

April 28, 1942.

H. P. MIXER
PAPER FEED MECHANISM
Filed May 29, 1941

2,280,964

2 Sheets-Sheet 1

FIG. 1

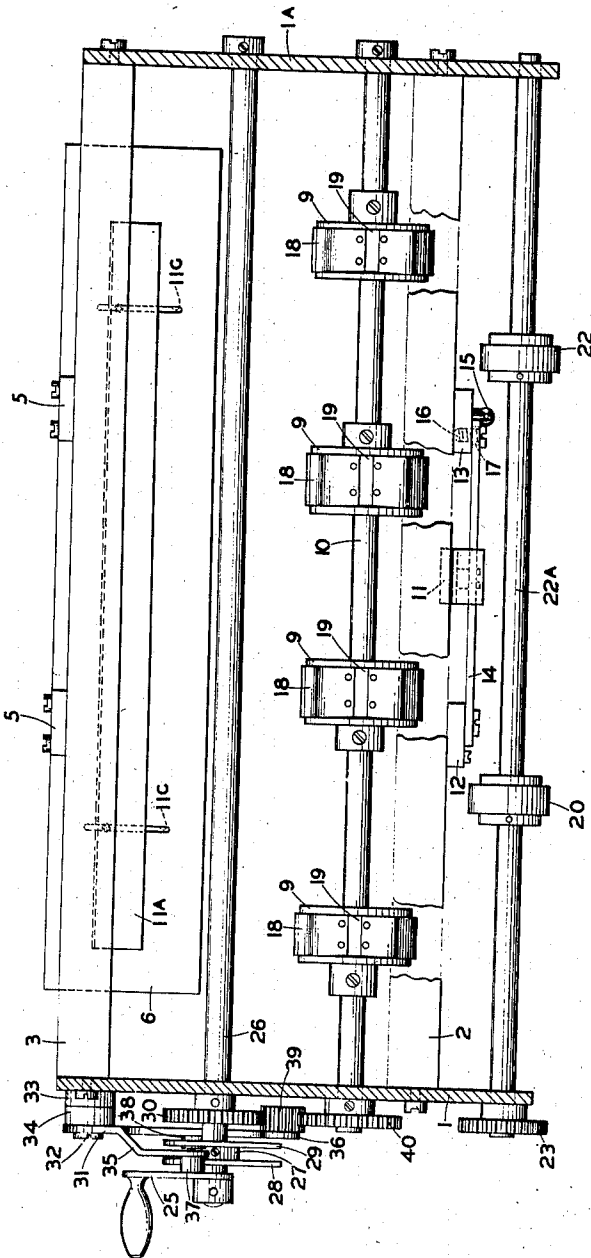
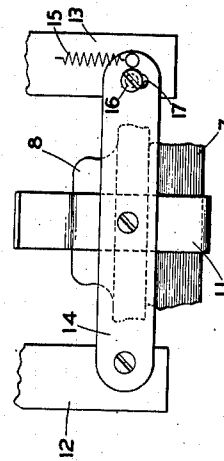


