Sept. 29, 1931. L. R. TUFTS ET AL 1,825,217

SHEET DEFLECTOR

Original Filed July 16, 1928

FIG. 1.

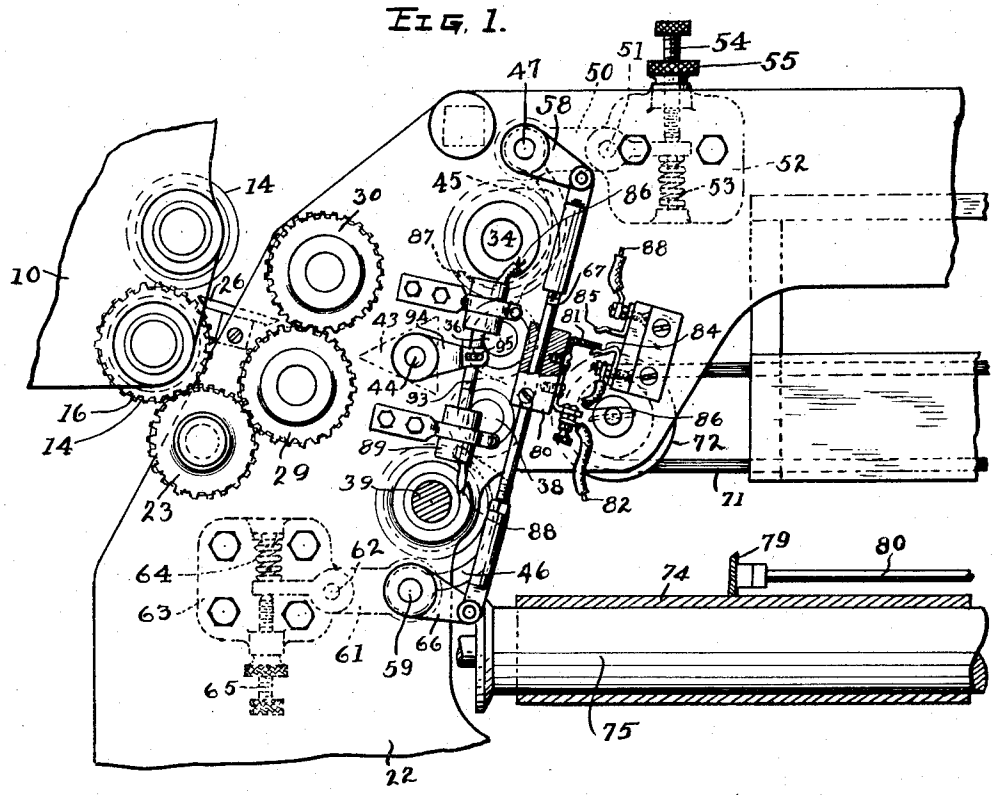


FIG. 2.

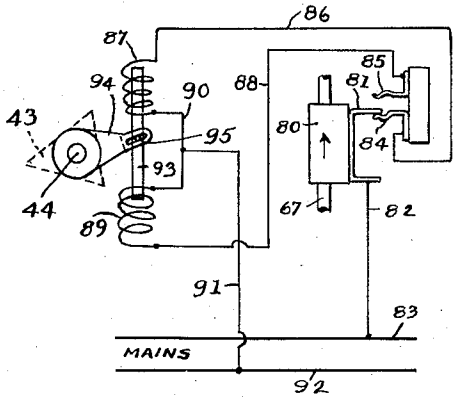
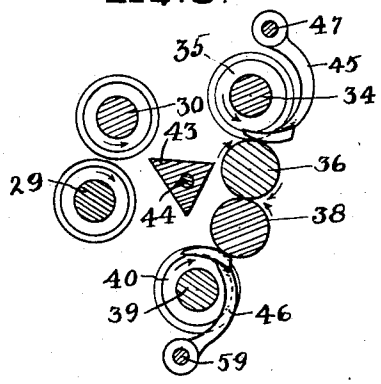


FIG. 3.



