Jan. 16, 1940. R. S. HARM 2,187,123

SHEET FEEDING MECHANISM

Filed Sept. 24, 1938 3 Sheets-Sheet 1

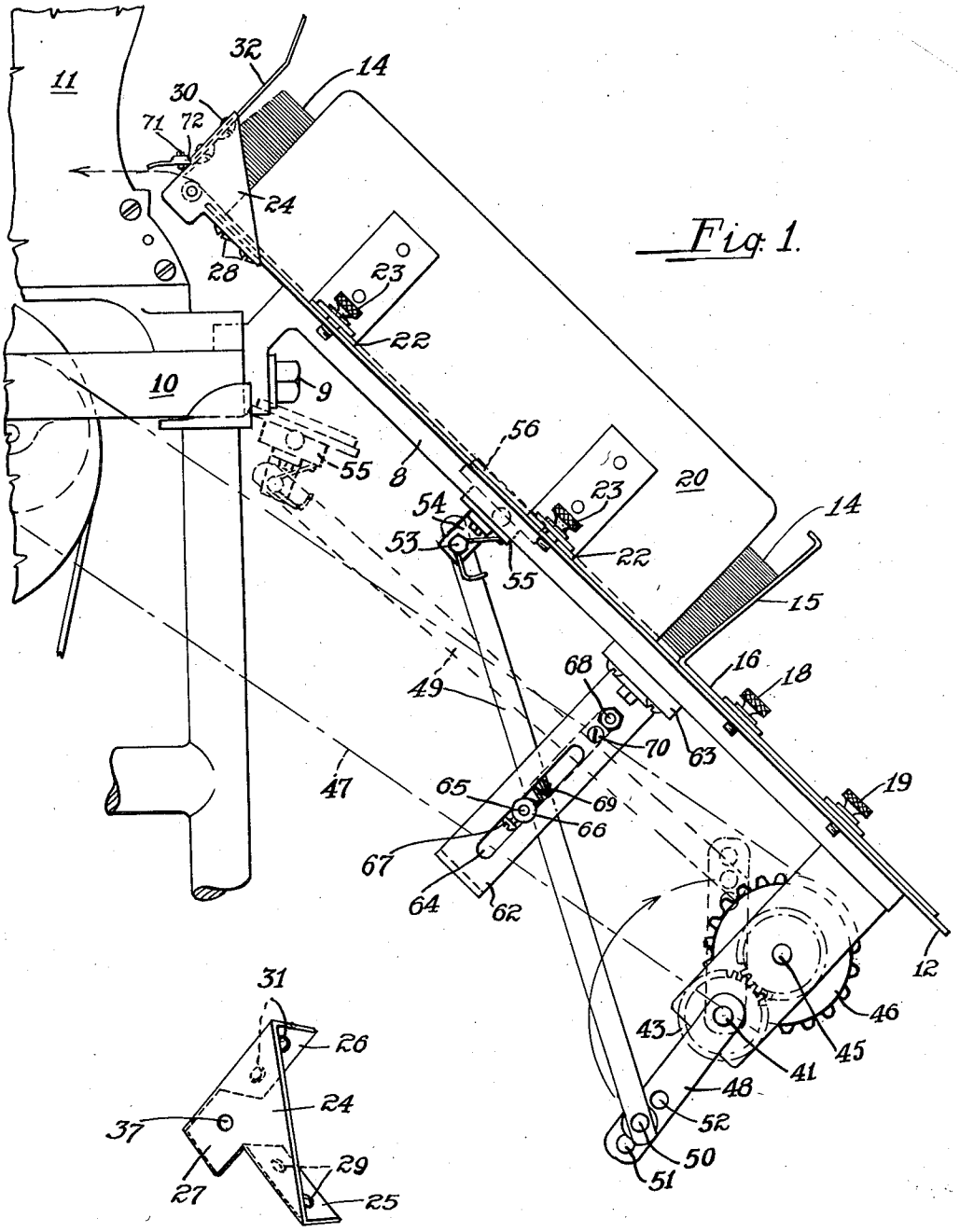

Fig. 1.

Fig. 7.

