

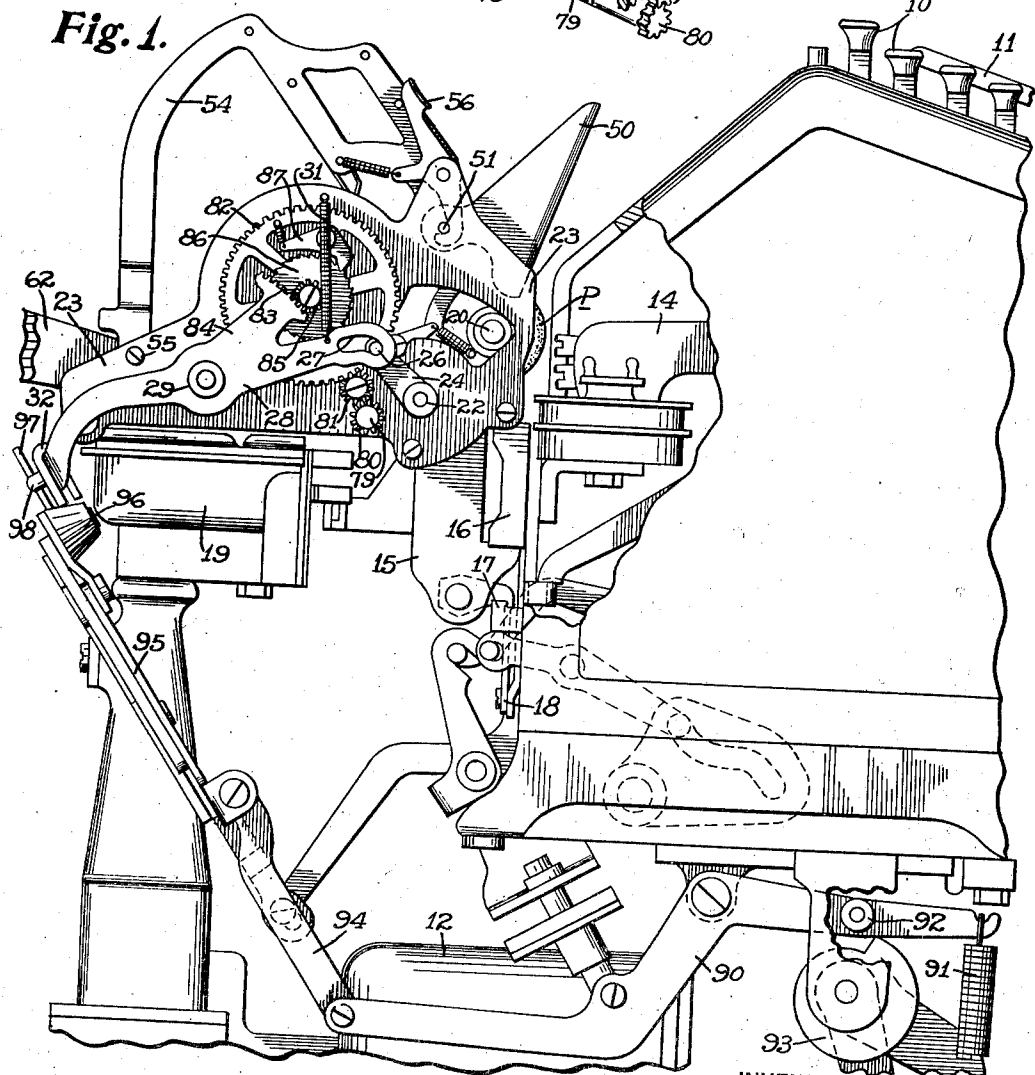
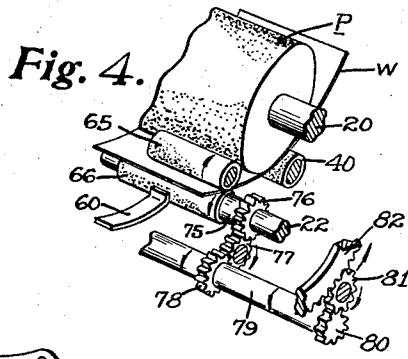
Dec. 6, 1938.

R. L. MULLER
CALCULATING MACHINE

2,139,168

Filed June 1, 1937

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 2.

