W. CAMERON.

BLANK FEEDING MECHANISM.

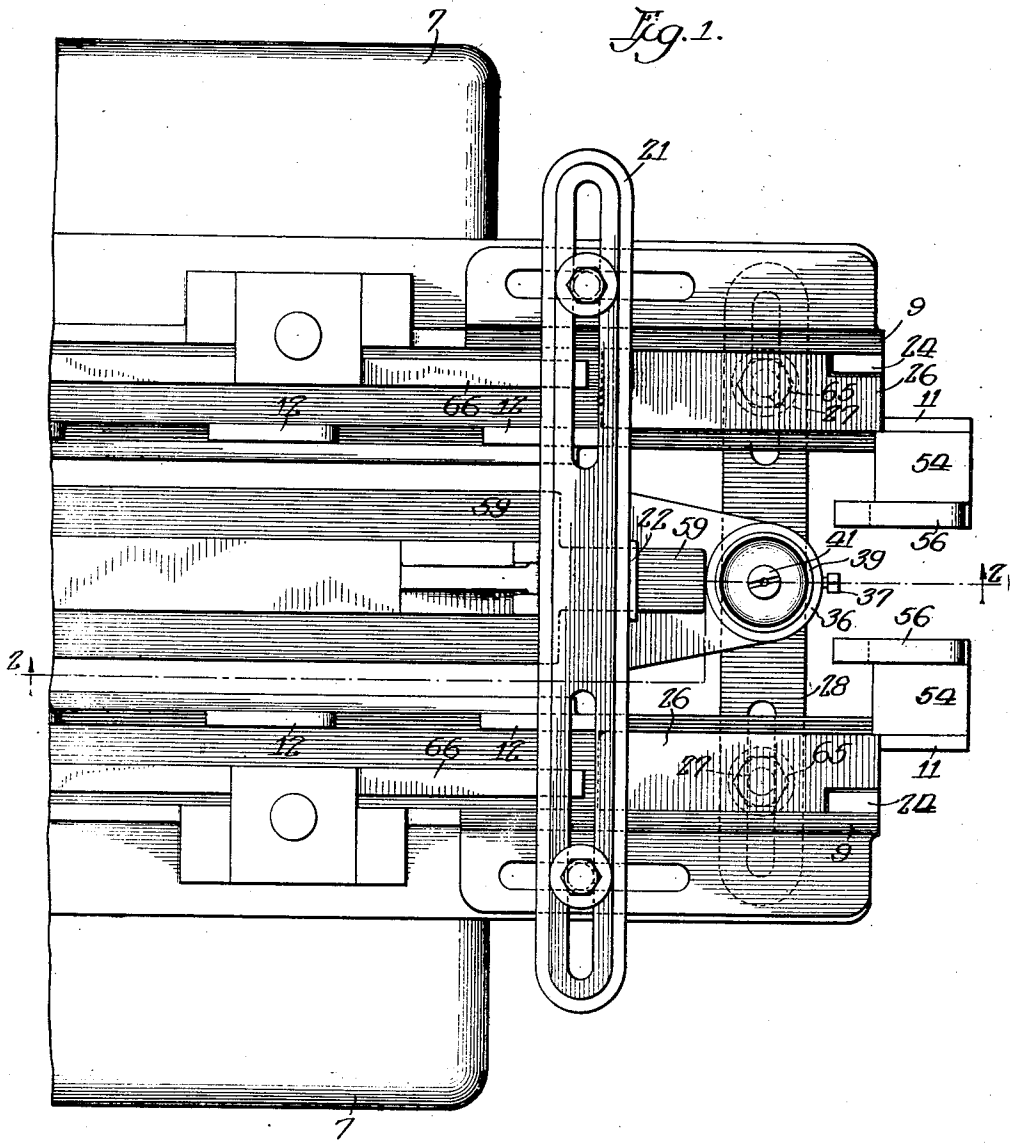
APPLICATION FILED NOV. 19, 1917

1,283,659.

Patented Nov. 5, 1918.

3 SHEETS—SHEET 1.

Fig. 1.



