

1,058,706.

4 SHEETS—SHEET 1.



Witnesses:
Casimir Young.
May Downey.

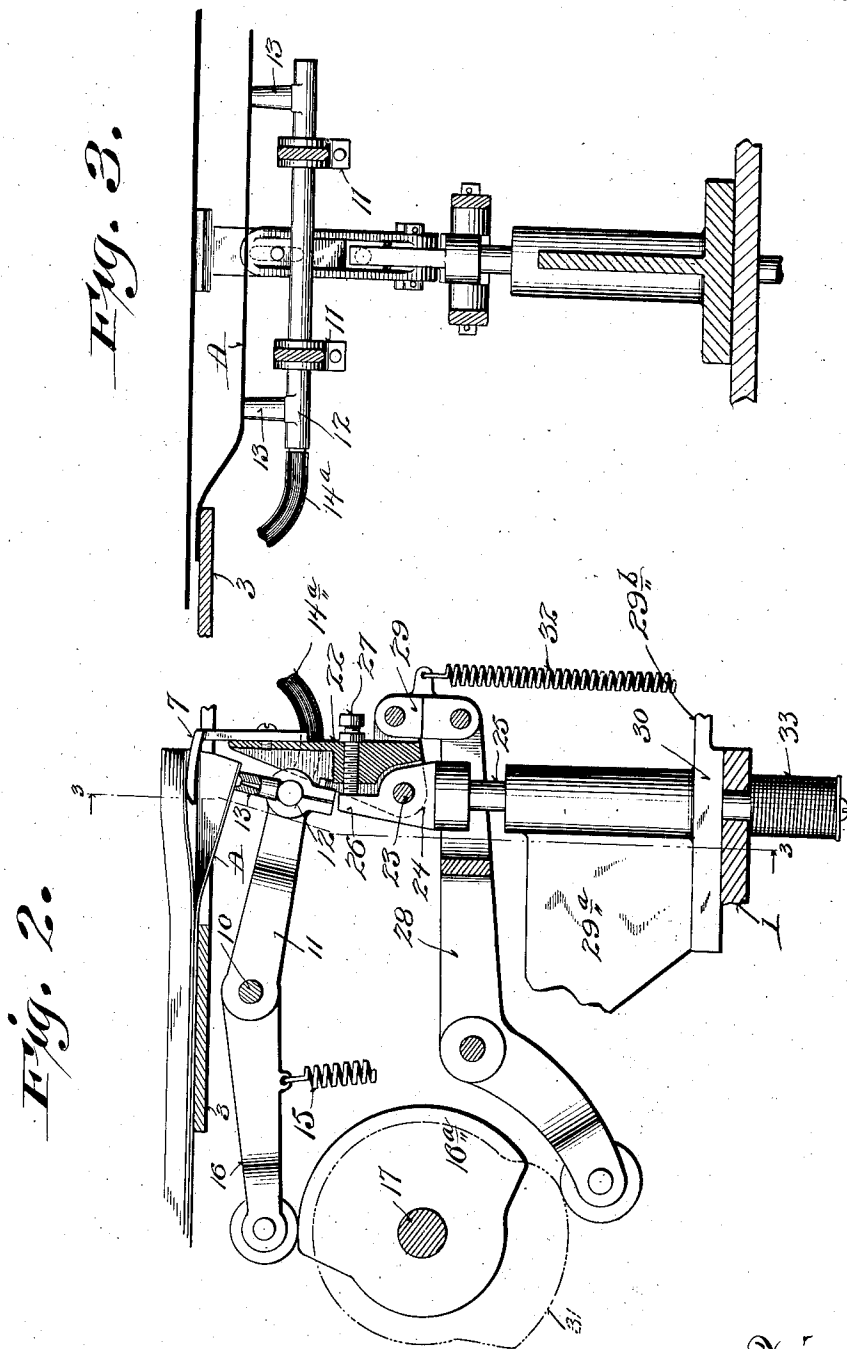

 In witness whereof
 William S. Shridder
 334 Captain Young
 Attorneys

W. S. AMIDON.
SHEET FEEDING MECHANISM.
APPLICATION FILED MAY 22, 1911.

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Patented Apr. 15, 1913.