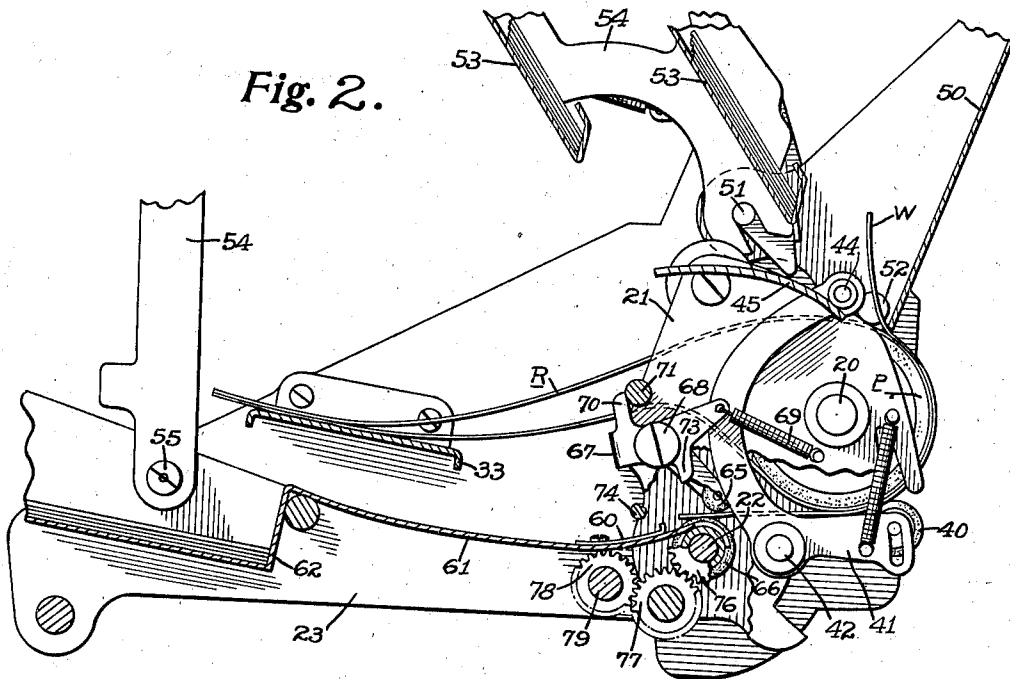
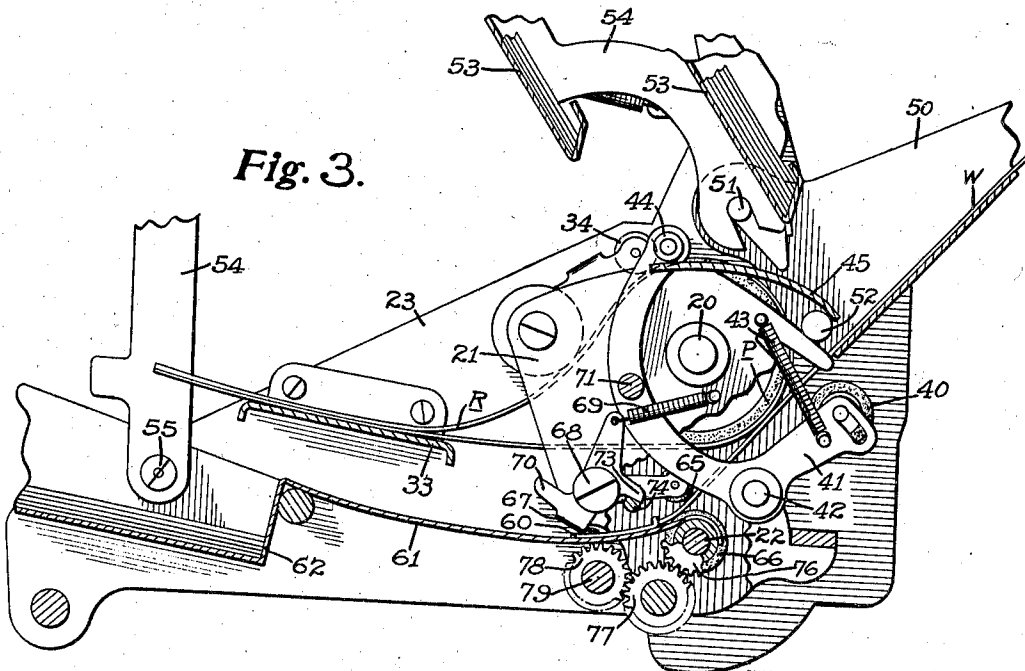


Fig. 3.



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2,139,168

CALCULATING MACHINE

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Application June 1, 1937, Serial No. 145,719

25 Claims. (Cl. 197—128)

This invention relates to an accounting machine and more particularly to the paper handling equipment of such a machine.

In certain classes of accounting work, it is desirable to have a running record in the nature of a journal sheet which contains all the entries that are made on separate sheets such as ledger sheets. Machines generally known as front-feed machines are used for this work in which a record sheet remains in the machine while the individual work sheets are inserted and removed in front of the platen and record sheet. The present invention is particularly applicable to this type of machine and it concerns an improvement for speeding of the work by providing for automatic removal of the work sheet while the record sheet remains in the machine. This relieves the operator of most operations other than making entries on the amount keys.

The general object of the invention is to provide an improved paper handling equipment for accounting machines.

Another object is to provide an improved front-feed means for a machine of this type.

A more specific object is to provide an improved sheet-ejecting means for ejecting sheets in a front feed type of machine.

Other and more particular objects are to provide a fully automatic mechanism of this character that is constructed so that it is not only simple but also easy to operate, easily accessible and foolproof against misoperation.

Other objects and advantages of the invention will appear in the following specification and drawings which illustrate one embodiment of the invention in which

Figure 1 is a left side elevation of a portion of a machine having the present invention applied thereto, the parts being shown in printing position;

Fig. 2 is a partial sectional view taken through the left side just inside of the paper carriage side plates and illustrating the parts in printing or closed throat position;

Fig. 3 is a similar view with the parts in front-feed or open-throat position, in which position the paper or record sheets are inserted in the machine; and

Fig. 4 is a fragmentary perspective of the platen, feed and ejecting rolls illustrating the latter in their respective positions as a work sheet is being ejected.

The invention is shown applied to a Burroughs bookkeeping or accounting machine of a type that is well known, and shown in the Burroughs

British Patent No. 382,613 so that a detailed description of it is not necessary. It will be understood that the invention can also be applied to other types of machines and that the disclosure herein is by way of illustration.

General machine features

Referring to Figure 1, the machine has a plurality of amount keys 10, upon which items may be entered and by which the machine can be operated in conjunction with a motor bar 11, depression of which causes the motor 12 to give the machine a cycle of operation. This cycle, in the machine shown, includes a forward and return stroke. During its operating cycle the machine performs certain calculating functions such as addition, subtraction, totalizing, or other operations of which the Burroughs machines now on the market are capable and such as disclosed in the heretofore mentioned British patent and in many other patents upon said machines.

A printing mechanism is provided, of which a portion is shown at 14 (Fig. 1), said mechanism being normally operated near the end of a forward stroke of the machine and serving to print the amount of the item entered or of the calculations performed.

