June 4, 1929. C. W. HARROLD 1,715,360

SHEET SEPARATOR

Filed Oct. 1, 1927

FIG. 1.

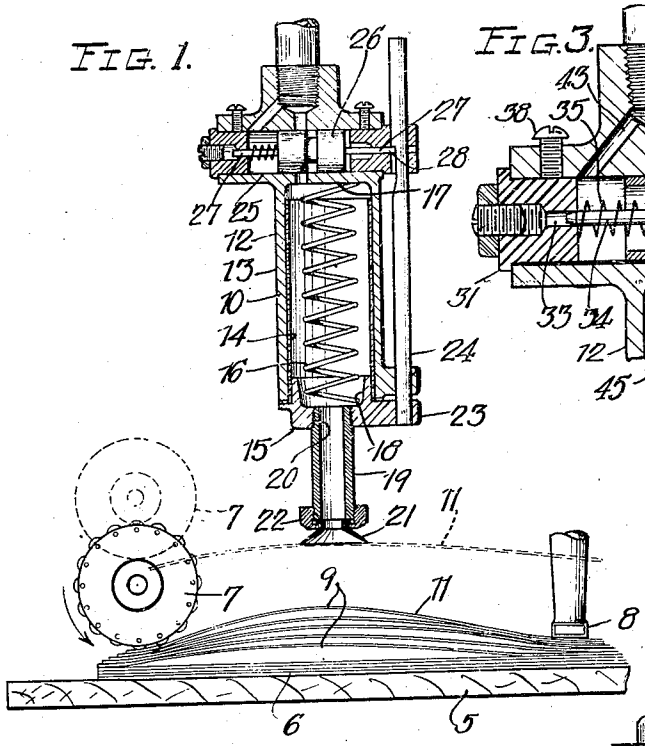


FIG. 3.

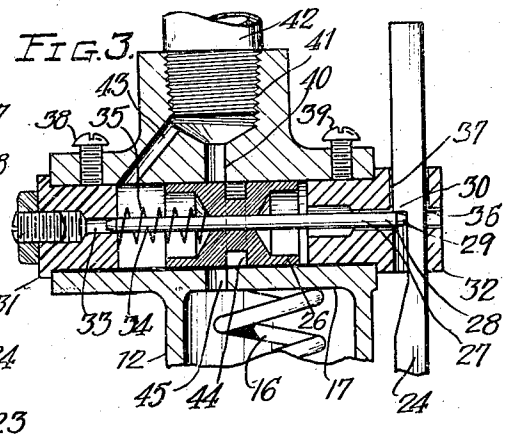


FIG. 4.

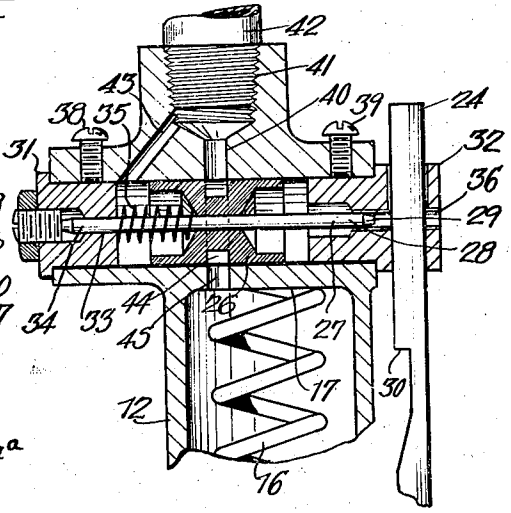
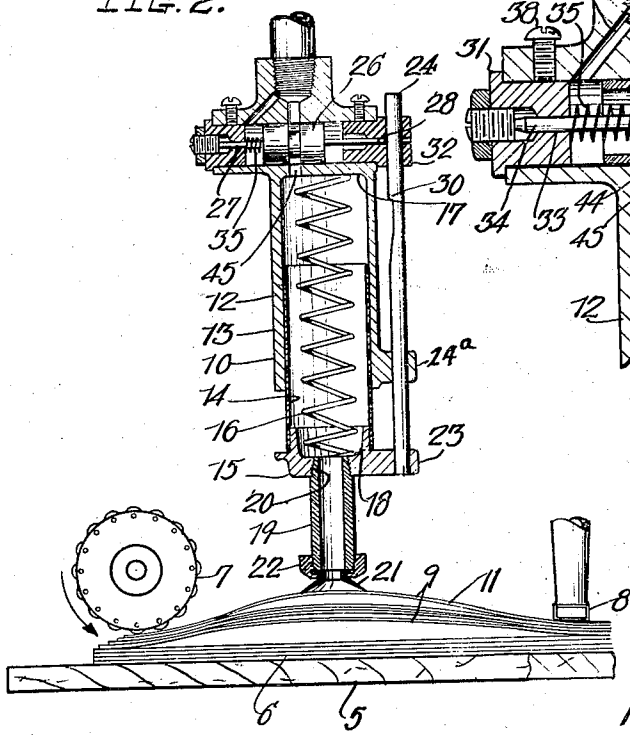