Witness:

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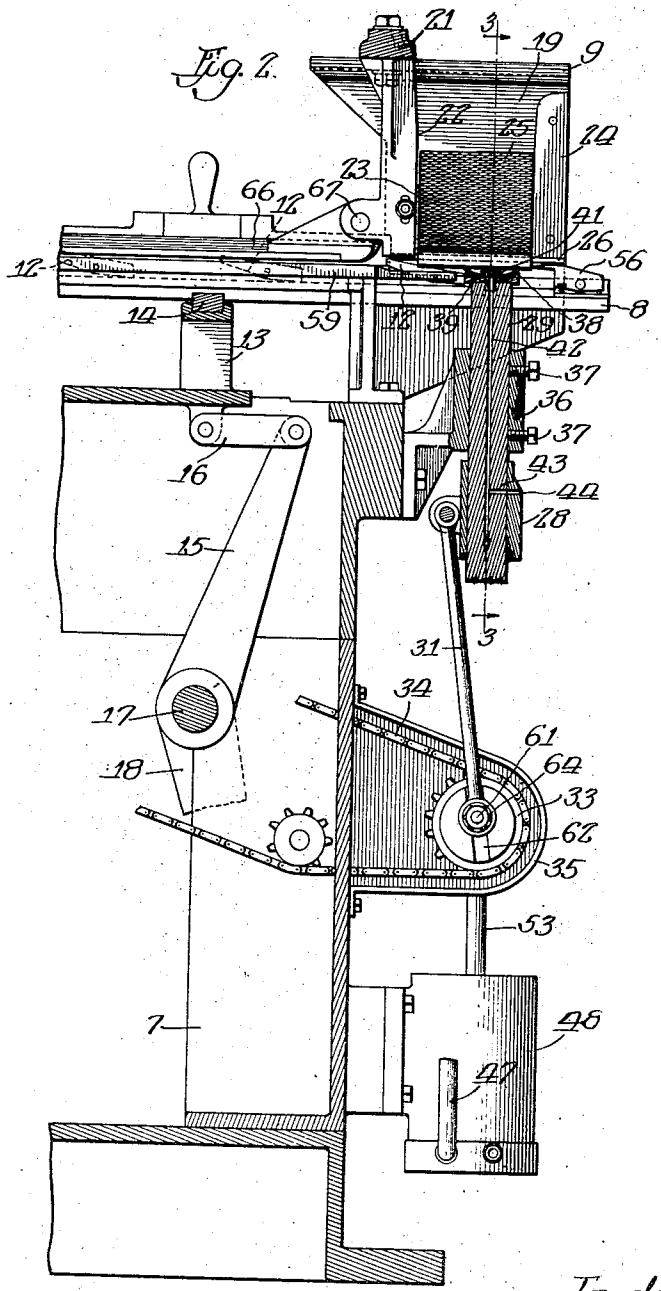
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3 SHEETS—SHEET 2.

Fig. 2.



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3 SHEETS—SHEET 3.

Fig. 3.

