Sept. 5, 1950 R. H. HOLMWOOD ET AL 2,521,370

TABULATING CARD FABRICATING MECHANISM

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Fig. 2.

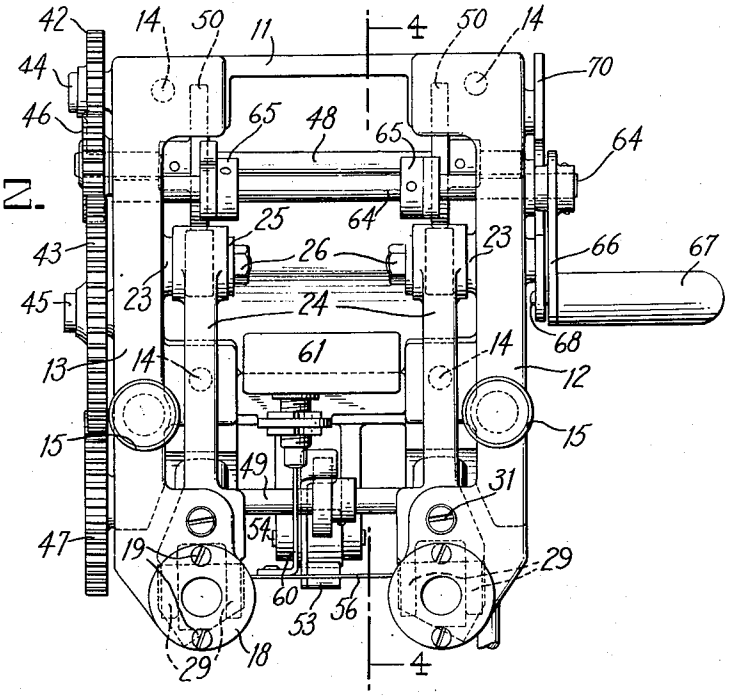
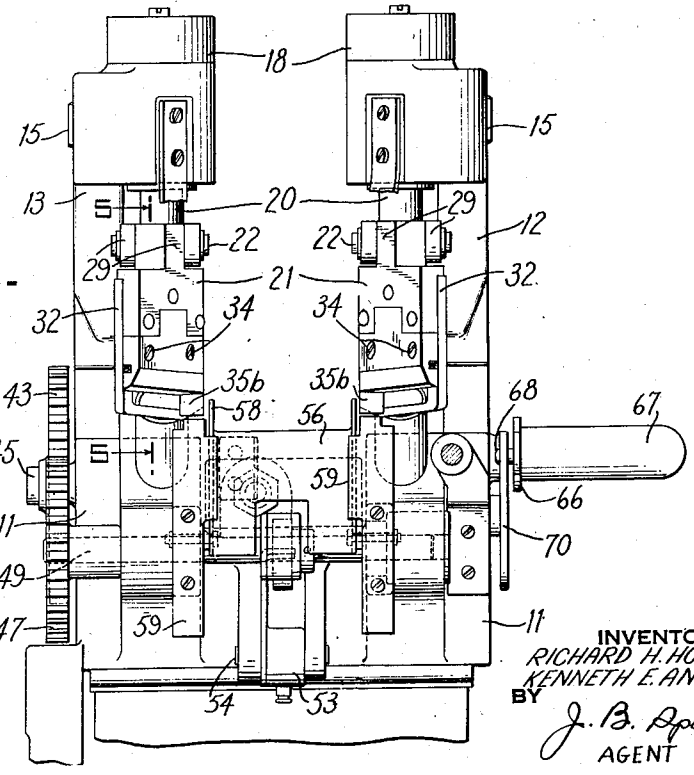


Fig. 1.



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Fig. 3.

