Oct. 25, 1927. 1,646,652

J. LULEY ET AL.

SHEET FEED CONTROLLER FOR FOLDING MACHINES

Filed Sept. 20, 1924 2 Sheets-Sheet 1

Fig. 1.

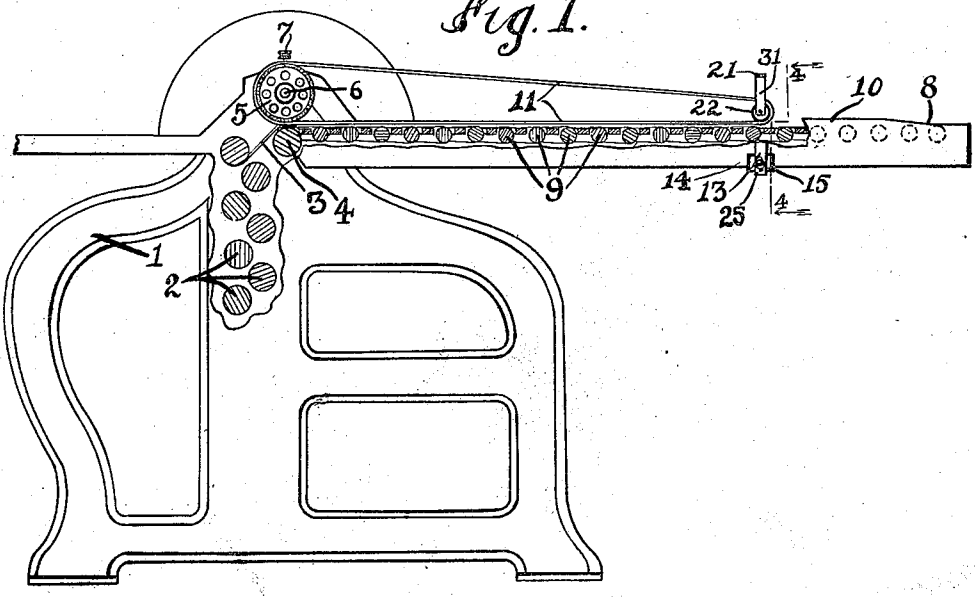


Fig. 2.

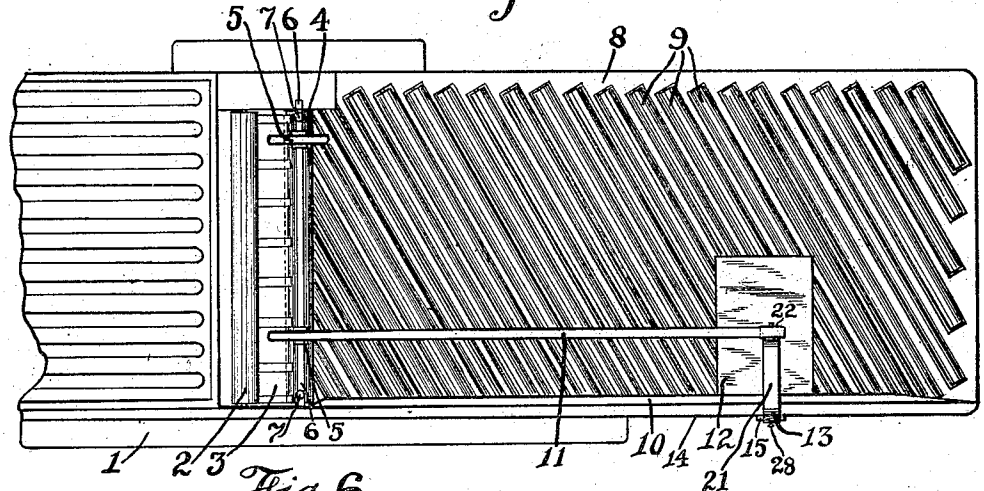
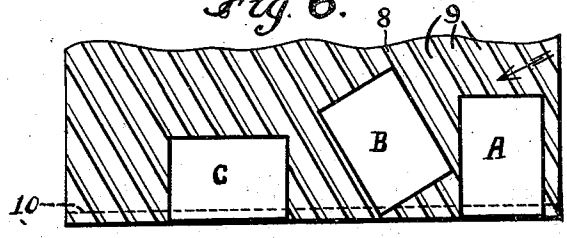


Fig. 6.



