July 4, 1933. J. M. CUNNINGHAM 1,916,965

CARD HANDLING MACHINE

Filed Sept. 6, 1929 4 Sheets-Sheet 1

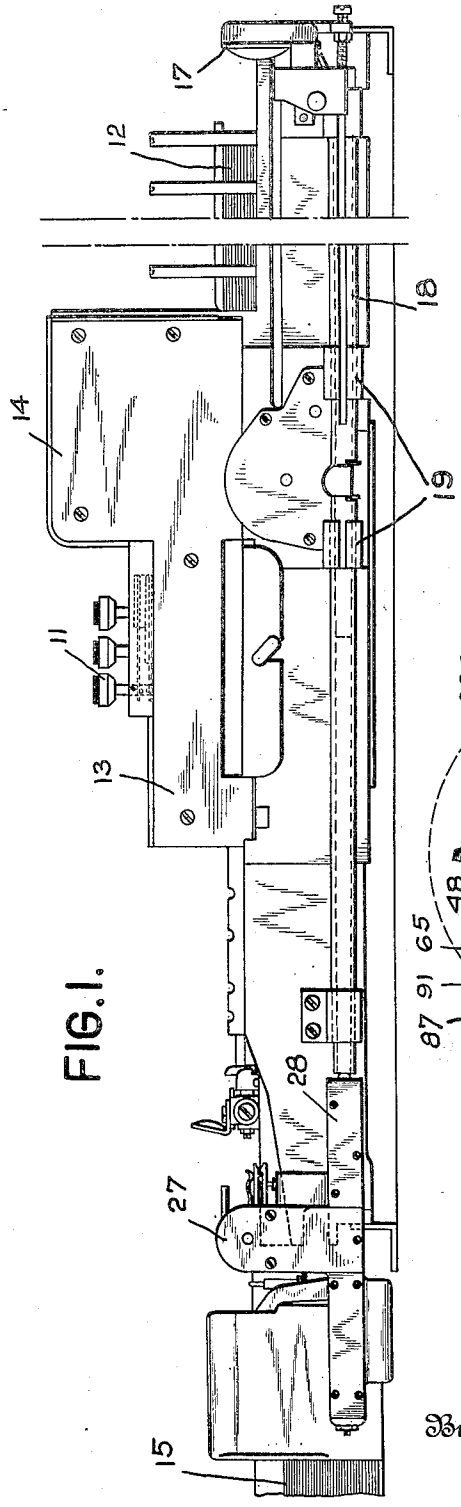


FIG. 1.

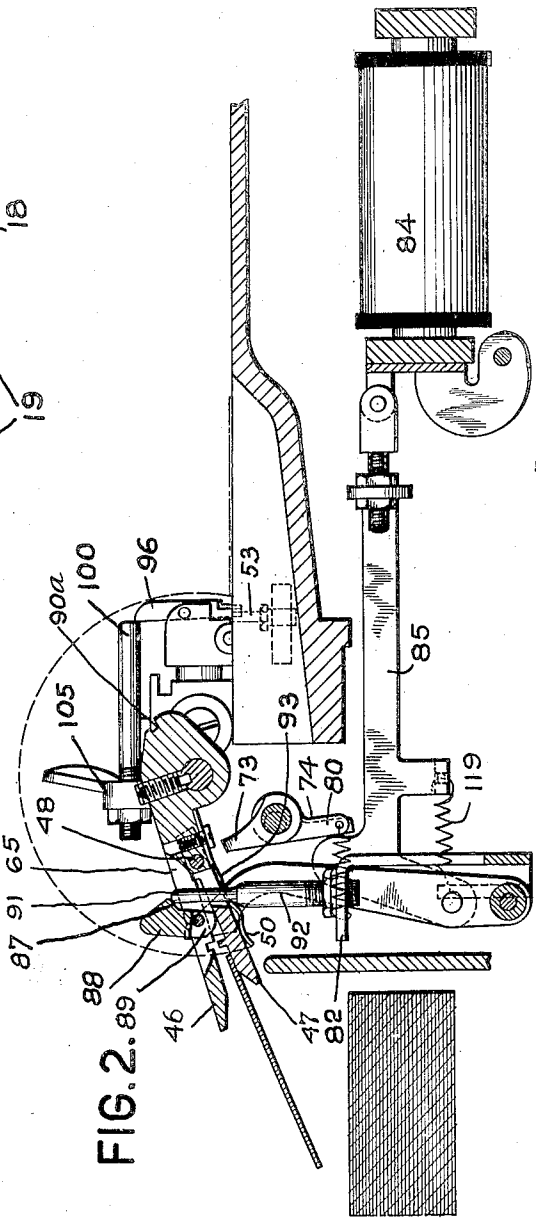


FIG. 2.