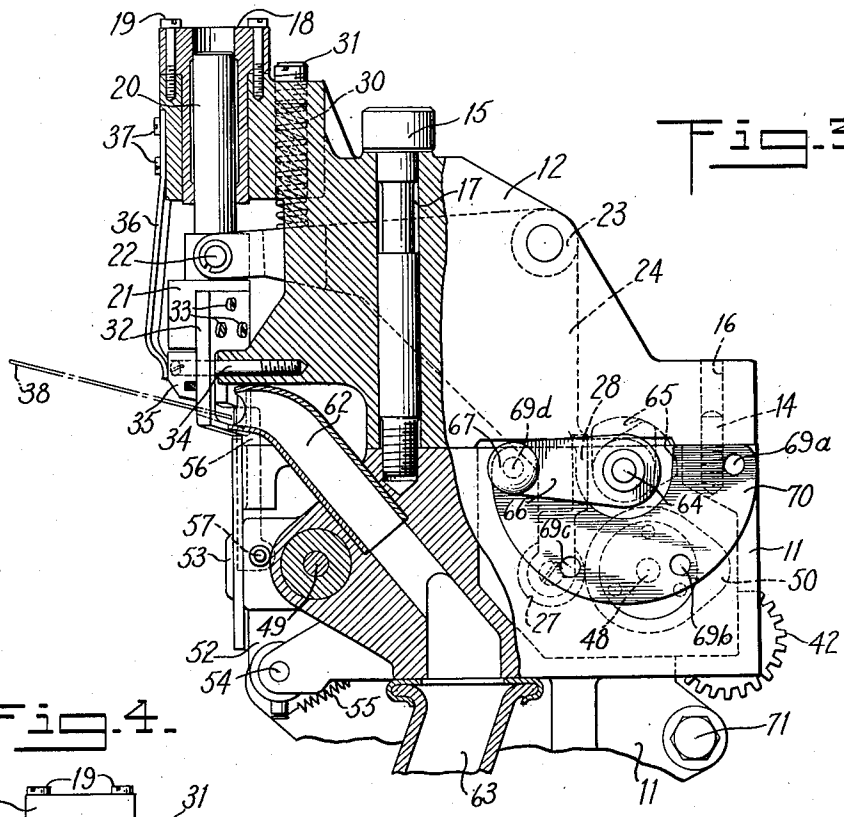


Fig. 4.

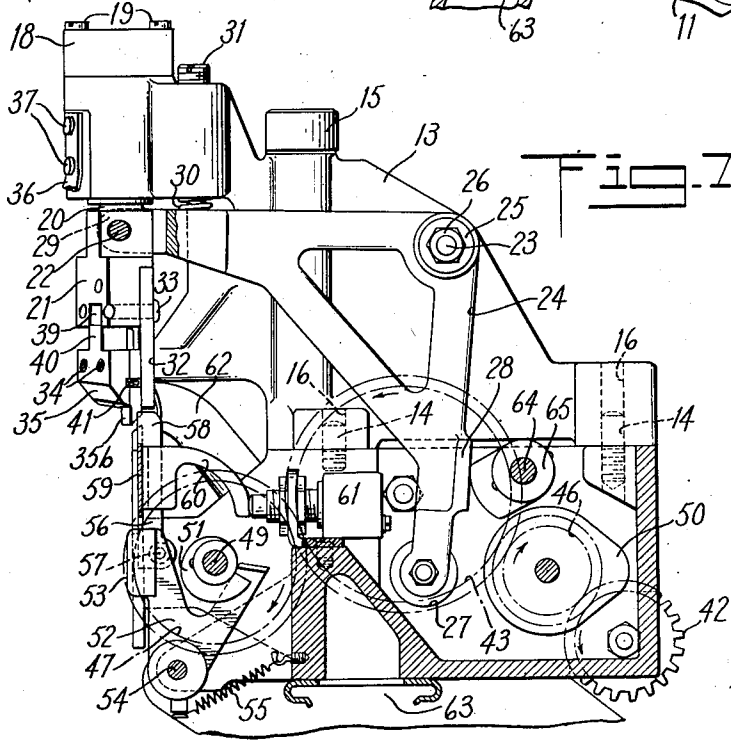
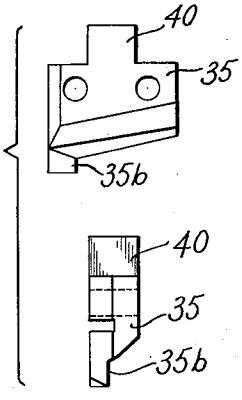


Fig. 7.