4 SHEETS—SHEET 2.



Witnesses:
Casauar Young
Mary Downey.

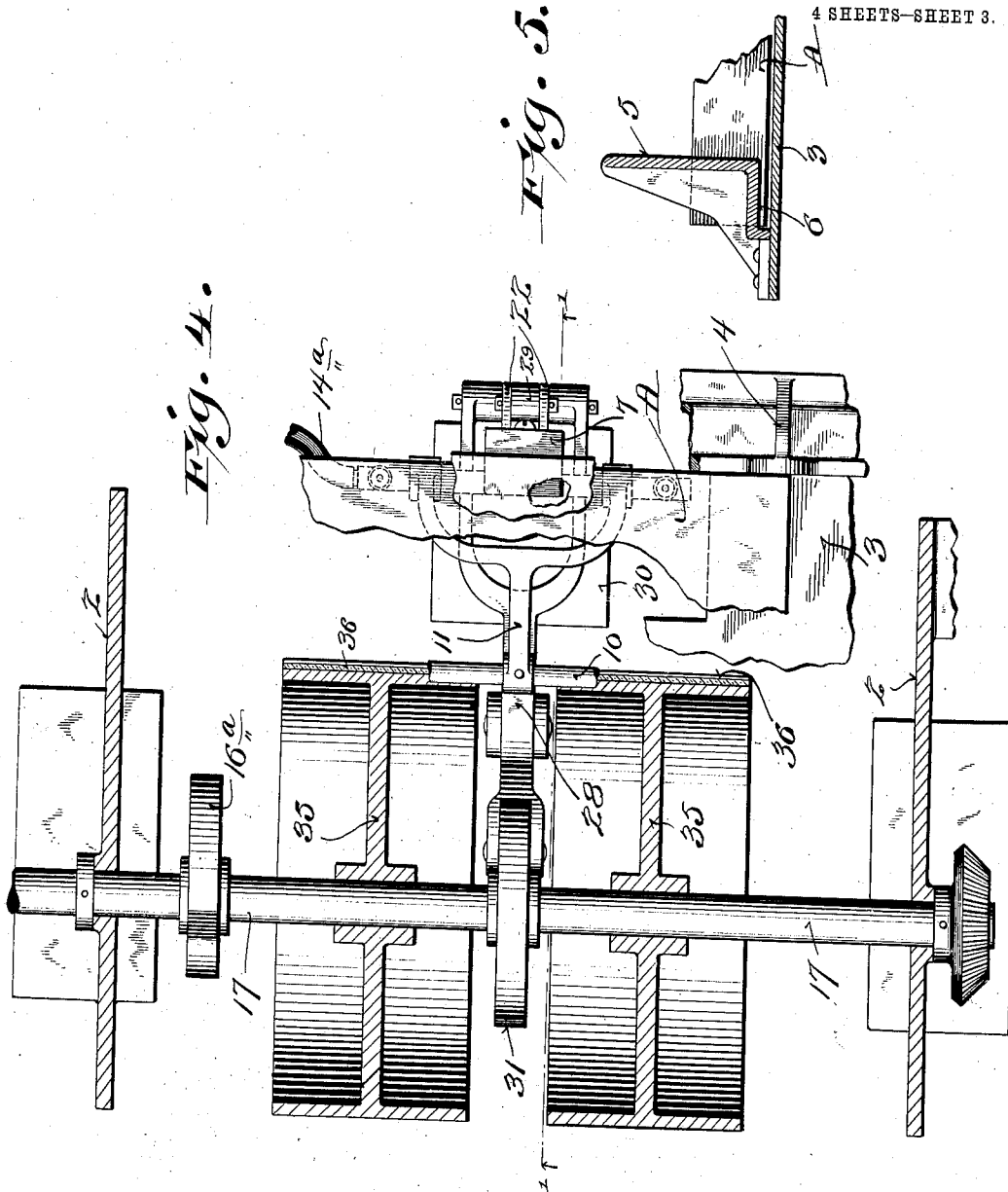
Inventor
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C. W. Young,
May Downey.

