

Dec. 15, 1925.

1,566,079

P. J. CHRISTMAN, JR., ET AL

ROTARY SHEET FOLDER

Filed Nov. 9, 1922

2 Sheets-Sheet 1

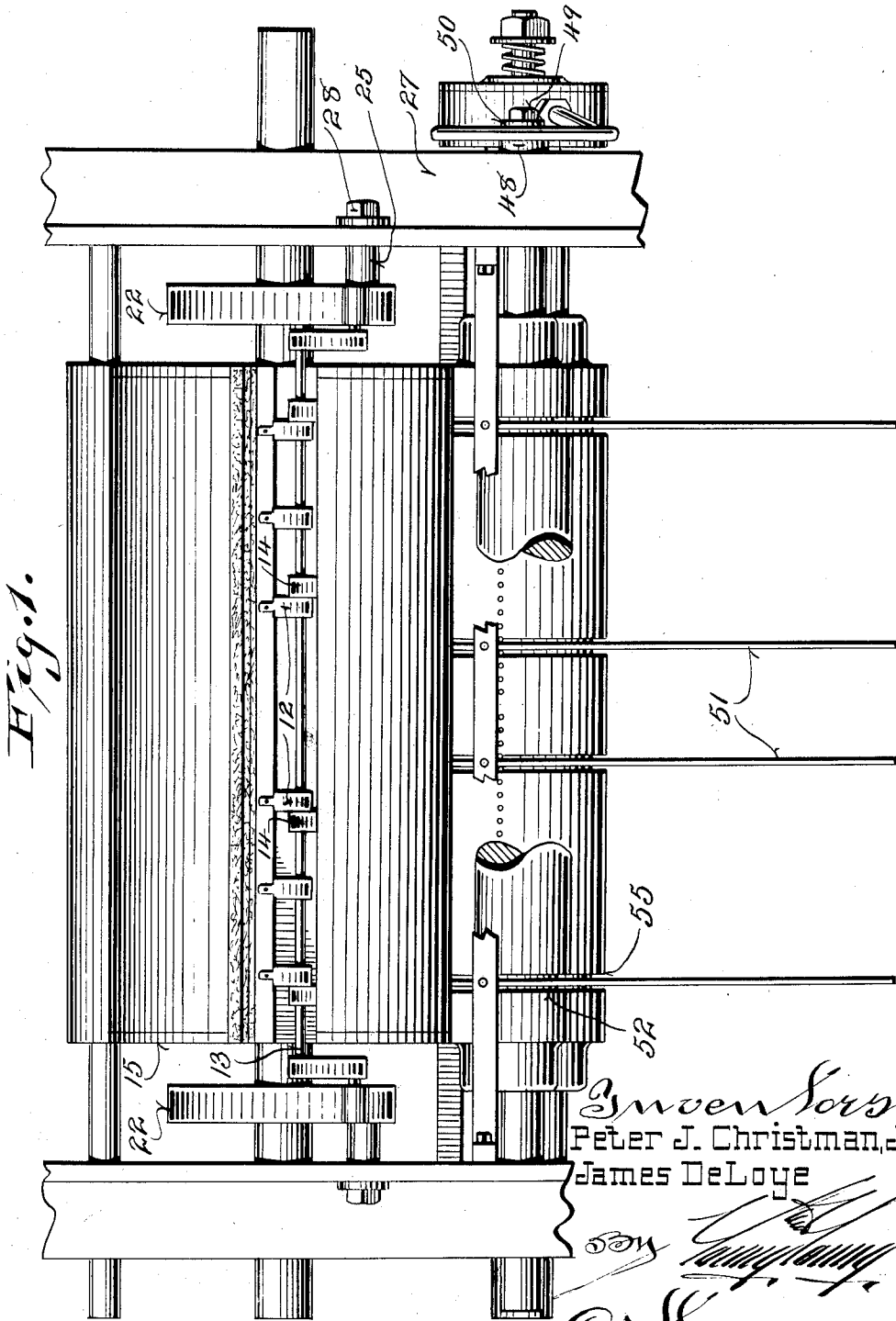


Fig. 1.