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UNITED STATES PATENT OFFICE

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SHEET DEFLECTOR

Original application filed July 16, 1928, Serial No. 293,278. Divided and this application filed October 11, 1929. Serial No. 399,012.

This invention relates to improvements in paper deflectors, that is mechanism for directing into a plurality of different courses the successive sheets of paper travelling in a given path. The invention finds special utility when employed in connection with folding machines where large printed sheets are handled, these sheets being cut into a plurality of parts and folded to make signatures or pamphlets which it is usually desirable to stack separately. The present application is a division of our copending application, Serial No. 293,278, filed July 16, 1928.

The principal object of our invention is the provision or a simple and effective deflector mechanism for directing successive sheets into different courses as the sheets are fed from a folding machine or other paper handling machine.

Another object is the provision of means located in each of the courses taken by the sheets, and adapted to be set in motion by the travel of the sheets themselves, for swinging or flipping the deflector, said two means being preferably interconnected whereby the actuation of one serves to set the other back into position to be actuated.

A further object is the provision of means for shifting or flipping the deflector before the rear edge of the sheet has passed the forward edge of the deflector, whereby the deflector is in position to properly direct the next succeeding sheet no matter how closely they are spaced, and in fact even though no space at all intervenes.

A further object is the provision of an electric means for shifting the deflector, such means being controlled by the travel of the sheets themselves.

Other objects and features of novelty will appear as we proceed with the description of that embodiment of the invention which, for the purposes of the present application, we have shown in the accompanying drawings, in which

Figure 1 is a side elevational view of a fragment of a sheet stacker embodying the invention, certain of the parts being broken away or shown in section in order to more fully illustrate the invention.

Fig. 2 is a wiring diagram illustrating electrical connections which may be employed in carrying out the invention, and

Fig. 3 is a fragmental, more or less diagrammatic, sectional view taken in a vertical transverse plane, showing the deflector in a different position.

In the drawings, we have illustrated at 10 a fragment of a frame of a folding machine at the delivery end thereof, in which are mounted a pair of feed rolls 14, by means of which paper sheets, usually folded sheets, may be delivered onto a fixed guide plate 26. The latter plate is mounted in or supported by the frame 22 of our stacker mechanism. The stacker is preferably entirely separate from the folding machine or other paper handling machine served thereby, thus permitting movement of the stacker out of operative relation with the folding machine or the like when the use of the stacker is not required. When the stacker is put into operative position, an idler gear 23 thereon is caused to mesh with a gear 16 fixed to the lower feed roll 14, and by this means driving power is transmitted to the stacker.

In the frame 22 there are mounted a pair of feed rolls 29, 30 so positioned as to receive sheets of paper from the guide plate 26. These rolls are intergeared to turn in opposite directions, and are driven from the idler gear 23 which meshes with the gear on roll 29.

Behind the rolls 29, 30 the frame 22 carries two further pairs of feed rolls 34, 36 and 38, 39. The rolls 36 and 38 are preferably all-metal rolls of the same diameter throughout, while rolls 34 and 39 comprise rubber surfaced wheels 35 and 40 respectively spaced along the length of each roll. These wheels bear upon the rolls 36 and 38, or at any rate upon the paper sheets fed thereover. These rolls are positively driven in any suitable manner in the directions indicated by the arrows in Fig. 3, being intergeared so that their surface speeds are the same, or substantially so. In front of the rolls 36 and 38 we mount a movable deflector or flipper 43

provided with trunnions 44 which are pivotally supported in the side members of the frame 22. On the extremity of one of these trunnions, outside the frame, there is fixed an arm 94, by means of which the deflector may be shifted on its trunnions from the position illustrated in Figs. 1 and 2 to that illustrated in Fig. 3, or vice versa.