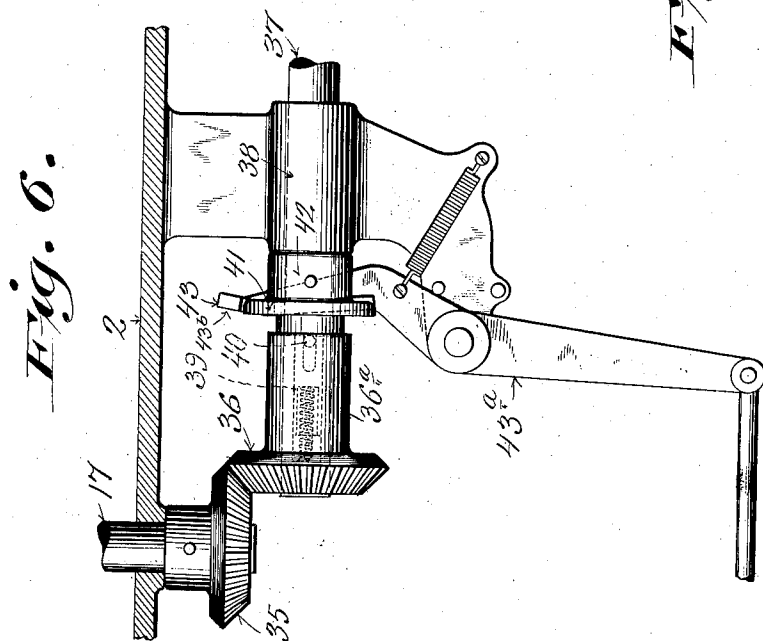
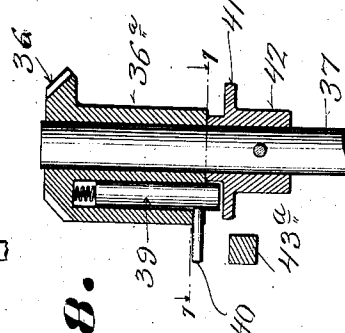
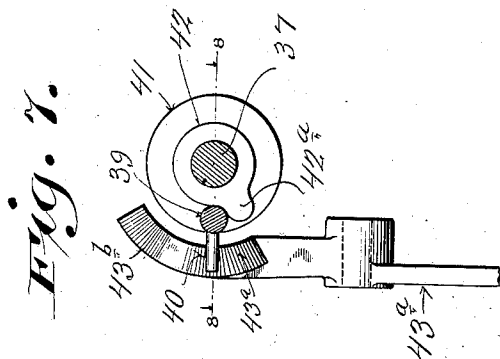
Inventor:
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4 SHEETS—SHEET 4.



Witnesses:
Casavant, Young
May Downey.

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UNITED STATES PATENT OFFICE.

WILLIAM S. AMIDON, OF MILWAUKEE, WISCONSIN, ASSIGNOR TO NATIONAL WRAPPING MACHINE COMPANY, OF MILWAUKEE, WISCONSIN.

SHEET-FEEDING MECHANISM.

1,058,706.

Specification of Letters Patent.

Patented Apr. 15, 1913.

Application filed May 22, 1911. Serial No. 628,704.

To all whom it may concern:

Be it known that I, WILLIAM S. AMIDON, a citizen of the United States, and resident of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Sheet-Feeding Mechanism; and I do hereby declare that the following is a full, clear, and exact description thereof.

10 The object of my invention is to provide a simple and positive mechanism for feeding sheets of the thinnest quality one by one from a stack of such sheets.

