

March 5, 1940.

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2,192,610

SHEET FEEDING DEVICE

Filed Sept. 1, 1938

3 Sheets-Sheet 1

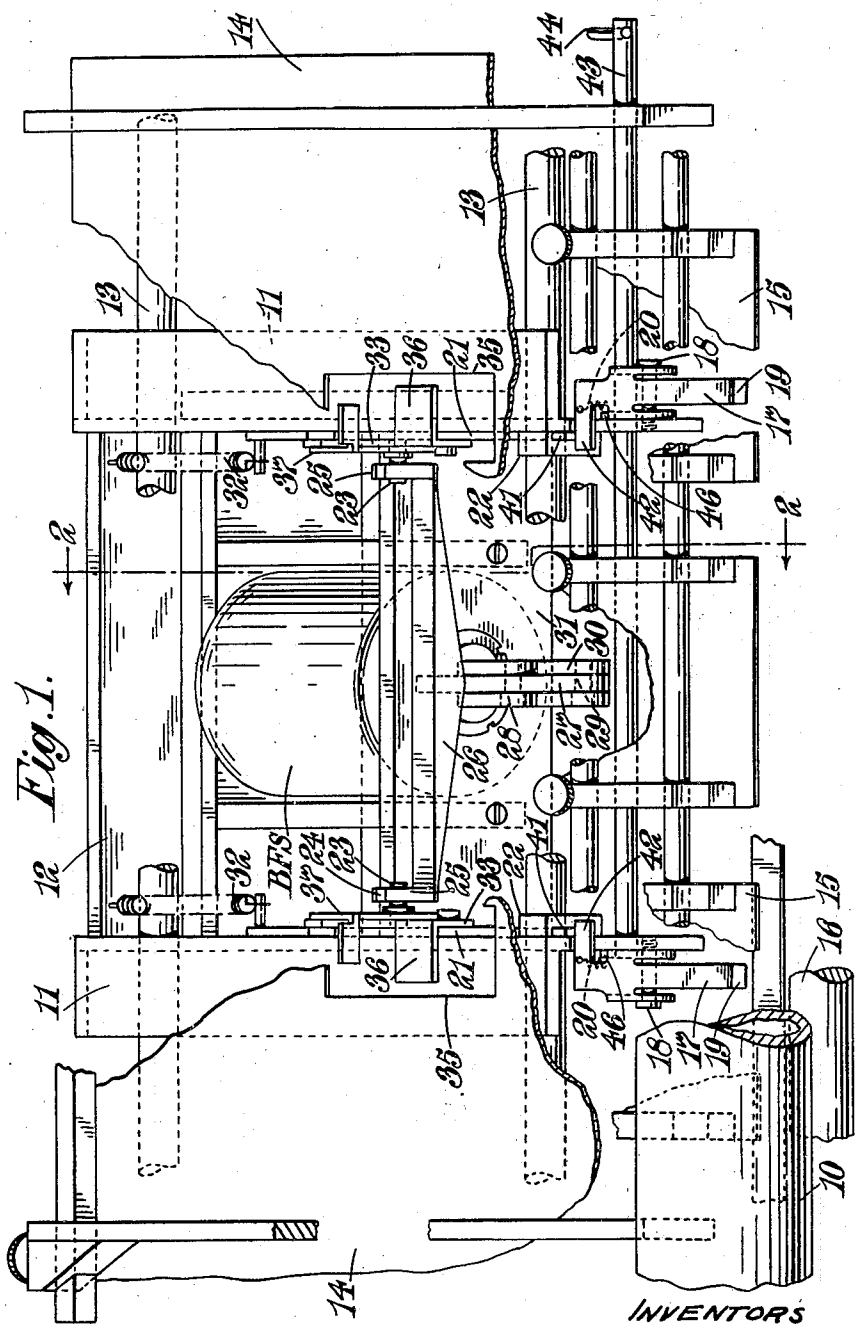


Fig. 1.