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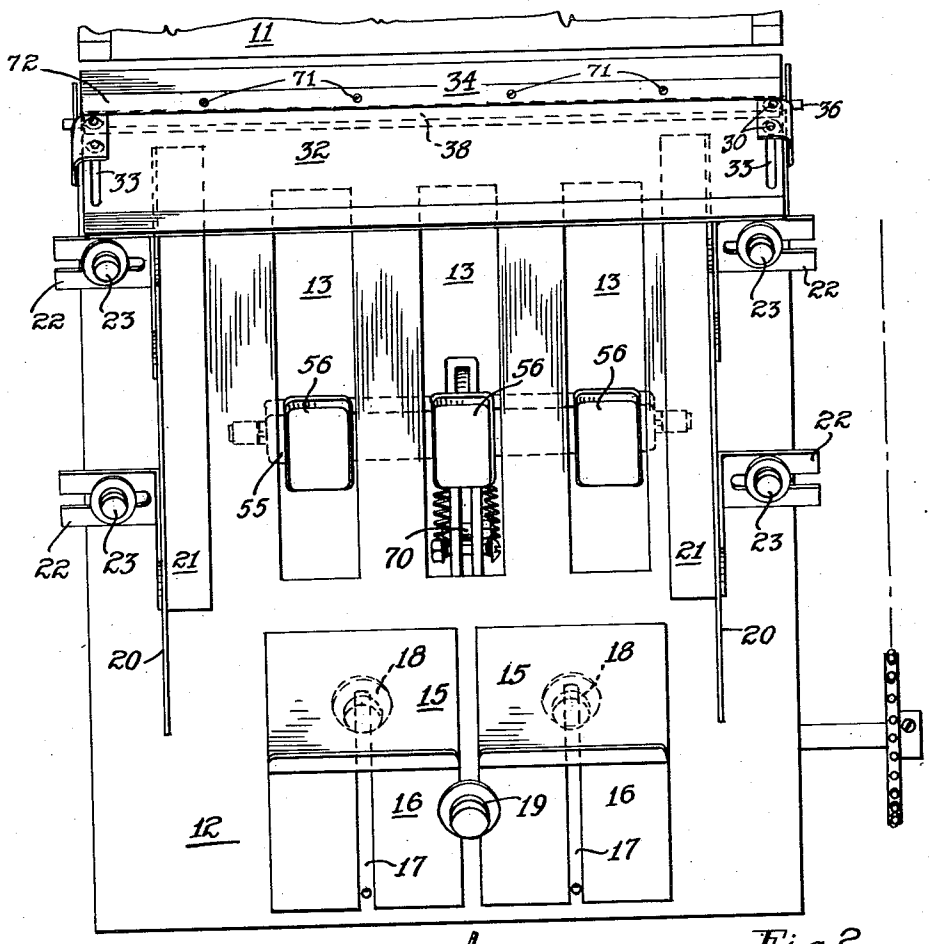

Fig. 2.

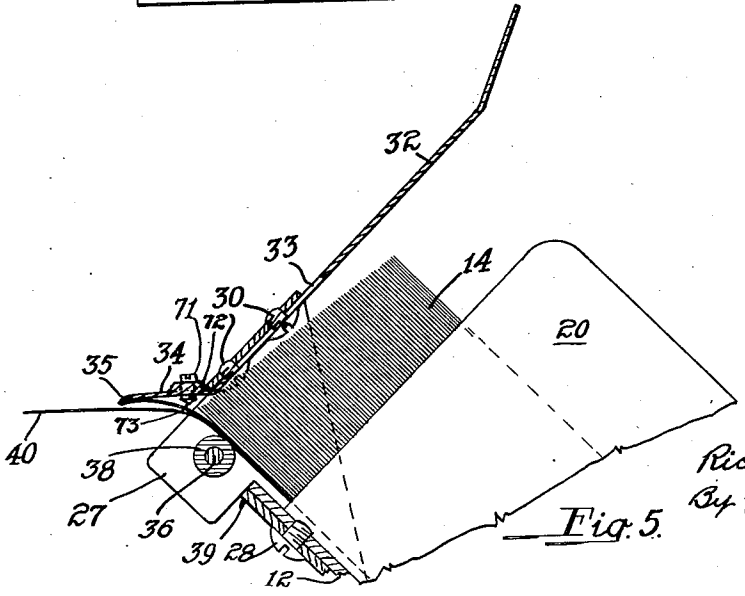

Fig. 5.