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Fig. 5.

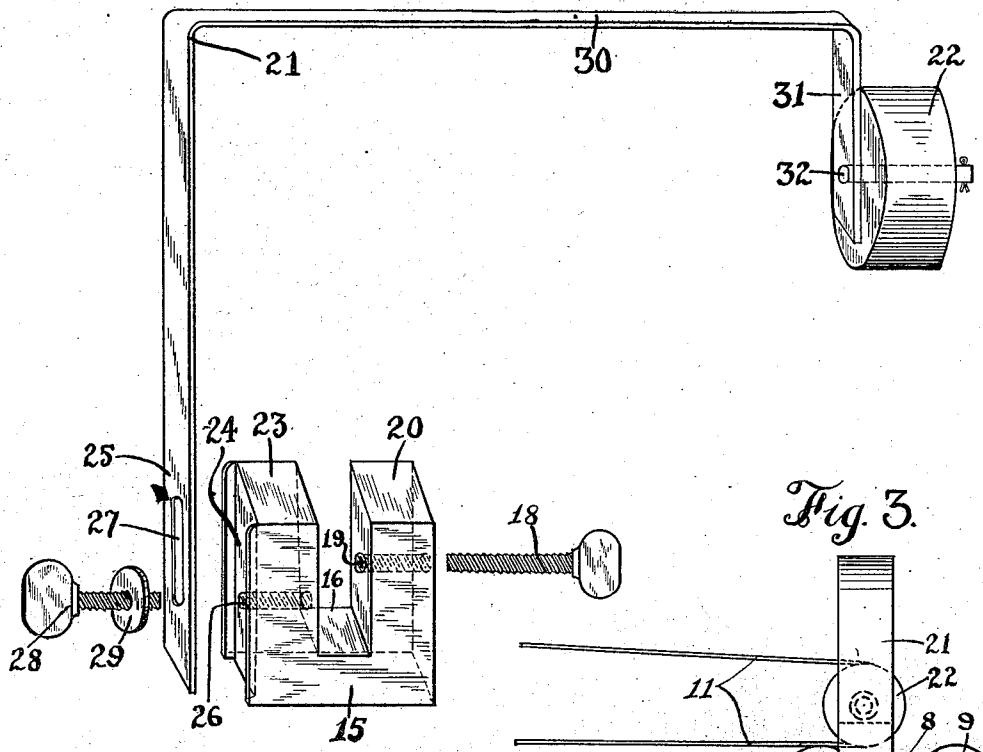


Fig. 3.

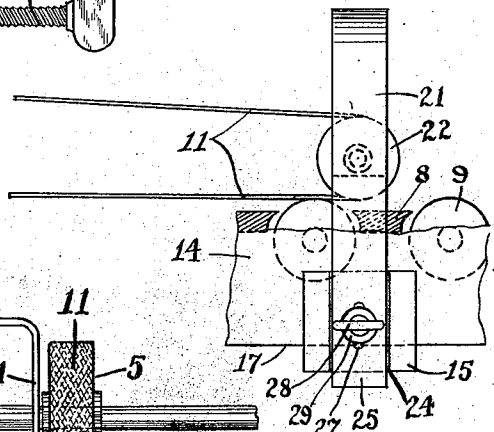
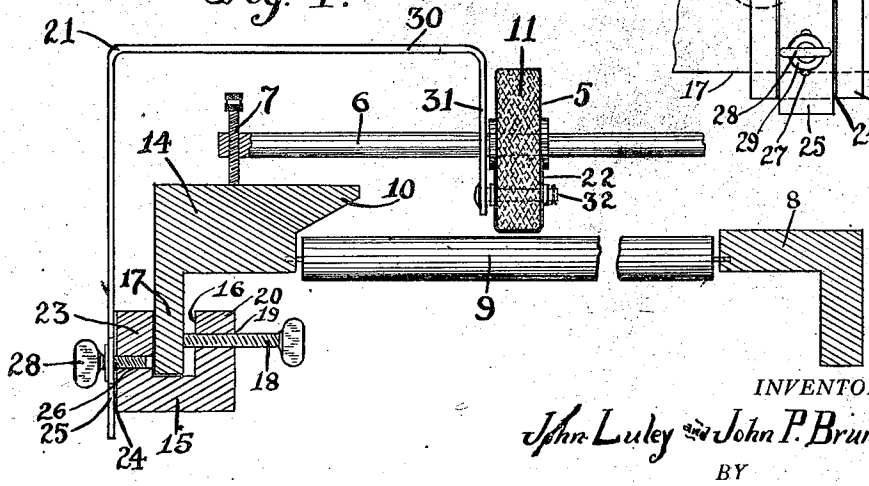