Provision is made for printing automatically in different columns on paper inserted in the machine and this is accomplished by having the paper carried by a platen P on the traveling paper carriage 15 movable laterally on a race-way 16. The carriage is urged to the left as viewed from the front and normally as the machine is cycled, the carriage moves automatically from column to column across the machine under the control of the tabulating mechanism, of which portions are shown at 17 and which is normally operated near the end of the machine cycle so that after the machine has performed its function the carriage moves to the next column to be ready for the succeeding operation. While the movement is normally from one column to the adjacent column, any number of columns can be skipped, as shown, for example, in the Rinsche Patent No. 1,580,534.

The platen P can be line-spaced after each printing operation by a line space mechanism, of which portions 18 are shown in Fig. 1. This mechanism can be adjusted to line-space the platen or it may be line-spaced at the end of a particular operation or in a particular position of the carriage.

The paper carriage can be automatically returned across the machine by power from the

motor 12 through a carriage return mechanism 19 disclosed in said Rinsche patent.

The paper carriage and its controls, particularly the tabulating mechanism, comprise a column printing control means that enables printing to occur in predetermined columns on the paper in the machine.

Platen mounting

The platen P is fixed to a shaft 20 journaled to rotate in two spaced side plates 21 (Figs. 2 and 3), which are fixed to a shaft 22 (Fig. 1) that is journaled in two spaced frame plates 23 of the traveling paper carriage. The platen is thus supported in a rockable frame on the paper carriage.

The platen is urged into printing position relative to the printing mechanism by gravity and by its springs, as will presently appear. It can be moved from printing to an out-of-printing or front-feed position, both manually and automatically. For this purpose a crank 24 (Fig. 1) is fixed to each end of the shaft 22. Each crank has a stud 26 on its end projecting into a cam slot 27 formed in its respective lever 28 fixed to a shaft 29 journaled in the frame plate 23 of the carriage. The front ends of the levers 28 are urged upwardly by springs 31 (Fig. 1) which tend to rock the crank in a direction to move the platen to printing position. The platen being forward of its pivot point about shaft 22 also tends to move to printing position by gravity. When the platen is in printing position, the shape of cam slots 27 in which studs 26 are positioned is such as to lock the platen in this position against any force applied to the platen itself, tending to move it away from printing position.

The platen can be moved from printing position by means of a manually operable lever such as shown in Muller Patent No. 2,110,399 and is also controlled automatically through levers 28 which are joined at their rear ends by a ball 32 (Fig. 1) that is operated automatically, as will presently be described. For further details of the platen mounting, reference is made to the Burroughs British Patent No. 382,613.

Record sheet

The record or journal sheet R (Figs. 2 and 3) is held around the platen P for a series of operations and is arranged so that it can be line-spaced with the platen. The record sheet is inserted under the platen from the rear over a flat guide 33 carried by the carriage side plates 23.

The record sheet is passed under and in front of the platen and turned rearwardly over the platen and passed under the pressure rolls 34 (Fig. 3) and is thus held in feeding relation about the platen so that it will be line-spaced as the platen is line-spaced. Also, as the platen is moved bodily from printing to front-feed position, the record sheet will move with it without having its line-spaced position disturbed. The record sheet is thus always in position to receive copies of the entries that are made on the work sheets which are inserted from time to time, the copies being made by means of carbon paper that is usually placed around the platen with the record sheet. For further details as to the supporting of the journal sheet, reference is made to the aforementioned Burroughs British patent.

Front-feed means

Provision is made for enabling individual work sheets W (Figs. 2 and 3) to be inserted from time to time in front of the platen. In order to re-

ceive these sheets, an opening is preferably provided which will be called the "front-feed throat," which is arranged to be moved from a closed to an open throat condition, and vice versa, as will presently appear.

In the embodiment illustrated, the platen comprises one member of the throat. Cooperating with the platen and adapted to engage it are a series of feed or pressure rolls 40 (Figs. 2 and 3) carried by and between a pair of arcuate arms 41 pivoted upon a rod 42 carried by the rocking platen frame. The arms are normally urged counterclockwise about their pivot by springs 43, which normally tend to urge the rolls into contact with the platen. The upper ends of arms 41 carry rollers 44 positioned to engage a curved cam blade 45, one of which is fixed to each of the side frames of the carriage, as the platen moves from printing to front-feed position. The blades are so positioned relatively to the rollers 44 that immediately upon movement of the platen toward front-feed position, the rollers 44 ride upon the cam blades 45 and rotate the arcuate arms 41 about their pivots to move the pressure rolls away from the platen into open throat position. The rolls are retained in this position by the blades until just immediately before the platen reaches printing position in its return movement when rolls are released to reengage the platen. The opening and closing of the front-feed throat to receive the work sheet is automatic, that is, when the platen is moved from printing position (shown in Fig. 2) to front-feed position (shown in Fig. 3), the throat is automatically opened and when the platen is returned to printing position (Fig. 2) the throat is automatically closed.

In order to guide the work sheet to front-feed position, a paper table or chute 50 is provided which is pivoted upon a rod 51 (Figs. 2 and 3) on the paper carriage. The table is provided at each side with a stud 52 which is engaged by the upper cam edges of the tilting platen frames 21 so that when the platen frame is moved, the chute will be swung about its pivot. When the platen is in its front-feed position (Fig. 3), the chute is in its sheet-receiving position where it acts to receive and guide an inserted work sheet to front-feed position. When the platen is moved to printing position (Fig. 2), the cam edges of the side plates 21 engage studs 52 and swing the chute to sheet-holding position. As this occurs, the bottom edge of the chute engages the inserted sheet above the printing line of the platen and tends to draw the sheet about the platen. The sheet is engaged below the printing line of the platen by the pressure rolls 40, and it is thus held in printing position on the front-feed side of the platen by being engaged and held both above and below the printing line. When the platen is moved to front-feed position, the upper edges of the platen frame side plates 21 release studs 52 on the paper chute and permit it to drop clockwise about its pivot 51 to its sheet-receiving position (Fig. 3).

