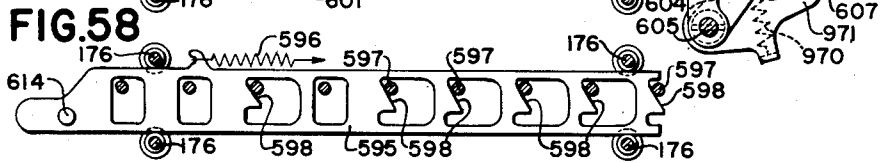
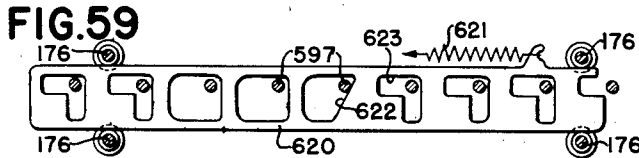
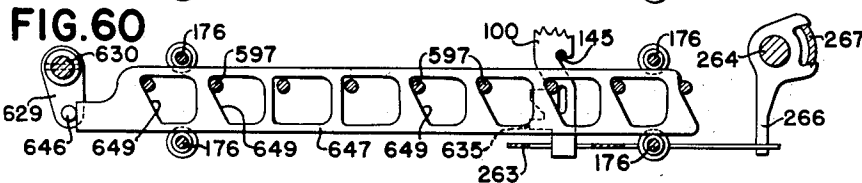
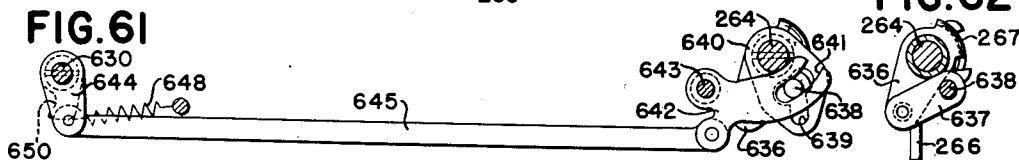
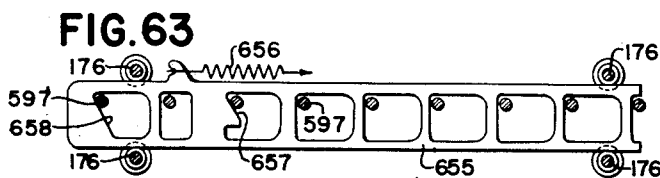
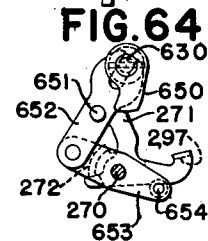
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MAYO A. GOODBAR
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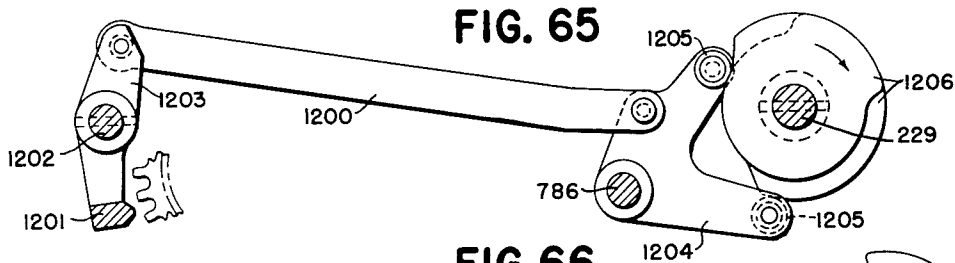
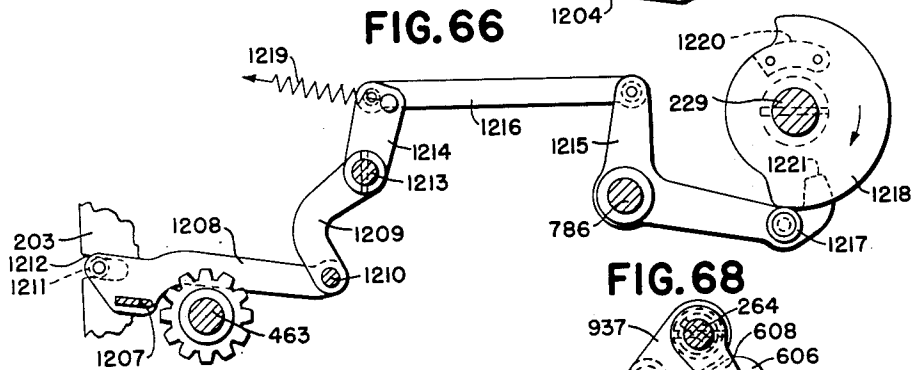
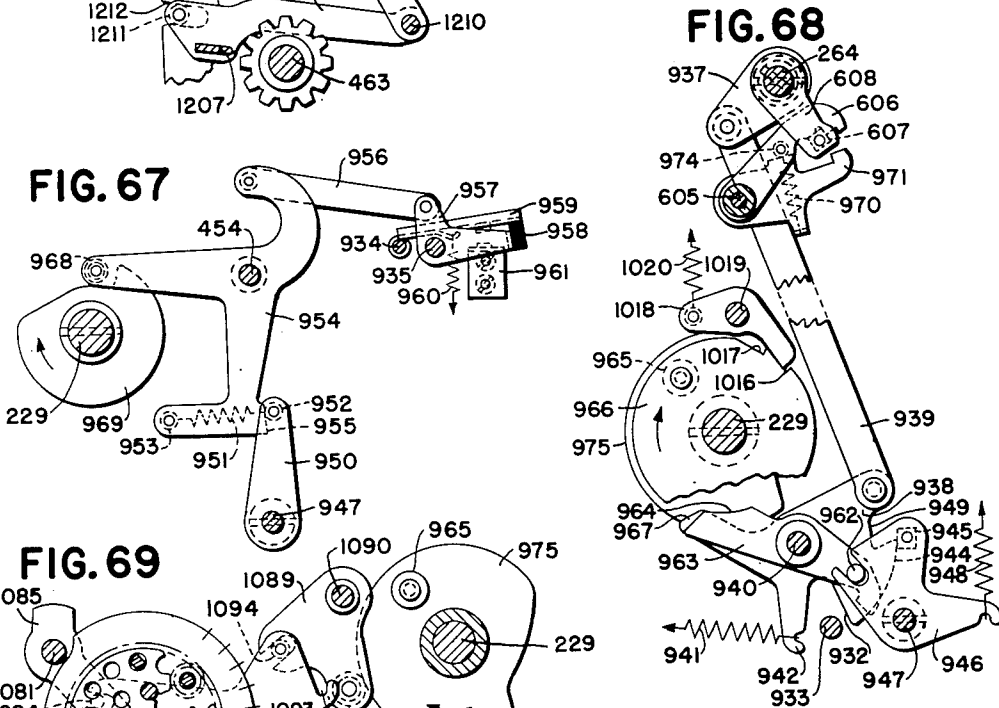
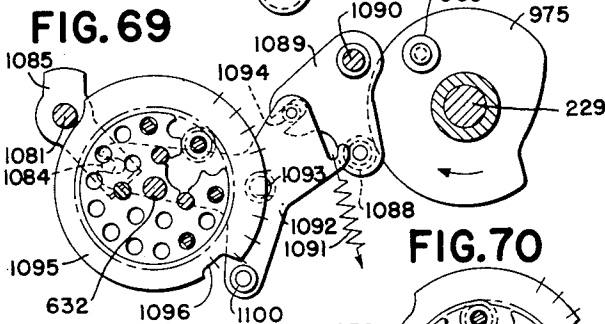
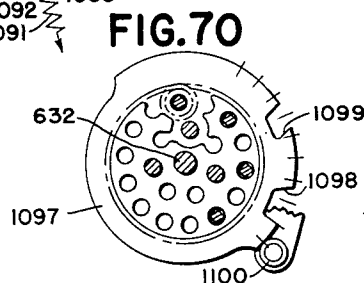
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Inventors
MAYO A. GOODBAR
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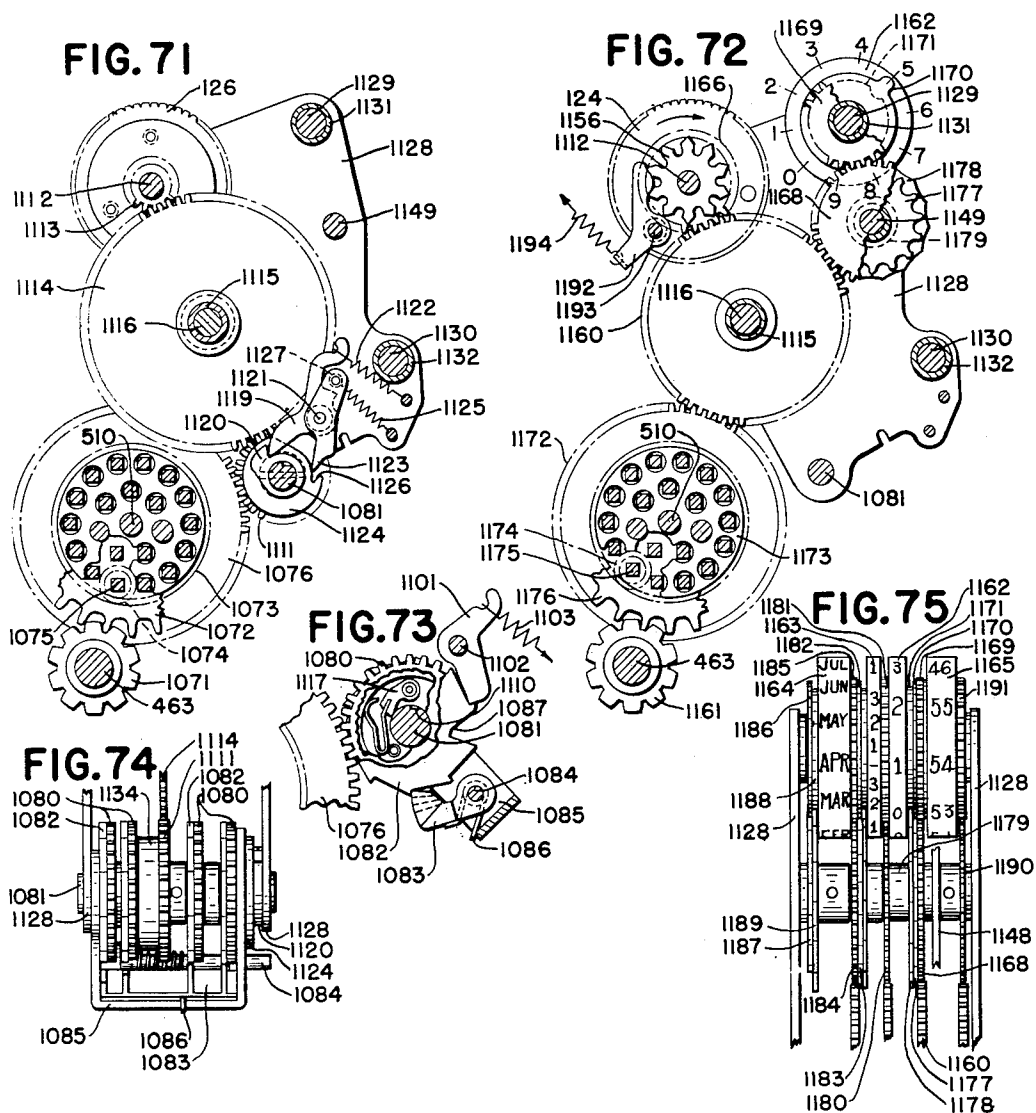
M. A. GOODBAR ET AL

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Inventors
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FIG. 76-A

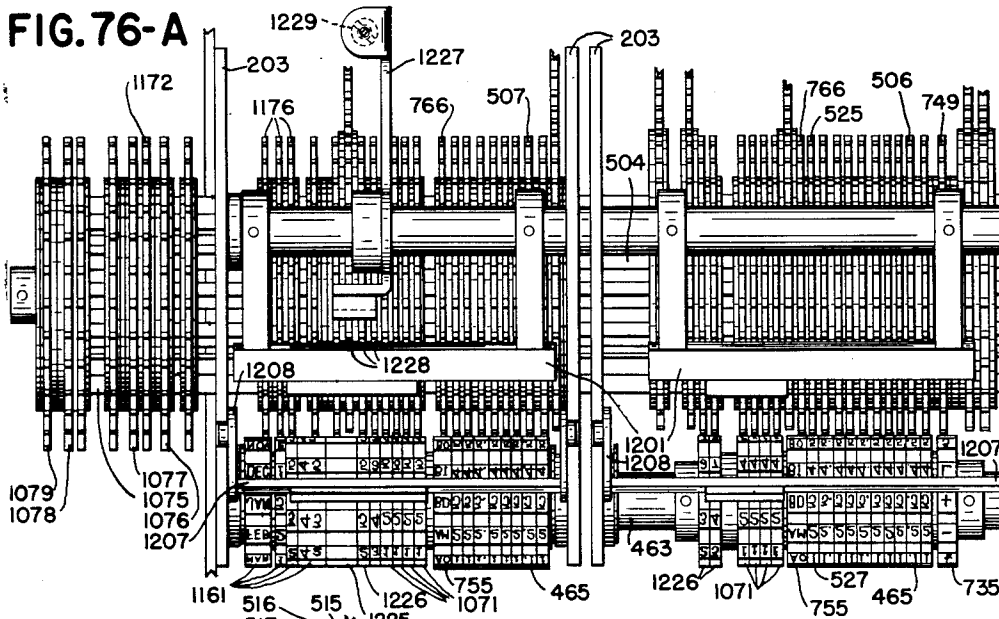
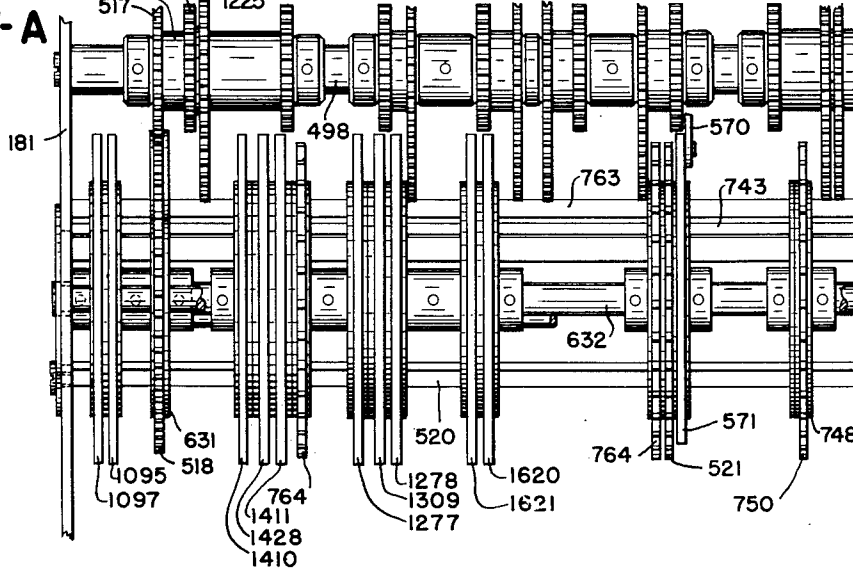


FIG. 77-A



Inventors
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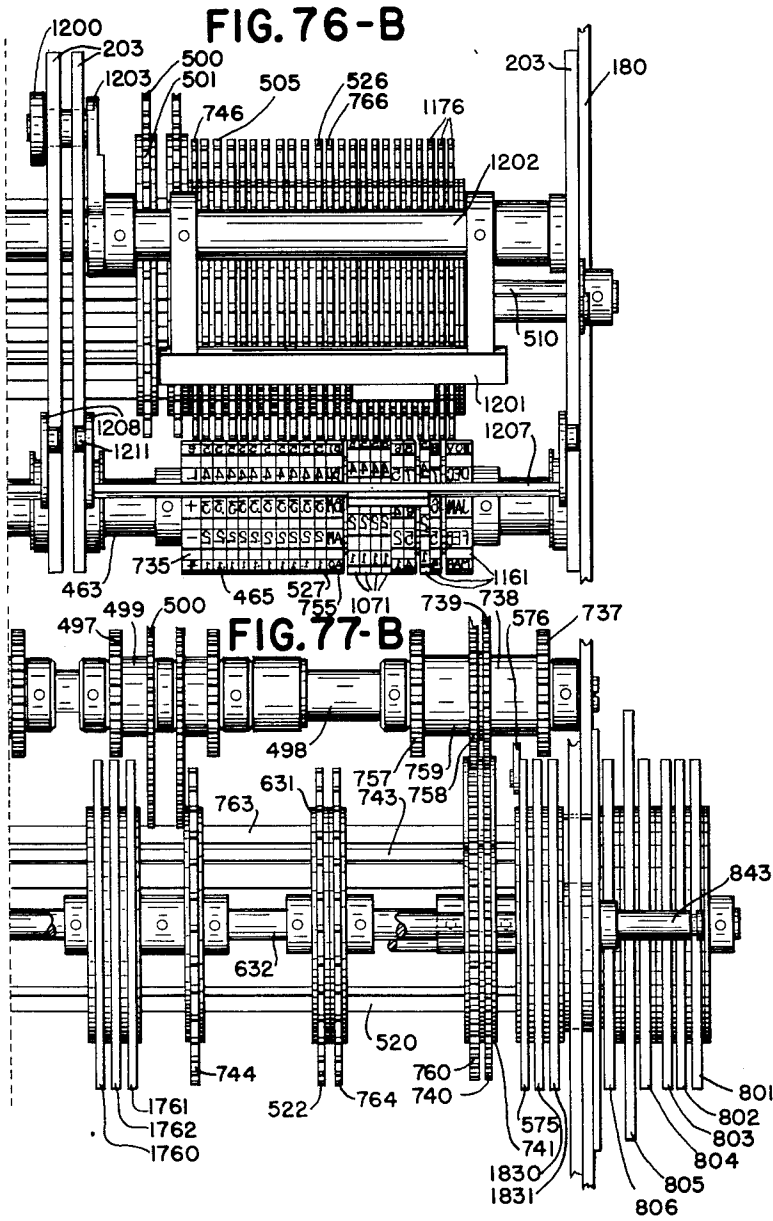
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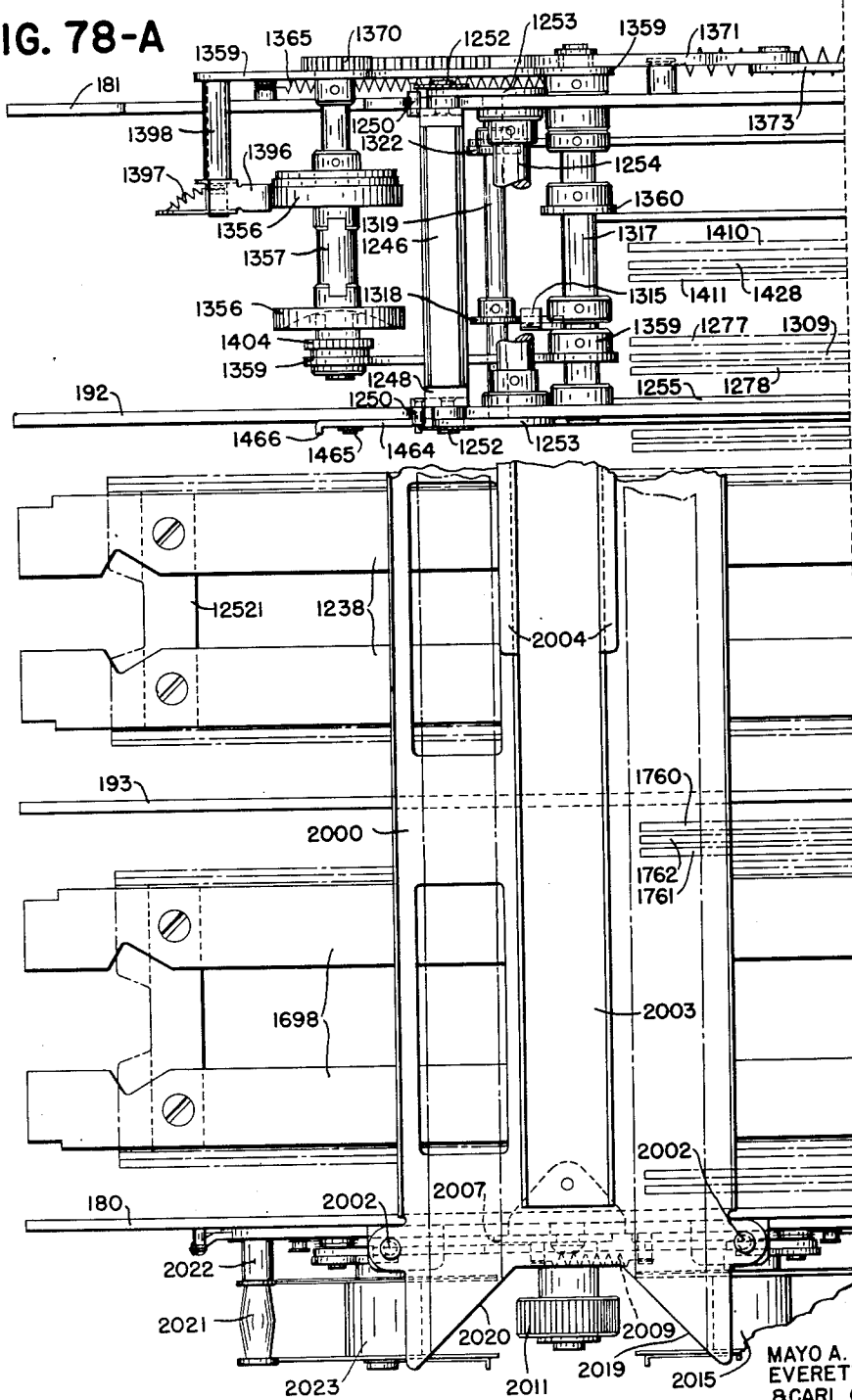
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FIG. 78-A



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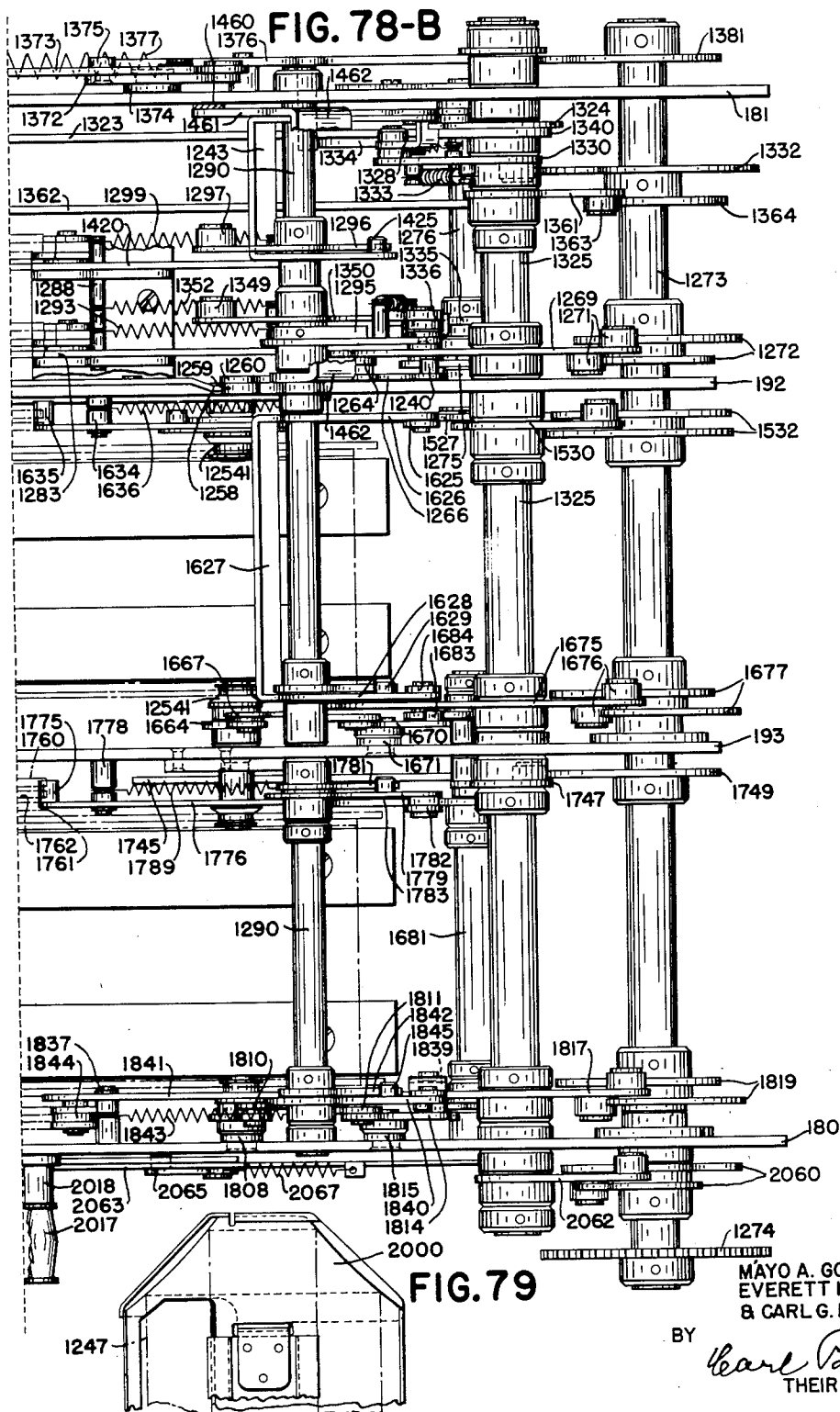
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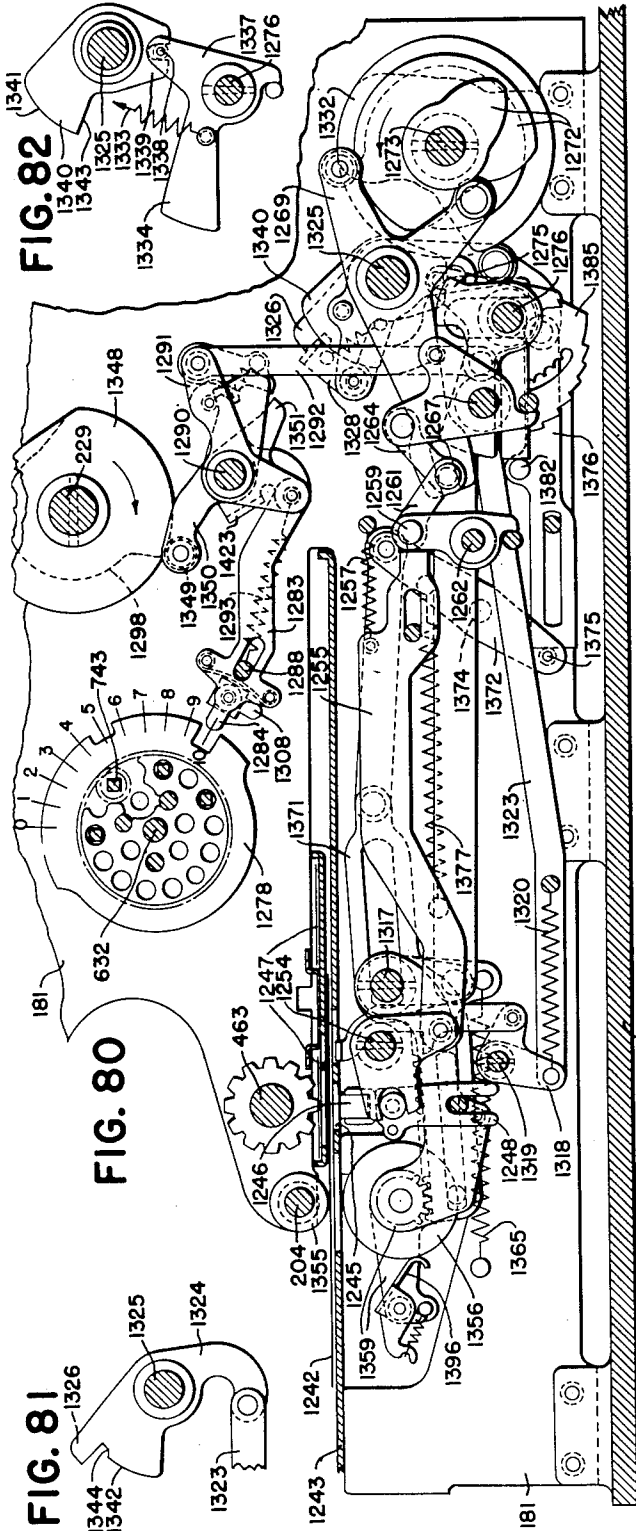


FIG. 80

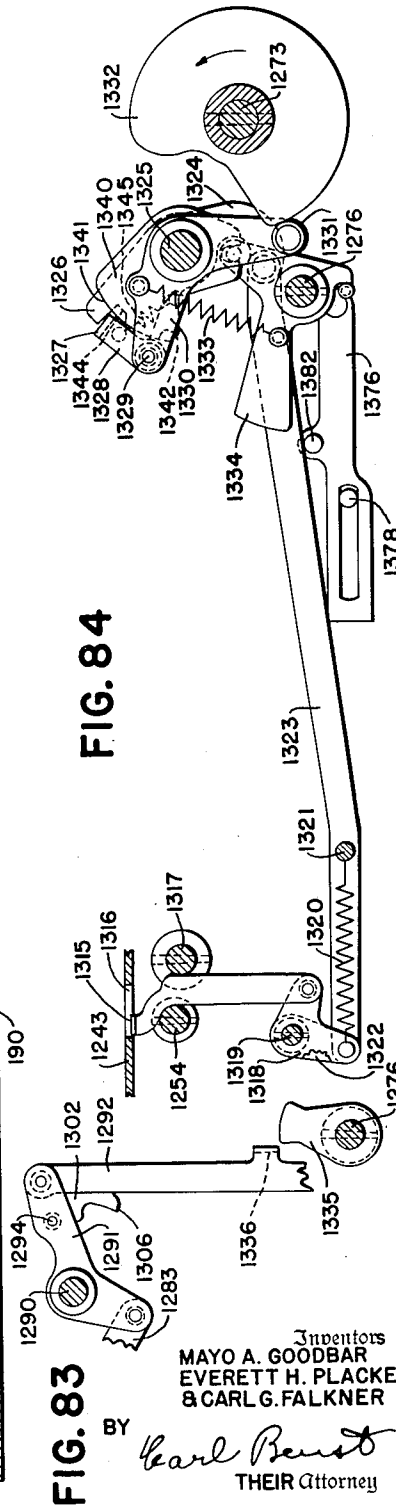


FIG. 81

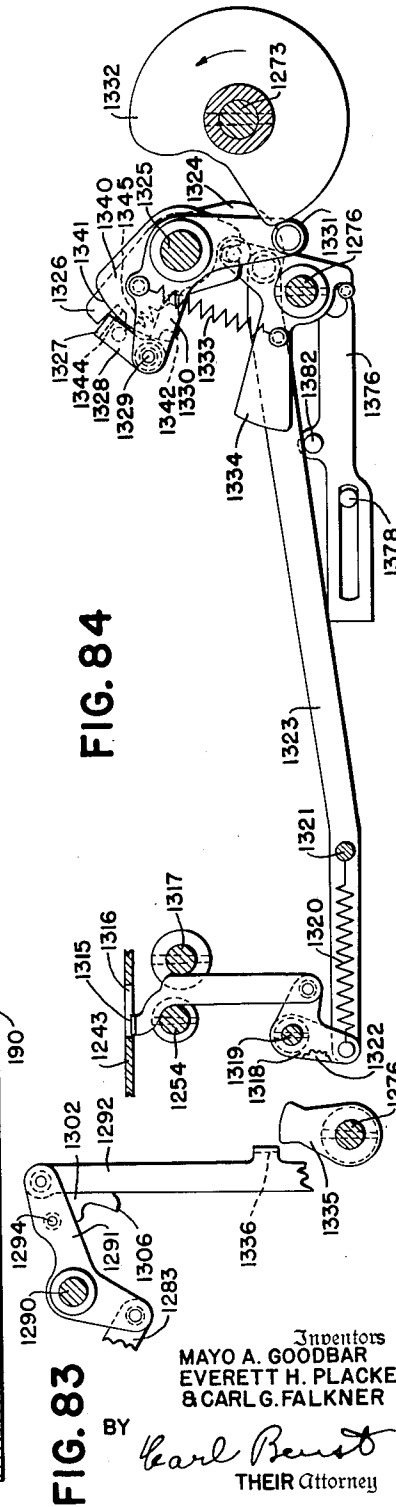


FIG. 82

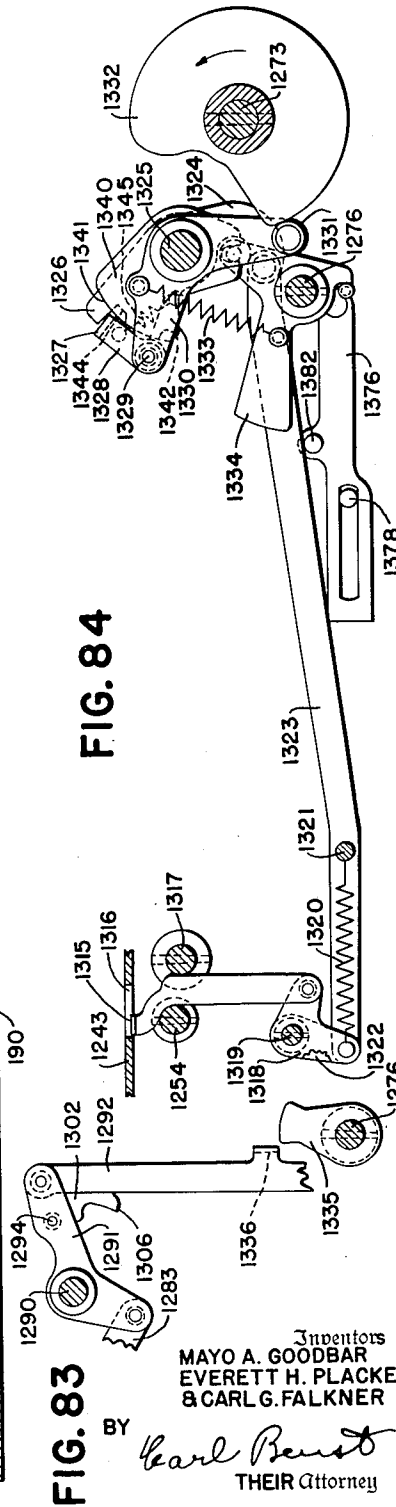


FIG. 83

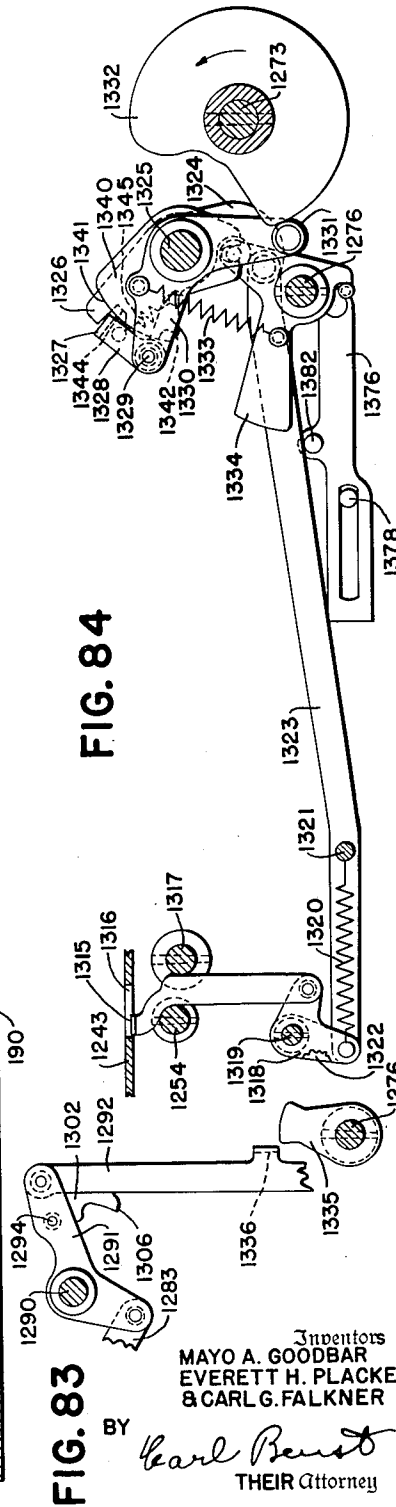


FIG. 84

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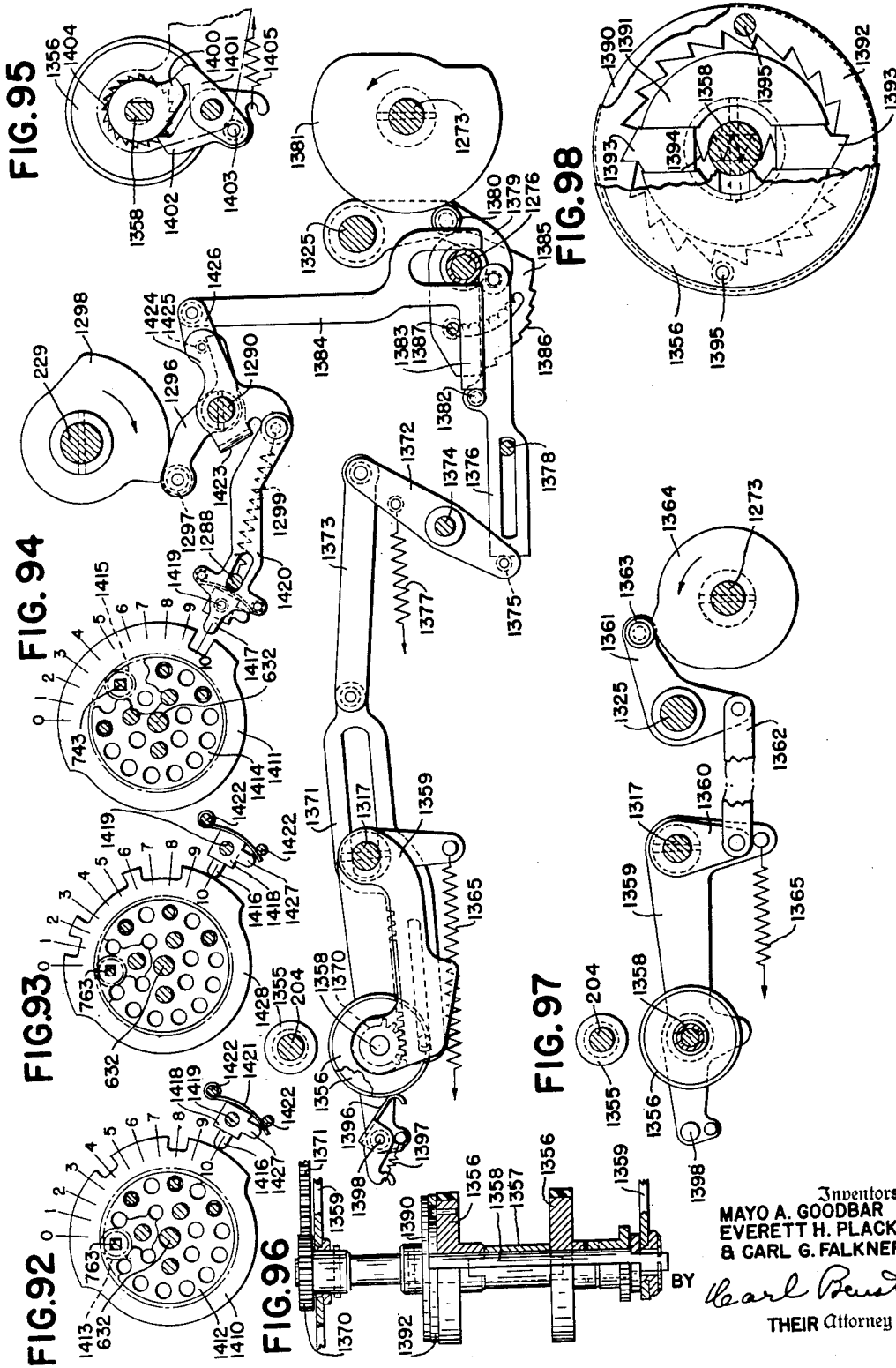
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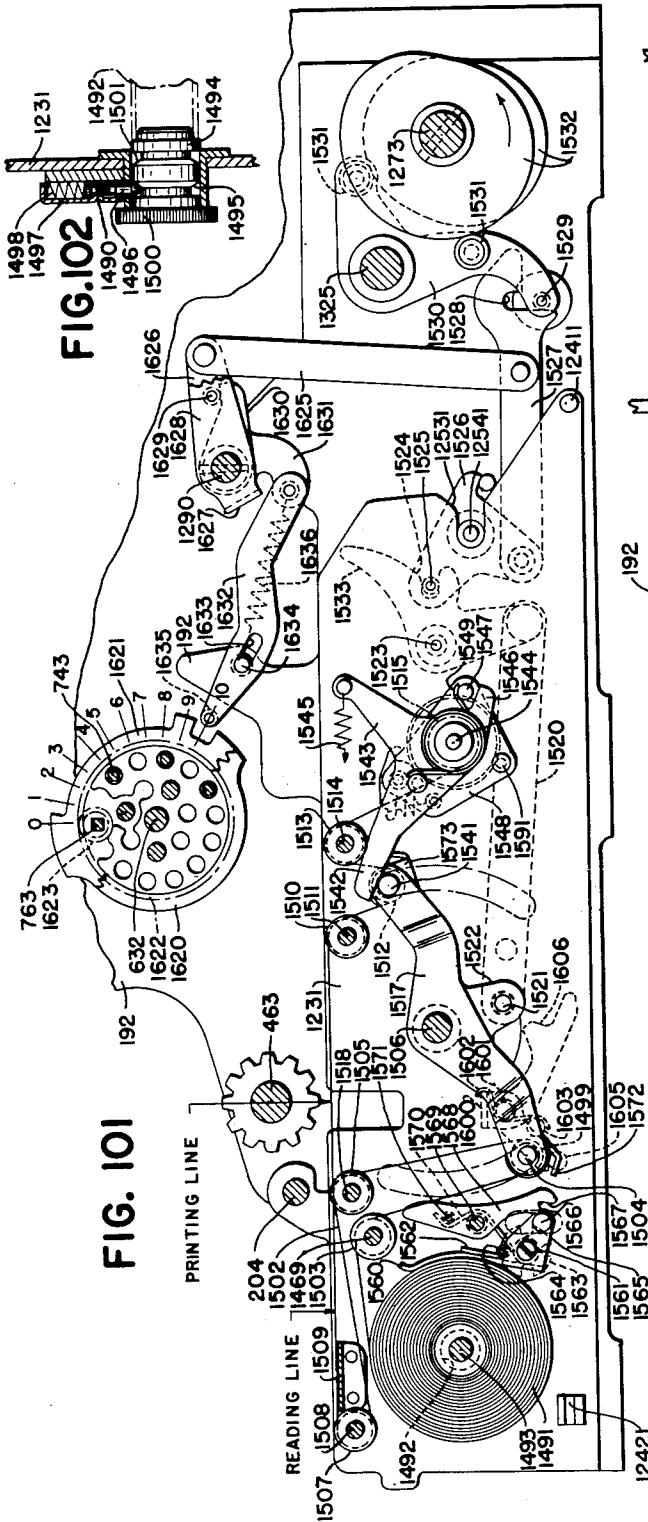


FIG. 101

PRINTING LINE

READING LINE

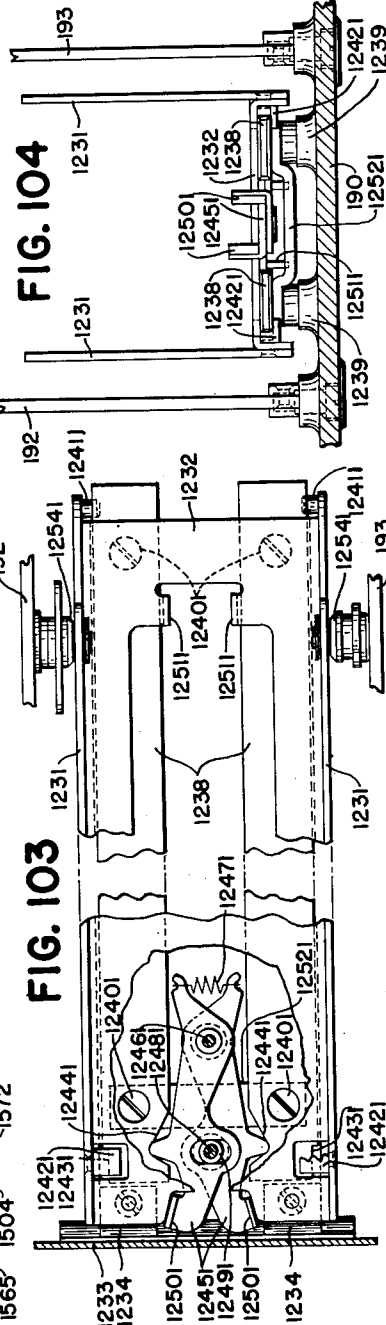


FIG. 102

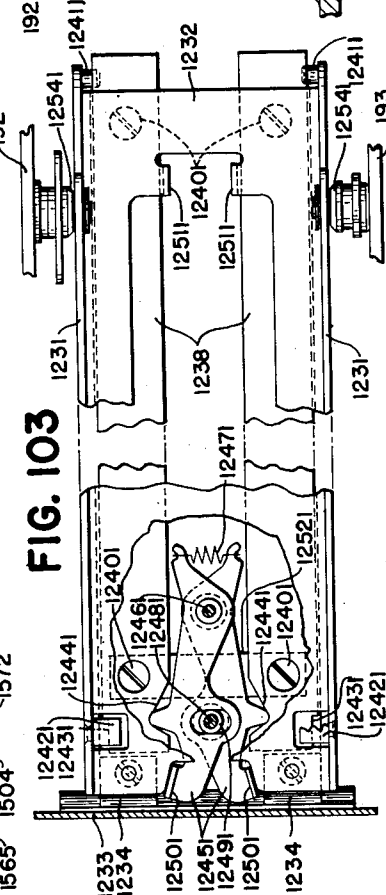


FIG. 103

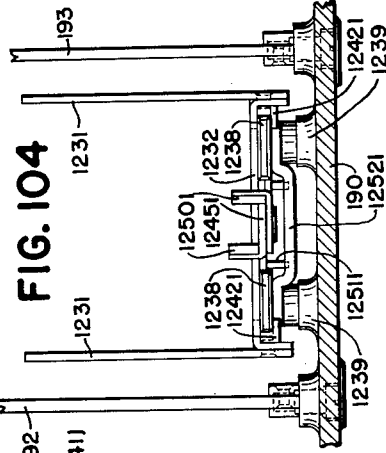


FIG. 104

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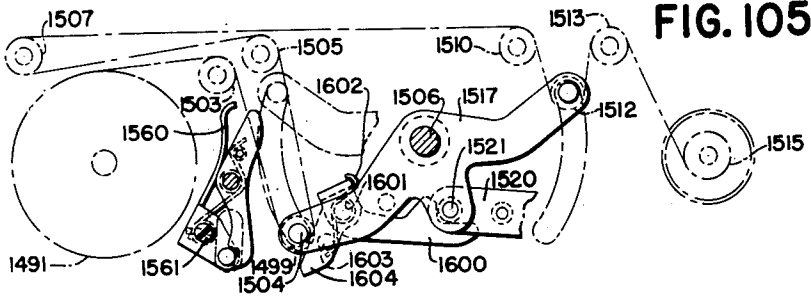


FIG. 105

FIG. 106

1502

12	001AD.....	75.00
12	001AD.....	75.00 -
12	001A1.....	75.00 -
12	001AO.....	40.00
12	001AO.....	25.00
12	001AO.....	34.00
12	001AO.....	23.00
12	001AO.....	35.00
12	001AO.....	44.00
12	002AD.....	125.50
12	002A1.....	25.00
12	002AO.....	24.00
12	002AO.....	24.75 L
12	002AO.....	24.75 L
12	002AO.....	24.75 L
12	002AO.....	24.75 L
12	002AO.....	24.75 L
12	002.....	123.75 *
12	002AO.....	348.75 *
12	002AD.....	377.72 Z
12	002A1.....	100.00 Z
12	002AO.....	348.75 Z

FIG. 107

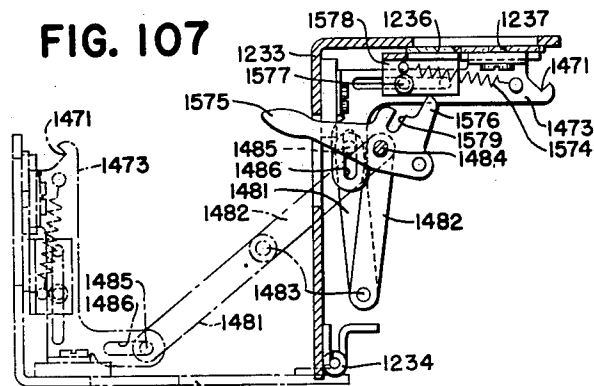


FIG. 108

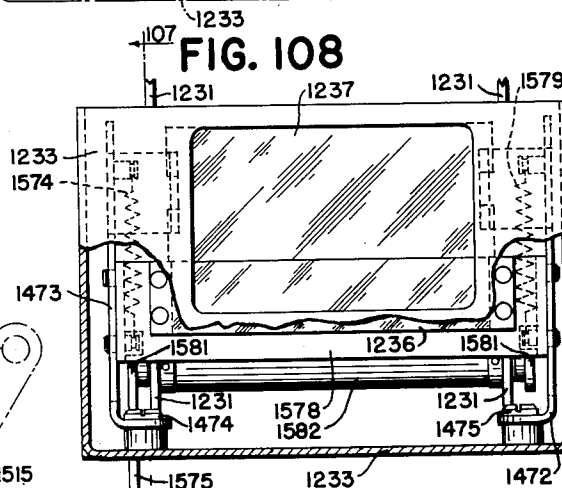
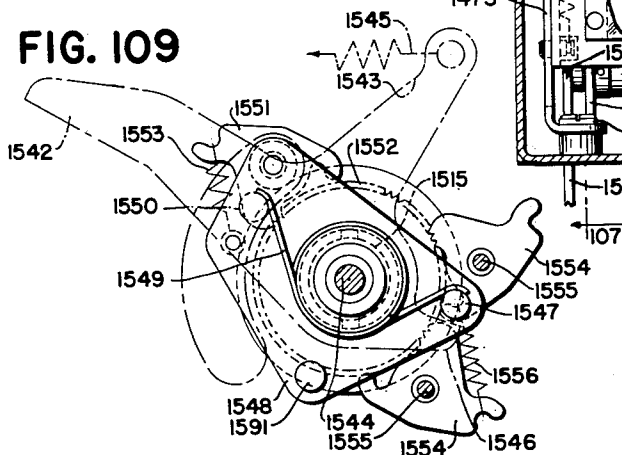