15 The construction and arrangement of my improved feeding mechanism is such that the rear end of the bottom sheet of the stack is first drawn down by a pair of spaced pneumatic suckers whereby said sheet is separated from the lower face of the next sheet 20 of the stack, the latter being suitably supported by a table having a recess at its rear end to permit exposure of the rear ends of the sheets so that access thereto by the sucker may be had. The above described movement 25 of the sucker is followed by an inward movement of a separating shoe whereby the same is inserted between the end of the separated bottom sheet from those above. This movement of the shoe is succeeded by an upward 30 movement to effect engagement with the exposed bottom face of the next sheet of the stack whereby a pressure is exerted upon the entire stack to slightly lift it at its rear end between said shoe and an opposing weight in 35 the form of a follower board. Thus the stack is securely gripped and its weight relieved from the surface of the drawn down sheet preparatory to the same being extracted. Following the lifting movement of 40 the shoe the forward end of the bottom sheet is gripped by the high faces of stripping rolls causing a slight lift and compression of the entire stack at this end, the lower face of the bottom sheet being securely gripped 45 by pad sections of the stripping roll whereby said bottom sheet is extracted from under the stack and delivered between a pair of suitable feed rollers that complete the feed movement.

50 With the above objects in view my invention consists in what is herein shown, described and claimed.

55 In the drawings Figure 1 represents an elevation of a feed mechanism embodying the features of my invention, certain me-

chanical elements being broken away and others in section to better illustrate the structural features; Fig. 2, a detailed fragmentary elevation of the essential elements of the feed mechanism illustrating the same in a 60 changed position relative to that shown in Fig. 1; Fig. 3, a detailed sectional end view of a sucker and separating shoe, the section being indicated by line 3—3 of Fig. 2; Fig. 4, a detailed sectional plan view of the feed 65 mechanism, the section being indicated by line 4—4 of Fig. 1; Fig. 5, a detailed sectional view of a portion of the table and one of its paper guard brackets, the section being indicated by line 5—5 of Fig. 1, and Figs. 6, 70 7 and 8, detail views of a clutch mechanism.

Referring by characters to the drawings, 1 represents a base-plate provided with standards 2 that support a table 3, the same having a suitable recess at its outer end to permit access to the base of a bottom sheet A of 75 a stack of such sheets which are supported by the table. The table 3 is provided with rear and side paper guide brackets 4 and a pair of front paper guide brackets 5 all 80 of which abut the edges of the stack, the front guide brackets 5 being formed with under-cut mouths 6 to permit free delivery of the bottom sheet of the stack from said table to feed rollers, which feed rollers are 85 indicated in dotted lines in Fig. 1, while the rear guard brackets are slightly offset at their base portion for the purpose of permitting clearance for a separator shoe 7, the structural details of which will be herein- 90 after described.

A pair of vertically disposed goose-neck rods project upwardly from the rear end of the table, which rods constitute guides for a follower-board 9, the same being provided with apertures through which the 95 rods extend. The follower-board is of sufficient weight to exert pressure upon the stack of sheets thereunder whereby the same are held in order and owing to its loose 100 connection with the rods the said follower board will settle down as the stack is depleted, it being understood that the board can be folded back over the goose-neck 105 ends of the rods when it is desired to insert a fresh stack of sheets thereunder.

Mounted upon a rock-shaft 10 that is journaled in the standards, is a yoke 11, the arms of which yoke carry a horizontally 110 disposed tube 12 having suction nipples

13 projecting at spaced intervals intermediate of its ends, the same constituting a sucker that receives its impulses from a pump 14, the head of which pump is connected by a hose pipe 14^a to one end of the sucker tube. The sucker as shown, in this instance, is adapted to be raised to its working position by a coiled spring 15 that is attached to one of the standards and an arm 16 carried by the sucker rock-shaft 10, the arm being provided with a roller at its free end for engagement with a cam-wheel 16^a that is carried by and rotates with a drive-shaft 17, which drive-shaft is journaled in the standards transversely to the direction of feed, the arm 16 in conjunction with the yoke constituting an actuating lever for the sucker. The cam-wheel 16^a thus acts in opposition to the spring whereby the sucker is drawn down and held for an interval of time.