For the further convenience of the operator there is provided a pair of magazines 53 for holding a supply of work sheets. These magazines are preferably formed of sheet metal and are supported between two end plates 54 pivoted at their rear ends to the carriage frame at 55 and detachably held at their forward ends to rod 51 by latches 56 (Fig. 1). These magazines are conveniently disposed above and adjacent the platen so that it is only necessary for the operator to pick a work sheet from either one of the mag-

azines as desired and drop it down in front of the platen over the chute 50 and into the throat as shown in Fig. 3. By unlatching the magazines they may be swung rearwardly about pivots 55 to permit insertion of a new journal sheet.

The work sheets are automatically arrested in proper position relative to the printing line of the platen and the printing mechanism when they are dropped in front of the platen by an adjustable stationary stop 60 as shown in Fig. 3, carried by a stationary plate or lower table 61 which lies beneath the platen, extends rearwardly to a receptacle 62 into which the work sheets are ejected, as will presently appear.

Work sheet ejecting means

Provision is made for automatically and positively ejecting the work sheets successively so that the operator does not need to bother with removing the sheets upon which operations have been performed.

The ejecting means comprises a series of upper ejecting rolls 65, a lower positively driven ejecting roll 66, and associated mechanisms. The two rolls are disposed just to the rear of and somewhat below the platen forward of the stop 60, and are adapted to receive the work sheets as they drop through the open throat formed by the platen P and rolls 40. The upper rolls are carried by arms projecting from a yoke 67 extending across the machine and being pivoted at 68 to the tilting platen frame and urged clockwise by a spring 69 about pivot 68. The yoke 67 together with the rolls 65 being carried by the tilting platen frame also moves about a radius with the shaft 22 as a center each time the platen is moved to and from printing position.

When the platen is at its lowermost or printing position (Fig. 2), an arm 70 of the yoke 67 engages a stud 71 as shown in Fig. 2 and rocks the yoke counterclockwise about its pivot 68 sufficiently to remove the upper rolls 65 from the lower roll 66 and thus open the throat between the rolls 65 and 66. In other words, when the platen is in printing position with the main front-feed throat closed the throat formed by the two ejecting rolls, which may be called a second throat, is open, permitting line feeding or spacing movement of the work sheet by the platen line spacing means. Immediately upon movement of the platen toward front-feed position, arm 70 moves away from stud 71 and the ejecting rolls close to grip the sheet. To put it another way, when the main front-feed throat is opened, the second throat is closed. The sheet is free of the means that holds it about the platen and the ejecting rolls then hold the work sheet and are in position to cause ejection thereof. This position is maintained until the platen with the yoke 67, turning about axis 22, approaches the end of its opening movement, at which time a lower projecting arm 73 of the yoke engages a stud 74 on the carriage as shown in Fig. 3 whereby the yoke is again rocked about its pivot 68 and the ejecting rolls are separated. At all other times the rolls 65 and 66 are maintained closed, i. e., in sheet-gripping position by spring 69.

The ejecting rolls thus serve to grip the front-fed sheet from a time immediately after the platen starts moving from printing position until just prior to the time said platen reaches its front-feed position. This gives the ejecting rolls an opportunity to eject the sheet as will be presently described. Conversely, when the platen is moved from front-feed to printing position, the

ejecting rolls grip the work sheet immediately after the platen starts to move and hold the work sheet until just prior to the time the platen reaches its front-feed position where the sheet is gripped by the devices that hold it in printing position. This gripping of the sheet by the ejecting rolls while the platen is moving to printing position eliminates any shifting or skewing of the papers due to contact with the platen as it is being lowered into printing position because in so moving it usually engages the sheets and tends to move them so that they might get out of alignment.

For the purpose of ejecting the work sheet, the lower roll 66 is positively driven. It is secured to the left end of a sleeve 75 journaled on shaft 22 (Fig. 4). Secured to the right end of sleeve 75 is a gear 76 which meshes with a second gear 77 which in turn meshes with a third gear 78 fixed to shaft 79. Shaft 79 extends through the left platen frame and carries a gear 80 (Fig. 4) upon its outer end. Gear 80 engages a gear 81 which in turn engages a large ring gear 82 (Figs. 1 and 4) which is preferably driven automatically by the mechanism that opens the front-feed throat. It will be recalled that the platen is thrown back and the front-feed throat opened by rocking the levers 28 clockwise about their pivots 29 whereby the cranks 24 are rocked counterclockwise. The levers 28 may be rocked by hand as described in Muller Patent No. 2,110,399, but they are preferably rocked by power through the action of a power means on the carriage bail 32. The arm 28 shown in Fig. 1 is provided with a sector 83 (Fig. 1) formed on the end of a projection 84, which sector meshes with the pinion 85 fixed to a ratchet 86. The ratchet is engaged by a pawl 87 carried by the large ring gear 82. The pawl and ratchet are so arranged that upon raising of bail 32, that is, upon clockwise movement thereof, rack 83 moves downwardly, thus rotating the pinion 85 in a counterclockwise direction so that the teeth of the ratchet engage the pawl and rotate the large ring gear 82 counterclockwise. This causes the lower ejector roll 66 to be rotated counterclockwise and eject the paper rearwardly. Upon lowering of the carriage ball or counterclockwise movement thereof pawl 87 passes over the ratchet teeth and the ejecting rolls are not driven.