FIG. 109



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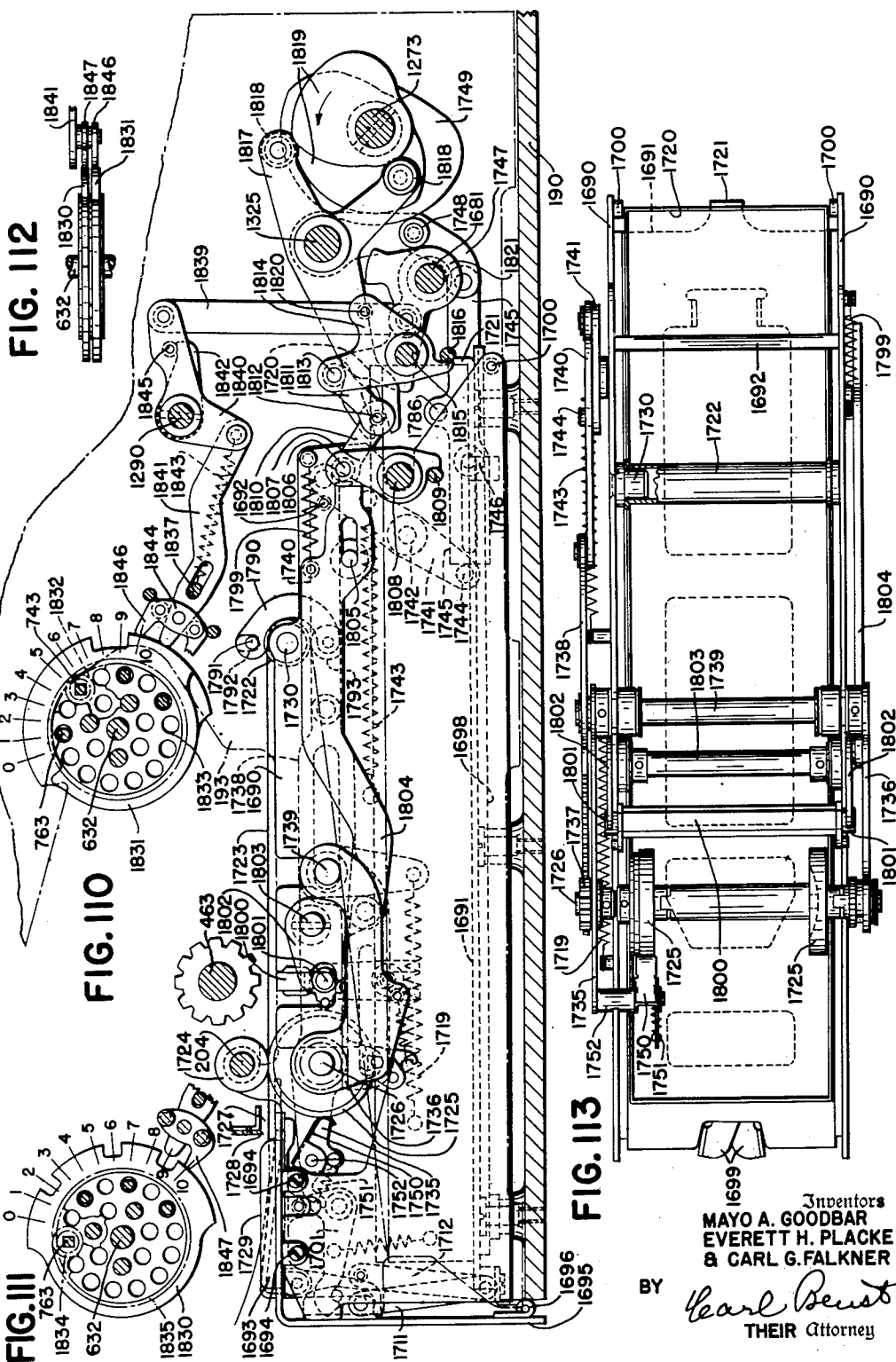
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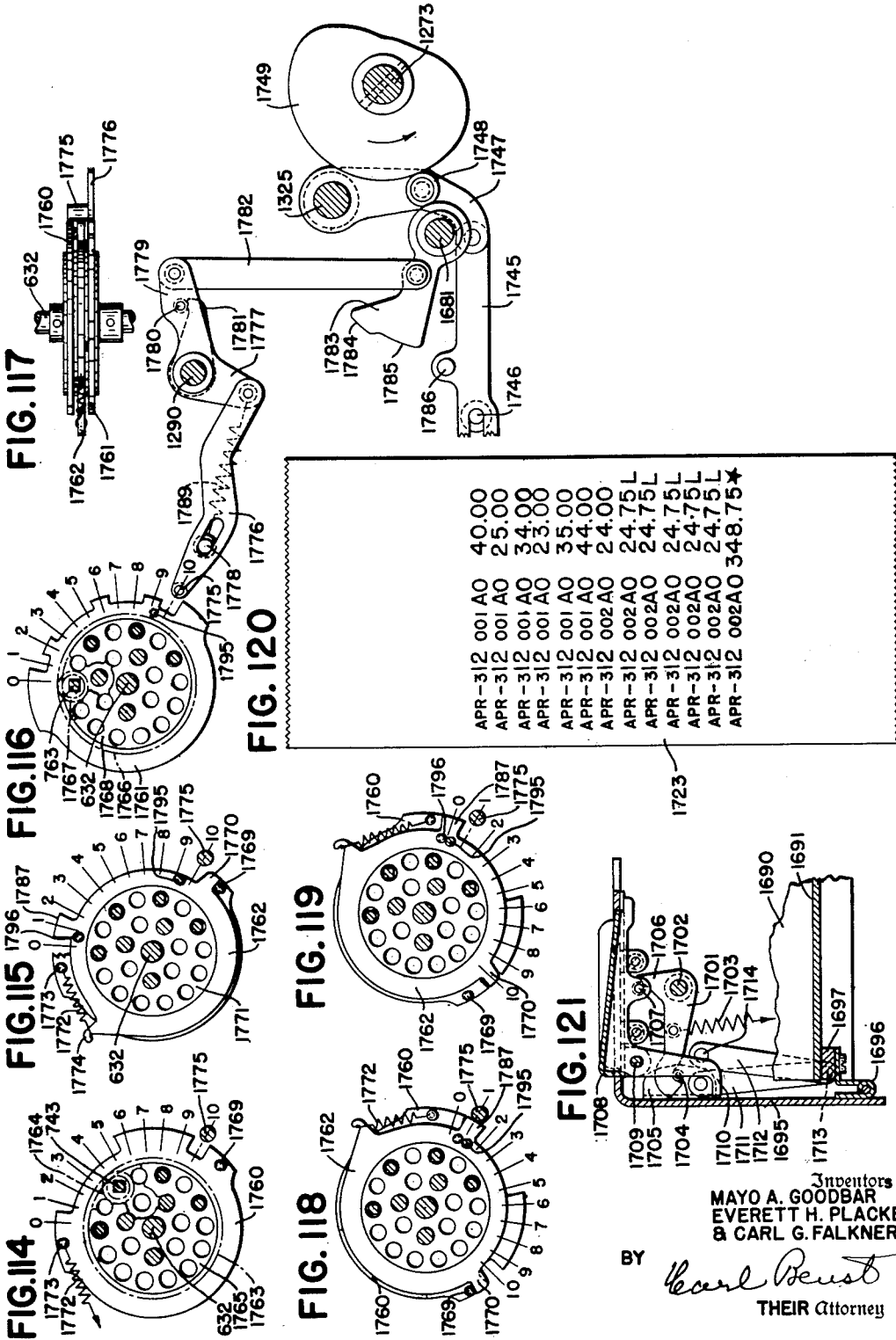
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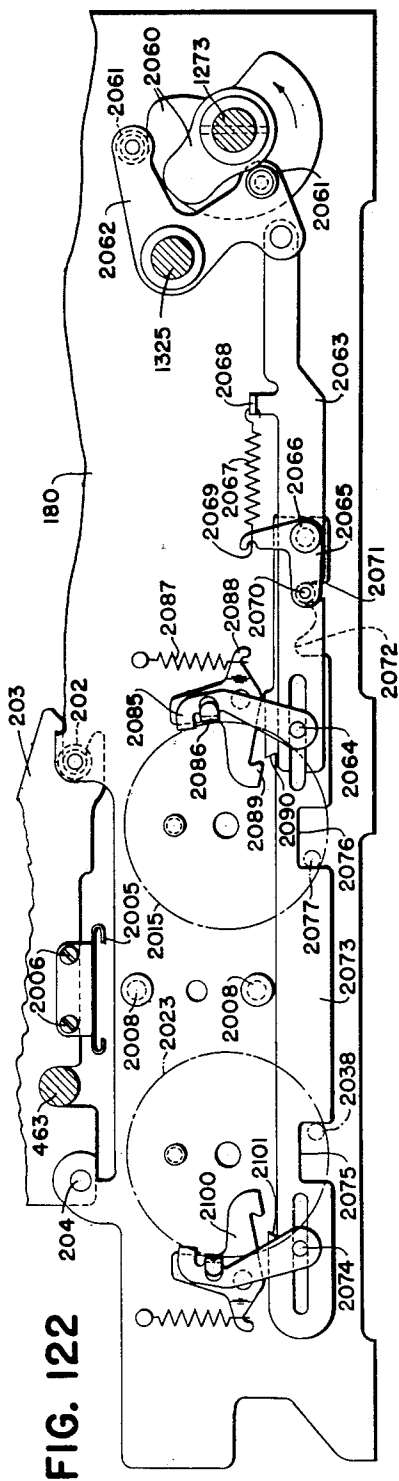
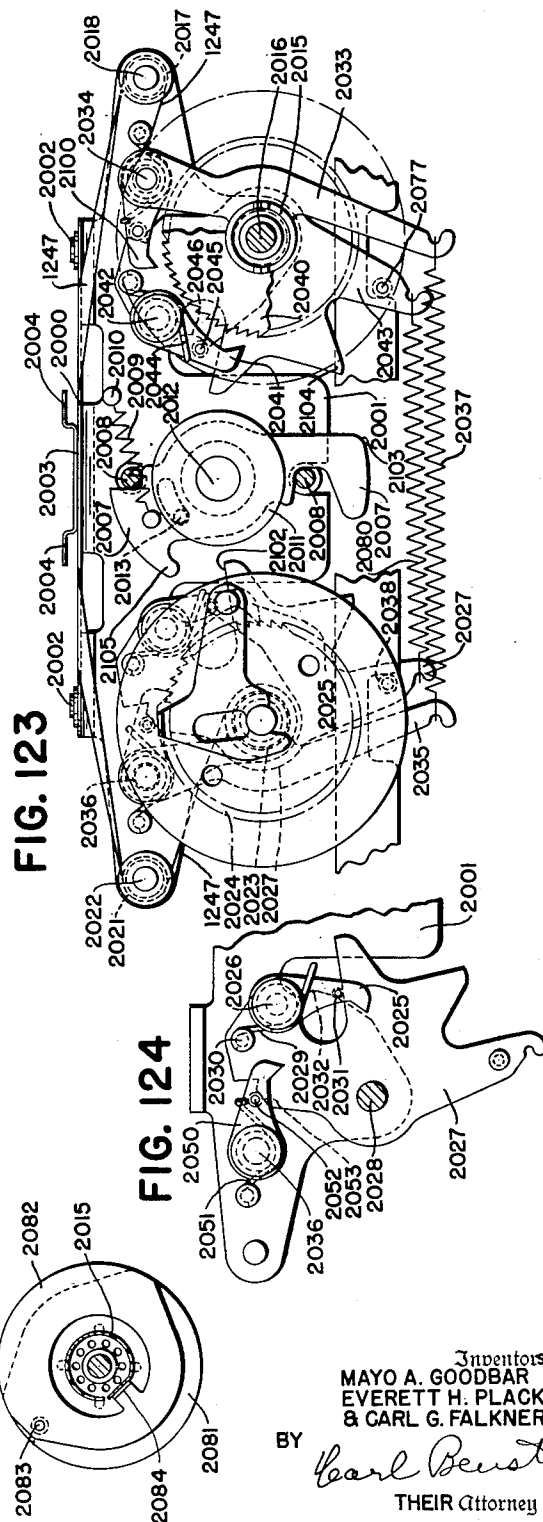


FIG. 122



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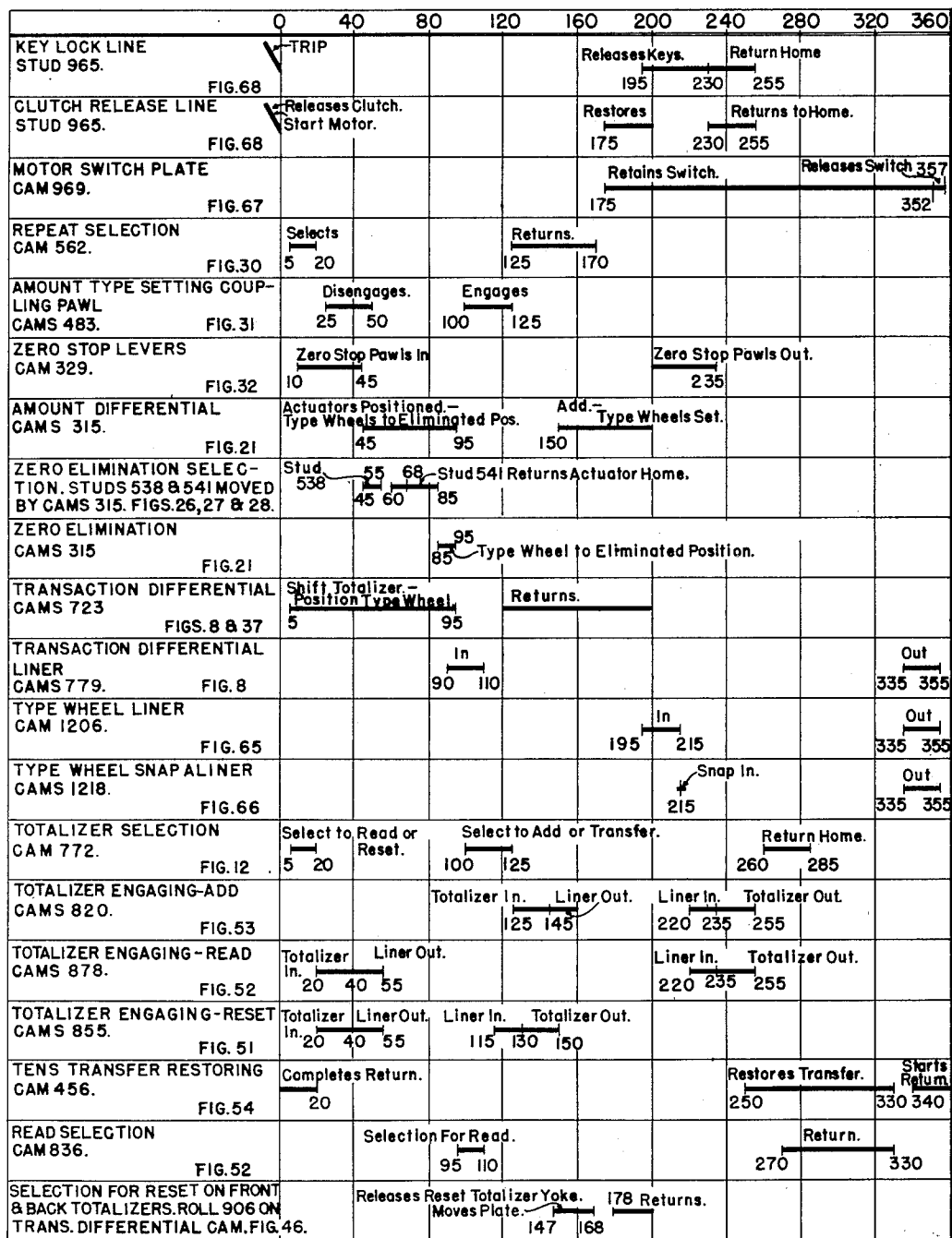


FIG. 126

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FIG. 127

	0	40	80	120	160	200	240	280	320	360
CONSECUTIVE NUMBER FEED CAM 975. FIG. 69				Selects 105 125 140	Adds					
IMPRESSION SELECTION FOR SINGLE IMPRESSION ON SLIP. CAM 1348. FIG. 80				Selects 110 136			Returns 239° 30' 258° 30'			
SELECTION FOR PRINT & FEED. ALL PRINTERS. CAM 1298. FIG. 94				Selects 110 136					Returns 330 356	
SLIP IMPRESSION CAMS 1272. FIG. 87							Print 195 225 245 275	Print 295 325		
PRINTING HAMMER CAMS -AUDIT TAPE 1677, FIG. 99 -ISSUING TAPE 1819, FIG. 110		Idle 50 110				Print 195 225 255				
AUDIT TAPE SHIFT & FEED CAM 1532. FIG. 101				Shift to Print Position, Feed Receiving Roll. 135 210 235			Shift To Visible Position-Pulls Paper from Supply Roll. 330			
ISSUING TAPE FEED CAM 1749. FIGS. 110 & 116				Backup 135 205 235			Feed 235 330			
SLIP TENSION CAM 1364, FIG. 97	On 5 20								Off 300 330	
SLIP FEED CAM 1381. FIG. 94				Back Up 135 205 235			Feed 235 265			
RIBBON FEED CAM 2060. FIG. 122	Feed Left Spool. 20 70			Feed Right Spool. 130						
SLIP FEELER CAM 133. FIG. 84	Feels For Paper. 5 45 60			Returns Feeler, Blocks Print & Feed. (No Slip) 110						
TWO CYCLE CONTROL CAM 936. FIG. 15				110 137				248 286		

FIG. 128

ONLY CAMS LISTED BELOW MAKE 2 CYCLES.

CAM LINE STOPS AT 20° FIRST CYCLE; COMPLETES MOVEMENT ON SECOND CYCLE.

	0	80	160	240	320	360	400	480	560	640	720
TRANSACTION DIFFERENTIAL SHIFTING CAMS 723. FIG. 37	Shift Tot. Sets T.W. 5 95 120 200						365 455				
SELECTION FOR RESET ON FRONT & BACK COUNTERS ROLLS 906, FIG. 46	Moves Plate Select- ing Totalizer, To Reset. 147 168 200							538 507 528			
TRANSACTION DIFFERENTIAL ALINER CAMS 779, FIG. 8	In 90 110				Out 335 355		In 450 470			Out 715 695	
TWO CYCLE CONTROL CAM 936, FIG. 15	Trip 110 137			Restores Arm. Retained by Pawl.	Return 248 286			470 497		608 646	

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2,616,623

ACCOUNTING MACHINE

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Application July 17, 1948, Serial No. 39,278

46 Claims. (Cl. 235—60.28)

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This invention relates to improvements in accounting machines.

One object of the invention is to provide a machine for use in handling commercial accounts by a bank teller.

Another object of the invention is to provide means to selectively control the machine to perform one-cycle or two-cycle total-taking operations.

A specific object of the invention is to provide a cycle control mechanism in which a clutch is provided which is controlled by total-taking control keys in such a manner that the clutch is disabled during one cycle of a two-cycle operation and remains effective during one-cycle operations.

Another specific object of the invention is to provide a machine with a plurality of lines of totalizers, at least one of which lines is a non-shifting line and at least one of which is a shifting interspersed line, together with means to automatically control the machine to perform one-cycle total-taking operations when printing totals from the non-shifting totalizer line, and two-cycle total-taking operations when printing totals from an interspersed totalizer line.

Another object of the invention is to provide a novel totalizer engaging control mechanism controlled by automatically positioned control members.

A further object of the invention is to provide a novel zero stop mechanism for amount differentials in which the zero stop elements are normally in ineffective positions but are moved into effective positions by mechanism operated from the main shaft.

Another specific object of the invention is to provide a machine in which the keys on the keyboard have a minimum load to provide a light touch for the keys.

Another object of the invention is to provide a novel amount differential mechanism.

A further object of the invention is to provide a novel zero setting mechanism for setting zeros in the printing mechanism only when needed.

A specific object of the invention is to provide a type wheel setting mechanism in which the type wheel is provided with positions "0" to "9" and a blank position, together with a differential mechanism to move the type wheel first into the blank position and thereafter to move a character to the printing line when required, said type wheel remaining in the blank position when a blank is required at the printing line.

Another object of the invention is to provide a novel totalizer aligning means.

An object of the invention is to provide a novel repeat mechanism to enable the operator of the machine to repeat previous entries without depressing amount keys on the keyboard.

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Another object of the invention is to provide a novel special counter mechanism.

Another object of the invention is to provide novel printing mechanisms to record data necessary in making a complete record of transactions by a commercial bank teller.

A specific object of the invention is to provide a novel printer mechanism having removable units which can be taken out of the printer for storing records or for supplying record material therein.

With these and incidental objects in view, the invention includes certain novel features of construction and combinations of parts, a preferred form or embodiment of which is hereinafter described with reference to the drawings which accompanying and form a part of this specification.

Of said drawings:

Fig. 1 is a perspective view of the machine, showing the keyboard and the cabinet in which the machine is enclosed.

Fig. 2 is a diagrammatic view of the keyboard.

Fig. 3 is a top plan view of the keyboard frame with certain parts broken away for clearness.

Fig. 4 is a sectional view taken on line 4—4 of Fig. 3.

Fig. 5 is a sectional view taken on line 5—5 of Fig. 3.

Fig. 6 is a sectional view taken on line 6—6 of Fig. 5.

Fig. 7 is a detail view showing the main framework of the machine as viewed from the front of the machine.

Fig. 8 is a sectional view taken at the right of the first transaction bank, showing the transaction differential mechanism and certain mechanisms adjusted thereby.

Fig. 9 is a detail view of the driving mechanism for the first transaction bank differential mechanism.

Fig. 10 is a detail view of the beam setting mechanism for the first transaction bank.

Fig. 11 is a detail view of certain parts of the first transaction bank differential mechanism.

Fig. 12 is a top plan view of the rear totalizer line and shows the shifting mechanism and certain of the engaging and disengaging mechanisms therefor.

Fig. 13 is a detail view of a part of the two cam lines of the machine.

Fig. 14 is a detail view of the clutch mechanism for starting the machine in operation.

Fig. 15 is a detail view showing the cycle control mechanism.

Fig. 16 is a detail view of the detent for maintaining the keys of the second transaction bank depressed during the machine operation.

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Fig. 17 is a detail view of the second transaction bank release detent.

Fig. 18 is a detail view of the control plate for maintaining the add-print key depressed until released manually.

Fig. 19 is an elevational view, looking at the machine from the right side, and shows the totalizer engaging and disengaging mechanisms, together with the hand operating mechanism for the machine.

Fig. 20 is a cross-sectional view of the machine taken just to the right of the ten-cent amount bank.

Fig. 21 is a detail view showing the amount differential operating cams.

Fig. 22 is a sectional view of the machine, as viewed from the front thereof, and shows the relationship of the keyboard to the amount and transaction bank differentials, together with the main cam line for operating the machine.

Fig. 23 is a detail view of the amount differential mechanism shown in the position in which it is arrested by the five-cent key in the early part of the machine operation and also shows the corresponding position of the zero setting and repeat mechanisms.

Fig. 24 is a detail view of the mechanism shown in Fig. 23, with the universal rod in its fully moved position.

Fig. 25 is a detail view of the mechanism shown in Fig. 23, with the parts in the position which they assume with the machine at rest, after "five" has been added in the totalizer.

Fig. 26 is a detail view of the mechanism shown in Fig. 23, with the parts in home position, with no key depressed.

Fig. 27 is a detail view of the parts shown in Fig. 26, shown in the position in which the amount differential slide is arrested by the zero stop pawl in the early part of the machine operation.

Fig. 28 is a detail view of the amount differential mechanism shown in Fig. 26, with the amount slide in the zero eliminated position and the type setting slide moved to its zero eliminated setting position.

Fig. 29 is a perspective detail view, with the parts partly broken away, showing the zero setting control yokes.

Fig. 30 is a detail view showing the repeat mechanism.

Fig. 31 is a detail view of a part of the mechanism shown in Fig. 30.

Fig. 32 is a detail view of the zero stop setting mechanism.

Fig. 33 is a detail view of the reset special counter operating mechanism.

Fig. 34 is a side view of part of the mechanism shown in Fig. 33.

Fig. 35 is an enlarged detail view of the amount differential mechanism.

Fig. 36 is a detail view showing the tens transfer mechanism for the totalizers, looking from the under side thereof.

Fig. 37 is a sectional view taken just to the right of the second transaction bank and shows the second transaction bank differential mechanism and the connections for shifting the interspersed totalizers.

Fig. 38 is a detail view of one of the control plates set by the first transaction bank for controlling the engagement of the rear totalizer line.

Fig. 39 is a detail view of the control plate set by the second transaction bank for controlling the engagement of the rear totalizer line.

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Fig. 40 is a detail view of the engaging mechanism for the rear totalizer and shows the control plate therefor, adjusted under control of the first transaction bank.

Fig. 41 is a top plan view of the control plates for controlling the engagement of the rear totalizer line.

Fig. 42 is a detail view of a control plate adjusted by the first transaction bank for controlling the engagement of the rear totalizer line.

Fig. 43 is a detail view showing a control plate adjusted under control of the first transaction bank, for controlling the engagement of the front totalizer line.

Fig. 44 is a detail view of the mechanism for controlling engagement of the front totalizer line and shows a control plate set by the second transaction bank for controlling said mechanism.

Fig. 45 is a detail view of a control plate set by the first transaction bank for controlling engagement of the front totalizer line.

Fig. 46 is a detail view of the mechanism for controlling the time at which the engaging control feelers for the rear and the front totalizer lines are operated.

Fig. 47 is a detail view of the mechanism for controlling the engagement of the upper totalizer and includes a control plate therefor set under control of the first transaction bank.

Fig. 48 is a detail view of the add and total-taking engaging mechanism for the three totalizer lines.

Fig. 49 is a detail view of a part of the totalizer engaging mechanism for the front totalizer line.

Fig. 50 is a detail view of the mechanism shown in Fig. 49, shown in the moved or totalizer engaging position.

Fig. 51 is a detail view of the cam for rocking the total-taking engaging mechanism in reset timing.

Fig. 52 is a detail view of the mechanism for controlling the movement of the total-taking engaging spider.

Fig. 53 is a detail view of the mechanism for operating the engaging mechanism in add timing.

Fig. 54 is a detail view of the mechanism for restoring the tripped tens transfer mechanism.

Fig. 55 is a sectional view, taken just to the right of the left side frame of the machine, and shows the locking control slide, the consecutive number mechanism, the date setting mechanism, and certain of the machine release mechanisms.

Fig. 56 is a detail view of the detent for holding the keys of the first transaction bank depressed during the machine operation.

Fig. 57 is a detail view showing the machine release control slide in the first transaction bank and the mechanism controlled thereby for releasing the machine for operation.

Fig. 58 is a detail view of the flexible detent in the first transaction bank for holding certain transaction keys in their depressed position.

Fig. 59 is a detail view of the interlocking control slide in the first transaction bank for preventing depression of certain transaction keys in said first transaction bank after the repeat key has been depressed and to prevent depression of the repeat key after any of said certain keys have been depressed.

Fig. 60 is a detail view of the control slide in the first transaction bank forming a part of an interlock between the total-taking keys and the amount keys.

Fig. 61 is a detail view of the mechanism in

the first transaction bank for preventing the release of the machine with amount keys depressed and for controlling the operation of the zero stop mechanism in the amount banks, when a total-taking key has been depressed.

Fig. 62 is a detail view of a part of the mechanism shown in Fig. 61.

Fig. 63 is a detail view of the detent in the first transaction bank for maintaining the List key in depressed position until released by depression of the Balance key.

Fig. 64 is a detail view showing the mechanism in the first transaction bank for blocking movement of the zero stop pawls in the amount differential banks when a total key has been depressed.

Fig. 65 is a detail view of the mechanism for aligning the type setting ring gears.

Fig. 66 is a detail view of the aligning mechanism for aligning the type printing wheels.

Fig. 67 is a detail view of the motor switch operating mechanism.

Fig. 68 is a detail view of part of the machine release mechanism.

Fig. 69 is a detail view of the consecutive number operating control mechanism.

Fig. 70 is a detail view of a control plate adjusted under control of the second transaction bank for controlling the operation of the consecutive number device.

Fig. 71 is a detail view of the consecutive number reset mechanism.

Fig. 72 is a detail view of the date setting mechanism.

Fig. 73 is a detail view of a part of the turn-to-zero mechanism for the consecutive number device.

Fig. 74 is a side view of the driving gears for the consecutive number operating mechanism.

Fig. 75 is a detail end view of the date setting indicators.

Figs. 76A and 76B taken together constitute a front elevational view of the transmission mechanism for setting the type wheels in the three printer sections of the machine.

Figs. 77A and 77B are a front elevational view of the connections between the amount and transaction differential mechanisms and the type setting transmission gears.

Figs. 78A and 78B together form a top plan view of the three printer sections, showing the cam lines and the mechanisms operated thereby, with the audit tape and issuing tape printers removed from the machine.

Fig. 79 is a detailed top plan view of one end of the ink ribbon frame.

Fig. 80 is a cross-sectional view taken through the slip printer mechanism.

Fig. 81 is a detail view of a part of the slip feeler operating mechanism.

Fig. 82 is a detail view of a part of the slip printer control mechanism.

Fig. 83 is a detail view of a part of the slip feeler mechanism for controlling the slip printing and feeding mechanisms.

Fig. 84 is a detail view of the slip feeler and the actuating mechanism therefor.

Fig. 85 is a detail view of the control disk set under control of the second transaction bank of keys for controlling the operation of the printing hammer for the deposit slip printer.

Fig. 86 is a detail view of another control disk set under control of the second transaction bank of keys for controlling the operation of the printing hammer for the deposit slip printer.

Fig. 87 is a detail view showing the deposit

slip printing hammer mechanism, together with the control disk set under control of the first transaction bank of keys, for controlling the hammer mechanism.

Fig. 88 is a detail view of a part of the mechanism shown in Fig. 87.

Fig. 89 is a top plan view of the control disks shown in Figs. 85, 86, and 87, together with the feeling fingers coacting therewith.

Figure 90 is a facsimile of a deposit slip printed in the slip printing section of the machine.

Fig. 91 is a facsimile of a teller's cash ticket printed in the slip printing section of the machine.

Fig. 92 is a detail view showing one of the control disks set under control of the second bank of transaction keys for controlling the feed of the deposit slip.

Fig. 93 is a detail view of another notched disk set under control of the second bank of transaction keys for controlling the feed of the deposit slip.

Fig. 94 is a detail view showing the deposit slip feeding mechanism and a control disk set under control of the first bank of transaction keys for controlling the feeding mechanism.

Fig. 95 is a detail view showing a lock for the feed mechanism for the deposit slip.

Fig. 96 is a top plan view showing the deposit slip feeding rollers.

Fig. 97 is a side view showing the mechanism for controlling the deposit slip feed tensioning mechanism.

Fig. 98 is a detail view, shown in an enlarged scale, of the clutch mechanism for operating the deposit slip feed rollers.

Fig. 99 is a cross-sectional view taken through the audit tape printing mechanism.

Fig. 100 is a top plan view of the audit tape printer carriage as it appears when removed from the machine, and with the audit tape removed therefrom.

Fig. 101 is a cross-sectional view of the audit tape paper shifting mechanism and certain controls therefor.

Fig. 102 is a detail view showing the mechanism for clutching the supply roll spool in position in the audit tape carriage.

Fig. 103 is a top plan view showing the audit tape printer carriage latches for holding the carriage in the machine.

Fig. 104 is a front elevation showing the latches for the audit tape printer carriage shown in Fig. 103.

Fig. 105 is a detail view of the mechanism for latching the audit tape shifting frame in an inactive position.

Fig. 106 is a facsimile of an audit tape produced by the audit tape printer.

Fig. 107 is a detail view showing the door for the audit tape printer carriage in the closed position in full lines, and in the open position in chain lines.

Fig. 108 is a top plan view showing the door for the audit tape printer, and illustrating the auto-graph slide opening mechanism.

Fig. 109 is a detail view of the feed mechanism for the audit tape.

Fig. 110 is a cross-sectional view taken through the issuing tape printing mechanism.

Fig. 111 is a detail view of a control disk set under control of the second transaction bank of keys for controlling the feed of the issuing tape.

Fig. 112 is a top plan view of the notched disks

for controlling the issuing tape feeding mechanism.

Fig. 113 is a top plan view of the issuing tape carriage illustrating it as it appears when removed from the machine and with the supply tape removed.

Fig. 114 is a detail view of the notched disks set under control of the first transaction bank of keys for controlling the extent of feeding movement of the issuing tape.

Fig. 115 is a detail view showing the auxiliary control disk for controlling the feeding movement of the issuing tape.

Fig. 116 is a detail view showing the notched disk set under control of the second bank of transaction keys for controlling the feed of the issuing tape, together with a part of the feeding mechanism coacting therewith.

Fig. 117 is a top plan view of the control disks shown in Figs. 114, 115, and 116.

Fig. 118 is a detail view showing the notched disks shown in Fig. 115 in adjusted positions.

Fig. 119 is a detail view of the notched disks shown in Fig. 118 in other adjusted positions.

Fig. 120 is a facsimile of the issuing tape.

Fig. 121 is a detail view showing the latch mechanism for the door of the issuing tape printer.

Fig. 122 is a side view of the ink ribbon feed and reversing mechanisms.

Fig. 123 is an elevational view, shown in enlarged scale, of the ribbon feed and reversing mechanism, together with the latch for latching the ink ribbon frame in the machine.

Fig. 124 is a detail view of certain ribbon feed and retaining latch mechanisms.

Fig. 125 is a detail side elevation showing the construction of the collapsible flanges of the ribbon spool.

Fig. 126 is a time chart showing the time of operation of certain of the mechanisms of the machine.

Fig. 127 is a time chart showing the time of operation of the various printer feed and control cams.

Fig. 128 is a time chart showing the time of operation of certain of the cams and mechanisms of the machine for two-cycle total operations.

GENERAL DESCRIPTION

The invention illustrated herein is embodied in a machine for use by commercial bank tellers. In handling commercial account transactions, it is necessary to segregate deposits, in the form of checks, cash, and mixed checks and cash, from cash paid out transactions. In recording these commercial bank transactions, it is also necessary to enter transactions wherein a check is presented, a part of the amount of which is deposited and the balance taken in cash by the customer.

All the above transactions are recorded on the present machine at the teller's window simultaneously to produce printed records for use by the auditing and bookkeeping departments. Recording mechanisms are located at the front of the machine and include a slip printer to print on deposit slips and cash tickets, an audit tape printer, and an issuing tape printer.

The slip printer is located near the left side of the machine just below the keyboard and includes a table upon which deposit slips or cash tickets are placed. When the total deposits shown by the deposit slip are entered into the

totalizers of the machine, a total is printed on the deposit slip. If duplicate deposit slips are to be used, the total is printed on each slip. In addition to the printing of the total of the deposit on the deposit slip, other data is also set up on the printing member, such as the date, the bank number, the machine number, the consecutive number, and a symbol for the transaction. An adjustable feed is provided to permit easy control over the spacing of the double impressions to accommodate various printed forms. As illustrated herein, the distance between printed impressions can be varied from .6 inch to two inches in steps of .2 inch.

The audit tape printer is located near the center of the front of the machine and to the right of the slip printer. The tape on which the data is printed is of the autographic type and is loaded from the front of the machine. The last six lines of printed data are visible through a window which can be opened to render the tape accessible for hand-written notations. A hand lever is provided to space the audit tape when the hand-written notations are made. The data printed on the audit tape includes the machine number, the consecutive number, the transaction symbol, the amount, and a symbol indicating the kind of operations, such as item entry, sub-total, or total.

An issuing tape is located at the front of the machine to the right of the audit strip. The data printed on the issuing tape includes the date, the machine number, the consecutive number, the transaction symbol, the amount, and the kind of operation symbol. The issuing tape is used to provide a printed record of all cash paid out, which is sent to the auditing department with a batch of cashed checks representing "Cash Out" transactions. At any time of the day when a messenger from the auditing department calls on the teller for a batch of cashed checks, a tape to accompany them is ready in the machine. All that the teller need do is print the total, from a totalizer provided for the purpose, on the tape, tear off the tape, and hand it to the messenger with the batch of checks. This gives the auditing department a printed record, which record is printed at the time the checks are cashed at the teller's window. A novel arrangement whereby the issuing tape is fed from a flat pack of paper instead of from the conventional roll of paper is provided.

The single ink ribbon, serving all three printers, is mounted on a removable frame for easy replacement. For this purpose, both spools are mounted on a removable frame which slides out of the right side of the machine.

One of the features of the printing mechanism is the easy removability of the various printing units for servicing and for the replacement of record material. The units are so controlled and assembled that they can be removed from the machine by simply releasing the latches and sliding the units out of the machine.

A machine is illustrated herein for use by two tellers and is provided with three totalizer lines spaced around common actuators. The upper line has a single "List" or visible totalizer and is used for adding, or listing, operations. The front totalizer line has two totalizers for accumulating the amounts of batches of checks, one for each teller. The rear totalizer line is provided with eight interspersed totalizers for classifying various entries, four of which totalizers are allotted

to each teller. The classifications are "Deposit," "Cash In," "Cash Out," and "Miscellaneous."

The List totalizer on the upper line is selected to receive entries under control of either the "Add" key or the "List" key in row 1. The List totalizer can be used for straight adding operations without making any printed entries. This is obtained by depression of the Add key alone; that is to say, no other key is depressed in combination therewith. When the Add Print key in row 2 is depressed in combination with the Add key of row 1, the items are printed on the issuing tape. A latch is provided for the Add Print key to hold it depressed until manually released, thus making it unnecessary to press the Add Print key for each item entered. The List totalizer is cleared by depression of the "Balance" key in row 1, or sub-totals can be printed on the issuing tape by depression of the "Sub-Balance" key in combination with the Add Print key of row 2. Only one cycle of operation is required to clear, or sub-total, the List totalizer. The "Batch" totalizers on the front totalizer line are selected by the "Cash Out" keys. As disclosed here, two "Batch" totalizers are provided on the front totalizer line, one being selected by the "A Cash Out" key and the other by the "B Cash Out" key.

The back totalizer line is provided with eight interspersed totalizers, one allotted to each key of the transaction bank, except the Add Print key, so that separate totals can be had for each classification.

The automatic controls effected by each key of the two transaction banks is briefly tabulated below:

Deposit keys

Depression of either deposit key, followed by an operation of the machine, will cause a double impression to be made on the slip and a single impression to be made on the audit tape, and controls the totalizers so as to add into a classification totalizer allotted to the depressed key on the rear totalizer line. These keys also control the consecutive number means so as to advance one step, and set up a symbol "AD" or "BD" in the printing lines.

Deposit keys and repeat key

If the Repeat key is depressed in combination with a deposit key, followed by an operation of the machine, a single impression is made on the slip, and the data is printed on the audit tape. During the operation of the machine, the classification totalizer is held out of engagement with the actuators, so that the repeated operation is not added therein. Also the consecutive number means is not advanced one step. The Repeat key sets up the symbol "-" at the printing lines.

"Cash in" keys or "miscellaneous" keys

Operation of the machine with a "Cash In" or a "Miscellaneous" key depressed causes one impression to be made upon the deposit slip and one impression on the audit tape. The data is entered into a totalizer allotted thereto on the rear totalizer line, and the consecutive number means is not advanced. These keys control the setting of symbols "AI," "BI," "AM," and "BM," respectively, at the printing line.

"Cash out" keys

Depression of a "Cash Out" key, followed by an operation of the machine, causes an impression to be made on the issuing tape and causes

the issuing tape to be fed one step. The "Cash Out" key also controls the printing so that an impression is made on the audit tape and causes the amount set up on the keyboard to be entered into a totalizer allotted thereto on the rear line. This amount is also added into a selected Batch totalizer on the front totalizer line. The consecutive numbering means is not advanced. A symbol "AO" or "BO" is set up at the printing line.

"Cash out" key with "list" key

Depression of the "List" key in combination with a Cash Out key, followed by an operation of the machine, causes an impression to be made on the issuing tape, and causes the issuing tape to be fed one step. An impression is made on the audit tape, and the amount set up on the keyboard is added into the selected classification totalizer and into the selected batch totalizer. The consecutive numbering means is not advanced. In addition to the above, the amount set up on the keyboard is added into the List totalizer on the front totalizer line.

Balance key

Depression of the Balance key, followed by an operation of the machine, causes the List, or visible, totalizer to be cleared and causes the total cleared therefrom to be printed on the audit tape. The consecutive numbering means is not advanced, and the symbol "*" is set at the printing line.

Balance key with add print key

Depression of the Add Print key in combination with the Balance key, followed by an operation of the machine, causes the List or visible totalizer on the upper totalizer line to be cleared, causes the total cleared therefrom to be printed on the issuing tape, and causes the issuing tape to be fed a greater distance. As disclosed herein, this greater distance is three inches. The consecutive numbering mechanism is not advanced, and a symbol "*" is set at the printing line.

Sub-balance key

Depression of the Sub-Balance key, followed by an operation of the machine, causes a sub-total from the List or visible totalizer to be printed on the audit tape. The consecutive number is not advanced, and a symbol "S" is set on the printing line.

Sub-balance key with add print

Depression of the Add Print key in combination with the Sub-Balance key, followed by an operation of the machine, causes a sub-total to be taken from the List or visible totalizer and to be printed on the issuing tape, and the issuing tape is fed .2 inch. The consecutive numbering means is not advanced, and the symbol "S" is set up at the printing line.

List key

Depression of the List key, followed by an operation of the machine, causes an amount to be added into the List, or visible, totalizer. The List key stays down until released by the Balance key. The List key sets the symbol "L" at the printing line but has no control over the printing mechanism, nor does it release the machine for operation. Any control over the printing mechanisms which are effective during an operation of the machine with the List key depressed is effected by whatever key is depressed therewith. In the system described herein, it is

contemplated that a "Cash Out" key be depressed in combination with the List key. The controls under this condition are explained above.

Add key

The Add key controls the machine so that the amounts are added into the List, or visible, totalizer. The totalizer engaging mechanisms for the front and back totalizers are disabled; all printing is disabled during the operation in which the Add key only is depressed; and the consecutive number mechanism is not advanced. Thus, when the machine is operated with the Add key only depressed, the machine operates as a straight adding machine. However, the Add key sets the symbol "+" at the printing line, so that, if the Add Print key is depressed in combination therewith, the symbol "+" is printed.

Add key in combination with repeat key

Operation of the machine with the Repeat key depressed in combination with the Add key results in the operation identical with that described for the Add key except that it repeats the addition of the amount previously added.

Add key with add print key

Depression of the Add key in combination with the Add Print key controls the machine so that amounts are added into the List, or visible, totalizer. The totalizer engaging mechanisms for the front and back totalizer lines are disabled, so that neither of these totalizer lines is rocked into engagement with the actuators. The printing mechanism is controlled to cause an impression to be made on the issuing tape, and the issuing tape is fed .2 inch. The consecutive numbering mechanism is not advanced and the symbol "+" is set at the printing line.

Repeat key

The Repeat key is always used with a motorized key, and the controls effected depend on the controls of the key with which it is depressed, in the manner pointed out above. The Repeat key sets the symbol "-" at the printing line.

Batch reset key

The Batch Reset key controls the machine to clear the batch totalizer on the front line corresponding to the key depressed. It controls the printing mechanisms so that the amount cleared from the totalizer is printed on the audit tape and on the issuing tape. The issuing tape is fed three inches, and the consecutive numbering mechanism is not advanced. A symbol consisting of a five-pointed star is set at the printing line. Operation of the machine with the Batch Reset key depressed consists of a two-cycle operation.

Batch read key

The Batch Read key controls the machine to operate exactly like the Batch Reset key, except that a sub-total is printed and the selected totalizer is not cleared. A symbol "#" is set at the printing line.

Reset key

The Reset key controls the machine to reset any selected totalizer on the rear totalizer line. The total is printed on the audit tape and on the issuing tape, and the issuing tape is fed three inches. The consecutive numbering mechanism is not advanced. Operation of the machine with the Reset key depressed consists of a two-cycle

operation. The symbol "Z" is set at the printing line.

Read key

Operation of the machine with the Read key depressed results in the identical operation described with the Reset key depressed, except that a sub-total is printed and the selected totalizer is not cleared. The Read key sets the symbol "X" at the printing line.

DETAILED DESCRIPTION

Keyboard

As shown in Figs. 1 and 2, the keyboard of the machine, as illustrated herein, is provided with eight rows of amount keys 100 and two banks of control, or transaction, keys 101 to 118 inclusive. The keys 101 to 118 inclusive are provided with legends to aid in their selection for controlling the machine in its operations. In addition to the controls indicated by the legends thereon, keys 101 to 108 inclusive, 110, 111, and 113 are what is known in the art as motor keys; that is, in addition to controlling the machine in accordance with the legends thereon, these keys also release the machine for operation. Keys 109, 112, and 114 to 118 inclusive do not release the machine for operation, and therefore they must be depressed in combination with one of the motor keys. Near the lower right-hand corner of the keyboard is a release key 119, which is used to release the keys on the keyboard if for any reason it is desired to release them after they have been depressed and before the machine has been released for operation. The reset key 117 is provided with a lock 120, whereby the teller may lock the reset key during his absence. A similar lock 121 is provided for the read key 118.

The add-print key 109 is a stay-down key and may be released by manipulation of a lever 122, located to the left of the key 109 (see also Fig. 18).

A control slide lock 123 (Figs. 2 and 55) is provided near the left side of the machine for locking the machine, controlling resetting of the consecutive number means, changing the date, and unlocking the audit tape door. The slide lock 123 has three positions. With the slide in its middle position, shown in the drawings, the consecutive number and the date cannot be changed, but the machine can be operated to enter items and to reset the totalizers. When the slide lock 123 is in its uppermost position, the machine is locked against operation, the date and the consecutive number means cannot be operated, and the audit tape door cannot be opened. When the slide lock 123 is in its lowermost position, the machine is locked against operation, but the consecutive number can be reset, the date can be changed, and the audit tape door can be opened.

A date setting wheel 124 (Figs. 2, 55, and 72) projects through the cabinet of the machine for setting the date on type wheels in the printer and on indicators 1162, 1163, 1164, and 1165 (Fig. 75). The wheel 124 is normally locked and is unlocked by moving the slide lock 123 into its lowermost position. This one wheel 124 sets all of the date wheels. The dates are advanced by rotation of the wheel 124 toward the top of the machine. The dates are turned backward by downward rotation of the wheel. Transfer mechanism between the date wheels controls the setting of the higher order wheels.

A wheel 126 (Figs. 2 and 71) is provided on the keyboard for resetting the consecutive num-

ber wheels to zero. In order to reset the consecutive number wheels to zero, it is necessary to move the slide lock 123 to its lowermost position, then rotate the wheel 126 downwardly until it is stopped, and then rotate the wheel 126 upwardly again until it comes to the second stop. Restoration of the slide lock 123 into either the middle position or the uppermost position locks the consecutive number resetting mechanism against resetting operation by wheel 126. An interlock is provided between the lock slide 123 and the reset wheel 126 so that the register cannot be locked unless the reset wheel 126 is again restored to its normal position.

Eight amount banks are shown in Fig. 2. However, there are ten totalizer wheels shown in the opening 127. This provides two overflow wheels for the List totalizer. A cabinet 128 is provided to enclose the entire machine. An opening 129, through which the keys of the keyboard project, is provided.

Unitary keyboard assembly

The amount keys 100 and the control keys 101 to 118 inclusive are mounted in a frame which consists of a unit which may be removed from the machine in its entirety. This unit construction provides an economical and convenient production method, since the keyboard can be assembled separately and then assembled into the machine as a separate entity. The unitary keyboard frame is best shown in Figs. 3, 4, 5, and 6 and consists of a top plate 130 secured to a back frame 131 by screws 132 and to an end plate 133 by screws 134 and 135. The top plate is also secured to a front plate 136 by two screws 137. The left-hand end of the back frame 131 is bent at right angles to form a flange 138 having an open slot 139 to receive a shaft on which certain control elements are assembled, as will be described hereinafter. Eleven partition plates 140 are provided to form compartments in which the amount keys are mounted (see also Fig. 22). The rear ends of the partition plates 140 are provided with ears 141, which project into slots in the back frame 131, and with ears 142, projecting into slots in the front plate 136. After being inserted into said slots, the ears 141 and 142 are riveted over to hold them firmly in place. Also projecting into slots in the plate 136 is an ear 143 on each plate 140. The plates 140 are provided with notches 144 to receive key restoring springs 145 stretched between the two end partition plates 140 (see also Fig. 22). The functions of the springs 145 will be described in connection with the consideration of the operation of the amount keys. Each partition plate 149 is provided with six ears 146 on its bottom edge, which project through and are riveted into a bottom plate 147. Each partition plate 140 is also provided on its top edge with four upstanding ears 148, which project up to the under side of the top plate 130 and provide a rest for said top plate. An intermediate plate 149 is provided, which rests on the partition plates 140, and the plate 149 is held in position by wires 151 projecting through openings in the upstanding ears 148 of the partition plates 140. The wires are long enough to span all the partition plates 140 and are held in place by friction.

The partition plates 140 support a series of rods for supporting the detents for the amount bank in a manner described hereinafter.

The top plate 130 is provided with round openings 152 to accommodate the amount keys 100. Slots 153 are provided in the intermediate plate

149, through which the body of each key 100 moves, and the bottom plate 147 is provided with slots 154, through which the bottom ends of the keys 100 move when they are depressed. Thus, the slots 153 and 154 forms means for guiding the amount keys in their up-and-down movements.

Near the right-hand end of the keyboard frame are provided two partition plate 159 (Figs. 3 and 22), which form a support for the transaction keys and the control keys. The bottom edge of the partition plate 159 is provided with projections 160 (see Fig. 5), which fit into slots in the bottom plate 147. Along the upper edge of each plate 159, nine pairs of flanged ears 166 are bent to form a guideway for the control keys. Four rods 167, extending through the right side plate 133, through the partition plates 159, and into the right partition plate 140, provide supports for four spacer plates 168, each being formed to provide a bearing 169 through which the rod 167 is passed. The spacer plates 168 extend upwardly to engage the under side of the top plate 130 in the transaction and control key section of the keyboard frame. The rods 167 are held in place by friction.

An auxiliary plate 171 (see also Fig. 8) is mounted on each partition plate 159 by means of studs 172, 173, and 174. The auxiliary plates 171 are held against the ears 166 by the ends of the bearings 169 to provide a runway for the transaction and control keys. The heads of the transaction and control keys project through openings 152 provided in the top plate 130 and shaped to fit the outlines of the respective keys. Eight studs 172, mounted on each partition plate 159 and projecting through its associated auxiliary plate 171, provide supports for a coil spring 170 (Figs. 8 and 37), stretching from a stud 173 near the front end of the auxiliary plate to a stud 174 near the rear end of the auxiliary plate, to form a means for restoring and holding the keys in their upper, or undepressed, positions. A third plate 175, carried by and spaced from the partition plate 159 by four rollers 176 (see Figs. 56 to 60 inclusive), forms a runway for the control detents described hereinafter.

The keyboard assembly, consisting of the top plate 130, the bottom plate 147, the front plate 136, and the back frame 131, together with the partition plates 140 and 159, forms a unitary assembly which can be inserted into the machine after it has been assembled, together with all of the amount and control keys, their control slides and detents, and certain other control elements which are operated by the keys as they are depressed, to be described later.

After the keys and slides have been assembled into the keyboard, the keyboard frame is mounted on the side frames 180 and 181 (Fig. 7) at the front and rear thereof. To provide for such mounting of the keyboard frame in the machine, the flange 138 (Figs. 3, 4, and 5) is provided with a block 183, which is tapped to receive the threads of a screw 184 (Fig. 20), which passes through an opening in the side frame 181 and into the threads in the block 183. The key frame end plate 133 is provided with an extension to which a block 185 (Fig. 3) is secured and which is also tapped to receive a screw 186 (Fig. 19) to anchor the key frame to the right side frame 180 at its upper right-hand corner. The front keyboard plate 136 is bent at right angles at its left end and is provided with a block 187, through which threads are tapped to receive a screw 188 (Fig.

20) to anchor the the lower left hand corner of the key frame to the side frame 181. At its lower end, the end plate 133 is also provided with an extension through which a screw 189 (Fig. 37) is inserted, to anchor the lower right-hand corner of the keyboard frame to the right side frame 180.

MAIN FRAMEWORK

Fig. 7 illustrates the main frames of the machine. The left side frame 181 and the right side frame 180 are mounted on a base 190 having lugs 191 thereon. Located intermediate the frames 180 and 181 are a left printer frame 192 and a right printer frame 193 suitably secured to lugs on the base 190. Secured to the left side frame 181 is an auxiliary frame 194, which is provided with two blocks 195. Secured to the right side frame 180 is an auxiliary frame 196 provided with blocks 197. The blocks 195 and 197 are tapped to receive screws projecting through a back frame 198. Another auxiliary frame 199 is provided with blocks 200 threaded to receive screws passing through the back frame 198, by means of which the auxiliary frame 199 is supported on the back frame 198. A shouldered stud 202 (Fig. 20) is provided on each side of the printer frames 192 and 193, on one side of the left side frame 181, and on one side of the right side frame 180. Near the front of the machine, a series of six auxiliary plates 203 (Figs. 7, 20, and 37) for supporting the type carrier and the setting mechanism is provided. Each auxiliary plate 203 has, on its lower rear end, a slot which is adapted to straddle the small diameter of a shouldered stud 202 when the type carrier unit, which unit is separately assembled, is inserted into the machine. A cross bar 201 is provided with a series of six notches, into which the upper edge of each plate 203, as best shown in Fig. 37, is inserted. After the type carrier unit has been separately assembled, in the manner described hereinafter, the entire unit is placed in the machine by inserting the notches of the auxiliary plates 203 over the small diameters of the shouldered studs 202, sliding the upper edges of the auxiliary plates 203 into the notches in the cross bar 201, and inserting a shaft 204 (Figs. 20 and 37) through the right side frame 180, through all of the auxiliary plates 203, through the printer frames 192 and 193, and finally through the left side frame 181. Near the rear of the machine, a cross bar in the shape of a formed channel 206 (Figs. 7 and 37) is mounted between the side frames 180 and 181. The auxiliary frame 182 is formed at its rear end with a flattened surface, to which is welded a threaded block to receive a screw 207 to form a support for the auxiliary frame 182. Near the rear of the machine, at its right, a bracket 210 (Fig. 8) is secured to the right side frame 180 by means of four screws 211. The bracket 210 is provided with a forwardly-extending ear 212 to support a cam shaft 213, forming one of the main shafts for driving the mechanism of the machine. The bracket 210 is also provided with a slot 214 for supporting a shaft 215 of an electric motor 216, which motor is one means for operating the machine. The motor 216 is carried by the cross bar 206 (Figs. 7 and 37).

MACHINE DRIVING MECHANISM

The machine may be operated by an electric motor or by a hand crank. The motor shaft 215 (Fig. 8) has secured thereon a gear 220, which meshes with a gear 221 (Figs. 8, 13, and 14), loose-

ly mounted on the cam shaft 213. Secured to the gear 221 is a clutch member 222, with which a clutch pawl 223 engages when the machine is released for operation. The clutch pawl 223 is pivotally mounted on a gear 224 secured to the shaft 213. The shaft 213 (Fig. 13) is supported at one end by the ear 212, on the motor bracket 210, and at the other end by a bearing 225 in the right side frame 180. Also meshing with the gear 224 is a gear 226 (see also Fig. 22) secured to a sleeve 227, which is mounted to rotate on a cam shaft 229 and upon which are mounted two pairs of cams 223 for operating the first and second transaction differential mechanisms. Also secured on the sleeve 227 is a clutch member 228 (see Figs. 13 and 14), which is controlled to operate the cam shaft 229 selectively in accordance with certain types of operation of the machine to be described later. The shaft 229 also has fast thereon certain cams, to be described later, and a gear 230 (Figs. 13, 22, and 52). The gear 230 meshes with a gear 231 mounted on a sleeve 233 carrying cams for operating certain mechanisms of the machine, which sleeve is mounted to rotate on a stud 232 carried by the right side frame 180.

A centrifugally-operated speed control device to regulate the speed of the motor is provided to prevent damage to the machine parts due to excessive speed. This device is indicated generally by the reference numeral 217 in Fig. 55 and consists of a switch blade which is normally in closed position and is moved to open position to open the circuit through the motor when the motor attains a greater speed than a predetermined speed. The switch operating means is mounted on the armature shaft 215 in the usual manner.

If desired, the machine may be operated by the hand crank 240 (Figs. 13 and 19), which is slidably mounted on a stud 241 on the right side frame 180. When it is desired to operate the machine by the hand crank, the handle 240 is slid endwise on the stud 241 to engage it with a hub 242, also rotatably mounted on the stud 241. Secured to the hub 242 is a gear 244 meshing with an intermediate pinion 245, rotatably mounted on the right side frame 180. Meshing with the pinion 245 is a gear 243 rotatably mounted on a stud 247 supported in the right side frame 180. Meshing with the gear 243 is a gear 248 secured to the end of a shaft 249 rotatably mounted in a bearing 250 carried by the right side frame 180. Also fixed on the shaft 249 is a gear 251 (Figs. 8 and 13) meshing with the before-mentioned gear 226 (see also Fig. 14).

Rotation of the hand crank 240, through the train of gears 244, 245, 243, and 248, the shaft 249, and the gear 251, rotates the gear 226 in the same manner as described in the description of these connections as driven by the motor shaft 215. In a hand operation, the clutch pawl 223 ratchets idly over the ratchet teeth of the clutch member 222.

AMOUNT KEY BANKS

Each bank of amount keys includes a full complement of nine keys 100 (Figs. 1, 2, 20, 22, and 23). Coacting with each bank of amount keys are four control members including a flexible detent 260, a zero stop actuating plate 261, a locking detent 262, and an interlocking plate 263 that provides a means for preventing the release of the machine by the depression of certain control keys after an amount key has been depressed. The manner in which the four plates 260 to 263

inclusive are operated will be described herein-after.

In assembling each key bank, the four control members 260, 261, 262, and 263 are first inserted into the keyboard frame by being inserted through suitable openings in the front plate 136 and between four rows of rods 259, which extend between the partition plates 140 so as to extend across the entire keyboard, on which rods the four control members of each bank of keys slide. Each control member 260, 261, 262, and 263 is provided with a slot in line with each key shank 100. After the four control members are inserted into the keyboard frame, the keys 100 are inserted through openings 152 (Fig. 3) in the top plate 130, through the slots 153 in the upper guide plate 149, then through the slots in the control members, and through appropriate slots in the bottom plate 147 of the keyboard frame. By reference to Figs. 22 and 23, it will be observed that the key shanks of the keys 100 are in staggered alignment, and the slots in the keyboard frame and the control members are arranged to register with the key shanks when the keys are inserted into the key frame. After the keys 100 for each digit are assembled into the keyboard frame, a rod 258 is inserted through the keyboard frames and through slots provided in the keys.

The rear end of each key is notched, as shown in Fig. 23, to receive the spring 145, which spring stretches across the keyboard frame from right to left, as viewed in Fig. 22, and from the front of the machine, in the manner hereinbefore described. The rods 258 limit the upward and downward movements of the keys 100.

Rotatably supported in the flange 133 of the back frame 131 of the keyboard frame, and by the end plate 133 of said keyboard frame, is a machine release shaft 264 (Fig. 23), which carries a pair of arms 265 and 266 for each bank of keys 100. The arms 265 are pinned to the shaft 264, and the free ends of each arm 265 project into a suitable slot in the locking detent 262. Also mounted on the shaft 264 is a yoke 267, which is engaged by two ears of each arm 266. The free end of each arm 266 projects into a slot in an interlocking plate 263. After the control members 260, 261, 262, and 263 have been assembled into the keyboard frame, the shaft 264, together with the arms 265 and 266 and the yoke 267, is assembled in the keyboard frame.

Mounted near the front of the keyboard frame on the ears 143 of the plates 140 is a zero stop control shaft 270, on which the zero stops 271, one for each amount bank, are pivotally mounted. The upper end of each zero stop pawl 271 has a finger projecting into a slot of its associated zero control plate 261. Also pivotally carried by the shaft 270 is a yoke 272, which normally engages the tails on the forward extensions of the zero stop pawls 271, by which the zero stop pawls are controlled, in the manner described hereinafter.

The flexible detent 260 (Figs. 20, 22, 23, and 24) is normally held with its slots, through which the amount keys 100 project, in engagement with a cam edge formed on each key, by a spring 280. When an amount key 100 is depressed to the position shown in Figs. 23 and 24, the flexible detent is first cammed toward the left, and, after a shoulder at the end of the cam edge of the key passes out of the slot in the flexible detent, the spring 280 moves the detent 260 to the right

to position the detent over the top of the shoulder on the key, to hold the key in its depressed position. Depression of another key in the same bank will cause its appropriate cam shoulder to again cam the flexible detent 260 toward the left to withdraw the detent from engagement with the shoulder of the depressed key and permit the spring 145 to restore the depressed key to its undepressed position. At the same time, the flexible detent moves over the top of the shoulder of the second depressed key to lock it in its depressed position. Near the end of the machine operation, the arm 265 on the shaft 264 is given a clockwise movement to engage the end of the flexible detent 260 and shift it toward the left (Fig. 23) to release the depressed key 100. The mechanism for rocking the shaft 264 and the arm 265 is described hereinafter.

