

Dec. 21, 1943.

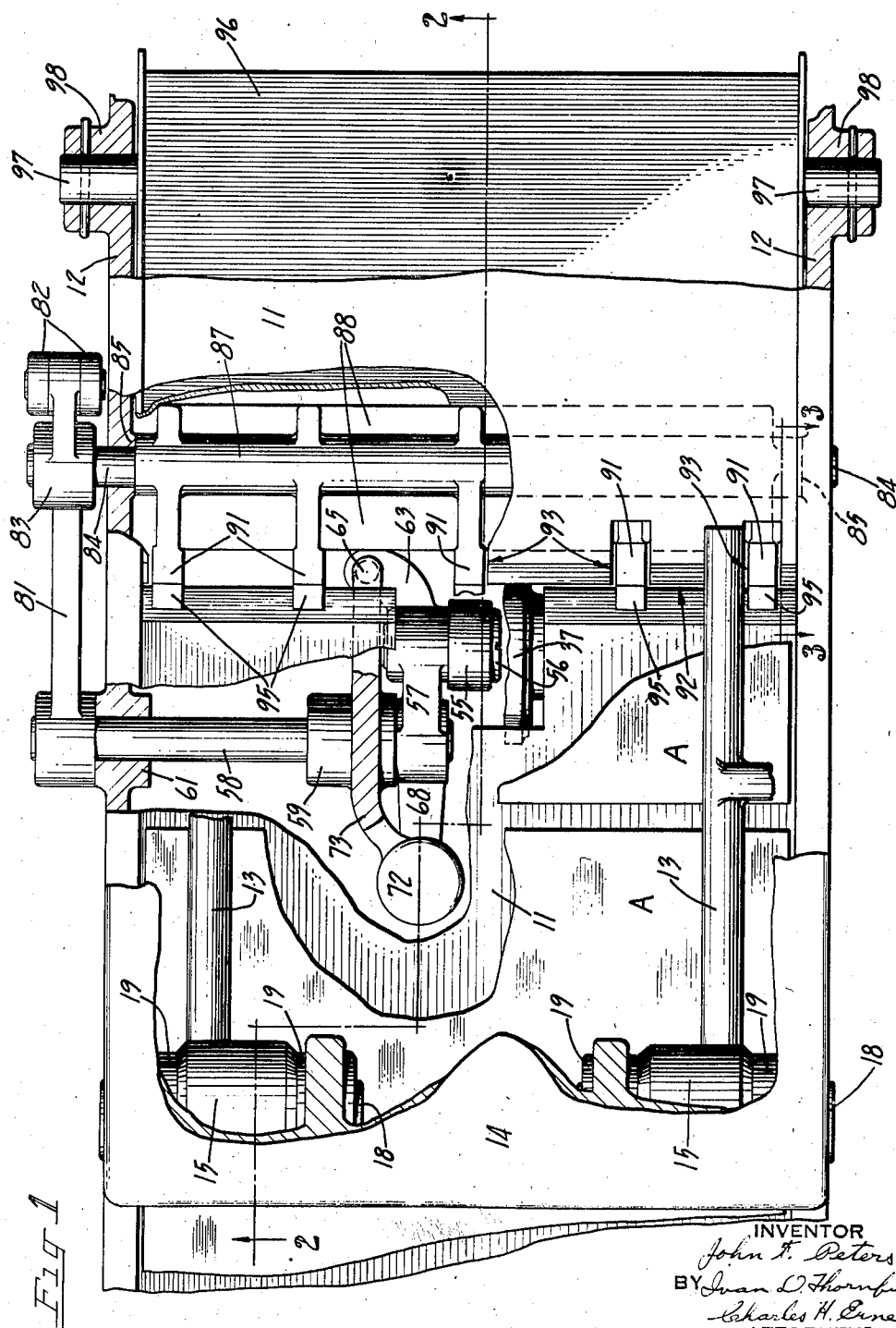
J. F. PETERS

2,337,064

DETECTING AND THROW-OUT DEVICE

Filed Aug. 26, 1941

4 Sheets-Sheet 1



Dec. 21, 1943.