FIG. 2



INVENTOR
H. P. MIXER

BY *John L. Stirling*

ATTORNEY

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2 Sheets-Sheet 2

FIG. 3

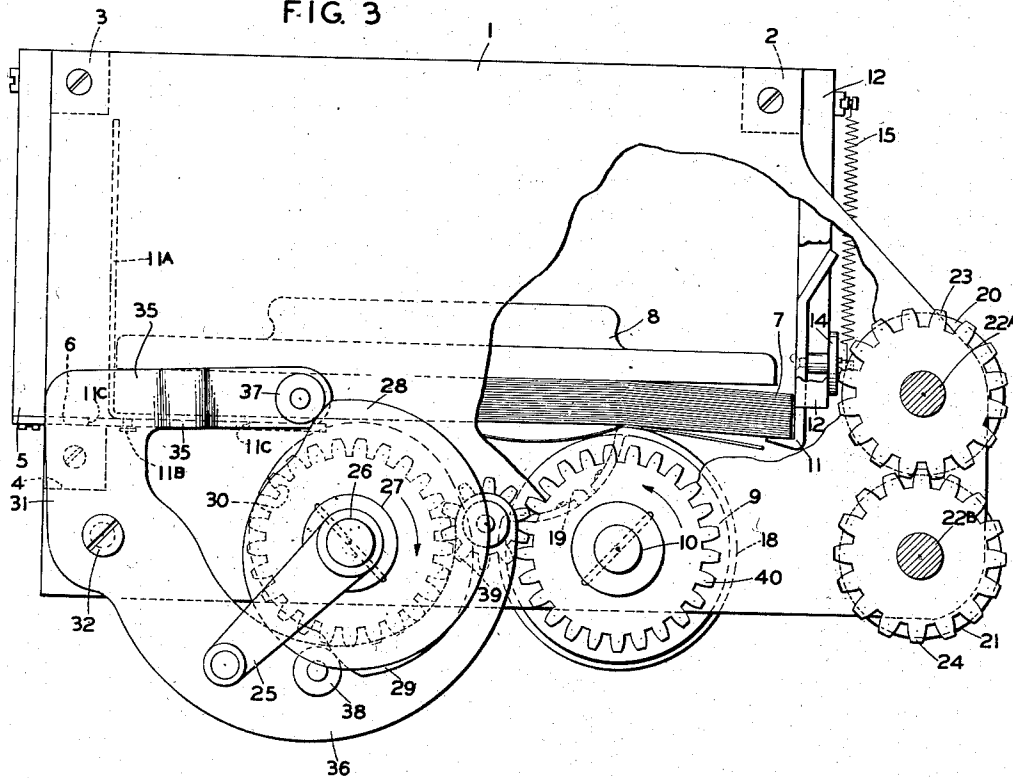
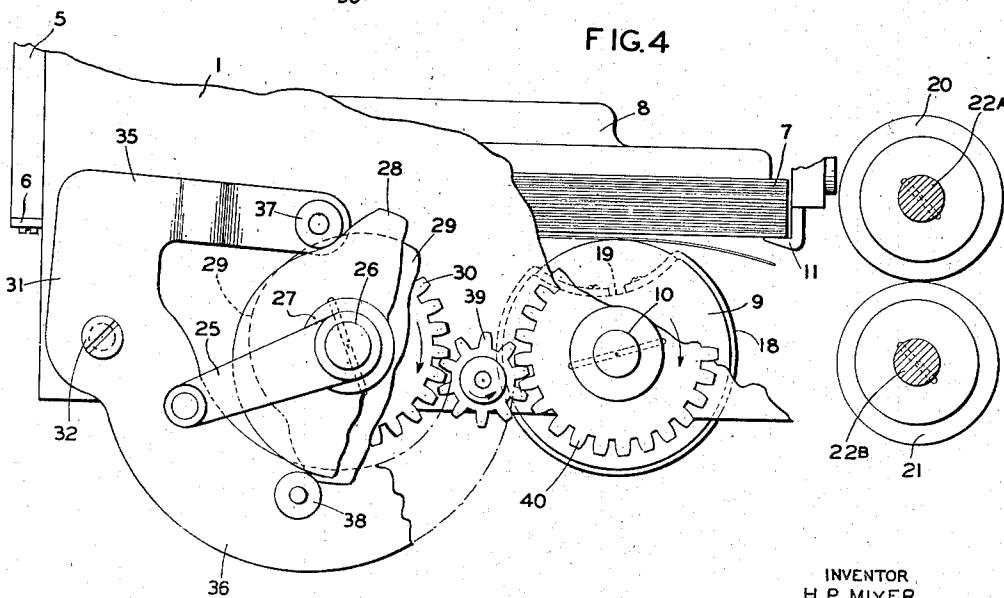


FIG. 4



INVENTOR
H. P. MIXER

BY *John L. Steubing*
ATTORNEY

UNITED STATES PATENT OFFICE

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PAPER FEED MECHANISM

Harold P. Mixer, Rockville Centre, N. Y., assignor
to Remington Rand Inc., Buffalo, N. Y., a cor-
poration of Delaware

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1 Claim. (Cl. 271—23)

This invention relates to paper feed mechanisms, and particularly to those for feeding single sheets into business machines, such as tabulators or the like.

The object of the invention is to insure the feeding of sheets one at a time into a machine.

