June 24, 1930. B. MANDRICH 1,765,684

AUTOMATIC FEEDER

Filed April 12, 1928

Fig. 1.

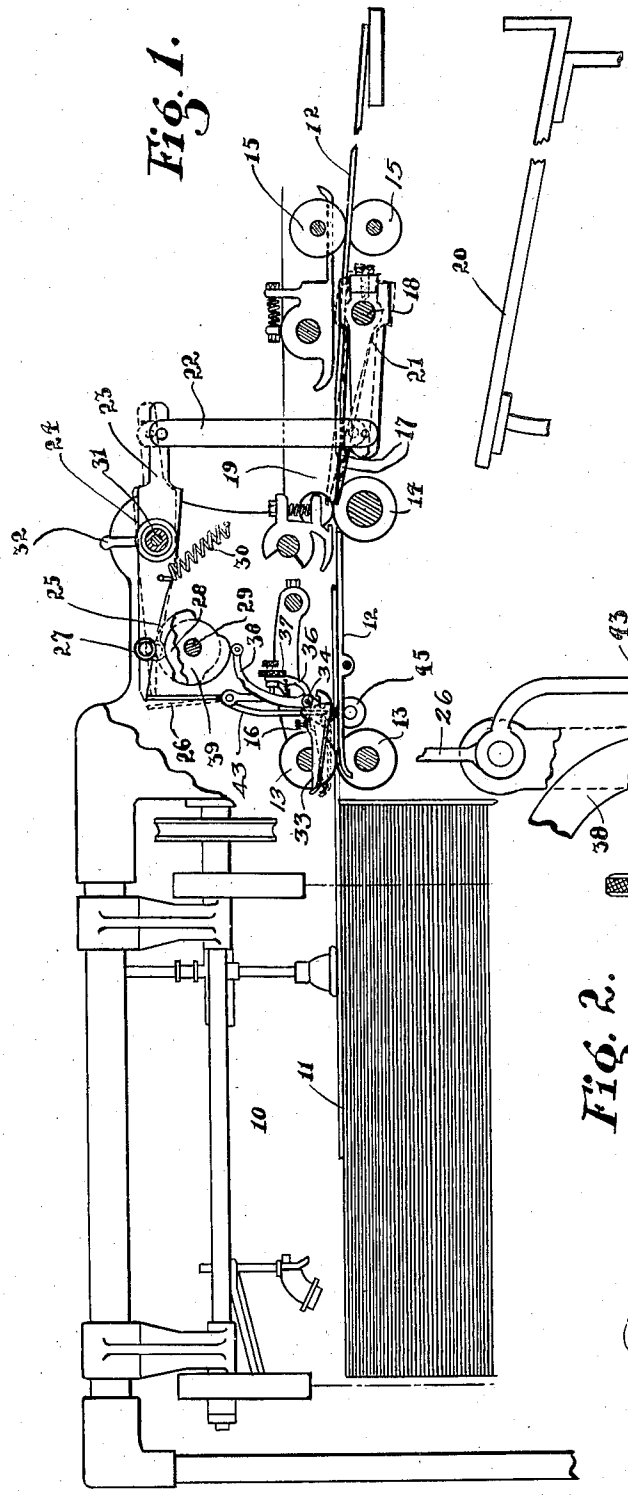


Fig. 3.

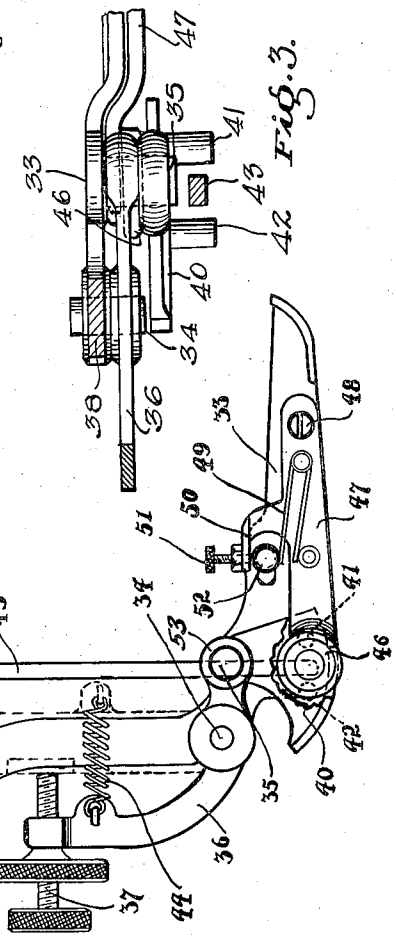


Fig. 2.