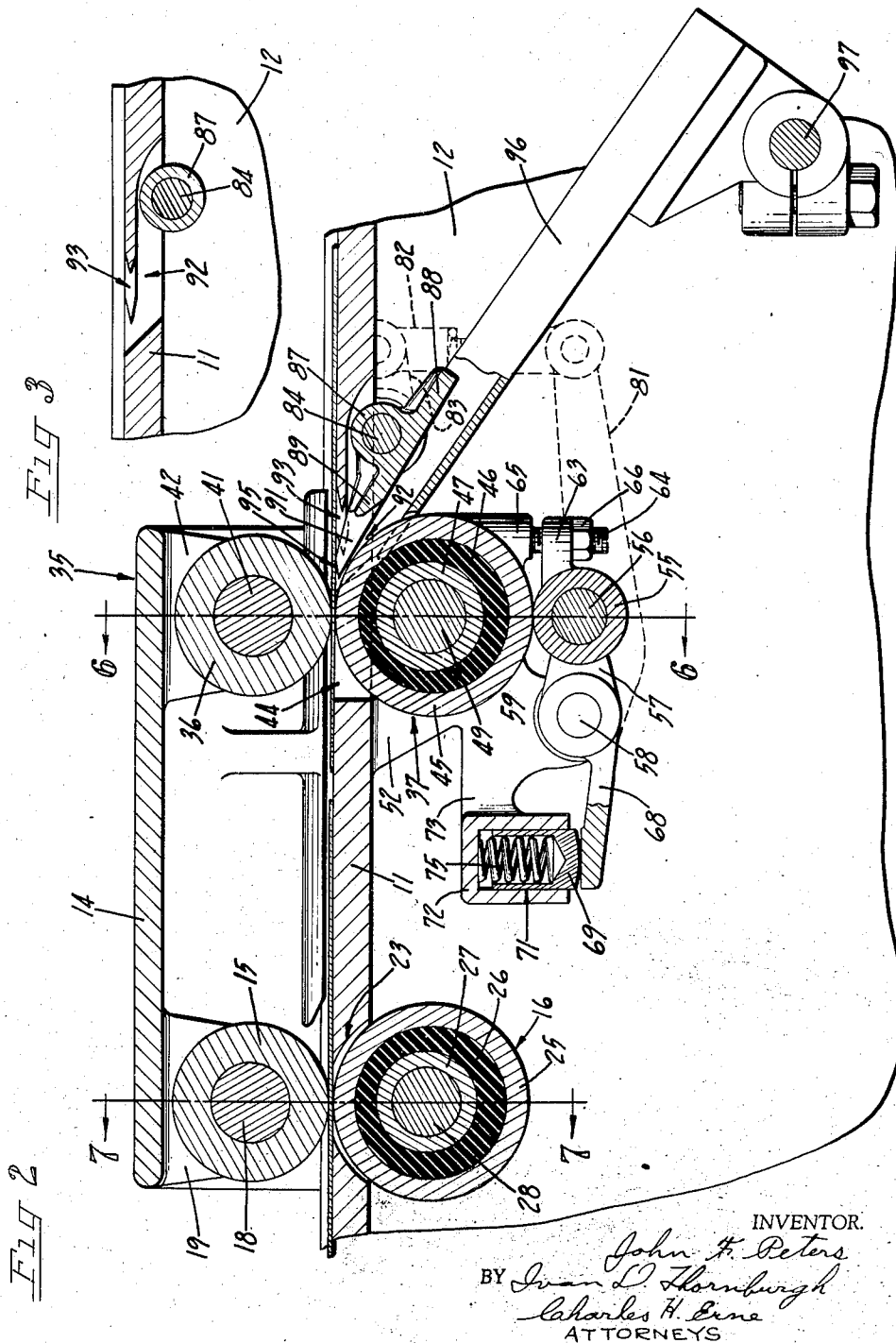
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4 Sheets-Sheet 2