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SHEET FEEDING MECHANISM

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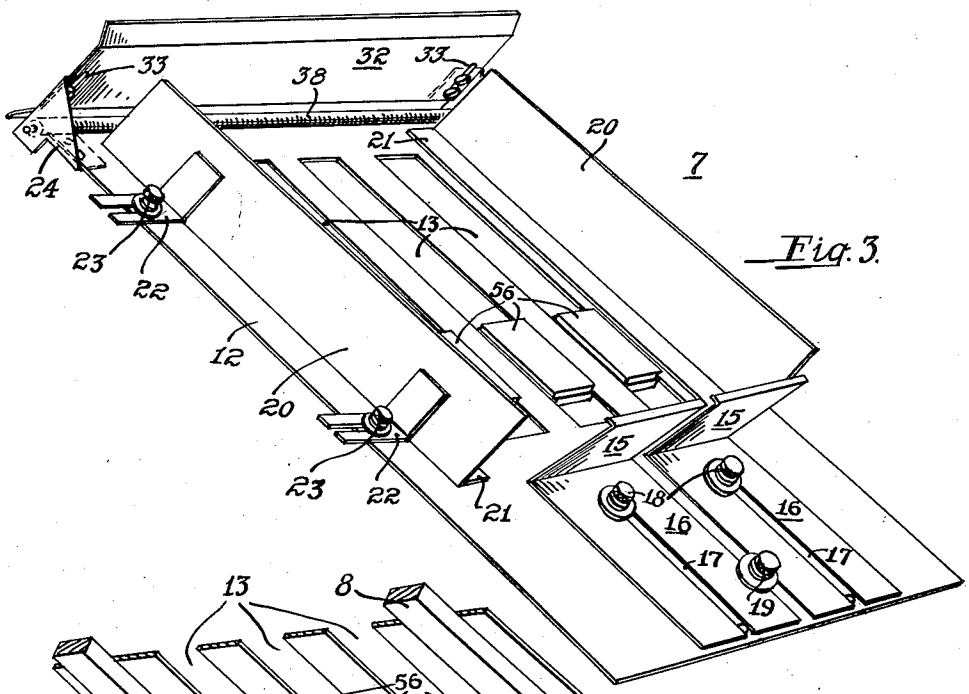

Fig. 3.

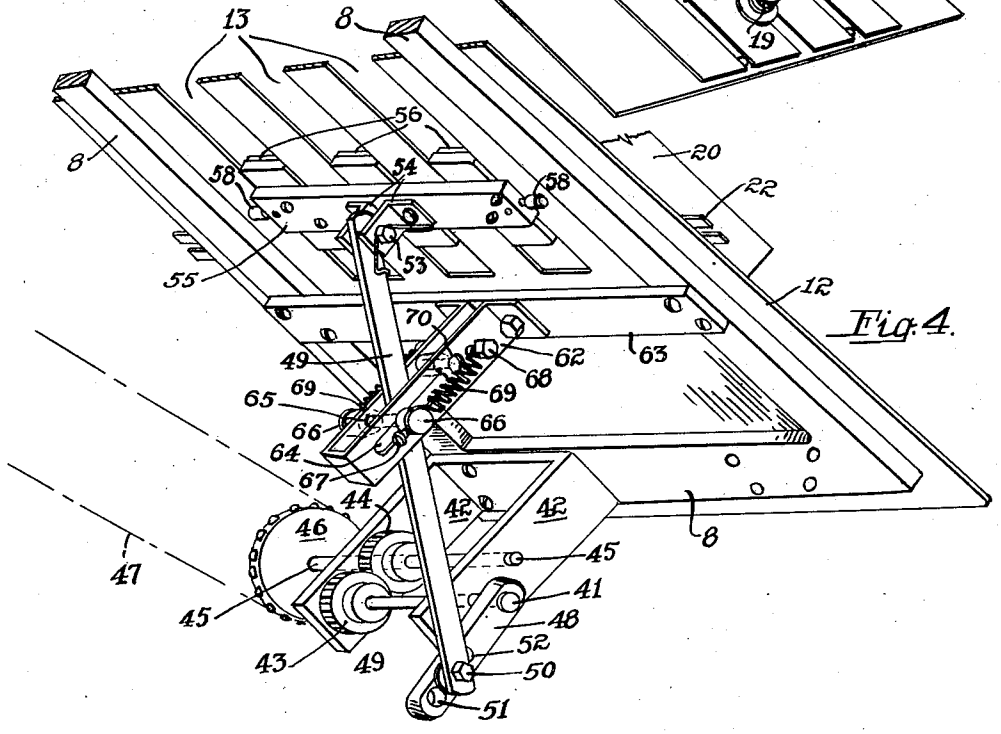

Fig. 4.

