

July 4, 1933.

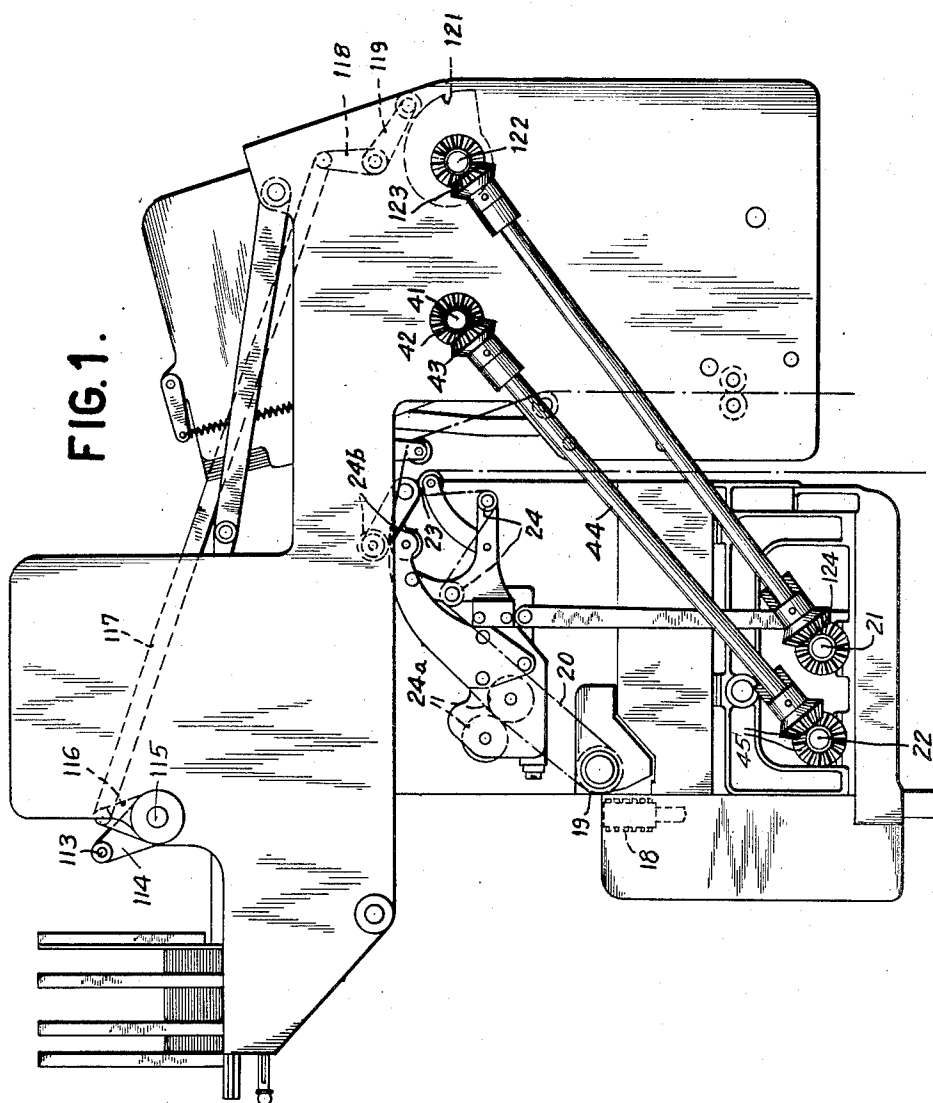
J. S. OGSBURY ET AL

1,916,985

PRINTING DEVICE FOR TABULATING MACHINES

Filed May 27, 1931

6 Sheets-Sheet 1



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PRINTING DEVICE FOR TABULATING MACHINES

Filed May 27, 1931

6 Sheets-Sheet 2

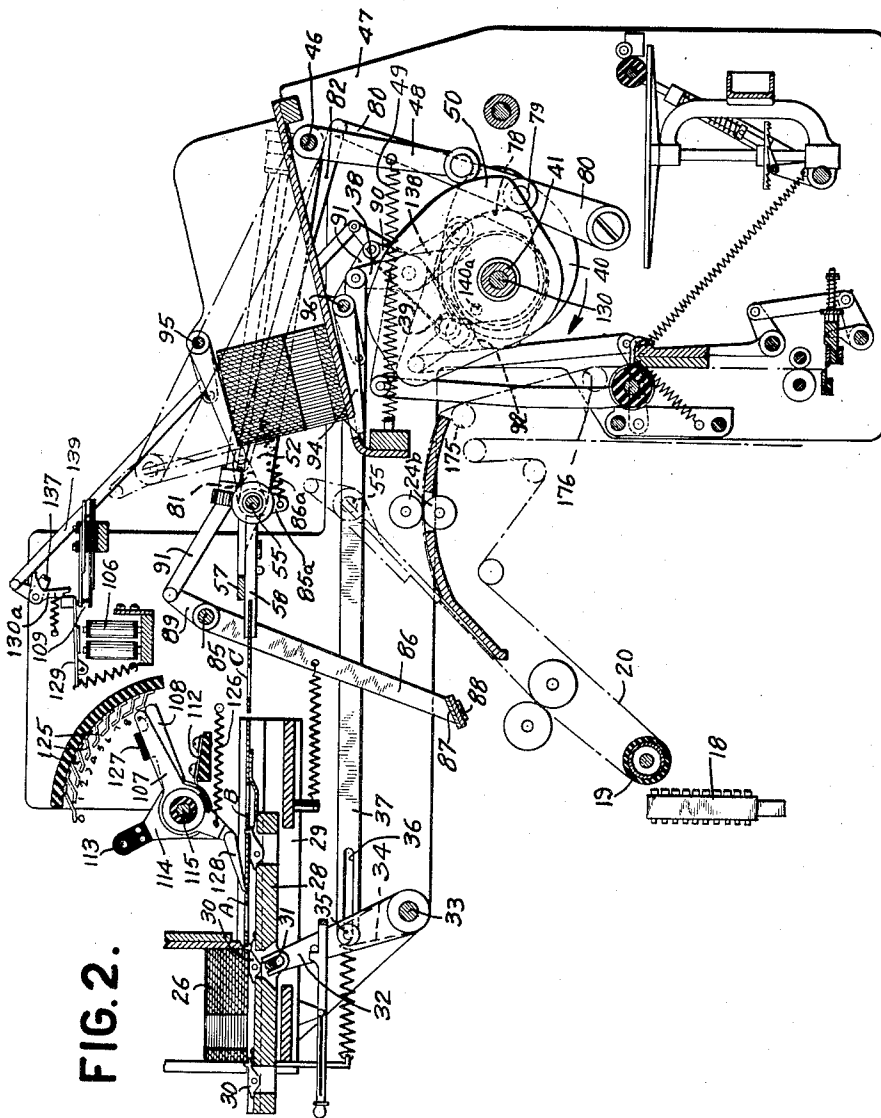


FIG. 2.