Inventor

James M. Cunningham

By his Attorney

A. C. Mabey

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CARD HANDLING MACHINE

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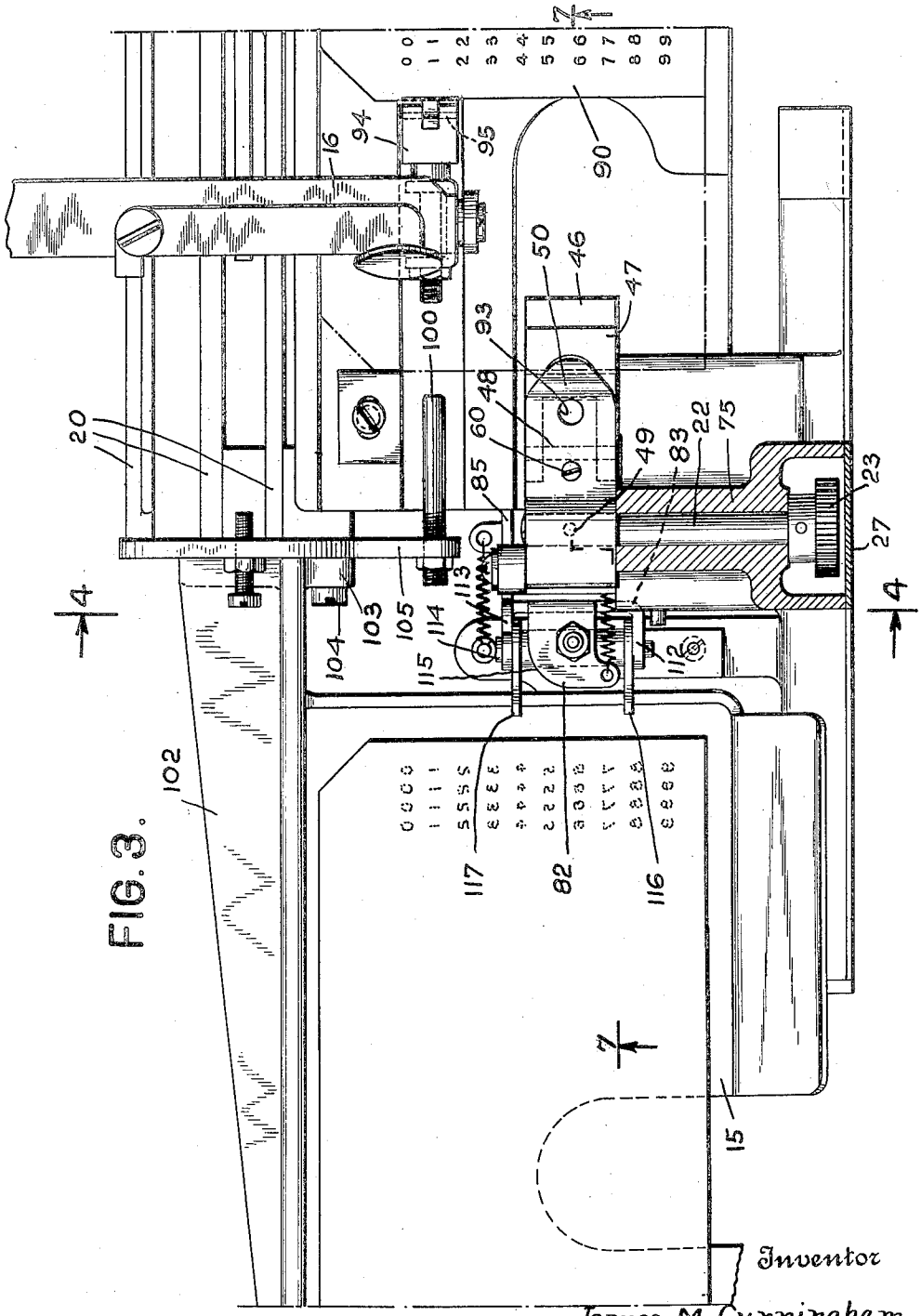


FIG. 3.