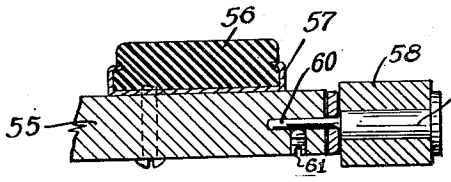

Fig. 6.

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UNITED STATES PATENT OFFICE

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SHEET FEEDING MECHANISM

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Application September 24, 1938, Serial No. 231,535

6 Claims. (Cl. 271—44)

This invention relates to sheet feeding and more particularly to apparatus for successively feeding individual sheets from the bottom of a stack or pack of sheets.

An object of this invention is to produce a simple, efficient and inexpensive device for successively feeding, to a machine such as a "multigraphing" machine, individual sheets from the bottom of a stack or pack of sheets.

Another object is to produce a simple, inexpensive device for successively feeding individual sheets from the bottom of a stack or pack of sheets which stack or pack may from time to time be replenished or added to without the necessity of stopping the device or otherwise interfering with the feed of such sheets.

These, as well as other objects which will be apparent to those skilled in the sheet feeding art, I attain by means of the device described in the specification and illustrated in the drawings accompanying and forming part of this application and throughout which similar elements are denoted by like characters.

In the drawings:

Figure 1 is a view in side elevation of a device embodying this invention; said device being attached to and driven from a machine such as a "multigraphing" machine to which it is designed to feed a succession of individual sheets from the bottom of a stack or pack of sheets;

Fig. 2 is a top plan view of such sheet feeding device per se;

Fig. 3 is a top perspective view of the magazine or container of the sheet feeding device within which the sheets to be fed are stacked;

Fig. 4 is a bottom perspective view of the major part of the sheet feeder of Fig. 1; the outlet portion of the magazine or container and the parts associated with the outlet portion thereof being omitted;

Fig. 5 is an enlarged view in side elevation of the outlet or discharge end of the magazine;

Fig. 6 is an enlarged detail view in section of a portion of the sheet feeder; and

Fig. 7 is a view in perspective of a portion of the device.

The device of this invention comprises a magazine or container for accommodating a stack or pack of sheets such as paper sheets, and means for successively feeding to a "multigraphing" machine (or other machine in which the sheets are to be processed or otherwise acted upon) individual sheets from the bottom of the stack or pack of sheets.

The magazine or container, which in its entirety is designated by the numeral 7, is mounted on a supporting frame 8 and this frame by means of bolts 9 is secured to the support structure 10 of a "multigraphing" or other machine 11. The plane of the top of the support frame 8 is inclined at an angle of about 45° to the horizontal.

The magazine comprises a floor-like member 12 which is attached to support frame 8 and has the same inclination to the horizontal as the upper surface of frame 8. Member 12 is provided with a series of longitudinally extending slots 13 within which sheet contact members of the sheet displacer are adapted to reciprocate during feeding movements of the displacer, as hereinafter described.

In Figure 1, I have illustrated a stack or pack 14 of sheets in place within the magazine or sheet container and it will be noted that the lower end of the stack rests upon a support which because of the inclination of member 12 sustains the major part of the weight of the stack. This support is made in two parts, each having an upstanding portion 15 and a foot or part 16 which lies in contact with member 12 and which is slotted as at 17 to receive securing screws 18. These screws are threaded into openings in member 12 and the slots and screws provide means for adjusting the position of the support to accommodate stacks of different lengths. A screw 19 threaded into an opening in member 12 located between parts 16 of the support cooperates with screws 18 in holding the separate parts of the support in line and in adjusted position.

Side members 20 are supported on member 12 and are adapted to serve as sides for the magazine or sheet container. These side members are preferably formed of sheet metal and each is provided with an inwardly extending bottom flange 21 and outwardly extending spaced feet 22. The feet are slotted as shown in Figs. 2 and 3 to receive securing screws 23 which are threaded into suitable openings in member 12. This construction provides adjustment of side members 20 laterally of member 12 in order to accommodate sheets of different widths.