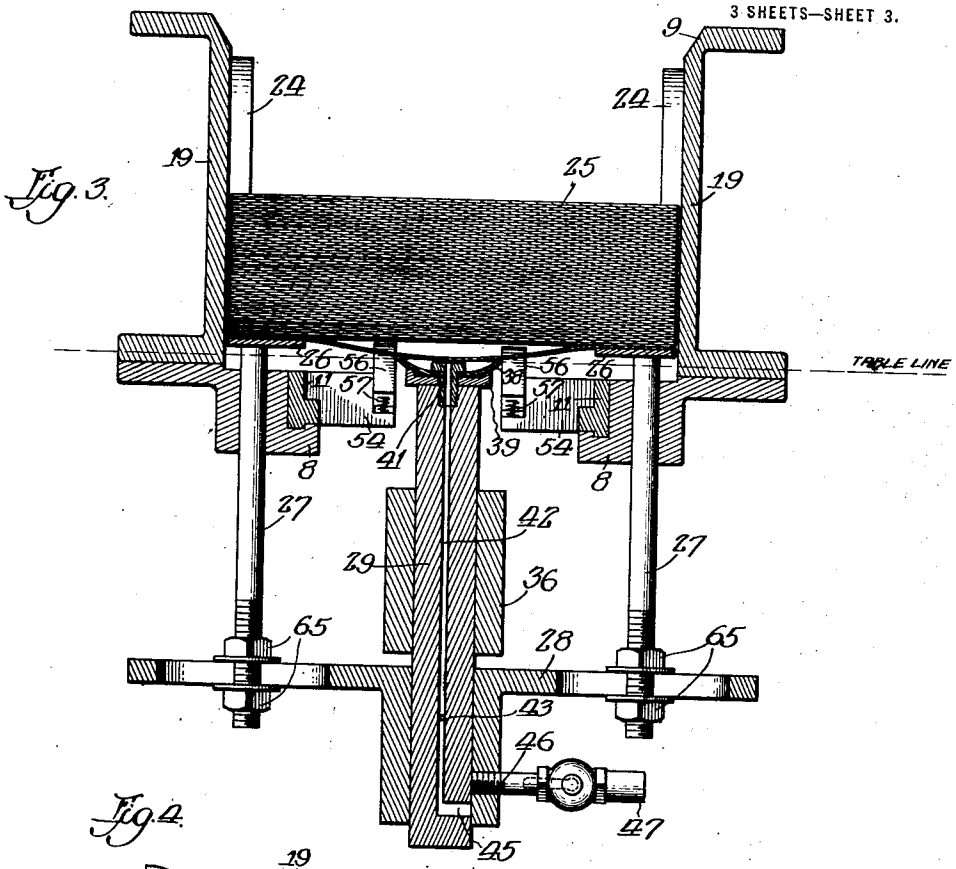


Fig. 4.

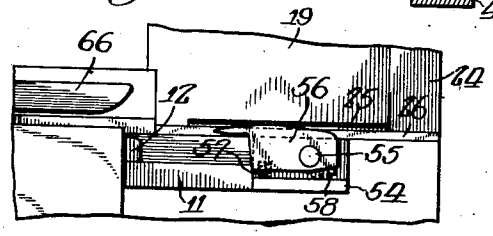


Fig. 5.

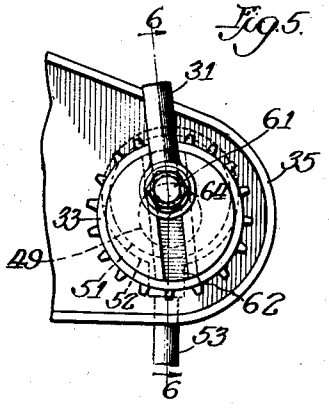
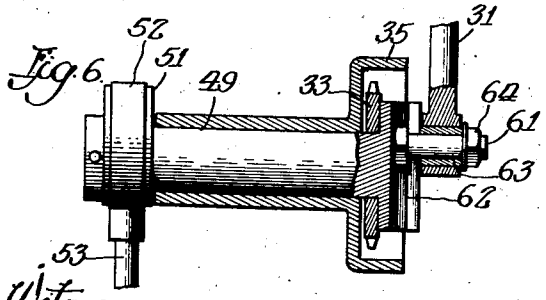


Fig. 6.



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UNITED STATES PATENT OFFICE.

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BLANK-FEEDING MECHANISM.

1,283,659. Specification of Letters Patent. Patented Nov. 5, 1918.

Application filed November 19, 1917. Serial No. 202,718.

To all whom it may concern:

Be it known that I, WILLIAM CAMERON, a citizen of the United States, residing at Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Blank-Feeding Mechanism, of which the following is a specification.

My present invention relates in general to blank-feeding mechanisms, but the embodiment thereof disclosed in the present case is more particularly adapted for separating and feeding sheet metal blanks from a stack to a machine which operates upon the blank, such, for instance, as a machine for forming tin can bodies from flat sheet metal blanks.

Sheet-feeding mechanisms have heretofore been employed in which the upper or more frequently the lower sheet of a stack of blanks in a magazine has been removed from the magazine by a pneumatic suction device, or has been flexed and thereby separated from the remaining sheets in the stack by a pneumatic suction device, the flexed and separated sheet being then fed from the magazine by feeding mechanism of some approved form.