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Fig. 6.

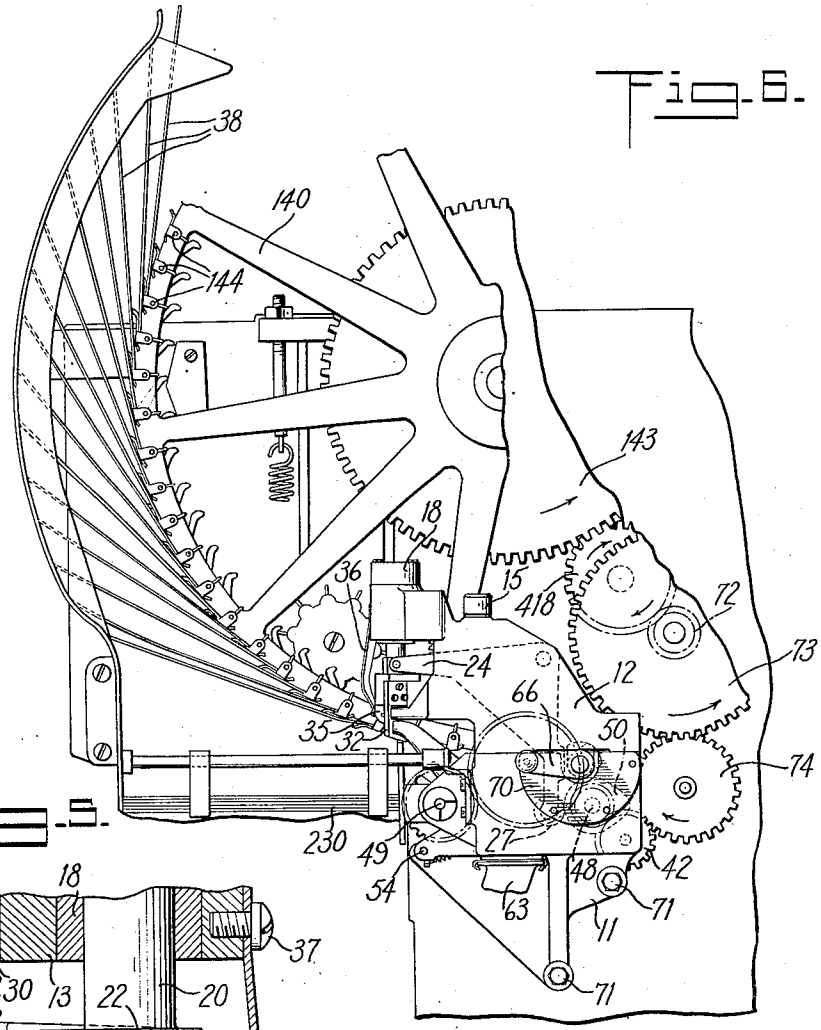


Fig. 5.

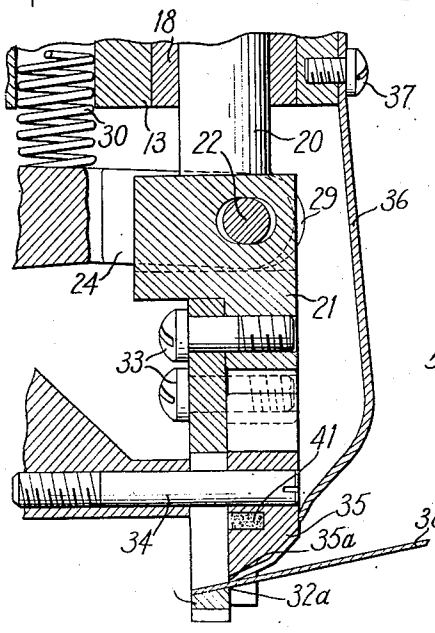
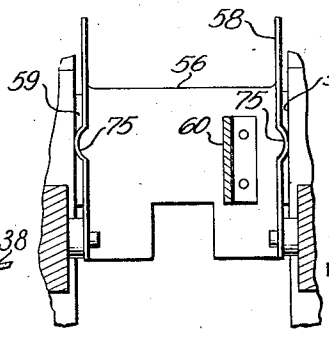


Fig. 8.