From the foregoing it follows that during the throwback movement of the platen, that is, during the time that the platen is being moved to front-feed position, the ejecting rolls 65 and 66 are rotated to eject the work sheet. The speed of rotation of the ejecting rolls is such that the sheet is automatically ejected rearward from beneath the platen, beyond the plate and into the receptacle 62 before the rolls are again separated. The sector 83 is, of course, automatically restored to its Fig. 1 position, when the platen is returned to printing position. During the return, the ratchet pawl 87 slips over the teeth of wheel 86, and the ejecting rolls are not rotated. They act at that time to hold the new sheet in position until grasped by the devices that hold said sheet in printing position. After the sheet is so gripped, the ejecting rolls automatically open to permit the new sheet to be line-spaced during printing.

When the platen is in front-feed position and the work sheet W is inserted, the lower edge of the work sheet engages the stop member 60, but after the platen is moved toward printing position the lower edge of the work sheet is tilted above the stop 60 as shown in Fig. 2. As the

platen moves away from printing position, the ejecting rolls grip the work sheet and hold it in position to pass over the stop 60. These rolls start to rotate quickly, with the result that the sheet is moved over stops 60 before the front or upper end of the sheet is released to such an extent as to appreciably tend to cause its lower end to engage stop 60. This means that the stop does not have to be removed as it is not in the path of travel of the sheet as it is ejected by the rolls under the platen and rearwardly into the receptacle 62.

Automatic power-operated control

15 In the illustrated embodiment of this invention the work sheet is automatically ejected, without any attention on the part of the operator, by power of the motor, that is, the carriage bail 32 is automatically raised by power derived from 20 the operating motor and it is returned by springs. This mechanism is shown in the heretofore mentioned Burroughs British patent and, accordingly, will only be briefly described herein.

Referring to Fig. 1, a lever 90 is pivoted on 25 the frame of the machine and is urged clockwise by a relatively strong spring 91. The forward portion of the lever carries a stud 92 adapted to be engaged by a snail cam 93 that is given one revolution by the motor 12 each time the machine 30 is given a cycle of operation. The rear end of the lever is connected by a link 94 to a slide 95 that carries a roller 96 on its upper end adapted to engage the under side of the carriage bail 32. This bail is, as previously described, connected to the levers 28 that control the opening and closing of the front-feed throat and the position of the platen. The slide is normally latched in lowered position by a latch carrying a pass-by pawl 97 adapted to be engaged by the stud 98 on the bail. The latch may be tripped by the stud 98 upon either tabulating or return movement of the paper carriage depending upon the position of the pass-by pawl. The stud on the bail can, of course, be located in any desired column or in as many columns as desired, depending upon the location and the number of the studs. The latch for slide 95 can also be released by a key as described in said British patent. It can also be released by the stud on the carriage bail while the carriage remains stationary by locating said stud relative to the tab stop that arrests the carriage so that said stud trips out the latch when the bail is lowered.

Briefly, the power mechanism just described 55 operates as follows: With the parts in the position of Fig. 1, the stud 92 on lever 90 is above the low portion of the snail-back cam as shown, the slide is latched in its lower position, the bail is in its lower position, and the platen is in printing position. If the latch for slide 95 is tripped 60 immediately, as by a key, the slide is released, whereupon spring 91 rocks lever 90 clockwise and moves slide 95 upwardly. Ordinarily, however, the machine is first given a cycle of operation. 65 This causes snail cam 93 to rotate so that, even though the latch 97 were released, lever 90 could not rock immediately because the high part of the cam passes under roller 92. Near the end of the cycle, however, the low part of snail cam 70 93 comes under roller 92, and also during the latter part of the cycle, the carriage ordinarily tabulates. If the release of the latch 97 is by the tabulating movement of the carriage, the power mechanism is thus automatically released 75 and caused to operate near the end of the cycle.

This raises bail 32 upwardly and moves levers 28 clockwise as viewed in Fig. 1. This movement of the levers raises the platen and opens the front-feed throat and causes the ejecting means to rotate to automatically eject the sheet rearwardly and under the platen.

During the next cycle of operation of the machine, cam 93 is again rotated, whereupon it engages stud 92 to rock lever 90 counterclockwise. This draws the slide downwardly and releases the bail 32, whereupon the platen moves to printing position by gravity and under the urge of its spring.

Operation

Although the operation of the machine would be clear from the description already given, a brief summary will be given.

First a record sheet is inserted about the platen. In order to do this the magazines are unlatched and tilted rearwardly and the platen is moved away from printing position to front-feed position. This opens the main front-feed throat. During the final stage of movement of the platen, the second throat formed by the ejecting rolls is opened. The record sheet is then inserted under the platen from the rear, passed under the auxiliary pressure rolls, and adjusted to proper line space position in which position it is held by the auxiliary pressure rolls. The operator then takes a work sheet from one of the magazines and drops it into the front-feed throat, the sheet limiting against the stops, as shown in Fig. 3. He then makes the necessary entries on the amount keys and gives the machine a cycle of operation by depressing the motor bar. As the machine starts to operate, the slide 95 is pulled down and the platen is lowered automatically. The work sheet is grasped immediately by the automatic closing of the ejecting rolls or second front-feed throat which rolls 40 firmly hold the work sheet against shifting while the platen is being lowered to printing position. As the platen reaches printing position the work sheet is engaged both above and below the printing line of the platen—that is, the front-feed 45 throat is closed, and the second throat formed by the ejecting rolls is opened. After the entry has been printed on the sheets the carriage moves to the next columnar position. Assuming that several entries are to be made on the work sheet, 50 they are made on amount keys and the machine is given a cycle of operation after each entry. The ejecting means, however, is not operated until the levers 28 are rocked, either by hand, or automatically. Assume that the operation is 55 automatic and that a stud on the carriage bail engages the latch 97 to release the slide 95 when the carriage tabulates near the end of the cycle.