The locking detent 262 (Figs. 20, 22, and 23) provided to prevent depression of an amount key after the machine has been released for operation, and also to prevent accidental release of said key during said machine operation. To obtain these results, each amount key 100 is provided with a forwardly-extending square shoulder which is normally just above the locking control detent 262. The slot in the locking control detent 262 is wide enough to permit any key in the bank to be depressed. After the key is fully depressed and the machine is released for operation, the arm 265 moves the locking detent 262 to the right (Fig. 23), thus moving it over the square shoulder near the bottom of the depressed key, to the position shown in Fig. 23. Simultaneously therewith, the locking detent 262 is moved beneath the square shoulders of all of the undepressed keys 100, thus preventing any undepressed key from being depressed after the machine has been released for operation. The mechanism for rocking the arm 265 is described hereinafter.

After all the keys 100, the control members 260, 261, 262, and 263, the shafts 264 and 270, together with the arms on the shaft 264, and the zero stop pawls 271 are assembled into the keyboard frame, together with the two control banks of keys and their control slides, the entire keyboard unit is assembled into the machine in the manner described hereinafter.

AMOUNT DIFFERENTIAL MECHANISM

Located beneath each bank of keys 100 (see Fig. 22) in a position midway between the staggered keys, and so as to be controlled thereby, is a differential actuator slide 290. Each actuator slide is suitably slotted to be supported by, and slide on, two cross bars 291 and 292 (Figs. 20 and 23 to 28) suitably supported in the machine framework. The slide 290 is provided with eight projections along its top edge, having flanges 295 bent at right angles thereto, and alternately to the right and left, into alignment with the shanks of the keys 100. The flanges 295 are so located on the slide 290 that they are controlled by the digit keys 1 to 8, respectively. The slide 290 is provided with a stop surface 296 near its front end, which engages the cross bar 291 to arrest the slide 290 in its "9" position. When no amount key is depressed, a flange 297 on the zero stop pawl 271 moves into the path of a flange 298 on the slide 290 to arrest the slide 290 in zero position, which zero position is one step from the home position of the slide. Thus the flanges 295 and 298 and the surface 296 provide means to selectively, and

differentially, arrest the slide 290 in any one of ten positions out of its home position, the position to which the slide 290 is moved depending upon whether or not a key has been depressed, or which key has been depressed. Thus it is clear that the differential slide 290 is capable of assuming any one of eleven positions; that is, a home position and ten positions of adjustment.

The slide 290 is provided near its rear end with teeth 300, meshing with a differential segment 301, rotatably mounted on a shaft 302 supported by the framework of the machine. Secured to the segment 301 is an actuator supporting member 303 (see also Figs. 35 and 36). Slidably mounted on the actuator supporting member 303 are three actuator racks 304, 305, and 306, each located to be engaged by totalizer wheels to be described later.

Upon operation of the machine with an amount key 100 depressed, the actuator slide 290 moves a distance commensurate with the value of the depressed key and, through the teeth 300, rocks the segment 301 and the actuator supporting member 303 a like distance. This sets the actuator racks 304, 305, and 306 to an extent representing the value of the depressed key. After the actuators have thus been set, one or more of the totalizers are engaged therewith, and the slide 290 is thereafter returned to its home position. In returning to home position, the segment 301 and the actuators 304, 305, and 306 are rotated backwardly a number of steps corresponding to the value of the depressed key, thus entering said amount in whichever totalizer, or totalizers, have been engaged therewith. After the amount has been entered therein, the totalizers are disengaged from the actuators.

The timing of movement of the differential slide 290 is controlled by a leading frame including a universal rod 310 (Figs. 20, 22, and 23 to 28). A spring 307, secured to the slide 290 at one end, and to a cross plate 308 at its other end, supported by the machine framework, normally maintains a shoulder 309 of the differential slide 290 against the universal rod 310. The rod 310 is supported by four arms 311, as best shown in Fig. 22, secured to a shaft 312. Also secured to the shaft 312 are two cam follower arms 313 (see also Fig. 21), each having two rollers 314 coacting with a pair of plate cams 315 secured on the main cam shaft 229.

During the operation of the machine, the cam plates 315 rotate clockwise (Fig. 21) to rock the arm 313 first clockwise and then counter-clockwise to move the rod 310 first to the right (Fig. 20) and then back to the left. When the rod 310 moves toward the right, the spring 307 moves the differential slide 290 toward the right until the slide is arrested by a flange 295 thereon coming into contact with a depressed key 1 to 8, or the surface 296 engages the cross bar 291 in the "9" position, or the zero stop pawl 271 arrests the slide in zero position, whereupon the rod 310 completes its rearward movement. Near the end of the machine operation, when the rod 310 is restored to its home position by the cams 315, the rod 310 picks up the differential slide 290 and restores it to its home position, which position is one step beyond its zero position. During this return, or movement toward home position, the differential slide 290, through the connections described above, rocks the actuator racks 304, 305, and 306 backwardly a number of steps commensurate with the value of the de-

pressed key, thus entering the amount into the totalizer wheels which were engaged therewith.

A spring-actuated member 316 (Fig. 20) is pivotally mounted on a shaft 323 to balance the load exerted by the differential springs 307. When the differential slides are released, they have a tendency to move too fast. The member 316 offsets this action by retarding the movement of the universal rod 310, by cooperation with the roller 318 on the arm 311.

One object of mounting the actuator racks 304, 305, and 306 slidably on the member 303 is to permit relative movement thereof for entering tens transfers, when needed, in a manner to be described hereinafter.

Another object of mounting the actuator racks 304, 305, and 306 slidably on the member 303 for relative movement thereof is to compensate for the movement of the differential slide 290 while it moves from its normal or home position into its zero position. The actuator rack 304 (Fig. 35) is provided with two studs 410 projecting into slots 409 in the member 303. When in home position, the studs 410 are located midway between the ends of the slots 409. A spring 411, stretched between the actuator 304 and the member 303, tends to move the actuator 304 toward the right-hand ends of the slots 409 but is arrested by a stud 412 engaging the end of an arm 413, described later. When the differential slide begins its differential movement from its home position, the member 303 rocks clockwise (Fig. 35), but the actuator 304 is restrained from taking part in this initial movement of the member 303 by the spring 411. When the member 303 moves to a position corresponding to the zero position of the differential slide 290, the right-hand ends of slots 409 are in engagement with the studs 410, and thereafter the actuator rack 304 partakes of any further movement of the member 303.

ZERO STOP MECHANISM

A zero stop pawl 271 (Fig. 26) is provided for each amount differential to arrest the differential slide 290 in the zero position, in the event that no amount key is depressed. This zero stop pawl 271 is normally in an ineffective position; that is, the flange 297 thereon is normally out of the path of the flange 298 (Fig. 26) of the differential slide. The yoke 272, mounted on the shaft 270, normally maintains the pawl 271 in said ineffective position by engaging a forwardly-extending toe on the zero stop pawl 271. The yoke 272 is maintained in its normal position by an arm 320 (Fig. 32) loosely mounted on the shaft 270 and having two toes 321 straddling the yoke 272 near its center. The lower end of the arm 320 has mounted thereon a stud 322, which projects into a notch in the forward end of a slide 323 bifurcated to engage and slide on the cross bar 291. The rear end of the slide 323 is pivoted to a bell crank 324 pivoted on a shaft 333, said bell crank having a rearwardly-projecting arm 325 carrying a stud 326 projecting into a notch in the forward end of a lever 327. The lever 327 is provided with a roller 328, which is normally held in engagement with a cam 329 (see also Fig. 22) by a spring 330 stretched between one arm of the bell crank 324 and a stud on the lever 327. The cam 329 is secured to the main cam shaft 229.

Near the beginning of the operation of the machine (see Fig. 126), when the main cam shaft 229 and the cam 329 rotate in a clockwise di-

rection (Fig. 32), the spring 330 rocks the lever 327 clockwise. This movement of the lever 327, through the bell crank 324, shifts the slide 323 to the left (Fig. 32), thus rocking the arm 320 and the yoke 272 clockwise. Clockwise movement of the yoke 272 permits the zero stop pawl 271 to be rocked by a spring 331 (Fig. 26), to position its flange 297 into the path of the flange 298 on the differential slide 290. The spring 331 is stretched between one end of the zero stop control plate 261 and the keyboard front plate 136. When no key is depressed, the plate 261 is free to move in the manner described later. When the differential slide 290 is released by movement of the universal rod 310, the flange 297, having been moved into the path of the flange 298, arrests the differential slide 290 in zero position. By reference to the time chart, Fig. 126, it can be seen that the cam 315 starts the slide 290 moving immediately the zero stop pawl is positioned in its effective position.

During an operation of the machine with an amount key depressed, the zero stop control plate 261, coacting with the depressed key, prevents the zero stop pawl 271 from moving into its effective position at the time the yoke 272 is actuated.

By reference to Fig. 26, it can be observed that the slot in the zero stop slide 261, through which the amount key 100 projects, is long enough to permit free movement of the key 100 therein, without affecting any movement of the zero stop control plate 261. However, when a key 100 is depressed, as shown in Fig. 23, the upper shoulder on the depressed key 100 moves into position to engage the left wall of the slot in the control plate 261 to prevent any movement of the zero stop control plate 261. The upper end of the zero stop pawl 271 has a toe projecting into a notch in the zero stop control plate 261, and therefore the zero stop pawl cannot move when released by the yoke 272 whenever a key 100 is depressed and blocks movement of the plate 261. Therefore, when an amount key is depressed and the plate 261 cannot move, the zero stop pawl 271 is maintained in its ineffective position at the time the yoke 272 is moved by its cam 329 (Fig. 32). Under these conditions, the yoke 272 rocks back and forth idly in the space between the toe on the zero stop pawl 271 and its upstanding arm (see Fig. 34).

When no key is depressed in the amount bank, the zero stop control plate 261, not being blocked by any key, is free to move to the right (Fig. 25) when the yoke 272 is rocked. Clockwise rocking movement of the yoke 272 permits the plate 261 to be so moved by the spring 331 connected to one end of the slide. Since the plate 261 can now be moved by the spring 331, the zero stop pawl 271 is rocked clockwise at the beginning of the machine operation to lower its flange 297 into the path of the flange 298 on the differential slide 290.

From the above it is clear that the zero stop pawl 271 is normally in its upper, or ineffective, position and is lowered into an effective position to arrest the differential slide 290, only when no key is depressed. Depression of the key 100 prevents movement of the plate 261 and therefore prevents the zero stop pawl 271 from moving into its effective position, thus permitting the differential slide to be moved under control of the depressed key.

The above arrangement is novel in that it places a minimum load on the amount keys. By moving the zero stop pawl by power supplied by

the motor, the extra load usually required to move the zero stop pawl by depression of the amount keys is eliminated.

TOTALIZERS

The machine as disclosed herein has eleven totalizers. The number of totalizers provided in a machine depends upon the business system in which the machine is to be used. As disclosed herein, the upper totalizer, also referred to herein as the "List" totalizer, consists of a single set of wheels, which may be visibly read through the openings 127 (Fig. 2) in the cabinet of the machine. The rear totalizers, also referred to herein as the "Transaction" totalizers, are what are known in this art as "interspersed" totalizers and accumulate items credited to the entries indicated by the legends on the keys 101 to 108 inclusive (Fig. 2). The front totalizers, also referred to herein as the "Batch" totalizers, consist of two interspersed totalizers, one for the "A" batch totals, and the other for the "B" batch totals. The "List" totalizer is a non-shifting totalizer, and therefore no shifting mechanism is required for selection. Since no shifting is required, totals may be taken from this totalizer in a single cycle of operation, as distinguished from the two-cycle total-taking operations, usual in this art.

The interspersed totalizers on the rear and front lines require shifting for selecting the proper totalizer into which amounts are to be added, or from which totals are to be taken. For this reason, the usual two-cycle operation is required for clearing the selected totalizer on the rear and front totalizer lines. Mechanism is provided which is hereinafter described for automatically controlling the machine for either one-cycle or two-cycle total-taking operations.

FRONT, OR "BATCH," TOTALIZER LINE

The Batch totalizer line comprises two interspersed totalizers consisting of totalizer elements 350 (Figs. 20, 35, 49, and 50). The totalizer elements 350 are rotatably mounted on a totalizer shaft 351. The shaft 351 is shiftably mounted in bearings carried by a pair of engaging arms 352 located adjacent the frame plates 194 and 199 (see also Figs. 7 and 12). The engaging arms 352 are mounted on a shaft 353 so as to rock thereon. Each arm 352 is provided with a cam slot 354. Engaging each cam slot 354 is a roller 355 carried by an arm 356 mounted on a stud 357, one carried by each side frame 194 and 199. Each arm 356 is also provided with a stud 358 projecting into an open slot in each arm 359 secured on the rock shaft 353. The rock shaft 353 is actuated during the machine operation in either adding to total-taking timing in a manner described hereinafter.

The shaft 351, together with the totalizer elements 350, is shifted endwise to properly align one or the other of the two interspersed totalizers with the actuator racks 304 (Fig. 35). The manner in which the totalizer elements 350 are properly aligned with the actuator rack 304 is described hereinafter.

Front, or "Batch," totalizer aligner

When the totalizer wheels 350 are in their disengaged positions, as shown in Fig. 49, an aligner 360, engaging between the teeth of the wheels 350, maintains the totalizer wheels against rotation. The aligner 360 is long enough to span the entire totalizer line and extends from the frame 194 to the frame 199. This aligner is in

the form of a yoke, having a bail and two arms 366, each of the latter having a stud 362 projecting into a cam slot 361 of an engaging arm 359. Upon rocking of the shaft 353, the cam slots 361, engaging studs 362 on aligner arms 366, disengage the aligner 360 from the totalizer elements 350, after the totalizer elements are properly engaged with the actuator racks 384.

Rear, or "Transaction," totalizer line

The rear totalizer line includes eight sets of interspersed totalizer elements 370 (Fig. 12). A ninth totalizer is shown in Fig. 12 to illustrate the maximum number of totalizers which can be provided. However, the ninth totalizer is shown in the position corresponding to the "Add Print" key, which key, in the present disclosure, prevents the rear totalizer from becoming engaged with its actuators. Therefore, as disclosed herein, nothing will ever be entered into the ninth totalizer. Therefore, for the purpose of this description, it is assumed that only eight totalizers on the rear totalizer line are actually used, which is adequate for the application illustrated.

The engaging mechanism for the rear totalizer line is identical with that described for the front totalizer line. The totalizer elements 370 are mounted on a shaft 371 shiftably mounted in bearings in a pair of arms 372, rotatably mounted on a rock shaft 373. The arms 372 are provided with notches similar to the notch 354 (Figs. 49 and 50), with which rollers 375 (Fig. 12) of arms 376, similar to the arm 356 (Fig. 50) engage. The arms 376 are provided with rollers 378 (Fig. 12), similar to the rollers 358, which project into open slots in rocking arms 379 pinned to the shaft 373. When the shaft 373 is rocked in the manner described hereinafter, the cam arms 379, through rollers 378, rock arms 376, which, through rollers 375, rock the arm 372 to engage the totalizer wheels 370 with the actuator racks 385.

An aligner 389, similar to the aligner 380, is provided for the rear totalizer line and is operated by the arms 379 in like manner.

During the operation of the machine, the totalizer shaft 371 is shifted laterally in bearings of arms 372, under control of the transaction keys, to align the proper set of totalizer wheels 370 with the actuators 385. Thereafter the shaft 373 is given a rocking movement, by mechanism described hereafter, to engage the selected set of totalizer elements 370 with the actuators 385 in the proper timing, so that either adding or total-taking operations may be performed in the selected totalizer.

Each totalizer shaft 351 and 371 has provided thereon a novel means for adjusting the totalizer elements in respect to the actuators 384 and 385, so that accurate alignment can be obtained. This novel construction is the same for both totalizer shafts, and therefore the mechanism is illustrated in connection with the rear totalizer line only. This mechanism is best disclosed in Fig. 12.

The left-hand end of the shaft 371 (Fig. 12) is provided with threads to receive an adjustable aligner member 381. The aligner member 381 consists of a castellated nut having aligner disks 382 thereon, arranged to engage aligning slots 383 in an aligning block 384 mounted on the left side frame 194. The right-hand end of the shaft 371 is threaded at 385 to receive an adjusting nut 386. A yoke 387 straddles the nut 386, and the yoke is differentially shifted sidewise by a drum cam 388 under control of the transaction keys, in a manner to be described hereinafter, to selec-

tively shift the totalizer wheels 370 in relation to the actuators 385 for selecting a totalizer. When the totalizer shaft 371, together with the totalizer wheels 370, is assembled in the machine, the shaft 371 is adjusted endwise by turning the nut 386 to properly align the selected set of totalizer wheels 370 with the actuator racks 385. Thereafter, a cotter pin 377 is inserted through notches in one face of the nut 386 and through an opening in the shaft 371. This holds the selected totalizer elements 370 in alignment in respect to the shifting drum cam 388. After the first adjustment has been made by means of the nut 386, aligner member 381 is properly adjusted to align the aligner disks 382 with the aligner slots 383.

After the aligner member 381 properly aligns the disks 382 with the slots 383 in accordance with the adjustment of the nut 386, a cotter pin 390 is inserted through the notches in the aligner member 381 and through an opening in the shaft 371.

The novel arrangement including the two nuts 381 and 386 provides a fine adjustment for accurately aligning the interspersed totalizer wheels 370 with respect to the actuator racks 385. The front totalizer shaft 351 is provided with a like adjusting feature whereby the two "Batch" totalizers may be accurately aligned with the actuators 384.

Upper, or "List," totalizer

The upper, or "List," totalizer, is a visible totalizer and has only one set of wheels; therefore it is not shifted laterally for selection. This totalizer is controlled for engaging the actuators 386 in add timing under control of the "List" key 112 or the "Add" key 113, and for engagement with the actuators 386 in total-taking timing by the sub-balance key 111 or the balance key 110.

The upper totalizer includes a plurality of totalizer wheels 390, each one of which has secured thereto an indicating or reading dial 391 (Figs. 2, 20, and 35). The totalizer wheels 390 are rotatably mounted on a shaft 392, and spacing collars provided between the wheels properly space them in relation to the actuators 386. The shaft 392 is carried by an arm 396 at each end thereof, similar to the arms 352 (Fig. 49). The shaft 392, together with the two supporting arms 396, is rocked to engage the totalizer wheels 390 with the actuator 386 by mechanism similar to that shown in Figs. 49 and 50.

An aligner mechanism including an aligner arm 393 (Fig. 35) for each totalizer wheel 390 is provided. The arms 393 are pinned to a shaft 395, supported by the rocking arms 396. The two end arms 393 (one shown in Fig. 20) are provided with rollers 397, which project into cam slots 399 in rocking arms 400 pinned on a rocking shaft 398. The rocking arms 400 are similar to the rocking arms 359 (Figs. 49 and 50).

At the proper time during the machine operation, the shaft 393 is rocked by mechanism hereinafter described to actuate arms 400 to thereby rock the totalizer arms 396 to engage the totalizer wheels with the actuators 386 and to disengage the aligners 393 therefrom. When the totalizer is disengaged, the aligners are again moved into engagement with the totalizer wheels 390 to properly hold the totalizer wheels 390 in alignment so that upon a subsequent rocking movement into engagement with the actuators 386 the totalizer will engage the teeth thereof in proper relationship.

TENS TRANSFER MECHANISM

Each of the three totalizer lines is provided with a tens transfer mechanism whereby "1" is carried to the next higher order wheel when a lower order wheel passes from "9" to "0." Inasmuch as the tens transfer mechanisms for all three of the totalizer lines are identical, only the one associated with the front totalizer will be described herein. The tens transfer mechanisms are shown in Figs. 20, 35, and 36.

The carry-over of one unit into the next higher order wheel is effected by permitting movement of the actuator rack 304 mounted on the differential plate 303 one step, in addition to the extent of movement that this actuator moves under control of the amount keys. This extra step of movement is relative to the actuator plate 303. The actuator rack is provided with two studs 410 projecting into slots 409 in the differential plate 303. A spring 411, connected to one end of the rack 304, tends to move the rack counter-clockwise as viewed in Fig. 35. When the differential plate 303 is in its normal position—that is, the position in which the plate 303 comes to rest after an operation of the machine—a stud 412 on the actuator 304 rests against the forward end of an arm 413, as shown in Fig. 35. When in this position, the actuator rack is in its home or normal position; that is to say, no transfer has been effected. When a tens transfer is to be effected, the arm 413 is rocked clockwise to withdraw its free end out of the path of the stud 412 to permit the actuator 304 to move one step farther, thus adding an extra unit in the totalizer element engaged therewith. This tripped condition is illustrated in Fig. 35 with reference to the rear totalizer rack 305.

The front totalizer transfer mechanism is shown in side spacing in Fig. 36, as viewed from the under side thereof. In Fig. 36, the lower order is shown at the top, and the next higher orders are shown progressively toward the bottom. The arms 413 are mounted to pivot on a rod 415 carried by a plurality of frame members 425, one arm 413 and one frame 425 being provided for each order of the totalizer. A spring 416, connected at one end to the lower end of an arm 418 and at its other end to a rod 432 carried by all the frame members 425, normally maintains a flange 417, forming a yoke between the arm 413 and the arm 418, in contact with a yoke 419. The yoke 419 is carried on a rod 420, also supported by frame members 425. The forward end of the arm 413 is in the path of movement of the stud 412 on the actuator 304 when the flange 417 contacts the yoke 419. One arm of the yoke 419 is provided with a flange 421 projecting into the path of a long tooth of a totalizer wheel 350. The yoke 419 is spring-urged clockwise by a spring 422, stretched between one arm of the yoke and the rod 432, to maintain a tail 423 on one arm of a yoke 419 against the rod 415. When the totalizer wheel 350 is engaged with the actuator 304, and the actuator 304, traveling counter-clockwise, rotates the totalizer wheel 350 from its "9" position to its zero position, the long tooth on the totalizer wheel 350 strikes the flange 421 and rocks the yoke 419 counter-clockwise against the action of the spring 422. This counter-clockwise movement of the yoke 419 withdraws it from contact with the flange 417 and permits the spring 416 to rock the arm 413 clockwise out of the path of movement of the stud 412 on the actuator 304 for the next higher order. There-

upon, when the actuator plate 303 in the next higher order moves its associated actuator 304 to its home position, the actuator 304 moves one extra step to enter "1" in said next higher order wheel.

If the actuator 304 of the said next higher order wheel is in home position—that is, with the stud 412 against the free end of the arm 413—when the next lower order wheel 350 passes from "9" to "0" at the time the yoke 419 is moved out of contact with the flange 417, the arm 413 of the next higher order is moved out of contact with the stud 412. Thereupon the spring 411 moves the actuator 304 one step, thus entering "1" in said next higher order wheel. When released to enter a unit in the said next higher order wheel, the rack 304 is limited in its movement of one step by engagement of the stud 412 with an edge 424 on its associated frame member 425.

The entire tens transfer mechanism for each totalizer is carried by the plurality of frames 425 so as to constitute a unit assembly which is separately assembled and thereafter inserted into the machine as a unit. Each frame member 425 is provided with an inwardly-extending arcuate foot 428, which rests on a sleeve on the shaft 302. At the outer ends, the frame members 425 are supported by rods 426 and 427.

Before mounting the frame members 425 on the rods 426 and 427, spacing bars 429 and 430 are inserted into position. These spacing bars 429 and 430 are notched to engage over each frame member 425. In assembling the spacing bars 429 and 430, they are inserted into the openings provided for the rods 426 and 427 and are slid into position over the frames. Thereafter the rods 426 and 427 are inserted into the openings provided therefor and shifted into position, where they maintain the spacing bars against any movement, thus forming a completely assembled unit ready to be inserted into the machine. After the rods 426 and 427 are in position to maintain the transfer unit properly assembled, the unit is inserted into the machine with the arcuate feet 428 resting against the sleeve on the shaft 302. The ends of the rods 426 and 427 are tapped to receive screws which project through holes in the frames 194 and 199, and into said tapped ends of the rods 426 and 427, to maintain the tens transfer unit assembly firmly in position.

Secured to each of the frame members 425 is an aligner bar 433 to maintain all of the totalizer wheels 350 which are not engaged with an actuator rack against rotation. A space is provided at the point of engagement with the actuator 304 to permit free rotation of the engaged totalizer wheel 350.

TENS TRANSFER RESTORING MECHANISM

Immediately after the amounts, including the tens transfers, have been entered into the totalizer, the totalizer wheels are disengaged from the actuators, and thereafter all the tripped tens transfer arms 413 and actuators 304 are restored to their normal positions.

The normal position of the restoring mechanism is shown in Figs. 20, 54, and 55, and the position which it assumes at the time the tens transfers are entered is shown in Fig. 35.

The means for restoring the tens transfer mechanism and the actuators 304 comprises a multiarmed plate 450 for each order of the totalizer. All of the plates 450 are pinned to the shaft 302, together with an arm 451, which has

pivoted thereto the upper end of a link 452. The lower end of the link 452 is pivoted to an arm 453 pivotally mounted on a stud 454 carried by the left side frame 181. The arm 453 is provided with two anti-friction rollers 455 coacting with a two-plate cam 456 pinned on the main cam shaft 229 near the left end thereof and adjacent the left side frame 181.

At the beginning of a machine operation, the cams 456 rock the arm 453 slightly counter-clockwise, thus raising the link 452 and rocking the multi-armed plates 450 counter-clockwise to the position shown in Fig. 35. When the plates 450 are in this position, the tens transfers may be freely entered into the totalizer wheels. After the amounts have been entered into the totalizer wheel and the appropriate tens transfers have been entered, the totalizer is disengaged from the actuators. Immediately thereafter, the cams 456 rock the arm 453 clockwise. This imparts a clockwise movement to the shaft 302 to rock the multi-armed plate 450 clockwise, to cause an arm 457 thereon to engage the stud 412 of the rack 304 to restore the rack to its normal position. A second arm 458 of the multi-armed member 450 engages a stud 459 on the transfer arm 413 and restores it to its normal position, whereupon the yoke 419 is restored to its normal position by its spring 422 to maintain the transfer arm 413 in its normal position. After all the tripped transfer pawls have been restored, and near the very end of the machine operation, the cams 456 again rock the arm 453 counter-clockwise, thus rocking the shaft 302 counter-clockwise to position the multi-armed plate 450 into the position shown in Fig. 20.

Two arms like the arms 457 and 458 are provided on the multi-armed plate adjacent the upper and back totalizer lines to restore the actuator racks 305 and 306, together with their tripped transfer members, in the same manner as described hereinbefore.

The above-described tens transfer restoring mechanism is timed to operate so that the tens transfer tripping arms 413 are always in their cocked positions when the machine comes to rest; that is to say, in a position ready to be tripped during the next machine operation. The restoring movement takes place near the end of the operation in which the tens transfer arms 413 are tripped. In this respect, the tens transfer restoring mechanism differs from the usual tens transfer restoring mechanisms, which in the prior art are usually restored at the beginning of the succeeding operation. This timing of the restoring of the tens transfer arms 413 becomes important when a single-cycle total-taking operation is made, as will become apparent hereinafter.

AMOUNT TYPE SETTING MECHANISM

To provide for printing the amounts entered into the totalizers on the deposit slip, the audit tape, and the issuing tape, three groups of type elements are mounted on shafts 463, as shown in Figs. 76A and 76B. A shaft 463 is supported in bearings carried by each pair of auxiliary plates 203, so as to provide a separate group of type wheels for each printer section. Each amount type wheel 465 (the tens order type wheel 465 being shown in Fig. 20) is adjusted in accordance with the amount entered into the totalizer by the amount differential mechanism. The amount differential mechanism controls the

setting of a slide 466 (Figs. 20 and 23 to 28 inclusive). The slide 466 is slotted to be supported by the cross bars 291 and 292. The slide 466 is adjusted during each operation to represent the item entered into the totalizer and remains in the set position until readjusted during the next succeeding operation. During each operation, when the universal rod 310 is rocked clockwise around the shaft 312 to release the differential members 290, the universal rod 310 strikes a surface 467 on the slide 466 and moves it to the right (Fig. 28) into a position which will be hereinafter referred to as the "eliminated" position. The term "eliminated" position is applied to the position that the slide 466 occupies when the type wheel 465 (Fig. 20) is in the zero eliminated position; that is, in a position in which a blank position on the type wheel is at the printing line. After the differential slide 290 has been adjusted differentially under control of the amount keys 100 or the zero stop pawl 271, as hereinbefore described, and after the slide 466 has been moved to its "eliminated" position, the two slides are coupled together by a coupling arm 468 pivoted to the slide 466 by a stud 469. The coupling arm 468 is provided with two coupling teeth 470 (see also Fig. 31), which teeth engage with teeth on the lower edges of the slide 290. Normally the teeth 470 are in engagement with the teeth on the slide 290, but, before the universal rod moves, the teeth 470 are withdrawn from engagement with the slides 290, so that the slides may be adjusted independently of each other. After the slides 290 and 466 assume their new positions, the coupling arm 468 is rocked clockwise to again couple the two slides together. After the slides have been coupled together, the universal rod 310 is rocked counter-clockwise, whereupon the rod 310 picks up the differential slide 290 from the position into which it was adjusted, and returns it to its normal position in a manner described hereinbefore. During this movement, the type adjusting slide 466, being coupled to the differential slide 290, is moved from its "eliminated" position into a position corresponding to the amount entered into the totalizers by the differential slide 290.

The disengagement and the reengagement of the coupling arm 468 are effected by a cam arm 471 (Fig. 31) mounted on the shaft 333. The cam arm 471 is provided with a cam slot 472, into which projects a universal rod 473 extending across the machine so as to project into the cam slot 472 in the arm 471 for each amount differential mechanism. The universal rod 473 is carried by three arms 474 pivotally mounted on the shaft 332. Near the center of the machine and adjacent the middle arm 474 is an arm 475 (see also Fig. 30) bifurcated at its upper end to engage the universal rod 473. A coupling pawl 476 is pivoted on the arm 475 by a stud 477 (Fig. 30) having a nose 478 lying in the path of a shoulder 479 (Fig. 31) of an arm 480, sleeved to a bell crank 481. The bell crank 481 is provided with two rollers 482, which are in contact with a pair of cams 483 mounted on the main cam shaft 229 (see also Fig. 22).

When, during the operation of the machine, the main cam shaft 229 is rotated clockwise (Fig. 31), the cams 483, coacting with the rollers 482, rock the bell crank 481 first counter-clockwise and then clockwise. During the counter-clockwise movement of the bell crank 481 and the arm 480 sleeved thereto, the shoulder 479 on the latter engages the nose 478 of the pawl 476

and rocks the arm 475, the shaft 332, and the universal rod 473 counter-clockwise, which, acting on the cam slot 472, rocks the arm 471 clockwise. Clockwise movement of the arm 471 brings a finger 484 thereon into contact with a stud 485 on the coupling arm 468 and rocks the coupling arm 468 clockwise to disengage the teeth 470 from engagement with the corresponding teeth on the differential slide 290. After the differential slide 290 has been adjusted under control of the amount keys, or the zero stop pawl, and the type setting slide 455 has been moved to its "eliminated" position, the cams 483 rock the bell crank 481 and the arm 480 clockwise and, acting through a finger 486 on the arm 480, engage the universal rod 473 and restore it clockwise to the position shown in Fig. 31. This movement of the universal rod 473, acting on the cam slot 472, raises the arm 471 and, through the stud 485, reengages the teeth 470 with the teeth on the under side of the differential slide 290.

After the coupling arm 468 is reengaged with the slide 290, the universal rod 310 restores the differential slide 290 to its home position. Inasmuch as the two slides are coupled together by the coupling arm 468 at the time the slide 290 is restored to its home position, the amount type setting slide 466 is moved into a position represented by the amount entered into the totalizer.

Each arm 474 is provided with a tail 487, which normally engages a rod 488 to maintain the arms 474 and the universal rod 473 in home position.

By referring to Fig. 26, it will be noted that the edge 490 of the arm 471, which normally supports the stud 485, lies in a plane parallel with the movement of stud 485, thus permitting free movement of the stud 485. When the arm 471 is in its moved position, as shown in Fig. 27, the lower edge 489 of the finger 484 is in a plane to permit free movement of the stud 485. In either of the two positions of the arm 471, the respective edges 489 and 490 maintain the pawl in disengaged, or engaged, position throughout their entire movement. Thus the edges 489 and 490 provide a locking means for locking the coupling arm 468 in either its engaged position or its disengaged position.

In order to better point out how the amount type setting slide is adjusted during an operation of the machine, reference may be had to Figs. 20, 26, 27, and 28, where the movements of the various parts are shown during the operation in which nothing is entered into the totalizer wheel. The normal position of the differential mechanism is shown in Figs. 20 and 26. When the machine is operated without an amount key depressed, the zero stop pawl 271 controls the positioning of the differential slide 290. At the very beginning of this operation (see the time chart, Fig. 126), the universal rod 473 is rocked counter-clockwise to disengage the coupling arm 468 from the slide 290, and the zero stop pawl 271 is lowered into the path of the flange 298, as shown in Fig. 27. Upon movement of the universal rod 310, the differential slide 290 is released to the action of the spring 307 and is moved until the flange 298 thereon engages the flange 295 on the zero stop pawl. This arrests the differential slide 290 while the universal rod continues to move in a clockwise direction. This condition is shown in Fig. 27. Upon further movement of the universal rod 310, the rod engages the surface 467 on the type setting slide 466 and moves the latter to the "eliminated" position, shown in Fig. 28. After the type setting slide 466 is positioned in its

"eliminated" position, the coupling arm 468 is again rocked into engagement with the teeth on the differential slide 290, as shown in Fig. 28. During the return movement of the universal rod 310, the major part of its initial movement is idle, and, when it strikes the shoulder 309 on the differential slide 290, it picks up this slide and returns it to its home position. During this movement, the amount type wheel setting slide 466 is adjusted to the same extent that the differential slide 290 was moved out of its home position, because during this setting movement the two slides are coupled together by the coupling arm 468. Since the differential slide 290 in the operation being described is moved one step out of its normal position into its zero position, the amount type setting slide 466 is moved one step from its "eliminated" position into its zero position.

The setting of the type setting slide 466 for setting up a "5" is illustrated in Figs. 23, 24, and 25. If the machine is operated with the "5" key depressed, as shown in Fig. 23, after the coupling arm 468 has been disengaged from the teeth in the slide 290, the differential slide 290 moves to the right until arrested by the depressed "5" key, as shown in Fig. 23. Upon further movement of the universal rod 310, it engages the surface 467 of the slide 466 and moves it into the position shown in Fig. 24, where the amount type wheel setting slide 466 is shown in its eliminated position, and the amount differential slide 290 is in its "5" position. After this setting has been completed, the coupling arm 468 is raised by the universal rod 473 to the position shown in Fig. 24. After the coupling arm 468 has been engaged with the slides 290, the universal rod 310 is restored to its normal position and during this movement engages the shoulder 309 on the differential slide 290 and moves the differential slide back to its home position. During this movement, the two slides, being coupled together by the coupling arm 468, are moved together, and the slide 466 receives the same extent of movement as the differential slide 290, which is equal to six steps, thus moving the type setting slide 466 from its "eliminated" position into the "5" position, as shown in Fig. 25.

At the end of the machine operation, the coupling arm 468 remains in engagement with the teeth on the slide 290 until uncoupled during the first part of the next machine operation. Advantage is taken of this condition for repeat operations in a manner to be described hereinafter.

The tens order type wheel 465 (Fig. 20) in each group of type wheels shown in Figs. 76A and 76B is adjusted by the type setting slide 466 in a manner now to be described. The amount setting slide 466 is provided with teeth 496 (Figs. 20 and 23 to 28 inclusive); which engage with a pinion 497 rotatably mounted on a shaft 498 (see also Fig. 77B). Connected to the pinion 497 by a hub 499 is a segment 500. The segment 500 meshes with a ring gear 501 similar to that shown in the United States patent to Walter J. Kreider, No. 1,693,279, issued November 27, 1928. The ring gear 501 is provided with internal teeth 502, meshing with a pinion 503 on a square shaft 504.

The square shaft 504 extends through all of the ring gears, as shown in Figs. 76A and 76B. Located in alignment with each type wheel 465 for the three groups of type wheels are ring gears 505, 506, and 507. Mounted on the square shaft

504 in alignment with each of the ring gears 505, 506, and 507 is a pinion similar to the pinion 503 (Fig. 20), which meshes with internal teeth of the ring gears 505, 506, and 507. Each ring gear 505, 506, and 507 is provided with teeth 508, which mesh with toothlike notches in the type wheels 465 whereby the type wheels are adjusted an extent equal to the adjustment of their corresponding ring gears.

From the above it is apparent that adjustment of the type setting slide 466 by means of its teeth 496, the pinion 497, the segment 500, the ring gear 501, the pinion 503, the shaft 504, and the ring gears 505, 506, and 507 adjusts the type wheel 465 in each group of type wheels in accordance with the amount entered into the totalizer.

The amount type wheel for each amount bank is adjusted by a similar train of mechanism, except for the ten-million-dollar amount bank. The connections for setting the ten-million-dollar type wheel is shown in Figs. 20, 76A, 76B, 77A, and 77B.

In the case of the ten-million-dollar bank in the present disclosure, there is no type wheel provided in the "Deposit slip" printing section.

Meshing with teeth similar to the teeth on the pinion 497 (Fig. 20) in the ten-million-dollar bank is a pinion 515 (Fig. 77A) connected to a segment 517 by a hub 516. The segment 517 meshes with a ring gear 518 mounted to rotate on a disk 631, secured to a shaft 632, and said ring gear 518 having internal teeth meshing with a pinion 519 on a square shaft 520. The square shaft 520 extends between the two side frames of the machine, as shown in Figs. 77A and 77B, and has mounted thereon two pinions, one inside of each ring gear 521 and 522 on disks 631, so as to drive these ring gears an extent commensurate with the movement of the ring gear 518. Each gear 521 and 522 meshes with an idler pinion 523 (Fig. 20) on a shaft 524. Each pinion 523 meshes with a respective ring gear 525 (Fig. 76A) and 526 (Fig. 76B), which mesh with the ten-million-dollar type wheels 527.

The two groups of ring gears, one group including the ring gears 501 and the disks 509, mounted on the shaft 510, and the other including the ring gears 521 and the disks 631, mounted on the shaft 632, provide a flexible construction for arranging and assembling the machine to fit various systems. The type wheels can be assembled on the type wheel shafts in any position throughout the width of the machine. If desired, an additional type line can be provided beneath the ring gears 521 so that, if some system or application requires two printing lines, two printing lines can be provided in the present machine without the necessity of redesigning the entire type setting mechanism.

ZERO SETTING CONTROLS

The type setting slides 466 are controlled in their movement so that zeros are not printed above the highest significant order. As pointed out above, the slide 466 is moved to its "eliminated" position during each operation of the machine prior to being readjusted by the universal rod 310 by the slide 290 and the coupling arm 468. In order to eliminate the printing of zeros where no zero printing is desired, it is only necessary to prevent adjustment of the slide 466 out of its "eliminated" position when the universal rod 310 is restored to its normal position. As explained above, the differential slide 290 is moved from a normal position to a "zero" position when

no amount key is depressed, which movement consists of one step of movement. In order to prevent the type setting slide 466 from being moved out of its "eliminated" position during machine operation, it is only necessary to move the differential slide 290 to its normal position before the coupling arm 468 is moved into its coupling position, wherein the differential slide 290 and the type setting slide 466 are coupled together. If the differential slide 290 is restored to its normal position before the coupling arm 468 becomes effective, then, upon subsequent restoring movement of the universal rod 310 to its normal position, no movement of the type setting slide 466 will take place. This leaves the type wheels standing with a blank position at the printing line.

To move the differential slide 290 (Figs. 26, 27, and 28) from its zero position to its normal position prior to the engagement of the coupling arm 468 with the slides 290 and 466, a yoke-shaped pawl 531, pivoted on a rod 532 supported by cam arms 533 loosely mounted on a shaft 534, is provided. A spring 535, stretched between a flange on a downwardly extending arm of the pawl 531 and an arm 536, also pivoted on the shaft 534, normally maintains a tail 537 of the pawl 531 in engagement with a rod 538 carried by three of the four arms 311. See also Fig. 22. One pawl 531 is pivotally mounted on the rod 532 for each amount bank above the ten-cent bank. An arm 536 is provided for each bank of amount keys above the ten-cent bank and has an upwardly-extending finger with a flat surface 539 normally bearing on a stud 540 carried on the differential slide 290. The spring 535 normally maintains the surface 539 in engagement with the stud 540.

Carried by each of the three arms 311 (Fig. 22) are rollers 541 (see also Figs. 26, 27, and 28), which project into cam slots 542 of the cam arms 533. When the machine is in its normal, or home, position, the rollers 541 are in the left-hand ends of the cam slots 542 (Fig. 26), and, when the arms 311 are moved clockwise to move the universal rod 310 clockwise to release the differential slides 290, the rollers 541 travel in the cam slots 542 and rock the cam arms 533 counterclockwise. During this movement of the arms 311, the rod 538 is withdrawn from beneath the tails 537 on the pawls 531, which permits the springs 535 to rock the pawls 531 clockwise. If, as illustrated in Fig. 27, the differential slide 290 is arrested in its zero position by the zero stop pawl 271, the pawl 531, upon being released by movement of the rod 538 from beneath the tail 537 thereon, moves behind a shoulder 543 formed on the lower edge of the differential slide 290. The position of the parts at this stage of the machine operation is shown in Fig. 27. Continued movement of the universal rod 310 moves the type setting slide 466 to its "eliminated" position, and the roller 541 on the arms 311, moving in the cam slot 542, rocks the cam arms 533 counterclockwise, whereby the differential slide 290 is moved to the left by the pawl 531 to its home position, as shown in Fig. 28. After the differential slide has been moved to its home position, the coupling arm 468 is moved to engage the teeth on the lower edge of the slide 290, as shown in Fig. 28. When the universal rod 310 is now restored to its home position, it does not change the setting of the differential slide 290, inasmuch as this slide has already been restored to its home position by the pawl 531. Inasmuch as the differential slide 290 is not moved at this time, the

type setting slide 466 is also not moved and therefore remains in its "eliminated" position. When moved into this "eliminated" position, the slide 466, through the connections hereinbefore described, positions a blank on the type carrier at the printing line.

The above description points out how one differential unit is controlled to prevent zero printing. If, however, an amount is set up in an amount bank higher than a lower order bank in which no amount has been set up, it is desired to set a zero in said lower bank. In order to control the lower order banks to print zeros, it is only necessary to prevent the pawl 531 in said lower order from moving into position to engage the shoulder 543 on the differential slide 290 in said lower bank. To accomplish this, a flange 544 (Fig. 29) is provided on each pawl 531, which underlies a shoulder 545 of the next highest order pawl 531. If a higher order pawl 531 is prevented from moving into the path of the shoulder 543, the flanges 544 of all the orders lower than the one prevented from rising will also be held depressed. Therefore, even though no amounts are set up on the lower order differential slides 290, the pawls 531 for said lower orders are nevertheless held in depressed position.

When the pawls 531 are held in their depressed positions and the universal rod 310 and the arms 311 pass through their middle positions (shown in Fig. 27) to rock the cam arms 533 counterclockwise, the pawls 531 are ineffective to adjust the differential slides 290 from their zero positions into their home positions. After the coupling arm 468 is moved into engagement with the slide 290, the universal rod 310 is moved to its home position. As the universal rod 310 moves to its home position, it restores the differential slide 290 to its home position, thereby moving the type setting slide 466 one step from its "eliminated" position into its "zero" position, thus filling in zeros in the lower orders.

The means for preventing the pawls 531 from rising into the path of the shoulders 543 in those orders in which an amount is set up is illustrated in Figs. 23, 24, and 25. As illustrated in Figs. 23 and 24, the "5" key is shown depressed and the differential slide 290 moved to the "5" position. When the differential slide 290 moves to its "5" position, the stud 540 is withdrawn from contact with the shoulder 539 of the arm 536, thus permitting the spring 535 to rock the arm 536 clockwise until a notch 546 therein engages over the flange of the pawl 531, to latch the pawl 531 against rising under the action of the spring 535.

From the above it becomes apparent that all of the pawls 531 in those orders in which the differential slide 290 passes beyond zero position are latched down by arms 536, and therefore all of the pawls 531 in the orders lower than the order in which a differential slide 290 passes beyond zero are held down by the interaction between the shoulder 545 and the flange 544 on the pawls 531. Therefore zeros will be printed in all such lower orders.

REPEAT MECHANISM

The amount differential slide 290 can be controlled to repeat a previous entry operation. At the end of an operation of the machine, the type setting slide 466 remains in its set position, and the coupling arm 468 remains in its coupling position and thereby maintains the differential slide 290 and the type setting slide 466 coupled to-

gether. For repeat operations, the coupling arm 468 is maintained in its coupling position throughout the operation, and, since no amount keys 100 can be depressed for repeat operations, the type setting slide 466 controls the movement of the differential slide 290. When the machine is released for a repeat operation and the universal rod 310 is rocked clockwise, the universal rod engages the surface 467 of the type setting slide 466 and moves the slide and the differential slide 290 to the right in unison until the slide 466 is arrested by the engagement of a surface 561 (Fig. 23) with the cross bar 291. This movement is of an extent to move the differential slide in accordance with the amount that was previously set on the type slide 466. When the universal rod 310 is moved counterclockwise to restore the actuator slide 290 and the type setting slide 466 to their original positions, the amount which was standing on the slide 466 is entered into the totalizer.

This mechanism can also be used for transferring totals from one totalizer to another. This is accomplished by first resetting a totalizer in a manner to be described hereinafter, at the end of which operation the type setting slide 436 is set to represent the total taken from the totalizer. If a selecting key for selecting another totalizer is depressed in combination with the Repeat key and the machine is released for operation, the total standing on the slides 466 will be entered into the newly-selected totalizer.

An interlock, described later, prevents depression of the Repeat key if an amount key is depressed, and vice versa. A means, also described later, prevents the zero stop pawl 271 from becoming effective during a repeat operation.

The mechanism for maintaining the coupling arm 468 in engagement with the differential slide 290 and the type setting slide 466 throughout the repeat operation is shown in Figs. 30 and 31. This mechanism consists of a means under control of the Repeat key 114 to rock the coupling pawl 476 from the path of the shoulder 479 on the arm 480. The mechanism for controlling this uncoupling of the pawl 476 includes a cam 562 (Figs. 22 and 30) mounted on the main cam shaft 229. Coacting with the cam 562 is a roller 563 carried on an arm 564 pivotally mounted on the shaft 312. The arm 564 is notched to engage a stud 565 carried by an arm 566 of a three-armed lever 567. A spring 568, connected to the stud 565 and the framework of the machine, normally maintains the roller 563 in engagement with the cam surface of the cam 562. The three-armed lever 567 is provided with a stud 569 projecting into the plane of the coupling pawl 476. A third arm on the three-armed lever has pivoted thereto a link 570, the other end of which is pivoted to a disk 571 carried in the ring gear assembly previously described. The location of the disk 571 is shown in Fig. 77A. The disk 571 is provided with internal teeth 572 meshing with a pinion 573. The pinion 573 is carried by a square shaft 574 and extends across the machine and supports a second pinion 573 in mesh with internal gears of a disk 575. See also Fig. 77B. The disk 575 has pivoted thereto a link 576 (Fig. 30), the upper end of which is pivoted to a bell crank 577 mounted on a stud 578 on the keyboard end plate 133 (Fig. 3), adjacent the first transaction bank. Mounted in the first transaction bank is the Repeat key 114, having a square stud 579 located near its bottom end. A flange 580, formed on the bell crank 577, is so located

that, upon movement of the bell crank 577 in a counter-clockwise direction, the flange 580 strikes the stud 579 when the Repeat key is in its underpressed position. Depression of the Repeat key 114 moves the stud 579 out of the path of movement of the flange 580.

During the operation of the machine, following depression of the Repeat key 114, when the cam 562 receives its initial movement, the spring 563 rocks the arm 564 clockwise. Clockwise movement of the arm 564, through the stud 565, rocks the three-armed lever 567 counter-clockwise. This counter-clockwise movement of the three-armed lever 567 is permitted during this type of operation because the flange 580 on the bell crank 577 passes over the stud 579 of the depressed Repeat key 114, under action of the spring 563. Counter-clockwise movement of the three-armed lever 567 causes the stud 569 thereon to engage and rock the coupling pawl 476 counter-clockwise about the stud 477 on the arm 475 to withdraw the nose 478 of the coupling pawl 476 from the path of the shoulder 479. Simultaneously with the counter-clockwise movement of the pawl 476, the stud 569 enters a notch 581 on the lower edge of the arm 475 and locks the arm 475 against movement. With the arm 475 locked by the stud 569 and the nose of the pawl 476 withdrawn from the shoulder 479, when the cams 483 rock the arm 480, the movement of the latter is idle, and therefore the arms 474, carrying the rod 473, remain stationary. With the rod 473 remaining stationary in the cam slot 472 of the arm 471, the coupling pawl 468 is held in engagement with the differential slide 290 and the type setting slide 466 throughout its forward and backward movements.

Previous to the return of the universal rod 310, the cams 483 again rock the arm 480 to its normal position, shown in Fig. 31, and thereafter the cam 562, engaging the roller 563, rocks the arm 564 back to its normal position, shown in Fig. 30, thereby withdrawing the stud 569 from the notch 581, and at the same time, the flange 580 is restored to its normal position, shown in Fig. 30.

During a machine operation in which the Repeat key 114 is not depressed, the coupling pawl 476 is controlled to remain in its effective position in the path of the shoulder 479 by the flange 580 on the bell crank 577 engaging the stud 579 of the underpressed Repeat key 114 when the cam 562 is rotated to release the arm 564 to the action of the spring 563. During this operation, when the flange 580 strikes the stud 579 of the underpressed Repeat key, only slight movement under action of the spring 563 is permitted, which slight movement is not sufficient to move the stud 569 into the notch 581 of the arm 475. Therefore the coupling pawl 476 remains in its effective position, and the cams 483 operate the arm 475 in a manner described hereinbefore to withdraw the coupling pawl 468 before the initial movement of the differential slide 290.

At the beginning of a repeat operation, the type setting slides 466 are all in the previously set position. This includes the setting of those which were controlled by the zero printing control mechanism. It is necessary that the slides 466 control the movement of the differential slide 290 to repeat the previous setting. This makes it desirable to prevent any control over the setting of the slides 290 and 466 by the zero setting mechanism. To prevent any such controls, a

special means is provided to disable the zero setting control mechanism.

To disable the zero setting control mechanism during repeat operations, the highest order cam arm 471 (Fig. 30) has riveted thereto an arm 585 provided with a stud 586 at its free end. A bell crank 587 (see also Fig. 22), pivoted on the shaft 534 and spring-urged into engagement with the stud 586 by a spring 588, normally engages over the pawl 531 of the highest order to prevent its being rocked clockwise in a manner described hereinbefore. The construction of the parts 585 and 587 is such that the bell crank 587 remains latched over the pawl 531 as long as the cam arm 471 remains in its normal position.

Inasmuch as, during a repeat operation, the cam arm 471 is not moved out of its normal position, as pointed out above, the highest order pawl 531 remains latched down during repeat operations and by the flanges 544 (Fig. 29) maintains all of the pawls 531 for the lower order wheels in depressed position, and therefore the zero setting control mechanism is disabled during repeat operations.

During a normal entry operation, in which the Repeat key is not depressed when the universal rod 473 is rocked counter-clockwise to disengage the coupling pawl 468 to permit the differential slide 290 to move under the control of the depressed key, the arm 585 on the highest order bank, acting through the stud 586, rocks the bell crank 587 counterclockwise, thus releasing the pawl 531 in the highest order to the action of its spring 535. This frees all the pawls 531 to perform their functions in a manner described hereinbefore.

When the bell crank 587 is restored to its normal position at the end of a non-repeat operation by action of the universal rod 473, the pawls 531 are again latched by the bell crank 587.

TRANSACTION KEYS

The transaction keys for controlling the various functions of the machine are arranged in two banks, as shown in Fig. 2. The keys 101 to 108 inclusive control the selection of totalizers into which amounts are to be added, in addition to controlling other operations in the printer section of the machine in the manner described hereinafter. This bank of keys will be referred to herein as the second transaction bank. The keys 110 to 118 inclusive control the time and manner of operation of the totalizer engaging and disengaging mechanism, together with controlling certain functions of the printing mechanism described hereinafter. The bank of keys 110 to 118 will be hereinafter referred to as the first transaction bank.

Keys 110, 111, and 113 of the first transaction bank, and keys 101 to 108 inclusive of the second transaction bank, in addition to controlling the functions just mentioned, also act to release the machine for operation. Keys 109, 112, 114, 115, 116, 117, and 118 do not release the machine for an operation.

First transaction bank—Control slides

The release of the machine for operation, and the operation of certain interlocks, are controlled by a plurality of slides in the first transaction bank, shown in detail in Figs. 56, 57, 58, 59, 60, and 63. The specific controls effected by each of these slides will be described hereinafter in connection with the description of the mechanism for obtaining the functions which they control.

First transaction bank detent

One of the control slides in the first transaction bank consists of a detent 595 (Fig. 58) supported by the before-mentioned four rollers 176, for maintaining certain keys of the first transaction bank in depressed position. A spring 596, attached to an ear on the upper edge of the detent 595, normally maintains cam edges 598 of the slide against studs 597, one stud 597 being supported by each key 112, 114, 115, 116, 117, and 118. Depression of one of these keys wipes its respective stud 597 on its associated cam edge 598 to cam the detent to the left (Fig. 58) until the stud 597 passes beyond the cam edge 598, whereupon the spring 596 snaps the detent 595 to the right and over the stud 597 to maintain the respective key in depressed position. Near the end of the machine operation, the detent 595 is moved to the left, by means described hereinafter, to release the depressed key.

The keys 112, 114, 115, 116, 117, and 118, which are held in depressed position by the detent 595, are non-motorized keys; that is, keys which do not release the machine for operation. The detent 595 is provided to hold these keys in depressed position until a motorized key can be depressed.

First transaction bank—Machine release control slide

After one of said keys 112, 114, 115, 116, 117, and 118 is depressed, and held in its depressed position by the detent 595, one of the motorized keys in the bank may be depressed. These motorized keys are keys 110, 111, and 113 (Fig. 56).

Depression of the key 110, 111, or 113 wipes its stud 597 against a cam edge 600 on a control slide 601 (Fig. 57) supported on the four studs 176 and moves this slide toward the left against the action of a spring 602. The right end of the control slide 601 (Fig. 57) is provided with a stud 603, which projects into the bifurcated end of an arm 604, pinned to a shaft 605 carried by the keyboard frame. Also secured to the shaft 605 is a latching arm 606, which normally latches over a square stud 607 on an arm 603 pinned to the machine release shaft 264. Upon depression of a key 110, 111, or 113, the control slide 601 is shifted to the left (Fig. 57), thus rocking the arms 604 and 606 counter-clockwise to withdraw a shoulder 609 of the arm 606 from contact with the square stud 607. This releases the arm 608 and the shaft 264 to the action of a spring described hereinafter to move the arm and the shaft counter-clockwise. Counter-clockwise movement of the shaft 264 releases the machine for operation in the manner described hereinafter.

First transaction bank—Locking control slide

Also pinned to the release shaft 264 (Fig. 56) is an arm 615 having a stud 611 projecting into the bifurcated end of a locking control slide 612 slidably mounted between the four studs 176.

Counter-clockwise movement of the arm 615 and the moving of the control slide 612 toward the right (Fig. 56) moves an associated notch 613 of the slide 612 over the stud or studs 597 of the key or keys which have been depressed in the first transaction bank to lock the depressed key or keys in their depressed positions.

Near the end of the machine operation, the shaft 264 receives a clockwise rocking movement, by means described hereinafter, to shift the slide

612 to the left (Fig. 56) to withdraw the notches 613 from engagement with the studs 597 of the depressed keys, thus permitting the keys to be restored to their normal undepressed position by the spring 170.

During the leftward movement of the locking slide 612, it engages a stud 614 on the before-mentioned detent 595 (Fig. 58) to disengage the detent 595 from its engagement with the stud 597 of the depressed key to permit the depressed key to be restored to its home position.