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UNITED STATES PATENT OFFICE

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TABULATING CARD FABRICATING MECHANISM

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Application January 23, 1947, Serial No. 723,742

8 Claims. (Cl. 164—48)

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This invention relates to improvements in tabulating card printing machines such as that described in U. S. Patent No. 2,181,935.

Particularly, the present invention is concerned with an improved corner clipping mechanism to be used in such a machine.

The production of tabulating cards for use in electrical accounting machines, and the like, requires certain precise refinements. Among such requirements may be included the so-called "corner cut" card, a tabulating card with one or more of its corners cut off. Such a card is useful not only for visually indicating a file classification, but also is used to control certain operations in a record machine, the missing corner being sensed by special electrical devices.

Certain disadvantages have accrued in existing corner cutting mechanisms, some of these being aggravated by the increased speeds which production economy demands of machines such as that shown in U. S. Patent No. 2,181,935. Chief among these is non-uniformity of "corner cut," card jams, and loss of production in machine stoppages brought about by corner cutting mechanism failures. Delicate adjustments requiring skilled mechanics have always been associated with corner cutting mechanisms, it being not infrequent to spend three hours adjusting the mechanism on one machine when a corner cutting mechanism is replaced. At the high production rate of current card printing machines, a three hour loss of production upon one machine represents 150,000 cards.

Previous corner cutting mechanisms also have been inflexible in that only one corner of a card could be cut at a time, and in changing the mechanism from a left hand cut to a right hand cut a skilled mechanic frequently is required.

It is, accordingly, an object of this invention to provide an improved corner clipping mechanism requiring no adjustments.

Another object is to provide a corner clipping mechanism wherein the card is positively positioned by one of the shearing elements so that uniformity of cuts is assured.

A further object is to provide a corner clipping mechanism in which more than one corner of a card may be clipped at a time.

Still another object of the invention is to provide a corner clipping mechanism having a simple manual control whereby the mechanism may be regulated to cut either, both, or neither of the corners of the leading edge of a card.

A still further object is to provide a mechanism wherein the shearing devices are readily replaceable by unskilled personnel.

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Still another object is to provide electrical interlocking in a corner cutting mechanism in association with a card jam release, whereby operation is stopped in the event of a card jam at the same time providing clearance for the jammed mechanism.

Other objects of the invention will be pointed out in the following description and claims and illustrated in the accompanying drawings, which disclose, by way of example, the principle of the invention and the best mode, which has been contemplated, of applying that principle.

In the drawings:

Fig. 1 is a front elevation view of the corner clipping mechanism.

Fig. 2 is a top view of Fig. 1.

Fig. 3 is a partial side elevation view of Fig. 1 with certain parts exposed.

Fig. 4 is a sectional view substantially along the line 4—4 of Fig. 2.

Fig. 5 is a partial view in section through one of the shearing devices approximately along the line 5—5 of Fig. 1.

Fig. 6 is a view showing the mechanism adapted to a tabulating card printing machine.

Fig. 7 is a detail view of one of the shearing elements.

Fig. 8 is a detail view of an anti-jamming mechanism.

With reference to Figs. 1, 2, 3, and 4, a lower casting 11 is adapted to receive each of two upper castings 12 and 13 by means of locating pins 14, each upper casting having corresponding locating holes. A bolt 15 provides a fastening device for clamping each upper casting to the lower casting 11. The castings 12 and 13 are mirror images of each other, each being comprised of an equal number of similar parts to form a complete shearing unit, and each being dependent for operation and control upon the mechanism of the lower casting 11.

Referring to Figs. 3 and 4, each upper casting 12 and 13 is recessed with suitable locating holes 16 to match corresponding locating pins 14 in the lower casting 11. A hole 17 is also provided in each upper casting through which a bolt 15 bears to clamp the upper castings 12 and 13 to the lower casting. Any upper casting can be replaced merely by loosening the bolt 15 and removing the upper casting from the lower casting locating pins 14.