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Fig 5

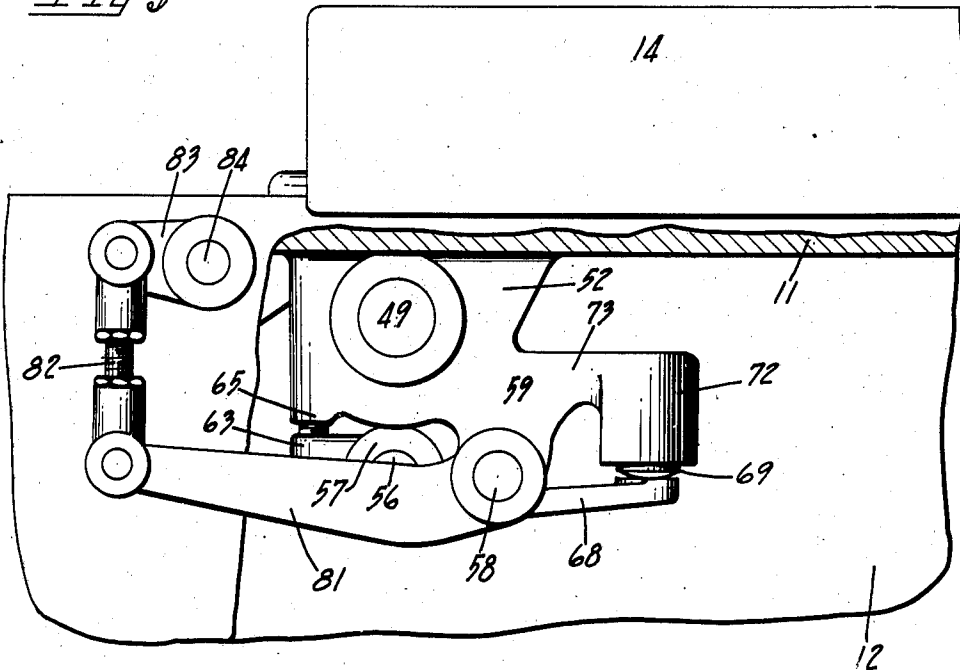
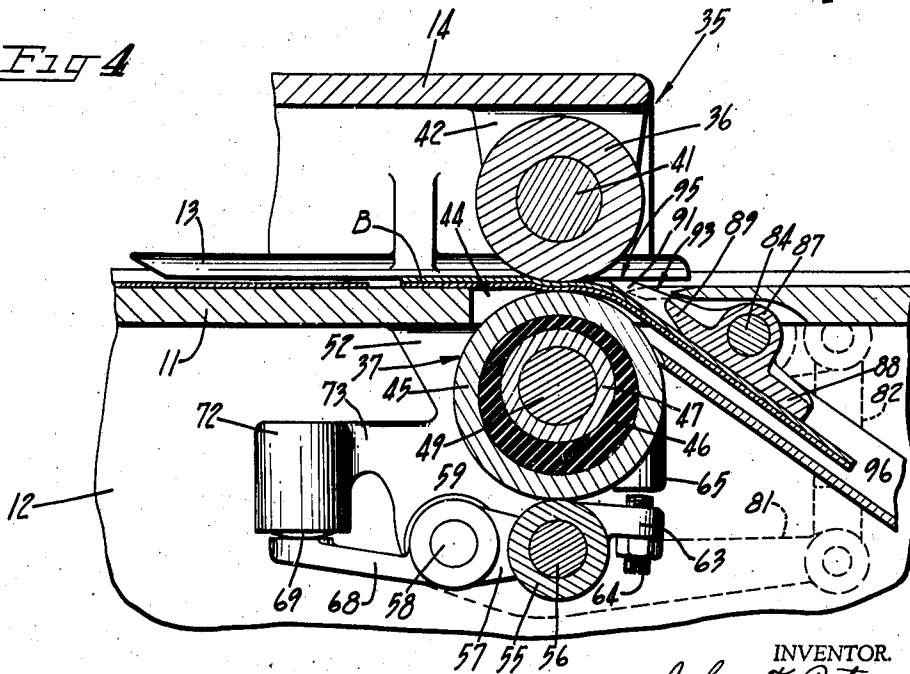