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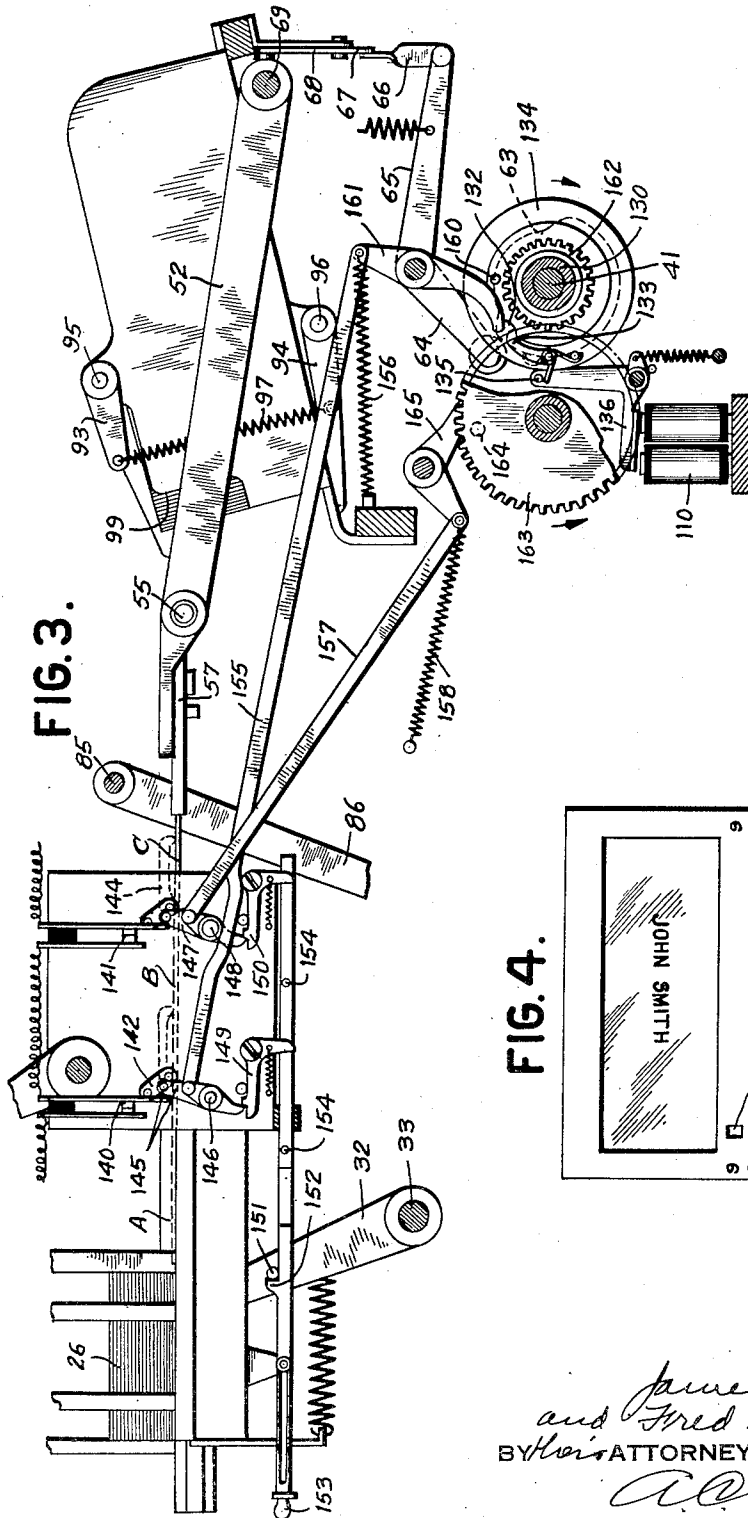
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PRINTING DEVICE FOR TABULATING MACHINES

Filed May 27, 1931

6 Sheets-Sheet 3



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1,916,985

PRINTING DEVICE FOR TABULATING MACHINES

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6 Sheets-Sheet 4

FIG. 5.

INTERNATIONAL PUBLIC SERVICE CORP.
BROADWAY

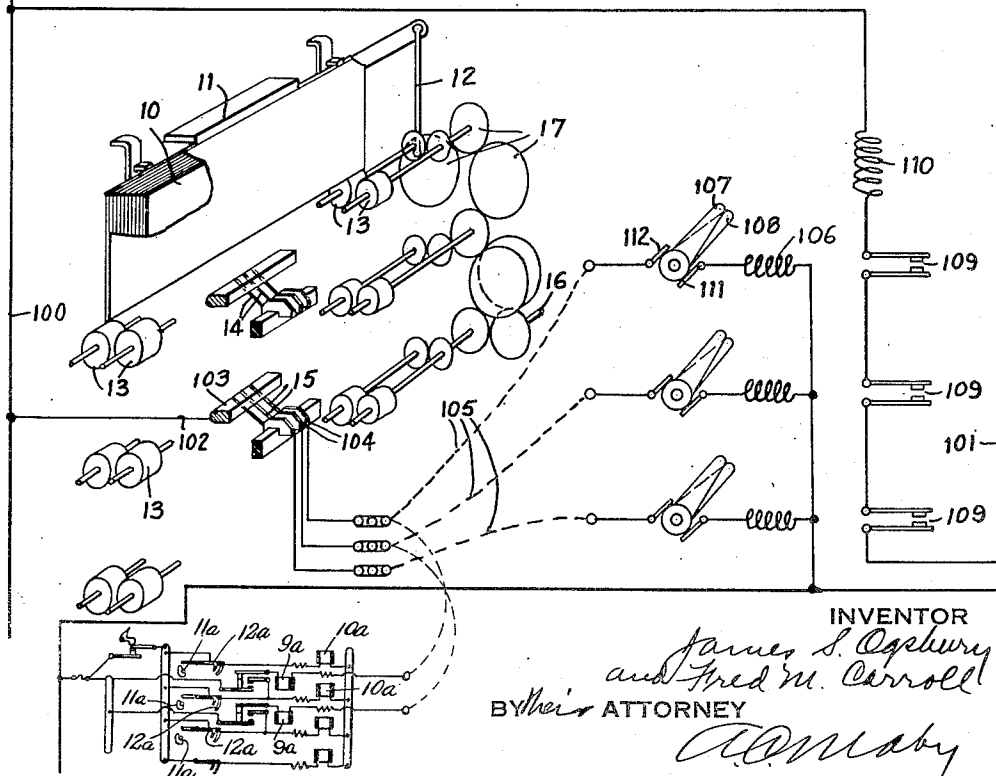
TEL. OFFICE HOURS

IN ACCOUNT WITH JOHN SMITH 25

275
658
337
89
5
38

1402

FIG. 6.



July 4, 1933.