Fig. 4.



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UNITED STATES PATENT OFFICE.

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SHEET-FEED CONTROLLER FOR FOLDING MACHINES.

Application filed September 20, 1924. Serial No. 738,906.

This invention relates to sheet feeding mechanism and more particularly to sheet feeding devices for paper folding or like machines of the type having a roller bed for feeding the sheets to the folding rolls or other mechanism.

In the operation of folding machines of the above type for instance, difficulty has been encountered in attempting to accurately feed sheets not substantially square in shape particularly when it has been desired to feed such sheets to the folding rolls or mechanism in such position that the sheets enter the folding mechanism along their long dimensional edges, due to the liability of the sheets to depart from the proper feeding position during the course of their travel over the feeding means. Certain machines, also, are equipped with a roller or other feed bed in which the path of the rolls or conveying means is directed at an angle to the normal path of travel of the sheet to the folding or other mechanism, so that the sheet however it may have been deposited on the feeding means is caused to be carried toward the guide provided at the side of the feed bed and thence along the guide to the folding mechanism. In such machines the tendency of the angularly set feeding means when feeding sheets not substantially square in shape is to present the greatest dimensional edge of the sheet at the side guide, and this tendency has heretofore rendered it difficult, and in fact practically impossible to properly and accurately feed and deliver sheets of certain shape to the folding or other mechanism.

For instance, when attempting to feed sheets of oblong shape in a folding machine so that the sheets will be caused to enter the folding rolls or mechanism along their greatest dimensional edge it has been found that the sheet is caused to turn in its travel, and either wanders in an irregular path over the feed bed or else reaches the folding mechanism with its greatest dimensional edge parallel with the side guide and with a shorter dimensional edge presented to the folding mechanism, either of which results in improper folding of the sheet or clogging of the folding mechanism, with consequent waste of time, material and labor.

The primary object of the present invention is to enable sheets to be properly and accurately fed and delivered.

A further object is to enable sheets of irregular shape to be properly and accurately fed to the folding or equivalent mechanism and to prevent the sheets from departing from the intended direction or path of travel over the feed bed.

A still further object is to improve the operation of sheet handling machines having an angularly directed path of motion and to enable sheets to be fed as intended regardless of the tendency of the angularly directed feeding means to turn the sheet in its travel.

Another object is to provide retarding means traveling with the sheet for counteracting the tendency of the angularly directed feeding means to cause the sheet to depart from the intended feeding position, and to effectively control the travel of the sheet over the feed bed and maintain the sheet in its proper feeding position at all times.

Still another object is to provide a novel sheet controlling attachment which is simple in construction, efficient in operation, cheap in cost of manufacture and readily applicable to machines of standard types without alteration of the feeding or other mechanism of such machines.

With the above and other objects in view which will hereinafter appear, we have devised the sheet feed controller described in the following specification and illustrated in the accompanying drawings, forming a part hereof, in which

Figure 1 is a side elevation of a standard folding machine known as the "Cleveland" type, partly in section, showing the sheet feed controller in operative position;

Figure 2 is a top plan view of the folding machine illustrated in Figure 1, showing the roller feed bed with a sheet in feeding position;

Figure 3 is an enlarged detail view of the adjustable sheet controller attachment as seen in Figure 1;

Figure 4 is a diagrammatic transverse sectional view through the feed bed substantially on the line 4—4 of Figure 1, certain parts being omitted for the sake of clearness;

Figure 5 is a perspective view illustrating a preferred form of the adjustable sheet controller attachment proper in disassembled relationship; and

Figure 6 is a diagrammatic top plan view illustrating a difficulty heretofore encountered in feeding sheets of a certain angular shape over a feed bed having an angularly directed path of motion.