Bell Mandrich

INVENTOR

BY Grant P. Whitmore

his ATTORNEY

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UNITED STATES PATENT OFFICE

BELL MANDRICH, OF BROOKLYN, NEW YORK, ASSIGNOR TO CROWN CORK & SEAL COMPANY, INC., OF NEW YORK, N. Y., A CORPORATION OF NEW YORK

AUTOMATIC FEEDER

Application filed April 12, 1928. Serial No. 269,350.

My invention relates to automatic feeders, and more particularly to a continuously operating feeder, the functioning of which will not be interrupted in the event that more than a single sheet is fed by the picker mechanism.

Heretofore automatic feeders have been provided with a picker mechanism adapted to remove the top sheet from a pile of sheets and deliver it to a conveyor mechanism which in turn delivers it adjacent to a printing couple or other mechanisms for acting upon the sheet. To avoid a possible feeding of two or more sheets at a time, it has long been the practice to provide a calipering device which may be set to approximately the thickness of a single sheet, and to provide means controlled by this calipering device so that if more than one sheet at a time passes into the operative relation to the calipering device, the conveyor mechanism and the picker mechanism will be made inoperative, thus interrupting the functioning of the feeder.

It has been a common practice to provide such feeders, particularly when used in connection with a printing press, with means which will cause the actuation of a throwoff mechanism operative upon the members of a printing couple in the event of the failure of the feeder mechanism to deliver a sheet to the printing couple. My invention, however, does not relate to this throwoff mechanism control but merely to the mechanisms controlled by the calipering device so that in the event of the feeding of more than a single sheet at a time, such sheets will merely be rejected without any interruption of the functioning of the feeder. By thus rejecting improperly fed sheets, the pressman or other operator is relieved from the necessity of removing such sheets from the feeder, thus effecting a saving of time and permitting an increased output capacity of the main machine in connection with which the feeder is used.

Heretofore in calipering devices two rollers have been provided, one mounted upon a fixed axis on the machine proper, and the other upon a movable member of the calipering device, said rollers serving to hold the sheet closely adjacent the trip member of the calipers. Such rollers have been subjected to material wear due to the fact that they have both been rigidly supported during the interval of engagement of the sheets therewith, notwithstanding their automatic disengagement from each sheet immediately following the delivery of a properly fed sheet by the picker mechanism. This wear is particularly pronounced when a feeder is used for delivering tin sheets.

To correct this condition, I yieldingly support the roller carried by the calipering device proper, so that it may automatically adjust itself to the sheet passing thereunder and thus minimize wear of parts while firmly holding the sheet in relation to the throwoff control device of the calipers.

The invention consists primarily in an automatic feeder embodying therein a conveyor mechanism including therein supports for a sheet while passing along said mechanism, means adapted to successively deliver sheets to said mechanism, a reject member, means normally tending to position said member across the plane of movement of sheets upon said supports, means for positively moving said member out of the plane of movement of sheets upon said supports, and caliper controlled means normally maintaining said member out of the path of movement of sheets upon said supports, and in such other novel features of construction and combination of parts, as are hereinafter set forth and described and more particularly pointed out in the claims hereto appended.

Referring to the drawings,

Fig. 1 is a longitudinal section through an automatic feeder embodying my invention;

Fig. 2 is a detail view of the calipering device with the trip mechanism shown in dotted lines; and

Fig. 3 is a view showing the mounting of the caliper member on the shoe with certain parts omitted.

Like numerals refer to like parts in all of said views.