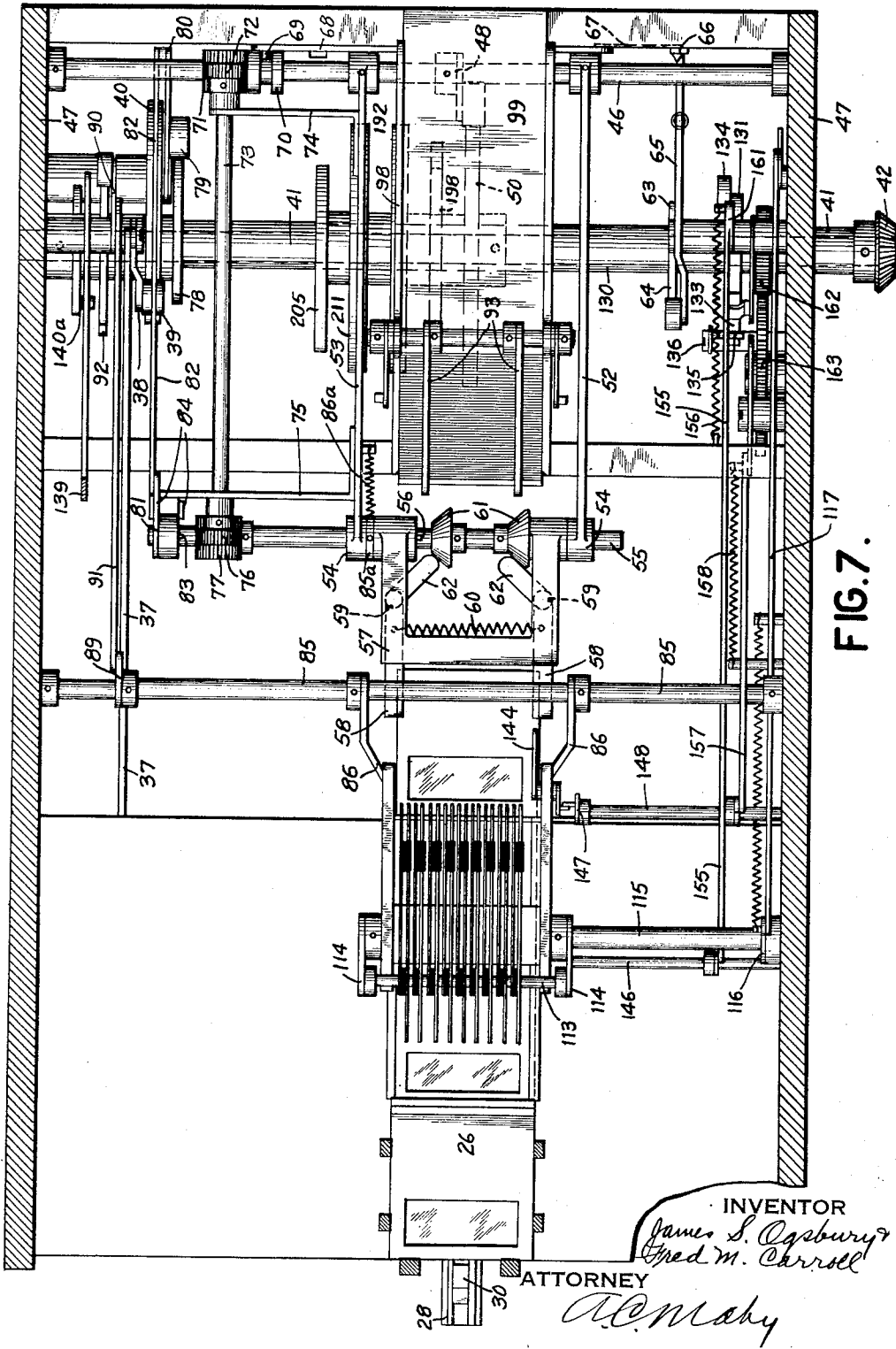
J. S. OGSBURY ET AL

1,916,985

PRINTING DEVICE FOR TABULATING MACHINES

Filed May 27, 1931

6 Sheets--Sheet 5



July 4, 1933.

J. S. OGSBURY ET AL

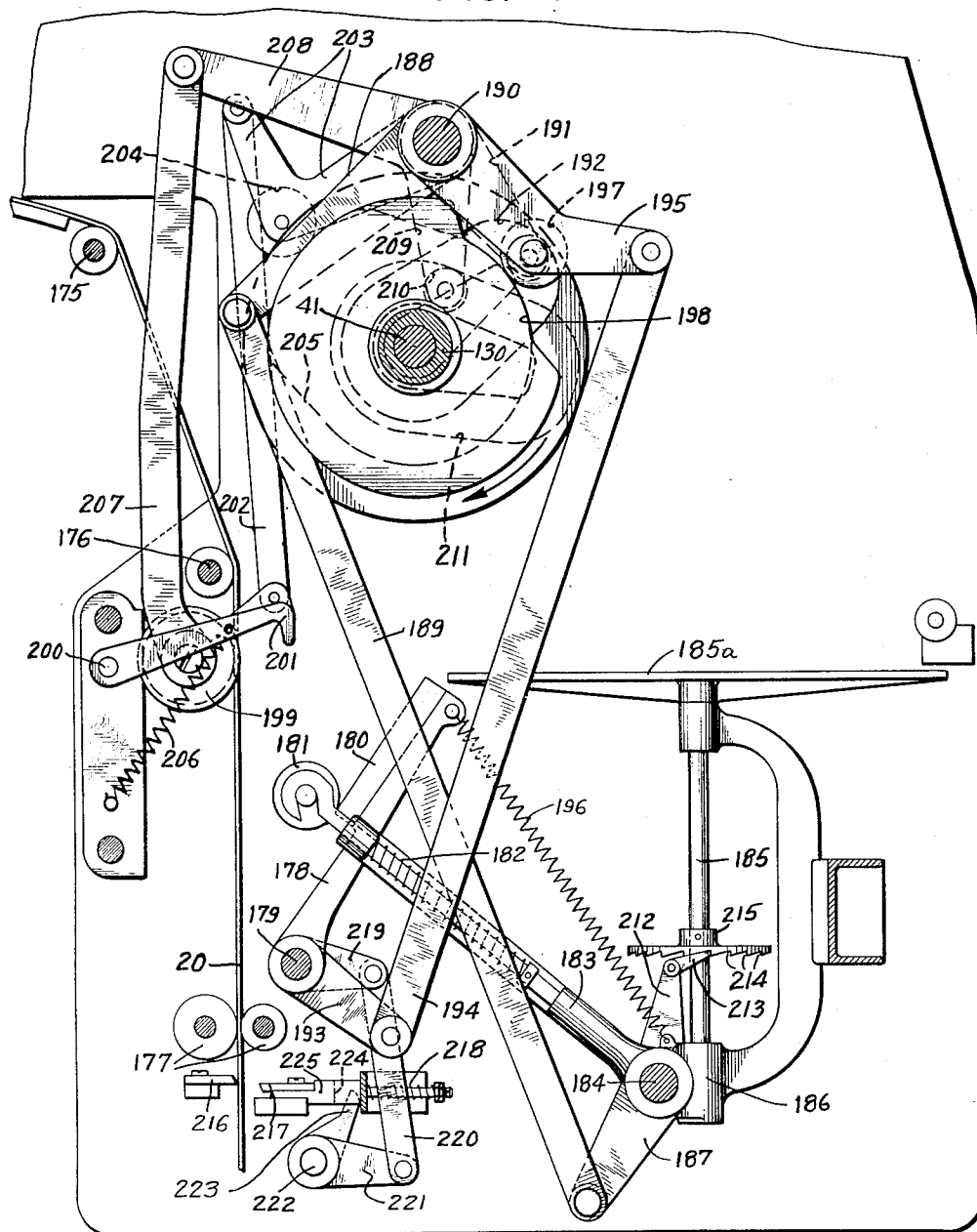
1,916,985

PRINTING DEVICE FOR TABULATING MACHINES

Filed May 27, 1931

6 Sheets-Sheet 6

FIG. 8.



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UNITED STATES PATENT OFFICE

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PRINTING DEVICE FOR TABULATING MACHINES

Application filed May 27, 1931. Serial No. 540,256.

This invention relates to automatically controlled accounting machines such as tabulating machines in which entries upon a record comprising a series of items and a total thereof are automatically printed upon a record strip. The invention is primarily directed to the inclusion of automatically operated mechanisms for effecting the printing of additional matter such as account names and a common heading such as are provided upon bills.

With respect to the improvements it is also an object to include devices whereby the account name printing devices, preferably in the form of stencils, are fed but are analyzed so that only the desired one identifies the related items and totals printed. Preferably the impression devices are compared with the item controlling devices so that printing of the wrong identification data will be prevented.

In connection with the printing devices for printing the common heading the object is to include automatically operated devices for printing this data when the other printing operations have been performed so that a completely printed bill may be effected.

