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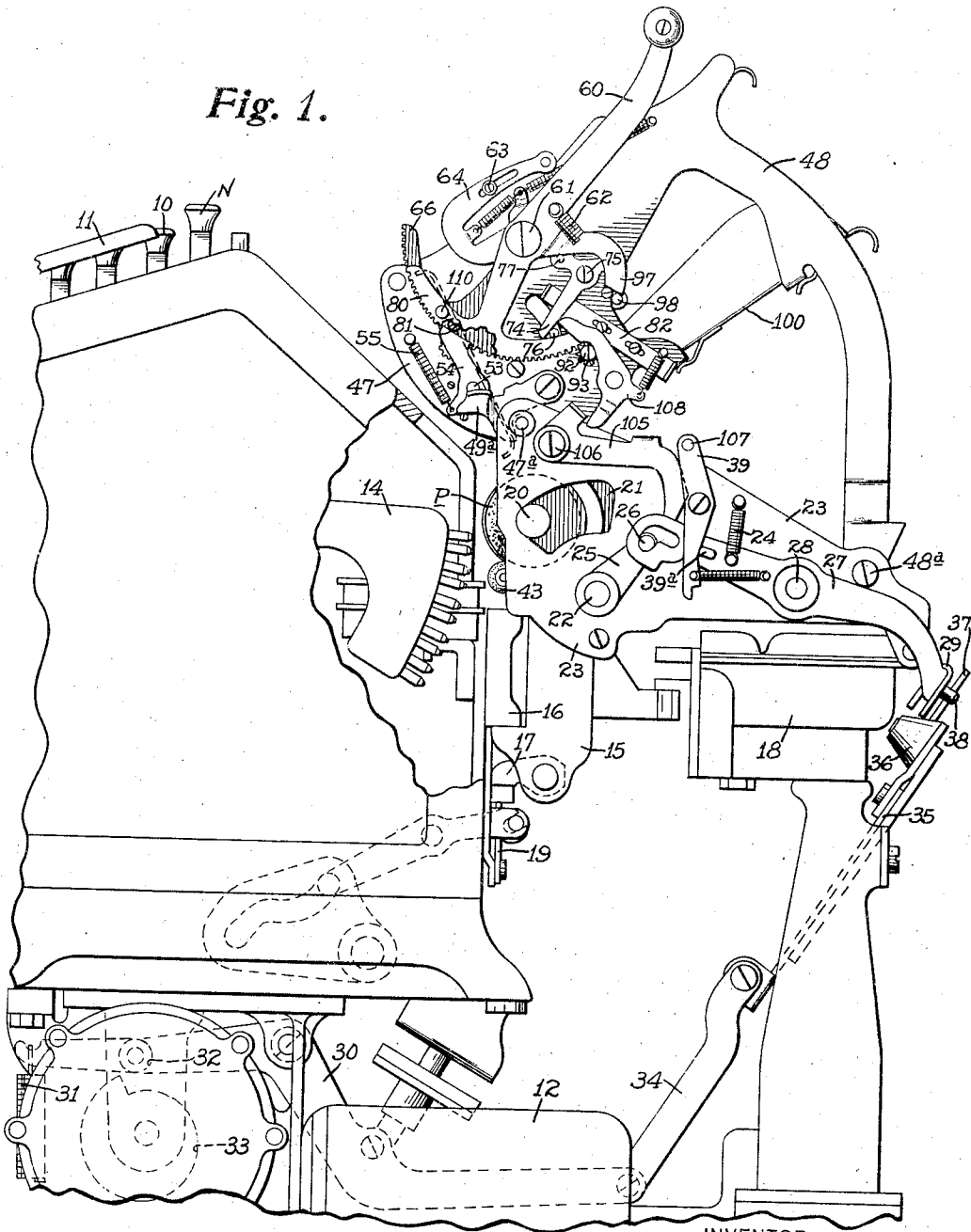
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2,139,169

CALCULATING MACHINE

Original Filed June 1, 1937 4 Sheets-Sheet 1

Fig. 1.



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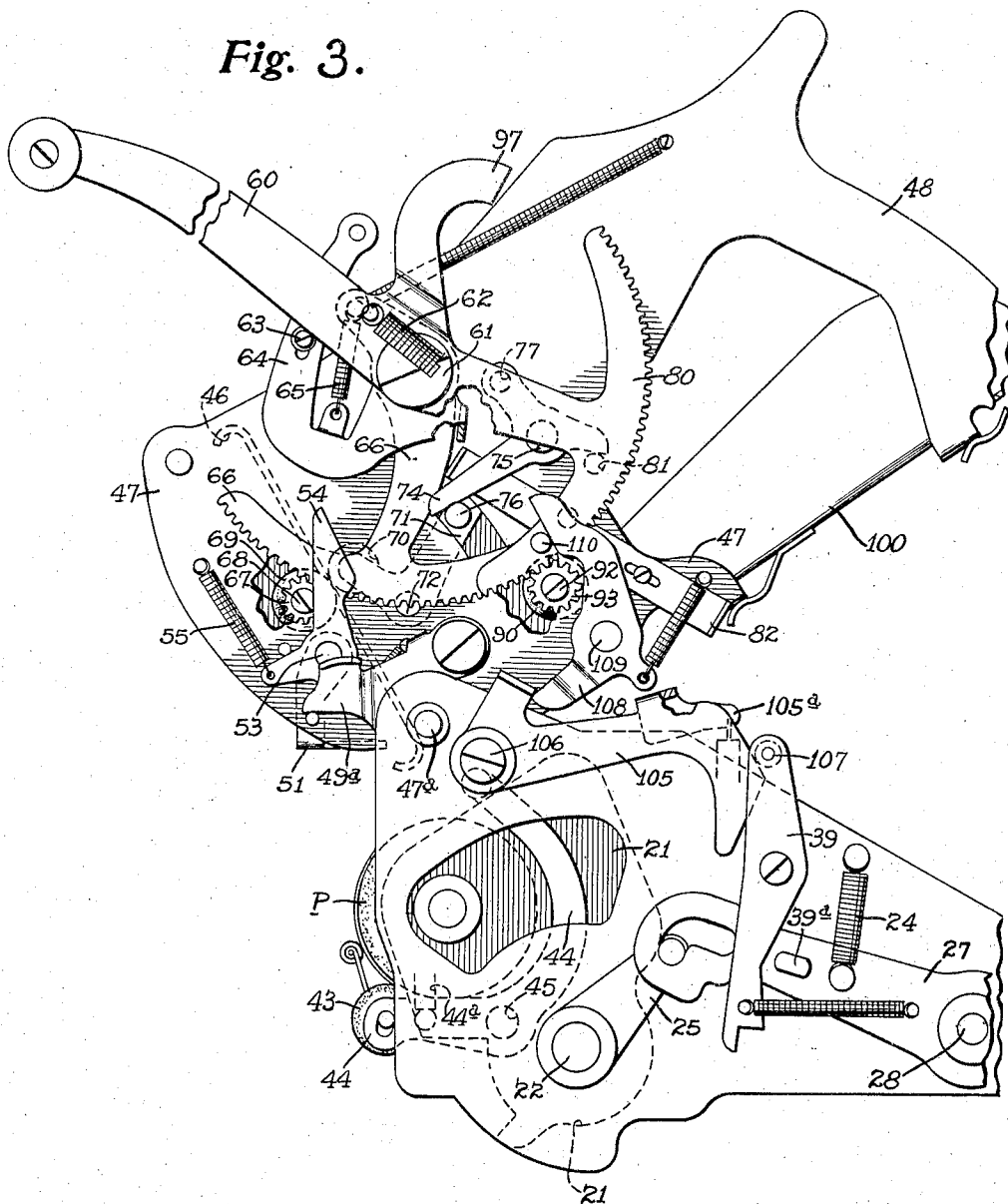
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CALCULATING MACHINE