In the accompanying drawings, I have illustrated the invention in connection with an old and well known type of automatic feeder, the picker mechanism of this feeder being indicated at 10 in the drawings and shown more or less conventionally. The feeder, as shown in the drawings, is designed primarily for use in connection with the feeding of tin sheets in relation to a printing press not shown in the drawings.

Since the picker mechanism 10 is old and well known in this art, a detailed description of this need not be entered into it being merely necessary to understand that the top sheet of the pile shown at 11 is removed during each cycle of operations of the feeder, and is delivered to a conveyor mechanism including therein bars or other supports 12 adapted to receive a sheet from the picker mechanism, having associated therewith means, as feed rollers 13, 14 and 15, for moving it toward the delivery end of the feeder.

Co-operating with the conveyor mechanism, adjacent the picker mechanism, is a calipering device 16, (which will be more fully described hereinafter) which may be so set as to permit the free passage of a single sheet from the pile 11, but which will operate in the event of the delivery of more than one sheet by the picker mechanism to actuate a trip mechanism in a manner to prevent such sheets being delivered to the printing press or other machine with which the feeder is used.

Heretofore, in this art, this trip mechanism has controlled the functioning of a clutch mechanism operative upon the main power shaft of the feeder mechanism, so that with the delivery of more than one sheet, this clutch mechanism will be released and thus interrupt the application of power to the feeder. This condition has required the operator of the machine, to remove such sheets from the conveyor mechanism before power can again be applied to the feeder, thus requiring more or less constant attention of the operator to avoid undue delays in the operation of the machine, and, at times, the bending of such sheets.

While in a feeder embodying my invention, I provide a calipering mechanism and a trip mechanism actuated thereby which generally operates in the same manner as the corresponding mechanisms in older feeders, nevertheless the feeder as a whole differs from such old feeders in the results secured, in that, instead of interrupting the application of power to the feeder with the actuation of the caliper when more than one sheet is fed, other mechanisms in the machine are so set as to merely reject such sheets, or remove them from the conveyor as a result of the continued application of power to the feeder. As a result of this new mode of operation, the feeder may operate continuously, and constant close attention of the operator thereto is unnecessary. Furthermore, the stoppage and re-starting of the machine, in each instance when more than one sheet is delivered by the picker mechanism, and the loss of production resulting from such, is avoided.

In securing the desired result, I provide movable reject members 17, the number and arrangement of which may be varied according to the size and character of the sheets to be fed. The members 17, in the form of the invention shown, consist of a finger or fingers carried by a rock shaft 18, these fingers and said rock shaft being positioned below the plane of the bars 12. A gap indicated at 19 is provided in the length of said bars to permit the passage of sheets from the conveyor mechanism to a collecting shelf 20 below said reject members.

Carried by the shaft 18 is a crank arm 21 which is connected by means of a link 22 with a crank 23 upon a rock shaft 24. This rock shaft also carries an arm 25 adapted to co-operate with one arm of a rocking lever 26, forming a part of the trip mechanism of the calipering device.

Acting upon the arm 25 through a roller 27 carried thereby, is a cam 28 mounted upon a shaft 29, which ensures a proper timing in the operation of the reject members 17, and in conjunction with the trip mechanism 26, either normally maintains the reject members out of the path of movement of the sheets upon the conveyor mechanism or brings them to a position across the plane of movement of such sheets in advance of the forward edge of a sheet or sheets, in the event of the delivery of more than one sheet by the picker mechanism 10.

Means, as the spring 30, are provided whereby said reject members will be actuated, the functioning of this spring, however, being controlled by the trip mechanism of the calipering device through the lever arm 26 and the crank 25 and the cam 28.

In order to permit the manual control of the application of power to the conveyor mechanism, the shaft 24 is preferably concentric with an inner shaft 31 having an operating handle 32, which shaft 31 is operatively connected with the control mechanism for the clutch, not shown.

In older feeders the movement of a shaft corresponding with the shaft 31 was under the direct control of the calipering device through an arm corresponding with the arm 25. In order to permit the adaptation of my invention to old feeders of the type above referred to, I merely mount a hollow shaft or sleeve 24 upon the shaft 31, and secure the crank 23 and the arm 25 to this hollow shaft or sleeve. This, however, is immaterial to the invention and applies only to the

adaptation thereof shown in the drawings.