Referring more particularly to the drawings, we have illustrated our invention as applied to a standard "Cleveland" type of folding machine, including a main frame 1, folding rolls 2, sheet guide 3, main feeding roll 4 of the folding or other mechanism and a plurality of coacting pressure rollers 5 freely rotatably mounted on a stationary shaft 6 and adjustable with relation to the main feeding roll 4 by means of adjusting screws 7 located at opposite ends of the shaft 6. The folding rolls 2 are driven by suitable means, as well known in this type of folding machine.

The feed bed 8 is located at one end of the frame 1, substantially in alignment with the main feeding roll 4, and in this instance the feed bed includes a plurality of forwarding rolls 9 adapted to be rotated in any suitable manner, as shown for instance in the patent to Trautman, No. 1,413,245, and a side guide 10. These forwarding rolls 9 are so located that the path of travel of the forwarding rolls 9 is at an angle to the longitudinal axis of the feed bed 8 and directed toward the side guide 10.

The folding machine as thus far described represents but one type of machine to which our invention is applicable. With such a machine the sheets to be fed may be deposited on the feed bed 8, whence they are carried toward the main feeding roll 4 and also toward the side guide 10. However, in feeding sheets of what may be termed irregular shape, such for instance as the sheet of oblong shape seen in Figure 6, with the longest dimensional edge foremost, as seen at A, the tendency of the angularly disposed forwarding rolls 9 is to cause the sheet to turn to a position substantially as indicated at B and thence either in a wandering path in various successive positions, or else to the position indicated at C with the longest dimensional edge adjacent to the side guide 10, whence it will be carried to the folding mechanism in an improper folding position.

The present invention comprehends counteracting this tendency of the angularly disposed forwarding rolls to alter the relative position of the sheet in its travel or turn it upon its axis, and for this purpose we have provided auxiliary controlling means adapted to cooperate with the forwarding rolls 9 and side guide 10 to cause the sheets to be fed in their intended position.

In this instance such means include preferably an endless traveling belt 11 suitably mounted and adapted to travel in a straight path above the forwarding rolls 9, a short distance from and substantially parallel with the side guide 10. The sheet 12 is adapted to be fed underneath the belt 11 and the belt is adapted to exert a relatively slight degree of pressure upon the sheet 12 and impart a certain degree of motion thereto in a direction different from the motion imparted by the forwarding rolls 9, and, as will be obvious, at lesser speed than the speed imparted by the forwarding rolls 9, with the result that the sheet is stabilized in its travel and an effective balance of the frictional force exerted by the forwarding rolls 9 upon the sheet is obtained by the provision of the intermediate or auxiliary force exerted by the belt 11 in the direction of the straight path which the sheet is intended to follow, this additional force acting to retard one portion of the sheet and thus counteract the tendency of the forwarding rolls to rotate or turn the sheet about its own axis.

The belt 11 may be mounted in any suitable manner and in the present modification a sheet controller bracket attachment 13 is adapted to be adjustably secured to the side frame 14 of the feed bed 8 at which the guide 10 is located. The bracket 13 includes suitable clamping means, here shown as a clamping block 15 having a groove 16 adapted to receive a downwardly projecting portion 17 of the side frame 14, and suitable securing means, as for instance a thumb screw 18 adapted to pass through a threaded aperture 19 in the side portion 20 of clamping block 15 into engagement with the inner side of frame portion 17, whereby the clamping block 15 may be securely attached to the side frame 14 at any desired location in the length of the frame.

The clamping block 15 is adapted to adjustably and rigidly support a suitable bracket arm 21 carrying a roller 22 above the forwarding rolls 9. In the present instance the outer side portion 23 of clamping block 15 is provided with a longitudinal recess or guide 24 adapted to receive the lower portion 25 of bracket arm 21 and a screw threaded aperture 26. The bracket portion 25 is provided with a longitudinal opening 27 adapted to register with the screw threaded aperture 26 and a thumb screw 28 having a clamping washer 29 is adapted to be passed through the opening 27 into the aperture 26 to secure the bracket portion 25 to the clamping block 15. The opening 27 is preferably of such length that a suitable range of height adjustment is afforded for the bracket arm 21 as will be obvious.