The pump 14 is provided with a piston 18 that, as shown, is in link connection with a spring-controlled actuating lever 19, which lever carries a roller 20 that engages a cam-wheel 21, the same, in this instance, being shown as mounted upon the drive-shaft. Thus it will be understood that the suction or working stroke of the pump is positively accomplished through the cam-wheel, the said stroke being timed to impart a direct suction impulse to the mouth of the sucker nipples incidental to its engagement with the surface of the bottom sheet of the stack of paper, which suction impulse is of such strength and duration as to cause the sheet to adhere thereto during an interval of time sufficient to permit the insertion of the separator shoe between the upper face of the held bottom sheet and lower face of the next sheet above, it being further understood that when the sucker engages the lower sheet the latter adheres thereto and is drawn down or partially bowed from the side edges of the table as shown in Fig. 3.

The separator shoe 7 has a shank portion that is adjustably attached to an oscillatory knee 22, which knee is loosely mounted upon a stud 23 that is carried by a head 24 of a plunger-rod 25, the head being provided with a lug 26 against which the end of a set screw 27 that is in threaded engagement with the knee abuts, the same forming a rule-joint connection between said knee and plunger-rod head, the rule-joint when closed permitting upward movement of the plunger. The knee 22 is also connected to a rocker-arm 28 by a link 29, the rocker-arm being carried by a pintle that is mounted between ears 29^a of a bracket 30. The rocker-arm is provided with a roller that engages a cam-wheel 31, which cam-wheel is mounted upon the drive-shaft and adapted to operate the separator

shoe and its knee in one direction in opposition to a coiled spring 32 that is connected to the knee through its link and also in opposition to a second coiled spring 33, the latter being of greater strength than the knee-spring 32 and is wound about the lower end of the plunger-rod between a collar thereon and lower face of the bed-plate 1 through which plate said plunger extends. The plunger-rod is reciprocatively mounted in a sleeve of the bracket 30, its head normally resting upon the top of said sleeve, which head abuts the latter and constitutes a stop for limiting downward movement of the knee and plunger. The bracket 30 is secured to the base-plate 1 and is provided with an extended arm 29^b that supports the pump. The cam-wheel 31 is centrally disposed with relation to the side standards 2 and mounted upon the drive-shaft 17 at opposite sides of said cam-wheel are stripper-rolls 34 having raised peripheral faces 35 that are partially covered with stripper-pads 36, the same being preferably of some frictional material, the material shown being corrugated-faced rubber that is adapted to engage the under side of the bottom sheet of the stack to effect withdrawal therefrom incidental to timed release of said sheet by the suction and separator-shoe mechanism, it being understood that the table 3 is recessed above the stripper rolls to permit engagement of the same with the forwardly disposed end of the bottom sheet.

In the operation when the parts assume the position shown in Fig. 1, a low face of the sucker cam 16^a has permitted the sucker actuating lever to drop and thus elevate the sucker, causing its nipples to contact with the face of the bottom sheet at its rear end. The cam-controlled pump then exerts a suction impulse whereby said sheet will adhere to the sucker nipples and further rotation of the cam-wheel 16^a in the direction indicated by the arrow will cause the sucker to move downward with the sheet attached thereto, whereby the rear end of same is bowed or dished from the three edges of the recess formed in the table. At approximately the completion of the downward movement of the sucker the cam-controlled rocker-arm 28 of the separating shoe 7 is moved, causing the knee 22 to swing inwardly upon its pivot stud 23 in opposition to the tension of coiled spring 32. This swinging movement of the knee causes the toe of the separator shoe to enter the sheet zone in the space between the upper face of the bowed bottom sheet and the under side of the next sheet above of the stack, the heavy tension plunger spring 33 having resisted upward movement of the plunger during this operation. When the toe of the shoe is in the above described position the knee set screw 27 abuts stop lug 130