Inventor
James M. Cunningham
By his Attorney
A. O. Maby

July 4, 1933. J. M. CUNNINGHAM 1,916,965

CARD HANDLING MACHINE

Filed Sept. 6, 1929 4 Sheets-Sheet 3

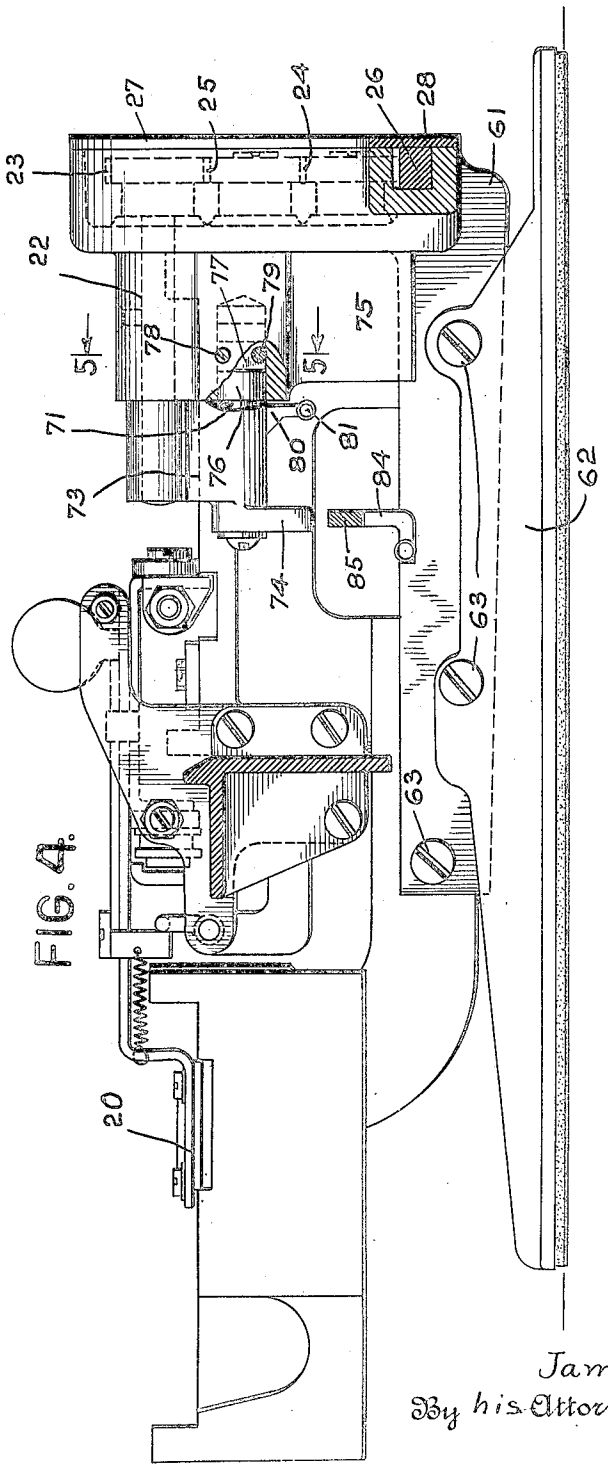


FIG. 4.

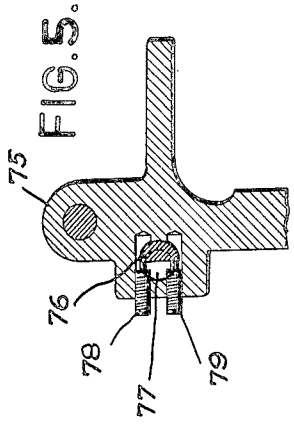


FIG. 5.

Inventor
James M. Cunningham
By his Attorney
A. A. Mabey

July 4, 1933. J. M. CUNNINGHAM 1,916,965

CARD HANDLING MACHINE

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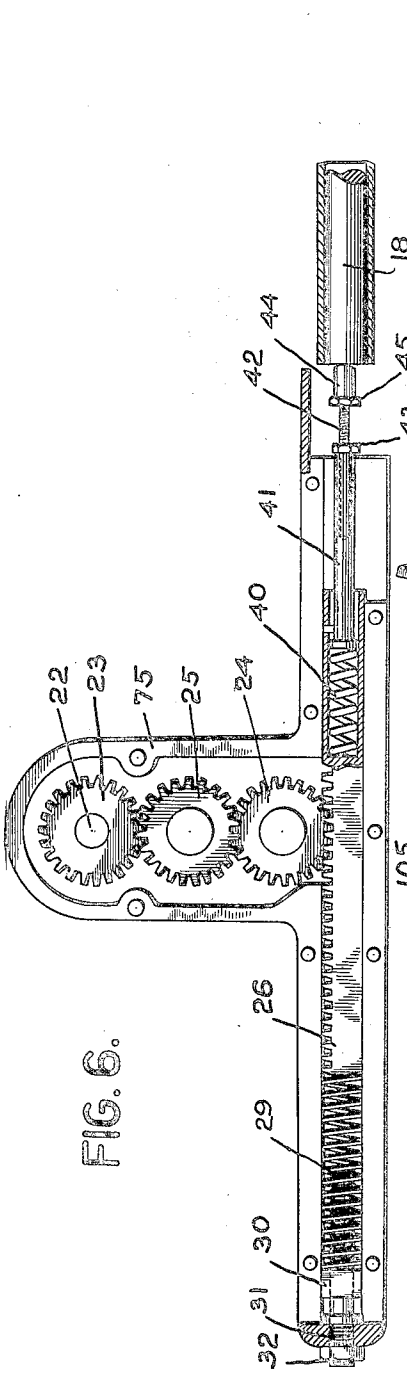