The friction feed rollers 13, 14 and 15, the number of which may be varied according to the length of the conveyor mechanism, are also merely a preferential means for moving the sheets along the conveyor.

The calipering mechanism in its general construction and mode of operation is of the type commonly used in feeders, and consists of a guide shoe 33, pivoted at 34 and pivotally connected at 35 with an arm 36 carrying a micrometrically adjustable setting screw 37 which bears against the adjacent frame work of the machine. The arm 36 is also pivotally mounted at 34, so that this arm and the shoe 33 will have simultaneous pivotal movement about the pivot 34, thus permitting the use of the screw 37 for limiting the pivotal movement of the shoe 33 in one direction and permitting a fine adjustment as to the extent of this movement. Also carried by the shoe 33 is an offset arm 38 acted upon by a cam 39, carried by the shaft 29, the riser of which cam is so proportioned that following the initial feeding movement of a sheet by the conveyor mechanism, the shoe and its appurtenances will be raised so as to avoid any unnecessary contact of the micrometer mechanism with the sheets being fed.

Mounted to have free oscillatory movement upon the shoe 33 is a friction clutch member 40. This clutch member, being pivotally mounted eccentrically of the pivot 34, may be set by means of the set screw 37 in any desired position so as to serve as an accurate gauge as to the thickness of the sheets which may pass thereunder without causing the actuation of the trip mechanism of which this member forms a part.

By the foregoing construction it is obvious that if the set screw 37 be actuated to permit the arm 36 to move to the right, (Fig. 2) the shoe 33 and the friction clutch member 40 will be moved by the spring 44 downwardly, thus permitting an accurate setting of the operative face of said clutch member with relation to the thickness of the sheet being fed in relation thereto. The member 40, in the event of its oscillation as a result of the engagement of a sheet therewith, will, with the passage of said sheet, be restored to its normal position by gravity and by the balancing action of the arm 43, to be hereinafter referred to.

Carried by the friction clutch member 40 are spaced pins 41 and 42 between which is seated an arm 43 of the rocking lever 26.

The arm 36 is acted upon by a spring 44 normally engaging the micrometer adjusting screw 37 with its co-operating stop. The general construction of the calipering device is old and well known, and no claim of invention is laid thereto.

It has been the practice heretofore, however, to mount, directly upon the shoe 33, a roller co-operating with a roller 45 upon the machine proper, so that not only is the calipering member 40 set by means of the micrometer screw 37, but this roller 46 is so set as well. The varying thickness of different sheets has heretofore resulted in the rapid wear of the roller carried by the shoe, as well as the roller 45, which wear is accentuated when more than one sheet is fed at a time. To compensate for this condition I provide a roller 46, which instead of being directly mounted upon the shoe 33 is mounted upon an arm 47 pivoted to the shoe at 48 and acted upon by a spring 49 so as to yieldingly maintain the roller in position in relation to the shoe and to its co-operating roller 45 while permitting it to recede from the roller 45 when sheets of excess thickness or a plurality of sheets pass between these rollers.

In order to permit a fairly accurate setting of the roller 46 independently of the setting of the shoe 33, I provide the lever 47 with an extension 50 carrying an adjusting screw 51 operative upon a pin 52, carried by the shoe. The friction clutch member 40 is pivoted at 53 upon the shoe 33.

The operation of the herein described automatic feeder is substantially as follows:—

In preparing for a run of the feeder, the micrometer screw 37 is so set as to bring the member 40 to a position above the plane of the conveyor bars and the roller 45 a distance approximating the thickness of a single sheet of those to be fed, the spring 44 having a normal tendency to restore the shoe to this set position upon, or prior to, the initial feeding movement of a sheet by the conveyor mechanism.

When the calipers have been properly set, power may be applied to the feeder, and the picker mechanism 10 thereof will operate in the usual manner to deliver the top sheet of the pile 11 to between the feed rollers 13 which frictionally engage the sheet and advance it along the conveyor bars 12.