First transaction bank—Interlocking slide between repeat key and total-taking keys

When the Repeat key 114 is depressed for a repeat operation, it is desired to prevent subsequent depression of the Balance key 110, the Sub-Balance key 111, the Batch Reset key 115, the Batch Read key 116, the Reset key 117, and the Read key 118, so that no Reset or Total-Taking key can be depressed in the first bank in combination with the Repeat key. In order to prevent such combination of keys from being depressed in the first transaction bank, an interlocking control plate 620 (Fig. 59) is provided, which plate lies adjacent to the detent 595. A spring 621, connected to an ear on the upper edge of the interlocking control plate 620, normally maintains a cam edge 622 therein in contact with the stud 597 of the Repeat key 114. When the Repeat key 114 is depressed, the stud 597, engaging the cam edge 622, shifts the control plate 620 toward the right (Fig. 59) against the action of the spring 621. The studs 597 of the keys 110, 111, 115, 116 and 117 project into inverted L-shaped openings in the plate 620. The stud 597 on the key 118 lies beyond the rear end of the plate 620. When the plate 620 is moved to the right by depression of the Repeat key 114, the horizontal leg 623 of the L-shaped opening for each of these keys passes over the studs 597 and prevents their depression after the Repeat key has been depressed. A notch in the end of the plate 620 prevents operation of the key 118 at this time. In the normal position, the vertical leg of the L-shaped slot is in the path of movement of the studs 597 on the total-taking keys, and therefore the keys may be depressed prior to depression of the Repeat key 114. If one of the total-taking keys is depressed prior to depression of the Repeat key, the stud 597 of the depressed key being in the vertical leg of the L-shaped opening, or in the path of movement of the plate 620, as in the case of the key 118, the plate 620 is prevented from moving toward the right, and therefore depression of the Repeat key is prevented after a total-taking key is depressed.

The studs 597 of the List key 112 and the Add key 113 project through square openings in the plate 620, and therefore the plate 620 can be moved either before or after depression of the List key 112 or the Add key 113.

First transaction bank—Interlocking slide between total-taking keys and amount keys

An interlock (Figs. 60, 61, and 62) is provided between the total-taking keys 110, 111, and 114 to 118 of the first transaction bank and the amount keys 100 to prevent release of the machine if an amount key 100 is depressed before a total key is depressed. This interlock is provided to prevent misoperation when totals are taken, since, during total-taking operations, the

actuator racks 304 must be free to be set under control of the totalizer wheels.

When an amount key 100 is depressed, a projection 635 thereon (Fig. 60) is positioned into the path of movement of the before-mentioned plate 263. The slide 263 is connected, by the arm 266, to move with the yoke 267. One arm 636 (Fig. 62) of the yoke 267 has pivoted thereon a link 637, the free end of which supports a stud 638 (see also Fig. 61). The stud 638 projects through a bayonet slot 639 in an arm 640 secured to the machine release shaft 264. The stud 638 also projects into an open slot 641 of a bell crank 642 pivoted on a stud 643 carried by the keyboard frame. The bell crank 642 is connected to an arm 644 by a link 645. The arm 644 is secured to a short shaft 630 carried by the right keyboard end plate 133 and an ear on the keyboard front plate 136. Also secured to the shaft 630 (Fig. 60) is an arm 629 having a stud 646 held in engagement with the end of a control slide 647 by a spring 648 (Fig. 61) stretched between the arm 644 and a stud in the keyboard frame. The spring 648, acting through the arm 644, the shaft 630, the arm 629, and the stud 646, normally maintains cam edges 649 of the control slide 647 in engagement with studs 597 of the total-taking keys 110, 111, 115, 113, 117, and 112, and with the stud 597 of the Repeat key 114.

When a key 110, 111, or 114 to 113 is depressed, the respective stud 597 of the depressed key wipes along the cam edge 649 coacting therewith and thereby shifts the control slide 647 leftwardly (Fig. 60). The end of the control slide 647, acting on the stud 646, rocks the arm 629, the shaft 630, and the arm 644 clockwise (Figs. 60 and 61), thus shifting the link 645 leftwardly to rock the bell crank 642 clockwise to shift the stud 638 into the lower, vertical, section of the bayonet slot 639 of the arm 640, secured to the release shaft 264. When the release shaft 264 is thereafter rocked by the depression of a motorized key, the arm 640, acting through the slot 639, carries the stud 638, the link 637, the arm 636, and the yoke 267 counter-clockwise. However, if, at the time the release shaft 264 is released, an amount key 100 is in depressed position, the yoke 267, the arm 266, and the plate 263 are held against movement by the projection 635 on the amount key 100 being in engagement with the plate 263. If no amount key 100 is depressed, the plate 263 is free to move, and therefore the release shaft 264 can rock to release the machine for operation.

First transaction bank—Zero stop pawl controls for total-taking operations

It is necessary to hold the zero stop pawls 271 out of effective positions during total-taking operations. This is accomplished by a stop arm 650 (Fig. 64) secured to the shaft 630. When the shaft 630 is rocked by the depression of a total-taking key, by the slide 647, the stud 646, and the arm 629, the stop arm 650 is moved into the path of a stud 651 on a pitman 652. The pitman 652 is bifurcated at its upper end to engage and slide on the shaft 630, and its lower end is pivoted to an arm 653 secured to the hub of the yoke 272. A rivet 654 also fastens the yoke 272 and the arm 653 together, the rivet being provided to give the yoke greater rigidity in respect to the arm 653.

If, when the yoke 272 (see also Figs. 20 and 32) is released, in the manner described hereinbefore, by the spring 330, under control of the cam 329, a total key has been depressed and the arm 650 overlies the stud 651, the yoke 272 cannot follow, 75

since it is arrested by the stop arm 650, acting through the stud 651, the pitman 652, and the arm 653. Therefore, the zero stop pawls 271 cannot rock into their effective positions, even though no amount key 100 has been depressed, and the actuators 290 are free to move so as to be set under control of the wheels of the selected totalizer.

First transaction bank—List key detent

When the List key 112 is depressed, it is convenient to maintain it in depressed position until a total is printed. The Balance key 113 is used to control the machine for taking the total of a list of items under control of the "List" key. To maintain the List key in depressed position, a detent 655 (Fig. 63) is provided in the first transaction bank, which detent is slidably mounted on the four rollers 176. A spring 656 normally maintains a cam edge 657 against the stud 597 of the List key 112, and a cam edge 658 against the stud 597 of the Balance key 110.

Depression of the List key 112, acting through its stud 597, shifts the detent 655 to the left (Fig. 63) against the action of the spring 656 until the stud 597 passes the end of the cam edge 657, whereupon the spring 656 snaps the detent 655 back to engage over the stud 597 of the depressed List key. The detent 655 can thereafter be shifted only by depression of the Balance key 110, which key, acting through its stud 597, wipes on the cam edge 658 to shift the detent leftwardly far enough to disengage the detent from the stud 597 of the List key 114. The spring 170 (Fig. 8) thereupon restores the List key into its normal undepressed position.

First transaction bank—Cycle control detent

To control the machine for two-cycle total-taking operations, a control slide 634 (Fig. 15) is provided, which also slides on the four rollers 176. This slide and its control over the cycling mechanism are described later.

Second transaction bank control slides

Keys 101 to 108 inclusive (Figs. 2, 16, and 37) in the second transaction bank release the machine for operation. The keys of the second transaction bank are provided with studs 597, which project into openings in, and cooperate with, certain detent slides.

To release the machine for operation, a detent 665 (Fig. 17) is provided in the second transaction bank, which has eight cam edges 666 coacting with the studs 597 on the eight machine release keys 101 to 108 inclusive. A spring 667 normally holds the cam edges 666 in engagement with the studs 597, and, upon depression of a key 101 to 108 inclusive, the detent 665 is shifted to the left (Fig. 17). The detent 665 is provided with a stud 668 near its right-hand end, which engages in a bifurcated end of an arm 669 secured to the before-mentioned shaft 605, which arm is like the arm 604 (Fig. 57). Leftward movement of the detent 665 rocks the arms 604 and 669 counter-clockwise to release the arm 608 and the release shaft 264, in a manner to be described hereinafter, to rock counter-clockwise. Counter-clockwise movement of the release shaft 264 rocks an arm 670 thereon (Fig. 16) counter-clockwise. The arm 670 is provided at its lower end with a stud 671, which engages in a bifurcated projection of a locking slide 672 adjacent the keys of the second transaction bank. When the release shaft 264 is rocked in said counter-

clockwise direction, the arm 670 shifts the locking slide 672 to the right (Fig. 16) to position a notch 673 over the stud 597 of the depressed key and a notch 674 over the studs 597 of the undepressed keys. The slide 672, therefore, holds the depressed key in its depressed position and the undepressed keys in their undepressed positions until the release shaft 264 is restored to its home position, whereupon the spring 170 (Fig. 37) restores the depressed key to its undepressed position.

The Add-Print key 109 (Figs. 2, 16, and 37) is of the type known in the art as a stay-down key, which remains in depressed position until released manually. In order to maintain the Add-Print key 109 in its depressed position until released manually, a detent 680 (Fig. 18) is provided, which is also mounted to slide on the rollers 176. Coacting with the stud 597 of the Add-Print key 109 is a cam edge 681. A spring 682 normally holds the cam edge 681 against the stud 597 of the Add-Print key. Depression of the Add-Print key cams the detent 680 to the left until a notch 683 moves over the stud 597 by action of the spring 682. The detent 680 has no connection with the release shaft 264, and therefore this key is not released by the machine release shaft. The detent 680 is provided with the before-mentioned finger 122 (see also Fig. 2), which projects through the cabinet of the machine and by means of which the detent 680 can be moved to the left to release the Add-Print key.

In order to prevent depression of the keys 101 to 108 inclusive after the Add-Print key has been depressed, the detent 680 is provided with L-shaped openings coacting with the studs 597 of the keys 101 to 108. When the detent 680 is in its normal position, as shown in Fig. 18, the keys 101 to 108 are free to be depressed. After one of these keys is depressed, the Add-Print key 109 cannot be depressed, inasmuch as the stud 597 of the depressed key 101 to 108 is in the vertical section of the L-shaped slot, and therefore depression of the Add-Print key is prevented. When the detent 680 is moved toward the left by depression of the Add-Print key, the horizontal section of the L-shaped opening passes over the studs 597, thus preventing depression of a key 101 to 108.

TRANSACTION BANK DIFFERENTIAL MECHANISMS

The depressed keys in the first and second transaction banks control the differential movement of actuators which control the various functions of the machine and control the selection of the proper totalizer for engagement with the amount actuators. Inasmuch as both differential mechanisms are alike, only one will be described herein in detail. Figs. 8 to 11 inclusive and 22 will be referred to in the description of the transaction bank differential mechanism. These figures illustrate the differential mechanism for the first transaction bank.

First transaction bank differential mechanism

Coacting with the studs 579 of the keys 110 to 118 inclusive is a differentially settable slide 689 (Figs. 8, 11, and 22). The studs 579 on the transaction keys alternately project to the right and left (Fig. 22) into the path of alternately-arranged ears 690 formed on the slide 689. The relationship between the studs 579 and the ears 690 is such that, on operation of the machine with a key depressed, the slide 689 is arrested in a

position commensurate with the position of the depressed key. The slide 689 is slotted at its front and rear ends to be supported by, and slide on, collars 691 and 692 carried by studs 693 and 694, respectively. The studs 693 and 694 are riveted on the frame 182 (Fig. 22) and are provided with tenons projecting into the side frame 180, and a screw 695, entering a tapped hole in each stud 693 and 694, maintains the frame 180 in proper relationship with the studs 693 and 694. Suitable spacing collars are provided to properly space the slide 689 on the studs 693 and 694, as clearly shown in Fig. 22.

The slide 689 is provided with teeth 696 (Fig. 11) meshing with a segment 697 of an arm 698 having a slot 699, into which projects a stud 700 of a latch 701 (Figs. 9 and 10). The arm 698 is rotatably mounted on a stud 702 carried by the frame 182 and by the side frame 180. The latch 701 is pivotally mounted on a stud 703 carried by an arm 704 also pivotally supported on the stud 702. A beam 705 is pivotally mounted on the arm 704 by a stud 706. The free end of the beam 705 is provided with a stud 707, which projects into a slot 708 of an arm 709, also pivoted on the stud 702. The arm 709 is provided with a segment 710 meshing with teeth 711 (Fig. 8) of a type setting and control slide 712. The control slide 712 is slidably mounted on the aforesaid collars 691 and 692, and at its upper end by a stud 688 mounted between the frames 196 and 199 (Fig. 7).

The latch 701 (Figs. 9 and 10) is provided with a toe 713 normally engaging with a notch 715 of a differential driver 716. The differential driver 716 is pivoted on the stud 702 and is provided with a notch 717, into which projects a stud 718 on the free end of a lever 719 pivoted on a stud 720 carried by the frames 180 and 182. The lever 719 is secured to an arm 733 (Fig. 8) by a hub 721. The arm 733 is provided with a pair of rollers 722, which coact with a pair of cam plates 723 (Figs. 8 and 22) secured to, so as to be rotatable by, the aforementioned sleeve 227 (Figs. 13, 14, 15, and 22). The lever 719 (Figs. 9 and 10) is provided with a roller 724, which is movable into engagement with a surface 725 of the beam 705 in a manner to be described presently.

When the cam plates 723 are rotated, upon rotation of the sleeve 227, the arm 733 is rocked clockwise (Fig. 8) to rock the lever 719 clockwise. Clockwise movement of the lever 719, through the stud 718 and the notch 717, rocks the differential driver 716 also clockwise. Clockwise movement of the driver 716 carries with it the latch 701 and, through the stud 700, rocks the arm 698 (Fig. 11) clockwise. Clockwise movement of the arm 698, by the segment 697, moves the slide 689 to the right (Fig. 8) until an ear 690 thereon comes into contact with the stud 579 of a depressed key. This arrests the slide 689 in a position commensurate with the depressed key and at the same time positions the arm 698 (Fig. 11) in a corresponding position. Arresting of the arm 698, through its cam slot 699 acting on stud 700, cams the latch 701 counter-clockwise around its stud 703, thus withdrawing the toe 713 from the notch 715 to arrest further movement of the arm 704. Counter-clockwise movement of the latch 701 (Fig. 10) cams an ear 726 thereon into a corresponding notch 727 (Fig. 8) of a locking plate 728 supported by the studs 693 and 720. Continued movement of the driver 716, after the latch 701 has been disengaged therefrom, moves a concentric surface 729 (Fig. 9) thereof beneath the toe 713 and positively locks the latch 701 and the

arm 704 in adjusted position, with the result that the stud 706 for the beam 705 is also locked in an adjusted position corresponding to the depressed key.

During the clockwise rocking movement of the lever 719, the roller 724 thereon comes into engagement with the surface 725 of the beam 705 and rocks the beam 705 around the stud 706 as a center. Movement of the beam 705 around the stud 706 cams the stud 707 on the lower end thereof into the slot 708 and rocks the arm 709 and the segment 710 into a position corresponding to the position in which the arm 704 has been adjusted and locked by the latch 701. This adjustment of the segment 710, through the teeth 711 on the slide 712, positions the slide 712 corresponding to the adjusted position of the differential slide 689.

After the control slide 712 has been positioned by the beam 705 in the manner just described, the cams 723 return the levers 719 counter-clockwise to restore the differential driver 716 into its home position. During this counter-clockwise movement of the driver 716, when the notch 715 again comes beneath the toe 713, the toe 713 drops behind the notch 715, and, upon continued clockwise movement, the driver 716, acting through a roller 714 thereon, engages the arm 704 and restores the arm 704 and the latch 701 to their home positions. During this movement, the segment 710 and the control slide 712 are held in their adjusted positions by means described hereinafter, and therefore the beam 705 pivots around the stud 707. The segment 710 remains in the adjusted position until readjusted during the next succeeding cycle of operation.

A counterbalancing plate 730 (Fig. 11) is pivotally mounted on the stud 702 adjacent the slide 688 and has a slot 731, through which the stud 700 on the latch 701 projects. A spring 732, stretched between the counterbalancing plate 730 and the arm 688, normally maintains the parts in the positions shown in Fig. 11. If, during the operation of the machine, the latch 701 has a tendency to withdraw prematurely from the notch 715 due to centrifugal force, the plate 730 prevents such movement. When the arm 688 is positively arrested, upon an ear 690 on the slide 689 coming into contact with the stud 579 of a depressed key, the stud 700, operating in the cam slot 699, rocks the latch 701 counter-clockwise in the manner described above. Counter-clockwise movement of the latch 701 moves the stud 700 thereon in the cam slot 731 to rock the counterbalancing plate 730 clockwise against the action of the spring 732. Since it is necessary to stretch the spring 732 to move the stud 700 in the cam slot 699, the spring 732 and the plate 730 act to prevent premature disengagement of the latch 701 from its driver 716.

Second transaction bank differential mechanism

The differential mechanism for the second transaction bank is identical with the differential mechanism just described for the first transaction bank, and, therefore, the same reference numerals are applied in Fig. 37. The description of the first transaction bank differential mechanism applies to the second transaction bank differential mechanism.

First transaction bank type wheel setting mechanism

Two type wheels 735 (Figs. 8, 76A, and 76B) are provided to print symbols on the audit tape,

and on the issuing strip, indicating the kind of operation being performed. The control slide 712 controls the positioning of the type wheels 735 mounted on the shafts 483 in the audit tape printing section and in the issuing strip printing section. No type wheel 735 is provided in the slip printing section.

Formed on the underneath side of the control slide 712 are teeth 736 (Fig. 8), which mesh with a segment 737 rotatable on the shaft 498. See also Fig. 77B. Connected to the segment 737 by a hub 738 is a segment 739, which meshes with a ring gear 740 on a disk 741 carried by the shaft 632. A pinion 742 meshes with the inner teeth of the ring gear 740 and is mounted on a square shaft 743 extending between the side frames 180 and 181. Lying within a ring gear 744 and carried by the shaft 743 is a pinion similar to the pinion 742, which meshes with an intermediate pinion 745 on the shaft 524. Also meshing with the pinion 745 is a ring gear 746 carried by a disk 747 supported on the shaft 510. The ring gear 746 meshes with the type wheel 735 (Fig. 76B) in the group of type wheels for printing on the issuing strip. The type wheel 735 lies adjacent the units order type wheel for printing amounts.

Also mounted on the square shaft 743 is a pinion, similar to the pinion 742, which lies within a ring gear 750 (Fig. 77A) mounted on a disk 748 carried by the shaft 510. The ring gear 750 meshes with a pinion, similar to the pinion 745, which in turn meshes with a ring gear 749 (Fig. 76A) in mesh with the type wheel 735 adjacent the units order amount type wheel in the audit tape printing group of type wheels.

Also connected to the square shaft 743, so as to be driven by the first transaction bank differential mechanism, are a series of control disks for controlling the totalizer engaging and disengaging mechanisms, and other functions of the machine, in a manner described hereinafter.

Second transaction bank type wheel setting mechanism

The control slide 712 (Fig. 37) for the second transaction bank controls the setting of a type element 755 in each of the three groups of type elements (Figs. 76A and 76B). The symbol-printing type wheel 755, in each group of type wheels, lies adjacent the highest amount type wheel.

Formed on the under side of the control slide 712 (Fig. 37) are a series of teeth 756, meshing with a pinion 757 (see also Fig. 77B), which is connected to a segment 758 by a sleeve 759. The segment 758 meshes with a ring gear 760 carried by a disk 761 mounted on the shaft 632. The ring gear 760 has inner teeth meshing with a pinion 762 carried by a square shaft 763. Also carried by the square shaft 763 are pinions, similar to the pinion 762, adjacent each one of the three ring gears 764, one being provided for each group of type wheels. Meshing with each ring gear 764 is an intermediate pinion 765 on the shaft 524. Meshing with each intermediate pinion 765 is a ring gear 766 meshing with the respective type wheels 755. Through the connections just described, the setting of the control slide 712 adjusts the type carrier 755 into a position corresponding to the position to which the control slide 712 is adjusted by the differential mechanism under the control of the depressed keys 101 to 108 of the second transaction bank to set a symbol at the printing line to identify the key which was depressed.

TOTALIZER SELECTING MECHANISM

The two interspersed totalizer lines—namely, the rear totalizer line on the shaft 371 (Fig. 20) and the front totalizer line on the shaft 351—are shifted to select a totalizer under control of the keys 101 to 108 in the second transaction bank through the control slide 712.

Near the upper, or right-hand, end of the control slide 712 (Fig. 37), and formed on its under side, are a series of teeth 767 in mesh with a segment 768 rotatably supported on the shaft 302. Connected with the segment 768, by a hub 769, is a gear 770 (see also Fig. 12). The gear 770 meshes with pinions 771 secured to the drum cams 388 for the rear and front totalizer shifting lines. The totalizer shifting cams 388 are rotatably mounted on shafts 389. Each drum cam 388 is provided with a cam race 772, into which projects a roller 773 secured to the before-mentioned yoke 387.

When the control slide 712 is adjusted under control of a depressed key 101 to 109, each drum cam 388 is rotated an extent commensurate with the depressed key. Each cam race 772, acting on the associated roller 773, slides the corresponding yoke 387 endwise on a pair of shafts 774 and 775 an extent sufficient to select the proper totalizers on the interspersed totalizer lines, as described hereinbefore, aligning the proper sets of totalizer wheels 350 and 370 with the actuator racks 304 and 305, respectively.

After the control slide 712 (Fig. 37) has been properly adjusted under control of the depressed key 101 to 109, an aligner 778, mounted on a shaft 776, is rocked to engage an aligning segment 777, also secured to the hub 769, to maintain the drum cam 388 in its proper adjusted position during the time the totalizers are engaged with the actuator racks 304 and 305.

To actuate the aligner 778, a pair of cams 779 (Fig. 8) are provided on the cam shaft 213. The cams 779 act on rollers 782 of a member 780, having an upwardly-extending arm, which arm is bifurcated to engage a stud 783 carried by a link 784 pivoted at one end to the aligner 778 and at the other end to an arm 785 on a shaft 786 supported in the frame of the machine.

After the control slide 712 and the drum cams 388 are properly adjusted under control of the second transaction bank of keys, the cams 779 rock the member 780 clockwise (Fig. 8), which, through the link 784, rocks the aligner 778 counter-clockwise to engage the aligning teeth of the aligner segments 777. At the end of the machine operation, the cams 779 rock the member 780 and the aligner 778 back to their normal positions, thus releasing the slide 712 and the drum cams 388 for readjustment during the next operation of the machine.

Simultaneously with the aligning of the segments 777, an aligner 800 (Fig. 37), in the form of a yoke secured to the shaft 786, is rocked into engagement with the aligning teeth on the ring gears 744 and 764, to maintain these ring gears and their connecting mechanism in adjusted positions.

TOTALIZER ENGAGING MECHANISM

As described hereinbefore, the three totalizer lines are rocked into engagement with, and disengagement from, the actuator racks 304, 305, and 306 by rocking the shafts 353, 373, and 398, respectively (Figs. 35, 49, and 50). These three shafts may be rocked in adding or total-taking

timing, and the total-taking timing may be in either read or reset timing. The rocking movement of the three shafts for engaging the totalizers with the actuators is under control of a series of notched disks adjusted by the first and second transaction banks. The setting of these disks determines which totalizer line is to be engaged with the actuators and also whether the engaging movement is to be in the adding, read, or reset timing. The control is effected by a series of feelers which engage the peripheries of the notched disks to determine the proper connections to obtain the various engaging and timing movements. A control plate is also provided for timing the engaging movement of the control feelers during the machine operation. The notched disk assembly for controlling the various engaging movements of the totalizers consists of disks 801, 802, 803, 804, 805, and 806 (Fig. 41, where the disks are shown in top plan view). The disks 801 to 806 inclusive are located just outside the right side frame 180, as shown in Fig. 77B.

The disks 801, 803, 804, and 806 (see also Figs. 38, 40, 42, 43, 45, 47, and 52) are all set under control of the first transaction bank when the control slide 712 is adjusted under control of the keys 110 to 118. As described before, when the control slide 712 is adjusted, the square shaft 743 is rotated by the segment 737 (Fig. 8), the segment 739, and the ring gear 740. Each control disk 801, 803, 804, and 806 is provided with internal teeth which mesh with a pinion 787 on the square shaft 743 so as to adjust the notched disks in accordance with the setting of the control slide 712 in the first transaction bank, in the same manner as the control slide 712 controls the setting of the type carriers described above.

The notched disk 802 (Figs. 39, 41, and 77B) is adjusted under control of the second transaction bank when the control slide 712 of that bank is set under control of the keys 101 to 109. As described before, when the control slide 712 therein is adjusted, the square shaft 763 is rotated by the pinion 757 (Fig. 37), the segment 758, and the ring gear 760 in the same manner as described for setting the type wheel under control of the second transaction bank. The notched control disk 802 (Fig. 39) is provided with internal teeth which mesh with a pinion 788 on the square shaft 763, so that the control disk 802 is adjusted simultaneously with the adjustment of the type wheels upon rotation of the square shaft 763.

The disk 805 (Fig. 46) normally maintains all of the feelers (described later) out of engagement with the control disks until the proper time during the machine operation, when the disk 805 is rocked to release the feelers.

When it is desired to engage a totalizer with the actuator racks 304, 305, or 306 for an add operation, the selected totalizer rocking shaft 353, 373, or 398 is coupled to an add engaging spider 810 (Figs. 48 and 53) rotatably mounted on the shaft 302, which spider is actuated to rock in add timing. If it is desired to engage the selected totalizer shaft 353, 373, or 398 with the actuator racks 304, 305, or 306 in total-taking timing, the shafts are coupled with a total-taking spider 811 (Figs. 48 and 52), which spider is actuated to rock in total-taking timing for either read or reset operations.

The coupling connections between the spiders 810 and 811 and the totalizer engaging rocking shaft 353 for the front totalizer line include a

stud 813 (Fig. 48) carried by a link 814 pivotally mounted on an arm 815 secured to the engaging shaft 353. The stud 813 normally lies in an intermediate position, in which it is disengaged from both the spiders 810 and 811. When the link 814 is rocked clockwise (Fig. 48) about its pivot on the arm 815, the stud 813 is seated into a notch 816 of the add spider 810. Then, upon rocking of the add spider 810, the front totalizer is engaged with and disengaged from the actuator racks 304 in add timing. If the link 814 is rocked counterclockwise (Fig. 48), the stud 813 is seated into a notch 817 of the total-taking spider. Thereupon, during the machine operation, the totalizer engaging shaft 353 will be rocked in either read or reset timing, depending upon the timed movement received by the total-taking spider 811.

Front totalizer line engaging mechanism—Add operations

As mentioned before, the front totalizers are illustrated herein to accumulate "Cash Out" entries. Therefore the front totalizer is engaged only when a "Cash Out" key is depressed, which may be either alone or in combination with the List key or the Repeat key of the first transaction bank.

The add engaging spider 810 (Figs. 48 and 53) is rocked in add timing by a pair of cams 820 (see also Fig. 13) secured to the beforementioned cam shaft 229. Coacting with the cam plates 820 are rollers 821 carried by a bell crank 822 pivoted on a stud 823 in the right side frame 180. A link 824 connects the bell crank 822 to the add engaging spider 810.

When the stud 813 for the front totalizer is rocked into engagement with the notch 816 during the operation of the machine, the cam plates 820, acting through the rollers 821, rock the bell crank 822 first clockwise (Fig. 53) and then counter-clockwise, thereby rocking the spider 810 first counter-clockwise and then clockwise. Counter-clockwise movement of the spider 810, through the stud 813, the link 814, the arm 815, and the shaft 353 (Fig. 48) rocks the shaft 353 counter-clockwise and then back in a clockwise direction. Counter-clockwise movement of the shaft 353 (Fig. 49), through the arm 356 and the cam slot 354 in the arm 352, rocks the totalizer wheels 350 into engagement with the actuators 304. The timing of the cam plates 820 is such that they will rock the spider 810 in its initial or counter-clockwise direction after the actuators 304 have been adjusted under control of the amount keys. After the totalizer has been engaged with the adjusted actuators 304, the actuators are returned to the normal positions, which movement enters the amounts standing thereon into the totalizer elements. Then, after the actuators 304 have entered the amounts set up thereon into the totalizer elements, the cam plates 820 rock the spider 810 clockwise, which, through the stud 813 and the connections just described, disengages the totalizer elements from the actuators 304.

The movement of the stud 813 into the notch 816 of the add spider 810 is under control of the disks 802, 803, and 804 (Figs. 43, 44, and 45). In addition to projecting into the plane of the notch 816 of the spider 810, the stud 813 projects into an opening 825 (Fig. 44) of a bell crank 826 pivoted on a stud 827 carried by the auxiliary frame 196. The bell crank 826 is provided with a stud 828, which is normally embraced by two spring-

urged pawls 829 and 830. A spring 831, stretched between an ear on the pawl 829 and an ear on the pawl 830, normally holds the two pawls against opposite sides of the stud 828. The pawls 829 and 830 also embrace a stud 832 on a three-armed member 833 pivotally mounted on the shaft 362. The three-armed member 833 is connected to a bell crank 834 (Fig. 40) by a link 835. The bell crank 834 is mounted on the before-mentioned stud 823 and is provided with a pair of rollers 837 coacting with a pair of cams 836 on the main cam shaft 229.

The cams 836, through the bell crank 834, the link 835, and the three-armed member 833, determine the position of the stud 832. When in the normal or home position, the stud 832 controls the positioning of the pawls 829 and 830 (Fig. 44) so as to maintain the bell crank 826 and, through the opening 825 therein, maintain the stud 813 in its normal or ineffective position; that is, in a position in which it does not engage either the add spider 810 or the total-taking spider 811.

The timing of the cams 836 is such that they rock the three-armed member 833 clockwise at the beginning of the machine operation, and then, after the actuators 304 have been positioned, the cams 836 rock the three-armed member 833 counter-clockwise to and beyond its home position. Near the end of the machine operation, the cams 836 again restore the three-armed member 833 in a clockwise direction back to its normal position. If, during the counter-clockwise movement of the three-armed member 833 and the stud 832, the bell crank 826 is free to operate, the stud 828 rocks the pawl 830 clockwise and through the spring 831 rocks the pawl 829 likewise, thus carrying with it the stud 828 and the bell crank 826, to move the stud 813 into the notch of the add spider 810.

Whether or not the bell crank 826 is permitted to move in the clockwise movement to engage the stud 813 with the notch 816 is under control of the notched disks 802, 803, and 804. The mechanism for controlling the movement of the bell crank 826 by said control disks includes a link 840 (Fig. 44), one end of which is pivotally connected to the bell crank 826 and the other end of which is carried between a pair of feeler members 841 and 842. The feeler members 841 and 842 are connected to move as a unit and are pivoted on a stud 843 (see also Fig. 19). The free end of the feeling member 841 is provided with a stud 844, which projects over, so as to coact with, the control disk 804 (Fig. 45). The feeler member 842 is provided with a stud 845 projecting into the path of, so as to cooperate with, the control disks 802 and 803 (Figs. 43 and 44).

If, during the counter-clockwise movement (Fig. 44) of the three-armed member 833, when the stud 832 is acting on the pawls 829 and 830, the bell crank 826 is free to move, the stud 813 will move into the notch 816 of the add spider. This condition prevails when notches in the disks 802 and 803 are opposite the stud 845 (Fig. 43).

As illustrated in Fig. 44, notches 849 and 850, provided in the disk 802, are positioned opposite the stud 845, under control of the "Cash Out" keys 102 and 106, respectively, of the second transaction bank. Also as illustrated herein, when either the List key 112, the Repeat key 114, or no key at all is depressed in the first transaction bank, it is desired to control the engaging movement of the front totalizer line so that the

amounts will be added into the totalizer of the front totalizer line selected for that operation. If the machine is operated with the List key depressed, the notch 846 (Fig. 43) is moved into the path of the stud 845. If the machine is operated with the Repeat key 114 depressed, a notch 847 is moved into the path of the stud 845, and, if no key is depressed in the first transaction bank, a notch 848 is moved into position in the path of the stud 845. The latter setting is shown in Fig. 43.

When a notch 849 or 850, in combination with a notch 846, 847, or 848, is in the path of the stud 845 when the spider 833 (Fig. 44) is rocked counterclockwise, the stud 828 in the bell crank 826 is free to move, since at this time the stud 845 is free to move into the notch in its path, and therefore the stud 813 is moved into the notch 816 of the add engaging spider (Fig. 53), and then, during the machine operation, the front totalizer line is engaged with the actuator racks 305 in add timing.

If, on the other hand, a key 101, 103 to 105, or 107 to 109 of the second transaction bank, or a key 110, 111, 113, or 115 to 118 of the first transaction bank is depressed, then a high spot is presented into the path of the stud 845. During such an operation, when the spider 833 is rocked counterclockwise and the pawl 830 is rocked counter-clockwise, the stud 828 is held against movement because the bell crank 826, the link 840, and the feeler member 842 are arrested by the control disk 803. During such an operation, the stud 813 does not move into the notch 816, and therefore the front totalizer line is not rocked into engagement with the actuators 304.

During operations in which the control disk 803 prevents clockwise movement of the bell crank 826, the pawl 830, when moved by the stud 832, stretches the spring 831, and, when the stud 832 returns to normal, the spring 831 restores the pawl 830 to its normal position.

The stud 813 is held in its intermediate position between the notches 816 and 817 (Fig. 48) by the bell crank 826 (Fig. 44) and is held in its lateral position by the engagement of the stud 813 with a shoulder 851 on the add engaging spider 810, and by the engagement of the arm 815 with a sleeve 852 on the stud 827. This construction also holds the engaging shaft 353 in its normal, or home, position.

Front totalizer line engaging mechanism—Reset and read operations

The total-taking engaging spider 811 is actuated in Reset timing by a pair of cams 855 (Figs. 13 and 51). The cams 855 are mounted on, so as to rotate with, the before-mentioned sleeve 233. Coacting with the cams 855 are a pair of rollers 856 carried by a rocking arm 857 mounted on a stud 8231. The arm 857 is provided with a notch 858, normally engaging a roller 859 carried by a link 860, described hereinafter. The roller 859 is mounted on a stud 861, to which is also connected a link 862, the upper end of which is pivoted to the total-taking engaging spider 811.

When the cams 855 are rotated, the arm 857 is rocked counterclockwise (Fig. 51) to raise the link 862 and thereby rock the total-taking engaging spider 811 counterclockwise. If at this time the stud 813 is in the notch 817 of the spider 811, the selected front totalizer line is rocked into engagement with the actuators 304 before the actuators 304 are operated to reset the totalizer wheels to zero. After the totalizer wheels have

been reset to zero, the spider is returned clockwise to its home position by the cams 855 thus disengaging the totalizer wheels from the actuators 304. After the totalizer elements have been disengaged from the actuators 304, the actuator racks are restored to their normal positions. At the end of this operation, the totalizer elements are standing at zero.

The roller 859 is normally maintained in the notch 858 of the cam arm 857 by a linkage actuated by a cam 863 (Fig. 52). Coacting with the cam 863 is a roller 864 carried by a bell crank 865 pivoted on a stud 866. The bell crank 865 is connected to a lever 867 by a link 868. A spring 869, one end of which is attached to a stud 870 (see also Fig. 19) on the side frame 180 and the other end of which is attached to a stud 871 on the link 868, normally maintains the roller 864 against the periphery of the cam 863. The lever 867 is pivoted on a stud 872, and the upper end of the arm 867 has pivoted thereto the before-mentioned link 860.

During the operation of the machine, when the cam 863 rotates clockwise (Fig. 52), the spring 869 moves the bell crank 865 clockwise, thus moving the link 868 to the left (Fig. 52) to cause a feeling finger 873 on the arm 867 to feel the periphery of the notched control disk 806. If the feeling finger 873 on the lever 867 engages a high point on the notched disk 806, the roller 859 remains in the notch 858 of the cam arm 857, and therefore the spider 811 is rocked in reset timing during the machine operation. The notched disk 806 is adjusted under control of the first transaction bank, and therefore, when the machine is operated with the Batch Reset key 115 depressed, a high point of the disk 806 will be opposite the feeler 873 to cause the roller 859 to remain in the notch 858 of the arm 857, and the spider 811 is rocked in reset timing. During this operation, the selected batch totalizer on the front totalizer line is reset to zero.

The total-taking engaging spider 811 is rocked in Read timing by the cams 855 in combination with a pair of cams 878. During read operations, the spider 811 is rocked counter-clockwise by the cams 855 and clockwise by the cams 878. The control for obtaining this result is as follows:

When the Batch Read key 116 is depressed and the machine operated, the first transaction bank differential mechanism adjusts the disk 806 to present a notch into the path of the feeler 873. During such a machine operation, after the totalizer has been engaged with the actuators and the totalizer has been reset to zero, the cam 863 releases the bell crank 865, the link 868, and the lever 867 to permit the feeler 873 to enter the notch in the notched disk 806. When the feeler finger 873 enters said notch in the disk 806, the spring 869 rocks the lever 867 clockwise from the position shown in Fig. 52 and moves the link 860 to the right to withdraw the roller 859 from the notch 858 and into a notch 874 in an arm 875 pivoted on the stud 8231. The arm 875 is hubbed to a cam arm 876 provided with a pair of rollers 877 coacting with the pair of cams 878 (see also Fig. 13).

The cam 863 has secured thereto a gear 879, which is in mesh with the before-described gear 231. The cam 863 and the gear 879 are rotatable on a stud 854 on the right side frame 180.

The relative timing of the cams 855, 863, and 878 is such that the first movement of the cams 855 and 878 rocks the respective arms 857 and 875 counter-clockwise in unison. If, after the

arms 857 and 875 have been rocked counter-clockwise, the cam 863 releasing the feeler 873, and the feeler engaging a high part on the control disk 806, the roller 859 remains in the notch 858 of the arm 857. The cam 855 then rocks the arm 857 clockwise to its normal or home position and carries the link 862 therewith, to disengage the totalizer from the actuators in reset timing. Inasmuch as the arm 857 is moved prior to the movement of the arm 875, the arm 875 is provided with a clearance slot for the roller 859 during this restoring movement of the link 862.

If, during the operation of the machine, the feeler 873 engages a notch in the disk 806, after the arms 857 and 875 have been moved to a counter-clockwise position, the roller 859 is moved into the notch 874 in the arm 875. Thereafter, the arm 857 is restored to its lower position, and, since the roller 859 has been withdrawn from the notch 858, the link 862 remains in its upper position. Later during the machine operation, when the arm 875 is restored to its home position, the notch 874 carries the link 862 downwardly to move the reset spider 811 to disengage the totalizer from the actuators after the amount has been restored into the totalizers.

From the above it is seen that the arms 857 and 875 are moved in their counter-clockwise directions simultaneously, during which time the arm 857 engages the totalizer with the actuators. If, after the arms are set in such counter-clockwise position, the feeler 873 is moved to withdraw the roller 859 out of the notch 858 and into the notch 874, the arm 857 thereafter is restored idly, and the arm 875 restores the spider 811 to disengage the totalizer in read timing.

At the end of each operation, the cam 863 restores the bell crank 865 and therefore the feeler 873 to their home position, shown in Fig. 52. At this time, the roller 859 is again moved into engagement with the notch 858 in the arm 857. Thus the roller 859 is restored into the notch 858 of the arm 857 at the end of each machine operation.

Rear totalizer engaging mechanism

The engagement of the selected totalizer on the rear totalizer line with the actuators 395 (Fig. 35) is under control of four notched disks 801, 802, 803, and 804 (Figs. 38, 39, 40, 41, and 42). As mentioned before, the disks 801, 803, and 804 are adjusted under control of the first transaction bank, and the disk 802 is set under control of the second transaction bank. The setting of these disks is accomplished through the square shafts 743 and 763 in the manner described hereinbefore. The rear totalizer line shaft 373 (Fig. 19) has connected thereto an arm 881 (see also Fig. 48), which has pivoted thereto a link 882. The link 882 is adapted to be rocked either clockwise, to move a stud 883 thereon into engagement with the add spider 810, or counter-clockwise into engagement with the reset spider 811, in the same manner as described for the stud 813 on the link 814. The clockwise or counter-clockwise rocking movement of the link 882 is controlled by certain feelers coacting with the control disks 801, 802, 803, and 804.

The stud 883 (Fig. 40) on the link 882 projects into an opening in an arm 884 pivoted on a stud 885 carried by the side frame 196 of the machine. Also mounted on the stud 885 is a pair of spring-actuated members 886 and 887, which are urged

toward each other by a spring 888. Mounted on the arm 884 is a stud 889, which projects between the spring-actuated members 886 and 887. Projecting from an arm of the multi-armed member 833 is a stud 890, which also is contacted on opposite sides by the spring-urged members 886 and 887.

When, as hereinbefore described, the multi-armed member 833 is rocked clockwise (Fig. 40), the stud 890 rocks the spring-urged member 886 counter-clockwise against the action of the spring 888. If at this time the arm 884 and the stud 889 are free to move counter-clockwise, the stud 883 moves into engagement with a notch 880 in the reset spider 811. This counter-clockwise movement of the arm 884 is controlled by the disk 804 (Fig. 42). The arm 884 has pivoted thereto a link 891, which at its lower end is connected to a feeler arm 898, having a feeler stud 889 on its free end adapted to coact with the control disk 804.

When the multi-armed member 833 is rocked clockwise to stretch the spring 888 and thereby pull the member 887 against the stud 889, the arm 884 tends to rock counter-clockwise, and the link 891 tends to move to the right (Fig. 40). This movement of the link 891 to the right tends to rock a two-armed lever 898 counter-clockwise to cause the stud 889 thereon to feel the periphery of the disk 804 (Fig. 42). If the stud 889 contacts the periphery of the disk 804, movement of the link 891 to the right is arrested, and therefore the arm 884 does not rock counter-clockwise to move the stud 883 into the notch 880 of the reset spider 811. If, on the other hand, the stud 889 is permitted to move into a notch in the periphery of the disk 804, the spring 888, acting through the spring-urged member 887 and the stud 889, rocks the arm 884 counter-clockwise to move the stud 883 into the notch 880 of the reset spider 811. The disk 804 is so constructed that only the Reset key 117 and the Read key 118 control the disk 804 to present notches into the path of the stud 889. A notch in the disk 804 is also placed in the path of the stud 889 when no key is depressed in the first transaction bank.

Also connected to the lower end of the link 891 (Fig. 40) is a bell crank 892, supporting a pivoted pawl having a finger 894 coacting with the control disk 803 (Fig. 38) and a finger 895 coacting with the control disk 802 (Fig. 39). The fingers 894 and 895 are connected to form a pawl 893 by a stud 893, to which is connected one end of a spring 897, the other end of which is connected to a stud on the bell crank 892. The spring 897 maintains the pawl 893 in its central position. A third finger 896 is formed on the bell crank 892 and coacts with the disk 801.

When the multi-armed member 833 is rocked counter-clockwise from its clockwise position past its normal position, the stud 890 rocks the spring-urged member 887 clockwise, thus causing the spring 888 to pull the arm 886 clockwise. If the arm 884 is free to move clockwise under action of the spring 888 by reason of a notch or notches being opposite the fingers 894, 895, and 896, the arm 884, through the stud 883 and the link 882, moves the stud 883 into a notch 804 (Figs. 48 and 53) in the add spider 810. If the finger 896 or the two fingers 894 or 895 engage a high spot of its respective control disk 801, 802, or 803, the link 891 is arrested and the stud 883 is prevented from engaging the add spider 810.

As mentioned before, the disk 801 is adjusted under control of the first transaction bank, and the finger 896 coacts with this disk. As illustrated herein, notches are positioned opposite the finger 896 when the machine is operated with either the List key or the Repeat key depressed, or when no key at all is depressed in the first transaction bank.

The disk 803 also is adjusted under control of the first transaction bank. This disk is so notched that a low spot is moved opposite the finger 894 when the List key is depressed or when no key at all is depressed in this bank.

The disk 802 is adjusted under control of the second transaction bank. This control disk is notched to present a notched portion opposite the finger 895 when either the "B Miscellaneous" key 101, the "B Cash-Out" key 102, the "B Cash-In" key 103, the "A Miscellaneous" key 105, the "A Cash-Out" key 106, or the "A Cash-In" key 107 is depressed.

An example of when the bell crank 884 is permitted to rock to move the stud 883 into engagement with the notch 904 of the add spider 810 is as follows:

When the "List" key is depressed and the machine operated, a low spot of the disk 801 is moved opposite the feeler 896 of the bell crank 892, and a low spot of the disk 803 is moved opposite the finger 894. For this operation, any key in the second transaction bank may be depressed; for example, the "A Cash-Out" key 106. This positions a notch of the disk 802 in the path of the finger 895. Then, during the operation of the machine, when the multiple-armed member 833 rocks counter-clockwise, the member 837 stretches the spring 888 and rocks the arm 884 clockwise to lower the link 891 and the fingers 894, 895, and 896 into their respective notches, thus permitting the stud 883 to move into the notch 904 in the add spider. Therefore, during this operation, the rear totalizer line will be rocked in add timing. The totalizer engaged at this time will depend upon the key in the second bank which has been depressed. For example, if the "A Cash-Out" key has been depressed, the amount will be added into the "A Cash-Out" totalizer.

The rear totalizer line is engaged in read or reset timing in the same manner described for the front totalizer line. The mechanism for obtaining this result is shown in Figs. 51 and 52 and is controlled by the notched disk 806 coacting with the feeler finger 873 in the same manner described herein before for the front totalizer line.

The time of operation of the feeler arms 842, 841, and 898 is controlled by the disk 805 (Figs. 46 and 126). A link 900 connects the disk 805 with a bell crank 901 having a cam surface 902. A spring 903 maintains the lower arm of the bell crank 901 normally against a stud 908 carried by the machine side frame. The spring 903 normally tends to rock the disk 805 clockwise, thus tending to rock the bell crank 901 likewise around a stud 905. A stud 906, mounted on one plate of the pair of cam plates 723 for the first transaction bank differential mechanism, is provided to actuate the bell crank 901. The stud 906 is so located on the cam plate 723 that, after the control disks 801, 802, 803, and 804 have been adjusted, the stud 906 engages the cam surface 902 and rocks the bell crank 901 counter-clockwise (Fig. 46), and this movement, through the link 900, rocks the control disk 905 counter-

clockwise, thus releasing the arms 841 and 898 to the action of their respective springs.

Totalizer engaging mechanism—Upper totalizer

The upper totalizer engaging mechanism for adding or total-taking operations is under control of the mechanism shown in Fig. 47.

The multiple-armed member 833 is provided with a stud 911 (Fig. 47) for controlling the movement of a stud 912 for engagement with the add spider 810 or the reset spider 811. The stud 911 is engaged at opposite sides by spring-actuated members 913 and 914. A spring 915 rocks the members 913 and 914 toward each other until arrested by the stud 911. Mounted on an arm 916, pivoted on a stud 917, is a stud 918, which also projects between the spring-urged members 913 and 914. The stud 912 is mounted on a link 919 (see also Fig. 48), pivotally connected to the engaging arm 920, for rocking the upper totalizer shaft 398. The arm 920 is rocked in either add timing or reset timing, depending on whether the stud 912 is engaged with a notch 923 of the add spider 810, or with a notch 924 of the reset spider 811.

Clockwise movement of the multi-armed member 833 rocks the spring-urged member 913 counter-clockwise, thus stretching the spring 915 and tending to move the spring-urged member 914 counter-clockwise. The spring-urged member 914 may be moved counter-clockwise if the arm 916, carrying the stud 918, is permitted to move counter-clockwise. This counter-clockwise movement is controlled by a finger 925, which normally lies in the path of movement of the stud 9201 on a feeler arm 921.

Balance totalizer—Read-reset operations

The upper totalizer is controlled for read or reset operation by the Balance and Sub-Balance keys 110 and 111, respectively. In order to engage the upper totalizer with the reset spider 811, it is necessary for the feeler arm 921 to rock counter-clockwise. Counter-clockwise movement of the arm 921 is normally prevented by the finger 925 overlying the stud 9201. The finger 925 is pinned to a shaft 926, to which is also pinned a bell crank 927, which projects beneath the Balance key 110 and the Sub-Balance key 111. The bell crank 927 is provided with a finger which is normally held in engagement with a collar 939 by a spring 928 to properly position the finger 925 in the path of the stud 9201. Depression of either the Balance key 110 or the Sub-Balance key 111 engages, through their respective studs 579, the bell crank 927 and rocks it clockwise, against the action of the spring 928, to remove the finger 925 from the path of the stud 9201. Thereafter during the operation of the machine, when the multi-armed member 833 is rocked clockwise, a link 922, connecting the feeler arm 921 with the arm 916, is free to move downwardly to rock the arm 921 counter-clockwise. Counter-clockwise movement (Fig. 48) of the arm 921, through the link 922, rocks the arm 916 counter-clockwise (Fig. 47) to move the stud 912 into the notch 924 of the reset spider 811.

Depression of the Balance key 110 controls the positioning of the notched disk 806, through the differential mechanism of the first transaction bank, to position an unnotched section thereof into the path of the finger 873 (Fig. 52) to control the position of the roller 859 for reset operations in the manner described hereinbefore.

Depression of the Sub-Balance key 111 controls

the positioning of the notched disk 806 to present a notch into the path of the finger 873 (Fig. 52) to control the positioning of the roller 359 for read operations in the manner described hereinbefore.

Depression of the Balance key 110 or the Sub-Balance key 111 positions the disk 806 to present high spots to the stud 9201 so that during Balance read or Balance reset operations the feeler arm 921 is held against clockwise movement, and therefore the stud 912 cannot be engaged with the add spider 819 during Balance read or Balance reset operations.

Balance totalizer—Add operations

When the multi-armed member 833 (Fig. 47) is moved counter-clockwise beyond its normal or home position, the spring 915, acting through the spring-urged member 913, tends to move the arm 916 clockwise. This clockwise movement of the arm 916 is controlled by the control disk 806, with which the stud 9201 on the feeler arm 921 coacts. If, when the multi-armed member 833 rocks counter-clockwise, a notch of the control disk 806 is opposite the stud 9201, the spring 915 can rock the arm 921 clockwise, thus raising the link 922 and rocking the arm 916 counter-clockwise to position the stud 912 into engagement with the notch 923 in the add spider 810.

The disk 806 is notched in the positions for controlling the upper totalizer for engagement in add timing when the List key 112 or the Add key 113 is depressed. Therefore, when either of these two keys is depressed, a notch in the disk 806 is positioned opposite the stud 9201, thus controlling the upper totalizer to be rocked in add timing.

Machine release mechanism and cycling controls

When the machine is released for operation, it performs either a one-cycle operation or a two-cycle operation, depending upon which keys in the first transaction bank are depressed. When the machine is released for an "add" operation, the machine performs a one-cycle operation. When the machine is released for taking a total from the upper, or non-shifting, totalizer, the machine performs one cycle of operation. A one-cycle total-taking operation from the upper totalizer is initiated by the depression of either the Balance key 110 or the Sub-Balance key 111 in the first transaction bank. When the machine is released for a total-taking operation, to take a total either from the rear totalizer line or from the front totalizer line, which lines include interspersed totalizers, the machine performs two cycles of operation. A total-taking operation from the rear totalizer line or the front totalizer line is initiated by the depression of either the Batch Reset key 115, the Batch Read key 116, the Reset key 117, or the Read key 118. During the first of the two cycles of operation, under control of the keys 115 to 118 inclusive, the main cam shaft 229 is arrested shortly after it starts its rotation, and the cams 723 and 779, together with a cycle control cam 936 (Fig. 13) to be described later, receive two complete rotations. The term "cycle" as used herein means a complete rotation of cams 723, 779, and 936.

During the first rotation of the cams 723, the selected interspersed totalizer is shifted to select the proper totalizer from which a total is to be taken. During the second rotation of the cams 723, the main shaft 229 is rotated therewith to complete its rotation. The novel cycle control mechanism is provided to simplify the total-

taking operations when only one cycle is necessary, such as when a total is taken from a non-shifting totalizer line. A two-cycle total-taking operation is performed only in those operations where it is necessary to select the totalizer during the first cycle of operation.

Machine release mechanism

In the manner described hereinbefore, depression of any of the motorized keys 101 to 108 inclusive of the second transaction bank, or a key 110, 111, or 113 of the first transaction bank (Figs. 17 and 57) moves the control slides 665 and 601, respectively, to rock the shaft 605 and the arm 606 to release the arm 608 and release the shaft 264 for releasing the machine for operation. See also Fig. 68. Pinned to the release shaft 264 is an arm 937 connected to a plate 938 by a link 939 (Figs. 55 and 68). The plate 938 is pivoted on a shaft 940. A spring 941 is connected to a downwardly-extending arm 942 of the plate 938, and to a stud 943 carried by the side frames 181 of the machine. The spring 941 normally tends to rock the plate 938 clockwise, thus normally tending to rock the arm 937 and the release shaft 264 counter-clockwise. Counter-clockwise movement of the shaft 264 is normally arrested by the stud 607 engaging a shoulder of the arm 606. When a motorized key is depressed in the manner described hereinbefore, and the arm 606 is rocked counter-clockwise to withdraw its shoulder from contact with the square stud 607, the spring 941 rocks the plate 938 clockwise until a surface 932 on the plate 938 engages a stud 933 on the left side frame 181 of the machine.

Clockwise movement of the plate 938 (Fig. 68) withdraws a surface 944 thereof from contact with a square stud 945 of a bell crank 946 secured to a shaft 947. The bell crank 946 is normally urged counter-clockwise by a spring 943, which normally maintains the square stud 945 in engagement with the surface 944. When the plate 938 is rocked clockwise, a notch 949 is brought opposite the stud 945, whereupon the spring 946 rocks the bell crank 946 counter-clockwise and moves the square stud into the notch 949. Counter-clockwise movement of the bell crank 946 rocks the shaft 947 (see also Fig. 67) to rock an arm 950, secured to the shaft 947, counter-clockwise. A spring 951 is connected to a stud 952 at the upper end of the arm 950, and the other end is connected to a stud 953 on a switch operating arm 954, pivoted on the beforementioned stud 454. The spring 951 normally holds a surface 955 on the arm 954 in engagement with the stud 952, and, when the arm 950 is rocked counter-clockwise, it rocks the switch operating arm 954 clockwise. A link 956 connects the upper end of the switch operating arm 954 with a bell crank 957 pivoted on a stud 935 and having an insulating block 958 normally holding a switch blade 959 in open position. The switch blade 959 is pivoted on a stud 934. Clockwise rotation of the switch operating arm 954, through the link 956, rocks the bell crank 957 clockwise to permit a switch spring 960, connected to the switch blade 959, to rock the blade 959 clockwise to contact a switch blade 961 to thereby close an electric circuit through the motor 216 to operate the machine in the manner described hereinbefore.

The bell crank 946 is bifurcated to receive a stud 962 of an arm 963 pivoted on the beforementioned shaft 940. When the plate 938 is rocked clockwise, upon depression of a motorized

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key, to move the notch 949 into the path of the square stud 945, the spring 948, rocking the bell crank 946 counter-clockwise, rocks the arm 963 clockwise to move a surface 964 of the arm 963 into the path of a roller 965 carried between a disk 966 and a cam 975 (see also Fig. 69) pinned to the main cam shaft 229. Also, clockwise movement of the plate 938 moves a surface 967 thereon into the path of the roller 965.

At about midway of the rotation of the main cam shaft, as shown in the time chart, Fig. 126, the roller 965 engages the surface 964 and rocks the arm 963 counter-clockwise to rock the bell crank 946 clockwise to withdraw the stud 945 from engagement with the notch 949. Clockwise movement of the bell crank 946 rocks the shaft 947 and the arm 950 clockwise to stretch the spring 951. At this time, the switch arm 954 cannot follow the arm 950, since a roller 968 (Fig. 67) of the switch arm 954 is in contact with the outer periphery of a cam 969 on the main cam shaft 229. Continued rotation of the disk 966 and the cam 975 brings the roller 965 (Fig. 68) into engagement with the surface 967 of the plate 938 and rocks the plate 938 counter-clockwise back to its normal position. Counter-clockwise movement of the plate 938, through the link 939 and the arm 937, moves the release shaft 264 beyond its normal position, wherein the arm 606 again moves into the path of the square stud 607. The springs 602 and 667 rock the shaft 605 and the arm 606 into engagement with the square stud 607 when the square stud is moved beyond the shoulder of the arm 606.

When the arm 950 is rocked counter-clockwise upon depression of a motorized key, and the switch arm 954 is rocked clockwise to close the switch 961, the roller 968 is lifted out of the range of the cam 969. During the greater part of the rotation of the cam 969, its outer periphery comes into contact with the roller 968 and maintains a switch arm, and therefore a switch 953—961, in a closed position. Near the end of the machine operation, the outer periphery of the cam 969 passes from beneath the roller 968. At this time, the arm 954 is under tension of the spring 951. Therefore, when the periphery of the cam 969 moves from the path of the roller 968, the spring 951 snaps the switch arm 954 counter-clockwise to open the switch 961 and interrupts the electrical circuit through the motor 216.