It is also an additional object to provide severing devices which detach the printed portion from the remaining part of the strip to automatically make up separate bills for distribution according to the system adopted.

To these and other ends the invention consists in the novel features of construction, arrangement of parts, and combination of elements hereinafter described and more particularly set forth in the claims.

Fig. 1 is an end view of a tabulating machine embodying the present improvements.

Fig. 2 is a cross sectional view of the identifying plate feeding, analyzing and printing mechanisms constructed according to the present invention.

Fig. 3 is a cross sectional view and shows in detail the construction of the clutch mechanism and associated electrical control devices.

Fig. 4 is a plan view of a printing plate provided with identifying and classification characters.

Fig. 5 is a representation of a completely printed bill effected by the present embodiment.

Fig. 6 is a diagrammatic representation of the electrical control system which may be employed in connection with the present improvements.

Fig. 7 is a plan view of the machine with certain parts removed.

Fig. 8 is a view in side elevation of the devices employed to print a heading upon the bill and sever the strip into separate bills.

Referring to Fig. 5 it will be observed that the present invention contemplates printing a common heading upon a section of a long web to provide a heading for a bill, a series of items represented by a series of controlling cards correspondingly classified, a total thereof, and means for printing variable data, such as the name of an account which is only printed upon the bill receiving correspondingly classified items.

The present improvements are illustrated herewith in connection with a tabulating machine of the form fully shown and described in the patent to C. D. Lake, No. 1,379,268, dated May 24, 1921. The particular type of machine does not enter into the present invention as any other form of entry receiving device would serve the purpose of explanation and embodiment equally as well.

As more fully explained in the Lake Patent 1,379,268 a stack of tabulating records which represent the items of the various accounts indicated by numeral 10 (see Fig. 6) are advanced singly by a picker 11 operated by an arm 12 and are thus drawn into cooperative relation with a pair of feeding rollers 13. The picker feeds one card at a time to the rollers 13 which advance a card during one machine cycle to the upper or control brushes 14 and during a later machine cycle to the lower or adding brushes 15. The rollers and feed mechanism are driven from a shaft 16 rotated by the usual tabulating motor and gear train indicated generally by reference character 17. As the perforated cards are fed to the adding brushes the index points are sensed in the usual manner in order that the printing type 18 (Fig. 2) may

be differentially controlled. Item and total printing operations are effected by impelling the selected type against the usual roller platen 19, impressions being effected upon the record strip 20 by the customary inking ribbon. As more fully explained in the Patent 1,762,145 to Daly et al., and shown diagrammatically in Fig. 6, the lower brushes 15 are adapted to be plugged so as to control printing control magnets 10a and adding magnets 9a. Printing control magnets 10a are adapted to selectively call the item type 18 (Fig. 2) into operation to print the values represented by the perforated cards. Upon a change in group designation determined by brushes 14 and 15 a total operation will ensue and contacts 12a (Fig. 6) will close at different points in the cycle depending upon the position of stepped cams 11a. The latter, as more fully described in the patent last cited, is adjusted under control of the adding elements controlled by adding magnets 9a. The closure of such contacts 12a will thereby energize the printing control magnet 9a at a certain point in the operation so that by a plurality of magnets 9a the same printing type 18 are differentially controlled to effect a total print on the record strip 20, as are used for item printing. During item listing operations a shaft 21 (Fig. 1) is operated to drive the various mechanisms.

It should further be explained that each record card carries a group of perforations representing a particular classification or group number. These perforations are sensed by brushes 14 and 15 but when a card having a new group number is presented to the brushes 14, item printing is terminated and the control mechanism more fully illustrated in the patent to C. D. Lake, No. 1,600,413, dated September 21, 1926, conditions the machine for a total taking operation. During this operation shaft 21 is idle but a total taking shaft 22 (Fig. 1) is driven to operate various mechanisms as an incident to total printing operations.

Any suitable paper strip spacing mechanism may be provided for effecting paper spacing operations such as, for example, the type disclosed in the patent to Daly and Page 1,762,145 dated June 10, 1930 and F. M. Carroll, Serial No. 287,549, filed June 22, 1928 to which reference may be had for further details of construction and operation. The paper strip 20 (Fig. 1) is drawn from a supply roll, thence passes about a tensioned roller 23, fixed rollers 24, around the platen 19 and thence between pairs of feeding rollers 24a and 24b (Fig. 3). Feeding rollers 24a are driven intermittently as an incident to item printing operations to suitably space the items as shown in Fig. 5. The paper strip 20 is, however, preferably given a greater spacing before and after total

printing operations in order that the total be printed on some predetermined line and to provide space to accommodate the variable identifying data 25 exemplified herewith as account names. Such printed matter identifies the data which follows below, and which preferably comprises a series of items with a related total.

In the present instance the identifying data is printed by a member 26 (Fig. 4) which may be a matrix, token and of any suitable material but is exemplified herewith as a plate carrying stencilled data for printing names of account, and, in addition, preferably carries perforations 27 representing an arbitrary account number.

For the purpose of successively feeding the printing plates 26 which are initially stacked as shown in Fig. 2, a bar 28 slidably mounted in a frame 29 is provided. The bar 28 carries spring urged picker members 30, a pair of which engage the front and rear edges of the lowermost plate 26 to positively feed it from the bottom of the stack when said bar 28 is moved in one direction.

Suitable spring pressed members or other means may be provided to hold the plate fed in this manner impositively on the upper surface of frame 29 while the bar 28 and picker members 30 are returned to normal position. It will be obvious that when the next plate at the bottom of the stack is fed, the plate previously fed will be moved a step to the right (as viewed in Fig. 2) the arrangement being such that three feeding operations are required to move a plate 26 from the stack to a gripper to be presently described.

Under certain conditions bar 28 is automatically reciprocated as an incident to a total taking operation by the following mechanism: Bar 28 (Fig. 2) carries a pin 31 engaging a bifurcation of a lever 32 at an end distant from its connection to a rock shaft 33. Shaft 33 has secured to it an arm 34 having a pin 35 engaging a closed slot 36 of a link 37 articulated to a spring urged bell crank 38 whose roller 39 cooperates with a cam 40 attached to a sleeve 130 which, if the required agreement between a tabulating card and printing member 26 is effected is clutched to a shaft 41 driven during each total taking operation. Shaft 41 (Fig. 1) carries a bevel gear 42 meshing with a similar bevel gear 43 on a connecting shaft 44, the latter being driven by shaft 22 by a similar pair of intermeshing bevel gears 45.

Secured to a shaft 46 (Fig. 7) journaled in the side frames 47 of the attachment is an arm 48 biased by a spring 49 (Fig. 2) so that a roller carried thereby engages a profile cam 50 secured to sleeve 130. Pinned to shaft 46 is a pair of spaced arms 52 and 53 (Figs. 3 and 7) which are provided at their ends with journal collars 54 which support a slidably mounted shaft 55. Splined to the shaft 55

by a key 56 is a yoke shaped plate gripper frame 57 the side arms of which carry their respective gripper arms 58 pivoted at 59 and urged towards each other by a connecting spring 60.

Pinned to shaft 55 is a pair of mushroom-shaped cams 61 engaging the extensions 62 of the respective arms 58, it being clear that as shaft 55 is shifted the free ends of arms 58 will be moved away or towards each other, and that the angular position of frame 57 is dependent on the position of shaft 55, and furthermore, the various positions of gripper arms 58 and frame 57 may be assumed independently of each other to perform the necessary operations.

Since the shaft 46 is rocked by cam 50 it will also be clear that the position of shaft 46 also controls the position of the arms 53 and the parts carried thereby.

