

Feb. 7, 1956

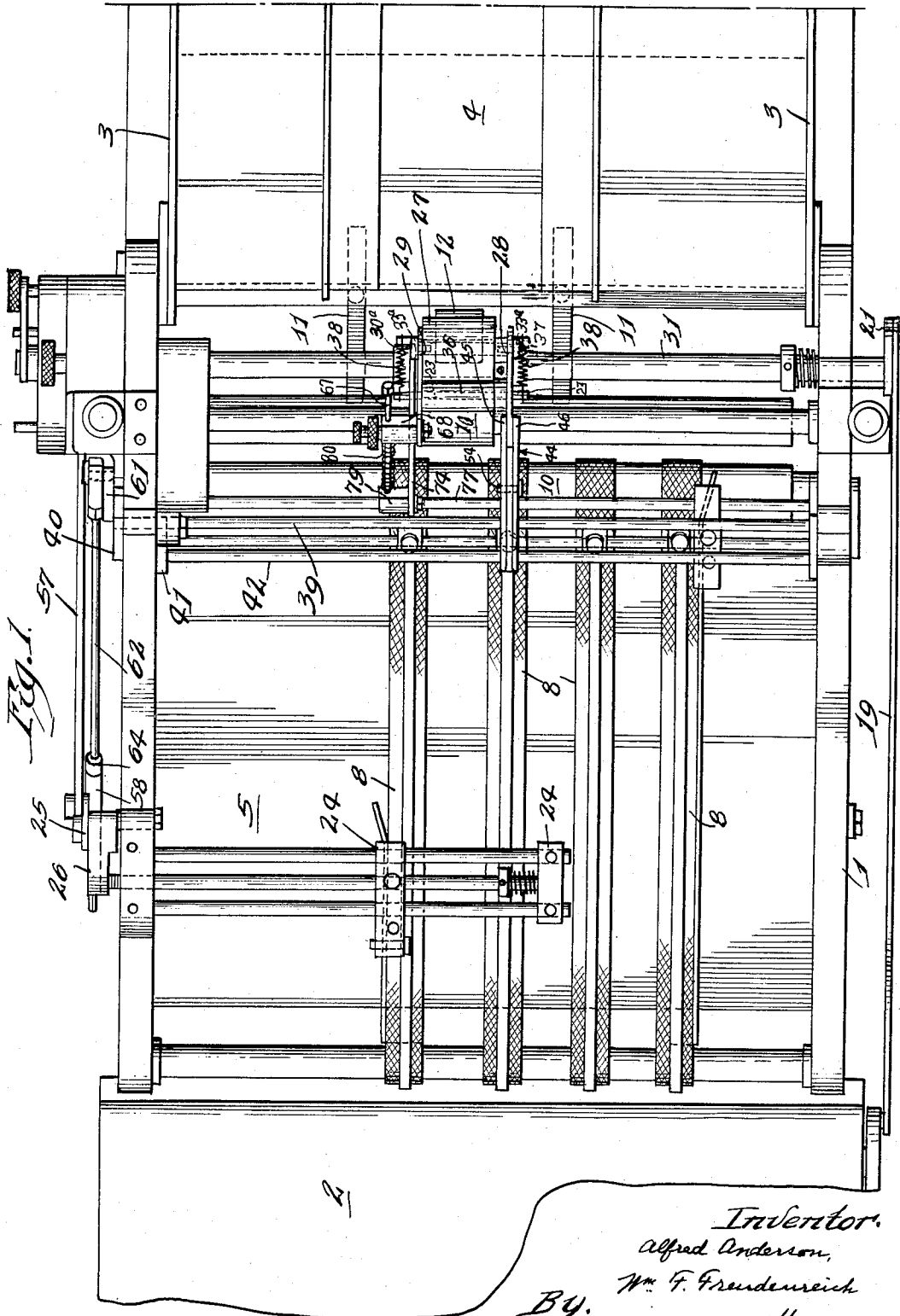
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2,733,919