As is consistent with the prior art, paper feed mechanisms may very properly be of the "picker knife," "frictional," or other type. However, in the handling of thin stock, the first method has been found to mutilate the paper and thus to cause irregular feeding, while the "frictional" is liable to remove more than one sheet at a time, unless preventive means are employed. Directed toward this latter method new features have been introduced in the present invention, among which are a combination of cams and gears designed to reverse the direction of the feed rollers for a short time during their every revolution, the feed rollers having a segment of their friction surface removed, and a separating knife acting in conjunction with a spring to press the forward ends of the paper or forms lightly together. In operation the feed rollers, revolving in a reverse direction momentarily, withdraw the bottom sheet of paper from the stack in the same manner that one fingers through the pages of a book. Then, changing direction again, the rollers present their cut-away portions uppermost, thus allowing the single sheet to snap forward of its own tension under the beveled edge of the knife and toward the machine, into which it is fed by the rollers completing their revolution.

A more detailed description of the mechanism and its operation will be found in the specification and the accompanying drawings, in which Fig. 1 is a plan view of the device;

Fig. 2 is a partial front elevation, showing the separating knife and cooperating spring arrangement;

Fig. 3 is an elevation from the left side of Fig. 1 with parts broken away to show the cam, gear and roller action in relation to the paper being fed, and

Fig. 4 is a detail elevation of the cam and gear action of Fig. 3 as the rollers begin their function of feeding the paper into the machine.

As shown in Fig. 1 the main features of the device—the cam and gear assemblage, the cut-away rollers, and the spring-pressed separating knife—are mounted in combination on two side plates 1 and 1A, which may be adapted for use with a tabulator or like machine, and which are spaced apart and held in rigid connection by

transverse bars 2, 3, and 4. Projecting downwardly from bar 3 are two supports 5 carrying at their lower end a plate 6 which serves as a rest for the stack of paper or forms 7, weighted down with a suitable block 8. Further support for the stack is found in feed rollers 9 fixedly mounted on shaft 10 journaled in the side plates, and at its forward end in separating knife 11. An L-shaped plate 11a, adjustably mounted on plate 6 for forms of different size by means of pins 11b confined in slots 11c, will bind under pressure to prevent the paper from shifting backward as a result of jarring or the reverse action of the feed rollers. It will be noted from Fig. 3 that the periphery of the feed rollers 9 extends slightly above the horizontal line of rest of the paper, maintaining it in raised position, so that the forward end has a tendency to bow down. For the purpose of keeping the ends of the sheets lightly pressed together, a cooperating spring attachment is provided for the separating knife as shown in Fig. 2. Carried on the transverse bar 2 are downwardly extending supports 12 and 13, on the former of which is fulcrumed at its lower end a lever 14 extending laterally and suspended adjacent support 13 by a spring 15. A pin 16 on lever 14 engaging with slot 17 of support 13 limits the motion of the lever. Separating knife 11, formed as shown in Figs. 2 and 3, and having a flange at its lower end for supporting the ends of the paper, is secured to lever 14 and is thus spring-pressed upward against the paper at all times. It may be remarked here that both the feed rollers 9 and the separating knife 11 have another distinct function, which will be described next, but which has no bearing on their function of supporting the paper.

During the forward rotation of the rollers 9 the sheets of paper would be fed out of the mechanism. The position of separating knife 11, however, prevents this, and a reverse action of the rollers is necessary to withdraw the lowermost sheet of paper to a position from which it can snap forward to be fed into the machine. To give the paper opportunity for doing this, the rollers and separating knife are of particular construction.

Formed as shown in Fig. 3, the rollers 9 have a rubber or other frictional material 18 covering their surface, except for an arc or portion 19. Immediately after the reverse action has taken place and the sheet has been withdrawn, the cut-away portion is presented uppermost in the forward rotation of the roller, so that the paper

in snapping forward will have no frictional surface to retard its motion. Following up this movement, the rubber surface will again come into contact with the sheet and feed it to auxiliary rollers designated as 20 and 21 in Fig. 3, and 20 and 22 in Fig. 1, mounted on shafts 22a and 22b and driven by a suitable continuous drive system of which two gears, 23 and 24, are shown in Figs. 1 and 3. The flange of separating knife 11 is beveled on its under edge, as will be seen in Fig. 3, to permit and assist the sheets of paper to pass beneath it, and the position of the knife is such as to prohibit any forward motion of sheets that have not been withdrawn, should they be so urged.