Fig 4



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Fig 6

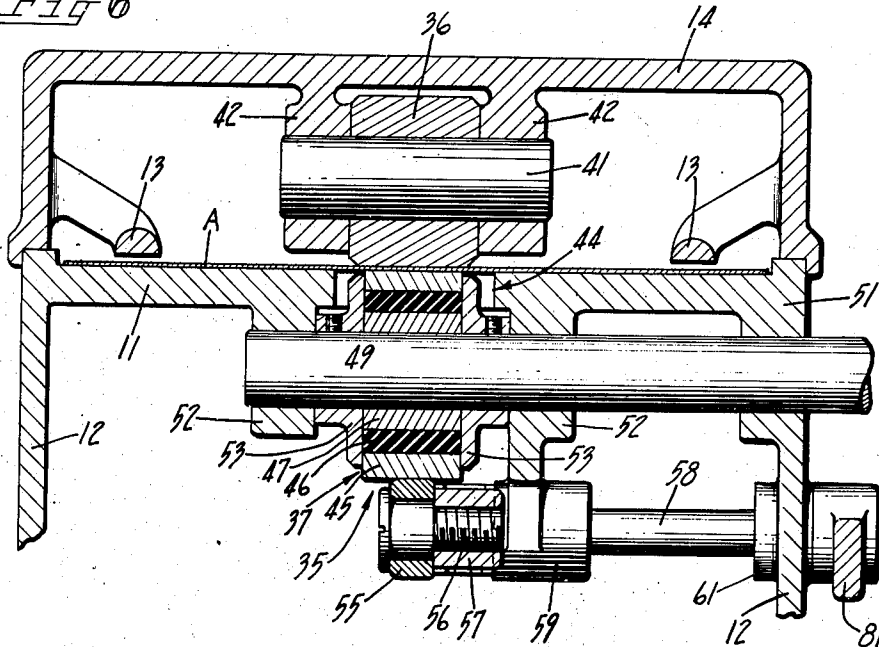
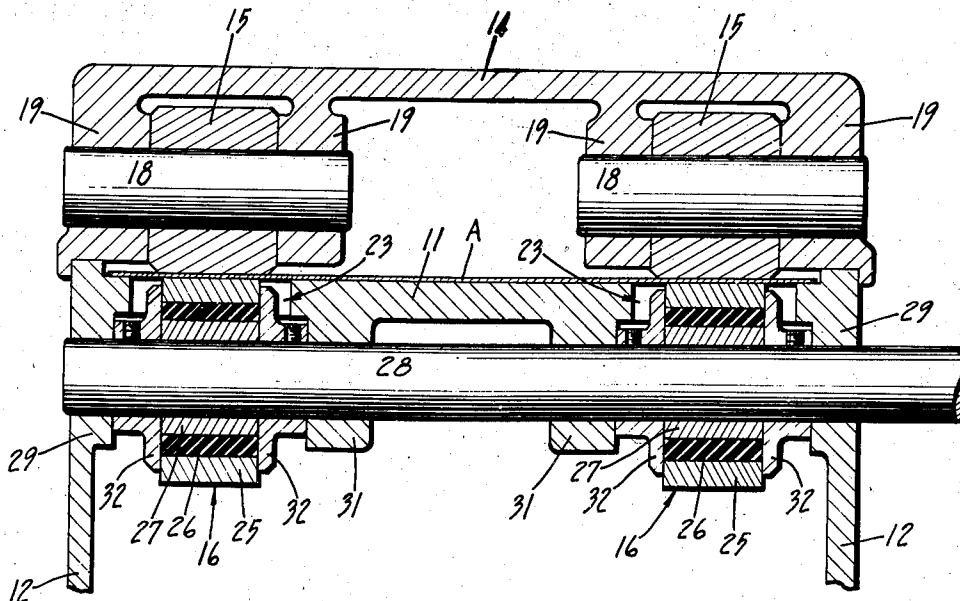


Fig 7



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UNITED STATES PATENT OFFICE

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DETECTING AND THROWOUT DEVICE

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Application August 26, 1941, Serial No. 408,399

6 Claims. (Cl. 209—83)

The present invention relates to a detecting and throw-out device for sheet feeding machines or the like and has particular reference to a simple quick acting double sheet detecting device which is adapted to high speed production machines.

An object of the invention is the provision in a sheet feeding machine of detector and throw-out devices of simple construction and highly efficient in operation and which detect a double sheet or a sheet having a thickness greater than a predetermined normal thickness and which deflect it from the machine with a quick acting operation so desirable in high speed production machines.

Another object is the provision of such a detecting and throw-out device wherein a feed roller having a yieldable core carried on a fixed axis is utilized to detect a sheet of a thickness greater than a predetermined normal thickness and to actuate a deflecting element which diverts such sheets from the machine, the actuation of the device being of quick acting nature so that sheets passing through the device may be fed at exceedingly high rates of speed.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

Referring to the drawings:

Figure 1 is a top plan view of a detecting device embodying the instant invention, with parts broken away and shown in section;

Fig. 2 is a longitudinal vertical section taken substantially along the broken line 2—2 in Fig. 1, with parts broken away;

Fig. 3 is a sectional detail taken substantially along the line 3—3 in Fig. 1, with parts broken away;

Fig. 4 is a view similar to Fig. 2 showing certain of the movable parts in a different position, with parts broken away;

Fig. 5 is a side elevation of the device as viewed from the top of Fig. 1, with parts broken away; and

Figs. 6 and 7 are transverse vertical sections taken substantially along the respective lines 6—6, 7—7, in Fig. 2, with parts broken away.