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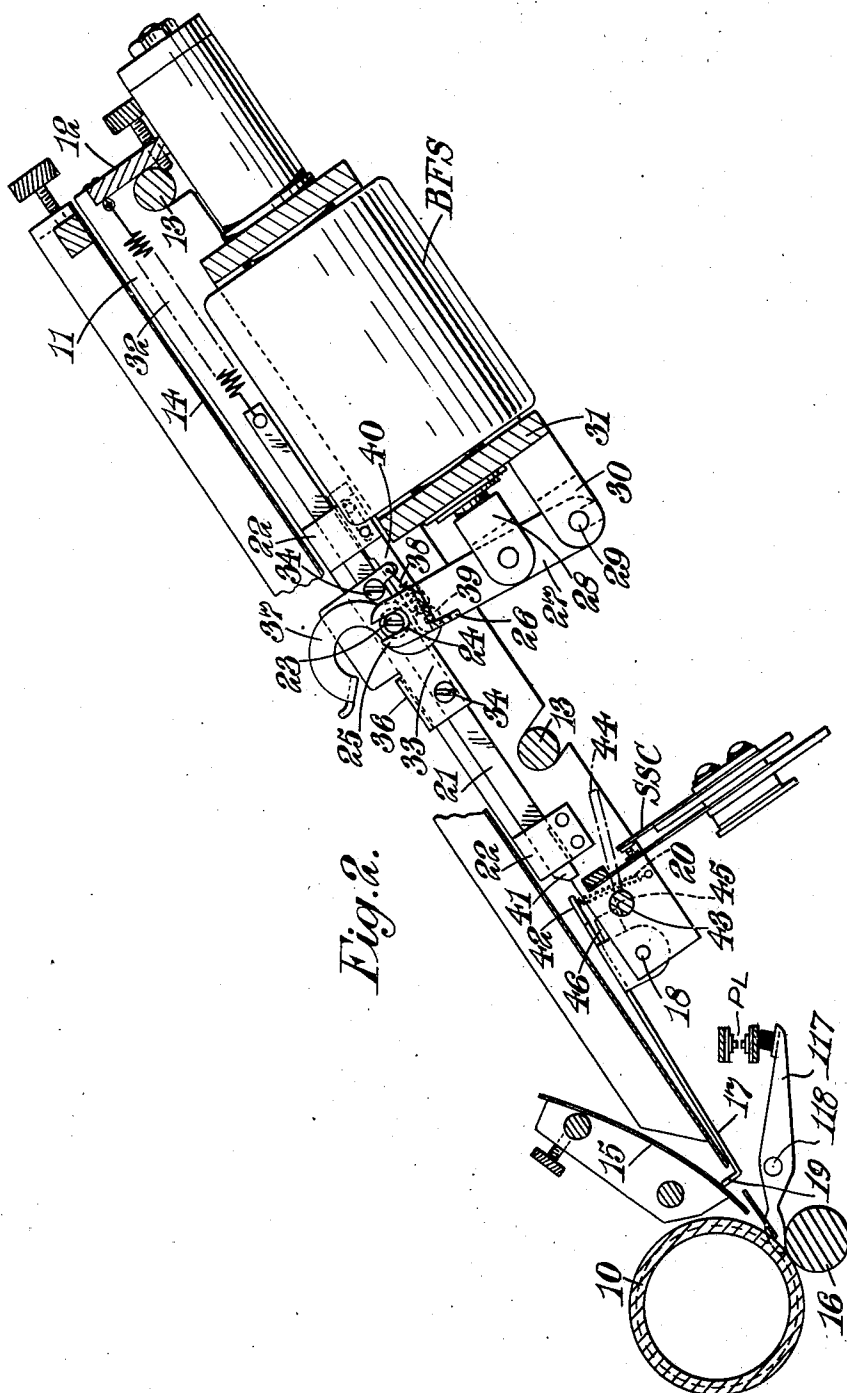
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3 Sheets-Sheet 2