The most frequent criticism of pneumatic feeding mechanisms of this character when employed for feeding metal sheets, is based on the fact that because of the burs on the edges of the sheets the sheets have a tendency to stick together, with the result that two sheets, instead of one, are frequently fed from the magazine together. In tin can making machinery such a "double" as it is called can not be handled by the body-forming mechanism and consequently the operative must stop the machine and remove the "double".

One of the primary objects of my present invention is to provide a sheet-feeding mechanism which will continuously and accurately feed the metal sheets from the magazine one at a time without producing "doubles". This desideratum is secured in a machine embodying my invention by a continual agitation and flexing of the sheets in the magazine so as to release the interclinging burs and free the sheets from each other, thereby permitting one sheet only to be withdrawn from the magazine at each action of the feeding mechanism.

Another feature of my invention is the provision of a feeding mechanism of the character indicated which shall be capable of adjustment within considerable latitudes to adapt the machine for the successful and accurate handling of metal sheets of various lengths, widths and thicknesses.

Another feature of my invention resides in the provision of a simple and accurate controlling device whereby a suction is created in the pneumatic sucker-head at the properly timed intervals, which suction is automatically relieved when the sheet is engaged by the feed fingers so that it may be fed freely forward without the necessity of being violently stripped from the sucker-head.

Further desirable features of my invention reside in its simplicity of construction, ease and accuracy of operation, and its ready adaptability to sheets of various characters.

For the purpose of facilitating an understanding of my invention I have illustrated on the accompanying drawing one preferred embodiment thereof, from which, when considered in connection with the following description, the inherent principles and advantages of my invention should be readily appreciated. Referring to the drawings,—

Figure 1 is a plan view of a sheet-feeding mechanism embodying my invention.

Fig. 2 is a vertical sectional view taken on the line 2—2 of Fig. 1.

Fig. 3 is a transverse sectional view on the line 3—3 of Fig. 2.

Fig. 4 is an enlarged fragmentary view showing one of the yielding feed fingers.

Fig. 5 is a detail of the adjustable operating crank; and

Fig. 6 is a sectional view on the line 6—6 of Fig. 5.

From an inspection of the drawings it will be observed that my improved mechanism is mounted upon one end of a machine, a portion of the frame construction of which is designated by reference character 7. While the machine may be of any type adapted to operate upon sheet metal blanks I have illustrated a portion of a can body-forming machine, the frame of which is formed to provide a pair of tracks or slideways 8 upon which the blanks are fed to the body-forming mechanism (not shown). The blanks are fed from the magazine, designated generally by reference character 9, along these tracks or slideways by means of

a pair of reciprocatory feed bars 11 equipped with a plurality of feed dogs 12 pivotally and yieldingly mounted upon the feed bars so that their rear ends engage with the successive sheets and feed them toward the operating mechanisms in a step by step movement in a well known manner.

The slideways 8 are laterally adjustable toward and from each other to accommodate sheets of various lengths, and carry with them in their adjusting movements the feed bars 11 which are slidably connected to an operating crosshead 13 by means of blocks 14 secured to the feed bars and slidable in a channel provided in the crosshead so as to permit of this lateral adjustability. The crosshead is reciprocated longitudinally of the machine so as to actuate the feed bars by means of a lever 15 connected to the crosshead by a link 16 and mounted on a rockshaft 17 which is oscillated by means of an arm 18 fixed thereon and equipped with a follower which receives its motion from a cam (not shown) in the usual manner.

The magazine 9 comprises a pair of vertically disposed side plates 19 adjustably mounted upon the slideways 8 so as to be adjustable for sheets of various lengths, these plates being connected at their upper ends by a cross-bar 21 adjustable with respect to the side plates and carrying intermediate its ends a depending member 22 equipped near its lower end with yieldingly mounted knurled sheet separating and detaining devices 23. The member 22 forms the front of the magazine and is adjustable longitudinally of the machine by reason of the bolt and slot connections between the cross-bar 21 and the side plates 19 to accommodate the magazine to sheets of various widths, the rear of the magazine being formed by two bars 24 fixedly secured to the opposed faces of the side plates.