As a preferred embodiment of the instant invention the drawings disclose a portion of a machine in which sheets A are advanced along a predetermined path of travel preparatory to being operated upon. The sheets preferably are ad-

vanced along a table 11 which is formed as a part of a machine frame 12. Overhanging hold-down bars 13 disposed adjacent the top of the table confine the sheet against upward displacement. These hold-down bars preferably are formed on a housing 14 which overhangs the table and is secured to its outer edges.

Advancement of the sheets along the table 11 preferably is carried out by two pairs of feed rollers disposed adjacent the side edges of the table. Each pair of rollers includes an upper feed roller 15 and a lower pressure roller 16 (Figs. 1, 2 and 7). The periphery of the upper feed rollers 15 is disposed tangent to the top surface of the table 11. The rollers are mounted on short shafts 18 the ends of which are carried in spaced bearing lugs 19 which depend from the overhead housing 14.

The lower or pressure rollers 16 are disposed below the table 11 and extend up into frictional contact with the feed rollers 15 through slots 23 formed in the table. Each pressure roller 16 preferably comprises an outer metallic ring 25 which is vulcanized or otherwise secured to the outer surface of a resilient (preferably rubber) ring or core 26. This in turn is vulcanized or otherwise secured to a metallic hub 27.

The hubs of the rollers 16 are mounted on a driving shaft 28 which is journaled in bearings 29 formed in the frame 12 and in bearings 31 which depend from the table 11. The shaft may be rotated in any suitable manner in time with the other moving parts of the machine. Side washers 32 secured to the shaft adjacent the sides of the rollers retain their ring parts against lateral displacement.

Hence when a sheet A passes along the table and between the rollers 15, 16 for further advancement, the pressure roller 16 yields sufficiently to permit the sheet to pass between the rollers without in any way unduly squeezing or otherwise distorting the sheet. The resiliency of the rubber ring 26 permits this yielding action and at the same time holds the outer shell or ring 25 of the roller in frictional contact with the sheet and the sheet in frictional contact with the upper feed roller 15.

Sheets advanced along the table 11 by the feed rollers 15, 16 move through a double thickness sheet detector and throw-out device generally indicated by the numeral 35 (Fig. 2). This device detects and is operated when a sheet of more than normal thickness or when two sheets stick together and are fed as one, passes the device.

It thereupon throws out such sheets so that they will not cause damage to machine parts with which they would later come in contact.

The detector and throw-out device 35 includes a pair of rollers which in themselves serve as feed rollers for further advancing normal sheets along the table 11 or for throwing out of the machine sheets of abnormal thickness. These feed rollers include an upper fixed roller 36 (Figs. 2, 4 and 6) and a lower yieldable roller 37 (see also Fig. 1).

The fixed roller 36 is disposed with its periphery tangent to the top surface of the table 11 and is near the middle of the table. This roller is mounted on a short shaft 41 carried in bearing lugs 42 which depend from the overhanging housing 14.

The lower yieldable roller 37 is disposed below the table 11 and extends up into frictional engagement with the upper roller through a slot 44 formed in the table. This roller comprises an outer preferably metallic shell or ring 45 which is vulcanized or otherwise secured to the outer surface of a resilient ring or core 46, preferably made of rubber. The rubber ring in turn is vulcanized or otherwise secured to a metallic hub 47.

The hub 47 of the yieldable roller 37 is secured to a shaft 49 having a fixed axis and journaled in a bearing 51 formed in the machine frame 12 and in a pair of bearing lugs 52 which depend from the table 11. This shaft may be rotated in any suitable manner in time with the other moving parts of the machine. Side washers 53 secured to the shaft adjacent the sides of the roller retain its ring parts against lateral displacement.

Hence when a normal thickness sheet A passes between the rollers 36, 37 the yieldable roller 37 yields sufficiently to permit the sheet to pass while at the same time presses the sheet against the upper roller 36 and thus advances the sheet along the table by frictional engagement therewith.

