June 11, 1940. J. F. JIROUSEK 2,203,823

SHEET SEPARATING AND FEEDING MECHANISM FOR PRINTING PRESSES

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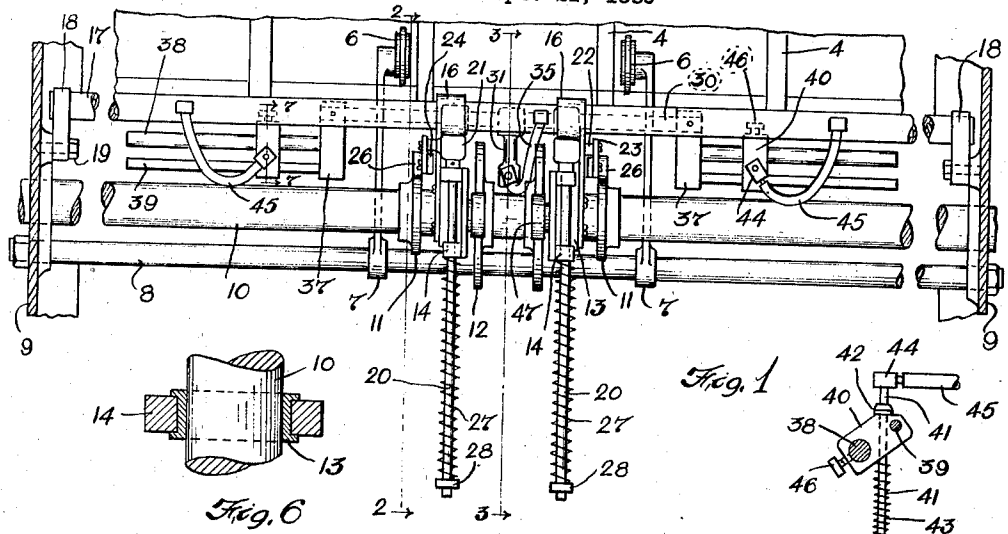


Fig. 1

Fig. 6

Fig. 7

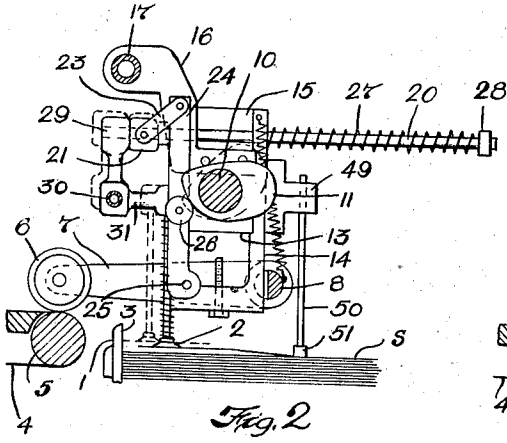


Fig. 2

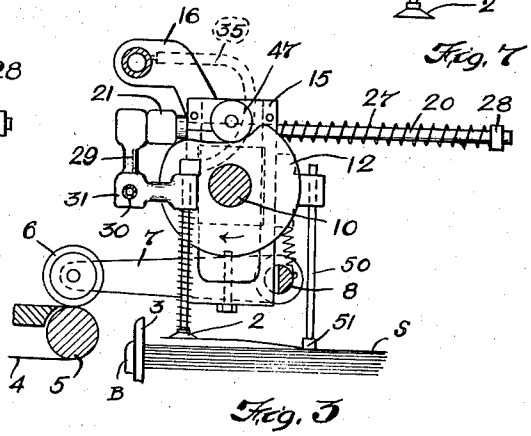


Fig. 3

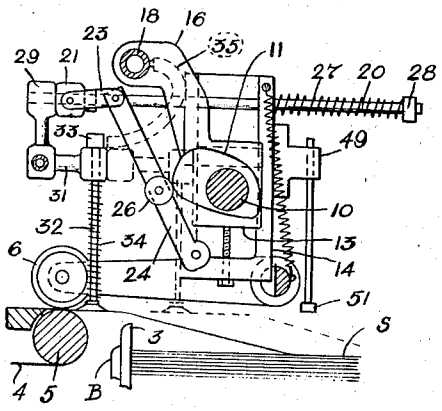


Fig. 4

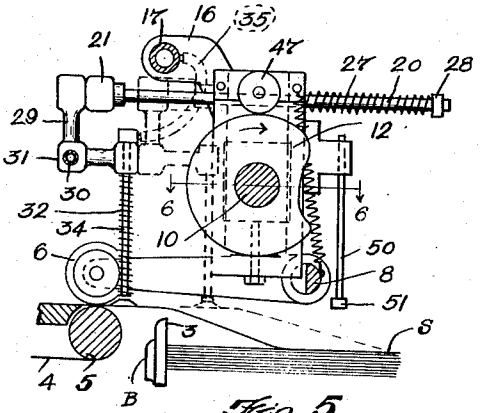


Fig. 5

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SHEET SEPARATING AND FEEDING MECHANISM FOR PRINTING PRESSES

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Application September 21, 1938, Serial No. 231,033

3 Claims. (Cl. 271—26)

This invention relates, as indicated, to sheet separating and feeding mechanism for printing presses, but has reference more particularly to mechanism designed for use in association with a printing press of the character described in my copending patent application, Serial No. 183,476.