FEEDING ATTACHMENT FOR AUTOMATIC SHEET FEEDING MACHINES

Filed Sept. 29, 1954

4 Sheets-Sheet 1



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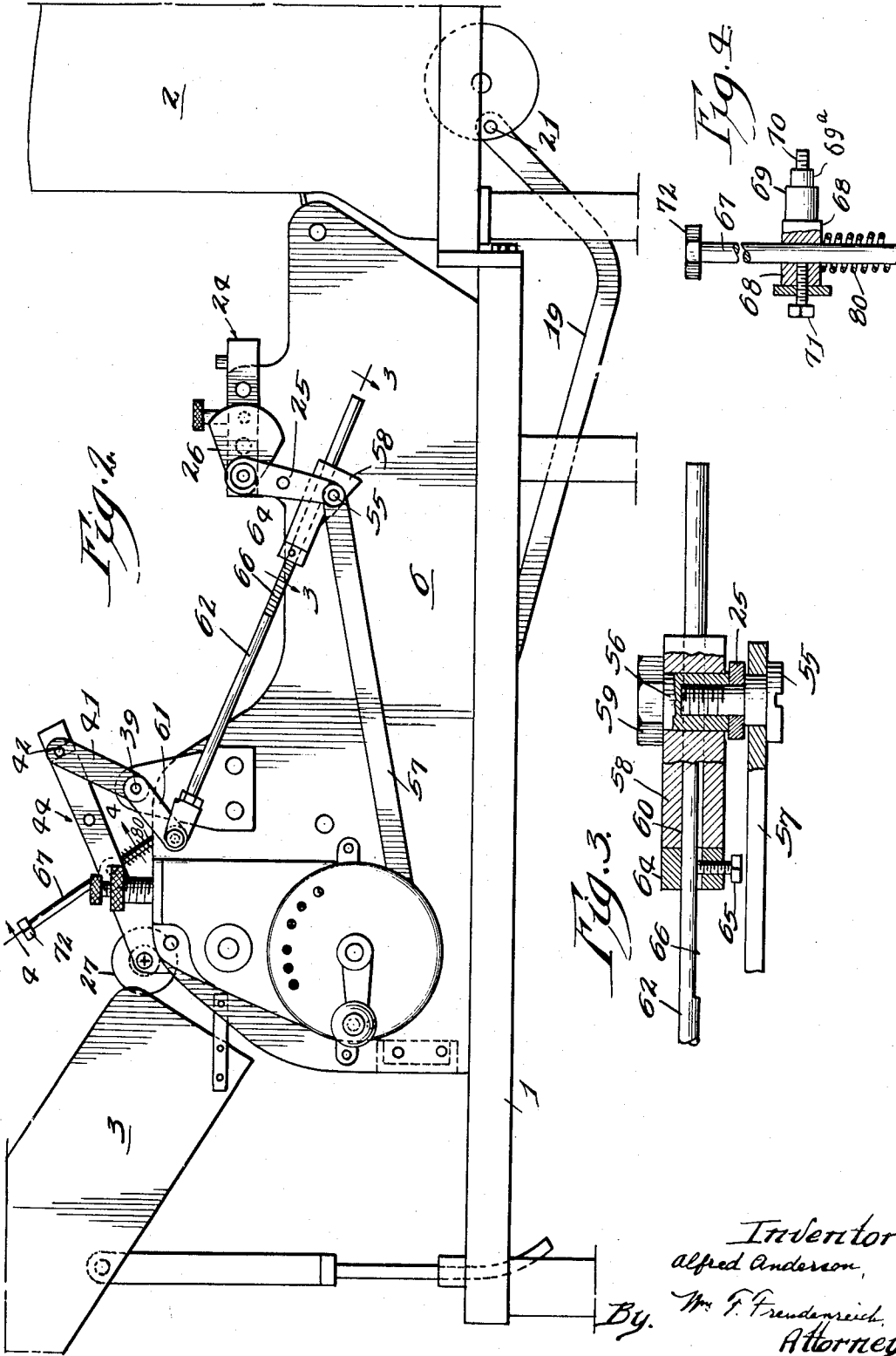
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FEEDING ATTACHMENT FOR AUTOMATIC SHEET FEEDING MACHINES