Original Filed June 1, 1937 4 Sheets-Sheet 3

Fig. 3.



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CALCULATING MACHINE

Original Filed June 1, 1937 4 Sheets-Sheet 4

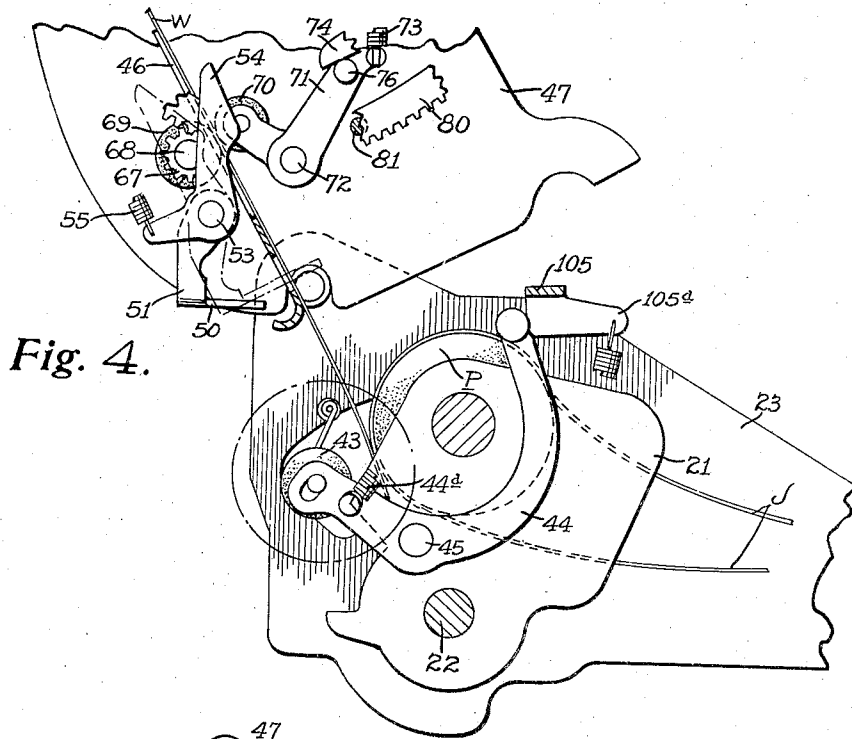


Fig. 4.

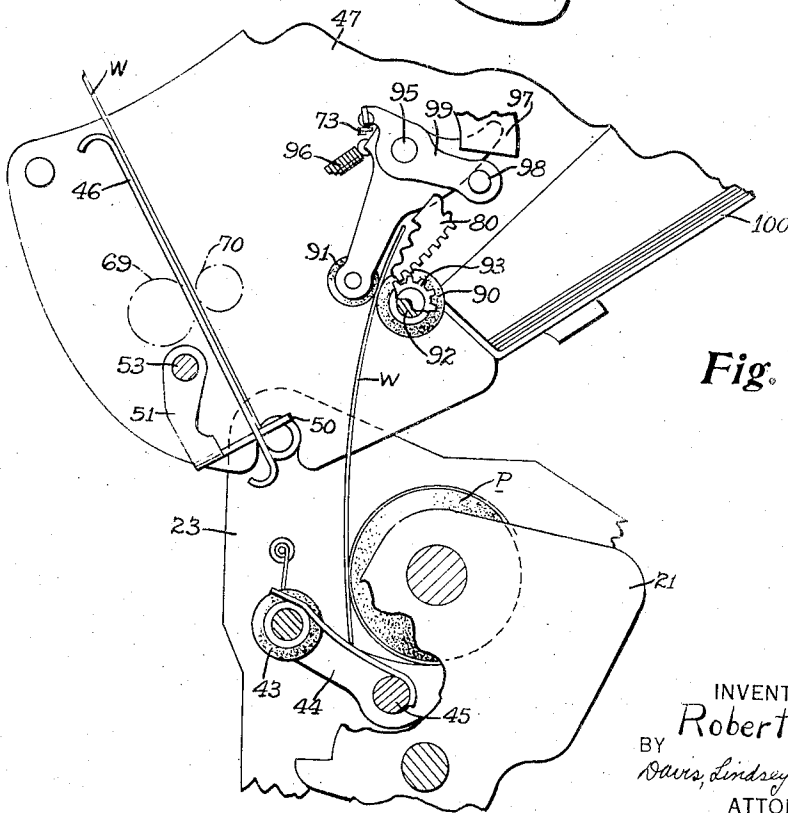


Fig. 5.

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2,139,169

CALCULATING MACHINE

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Application June 1, 1937, Serial No. 145,720
Renewed June 18, 1938

40 Claims. (Cl. 197—128)

This invention relates to accounting machines and is directed particularly to the paper handling equipment of such a machine.

In certain classes of accounting work it is desirable to print a continuous record in the nature of a journal sheet which contains all the entries that are printed on separate sheets, such as ledger sheets. Machines generally known as front-feed machines have been developed for this work. In these machines the 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 up the work by providing for the automatic injection and removal or ejection of the work sheets while the record sheet remains in the machine. This reduces the operator's duties so that he can direct almost his entire attention to the making of entries on the amount keys.

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

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

Other and more particular objects are to provide an automatic but simple mechanism of this character that is easy to operate, foolproof against misoperation, and that will speed up the operation of the machine and stack the work sheets in reversed order.

Other objects and advantages of the invention will appear from the following specification and drawings in which one embodiment of the invention is illustrated, and in which:

Figure 1 is a right side elevation of the rear portion of a calculating machine including the paper carriage and having the present invention embodied therein, the parts being in normal position.

Fig. 2 is a sectional view of the paper carriage taken just inside the right carriage frame and illustrating the parts in normal position.