When the last entry has been made and during the latter portion of the cycle of machine operation for this entry the stud on the carriage bail releases the latch and permits the bail to rise. This causes the platen to be moved back; the front-feed throat to be opened; the ejecting rolls to grip the sheet; and, as the platen is moved 65 back, the driving sector rotates the associated pinions and causes rotation of the ejecting rolls which, in turn, eject the work sheets rearwardly under the platen and into the receptacle. All this happens while the platen is moving to front-feed position so that by the time the platen has moved to its full front-feed position the work sheet has been ejected and the ejecting rolls are again opened, thus permitting insertion of a second work sheet immediately. It will be un- 75

derstood the operation is wholly automatic and all the operator need do is place the successive work sheets in position.

It will be obvious that changes may be made in the details of construction without departing from the spirit and scope of this invention as defined in the appended claims.

I claim:

1. A machine of the class described having printing means for making type impressions, a platen, sheet-holding means for holding an individual work sheet about said platen while it receives printing impressions from said printing means, a sheet-ejecting means operable independently of said platen and sheet-holding means for positively ejecting said work sheet beneath and rearwardly of said platen, said sheet being free of said ejecting means while it is held about said platen in printing position, and means operable to condition said sheet-holding means to free said sheet for movement relative to said platen and to cause said ejecting means to operate automatically to eject said sheet clear of said platen beneath and to the rear thereof.

2. A machine of the class described having printing means for making type impressions, a platen, sheet-holding means for holding an individual work sheet about said platen while it receives type impressions, a sheet-ejecting means including a set of ejecting rolls separate from and below said platen between which said work sheet passes when fed into said machine, means for causing said sheet-holding means to hold a sheet about said platen for a printing operation, and means operable to move said ejecting rolls to cause said rolls to grasp said sheet, to condition said sheet-holding means to release said sheet for movement relative to said platen and to cause said ejecting rolls to eject said sheet beneath and to the rear of said platen.

3. A machine of the class described having a printing means, a rotatable platen movable bodily from a printing position relative to said printing means to an out-of-printing position and vice versa, means for moving said platen from one position to the other, sheet-holding means for holding an individual work sheet in printing position relative to said platen while it receives printing impressions from said printing means, a sheet-ejecting means disposed beneath said platen separate from said platen and operable independently of said sheet-holding means for positively ejecting said work sheets, and means operating automatically as said platen is moved from printing to out-of-printing position to cause said ejecting means positively to eject said work sheets to the rear and beneath said platen.

4. A machine of the class described having a printing means, a rotatable platen movable bodily from printing position relative to said printing means to an out-of-printing position and vice versa, means for moving said platen from one position to the other, sheet-holding means for holding a work sheet in printing position relative to said platen and movable to non-holding position immediately upon movement of said platen from printing position toward out-of-printing position, a set of ejecting rolls positioned below said platen and normally held separated, power means tending to rotate said rolls and operating automatically as said platen is moved from printing toward out-of-printing position immediately to move said ejecting rolls together and to rotate said rolls to eject said sheets to

the rear and beneath said platen, and means operable as said platen is returned to printing position to separate said ejecting rolls.

5. A machine of the class described having means for giving it cycles of operation, a printing mechanism operable automatically at a predetermined point in the machine cycle, a rotatable platen, sheet-holding means for holding an individual work sheet on said platen while it receives printing impressions from said printing mechanism, a sheet-ejecting means disposed beneath said platen separate from said platen and operable independently of said platen and of said sheet-holding means in an ejecting operation, and power means operating automatically during a cycle of machine operation and after said printing mechanism has operated to condition the sheet-holding means to cause it to release said work sheet for movement relative to said platen and to cause said ejecting means positively and automatically to eject said sheet beneath said platen and horizontally to the rear and clear of said platen.

6. A machine of the class described having a printing means, a traveling paper carriage provided with a platen, sheet-holding means for holding a work sheet in printing relation to said platen to receive printing impressions, a sheet-ejecting means disposed beneath said platen, and power-operated means controlled by said paper carriage operating automatically to condition said sheet-holding means to free said work sheet for movement relative to said platen and to cause said ejecting means automatically and positively to eject said sheet beneath and to the rear of said platen in a predetermined position of said carriage.

7. A front-feed machine of the class described having a printing means, a rotatable platen, means for holding a record sheet about said platen, front-feed means for enabling a work sheet to be front fed relative to said platen and for holding said sheet in front-fed position, said front-feed means including portions forming a front-feed throat movable from a closed to an open-throat condition and vice versa, a work sheet ejecting means disposed beneath said platen, and means operable to open said front-feed throat and cause said ejecting means automatically and positively to eject said work sheet beneath and to the rear of said platen while leaving said record sheet about said platen.

8. A front-feed machine of the class described having a printing means, a platen, means for holding a record sheet about said platen, a guide for guiding a work sheet into front-fed position relative to said platen, sheet engaging devices for engaging an inserted sheet above and below the printing line of said platen to hold said sheet in position about said platen for a printing operation of said printing means, work sheet ejecting means disposed beneath said platen, and means operable to cause a relative movement between said platen and sheet engaging devices to free the work sheet and to cause said ejecting means automatically and positively to eject said work sheet beneath and to the rear of said platen while leaving said work sheet about said platen.

9. A front-feed machine of the class described having a printing means, a rotatable platen, means for holding a record sheet about said platen, front-feed means for enabling a work sheet to be front-fed relative to said platen and for holding said sheet in front-fed position, said

front-feed means including portions forming a front-feed throat movable from a closed to an open-throat condition and vice versa, a work sheet ejecting means disposed beneath said platen, and means operable to open said front-feed throat and to cause said ejecting means automatically and positively to eject said work sheet beneath said platen and substantially horizontally to the rear into a receptacle whereby the sheets ejected by the machine will be in the same order as their order of insertion in the machine.