FIG. 6.

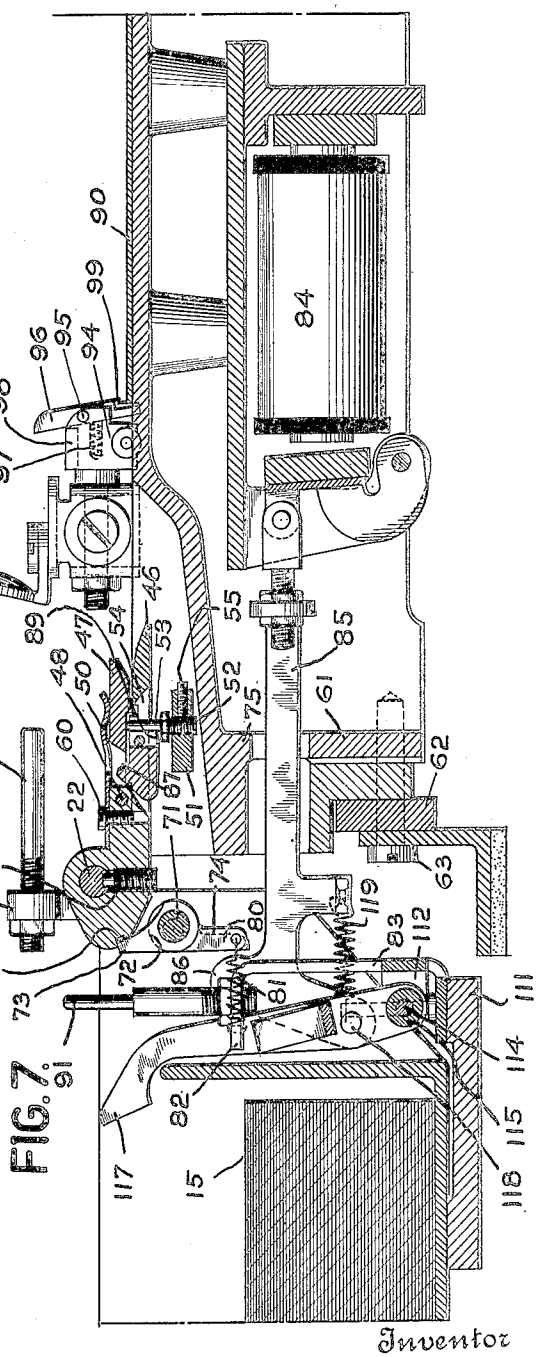


FIG. 7.

Inventor

James M. Cunningham

By his Attorney

A. O. Maby

Patented July 4, 1933 1,916,965

UNITED STATES PATENT OFFICE

JAMES MASON CUNNINGHAM, OF SAN PEDRO, CALIFORNIA, ASSIGNOR TO THE TABULATING MACHINE COMPANY, OF ENDICOTT, NEW YORK, A CORPORATION OF NEW JERSEY

CARD HANDLING MACHINE

Application filed September 6, 1929. Serial No. 390,755.

This invention relates to record handling machines and more particularly to a device for automatically ejecting records from a punching machine, tabulating or the like after they have been operated upon. The invention is particularly adapted to card punching machines from which the cards are ordinarily manually removed after the punching operation.

The present invention relates specifically to an improvement upon the type of ejector shown in the copending application of E. F. W. Richter, Serial No. 166,626 filed February 8, 1927. The above shows a machine in which manual removal of the cards is eliminated and automatic means are provided for ejecting each card into a receptacle immediately after the completion of the punching operation.

The main object of the present invention is to provide an improved and simplified means for removing cards from a card handling machine.

Another object of the invention is to provide a stripping mechanism which automatically and positively removes the cards from a gripping device provided to remove the cards from the machine.