Fig. 3 is a right side elevation of the paper carriage illustrating the control lever moved to counterclockwise position to eject a completed bill and to inject a new bill into printing position and the platen frame moved to printing position.

Fig. 4 is a fragmentary sectional view of the paper carriage illustrating the platen in open throat position and a work sheet being inserted

by the injecting means of the present invention, and

Fig. 5 is a view similar to Fig. 4 but illustrating the ejecting mechanism of the present invention about to eject a completed bill or work sheet.

The invention is shown applied to a Burroughs high keyboard bookkeeping or accounting machine of a type that is well-known and is illustrated in the Burroughs British Patent No. 382,613. Accordingly, 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 for illustrative purposes only.

General machine features

Referring to Fig. 1, the machine has a plurality of amount keys 10 upon which items may be entered after which the machine can be operated by depressing a motor bar 11 that causes the motor 12 to give the machine a cycle of operation, such cycle in the machine shown including a forward and a return stroke. During its operating cycle the machine performs certain calculating functions, such as addition or subtraction. Provision is also made for taking totals by a total key (not shown) and for otherwise controlling the machine to cause it to perform other operations such as are possible on the Burroughs machines now on the market and as disclosed in many of the patents issued on said machine.

A printing mechanism is provided, of which a portion is shown at 14, said mechanism being normally operated near the end of a forward stroke of the machine and serving to print the amount of the items 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 mounted on a traveling paper carriage 15 movable laterally on a raceway 16. The carriage is urged to the left, as viewed from the front. As the machine is cycled, the carriage moves automatically from column to column across the machine under the control of a tabulating mechanism, of which portions are shown at 17, and which is normally operated near the end of each machine cycle so that after the machine has performed its functions, the carriage moves to the next column to be ready for the succeeding operation. The paper carriage will automatically be returned across the machine by power from the motor 12 through

carriage return mechanism 18 similar to that disclosed in the Rinsche Patent No. 1,580,534.

While the movement is normally from one column to the next 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 19 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 any particular position of the carriage.

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.

The machine is provided with a "carriage normal" key N which, when depressed, disables the tabulating mechanism and causes the carriage to remain stationary.

Platen mounting

The platen P is fixed to a shaft 20 supported in spaced side plates 21 which are fixed to a shaft 22 journaled in two spaced frame plates 23 of the traveling paper carriage. The platen is thus supported for rocking movements relatively to the paper carriage.

The platen is urged to lower or printing position relative to the printing mechanism by gravity and by a spring 24, and is moved from printing to an out-of-printing or front-feed position automatically in the illustrated machine. For this purpose a crank 25 is fixed to each end of the platen frame shaft 22 and each crank has a stud 26 on its end which engages in a cam slot formed in the end of a lever 27 fixed to a shaft 28 journaled in the frame plates 23. The front ends of levers 27 are urged upwardly by a spring 24 which tends to rock the crank 25 counterclockwise (Fig. 1) 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. The platen is retained or latched in printing position by the shape of the cam slots in which the studs 26 are engaged.

The platen can also be moved from printing position manually by means described in the British Patent 382,613 but is illustrated as being moved automatically through levers 27 which are joined at their rear by a bail 29.

This type of operation and the mechanism are also shown in the heretofore mentioned Burroughs British Patent and in British Patent No. 468,054, and, accordingly, the mechanism will be only briefly described herein. Referring to Fig. 1, a lever 30 is pivoted on the frame of the machine and is urged counterclockwise by a relatively strong spring 31. The forward portion of the lever carries a roller 32 adapted to be engaged by a snail cam 33 that is given one rotation by the motor 12 each time the machine is given a cycle of operation. The rear end of the lever 30 is connected by a link 34 to a slide 35 that carries a roller 36 on its upper end adapted to engage the underside of the carriage bail 29. This bail is, as previously described, connected to the levers 27 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 37 adapted to be engaged by a stud 38 on the bail. The latch may be tripped by the stud upon either tabulat-

ing or return movement of the paper carriage by reversing the position of the pass-by pawl or by lowering of the bail, depending upon the position of the stud. The stud on the bail can, of course, be placed in any desired column or in as many columns as desired, depending upon the form of the work sheets being printed upon. The latch can also be tripped by a key as described in said British Patent No. 382,613, or it can be tripped out by a stud on the carriage while the carriage is stationary—the latter being better described in British Patent No. 468,054.

Briefly, the mechanism just described operates as follows: With the parts in the position shown in Fig. 1, the roller 32 on lever 30 is above the lower 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 were to be released immediately, as by a key, the slide 35 would move upward immediately. Ordinarily, however, the machine is given a cycle of operation whereupon the snail cam 33 rotates so that its high portion comes under roller 32. The slide 35 is thus prevented from moving upward until near the end of the cycle when the low part of cam 33 comes under roller 32. The carriage also tabulates near the end of the cycle, and assuming control by the carriage, when the carriage moves so that the stud 38 on the carriage bail 29 engages the pawl 37, the latch is tripped and the slide is released, whereupon spring 31 rocks lever 30 counterclockwise and moves the slide 35 upwardly. This raises bail 28 upwardly and moves levers 27 counterclockwise, as viewed in Fig. 1. This movement of the levers raises the platen and opens the front-feed throat. During the next cycle of operation of the machine, cam 33 is rotated and engages roller 32 to rock lever 30 clockwise to draw the slide downwardly.

In the illustrated machine arms 27 are latched in their counterclockwise position with the platen in front-feed position by a spring urged latch 39 which engages a projecting lug 39^a on one of the arms 27, as shown in Fig. 1.

Record sheet

The record or journal sheet J (Fig. 2) is held about the platen P by the customary pressure rolls 40 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 plate 41 secured to 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 other pressure rolls 42 which hold the sheet in feeding relation about the platen so that it will be 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 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 record sheet, reference is made to the aforementioned British patent.

Front-feed means

Provision is made for enabling individual work sheets W, Figs. 2 and 4, to be inserted from time to time in front of the platen. In order to receive

these sheets an opening must be provided which will be called the front-feed throat and 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 and cooperating with the platen, and adapted to engage it below the printing line are a series of feed or pressure rolls 43, Figs. 2 and 4, which serve to hold the work sheet as well as the record sheet against the platen. The rolls are carried by arms 44 supported from a cross shaft 45 extending between the carriage plates 21. The springs 44^a (Fig. 4) normally urge the feed rolls toward and into contact with the platen but the rolls are restricted beyond a limited movement so that when the platen is moved from lowered or printing position to raised position a throat will be formed between the platen and the feed rolls. Accordingly, the throat is automatically opened when the platen is moved from printing position and is automatically closed when the platen is returned to printing position. In other words, rolls are automatically conditioned to free the work sheets for movement relatively to the platen as the platen moves.