The top of each upper casting is bored to contain a sleeve bearing 18 which is secured to the casting by two screws 19. A rod 20 rides in the bearing 18, the lower end of the rod terminating

in an inverted Y-shaped block 21. Each block 21 is turned to have its face at a predetermined angle (30 degrees) with respect to the vertical plane of Fig. 1, the faces of the two blocks being turned toward each other. A pin 22 is fitted loosely through an elongated hole in each block 21, the pins extending on either side and having axes parallel with the vertical plane of Fig. 1.

In each upper casting 12 or 13 is located a stud 23 upon which pivotally is mounted a bell crank 24 retained by a washer 25 and a nut 26 fastened to the end of the stud. On one arm of the bell crank 24 is fixed a cam follower in the form of a roller 27. A bearing surface 28 is provided extending over a portion of the same arm. On the other arm of the bell crank 24 is a yoke 29 which is secured pivotally to the block 21, the pin 22 passing through each arm of the yoke. A counterclockwise rotation of the bell crank 24 therefore will cause the block 21 to be moved downwards. A spring 30 mounted in each upper casting 12 or 13 bears against the bell crank 24 to urge it constantly downwards, the tension in the spring 30 being varied by a screw 31 which also acts as a retainer.

Referring now to Fig. 5, a shearing knife 32 is fastened rigidly to the rear face of the block 21 by three screws 33. Also fastened to each upper casting are two rods 34 upon which a second shearing knife 35 floats. The knife 35 is pressed against the knife 32 by a spring 36 mounted to the upper casting by two screws 37. The cutting edge 32*a* of knife 32 and the cutting edge 35*a* of the knife 35, together, form a shearing couple so that a portion of a card 38, placed as shown in Fig. 5, will be sheared off when the block 21 is moved upwards sliding the knives 32 and 35 over each other. The block 21 is provided with a groove 39 in which a tongue 40 in the knife 35 rides (see Fig. 4). The tongue 40 serves to provide a remote fulcrum, about which the knife 35 tends to be turned when the knives close upon a card to be sheared, so that the spring 36 has a substantial lever arm through which it can exert a counter moment. Thereby the tendency for the knives to separate against the urging of the spring 36 due to the resistance of the material being sheared is reduced. An oil pad 41 contained in a recess in the knife 35 provides for lubrication of the knives.

In the lower casting 11 are located the elements which operate and control the shearing devices in the upper castings, together with other controlling mechanism.

Along one side of the casting 11 is mounted a chain of gears 42, 43, 46, and 47. Gears 42 and 43 are mounted freely on the studs 44 and 45, respectively, while gears 46 and 47 are fixed, respectively, to the shafts 48 and 49, each of which is journalled in the casting 11. Gear 42 rotates counterclockwise (see Fig. 4) and meshes with gear 46 to drive it, and its shaft 48, clockwise. Fixed to the shaft 48 are two single lobed cams 50, each positioned similarly on the shaft, arranged and spaced to coact with the rollers 27 of the bell cranks 24, respectively, in the upper castings 12 and 13 when they are attached to the lower casting 11. Consequently, when the shaft 48 is rotated, the cams 50 rotate and operate the bell cranks 24, which, upon being actuated, cause the blocks 21 to be moved upwards and the shearing knives 32 and 35 to be operated.

The gear 46 engages and rotates the idler gear 43 in a counterclockwise direction so that the gear 47, which meshes with gear 43, and its shaft 49 are rotated clockwise. At the center of the shaft 49 is fixed a single lobed cam 51 which is arranged to actuate one arm of a bell crank 52, the other arm of which terminates in a pad block 53. The bell crank 52 is pivotally mounted on a shaft 54, journalled in an extension of casting 11, and is constantly urged to contact the cam 51 by a spring 55. As the shaft 49 rotates, the block 53 is constantly agitated.