10. A front-feed machine of the class described having printing means, a platen, a guide for guiding a work sheet into front-fed position relative to said platen, sheet-engaging means for engaging a front-fed work sheet above and below the printing line of said platen to hold said sheet in position for a printing operation of said printing means, means for causing a relative movement between said sheet-engaging means and said platen to free said sheet, work sheet ejecting means operating automatically to eject the sheet when it is released, and means for causing a relative movement between said platen and sheet engaging means to grip said sheet for a printing operation, said ejecting means operating, as said relative movement is caused between said platen and sheet-engaging means for the purpose of gripping the sheet, to grip said sheet and hold it until it is held by said engaging means and to then release it.

11. A front-feed machine of the class described having a printing means, a platen, means for holding a record sheet about said platen, front-feed means for enabling a work sheet to be front-fed relative to said platen and for holding said sheet in front-fed position, said front-feed means including portions forming a front-feed throat movable from a closed to an open-throat condition and vice versa, means for opening said throat, work sheet ejecting means operating automatically to eject a work sheet when said throat is opened, and means for causing said throat to close, said ejecting means operating automatically, as movement of said front-feed means starts for closing said throat, to grip an inserted work sheet and hold it until said throat is closed and to subsequently release it.

12. A front-feed machine of the class described having a printing means, a rotatable platen movable bodily from a printing position relative to said printing means to a front-feed position and vice versa, means for holding a record sheet about said platen, front-feed means for enabling a work sheet to be front-fed relative to said platen and for holding said sheet in front-fed position, said front-feed means including portions forming a front-feed throat movable from a closed to an open-throat condition and vice versa, means for moving said platen from printing position to front-feed position and for opening said throat, ejecting means operating automatically to eject the work sheet as said throat is opened, and means for causing said platen to be returned to printing position and said throat to be closed, said ejecting means operating automatically as said platen is moved toward printing position to grip a newly inserted work sheet and hold it while said platen is moving to printing position until said front-feed throat is closed, said ejecting means subsequently releasing said sheet to permit it to be line spaced.

13. A front-feed machine of the class described having a printing means, a rotatable platen,

means for holding a record sheet about said platen, a front-feed means for enabling a work sheet to be front fed relative to said platen and for holding said work sheet in front-fed position, said front-feed means including portions forming a front-feed throat movable from a closed to an open-throat position and vice versa, work sheet ejecting means having a second front-feed throat disposed beneath said platen into which said work sheet moves when it is inserted to front-fed position, means operable to open said first-mentioned front-feed throat and simultaneously close said second front-feed throat and to cause said ejecting means automatically to eject said work sheet clear of said platen while leaving said record sheet about said platen, and means for thereafter opening said second front-feed throat while said first front-feed throat remains open whereby a new sheet may be front-fed into both of said throats.

14. A front-feed machine of the class described having a printing means, a platen, means for holding a record sheet about said platen, front-feed means for enabling a work sheet to be front fed relative to said platen and for holding said work sheet in front-fed position, said front-feed means including portions forming a front-feed throat movable from a closed to an open-throat condition and vice versa, work sheet ejecting rolls positioned beneath said platen and constituting a second front-feed throat, operating means for closing said front-feed throat and opening said ejecting rolls to permit line spacing of said work sheet, said operating means being also operable to open said front-feed throat and to close said ejecting rolls upon said sheet and to cause said rolls automatically to grip and eject said sheet beneath and to the rear of said platen while said record sheet remains about said platen.

15. A front-feed machine of the class described having a printing means, a rotatable platen movable bodily from a printing position relative to said printing means to a front-feed position and vice versa, means for holding a record sheet about said platen, front-feed means for enabling a work sheet to be front fed relative to said platen and for holding said sheet in front-fed position, said front-feed means including portions forming a front-feed throat movable from a closed to an open-throat condition and vice versa, means for moving said platen from printing position to front-feed position, ejecting means for ejecting said work sheets clear of said platen, and means operating automatically and as said platen is moved from printing toward front-feed position to open said front-feed throat and to condition said ejecting means automatically to eject said work sheet beneath and to the rear of said platen while said record sheet remains about said platen.

16. A front-feed machine of the class described having a printing means, a rotatable platen movable bodily from a printing position relative to said printing means to a front-feed position and vice versa, means for holding a record sheet about said platen, front-feed means for enabling a work sheet to be front fed relative to said platen and for holding said sheet in front-fed position, said front-feed means including portions forming a front-feed throat movable from a closed to an open-throat condition and vice versa, means for moving said platen from printing position relative to said printing means to a front-feed position, ejecting means for ejecting said work sheet clear of said platen, and means oper-

ating automatically as said platen is moved from printing toward front-feed position to open said front-feed throat and to cause said ejecting means automatically to grip and eject said work sheet beneath and to the rear of said platen while said record sheet remains about said platen, and to thereafter condition said ejecting means to receive another work sheet while said front-feed throat remains open.

17. A front-feed machine of the class described having a printing means, a rotatable platen movable bodily from a printing position relative to said printing mechanism to a front-feed position and vice versa, means for holding a record sheet about said platen, front-feed means for enabling a work sheet to be front fed relative to said platen and for holding said sheet in front-fed position, said front-feed means including portions forming a throat movable from a closed to an open-throat condition and vice versa, a work sheet ejecting means below said platen, said ejecting means being movable to receive a work sheet and also being movable bodily with said platen to facilitate insertion of a record sheet about said platen and into said ejecting means, means for closing said ejecting means when said platen is moved to front-feed position from printing position or vice versa, and means for opening said ejecting means upon said platen reaching either final front-feed position or final printing position.