The bracket arm 13 is preferably bent at 21 to provide a horizontal portion 30 adapted to extend any desired distance over the feed bed 8 and a relatively short depending portion 31 carrying a shaft 32 upon which the pulley 22 is mounted. The pulley 22 in this instance is adapted to be aligned with one of the pressure rollers 5 and the endless belt 11, which may be of canvas or other material, is passed over this roller 5 and the pulley 22. The pressure rollers 5 are normally rotated

by frictional contact with the main feeding roll 4 which, as will be seen, will also cause the belt 11 to travel over the roller feed bed 8 in a straight path and exert a degree of force or motion independent of and in a direction different from the force exerted by the forwarding rolls 9 in imparting motion to the sheet 12. The height of the belt 11 relative to the forwarding rolls 9 is adjustable at both ends by means of the adjusting screws 7 and thumb screw 28, and the bracket arm portions 21, 30 and 31 may be bent to any desired position, so that the proper degree of frictional contact with the sheet 12 may be obtained according to the thickness of the sheet. When it is not desired to use the sheet feed controller it may be readily removed from the machine by loosening the clamp 15 or thumb screw 28.

With the use of our sheet feed controller sheets of material of oblong shape, or other irregular shapes, are accurately and properly fed to the folding rolls or mechanism in a straight path over a roller or other type of feed bed laid out in an angular path without liability to dislocation or change of position during the course of their travel over the feed bed.

Other troublesome conditions heretofore encountered have been that occasionally a sheet will be deposited on the feed bed and will remain substantially stationary, regardless of the rotating forwarding rolls, due to the presence of so called static electricity; and in other cases sheets or printed signatures will be found to contain wrinkles, buckles or turned ends or corners so that a plane engaging surface is not presented to the forwarding rolls, with the result that the sheet will either fail to move or will be caused to turn or depart from the proper path of feed. An important advantage of our invention is that a sheet of any shape which may fail to be picked up or moved by the forwarding rolls due to any of these causes will be quickly picked up as soon as it is deposited under the traveling belt and positively and continuously fed to the folding mechanism.

The sheet feed controlling mechanism herein described is capable of various modifications to enable the same to be applied to machines of various standard types; hence it is to be understood that we do not wish to be limited strictly to the construction herein shown and described, but what we claim is:

1. The combination with sheet feeding mechanism prescribing an angular path of travel, of means to rest transversely upon a portion of the sheet and impart auxiliary feeding motion in a straight path at retarded speed throughout the travel of the sheet.

2. The combination with sheet feeding mechanism including a side guide and feeding means prescribing an angular path toward said side guide, of means to travel with the sheet and impart auxiliary feeding movement in a straight path parallel with said side guide.

3. The combination with sheet feeding mechanism including forwarding rolls over which the sheet is adapted to travel, of means above and traveling continuously with the sheet to impart an additional feeding and retarding movement in a different direction from that imparted by said forwarding rolls.

4. The combination with sheet feeding mechanism including a side guide and forwarding rolls over which the sheet is adapted to travel, said forwarding rolls prescribing an angular path toward said side guide, of means to be superposed above the forwarding rolls and arranged to engage and move with the sheet and impart a friction drag and additional feeding movement to a portion of the sheet in a straight path parallel with said side guide.

5. The combination with sheet feeding mechanism including a side guide and forwarding rolls over which the sheet is adapted to travel, said forwarding rolls prescribing an angular path toward said side guide, of a traveling belt above the forwarding rolls adapted to rest transversely upon a portion of the sheet and impart additional feeding and retarding movement to the sheet in a straight path parallel with said side guide.

6. The combination with sheet feeding mechanism including a side guide and forwarding rolls prescribing an angular path toward said side guide, of a friction drag device arranged to engage the upper surface of the sheet and move with the sheet in a path parallel with said side guide to counteract the tendency of said forwarding rolls to turn the sheet about its axis during its travel.