Below the yieldable roller 37 there is located a throwout roller 55 which is mounted on a pivot stud 56 secured in a lever 57 (see also Fig. 1). The lever is mounted on the inner end of a cross shaft 58 carried in a bearing lug 59 formed as a part of one of the yieldable roller bearing lugs 52 and also carried in a bearing 61 formed in the machine frame 12.

Adjacent the throwout roller 55, the lever 57 is formed with a curved lug extension 63 which carries an adjusting setscrew 64. The setscrew engages against a boss 65 formed as a part of the yieldable roller bearing lug 52. This setscrew is utilized to locate the throwout roller 55 relative to the yieldable roller 37 so that the latter will just engage but not move the throwout roller when the yieldable roller yields for a normal thickness sheet passing between it and the upper roller 36. A locknut 66 is provided on the setscrew for locking it in position after it is adjusted.

The opposite end of the lever 57 is formed with an arm 63 which is engaged by a spring barrel 69 located in a recess 71 in a boss 72 formed on an extension 73 of the bearing lug 59. A compression spring 75 located in the barrel forces the latter outwardly against the lever arm 63 and thus maintains the setscrew 64 in the opposite end of the lever in engagement with its boss 65.

Hence when an abnormal thickness sheet such as the double thickness sheet B shown in Fig. 4

enters between the feed rollers 36, 37 the latter yields a greater amount than for a normal thickness sheet and this throws the outer ring 45 of the roller 37 still further out of concentricity with its relatively fixed hub 47, as clearly shown in Fig. 4. The eccentric outer ring 45 thus presses down on the throwout roller 55 and this rocks the lever 57 and its shaft 58 in a clockwise direction (as viewed in Figs. 2 and 4) against the pressure of the spring barrel 69.

This rocking of the lever 57 and its shaft 58 deflects the abnormal thickness sheet B from the machine as will now be explained. For this purpose the lever shaft 58 carries a long arm 81 (Figs. 1, 2, 4, 5 and 6) the outer end of which is connected to a vertical link 82. This link is also connected with a short arm 83 which is secured to the outer end of a cross-shaft 84 carried in bearings 85 formed in the machine frame 12.

The cross shaft 84 extends entirely across the main frame 12 below the table 11 and carries a movable gate 87. This gate includes a flat bottom web 88 which extends at an angle to the table and is formed with a front beveled edge 89. At spaced intervals across the table the web is formed with narrow upwardly extended fingers 91. These fingers are located in a long slot 92 formed in the table transversely thereof and extend up into connecting slots 93 in the top of the table. The edges of the slots are preferably beveled as shown in Fig. 3 to facilitate the travel of normal thickness sheets thereover while advancing along the table.

The normal position of the gate 87 and its fingers 91 is shown in Fig. 2 in which the upper ends of the fingers are just below the top surface of the table 11 and entirely within the long table slot 92. The ends of the fingers are beveled as at 95 to correspond with the top of the table when in this position. When the fingers are in this position a normal thickness sheet A passing between the rollers 36, 37 readily glides over the tops of the fingers and continues on its way along the table.

However, when a double thickness sheet B advances between the rollers 36, 37 and rocks the lever 57 on its shaft 58 as hereinbefore explained, the long arm 81 pulls down on the link 82 and this rocks the gate shaft 84 in a clockwise direction, as viewed in Figs. 2 and 4. This rocking of the gate shaft tilts the gate 87 and thereby raises the fingers 91 to a position where their upper ends extend up through the table slots 93 and project above the top of the table as shown in Fig. 4.

This tilting action is effected rapidly and immediately upon entry of the leading edge of the double thickness sheet B to between the rollers 36, 37. As the sheet advances between the rollers its leading edge engages the upturned fingers 91 and is deflected downwardly into and through the long slot 92 in the table. The sheet thus deflected rides along the web 88 of the gate and is directed by it into an inclined discharge chute 96 located under the table. This chute directs the abnormal sheet to any suitable place of deposit. The chute is clamped to a cross bar 97 which extends across the machine frame 12 and is secured in bosses 98 formed therein.