Although it has heretofore been common practice to direct a blast of air against the forward edge of a stack of sheets to be printed in order to cause a separation of the uppermost sheets of the stack, to thereby facilitate feeding of the sheets, there is still a tendency, due to a number of different factors, for the uppermost sheet to adhere to the subjacent sheet, rendering separation difficult.

It is a primary object of the present invention to provide means for effecting a separation of such uppermost sheet of the stack from the subjacent sheet, so as to facilitate the removal of the uppermost sheet from the stack.

Another object of the invention is to provide suction means for removing the sheets from the stack, and for effecting movement of such means from and to the stack in predetermined paths, designed to facilitate the handling of the sheets.

To the accomplishment of the foregoing and related ends, said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims.

The annexed drawing and the following description set forth in detail certain mechanism embodying the invention, such disclosed means constituting, however, but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawing:

Fig. 1 is a fragmentary plan view of the sheet feeding mechanism;

Fig. 2 is a cross-sectional view, taken on the line 2—2 of Fig. 1, with the sucker tips in their rearmost position;

Fig. 3 is a cross-sectional view, taken on the line 3—3 of Fig. 1, with the sucker tips in the same position as in Fig. 2;

Fig. 4 is a view similar to Fig. 2, but with the sucker tips in their foremost position;

Fig. 5 is a view similar to Fig. 3, with the sucker tips in the same position as in Fig. 4;

Fig. 6 is a fragmentary cross-sectional view, taken on the line 6—6 of Fig. 5; and

Fig. 7 is a fragmentary cross-sectional view, taken on the line 7—7 of Fig. 1.

Referring more particularly to the drawing, it may be noted that the present mechanism is designed to replace the sheet feeding mechanism described in my copending patent application, Serial No. 19,688, so that the latter application may be referred to for a general description of the press with which the mechanism is to be associated.

The press, generally considered, has a feed table which supports a stack S of sheets to be printed, the front guides of the table being designated by reference numeral 1, such front guides rising somewhat above the stack of sheets so as to provide an abutment for the front edges of the sheets. The sheets are individually removed from the stack by means of the sucker tips 2 and are carried by such tips over the upper ends 3 of the front guides 1 and onto a series of laterally spaced endless tapes 4, driven by rollers, one of which, designated 5, is shown in the drawing. These tapes carry the sheet to the feed plate (not shown) of the press. The feed table is fed upwardly step by step as the sheets are removed from the top of the stack and suitable mechanism for thus elevating the feed table is described at some length in the aforesaid copending application, Serial No. 19,688.

In order to hold the sheet on the tapes as it is being transferred to the latter, rolls 6 are provided, which overlie the roller 5 and function in a manner similar to the rolls 28 in the aforesaid copending application, Serial No. 19,688. These rolls 6 are mounted on arms 7 which are pivotally mounted on a cross-shaft 8 secured to the frame 9 of the press.

Journalled in the frame 9 of the press is a driven shaft 10, to which are rigidly secured the various operating cams of the feed mechanism. Such cams include a pair of spaced forwarding cams 11 and a pair of spaced elevating cams 12.

Mounted on the shaft 10, intermediate the cams 11 and 12, are blocks 13, which form guides for vertically slidable yokes 14. The arms of each yoke are bridged by cross-pieces 15, the yokes with such pieces, forming in effect, rectangular frames. The blocks 13 are supported against movement axially of or pivotally about the shaft 10 by means of brackets 16 which are secured to a hollow tube 17, carried by brackets 18, which are secured to the frame 9 of the press, as by screws 19.

Slidably mounted in the arms of the yokes 14, and with their axes normal to said arms, are rods 20, which are provided near their forward ends with enlarged knobs 21. To lateral bosses 22 of these knobs are pivoted links 23, which are pivotally secured at their other end to levers 24.

The levers 24 are pivoted as at 25, to the yokes 14 and have mounted thereon at points intermediate the ends cam rollers 26. These cam rollers are maintained in engagement with the cams 11 due to the action of expansion coil springs 27, which are mounted on the rods 20, between the yokes 14 and stop collars 28 on said rods.

The rods 20 have mounted on their forward ends hangers 29, in the lower ends of which is mounted a tubular member 30. To the central portion of this member is secured a rearwardly extending arm 31 having a vertical passage in its rear portion through which a sucker tube 32 extends. This sucker tube is provided at its upper end with a head 33, which engages the arm 31 to limit downward movement of the tube, and is also provided with an expansion coil spring 34, interposed between the arm 31 and the sucker tip 2, such spring serving to normally maintain the sucker tube in its lowermost position with respect to the arm, but being yieldable to prevent damage to the mechanism upon engagement of the sucker tip with the stack of sheets. A flexible tube 35 connects the suction tube 18 with the head 33 of the sucker tube 32, so as to provide suction in the sucker tip 2 at predetermined intervals.