A further object is to provide an improved releasing device which calls the ejector into operation as an incident to energization of a magnet which lends itself more easily to any selected system of control.

Further objects reside in an improved structural arrangement of the parts, particularly the means provided to separate the jaws to facilitate the stripping of the card from the ejector, and the means for re-latching the gripper, the latter having provisions for allowing an overmovement of the finger piece after the ejector has been re-latched.

Other objects and advantages will be seen from the following specification and drawings in which:

Fig. 1 shows a side elevation of the illustrative machine which is provided with an ejecting device constructed according to the present invention;

Fig. 2 shows the ejecting device more in detail and in operated position;

Fig. 3 is a top plan view of a part of the machine illustrating the coordination of the ejecting mechanism with the punching machine;

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

Fig. 5 is a sectional view taken on line 5—5 of Fig. 4 and shows a detail of the ejecting device;

Fig. 6 is a detail view of the actuating mechanism for the ejector;

Fig. 7 is a longitudinal sectional view taken on line 7—7 of Fig. 3.

For the purpose of clearly disclosing the purpose of the invention it has been shown as applied to a duplicating punch of the type described in the copending application of F. Lee and B. Phillips, Serial No. 34,516 filed June 3, 1925. The operation of the punch is fully explained in that and other applications but will be described in the present case in sufficient detail to explain its functional and structural co-ordination with the ejector mechanism.

In Fig. 1 a stack of blank record cards is designated at 12. The cards are fed singly by the feeding mechanism to the punching section 13 where they are punched in different columns. The punching mechanism comprises a single row of punches, which may be manually controlled by keys 11 or automatically by a set of controlling magnets provided in a housing 14, which magnets, in turn, are under the control of a perforated master card. The feeding mechanism comprises a carriage for feeding the card relatively to the single row of punches as is well known in this type of punching machines. When the last column of the card has been punched and the card fed a step to the extreme left position by the carriage, the ejecting mechanism according to this invention will grip the card and deliver it to a receptacle 15 where all punched cards are collected.

The improvements are preferably applied to the type of punching machine shown in the patent to Lee & Phillips 1,772,186, dated August 5, 1930, although it will be clear from the subsequent description that many of the

improvements may be applied to other forms of machines, singly, or in combination.

The feeding carriage for the cards includes a picker knife and a feeding element which transports cards singly from the supply hopper 12 to the carriage which in turn moves the blank card step by step past the punches. When the carriage is at the extreme left position it may be restored to initial punching position by moving handle 17 to the left. Handle 17 is slidably mounted on the machine and has suitable connections to shift a rod 18 (see also Fig. 6) which is guided in brackets 19 fast to the machine frame. Rod 18 cooperates with the card carriage as described in detail in the aforementioned application to Lee and Phillips and moves the carriage to the right in order to receive the bottom card fed from the supply hopper 12 so that this card may be fed to the left step by step past the punches upon subsequent actuations of keys 11 or the controlling magnets. These magnets are controlled by a master card which is carried by an auxiliary carriage generally designated by numeral 20 (Figs. 3 and 4) which is fed in unison with the blank card.

The auxiliary card carriage is suitably connected with the main card carriage for a simultaneous movement.

To the left end of the machine frame there is attached a casting 75 (Figs. 3, 4 and 7) which carries most of the parts of the ejector mechanism. This casting includes a cross bar 61 (Figs. 4 and 7) which is clamped between foot 62 and the frame of the punching machine by means of screws 63. In the top part of casting 75 is rotatably mounted a shaft 22 (Fig. 6) having a gear 23 fixed thereto at one end. Gear wheel 23 drives gear wheel 24 through an idler gear 25, gear 24 in turn meshing with a rack bar 26 (Fig. 6). Gears 23, 24 and 25 fit in a recessed portion of the casting 75, said recess being normally covered by a plate 27 (Fig. 4). Bar 26 is square sectionally and is slidably mounted in a recessed groove of said casting which groove is covered by plates 28 (Figs. 1 and 4). The left end of bar 26 (Fig. 6) coacts with a spring 29 which tends to move the bar to the right. At its opposite end the spring abuts a threaded block 30 in which passes an adjusting screw 31. This screw is passed through a hole formed into the left terminal portion of casting 75 and its projecting end is threaded. When the screw 31 is turned the block 30, which is restrained from turning by reason of its square shape, feeds along the screw and adjusts the tension of spring 29. The screw 30 is locked in its position of adjustment by a lock nut 32.