The means whereby power is transmitted, and its direction controlled, for the operation of the feed rollers is shown at the left of Fig. 1 and in sectional detail in Figs. 3 and 4. Connected with any give source of power, as in this instance a manually operated crank 25, is a drive shaft 26 journaled between the side plates 1 and 1A and on which are fixedly mounted exterior to the side plate 1 a collar 27 carrying cams 28 and 29, and gear 30. A prong-like lever 31, consisting of two arms 35 and 36, is pivoted on the frame at 32 and spaced therefrom by means of collars 33 and 34 fixed on the side plate and lever respectively. The upper arm 35 is bent away from the frame 1 so as to position a roller 37, pivoted on the end thereof, over the outer cam 28, while the lower arm 36 is hook-shaped, having a roller 38 pivoted thereon in alignment with the inner cam 29 and carrying a pinion 39 mounted at its outer end, which is maintained at all times in operative contact with gear 30 and a gear 40 fixed to the end of roller shaft 10. While in the present embodiment complementary cams are used for transmitting and controlling the direction of power, it is obvious that other means might be adopted for the same purpose, as, for example, a box cam.

Referring to Fig. 4, it will be seen that when crank 25 is turned clockwise with the gears 30 and 40 and pinion 39 in the position of Fig. 4 the result is to rotate gear 30 clockwise, which in turn revolves pinion 39 counter-clockwise and, consequently, gear 40 clockwise in the line of feed of the paper. This action is accomplished as cams 28 and 29 rotate lever 31 counter-clockwise around pivot 32 carrying pinion 39 up and in an opposite path of rotation from gear 30, thus rotating gear 40 in a clockwise direction. However, as lever 31 reaches the position shown in Fig. 3 the action of cams 28 and 29 rotates lever 31 in a clockwise direction, carrying pinion 39 in a path of rotation substantially the same as that of gear 30 and at the same speed, with the result that the pinion is not induced to revolve, but remains stationary and acts in conjunction with

gear 30 as a means of reversing the path of rotation of gear 40 and shaft 10. In every revolution of the drive shaft, therefore, the operating shaft of the feed rollers will reverse direction once momentarily during its complete cycle.

In the operation of the present invention sheets of paper or forms 7 are stacked so as to rest on the plate 6 and rollers 9 under pressure of weight 8 and with their forward edges lightly pressed upward and together by the spring-actuated knife 11. Driven by any given source of power, as for example the manually operated crank 25, cams 28 and 29 on the drive shaft 26 are rotated in a clockwise direction engaging the rollers 37 and 38 mounted on the arms 35 and 36 of lever 31. In forcing lever 31 down, cams 28 and 29 cause the pinion 39 to follow a path of rotation virtually the same as that of gear 30, and because of which the pinion will not revolve, but will act in conjunction with gear 30 as means for driving gear 40 momentarily in counter-clockwise direction. By this action the lowermost sheet of paper in the stack is forced rearwardly against the plate 11a and is withdrawn from over the knife 11. Subsequent rotation of cams 28 and 29 results in pinion 39 traveling upward in a counter-clockwise or opposite path of rotation from gear 30, imparting to gear 40 clockwise motion in the path of feed. As the cut-away surface 19 of the feed rollers is now presented uppermost, the paper is permitted to snap forward of its own tension, the beveled edge of knife 11 urging it in the proper direction. The rollers, completing their revolution, feed the sheet to the auxiliary rollers, and the entire operation is repeated until all the sheets have been fed out.

While what has been described is a particular embodiment of my invention, changes and modifications may be made without departing from the spirit and scope of the invention.

What I claim as new, and desire to secure by Letters Patent, is:

In a paper feeding device, the combination of a plate, feed rollers and spring-pressed separating knife supporting a stack of sheets of paper, said rollers being fixedly mounted on a shaft operatively connected with cam-controlled gearing means, in which the movement of one cam forces a pinion to be swung in a path of rotation substantially the same as that of a drive gear and thus to remain stationary to act in conjunction with the drive gear in causing a gear of the feed roller operating shaft to revolve momentarily in reverse, and in which the movement of a complementary cam forces the pinion to be swung in a path of rotation opposite that of the drive gear, thus to be revolved itself and impart a forward motion to the gear of the feed roller operating shaft similar to that of the drive gear and which will be in the line of feed of the sheets of paper.

HAROLD P. MIXER.