When the electrical circuit through the motor 216 is interrupted, the machine is arrested in home position by a shoulder 9701 (Fig. 14) on the pawl 223 being wedged between a stud 9711 on the drive gear 224 and the upper end of a stop arm 972 secured to the beforementioned shaft 947. When the shaft 947 is rocked counter-clockwise upon depression of a motorized key in the manner described above, the stop arm 972 is withdrawn from the shoulder 9701 of the pawl 223, and thereafter a spring 973, connected to the free end of the clutch pawl 223 and on a stud on the gear 224, rocks the pawl 223 counter-clockwise to engage with the clutch member 222 to drive the cam shaft 229 in a manner hereinbefore described. When the arm 950 (Fig. 67) is restored to its home position by the roller 965, the arm 963, the bell crank 946, and the shaft 947, the upper end of the stop arm 972 (Fig. 14) is moved into the path of movement of the shoulder 9701, and therefore, when the shoulder 9701 comes into contact with the stop arm 972, the pawl 223 is withdrawn from engagement with the clutch member 222. Thus,

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when the shoulder 9701 engages the stop arm 972, the pawl 223 is withdrawn to interrupt the driving action of the motor, and, at the same time, the stop arm 972, the shoulder 9701, and the stud 9711 act as a positive stop to arrest the shaft 229 in its home position.

Non-repeat mechanism

In order to prevent a second operation of the machine, if a motorized key is held depressed during the entire machine operation, a means is provided to prevent the machine from releasing for a second operation until the motorized key is released and again depressed.

When the arm 606 (Fig. 68) is rocked to release the release shaft 264, the non-repeat pawl 971 normally moves into engagement with the lower edge of the stud 607. The non-repeat pawl 971 is normally held in engagement with a stud 974 on the release arm 606 by the spring 970. If the operator should hold the release key in its depressed position until the end of the operation of the machine, the connections hereinbefore described maintain the arm 606 in its moved position, and therefore, when the release shaft is restored past its normal position, the arm 606 does not engage the stud 607; therefore the release shaft 264 would be permitted to rock to release the machine again. However, at this time the non-repeat pawl 971 will have been moved counter-clockwise by the spring 970 and therefore engages behind the square stud 607 and prevents such a repeat operation. When the operator releases the depressed motorized key at the end of the machine operation, the release arm 606 is restored clockwise by the springs 602 and 667 into the position shown in Fig. 68, and, during such clockwise movement of the arm 606, the stud 974, engaging the non-repeat pawl 971, restores the non-repeat pawl to its normal position out of engagement with the square stud 607. Therefore the square stud 607 again comes into contact with the shoulder on the arm 606, and the machine is again in condition for release by depression of a motorized key.

One-cycle-add operation

As described hereinbefore, the clutch member 228 (Figs. 14 and 22), the cam 936 (Fig. 15), the two pairs of differential driving cams 723, and the driving gear 226 (Figs. 14, 15, and 22) are all mounted on the sleeve 227 to form a cluster which can be independently rotated on the main cam shaft 229. Normally this cluster of cams and the gear 226 are connected to the main cam shaft 229 by a clutch mechanism now to be described. The clutch mechanism forms a connection whereby the main cam shaft 229 is driven through the cam cluster.

Secured on the main shaft 229 (Figs. 15 and 22) is a disk 981. Pivoted on the disk 981 is a clutch pawl 982, normally held in operating connection with the clutch member 228 by a spring 983. The spring 983 connects the clutch pawl 982 with a retaining pawl 984, also normally in engagement with the clutch member 228. When the motor drives the gear 226 clockwise (Fig. 14), and with the pawl 982 in engagement with the clutch member 228, the clutch member 228 carries the pawl 982 therewith and thereby rotates the disk 981 and the main shaft 229 clockwise. During a one-cycle add operation, the clutch pawl 982 remains in engagement with the clutch member 228 throughout the entire operation, and therefore the cluster of cams, including the cam

936 and the two pairs of cams 723, rotate with the shaft 229. At the end of the operation, when the shoulder 9761 on the pawl 223 engages the end of the stop arm 972, the machine is arrested in the manner described above. During this one cycle of operation of the main shaft 229, the amount differentials are operated, and the engaging mechanisms for the totalizers are controlled to engage the totalizers with the actuators in add timing, as controlled by the transaction keys in the manner described hereinbefore.

One-cycle total-taking operation

When the machine is released for operation, with either the Balance key 110 or the Sub-Balance key 111 depressed, the clutch pawl 932 remains in operative engagement with the clutch member 228, and therefore, during this operation, the clutch of cams 936 and the two pairs of cams 723 rotate with the main shaft 229. During this operation, the Balance key and the Sub-Balance key control the engagement and disengagement of the front totalizer in the manner hereinbefore described, to take a total from the front totalizer.

Two-cycle total-taking operation

As above mentioned, the front and rear totalizer lines consist of interspersed totalizers, and therefore it is necessary to make a preliminary operation of the machine so as to provide time to shift the selected totalizer line for selecting or aligning the proper one of the interspersed totalizers with the differential actuators before totals can be taken therefrom. However, it is neither necessary nor desirable to operate the amount actuators during the first cycle of a two-cycle operation. To prevent operation of the amount actuators during the first cycle of a two-cycle total-taking operation, the main cam shaft 229 is unclutched from the cluster of cams, including the cam 936 and the two pairs of transaction differential cams 723. This cluster of cams is operated during the first cycle of a two-cycle total-taking operation independently of the main cam shaft 229. The unclutching of the main cam shaft 229 from the cluster of cams is accomplished by rocking the clutch pawl 982 (Fig. 15) out of engagement with the clutch member 228 (Fig. 14) at the beginning of the machine operation. The unclutching of the clutch pawl 982 is under control of the Batch Reset key 115, the Batch Read key 116, the Reset key 117, and the Read key 118 (Figs. 2 and 15).

Depression of one of the keys 115 to 118 shifts the beforementioned cycle control slide 634 upwardly (Fig. 15) by wiping the respective stud 579 against the respective cam edge 991 of the control slide. Mounted at the right-hand end of the control slide 634 is a stud 992, resting in the bifurcated end of an arm 993 pivoted on the shaft 605. Hubbed to the arm 993, so as to move therewith, is a finger 994, whose free end engages over a stud 995 of a slide 996. The slide 996 is slotted to slide on a stud 997 and on the before-mentioned stud 693. The slide 996 is normally held in elevated position by a spring 998, which maintains the bottom of the slot engaging the stud 997 in the position shown in Fig. 15. The slide 996 is provided with a flange 999 and a guide finger 1000. A cycle control arm 1001, loosely pivoted on a stud 1002 carried by the side frame of the machine, has near its upper end a finger which engages the flange 999 when the machine is released. The finger 1000 acts as a guide for the upper end of the cycle control arm 1001 to guide

it laterally. Connected to the arm 1001 is a two-armed member 1003, so as to form a unitary pivoting member, consisting of the arms 1001 and 1003. A spring 1004 is stretched between a stud 1005 on the arm 1003 and a stud 1006 on a pawl 1007 pivoted on the shaft 947. The spring 1004 normally holds the stud 1006 in contact with a finger 1008 of a stop arm 1009 pinned to the shaft 947. The arm 1003 is provided with a flange 1010, which is normally held against the free end of the stop arm 1009 by the spring 1004.

Depression of any key 115 to 118 inclusive, acting through the control slide 634, lowers the slide 996 to move the flange 999 thereon out of the path of the upper end of the cycle control arm 1001 and positions the flange 999 opposite a notch in the arm 1001 so as to permit free movement of the latter when released. After the slide 996 has been lowered by depression of a key 115 to 118, a motorized key is depressed, and the shaft 947 is rocked counter-clockwise, as described hereinbefore. The stop arm 1009 is thereby moved from the path of movement of the flange 1010, thus permitting the spring 1004 to rock the unit consisting of the arms 1001 and 1003 in a counter-clockwise direction (Fig. 15). Counter-clockwise movement of the arm 1001 is arrested when a tail 1011 comes into engagement with a stop stud 1012, carried by the side frame of the machine. When the arm 1001 is arrested by the stud 1012, a surface 1013 thereof is positioned into the path of an extension 1014 on the clutch pawl 982. When the machine starts to operate with the surface 1013 in the path of the extension 1014, the extension 1014 comes into engagement with the surface 1013 shortly after the machine starts to operate. Continued rotation of the disk 981, carrying the pawl 982, causes the pawl 982 to be rocked counter-clockwise to disengage the clutch pawl 982 from the clutch member 228 and to permit the clutch member 228 and the transaction differential driving cams 723 to continue to rotate. Since the clutch pawl 982 is disengaged from the clutch member 228, the disk 981 and the main cam shaft 229 remain stationary. The partial rotation of the main cam shaft 229 is not sufficient to start the amount differential mechanisms in operation. The transaction differential cam 723 of the cluster continues to rotate and, through the second bank transaction differential, actuates the totalizer shifting cams 388 to properly select a totalizer by aligning the selected totalizer with the amount actuators, in the manner described hereinbefore. After the clutch pawl 982 has been rocked from engagement with the shoulder of the clutch member 228, the pawl rides on the outer periphery of the clutch member 228. During the first cycle of operation, the cam 936 (Fig. 15), rotating with the transaction bank pairs of cams 723, comes into engagement with a roller 1015 on the arm 1003 and rocks the arm 1103, together with the cycle control arm 1001, clockwise past their home positions.

When the stop arm 1009 is rocked counter-clockwise to release the arm 1003, the flange 1010 moves between the stop arm 1009 and the pawl 1007. When the arm 1003 is restored past its home position by the cam 936, the stop arm 1009 remains in its moved position, and therefore, when the flange 1010 is moved from between the stop arm 1009 and the pawl 1007, the spring 1004 moves the pawl 1007 into engagement with the edge of the flange 1010, to hold the arms 1001 and 1003 in a position slightly out of home position,

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to maintain the surface 1013 out of the path of the extension 1014 of the clutch pawl 982. During the beginning of the second cycle of operation, when the shoulder of the clutch member 228 passes beneath the clutch pawl 982, the spring 983 is free to rock the pawl 982 into engagement therewith, and, during the second cycle of the two-cycle total-taking operation, the main cam shaft 229 is rotated by and with the cluster of transaction differential cams. Near the end of the second cycle of operation, the shaft 947 is given a restoring movement in the manner described hereinbefore, thus positioning the stop arm 1039 into the path of the flange 1010, and, through the finger 1008, engaging the stud 1006, removes the pawl 1007 from engagement with the flange 1010. When the depressed key 115 to 118 is released to return to its normal undepressed position, the spring 998 raises the slide 996 to again position the flange 999 in the path of the arm 1001.

From the above, it is seen that the cycle control mechanism controls the operation of the main cam shaft 229 so as to operate only when needed during total-taking operations. In those operations in which no shifting of the totalizer is required for selection, a total-taking operation is performed in one cycle of operation. In those operations where a totalizer must first be selected from a line of interspersed totalizers, the main cam shaft 229 is arrested so as to prevent the idle operation of the amount differential mechanisms. During the first cycle of the two-cycle operation, only the cams for operating the totalizer selecting mechanism, and the aligners therefor, are operated.

The roller 965 (Figs. 68 and 69) is carried between the disk 966 and the cam 975, secured to the main cam shaft 229, and, since the main shaft 229 does not rotate during the entire first cycle of operation, the shaft 947 is rocked to restore the release shaft 264, and stop the machine, only near the end of the second cycle of a two-cycle total-taking operation.

The disk 966 is provided with two ratchet teeth 1016 and 1017 (Fig. 68). When the tooth 1016 is in the home position, a pawl 1018, pivoted on a stud 1019, engages it. Upon the initial movement of the shaft 229 during the first cycle of a two-cycle operation, the pawl 1018 drops into the tooth 1017, which is spaced from the tooth 1016 an extent equal to the movement of the shaft 229 required for disengaging the clutch pawl 982 from the clutch member 228 (Fig. 15). A spring 1020 maintains the pawl 1018 in constant contact with the disk 966 to properly align the disk 966 in whichever one of the two positions it is arrested in.

KEY RELEASE MEANS

The key 119 (Figs. 1, 2, and 19) is provided to release any depressed key, except a motorized key, on the keyboard, that has been depressed in error. Secured to the shank 1023 of the key 119 is a clip 1025, which is bifurcated to engage over a stud 1026 on a bell crank 1027 pivoted on a stud 1028 mounted on the side frame 180. The lower end of the key shank 1023 is bifurcated to fit over a shouldered stud 1024 on the side frame 180. The bifurcated lower end of the key shank and the bifurcated clip 1025 provide means for removing the key from the machine if desired, without disturbing the mechanism in the machine.

Secured to the bell crank 1027, by a hub 1029, 75

62

is an arm 1030 having pivoted thereto a link 1031 slotted at its upper end to fit over a shouldered stud 1032. The stud 1032 is carried on the free end of an arm 1033 secured to the machine release shaft 264. A spring 1034, having one end fastened on a stud in the side frame 180 and the other end to a stud on the link 1031, normally maintains a finger 1035 on the bell crank 1027 in engagement with a stud 1036 on the side frame 180. The stud 1036 limits the movement of the bell crank 1027, the arm 1030, and the link 1031 so as to position the slot in the right-hand end of the link 1031 midway over the stud 1032, so that the arm 1033 is free to move either clockwise or counterclockwise without moving the link 1031. Therefore the link 1031 does not interfere with the normal releasing and restoring movements of the release shaft 264.

If it is desired to release a depressed key in the key bank, the operator depresses the Release key 119, which, through the clip 1025, the stud 1026, the bell crank 1027, and the arm 1030, moves the link 1031 leftwardly (Fig. 19) to rock the arm 1033 and the release shaft 264 clockwise (Figs. 16, 23, and 56). Clockwise movement of the release shaft 264 rocks the arms 670, 265, and 615 clockwise to shift the detents for the amount banks and the first and second transaction banks to release the depressed keys. The movement of the link 1031 by the depression of the key 119 is sufficient to first take up the slack in the slot engaging the stud 1032, and to rock the arm 1033 far enough to effect the releasing movement of the keys. Upon release of the key 119 by the operator, the spring 1034 again restores the link 1031 to its normal position, and the spring 941 (Fig. 68) restores the release shaft 264 to its normal position.

RESET SPECIAL COUNTER

In the use of the machine as illustrated herein, the totalizers on the rear totalizer line are usually reset at the end of a day's business, and all are reset in one series of operations. In order to reset these totalizers, the Reset key 117 is depressed, and thereafter one of the keys 101 to 108 is depressed, depending upon which totalizer is to be reset. To reset all of the totalizers on the rear totalizer line, eight separate reset operations are performed for each series of reset operations. In order to check on the number of series of reset operations performed, so as to detect any fraudulent resetting operations, a special counter 1041 (Figs. 2, 33, and 34) is provided. A unit is added into the special counter 1041 during the first operation of a series of reset operations. During the reset operation subsequent to the first of the series, the operating mechanism for entering the unit into the special counter is disabled.

The special counter consists of three wheels 1041, rotatably mounted on a shaft 1042. Each wheel 1041 is provided with a ratchet wheel 1043 engaged by a pawl 1044 on a yoke 1045 pivoted on the shaft 1042. The shaft 1042 is mounted on the keyboard end plate 133. A spring 1046, stretched between a stud on the keyboard frame and a stud 1047 on one arm of the yoke 1045, normally maintains the yoke 1045 in contact with a stud 1048 on the Reset key 117. Depression of the Reset key 117, acting through the stud 1048, rocks the yoke 1045 clockwise (Fig. 33), and the pawl 1044, engaging the ratchet wheel 1043, enters "1" into the units order wheel 1041.

The pawl 1044 consists of a member having

three fingers, one extending into the path of, so as to engage with, a ratchet wheel of each of the special counter wheels 1041. Each counter wheel is also provided with a notched disk having its notch in the "nine" position to provide for tens transferring between the lower and higher order wheels 1041 when the lower order wheel passes from 9 to 0 in the manner well known in the art. To effect tens transfers, the pawl 1044 is made of spring steel, and the higher order fingers of the pawl 1044 are normally held out of engagement with the ratchets of the higher order wheels until the notched disk comes under the finger and permits the finger to drop into said notch, thereby permitting the next higher order finger to engage with the ratchet wheel of its associated wheel to add "1" into the next higher order wheel when the Reset key 117 is depressed and the lower order wheel moves from 9 to 0.

A non-retrograde movement pawl 1049 is provided, having three fingers, one engaging each of the ratchet wheels 1043 to prevent retrograde movement of the counter wheels 1041 when the pawl 1044 is restored to its normal position. The pawl 1049 is carried by the keyboard side frame by two studs 1050. This pawl 1049 is made of spring steel, so as always to come into contact with the ratchet wheels 1043.

In order that the special counter will be advanced "1" for only the first reset operation of a series, a means is provided to prevent the yoke 1045 from being restored to normal position at the end of the first reset operation. To prevent such restoring movement of the yoke 1045, a spring-urged blocking member 1051, in the form of a yoke having a blocking finger 1052, is provided, which finger moves into the path of return movement of an arm 1053 of the yoke 1045 when the Reset key is depressed. The spring-urged blocking member 1051 is pivotally mounted on a short shaft 1054, carried by two angle brackets 1055 mounted on the keyboard frame bottom plate 147. A spring 1056, one end of which is hooked around an arm on the spring-urged member 1051 and the other end of which bears against the bottom of the keyboard frame 147, urges the spring-actuated member 1051 clockwise (Fig. 34). Depression of the Reset key 117 rocks the yoke 1045 clockwise (Fig. 33) and withdraws its arm 1053 from the path of the blocking finger 1052 and permits the spring 1056 to move the blocking finger 1052 beneath the arm 1053 and into an opening 1057 in the end plate 133 of the keyboard frame. The blocking finger 1052 remains in this position at the end of the reset operation and prevents the yoke 1045 from returning in a counter-clockwise direction (Fig. 33) when the Reset key 117 is released. If the Reset key 117 is depressed during the next succeeding operation, no advance is made in the special counter, inasmuch as the yoke 1045 is held in its moved position by the blocking finger 1052, and therefore the pawl 1044 is not effective to add "1" into the units order wheel.

Means is provided for withdrawing the blocking finger 1054 during the first operation following a reset operation and other than one in which the Reset key 117 is depressed. This means includes a link 1060 (Figs. 33 and 34) guided for up-and-down movement on a stud 1061 carried by the side frame 180. The link 1060 is carried on an arm 1062 pivoted on the beforementioned stud 720 (see also Fig. 22). The arm 1062 is provided with a toe 1063 normally engaging a stud 1064 on the beforementioned bell crank 901

associated with the totalizer engaging and disengaging mechanism.

During the operation of the machine in which the Reset key 117 is not depressed, when the stud 900 engages the bell crank 901 and rocks the latter counter-clockwise in the manner described hereinbefore, the stud 1064, engaging the toe 1063, rocks the arm 1062 counter-clockwise, thus raising the link 1060 to engage an angularly-bent-over end 1065 thereon with an extension 1066 of the spring-urged blocking member 1051. Engagement of the bent-over end 1065 with the extension 1066, when the link 1060 is raised, rocks the blocking member 1051 counter-clockwise to withdraw the finger 1052 from beneath the extension 1053 of the yoke 1045. This releases the yoke 1045 to the action of its spring 1046 and permits it to be restored in a counter-clockwise direction until arrested by contact with the stud 1048 on the Reset key, which during this operation is in its undepressed position.

When the link 1060 is released by the stud 906 passing from beneath the bell crank 901, the spring 1056 rocks the blocking member 1051 clockwise. At this time, the arm 1053 is again in the path of the spring-urged blocking member 1051, and therefore the blocking member comes to rest against the side of the arm 1053 in the manner shown in Fig. 34.

The stud 906 is carried by one of the cam plates 723 of the first transaction bank differential, and therefore the link 1060 is raised and lowered twice during each reset operation. When the link 1060 is raised and the Reset key 117 is in its depressed position, the stud 1048 holds the yoke 1045 in its moved position. During this operation, the raising of the link 1060 merely withdraws the blocking finger 1052 from beneath the yoke 1045, and, when the link 1060 is lowered, the blocking member again enters the opening 1057 in the keyboard end plate 133. The rocking movement of the blocking member 1051 during such an operation is therefore idle. However, when the machine is operated without the Reset key 117 depressed, then, when the link 1060 is raised to withdraw the blocking member 1051 from its effective position, the yoke 1045 is permitted to move to its normal position, as explained above, and the blocking member 1051 cannot again re-enter the opening in the end plate 133.

CONSECUTIVE NUMBERING MEANS

A consecutive numbering means is provided in the machine to consecutively number all deposits recorded by the machine. A group of type wheels is provided in each of the three printing sections, so that the consecutive number is printed on the deposit slip, on the audit tape, and on the issuing tape. It is desired to consecutively number only deposits entered into the machine, and therefore the last previous consecutive number is printed on each of the record media during every operation of the machine in which deposits are not entered. However, when a deposit is entered, the consecutive number is advanced one unit. The control over the consecutive numbering mechanism for advancing the consecutive number type carriers is effected by two notched control disks, one being adjusted by the first transaction bank differential means and the other by the second transaction bank differential means. The notched disk set by the first transaction bank differential means is such that, if any of the keys in the first transaction bank are depressed, the con-

secutive number advancing mechanism is disabled. The notched disk adjusted by the second transaction bank differential means is so constructed that the consecutive number is advanced only when the "B" deposit key 104, or the "A" deposit key 108, is depressed. If, however, the Read key 113 or the Reset key 117 of the first transaction bank is depressed prior to the depression of a Deposit key 104 or 108, the notched disk adjusted by the first transaction bank differential means overrides the control of the notched disk adjusted by the second transaction bank to prevent the consecutive number from being advanced. Therefore, when the totals of deposits are printed, the consecutive number is not advanced even though the Deposit key is depressed. Likewise, if a repeat deposit operation is performed—that is to say, if the machine is operated with the Repeat key 114 depressed and the "A" or "B" Deposit key depressed, the notched disk adjusted by the first transaction bank differential means disables the consecutive number advancing means.

Mounted in each printing unit—namely, the slip printer, audit tape, and issuing tape units—are four type wheels 1071 (Figs. 71, 76A, and 76B). The three sets of type wheels are mounted on the beforementioned shafts 463. Meshing with each type wheel 1071 is a ring gear 1072, having internal teeth 1073, meshing with a pinion such as the pinion 1074 (Fig. 71) for the units order type wheel. The pinion 1074 is mounted on a square shaft 1075, on which is mounted another pinion like the pinion 1074, the latter pinion being mounted on the square shaft 1075, extending to the left (Fig. 76A) of the left side frame 181. The pinion near the left-hand end of the shaft 1075 is in engagement with internal teeth, similar to the teeth 1073, of a ring gear 1076. Each of the type wheels for the tens, hundreds, and thousands orders is similarly connected through individual square shafts to a corresponding gear 1077, 1078, and 1079, respectively, located near the left end of the machine. Meshing with each ring gear 1076, 1077, 1078, and 1079 is a pinion 1080 (Fig. 73), rotatably mounted on a reset shaft 1081. Secured to, so as to rotate with, each pinion 1080 is a ratchet wheel 1082 engaged by a differentially timed pawl 1083 mounted on a shaft 1084 carried by a yoke 1085. A spring 1086 normally maintains the differentially timed pawl 1083 in engagement with the ratchet wheels 1082. Each ratchet wheel 1082 is provided with the usual and well-known deep notch 1087, to provide for tens carrying between the lower and higher order wheels of the consecutive numbering means. The yoke 1085 is pivotally mounted on the shaft 1081, and, when rocked clockwise during a machine operation, the differentially timed pawl 1083, acting on the ratchet wheel 1082, advances the pinion 1080 an extent equal to one step of movement of the type wheel 1071.

The yoke 1085 is pivoted on the shaft 1081 and is operated by the aforementioned cam 975 (Fig. 69), which restores the machine release mechanism. A roller 1088, carried by a bell crank 1089 pivoted on a stud 1090, is held in engagement with the periphery of the cam 975 by a spring 1091. The spring 1091 is connected to a stud on the left side frame 181 at one end, and the other end is connected to an operating arm 1092 pivoted on a stud 1093. The operating arm 1092 is provided with a stud 1094 in engagement with a bifurcation in the bell crank 1089. The left end

(Fig. 69) of the operating arm 1092 is bifurcated to engage the beforementioned shaft 1084.

A control disk 1095 (Figs. 69 and 77A) is adjusted differentially by the first transaction bank differential means. The control disk 1095 is provided with a notch 1096, which notch is moved opposite a roller 1100 on the arm 1092 when the machine is operated with no key depressed in the first transaction bank. A second control disk, 1097 (Fig. 70), is differentially adjusted by the second transaction bank differential mechanism and is provided with notches 1098 and 1099 in the positions which are moved opposite the roller 1100 when the machine is operated with the "A" Deposit key or the "B" Deposit key, respectively, depressed.

During the operation of the machine, when the cam 975 is rotated clockwise (Fig. 69), the spring 1091 causes the roller 1088 to follow the contour of the cam if notches are in the path of a roller 1100. If no notch is in the path of the roller 1100, the bell crank 1089 cannot follow the contour of the cam 975. If, however, notches are moved into the path of the roller 1100 by both disks 1095 and 1097, the roller 1100 is free to move into the notches, and therefore the operating arm 1092 is rocked clockwise by the spring 1091. Clockwise movement of the operating arm 1092 rocks the yoke 1085 counter-clockwise, thus causing the differentially timed pawl 1083 (Fig. 73) to ratchet over the teeth of the ratchet wheel 1082 and to be positioned behind the next ratchet tooth of said ratchet wheel. When the cam 975 restores the bell crank 1089 in its clockwise direction and the operating arm 1092 in a counter-clockwise direction, the operating arm 1092, through its engagement with the shaft 1084, rocks the yoke 1085 clockwise to cause the timed pawl 1083 to advance the ratchet wheel 1082 and the pinion 1080 one step. This one step of movement is transmitted to the type wheel through the ring gear 1076 and the square shaft 1075 and the ring gear 1072 to position the type wheel 1071 one step in advance.

When a lower order wheel passes from 9 to 0, the differentially timed pawl drops into the deep notch 1087, thus permitting the next higher order time of the pawl 1083 to engage the next higher order ratchet wheel 1082 to transmit one step of movement to the type wheel 1071 of the next higher order in the manner well known in the art and as shown in the United States patent to Frank H. Bickford, No. 589,114, issued August 31, 1897.

A retaining pawl 1101 is pivoted on a stud 1102 to engage the ratchet wheel 1082 to prevent retrograde movement of the ratchet wheel 1082 when the differentially timed pawl 1083 is moved in its counter-clockwise direction. A spring 1103 maintains the retaining pawl 1101 in constant engagement with the ratchet wheel 1082.

From the above it is apparent that the only time the consecutive number can be advanced is when no key is depressed in the first transaction bank, which positions the notch 1096 into the path of the roller 1100, and either an "A" Deposit key or a "B" Deposit key is depressed in the second transaction bank, which positions either the notch 1098 or 1099 into the path of the roller 1100 during the machine operation. If a key is depressed in the first transaction bank, a high spot will be in the path of the roller 1100. Therefore, when the Reset key is depressed to reset either one of the deposit totalizers, the consecutive number mechanism will not be advanced,

since at this time a high point of the control disk 1095 prevents movement of the operating arm 1092, even though a notch 1093 or 1099 may be in the path of the roller 1100.

As will become apparent in the consideration of the printing mechanism of the machine, a consecutive number is printed on each of the record media during every printing operation of the machine. If the operation being performed is not a deposit operation, the consecutive number previously set up will be printed. For this reason, the records will have a series of like consecutive numbers printed thereon. However, when a deposit is entered in the machine, the machine advances the consecutive number one step, and therefore, with the deposit entry, a new consecutive number will be printed.

Consecutive number reset mechanism

A reset mechanism is provided so as to permit an authorized person to reset the consecutive number wheels 1071 to zero. The resetting of the consecutive number mechanism is under control of the lock slide 123 (Figs. 2 and 55). When the lock slide 123 is in the position shown in Figs. 2 and 55, the reset mechanism for the consecutive number is locked against movement. When the lock slide is operated to release the consecutive number reset mechanism, the reset wheel 126 (Figs. 2 and 71) can be manually rotated by the authorized person.

The reset wheel 126 (Fig. 71) projects through the keyboard near its left-hand end, as shown in Figs. 1 and 2, and is mounted on a short stud 1112, carried by two auxiliary frames 1120, mounted on the left side frame 101 of the machine. Secured to the side of the reset wheel 126 is a pinion 1113, meshing with an intermediate pinion 1114 on a sleeve 1115, rotatably mounted on a short shaft 1116. The intermediate pinion 1114 meshes with a pinion 1111 (see also Fig. 74), secured to the beforementioned reset shaft 1081. The reset shaft 1081 is provided with a notch 1110, extending between the four pinions 1090. Mounted inside each pinion 1090 is a pawl 1117, which is spring-urged to contact the reset shaft 1081. When the pinion 1090 is actuated by the differentially timed pawl 1063 in a clockwise direction to enter "1" into the consecutive numbering mechanism, the pawl 1117 moves clockwise around the shaft 1081 and ratchets past the notch 1110.

To reset the consecutive number wheels 1071, the wheel 126 is rotated in a clockwise direction. Clockwise rotation of the wheel 126 rotates the intermediate pinion 1114 counter-clockwise and the pinion 1111 and the shaft 1081 clockwise. Clockwise rotation of the shaft 1081 causes the notch 1110 to pick up the pawls 1117 from whichever position they are set in and restores the pinions 1111 and their connected type wheels to their home or zero positions in the manner well known in the art and as illustrated in the United States Patent No. 788,453, issued to Joseph P. Cleal and Alvan Macauley on April 25, 1905.

The usual stop pawl 1119, engaging a stop arm 1120 on the shaft 1081, is provided to arrest the shaft 1081 when the type wheels reach their zero positions. The pawl 1119 is pivoted on a stud 1121 and is spring-urged by a spring 1122 in a clockwise direction. The stop arm 1120 is undercut on its effective surface so as to engage the stop pawl 1119 and maintain it in the position shown in Fig. 71, when the shaft 1081 reaches its zero position. Therefore, before the wheel 126 can be

rotated in a clockwise direction to rotate the shaft 1081 in a clockwise direction, as described above, it is necessary first to back up the wheel 126 far enough to release the pawl 1119 to the action of the spring 1122. The backward movement of the shaft 1081 is limited by a pawl 1123, also pivoted on the stud 1121 and spring-urged against the periphery of a cam 1124 by a spring 1125. When the wheel 126 is backed up in a counter-clockwise direction, the cam 1124, being secured to the shaft 1081, is rocked counter-clockwise until arrested by the end of the pawl 1123. At this time, the spring 1122 is free to withdraw the stop pawl 1119, which is then moved an extent determined by a stop stud 1127 on the pawl 1123. The stud 1127 is so located in relation to the stop pawl 1119 that, when the stop pawl 1119 is moved into engagement with the stud 1127, the opposite end of the stop pawl 1119 is withdrawn from the path of the arm 1120 on the reset shaft 1081. After the reset shaft is released by the above backward movement of the wheel 126, the wheel will be free to be rotated clockwise. During this movement, the cam 1124, engaging the pawl 1123, rocks said pawl counter-clockwise. This counter-clockwise movement of the pawl 1123, through the stud 1127, rocks the stop pawl 1119 back into its effective position, so that the arm 1120 on the reset shaft can come into engagement with the free end of the pawl 1119 and arrest further movement of the shaft 1081 when the shaft reaches its zero position.

The consecutive number mechanism, including the resetting means therefor, is carried between the auxiliary frames 1128 (Figs. 55 and 71) and includes the stud 1112, the shaft 1116, the shaft 1081, and the stud 1121. This unit can therefore be assembled as a separate entity and assembled into the machine as a whole.

The two auxiliary frames 1128 are formed into a unitary framework by the sleeve 1115 and two sleeves 1131 and 1132. The sleeves 1131 and 1132 and 1115 are supported on shafts 1129, 1130, and 1116, respectively. After the unit has been assembled on the shafts 1116, 1129, and 1130, screws 1133 (Fig. 55) are entered into the ends of the shafts 1116, 1129, and 1130, to maintain the consecutive numbering unit in position in the machine.

Secured to the pinion 1111 (Figs. 55 and 74) is a disk 1134, having a notch 1135, with which coacts a spring-urged pawl 1136. When the reset shaft 1081 is in its zero position, the spring-urged pawl 1136 rests on the periphery of the disk 1134. When the reset rotation, in a clockwise direction (Fig. 55), of the reset shaft 1081 is started, it is necessary to complete the operation of the reset shaft, inasmuch as, shortly after the beginning of the clockwise rotation of the shaft, the pawl 1136 drops behind the notch 1135 and prevents return movement of the disk 1134. The pawl 1136 and the disk 1134 constitute what is known in the art as a "full-stroke device."

The disk 1134 is also provided with a notch 1137, which is normally engaged by a locking pawl 1138 (Fig. 55). The locking pawl 1138 is pivoted on the beforementioned stud 1102 and normally prevents reset operation of the consecutive number means. Before the consecutive numbering means can be reset to zero, it is necessary to withdraw the pawl 1138 from engagement with the disk 1134. This is accomplished in the manner presently described, under control of the lock slide 123.

Lock control slide

The machine is provided with a control slide 1139 (Fig. 55) slidably mounted on two studs 1140 and 1141, carried by the side frame 181 of the machine. The control slide can be moved into three different positions; in one position the machine is locked against operation; in another position the machine may be operated; and in a third position the consecutive number may be reset and the date may be changed.

Mounted on the control slide 1139 is the beforementioned lock slide 123, the lock on which projects through a slot 1142 of the cabinet 128. The slot 1142 is provided with an index pointer 1143 to aid the operator in positioning the slide 1139. When the slide 1139 is in its intermediate position—that is, with the legend "Register" opposite the index pointer 1143—the machine may be operated, but the consecutive number reset and date setting mechanisms are locked against operation. When the slide 1139 is moved upwardly (Fig. 2) to position the legend "Locked" opposite the index pointer 1143, the machine cannot be released for operation. When the slide 1139 is lowered to position the legend "Consecutive No. Reset" opposite the index pointer 1143, the consecutive number reset mechanism is unlocked, and the mechanism for setting the date, to be described hereinafter, is also unlocked.

The lock 123 is provided with a bolt 1144, which may be moved into locking contact with a keeper 1145, carried on the beforementioned studs 1140 and 1141. In order to shift the slide from its normal position to either of its two adjusted positions, it is necessary to first disengage the bolt 1144 from the keeper 1145 and thereafter to move the slide 1139 to the desired position.

The control slide 1139 is provided with a cam slot 1146 (Fig. 55), which engages a stud 1147 on a three-armed member 1148. The three-armed member 1148 is mounted on a stud 1149 supported by the frames 1128. A downwardly-extending arm of the three-armed lever 1148 is bifurcated to engage a stud 1159 on the beforementioned locking pawl 1138.

When the slide 1139 is lowered, as viewed in Fig. 2, to position the legend "Consecutive No. Reset" opposite the index pointer 1143, the cam slot 1146 raises the stud 1147 and rocks the three-armed member 1148 counter-clockwise. Counter-clockwise movement of the three-armed member 1148, through the stud 1150, rocks the locking pawl 1138 clockwise to withdraw it from engagement with the notch 1137 of the locking disk 1134. This frees the reset wheel 126 and permits the consecutive number wheels 1071 to be reset to zero in the manner described hereinbefore. When the control slide 1139 is moved upwardly, as viewed in Fig. 2, to position the legend "Locked" opposite the index pointer 1143, the stud 1147 remains in the horizontal section (Fig. 55) of the cam slot 1146, and therefore the locking pawl 1138 remains in its locked position.

A retaining pawl 1151 (Fig. 55), pivotally mounted on the beforementioned stud 1140, is spring-urged in a counter-clockwise direction by a spring 1152, to position a stud 1153 on the pawl 1151 into a notch in the lower edge of the control slide 1139 to maintain the slide in either of its three adjusted positions.

The three-armed member 1148 is provided with a leftwardly-extending arm (Fig. 55), which is bifurcated to engage a stud 1154 of a locking pawl 1155 in engagement with a locking wheel 1156 on the date setting wheel 124. When the three-

armed member 1148 is rocked counter-clockwise by shifting the slide 1139 downwardly, as viewed in Fig. 2, to position the legend "Consecutive No. Reset" opposite the index pointer 1143, the three-armed member 1148, by engagement with the stud 1154, rocks the locking pawl 1155 clockwise to disengage it from the locking wheel 1156. The locking wheel 1156 is secured to rotate with the date setting wheel 124. Thus it is clear that, when the control slide 1139 is moved to the "Consecutive No. Reset" position, the date wheels can also be adjusted.

When the control slide 1139 is moved to its lower position to unlock the consecutive number reset mechanism and the date setting mechanism, the machine release shaft 264 (Fig. 55) is locked against movement. To lock the release shaft 264 against movement, the control slide 1139 is provided with a surface 1157, which is brought into the path of a stud 1158 when the control slide 1139 is moved into its "Consecutive No. Reset" position. The surface 1157, coacting with the stud 1158, therefore, prevents any releasing movement of the shaft 264 while the date is being changed or the consecutive number is being reset to zero. The machine release shaft 264 is also locked against movement when the slide 1139 is moved upwardly (Fig. 2) into its locked position. When the slide is moved into its locked position, a cam surface 1159 on the slide 1139 engages the stud 1158 and rocks the link 939 upwardly, thus rocking the release shaft 264 clockwise. Clockwise movement of the release shaft 264 releases all of the keys which may have been depressed on the keyboard. With the shaft 264 held in this clockwise position, any key on the keyboard may be depressed, but the key will immediately move into its undepressed position upon removal of the operator's finger from the key. The above mechanism, therefore, provides an effective means for preventing any operation of the machine while the slide 1139 is in its locked position. The effect of rocking the release shaft 264 in a clockwise direction by the cam surface 1159 is the same as though the Release key 119 is depressed to release keys on the keyboard as described hereinbefore. Therefore, if desired, the Release key may be depressed first to raise the stud 1158 and thereafter move the slide 1139 into its locked position. This would eliminate some of the force necessary to cam the stud 1158 into its upper position by the slide 1139.

DATE SETTING MECHANISM

Type wheels 1161 (Figs. 72, 76A, and 76B) are provided to print dates on the deposit slip and the issuing tape. No date printing wheels are provided for printing the date on the audit strip. Four type wheels 1161 are provided in the slip printing section of the printing mechanism, so that the month, the day, and the year can be printed on the deposit slip. Only three type wheels 1161 are provided in the issuing tape printing section, and these wheels are provided to print the month and the day only. No date printing wheels are illustrated in the audit tape printing section, inasmuch as it is not necessary to date the entries on the audit tape in the system illustrated herein.

The date type setting wheels 1161 are adjusted by the date setting wheel 124 (Figs. 2 and 72). In addition to setting the type wheels 1161, indicating wheels, including a units indicator 1162 (Fig. 75), a tens of day indicator 1163, a month indicator 1164, and a year indicator 1165, are provided, which are visible through the opening

125 (Fig. 2) in the cabinet of the machine to aid the operator in properly adjusting the type wheels 1161.

The date setting wheel 124 has secured to its side a pinion 1166 (Figs. 55 and 72) meshing with a gear 1160 rotatably mounted on the sleeve 1115. The gear 1160 meshes with a gear 1168 rotatably mounted on the stud 1149. The gear 1168 meshes with a gear 1169 mounted to rotate on the sleeve 1131. The gear 1169, together with a Geneva tens transfer member 1170 and a locking disk 1171, is secured to the units indicator 1162.

Rotating the date setting wheel 124 clockwise, through the gears 1166, 1160, 1168, and 1169, adjusts the indicator 1162 in a counter-clockwise direction to advance the units date indicator.

Also meshing with the gear 1168 is a ring gear 1172 rotatably mounted on a disk 1173 carried by the shaft 632. The ring gear 1172 is provided with internal teeth meshing with a pinion 1174 mounted on a square shaft 1175. The square shaft 1175 extends across the machine, and a pinion, similar to the pinion 1174, is provided to adjust the units of day type wheel in the slip printer and the issuing tape printing sections. The pinion, similar to the pinion 1174 in the printer section, meshes with internal teeth of a ring gear 1176, which meshes with the units of days type wheel 161.

Therefore, when the date setting wheel 124 is rotated until the proper numeral appears on the indicator, the type wheel 1161 is adjusted a similar extent. When the units of day type wheel passes from 9 to 0, the Geneva tens transfer member 1170 engages in a tooth space of a Geneva transfer gear 1177, rotatably mounted on the stud 1149. A locking disk 1178, coacting with the locking disk 1171, prevents rotation of the Geneva tens transfer mechanism except when the tooth of tens transfer disk 1170 is effective to rotate the gear 1177 in a manner well known in the art, as shown in the patent to Thomas Carney, No. 532,762, issued on January 22, 1895. Secured to the assembly including the gear 1168, the Geneva tens transfer gear 1177, and the disk 1178, is a hub 1179, also connected to a gear 1180. The gear 1180 meshes with a gear 1181, secured to a tens of days date indicator. By this Geneva tens transfer mechanism, the tens of days indicator is advanced one step each time the units of days indicator passes from 9 to 0. A similar Geneva tens transfer mechanism is provided between the tens of days indicator and the month indicator 1164 and consists of a Geneva transfer member 1182, similar to the member 1170, which engages a gear 1183, secured to a gear 1184. The gear 1184 meshes with a gear 1185 secured to the month indicator 1164. The Geneva transfer mechanism between the tens of days indicator 1163 and the month indicator 1164 is so constructed that, each time the tens of days indicator moves from "3" to a blank position, the month indicator 1164 will be advanced one step. The month indicator 1164 is also provided with a Geneva tens transfer mechanism 1186, meshing with a Geneva gear 1187. A locking disk 1188 is provided on the month wheel and coacts with a locking disk 1189 secured to the gear 1187. The gear 1187 and the locking disk 1189 are pinned to the stud 1149, to which stud is also pinned a gear 1190, meshing with a gear 1191 on the year indicator 1165. The Geneva transfer member 1186 is arranged to advance the year wheel 1165 one step each time the month wheel 1164 passes from "December" to "January."

Each gear 1180, 1183, and 1190 meshes with a ring gear 1172, similar to that provided in the units type wheel setting mechanism, to adjust the corresponding type wheels in the manner described for the units of days type setting.

An aligning pawl 1192 (Fig. 72), pivoted on a stud 1193, carried by the right-hand frame 1128, is provided to maintain the date setting wheel 124 in its adjusted position to properly align the indicator wheels 1162 and the units type wheel 1161 in set position. A spring 1194, attached to the pawl 1192, constantly urges the pawl into engagement with the aligning wheel 1156.

The use of the Geneva tens transfer between the date setting indicators and wheels makes it possible to adjust the type wheels forwardly and reversely.

TYPE WHEEL ALIGNING MECHANISMS

After the type wheels have been adjusted by the ring gears, by their respective differential mechanisms, the ring gears are all aligned by aligners 1201 (Figs. 8, 20, 37, 65, 76A, and 76B). An aligner is provided in each printing section; that is, for the slip printer, audit tape printer, and issuing tape printer sections, as shown in Figs. 76A and 76B. The three aligners 1201 are pinned to a shaft 1202 (see also Fig. 65) supported by, and extending between, the frames 203. Also pinned to the shaft 1202 is an arm 1203 (Figs. 65 and 76B), connected to a cam arm 1204 by a link 1200. The cam arm 1204 is pivoted on the shaft 786 and is provided with two rollers 1205, coacting with a pair of cams 1206 (see also Fig. 22) pinned to the main cam shaft 229.

The cam plates 1206 are so formed that, immediately after the ring gears, carried by the shaft 510 (Fig. 20), are adjusted by their respective differential mechanisms, the cams 1206 rock the cam arm 1204 counter-clockwise to move the link 1200 to the left, as viewed in Fig. 65. This movement, through the arm 1203 and the shaft 1202, rocks the aligners into engagement with the ring gears to align them according to their differential setting. The aligners 1201 compensate for any lost motion between the ring gears and the differential mechanism.

Just before the printing takes effect in the manner described hereinafter, a second aligner is moved into engagement with the type wheels themselves to align the type wheels accurately at the printing line. This aligner consists of a bar 1207 (Figs. 66, 76A, and 76B), for each group of type wheels; that is, one in the slip printer section, one in the audit tape section, and one in the issuing tape section. Each bar 1207 is supported by two links 1208, connected at their right-hand ends, as viewed in Fig. 66, to an arm 1209 by a rod 1210. The left ends of the links 1208 are provided with guide rollers 1211, which project into, so as to slide in, notches 1212 in the plates 203. The arms 1209 are all pinned to a shaft 1213, to which is also pinned an arm 1214. The arm 1214 is connected to a cam arm 1215 by a link 1216. The cam arm 1215 is pivotally mounted on the shaft 786 and carries a roller 1217 normally held in engagement with a cam 1218 by a spring 1219. The cam 1218 is secured to the main cam shaft 229. The cam arm 1215 is provided with a nose 1221, which is engaged by a block 1220, riveted to the side of the cam plate 1218 (see Fig. 22) when the cam rotates.

The cam 1218 is so formed that, after the type wheels are positioned and the aligner 1201 has

been engaged with the ring gears in the manner described above, the bar 1207 is snapped into position to align the type carriers just before the printing takes place. Clockwise rotation of the cam 1218 will bring the surface of the block 1220 into the path of the nose 1221 on the cam arm 1215. When the block 1220 moves beyond the nose 1221, the spring 1219 snaps the link 1216 and the cam arm 1215 counter-clockwise to rock the arm 1214, the shaft 1213, and the arms 1209 counter-clockwise to snap the bar 1207 into engagement with the teeth on the type carriers.

Certain of the type wheels are ten-space wheels, while others are twelve-space wheels, such as those for setting up the date. In order to properly engage all of the type carriers of a group, the bar 1207 is slightly offset, so that it will engage between teeth of the type carriers to properly align all of the printing characters at the printing line.

Bank number and machine number type wheels and aligner

A type wheel 1225 and two type wheels 1226 (Fig. 76A) are provided to print the bank number and the machine number, respectively, on the deposit slip. These type wheels are set when the machine is assembled and are not readjusted during a machine operation. An aligner 1227, mounted on the shaft 1202, engages with the teeth of ring gears 1228, meshing with the type wheels 1225 and 1226. The aligner is held in position to engage the ring gears 1228 by a screw 1229, which passes through a flange on the aligner and is screwed into the cross bar 201. To change the setting of the type wheels 1225 and 1226, the screw 1229 is removed, and the aligner is manually rocked on the shaft 1202 to release the ring gears 1228, whereupon the type wheels can be manually adjusted to any desired position, after which the aligner is again secured in place by the screw 1229. The data printed by the type wheels 1225 and 1226 is illustrated in Figs. 90 and 91 and appears between the date and the consecutive number.

INSERTABLE SLIP PRINTER

In the herein-illustrated system for a commercial bank teller, the machine is adapted to print on insertable slips, such as a deposit slip (Fig. 90) and a teller's cash ticket (Fig. 91). The data to be printed includes the date, the bank number, the machine number, a consecutive number, a symbol for the teller, a symbol representing the kind of entry, and the amount of the deposit. The printing mechanism for printing on the insertable slip is located at the lower left-hand corner of the machine, as shown in Fig. 1.

In commercial accounts, the deposit being made by the customer may consist of all checks, all cash, or mixed deposits including both checks and cash. In order to assist the auditing department to audit the teller's cash balance, it is usually the practice for the teller to fill in a cash ticket, indicating the amount of cash taken in on any deposit, whether it is a straight cash deposit or a mixed cash and checks deposit. When a deposit including both checks and cash is made, the machine disclosed herein prints the total of the deposit on the deposit slip and the amount of cash included in the deposit on the cash ticket. One copy of the deposit slip and the cash ticket are sent to the auditing department with the checks. In auditing the individual transaction, the auditor first enters the total amount of the

deposit on a bank proof machine and then subtracts the amount read from the cash ticket, then the amount of each check involved in the particular deposit. If the transaction is complete in all respects, the bank proof machine indicates a clear balance.

The deposit slip is prepared in duplicate, so that the teller can give one copy to the customer and send the other copy to the auditing department. The deposit slip also provides means for properly crediting the customer's account with the total amount thereof, after it is properly proved out in the bank proof machine.

In addition to proving the correctness of the entries of the items on the deposit slip, the teller's cash ticket also provides a means for balancing the cash in a teller's cage. At the end of the day's business, the auditor totals all of the cash tickets for a given teller, which gives him a total of the amount of cash taken in by the teller. The audit strip, to be described presently, furnishes a total of the amount of cash which the teller pays out. The difference between the amount of cash taken in and the amount of cash paid out gives the auditor the balance which the teller should have in his cage.

As illustrated herein, the miscellaneous keys in the second transaction bank also control a slip impression means to make one impression on an insertable slip. The form of slip used for this purpose depends upon the nature of the use to which the miscellaneous key is put.

Insertable slip printing mechanism

The deposit slip 1241 (Fig. 90) or the cash ticket 1242 (Fig. 91) is positioned on a slip table 1243 (Figs. 1 and 80) supported on the frames 181 and 192 (Figs. 8 and 78A). Guide lines 1244 (Fig. 1) are engraved on the slip table to guide the teller in positioning the slip on the slip table 1243 in the proper relationship with the printing wheels in the slip printing section. All of the slip printing mechanism is located between the frames 181 and 192, and the slip table 1243 is provided with an opening 1245, through which a printing hammer 1246 is moved to carry the inserted slip 1241 or the cash ticket 1242 and a ribbon 1247 against the type wheels to make an impression. The printing hammer 1246 is carried by a support 1248 (Fig. 87) guided on a stud 1249 carried by the frame 192 and a similar stud 1249 carried by the frame 181. Each end of the supporting member 1248 is provided with studs 1250 and 1252, which project into a notch 1251 formed in each of the side frames 181 and 192 (see also Fig. 78A). The studs 1249, 1250, and 1252, therefore, provide a means for guiding the printing platen in its vertical or up-and-down printing movements.

The studs 1252 (Figs. 78A and 87) are engaged by the bifurcated ends of bell cranks 1253 secured to a shaft 1254 pivotally supported in the frames 181 and 192. Connected to the bell crank 1253, adjacent the frame 192, is a link 1255, the right-hand end of which is slotted to engage over a stud 1256 to guide the link 1255 in its movements. A spring 1257, connected to the link 1255 and a suitable stud on the frame 192, normally maintains the hammer in its lower position, the stud 1256 acting as a stop for the link 1255 when held in its normal position, shown in Fig. 87. The right-hand end 1258 of the link 1255 is offset into the plane of a stud 1259, which acts as a pivot between an arm 1260 and a toggle link 1261. The stud 1259 is shouldered to pro-

wide space between the link 1261 and the arm 1260, into which space the end 1253 of the link projects. The arm 1260 is mounted on a stud 1262, carried by the frame 192. A stud 1263 on the frame 192 acts as a limiting stop for the arm 1260. A second toggle link 1264 is connected to the toggle link 1261 by a stud 1265, and the opposite end of the toggle link 1264 is pivoted to an arm 1266, pivoted on a stud 1267 carried by the frame 192. A stud 1268 on the frame 192 acts as a limiting stop for the arm 1266 when in its home position. The stud 1265 projects laterally from the link 1264 and into a bifurcated end of a cam arm 1269, pivoted on a shaft 1325 carried by the frames 181, 192, 193, and 180 (Fig. 78B).

The cam arm 1269 is provided with two anti-friction rollers 1271, which are acted upon by a pair of cams 1272 secured on the printer shaft 1273.

The printer cam shaft 1273 is rotated from the main cam shaft 229 (Fig. 52) by the train of gears including the gears 230, 231, and 879. Meshing with the gear 879 is a gear 1274 (see also Fig. 78B) secured to the printer cam shaft 1273. The ratio of the train of gears 230, 231, 879, and 1274 is such that one complete rotation of the main cam shaft 229 rotates the printer cam shaft 1273 one complete rotation.

Counter-clockwise rotation of the cams 1272 rocks the cam arms 1269 first clockwise and then counter-clockwise, back to its home position. Clockwise movement of the cam arm 1269, acting on the toggle stud 1265, tends to straighten the toggle composed of links 1261 and 1264. If the arm 1266 is held against clockwise rotation, the toggle is straightened and the arm 1260 is rocked counter-clockwise. Counter-clockwise movement of the arm 1260 moves the link 1255 toward the left (Fig. 87) to rock the bell cranks 1253 clockwise, which, through the studs 1252, raises the printing hammer 1246 to take an impression from the type wheels onto the inserted slip.

The extent of rocking movement of the arm 1269 is such that the toggle links 1261 and 1264 are moved into a horizontal position and beyond to again break the toggle joint. Therefore, when the arm 1269 is restored in a counter-clockwise direction, the toggle links 1261 and 1264 are again straightened before they are broken, upon their return to their normal position. This movement is taken advantage of in controlling the printing hammer for making one or two impressions. The first impression is made when the toggle is straightened during the clockwise movement of the cam arm 1269, and the second impression is made when the cam arm 1269 is returned counter-clockwise to its home position.

Whether the platen is operated to make one impression, two impressions, or no impression at all depends upon whether or not the arm 1266 is blocked against clockwise movement. The blocking of the arm 1266 is effected by a segment 1275, pivoted on a shaft 1276, carried by the frames 181 and 192 (Fig. 78B). If the segment 1275 is rocked counter-clockwise before the cam arm 1269 is rocked clockwise, the segment 1275 moves under a stud 1240 on the arm 1266. If the segment 1275 is held under the stud 1240 during both the clockwise and counter-clockwise movements of the cam arm 1269, two impressions will be made. If only one impression is to be made, the segment 1275 is withdrawn from beneath the stud 1240 prior to the counter-

clockwise return movement of the cam arm 1269. If, on the other hand, no impression at all is to be made during the machine operation, the segment 1275 is controlled to remain in the position shown in Fig. 87, and therefore no impression will be made during either the clockwise or the counter-clockwise movement of the cam arm 1269.

The selective movement of the segment 1275 is controlled by notched disks 1277 (Fig. 85) and 1278 (Fig. 87). The notched disk 1277 (see also Fig. 77A) is adjusted under control of the second transaction bank through the square shaft 763 in a manner hereinbefore described for the setting of the other notched control plates. The notched disk 1277 is mounted on a disk 1279 and is provided with internal teeth meshing with a pinion on the square shaft 763, and the disk 1279 is mounted on the shaft 632.

The notched disk 1278 is provided with internal teeth and is mounted on a disk 1280, carried by the shaft 632, and said internal teeth mesh with a pinion on the square shaft 743, which shaft, as hereinbefore described, is adjusted under control of the first transaction bank of keys.

The disks 1277 and 1278 are provided with notches, some of which are deeper than others. Coacting with the peripheries of the notched disks 1277 and 1278 is a feeler mechanism comprising a finger 1281 in the plane of the disk 1277, carried by an adjustable block 1285, rotatably mounted on a stud 1282, carried by a feeler link 1283. The feeler link 1283 is provided with a finger 1284 in the plane of the disk 1278. The block 1285 is rotatable on the stud 1282 to vary the control over the printing hammers in a manner to be described hereinafter. A spring plate 1286, carried on studs 1287 on the link 1283, provides a means for maintaining the block 1285 in its adjusted position.

The link 1283 is slotted to slide on a stud 1288 at its left end, and is pivoted on an arm 1289 at its right-hand end. The arm 1289 is pivotally mounted on a shaft 1290, and a rearwardly-extending arm 1291 of the arm 1289 has pivoted thereto a link 1292, the lower end of which is pivoted to the segment 1275. A spring 1293, one end of which is connected to the stud 1288, and the other end of which is connected to the pivot stud on the arm 1289, maintains the arm 1289, the link 1292, and the segment 1275 in their normal ineffective positions. In the normal position of the arm 1291, a stud 1294 thereon rests on a shoulder of an arm 1295, secured to the shaft 1290. Also secured to the shaft 1290 is a cam arm 1296 (see also Figs. 78B and 94). The cam arm 1296 is provided with an anti-friction roller 1297, normally held against a cam 1298 on the main cam shaft 229 by a spring 1299 (Figs. 78B and 94), acting through a yoke 1423 and a stud 1425, described later.