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4 Sheets-Sheet 2



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FEEDING ATTACHMENT FOR AUTOMATIC SHEET FEEDING MACHINES

Filed Sept. 29, 1954

4 Sheets-Sheet 3

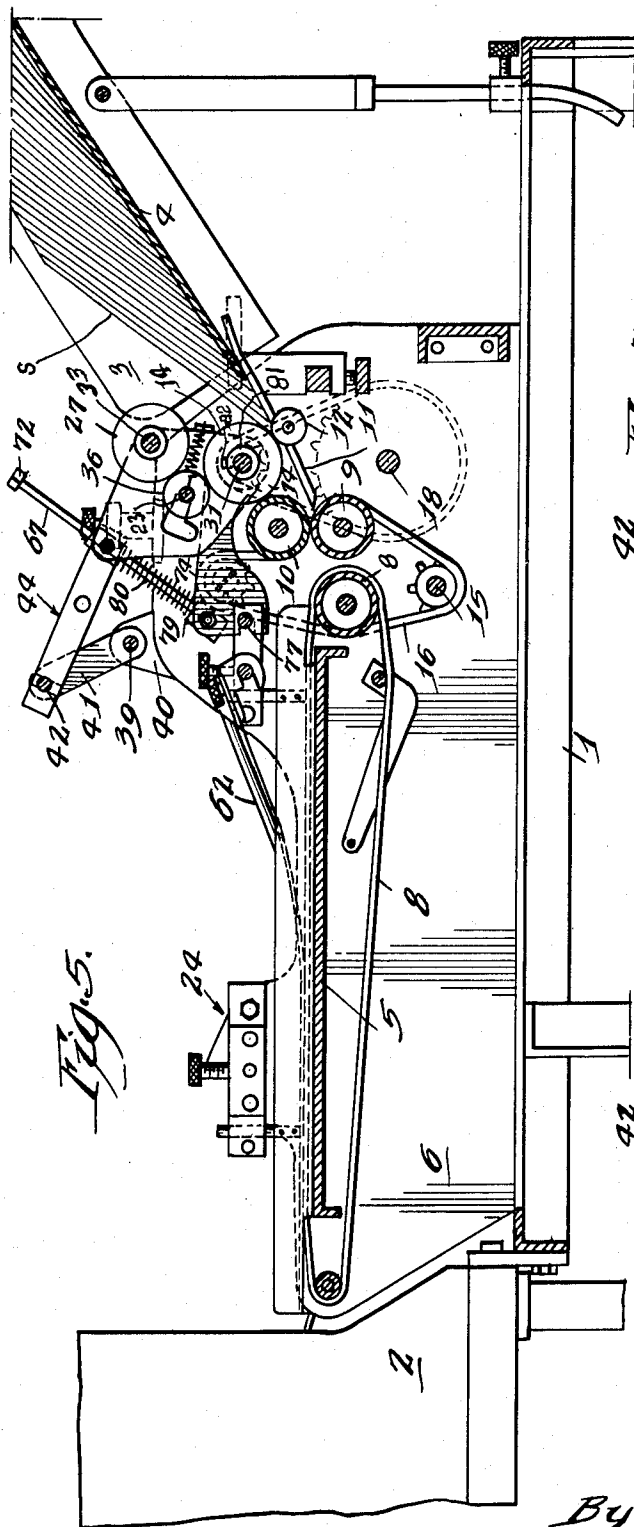


Fig. 5.

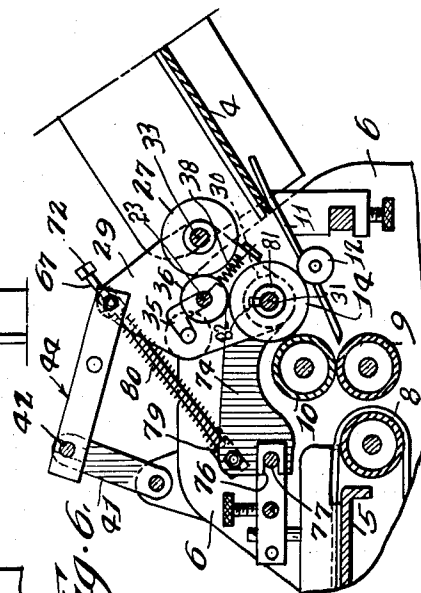
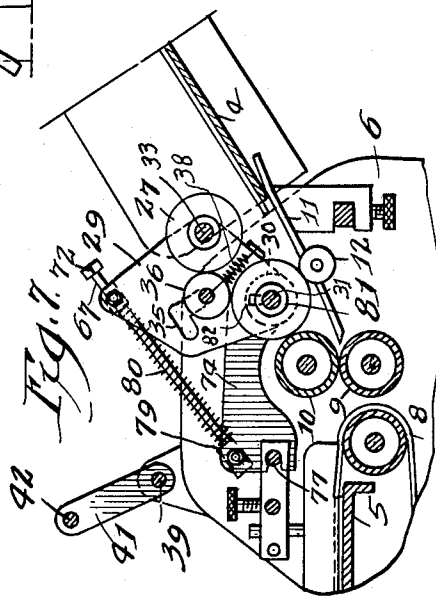


Fig. 6.