Located above the block 53 is an inverted U-shaped plate 56 hinged at the ends of its arms on pins 57 which are secured to projections of the casting 11. The top of plate 56, as shown in Fig. 1, is provided with two ears 58 having bent out portions 75 (see Fig. 8) which are resiliently engaged and retained normally by a pair of coacting latches 59 attached to the casting 11. Attached to the back side of the plate 56 is an arcuate member 60 which rests against the operating plunger of a microswitch 61 in such a way that when the plate 56 is unlatched and hinged about its pins 57, the arcuate member 60 cams the plunger of the switch 61 to close its contacts. As pressure is applied to the plate 56, it unlatches and pivots (clockwise as seen in Fig. 4) about the pins 57, thereby being displaced inwardly from its normal latched position, the arcuate member 60 maintaining the contacts of the switch 61 in a closed position until the plate 56 is returned to its normal latched position.

To the rear of each pair of shearing knives 32 and 35 is the mouth of a suction tube 62 leading to a common suction outlet 63 which is connected with a suction pump (not shown) for removing clippings from the shearing knives after each operation.

Above shaft 48 (see Fig. 4) is located another shaft 64 journalled in, and extending through, one side of the casting 11. Two cams 65 are fixed to the shaft 64 and spaced to coact, respectively, with the surfaces 28 of the bell cranks 24 of the upper castings 12 and 13. When the shaft 64 is turned, the cams 65 engage the surfaces 28 thereby rotating the bell cranks 24 so that the blocks 21 are moved and retained upwards to render the shearing knives 32 and 35 inoperative since the cams 50 can no longer engage the rollers 27. The two cams 65 are positioned sixty degrees from each other on the shaft 64 so that as it is rotated (clockwise as viewed in Fig. 3) first one of the shearing couples, then both, then the other, and finally neither are rendered inoperative. A crank 66 with a handle 67 including a retractable detent 68, coacting to lock with index holes 69*a*, 69*b*, 69*c*, 69*d* in a semicircular plate 70, is attached to the protruding end of shaft 64, thereby providing a manual control for rendering the shearing devices operative or inoperative in a predetermined manner, as related above.

Referring now to Figs. 1 and 3, it will be understood that when a card is presented to the mechanism (see Fig. 3), assuming feed to be into the face of the drawing of Fig. 1, when the handle 67 locates its detent 68 in the hole 69*a*, the right hand corner of the leading edge of a card will be cut as the shaft 48 rotates. When detent 68 is in hole 69*b*, neither corner of the leading edge of the card will be cut; when detent 68 is in hole 69*c*, the left hand corner will be cut; and when detent 68 is in hole 69*d*, both corners will be cut.

In Fig. 6, the present invention is shown applied to a card printing machine such as described in the reference patent. The lower cast-

ing 11 is provided with suitable mounting holes through which bolts 71 pass to attach the mechanism to such a machine. The corner clipping mechanism is located on the machine so that cards will be positioned against the shearing knife 35 when they are released from the carrier drum 140 by the clips 144 (for detailed description of the manner of release see U. S. Patent No. 2,181,935), the face of the subject mechanism viewed in Fig. 1 abutting the hoppers of the stacking table 230 (only partially shown in Fig. 6). Power is supplied to the corner cutting mechanism by the gear 418, which drives the carrier drum 140, through the gears 72, 73, 74, and 42. The gearing is chosen with suitable ratios so that the shaft 48 makes one complete revolution for each incremental advance of the carrier drum 140 equivalent to the distance between two consecutive clips 144, whereby the shearing knives 32 and 35 operate each time a card 38 is presented to the corner clipping mechanism.

In previous corner clipping devices, particularly that shown in the reference patent, nonuniformity of cuts was caused at high speed operation due to the clips 144 failing to positively position each card to the shearing devices. In the present device, the clips 144 release the card as it is delivered to the shearing devices, and the card is forced under its own momentum against a pair of stops 35b formed by projections on the shearing knives 35 (see Fig. 7), thereby insuring uniformity of corner cut. The ears 58 on the plate 56 and the faces of the latches 59 act as guides, after each card strikes the stops 35b, so that the card falls downwards onto a hopper on the stacking table 230 in proper alignment with plate 56, under which the block 53 constantly agitates the cards into alignment to form a uniform stack in a hopper.