When, during the operation of the main cam shaft 229, the cam 1298 moves beyond the roller 1297, the spring 1299 rocks the arm 1296 clockwise to rock the shaft 1290 and to thereby lower the arm 1295 (Fig. 87), thus permitting the spring 1293 to move the arm 1291 and the link 1292, together with the segment 1275, to move the latter beneath the stud 1240, if permitted to do so by notches in the disks 1277 and 1278.

If, when the arm 1291 starts to rock clockwise under control of the cam 1298, the fingers 1281 and 1284 contact the full peripheries of the control disks 1277 and 1278, respectively, the feeler

link is immediately arrested, thus preventing the arm 1291 from moving clockwise, thereby holding the link 1292 in its normal position to thereby prevent the segment 1275 from moving beneath the stud 1240. Under this condition, no impression is made when the cam arm 1269 later moves the stud 1265. The resistance met by the stud 1259, due to the spring 1257 and the weight of the parts, including the link 1255, the bell crank 1253, and the hammer 1246, prevents the arm 1260 from rocking counter-clockwise. This causes the arm 1256 to rock clockwise, and therefore the link 1255 is not moved to operate the printing hammer.

If, when the arm 1291 is released under control of the cam 1298, both fingers 1281 and 1284 enter notches in the disks 1277 and 1278, respectively, the arm 1291 is free to rock clockwise, thus lowering the link 1292 and moving the segment 1275 counter-clockwise beneath the stud 1240. Thereafter, upon rocking movement of the arm 1269, the arm 1266 is maintained against clockwise rotation, and therefore the toggle consisting of the links 1261 and 1264 is straightened to rock the arm 1260 to shift the link 1255 and the bell crank 1253 to raise the printing hammer 1246 to make an impression.

If the fingers 1281 and 1284 enter deep notches such as those shown in positions 4 and 8 of the notched disk 1277 and in position 10 in the disk 1278, means presently described control the segment 1275 to remain under the stud 1240 during both the clockwise and counter-clockwise movements of the cam arm 1269, and therefore two impressions are made, one during the clockwise movement of the arm 1269 and the other during its counter-clockwise movement.

After the two impressions have been made, the cam 1298, coacting with the roller 1297, restores the cam arm 1296, the shaft 1290, and the arm 1295 counter-clockwise to their home positions. During this movement, the arm 1295, engaging the stud 1294, restores the arm 1291, the link 1292, and the segment 1275 to their home positions.

In operations of the machine when the fingers 1281 and 1284 enter the shallow notches of the disks 1277 and 1278, respectively, or when one of the fingers 1281 or 1284 enters a deep notch and the other enters a shallow notch, the feeler link 1283 and therefore the arm 1291 are not moved as great an extent as when these fingers both enter deep notches. When this condition exists and the cam arm 1296 is rocked clockwise to rock the arm 1295 likewise, the arm 1291 and the link 1292 are moved an extent less than when both fingers enter deep notches. Upon continued movement of the arm 1295, after the link 1292 is arrested, a surface 1300 of the arm 1295 (Fig. 88) is moved beyond a stud 1301 of a pawl 1302 pivotally mounted on a stud 1303, which forms a pivot point between the arm 1291 and the link 1292. A spring 1304, stretched between the stud 1301 and the stud 1294, normally tends to rock the pawl 1302 clockwise. Therefore, when the surface 1300 moves beyond the stud 1301, the spring 1304 rocks the pawl 1302 clockwise to follow the inclined surface 1305 of the arm 1295. This clockwise movement of the pawl 1302 positions its end 1306 into the path of a finger 1351 of a cam arm 1350, pivoted on the shaft 1290, the latter having a roller 1349 held in engagement with a cam 1348 (Figs. 87 and 88), on the main cam shaft 229, by a spring 1352. The cam 1348 permits the arm 1350 to rock first clockwise under the influence of the spring 1352 (Fig.

88) and then back to home position. When the cam 1348 restores the cam arm 1350 to its home position, the finger 1351 engages the end 1306 of the pawl 1302 and moves the pawl 1302, together with the link 1292, upwardly. This movement takes place prior to the time the cam arm 1269 receives its counter-clockwise movement, and therefore, when the link 1292 is moved upwardly by the finger 1351, the segment 1275 is withdrawn from beneath the stud 1240. Therefore the second impression does not take place.

When the feeling fingers 1281 and 1284 enter the deep notches, the link 1292 partakes of the entire movement of the arm 1295, and therefore the surface 1300 is never withdrawn from contact with the stud 1301, and the end 1306 of the pawl 1302 remains out of the path of the finger 1351. During the restoring movement of the arm 1350, the finger 1351 does not contact the end 1306 of the pawl 1302, and therefore the link 1292 is restored to its home position after the second impression has been made, in the manner described above.

As shown in Figs. 85 and 87, the disks 1277 and 1278 are notched, so that, if a Deposit key is depressed in the second transaction bank and no key is depressed in the first transaction bank, a deep notch is positioned in the path of the finger 1281, as shown by positions 4 and 8 of Fig. 85 and position 10 of Fig. 87, and therefore, on any deposit entry in the machine, two impressions are made to print on the duplicate deposit slips. If one of the miscellaneous keys or one of the cash-in keys is depressed in the second transaction bank and no key is depressed in the first transaction bank, one of the shallow notches of positions 1, 3, 5 or 7 is positioned in the path of the fingers 1281, and a deep notch is in the position of the finger 1284, and therefore only one impression will be made. If a repeat key in position 5 of the first transaction bank is depressed, the shallow notch shown in position 5 (Fig. 87) is presented to the finger 1284, and a notch corresponding to whichever key is depressed in the second bank will be positioned in the path of the finger 1281. In this operation, the shallow notch in position 5 of the disk 1278 controls the printing mechanism to make one impression. Therefore, on all repeat operations, only one impression is made by the printing hammer, even though a deep notch may be presented to the finger 1281. This is so because a shallow notch always takes precedence in its control over a deep notch presented to the finger 1281 or 1284.

The adjustable block 1285 is provided so that, if the system being used requires a different printing control, such different printing control can be obtained by simply rotating a block 1285 on the stud 1282 to move the finger 1281 out of effective position with respect to the disk 1277 and moving a finger 1308 on the block 1285 to effect a position in respect to a third disk 1309 (Fig. 86). As illustrated in Fig. 86, all of the notches shown are deep notches. That is to say, a deep notch is provided in each of the positions 1, 3, 4, 5, 7, and 8. Under this adjustment of the block 1285, the finger 1308, always engaging a deep notch, will cause two impressions to be made during every printing operation when no key is depressed in the first transaction bank, whereby a deep notch is also presented to the finger 1284. With the block 1285 moved to the position to be controlled by the disk 1309 and a Repeat key depressed in the first transaction

bank, a shallow notch in position 5 is moved into the path of a finger 1284, and therefore only one impression will be made even though a deep notch is presented to the finger 1308 in the manner described above.

The novel arrangement whereby the feeling finger 1281 or 1308 can be manually adjusted, to be controlled by their respective notched disks, forms a simple and effective way of changing the printing control whenever it is desired to change the control over the printing hammer. It is to be understood that the notching of the disks as shown in Figs. 85, 86, and 87 are only examples for controlling the printing hammer to fit the particular system described herein. These disks may be notched in any desired manner so that the printing control may be effected to fit any system in which the machine is to be used.

Slip feeling mechanism

A slip feeling mechanism is provided in the machine so as to disable the printing hammer if no slip is placed on the slip table 1243 (Fig. 84), to prevent idle operation of the printing hammer and prevent smudging the printing platen.

The slip feeling mechanism includes a feeler 1315 (Figs. 80 and 84), which is arranged to enter an opening 1316 of the slip table 1243 to feel for the presence of a slip. If no slip is on the table and the machine is operated, the slip feeler 1315 is raised to thereby present an obstruction in the path of the link 1292 (Figs. 83 and 87) to prevent the segment 1275 from moving beneath the stud 1240, so that the toggle links 1261 and 1264 will not actuate the arm 1260, the link 1255, and the hammer 1246.

The feeler 1315 (Fig. 84) is guided in its upward and downward movements by the before-mentioned shaft 1254 and a shaft 1317, carried by the frames 181 and 192. The lower end of the slip feeler 1315 is pivoted to a bell crank 1318, secured on a shaft 1319, carried by the frames 181 and 192. The lower arm of the bell crank 1318 has connected thereto a spring 1320, the other end of which is secured to a stud 1321 on the frame 192. Also secured on the shaft 1319 is an arm 1322, to which is pivoted a link 1323 at one end, the other end of the link being connected to an arm 1324 pivoted on the shaft 1325, carried by the frames 180, 181, 192, and 193 (see also Fig. 81). The arm 1324 is provided with a finger 1326, which is normally held against a flange 1327 (Fig. 84) of a pawl 1328, pivoted on a stud 1329 of a cam follower arm 1330, by the spring 1320. The flanges 1327, therefore, provides a means for locating the feeling finger 1315 in respect to the slip table 1243. The cam arm 1330 is pivoted on the shaft 1325 and is provided with an anti-friction roller 1331, held in engagement with a cam 1332 on the printer cam shaft 1273 by a spring 1333 stretched between a stud on the arm 1330 and a stud on a segment 1334 secured to the shaft 1276.

Also secured to the shaft 1276 is a segment 1335 (Fig. 83), located in respect to a flange 1336 on the link 1292, so that, upon the segment 1335 being rocked counter-clockwise, the segment moves beneath the flange 1336 and prevents downward movement of the link 1292. The segment 1334 is integral with an arm 1337 (Fig. 82), the arm 1337 being provided with a stud 1338, which projects into a notch in an arm 1339, pivotally mounted on the shaft 1325. The arm 1339 is integral with a segment 1340, the outer periphery 1341 of which is slightly lower than the periphery 1342 of the arm 1324 (Fig. 81).

When the printer cam shaft 1273 is rotated counter-clockwise (Fig. 84), the spring 1333 rocks the cam arm 1330 counter-clockwise to carry the pawl 1328 and its flange 1327 away from the finger 1326 of the arm 1324. Movement of the flange 1327 away from the finger 1326 releases the arm 1324 and the link 1323 to the action of the spring 1320, rocking the bell crank 1318 counter-clockwise to raise the feeler 1315 to feel for a slip in the machine. If no slip is present on the slip table 1243, the slip feeler 1315 is permitted to rise, and therefore the spring 1320 moves the link 1323 to the right (Fig. 84) to cause the finger 1326 to follow the flange 1327. Counter-clockwise movement of the cam follower arm 1330 to its fullest extent moves the flange 1327 beyond a surface 1343 (Fig. 82), whereupon the flange 1327 drops behind the surface 1343. This movement is permitted by a notch 1344 in the arm 1324 and is effected by a spring 1345 stretched between a stud on the pawl 1328 and the cam arm 1330. When the flange 1327 is in the notch 1344 and behind the surface 1343 of the segment 1340, and the cam arm 1330 is restored to its home position by the cam 1332, the pawl 1328 rocks the segment 1340 clockwise, thus rocking the arm 1337 and the shaft 1276 counter-clockwise (Figs. 82, 83, and 84). Counter-clockwise movement of the shaft 1276 moves the segment 1335 (Fig. 83) beneath the flange 1336 to prevent downward movement of the link 1292, which prevents operation of the printing hammer.

If a slip is present on the slip table 1243, then, when the slip feeler 1315 begins to rise, the feeler is arrested by coming into contact with the inserted slip, and therefore the feeler 1315, the bell crank 1318, the shaft 1319, the link 1323, and the arm 1324 are arrested. Therefore, when the cam arm 1330 is rocked counter-clockwise, the flange 1327 of the pawl 1328 rides on the periphery 1342 of the segment 1324; therefore the flange 1327 cannot drop into the path of the surface 1343 of the segment 1340. If the flange 1327 cannot drop into the path of the surface 1343, the flange 1327 is held out of the path of the surface 1343 of the segment 1340, and therefore, upon return movement of the cam arm 1330, the flange of the pawl 1328 does not rock the segment 1340, which results in the shaft 1276 being held stationary, and the segment 1335 (Fig. 83) is held out of the path of the flange 1336 of the link 1292. Therefore, when a slip is on the slip table 1243, the link 1292 is free to operate to control the operation of the printing hammer, in the manner described hereinbefore.

Slip feed tension rollers

In order to space the printed data on the deposit slips (Fig. 90), so that the two impressions can be made, one for each copy thereof, mechanism is provided for feeding the deposit slip between the two impressions. The feed rollers are normally separated so that the deposit slip, or the teller's cash ticket, can be easily inserted into the machine. Immediately after the machine begins to operate, the feed rollers are brought together to grip the inserted slip, not only during the feeding movements but also at the time the printing takes place, to maintain the inserted slip in proper position.

The mechanism for controlling the tension rollers is shown in Fig. 97. Two upper feed rollers 1355 are rotatably mounted on the stationary shaft 204. Two tension rollers 1356 (Figs. 96

and 97) are provided, which are movable to come into contact with the stationary rollers 1355 immediately the machine begins to operate. The tension feed rollers 1356 are coupled together by a sleeve 1357 and are rotatably mounted on a shaft 1358 carried by two arms 1359 securely mounted on the before-said shaft 1317. Also secured to the shaft 1317 is an arm 1360 (Figs. 78A and 97), which is connected to a cam arm 1361 by a link 1362 (see also Fig. 78B). The cam arm 1361 is provided with an anti-friction roller 1363, held in engagement with a cam 1364, secured to the hub of the before-mentioned cam 1332 (see Fig. 78B), whereby the cam is secured to the printer cam shaft 1273. A spring 1365, connected at one end to one of the arms 1359 and at the other end to a stud on the frame 181, normally maintains the roller 1363 in contact with the periphery of the cam 1364. When the cam 1364 is in its home position, as shown in Fig. 97, the tension roller 1356 is in its lower position and out of contact with the stationary feed rollers 1355, thus clearing the opening for inserting the slip into proper position for receiving the impression.

Immediately upon the beginning of the operation of the machine, the cam 1364 rotates counter-clockwise, thus permitting the spring 1365 to rock the cam arm 1361 clockwise, which movement, through the link 1362 and the arm 1360, transmits similar clockwise rotation to the shaft 1317, thus raising the roller-supporting arms 1359 to bring the tension rollers 1356 into contact with the inserted slip and pressing it against the stationary feed rollers 1355. Near the end of the machine operation, after all impressions have been made, the cam 1364 rocks the cam arm 1361 counter-clockwise to restore the tension feed rollers 1356 to their normal positions, shown in Fig. 97.

Slip feed mechanism

After the tension rollers 1356 are rocked to their upper positions by the cam 1364 and the connecting mechanism therebetween, and after the first impression has been made upon the deposit slip, the tension rollers 1356 are given a counter-clockwise rotation to feed the slip an extent sufficient to present the next printing line to the printing position.

Means, to be presently described, is provided in the machine and can be manually set to vary the extent of the feeding of the insertable slip in accordance with a particular form being used in the machine. This variable feed provides a convenient means to adapt the machine to whatever form a bank or other business institution may want to adopt.

The mechanism for feeding the insertable slip is normally ineffective to rotate the feed rollers 1356 but is controlled from the keys of the first and second transaction banks, so that the feed mechanism will be operative during the machine operation in which a printing takes place. If the printing mechanism is automatically thrown off in the manner described hereinbefore, the feed mechanism is also thrown off. On the other hand, if the printing mechanism is thrown on to effect a print, the feed mechanism is also thrown on, so that the slip will be fed to space the two printed records.

Secured to one end of the shaft 1358 (Figs. 94 and 96) is a pinion 1370 in mesh with a rack 1371. The rack 1371 is connected to a lever 1372 by a link 1373. The lever 1372 is pivoted on a stud 1374 mounted on the side frame 181 and is provided with a stud 1375 at its lower end, nor-

mally held against the end of a pusher slide 1376 by a spring 1377. The pusher slide 1376 is slotted to slide on a guide stud 1378 mounted on the side frame 181. Pivoted at the rear end of the pusher slide 1376 is a cam arm 1379 pivoted on the before-mentioned shaft 1325. The cam arm 1379 is provided with an anti-friction roller 1380, held in engagement with the periphery of a cam 1381, secured to the printer cam shaft 1273, by the spring 1377.

The pusher slide is provided with a stud 1382, which is normally engaged by a lateral extension 1383 of a vertically-movable pitman 1384. The pitman 1384 is controlled in its movements by control disks differentially set under control of the transaction bank of keys, in a manner to be described hereinafter, so that, when no feed is required, the extension 1383 remains in the path of the stud 1382, and, when a feed is required, the vertical extension 1383 is lowered out of the path of the stud 1382.

If the extension 1383 is out of the path of the stud 1382 and the printer cam shaft 1273 rotates counter-clockwise, the spring 1377, acting through the lever 1372, the stud 1375, and the pusher slide 1376, causes the roller 1380 to follow the contour of the cam 1381 and thereby rock the cam arm 1379 counter-clockwise. Counter-clockwise movement of the cam arm 1379 moves the pusher slide 1376 to the right (Fig. 94), and the spring 1377 moves the link 1373 to the left, thus moving the rack 1371 to the left to rotate the pinion 1370 clockwise. Clockwise movement of the pinion 1370 rotates the shaft 1358 likewise. However, at this time the shaft 1358 is uncoupled from the feed rollers 1356, and therefore the feed rollers are not rotated. Upon further rotation of the cam 1381, its contour rocks the cam arm 1379 in a clockwise direction, thus moving the pusher slide 1376 to the left (Fig. 94), and, through the lever 1372, moves the link 1373 and the rack 1371 to the right, thus rotating the pinion 1370 and the shaft 1358 counter-clockwise. During the counter-clockwise rotation of the shaft 1358, a clutch between the shaft 1358 and the feed rollers 1356 is effective, as will be described hereinafter, to rotate the feed rollers 1356 to space the inserted slip to receive the second impression.

The extent of feeding movement to be given to the inserted slip is controlled by a plate 1385, rotatably mounted on the shaft 1276. The plate 1385 is provided with a plurality of steps 1386 of varying distances from its pivot point. Any of the steps 1386 may be brought into the path of the stud 1382 by removing a screw 1387, which is screwed into the side frame 181 of the machine. Upon removal of the screw 1387, the plate 1385 can be manually positioned in any of its disclosed positions, and, upon reinsertion of the screw 1387, the plate 1385 is held in the desired position. When the pusher slide 1376 is released for movement to the right (Fig. 94) by the contour of the cam 1381, the stud 1382 thereon comes into contact with the step 1386 in its path. The movement given to the slide 1376 is determined by the space between the stud 1382 and the selected step 1386. In the machine used to illustrate the present invention, the steps 1386 are so arranged that the distance between prints on the insertable slip can be varied from .6" to 2" in steps of .2". These dimensions are illustrative only, and any desired dimensions may be used in building the machine.

The clutch arrangement between the shaft

1358 and the feed rollers 1356 is illustrated in enlarged scale in Fig. 98. Secured to the shaft 1358 is a disk 1390 (see also Fig. 96) having a divided cylindrical portion 1391, which projects inwardly into the inner diameter of a ratchet ring 1392. Slidably mounted in the runways provided in the cylindrical portion 1391 are a pair of one-way drive pawls 1393, which are forced into teeth of a ratchet ring by a spring 1394. The spring 1394 passes through an opening drilled through the shaft 1358, so that the pawls 1393 may be forced outwardly to engage the inner ratchet teeth of the ring 1392. The ratchet ring 1392 is secured to one of the feed rollers 1356 by two studs 1395.

When the shaft 1358 receives its clockwise rotation at the beginning of the operation of the feed mechanism, the feed pawls 1393, camming against the ratchet teeth, are both moved inwardly to disconnect the driving connection between the shaft 1358 and the feed roller 1356. A brake mechanism, described hereinafter, prevents accidental rotation of the feed rollers 1356 during this operation. Upon the counter-clockwise rotation of the shaft 1358, the pawls 1393 form a driving connection between the cylinder 1391 and the ratchet ring 1392, thus rotating the feed rollers 1356 in a counter-clockwise direction to feed the inserted slip from one printing position to the other.

The clutch mechanism shown in Fig. 98 is provided in only one of the feed rollers 1356. However, inasmuch as the two feed rollers are connected together by the sleeve 1357 in the manner hereinbefore described, both feed rollers partake of the rotating movement.

The brake mechanism for the feed roller 1356, mentioned hereinbefore, consists of a spring-actuated brake 1396 (Fig. 94), which has a formed end normally held in engagement with one feed roller 1356 by a spring 1397. The brake member 1396 is pivoted on a stud 1398 on an extension of one of the tension arms 1359.

If, when the shaft 1358 receives its initial or clockwise rotation, the feed roller 1356 should tend to be moved in a clockwise direction by the clutch pawls 1393, the coaction between the periphery of the feed roller 1356 and the formed end of the brake member 1396 is such that the roller 1356 is wedged against the brake member 1396, and rotation thereof is prevented. The reason for this wedging action is that the point of contact of the formed member of the brake member 1396 is below center of the line drawn between the pivot point of the brake member 1396 and the shaft 1358. Clockwise rotation of the feed roller 1356, therefore, has a tendency to rock the brake member 1396 counterclockwise, thus causing a wedging action, which prevents such rotation of the feed roller 1356.

As disclosed in Fig. 96, each of the feed rollers 1356 is provided with a surface of resilient material such as rubber, to effect a better gripping action therebetween and the stationary rollers 1355.

Means is also provided on the shaft 1358 to prevent any excess rotation of the feed rollers 1356 at the end of a feeding operation. This lock includes the cam member 1400 (Fig. 95) secured on the end of the shaft 1358. Normally—that is, when the machine is at rest—the cam 1400 lies in the path of a pawl 1401 connected to a second pawl 1402 by a stud 1403 and holds the pawl 1402 in contact with a ratchet wheel 1404 coupled to the right-hand feed roller 1356.

As long as the cam 1400 blocks movement of the pawl 1401, the pawl 1402 is locked in engagement with the teeth of the ratchet wheel 1404, thus preventing any rotation of the feed rollers 1356. However, upon initial clockwise rotation of the shaft 1358, after the feed rollers have been raised into feeding position, the cam 1400 moves away from the pawl 1401, thus permitting a spring 1405, connected to the pawl 1402 at one end and to a stud on one of the arms 1359 at its other end, to withdraw the nose of the pawl 1402 from engagement with the ratchet wheel 1404, thus freeing the rollers 1356 to the action of the feeding mechanism hereinbefore described.

Automatic slip feed control disk

The position of the pitman 1394 and its lateral extension 1393 is automatically controlled by notched disks 1410 and 1411 (Figs. 92 and 94). The disk 1410 is provided with internal teeth rotatably mounted on a disk 1412 carried by the shaft 632. The internal teeth of the disk 1410 are in engagement with a pinion 1413 mounted on the beforementioned shaft 763, which is adjusted under control of the second transaction bank in the manner hereinbefore described.

The disk 1411 (Fig. 94) is provided with internal teeth which rotate on a disk 1414, rotatably mounted on the shaft 632. The internal teeth of the disk 1411 mesh with a pinion 1415 carried by the shaft 743, which is differentially positioned under control of the first transaction bank in a manner hereinbefore described.

A feeling finger 1416 is provided to engage the periphery of, or a notch in, the disk 1410, and a feeling finger 1417 is provided to engage the periphery of, or a notch in, the disk 1411. The finger 1416 is integral with an adjustable block 1418 rotatably mounted on a stud 1419 carried by a slide 1420, the forward end of which slide has the finger 1417 formed thereon. A spring plate 1421, carried by studs 1422 on the slide 1420, provides means for holding the block 1418 in its adjusted position. The slide 1420 is slotted to slide on the before mentioned stud 1298. The beforementioned spring 1299 having one end connected to the stud 1298 and the other end to the pivot stud for the slide 1420, said pivot stud provides a connection between the slide 1420 and the yoke 1423, rotatably mounted on the shaft 1290. The yoke 1423 has one arm 1424 projecting to the right (Fig. 94), carrying the stud 1425, normally held against the beforementioned arm 1296 by the spring 1299. The yoke 1423 is provided with a second arm 1426, to which the upper end of the beforementioned pitman 1394 is pivoted.

When the cam 1298 rocks clockwise as described hereinbefore, to permit the arm 1296 to move in a clockwise direction, the stud 1425 and the yoke 1423 are released to the action of the spring 1299, whereupon the slide 1420 tends to move leftwardly (Fig. 94) to bring the feeling fingers 1416 and 1417 into contact with the peripheries or notches of the disks 1410 and 1411. If the Deposit key has been depressed prior to the operation of the machine, the second transaction bank differential, acting through the square shaft 763 and the pinion 1413, adjusts the disk 1410 to present either the notch 4 or 8 (Fig. 92) into the path of the finger 1416. During a deposit transaction entry operation, no key is depressed in the first transaction bank, and therefore a notch 10 is in the path of the finger 1417. During such an operation, both fingers 1416 and 1417 are permitted to enter notches in

their associated disks 1410 and 1411, and therefore the yoke 1423 is rocked clockwise to lower the pitman 1384 and thereby to remove the lateral extension 1383 from the path of the stud 1382, which, as described hereinbefore, results in a feeding movement of the feed rollers 1356.

If any of the keys in the second transaction bank other than a Deposit key is depressed, then an unnotched portion of the disk 1410 is in the path of the finger 1416. During this operation, when the yoke 1423 is released by the cam 1293, the slide 1420 is immediately arrested due to the finger 1416 coming into contact with the periphery of the disk 1410. During this operation, the yoke 1423 is not permitted to move, and therefore the pitman 1384 remains in the position shown in Fig. 94, wherein the lateral extension 1383 remains in the path of the stud 1382. During this operation of the machine the, pusher slide 1376 cannot move, and therefore the feed rollers 1356 are not rotated.

If it is desired to change the control of the feed mechanism for an inserted slip for any reason, the block 1418 can be rotated on its stud 1419 manually to move a feeler 1427 thereon into effective position to coact with a notched disk 1428 (Fig. 93), and simultaneously the finger 1416 is removed from coacting position with the notched disk 1410. With this setting, the disk 1428, being notched differently from the disk 1410, will control the effectiveness of the slip feeding mechanism in accordance with any different system. The notching shown in Fig. 93 is illustrative only and can be arranged in any desired manner.

As illustrated, the disk 1428 is adjusted under control of the second transaction bank in the same manner as described for the adjustment of the notched disk 1410.

AUDIT TAPE PRINTER

An audit tape printing mechanism is provided to receive data comprising the machine number, the consecutive number of the transaction, a symbol identifying the kind of transaction entered into the machine, the amount of the transaction, and a symbol indicating the kind of operation performed. The data printed on the audit tape is illustrated in Fig. 106.

The audit tape printer is located in the central front section of the machine (Fig. 1) between the frames 192 and 193 (Figs. 7, 78A, and 78B). The audit tape printing mechanism is carried in a removable carriage, which can be removed from, or inserted into, the machine at will. The removable audit tape printer slides in and out of the machine on tracks provided in the base of the machine. The removable printer carriage is normally locked in the machine under the control of the unit lock 123 (Figs. 1, 2, and 55). Moving the unit lock 123 forwardly releases a door latch on the front of the removable carriage, which door is pivoted at its lower end to expose manually operable latches, which latches, when operated, release the removable carriage and permit the operator to pull the carriage forwardly. If the carriage is to be moved forwardly merely for replacing a supply of paper in the audit tape printer, the carriage is slid forward until a positive stop arrests its movement. In this position, all of the feed and guide rollers of the audit tape printer are easily accessible, making it a simple matter to remove any portion of the audit tape therefrom, or to replace a supply of audit tape paper. Withdrawing the audit tape carriage from the machine is a distinct improvement over

the usual printer construction, wherein the audit tape feed and guide rollers remain in the machine, making it difficult to remove the audit tape or to replace a supply of paper into a printer.

A further feature of applicants' novel audit tape printing mechanism is that the audit tape carriage can be entirely removed from the machine, if desired, by simply raising the forward end of the carriage after the carriage has been stopped by the positive stop, and pulling the carriage out of the machine. By so doing, certain novel results can be obtained, some of them being as follows:

(1) The carriage, having therein the audit tape, which bears a record for the day's business, can be removed from the machine and stored in a vault for safe keeping, if desired.

(2) If a system established by the user of the machine is such that it would be desired to have a separate audit tape for each teller, or if the machine is adapted for use in any other type of business, and an audit tape is desired for each clerk, each clerk is provided with his own audit tape carriage, which can be inserted into the machine when the clerk, or teller, goes on duty.

(3) Another feature of the removable carriage is that, if it is desired to require the signature of a customer on the audit tape for any particular reason, the audit tape carriage can be removed from the machine and brought to the customer, where the customer can sign the audit tape through an autographic opening provided therefor, whereupon the carriage can again be inserted in the machine and a printed record made adjacent the signature.

The above three uses of the removable carriage are illustrative only, and it is obvious that the usefulness of a removable printer carriage is such that it can be adapted to many uses as required in different systems in which the machine may be used. By placing the carriage under control of the unit lock 123, it is possible to prevent unauthorized persons from removing the carriage from the machine.

Audit tape carriage

The framework of the audit tape carriage is illustrated in Figs. 103 and 104 and comprises two side frames 1231 and a bottom plate 1232 secured thereto. Secured to the bottom plate 1232, near its front, or at the left-hand end, as viewed in Fig. 103, is a door 1233 hinged to the bottom plate 1232 by a pair of hinges 1234 (see also Figs. 99 and 107). The door 1233 comprises a vertical section and a horizontal section, as shown in Fig. 99, and the horizontal section is provided with an opening 1235, which is normally closed by a window comprising a stationary section 1237 and a movable section 1236, of glass to prevent unauthorized tampering with the audit tape beneath the glass.

The audit tape carriage, comprising the side frames 1231, the bottom plate 1232, and the door 1233, is slidable into the machine on a pair of tracks 1238 (Figs. 103 and 104), supported on six lugs 1239. Screws 1240 are provided to secure the tracks 1238 to the lugs 1239, as shown in Fig. 103. Mounted on each side frame 1231, at their rear ends, is a stud 1241 facing inwardly so as to engage the under sides of the tracks 1238 when the carriage is in the machine. Two notched blocks 1242, one mounted on each frame 1231, near their front ends, project inwardly to straddle the tracks 1238 (see Fig. 104) when the carriage is in the machine. Each track

1238 is provided with a notch 12431. Movement of the carriage 1231 to the rear of the machine with the studs 12411 under the tracks 1238 brings the notches in the blocks 12421 into engagement with the notches 12431 in the tracks 1238, thus maintaining the carriage in a proper position in the machine.

The tracks 1238, on their facing edges, are provided with notches 12441, which are engaged by a pair of latches 12451 pivoted on a stud 12461 on the bottom plate 1232. A spring 12471, attached to the right-hand ends (Fig. 103) of the latches 12451, normally tends to spread the latches at their forward ends to engage the notches 12441. A stud 12481, mounted on the under side of the bottom plate 1232, engages slots 12491 of the latches 12451 to limit their movements when the carriage is removed from the machine.

The notches 12441 are so formed that, when the latches 12451 engage therein, the carriage is firmly latched in position. When it is desired to remove the carriage from the machine, the operator grasps the finger pieces 12501 of the latches 12451 and forces them toward each other, thus releasing the latches from the notches 12441, whereupon the carriage can be pulled forwardly. Downwardly-extending flanges 12511 on the bottom plate 1232 come into contact with a cross bar 12521 (see also Fig. 78A) to arrest the carriage when it is withdrawn sufficiently to give access to the audit tape. If it is desired to remove the carriage from the machine, the operator tilts the carriage upwardly to raise the flanges 12511 above the cross bar 12521, whereupon the carriage may be withdrawn further.

From the above it is clear that the studs 12411 provide means for maintaining the carriage in a horizontal position when the carriage is drawn forward without removing the carriage from the machine, due to their engagement with the under sides of the tracks 1238, when the carriage is moved forwardly far enough to tilt downwardly due to the weight of the forward end of the carriage when it extends beyond the opening in the machine.

Certain mechanisms for driving the printing platen and the paper shifting and feeding mechanisms, and for controlling their operations, are operated from the main cam shaft of the machine, which cam shaft and operating mechanisms remain in the machine when the carriage is removed therefrom. The mechanisms which are a part of the carriage must register with the operating mechanism when the carriage is positioned in the machine. In order to properly align the elements of these mechanisms when the carriage is inserted into the machine, the side frames 1231 are provided with guiding notches 12531 (Fig. 101), which engage studs 12541 on the frames 192 and 193 when the carriage approaches its innermost position. The studs 12541 are provided with annular grooves which have tapered walls to properly guide the side frames 1231 into positions in which the mechanism for operating the platen, paper shift, and paper feed control mechanisms, carried by the carriage, register with their operating means. The annular groove in the studs 12541 is best shown in Fig. 78B, where the machine is shown with the carriage removed therefrom.

Audit tape door lock

As mentioned before, the door for the audit tape carriage is under control of the unit lock 123 (Fig. 55). The stud 147, described herein-

before, projects into the cam slot 146 in the lock slide 1139 and has pivoted thereto a link 1460 (Figs. 55, 78B, and 99). The lower end of the link 1460 is pivoted to an arm 1461 of a yoke 1462, pivoted on the shaft 1290 and located between the side frame 181 and the frame 192. The yoke 1462 is provided with a second arm 1463, which lies adjacent the frame 192 and has connected thereto a link 1464 extending forwardly, where it is slotted to slide on a stud 1465. The forward end of the link 1464 is provided with a flange 1466 lying in the plane of a stud 1467 on a door latch 1468. The latch 1468 is securely mounted on a shaft 1469 pivotally mounted in the carriage frames 1231. Also secured to the shaft 1469 is a latch 1470, which is identical with the latch 1468 but has no stud 1467 thereon. When the audit tape carriage is latched in the machine, the latches 1468 and 1470 engage over, and into notches 1471 of, latch brackets 1472 and 1473, respectively (see also Figs. 107 and 108), which brackets are mounted on the door 1233 by screws 1474 and 1475, respectively.

When the latches 1468 and 1470 are in the position shown in Fig. 99, they engage the latch brackets 1472 and 1473 and therefore hold the door 1233 in its closed position. Upon moving the unit lock forwardly, the cam slot 146 therein raises the link 1460 to rock the arm 1461 and the yoke 1462 in a clockwise direction. Clockwise movement of the arm 1461 and the yoke 1462, through the arm 1463, moves the link 1464 leftwardly, as viewed in Fig. 99, to cause the flange 1466 on its forward end to engage the stud 1467 and rock the latch 1468, together with the shaft 1469 and the latch 1470, in a clockwise direction to withdraw the latches from engagement with the notches 1471 in the brackets 1472 and 1473. This permits the operator to rock the door 1233 around the hinge 1234 as a pivot into the chain-line position illustrated in Fig. 107, to gain access to the latching fingers 12501 (Fig. 103) to thereby release the audit tape carriage from the tracks 1238. This enables the operator to pull the carriage forwardly until the flanges 12511 strike the bar 12521, in which position the studs 12411, engaging the under side of the tracks 1238, maintain the carriage in a horizontal position, where the audit tape is accessible. When the audit tape is accessible, the printed portion of the audit tape may be removed from the carriage and the end of the paper again inserted into the rewind spool.

Either before the carriage is inserted in the machine, or after the carriage is positioned in the machine, the unit lock 123 is again moved into operating position, wherein the link 1460 is lowered, thus rocking the arm 1461 and the yoke 1462, together with the arm 1463, counter-clockwise. Counter-clockwise movement of the arm 1463 moves the link 1464 to the right (Fig. 99) to permit the latches 1468 and 1470 to be rocked into a position to engage with the notches 1471 of the latching brackets 1472 and 1473 mounted on the door, near the left and right sides, respectively, thereof. In order to so rock the latches 1468 and 1470, a spring 1476 is provided on the hub of the latch 1468. One end of the spring 1476 is hooked over the latch, and the other end bears against a stud 1477, carried by the left-hand carriage side frame 1231. The spring 1476 is so tensioned that, when the flange 1466 is withdrawn from engagement with the stud 1467, the spring 1476 rocks the latches, together with the shaft 1469, in a counter-clock-

wise direction into engagement with the notches 1471 of the brackets 1472 and 1473.

In order to limit the movement of the door 1233 when it is opened, to avoid damage to the hinges 1234 and the cabinet of the machine, a pair of toggle links 1481 and 1482 (Fig. 107) are provided, which are connected together by a stud 1483. The upper end of the link 1482 is pivoted on a shaft 1434, carried by the carriage side frame 1231. The upper end of the link 1481 is provided with a stud 1485, which is mounted to slide in a slot 1486 in the left-hand door bracket 1473.

After the door 1233 is released by movement of the latches 1468 and 1470, the door is moved forwardly round the hinges 1234, at which time the toggle links 1481 and 1482 are straightened and the movement of the door 1233 is limited by the stud 1495 coming into contact with the bottom of the slot 1486. When the door is in its limit of counter-clockwise movement, the front of the door is in approximately horizontal position, as shown in chain lines in Fig. 107, thus giving full access to the audit tape or any other mechanism on the carriage.

Audit tape support and guiding means

The audit tape is fed from a supply roll 1491 (Fig. 101), which is provided with a hollow core or sleeve 1492, supported at its right-hand end, as viewed from the front of the machine, on a stud 1493 carried by the right carriage frame 1231. The left carriage side frame 1231 has mounted therein a slidable stud 1494 (see Fig. 102), on which the left end of the sleeve 1492 is rotatably mounted. The stud 1494 is provided with an annular groove 1495, in which a spring-pressed plunger 1496 engages when the supply roll is in position. The plunger 1496 is slidably mounted in a housing 1497, which also has mounted therein a spring 1498, engaging the upper end of the plunger 1496 to force it into engagement with the annular groove 1495. A crimped annular flange 1490 is formed in the housing 1497 to limit the downward movement of the plunger 1496. When it is desired to remove the sleeve 1492 from the machine, the stud 1494 is moved leftwardly (Fig. 102) by the operator, who grasps a knurled knob 1500 and forces the stud 1494 leftwardly until an annular groove 1501 comes into the path of a spring plunger 1496. The annular grooves 1495 and 1501 are beveled, so that forcing the stud 1494 leftwardly cams the plunger 1496 upwardly until the annular groove 1501 comes into its path, whereupon the spring 1498 forces the plunger 1496 into the annular groove 1501. The right-hand wall of the annular groove 1501 is straight, so that the stud 1494 cannot be moved entirely from its bearing in the side frame 1231. After the stud 1494 is in its leftward position, the exhausted sleeve 1492 can be lifted from the carriage and a new supply roll positioned on the stud 1493, whereupon the stud 1494 is again forced inwardly to maintain the new supply roll in the machine.

The web 1502 (see also Fig. 105) of the audit tape is guided around a roller 1503 mounted on the beforementioned shaft 1469, thence under a roller 1499 carried on a shaft 1504 mounted between two arms 1517 forming a shifting frame. The frame is pivoted on a stud 1506 carried by the carriage side frames 1231. From the roller 1499, the web 1502 is fed around a roller 1505 on a shaft 1513 carried by the side frames 1231 of the carriage. From the roller 1505, the web is fed around a roller 1507 carried by a shaft 1508 and over a writing table 1509. The shaft 1508

and the writing table 1509 are supported by the carriage side frames 1231. From the table 1509, the web 1502 is fed over a roller 1510 mounted on the shaft 1511, also carried by the side frames 1231 and under a roller 1512 supported by a shaft 1541 carried by the rocking frame 1517, and over a roller 1513 mounted on a shaft 1514 carried by the carriage frames 1231, and thence to a receiving spool 1515 (see also Figs. 105 and 109). The web 1502 is held on the receiving spool by any well-known clip (not shown).

During the operation of the machine, the receiving spool 1515 is given steps of movement to feed the audit tape from the supply roll 1491 and over the guide rollers described above, and the strip is thereby wound on the spool 1515 in a manner to be described presently.

Audit tape shifting mechanism

When the machine is at rest, the last six printed lines of data are visible under the glass 1237 (Figs. 99 and 108). During the machine operation, the audit tape web 1502 is shifted to bring the last printed data from a point designated "Reading Line" (Fig. 101) to a point designated "Printing Line," and, at the same time, the web is fed to line-space the printed data by mechanism described hereinafter. The impression is taken at the point marked "Printing Line," and thereafter the tape is shifted back to bring the last printed data to the point marked "Reading Line."

To shift the paper from the "Reading Line" to the "Printing Line," the frame 1517 (Fig. 101) is rocked clockwise to raise the guide roller 1499 to give up slack in the web 1502, and to lower the guide roller 1512 to take up said slack. This shifting movement, together with the line-spacing movement described hereinafter, is sufficient to move the audit tape into its proper printing position.

To rock the frame 1517 clockwise, a link 1520 (Fig. 101) is pivoted on a stud 1521 carried by an ear 1522 formed on one arm of the frame 1517. The opposite end of the link 1520 is pivoted to a bell crank 1533, mounted on a stud 1523 of the left carriage side frame 1231.

The bell crank 1533, the link 1520, and the rocking frame 1517 are carried by the carriage side frames 1231, and therefore, when the carriage is removed from the machine, these elements are carried therewith. In order to rock the frame 1517 during the machine operation, this mechanism is automatically connected to an operating mechanism operated from the printer cam shaft 1273 when the carriage is inserted into the machine. To this end, the bell crank 1533 is provided with a notch 1524, which is open and beveled so as to be guided onto a stud 1525 carried by a bell crank 1526 pivoted on the stud 12541, carried by the side frame 192 (Fig. 78B). The bell crank 1526 has pivoted thereto a link 1527, the rear end of which is provided with a notch 1528, which may be lowered into engagement with a stud 1529 carried on the lower end of a cam arm 1530. The cam arm 1530 is pivoted on the beforementioned shaft 1325 and is provided with a pair of anti-friction rollers 1531, coacting with a pair of plate cams 1532 on the printer cam shaft 1273.

The notch 1528 of the link 1527 is normally disengaged from the stud 1529 but is automatically lowered to engage the stud 1529 during those operations in which an impression is to be made on the audit tape. In the system described here-

in, to illustrate one application of the invention, the only operation in which no impression is made on the audit tape is when the machine is used as an adding machine; that is, with either the "Add" key in row 1 or the "Add Print" key in row 2 depressed, preparatory to operating the machine. In all other operations of the machine, the link 1527 is lowered to bring the notch 1528 into engagement with the stud 1529, in a manner to be described hereinafter.

When the machine is operated with the link 1527 coupled to the cam arm 1530, the cams 1532, rotating counter-clockwise, rock the cam arm 1530 first counter-clockwise, thereby moving the link 1527 to the right, as shown in Fig. 101, to rock the bell crank 1526 counter-clockwise. Counter-clockwise rocking movement of the bell crank 1526 rocks the bell crank 1533 clockwise, thus moving the link 1520 to the left (Fig. 101) to rock the frame 1517 clockwise to shift the audit tape to present the proper line for receiving the impression during the machine operation. After the impression has been made, further counter-clockwise rotation of the cam plates 1532 reverses the movement of the train of mechanism, including the cam arm 1530, the link 1527, the bell cranks 1526 and 1533, and the link 1520, to rock the frame 1517 counter-clockwise, and during this operation the roller 1512 gives up the slack and the roller 1499 shifts the last printed data to the "Reading Line."

The receiving spool 1515 is mounted in the same manner as the supply roll and is controlled by a knob like the knob 1500 (see also Fig. 102) in the same manner as the supply roll is mounted and controlled.

Line spacing control

The shaft 1541, which supports the guide roller 1512 on the rocking frame 1517, extends into the path of a finger 1542 of an arm 1543 pivotally mounted on the stud 1544, upon which the receiving spool 1515 is also mounted. A spring 1545 normally maintains the finger 1542 in contact with the extension of the shaft 1541. The arm 1543 is provided with a toe 1546 normally in the path of a stud 1547 in a plate 1548 (see also Fig. 109). A coil spring 1549, having one end in contact with the stud 1547 and the other end in contact with a stud 1550 on the arm 1543, normally tends to move the stud 1547 into contact with the toe 1546, so that, when the arm 1543 is rocked clockwise, the plate 1548 moves therewith.

Mounted on the plate 1548 is a feed pawl 1551, provided with teeth held in engagement with a ratchet wheel 1552 by a spring 1553. The ratchet wheel 1552 is secured to the receiving spool 1515, and therefore, when the ratchet wheel 1552 is rotated counter-clockwise (Figs. 105 and 109), the web 1502 is wound on the spool.

The plate 1548 is rocked counter-clockwise to feed the web 1502 onto the spool 1515 by the spring 1545 (Fig. 101) when the shifting frame 1517 is rocked clockwise. Clockwise movement of the frame 1517 releases the arm 1543 to the action of the spring 1545, and, during the movement of the latter, the toe 1546 thereon engages the stud 1547 and rocks the plate 1548 counter-clockwise to cause the feed pawl 1551 to rotate the ratchet wheel 1552 counter-clockwise to wind the audit tape web 1502 on the receiving spool 1515.

At the time the feed pawl 1551 is effective to

rotate the ratchet wheel 1552 counter-clockwise, the audit tape web is in its slackened condition. This slackened condition of the web is effected by the roller 1499, which, when rocked upwardly, releases the web 1502 and the roller 1512 pulls the web to the right (Fig. 101) far enough to shift the last printed record to the printing line. During this shifting movement, the feed pawl 1551, when actuated by the spring 1545, through the plate 1548, feeds the web far enough to line-space the web. After the web 1502 arrives in printing position, the feed pawl 1551 will have pulled the paper taut and presented a new printing line at the printing line.

During the return movement of the rocking frame 1517, the roller 1512 provides slack which is taken up by the roller 1499 to shift the paper back to the reading line. At this time, the arm 1543 is rocked clockwise back to its normal position by the extension on the shaft 1541 contacting the finger 1542 thereon. During the clockwise movement of the arm 1543, the spring 1549 pulls the plate 1548 in a clockwise direction to restore the feed pawl into its feeding position for the next machine operation. During this return movement, the teeth on the feed pawl 1551 ratchet over the teeth of the ratchet wheel 1552. To prevent retrograde movement of the ratchet wheel 1552 when the plate 1548 and its feed pawl 1551 are restored to their normal positions, two spring-urged pawls are provided, which engage the teeth of the ratchet wheel 1552 in such a manner that the wheel 1552 cannot be turned clockwise. The pawls 1554 are pivotally mounted on studs 1555, respectively, on the carriage side frame 1231. Springs 1556 urge the pawls into engagement with the ratchet wheel 1552.

As the receiving spool 1515 becomes filled, its outside diameter becomes greater, and therefore a smaller angular rotating movement of the receiving spool is required for properly line-spacing the printed items. This difference in angular movement of the receiving spool is compensated for automatically in the mechanism provided herein.

The roller 1512 on the rocking frame 1517 is nearer the pivot point of the rocking frame than is the roller 1499. When the rocking frame rocks clockwise, the roller 1499 gives up sufficient slack to shift the last printed line one line space beyond the "Printing Line." During this clockwise movement of the rocking frame 1517, the spring-urged arm 1543, acting through the toe 1546 and the stud 1547, rocks the plate 1548 counter-clockwise to wind the excess slack onto the receiving spool 1515. The extent of clockwise rotation of the receiving spool 1515 is dependent upon the diameter of the roll of tape thereon. As the roll of web increases in diameter, the angular movement of the arm 1543 and the plate 1548 becomes progressively shorter. This difference of angular movement is obtained by actuating the arm 1543 by the spring 1545, which spring is strong enough to stretch the web 1502 taut, but not strong enough to pull the web off of the supply roll 1491. The finger 1542 of the arm 1543 follows the extension of the shaft 1541 only far enough to stretch the web taut. During the reverse or counter-clockwise movement of the frame 1517, the roller 1499 moves a greater extent than the roller 1512, and, since at this time the receiving roll is held against retrograde movement by the retaining pawls 1554, the roller 1499 pulls sufficient tape off of the supply roll 1491 to allow for the line-space movement thereof.

Supply roll brake

In order to prevent the excessive rotating movement of the supply roll 1491 when the web 1502 is pulled therefrom by the rocking frame 1517, a brake device 1560 (Figs. 101 and 105) is provided. The brake device 1560 comprises a plate pivoted on a shaft 1561 carried by the carriage frames 1231. A coil spring 1562, coiled around the shaft 1561 and having one end anchored on a stud on the shaft 1561, is provided with an upstanding extension engaging the back of the brake plate 1560 to normally hold the plate 1560 against the outer diameter of the supply roll 1491. Proper tension can be maintained on the brake plate 1560 by tightening the spring 1562 on the shaft 1561 by an adjusting disk 1563 on one end of the shaft 1561. The shaft 1561 is held in its adjusted position by a screw 1564 entering a notch 1565, four of which are provided in the disk 1563. The screw 1564 is secured to the left-hand carriage frame 1231. By rotating the shaft 1561 counter-clockwise, the tension of the spring 1562 can be increased, and, by rotating the shaft 1561 clockwise, the tension thereon can be eased, so that the action of the brake plate 1560 can be adjusted to place the proper tension on the periphery of the supply roll 1491, so that the paper shifting frame will not be overloaded, or, conversely, to adjust the tension on the brake plate 1560, so that the supply roll 1491 will not rotate clockwise after the paper has been properly shifted into printing position.

When a new supply roll is to be placed in the carriage, it is desirable to hold the brake device 1560 out of the operator's way, so that the replacement of the new supply roll can be accomplished without interference. In order to hold the brake 1560 out of the operator's way, the operator pushes the plate 1560 in a clockwise direction (Fig. 101) until a stud 1566 thereon comes into the path of a notch 1567 on a latch pawl 1568. The latch pawl 1568 is pivoted on a stud 1569 on one of the carriage frames and is spring-urged in a clockwise direction by a spring 1570, one end of which engages the shaft 1561 and the other end of which is in contact with a stud 1571 on the pawl 1568. When the brake plate 1560 is manually rocked clockwise far enough to present the stud 1566 into the path of the notch 1567, the spring 1570 snaps the latch pawl 1568 into position to cause the notch 1567 to latch over the stud 1566. When in this position, the brake plate 1560 is held out of the operator's way, so that he can place a new supply roll in the machine without any interference therefrom.

To make it more convenient to feed the web around the various guide rollers, and particularly the guide roller 1499, when a new supply roll is placed in the machine, the operator rocks the rocking frame 1517 in a clockwise direction to bring the guide roll 1499 into its upper position. This rocking of the rocking frame 1517 is done before the supply roll is placed in the machine, and therefore, when the operator subsequently moves the brake plate 1560 in a clockwise direction, where it is latched by the latch pawl 1568, the upper end of the latch pawl 1568 comes into the path of the guide roller 1499. After the paper has been wound around the guide roller 1499 and over the guide rollers 1505 and 1507, and down over the guide roller 1510, the operator again rocks the shifting frame counter-clockwise to lower the feed roller 1499 and raise

the guide roll 1512 into a more accessible position. During this clockwise rotation of the rocking frame 1517, the guide roller 1499 comes into contact with the latching pawl 1568 and rocks it counter-clockwise, thus withdrawing the notch 1567 from engagement with the stud 1566 and permitting the spring 1562 to bring the brake plate 1560 into engagement with the supply roll 1491 to effectively brake the supply roll against over-rotation.

To better guide the web 1502 around the rollers 1505 and 1512, when a new web is being manually threaded into the machine, guide plates 1572 and 1573, respectively, are provided on the rocking frame 1517, which act as baffles to guide the web around the respective guide rollers.

Manual audit tape feed

When a manual notation is written on the audit tape, the web must be spaced so that the next printed item will not be printed over the written notation. Also in the machine as illustrated herein, the opening through which the written notations are made is normally closed by the glass plate 1236 (Figs. 99 and 108) and must be opened to give access to the audit tape. A lever 1575 is provided to simultaneously space the audit tape and to slide the glass plate 1236 toward the front of the machine.

The lever 1575 is pivotally mounted on a stud 1484 (Figs. 99 and 107), in the left side frame 1231, and is provided with an upwardly-extending finger 1576. When the lever 1575 is manually rocked counter-clockwise, the finger 1576 engages a stud 1577 on a slide 1578 slidably supported in the brackets 1472 and 1473 on the door 1233 (see also Fig. 108). The slide 1578 supports the glass plate 1236 and is normally held in closed position by springs 1574, one on each side of the slide 1578. When the lever 1575 is rocked counter-clockwise and the finger 1576 engages the stud 1577, the slide 1578 is moved forwardly to provide access to the audit tape.

Simultaneously with the sliding of the glass plate 1236 forwardly to provide access to the audit tape, the lever 1575, by a notch 1579 therein, in engagement with a stud 1580 (Fig. 99) on an arm 1581, secured to a shaft 1582, rocks said shaft clockwise. Near the right-hand side of the carriage, a second arm 1581 is provided, which has a stud 1580 projecting into a notch of an arm 1583, pivoted on a stud 1484 carried by the right side frame 1231. A link 1585 connects the arm 1583 to a bell crank 1586 pivoted on a stud 1587, to which is pivoted the forward end of a link 1588. The link 1588 is connected to a feed pawl 1589 pivoted on a stud 1590 on the right-hand carriage side frame 1231. A spring 1592, connected to the bell crank 1586, normally maintains the bell crank 1586 in a position in which the lever 1575 is in its upward position.

Downward movement of the lever 1575 rocks the shaft 1582 and the arm 1583 to raise the link 1585, and rocks the bell crank 1586 clockwise. Clockwise movement of the bell crank 1586 pulls the link 1588 forwardly (to the left as viewed in Fig. 99), thus rocking the feed pawl 1589 clockwise. Clockwise movement of the pawl 1589 coming into contact with the stud 1591 rocks the feed plate 1548 counter-clockwise, which, through the feed pawl 1551, spaces the audit strip a distance sufficient to provide space for a hand-written notation.

The writing table 1509 (Fig. 101) lies beneath the opening provided by moving the glass plate

1236 forwardly, thus providing a table for backing the audit tape when the hand-written notations are made thereon.

Audit strip shifting frame latch

Means is provided to latch the audit tape shifting mechanism in normal position when the carriage is withdrawn from the machine and the notch 1524 in the bell crank 1533 (Fig. 101) is withdrawn from engagement with the stud 1525. The mechanism to be latched includes the bell crank 1533, the link 1520, and the rocking frame 1517, together with the arm 1543. A latch 1600 is provided, which maintains the above train of mechanism in the normal position, shown in Fig. 101, until such time as the operator desires to rock the frame 1517 clockwise for the purpose of inserting a new audit tape into the machine, in the manner described hereinbefore.

To accomplish the above objectives, the latch 1600 (Figs. 100, 101, and 105) is provided, which latch is pivoted on a stud 1601 carried by the left side frame 1231 of the carriage. The latch 1600 is normally urged counter-clockwise by a coil spring 1602 wound around the stud 1601 and engaging the flange of the latch 1600 at one end, the other end of the spring engaging a stud 1603 carried by the printer side frame 1231. The latch 1600 is provided with a forwardly-projecting finger 1604, which engages a stud 1605 on the side frame 192 when the carriage is in the machine, as shown in Fig. 101. When in this position, the latch 1600 is held with a latching shoulder 1606 thereon out of engagement with the stud 1521 on the rocking frame 1517, forming a pivot for the link 1520. When the carriage is moved forwardly, the finger 1604 becomes disengaged from the stud 1605, whereupon the spring 1602 rocks the latch 1600 counter-clockwise until the shoulder 1606 comes into engagement with the stud 1521, as shown in Fig. 105. The timing of the movement of the latch 1600 is such that the shoulder 1606 is in effective position in engagement with the stud 1521 prior to the complete disengagement of the notch 1524 from the stud 1525 on the driving bell crank 1526. Thus, when the carriage is removed from the machine, the rocking frame 1517 is latched in the position shown in Figs. 101 and 105. The position of the latch 1600, when the carriage is in the machine, is shown in Fig. 101 by dotted lines. The position which the latch 1600 assumes when the carriage is removed from the machine is shown in Fig. 105, where the latch 1600 is in engagement with the stud 1521.

When it is desired to insert a new audit tape into the machine, in the manner hereinbefore described, the latch 1600 is rocked clockwise from the position shown in Fig. 105, manually, by the operator, the latch 1600 then being in accessible position, which releases the rocking frame 1517 to the action of the spring 1545 on the arm 1543, thus permitting the rocking frame 1517 to rock clockwise. After the tape has been properly threaded in the machine around the guide roll 1505, the operator manually rocks the frame 1517 in a counter-clockwise direction until the latch 1600 again engages the stud 1521 to maintain the rocking frame 1517 in its normal position, as shown in Figs. 101 and 105.