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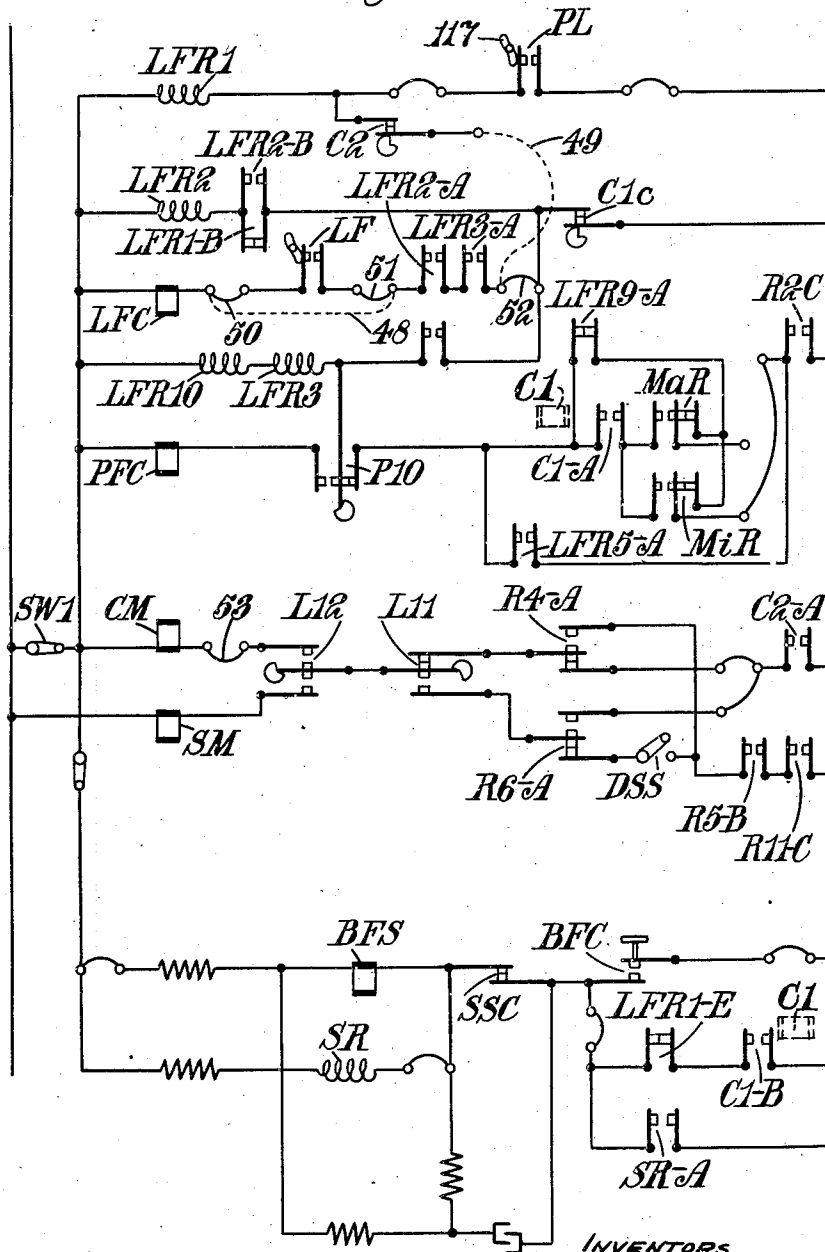
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3 Sheets-Sheet 3

Fig. 3.



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SHEET FEEDING DEVICE

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Application September 1, 1938, Serial No. 228,000
In Great Britain September 8, 1937

10 Claims. (Cl. 271-18)

This invention relates to sheet-feeding mechanism for calculating, accounting, and like machines of the kind having a printing mechanism, comprising a platen or other rotary feeding member (hereinafter referred to as the platen), line spacing mechanism for rotating the platen step by step to line space a paper sheet on which printing is to be effected, and long-feed mechanism for feeding the platen continuously in order to eject one sheet and to feed the following sheet to the printing position. The long-feed mechanism is brought into action when the last line of printing, for example, the printing of a total, is effected on the sheet and is put out of action when the next sheet reaches the proper position for printing to be effected on its first line.