FIG. 2.



INVENTOR
Charles W. Harrold
BY
Philip B. Reed
ATTORNEY

Patented June 4, 1929. 1,715,360

UNITED STATES PATENT OFFICE.

CHARLES W. HARROLD, OF CLEVELAND, OHIO, ASSIGNOR TO HARRIS-SEYBOLD-POTTER COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF DELAWARE.

SHEET SEPARATOR.

Application filed October 1, 1927. Serial No. 223,310.

My invention relates to sheet separating mechanisms for automatic sheet-feeders, and more particularly to pneumatic suction sheet separating devices especially adapted for use when embodied in the pile sheet-feeders of the type shown in the U. S. Charles G. Harris Patent No. 1,112,609 of October 6, 1914.

The objects of my invention are, among other things, to provide an improved telescopic suction separator which is adapted to seize and lift the successive top sheets from a pile or stack of paper, and then separate and advance each engaged sheet to the feed-rolls of the printing-press or other machine to which the sheet-feeder is attached. A further feature of my invention is to provide a novel form of telescopic suction separator of this type which utilizes suction to lift the sucker intermittently against the tension of a spring which normally forces the sucker downwardly toward the pile. Such improved sheet separator will have a wide range of flexibility in picking up and removing the top sheets successively from piles of stock of varying heights whereby the separation of the individual sheets may be carried on with a high degree of accuracy, rapidity and general efficiency in action even when different grades and thicknesses of paper are used.

With these and other objects in view, my invention comprises the constructions and operating parts forming the improved suction separator herein shown and hereinafter to be described as a preferred embodiment of my invention which is also readily adapted to any form of suction sheet-feeder and is not to be restricted to the type shown in the C. G. Harris Patent No. 1,112,609 issued as aforesaid.

In the drawings, Fig. 1 is a sectional elevation of the improved suction head and separator shown in conjunction with a sheet-buckling unit as in embodied in the Harris feeder, the sucker separator having been elevated to raise the top sheet (shown in dotted lines) from the pile with the suction released and the separator slightly lowered to its latched position;

Fig. 2 is a sectional elevation similar to Fig. 1 showing the sucker as having been lowered by the expansible spring, and as having gripped the top sheet from the bulged or buckled portion of the stock held between the combing buckler wheel and presser-foot preparatory to the raising of the sucker along with the top sheet;

Figs. 3 and 4 are enlarged sectional views of the upper portions of Figs. 1 and 2 respectively, showing in detail the operation of the transverse piston and latch control for the release of the sucker for its lowering movement.

Similar numerals refer to similar parts throughout the several figures.

Referring to the figures, the feed-table 5 supports the pile or stack of paper stock 6 and at each of the rear corners of the pile 6 is arranged a separating unit comprising the combing buckler wheel 7 which is rotated inwardly (Figs. 1 and 2) to frictionally engage the top portion of the pile 6 so as to produce a series of traveling arcs or buckles in the topmost and subjacent sheets of the pile 6, that portion of the pile under the influence of the buckler wheel 7 being held firmly to the adjacent presser-foot 8 as shown in Figs. 1 and 2. While the bulged portion 9 (Fig. 2) is so held by the combing buckler 7 and presser foot 8, the suction sheet separator 10 is lowered to seize the topmost sheet 11 and is then raised with the top sheet 11 adhering to the separator 10 after which the combing buckler 7 is lifted to the dotted line position shown in Fig. 1. Meanwhile the presser-foot 8 is thrown outwardly and then inwardly to again engage the pile 6 beneath the top sheet 11, and simultaneously blasts of air are projected from the hollow presser foot 8 whereby the top sheet 11 is "winded" from the pile 6, and, while held by the suction separator 10, is caused to float or flutter out of contact with such pile 6. Then suction carriers located at the front of the pile (corresponding to the suction carriers 6 of the Harris Patent No. 1,112,609) seize the top sheet 11, and by a horizontal forward movement advance this top sheet to the usual feed-rolls of the printing-press or other machine to which the sheet-feeder is attached. The above cycle of operations in sheet separation and feeding is substantially the same as that described in the Harris patent just mentioned.