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4 Sheets-Sheet 4

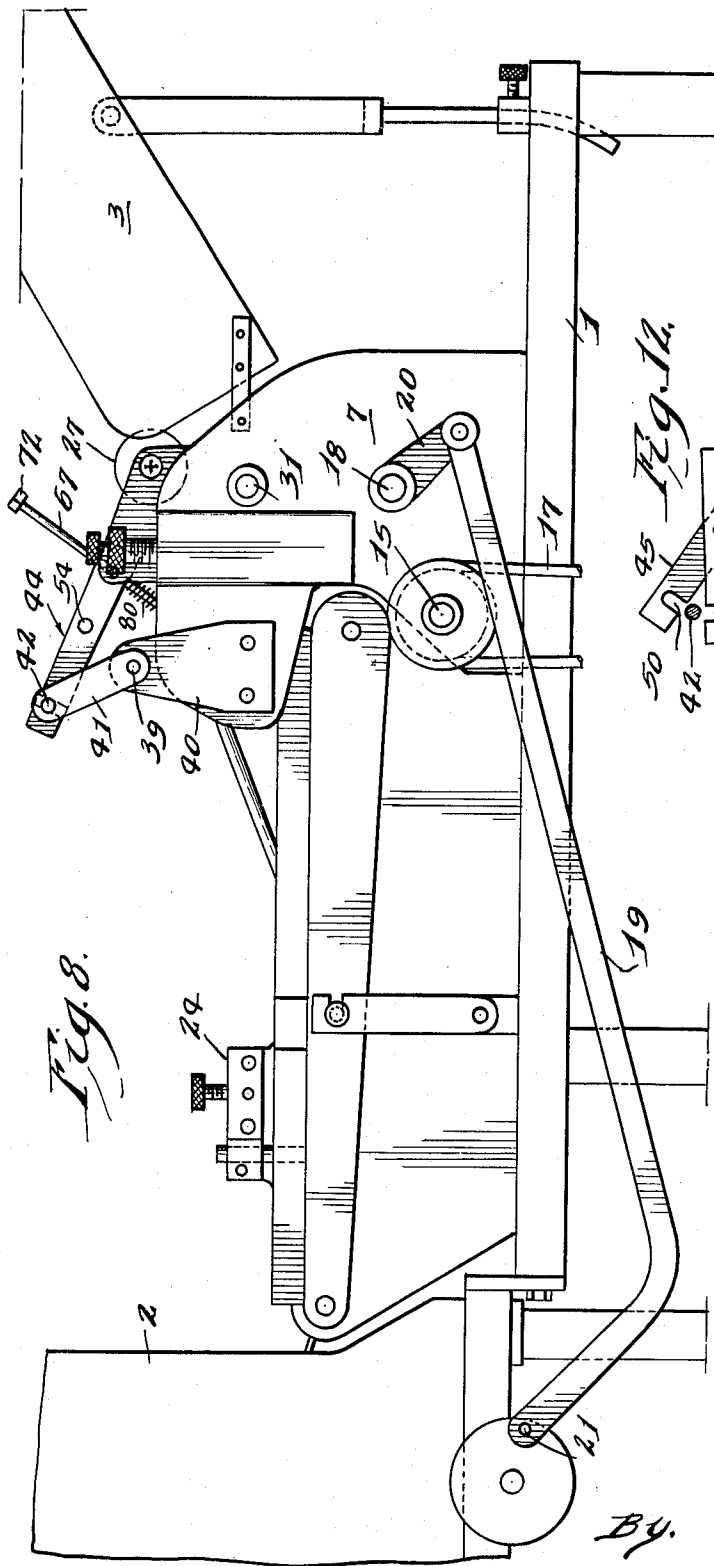


Fig. 8.

Fig. 12.

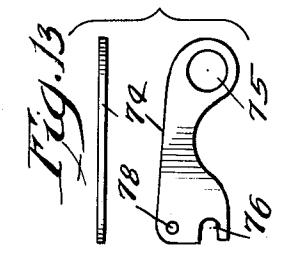
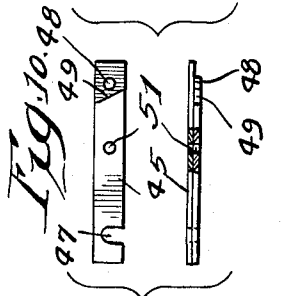
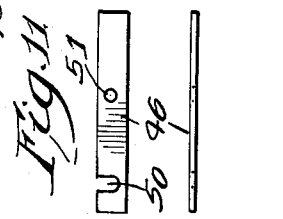
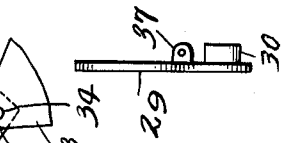
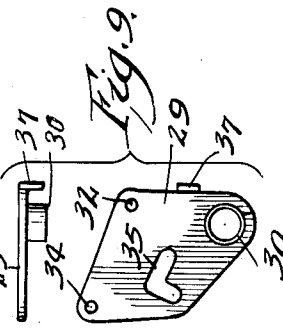
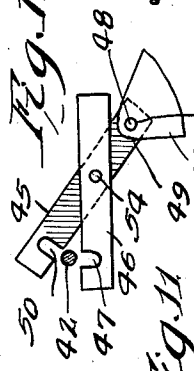


Fig. 13.

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FEEDING ATTACHMENT FOR AUTOMATIC SHEET FEEDING MACHINES

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Application September 29, 1954, Serial No. 459,050

12 Claims. (Cl. 271-10)

The present invention relates to automatic sheet feeding machines, particularly machines of the type shown in my application Ser. No. 99,098, filed June 14, 1949, now Pat. No. 2,696,983.