Fitting in a socket 40 (Fig. 6) in the right hand end of rack bar 26 is a spring urged plunger rod 41 which is tapped to receive a screw 42. The screw may be adjusted and locked in position by a nut 43. The right hand terminal of screw 42 is formed with a head 44 having a hexagonal portion 45 by means of which the screw 42 may be turned for adjustment. Head 44 coacts with rod 18 actuated by the handle 17 which, as has been previously explained, effects the restoring movement of the card feeding carriage. Rod 18 is in its extreme right position when the card carriage carrying the blank card is in left hand position and consequently bar 26 is also at its extreme right position. When handle 17 and rod 18 are moved to the left the card carriage is moved into initial punching position and simultaneously therewith bar 26 is moved to the left against the tension of spring 29 as shown in Fig. 6. This causes gear 23 (Fig. 6) and shaft 22 to turn in clockwise direction to cause the gripping device to be moved into gripping position. The parts including the interconnected gearing 23, 24, 25, and bar 26 are locked in this position by a locking mechanism hereinafter described permitting rod 18 to be returned to its home or rightward position. When the carriage reaches its extreme left position subsequent to a plurality of punching operations said locking mechanism will be automatically released and under the influence of spring 29, rack bar 26 will be pushed to the right (Fig. 6) thus causing shaft 22 to turn in counterclockwise direction.

The gripper unit includes in its normal position shown in Fig. 7 a lower jaw 46 and an upper jaw 47 pivotally mounted by a pin 48 on jaw 46. Jaw 46 is fixed to shaft 22 by means of a screw 49. A plate spring 50 attached to upper jaw 47 by a screw 60 rests on top of the jaw 47 and tends to press jaw 47 against jaw 46. On the cross bar 51 of the machine frame is adjustably mounted a screw 52 carrying a pin 53. This pin projects through a hole 54 in jaw 46 and engages the underside of jaw 47 when the gripper unit is in the position shown in Fig. 7. Screw 52 is adjusted and locked in position by set screw 55 so that the upper and lower jaws are normally spaced apart to permit the punched card to pass in the slit or separation thus formed.

The operation of the gripping unit is placed under the control of a releasing mechanism. On a shaft 71 (Figs. 4 and 7) is loosely mounted a sleeve 72 having an integral latch bar 73 and a lever 74. Shaft 71 has an enlarged end portion 76 (Fig. 4) which fits loosely in the casting 75 and has a slot 77 (Fig. 5) into which pass two screws 78, 79. These screws prevent axial movement of the shaft but permit a limited rocking movement which may be varied by means of the screws. The associated latch bar 73 and lever 74 likewise have corresponding rocking movements. Sleeve 72 is also provided with an

integral arm 80 (Figs. 4 and 7) to which is connected a spring 81 anchored to a projection 82 of a sheet metal bracket 83 to bias the sleeve for rotation in one direction. In the position shown in Fig. 7 the latch bar 73 coacts with a shoulder 90a on the rear portion of jaw 46 this engagement being held by spring 81.

It should also be observed that the plunger 41 (Fig. 6) may have an independent movement subsequent to the latching operation, spring 40 being merely compressed during this overmovement. This eliminates any mechanical construction which requires the latching by bar 73 precisely at the moment finger piece 17 has reached its extreme leftward position.

When the card carriage reaches the extreme left position coincident with a punching operation in the last card column a magnet 84 is energized attracting its armature and shifting a link 85. Link 85 has a projection 86 in the plane of lever 74 to thus rock lever 74 counterclockwise (as shown in Fig. 2) which causes disengagement of latch bar 73 and the notch 90a in jaw 46. Shaft 22 which is now unlocked for movement turns counterclockwise under the pressure of spring 29 (Fig. 6), as has been previously described, and rotates the whole ejecting unit. It will be understood that before this turning movement is initiated the left hand edge of the card has been fed between the head portions of jaws 46 and 47 but not yet firmly gripped by the same. However, as soon as jaw 46 is released by latch bar 73 and the ejecting unit starts to rotate jaw 47 leaves pin 53 allowing spring 50 to press jaw 47 towards the jaw 46 so that the card is firmly held between the two jaws. The card is then flipped around by the released gripping unit and at the end of this movement the gripping unit and the card will be shifted to the position shown in Fig. 2.