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2 Sheets-Sheet 2

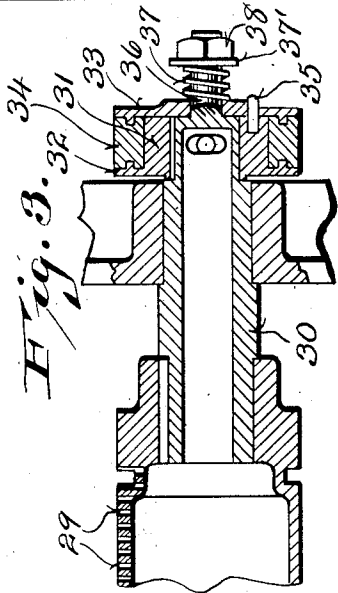
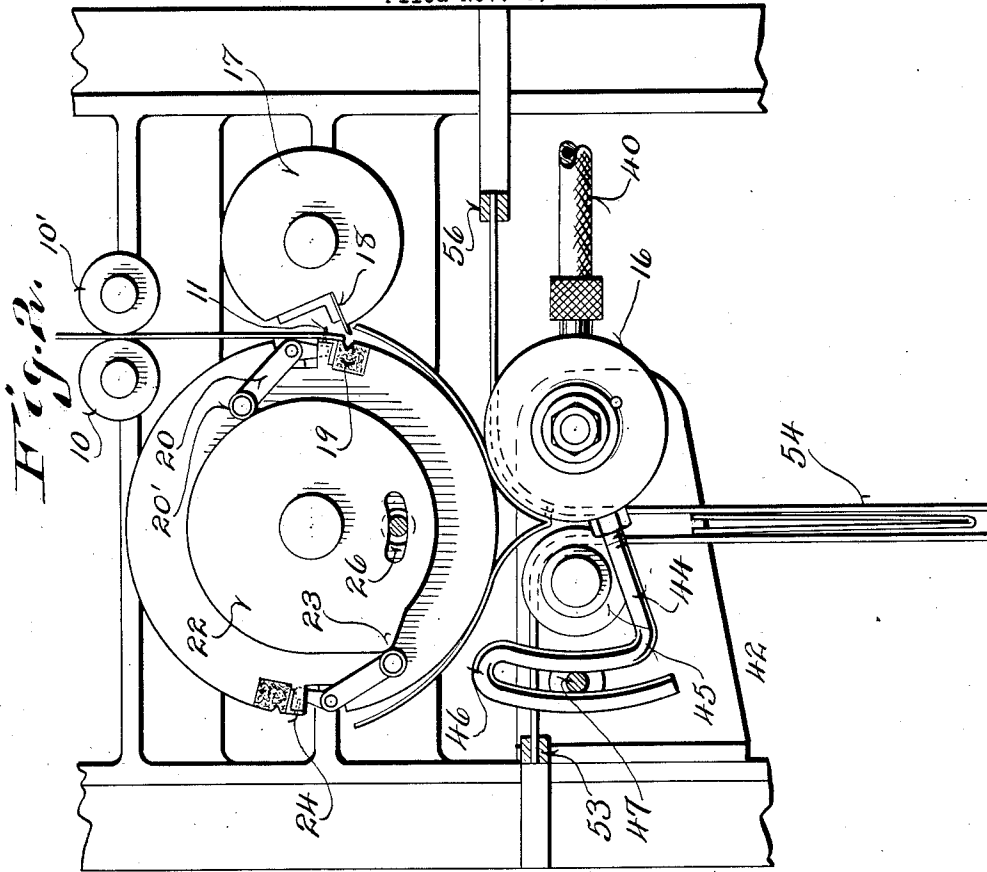
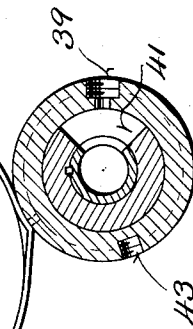


Fig. 3.



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UNITED STATES PATENT OFFICE.

PETER J. CHRISTMAN, JR., AND JAMES DE LOYE, OF GREEN BAY, WISCONSIN. ASSIGNORS, BY DIRECT AND MESNE ASSIGNMENTS, TO PAPER CONVERTING MACHINE COMPANY, OF GREEN BAY, WISCONSIN, A CORPORATION.

ROTARY SHEET FOLDER.

Application filed November 9, 1922. Serial No. 599,823.

To all whom it may concern:

Be it known that we, PETER J. CHRISTMAN, JR., and JAMES DE LOYE, both citizens of the United States, and residents of Green Bay, in the county of Brown and State of Wisconsin, have invented certain new and useful Improvements in Rotary Sheet Folders; and we do hereby declare that the following is a full, clear, and exact description thereof.

The invention relates to improvements in sheet folding machines of the type upon which an application was filed February 20, 1922 by Peter J. Christman, Jr., Serial No. 537,934.