As soon as an abnormal sheet B passes from between the rollers 36, 37 the yieldable roller outer ring 45 resumes its normal concentric position relative to its hub 47 and this permits the throwout roller 55 to return to its original position under the pressure of the spring barrel 69. This

rocks the lever 57 and the long arm 81 back to their normal positions and hence tilts the gate 87 back to a normal position where its fingers 91 are once more located below the top surface of the table 11 in readiness to clear a single or normal thickness sheet or to be lifted again to deflect an abnormal or double thickness sheet.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. In a sheet feeding device arranged for detecting and for throwing out sheets of abnormal thickness, the combination of a feed roller having a fixed axis, a cooperating pressure roller adjacent said feed roller for pressing sheets thereagainst for feeding them along a predetermined path of travel, a drive shaft on which said pressure roller is mounted, said shaft having a fixed axis, a resilient mounting between said pressure roller and said shaft so that said pressure roller will shift normal to said shaft when a sheet of abnormal thickness passes between said rollers, and means operable by the shifting of said pressure roller for deflecting the abnormal sheet from its predetermined path of travel.

2. In a sheet feeding device arranged for detecting and for throwing out sheets of abnormal thickness, the combination of a feed roller having a fixed axis, a cooperating pressure roller adjacent said feed roller for pressing sheets thereagainst for feeding them along a predetermined path of travel, a drive shaft on which said pressure roller is mounted, said shaft having a fixed axis, said pressure roller including a relatively hard outer ring, and a resilient core on which said ring is mounted, said ring being shiftable on said core normal to said shaft by a sheet of abnormal thickness passing between said rollers, and means operable by the shifting of said pressure roller for deflecting the abnormal sheet from its predetermined path of travel.

3. In a sheet feeding device arranged for detecting and for throwing out sheets of abnormal thickness, comprising in combination a support for guiding sheets along a predetermined path of travel, a pair of cooperating rollers between which the sheets pass for advancement along said support, said rollers being mounted on shafts having fixed axes, one of said rollers being mounted on a drive shaft and including an outer relatively hard ring secured to a resilient core so that the roller will shift normal to said shaft when a sheet of abnormal thickness passes between the rollers, and a gate operable by the shifting of said shiftable roller for deflecting the abnormal sheet from its predetermined path of travel.

4. In a sheet feeding device arranged for detecting and for throwing out sheets of abnormal thickness, the combination of a feed roller having a fixed axis, a cooperating pressure roller adjacent said feed roller for pressing sheets thereagainst for feeding them along a predetermined path of travel, a drive shaft on which said pressure roller is mounted, said shaft having a fixed axis, said pressure roller being resiliently mounted on said shaft so that it will shift normal to the shaft when a sheet of abnormal thickness passes between said rollers, a gate pivotally mounted adjacent the path of travel of the sheets, a gate actuating roll frictionally engaging against the periphery of said pressure roller, and links connecting said actuating roll with said gate for shifting the gate into the path of travel of an abnormal sheet to deflect it when such a sheet comes between the feed roller and the pressure roller and shifts the latter relative to the axis of its shaft.

5. In a sheet feeding device arranged for throwing out sheets of abnormal thickness, the combination of a pair of pinch rollers respectively mounted on fixed axes for feeding sheets along a predetermined path, one of said rollers being yieldable relative to and in a direction normal to its fixed axis in an amount varying in accordance with the thickness of the sheets passing between said rollers, a sheet deflecting gate movably mounted close to the right between said rollers and movable away from said yieldable roller as the gate moves into deflecting position, and means operable by said yieldable roller for moving said gate into deflecting position when said roller is forced to yield relative to its fixed axis by a sheet of abnormal thickness, the combined movements of said yieldable roller and the gate simultaneously opening a sufficient space therebetween through which the deflected abnormal sheet is passed.

6. In a sheet feeding device arranged for throwing out sheets of abnormal thickness, the combination of a sheet support, a roller adjacent said support for pressing sheets thereagainst for feeding them along a predetermined path of travel, a drive shaft on which said roller is mounted, said shaft having a fixed axis, a resilient mounting between said roller and shaft so that the roller will yield normal to said shaft when it engages a sheet of abnormal thickness, a sheet deflecting gate movably mounted close to said roller and movable away from the latter as it shifts into deflecting position, and means operable by said yieldable roller for moving said gate into deflecting position when said roller is forced to yield by a sheet of abnormal thickness, the combined movements of said yieldable roller and the gate simultaneously opening a sufficient space between them through which the deflected abnormal sheet is passed.

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