A sheet metal bracket is secured to each upper forward corner of member 12. These brackets are made right and left and the bracket shown in Figs. 1 and 3 is illustrated in Figure 7. These brackets are preferably formed from sheet-like metal to provide a more or less triangular portion 24, angle flanges 25 and 26 and a depending portion 27. Flange 25 is located below the forward end of member 12 and is secured thereto by

means of screws 28 which pass through holes 29 of the flange and are threaded into suitable holes in member 12. Bolts 30 located within holes 31 of flange 26 are utilized to secure the top end piece 32 of the magazine in place. This end piece is provided adjacent each of its ends with a slot 33 through which bolts 30 pass. End piece 32 at its bottom is provided with a guard lip 34 and this lip at its extreme outer end is bent slightly inward as shown at 35 to form a shallow hook-like edge for the purpose of catching and holding back the upper sheet if two sheets happen to move simultaneously through the outlet opening of the magazine.

The bolt and slot connection between flanges 26 of the corner brackets and the top end gate of the magazine affords means for nicely adjusting the position of the deflector lip 34.

It will be apparent that the two part support 15 is the actual floor or bottom of the magazine since member 12 is positioned at an angle of about 45° to the horizontal which angle is greater than the angle of stability or angle of repose of the stack or pack of sheets. In reality, the stack or pack leans against member 12; the major part of its weight being carried by support 15. This angular arrangement of member 12 materially assists in the successful feeding of individual sheets from the bottom of the stack.

A roller support rod 36 is mounted within openings 37 formed in the depending ears 27 of the corner brackets and a tubular roller 38 is mounted for rotation on this rod. This roller as shown in Fig. 5 is located below and supports the outer end of the stack of sheets. The roller being located beyond the upper end 39 of member 12 and between member 12 and guide lip or apron 34 assists in the feed of the sheets through the outlet of the magazine. In Figs. 1 and 5, the end of the lower sheet 40 of the pack is shown as having been bent downwardly over roller 38 by guide apron 34 to position the same for its entrance into the "multigraphing" machine.

The sheet feeding mechanism is attached to the under side of support frame 8 and is adapted to be operated in synchronism with the multigraphing or other machine to which sheets are to be fed. A shaft 41 journaled in bracket arms 42—42 at one end carries a gear 43 which meshes with a gear 44 carried on a shaft 45. Shaft 45 carries a sprocket 46 which is adapted to be driven from the "multigraphing" or other machine 11 by means of a silent chain 47. Shaft 41 carries a crank arm 48 and to this a rod 49 is pivotally attached by means of a crank pin 50. As will be noted, crank arm 48 is provided with several other holes such as 51 and 52 for receiving crank pin 50 for the purpose of adjusting the throw of the crank to accommodate longer or shorter sheets.

Rod 49 at its outer end is pivotally connected by means of a pin 53 and a two part bracket 54 to a displacer support 55. This displacer support is of such length as to span slots 13 in member 12, and in line with each of said slots support 55 carries a sheet contact pad 56. These pads are preferably made of friction material such as sponge rubber and each pad is preferably secured to displacer support 55 by means of gripping members 57.

Each outer end of displacer 55 is provided with a contact roller 58 and each of these rollers is mounted on a cylindrical bearing member 59 which is secured to or formed in one piece with an eccentric pin 60 which fits within a bore formed for that purpose in the end of support 55. A set screw 61 locks pin 60 in position and by rotating bearing portion 59 the position of roller 58 with relation to the top and bottom surfaces of displacer support 55 may be adjusted.

A bifurcated bracket 62 which is secured to a cross member 63 carried by frame 8 has its side members slotted as at 64 to receive a pin 65. The ends of pin 65 which project beyond the outside surfaces of the side members of bracket 62 carry cylindrical stop members 66. These form enlarged ends for the pin and are secured in place on said pin by means of set screws 67. A bolt 68 passes through openings formed for its reception in the side members of bracket 62. Connected to each outer end of this bolt is a spring 69. The opposite end of each of these springs is connected to one of the cylindrical stop members 66 of pin 65.

A pin 70 has its opposite ends secured within the side members of bracket 62. Rod 49 passes between the side members of bracket 62 and between pins 65 and 70. Pin 65 under the urge of springs 69 yieldingly holds the displacer support 55 in operative or feeding position with its support rollers 58 in contact with the under side of member 12 during feeding movements of the displacer support member.