Such machines are adapted to feed sheets or sheet-like material (such as flattened cartons and pamphlets, for example), one piece at a time, into a machine for printing or other work thereon. At the present time there are a great many articles, differing greatly in size and other characteristics, which may be handled to advantage in this manner, provided that there be made available a feeding mechanism which may be easily adjusted to suit the varying conditions encountered in initiating the movements of these widely different sheets or sheet-like pieces.

The object of the present invention is to create such a feeding mechanism which shall materially lengthen the list of articles that may be handled by an automatic feeding machine and which shall also give better results in the case of some articles already being handled in such machines.

In my aforesaid machine the stock is initially placed in a magazine having a forwardly and downwardly inclined bottom; a group of sheets or other sheet-like articles being "fanned out" and set into the magazine at an angle to and having their forward edges resting on the magazine bottom. Thus the article that would be uppermost in a simple stack wherein the article is horizontal becomes the forward or leading article. The forward edge of which ever article is in the lead enters the bite between a first, intermittently driven friction roller and an underlying, stationary "retard" roller, whereby that article is moved ahead to a pair of main or "pull-out" rollers. As one article after another is detached and carried away the remainder of the stock slides down to present new articles to be gripped.

I have found that the addition of a second friction feed roller that contacts the work in advance of the first such roller and moves in unison with the latter gives good results in the case of some articles commonly handled in the machine. However, the beneficial effect of this added roller is not sufficiently far reaching and, sometimes the presence of such an intermittently driven roller may even be objectionable.

Considered in one of its aspects the present invention may be said to have for its object to provide means to utilize said second friction feed roller in such a way that, through simple adjustments, it may be used as an intermittently driven roller or as an idle roller contacting the stock, or it may be used as a mere stop.

In actual practice I mount and drive said second friction feed roller for automatic bodily movements toward and from stock in the magazine. This jars or vibrates the stock and makes the individual articles move more freely and certainly into the article gripping zone.

Therefore, viewed in a further aspect, the present invention may be said to have for its object to provide simple and novel means to jar or vibrate, and thus loosen, a group of sheet-like articles that must slide by gravity

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into a zone where they are gripped and carried away one at a time.

The various features of novelty whereby the present invention is characterized will hereinafter be pointed out with particularity in the claims; but, for a full understanding of the invention and of its objects and advantages, reference may be had to the following detailed description taken in connection with the accompanying drawings, wherein:

Figure 1 is a top plan view of a sheet feeding machine to which mechanism embodying the present invention has been added as an attachment.

Fig. 2 is a view looking at the side of the machine which is at the top in Fig. 1.

Fig. 3 is a section, on a larger scale, on line 3-3 of Fig. 2.

Fig. 4 is a section, on a large scale, on line 4-4 of Fig. 2.

Fig. 5 is a longitudinal, vertical section through the machine.

Fig. 6 is a section similar to Fig. 5, showing only a fragment of the apparatus, with some of the parts in different positions than those occupied in the latter figure.

Fig. 7 is similar to Fig. 6, except that the roller driven by one friction feed roller and adapted to drive a second such roller is in an idle position, and the magazine is shown empty.

Fig. 8 is an elevational view showing the opposite side of the machine from that appearing in Fig. 2.

Fig. 9 consists of a face view and two edge views of one of two similar plates which serve as a swinging support for two of the rollers.

Fig. 10 consists of a side view and an edge view of a bar forming part of a connecting rod shown attached to one of the plates, appearing in Fig. 9, in some of the main views.

Fig. 11 consists of a side view and an edge view of the second bar which, with the bar appearing in Fig. 10, constitutes a connecting rod.

Fig. 12 is a side view of the aforesaid connecting rod, with its two bar elements standing at an angle to each other, the shaft to which one end of the rod is adapted to be attached being shown in section, and a fragment of the swinging support being shown still attached to one of the bars.

Fig. 13 consists of a side view and an edge view of a strut to which is connected one end of a rod forming a guide for the spring that acts on the swinging support.

For the sake of brevity the word sheets will be used hereinafter in the specification and claims to designate, not only individual pieces of a single thickness, but also flattened cartons, envelopes, pamphlets and folded newspapers of medium thicknesses.

Since much of the apparatus illustrated comprises simply the machine disclosed in my aforesaid application, modified only as to the form of some of its elements, this part of the apparatus will be described briefly before any discussion of the features constituting the present invention.