18. A front-feed machine of the class described having means for giving it cycles of operation, a printing mechanism operated at a predetermined time during a cycle of machine operation, a platen, means for holding a record sheet about said platen, front-feed means for enabling a work sheet to be front fed relative to said platen and for holding said work sheet in front-feed position, said front-feed means including portions movable from a closed to an open-throat condition and vice versa, work sheet ejecting means disposed beneath said platen, and power means operating automatically during a cycle of operation of said machine and after said printing mechanism has operated to open said front-feed throat and cause said ejecting means automatically and positively to eject said sheet beneath and to the rear of said platen while said record sheet remains about said platen.

19. A front-feed machine of the class described having a printing means, a platen, means for holding a record sheet about said platen, front-feed means for holding a work sheet to be front fed relative to said platen and for holding said sheet in front-fed position, said front-feed means including portions movable from a closed to an open-throat condition and vice versa, a work sheet ejecting means beneath said platen, printing control means for causing printing to occur in predetermined columns of said work sheet, and power means controlled automatically in accordance with columnar printing to open said front-feed throat and cause said ejecting means automatically and positively to eject said work sheet beneath and to the rear of said platen after printing occurs in a predetermined column and while said record sheet remains in position about said platen.

20. A front-feed machine of the class described having a printing means, a traveling paper carriage provided with a platen, means for holding a record sheet about said platen, front-feed means for enabling a work sheet to be front fed relative to said platen and for holding said sheet

in front-fed position, said front-feed means including portions forming a throat movable from a closed to an open-throat condition and vice versa, a work sheet ejecting means below said platen, and power means controlled by said paper carriage acting automatically to open said front-feed throat and cause said ejecting means automatically and positively to eject said work sheet beneath and to the rear of said platen while said record sheet remains about said platen.

21. A front-feed machine of the class described, having a printing means, a traveling paper carriage provided with a platen, means for moving said platen from printing position relative to said printing means to a front-feed position and vice versa, means for holding a record sheet about said platen, front-feed means for enabling a work sheet to be front fed relative to said platen and for holding said sheet in front-fed position, said front-feed means including portions movable from a closed to an open throat condition and vice versa, a work sheet ejecting means beneath said platen, and power means controlled automatically in accordance with the position of said paper carriage for causing said platen to be moved from printing to front-feed position to cause said front-feed throat to be opened upon movement of said platen from printing position and to cause said ejecting means automatically and positively to eject said work sheet beneath and to the rear of said platen while said record sheet remains about said platen.

22. A front-feed machine of the class described having a printing means, a platen, means for holding a record sheet about said platen, front-feed means for enabling a work sheet to be front fed relative to said platen and for holding said sheet in front-fed position, said front-feed means having portions forming a throat movable from a closed to an open-throat condition and vice versa, means for opening and closing said throat, an ejecting means operable to eject a work sheet as said throat is opened, stops for arresting a new sheet in proper line spaced position when a new sheet is inserted in said open throat, said front-feed means and platen being constructed and arranged so that, when said throat is closed, the end of said work sheet adjacent said stops will be moved so that said sheet will clear said stops when said ejecting means operates.

23. A front-feed machine of the class described having a printing means, a rotatable platen movable bodily from a printing position relative to said printing means to a front-feed position and vice versa, front-feed means for enabling the work sheet to be front fed relative to said platen and for holding said sheet in front-fed position, said front-feed means including portions forming a throat that is movable from a closed to an open-throat condition and vice versa, ejecting means for ejecting a work sheet, means for moving said platen out of printing position, for opening said throat and for causing said ejecting means to eject the work sheet, stops for arresting a new work sheet in line spaced position when said sheet is inserted in said open throat, said platen and front-feed means being constructed and arranged so that, when said throat is closed, the edge of said sheet adjacent said stops will be moved to a position such that said sheet will clear said stops when said ejecting means operates.

24. A front-feed machine of the class described having a printing means, a platen, front-feed means for enabling a work sheet to be front-fed relative to said platen and for holding said sheet

In front-fed position for operations of said printing means, said front-feed means including portions forming a front-feed throat movable from closed to open-throat condition and vice versa,

5 limit stops for arresting a work sheet in predetermined position relative to said platen when said sheet is inserted into said throat when the latter is open, a normally inactive sheet-ejecting means between said limit stops and said throat adapted

10 to receive said sheet when it is inserted, means operable to close said throat, means operating automatically as said throat is closing to cause said ejecting means to grip the work sheet to hold it in position as said throat is being closed and

15 to thereafter release it, said sheet being moved to a position such that it clears said limit stops, and means operating automatically as said throat is opened to cause said ejecting means to grip the work sheet and eject it free of said platen and to

20 thereafter move to inactive position to enable a new work sheet to be inserted into the throat against said limit stops.

25 A front-feed machine of the class described having a printing means, a platen movable from printing position relative to said printing means to a front-feed position and vice versa, feed rolls cooperating with said platen to form a front-feed throat, said feed rolls being movable bodily

with said platen, and said platen and feed rolls being relatively movable to open and close said throat, means operating to cause a relative movement between said platen and feed rolls to open said throat at the beginning of the movement of the platen out of printing position and to close said throat near the end of the movement of the platen to printing position, limit stops for limiting a new work sheet in a predetermined position relative to said platen when said sheet is inserted in the open front-feed throat, a set of ejecting rolls between said limit stops and said feed rolls, means operating automatically upon the opening of said throat to cause said ejecting rolls to grip the work sheet and to be rotated to eject said sheet to the rear end and to then cause said ejecting rolls to be separated so that a new work sheet may be inserted between them against said limit stops, said means for controlling said ejecting rolls also operated automatically as said platen is returned toward printing position to cause the ejecting rolls to grip the new work sheet while the platen is being moved and to release said sheet after it has been gripped by the feed rolls and platen as the latter engage one another near the end of the return of the platen to printing position.

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