Shaft 41 is rotated in the direction of the arrow of Fig. 1 and it will be apparent that during part of the throw of crank arm 48 contact pads 56 will move within slots 15 and toward their upper ends. As rotation of the crank continues, rod 49 will contact with pin 70 which preferably carries an encircling tubular roller and as this occurs, displacer support 55 will be kicked out of feeding position as shown by dotted lines in Fig. 1 and will remain out of feeding position until the crank arm 48 again moves into feeding position.

I have found that at times if the stack happens to get low, there is a tendency for two or more sheets to follow the bottom sheet in its upward travel. For the purpose of holding back these sheets, I provide a series of sheet retarders 71. These retarders resemble set screws and are threaded through a thickened part 72 of guard lip 34. Each retarder is provided with a bluntly pointed contact end 73 and it will be apparent that these retarders may be adjusted to just the position required.

It will be apparent that the stack of sheets may be replenished from time to time without interrupting the operation of the feeder.

If narrow sheets are to be fed one or more of the contact pads 56 may be detached from the displacer support 55 and the side members 20 adjusted to accommodate the narrower sheets. If the sheets to be fed are shorter and narrower than normal, one half of a support made up of parts 15—16 may be moved upwardly between side members 20.

Having thus described my invention, what I claim is:

1. In a device for successively feeding individual sheets from the bottom of a stack of sheets, a longitudinally slotted support for a stack of sheets, a sheet displacer movable below said support and having means adapted during feeding movements to project through the slot of said support and frictionally engage the bottom sheet of the stack, a crank adapted to be driven in synchronism with the machine to which sheets are to be fed, an operative connection between said displacer and said crank, means yieldingly holding said displacer in sheet feeding

position during part of the travel of said crank, and means for holding said displacer out of contact with said stack during the remaining travel of said crank.

2. In a device for successively feeding individual sheets from the bottom of a stack of sheets to a "multigraphing" or other machine, means for supporting a stack of sheets at an angle beyond its angle of repose and a sheet feeder arranged to engage the bottom sheet of the stack and to slide the same upwardly beneath the stack; said feeder including a crank adapted to be driven synchronously with said machine, a member for frictionally engaging the bottom sheet of the stack, a rod connecting said friction member and said crank, means tending to yieldingly hold said friction member in contact with the bottom sheet of said stack during each entire revolution of said crank and an agent for rendering said means ineffective during part of such revolution whereby said friction member is held in contact with the bottom sheet during its feed movements and out of contact with the stack during its return movements.

3. In a sheet feeder, a rest member having an inclination to the horizontal of approximately 45° and which is provided with longitudinal openings extending therethrough, a bottom support member for supporting a stack of sheets leaning against said rest member, a sheet displacer movable below said rest member and having means adapted during its upward movements to project through the openings in said rest member and frictionally engage the bottom sheet of the stack, a crank adapted to be driven in synchronism with the machine to which the sheets are to be fed, an operative connection between said displacer and said crank, means yieldingly holding said displacer in sheet feeding position during part of the travel of said crank and means for holding said displacer out of contact with said stack during the remaining travel of said crank.

4. In a device for feeding individual sheets from the bottom of a stack of sheets, slotted means for supporting a stack of sheets at an angle to the horizontal, a frictional sheet feeder element located below said slotted means, means for reciprocating said feeder element, spring means for yieldingly forcing said feeder element through the slot of said slotted means and into sheet feeding position during upward movements thereof and means for holding said element out of said slot in opposition to said spring means during downward movements thereof.

5. In a device for feeding individual sheets from the bottom of a stack of sheets supported at an angle beyond its angle of repose, a longitudinally slotted support, a sheet displacer located below said support and having means adapted, during its upward movements, to project through the slot of said support and frictionally engage the bottom sheet of the stack supported thereby, a member adapted to be reciprocated in synchronism with the machine to which sheets are to be fed, an operative connection between said member and said displacer, means yieldingly holding said displacer in sheet feeding position during part of the travel of said member and means for holding said displacer out of contact with said stack during the remaining travel thereof.

6. In a device for feeding individual sheets from the bottom of a stack of sheets supported at an angle beyond its angle of repose, a longitudinally slotted sheet support, a sheet displacer below said support, a rod carrying said displacer, a crank for reciprocating said rod back and forth below said support, yielding means for holding said displacer in sheet feeding position during feeding movements of said rod, and stop means located above said rod and against which said rod is held by said yielding means during return movements of said rod.

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