The web is gripped in a novel manner, the carrier cylinder being provided with arms carrying a plurality of pins adapted to engage the web. A stationary cam moves the arms to disengage the pins. A suction roll is provided adapted to remove the sheets from the carrier roll, the suction roll cooperating with a folding roll to fold sheets at their middle portions and feed them into a fence.

A primary object of the novel carrier roll structure is the smooth and instantaneous release of the sheets carried by the roll. There is no tearing of the paper by the pins and no resistance is offered to the action of the suction roll. The structure provides for nicety of adjustment of the cams so that the instant of the release of the pins may be accurately determined. Thus the rapid action of the carrier roll is assured and the device operates smoothly and without interruption. The object of the suction roll structure is the provision of means for quickly removing the sheets from the carrier roll without any danger of tearing the sheets. The suction device obviates the need for mechanical parts such as used in the above identified application, which are designed to slap the sheets. The suction action is not limited to small areas, but extends across the entire width of the paper. There is no gripping of the paper by mechanical parts, but the sheet is maintained tightly in contact with the roll and brought down adjacent the folding roll. A rapid and reliable folding action results. An advantageous feature of the suction roll structure is the provision of a valve which may be accurately adjusted so that the time of the suction action may be

regulated. Thus the operation may be made such that the fold is produced exactly in the middle of the sheet.

An object of the novel construction is the provision of a fence comprising strands of wire extending vertically and bent about the folding roll, grooves being provided therein for the reception of the wire. Similar strands extend upwardly and about the suction roll so that a fence is provided adapted to receive the folded sheets discharged from the folding roll and suction roll.

With the above and other objects in view, which will appear as the description proceeds, the invention resides in the novel construction, combination and arrangement of parts, substantially as hereinafter described and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the herein disclosed invention may be made as come within the scope of the claims.

In the accompanying drawings is illustrated one complete example of the physical embodiment of the present invention constructed according to the best mode so far devised for the practical application of the principles thereof, and in which:

Figure 1 is a side elevation of the novel mechanism.

Figure 2 is a side elevation taken at right angles with respect to Figure 1.

Figure 3 is a central longitudinal section of the suction roll and valve.

Figure 4 is a cross section of the valve showing the manner of operation of the suction roll.

The novel mechanism is installed in frames substantially of the nature described in the above identified application, V-plates being provided. As in said case, the webs of paper descend between pull rolls 10—10' and are then engaged by a series of pins 11. Each of the pins is carried by an arm 12 rigid with a rod 13 which is journaled in a plurality of bearing members 14, the rod and bearing members being received in a longitudinal slot in carrier cylinder 15 to which the bearing members are secured. The rotation of the carrier cylinder brings the end of the web downwardly, causing it to contact with suction roll 16 beyond which it is carried until another series of pins is brought in contact with the web adjacent

cutoff roll 17. The parts cooperating with the second series of pins are similar to those described in connection with the first series and the two transverse series of pins are disposed at angles of one-hundred and eighty degrees about the circumference of the carrier cylinder.

At the time of engagement of a series of pins with the web a knife 18 cuts through the web below the pins, cutting block 19 being carried by the carrier cylinder which cooperates with the knife so that an effective cutting action of the web results. The pins 11 retain the end of the web until lever 20 rigid with rod 13 and carrying rollers 21 which run on stationary cams 22 is brought in contact with an enlargement 23 on the cam. The lever is then moved outwardly and the arms 12 are withdrawn, the pins moving inwardly through a plurality of slots in a transverse release bar 24.

As shown in Figure 1, two cams are provided. Only one, however, is essential to the operation of the device. An adjustment of the cam may be made by means of a stud 25 in an arcuate slot 26 of the cam, the stud being secured to the side frame 27 by means of a bolt 28. By adjusting the cam the moment of disengagement of pins 11 with the sheet may be varied as desired. The suction roll is provided with a transverse series of alined apertures 29 through which air is admissible to the hollow interior of the roll. The roll is provided with a shaft 30 journaled in the side frame and at the extreme end of the shaft a valve is provided and a hub 31 is keyed to the shaft and carries an outwardly directed flange 32 which cooperates with a movable plate 33 to retain in position a stationary valve ring 34, a pin 35 extending from the hub through an opening in plate 33. The shaft is provided with an extension 36 enveloped by a spring 37 contacting at one end with plate 33 and at the other with a washer 37 retained in position by a bolt 38. Thus the valve is prevented from movement outwardly on the shaft. Valve ring 34 is stationary and is provided with an opening 39 through which a suction action may be exerted by means of a tubular connection 40.