In order to provide for the necessary positioning of arms 58 by shifting shaft 55 the following mechanism is preferably employed. Attached to sleeve 130 is a cam 63 (Fig. 3) coacting with a roller carried by an arm 64. Integral with arm 64 is an arm 65 which is connected to one arm of a bell crank 67 by a twisted link 66 (see also Fig. 7). The other arm of bell crank 67 is connected to a link 68 (Fig. 7) carrying a stud 69, engaging an annular groove of a sleeve 70 slidably mounted on shaft 46. Also slidably mounted on shaft 46 but secured to sleeve 70 is an arcuate rack member 71 meshing with a pinion 72 attached to a shaft 73. Shaft 73 is journaled in brackets 74 and 75 secured to arm 53 and carries at the other end a similar pinion 76 meshing with a similar arcuate rack member 77 pinned to the shaft 55. Through the train of mechanism just described cam 63 effects the desired shifting movement of shaft 55 to open or close the jaws or gripper arms 58.

In order to effect the desired rocking movement of shaft 55 a cam 78 (Fig. 2) secured to sleeve 130 is provided. This cam coacts with a roller 79 carried by an arm 80 the upper end of the arm being attached to an arm 81 by a link 82.

As shown in Fig. 7, arm 81 has a splined connection 83 to a shaft 55 the arm 81 being confined by bracket extensions 84 of the bracket 75. Attached to shaft 55 is an arm 85a (Fig. 2) biased by a spring 86a acting to hold shaft 55 in a position determined by cam 78.

When the parts are in their normal position, as shown in Fig. 3, the jaws 58 firmly grip the plate from which the next printing is to be effected. When the sleeve 130 is driven, cam 50 is almost immediately effective to rock shaft 46 to lower arms 52 and 53 and parts carried thereby until shaft 55 occupies its lowest position, illustrated by dotted lines in Fig. 2. As the parts are thus

brought to their lowest positions cam 78 is effective to rock arm 80 and through the train of mechanism previously described rock shaft 55 slightly in a counterclockwise direction. This will result in placing the seized printing plate directly against the record strip 20 at which time a printing impression will be effected by the following mechanism.

Secured to a shaft 85 (Figs. 2 and 7) journaled in the side frames 47 is a pair of downwardly extending arms 86 (Fig. 2) integrally connected at their lowermost ends by a cross piece 87 to which is affixed an inked felt pad 88.

Also secured to shaft 85 is an arm 89 (Fig. 2) connected to a cam operated bell crank 90 by a link 91. The roller carried by one of the arms of the bell crank 90 coacts with a cam 92 secured to sleeve 130. When the plate 26 occupies the proper printing position the high part of the cam 92 is effective to rock the yoke 86—87 and inked pad 88 against the plate and directly over the stenciled name portion to thus produce a like impression 25, (Fig. 5) on the record sheet 20 which suitably identifies the matter previously printed.

When the inked pad 88 has been moved reversely out of the way the cam 50 is then effective to elevate shaft 55 to the uppermost dotted line position, cam 78 being effective during this time to rock the shaft 55 to bring the seized printing plate directly in front of the stacked plates 26 from which printings have already been effected. A continued rocking movement of shaft 55 will force the seized plate behind pairs of latching arms 93, 94 (Figs. 2 and 7) to hold the plate in stacked position. The latching arms are secured to their respective supporting shafts 95, 96 and are urged towards each other by a spring 97 (Fig. 3). In order to accommodate the grippers 58 the side plates 98 of the receiving chute are cut away at 99 as clearly shown in Fig. 3.

After the plate is in stacked position the cam 63 (Fig. 3) is then effective to separate the grippers 58 releasing their hold on the stacked plate 26. At the termination of this cycle of events shaft 46 is restored to its normal position bringing the parts again to the position shown by full lines in Fig. 2, the grippers 58 now being drawn towards each other to receive a new printing plate which is fed to the grippers during the time the grippers are in horizontal alignment with the plate being fed thereto.

As the record cards carrying group classification are sensed by the brushes 15 the perforations are compared with the group classification perforations 27 of the printing plates 26 and if the perforations completely agree further operation of the machine will ensue. Referring to the circuit diagram in Fig. 6 it will be observed that current to the

brushes 15 and various relays is supplied by main lines 100 to 101.

From main line 100 a wire 102 leads to a metal block 103 carrying brushes 15 each of which continues the circuit connection to an individual segment plate 104 through a perforation in a record card. The circuit then extends by a jumper connection 105 to the relay magnet 106 when a pair of reading levers 107 and 108 are electrically bridged.

It will be apparent that the circuit connection just described is duplicated for the different denominational orders and while the diagram shows an embodiment for analyzing only three orders, this number may be altered to coincide with the number of denominational orders of the perforations 27 representing the group classification number of the printing plates 26.

Each relay magnet 106 when energized is adapted to close its relay contacts 109 which are in serial connection with a clutch relay magnet 110 shunted across the main line wires 100 and 101. Brushes 111 and 112 engage the hubs of the reading levers 107 and 108 to provide for a continuous electrical contact during their movements. (See also Fig. 2).

From Figs. 2 and 7 it will be observed that the levers 108 for the different denominational orders are tied together for synchronous operation by a rod 113 passing through insulated extensions of said levers. Rod 113 is supported at its ends by a pair of arms 114 pinned to a rock shaft 115 which carries another arm 116 (Fig. 1) joined to one arm of a bell crank 118—119 by a link 117. The arm 119 carries a roller 120 engaging a profile cam 121 attached to a stub shaft 122. This shaft, by bevel gear connections 123 and 124, is driven from the shaft 21 which, it will be recalled is rotated as an incident to each listing operation. Cam 121 is arranged to oscillate the rod 113 (Fig. 2) during each item listing operation so that the levers 108 contact index point plates 125 simultaneous with the sensing of the corresponding index point perforation of the record card by the brushes 15.

Index point plates 125 are in the form of curved spring plates which are wide enough to contact companion levers 107 and 108 when their angular positions coincide. Normally, the levers 107 and 108 are displaced with respect to their angular setting by reason of the fact that a spring 126 (Fig. 2) connected to an integral extension of each related lever 107 rocks the same to engage a laterally projecting insulating block 127 attached to the companion lever 108. It will be apparent that as rod 113 is rocked, springs 126 will cause levers 107 to follow the movement of levers 108 until one of the levers 107 is arrested by the engagement of a reading lever 128 with one of the perforations 27 in the

group with which it is in alignment. Thereupon lever 107 will be stopped and as lever 108 arrives adjacent an index point plate 125 corresponding to a perforation presented to brush 15, levers 107 and 108 will be electrically bridged by one of the plates 125 thus energizing the related magnet 106 which draws downwardly its armature structure 129 (Fig. 2) to close related contacts 109. As each pair of contacts 109 are closed they are latched in such position by a related latching lever 130a and when all of the pairs of contacts 109 are closed the clutch relay magnet 110 (Fig. 3) will be energized.

It will be apparent that during the first and succeeding listing operation the reading levers 128 (Fig. 2) will be drawn over the printing plate 26 until each lever 128 engages a perforation 27. Due to the formation of the hooked end of the lever 128 the related lever 107 will be stopped in its movement when the lever 128 enters a perforation.

Companion levers 108 continue to contact the remaining contact plates 125 of the series but upon the return thereof they pick up and return such levers 107 that have been arrested by the perforations 27, levers 128 being merely cammed out of such perforations to be brought to the normal starting position. The particular card 26 which is analyzed by reading levers 107—108 constitutes the one fed from the stack during the previous total printing operation, and although the card is successively analyzed during each item printing or listing operation the clutch relay magnet 110 is energized during the first listing operation if the group classification perforations in the record cards and printing plates agree in all orders. If the printing plate 26 does not correspond to the group classification of record cards magnet 110 will not be energized and the machine will be stopped in its operation, as will be described hereinafter.