A paper table or chute 46, constituting part of the front-feed means, is provided in order to guide the work sheets to front-feed position. The table is rigidly secured between a pair of plates 47 supported above the platen by a pair of arms 48 extending upwardly from the main frame of the carriage and being pivoted at 48^a (Fig. 1) to the carriage. The table is inclined slightly forward from the vertical and terminates at each end in a curve to facilitate movement of the work sheets over the table. The sheets may be inserted to the position of Fig. 4, after which the throat can be closed. As the platen is moved to printing position, the lower edge of the table engages the upper end of the inserted work sheet above the printing line of the platen, as shown in Fig. 2, and bends the upper end of said sheet about the platen to help hold the sheet in front-feed position.

For the further convenience of the operator, there is provided a pair of magazines 49 for holding a supply of work sheets. These magazines are preferably formed of sheet metal and are supported between the two plates 47 which carry the front-feed table. The magazines are conveniently disposed above the table and within convenient reach of the operator. The magazines, chute, and arms 48 are latched in their forward position by means of a latch 49^a (Fig. 1) at each end of the carriage.

It follows from the foregoing that the entire assembly of injector and ejector mechanisms carried between the two plates 47 carried by the arms 48 can be removed out of the way of the operator to permit insertion and adjustment of a journal sheet.

Work sheet injecting means

It will be understood that, when a bill or work sheet is to be inserted in the machine, the carriage is at rest in desired columnar position, the platen is in throwback or front-feed position shown in Fig. 4, and the front-feed throat is open. With the platen in this position and before the machine is given a cycle of operation, the operator removes a work sheet from one of the magazines and places it on the table 46 where it is limited by a series of stops 50 which project through the table and are carried by a pair of

arms 51 rigidly secured to a shaft 53. Also secured to shaft 53 is a bell crank 54 (Fig. 4) to the lower arm of which is secured a spring 55 normally tending to rotate shaft 53 clockwise, Figs. 3 and 4, so as to retract or withdraw the stops 50. Normally, withdrawal of the stops is prevented by engagement of the upper arm of bell crank 54 with means later to be described.

From this position the work sheet is injected or front fed by injecting means operated through a handle or hand lever 60 pivoted at 61 and urged clockwise by a spring 62. As the lever 60 is pulled counter-clockwise by the operator to cause injection of a work sheet, the forward edge of the lever engages a stud 63 carried by a lever 64 pivoted on shaft 61 and yieldingly connected by a spring 65 to a toothed sector 66 also pivoted on shaft 61. Sector 66 is in constant mesh with a pinion 67 (Fig. 3) carried by a shaft 68 to which is also secured an injecting roll 69. Injecting roll 69 cooperates with a second injecting roll 70 carried by one arm of a bell crank 71 pivoted at 72 and constantly urged counterclockwise to cause engagement of the two rolls by a spring 73. Normally, however, the bell crank is prevented from rocking counterclockwise by a lever 74 pivoted at 75 and engaging a stud 76 secured to the other arm of bell crank 71. Lever 74 carries a stud 77 which is engaged by hand lever 60 (Fig. 1) when the latter is in its fully retracted or normal position so as to hold lever 74 counterclockwise to retain its one arm in contact with stud 76, which in turn retains bell crank 71 in clockwise position to maintain feed rolls 69 and 70 disengaged. Immediately upon movement of hand lever 60 and before engagement of its front edge with stud 63, it releases lever 74 and bell crank 71 to permit engagement of the injecting rolls 69 and 70. Upon continued movement of hand lever 60 and following its engagement with stud 63, lever 60 and sector 66 are rotated thus causing rotation of roll 69 to inject a work sheet W in front of the platen.

It will be obvious that before the work sheets can be fed by feed rolls 69 and 70, the stops 50 must be retracted. For this purpose a sector 80, formed integrally with lever 60 for ejecting a work sheet as will be described later, carries a stud 81 which is normally in engagement with the upper arm of bell crank 54 (Fig. 1) and prevents the latter from pivoting clockwise as previously stated. During early movement of the sector 80 after the injecting rolls 69 and 70 have closed, stud 81 moves away from the upper arm of the bell crank 54 and permits the latter to rock clockwise under urge of its spring, thereby rocking shaft 53 clockwise and retracting stops 50. The reverse movement, of course, takes place upon the return of sector 80 and the stops are again repositioned in the path of the work sheets.

Continued counterclockwise movement of hand lever 60 causes clockwise rotation of injecting roll 69 and positive injection of the work sheet into position, as determined by an adjustable slide 82 positioned to engage the rear edge of the arm of sector 66, as shown in Fig. 3. Adjustability of stud 63 carried by the lever 64 makes it possible to control the throw of the sector by varying the time of contact of hand lever 60 with lever 64, whereas adjustability of slide 82 terminates movement of sector 66 and rotation of roll 69 and the ejecting rolls as will later appear.

Near the end of the counterclockwise movement of hand lever 60, certain elements are moved, which release the platen to permit the

platen to return to printing position, as will later be described. It will be understood, of course, that the previously printed work sheet must be ejected before this takes place. So far as has been described, counterclockwise movement of the hand lever 60 first causes the injecting rolls 69 and 70 to grip the bill, after which the stops 50 are withdrawn and then roll 69 is rotated so that the sheet is positively injected to printing position. During these movements the platen is moving to or is in throwback or front-feed position.

When the handle 60 is released, its spring 62 pulls it back to the position of Fig. 1 and, as a result, the handle engages the stud 77 on the bell crank 74, thus rocking it clockwise into engagement with the stud 76 which causes the bell crank 71 to be rocked clockwise and the injector rolls 69 and 70 to be separated, that is, the throat of the injecting means is again opened. The return of the lever also causes the stud 81 to engage the bell crank 54 to rock it counterclockwise and thus project or re-enable the stops 50. Thus, the injecting means is again conditioned to receive a new sheet.

One of the advantages of this construction is that a work sheet may be inserted into the injecting means while it is in open-throat condition without requiring that the operator pay much attention to just how the sheet is fed to position. The sheet drops against the stops 50 and is properly aligned. The insertion is easy as compared with injecting devices where the rolls are permanently in engagement with one another. In such devices, it is difficult to get the sheet fed between the rolls properly and, unless great care is taken, one side of the sheet will be gripped before the other and the sheet will be injected diagonally. But, with applicant's construction, and without any particular attention on the part of the operator, the sheet can be fed to a proper position, after which the rolls grip the sheet and inject it. The injection is into an open throat which offers no obstruction to the movement of the sheet. After the sheet has been injected to proper position, the throat is then closed to grip the sheet. Thus, it will be seen that during all the operations, there is nothing that tends to get the sheet out of alignment.

After the sheet has been gripped by the closing of the front-feed throat, the injecting means is placed in open-throat condition again so that it can receive a new sheet and it may receive this sheet while operations are being performed on the sheet that is in the machine.