Automatic control of audit tape shift mechanism

As mentioned hereinbefore, the shifting mechanism for the audit tape is normally in ineffective position; that is, the notch 1528 (Fig. 101) of the

link 1527 is normally disengaged from the stud 1529. When it is desired to shift and feed the audit tape, the right-hand end of the link 1527 is lowered to engage the notch 1528 over the stud 1529. The lowering movement of the link 1527 is automatically controlled by two notched disks 1620 and 1621 (Figs. 99 and 101).

The disk 1620 is provided with internal teeth 1622, which engage a pinion 1623 on the before-mentioned square shaft 763, which shaft is adjusted differentially under control of the keys of the second transaction bank in the manner described hereinbefore.

The notched disk 1621 is provided with internal teeth meshing with a pinion 1624 on the square shaft 743. The square shaft 743 is differentially adjusted under control of the keys in the first transaction bank in the manner described hereinbefore.

A link 1625 is pivoted at its lower end to the link 1527 and at its upper end to one arm 1626 of a yoke 1627 (see also Fig. 78B). The second arm 1628 of the yoke 1627 is provided with a stud 1629, normally held in engagement with an arm 1630 secured to the beforementioned shaft 1290. The arm 1626 is provided with a tail 1631, to which is pivoted a feeling link 1632, slotted at 1633 to slide on a stud 1534 on the side frame 192. The forward end of the link 1632 is provided with a stud 1635, which is long enough to straddle the two notched disks 1620 and 1621. A spring 1636 normally tends to move the feeling link 1632 to bring the stud 1635 into engagement with the notched disks 1620 and 1621. The normal position of the feeling link 1632, and therefore of the yoke 1627, is determined by the position of the arm 1630.

When the cam 1293 (Fig. 94) is rotated in a clockwise direction to release the arm 1296 to permit the shaft 1290 to rock clockwise, the arm 1630 (Fig. 101) also moves clockwise, thus releasing the yoke 1627 to be rocked clockwise under the action of the spring 1636. If, during this clockwise movement of the yoke 1627, a notch is presented to the stud 1635 by both disks 1620 and 1621, the feeler 1630 can move to the left (Fig. 101), thus permitting the yoke 1627 to rock clockwise, thereby lowering the link 1625 and bringing the notch 1528 into engagement with the stud 1529. Thereafter, when the cam plates 1532 rock the cam arm 1530, the audit tape shift and feed mechanisms are operated in the manner described hereinbefore.

If, during the time of movement of the feeler 1632 to the left (Fig. 101), the stud 1635 encounters a high spot in either notched disk 1620 or 1621, the yoke 1627 is immediately arrested, and therefore the link 1625 is not lowered, thus maintaining the notch 1528 out of engagement with the stud 1529. During this operation, when the cams 1532 operate the arm 1530, the audit tape shift and feed mechanisms do not operate.

The disks 1620 and 1621 are illustrated herein to control the audit tape shift and feed mechanisms for the system illustrated herein to describe the invention. In this system, the only time no impression is made on the audit tape, and therefore the only operation during which the audit tape is not shifted and fed, is when the machine is used with an "Add" key or an "Add Print" key depressed. For this reason, a high spot is provided in the "4" position of the disk 1620, which is set under control of the first transaction bank, and a high spot is provided in the "9" position of the disk 1621, which is set

under control of the keys of the second transaction bank. The "Add" key in row 1 occupies the "4" position, and the "Add Print" key occupies the "9" position in the respective banks of keys. It is to be understood that the notching of the disks 1620 and 1621 can be varied in accordance with any particular system to which the machine is to be adapted.

Audit tape printing mechanism

After the audit tape is shifted from the "Reading Line" (Fig. 101) to the "Printing Line" and line-spaced to receive the next impression, a printing platen 1650 (Fig. 99) is raised to force the audit tape into engagement with the type characters which have been positioned in accordance with the data set up on the keyboard. The platen 1650 is carried by a printing hammer 1651 and is provided with two studs 1652, which engage the sides of notches 1653 in the side frame 1231 of the carriage, to guide the printing platen in its printing movements. The printing hammer is provided with two bifurcated legs, one adjacent each frame 1231, to straddle studs 1654 carried by the carriage frames 1231, one stud being provided on each frame to guide the printing platen at each end thereof. Mounted on each end of the printing hammer is an eccentric 1655 engaged by arms 1656 pinned to a shaft 1657. One arm 1656 (Fig. 99) is provided with a downwardly-extending projection 1658, to which is pivoted a link 1659, the right-hand end (as viewed in Fig. 99) being slotted to slide on a stud 1660 carried by the righthand carriage frame 1231. A spring 1661 normally maintains the left-hand end of the slot in the link 1659 in engagement with the stud 1660 to maintain the free end 1662 of the link 1659 in the path of a stud 1663, carried by an arm 1664 pivoted on one of the beforementioned studs 1254 (see Fig. 78B). The lower end of the arm 1664 is provided with a finger 1665 normally held in engagement with a stud 1666 carried by the machine frame 193. Pivoted to the stud 1663 is a link 1667, also pivoted to a link 1668 to form a toggle joint. The free end of the link 1668 is pivoted to a stud 1669 of a bell crank 1670 carried by a stud 1671 on the side frame 193. The bell crank 1670 is provided with a finger 1672, normally in engagement with a stud 1673 carried by the side frame 193. The links 1667 and 1668 are pivoted together by a stud 1674, which stud is engaged by the bifurcated end of a cam arm 1675 carried by the beforementioned shaft 1325. The cam arm 1675 is provided with two rollers 1676, which engage a pair of cams 1677 on the main cam shaft.

When the main shaft 1273 is rotated counter-clockwise, the cam arm 1675 is rocked first clockwise and then back to its normal position in a counter-clockwise direction. During the clockwise and counter-clockwise movements of the cam arm 1675, the links 1667 and 1668, forming the toggle, are first straightened to rock either the arm 1664 or the bell crank 1670, whichever one is free to operate. Upon further movement of the cam arm 1675, the toggle is again broken, and during the return movement the same operation is repeated. If the bell crank 1670 is free to rock clockwise when the toggle comprising the links 1667 and 1668 is straightened, the arm 1664 is not moved, and therefore the printing hammer is not operated. If, on the other hand, the bell crank 1670 is held against clockwise rotation, then, upon straightening of the toggle

comprising the links 1667 and 1668, the arm 1664 is rocked counter-clockwise, causing the stud 1663 thereon to shift the link 1659 toward the left (Fig. 99), thus rocking the arms 1656 and the shaft 1657 clockwise to raise the hammer 1651 to effect a printing operation on the audit tape. Normally the bell crank 1670 is free to rock clockwise, and therefore, in the normal setting of the mechanism, no impression will be made on the audit tape. When it is desired to make an impression on the audit tape, a segment 1680 (Fig. 99), pivotally mounted on a shaft 1681, is rocked counter-clockwise to position its outer periphery 1682 beneath a stud 1683 on the bell crank 1670. Thereafter, when the cam arm 1675 is rocked to straighten the toggle comprising the links 1667 and 1668, the bell crank 1670 is blocked against clockwise rotation, and therefore the arm 1664 is rocked counter-clockwise, whereupon the stud 1663, engaging the end 1662 of the link 1659, rocks the projection 1658 of the arm 1656 clockwise to raise the platen 1650 to take an impression on the audit tape.

The counter-clockwise movement of the segment 1680 is timed to move into the path of the stud 1683 just before the cam arm 1675 is returned counter-clockwise to its home position, and therefore the printing takes place during the return stroke of the cam arm 1675.

The movement of the segment 1680 is controlled by the beforementioned notched disks 1620 and 1621 under control of the yoke 1627. The right-hand arm 1628 of the yoke 1627 has pivoted thereto a link 1684, the lower end of which is pivoted to the segment 1680. Therefore, when the feeler 1632 is moved to the left (Fig. 99) in a manner described hereinbefore, to feel for notches in the disks 1620 and 1621, and if the stud 1635 enters notches in both disks 1620 and 1621, the yoke 1627 is rocked clockwise, thus lowering the link 1684 and thereby rocking the segment 1680 counter-clockwise to position the periphery 1682 thereof into the path of the stud 1683.

ISSUING TAPE PRINTER

In the business system described herein to illustrate the present invention, the bank teller provides the auditing department with a printed tape, listing the amounts of a batch of checks cashed, together with a total thereof. Such a list includes only the checks cashed, so that the teller and the auditor may have a complete record of cash paid out. Checks presented for deposit are not listed on the issuing tape, since they do not involve cash paid out by the teller. At any time of the day when a messenger from the auditing department calls on the teller in his cage for a batch of cashed checks, a tape to accompany them is ready in the machine. All the teller need do is to print the total on the tape from the totalizer provided for that purpose, tear off the tape, and hand it to the messenger with the batch of checks. This gives the auditing department a printed record of cash paid out, which record is printed at the time the transactions are made at the teller's window. The issuing tape is fed from a flat pack of paper instead of from the conventional roll of paper.

When "Cash In" or "Deposit" transactions are entered, no record is made on the issuing tape. However, when the teller takes a total from either one of the "Cash In" or "Deposit" totalizers, the total is recorded on the issuing tape, and the tape is given a long feed, to provide the teller with a printed record of the totals of those trans-

actions, to give him the necessary data to check his cash balance.

The issuing tape printer is located at the right front of the machine between the printer frame 193 and the side frame 180 (Figs. 7, 70A, and 70B). The issuing tape printing mechanism is carried in a removable carriage, which can be removed from, or inserted into, the machine at will. The removable issuing tape printer carriage slides in and out of the machine on tracks provided in the base of the machine.

The door of the issuing tape printer is released manually by depression of a table at the front of the printer, which permits the swinging forward of a door on hinges at its lower end near the base of the machine. Opening of the door exposes manually-operable latches, which latches, when operated, release the removable carriage and permit the operator to pull the carriage forwardly. If the carriage is to move forwardly merely for replacing a supply of paper in the issuing tape printer, the carriage is slid forward until a positive stop arrests its movement. In this position, all of the feed and guide rollers for the issuing tape are easily accessible, together with the bin in which the paper packet is positioned, thus making it a simple matter to replace the issuing strip paper packet when necessary. If desired, the issuing tape printing carriage can be entirely removed from the machine by tilting the forward end of the carriage upwardly after the carriage has been arrested by the positive stop, thereafter pulling the carriage out of the machine.

The construction of the issuing tape carriage, together with the manually-operable latches for latching the carriage in the machine, is identical with that described for the audit tape printer, and reference will be made to certain detailed drawings illustrating the construction of the latches in the audit tape printer in the description of the issuing tape carriage.

Issuing tape carriage

The framework of the issuing tape carriage is illustrated in Figs. 110, 113, and 121 and comprises two side frame 1690 and a bottom plate 1691. A cross rod 1692 braces the side frames at their rear ends, and a paper chute 1693, secured to the side frames 1690 by means of two screws 1694, coacting with ears on each side of the paper chute, provides a cross bracing for the carriage near its front. A door 1695 is pivoted to the bottom plate 1691 by hinges 1696. A bar 1697, interposed between the hinge 1696 and the bottom plate 1691, forms a brace for securely holding the hinges 1696 in proper position. The carriage is movable into the machine on a pair of tracks in the same manner as the audit tape carriage slides on the tracks 1238 (Fig. 103). Latches 1699, similar to the latches 12451 (Fig. 103) are provided for latching the issuing tape carriage in the machine on the tracks 1698. Stud 1700, like the studs 12411 (Fig. 103), are provided on the issuing tape carriage frames 1690 for engaging the under sides of the tracks 1698 to maintain the carriage in the horizontal position, when pulled forwardly on the tracks, in the same manner as the studs 12411 maintain the audit tape carriage in horizontal position.

Issuing tape door latch

The door 1695 (Fig. 121) is latched in its closed position by a latch 1701 pivoted on a stud 1702 on the left-hand carriage frame 1690. A spring 1703 normally tends to rock the latch 1701 counter-

clockwise into engagement with a stud 1704 on an angle bracket 1705 secured to the inner face of the door. The latch 1701 is provided with an upwardly-extending cam finger 1706, held in engagement with a stud 1707 on a pivoted release member 1708 by the spring 1703. The member 1708 is pivoted on a rod 1709 carried by the carriage frames 1690. The member 1708 is provided with a downwardly-extending finger 1710, which normally bears on the inner face of the door 1695.

When it is desired to open the door 1695, the operator presses on the member 1708 near its right-hand end, as viewed in Fig. 121, to rock the member 1708 clockwise. Clockwise movement of the member 1708 causes the stud 1707 to engage the cam finger 1706 to rock the latch 1701 clockwise against the tension of the spring 1703 to lift the latch off of the stud 1704. Simultaneously the clockwise movement of the member 1708, through the finger 1710, bearing against the inner face of the door 1695, starts the door 1695 moving counter-clockwise, whereupon the operator can grasp the door and open it.

The extent of movement permitted the door is controlled by a pair of toggle links 1711 and 1712, connected together by a stud 1713. The upper end of the link 1711 is pivoted to the angle bracket 1705, and the upper end of the link 1712 is pivoted on a stud 1714 carried by one of the carriage side frames 1690. When the door is rocked counter-clockwise, the extent of such movement is limited by the links 1711 and 1712 when they are moved to a position in which they are extended their fullest extent. When so extended, the links occupy a position similar to the chain-line position of the links 1482 (Fig. 107) for the audit tape door.

Issuing tape support and guide means

The issuing tape supply is in the form of a paper pack, which is placed in a box 1720 (Fig. 113) on the bottom plate 1691 of the carriage. An upwardly-extending flange 1721 of the base 1691 forms a locating means for the supply pack box. The web 1723 of the supply pack is guided around the guide roller 1722, rotatably mounted on studs 1730, one on each carriage frame 1690. From the guide roller 1722, the web 1723 is fed forwardly between a roller 1724 and a feed roller 1725. The roller 1724 is rotatably mounted on the beforementioned shaft 204, and the feed roller 1725 is mounted on a shaft 1726 in a manner described hereinafter. From the feed rollers, the web 1723 is passed through an opening 1727 and beneath a stationary tear-off knife 1728 on the front of the cabinet (see also Fig. 1). From the knife 1728, the web 1723 is fed between two upstanding flanges 1729 on the paper chute 1693, where the paper normally rests as it is being fed out of the machine during the machine operations.

A weighted frame comprising two arms 1790 (Fig. 110), connected by a shaft 1791, projecting into a slot 1792 in each frame 180 and 193, and a roller 1793, acts to keep the bight of the web 1723 in engagement with the guide roller 1722 when the carriage is moved into the machine. When the carriage is moved forwardly to replace a tape in the machine, the roller 1722 moves with the carriage and out of engagement with the roller 1793 and the shaft 1791. Thus, when the carriage is out of the machine, the web 1723 can be freely fed around the roller 1722, and, when the carriage is again inserted into the machine, the roller 1793 and the shaft 1791 maintain the web in contact

with the roller 1722. This is necessary when the web is fed off of the paper packet from the right-hand end thereof, as viewed in Fig. 110. The roller 1793 guides the web to the roller 1722 and maintains the desired tension thereon.

Issuing strip feed mechanism

The feed mechanism for the issuing strip is similar to the feed mechanism for the slip feed, and reference may be had to that mechanism for a description of the details of construction thereof. The shaft 1726 is mounted between a pair of tension arms 1735 and 1736. A spring 1719, connected to an extension on the arm 1735, maintains the feed rollers 1725 in contact with the rollers 1724. One end of the shaft 1726 (see Fig. 113) has secured thereto a pinion 1737, which meshes with a rack 1738 (see also Fig. 110) guided on a shaft 1739 carried by the carriage frames 1690. At its rear end, the rack 1738 is pivoted to a link 1740. The rear end of the link 1740 is secured to a two-armed lever 1741 pivoted on a stud 1742 carried on one side frame 1690. A spring 1743, connected at one end to the two-armed lever 1741 and at its other end to a stud in the carriage frame, normally maintains a stud 1744 on the lever 1741 in contact with the end of a pusher slide 1745. The pusher slide 1745 is slotted to slide over a stud 1746, by means of which it is guided at its free end. The rear end of the slide 1745 is pivotally connected to a cam arm 1747 pivoted on the beforementioned shaft 1325. The cam arm 1747 is provided with a roller 1749, held in engagement with a cam plate 1749, secured to the main cam shaft 1273, by the spring 1743. The above-described feed mechanism is similar in every respect to the feed mechanism for the slip disclosed in Fig. 94.

If, during the operation of the machine, the slide 1745 is free to move rightwardly, when the cam 1749 is rotated, the stud 1744 follows therewith. An automatic control is provided to determine when and to what extent the slide 1745 is permitted to move toward the right (Fig. 110) when released by the cam 1749.

Counter-clockwise rotation of the cam 1749 releases the slide 1745 to be pushed by the stud 1744 when the spring 1743 rocks the two-armed lever 1741 counter-clockwise. Counter-clockwise rocking movement of the two-armed lever 1741, through the link 1740, moves the rack 1738 toward the left to rotate the pinion 1737 and the shaft 1726 clockwise. A ratchet mechanism, similar to the mechanism shown in Fig. 98, is provided between the shaft 1726 and the feed roller 1725, and therefore, when the rack 1738 rotates the shaft 1726 clockwise, the stud 1726 moves idly, without turning the roller 1725. On further clockwise movement of the cam plate 1749, it rocks the cam arm 1747 clockwise, thus moving the pusher slide 1745 toward the left (Fig. 110) to rock the two-armed lever 1741 clockwise to pull the link 1740 and the rack 1738 rightwardly. This movement of the rack 1738 rotates the pinion 1737 counter-clockwise, and at this time the ratchet, similar to the ratchet shown in Fig. 98, picks up the feed rollers 1725 and rotates them counter-clockwise, thus feeding the web 1723 toward the left and out of the machine, past the stationary tear-off knife 1728.

A brake member 1750, engaging the feed roller 1725 adjacent the arm 1735, provides a means for preventing overthrow of the feed roller 1725. The brake member 1750 is pivoted on a stud 1752 mounted on the arm 1735 and is spring-actuated

by a spring 1751. The brake member 1750 functions similarly to the brake 1396, shown in Fig. 94.

Automatic control of issuing tape feed mechanism

The issuing tape is provided for listing "Cash Out" items and totals thereof, for listing items and totals when the machine is used as an adding machine, and for listing totals of "Cash In" and "Deposit" transactions. In listing "Cash Out" items, or items when the machine is used as an adding machine, the tape is line-spaced during each item entry operation, but, when totals of the items are printed, the issuing tape is given a long feed to feed the tape far enough to feed the printed total past the tear-off knife.

As pointed out hereinbefore, the upper or visible totalizer is used for adding items, and the items may, or may not, be printed on the issuing tape. When the "Add Print" key is depressed together with the "Add" key, the items are printed on the issuing tape, and the issuing tape is line-spaced, but, when the "Add" key alone is depressed without depression of the "Add Print" key, the items are not printed on the issuing tape. Therefore, normally, when the "Add Print" key is depressed, the issuing tape must be given a short feed to line-space the printed items. When the "Sub-Balance" key is depressed, in combination with the "Add Print" key, the issuing tape is given a short feed to line-space the sub-total. When the "Balance" key is depressed, in combination with the "Add Print" key, the issuing tape is given a long feed to feed the printed balance past the tear-off knife.

When the machine is operated with a "Reset" key or a "Read" key depressed, for recording totals of the "Cash In" or "Deposit" totals, the totals are recorded on the issuing tape, and the issuing tape is given a long feed.

The automatic controls over the feeding of the issuing tape are controlled by notched disks 1760 (Fig. 114) and 1761 (Fig. 116). The disk 1760 is differentially positioned under control the first transaction bank of keys, and the disk 1761 is differentially positioned under control of the second transaction bank of keys. There are two kinds of controls over the issuing tape feed with the "Balance" key depressed, one being effective when the "Add Print" key is depressed when a long feed is necessary, and the other when the "Add Print" key is not depressed, when no feed is necessary. Also, there are two kinds of controls by the "Add" key, one when it is depressed in combination with the "Add Print" key, when a short feed of the issuing tape is necessary, and the other when the "Add" key is depressed without the "Add Print" key being depressed, in which case no feed of the issuing tape is desired. To obtain all these results, the disks 1760 and 1761 cannot of themselves effect the necessary control. To obtain these controls, an auxiliary disk 1762 (Figs. 115, 118, and 119) is provided, which auxiliary disk is adjusted under the joint control of the disks 1760 and 1761. The manner in which the various controls are effected is described in detail below.

The disk 1760 (Fig. 114) is provided with internal teeth 1763, which mesh with a pinion 1764 mounted on the beforementioned square shaft 1743, the latter being differentially rotated under control of the keys in the first transaction bank. The teeth 1763 of the disk 1760 are rotatable on a disk 1765, carried by the beforementioned shaft 632.

The disk 1761 is provided with internal teeth 1766, which mesh with a pinion 1767 carried by the beforementioned square shaft 763, which shaft is differentially positioned under control of the keys of the second transaction bank. The internal teeth 1766 rotate on a disk 1768 carried by the beforementioned shaft 632.

The disk 1769 is provided with a stud 1769 (Figs. 114 and 115), which is normally engaged by a toe 1770 on the beforementioned auxiliary disk 1762, rotatably mounted on a disk 1771 carried by the shaft 632. A spring 1772, stretched between a stud 1773 on the disk 1769 and a hook 1774 formed on an auxiliary disk 1762, normally maintains the toe 1770 in engagement with the stud 1769.

The disks 1760, 1761, and 1762 are differentially adjusted by the first and second transaction banks to present high and low spots thereon to a stud 1775, carried on the forward end of a feeler link 1776 pivoted on a bell crank 1777 pivotally mounted on the beforementioned shaft 1290. The feeler link 1776 is normally urged toward the left (Fig. 116) by a spring 1789 and is guided in its movement by a stud 1778 carried by the side frame 193 (see also Fig. 78B). The bell crank 1777 is provided with a rearwardly-extending arm 1779, which arm has a stud 1789, normally held in engagement with an arm 1781 secured to the beforementioned shaft 1290. The arm 1779 has pivoted thereto a link 1782, which is connected at its lower end to a segment 1783, pivoted on the beforementioned shaft 1681. The segment 1783 is provided with a high section 1784 and a low section 1785 on its periphery. The sections 1784 and 1785 may be brought into selective relationship with a stud 1786 on the slide 1745 under control of the notched disks 1760, 1761, and 1762.

When a high spot of any of the disks 1760, 1761, or 1762 is presented into the path of the stud 1775, the feeler link 1776 cannot be moved to the left (Fig. 116) by its spring 1789. This condition exists when the machine is operated with either the Batch Reset key 115, the Batch Read key 116, the Reset key 117, or the Read key 118 depressed and the machine operated, as indicated by the high spots on the disk 1760 in the sixth, seventh, eighth, and ninth positions. Also, when the auxiliary disk 1762 is positioned under control of the disks 1760 and 1761, to move a high spot 1787 thereon into the path of the stud 1775, as shown in Fig. 118, the feeler link 1776 cannot be moved to the left during the machine operation. When either the Balance key 110, the Sub-Balance key 111, the List key 112, the Add key 113, or the Repeat key 114 is depressed and the machine operated, the disk 1760 presents a low spot to the stud 1775, as indicated by the 1, 2, 3, 4, and 5 positions of Fig. 114.

The disk 1761 has no high spots but has intermediate spots in its 2, 6, and 9 positions, as indicated in Fig. 116. When any of these intermediate spots are positioned into the path of the stud 1775 under control of the "B Cash-Out" key, the "A Cash-Out" key, or the "Add Print" key, the feeler link 1776 can move a short distance. If low spots, such as indicated in positions 1, 3, 4, 5, 7, 8, and 10 (Fig. 116) or the low spots 1, 2, 3, 4, 5, or 10 (Fig. 114), are simultaneously positioned in the path of the stud 1775, the feeler link 1776 can move its fullest extent.

When the feeler link 1776 moves its fullest extent upon rocking of the shaft 1290 by the cam 1298 (Fig. 94), as described above, the bell

crank 1777 shifts the link 1782 downwardly far enough to lower the segment 1783 to position the high section 1784 thereon into the path of the stud 1786. With the high section 1784 in the path of the stud 1786, when the cam 1749 rotates counter-clockwise to release the slide 1745, the slide will be held against movement, and therefore no feed will take place.

If an intermediate spot on the disk 1761 is in the path of the stud 1775, the link 1776 will move an intermediate extent, thus positioning the section 1785 of the segment 1783 in the path of the stud 1786, and therefore, when the slide 1745 is released for movement by the cam 1749, the slide will move a short distance. This short distance is sufficient to feed the issuing tape a short feed, which is equivalent to a line-spaced movement.

If, on the other hand, a high spot represented by the positions 6, 7, 8, and 9 on the disk 1760, or the high spot 1787 on the auxiliary disk 1762, is in the path of the stud 1775 and the link 1776 can not move, the segment 1783 will be maintained in the position shown in Fig. 116, and therefore the slide 1745 will move its fullest extent. This full extent of movement of the slide 1745 permits the issuing tape to be fed a long feed, which is sufficient to feed the last impression past the tear-off knife 1728 (Fig. 110).

Issuing tape feed—Cash out key

The issuing tape is illustrated in Fig. 120, as produced in listing cash-out transactions, and is provided to enable the auditing department of the bank to balance the teller's cash balance. Therefore, whenever an item is entered involving the payment of cash by the teller, an impression is made on the issuing tape, and the issuing tape is line-spaced. The entering of a cash-out transaction involves the depression of the "B Cash-Out" key 102 in the "2" position, or the "A Cash Out" key 107 in the "6" position, of the second transaction bank, which moves an intermediate spot into the path of the stud 1775 (Fig. 116). When either intermediate spot "2" or "6" on the disk 1761 is moved into the path of the stud 1775, the feeler link 1776 (Fig. 16) can move a short distance when the shaft 1290 is released by the cam 1298, with the result that the surface 1785 on the segment 1783 is brought into the path of movement of the stud 1786. Thereafter, when the cam 1749 releases the cam arm 1747 and the slide 1745, the rack 1738 will be moved far enough to effect a line-spacing feed movement of the feed roller 1725.

Issuing tape feed—Batch read or batch reset keys

When a total is to be printed on the issuing strip, as illustrated in Fig. 120, this result is accomplished by depression of one of the keys 115 or 116 (Fig. 2), which positions a high spot 6 or 7 (Fig. 114) of the disk 1760 into the path of the stud 1775. During the operation of the machine, with one of the high spots 6 or 7 of the disk 1760 in the path of the stud 1775, the feeler link 1776 is not moved. Therefore the segment 1783 remains in the position shown in Fig. 116, and, during the operation of the machine, when the cam 1749 releases the cam arm 1747 and the slide 1745, the feed rack 1738 is moved its fullest extent to rotate the feed roller 1725 to feed the issuing tape a long distance, which is sufficient to feed the printed total past the tear-off knife 1728.

Issuing tape feed—"Add print" and "add" keys

A column of items may be listed on the issuing

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tape by depression of the "Add" key 113 of the first bank and the "Add Print" key of the second bank, when the machine is used as an adding machine. In printing a total of such a list, the "Balance" key 110 or the "Sub-Balance" key 111 is depressed.

Operation of the machine with the "Add Print" key 109 in the second bank depressed, and the "Add" key 113 in the first transaction bank depressed, moves the intermediate spot in the "9" position of the disk 1761 (Fig. 116) into the path of the stud 1775, and the deep spot in the "4" position of the disk 1760 (Fig. 114) into the path of the stud 1775. The intermediate spot of the disk 1761, therefore, controls the positioning of the segment 1783 to cause a short feed to line-space the printed item.

Issuing tape feed—"Add print" key and "balance" key

When printing the total of a plurality of items entered on the front, or visible, totalizer, the "Add Print" key 109 and the "Balance" key 110 are depressed. In such operations, the "Add Print" key 109 controls the positioning of the disk 1761 to move the intermediate spot 9 (Fig. 116) into the path of the stud 1775, and the Balance key 110 controls the positioning of the disk 1760 to move the low spot 1 (Fig. 114) into the path of the stud 1775. Under this setting, the intermediate spot 9 on the disk 1761 would control the feed mechanism to cause a short feed of the issuing tape. This is not desirable, since a long feed is necessary to feed the printed balance out of the machine. To properly effect a long feed in this operation, the auxiliary disk 1762 is moved to position the high spot 1787 into the path of the stud 1775. The auxiliary disk is required to obtain this control because when the "Add Print" key is not depressed, the "Balance" key must control the disk 1760 to prevent any feed of the issuing tape. Therefore, to prevent any feed, a low spot must be provided in the "1" position of the disk 1760.

The high spot 1787 on the auxiliary disk 1762 is positioned into the path of the stud 1775 in an operation during which the "Add Print" key 109 and the "Balance" key 110 are depressed, in the following manner. During an operation in which the "Add Print" key 109 (Fig. 2) is depressed, the disk 1761 (Fig. 116) is moved to position the "9" intermediate spot into the path of the stud 1775. During this movement of the disk 1761, a stud 1795 thereon is moved one step clockwise from the position shown in Fig. 116 into the position shown in Fig. 118. Operation of the machine with the "Balance" key depressed controls the positioning of the disk 1760 wherein the "1" position thereon (Fig. 114) is moved into the path of the stud 1775, as shown in Fig. 118. Movement of the disk 1761 to bring the stud 1795 into the position shown in Fig. 118, through the spring 1772, carries the auxiliary disk 1762 therewith to present the high spot 1787 thereon into the path of the stud 1775. Therefore, when the machine is operated with the "Balance" key and the "Add Print" key depressed, the high spot 1787 is positioned into the path of the stud 1775, and a long feed is effected during the machine operation.

Issuing tape feed—"Add print" key and "sub-balance" key

When printing a Sub-Balance of a plurality of items listed on the front, or visible, totalizer, the "Add Print" key 109 and the Sub-Balance key

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111 are depressed. In this operation, the "Add Print" key 109 controls the positioning of the disk 1761 to move the intermediate spot 9 (Fig. 116) into the path of the stud 1775, and the "Sub-Balance" key 110 controls the positioning of the disk 1760 to move the deep spot 2 (Fig. 114) into the path of the stud 1775. During this operation, the stud 1769 on the disk 1760, coacting with the toe 1770, prevents the high spot 1787 of the auxiliary disk from moving into the path of the stud 1775. Therefore, the intermediate spot 9 of the disk 1761 controls the extent of movement of the feeler 1776, and the issuing tape is given a short feed.

Issuing tape feed—"Add" key

When the machine is used as an adding machine, in which case the "Add Print" key is not depressed, no feed of the issuing tape takes place. During this operation, the notched disk 1761 is moved into the "10" position, as shown in Fig. 116, since no key is depressed in the second transaction bank. Since during this operation the "Add" key 113 is depressed, the disk 1760 is moved to present the "4" position of the disk 1760 in the path of the stud 1775, which position has a low spot. During this operation, a low spot is presented by both disks 1760 and 1761, and, therefore, the control segment 1783 is moved its fullest extent, thus blocking movement of the slide 1745 and preventing any feeding of the issuing tape.

Issuing tape feed "balance" key

When a total is taken of the items added into the front, or visible, totalizer, after a series of entries without the "Add Print" key being depressed, the "Balance" key 110 is depressed. Depression of the "Balance" key 110 in the first transaction bank causes the disk 1760 to move the "1" position into the path of the stud 1775, and, since no key is depressed in the second transaction bank, the disk 1761 is moved to the "10" position, as shown in Figs. 116 and 119. During this operation, the feeler 1776 can move its fullest extent, thus preventing any feed of the issuing tape.

During this operation, the stud 1769 on the disk 1760 moves far enough to permit the high spot 1787 to move into the path of the stud 1775 on the feeler 1776. However, this is prevented by the stud 1795 on the disk 1761. The stud 1796 on the auxiliary disk 1762 projects into the path of the stud 1795, and therefore, when the stud 1795 is positioned to the tenth position, under control of the second transaction bank, the extent of movement permitted the auxiliary disk 1762 is limited by the stud 1796 coming into contact with the stud 1795. At this time, the stud 1769 moves on after the auxiliary disk 1762 is arrested, into the position shown in Fig. 119. This prevents the high spot 1787 of the auxiliary disk 1762 from coming into the path of the stud 1775, and therefore, during the operation of the machine, the control segment 1783 moves its fullest extent, thus preventing any feeding movement of the issuing tape.

Issuing tape feed—Cash in, or deposit, or misc. keys

When the machine is operated to enter "Cash In" or "Deposits," no impression is made on the issuing tape, and therefore the issuing tape is not fed. Operation of the machine with either a "Cash In" key, a "Deposit" key, or a "Miscellaneous" key depressed controls the movement of the disk 1761 to move a low spot 1, 3, 4, 7, or 8 into the

path of the stud 1775. Since no key is depressed in the first bank in any of these operations, the disk 1760 is moved to position the low spot 10 into the path of the stud 1775. This permits the feeler 1776 to move its fullest extent to move the segment 1783 into position to prevent feeding the issuing tape.

Issuing tape feed—Read or reset keys

When reading or resetting the Cash In, Deposit, or Miscellaneous totalizers, the "Read" key 118 or the "Reset" key 117 is depressed in combination with the selected key. During this operation, it is desired to issue a ticket for use by the auditing department. Such a ticket is provided by printing such totals on the issuing tape and feeding the printed total out of the machine past the tear-off knife, where it is detached from the issuing tape web.

To obtain such long feed, the disk 1760 is provided with high spots "8" and "9," which move into the path of the stud 1775 under control of either the "Read" key 118 or the "Reset" key 117. Low spots in the disk 1761 are positioned into the path of the stud 1775 by the "Cash In," "Deposit," and "Miscellaneous" keys, but the high spots on the disk 1760 control the feeler 1776, so that the feeler is arrested thereby to prevent the segment 1783 from moving, thus permitting the feeding mechanism to operate its fullest extent to cause a long feed to take place.

Issuing tape printing mechanism

The printing mechanism for the issuing tape is identical in construction with the printing mechanism for the audit tape, shown in Fig. 99, and comprises a printing platen 1800 (Figs. 110 and 113) having a stud 1801 on each end thereof projecting into notches in arms 1802 secured to a shaft 1803. One of the arms 1802 is provided with a downwardly-projecting ear, to which is pivoted a link 1804, the free end of which is slotted to slide on a stud 1805. A spring 1799 normally maintains the left end of the slot through which the stud 1805 projects in engagement with said stud. The free end of the link 1804 lies in the path of a stud 1806 carried by an arm 1807 pivoted on a stud 1808 carried by the side frame 180. The arm 1807 is provided with a toe engaging a stud 1809 on the side frame 180 to limit the clockwise rotation of the arm 1807. Also pivoted on the stud 1806 is one link 1810 of a toggle including a second link 1811, the links 1810 and 1811 being connected by a stud 1812. The link 1811 is also pivoted on a stud 1813 carried by a bell crank 1814, pivoted on a stud 1815 carried by the side frame 180. The bell crank 1814 is provided with a toe normally engaging a stud 1816 carried by the side frame 180, to limit its counter-clockwise rotation. The stud 1812 projects into the bifurcated end of a cam arm 1817, pivotally mounted on the beforementioned shaft 1325. The cam arm 1817 is provided with rollers 1818, which engage cam plates 1819 carried by the printer cam shaft 1273.

The bell crank 1814 is provided with a stud 1820, which projects into the path of movement of a control segment 1821, pivoted on the shaft 1681. In order to control the operation of the printing platen 1800, the segment 1821 may be rocked counter-clockwise beneath the stud 1820 to prevent clockwise rotation of the bell crank 1814 when the cam plates 1819 are rotated to rock the cam arm 1817. When the cam plates 1819 rock the cam arm 1817 clockwise, the bifurcated

end thereof, engaging the stud 1812, raises the stud to straighten the toggle consisting of the links 1810 and 1811. If the segment 1821 is beneath the stud 1820, the bell crank 1814 cannot move clockwise, and therefore the toggle, comprising the links 1810 and 1811, is straightened to rock the arm 1807 counter-clockwise. Counter-clockwise movement of the arm 1807 causes the stud 1806 to engage the free end of the link 1804 to shift the link 1804 toward the left (Fig. 110) to rock the shaft 1803 and the arms 1802 clockwise to raise the platen 1800 into engagement with the type carriers on the shaft 463. If the segment 1821 is not moved beneath the stud 1820, then, when the cams 1819 rock the arm 1817 clockwise, the bell crank 1814 is not arrested, and therefore the bell crank 1814 is free to rock clockwise when the toggle comprising the links 1810 and 1811 is straightened. In this operation, the arm 1807 is not rocked counter-clockwise, and therefore the platen 1800 is not raised to take an impression on the issuing strip.

The positioning of the control segment 1821 is controlled by notched disks 1830 (Fig. 111) and 1831 (Fig. 110). The notched disk 1831 is differentially positioned under control of the keys in the first transaction bank in the manner hereinbefore described, through the square shaft 743. The square shaft 743 is provided with a pinion 1832, meshing with internal teeth on the disk 1831. The notched disk 1831 is provided with internal teeth which ride on a disk 1833 carried by the shaft 632.

The notched disk 1830 is differentially positioned under control of the keys in the second transaction bank, which transaction bank differentially positions the shaft 763 in the manner described hereinbefore. The shaft 763 has mounted thereon a pinion 1834, which meshes with internal teeth of the notched disk 1830. The internal teeth of the notched disk 1830 ride on a disk 1835 carried by the beforementioned shaft 632.

The control segment 1821 is connected to a bell crank 1840 by a link 1839. The bell crank 1840 is pivotally mounted on the beforementioned shaft 1290 and is provided with a stud 1845 normally resting on an arm 1842 secured to the beforementioned shaft 1290. One arm of the bell crank 1840 has pivoted thereto a feeler link 1841, slotted near its free end to slide on a stud 1837 carried by the side frame 180. A spring 1843 normally maintains the stud 1845 in engagement with the arm 1842. The forward end of the feeler link 1841 is provided with feeler fingers 1846 and 1847, carried by a block 1844 pivoted on the feeler link 1841. The feeler finger 1846 coacts with the control disk 1831, and the feeler finger 1847 coacts with the control disk 1830.

If either feeler finger 1846 or 1847 engages a low spot in the disks 1830 and 1831, the link 1841, when moved by the spring 1843, moves toward the left (Fig. 110), thus rocking the bell crank 1840 clockwise to lower the link 1839 and position the segment 1821 into the path of the stud 1820. When this condition occurs, the toggle comprising the links 1810 and 1811 is straightened, and the arm 1807 is rocked counter-clockwise to cause an impression to be taken in the manner described hereinbefore. However, if both fingers 1846 and 1847 engage high spots (or, in other words, the periphery of both disks 1830 and 1831), the feeler link 1841 is not permitted to move, and therefore the control segment 1821 is held out of the path of the stud 1820, and therefore no impression will be taken.

The disk 1830, which is adjusted under control of the second transaction bank, is provided with notches in the 2, 6, and 9 positions, which correspond to the "B Cash-Out" key 102, the "A Cash-Out" key 106, and the "Add Print" key 109. Thus, when the machine is operated with either one of these three keys depressed, a notch is presented to the feeler finger 1847, and therefore the link 1841 is moved to position the control segment 1821 into the path of the stud 1820.

If any other key in the second transaction bank except a Cash-Out key and the Add Print key is depressed, a high spot of the control disk 1830 is moved into the path of the finger 1847, and therefore, when the machine is operated, the link 1841 is arrested; therefore no impression is made on the issuing strip.

When a total of a batch of cash-out checks is to be printed, either the Batch-Out Read key 116 or the Batch Reset key 115 is depressed, together with the proper Cash-Out key 106 or 102. As just described, depression of either of the Cash-Out keys presents low spots to the finger 1847. Depression of the Batch Read or Batch Reset key presents a high spot, represented by positions 6 and 7 (Fig. 110) of the control disk 1831, into the path of the finger 1846. During the Batch Read or Batch Reset operation, the feeler finger 1847 moves into a low spot of the disk 1830, whereas the finger 1846 engages a high spot of the control disk 1831. In order to permit this action, the block 1844 is pivoted on the feeler link 1841, and therefore, even though the control disk 1831 presents a high spot to the finger 1846, the impression hammer will nevertheless be controlled to be operated by the control segment 1821 in the manner described above.

When the machine is used as an adding machine—that is, to list items other than cash-out—the machine is operated with the Add Print key depressed and the machine is released by the Add key 113, and the disk 1830 controls the operation of the hammer during the item-entry operations by presenting the notch represented by the "9" position in Fig. 111 to the feeling finger 1847. When the items are added into the machine by depression of the Add key, or when a total of the items is printed as a result of the depression of either the Sub-Balance key 111 or the Balance key 110, the disk 1831 is adjusted to present a high spot, represented by the positions 1 and 2, in the path of the finger 1846. However, inasmuch as the notch in the "9" position of the control disk 1830 is in the path of the finger 1847, during such operations, the impression mechanism is controlled to take an impression on the issuing strip.

When the classification totalizers are read or reset, an impression is made on the issuing strip. For this reason, notches are provided in the control disk 1831 in positions 8 and 9 (Fig. 110) of the control plate set under control of the first transaction bank. Depression of either the Read key 118, or the Reset key 117, followed by an operation of the machine, moves a notch into the path of the feeling finger 1846, and therefore the feeler link 1841 is moved to position the segment 1821 in the path of the stud 1820. Therefore, when the total of the deposit or cash-in totalizer is taken by depression of the keys 117 and 118, an impression is made on the issuing tape.

The above notchings of the control disks 1830 and 1831 are shown by way of example only, for use in connection with the bank teller's system, but, if the machine is used for other purposes,

the notching of the control disks may be altered according to the requirements of the system in which the machine is being used.

Ink ribbon mechanism

The ink ribbon 1247 is carried on a removable frame, and the frame may be inserted into the machine from its right-hand side. The insertable frame is of sufficient length to position the ribbon over all three of the groups of type carriers, so that a single ribbon serves for the deposit slip, the audit tape, and the issuing tape printing mechanisms.

The removable ink ribbon frame comprises a horizontally-disposed plate 2000 (Figs. 78A, 79, and 123) and is secured to a vertically-disposed end plate 2001 by means of rivets 2002. The ink ribbon frame is provided with a guiding member 2003, provided with flanges 2004 extending in opposite directions. The flanges 2004 are inserted into a channel member 2005 (Fig. 122) supported by the end printer frames 203 by screws 2006. The channel member 2005 extends across the three printer sections beneath the six printer frames 203. After the ink ribbon frame has been inserted in the machine, it is latched in position by a latching member comprising two arms 2007. The arms 2007 are moved into engagement with annular grooves in two studs 2008 carried by the side frame 199. A spring 2009, stretched between one of the arms 2007 and a stud 2010 on the ink ribbon end plate 2001, maintains the arms 2007 in engagement with the annular grooves of the studs 2008 when the ink ribbon frame is in the machine.

When it is desired to remove the ink ribbon frame from the machine, the arms 2007 are rocked counter-clockwise by a knob 2011 secured thereto and mounted to rotate on the stud 2012 carried by the end plate 2001. A stud 2013, carried by the end plate and projecting into a slot in the arm 2007, limits the movement of the arms 2007 in a counter-clockwise direction when the ribbon frame is being removed from the machine.

The ends of the ink ribbon are secured to spools which may be rotated in either direction to feed the ribbon one step during each machine operation, and, when the end of the ribbon is reached, a reversing mechanism reverses the direction of movement of the ribbon. One spool 2015 is rotatably mounted on a stud 2016 carried by the end plate 2001. The ribbon is fed from the spool 2015 over a guide roller 2017 rotatably mounted on a stud 2018 on the end frame 2001. The end of the ink ribbon horizontal plate 2000 is formed at an angle 2019 (Fig. 78A), and the ribbon is guided across the plate to its left-hand end, as viewed from the front of the machine and as shown at the upper right in Fig. 79, where the plate is also cut at an angle and the ribbon is fed over the angle and underneath the plate and over the top of an angle on the left (Fig. 79) back over the plate 2000 and under an angle 2020 to a guide roller 2021 rotatably mounted on a stud 2022 carried by the end plate 2001. From the roller 2021, the ribbon is guided to a second spool 2023, where the ribbon is wound thereon. When the ribbon feeding mechanism is reversed in the manner described hereinafter, the ribbon is fed from the spool 2023 back to the spool 2015.

Secured to the spool 2023 is a ratchet wheel 2024, which may be engaged by a feed pawl 2025 (Fig. 124) pivotally mounted on a stud 2026 on a feed arm 2027. The feed arm 2027 is pivotally mounted on a stud 2028 carried by the end plate

2001. A spring 2029, having one end hooked over the pawl 2025 and the other end hooked over a stud 2030, normally maintains a stud 2031 in engagement with the ratchet wheel 2024. Clockwise rotation of the feed arm 2027 rotates the ratchet wheel 2024 clockwise an extent sufficient to feed the ribbon one space. At the time the spool 2023 is rotated clockwise to pull the ribbon from the spool 2015, the spool 2015 is free to rotate, thus giving up ribbon which is wound on the spool 2023. In order to prevent too rapid rotation of the spool 2015 when the spool is unwound, a brake arm 2033 is provided, which arm is pivoted on a stud 2034 carried by the end plate 2001. A similar brake arm 2035, pivoted on a stud 2036, is provided for preventing too rapid rotation of the spool 2023. A spring 2037, secured to the ends of the brake arms 2033 and 2035, normally maintains concave portions of the brake arms in contact with the respective spools 2015 and 2023. The spring 2037 is strong enough to effect a proper braking action on the spools.

The spool 2015 has secured thereto a feed ratchet wheel 2040, which may be engaged by a pawl 2041, pivoted on a stud 2042 carried by a feed arm 2043 pivoted on the stud 2016. A spring 2044 maintains a stud 2045 on the pawl 2041 in engagement with a shoulder 2046 formed on the end plate 2001 to maintain the pawl 2041 out of engagement with the ratchet wheel 2040 when the ribbon is feeding off the spool 2015 and onto the spool 2023. When the feed arm 2043 is rocked counter-clockwise in a manner herein-after described, the stud 2045 is moved off the shoulder 2046, thus permitting the pawl 2041 to drop into engagement with a tooth of the ratchet wheel, and, upon continued counter-clockwise movement of the feed arm 2043, the feed pawl 2041 picks up the ratchet wheel 2040 and rotates the spool 2015 to wind the ribbon thereon. At this time, the ribbon is fed off the spool 2023, and the stud 2031 is on a shoulder 2032; therefore the feed pawl 2025 is held out of engagement with the ratchet wheel 2024, thus permitting free rotation of the spool 2023 to permit it to play out ribbon as it is wound up on the spool 2015.

Mounted on the stud 2036 is a non-retrograde movement pawl 2050. The pawl 2050 normally tends to rock clockwise under the action of a spring 2051 to engage with the ratchet wheel 2024 to prevent retrograde movement of the ratchet wheel 2024 and therefore also of the spool 2023. When the ribbon is being wound on the spool 2015, a ledge 2053 is moved beneath a stud 2052 on the pawl 2050 to hold the pawl out of engagement with the ratchet wheel 2024.

The ribbon feed arms 2027 and 2043 are operated selectively by a pair of cams 2060 (Fig. 122) secured to the printer cam shaft 1273. Coacting with the cam plates 2060 are rollers 2061 carried by an arm 2062 pivotally mounted on the before mentioned shaft 1325. Pivotally connected to the arm 2062 is a link 2063 bifurcated at its left-hand end (Fig. 122) to slide on a stud 2064. Pivotally mounted on a stud 2066, carried by the link 2063, is a coupling pawl 2065. A spring 2067, stretched between an ear 2068 on the link 2063 and an upstanding finger 2069 of the pawl 2065, maintains a stud 2070, on the pawl 2065, either in a notch 2071 or in a notch 2072, for a purpose described hereinafter. The notches 2071 and 2072 are formed in a slide 2073, slidably mounted on studs 2064 and 2074. The slide 2073 is provided with a notch 2075 for engaging a stud 2038

on the feed arm 2027, and with a notch 2076 for engaging a stud 2077 carried by the feed arm 2043 (Figs. 122 and 123). The studs 2038 and 2077 may normally be in engagement with either the right or left walls of the respective notches 2075 and 2076. In Fig. 122, the stud 2038 is shown in engagement with the right-hand wall of the notch 2075, and the stud 2077 is illustrated in contact with the left-hand wall of the notch 2076. When the studs 2038 and 2077 are in such positions and the stud 2070 on the coupling pawl 2065 is in the notch 2071 and the machine is operated, the cams 2060 rock the arm 2062 first clockwise to shift the link 2063 leftwardly (Fig. 122). During this movement, the stud 2070, being held in engagement with the notch 2071 by the spring 2067, shifts the slide 2073 leftwardly. Leftward movement of the slide 2073, with the right-hand wall of the notch 2075 in engagement with the stud 2038, rocks the feed arm 2027 clockwise to effect a feeding movement of the ratchet wheel 2024 in a manner described hereinbefore.

After the ribbon has been fed the required distance, the cam plates 2060 rock the arm 2062 counter-clockwise to restore the slides 2063 and 2073 toward the left into the position shown in Fig. 122. During this restoring movement of the slide 2073, when the notch 2075 releases the stud 2038, a spring 2080 (Fig. 123), stretched between the lower ends of the feed arms 2027 and 2043, restores the feed arm 2027 into the position shown in Fig. 123.

A reversing mechanism is provided for causing the feed arm 2043 to effect the feeding operation of the ribbon in a reverse direction when the end of the ribbon is reached on the spool 2015. The spool 2015 (Fig. 125) is provided with a flange made up of two sections 2081 and 2082, the latter being pivoted to the flange 2081 by a stud 2083. The flange 2082 is provided with a turned-in ear 2084, which lies in a flat portion of the spool 2015, and the ribbon is wound over the ear 2084. As long as the ribbon is over the ear 2084, the flange 2082 lies with its periphery in coincidence with the periphery of the flange 2081, thus providing a complete circle. If, however, the end of the ribbon is reached and the ribbon passes beyond the ear 2084, the flange 2082 may be rotated on the stud 2083 to release a control means to reverse the direction of feeding movement of the ribbon. This reversing control is effected by a pawl 2085 (Fig. 122) pivoted on the beforementioned stud 2064. The pawl 2085 is provided with a flange 2086, which bears on the periphery of the flange comprising the sections 2081 and 2082. As long as the peripheries of the sections of the flanges 2081 and 2082 are in coincidence, the pawl 2085 is maintained in the position shown in Fig. 122. However, when the end of the ribbon is reached, to permit the section 2082 to rock around the stud 2083, the pawl 2085 is permitted to rock counter-clockwise under the action of a spring 2087, having one end secured to a reversing pawl 2088 and the other end connected to a stud on the frame 180. The upper end of the reversing pawl 2088 bears on a flange formed in the upper end of the pawl 2085, and therefore the pawl 2085 determines the position of the pawl 2088.

The pawl 2088 is provided with a coupling shoulder 2089, which may be rocked into engagement with a shoulder 2090 on the slide 2073 when the section 2082 is rocked around the stud 2083. The pawl 2088 is mounted on a stud on the side frame 180 and therefore cannot move with the slide 2073. Therefore, when the end of the ribbon

on the spool 2015 is reached and the section 2082 of the flange of the spool is permitted to rock around the stud 2083, the pawl 2088 is rocked counter-clockwise to arrest the leftward movement of the slide 2073. When this occurs, and the cams 2060 rock the arm 2062 to shift the link 2063 leftwardly (Fig. 122), the slide 2073 cannot move therewith. Therefore the stud 2070, engaging the cam surface between the notches 2071 and 2072, cams the stud 2070 out of the notch 2071, and the spring 2067 snaps the stud 2070 into engagement with the notch 2072. Upon restoring movement of the link 2063, the link 2063 shifts the slide 2073 to the right (Fig. 122), and during this movement the left-hand wall of the notch 2076 picks up the stud 2077 and rocks the feed arm 2043 counter-clockwise to cause the feed pawl 2041 to be released from the ledge 2046 and to rotate the ratchet wheel 2040 counter-clockwise to wind the ribbon onto the spool 2015 and off the spool 2023.

The spool 2023 is provided with a collapsible flange, like the flange 2082 of the spool 2015, and also with pawls similar to those shown for the spool 2015 to control the reversing movement of the ribbon feed when the end of the ribbon is reached on the spool 2023. When this occurs, a pawl 2100 is permitted to drop into the path of the shoulder 2101 on the slide 2073, thus arresting movement of the slide 2073 to the right (Fig. 122), and therefore, during this operation of the machine, when the cam plates 2060 move the link 2063 to the right, with the stud 2070 in the notch 2072, the slide 2073 will be arrested, and therefore the stud 2070 will be cammed out of the notch 2072 and back into the notch 2071, whereupon the reversing mechanism is again in the position shown in Fig. 122 and ready to rewind the ribbon onto the spool 2023.

When the ink ribbon frame is removed from the machine, it is desirable that the ratchet studs 2038 and 2077 be moved toward the central section of the notches 2075 and 2077, so that, upon reinsertion of the ribbon frame into the machine, the studs 2038 and 2077 will properly move into said notches. The latch arms 2007 are provided with extensions to rock the feed arms 2027 and 2043 a slight extent, which movement is sufficient to move the studs 2038 and 2077 toward the central sections of the said notches. To rock the arm 2027 slightly clockwise, the upper latch arm 2007 is provided with a finger 2105 (Fig. 123), which is moved into engagement with an extension 2102 on the feed arm 2007 when the latch arm is manually rocked counter-clockwise to release the ink ribbon frame from the studs 2008. Latching the ribbon frame in the machine, after it is reinserted, by moving the latch arms 2007 clockwise, removes the finger 2105 and the surface 2104, respectively, to permit the spring 2080 to restore the feed arms 2027 and 2043 to their normal positions, with the studs 2038 and 2077 against their respective walls in the notches 2075 and 2076.

OPERATIONS

A brief résumé of representative kinds of operations of the machine, as used in a bank teller's cage for handling commercial accounts, is now given.

Mixed deposit transactions

Assuming a transaction illustrated in Figs. 90, 91, and 106, in which a customer deposits a check for \$100.50, and \$25.00 in cash, the handling of this transaction requires the following entries:

1. A printed deposit slip in duplicate, showing the total deposit of \$125.50, one copy for the customer and one copy for the auditing department.

2. A cash ticket in the amount of \$25.00, for use in balancing the teller's cash.

3. Entry of the total deposit, \$125.50, into the "Deposit" totalizer, to enable the auditing department to balance the teller's deposit accounts.

4. Entry of the amount of cash, \$25.00, in the "Cash-In" totalizer, to enable the teller to balance his cash.

5. A printed record of both the amount of the total deposit, \$125.50, and the amount of the "Cash-In," \$25.00, on the audit tape, for use by the auditing department.

In entering the above transactions into the machine, the teller first inserts a duplicate deposit slip on the slip table 1243 (Fig. 1), with the printing line of the top copy over the guide lines 1244. Thereafter he sets up the amount of \$125.50 on the amount keyboard and then depresses the Deposit key 108. Since the Deposit key is a motorized key, depression thereof releases the machine for operation, during which the amount is entered into the "A deposit" totalizer, and the amount, together with the date, the bank number, the machine number, the consecutive number, the clerk's initial "A," and the symbol "D," are printed on both copies of the deposit slip, the latter being spaced between the two printing operations. After the machine comes to rest, the deposit slips are removed from the slip table. During the machine operation, the total amount of the deposit—that is, \$125.50—the machine number, the consecutive number, the teller's initial, and the symbol "D" are printed on the audit tape. See Fig. 106. No record is made on the issuing tape when deposits are entered. Since the instant transaction includes a cash item of \$25.00, the teller next places a cash ticket (Fig. 91) on the slip table 1243 and thereafter set the amount of \$25.00 on the amount keyboard, followed by depression of the "A Cash-In" key 107. The "A Cash-in" key releases the machine for operation, during which the amount of \$25.00 is added into the "A Cash-In" totalizer and a complete record is printed on the cash ticket, which record includes the date, the bank number, the machine number, the consecutive number of the transaction, the teller's symbol "A," and the symbol "I," as illustrated in Fig. 91. Since printing a cash ticket requires only one impression, the "A Cash-In" key controls the printing mechanism to make only one impression. Simultaneously the amount of cash in, the machine number, the consecutive number of the transaction, the teller's symbol, and the symbol "I" are printed on the audit tape (see Fig. 106.) During cash-in entry operations, no record is printed on the issuing tape. The deposit slips, the cash-in tickets, and the checks deposited are sent to the auditing department, which thus receives a complete record of all deposits made and is enabled to properly credit the total deposits to the customer, and also to balance the tellers' cash accounts.