As previously stated when the group classification of successively fed record cards change, the machine is conditioned for total taking operations and in the event that the classification of the group of cards analyzed is identical to the group number represented by the perforations of the printing plate in analyzing position, clutch magnet 110 will be energized to cause an operative connection between the driven shaft 41 and the cam carrying sleeve 130 (Figs. 3 and 7). The bevel gear 42, previously described, is secured to shaft 41 which also has secured thereto a disk 131 (Fig. 3) having a cam notch 132 in its periphery normally engaging a pawl 133 carried by a disk 134 secured to the sleeve 130. A tail of pawl 133 normally underlies a pin 135 carried by an upstanding arm of the armature structure 136 of relay magnet 110.

It will be evident that when the pin 135

coacts with the tail of the pawl the cam notch 132 will cause the tail to be disengaged from the disk as the latter rotates during a total taking operation. However, if magnet 110 should be energized under the conditions previously stated the pin 135 will be disengaged from the tail of the pawl 133 and the latter will cause disk 134 and sleeve 130 to be driven a complete revolution to perform functions previously described.

Contacts 109 are opened to deenergize magnet 110 after the clutch connections have been permanently established causing pin 135 to subsequently engage over the tail of pawl 133. Underlying tails of the latching levers 130a is a bail 137 (Fig. 2) which is connected to a bell crank lever 138 by a link 139. One arm of the bell crank lever 138 is in the plane of a pin 140a secured to a disk attached to shaft 41 so that as the pin 140a contacts the bell crank lever the link will be rocked resulting in rocking the bail 137 and latch levers 130a, the unlatched contact springs 109 opening under their own resiliency thus deenergizing the clutch relay magnet 110.

In order to prevent the machine from continuing its operation in the event that a wrong plate is fed, or failure of the feeding of a plate, the present invention contemplates the provision of certain electrically controlled precautionary devices.

As more fully disclosed in the Lake Patent No. 1,379,268 the main tabulating motor is provided with an emergency or record controlled stop circuit and preferably included in this circuit are two pairs of serially connected contacts 140 and 141 (Fig. 3).

Upon closure of both contacts operation of the tabulating motor may be initiated but upon opening of either pair, operation will be inhibited. The machine also includes a card operated lever 142 the tail of which is adapted to engage the upper surface of a printing plate or matrix as it is fed to the "B" position to thereby rock the lever to close contacts 140. A similar card operated lever 144 is adapted in the same way to close its related contacts 141 only when a plate is fed from the "B" position to the "C" position.

It will be observed in Fig. 3 that card lever 142 engages the intermediate plate in the "B" position while card lever 144 engages the one fed in advance of the preceding one which is now in the "C" position; or stated in other words, at the end of the first three card feeding operations, one manual and the other the result of two subsequent plate feeding operations occurring in two total printing cycles, there will be the plate first in the "C" position seized by grippers 58 and engaged by card lever 144, (Fig. 3) an intermediate plate in the "B" position engaged by card lever 142 and the last plate fed, in the "A" or reading position

(Fig. 2) and coacting with reading levers 128.

To start the tabulator without any printing plates physically contacting with card levers 142 and 144, the following mechanism is provided. A pin carried by a lever 145 secured to a shaft 146 is adapted to cooperate with the longer contact plate of contacts 140 and when urged in a counter-clockwise direction is adapted to close contacts 140. A similar set of parts comprising a pin carried by a lever 147 secured to rock shaft 148 is associated with contacts 141. Closure of the contacts is, however, prevented by latching levers 149 and 150 engaging the tails of the respective levers 145 and 147, which condition exists after a total taking operation.

Closure of contacts 140 and 141 by unlatching of the levers 145 and 147 is arranged for when the first printing plate of a stack is manually fed to the "A" or reading position.

In alignment with a pin 151 carried by the arm 32 (Fig. 3) is a shoulder 152 of an externally operable slide 153. When the slide is pushed it results in rocking shaft 33 to accomplish a feeding operation as described heretofore to cause the bottom plate of the stack to be fed to the "A" or reading position. As the slide is operated pins 154 carried thereby coact with tails of latching levers 149 and 150 respectively, to disengage them from their related levers 145 and 147. Attached to an arm secured to shaft 146 is a link 155 biased by a spring 156 to rock lever 145 to close contacts 140 when the lever 145 is released. Similarly, attached to an arm secured to shaft 148 is a link 157 biased by a spring 158 provided for the purpose of closing contacts 141 associated therewith in a similar manner. It will be obvious therefore, that positioning of the first plate to the "A" or reading position will close contacts 140 and 141 to permit operation of the tabulator.

It will be clear that when the operator starts the tabulator the listing of items represented by the record cards will then ensue, item printing, of course, being performed at the printing line determined by platen 19, and the record strip being spaced an increment each listing operation. Upon a change in group classification of controlling record cards the machine will be conditioned for a total printing operation, which will then ensue. If the group classification of both record cards and the analyzed printing plate in the "A" position agree in all orders, relay magnet 110 will be energized, resulting in feeding the second lowest plate from the stack to the "A" position. The plate previously analyzed which was in the "A" position will then occupy the intermediate or "B" position, physically contacting lever 142 to retain contacts 140 closed.

After the co-operation of lever 142 with the first plate fed, a pin 160 carried by disk 131

will engage one arm of a bell crank lever 161 connected to link 155 restoring lever 145 to ineffective latched position.

It will be observed that no plate has yet reached lever 144 in the "C" position so that it is ineffective to close contacts 141. Secured to shaft 41 is a pinion 162 driving a gear 163 with a two to one ratio, gear 163 carrying a pin 164 adapted to contact, by reason of the gear ratio selected, during only the second total printing cycle one arm of a bell crank 165 secured to link 157. Therefore, it will be apparent that since pin 164 does not operate arm 165 during the first printing cycle, the lever 147 will not be latched and thus be effective to keep contacts 141 closed, permitting the machine to operate for a second series of tabulating operations. The proper starting position of pin 164 may be controlled effecting idle total printing cycles by depression of a special total and reset key more fully described in the Lake Patents 1,379,268 and 1,600,413.

The machine is preferably equipped with a paper feeding mechanism that will feed the record strip a definite amount for each account printing operation thus permitting pre-printed work forms to be used and resulting in printing of the identifying data 25 at certain lines on each work sheet. It should also be explained that if the number of items listed does not come up to the predetermined number that may be accommodated on each work sheet the paper strip is supplementally fed after the last item printed to provide for printing the total at a predetermined line, which is generally at the bottom of a sheet. A type of paper feeding mechanism that will provide for the above is shown fully in the copending application of F. M. Carroll, Serial No. 287,549, filed June 22, 1928, to which reference may be had for further details of construction and operation.

It will be observed that printing of items and totals takes place at a line distant from the printing line of the identifying matter, requiring several accounts be printed before any account is identified by printing from its related printing plate. While an account is printed, the related plate is in analyzing position. When the subsequent or second account is printed, the plate related to the preceding account occupies an intermediate position, the first printed account on the record strip 20 then occupying an intermediate position with respect to the printing lines determined by platen 19 and inked pad 88. When the third account is printed the record strip will be advanced sufficiently to permit printing by the related plate which has now been fed to the grippers 58 and which is brought to the printing line during the third printing cycle.