With the position of parts as shown in Fig. 1, a sheet has been partially fed by the conveyor mechanism, the shoe 33 being raised by the cam 39 out of contact with the sheet, and the arm 25 being supported by the arm 26, the shaft 29 having a contra-clockwise rotation. Hence, during the continued feeding movement of that particular sheet, and prior to the delivery of the next sheet, the parts will be maintained in the relation shown.

Following the next feeding movement, however, the fall of the cam 39 will permit the spring 44 to move the shoe 33, the clutch member 40 and the roller 46 downwardly to a position where the member 40 is operative to gauge the succeeding sheet passing thereunder. When the fall of the

cam 28 reaches the roller 27 following this movement of the calipering device, the shaft 24 will not be permitted to rock under the control of the spring 30 because of the engagement of the trip arm 26 with the arm 25 carried by said shaft.

The roller 46 co-acting with the roller 45 will firmly hold the portion of the sheets being fed closely adjacent the member 40 so as to prevent any tendency of irregularities in the thickness of the sheet, causing the actuation of the clutch mechanism. Upon a partial feeding of each succeeding sheet after the forward part thereof has passed the calipering device, the cams 39 and 28 will reach the position shown in Fig. 1 so as to again hold the calipering device out of engaging relation with the sheets and permit the arm 25 to descend in the event of the actuation of the member 40 as a result of the feeding of two sheets. This is the normal functioning of the feeder and does not differ from old and well known feeders.

By using a yieldable support for the roller 46, this roller is permitted to have movement independently of the shoe 33 and of the member 40, so that it may remain in the proper engaging relation with the sheet positioned between it and the roller 45 to ensure the proper feeding of this sheet in relation to the member 40, notwithstanding possible irregularities in the thickness of this sheet from any cause.

In preparing for a run, the set screw 51 may be used to limit the extent of downward movement of the arm 47 and thus properly gauge the engaging relation of the roller 46 with a sheet passing over the roller 45 in a manner to minimize wear of both of these rollers, particularly as the roller may be so set as to have practically no engagement with the roller 45 under normal conditions when a sheet is not being fed. In fact the mounting of the roller 46 in the manner described permits it to automatically adapt itself to varying thicknesses of sheets or to conditions when more than one sheet is being fed, which is an accidental condition, to guard against the effects of which the present invention is designed.

It will be understood that so long as a single sheet is being fed, the functioning of the feeder will be substantially that of any other feeder, the reject members 17 being positioned below the plane of the bars 12 or of the sheet passing over these bars, and in fact will serve as a support for the sheet when passing the gap 19. Assuming, however, that two sheets adhere when the picker mechanism acts to lift the uppermost sheet, and said two sheets are delivered to the rollers 13, it becomes necessary, in order to permit a successful operation of any feeder, to provide means whereby these superimposed sheets will be prevented from reaching the mechanisms being supplied by the feeder. If such mechanism were a printing press, the delivery of two such sheets, particularly tin sheets, might do serious damage to the printing couple.

In all automatic feeders the construction must be such as to prevent two or more sheets ever reaching such mechanisms, and in the old types of feeders, as heretofore stated, the custom always was to utilize a caliper mechanism to interrupt the application of power to the feeder and afford the operator an opportunity, while the feeder was stopped, to remove such sheets from the conveyor by hand and then re-start the feeding mechanism after the removed sheets were either restored to the pile or had been placed upon the conveyor mechanism.

The mechanisms of the feeder of my invention, however, are such that this condition may be taken care of without stopping the feeder mechanism and without requiring any hand labor on the part of the operator, it being necessary for the successful operation of the feeder of my invention that the conveyor mechanism be continuously operated in order to ensure the automatic removal or rejection of two or more sheets thus improperly fed to the conveyor mechanism by the picker mechanism.