It is an object of the present invention to provide the combination with the platen of a machine of the above kind, of a support for a sheet, inserting means automatically operable to engage the sheet and feed it along the support to the platen, and means operable on the ejection of a sheet by the platen to bring the inserting means into action. With this arrangement, the operator has merely to lay a sheet on the support, and the sheet will then be fed to the platen automatically and brought by the platen to the proper printing position. Preferably, there is provided a stop for limiting movement of the sheet along the support towards the platen, and the inserting means comprises a gripper arranged to grip the sheet and movable towards the platen and means operable to move the stop out of the path of the sheet when the gripper is moved towards the platen. The support is preferably inclined so that the sheet will tend to seat itself against the stop by gravity.

A feature of the invention is the provision of devices which save time in inserting and removing record sheets. A second sheet may be placed on the supports under a first sheet while said first sheet is wrapped around the platen and being printed upon. The supports for the second sheet are arranged to be automatically brought into operation to engage the second sheet with the platen feeding devices as soon as the first sheet is ejected. Thus, time is saved by making it possible to feed the sheets in succession with a smooth unhalting mode of operation.

Further objects of the instant invention reside in any novel feature of construction or operation or novel combination of parts present in the embodiment of the invention described and shown in the accompanying drawings whether within or without the scope of the appended claims and ir-

respective of other specific statements as to the scope of the invention contained herein.

A construction of sheet inserting mechanism in accordance with this invention will now be described, by way of example only, with reference to the accompanying drawings in which:

Fig. 1 is a front elevation of the mechanism with parts broken away to show the underlying mechanism.

Fig. 2 is a section on the line 2-2 of Fig. 1, and

Fig. 3 is a circuit diagram of the electrical controls for the mechanism.

The mechanism will be described as incorporated in a sheet-feeding mechanism of the kind described in U. S. application Serial No. 202,220, filed April 15, 1938, by Harold H. Keen. In this sheet-feeding mechanism there is a platen which may be rotated step by step by line spacing mechanism or continuously by a long-feed mechanism. The long-feed mechanism is brought into action by engaging a paper-feed clutch which is engaged on the energization of a magnet PFC (Fig. 3). The long-feed mechanism is put out of action and the platen brought to rest by energizing a magnet LFC (Fig. 3) which engages a clutch to cause a shaft (not shown) to rotate. This shaft carries a cam that disengages the paper-feed clutch after the shaft has turned through a predetermined angle and the platen has also turned through a predetermined angle from the position it occupied when the magnet LFC was energized. Provision is made for energizing the magnet PFC when a total is printed, so that the platen is then rotated to eject one sheet. The magnet LFC is energized when the next sheet is a predetermined distance from the position it should occupy for the printing of the first line on it.

The sheet-inserting mechanism comprises a frame consisting of two angle bars 11 connected together by a bar 12 and detachably supported on cross bars 13 secured to the frame of the machine. A table 14 is supported above this frame. The table 14 is inclined and slopes downwardly towards the platen 10. A guide-plate 15 extends across the lower end of the table and serves to guide a sheet which is slid down the table into the bight between the platen and a number of pressure rollers 16. Two stop levers 17 are pivoted each on a pin 18 screwed into one of the angle bars 11 and their free ends 19 are bent upwardly to project above the lower edge of the table 14 and engage the guide plate 15. Springs bias the stop levers 17 into this position. A

sheet may be placed on the table 14 and slid down the table until its leading edge engages the upturned ends 19 of the stop levers which limit its movement towards the platen 10. The sheet will remain in this position under the influence of gravity which tends to cause it to slide down the table.

Two slide bars 21 are mounted to slide in suitable bearings 22 secured to the angle bars 11. Each bar 21 has a pin 23 which engages a slot 24 in an upturned ear 25 of a cross-head 26. The cross-head 26 has a central arm 27 pivoted on the movable core 28 of a solenoid BFS and also pivoted by an open slot on a pin 29 carried by a lug 30 on a cross member 31 of the frame 11, 12. The solenoid BFS is fixed to the frame 11, 12 and, when energized, moves its core 28 to rock the arm 27 about the pin 29. As the point of articulation between the arm 27 and the core 28 of the solenoid will move in a straight line, the connection between the arm 27 and the lug 30 comprises a pin-and-slot joint to allow for the arcuate movement of this part of the arm 27. The rocking movement of the arm 27 and cross-head 26 causes the slide bars 21 to move parallel to the table 14 towards the platen 10. These bars are connected to the bar 12 by suitable springs 32 which serve to move them towards the top of the table and away from the platen 10 and also to restore the cross-head and the core of the solenoid to its normal position.