A stack of sheets 25 positioned in the magazine, as shown in Fig. 2, is supported upon two plates or bars 26 extending longitudinally of the machine adjacent the side plates of the magazine, these supporting plates 26 being adapted to support the stack of sheets adjacent the ends thereof only. The supporting plates are mounted upon the upper ends of reciprocatory rods 27 carried at their lower ends by a cross-head 28 and guided in their reciprocatory movements by the cross-head and guide-apertures extending through the slideways 8, as will be evident from Fig. 3. The cross head slidably embraces the lower end of a tubular member 29 and receives its vertical reciprocatory movements through a pitman 31 which is actuated by a crank pin 61 which is driven from the drive shaft of the machine through a sprocket chain 34, a guard 35 being disposed over the chain and sprocket wheel for safety purposes. The tubular member 29 is carried by a bracket 36 mounted on the machine frame and is secured in any desired vertical position by setscrews 37. The upper end of the tubular member is equipped with a sheet engaging and retaining device of suitable character, the device selected for purposes of illustration being a sucker-head comprising a disk 38 of sheet rubber or other suitable material, which is clamped so as to present an upwardly disposd concave face, between a flanged member 39 and a central radially flanged hollow plug 41 threaded into the upper end of the tubular member 29, all as clearly shown in Figs. 2 and 3. The bore 42 of the tubular member extends longitudinally thereof and is provided near its lower end with a relief port 43 adapted to be brought into registration with a similar port 44 in the cross-head 28, and a suction port 45 adapted to register with a nipple 46 threaded into the cross head and connected by means of a flexible hose 47 with a suction pump 48. The ports 43 and 45 are so arranged with respect to the port 44 and the suction nipple 46, respectively, that when the cross-head is in its lower position suction created by the pump 48 will be applied to the sucker-head, and when the cross-head 28 is in its upper position, as shown in Figs. 2 and 3, communication between the sucker-head and the pump will be shut off and the vacuum created at the sucker-head will be relieved through the ports 43 and 44.

The pump 48 is driven from the sprocket wheel 33 through a shaft 49 on which the sprocket wheel is fixed and an eccentric 51 mounted on the shaft 49 and embraced by an eccentric strap 52 which is connected with the piston of the cylinder through a pitman or piston rod 53. The pump is mounted upon the main frame of the machine and may be of any well known or preferred construction as the details of the pump itself are immaterial so far as the present invention is concerned.

The rear end of each of the feed bars 11 has fixedly mounted thereon a block 54 projecting inwardly toward the center of the machine and upon the inner end of each of these blocks there is mounted upon a pin 55 a feed finger 56, the forward feed end of which is normally urged upwardly above the plane of the feed bar by a small expansion spring 57, the upward movement of the finger being limited by an abutment screw 58 threaded into the bottom of the feed finger so as to abut against the opposed surface presented by the block 54 as the finger is moved under the influence of the spring 57. By adjusting this abutment 58 the extent to which the finger may project above the feed bar can be easily and accurately adjusted. The purpose in having the feed

fingers 56 pivotally and yieldingly mounted is to permit the fingers to move beneath the stack of sheets upon the rearward travel of the feed bars with the minimum amount of friction, since upon this rearward travel the sheets are in lowered position so that the lowermost one is engaged by the fingers as shown in Fig. 4.

The supporting plates or bars 26 are reciprocated up and down by the cross head 28 moving the stack of sheets 25 up and down in the magazine so as to continually agitate them and facilitate their separation one from another. Upon their extreme downward movement the plates 26 are disposed below the plane of the sucker head so that the weight of the stack of sheets rests largely upon the sucker head although the ends will bow downwardly below the plane of the sucker head. This bowing or flexing of the sheets further tends to disengage the burs and breaks the adhesion of the sheets to each other so that they may be readily separated.