Means are provided for flipping the deflector from one position to the other, this means preferably comprising swinging shoes 45, 46 of identical form, the free ends of which extend into proximity with the surfaces of rolls 36 and 38 respectively, so that they are adapted to be engaged by sheets of paper passing over the surfaces of those rolls. The shoe 45 is secured to a spindle 47 that has a pivotal connection with a lever 50, which is in turn mounted at 51 in the machine frame. An arm 58 secured to the spindle 47 in front of the machine frame therefore moves whenever the shoe 45 moves. The free end of lever 50 is positioned between a compression spring 53 and an adjusting screw 54 threaded into a bracket 52, by means of which the position of spindle 47 may be nicely adjusted. When a proper adjustment is effected the screw 54 may be locked in place by a knurled lock nut 55. The spring 53 holds the lever 50 yieldably up against the set screw 54 and permits the spindle 47 to rise somewhat should the shoe 45 encounter an unusual thickness of paper.

The shoe 46 is inverted and attached to a spindle 59 similar in every respect to the spindle 47 and similarly mounted in a lever 61 which is pivoted upon a pin 62 supported in a bracket 63. The opposite end of the lever 61 is adjustable between a coil spring 64 and an adjusting screw 65 carried by the bracket 63 in a manner exactly similar to that employed in connection with the lever 50.

On the outer end of the spindle 59 there is a crank 66. The two cranks 58 and 66 are pivotally connected to a link 67 in which may be embodied means for varying somewhat the length of the link. By this connection it will be apparent that when the shoe 45, for example, swings toward the right, or from the position indicated in dotted lines in Fig. 1 to that indicated in Fig. 3, the shoe 46 will swing toward the left as illustrated in the same figures.

The swinging of the deflector 43 from one position to the other is accomplished by electrical means. To this end we mount upon the link 67 a block of insulation 80 upon which is carried a metal contact finger 81, to which is attached a flexible wire connection 82 leading from a current main 83. The finger 81 is adapted, when at either extreme of its movement, to contact electrically with one of the spring fingers 84 and 85. The finger 84 is connected by an electric conductor 86 with one end of the coil of an electro-magnet 87, while the finger 85 is connected by a conductor 88 with one end of the coil of a similar electro-magnet 89. The adjacent ends of the two coils are connected by a conductor 90 from which a conductor 91 leads to the other main 92. The coils of the two magnets 87 and 89 are arranged in alignment, and they have a common armature 93 which is loosely attached to the crank 94, previously mentioned, a pin and slot connection 95, as illustrated, being suitable for the purpose.

The particular means employed for collecting and stacking the sheets travelling in the two different courses may vary in practice, but we have illustrated herein one arrangement which is suitable for the purpose. It includes an upper endless conveyor 71 mounted at one end upon a roller 72, driven at low speed by any suitable means. The arrangement referred to includes also a lower endless belt 74 extending transversely of the belt 71 and carried upon suitable rollers one of which, 75, is illustrated herein. This roller 75 also is driven at low speed by suitable means, not shown. When the deflector 43 is in the position illustrated in Fig. 1, sheets are fed from the rolls 29, 30 over the deflector and through rolls 34, 36 onto the belt 71. When the deflector 43 is in the opposite position illustrated in Fig. 3, however, sheets are fed from the rolls 29, 30 under the deflector 43 and through rolls 38, 39 onto the lower belt 74 in a direction transverse to the length of the belt, and means may be provided for stopping their movement in the latter direction, the means herein illustrated for that purpose comprising a fence 79 carried by one or more rods 80 mounted in the frame of the machine.

Operation: Folded sheets moving single file through the feed rolls 14 of a folding machine or the like are directed by the guide plate 26 into the feed rolls 29, 30 of our sorting and stacking machine. Assuming that the deflector 43 is in the position illustrated in Fig. 1, the next sheet fed between rolls 29, 30 will strike the upper side of the deflector and will be directed thereby between the rolls 34 and 36, these rolls being driven as heretofore explained. The front edge of the sheet, passing between the hard surfaced roll 36 and the shoe 45, causes the latter to swing toward the right, that is from the position illustrated in Fig. 1 to that ilustrated in Fig. 3. The sheet continues its movement, and is delivered onto the belt 71.