Cash deposit transactions

Assuming a transaction in which the deposit consists of all cash in the amount of \$75.00, and that the customer wishes two copies of the deposit slip, as illustrated in the three top lines in Fig. 106, the handling of this kind of transaction requires

1. Three copies of the printed deposit slip show-

ing the total of \$75.00, two copies for the customer and one copy for the auditing department.

2. A cash ticket in the amount of \$75.00, for use in balancing the teller's cash.

3. The entry of the total amount of cash—\$75.00—in the deposit totalizer, which enables the auditing department to balance the teller's deposits.

4. The entry of the total amount of cash—\$75.00—in the "A Cash-In" totalizer will enable the teller to balance his cash.

5. A record on the audit tape for use by the auditing department.

In entering such a transaction, the teller first places the deposit slip in duplicate on the table 1243, then the amount of \$75.00 is set up on the keyboard, and finally the operator depresses the "A Deposit" key 108. Operation of the machine enters the amount in the deposit totalizer, prints the amount of the deposit on the deposit slips in duplicate, and enters the amount of the deposit on the audit tape (first line, Fig. 106). Since the customer wishes a second copy of the deposit slip, the teller next inserts a single copy of the deposit slip in the machine, depresses the Repeat key 114, and finally depresses the Deposit key 108. During the ensuing operation, the Repeat key controls mechanism which prevents the amount from being again added into the deposit totalizer, but controls the printing mechanism to repeat the printing of the cash deposit—\$75.00—on the deposit slip and on the audit tape. During this operation, a dash is printed after the amount, as illustrated in Fig. 106, to indicate that the entry was a repeat operation. Since the transaction assumed consists all of cash, the teller, after placing a cash ticket on the slip table 1243, again depresses the Repeat key 114, followed by the depression of the "A Cash-In" key 107. During this operation, the amount is added into the "A Cash-In" totalizer and is printed on the cash ticket and on the audit tape. A dash is printed after the amount to indicate a repeat operation. This entry is illustrated in line 3, Fig. 106.

It should be noted that if all items of the deposits are of the same class—that is, all checks or all cash—the entries following the first entry can be made without again depressing the amount keys by simply depressing the Repeat key in combination with the proper classification key.

Cash-out transactions

Assuming that the customer presents a check to be cashed, which transaction involves the paying out of cash by the teller, the handling of this transaction requires the following entries:

1. An entry of the amount of cash-out on the issuing tape to enable the auditing department to balance the teller's cash.

2. An entry of the amount into the cash-out totalizer to enable the teller to balance his cash.

3. An entry of the amount of cash-out on the audit tape for use by the auditing department.

4. An entry of the amount of cash-out on the batch totalizer to enable the teller to give the auditing department a total of a batch of checks cashed.

In order to properly balance the teller's cash, it is necessary to provide a separate record of the cash-out transactions. Such a separate record is made on the issuing tape (Fig. 120). In entering this kind of transaction, the amount of cash paid out is set up on the keyboard, and the "Cash-Out" key 106 is depressed. During the ensuing operation of the machine, the amount

is added into the cash-out totalizer and also into the batch totalizer. An entry including the date, the machine number, the consecutive number of the last deposit entry, the teller's initial, and a symbol "O," representing a cash-out transaction and the amount of cash paid out, is made on the issuing tape. Simultaneously a similar record is made on the audit tape except that the date is not printed thereon. For example, compare the first line illustrated in Fig. 120 with the fourth line in Fig. 106. The check is then filed separately from the checks which are deposited, so that deposit checks and cash checks are kept segregated in the teller's cage. Since in the normal use of the machine only cash-out transaction entries are made on the issuing tape, the tape will have printed thereon a list of all checks cashed by the teller, and the teller will have the corresponding cashed checks in a separate file. Therefore, at any time of the day when a messenger from the auditing department calls at the teller's cage for cashed checks, the teller depresses a Batch Reset key 115, together with the Cash-Out key 106, to operate the machine through two cycles to print a total of the checks cashed, together with a five-point star symbol on the issuing tape and also on the audit tape. During the batch reset operation, the issuing tape is given a long feed to feed the printed total past the tear-off knife, whereupon the teller tears off the tape, attaches it to the batch of cashed checks, and hands them to the messenger. This gives the auditing department a printed list of the checks cashed, together with the checks themselves.

Cash-out list transactions

Assuming a transaction which consists of cashing a plurality of checks, illustrated in lines 8 to 12 of Fig. 120: In entering this transaction, the amount of each check is entered separately into the cash-out totalizer, and a printed record is made on the audit tape and on the issuing tape. To provide the teller with the total amount of the checks, to enable him to give the customer the proper amount of cash, the List key 112 is depressed following the setting up of the amount of the first check.

Release of the machine by depression of the Cash-Out key with the List key depressed causes the amount to be entered into three totalizers; that is, into the cash-out totalizer, the batch totalizer, and the visible totalizer. The List key remains depressed at the end of the operation, and therefore subsequent entries of the transaction result in each item's being entered into the said three totalizers. During these operations a symbol "L" is printed after each amount, as illustrated in Figs. 106 and 120. After the last item is listed, the teller reads the total on the visible totalizer to determine the total amount of cash to be paid to the customer. After the customer has been paid, the teller depresses the Balance key 110, and during the ensuing operation the visible totalizer is reset to zero and the List key is released. Also during this operation the total cash paid out is printed on the audit tape but not on the issuing tape. An asterisk following the amount printed on the audit tape indicates that the total of a plurality of items listed has been printed.

Add transactions

The machine may be used to add a column of figures without entering these items into the classification totalizers. When the machine is

used to add a column of figures, the items are entered into the visible totalizer only, and the machine is released for operation by depression of the Add key 113 after the amount of the item to be entered has been set up on the keyboard. The total is then read from the visible totalizer. If a printed record is desired, having the items and their total printed thereon, the Add Print key 109 is depressed prior to depression of the Add key. The total is obtained by depression of the Balance key 110. Add Print key is held depressed by a special latch, which can be released manually.

Transfer total operations

If it is desired to transfer a total taken from one totalizer to another totalizer, this may be accomplished by first clearing the first totalizer and thereafter depressing the Repeat key, together with the key representing the totalizer into which the total is to be transferred. For example, if it is desired to determine the total amount of cash paid out by Teller A and Teller B, Teller A's totalizer can be reset, and thereafter the Repeat key and Teller B's Cash Out key are depressed, and the machine is released for operation, during which the amount taken from Teller A's totalizer is entered into Teller B's totalizer. In this manner, any total can be transferred from one totalizer into any other totalizer in the machine. Another example is if it is not desired to disturb the totals on the cash-out totalizers, representing Tellers A and B, the Teller A totalizer may first be read by taking a subtotal thereof, and then the amount can be transferred to the visible totalizer in the usual manner. Thereafter the "B Cash-Out" totalizer can be read and this amount subsequently transferred to the visible totalizer. The total now standing on the visible totalizer will give the total amount of cash paid out by both the Teller A and Teller B, without disturbing the setting of the totals on the respective Teller A and Teller B cash-out totalizers. The transfer total operations are given here by way of example, and, if the machine is used in any other system which requires transferring totals from one totalizer to another, the flexibility of the machine is thus illustrated.

The examples of operation and use of the machine given above under the main heading "Operations" are representative only and indicate the flexibility of the use of the machine. If adapted to any other system, many other uses can be obtained due to the extreme flexibility in the control of the machine, all of which can be obtained without modification of the structure of the machine itself.

While the form of mechanism shown and described herein is admirably adapted to fulfill the objects primarily stated, it is to be understood that it is not intended to confine the invention to the one form or embodiment shown herein, for it is susceptible of embodiment in various other forms.

What is claimed is:

1. In a machine of the class described, capable of being operated through one or two cycles of operation to effect total-taking operations, the combination of amount differential mechanisms; totalizers for controlling the setting of the amount differential mechanisms commensurate with the amount standing on the totalizers; operating means for the amount differential mechanisms; transaction differential mechanisms; 70

isms; operating means for the transaction differential mechanisms; a clutch connecting the two operating means together so as to operate simultaneously; power means connected to one of said operating means; control means to selectively render the clutch ineffective to thereby cause one operating means to operate while the other operating means remains idle; manipulative devices to condition the machine for total-taking operations certain of which manipulative devices control the effectiveness of the control means to cause the two operating means to be operated simultaneously for one-cycle total-taking operations; means operated by the manipulation of certain other of the manipulative devices to cause one of said operating means to be operated while the other operating means remains idle during the first cycle of a two-cycle total-taking operation; and means to automatically render the clutch mechanism effective during the second cycle of a two-cycle total-taking operation.

2. In a machine of the class described, capable of being operated through one or two cycles of operation to effect total-taking operations, the combination of amount differential mechanisms; a totalizer normally in position to engage with the amount differential mechanisms; a plurality of interspersed totalizers selectively shiftable into a position to be engaged with the amount differential mechanisms, said totalizers controlling the setting of the amount differential mechanisms commensurate with the amount standing on the totalizers; operating means for the amount differential mechanisms; transaction differential mechanisms; operating means for the transaction differential mechanisms; a clutch connecting the two operating means together so as to operate simultaneously; power means connected to one of said operating means; control means to selectively render the clutch ineffective to thereby cause one operating means to operate while the other operating means remains idle; manipulative devices to condition the machine for one-cycle or two-cycle total-taking operations, certain of which manipulative devices control the effectiveness of the control means to cause the two operating means to be operated simultaneously for one-cycle total-taking operations from said first-named totalizer; means operated by the manipulation of certain ones of the manipulative devices to cause one of said operating means to be operated while the other operating means remains idle during the first cycle of a two-cycle total-taking operation from a selected interspersed totalizer; and means to automatically render the clutch mechanism effective during the second cycle of a two-cycle total-taking operation.

3. In a machine of the class described, capable of being operated through one or two cycles of operation to effect total-taking operations, the combination of amount differential mechanisms; a totalizer normally in position to be engaged with the amount differential mechanisms; a plurality of interspersed totalizers selectively shiftable into a position to be engaged with the amount differential mechanisms, said totalizers controlling the setting of the amount differential mechanisms commensurate with the amount standing on the totalizers; operating means for the amount differential mechanisms; transaction differential mechanisms; operating means for the transaction differential mechanisms; a clutch connecting the two operating means together so 75

as to operate simultaneously; power means connected to one of said operating means; control means to selectively render the clutch ineffective to thereby cause one operating means to operate to select a totalizer from the interspersed totalizers, while the other operating means remains idle; manipulative devices to condition the machine for total-taking operations, certain of which manipulative devices control the effectiveness of the control means to cause the two operating means to be operated simultaneously for one-cycle total-taking operations from said first-named totalizer; means operated by the manipulation of certain ones of the manipulative devices to cause one of said operating means to be operated while the other operating means remains idle during the first cycle of a two-cycle total-taking operation from a selected interspersed totalizer; and means to automatically render the clutch mechanism effective during the second cycle of a two-cycle total-taking operation.

4. In a machine of the class described, capable of being operated through one or two cycles of operation to effect total-taking operations, the combination of amount differential mechanisms; a totalizer normally in position to be engaged with the amount differential mechanisms; a plurality of interspersed totalizers selectively shiftable into a position to be engaged with the amount differential mechanisms, said totalizers controlling the setting of the amount differential mechanisms commensurate with the amount standing on the totalizers; operating means for the amount differential mechanisms; transaction differential mechanisms; operating means for the transaction differential mechanisms; a clutch connecting the two operating means together so as to operate simultaneously; power means connected to one of said operating means; control means to selectively render the clutch ineffective to thereby cause one operating means to operate to select a totalizer from the interspersed totalizers, while the other operating means remains idle; manipulative devices to control one of said transaction differential mechanisms to select a totalizer from the interspersed totalizers; manipulative devices to condition the machine for total-taking operations, certain of the last-named manipulative devices control the effectiveness of the control means to cause the two operating means to be operated simultaneously for one-cycle total-taking operations from said first-named totalizer; means operated by the manipulation of certain ones of said last-named manipulative devices to cause one of said operating means to be operated while the other operating means remains idle during the first cycle of a two-cycle total-taking operation from a selected interspersed totalizer; and means to automatically render the clutch mechanism effective during the second cycle of a two-cycle total-taking operation.

5. In a machine of the class described, capable of being operated through one or two cycles of operation to effect total-taking operations, totalizers for controlling the setting of the amount differential mechanisms commensurate with the amounts standing on the totalizers; operating means for the amount differential mechanisms; transaction differential mechanisms; operating means for the transaction differential mechanisms; a clutch normally connecting the two operating means together so as to operate simultaneously; power means connected to one of said

operating means; manipulative devices to condition the machine for one-cycle or two-cycle total-taking operations; a clutch throwout device; a setting device to normally maintain the clutch throwout device in a position out of coacting relation with the clutch; means movable by the manipulation of certain ones of said manipulative devices to move the setting device out of normal position to thereby release the clutch throwout device for movement into a position wherein the clutch throwout device disables the clutch during the first cycle of a two-cycle operation; means to return the clutch throwout device to its normal position; a latch to maintain the clutch throwout device in normal position during the second cycle of a two-cycle operation, said clutch device thereby controlling the clutch mechanism to cause one of said operating means to be operated while the other operating means remains idle during the first cycle of a two-cycle total-taking operation; and means to automatically render the clutch mechanism effective during the second cycle of a two-cycle total-taking operation.

6. In a machine of the class described, the combination of a totalizer element; a differential actuator movable from a normal position into a differentially adjusted position, and back to normal position to enter amounts into the totalizer element; a character-bearing member; a setting device to adjust the character-bearing member; a coupling means pivoted on the setting device and engageable with the actuator to couple the setting device to the actuator; a cam arm movable into one position to move the coupling means to uncouple the setting device from the actuator and to a second position to move the coupling means to couple the setting device to the actuator; a locking surface on said cam arm movable into a position to engage the coupling means, and disposed parallel with the movement of the actuator and the coupling means to lock the coupling means in coupling position while the setting means and the actuator are adjusted in one direction; and a second locking surface on said cam arm movable into a position to engage the coupling means and disposed parallel with movements of the actuator and the coupling means to lock the coupling means in uncoupled position while the setting means and the actuator are adjusted in the second direction.

7. In a machine of the class described, a type carrier; a differentially settable means to set the type carrier to position a plurality of digits, 0 to 9, or a blank at the printing line; a totalizer element; an actuator movable from a normal position into a plurality of differentially adjusted positions to enter an amount in the totalizer element; a zero stop pawl to arrest the actuator in zero position after the actuator moves one step from a normal position; manipulative devices to differentially arrest the actuators to enter digits from 1 to 9 into the totalizer element; means operable during each machine operation to move the settable means into a position to move the blank of the type carrier to the printing line; means to couple the actuator to the setting means after the actuator has been differentially positioned under control of a manipulative device and the settable means has been set to said blank position; means to restore the actuator to normal position after the coupling means is in effective position, whereby the settable means is adjusted commensurate with the differentially set position of the actuator; means movable into

engagement with the actuator when the actuator is arrested in zero position; and means to operate the last-named means to restore the actuator to normal position before the coupling means becomes effective to prevent moving the settable means out of the blank position when the actuator is arrested in zero position by the zero stop pawl, to thereby maintain the blank space of the type carrier at the printing line.

8. In a machine of the class described, the combination of a plurality of type carriers; differentially settable means to set each type carrier to position a plurality of digits 0 to 9, or a blank, at the printing line of each type carrier; totalizer elements; actuators movable from a normal position into a plurality of differentially adjusted positions to enter amounts into the totalizer elements; zero stop pawls to arrest the actuators in zero position after each actuator moves one step from a normal position; manipulative devices to differentially arrest the actuators to enter digits from 1 to 9 into each totalizer element; means operable during each machine operation to move the settable means into positions to move the blanks on each type carrier to the printing line; means to couple the actuators to the settable means after the actuators have been differentially positioned under control of the manipulative devices and the settable means have been set to said blank positions; means to restore the actuators to normal positions after the coupling means are in effective position, whereby the settable means are adjusted commensurate with the differentially set position of the actuator; means movable into engagement with the actuators when the actuators are arrested in zero positions; means to operate the last-named means to restore the actuators to normal position before the coupling means become effective to prevent moving the settable means out of their blank positions when the actuators are arrested in zero positions by the zero stop pawls to thereby maintain the blank spaces of each type carrier at the printing line; and means controlled by a higher order actuator to prevent the last-named means from moving into engagement with a lower order actuator when the said higher order actuator is positioned under control of a manipulative device to cause the actuator to remain in zero position until the coupling means becomes effective to thereby cause the means to restore the actuator to move the settable means and the type carriers to zero positions.

9. In a machine of the class described, having a totalizer actuator movable from a normal position into a zero position and into a plurality of differentially set positions representing a digit from 1 to 9, a type setting device, and means to differentially position the type setting device into a blank position or into a plurality of digit-representing positions in accordance with the setting of the actuator, the combination of means operable to couple the type setting element to the actuator after the actuator has been set to control the adjustment of the type setting element in accordance with the setting of the actuator when the actuator is set in any position representing a digit from 1 to 9; and means to move the actuator out of zero position into normal position before the coupling means becomes effective to cause the setting means to remain in said blank position in operations in which the actuator is set to zero position.

10. In a machine of the class described, an

actuator, differentially movable from a normal position into a position representing a digit 0 to 9; a type carrier; a settable device for the type carrier, to move the type carrier to represent a digit 0 to 9, or to a zero eliminated position; operating means to move the actuator into any one of said positions; operating means to move the settable means to a zero eliminated position during every operation of the machine and to restore the actuator from any position representing digits 1 to 9; coupling means to couple the settable means to the actuator prior to the time the actuator is moved to normal position by said means, whereby the settable means is adjusted into a position commensurate with a digit represented by differential setting of the actuator; and a secondary means, effective when the actuator is arrested in zero position, to restore the actuator from said zero position to normal position before the coupling means becomes effective to couple the setting means to the actuator, to thereby cause the setting means to remain in eliminated position.

11. In a machine of the class described, a lower order actuator, differentially movable from a normal position to a position representing digits from 0 to 9; a type carrier; a settable device for the type carrier to move the type carrier to represent a digit 0 to 9, or to a zero eliminated position; operating means to move the actuator into any of said positions; operating means to move the settable means into zero eliminated position during every operation of the machine and to restore the actuator from any position representing digits 1 to 9 into normal position; coupling means to couple the settable means to the actuator prior to the time the actuator is moved to normal position by said means, whereby the settable means is adjusted into a position commensurate with a digit represented by the differential setting of the actuator; secondary means to restore the actuator from zero position to normal position during an operation in which the actuator is arrested in zero position, said secondary means being effective before the coupling means becomes effective to couple the settable means to the actuator, to thereby cause the settable means to remain in eliminated position; a higher order actuator; and means controlled by the actuator of higher order when the higher order actuator is set into a position representing digits 1 to 9 to disable the secondary restoring means to permit the settable means to be moved to zero position under control of the lower order actuator when the lower order actuator is restored to normal position.

12. In a machine of the class described, in combination with manipulative devices and a zero stop, an actuator differentially adjustable under control of said manipulative devices and zero stop from a normal position, and an operating means to restore the actuator to normal position during each machine operation, of a second operating means to restore the actuator to normal position after the actuator is adjusted to zero position; a type carrier; a settable means connected to the type carrier and normally movable into a zero eliminated position; and coupling means to couple the settable means to the actuator after the actuator has been differentially adjusted and before the first-named operating means restores the actuator to normal position to thereby adjust the type carriers commensurate with the differential setting of

the actuator under control of said manipulative devices, said second operating means operating before the coupling means is moved to couple the setting means to the actuator to thereby restore the actuator from zero position to normal position without moving the setting means out of eliminated position.

13. In a machine of the class described, in combination with manipulative devices and a zero stop, an actuator differentially adjustable under control of said manipulative devices and zero stop from a normal position, and operating means to restore the actuator to normal position during each machine operation, of a second operating means to restore the actuator to normal position after the actuator is adjusted to zero position; a type carrier; a settable means connected to the type carrier and movable into a zero eliminated position; coupling means to couple the settable means to the actuator after the actuator has been differentially adjusted and before the first-named operating means restores the actuator to normal position to thereby adjust the type carrier commensurate with the differential setting of the actuator under control of said manipulative devices, said second operating means operating before the coupling means is moved to couple the setting means to the actuator; and connections between the first-named operating means and the second operating means whereby the second operating means is operated by the first operating means.

14. In a machine of the class described, in combination with manipulative devices and a zero stop, an actuator differentially adjustable under control of said manipulative devices and zero stop from a normal position, and an operating means to restore the actuator to normal position during each machine operation, of a second operating means to restore the actuator to normal position after the actuator is adjusted to zero position; a type carrier; a settable means connected to the type carrier and movable into a zero eliminated position; coupling means to couple the settable means to the actuator after the actuator has been differentially adjusted and before the first-named operating means restores the actuator to normal position to thereby adjust the type carrier commensurate with the differential setting of the actuator under control of said manipulative devices, said second operating means operating before the coupling means is moved to couple the setting means to the actuator; and a means operated by the actuator to disable one element of the second operating means when the actuator is adjusted under control of a manipulative device.

15. In a machine of the class described, in combination with manipulative devices and a zero stop, an actuator differentially adjustable under control of said manipulative devices and zero stop from a normal position, and an operating means to restore the actuator to normal position during each machine operation, of a second operating means to restore the actuator to normal position after the actuator is adjusted to zero position; a type carrier; a settable means connected to the type carrier and movable into a zero eliminated position; coupling means to couple the settable means to the actuator after the actuator has been differentially adjusted and before the first-named operating means restores the actuator to normal position to thereby adjust the type carriers commensurate with the differential setting of the actuator under con-

trol of said manipulative devices, said second operating means operating before the coupling means is moved to couple the setting means to the actuator; connections between the first-named operating means and the second operating means whereby the second operating means is operated by the first-named operating means; and means controlled by the actuator to disable one element of the second operating means when an actuator is adjusted under control of a manipulative device.

16. In a zero setting mechanism, in combination with manipulative devices and a zero stop, an actuator differentially adjustable under control of said manipulative devices and zero stop from a normal position, and an operating means to restore the actuator to normal position during each machine operation, of a second operating means to restore the actuator to normal position after the actuator is adjusted to zero position; a type carrier; a settable means connected to the type carrier and movable into a zero eliminated position; coupling means to couple the settable means to the actuator after the actuator has been differentially adjusted and before the first-named operating means restores the actuator to normal position to thereby adjust the type carrier commensurate with the differential setting of the actuator under control of said manipulative devices, said second operating means operating before the coupling means is moved to couple the setting means to the actuator; a latch to latch one element of the second operating means in ineffective position when the actuator is differentially adjusted under control of said manipulative devices; and means on said actuator to disable the latch when the actuator is in normal and zero positions to enable the second operating means.

17. In a zero setting mechanism, in combination with manipulative devices and a zero stop, an actuator differentially adjustable under control of said manipulative devices and zero stop from a normal position, and an operating means to restore the actuator to normal positions on each machine operation, of a second operating means to restore the actuator to normal position after the actuator is adjusted to zero position; a type carrier; a settable means connected to the type carrier and movable into a zero eliminated position; and coupling means to couple the settable means to the actuator after the actuator has been differentially adjusted and before the first-named operating means restores the actuator to normal position to adjust the type carrier commensurate with the differential setting of the actuator under the control of said manipulative devices, said second operating means operating before the coupling means is moved to couple the setting means to the actuator, and said second operating means including a cam arm, means on the first-named operating means to operate said cam arm, and a pawl on said cam arm movable into engagement with said actuator when the actuator is adjusted into zero position.

18. In a zero setting mechanism, in combination with manipulative devices and a zero stop, an actuator differentially adjustable under control of said manipulative devices and zero stops from a normal position, and an operating means to restore the actuator to normal position during each machine operation, of a second operating means to restore the actuator to normal position after the actuator is adjusted to zero position; a type carrier; a settable means connected

to the type carrier and movable into a zero eliminated position; and coupling means to couple the settable means to the actuator after the actuator has been differentially adjusted and before the first-named operating means restores the actuator to normal position to adjust the type carrier commensurate with the differential setting of the actuator under control of said manipulative devices, said second operating means operating before the coupling means is moved to couple the setting means to the actuator, said second operating means including a cam arm, means on the first-named operating means to operate said cam arm, a pawl on said cam arm movable into engagement with said actuator when the actuator is setting in zero position, a latch to latch the pawl in an ineffective position, and means on the actuator to normally maintain the latch in an ineffective position and releasable to move into effective position when the actuator is adjusted under control of a manipulative device to enable the latch and thereby disable the second operating means when the actuator is moved to represent a digit 1 to 9.

19. In a zero setting mechanism, in combination with manipulative devices and a zero stop, an actuator differentially adjustable under control of said manipulative devices and zero stop from a normal position, and an operating means to restore the actuator to normal position during each machine operation, of a second operating means to restore the actuator to normal position after the actuator is arrested in zero position; a type carrier; a settable means connected to the type carrier and movable into a zero-eliminated position; and coupling means to couple the settable means to the actuator after the actuator has been differentially adjusted and before the first-named operating means restores the actuator to normal position to thereby adjust the type carrier commensurate with the differential setting of the actuator under control of a set of manipulative devices, said second operating means operating before the coupling means is moved to couple the setting means to the actuator, said second operating means including a cam arm, means on the first-named operating means to operate said cam arm, a pawl on said cam arm movable into engagement with said actuator when the actuator is setting in zero position, a spring-urged latch to latch the pawl in ineffective position, and a projection on the actuator engaging the latch when the actuator is in normal or zero position to disable the latch, said projection movable out of engagement with the latch when the actuator is adjusted to represent a digit 1 to 9, to thereby render the latch effective to latch the pawl in ineffective position to thereby disable the second operating means.

20. In a zero setting mechanism, in combination with manipulative devices and a zero stop, an actuator differentially adjustable under control of said manipulative devices and zero stop from a normal position, and an operating means to restore the actuator to normal position during each machine operation, of a second operating means operated by the first operating means to restore the actuator to normal position after the actuator is adjusted to zero position; a type carrier; a settable means connected to the type carrier and movable into a zero-eliminated position; coupling means to couple the settable means to the actuator after the actuator has been differentially adjusted before the first-named operating means restores the actuator to normal posi-

tion to adjust the type carrier commensurate with the differential setting of the actuator under control of said manipulative devices, said second operating means operating before the coupling means is moved to couple the setting means to the actuator; and means on the actuator to control the effectivity of the second operating means.

21. In a zero setting mechanism, in combination with manipulative devices and a zero stop, an actuator differentially adjustable under control of said manipulative devices and zero stop from a normal position, and an operating means to restore the actuator to normal position during each machine operation, of a second operating means; a cam arm operated by the first operating means to restore the actuator to normal position after the actuator is adjusted to zero position; a type carrier; a settable means connected to the type carrier and movable into a zero eliminated position; coupling means to couple the settable means to the actuator after the actuator has been differentially adjusted and before the first-named operating means restores the actuator to normal position to thereby adjust the type carrier commensurate with the differential setting of the actuator under control of said manipulative devices; and cam means on the second operating means operating before the coupling means is moved to couple the setting means to the actuator, to thereby prevent setting of the setting means by the first-named operating means when the actuator is adjusted to zero position during the machine operation to cause the type carrier to remain in eliminated position.

22. In a zero setting mechanism, in combination with manipulative devices and a zero stop, an actuator differentially adjustable under control of said manipulative devices and zero stop from a normal position, and an operating means to restore the actuator to normal position during each machine operation, of a second operating means operable by the first operating means to restore the actuator to normal position after the actuator is adjusted to zero position; a type carrier; a settable means connected to the type carrier and movable into a zero eliminated position; and coupling means to couple the settable means to the actuator after the actuator has been differentially adjusted and before the first operating means restores the actuator to normal position to thereby adjust the type carrier commensurate with the differential setting of the actuator under control of said manipulative devices, said second operating means operating before the coupling means is moved to couple the setting means to the actuator, said second operating means including a cam arm, means on the first-named operating means to operate said cam arm, a spring-urged pawl on said cam arm, and means on the first-named operating means to normally maintain said pawl in an ineffective position, said pawl released to the action of its spring, when the operating means is operated to release the actuator, to move into engagement with the actuator when the actuator is arrested in zero position by the zero pawl, and before the second operating means is operated to move the actuator to normal position before the coupling means becomes effective.

23. In a machine of the class described, the combination of a plurality of type carriers; a totalizer including a plurality of totalizer elements; differentially settable means to set each type carrier to position a plurality of digits 0 to 9,

or a blank, at the printing line of each type carrier; totalizer actuators movable from a normal position into a plurality of differentially adjusted positions to enter amounts in the totalizer elements; zero stop pawls to arrest the actuators in zero position after each actuator moves one step from a normal position; manipulative devices to differentially arrest the actuators to enter digits from 1 to 9 into each totalizer element; means operable during each machine operation to move the settable means into positions to move the blanks on each type carrier to the printing line; means to couple the actuators to the setting means after the actuators have been differentially positioned under control of manipulative devices and the settable means have been set to set blank positions; means to restore the actuators to normal positions after the coupling means are in effective positions, whereby the settable means are adjusted commensurate with the differentially set position of the actuators; an element movable into engagement with the actuators when the actuators are arrested in zero position; a cam operated by the means to restore the actuators to operate the element to restore the actuators to normal position before the coupling means becomes effective to prevent moving the settable means out of their blank positions when the actuators are arrested in zero positions by the zero stop pawls to thereby maintain the blank spaces of each type carrier at the printing line; and an interponent controlled by a higher order actuator to prevent the element from moving into engagement with lower order actuators when said higher order actuator is positioned under control of a manipulative device to cause the lower order actuators to remain in zero position until the coupling means becomes effective to thereby cause the means to restore the actuator to move the settable means and type carriers to zero positions.

24. In a machine of the class described, the combination of a plurality of type carriers; a totalizer including a plurality of totalizer elements; differentially settable means to set each type carrier to position digits 0 to 9 or a blank at the printing line; actuators movable from a normal position into a plurality of differentially adjustable positions to enter amounts in the totalizer elements; zero stop pawls to arrest the actuators in zero position after each actuator moves one step from a normal position; manipulative devices to differentially arrest the actuators to enter digits from 1 to 9 in each totalizer element; means operable during each machine operation to move the settable means into positions to move the blanks on each type carrier to the printing line; means to couple the actuators to the setting means after the actuators have been differentially positioned under control of the manipulative devices and the settable means have been set to said blank positions; means to restore the actuators to normal position after the coupling means are in effective position, whereby the settable means are adjusted commensurate with the differentially set position of the actuators; a cam member operated by the means to restore the actuators; a pawl on each cam member; a projection on each actuator; means to move the pawls into engagement with the projections on the actuators when the actuators are arrested in zero positions, said cam members thereafter operated to restore the actuators to normal position before the coupling means become effective to prevent moving the settable means out of their blank positions when the actuators are arrested in zero positions by

the zero stop pawls to thereby maintain the blank spaces of each type carrier at the printing line; and an interponent controlled by a higher order actuator to prevent the pawls from moving into engagement with lower order actuators when the said higher order actuator is positioned under control of a manipulative device to cause the actuator to remain in zero position until the coupling means becomes effective to thereby cause the means to restore the actuators to move the settable means and the type carriers of said lower orders to zero positions.

25. In a repeat mechanism of the class described, the combination of a totalizer actuator; a repeat control setting means; a coupling device to normally couple the actuator and the setting means together; power-operated means to move the coupling device to uncouple the actuator from the setting means to permit differential setting of the actuator independently of the setting means and to thereafter move the coupling device to couple the actuator to the setting means to control the setting of the setting means commensurate with the differential setting of the actuator; a manipulative device movable from a normal position into an operated position; means to disconnect the coupling means from the power-operated means to cause the coupling means to remain in coupling position during the machine operation; operating mechanism to move the setting means from a previously set position to a certain position while the actuator is coupled to the setting means to thereby control the positioning of the actuator in accordance with the previous setting of the setting means for repeat operations; and a means on the manipulative device to arrest movement of the last-named means when the manipulative device is in normal position, said means on the manipulative device movable into an ineffective position when the manipulative device is moved into operated position.

26. In a repeat mechanism of the class described, the combination of a totalizer actuator; a repeat control setting means; a coupling device to normally couple the actuator and the setting means together; power-operated means to move the coupling device to uncouple the actuator from the setting means to permit differential setting of the actuator independently of the setting means and to thereafter move the coupling device to couple the actuator to the setting means to control the setting of the setting means commensurate with the differential setting of the actuator, said power-operated means including a clutch normally in effective positions whereby the power-operated means operates the coupling device; a manipulative device movable from a normal position into an operated position; a clutch throw-off means to render said clutch ineffective to thereby disable the power-operated means; and a stop on said manipulative device and coacting with one element of the clutch throw-off means to maintain the clutch throw-off means ineffective, said stop on the manipulative device movable out of coacting relationship with said one element when the manipulative device is moved into operated position to thereby release the clutch throw-off means.

27. In a machine of the class described, the combination of a totalizer actuator; a repeat control setting means; a coupling device to normally couple the actuator and the setting means together; power-operated means to move the cou-

pling device to uncouple the actuator from the setting means to permit differential setting of the actuator independently of the setting means and to thereafter move the coupling device to couple the actuator to the setting means to control the setting of the setting means commensurate with the differential setting of the actuator, said power-operated means including a clutch normally in effective position whereby the power-operated means operates the coupling device; a manipulative device movable from a normal position into an operated position; a spring-actuated means operable to render said clutch ineffective to thereby disable the power-operated means; cam means to control the time of operation of the spring-actuated means; and means on said manipulative device and coacting with one element of the spring-actuated means to maintain the spring-actuated means in ineffective position, said means on the manipulative device movable out of coacting relationship with said manipulative element when the manipulative device is moved into operated position to release the spring actuated means.

28. In a repeat mechanism of the class described, the combination of a totalizer actuator; a repeat control setting means; a coupling device to normally couple the actuator and the setting means together; power-operated means to move the coupling device to uncouple the actuator from the setting means to permit differential setting of the actuator independently of the setting means and to thereafter move the coupling device to couple the actuator to the setting means to control the setting of the setting means commensurate with the differential setting of the actuator, said power-operated means including a clutch normally in effective position whereby the power-operated means operates the coupling device; a manipulative device movable from a normal position into an operated position; a spring to maintain the clutch in effective position to maintain said power-operated means in operated condition; a cam-controlled means operable to move said clutch against the action of said spring to render said clutch ineffective to thereby disable the power-operated means; and means on said manipulative device and coacting with one element of the cam-controlled means to maintain the cam-controlled means ineffective, said means on said manipulative device movable out of coacting relationship with said one element when the manipulative device is moved into operated position to release the cam-controlled means to the action of said cam.

29. In a repeat mechanism of the class described, the combination of a totalizer actuator; a repeat control setting device; a coupling device to normally couple the actuator to the setting device; power-operated means to move the coupling device to uncouple the actuator from the setting device to permit differential setting of said actuator independently of the setting device and to thereafter move the coupling device to couple the actuator to the setting device, to control the setting of the setting device commensurate with the differential setting of the actuator; a manipulative device movable from a normal position into an operated position; a spring-actuated clutch pawl; a spring-actuated element for moving the pawl out of effective position to disconnect the coupling device from the power-operated means to cause the coupling means to remain in coupling position during the machine operation; operating mechanism to move the set-

ting means from a previously set position while the actuator is coupled to the setting means to thereby control the positioning of the actuator in accordance with the previous setting of the setting device for repeat operations; and means on the manipulative device to arrest movement of the spring-actuated element when the manipulative device is in normal position, said means on the manipulative device movable into an ineffective position when the manipulative device is moved into operated position.

30. In a repeat mechanism of the class described, the combination of a totalizer actuator; a repeat control setting means; a coupling device to normally couple the actuator to the setting means; power-operated means to move the coupling device to uncouple the actuator from the setting means to permit differential setting of the actuator independently of the setting means, and to thereafter move the coupling device to couple the actuator to the setting means to control setting of the setting means commensurate with the differential setting of the actuator, said power-operated means including a member having a shoulder, and a spring-urged pawl normally held in engagement with said shoulder, whereby the power-operated means operates the coupling means; a manipulative device movable from a normal position to an operated position; a spring-urged member coacting with said pawl to withdraw the pawl from engagement with the shoulder; means connected to the spring-urged member and normally engaging the manipulative device to prevent operation of the spring-actuated member, said spring-urged member being released for operation upon depression of the manipulative device whereby the spring-urged member moves the pawl into ineffective position when the manipulative device is moved into its operated position to prevent the power-operated means from moving the coupling device into ineffective position; and operating mechanism to move the setting means from a previously set position to a certain position while the actuator is coupled to the setting means to thereby permit the coupling device to control the operation of the actuator commensurate with the previous setting of the setting means.

31. In a repeat mechanism of the class described, the combination of a totalizer actuator; a repeat operation setting means; a coupling device to normally couple the actuator and the setting means together; power-operated means to move the coupling device to uncouple the actuator from the setting means to permit differential setting of the actuator independently of the setting means and to thereafter move the coupling device to couple the actuator to the setting means to control the setting of the setting means commensurate with the differential setting of the actuator, said power-operated means including a shouldered member, a clutch pawl, and a spring for normally maintaining the clutch pawl in engagement with the shouldered member; a control means coacting with the clutch pawl, which when operated moves the clutch pawl out of engagement with the shouldered member; a spring normally tending to operate the control means; a manipulative device having a normal position and an operated position; and means on the manipulative device to block movement of the control means when the manipulative device is in the normal position, and said manipulative device movable

to free the control means when the manipulative device is moved into its operated position.

32. In a machine of the class described, the combination of type carriers; differentially settable means to set the type carriers to position a plurality of digits 0 to 9, or a blank, at the printing line; totalizer elements; actuators movable from a normal position into a plurality of differentially adjusted positions to enter amounts into the totalizer elements; zero stop pawls to arrest the actuators in zero positions after the actuators move one step from a normal position; manipulative devices to differentially arrest the actuators to enter digits from 1 to 9 into the totalizer elements; means operable during each machine operation to move the settable means into positions to move the blanks of the type carriers to the printing line; means to couple the actuators to the settable means; actuating means to normally maintain the coupling means in the coupling position but adapted to move the coupling means out of coupling position before the actuators are differentially adjusted, and to move the coupling means into coupling positions, after the actuators have been differentially positioned under control of the manipulative devices and the settable means have been set to said blank positions; means to restore the actuators to normal positions after the coupling means are in effective position whereby the settable means are adjusted commensurate with the differentially set position of the actuators; means movable into engagement with the actuators when the actuators are arrested in zero positions; means to operate the last-named means to restore the actuators to normal position before the coupling means becomes effective to prevent moving the settable means out of their blank positions when the actuators are arrested in zero positions by the zero stop pawls to thereby maintain the blank spaces of each type carrier at a printing line; means controlled by a higher order actuator to prevent the last-named means from moving into engagement with a lower order actuator when said higher order actuator is positioned under control of a manipulative device to cause the actuator to remain in zero position until the coupling means becomes effective to thereby cause the means to restore the actuator to move the settable means and the type carriers to zero positions; a repeat key; means under control of the repeat key to disable said actuating means during repeat operations; and means connected to the actuating means and coacting with the means movable into engagement with the actuators to render said means movable into engagement with the actuators ineffective during repeat operations to thereby permit all of the settable means to control the adjustment of the totalizer actuators when the settable means are moved by said means operable during each machine operation.

33. In a machine of the class described, the combination of a lower order actuator differentially movable from a normal position to a position representing digits from 0 to 9; a type carrier; a settable device for the type carrier to move the type carrier to represent a digit 0 to 9 or to a zero eliminated position; operating means to move the actuator in any of said positions; a second operating means to move the settable means into zero eliminated position during every operation of the machine and to restore the actuator from any position representing digits 1 to 9 into normal position; coupling means to couple

the settable means to the actuator; actuating means to normally maintain the coupling means in coupling position but adapted to move the coupling means out of coupling position before the actuator has been differentially adjusted and back into coupling position prior to the time the actuator is moved to normal position by said second operating means, whereby the settable means is adjusted into a position commensurate with a digit represented by the differential setting of the actuator; a secondary means to restore the actuator from zero position to normal position during an operation in which the actuator is arrested in zero position, said secondary means being effective before the coupling means becomes effective to couple the settable means to the actuator, to thereby cause the settable means to remain in eliminated position; a higher order actuator; means controlled by the actuator of higher order to disable the secondary restoring means to permit the settable means to be moved to zero position under control of the lower order actuator when the lower order actuator is restored to normal position; a repeat key; means under control of the repeat key to disable said actuating means during repeat operations; and means connected to the actuating means and coacting with said secondary restoring means to render the secondary means ineffective during repeat operations.

34. In a machine of the class described, in combination with manipulative devices and a zero stop, an actuator differentially adjustable under control of said manipulative devices and zero stop from a normal position, and an operating means to restore the actuator to normal position during each machine operation, of a second operating means to restore the actuator to normal position after the actuator is adjusted to zero position; a type carrier; a settable means connected to the type carrier and normally movable into a zero eliminated position; coupling means to couple the settable means to the actuator after the actuator has been differentially adjusted; actuating means to normally maintain the coupling means in coupling position but adapted to move the coupling means out of coupling position before the actuator is differentially adjusted, and back into coupling position before the first-named operating means restores the actuator to normal position to thereby adjust the type carriers commensurate with the differential setting of the actuator under control of said manipulative devices, said second operating means operating before the coupling means is moved to couple the setting means to the actuator to thereby restore the actuator from zero position to normal position without moving the setting means out of eliminated position; a repeat key; means under control of the repeat key to disable said actuating means during repeat operations; and means connected to the actuating means and coacting with the second operating means to render the second operating means ineffective during repeat operations.

35. In a machine of the class described, in combination with manipulative devices and a zero stop, an actuator differentially adjustable under control of said manipulative devices and zero stop from a normal position, and operating means to restore the actuator to normal position during each machine operation, of a second operating means to restore the actuator to normal position after the actuator is adjusted to zero position; a type carrier; a settable means con-

nected to the type carrier and movable into a zero-eliminated position; coupling means to couple the settable means to the actuator; actuating means to normally maintain the coupling means in coupling position but adapted to move the coupling means out of coupling position before the actuator is differentially adjusted, and back into coupling position after the actuator has been differentially adjusted and before the first operating means restores the actuator to normal position to thereby adjust the type carrier commensurate with the differential setting of the actuator under control of said manipulative devices, said second operating means operating before the coupling means is moved to couple the setting means to the actuator; connections between the first operating means and the second operating means whereby the second operating means is operated by the first operating means; a repeat key; means under control of the repeat key to disable said actuating means during repeat operations; and means connected to the actuating means and coacting with the second operating means to disable the second operating means during repeat operations.

36. In a machine of the class described, in combination with manipulative devices and a zero stop, an actuator differentially adjustable under control of said manipulative devices and a zero stop from a normal position, and an operating means to restore the actuator to normal position during each machine operation, of a second operating means to restore the actuator to normal position after the actuator is adjusted to zero position; a type carrier; a settable means connected to the type carrier and movable into a zero eliminated position; coupling means to couple the settable means to the actuator after the actuator has been differentially adjusted; actuating means to normally maintain the coupling means in coupling position but adapted to move the coupling means out of coupling position before the actuator is differentially adjusted and then back into coupling position after the actuator has been differentially adjusted and before the first-named operating means restores the actuator to normal position to thereby adjust the type carrier commensurate with the differential setting of the actuator under the control of said manipulative devices, said second operating means operating before the coupling means is moved to couple the setting means to the actuator; means operated by the actuator to disable one element of the second operating means when the actuator is adjusted under control of the manipulative device; a repeat key; means under control of the repeat key to disable said actuating means during repeat operations; and means connected to the actuating means and coacting with the second operating means to disable the second operating means during repeat operations.

37. In a machine of the class described, in combination with manipulative devices and a zero stop, an actuator differentially adjustable under control of said manipulative devices and zero stop from a normal position, and an operating means to restore the actuator to normal positions on each machine operation; of a second operating means to restore the actuator to normal position after the actuator is adjusted to zero position; a type carrier; a settable means connected to the type carrier and movable into zero eliminated position; coupling means to couple the setting means to the actuator after the

actuator has been differentially adjusted; actuating means to normally maintain the coupling means in coupling position but adapted to move the coupling means out of coupling position before the actuator has been differentially adjusted and into coupling position after the actuator has been differentially adjusted and before the first-named operating means restores the actuator to normal position to adjust the type carrier commensurate with the differential setting of the actuator under control of said manipulative devices, said second operating means operating before the coupling means is moved to couple the setting means to the actuator, said second operating means including a cam arm, means on the first-named operating means to operate said cam arm, and a pawl on said cam arm movable into engagement with said actuator when the actuator is adjusted into zero position; a repeat key; means under control of the repeat key to disable said actuating means during repeat operations; and means connected to the actuating means and coacting with said pawl to maintain said pawl out of engagement with said actuator to thereby disable the second operating means during repeat operations.

38. In a machine of the class described, in combination with manipulative devices and a zero stop, an actuator differentially adjustable under control of said manipulative devices and the zero stop from a normal position, and an operating means to restore the actuator to normal position during each machine operation, of a second operating means to restore the actuator to normal position after the actuator is adjusted to zero position; a type carrier; a settable means connected to the type carrier and movable into a zero eliminated position; coupling means to couple the settable means to the actuator; actuating means to normally maintain the coupling means in coupling position, but adapted to move the coupling means out of coupling position before the actuator has been differentially adjusted, and back into coupling position after the actuator has been differentially adjusted and before the first-named operating means restores the actuator to normal position to adjust the type carrier commensurate with the differential setting of the actuator under control of said manipulative devices, said second operating means operating before the coupling means is moved to couple the setting means to the actuator, said second operating means including a cam arm; means on the first-named operating means to operate said cam arm; a pawl on said cam arm movable into engagement with said actuator when the actuator is setting in zero position; a latch to latch the pawl in ineffective position; means on the actuator to normally maintain the latch in ineffective position and releasable to move into effective position when the actuator is adjusted under control of a manipulative device to enable the latch and thereby disable the second operating means when an actuator is moved to represent a digit 1 to 9; a repeat key; means under control of the repeat key to disable said actuating means during repeat operations; and means connected to the actuating means and coacting with said latch to maintain the latch in normal position to thereby maintain the pawl in ineffective position to disable the second operating means during repeat operations.

39. In a machine of the class described, in combination with manipulative devices and a zero stop, an actuator differentially adjustable

under control of said manipulative devices and said zero stop from a normal position, and an operating means to restore the actuator to normal position during each machine operation, of a second operating means to restore the actuator to normal position after the actuator is arrested in zero position; a type carrier; a settable means connected to the type carrier and movable into zero eliminated position; coupling means to couple the settable means to the actuator; actuating means to normally maintain the coupling means in coupling position but adapted to move the coupling means out of coupling position before the actuator is differentially adjusted and back into coupling position after the actuator has been differentially adjusted and before the first-named operating means restores the actuator to normal position to thereby adjust the type carrier commensurate with the differential setting of the actuator under the control of a set of manipulative devices, said second operating means operating before the coupling means is moved to couple the setting means to the actuator, said second operating means including a cam arm; means on the first-named operating means to operate said cam arm; a pawl on said cam arm movable into engagement with said actuator when the actuator is setting in zero position; a spring-urged latch to latch the pawl in ineffective position; a projection on the actuator engaging the latch when the actuator is in normal position to disable the latch, said projection movable out of engagement with the latch when the actuator is adjusted to represent a digit 1 to 9, to thereby render the latch effective to latch the pawl in ineffective position to disable the second operating means; a repeat key; means under control of the repeat key to disable said actuating means during repeat operations; and means connected to the actuating means and coacting with said latch to maintain the latch in normal position to thereby disable the second operating means during repeat operations.

40. In a machine of the class described, in combination with manipulative devices and a zero stop, an actuator differentially adjustable under control of said manipulative devices and zero stop from a normal position; and an operating means to restore the actuator to normal position during each machine operation, of a second operating means operated by the first operating means to restore the actuator to normal position after the actuator is adjusted to zero position; a type carrier; a settable means connected to the type carrier and movable into zero eliminated position; coupling means to couple the settable means to the actuator; actuating means to normally maintain the coupling means in coupling position but adapted to move the coupling means out of coupling position before the actuator has been differentially adjusted and into coupling position after the actuator has been differentially adjusted before the first-named operating means restores the actuator to normal position to adjust the type carriers commensurate with the differential setting of the actuator under the control of said manipulative devices, said second operating means operating before the coupling means is moved to couple the setting means to the actuator; means on the actuator to control the effectivity of the second operating means; a repeat key; means under control of the repeat key to disable said actuating means during repeat operations; and means con-

nected to the actuating means to disable the second operating means during repeat operations.

41. In a machine of the class described, in combination with manipulative devices and a zero stop, an actuator differentially adjustable under control of said manipulative devices and zero stop from a normal position, and an operating means to restore the actuator to normal position during each machine operation, of a second operating means operable by the first operating means to restore the actuator to normal position after the actuator is adjusted to zero position; a type carrier; a settable means connected to the type carrier and movable into a zero eliminated position; coupling means to couple the settable means to the actuator; actuating means to normally maintain the coupling means in coupling position but adapted to move the coupling means out of coupling position before the actuator has been differentially adjusted and back into coupling position after the actuator has been differentially adjusted and before the first operating means restores the actuator to normal position to thereby adjust the type carrier commensurate with the differential setting of the actuator under control of said manipulative devices, said second operating means operating before the coupling means is moved to couple the setting means to the actuator, said second operating means including a cam arm; means on the first-named operating means to operate said cam arm; a spring-urged pawl on said cam arm; means on the first-named operating means to normally maintain said pawl in ineffective position, said pawl released to the action of a spring when the operating means is operated to move into engagement with the actuator when the actuator is arrested in zero position by the zero pawl, and before the second operating means is operated to move the actuator to normal position before the coupling means becomes effective; a repeat key; means under control of the repeat key to disable said actuating means during repeat operations; and means connected to the actuating means and coacting with the spring-urged pawl to prevent the spring-urged pawl from moving into effective position when the actuator is arrested in zero position during repeat operations.

42. In a machine of the class described, the combination of a totalizer element; a differential actuator therefor; means to engage and disengage the totalizer with and from the differential actuator; means to move the actuator from a normal position to a differentially adjusted position while the totalizer element is disengaged therefrom; a second means to move the differential actuator back to normal position while the totalizer element is engaged with the differential actuator to enter amounts into the totalizer element; a character-bearing member; a setting device to adjust the character-bearing member, said second means engaging said setting device and moving it from any previously set position to a fixed position before said second moving means moves the actuator back to normal position; a coupling means pivoted on the setting device; and means to move the coupling device into engagement with the actuator after said second moving means moves the setting device into said fixed position and before the said second moving means moves the actuator back to normal position, whereby the setting device is moved from said fixed position into an adjusted position commensurate with the differential adjustment of

the actuator to thereby position the character-bearing member into an adjusted position as the differential actuator is moved back to normal position.

43. In a machine of the class described, the combination of a totalizer element; a differential actuator therefor; means to engage and disengage the totalizer with and from the differential actuator; means to move the actuator from a normal position to a differentially adjusted position while the totalizer element is engaged with the differential actuator; a second means to move the differential actuator back to normal position while the totalizer element is engaged with the differential actuator to enter amounts into the totalizer element; a character-bearing member; a setting device to adjust the character-bearing member, said second means engaging said setting device and moving it from any previously set position to a fixed position before said second moving means moves the actuator back to normal position; a coupling means pivoted on and movable with the setting device; means to move the coupling device into engagement with the actuator after said second moving means moves the setting device into said fixed position and before the said second moving means moves the actuator back to normal position, whereby the setting device is moved from said fixed position into an adjusted position commensurate with the differential adjustment of the actuator to thereby position the character-bearing member into an adjusted position as the differential actuator is moved back to normal position; and a guide on the last-named means having a guide surface to guide the coupling means in a path parallel to the movement of the setting device while the latter is being adjusted.

44. In a machine of the class described, the combination of a totalizer element; a differential actuator therefor, said element normally disengaged from the actuator; resilient means to move the actuator from a normal position to a differentially adjusted position; means to engage the totalizer element with the actuator after the actuator has been moved into an adjusted position; a cam-operated bar to move the differential actuator back to normal position after the totalizer element is engaged with the differential actuator to enter amounts into the totalizer element; a character-bearing member; a setting device to adjust the character-bearing member, said bar engaging said setting device and moving it from any previously set position to a fixed position before said bar moves the actuator back to normal position; a coupling means pivoted on and movable with the setting device; a cam arm engageable with the coupling device to move the coupling device into engagement with the actuator after said bar moves the setting device into said fixed position and before the said bar moves the differential actuator back to normal position, whereby the setting device is moved from said fixed position into an adjusted position commensurate with the differential adjustment of the differential actuator as the differential actuator is moved back to normal position to position the character-bearing member into an adjusted position; and a locking surface on the cam arm engageable with the coupling means to lock the coupling means in coupling position while being moved with the setting device.

45. In a machine of the class described, the combination of a totalizer element; a differential

actuator therefor, said element normally being disengaged from the actuator; a spring to move the differential actuator from a normal position to a differentially adjusted position; means to engage the totalizer element with the differential actuator; a reciprocating bar to move the actuator back to normal position after the totalizer element has been engaged with the differential actuator to enter amounts into the totalizer element; a character-bearing member; a setting device to adjust the character-bearing member, said reciprocating bar engaging said setting device and moving it from any previously set position to a fixed position before said reciprocating bar moves the actuator from the differentially adjusted position back to normal position; a coupling means pivoted on and movable with the setting device; an arm engageable with the coupling device to move the coupling device into engagement with the differential actuator after said reciprocating bar moves the setting device into said fixed position and before the said reciprocating bar moves the differential actuator back to normal position, whereby the setting device is adjusted commensurate with the differential adjustment of the differential actuator as the differential actuator is moved back to normal position by said bar; a locking surface on the arm engageable with the coupling means to lock the coupling means in coupling position while being moved with the setting device; a second locking surface on the arm engageable with the coupling means to maintain the coupling means in uncoupled position while the actuator is differentially adjusted; and a cam to move said arm into said locking positions.

46. In a machine of the class described, the combination of a totalizer element; a differential actuator therefor; a spring to move the actuator from a normal position to a differentially adjusted position; means to engage the totalizer element with the actuator; a cam-actuated bar to positively move the actuator back to normal position after the totalizer element has been moved into engagement with the actuator to enter amounts into the totalizer element; a character-bearing member; a setting device connected to the character-bearing member to adjust the character-bearing member, said bar engaging said setting device and moving it from any previously set position to a fixed position before said bar moves the actuator back to normal position; a coupling means pivoted on and movable with the setting device said coupling device provided with teeth; means to move the coupling device to engage said teeth with notches in the actuator after bar moves the setting device into said fixed position and before the said bar moves the actuator back to normal position, whereby the setting device is adjusted commensurate with the differential adjustment of the actuator as the differential actuator is moved back to normal position; two locking surfaces on said last-named means to lock the coupling means in either coupled or uncoupled position while the actuator and the setting devices are moved in either direction; and means to determine which locking surface is to be effective.

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(References on following page)

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
532,762	Carney	Jan. 22, 1895
788,453	Cleal	Apr. 25, 1905
1,002,341	Vincent	Sept. 5, 1911
1,028,162	Vincent et al.	June 4, 1912
1,318,798	Quentell	Oct. 14, 1919
1,526,931	Rauchwetter	Feb. 17, 1925
1,652,091	Christian	Dec. 6, 1927
1,693,279	Kreider	Nov. 27, 1928
1,702,171	Radermacher	Feb. 12, 1929
1,851,401	Munzer	Mar. 29, 1932

Number

1,853,051
1,909,715
1,931,113
2,034,345
2,056,536
2,063,080
2,087,182
2,091,778
2,115,118
2,119,841
2,121,683
2,173,246
2,176,640
2,259,344
2,262,258

5

10

15

140

Name

Date

Horton Apr. 12, 1932
Pasinski May 16, 1933
Muller Oct. 17, 1933
Kottmann Mar. 17, 1936
Sampson Oct. 6, 1936
Christian Dec. 8, 1936
Crosman July 13, 1937
Garbell Aug. 31, 1937
Neureiter et al. Apr. 26, 1938
Breitling June 7, 1938
Britten June 21, 1938
Aurbach Sept. 19, 1939
Payne Oct. 17, 1939
Kiel Oct. 14, 1941
Shipley et al. Nov. 11, 1941