It will be recalled that while pin 164 is ineffective to cause the restoration of lever 147

to latched position to permit contacts 141 to open at the termination of first total printing cycle, it is effective during the subsequent, or second total printing cycle. At this time, however, a plate is in cooperation with the card lever 144 causing contacts 141 to be retained in closed position, and, in fact card levers 142 and 144 will keep contacts 140 and 141 closed as long as proper printing plates are fed. In the event that a wrong printing plate is fed operation is discontinued directly thereafter. The manner in which this is performed is as follows:

In the event that group classification perforations of the printing plate and record cards do not agree clutch magnet 110 will not be energized and therefore, no plate feeding operation will take place. The machine will, however, be conditioned for a total taking operation thus driving shaft 41.

Pin 160, will therefore relatch arm 145 if it is not already in such position where it is ineffective to keep contacts 140 closed, and since it is assumed in this case the first plate is manually fed, it will remain in the "A" or analyzing position, and card lever 142 will not be engaged by a plate to close contacts 140. At the termination of the total taking cycle, operation of the machine as far as tabulation is concerned, will be discontinued until the proper plate is placed in position and tabulating in connection with the group of previously tabulated record cards and proper plate again resumed.

Up to this point there has been described the automatically operated devices which effect the listing upon a part of the strip a series of items representing accounts designated by a series of perforated records the total thereof, and in addition, the printing of the account name during a total taking operation contingent upon an agreement between the classification of the printing plate and the classification data of the tabulating cards. In addition to the above the illustrative embodiment also includes an arrangement for printing a common heading on the printed strip after it has received the imprint of the items, total and account name. Preferably, the printed part is severed from the strip thus making a complete bill ready for distribution.

To this end the strip 20 (Figs. 2 and 8) after it emerges from between the rollers 24b passes over rollers 175, 176 and between feeding rollers 177 which are driven to frictionally take up the strip 20 a sufficient amount during each machine operation to cause it to be taut between the pair of rollers 177 and roller 176.

Referring to Fig. 8, carried by a pair of arms 178 secured to a shaft 179 is an electro plate 180 carrying raised characters for printing the upper four lines (with the ex-

ception of the account name, John Smith) upon the bill shown in Fig. 5.

The electro is adapted to be shifted against the strip 20 but previous to this the printing elements are inked by a roller 181. This roller is drawn downwardly by springs 182 to contact the electro and in the preferred embodiment the roller is carried by a frame 183 secured to a rock shaft 184.

The inking plate 185a, by which the roller 181 is inked, is supported by a pivot rod 185 freely rotatable in the frame 186 so as to be capable of being intermittently turned to effect efficient inking operations.

At the initial operation of the machine during a total taking operation, which as previously stated, is initiated upon an agreement of the perforations in the identifying printing plate and the record cards tabulated, the inking roller 181 is first removed out of contact with the electro plate 180. In the present cases, this is effected by a cam which is secured to the sleeve 130 which as previously stated is turned during each total taking operation. Secured to the shaft 184 is an arm 187 which is connected to an arm 188 through a link 189. The arm 188 is secured to a rock shaft 190 which has depending therefrom an arm 191 carrying a roller coacting with a cam race 192 of a box cam secured to the sleeve 130. During an initial rotation of the cam in the arrow direction (Fig. 2), link 189 will be shifted upwardly thereby shifting the frame 183 to the right and forcing the inking roller 181 over the electro plate 180 to re-ink the latter. After the roller 181 passes out of cooperation with the electro plate 180, it is then rolled over the surface of the inking plate 184a so that its periphery picks up the ink supply on the plate.

As premised hereinbefore the frame 178 which carries the electro plate 180 is secured to a shaft 179 and secured to the latter is an arm 193 which is articulated to a link 194 which, at its upper extremity is connected to an arm 195 loosely mounted upon the rock shaft 190. Connected to the electro plate carrying frame 178 is a spring 196 normally tensioned so as to cause, through the connecting link 194 just described, the constant engagement of a roller 197 secured to arm 195 with the periphery of a cam disk 198 which is also secured to the sleeve 130. The formation of the cam disk 198 is such that after the roller 181 is out of contact with the electro plate 180, it will cause the arm 195 to be elevated, drawing link 194 upwardly and thereby shifting the electro plate 180 to the left in immediate contact with the strip 20, the lower part of which was previously imprinted with the account name, item and total.

When the electro plate 180 is in contact with strip 20, a roller 199 is rolled over the strip forcing the latter against the raised

type of the electro plate and effecting the desired printing impression. Previous to such operation, it is desirable that the electro plate 180 be locked in its shifted position so as to rigidly hold it and preventing its being shifted when the roller 199 is passing over the strip 201 to effect the printing impression. To this end there is secured to a rock shaft 200 a pair of hook shaped locking arms 201 which are lowered to engage a suitable portion of the frame 178 to hold it at its upper end. One of the hook-shaped arms 201 has an upward extension by which it is articulated to a link 202 pivoted at its upward extremity to one arm of a bell crank 203 loosely mounted upon the rock shaft 190. The bell crank 203 carries a roller 204 which is in constant engagement with a supplementary profile cam 205 secured to the sleeve 130.

The continuous engagement of roller 204 with the profile of cam 205 is effected by means of a spring 206 interconnected with a fixed part of a frame and one of the hook shaped members 201. The formation of the cam 205 is such that it permits the hooked arms 201 to be lowered against the action of spring 206 to thereby hold the electro carrying frame 178.

Subsequent to such operation the printing roller 199 is rolled over the strip as previously stated. In the preferred embodiment the roller 199 is carried by a pair of arms 207 which are dependently carried by a pair of arms 208 each loosely mounted upon the rock shaft 190, one of said arms 208 having a depending integral arm 209 carrying a roller 210 in engagement with the race 211 of a box cam secured to sleeve 130. The race of the box cam is so designed that it will cause arms 208 to be positively shifted downwardly causing roller 199 in its rolling action to force the strip 20 against the inked electro plate effecting the desired depression therefrom.

Prior to the restoration of electro plate 180 to its normal position, and after the printing impression has been effected, the hook-shaped arms 201 are elevated under action of the associated cam 205.

After the printing impression has been effected the electro plate 180 is shifted to its normal position. (Shown in Fig. 8.) This is done, of course, after the roller 199 has been lifted upwardly to its normal position. During the last part of the machine operation the cam which caused the inking roller 181 to be shifted out of cooperation with the electro plate 180 now causes the frame 183 to be restored to the left rolling the inking roller over the inking plate 185 and again in contact with the electro plate 180 re-inking the same for a subsequent printing impression.

To intermittently turn the inking plate 185 an incident to each printing operation there

is secured to the rock shaft 184 an arm 212 which carries a pawl 213 spring urged into engagement with the serrated teeth 214 formed at the underside of a plate 215 secured to the pivot rod 185. As this arrangement is well known in the printing art no further description of its operation or details of construction are given herein.

It is also desirable that when all the printing operations have been completed that the printed portion of the strip be severed from the remaining part in order to make a separate bill. In the present instance, severing is accomplished after the paper feeding operation by rollers 177 by the coaction of a stationary knife blade 216 with a movable knife blade 217 which is mounted and guided as to pass beneath the stationary blade 216 to sever strip at the desired line of demarcation. The blade 217 may be guided for a linear restoring movement in any suitable manner against the action of a return spring 218. Secured to the rock shaft 179 is an arm 219 which is connected by a link 220 to an arm 221. The arm 221 is secured to a shaft 222 which has also secured to it an operating extension 223 adapted to fit within a slot and engage a wall 224 of the guide plate 225 which carries the movable knife blade 217. When the operating arm 223 abuts the wall 224 which is effected by the shaft 179, the movable knife 217 will pass beneath the fixed knife 216 to thereby sever the part of the strip which has been printed.