Work sheet ejecting means

It will be understood that after a predetermined printing operation has been completed, the platen frame may be automatically moved to front-feed position and the front-feed throat opened by means disclosed in the Burroughs British Patent No. 382,613, or by means disclosed in British Patent No. 468,054. Ordinarily when the operator is ready to start on a new sheet, the platen will be in front-feed position, as previously mentioned. In this position, the hand lever 60 is given a counterclockwise movement for the purpose of injecting a new work sheet into the carriage as previously described. Prior to injecting a new work sheet, however, the previously printed work sheet, if there had been one, must be ejected. This is accomplished in the same operation which injects the new bill by operating the same hand lever, as will now be described.

As the platen frame is raised from printing position to front-feed position, the upper edge of the printed work sheet, which rests against the lower end of table 46 with the platen in printing position, is guided by the lower edge of table 46 and, during initial movement of the platen, is caused to move upwardly between ejecting rolls 90 and 91 finally coming to rest as illustrated in dot-dash lines in Fig. 2. The lower ejecting roll 90 is carried by a shaft 92 which also carries a pinion 93 which is constantly in mesh with the toothed sector 80 formed as an integral part of the hand lever 60. Accordingly, upon initial movement of the hand lever, sector 80 moves and rotates pinion 93, thereby rotating lower ejecting roll clockwise.

The upper ejecting roll 91 is carried by a crank 94 secured to shaft 95 and normally urged counterclockwise by a spring 96 to cause engagement of the two ejecting rolls. Engagement of the two ejecting rolls is prevented however when the hand lever 60 is in fully retracted position by an arm 97 of the hand lever which engages a stud 98 carried by an arm 99 also secured to shaft 95. It will be seen that immediately upon movement of the hand lever 60 arm 97 moves away from stud 98 and permits closing of the ejecting rolls to grip the printed work sheet previously positioned between the rolls. Further movement of the hand lever causes rotation of the sector 80, pinion 93 to positively rotate lower ejecting roll 90 to positively eject the gripped work sheet rearwardly and over the platen into a receptacle 100 where the work sheets are stacked in reverse order. Due to the positioning of the stud 63 on lever 64 ejection of the completed work sheet takes place during the early part of the stroke of hand lever 60 and before the work sheet stops have been withdrawn to permit injection of a new work sheet into printing position. It follows from the foregoing that the single hand lever 60 causes both positive injection and ejection upon a single operation thereof.

Automatic closing of throat

Upon completion of a counterclockwise movement of hand lever 60 and after the previously printed work sheet has been ejected and the new bill injected, the platen is automatically released to return to printing position. This is accomplished by releasing latch 39. For this purpose a crank 105 is pivoted to one of the carriage side plates at 106 and has one arm projecting rearwardly into position to engage a stud 107 carried by the upper end of latch 39. The other arm of crank 105 extends upwardly and has a lug projecting into the path of movement of one arm of a lever 108 pivoted at 109, which lever also has an arm adapted to be engaged by a stud 110 carried by sector 80 when the sector reaches the limit of its counterclockwise movement. Accordingly, as hand lever 60 is moved counterclockwise and reaches the limit of its movement, stud 110 will engage lever 108, rock it about its pivot, and thereby rock bell crank 105 and release latch 39 permitting arms 27 to rotate clockwise to return the platen to printing position.

Operation

Although the operation of the machine will be clear from the previous description as given, a brief summary thereof will be given at this point.

First a record sheet J is inserted about the platen. In order to do this, the platen is moved away from printing position to front-feed posi-

tion if it is not already in such position. The record sheet is then inserted about the platen from the rear and adjusted to proper line-space position. The operator then takes a work sheet W from one of the magazines and places it upon the front-feed table where it limits against the stops 50 as shown in Fig. 2. The operator then grasps the hand lever 60 and pulls the same forwardly to the limit of its movement which first causes ejection of a previously printed work sheet, if there were one in the machine, then injection of the new work sheet previously placed upon the front-feed table and finally a lowering of the platen to printing position and a closing of the front-feed throat. The operator then makes the necessary entry or entries on the amount keys and gives the machine a cycle of operation by pressing the motor bar. After the entry or entries have been printed on the bill, the carriage moves through the necessary columnar positions to give the desired repeat printing and operations as called for by the form being used. After all entries have been made upon the one bill, the carriage automatically returns to initial position and the throat automatically opens to permit ejection of the printed work sheet and injection of a new sheet.

One of the advantages of this invention is that a sheet may be inserted in injecting position while operations are being performed on a sheet in the machine, and then the mechanism may be operated to eject the sheet on which operations have been performed and to inject another sheet. This is a decided advantage over constructions in which it is necessary, first, to eject a sheet, then to insert another new sheet into the mechanism, and then to operate the mechanism a second time to inject the new sheet. In applicant's construction, the new sheet can be placed in position at any time after the preceding sheet has been moved to printing position. The operator need not pay particular attention to how the new sheet is placed in position. He simply drops it into the open throat of the injecting mechanism. When he wants to change sheets, all he has to do is to pull the lever forward. This one movement of one lever ejects the sheet that is in the machine, inserts a new one, and causes the front-feed throat to grip the new sheet. He releases the lever which then returns automatically and causes the injecting means to return to condition to receive a new sheet. When the paper carriage arrives at the position where sheets should be changed, the throat automatically opens, indicating to the operator that the sheet should be changed.

In other words, the construction permits of much more rapid operation than has heretofore been possible and reduces the number of manual operations to a minimum.

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

I claim:

1. 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, said front-feed means including portions forming a front-feed throat movable from a closed to an open-throat condition and vice versa independently of operation of said printing means, means for opening said throat, work sheet ejecting means, and means

operable to cause said ejecting means to eject a work sheet clear of said platen while leaving said record sheet in line space position relative to said printing means and thereafter to cause said throat to be automatically closed.

2. 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, said front-feed means including portions forming a front-feed throat, work sheet injecting means having an open throat for receiving a work sheet and being provided with means for temporarily supporting said sheet in a substantially vertical position when it is inserted in the open throat of said injecting means, said injecting means being operable to positively inject a work sheet into said front-feed throat to a printing position in front of said platen, and means causing said injecting means to grip the inserted work sheet and inject said sheet to said printing position.

3. 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, said front-feed means including portions forming a front-feed throat, work sheet injecting means having an open throat to receive a work sheet and including a supporting means to temporarily support said sheet in a substantially vertical position in said open injector throat, and means for causing said injecting means to grip said sheet, to disable said temporary support, and to inject said sheet into said front-feed throat to a printing position.