Referring to the drawings, 1 represents a frame adapted to be attached to a machine 2 which is to receive sheets, one at a time, and print or do other work thereon. Mounted on top of the frame at the end remote from machine 2 is a magazine 3 having a downwardly and forwardly inclined bottom 4. Between the magazine and machine 2 is a horizontal table 5; there being a considerable space between the magazine and the near end of the table; and the table being well below the magazine. The table is disposed between two vertical walls 6 and 7, rising above the frame, and it supports endless conveyor belts 8. Between the table and the magazine are two horizontal pull-out rollers 9 and 10, one above the other, the bite or line of

contact between them being at or a little above the plane of the table. Rails 11 form a forward and downward continuation of the magazine bottom and terminate close to the bite between the pull-out rollers. A stationary retard roller 12, parallel to rollers 9 and 10, protrudes somewhat above the plane of the rails. Above the retard roller is a cooperating friction feed roller 14.

The conveyor belts and the pull-out rollers are driven by a shaft 15 through sprocket chain 16; this shaft being driven by a motor (not shown) through a belt 17.

Feed roller 14 is driven in definite time relation with the operation of machine 2; a shaft 18, well below the roller, being turned intermittently by a connecting rod 19 attached at one end to a crank 20 on this shaft, while its other end is connected to a crank pin 21 on machine 2. Roller 14 is driven by shaft 18 through a sprocket chain drive 22.

Shaft 18 also drives the jogger 24. This is not of importance except that rocker arm 25 (see Fig. 2) which oscillates the jogger-operating cam 26, also drives the attachment which constitutes the present invention.

The attachment embodying the new features will now be described.

The first element in the new attachment is a second friction feed roller 27 for engaging with the sheets at a substantial distance from the advance edges that engage roller 14 at the bite between the same and the retard roller. Roller 27 is mounted between two diamond shaped plates 28 and 29, that form the body of a swinging support member for rollers. Each of these plates contains at one end a laterally projecting hub 30 fitting and rotatable on shaft 31 on which roller 14 is mounted for rotation therewith. At corresponding corners, about midway between the ends of the plates, are small holes 32 that register with the ends of a combined spacer and shaft 33 arranged between the plates. This shaft and the plates are rigidly secured together by cap screws 33^a passing through holes 32 into the ends of the shaft. Roller 27 is rotatably mounted on this shaft. Each plate contains a second, small hole 34 at the second end of the plate. In each plate, near the corner opposite hole 32, is an inverted V slot 35. A shaft 23, longer than shaft 33, extends loosely through these slots and supports a small driver roller 36, extending between the two plates. When shaft 23 is in the ends of the slots nearest roller 27, roller 36 contacts both that roller and roller 14. When this shaft is at the other ends of the slots, roller 36 does not contact either of the other two rollers and roller 27 becomes an idler. Each plate has at one edge, below hole 32, a laterally projecting ear 37. A tension spring 38 extends from each of these ears to the corresponding ends of shaft 23. The parts are so proportioned that these springs hold roller 36 in which ever position it may be set.

The swinging unit, consisting of plates 28 and 29 and rollers 27 and 36, may be rocked to carry roller 27 from a lower position well down in the front of the end of the magazine to an upper position where it protrudes above the top of the magazine and is farther forward.

Means are provided to oscillate the feed unit in definite time relation to the intermittent movements of feed roller 14. To this end I provide a transverse rock shaft 39 mounted at its ends in ears 40 rising from side walls 6 and 7, somewhat forwardly from shaft 31 that supports the swinging feed unit. Shaft 39 has at each end a radial arm 41 extending upwardly therefrom. A second, bodily movable, transverse shaft 42 spans the distance between these arms and is secured to the same near their free ends. A suitable connecting rod 44 couples shaft 42 to one of the plates in the swinging feed roller unit. This rod, as best shown in Figs. 10 to 12, is composed of two thin, flat bars, 45 and 46. Bar 45 has in the top, near one end, a notch 47 as wide as the diameter of shaft and preferably a little deeper. The inner side of this bar is cut away to a depth equal to the thickness of plate 28 or 29, and is provided with a short pin 48 protruding from the bottom

of the recess so formed. Bar 46 has in the under edge, near one end, a notch 50 similar to notch 47. At the middle of each bar is a hole, hole 51 in bar 45 being a smooth bore while hole 52 in bar 46 is screw threaded. A screw 54, extending through hole 51 into hole 52, serves to clamp the two bars together.

With the parts of the connecting rod in the relative positions illustrated in Fig. 12, the tip of plate 28 can be set into recess 49, with pin 48 entered in hole 34. The connecting rod may then be brought into a position that places shaft 42 between the notches 47 and 50; and, upon swinging the two bars into parallelism with each other, the said notches form a closed bearing for the shaft. Upon tightening screw 54 the two bars are clamped together into a single rigid unit which may swing on the shaft.