of the plunger-head, further swing of the knee being thus arrested, due to the rule-joint lock between said plunger and knee. Further upward movement of the rocker-arm 28 will cause the plunger to rise against the resistance force of its coiled spring. The separator shoe will thus move upward in a straight line to the position shown in Fig. 2, the toe of the shoe being elevated slightly above the normal plane of the bottom of the stack, whereby pressure is exerted upon the latter, resulting in a slight lift in opposition to the weight of the follower board. Thus the stack is gripped at its rear end. Simultaneously with the gripping engagement of the stack, the high face of the stripping rolls engages the forward end of the bottom sheet and incidentally lifts the entire stack slightly in opposition to the follower board at this point, whereby the bottom sheet and the lower face of the same is relieved from frictional engagement with the table to facilitate its extraction, it being understood that the stack with the exception of the lower sheet is gripped at its rear end by the separator shoe at this time in order to overcome any tendency of the stacked sheets to slip and that the high anti-friction surface lifts the sheet but does not feed. The pads 36 of the stripping rolls now grip the lower sheet firmly and draw the same from under the stack delivering its forward edge to suitable driven feed-rolls, it being borne in mind that stripping of the sheet or sheets, above the sheet being operated upon; incidental to the ejection of the latter, is prevented owing to the fact that the rear end of the entire stack is held and that the suction impulse or vacuum is broken by the timed movement of the pump piston coincident to the stripping movement of the rolls 34 and thus with each cycle of the cam a sheet is freed, there being no buckling or snarling of the freed sheet irrespective of its delicacy of texture.

As it is essential that the feed mechanism should complete its cycle or feeding movement before coming to rest incidental to stoppage thereof for any cause, I have, as shown in Figs. 6, 7 and 8, provided an automatic throw-out clutch that is in gear connection with the drive-shaft 17, whereby the feed mechanism will come to rest just after the stripping rolls have completed a sheet-feeding movement and the sucker is depressed, the throw-out at this moment of the cycle being positive irrespective of the time the clutch is manually operated by a controlling lever. Thus should it be desirable to stop the feed owing to the snarling of a defective sheet or other contingency arise, the machine will complete a single feed movement before said stoppage so as to be in position for accurately feeding the next sheet. With this in view, as shown in Figs.

6, 7 and 8, the drive-shaft 17 is provided with a beveled gear-wheel 35 that meshes with a similar beveled gear-wheel 36 loosely mounted upon a power-shaft 37, which power-shaft is journaled in bearings 38 that extend from the standard 2, only one of the bearings being shown. A hub 36^a of the beveled gear-wheel 36 is provided with a spring-controlled plunger 39 having a projecting pin 40 that extends through and is reciprocative in a guide-slot formed in the hub. The end of the plunger normally engages a flange 41 of a collar 42 that is fast upon the power-shaft 37 and said plunger also engages a radially disposed lug 42^a that extends from the collar whereby the gear-wheel 36 is clutched to the continuously driven power-shaft and motion is imparted to the drive-shaft 17. Should it be desired to trip the clutch, the same is effected by an arc-shaped cam-shoe 43 that is carried by a manually operated spring-controlled lever 43^a, which lever is fulcrumed to an ear that extends from one of the power-shaft bearings 38. The cam-shoe is normally held clear of the path of travel of the plunger-pin 40 and when it is desired to trip the clutch, the cam-shoe is drawn into the path of travel of said pin. The latter will then engage said shoe at a fixed point in its travel irrespective of the time that the controlling lever was manipulated, whereby a complete cycle of the feeding apparatus is effected before such throw-out, it being understood that the cam-shoe, when engaged by the pin, will cause retraction of the plunger, whereby the latter is disconnected from the collar lug and that overthrow of the drive-shaft 17 is checked after such disconnection by a high face 43^b of the cam-shoe.

I claim:

1. A sheet feeding device comprising a table for the support of a stack of sheets, a sucker for engagement with the rear end of the bottom sheet of the stack, a rearwardly disposed separator shoe, means for lifting the sucker to its sheet engaging position and returning the same, whereby the lower rear end of the bottom sheet is bowed downwardly, means for imparting an initial inward and a succeeding upward movement to the separator shoe, whereby said shoe initially enters between the bowed sheet and the one next above and thereafter moves upward to exert a lifting pressure upon the stack by engagement of the bottom face of the next sheet, and a stripper for engagement with the forward end of the bottom sheet succeeding a lifting pressure exerted upon the remaining sheets of the stack by the separator shoe.