It is pointed out that the various operations of the machines are performed during successive machine operations, that is, the items are first listed upon the bill and the total thereafter printed if the account name on the identifying plate is in harmonious agreement with the cards tabulated.

Contingent upon such agreement the account name is printed upon the bill during the total printing operation. Thereafter by several machine operations the strip is fed so that it receives the common heading and by a subsequent machine operation is severed by the severing devices just described. However, the aggregate of the machine operations performed on the strip of paper will result in a completely printed bill ready for distribution in accordance with the system adopted.

While there has been shown and described and pointed out the fundamental novel features of the invention as applied to a single modification, it will be understood that various omissions and substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled in the art without departing from the spirit of the invention. It is the intention therefore to be limited only as indicated by the scope of the following claims.

What is claimed is as follows:—

1. In a machine of the class described, a single set of printing devices for listing groups of items and the totals thereof upon a strip, a hinged electro plate adapted to be swung before printing therefrom to printing position adjacent the printed strip, a roller, and an operating mechanism automatically effective after printing each group of items for printing a related total by said printing devices and reciprocating said roller over the electro to impress separate sections of the strip against said electro.

2. A record controlled machine comprising a single set of differentially movable printing bars for listing items and a total thereof upon a strip, an electro shiftable adjacent said strip, a total taking operating mechanism automatically effective after printing each group of items for shifting said electro and setting said printing bars, means for locking the electro stationary in shifted position, and a roller automatically reciprocable by said operating mechanism during a total printing impression for impressing a section of said strip against the stationary electro.

3. In a machine of the class described, the combination with a single set of type bars, of means whereby said type bars are differentially movable under control of perforated records to print a series of items upon a section of a paper strip, an electro hinged in the machine, means automatically effective upon the completion of the printing of each group of items for automatically swinging said electro to a position adjacent said strip, a roller, and devices whereby said roller is reciprocated by said means over part of the strip covering the electro to print the same data on each section of the strip.

4. In an accounting machine having a set of printing devices for listing items upon a strip, a single electro from which successive but same impressions are effected on the strip, means automatically operative upon printing each group of items for shifting said electro from a normal to a printing position adjacent said strip, and then back to normal, means operated by the automatic means whereby the electro effects the same imprint on successive sections of the strip, and means for severing the part of the strip imprinted by said type bars and electro.

5. In an accounting machine, a single set of printing devices for printing upon a strip separate groups of items and a total of each group, an electro, automatically operable means effective between printing of each group of items for first moving said electro to a stationary position and then back to a normal position, and a roller reciprocable over said electro while stationary to effect the printing of the same data upon each section of the strip.

6. In an accounting machine, means for printing items and totals, automatically operated means for taking a total, a single electro for printing invariable data intermittently shifted by said means, means for locking the electro in shifted position, a strip severing means, a roller, means whereby the automatically operated means causes said roller to roll said strip against said electro and operates the severing means.

7. In an accounting machine, a single set of printing devices for printing groups of items and a total of each group upon a strip, a single electro plate, means operable automatically upon printing a group of items for effecting a printing relation between said electro and said strip by bodily moving said plate, devices whereby successive sections of the strip receives an impression from said electro while in moved position, and means for severing the section of the sheet imprinted with a group of items, related total, and the data printed by said electro.

8. In an accounting machine in which an account comprising a series of items and a related total is printed upon a sheet, a plurality of account identifying printing members, one being presented for each complete account printing operation, means for rejecting an account identifying member to prevent a printing operation therefrom on said sheet unless it is correlated with the account printed, a printing plate for printing fixed data for each account, and means operable, if the member is correlated with the account printed, to effect a printing impression from the printing plate and the account identifying member on said sheet.

9. In an accounting machine in which items and totals are printed upon a strip, a movable printing plate for effecting impressions at successive points on said sheet, means effective upon selected operations of the machine for initially moving said plate to coact said strip, locking members shiftable to hold the printing plate in shifted position, a roller, a reciprocable frame carrying said roller for causing a printing coaction between the strip and plate, means comprising a roller for re-inking the plate, and means for shifting said inking roller to re-ink the printing plate when the latter is away from its printing position.

10. In an accounting machine, means whereby items and a total representing an account are printed upon a section of a strip by distinct machine operations, a plurality of separately presented identifying account impression members by which accounts are identified, means for effecting impressions from said members upon sections of said strip, a printing plate for printing fixed data upon each section of said sheet, means for effecting impressions from said plate upon the sheet, and means for calling both of said impres-

sion effecting means into operation during selected machine operations.

11. In an accounting machine, means whereby distinct machine operations are effected to cause either listing items upon a sheet or a total thereof, a printing plate, means for effecting printing impressions from said plate upon successive portions of the sheet, means for shifting said plate prior to a printing operation, and automatic means for calling said impression effecting and plate shifting means into operation during selected machine operations.

12. In a machine of the character described, a series of printing plates having classification designations, means for bringing them successively into their printing position, an item and total printing mechanism for printing a series of items and a total, means for feeding groups of classified records to control the setting of the printing mechanism, a supplemental printer having an electro for printing the same designation on each section of a strip printed with a group of items and a related total, and means for comparing the classification of a record in a group with the classification of a printing plate to determine the operation of said printer.

13. In a record controlled machine, printing devices for listing items and a total thereof upon a strip, an electro intermittently movable to a printing position adjacent the strip for each section of the sheet, means whereby perforated cards determine the printing of items and a related total, means whereby separately presented printing plates having classification designations determine the printing of additional data on said strip, and mechanism whereby the listing of items and printing from said electro plate is dependent upon the result of comparison of classification designations of controlling records and a printing plate.

14. In a machine of the class described, means for listing groups of items on a strip, a total taking mechanism automatically instituted for printing a total each time the classification of items changes, a series of identification printing plates, a printer invariably operated for printing the same data upon successive sections of the strip, means controlled by the total taking mechanism for causing the operation of the printer, and means for stopping the operation of the machine to prevent a subsequent listing of items and operation of the printer when the printing plates are determined to be located in the improper sequence with respect to listing of groups of items.

15. In a machine of the class described the combination of a series of identification impression plates having classification designations, means for feeding them to printing

position, a single set of type for listing groups of items and related totals, a printer including an electro which is invariably operated to print the same data on successive sections of a strip, a single analyzing means for analyzing designations of groups of records for controlling the listing of items and comparison of the designations of the records with the designations of an impression plate, and means whereby the result of the comparison determines the operation of the feeding means and the printer.

16. In a machine of the class described, a printer including an electro for printing the same data upon successive sections of a strip, a printing mechanism including a single set of printing elements for printing groups of items and related totals, a printer including separate and individually presented changeable identification impression members a different one being employed for each total printing impression, and means for

operating both of said printers and said printing mechanism.

17. In a machine of the class described, an item and total printer for printing groups of items and related totals upon a strip, means for successively feeding a series of impression plates each to identify a related series of items, a printer including an electro for printing invariable data on successive sections of the strip, means for causing said plates to identify only related items, means for detaching each section of said strip imprinted with a series of items, a total, the invariable and identification data, and means for stopping the operation of the feeding means when said plates are found to be in improper order with respect to the groups of items.

In testimony whereof we hereto affix our signatures.

JAMES STANLEY OGSBURY
FRED M. CARROLL.

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30	95
35	100
40	105
45	110
50	115
55	120
60	125
65	130