In the event of the feeding of two or more sheets, and ordinarily only two such sheets will be accidentally fed, the additional thickness of the material passing below the member 40 will cause these sheets to frictionally engage said clutch member 40 and impart oscillatory movement thereto, which movement will cause the pin 41, by engagement with the arm 43, to move the trip arm 26 and keep it out of the path of the arm 25 during an interval following the disengagement of the rise of the cam 28 from the roller 27, so that the spring 30, by drawing said arm 25 downwardly, will move the rock shaft 24 and actuate the crank 23 in a manner to raise the fingers or other reject members 27 to an extent to project them at an angle across the plane of movement of the sheet in advance of the forward edge thereof. This movement of the fingers is imparted thereto through the link 22, the crank 21 and the rock shaft 18. The fall of the cam 28 will permit this condition to continue for a sufficient period to cause the superimposed sheets to be deflected downwardly by the reject members 17 and passed entirely through the gap 19 and be deposited upon the collecting shelf 20.

In the accompanying drawings the layout and setting of the cams 28 and 39 is such that the calipering device is brought into engagement with the sheets for merely a sufficient interval to permit, when necessary, the actuation of the trip member 26—43 dur-

ing an interval immediately prior to the disengagement of the riser of the cam 28 from the roller 27 upon the arm 25. The riser of the cam 28 is of a length to ensure the support of the arm 25 by this cam during the initial downward movement of the calipering device and to raise it so as to permit the arm 26 to pass freely thereunder upon the completion of the feeding movement of any sheet following the actuation of the clutch member 40. The details and setting of these cams requires no great precision, it being merely necessary that the fall of the cam 28 shall be of a length to permit the sheets to pass in their entirety below the reject members 17 before said members are restored to their normal position below the plane of the bars or other supports 12, and that the fall of the cam 39 shall be of sufficient length to permit the proper functioning of the trip mechanism of the calipering device.

A detailed description of the functioning of the calipering device is not given because such is old and well known in the art. In fact, any desired type of calipering device may be used so long as it is capable of controlling the functioning of the reject mechanism in the manner herein described.

The invention resides primarily in the employment of mechanisms which are controlled by a calipering device so that in the event of more than one sheet being delivered by the picker mechanism such sheets, under the control of the conveyor mechanism, will be removed from the supports of this mechanism as a result of a continued actuation of the feeder, and afford a clear path for a succeeding properly fed sheet. In the drawings, I have illustrated a construction in which improperly fed sheets will pass below the supports 12 to the table 20, which I have found preferable as avoiding supplemental conveyor mechanisms for handling the sheets.

It is not my intention to limit the invention to the precise details of construction shown in the drawings, it being apparent that such may be varied without departing from the spirit and scope of the invention.

Having described the invention, what I claim as new and desired to have protected by Letters Patent, is:—

1. An automatic feeder embodying therein a conveyor mechanism including therein supports for a sheet while passing along said mechanism, means adapted to successively deliver sheets to said mechanism, a reject member, means normally tending to position said member across the plane of movement of sheets upon said supports, means for positively moving said member out of the plane of movement of sheets upon said supports, and caliper controlled means normally maintaining said member out of the path of movement of sheets upon said supports.

2. An automatic feeder embodying therein a conveyor mechanism including therein supports for a sheet while passing along said mechanism, means adapted to successively deliver sheets to said mechanism, reject members pivotally supported in a plane parallel with that of said supports, means normally tending to project said members at an angle across the plane of movement of sheets upon said supports, means for positively moving said members in their entirety out of the plane of movement of sheets upon said supports, and caliper controlled means normally maintaining said members out of the path of movement of sheets upon said supports.

3. An automatic feeder embodying therein a conveyor mechanism including therein supports for a sheet while passing along said mechanism, said supports having a gap in the length thereof, means adapted to successively deliver sheets to said mechanism, reject members supported below said supports, means normally tending to raise said members and position them in an incline across the plane of movement of sheets upon said supports, means for positively moving said members below said supports, and caliper controlled means normally maintaining said members below said supports.

4. An automatic feeder embodying therein a conveyor mechanism including therein supports for a sheet while passing along said mechanism, said supports having a gap in the length thereof, means adapted to successively deliver sheets to said mechanism, reject members pivotally mounted below said supports, an oscillatory member, operative connections between same and said reject members, a spring operative upon said oscillatory member with a normal tendency to raise said reject members and position them in an incline across the plane of movement of sheets upon said supports, a cam operative upon said oscillatory member, whereby said reject members may be positively moved to below said supports, and caliper controlled means operative upon said oscillatory member to prevent actuation thereof by said spring.