A gripper pad 33 is detachably secured to each slide bar 21 by screws 34 and projects through a suitable slot 35 cut in the table with an upper gripping surface 36 in the plane of the table 14. When a sheet is placed on the table 14 against the upturned ends 19 of the stop levers 17, the gripper pads lie under the upper trailing margin of the sheet. In order to suit different lengths of sheet, each slide bar 21 may have alternative screw holes to receive the screws 34 so that each gripper pad 33 may be secured to its slide bar 21 in any one of a number of positions. As shown, the pins 23 are screwed each into one of the gripper pads 33. If the latter are made adjustable, the pins connecting the slide bars 21 to the cross-head 26 should be screwed each directly into its slide bar at a point outside the range of adjustment of the gripper pads. A gripper lever 37 is pivotally mounted on each gripper pad 33 by means of the pin 23 on that pad and is biased by a spring 38 towards the gripping surface 36 of its pad, so that the upper margin of the sheet is gripped. When the slide bars 21 are in their normal upper position, a tail 39 (Fig. 2) on each gripper lever 37 engages an adjustable stop 40 which serves to rock the gripper lever 37 away from the gripping surface 36 on the pad, so that a sheet may be placed upon the table against the upturned ends 19 of the stop levers 17 and with its upper margin overlying the gripping surfaces 36 of the gripper pads.

When the solenoid BFS is energized, it rocks the cross-head 26 and moves the slide bars 21 downwardly towards the platen 10. During the first part of its movement, the gripper levers 37 are rocked by their springs 38 to grip the upper margin of the sheet, since they move away from the adjustable stops 40 which are engaging their tails 39. Just before the gripper levers grip the sheet or at about the same instant, the leading ends 41 of the slide bars 21 engage rearwardly-extending parts 42 of the stop levers 17 and rock the stop levers to move their upturned ends 19

below the level of the table 14. As the slide bars 21 are moved further, the sheet is gripped and fed down the table until its leading end enters the bight between the platen 10 and the pressure rollers 16 which are rotating. The platen then feeds the sheet forwardly. As the slide bars 21 approach their extreme forward position, a shoulder on one of them engages and opens a pair of contacts SSC which break the circuit of the solenoid, so that it is deenergized. The parts are then restored to their normal position by the springs which retract the slide bars.

In order to allow of the sheet being inserted manually, a cross-shaft 43 is provided which can be rocked manually by a lever 44 and which has flats 45 (Fig. 2) cooperating with projections 46 of the stop levers 17 and serves, when rocked, to cam the stop levers and to move their upturned ends out of the path of the sheet. When the mechanism is operating with short sheets, the trailing end of the sheet overlies the table 14 but is supported away from the table by the upturned ends 19 of the stop levers 17, so that a new sheet can be inserted manually under the trailing end of the sheet that is around the platen and against the upturned ends of the stop levers. When operating with long sheets, however, the trailing margin of the sheet may lie on the table and render it difficult to insert a new sheet. To overcome this difficulty, the table is preferably provided with two or more light springs (not shown) which tend to project in the form of a bow above the top of the table and support the trailing edge of the sheet which is around the platen. This causes the trailing margin of this sheet to project upwardly so that a new sheet can be placed under it. The springs are so light that the weight of the new sheet is sufficient to make them fall flat against the table.