In this position the head portion 91 of a pin 92 adjustably mounted on the lip 82 of bracket 83 passes through a hole 93 in spring 50 and an aperture 65 in jaw 47. The head portion 91 engages a shoulder 87 of a cam element 88 pivoted to jaw 47 at 86a and turns the element slightly counterclockwise (as seen in Fig. 2) so that a lower cam edge 89 separates jaws 46, 47 to release the card. When element 88 is turned to the position shown in Fig. 2 it will be retained in this position during the return movement of jaws 46 and 47 by the action of spring 50. At the termination of the restoration of the gripper unit the element 88 will strike pin 53 to shift it to the jaw closing position (see Fig. 7), pin 53 passing through a slot in the lower part of element 88 to retain the jaws 46–47 slightly separated to receive the next card fed.

Referring to Figs. 3 and 7 the carriage element 16 carries a block 94 in which is pivoted at 95 a lever 96 biased by a spring 97 against a stop shoulder 98. This arrangement is well known in the art and serves to facilitate insertion of the card into the carriage and to position the card accurately therein. When the card 90 is being inserted the left edge of the same encounters lower arm of lever 96 (Fig. 7) and turns the same slightly clockwise until the card edge catches beneath an angular cross bar 99. Lever 96 will then return to the position shown in Fig. 7 and hold the card in position. When the carriage reaches its extreme left position and shortly before the ejecting unit becomes operative, the lever 96 is automatically rocked slightly clockwise (see Fig. 2) by a pin 100 secured to a plate 105 to free the card from lever 96 and permit its removal from the carriage by the gripping device.

The rectangular receptacle 15 includes an angular extension 102 having a terminal plate 103 (Fig. 3) which is attached to the frame of the machine by means of screws 104. Between terminal plate 103 and the machine frame is clamped plate 105 which is thus fastened to the machine.

There has already been explained how the card is gripped by the gripper unit and flipped around to the position illustrated in Fig. 2 where it will be observed that the inclined position of the card permits it to drop freely in the receptacle 15. The above described mechanism is substantially like that shown and claimed in the patent to Richter, 1,803,977, dated May 5, 1931. It is preferable however to positively strip the card from the ejector jaws and push the card into the card receptacle and the devices provided to accomplish this operation will now be described in detail.

Attached to the bottom of receptacle 15 (Fig. 7) is a base 111 to which the previously mentioned sheet metal bracket 83 is fastened. This frame includes bent ears 112, 113 (Figs. 3 and 7). These ears support a shaft 114 upon which is rotatably mounted a sleeve 115 to which is secured upwardly extending stripper arms 116 and 117. Link 85 is connected at 118 to the stripper arm 117 so that when the magnet 84 is deenergized stripper arms 116, 117 will be urged by a spring 119 to the position shown in Fig. 7 but as soon as the magnet is energized the arms 116, 117 will be quickly moved to the right (as viewed in Fig. 2), the ejector unit in the meantime being swung to the flipped position. Deenergization of magnet 84 will then permit spring 119 to act to shift stripper arms 116–117 to the left to positively remove the card from the jaws and push it into the receiving receptacle.

While there has been shown and described and pointed out the fundamental novel features of the invention it will be understood

that many changes in the construction and variation in the embodiment of the same may be made without departing from the spirit of the invention. It is the intention therefore to be limited only by the scope of the following claims.

What is claimed is as follows:

1. In a card handling mechanism, in combination, means automatically operable for flipping and turning a card to an eject position, said means including provisions for automatically gripping the card while it is being flipped and movable means engaging the card to positively remove the card from said gripping means when said card is in the eject position.

2. In combination in a card ejecting mechanism, a pivotally mounted card gripping means having provisions for receiving a card when the gripping means is in one position, means for automatically gripping a card and shifting the same by imparting rotatable movement to the gripping means about its pivot and thereby positioning the card to an eject position, and pivoted automatic stripping means movable for engaging the card to positively remove the card from said gripping means when said card is in the eject position.

3. A card ejecting mechanism comprising a card gripping and ejecting mechanism having provisions for receiving a card brought into cooperation therewith, means for effecting a concurrent gripping and turning over of the card to an eject position, and reciprocable stripping means adapted to automatically in one of its movements strip the card from said gripping means by engaging the card when said card is in an eject position.

4. A card ejecting mechanism comprising a pivotally mounted gripper, means for holding said grippers separated to receive a card, means automatically operable after the entry of the card into the gripper for permitting the grippers to close to grip the card, means for shifting the grippers about the pivot point to flip the card to ejecting position, and pivotally mounted stripping means adapted to remove the card from said grippers upon completion of the shifting movement of said grippers.

5. A card eject mechanism adapted for cooperation with a movable card carriage to remove cards therefrom, said ejecting mechanism including grippers with provisions for shifting the same under the control of the card carriage to card receiving position, means operable as an incident to the positioning of the card carriage to a predetermined position for effecting gripping of the received card and removing it to an eject position, a stripping means engaging the card to positively remove the card from said gripping means and a spring released for action to move the stripping means.