Hub 31 is cutaway to provide outlet 41. The rotation of the hub brings outlet 41 in registry with opening 39. Thus suction is produced in suction roll 16. The apertures 29 being brought immediately adjacent the sheet of paper draws the same downwardly, producing a fold therein. In the downward movement of the paper pins 11 are withdrawn therefrom by the action of cam 22. The paper is then brought in contact with folding roll 42 which cooperates with suction roll 16 to effectively grip the folded sheet and direct the same downwardly. After outlet 41 passes beyond opening 39,

suction ceases to be produced in the suction roll 16 as tubular connection 40 is cut off. The suction in suction roll 16 is broken when inlet 41 is brought in registry with a hole 43 in which pipe 44 is threaded. The pipe extends straight away from the suction roll 16 to a point 45 and then bent upwardly in a slight curve to a point 46 where it is bent backwardly in a parallel curve terminating slightly beyond point 45.

A bolt 47 extending through an opening in the side frame 27 operates to retain the parallel curved portions of pipe 44 against a sleeve 48, a nut 49 tensioning the washer 50 against the pipe. Thus an adjustment upwardly or downwardly of the pipe may be effected which effects a corresponding change of position of ring 34. By making this adjustment of the ring the relation of opening 39 to inlet 41 is altered in such a way that the moment at which suction is produced in the suction roll 16 is varied. Suction is produced when inlet 41 is in registry with opening 39.

It is apparent, therefore, that the time of action of suction through apertures 29 may be adjusted very accurately. The cooperation of the carrier cylinder with the suction roll may therefore be adjusted so that the folding of the sheet will occur exactly in the middle thereof. A plurality of strands of wire 51 are disposed below fold row 42 extending upwardly and curved about the fold roll, being received in grooves 52 and extending horizontally to a support 53, extending between the side frames.

Spaced slightly from rolls 51 is a similar series of strands of wire 54 which are curved about suction roll 16 being received in grooves 55 and extending horizontally to a horizontal support 56 secured to the side frame. The folded sheets are directed downwardly by cooperative action of suction roll 16 and fold roll 42 and are received between the series of wire strands from which they are removed, as described in the above identified co-pending case. The strands of wire do not interrupt the smooth surfaces of the rolls 16 and 42 and the curves formed in the rolls are such that the sheet must necessarily be received between the two series of strands. Thus a reliable action is insured, the sheets being folded and deposited below.

The carrier cylinder and the rolls are driven in a suitable manner and are described in the above identified application.

Claims:—

1. In a device of the class described, the combination of a carrier cylinder, means cooperating therewith for cutting a web of paper into sheets, a suction roll for drawing said sheets from the carrier roll, said carrier cylinder and said suction roll receiving the

paper between them, and a folding roll cooperating with said suction roll to fold said sheets.

2. In a device of the class described, the combination of a carrier cylinder, means cooperating therewith to cut a web into sheets, said carrier cylinder holding each sheet temporarily wrapped about itself, a suction roll having alined apertures therein, means for producing suction in said suction roll, said suction roll operating to remove said sheets from said carrier cylinder, and a folding roll cooperating with said suction roll to fold said sheets.

3. The combination of a carrier cylinder, adapted to hold sheets of paper temporarily wrapped about itself, a folding roll, a suction roll cooperating with said carrier cylinder and having a plurality of alined apertures therein, means for producing a sucking action in said apertures whereby said suction roll will carry said sheets from said carrier cylinder to said folding roll, said means operating to discontinue the suction action, said folding roll and said suction roll having annular grooves therein, and wire strands curved about said rolls and received

in said grooves and extending downwardly from said rolls for receiving the folded sheets.

4. The combination of a horizontal paper carrying roll having means for intermittently engaging a web of paper, a cutter roll cooperating therewith and adapted to sever said paper, a suction roll and a folding roll having their adjacent portions mounted directly beneath the center of said carrying roll, a suction pipe, said suction roll having apertures opening through its periphery, and means for connecting said suction pipe and said apertures through a predetermined portion of the rotation of said suction roll, whereby an intermediate portion of the severed length of paper is drawn downwardly from said carrier roll by said suction roll, and is passed between said suction roll and said folding roll.

In testimony that we claim the foregoing we have hereunto set our hands at Green Bay, in the county of Brown and State of Wisconsin.

JAMES DE LOYE.
PETER J. CHRISTMAN, JR.