4. 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, said front-feed means including portions forming a front-feed throat, work sheet injecting means having an open throat to receive a work sheet and including a supporting means to temporarily support said sheet in a substantially vertical position in said open ejector throat, means for causing said injecting means to grip said sheet, to disable said temporary support, and to inject said sheet into said front-feed throat to a printing position, and means for reopening the throat of said injecting means and for reenabling said temporary support whereby said injecting means is conditioned to receive a new sheet.

5. A front-feed machine of the class described having a printing means, a platen, a guide for guiding a work sheet toward a front-feed position relative to said platen, sheet-engaging means for engaging a work sheet above and below the printing line of said platen to hold said sheet about said platen for a printing operation of said printing means, said sheet-engaging means and platen being mounted to enable a relative movement to occur between them to hold the sheet in one case and release it in the other, work sheet injecting means having an open throat to receive a work sheet and including a sheet supporting means to temporarily support said sheet in said injector throat, means for causing said injecting means to grip said sheet, to disable said temporary support, to inject said sheet to a printing position relative to said platen, and to thereafter cause a relative movement between said sheet-engaging means and platen to grip said sheet, and means operable to reopen the throat of said injecting means and to reenable said temporary support.

6. 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, 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 injecting means having an open throat to receive a work sheet and including a sheet supporting means to temporarily support said sheet in said injector throat, means for causing said injecting means to grip said sheet, to disable said temporary support, to inject said sheet into said front-feed throat to a printing position, to cause said front-feed throat to close to grip said sheet, to thereafter release said sheet from said injecting means and open its throat to receive a new sheet, and to reenable said temporary support.

7. A front-feed machine of the class described having a printing means, a platen, a front-feed means for enabling the work sheet to be front fed relative to said platen, 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, separated injecting rolls between which a work sheet may be positioned, stops for temporarily holding an inserted work sheet in a substantially vertical position when it is inserted between said separated rolls, means operating to cause said rolls to grip the inserted sheet, to disable said stops, and to rotate said rolls to inject said sheet into said open throat, and to close said throat to grip the inserted work sheet, and means for subsequently causing said rolls to be separated and said stops to be restored to enabled condition.

8. 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, 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, injecting means having an open throat for receiving a work sheet and means for temporarily supporting said sheet, and means for causing said injecting means to positively inject a work sheet into said open front-feed throat to a predetermined printing position in front of said platen and to then cause said front-feed throat to be automatically closed.

9. 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, 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 supporting means for enabling a new work sheet to be supported in front-feeding position while said front-feed throat is closed for operations on the work sheet in the throat, means for opening said throat to enable the work sheet in said throat to be removed, work sheet injecting means, and means operable to disable said sheet supporting means, to cause said injecting means to automatically inject the new work sheet into said open throat to a predetermined printing position, and to then automatically close said throat.

10. 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, 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 supporting a stack of work sheets above said platen, work sheet injecting means, a set of stops associated with said front-feed means for enabling a new work sheet to be supported in feeding relation to said injecting means while said throat is closed for operations on a work sheet in said throat, means for opening said throat, and means operable to withdraw said stops, to enable said injecting means and cause it to inject a new work sheet into said open throat to a predetermined position, and to then automatically close said throat.

11. 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, front-feed means for enabling a work sheet to be front fed relative to said platen, said front-feed means including portions forming a front-feed throat movable from closed to open-throat condition and vice versa, means operable to move said platen out of printing position and to open said throat, injecting means for injecting a work sheet into said open throat, and means operable to cause said injecting means to inject a work sheet into said open throat to a predetermined position in front of said platen and to then cause said throat to be closed and the platen to be moved to printing position.

12. A front-feed machine of the class described having a printing means, a platen movable from printing position relative to said printing means to 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 as it is moved out of printing position, and said platen and feed rolls being relatively movable to open and close said front-feed throat, sheet injecting means, means for supporting a work sheet in feeding relation to said injecting means, means operable to move said platen out of printing position and to open said throat adjacent one end of said work sheet so that the latter may be injected into said throat, and means operable to cause said injecting means to inject said sheet into said open throat and to then automatically cause the throat to be closed and the platen to be moved to printing position.

13. 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, said front-feed means including portions forming a front-feed throat movable from a closed to an open-throat condition and vice versa independently of operation of said printing means, means for opening said throat, and means operable by the manipulation of a single member for positively injecting a work sheet into said open front-feed throat to a predetermined printing position in front of said platen and to then cause said throat to be automatically closed.

14. 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, 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, injecting rolls between which a work sheet may be positioned for injection into said open throat, and means operable by movement of a single lever for causing said injecting rolls to grip said work sheet, for causing said rolls to in-

ject said sheet into said open throat to a predetermined position, for then causing said front-feed throat to be automatically closed, and for then freeing said work-sheet from said injecting rolls.

15. 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, said front-feed means including portions forming a front-feed throat movable from closed to open-throat condition and vice versa, sheet-injecting means having an open throat to receive a work sheet and work sheet supporting means for temporarily supporting a work sheet in said ejector throat, means for opening said front-feed throat, and means operable by the manipulation of a single member for disabling said work sheet supporting means to free said work sheet, for causing said injecting means to inject said sheet into said open front-feed throat to a predetermined printing position in front of said platen, for closing said front-feed throat, and for reconditioning said ejecting means to receive a new sheet.

16. A machine of the class described having a platen, means for holding a work sheet in printing position relative to said platen and for line spacing said sheet, a normally inactive work sheet-ejecting means, a normally inactive work sheet-injecting means, and means operable by the manipulation of a single lever in a single direction to enable said ejecting means and to cause it to eject free of said platen a work sheet that is in printing position relative thereto and to enable said injecting means and to cause it to positively inject a new work sheet to a predetermined printing position relative to said platen.

17. A machine of the class described having a platen, feed rolls cooperating with said platen to line-space a work sheet and hold it about said platen, work sheet-ejecting means, work sheet-injecting means, means for causing a relative movement between said platen and feed rolls to free a work sheet that is in printing position, and means operable by movement of a single lever in a single direction for enabling said ejecting means and causing it to eject said work sheet, for enabling said injecting means and causing it to positively inject a new work sheet to a predetermined printing position relative to said platen, and for then automatically causing a relative movement of said feed rolls and platen to grip the new work sheet in printing position.

18. A machine of the class described having a rotatable platen, feed rolls cooperating with said platen for line-spacing a work sheet and holding it in printing position, a set of work sheet-ejecting rolls, a set of work sheet-injecting rolls, means for causing a relative movement between said platen and feed rolls to free a work sheet that is in printing position, and means operable by movement of a single lever in a single direction to cause said ejecting rolls to grip said work sheet and to cause said rolls to rotate to eject said work sheet clear of said platen, to cause said injecting rolls to grip said work sheet and to rotate said rolls to inject a new work sheet to a predetermined printing position relative to said platen, to then cause a relative movement of said platen and feed rolls to grip the new sheet and to cause said injecting and ejecting rolls to free said injected sheet.