5. An automatic feeder embodying therein a conveyor mechanism, means adapted to successively deliver sheets to said mechanism, reject members arranged in the length of said conveyor mechanism, a rock shaft carrying said reject members, a crank arm thereon, a second rock shaft, a crank arm thereon, a link connecting the crank arms of said rock shafts, means having a normal tendency to actuate said rock shafts to position said reject members at an angle across the plane of movement of said sheets, means operative upon said rock shafts to position said reject members below the plane of movement of sheets upon said conveyor

mechanism, and means operative upon said last named means, whereby said means operative upon said second rock shaft will be made inoperative to impart movement to said reject members except in the event of the delivery of more than a single sheet to said conveyor mechanism.

6. An automatic feeder embodying therein a conveyor mechanism having a gap in the length thereof, means adapted to successively deliver sheets to said mechanism, reject members arranged in the gap of said conveyor mechanism, a rock shaft carrying said reject members, a crank arm thereon, a second rock shaft, a crank arm thereon, a link connecting the crank arms of said rock shafts, means having a normal tendency to actuate said rock shafts to position said reject members at an angle across the plane of movement of said sheets, means operative upon said rock shafts to position said reject members below the plane of movement of sheets upon said conveyor mechanism, and means operative upon said last named means, whereby said means operative upon said second rock shaft will be made inoperative to impart movement to said reject members except in the event of the delivery of more than a single sheet to said conveyor mechanism.

7. An automatic feeder embodying therein a conveyor mechanism, means adapted to successively deliver sheets to said mechanism, reject members arranged in the length of said conveyor mechanism, a rock shaft carrying said reject members, a crank arm thereon, a second rock shaft, a crank arm thereon, a link connecting the crank arms of said rock shafts, means having a normal tendency to actuate said rock shafts to position said reject members at an angle across the plane of movement of said sheets, an arm carried by said second rock shaft, a rocking lever co-operating therewith, a cam operative upon said arm, whereby movement may be imparted to said rock shafts to bring said reject members out of the plane of movement of sheets upon said conveyor mechanism, and said rocking lever may be moved into the operative relation to said arm to maintain said reject members in this position except in the event of the delivery of more than a single sheet to said conveyor mechanism, a calipering device operative upon said rocking lever, and means moving said calipering device into and out of the operative relation to sheets upon said conveyor mechanism.

8. An automatic feeder embodying therein a conveyor mechanism having a gap in the length thereof, means adapted to successively deliver sheets to said mechanism, reject members arranged in the gap of said conveyor mechanism, a rock shaft carrying said reject members, a crank arm thereon, a second rock shaft, a crank arm thereon, a link connecting the crank arms of said rock shafts, means having a normal tendency to actuate said rock shafts to position said reject members at an angle across the plane of movement of said sheets, an arm carried by said second rock shaft, a rocking lever co-operating therewith, a cam operative upon said arm, whereby movement may be imparted to said rock shafts to bring said reject members out of the plane of movement of sheets upon said conveyor mechanism, and said rocking lever may be moved into the operative relation to said arm to maintain said reject members in this position except in the event of the delivery of more than a single sheet to said conveyor mechanism, a calipering device operative upon said rocking lever, and means moving said calipering device into and out of the operative relation to sheets upon said conveyor mechanism.

9. In an automatic feeder, a calipering device comprising an oscillatory shoe, a clutch member pivotally mounted thereon, adjusting means operative upon said shoe, a lever pivotally mounted upon said shoe, a bearing roller carried thereby, a spring normally positioning said roller in relation to said clutch member but permitting movement thereof relatively to said shoe, and means for limiting the operative effect of said spring.

10. In an automatic feeder, a calipering device comprising an oscillatory shoe, a clutch member pivotally mounted thereon, adjusting means operative upon said shoe, a lever pivotally mounted upon said shoe, a bearing roller carried thereby, a spring normally positioning said roller in relation to said clutch member but permitting movement thereof relatively to said shoe, and adjustable means for limiting the operative effect of said spring.

In witness whereof I have hereunto affixed my signature April, 1928.

BELL MANDRICH.