When the present improvements are applied to a machine of the kind known commercially as the "Hollerith total rolling machine," the circuits for controlling the operations of the platen may be arranged exactly as described in the application referred to hereinbefore. The circuits for controlling the solenoid will be as follows:

A Hollerith total rolling machine is controlled by perforated record cards and the machine is started and feeds the first card to lower brushes by which the amounts are read from the card. Card feeding then stops and the machine performs idle cycles. A sheet is now placed on the table and a bill-feed key is depressed to close a pair of contacts BFC (Fig. 3). This key is preferably arranged at one side of the table for convenience of operation. The closure of the bill-feed key contacts BFC completes a circuit through the solenoid stop contacts SSC the solenoid BFS and a solenoid relay SR which is connected in parallel with the solenoid. The solenoid relay SR closes contacts SR-A in parallel with the bill-feed key contacts BFC to maintain the solenoid and itself energized after the bill-feed contacts open. The solenoid is thus energized and the sheet is fed to the platen as previously described. Near the end of its feeding movement, the solenoid stop contacts SSC are opened to deenergize the solenoid and the solenoid relay. The contacts SR-A of the relay will then open and the parts actuated by the solenoid will be restored to their normal position. The platen will then feed the sheet into the proper position for printing exactly as de-

scribed in the prior specification. As soon as the sheet is properly positioned, the machine will be conditioned to resume card feeding, and printing will be effected on the sheet.

After a group of cards have been read, the machine automatically performs a plurality of total printing cycles. In the last of these cycles which is known as cycle 1, the magnet PFC is energized to render the long-feed mechanism operative, so that the platen rotates to eject the sheet. As explained in the prior specification, the mechanism is provided with a paper lever 117 (Fig. 2) which engages the paper surrounding the platen to hold contacts PL (Fig. 3) closed. When the end of the sheet passes this paper lever, the contacts PL open. So long as the contacts PL are closed, they maintain a relay LFR1 energized. This relay LFR1, when energized, opens a pair of contacts LFR1-E which are in a shunt around the bill-feed key contact BFC. This shunt also includes a pair of contacts C1-B of a relay C1 which is energized during the total printing cycle 1. The contacts C1-B are closed when the cycle control relay C1 is energized, that is during cycle 1. Thus, when the contacts PL open and deenergize the relay LFR1, the contacts LFR1-E of this relay will close to complete a circuit through the contacts C1-B, the solenoid stop contacts SSC and the solenoid BFS and solenoid relay SR in parallel. The solenoid BFS then causes the new sheet to be fed to the platen. Thus, the second sheet is automatically brought to the platen as soon as the first sheet is ejected.

In the prior application, each sheet might have a variable number of lines already printed and a step is cut in the margin of the sheet to indicate the position of the highest blank line. This step cooperates with a line-finding lever to close contacts LF (Fig. 3) which energize the magnet LFC which determines the extent to which the platen feeds the sheet to bring the first blank line to the printing position. For this type of operation the plug connections are made as shown in full lines on Fig. 3.

The present arrangement is, however, also applicable where the sheets do not have a variable number of lines already printed but are merely provided with a heading of predetermined length, so that the first blank line is at a constant distance from the leading edge of the sheet. In such cases the plug connections 50, 51, 52 and 53 are omitted and plug connections 48 and 49 are made instead. The magnet LFC is energized over the circuit which includes the contacts LFR2-A, LFR3-A, a plug wire 49, cam contacts C2 and the paper lever contacts PL. The contacts C2 are normally closed and are opened by a cam which is driven through the clutch engaged by the magnet LFC. The magnet LFC will thus be energized immediately when the leading edge of a new sheet reaches the paper lever and causes the paper lever contacts PL to close. The contacts C2 open to break the circuit to the magnet LFC before the mechanism controlled by this magnet completes a cycle of operations and then remake. The relay LFR2 is also deenergized by contacts C1c of the prior application, so that its contacts LFR2-A open while contacts C2 are open. This breaks the circuit to the magnet LFC, so that the mechanism which it controls will only perform one cycle of operation.

With the arrangement just described, the punch, referred to in the prior application, for cutting the steps in the margin of the sheet is

rendered inoperative by the omission of the plug connection 53 in series with the magnet CM which actuates the punch.