19. 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 while it receives printing impressions from said printing means, an ejecting and injecting means separate from said platen and including a set of ejecting rolls and a set of injecting rolls operable independently of said sheet holding means in ejecting said work sheet, said work sheet being free of said ejecting rolls while held about said platen, means operating automatically as said platen is moved from printing to out-of-printing position to move said sheet between said ejecting rolls and to condition said sheet holding means to free said work sheet for movement relative to said platen, and means for rotating said ejecting rolls to eject said work sheet clear of said platen and for thereafter rotating said injecting rolls to inject a sheet into printing position.

20. 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 a work sheet in printing position relative to said platen to receive printing impressions, a sheet ejecting and injecting means, means operating automatically as said platen is moved from printing to out-of-printing position to condition said sheet holding means to free said work sheet for movement relative to said platen, and a single operating member for causing said ejecting and injecting means to eject a sheet clear of said platen and to deposit said ejected sheet face downward in a receptacle and thereafter to inject a new sheet in front of said platen into printing position.

21. 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, said front-feed means including portions forming a front-feed throat movable from a closed to an open-throat condition and vice versa, a sheet-controlling means constructed and arranged to enable a new sheet to be readily placed in a substantially vertical front-feeding position and including a sheet support for temporarily supporting said sheet in said position while another sheet is in said machine and independently of the sheet that is in the machine, means for opening said front-feed throat, means for causing said sheet-controlling means to eject the sheet that is in the machine to a position clear of said platen and to cause the new sheet to move into printing position in front of said platen, and means for closing said front-feed throat.

22. 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, said front-feed means including portions forming a front-feed throat movable from a closed to an open-throat condition and vice versa, sheet-controlling means including a set of sheet-supporting stops for temporarily supporting a work sheet in substantially vertical front-feeding position while another sheet is in printing position, means for opening said front-feed throat, means for causing said sheet-controlling means to eject the sheet that is in printing position to a position clear of said platen and disable said sheet-supporting stops to enable the new work sheet to move into said

open-throat to a printing position in front of said platen, and means for closing said throat and reenabling said stops to support a new sheet.

23. A front-feed machine of the class described
- 5 having a printing means, a paper guide for guiding a work sheet toward front-fed position relative to said platen, a sheet-engaging means for engaging said sheet above and below the printing line of said platen to hold said sheet about
- 10 said platen, said sheet-engaging means and platen being mounted to enable a relative movement to occur between them to grip the sheet in one case and release it in another, sheet-controlling means including a sheet support enabling a new sheet to be readily placed in and
- 15 supported in a substantially vertical front-feeding position while another sheet is in said machine, means for causing a relative movement between said sheet-engaging means and platen to free the sheet that is in the machine, means for causing said sheet-controlling means to eject the sheet that is in printing position and to disable said sheet support to free the new sheet to enable it to move to printing position, and means for
- 20 causing a relative movement between said sheet-engaging means and platen to grip the new sheet and to reenable the sheet support.
24. A front-feed machine of the class described having a printing means, a rotatable platen,
- 30 front-feed means for enabling a work sheet to be front fed to a printing position on the front side of said platen, said front-feed means including portions forming a front-feed throat, and sheet-injecting and ejecting means constructed and arranged to enable a new sheet to be inserted in the
- 35 injecting portion of said injecting and ejecting means while another sheet is in printing position in said machine, said injecting and ejecting means being operable independently of said platen in a single operation to eject the sheet that is in the machine to a position clear of said platen and to inject the new sheet into printing position relative to said platen.
25. A front-feed machine of the class described
- 45 having a printing means, a platen, front-feed means for enabling a work sheet to be front fed to a printing position on the front side of said platen, said front-feed means including portions forming a front-feed throat, and sheet-injecting and ejecting means constructed and arranged to enable a new sheet to be inserted by hand into an open throat in the injecting portion of said
- 50 injecting and ejecting means while another sheet is in printing position in said machine, said injecting and ejecting means being operable independently of said platen to eject the sheet that is in the machine to a position clear of said platen and to grip the new sheet and inject it into printing position relative to said platen.
- 60 26. 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 to a printing position on the front side of said platen, said front-feed means including portions
- 65 forming a throat movable from a closed to an open-throat condition and vice versa, sheet-injecting and ejecting means constructed and arranged to enable a new sheet to be inserted in the injecting portion of said injecting and ejecting means while another sheet is in printing position in said machine, means for opening said front-feed throat to release the sheet that is in printing position, and means operable to cause said injecting and ejecting means to operate independently of the platen to eject the sheet that
- 75

is in the machine to a position clear of said platen, to inject the new sheet into said open front-feed throat to a printing position relative to said platen, and to then close said front-feed throat.

27. A front-feed machine of the class described having a printing means, a paper guide for guiding a work sheet toward front-fed position on the front side of said platen, a sheet-engaging means for engaging said sheet above and below the printing line of said platen to hold said sheet about said platen, said sheet-engaging means and platen being mounted to enable a relative movement to occur between them to grip the sheet in one case and release it in another, sheet-injecting and ejecting means constructed and arranged to enable a new sheet to be inserted in injecting position in said injecting and ejecting means while another sheet is in printing position in said machine, means for causing a relative movement between said sheet-engaging devices and platen to free the sheet that is in printing position, and means causing said injecting and ejecting means to operate to eject the sheet that is in printing position and to inject the new sheet to printing position, and to thereafter cause a relative movement between said sheet engaging means and said platen to grip the new sheet.

28. A front-feed machine of the class described having a printing means, a platen, a guide for guiding a work sheet toward a front-fed position on the front side of said platen, a sheet-engaging means for engaging a work sheet above and below the printing line of said platen to hold said sheet about said platen, said platen and sheet-engaging means being mounted to enable a relative movement to occur between them to hold the sheet in one case and to release it in another, injecting and ejecting means operable independently of said platen, said work sheet being free of said injecting and ejecting means while held in printing position about said platen, means operable to condition said sheet-engaging means and platen to free said sheet for movement relative to said platen and to place said sheet under the control of said ejecting means, and means for operating said injecting and ejecting means to cause it to eject the sheet clear of said platen and to inject a new sheet into printing position.

29. A front-feed machine of the class described having a platen, feed rolls cooperating with said platen to form a front-feed throat, said platen and feed rolls being relatively movable to open and close said throat, a normally inactive set of injecting rolls, means enabling a work sheet to be placed between said injecting rolls and temporarily supported in injecting position, a normally inactive set of ejecting rolls, means for opening said throat, and means operable to cause said ejecting rolls to grip the work sheet that is in said front-feed throat and eject it to a position clear of said platen, to cause said injecting rolls to grip a new work sheet and inject it into said open throat to a predetermined printing position in front of said platen, to cause said front-feed throat to be automatically closed, and to free said work sheet of said injecting rolls.