The swinging of shoe 45 to the right raises crank 58 and with it link 67, which in turn raises crank 66 on the lower spindle 59, thereby swinging shoe 46 to the left, that is from the position illustrated in Fig. 3 to that illustrated in Fig. 1. The shoe 46 is thus placed in position to be actuated by the next sheet travelling that course. At the same time the finger 81 breaks contact with finger

84 and makes contact with finger 85. Thereupon magnet coil 87 is deenergized and coil 89 is energized, pulling armature 93 downward and operating thereby through pin and slot connection 95 to swing arm 94 downward and throw deflector 43 from the position of Figs. 1 and 2 to that of Fig. 3.

The next succeeding sheet delivered from the feed rolls 29, 30 strikes the lower side of deflector 43 and is directed downwardly between rolls 38 and 39. The travel of the forward edge of this sheet through these rolls causes the shoe 46 to swing toward the right from the position illustrated in Fig. 3 to that illustrated in Fig. 1. The sheet continues its travel and drops onto the belt 74. The swinging of the shoe 46 to the right acts through cranks 66 and 58 and link 67 to swing shoe 45 back again into the position of Fig. 1, in other words sets it for actuation by the next sheet travelling over the upper course. Thus the movement of one shoe is always transmitted to the other shoe in order to set the later for the next operation.

Successive sheets delivered from the folding machine are thus directed in different courses onto the upper and lower belts 71 and 74 respectively. Thus where two different pamphlets or signatures are printed upon a single sheet and are cut apart and folded on the folding machine and transmitted to the present sorting and stacking machine, all of the pamphlets or signatures of one kind are caused to travel in one course onto the upper belt 71 and all of the other kind are caused to travel in the other course onto the lower belt 74. The belts 71 and 74 are of the slow moving type employed in stackers and their functions and mode of operation are well known in the art. While we have shown one of them arranged transversely to the other, such an arrangement is not at all essential, as they may both run in the same direction if desired.

While in the foregoing description and accompanying drawings we have disclosed the invention somewhat in detail, we desire it to be understood that such detail disclosure is primarily for the purpose of fully illustrating the invention, and is not to be construed as limiting the scope thereof.

Having thus described our invention, we claim:

1. In a paper handling machine, means for causing sheets to travel single file in a given path, a deflector for directing sheets from said path to either of two courses, electrical means for shifting said deflector from one position to the other, and means actuated by the travel of the sheets themselves for controlling said electrical means.

2. In a paper handling machine, means for causing sheets to travel single file in a given path, a deflector for directing sheets from said path to either of two courses, electrical means for shifting said deflector from one position to the other, and means located in each of said courses and adapted to be actuated by the travel of the sheets in that course for controlling said electrical means to shift the deflector so as to direct a succeeding sheet into the other course.

3. In a paper handling machine, means for causing sheets to travel single file in a given path, a deflector for directing sheets from said path into either of two different courses, electrical means for shifting said deflector to direct sheets into one of said courses and for shifting the deflector to direct sheets into the other of said courses, electrical circuits for delivering current to operate said means for shifting the deflector in opposite directions comprising switch means, and means for operating said switch means comprising elements located in said courses and adapted to be actuated by the travel of the sheets therein.

4. In a paper handling machine, means for causing sheets to travel single file in a given path, a deflector for directing sheets from said path to either of two courses, electrical means for shifting said deflector from one position to the other, and means actuated by the travel of the forward portions of the sheets themselves for controlling said electrical means.

5. In a paper handling machine, means for causing sheets to travel single file in a given path, a deflector for directing sheets from said path to either of two courses, electrical means for shifting said deflector from one position to the other, and means actuated by the travel of the sheets themselves for operating said electrical means to cause successive sheets to travel alternately in different courses.

6. In a paper handling machine, means for causing sheets to travel single file in a given path, a deflector for directing sheets from said path into either of two different courses, electrical means for shifting said deflector to direct sheets into one of said courses and for shifting the deflector to direct sheets into the other of said courses, electrical circuits for delivering current to operate said means for shifting the deflector in opposite directions comprising a double acting switch, elements located in said courses and adapted to be actuated by the travel of the sheets therein, a mechanical interconnection between said elements, and means carried by said interconnection for operating said switch.

In testimony whereof, we hereunto affix our signatures.

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