Except as described above, the circuits operate in the way described in the prior application. These circuits need not be described therefore but the relays and contacts in them have been designated so that the operation of the circuits can be understood from the prior application.

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

What is claimed is:

1. In a machine for feeding record sheets, means for holding a record sheet, means for supporting a second sheet before it reaches said holding means, inserting means movable with respect to said supporting means to bring the second sheet to said holding means, means for initiating operation of said holding means to eject the record sheet, contacts closed during the ejection of the record sheet from the holding means, and electrical devices operable under control of said contacts for automatically operating said inserting means to bring said second sheet to said holding means when the record sheet is ejected therefrom.

2. In a machine for feeding record sheets, means for holding a record sheet, means for supporting a second sheet before it reaches the holding means, a stopping means for limiting movement of said second sheet along the supporting means towards the holding means, inserting means movable with respect to said supporting means and comprising a gripper arranged to grip said second sheet and move it towards the holding means, means for initiating operation of said holding means to eject the record sheet, and means under control of said initiating means for automatically operating said inserting means to bring said second sheet to said holding means when the record sheet is ejected from the holding means, and means operable to move the stopping means out of the path of the sheet when the gripper is moved towards the holding means.

3. The combination according to claim 2, in which the gripper comprises a part affording a gripper pad on which the sheet may lie, movable towards and away from the holding means, and arranged to engage the stopping means as it moves towards the holding means and move the stopping means out of the path of the sheet, a gripper lever pivoted on said part and spring-biased to engage the gripper pad and means arranged to be engaged by the gripper lever when said part is moved away from the holding means to its fullest extent and to rock the gripper lever away from the gripper pad.

4. In a machine for feeding record sheets, a platen, means for supporting a sheet before it reaches said platen, a slide with grippers for moving said sheet towards the platen, a solenoid with a plunger attached to said slide for moving it and the sheet towards the platen when energized, means for automatically energizing said solenoid, means for automatically deenergizing

said solenoid, and a spring for retracting said slide when the solenoid is deenergized.

5 In a machine for feeding record sheets, sheet-feeding rollers, means for inserting a sheet
10 between said rollers, a magnet for operating said inserting means, and cyclically controlled contacts in series with said magnet for controlling the energization thereof to cause operation of said inserting means after a predetermined number of cycles of the machine.

6. In a machine for feeding record sheets, sheet-feeding rollers, means for inserting a sheet between said rollers, a magnet for operating said inserting means, means for energizing said magnet to insert a sheet comprising contacts in series with said magnet opened by said inserting means during the inserting operation to deenergize said magnet.

7. In a machine for feeding record sheets, a platen and pressure rollers cooperating therewith, means for inserting a sheet between the platen and said rollers, a magnet for operating said inserting means, means for automatically energizing said magnet to operate the inserting means to insert a sheet, normally open contacts in series with said magnet, and a key for closing said contacts to energize said magnet manually.

8. In a machine for feeding record sheets, a platen, means for sensing when the end of a sheet is passing said platen, means for inserting a second sheet around said platen, a magnet for controlling operation of said inserting means, and contacts in series with said magnet and closed by said sensing means to initiate operation

of said sheet inserting means when a sheet is ejected.

9. In a machine for feeding record sheets, means for holding a record sheet, means for supporting a second sheet away from said holding means, a stopping means for limiting the movement of said second sheet towards the holding means, an inserting means for moving said second sheet from the supporting means to said holding means, means for operating said inserting means, means under control of said inserting means for moving said stopping means out of the path of said second sheet in the first part of the inserting operation, means for retracting said inserting means, and means under control of said inserting means for disabling said operating means and initiating operation of said retracting means late in the inserting operation.

10. In a machine for feeding record sheets, means for holding a record sheet, means for supporting a second sheet away from said holding means, a stopping means for limiting the movement of said second sheet towards the holding means, an inserting means for moving said second sheet from the supporting means to said holding means, means for operating said inserting means, means under control of said inserting means for moving said stopping means out of the path of said second sheet when said second sheet is inserted automatically, and other means for moving said stopping means out of the path of a second sheet when the sheet is to be inserted manually.

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