6. A card eject mechanism adapted to receive a card after operations have been performed upon it and after a certain step by step advance of the card has occurred, said ejector comprising means for gripping a card when it reaches a predetermined position, means for shifting the gripping means to flip the card, means for thereafter opening said gripping means, and a movable stripping means automatically operative to positively remove the card from said gripping means.

7. In a machine of the character described, an ejecting device comprising in combination, a gripper for a card, resilient means for urging the gripper to flip a card, a detent normally holding the gripper in card receiving position against the action of the resilient means, means for moving the card into engagement with the gripper and for subsequently moving the detent out of detaining position thereby enabling the aforesaid resilient means to move the gripper to flip the gripped card, and a pivoted stripping means automatically operated when said card is in flipped position to engage the gripped card and positively remove it from said gripper.

8. In a machine of the class described, means for feeding records to a plurality of operating positions successively, means for automatically removing the records from the machine after movement from its last operated position, and means adapted to remove the record automatically from said removing means.

9. In a machine of the class described, means comprising a carriage for feeding records to a plurality of operating positions successively, means for automatically removing the records from the carriage after the feeding means reaches a predetermined position, and means adapted to eject the record from said removing means subsequent to removing of the cards from said carriage.

10. In a machine of the character described having a card receptacle, a carriage for feeding record cards, gripping means adapted to remove cards from said carriage and a pivoted reciprocable stripper mechanism having a fixed pivot and adapted in one of its movements to remove a card from said gripping means by engaging and shifting the card while in the gripper to permit it to be received by said receptacle.

11. The invention described in claim 10 wherein said gripping mechanism comprises a pair of pivotally mounted stripper arms coacting with the card, and an electrically operated device adapted to control the operation of the stripper arms.

12. In a machine of the class described the combination of a carriage adapted to feed a card, a gripper adapted to remove a card from the carriage and position it to an eject position and means for controlling said grip-

per, said means adapted to control the removal of said card from the gripper.

13. In a machine of the class described, the combination of a card carrying carriage, a gripper adapted to remove a card from said carriage, a power storing device adapted to operate said gripper, and a flexible connection between said carriage and said device.

14. In a machine of the class described, the combination of a gripper adapted to remove a card, a detent adapted to hold said gripper in card receiving position, manually operated means whereby said gripper is shifted to be engaged by said detent, and means for permitting an overmovement of said manually operated means with respect to said gripper.

15. In a machine of the class described, the combination of a pair of normally separated card receiving gripper jaws, means whereby said gripper jaws are shifted to eject a gripped card, and an element pivoted to one of said jaws adapted to be shifted to separate said jaws when said jaws are in shifted position.

16. In a machine of the class described, the combination of a pair of gripper jaws adapted to shift a card to an eject position and a shiftable camming element pivoted to one of said jaws and when shifted adapted to positively separate said jaws to permit free removal of the card from the jaws.

17. In a machine of the class described, the combination of a gripper adapted to receive a card and be shifted to position said card at eject position, means for controlling the operation of said gripper, and a card stripping means adapted to be shifted to a card stripping position by said controlling means.

18. In a machine of the class described, the combination of a gripper adapted to be operated to position a card at an eject position, a single magnet for controlling the operation of said gripper, said magnet also having provisions to effect the ejection of a card from said grippers.

19. In a machine of the class described, the combination of a gripper adapted to shift a card to an eject position, a card stripping device, and means for controlling said gripper and for positioning said card stripping device.

20. In a card handling mechanism, in combination, means automatically operable for flipping and turning a card to an eject position, said means including provisions for automatically gripping the card while it is being flipped, means comprising an arm shiftable for releasing said card from the gripping means when in eject position and means engaging the card for positively removing it therefrom for reception in a receptacle.

21. In a card handling machine, in combination, means for receiving a card from a carriage of a punching machine, and concurrently gripping it to shift it to an eject position, a coil spring for operating said means, and means engaging the card for stripping the card from the receiving means.

22. In a card handling machine, in combination, means for engaging a marginal edge of a card and turning it over while gripped by said means, and shiftable means for engaging said marginal edge to strip the card from said receiving means.

23. In a card handling machine, in combination, a carriage for feeding punched cards, pivoted means for engaging a marginal edge of a punched card while the carriage is in a certain position, means for shifting the card to an eject position, and reciprocable means engaging the edge of the card for stripping the card from the engaging means.

In testimony whereof I hereto affix my signature.

JAMES MASON CUNNINGHAM.