Rock shaft 39 is operated through a connection with rocker arm 25 which moves the cam 26 that controls jogger 24. This is best illustrated in Figs. 2 and 3. It will be seen that the nut 55 on the bolt 56 that secures the actuating rod 57 to rocker arm 25 constitutes also a bearing for a block 58; the nut itself having thereon a head 59 that keeps the blocks from falling off. This block contains a bore 60 extending through the length of the block. On the end of rock shaft 39 is a radial arm 61. A rod 62 is connected at one end to this arm and extends slidably through bore 60. On the rod is a loose collar 64 provided with a set screw 65 to secure it at any desired point along the rod. The rod preferably has a flattened side 66 with which the set screw engages and which marks the limits of the distance through which adjustments may be made. Block 58 having a definite range of movements, it is apparent that the angle through which the rock shaft will be driven depends on the location of the collar along the rod.

Rock shaft 39 drives the swinging support for rollers 27 and 36 in one direction only, namely forwardly to retract the rollers. Resilient means are provided to drive said support in the direction, rearward, to contact stock in the magazine.

Such resilient means includes a long rod 67 that extends slidably through a block 68 that projects laterally from the upper end of plate 29. As best shown in Fig. 4, this block has at one end a hub 69 terminating in a part 69^a of reduced diameter, which extends into and is rotatable in hole 34 in the plate, and a screw 70. Upon applying a nut to the screw, the block is secured to the plate so as to be oscillatory thereon. The block may be locked to the rod, in any desired position lengthwise of the latter, by a set screw 71. On the upper end of the rod is a head 72, while the lower end is hinged to a stationary strut 74. This strut, as best shown in Fig. 13, is a plate standing on edge that has in the same, near one end a hole 75 of the same diameter as the external diameters of hubs 30 on plates 28 and 29. In the end edge, at the opposite end of the strut, in the end edge, is a notch 76. Hub 30 on plate 28 extends through hole 75 and is rotatable therein, and is prevented from coming out by a collar 30^a on the hub outwardly from plate 74. Notch 76 forms simply a seat loosely engaging shaft 39. Plate 74 contains a small hole 78 at a substantial distance above the notch. A part 79 on the lower end of rod 67 is connected to plate 74 at this latter hole for swinging movements. Surrounding rod 67 is a compression spring 80, one end of which bears against block 68 and the other end against part 79.

It is desirable that the entire friction unit be readily adjustable, bodily, crosswise of the machine. This is readily accomplished by using roller 14 to lock itself and the entire unit against lateral movements. As best shown in Fig. 5, this roller has a hub 81 provided with a set screw 82 for locking the same to shaft 31. With roller 14 lying between plates 28 and 29, the entire friction feed unit is held in place so long as roller is fast on the shaft. By loosening the set screw the entire unit, including the strut 74, may be shifted laterally in either

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direction into any desired new position. After the adjustment has been made one need only tighten set screw 82 again to ready the machine for further normal operation.

In the operation of the apparatus, with the parts connected as in Fig. 5, the first friction feed roller 14 functions precisely as in my said prior machine. The second friction feed roller 27 is oscillated between a position in which it assists roller 14 and a retracted position. The distance through which such retraction takes place depends on the position of collar 64 on rod 62. Except while being retracted, roller 27 is being yieldingly pressed toward or against the stock in the magazine. As this roller strikes the stock, it jars or vibrates the same, thereby making certain of a proper down flow of the sheets in the magazine.

For some work the maximum effort of both the rollers 14 and 27 is highly desirable as, for example, very small and very large cartons in a flattened state. On the other hand, with medium sized cartons roller 27 may be used simply for its jarring effect, drive roller 36 being shifted into its idle position as shown in Fig. 7; so that roller 27 is no longer positively rotated. In some instances, the jarring action may be eliminated by taking off connecting rod 44, while leaving roller 36 in its working position. In other instances roller 27 may be employed simply as an idler, yieldingly held at all times in stock-engaging position; this being the setting in Fig. 7. Again, the settings may be as shown in Fig. 7, except that rod 67 is locked to plate 29 through a tightening of set screw 71; thus holding roller 27 at any point within its range of bodily movements and permitting it to function simply as a stop. Such a setting is advantageous in feeding lengthwise #10 envelopes. In the absence of roller 27, the trailing ends of the envelopes tend to spring up. With this roller present, properly set to form a stop, smooth feeding of these envelopes results. The user of the apparatus quickly learns what setting is needed for any given stock.

Except as heretofore explained, the operation of the apparatus is the same as in my said prior machine; the user fanning out a group of sheets S and setting them into the magazine as shown in Fig. 5.

The apparatus is then operated in the same way as was my prior machine, the attendant from time to time preparing further groups of sheets and placing them behind what is left of the preceding group.