Secured to the ends of the member 30, are brackets 37, from which extend rods 38 and 39 which are parallel with the member 30. Mounted on the rods 38 and 39 are inclined blocks 40 having vertical passages through which sucker tubes 41 extend. These sucker tubes are provided near their upper ends with stop collars 42, which engage the blocks 40 to limit downward movement of the tubes, and are also provided with expansion coil springs 43, interposed between the blocks 40 and the sucker tips 2, and which function in the same manner as the spring 34. The sucker tubes 41 are also provided at their upper ends with heads 44, and flexible tubes 45 connect the tubes 41 with the suction manifold 17. The blocks 40 may be adjusted along the rods 38 and 39 to vary the position of the sucker tips transversely of the stack of sheets S, and are locked in adjusted position by means of set screws 46.

The cross-pieces 15 have mounted thereon cam rollers 47, which are maintained in engagement with the periphery of the cams 12 by gravity and by the action of compression springs 48, which, as shown in Fig. 4, interconnect the upper ends of the yokes 14 with the cross-shaft 8.

The yokes 14 are further provided at the rear with brackets 49, which carry depending rods 50, provided at their lower ends with presser-shoes 51, the function of which will presently be described.

Having described in detail the construction of the sheet feeding mechanism, the operation will now be briefly described.

With suction created in the sucker tips 2, such tips are brought to the position shown in dotted lines in Fig. 2, in which position they engage the forward portion of the uppermost sheet of the stack. This portion of the sheet has been elevated somewhat above the upper level of the stack by means of a blast of air discharged against the forward edges of the stack by the air blast heads B, such blast being effective to fluff up about six or seven of the sheets. In spite of this sheet-separating blast, there is a tendency for the uppermost sheet to stick to the subjacent sheet, and in order to separate such sheets, the forward portion of the uppermost sheet is caused to slide substantially rearwardly with respect to the forward portion of such subjacent sheet. This is effected by movement of the sucker tips from the dotted to the solid line position in Fig. 2, it being noted that the movement of the tips is slightly downward as well as rearward, this being somewhat more effective than a straight rearward movement. During this movement, which is effected by the conjoint action of the cams 11 and springs 27, the shoes 51 bear on the stack, as shown in Fig. 2, so as to prevent displacement bodily of the uppermost sheet of the stack.

The sucker tips are then caused to move upwardly to the dotted line position shown in Fig. 4 and thence forwardly to the solid line position in this figure, in which position, the forward edge of the sheet is entered between the roller 5 and rollers 6 and onto the sheet conveyor tapes 4. This upward and forward movement lifts the sheet over the guides 3, and is effected by the cams 11 and 12.

After the sheet enters the roller 5 and rollers 6, the vacuum in the sucker tips is broken and the latter are returned in a rearward and downward path to the dotted line position shown in Fig. 2.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:

1. In sheet separating and feeding mechanism for printing presses and the like, the combination of sheet conveying means, a feed table adapted to support in a substantially horizontal position a stack of sheets to be fed to said conveying means, presser-shoes operative to bear on the upper surface of such stack, means for directing a blast of air against the forward edges of the uppermost sheets of the stack in order to fluff said sheets, suction means for feeding said sheets individually to said conveying means, and means for imparting to said suction means a movement whereby the forward portion only of the uppermost sheet of the stack is moved rearwardly and downwardly with respect to the forward portion of the subjacent sheet of the stack and is thereafter fed to said sheet conveying means.

2. In sheet separating and feeding mechanism for printing presses and the like, the combination of sheet conveying means, a feed table adapted to support in a substantially horizontal position a stack of sheets to be fed to said conveying means, presser-shoes operative to bear on the upper surface of such stack, means for directing a blast of air against the forward edge of the uppermost sheet in order to fluff said sheet, suction means for feeding said sheets individually to said conveying means, and means for imparting a movement to said suction means after contact with said uppermost sheet whereby the forward portion only of the uppermost sheet of the stack is moved rearwardly and downwardly with respect to the forward portion of the subjacent sheet of the stack and is thereafter fed to said sheet conveying means.

3. In sheet separating and feeding mechanism for printing presses and the like, the combination of sheet conveying means, a feed table adapted to support in a substantially horizontal position a stack of sheets to be fed to said conveying means, presser-shoes operative to bear on the upper surface of such stack, means for directing a

blast of air against the forward edge of the uppermost sheet in order to fluff said sheet, suction means for feeding said sheets individually to said conveying means, and means for imparting a movement to said suction means after contact with said uppermost sheet whereby the forward portion only of the uppermost sheet of the stack is moved rearwardly and downwardly with respect to the forward portion of the subjacent sheet of the stack and is thereafter raised and the sheet fed forwardly to said sheet conveying means.

JOSEPH F. JIROUSEK.