In the event of a jammed card being thrust by the carrier drum 140 into the corner cutting mechanism, the hinged plate 56 normally bears the thrust. Any appreciable amount of pressure against plate 56 causes it to unlatch and to be pivoted to operate the microswitch to close its contacts. These contacts may be wired in parallel with the jam detector (shown in the circuit diagram of the U. S. Patent No. 2,181,935) so that the card printing machine will be stopped. Plate 56 is capable of pivoting approximately ninety degrees so that the path of the jammed card may be free as the carrier drum 140 continues to move under inertia to lessen probability of machine damage.

Whenever the shearing devices become inoperative through wear or damage, either or both can be easily and quickly removed and replaced by simply removing the clamping bolt 15, taking out the old unit, inserting a new unit, and returning the bolt 15 to its normal position. No adjustments are required, and the work can be performed by the machine operator in a few minutes.

While there have been shown and described and pointed out the fundamental novel features of the invention as applied to a preferred 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 combination with a card producing machine from which cards are fed edgewise, a mechanism for clipping cards comprising a member against which cards are fed, a plurality of pairs of shearing elements associated with the said member for cutting portions from a card, means for actuating the said elements each time a card is fed to the said member, and controlling means selectively to render any one of the said shearing elements inoperative.

2. In combination with a card producing machine from which cards are fed edgewise, a card clipping mechanism comprising one or more shearing elements, each of the elements being composed of a movable knife and a coacting fixed knife, a projection on each of the said fixed knives, the said fixed knives being arranged to have cards fed against them, so that the said projections form a positive stop against the edge of a card, means for actuating the movable knives each time a card is fed to the fixed knives, and means for controlling the actuation selectively of each of the said movable knives.

3. In a record card printing machine from which cards are fed edgewise, a card clipping mechanism comprising a fixed plate against which a card is fed, shearing devices disposed upon the said plate and arranged to engage the said card at predetermined locations and in predetermined positions, means for actuating the said devices once for each card delivered, and means for rendering selectively the shearing devices operative.

4. In combination with a card producing machine from which cards are fed edgewise, a mechanism for clipping portions from cards comprising a semi fixed plate against which a card is fed, resilient means for retaining the said plate normally fixed, one or more pairs of shearing elements disposed about the said plate for engaging the cards, means for actuating the said elements each time a card is fed to the said plate, and means associated with the said plate for stopping the said machine when the plate is displaced from its normal position.

5. In combination with a card producing machine from which cards are fed edgewise, a card clipping mechanism comprising a pivoted plate against which a card is fed, shearing means associated with the said plate to engage a portion of a card, actuating means for the said shearing means operable each time a card is fed from the said machine, latching means normally retaining the said member in a predetermined position to provide a card stop, the said latching means being yieldable to release the said plate to turn about its pivot, and means coacting with the said plate for stopping the said machine when the plate is turned about its pivot.

6. In combination with a card producing machine from which rectangular cards are fed edgewise, a mechanism for cutting corners from the leading edge of a card comprising a pair of stops against which a card is fed, two pairs of shearing elements located adjacent the said stops and adapted to cut portions from each corner in which the said edge terminates, means for actuating the shearing elements each time a card is fed to the said stops, and means for selectively rendering one of the said pairs of shearing elements inoperative while retaining the other of said pairs operative.

7. In a mechanism for cutting corners from

cards, means for positionably supporting a card to present an edge to be cut, a shearing unit having a fixed knife, a coacting movable knife, and actuating means for the movable knife; means for detachably fastening the said shearing unit upon the said supporting means in registration with two intersecting edges of a card at its supported position, operating means on the said supporting means for engaging the said actuating means, and means on the said supporting means for disengaging the said operating means from the said actuating means.

8. In combination with a shearing couple comprising a relatively fixed knife and a movable knife, means for positioning the knives in mutual contact, actuating means for sliding the movable knife over the fixed knife in shearing relationship, a tongue on the said fixed knife forming a pivot about which the said knives tend to separate under the force of shearing, and resilient means bearing upon the said fixed knife at a point remote from the said pivot for providing a mechanical advantage to prevent separation of the said knives.

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