When the supporting plates are in their lowermost position so that the lower sheet in the magazine is supported wholly by the sucker head the cross head 28, being in lowered position, will establish communication between the suction pump 48 and the sucker head through the nipple 46 and port 45, thereby creating a partial vacuum in the sucker head which will cause the lowermost sheet to firmly adhere thereto at its central portion. Upon upward movement of the cross head the plates 26 will lift the ends of the sheets but the center of the lowermost sheet will be held down so that this sheet will be bowed into the position shown in Fig. 3. In the meantime the feed bars 11 have moved rearwardly until the fingers 56 are back of the stack, whereupon the forward ends of the fingers will be elevated by the springs 57, and as the feed bars start forwardly these fingers will project between the lowermost sheet and the remainder of the stack and the fingers will feed the lowermost sheet from the stack onto the feed table 59 of the machine. Just after the forwardly projecting portions of the feed fingers have engaged over the lowermost sheet the port 44 will be brought into registration with the relief port 43 so as to relieve the vacuum in the sucker head and permit the sheet to be easily fed from the magazine. It will be manifest that if the suction were not relieved at this moment considerable force would necessarily be expended in stripping the sheet from the sucker head.

It will be observed from Figs. 2 and 3 that the plates 26 when in fully lowered position are disposed below the plane of the table line, and when fully elevated they are slightly above this plane. This provision is made in order that the sheets may be readily fed from the plates 26 onto the table without being unduly bent, as might be the case if all of the reciprocatory movements of the plates 26 were above the table line instead of being distributed partially above and partially below this line. Different lengths of sheets require different lateral adjustments of the slideways 8 and the magazine sides, and it should be observed that any lateral adjusting movements of the slideways 8 will be imparted to the rods 27, and that these adjusting movements are permitted by reason of the slotted connection between the cross head 28 and the rods. After the adjustment has been effected the clamping nuts on the rods will be tightened to prevent lost motion between the cross head and the rods.

The amount of sag between the supported ends of the sheets will vary, depending upon the length and thickness of the sheets. For instance, a longer sheet will sag more than a shorter sheet of the same thickness, and also a thinner sheet will sag more than a thicker sheet of equal length.

In order to secure absolute accuracy in the operation of the feeding mechanism it is desirable either that the amount of sag be maintained uniform for all sheets by supporting them at various distances from their ends or that the length of the lifting stroke of the supporting plates be increased in proportion to the increased sag.

The plates 26 are removably secured to the rods 27 by screws or otherwise and by substituting plates of greater or less width the amount of sag may be maintained uniform. When it is preferable to use the same plates without change for all lengths and grades of sheets, the length of stroke may be varied to secure the desired results by having the crank pin 61, which operates the pitman 31, adjustably connected to its driving shaft 49. From Figs. 5 and 6 it will be seen that the pin 61 has its head slidably disposed in an undercut groove or slot 62 in the head of the shaft 49 to which the sprocket wheel 33 is fixedly secured. A bushing 63 surrounding the bolt 61 provides a bearing for the pitman 31 and the nut 64 serves to firmly clamp the bushing in any desired position radially of the slot 62. By loosening the nut 64 the bolt may be adjusted toward or from the axis of the shaft to decrease or increase the effective stroke of the crank, and when the requisite adjustment has been secured the bolt may be locked by simply tightening up the nut 64. Should the increase in the length of stroke tend to lower the plates 26 below the plane permitted by the slideways 8 this difficulty may be obviated by adjusting the clamping nuts 65 downwardly on the rods 27. The sucker head may also be adjusted vertically into any desired plane by loosening the setscrews 37, as previously de-

scribed. The usual weighted frame 66 pivoted to the magazine at 67 overlies the feed table 59 so as to hold the sheets flat on the table in position to be engaged by the feed dogs 12, whereby they are fed to the operating mechanisms of the machine.

It is believed that one preferred embodiment of my invention should be understood from the foregoing without further description and the various advantages of this invention resulting from the continuous agitation and flexing of the sheets in the magazine and the various provisions for adjustment result in a machine which is extremely accurate in its operation so that it feeds a single sheet at each actuation thereof without producing the very undesirable doubles which have been so frequent with pneumatic suction feeds heretofore employed. The details of construction may obviously be varied within considerable limits without departing from the essence of this invention as set forth in the following claims.