30. A front-feed machine of the class described having means for giving it cycles of operation, printing means, a platen, front-feed means for enabling a work sheet to be front fed relative to said platen, said front-feed means including portions forming a front-feed throat that is movable from a closed to an open-throat condition and vice versa, sheet-ejecting and injecting means op-
- 75

erable independently of said platen, means enabling a new work sheet to be supported in injecting position while another sheet is in printing position in said machine, said sheet that is in printing position being free of said ejecting and injecting means while in printing position, means automatically operable, during a cycle of operation of said machine, to open said front-feed throat to free the sheet that is in printing position for movement relative to said platen and to place said sheet under the control of said ejecting means, and manually operable means for operating said ejecting and injecting means to eject the sheet that is in printing position to a position clear of said platen and to inject the new sheet into printing position.

31. 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, said front-feed means including portions forming a front-feed throat movable from closed to open-throat condition and vice versa, sheet-injecting means having an open throat to receive a work sheet, work sheet supporting means for temporarily supporting a work sheet in said injector throat while another sheet is in printing position in said machine, means for opening said front-feed throat, work sheet ejecting means, and means operable by the manipulation of a single member for causing said ejecting means to eject the sheet that is in printing position, to disable said work sheet supporting means, to cause said injecting means to positively inject said sheet into said open throat to a predetermined printing position in front of said platen, and to cause said front-feed throat to close.

32. 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, said front-feed means including portions forming a front-feed throat movable from a closed to an open throat condition and vice versa independently of operation of said printing means, means for opening said throat, work sheet ejecting means, work sheet injecting means, and means operable by movement of a single lever in a single direction for causing said ejecting means to eject the work sheet that is in printing position to a position clear of said platen and for causing said injecting means to inject a new work sheet into said open throat to a predetermined printing position in front of said platen.

33. A front-feed machine of the class described having a printing means, a platen, means for guiding a work sheet toward front-feed position relative to said platen, sheet engaging means for engaging said sheet above and below the printing line of said platen to hold said sheet about said platen, said sheet engaging means and platen being mounted to enable a relative movement to occur between them to release and to hold said sheet, work sheet injecting means, work sheet ejecting means, and means operable by the movement of a single lever in a single direction for causing said ejecting means to eject the work sheet that is in printing position, for causing said injecting means to inject a new work sheet to a predetermined position in front of said platen, and to cause said sheet engaging means to engage the injected sheet.

34. A front-feed machine of the class described having a printing means, a platen, feed rolls cooperating with said platen to form a front-feed throat, said feed rolls and platen being relatively

movable to open and close said throat, a set of normally separated ejecting rolls, a set of normally separated injecting rolls, means for supporting a new work sheet adjacent said front-feed throat, means operable to open said throat and to condition the sheet therein for ejection by said ejecting rolls, and means controlled by a single manipulative member for causing said ejecting rolls to grip said sheet and to rotate said rolls to eject said sheet, for disabling said sheet supporting means, for causing said injecting rolls to grip a new sheet and to rotate said rolls to insert said sheet into said open throat to a predetermined printing position in front of said platen, to cause said front-feed throat to be automatically closed, and to cause said injecting and ejecting rolls to be separated.

35. A front-feed machine of the class described having a printing means, a platen movable from a printing position relative to said printing means to a front-feed position, front-feed means for enabling a work sheet to be front fed relative to said platen, said front-feed means including portions forming a front-feed throat movable from a closed to an open throat condition and vice versa independently of operation of said printing means, means for enabling a work sheet to be placed in injecting position while another sheet is in printing position in said machine, means for opening said throat, and means operable to first eject the work sheet that is in said throat to a position clear of said platen, to thereafter inject a new work sheet to a predetermined printing position in front of said platen, and to thereafter automatically cause said throat to be closed and said platen to be moved to printing position.

36. A 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, feed rolls cooperating with said platen to form a front-feed throat, said feed rolls being movable bodily with said platen as it is moved out of a printing position and said feed rolls and platen being relatively movable to open and close said throat, a paper guide in front of said platen, supports for holding a new work sheet in front-feeding position in front of said platen, sheet ejecting means, means operable to move said platen out of printing position, to open said throat adjacent said paper guide, and to condition the sheet that is in said throat for ejection by said ejecting means, sheet injecting means, and means operable to cause said ejecting means to eject the work sheet that is in said throat to a position clear of said platen, to disable said sheet support to free the new work sheet, to cause said injecting means to grip the new work sheet and inject it into said open throat to a predetermined printing position in front of said platen, to cause said throat to be closed and said platen to be returned to printing position, and to cause said injecting means to free said new work sheet.

37. A front-feed machine of the class described having a printing means, a platen, column printing control means for controlling the column in which printing occurs, 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, work sheet ejecting means, means operating automatically after operation of said printing means in a predeter-

mined column to open said throat and to condition the work sheet on which operations have been performed for ejection by said ejecting means, work sheet injecting means, and means operable to cause said ejecting means to eject said work sheet clear of said platen, to cause said injecting means to inject a new sheet to a predetermined printing position in front of said platen, and to thereafter cause said throat to be automatically closed.

38. A front-feed machine of the class described having means for giving it cycles of operation, a printing mechanism, 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 movable from a closed to an open throat condition and vice versa, work sheet ejecting and injecting means, 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 place said work sheet under control of said ejecting means, and means for operating said ejecting means to cause said work sheet to be ejected over and to the rear of said platen while said record sheet remains about said platen and to deposit said ejected sheet face downward in a receptacle, for thereafter operating said injecting means to inject a new sheet in front of said platen and for thereafter causing said throat to be closed.

39. 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, said front-feed means including portions forming a front-feed throat

movable from a closed to an open throat condition and vice versa, said front-feed means being urged to closed throat condition, means for opening said throat, means for latching said throat in open-throat condition, and means operable while said throat is latched open to eject a work sheet that is in said throat to a position clear of said platen, to thereafter inject a new work sheet into said open throat to a predetermined printing position in front of said platen, and to then release said latch to enable said front-feed means to move to closed throat position.

40. A front-feed machine of the class described having a printing means, a platen movable bodily from printing position relative to said printing means to a front-feed position and vice versa, front-feed means for enabling a work sheet to be front fed relative to said platen, said front-feed means including portions forming a front-feed throat movable from a closed to an open-throat condition and vice versa, said platen being urged to printing position and said front-feed means to closed throat condition, means for moving said platen to front-feed position and said throat to open-throat condition, means for latching said platen and throat in said condition, and means operable to first eject the work sheet that is in said open throat to a position clear of said platen, to thereafter inject a new work sheet into said open throat to a predetermined printing position in front of said platen, and to subsequently release said platen and front-feed means to enable the platen to return to printing position and said throat to closed-throat condition.

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