2. A sheet feeding device comprising a table for the support of a stack of sheets, a sucker for engagement with the rear end of the bottom sheet of the stack, a rearwardly

disposed separator shoe, a follower arranged to rest upon the upper sheet of the stack, means for lifting the sucker to its sheet-engaging position and returning the same whereby the lower rear end of the bottom sheet is bowed downwardly, means for imparting an initial inward and a succeeding upward movement to the separator shoe whereby said shoe initially enters between the bowed sheet and thereafter moves upward to exert a lifting pressure upon the stack by engagement of the bottom face of the next sheet, and a stripper for engagement with the forward end of the bottom sheet succeeding a lifting pressure exerted upon the remaining sheets of the stack by the separator shoe.

3. A sheet feeding device comprising a table for the support of a stack of sheets, a sucker for engagement with the rear end of the bottom sheet of the stack, a rearwardly disposed separator shoe, a follower arranged to rest upon the upper sheet of the stack, a pump in communication with the sucker, an actuating means for the pump whereby its suction stroke is regulated with relation to movement of the sucker, means for lifting the sucker to its sheet-engaging position and returning the same whereby the lower rear end of the bottom sheet is bowed downwardly, means for imparting an initial inward and a succeeding upward movement to the separator shoe whereby said shoe initially enters between the bowed sheet and thereafter moves upward to exert a lifting pressure upon the stack by engagement of the bottom face of the next sheet, and a stripper for engagement with the forward end of the bottom sheet succeeding a lifting pressure exerted upon the remaining sheets of the stack by the separator shoe.

4. In a sheet feeding device having a supporting table for a stack of sheets, and a cam-actuated sucker disposed under the rearward end of the table for engagement with the bottom sheet of the stack; the combination of a sheet separating shoe comprising a spring-controlled plunger, a knee in rule-joint union therewith, and a spring secured to the knee, the spring being of less resisting force than the plunger spring.

5. In a sheet feeding device having a sheet-supporting table, and a cam-controlled sucker disposed under the rearward end of the table for engagement with the bottom sheet of the stack; the combination of a sheet separating shoe comprising a spring-controlled plunger, a knee pivoted

thereto, a rocker-arm in link connection with the knee, an actuating cam for the rocker-arm, a spring in connection with the rocker-arm and knee whereby the rocker-arm is held in engaging contact with its cam and the knee shoe is held beyond the zone of the stack of sheets, and means for limiting inward movement of the knee carried by the plunger.

6. A sheet feeding device comprising a table for the support of a stack of sheets, a reciprocative sucker adapted to engage the rear end of the bottom sheet, a drive-shaft, a power-shaft in gear connection with the drive-shaft, cam-controlling means carried by the drive-shaft for imparting movement to the sucker, a separator shoe disposed rearwardly of the table and normally beyond the sheet area zone, cam-controlling means for imparting an inward and upward movement thereto successively and in timed relation to outward movement of said sucker, a rotatory stripper roll mounted upon the drive-shaft provided with raised gripping-faces and a manually operated clutch carried by the power-shaft whereby the drive-shaft is automatically stopped at a predetermined point in its rotation succeeding a completion of a feed movement.

7. In a sheet feeding device having a supporting table for a stack of sheets, and a cam-actuated sucker disposed under the rearward end of the table for engagement with the bottom sheet of the stack; the combination of a sheet-separating shoe comprising a spring-controlled plunger, a knee in rule-joint union therewith, a spring secured to the knee, the spring being of less resisting force than the plunger spring, and a stop for positively limiting downward movement of the knee and plunger.

8. In a sheet-feeding device having a supporting table for a stack of sheets, and a cam-actuated sucker disposed under the rearward end of the table for engagement with the bottom sheet of the stack; the combination of a sheet-separating shoe comprising a head, a spring-controlled knee in rule-joint union therewith, a lever for the head, and an actuating cam for said lever.

In testimony that I claim the foregoing I have hereunto set my hand at Milwaukee in the county of Milwaukee and State of Wisconsin in the presence of two witnesses.

W. S. AMIDON.

Witnesses:

N. E. OLIPHANT,
MAY DOWNEY.