7. The combination with a paper folding machine including a feed bed having a side guide and forwarding rolls prescribing an angular path toward said side guide, of a traveling belt adapted to be superposed above the forwarding rolls, said belt arranged to impart auxiliary feeding motion in a straight path parallel with said side guide at lesser speed than that imparted by said forwarding rolls.

8. The combination with a paper folding machine including a side guide and forwarding rolls prescribing an angular path toward said side guide, of means to rest upon and move with a sheet fed over said angular forwarding rolls to maintain the sheet in its initial relative position during its travel over said angularly disposed forwarding rolls.

9. The combination with a paper folding machine including a side guide and forwarding rolls prescribing an angular path toward said side guide, of auxiliary means arranged to move with a sheet fed over said forwarding rolls with the narrow edge of

the sheet against said side guide and impart frictional resistance to the angular motion imparted by said angular forwarding rolls transversely of the sheet, whereby the sheet is maintained in proper feeding position during its travel over said angularly disposed forwarding rolls.

10. The combination with a paper folding machine including a side guide and forwarding rolls prescribing an angular path toward said side guide, of a traveling friction drag device arranged to rest upon a portion of a sheet of irregular dimensions during travel of said sheet to prevent the sheet from turning about its axis due to said angularly disposed forwarding rolls.

11. The combination with a paper folding machine having a side guide and angularly disposed feeding rolls, of a sheet feed controller including a bracket adapted to be positioned over said feeding rolls, a pulley mounted on said bracket and a belt adapted to travel over said pulley in a path parallel with said side guide.

12. The combination with a paper folding machine having a main feeding roll for the folding mechanism, a roller adapted to be disposed above said main forwarding roll and rotated thereby, a side guide and feeding rolls prescribing an angular path, of a sheet feed controller including a bracket adapted to be positioned over said forwarding rolls, a pulley mounted on said bracket, and a belt adapted to travel over said roller and pulley above said forwarding rolls in a straight path parallel with side guide.

13. The combination with a paper folding machine having a main feeding roll for the folding mechanism, a roller adapted to be disposed above said main forwarding roll, a side guide and feeding rolls prescribing an angular path, of a sheet feed controller adapted to be attached to said paper folding machine, said sheet feed controller including clamping means, a bracket adapted to be positioned over said forwarding rolls, a pulley mounted on said bracket and a belt adapted to travel over said roller and pulley above said forwarding rolls in a straight path parallel with said side guide and in engagement with a sheet fed over said forwarding rolls.

14. The combination with a paper folding machine including folding mechanism and a main feeding roll for directing sheets thereto, a roller adapted to be disposed above said main feeding roll and rotated thereby, a side guide and forwarding rolls prescribing an angular path toward said side guide, of a sheet feed controller adapted to be secured to said paper folding machine, said sheet feed controller including a removable clamp, an arm adjustably mounted on said clamp and extending over said forwarding rolls, a pulley mounted on said arm, and an endless belt adapted to travel over said roller and pulley in a path parallel with said side guide and in engagement with a sheet fed over said forwarding rolls.

15. The method of feeding a relatively long and narrow strip of paper to a folding mechanism which consists in providing a feed table having forwarding rollers prescribing an angular path relative to said feed table, a side guide arranged at one side of the table to register and guide one edge of the strip, and a means moving longitudinally of the table and with the sheet for effecting a friction drag upon a portion of the upper surface of the strip distant from said registered edge throughout the travel of the strip longitudinally of the table.

16. In a sheet feeding device for Cleveland folding machines, a feed bed having forwarding rollers prescribing an angular path of travel, a side guide at one side of said feed bed to guide one edge of a relatively long and narrow sheet, and a movable device to effect continuous friction drag upon a portion of the upper surface of said sheet distant from said side guide throughout the travel of the strip longitudinally of the feed bed.

17. A device as set forth in claim 16, in which the movable friction drag element comprises a traveling belt, and means to support said traveling belt in relation to the feed bed, said means adjustable vertically of the feed bed.

In testimony whereof, we have signed this specification.

JOHN LULEY.
JOHN P. BRUNNER.