I claim:

1. In a sheet-feeding mechanism, the combination of a magazine, a stationary sucker disposed intermediate the sides of said magazine, means for alternately raising and lowering a stack of sheets in the magazine to bring the lowermost sheets successively into engagement with said sucker and means for removing said lowermost sheets successively from the magazine and sucker.

2. In a sheet-feeding mechanism, the combination of a magazine, a stationary sucker, means for alternately moving a stack of sheets in the mazagine toward and from said sucker, and means independent of said sucker for removing from the magazine that sheet which has been brought into engagement with the sucker.

3. In a sheet-feeding mechanism, the combination of a magazine, a plurality of reciprocatory sheet-supporting plates, a sucker disposed between said plates, means for reciprocating the plates to successively engage the lowermost sheet in the magazine with said sucker, and reciprocatory mechanism for withdrawing said engaged sheet from the magazine.

4. In a sheet-feeding mechanism, the combination of a magazine, a stationary sucker, a plurality of reciprocatory plates, movable, independently of the magazine, means for inducing a vacuum in said sucker when the plates are in one position and for relieving said vacuum when said plates are in another position.

5. In a sheet-feeding mechanism, the combination of a magazine, means for causing the major portion of the weight of a stack of sheets in said magazine to be supported alternately at the center and ends of said stack, said means including apparatus for bowing the center of the lowermost sheet downwardly, and means independent of said supporting means for withdrawing said lowermost sheet of the stack from the magazine.

6. In a sheet-feeding mechanism, the combination of a magazine, a feed table, means reciprocating across the horizontal plane of said feed table for supporting a stack of sheets in a magazine alternately above and below said plane, means for holding the center of the lowermost sheet in the magazine while the remaining sheets are moved upwardly, and means for feeding said lowermost sheet onto the feed table.

7. In a sheet-feeding mechanism, the combination of a magazine, a plurality of reciprocatory sheet supporting plates, means for reciprocating said plates, means whereby the length of the reciprocatory strokes of said plates may be adjusted, and means for removing the sheets in succession from said plates.

8. In a sheet-feeding mechanism, the combination of a magazine, sheet supporting means reciprocable in said magazine, a sucker disposed between said supporting means, means whereby the vertical position of said sucker may be adjusted, and means for alternately applying suction to and relieving the suction of said sucker in predetermined timed relation with respect to the reciprocation of said supporting means.

9. In a sheet-feeding mechanism, the combination of a magazine, means for raising and lowering a stack of sheets in said magazine, a sucker for bending the lowermost sheet away from the remaining sheets in the magazine, a pair of reciprocatory feed bars movable beneath the magazine, and a yielding pivotally mounted feed finger carried by each bar in position to engage the lower face of a sheet in the magazine upon movement in one direction and to engage the upper face of said sheet upon movement in the opposite direction.

10. In a sheet-feeding mechanism, the combination of a magazine adapted to contain a stack of sheets, means for moving said stack bodily up and down in the magazine, a device disposed in the path of travel of said stack for limiting the movement of the central portion of said stack in one direction, and for preventing return movement of the central portion of one sheet in the opposite direction, and means for removing said one sheet from the magazine.

11. In a sheet-feeding mechanism, the combination of a magazine, a stationary sheet holding device mounted intermediate the sides of said magazine, near the bottom thereof, a pair of supporting members upon which the ends of the sheets are supported, means for moving said supporting members vertically across the horizontal plane of said sheet engaging and holding

means to intermittently bring the lowermost sheet in the magazine into contact with said engaging means and means for removing said lowermost sheet from the magazine.

12. In a sheet-feeding mechanism, the combination of a magazine comprising vertical walls, a stationary sucker mounted near the bottom thereof, a pair of sheet supporting members independent of said walls upon which the ends of a stack of sheets in the magazine normally rest, means for moving said members and the ends of the stack of sheets thereon up and down in the magazine across the horizontal plane of said sucker, and means whereby the stroke of said sheet supporting members may be adjusted.

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