I claim:

1. The combination with a sheet feeding machine including a magazine for holding a group of sheets, conveyor means in front of the magazine including rotary pull-out rollers arranged one above the other a short distance from the magazine, a stationary retard roller and a cooperating first rotary friction feed roller above said retard roller positioned between the pull-out rollers and the magazine to receive individual sheets moving forwardly out of the magazine and move them to the pull-out rollers, and means to drive the first friction feed roller: of a support member mounted to project upwardly from and swing about the axis of said first friction feed roller, a second friction feed roller mounted on said support member parallel to and spaced apart from said first friction feed roller, a driving roller mounted on said support member between and in frictional contact with both of said friction feed rollers to cause said first one to drive said second one, and automatic means to oscillate said support to carry the said second friction feed roller from and toward the magazine.

2. The combination set forth in claim 1, wherein means are provided on the swinging support member to shift the drive roller bodily out of engagement with at least one of said friction feed rollers.

3. The combination set forth in claim 1, having in addition, means to operate said first friction feed roller intermittently and wherein there is a connection between such

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means and the said support member to operate the latter in unison with that roller.

4. The combination with a sheet feeding machine including a magazine for holding a group of sheets, conveyor means in front of the magazine including rotary pull-out rollers arranged one above the other a short distance from the magazine, a retard roller and a cooperating first rotary friction feed roller above said retard roller positioned between the pull-out rollers and the magazine to receive individual sheets moving forwardly out of the magazine and move them to the pull-out rollers, and means to drive the first friction feed roller: of a support member mounted to project upwardly from and swing about the axis of said first friction feed roller, a second friction feed roller mounted on said support member parallel to and spaced apart from said first friction feed roller, a driving roller mounted on said support member between and in frictional contact with both of said friction feed rollers to cause said first one to drive said second one, a transverse shaft, a driving connection between said means for driving the first friction feed roller and said shaft to move the latter toward and from said magazine, and a connection between said shaft and said support member to shift the latter and cause said second friction feed roller to move into and out of engagement with stock in the magazine.

5. The combination set forth in claim 4, wherein the connection for driving the transverse shaft contains means to vary the distance through which that shaft moves.

6. The combination set forth in claim 4, wherein the connection between the transverse shaft and the support member is a connecting rod provided at its ends with means for quickly attaching and detaching the same with respect to the shaft and support member.

7. In a sheet feeding apparatus, a magazine for holding a group of sheets, a conveyor means, mechanism including a first friction feed roller rotatable about a stationary axis to deliver said sheets, one at a time, to said conveyor means, a support member mounted to swing about the axis of the aforesaid feed roller, a second friction feed roller mounted on said support member in position to move into contact with and away from the sheets in the magazine when such member swings back and forth, means on the support to transmit power from the first friction feed roller to the second friction feed roller to cause the latter to rotate, a drive connected to the first friction roller to rotate it intermittently, and a connection between said drive and said support member to swing the same as aforesaid.

8. A sheet feeding apparatus as set forth in claim 7, wherein the connection between said drive and the support member includes a transverse shaft movable bodily back and forth at right angles to its axis and also a connecting rod attached at its ends to the shaft and to said support member, respectively.

9. A feeding apparatus as set forth in claim 7 wherein the connection between said drive and said support member includes a reciprocating member, a rock shaft, an element connected to the rock shaft and slidably mounted on said reciprocating member, together with a shoulder on and adjustable along said reciprocating member into positions to contact said element at any one of various points in a stroke in one direction of that member.

10. A feeding apparatus as set forth in claim 7, wherein the connection between said drive and said support member includes a rock shaft and a connecting rod extending from an element on said rock shaft to said support member; and wherein the connecting rod comprises two bars arranged side by side and pivotally connected at the middle, one bar having near one end a downwardly facing notch, and the corresponding end of the other bar having an upwardly facing notch, the notches being shaped to form a closed bearing seat for said element when the bars are parallel, and means at the other ends of the bars to form a pivotal connection with said support member.

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11. A feeding apparatus as set forth in claim 10, wherein the pivotal connection between the connecting rod and the support member comprises a notch in one end of the connecting rod to form a jaw within which a part on the support element is seated, the notch lying wholly in one of the bars and having a small opening leading therefrom to the outer side of the bar, a pin on said part on the support in position to fit into said opening, and the pivotal connection between the bars being a screw device which clamps the bars together and, when loosened, allows relative swinging movements between the bars to free them from both said support member and said elements on the rock shaft.

12. In a sheet feeding apparatus, a magazine for holding a group of sheets, a conveyor means, mechanism including a first friction feed roller rotatable about a stationary axis to deliver said sheets, one at a time, to the conveyor means, a support member mounted to swing about

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the axis of the aforesaid friction feed roller, a second friction feed roller mounted on the support in position to swing bodily into contact with and away from the sheets in the magazine when said support member oscillates, a drive connected to the first friction feed roller to rotate it intermittently, and a connection between the said drive and said support member to move the latter in the direction to carry the said second friction feed roller away from the sheets in the magazine, and means yieldingly urging said support member in the direction to cause the latter to engage the sheets.

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