Referring more particularly to Figs. 1 and 2, the suction head 12 comprises the main cylinder 13 in which is sleeved the hollow cylindrical piston 14 having the piston head 15 secured to the lower end thereof. The coil-spring 16 axially disposed within the piston

14, and having its upper end bearing on the top plate 17 forming the top of the cylinder 13 and its lower end held in the socket 18 formed in the piston head 15, normally forces the piston 14 and head 15 downwardly to the extended position shown in Fig. 2. The socket 18 is connected with the tube 19 threaded in the bore 20 cut in the head 15 and the lower end of the tube 19 is provided with the usual rubber-lipped sucker 21 secured to the tube 19 by the lock-nut 22, which sucker 21 is adapted to be closed by and grip a sheet as shown in Figs. 1 and 2.

The piston head 15 has a projecting lug 23 to which is fastened the vertically disposed latch-rod 24 sliding through the bracket 24ª extending outwardly from the walls of the cylinder 13. The upper portion of suction head 12 is cast so as to form the transverse piston chamber 25 in which slides the piston 26. Fastened to the piston 26 and extending outwardly therefrom on either side is the bar 27, the right end 28 of which is slightly tapered at its tip 29 to cooperate with the shoulder 30 cut in the upper portion of the latch-rod 24 (Fig. 3). The open ends of the chamber 25 are closed by suitable plugs 31 and 32. The plug 31 (at the left) is provided with a center bore 33 to receive the left end 34 of the bar 27. Coiled about the bar end 34 is the spring 35 between the piston 26 and plug 31 which normally tends to force the piston 26 to the right so as to cause the tip 29 to engage the shoulder 30 to hold the piston 14 and sucker 21 in their raised positions as shown in Figs. 1 and 3. The plug 32 is provided with the transverse bore 36 of slightly larger diameter than the bar 27 through which the right end 28 of the bar 27 slides loosely to provide a bleed for the chamber to the right of the piston 26, and also with a vertical bore 37 through which loosely slides the upper end of the latch-rod 24, the bores 36 and 37 intersecting at right angles as shown in the figures. The plugs 31 and 32 are held in their respective positions by the set screws 38 and 39 respectively. The top portion of the suction head 12 casting has cut therein the vertical port 40 communicating with the piston chamber 25 the upper part of the port 40 being enlarged to form the compartment 41 and its sidewalls being threaded to the pipe 42 which is connected with an air-exhausting device (not shown) which creates the suction or exhaust pressure by which my improved telescopic suction sheet-separating device is operated. The necessary valves to properly intermit the suction applied to the suction head 12 through the pipe 42 are not shown as such means actuated by the feeder to control the suction are common and well-known in these suction sheet-feeders. The bottom of the compartment 41 is connected to the left portion of the piston chamber 25 by the inclined passage 43, and the piston 26 midway between its ends is provided with the annular groove 44 which is also adapted to register with the port 45 cut in the top plate 17; upon the horizontal reciprocating movement of the piston 26 the groove 44 alternately registers with the ports 40 and 45 (Figs. 2 and 4) to provide suction communication between the compartment 41 and the cylinder 13. Figs. 1 and 2 show the left end of the piston 26 as closing the ports 40 and 45 with the groove 44 out of alinement and with the latch-rod 24 held by the tip 29 of the bar 27.

The operation of my improved telescopic suction sheet separator is substantially as follows: When the combing buckler wheel 7 is revolving in a counter-clockwise direction, the bulged portion 9 of the stock held between the buckler 7 and presser-foot 8 is loosened or partially aerated (Fig. 1) and the bottom of the sucker 21 is open to atmosphere. Then as suction or exhaust pressure is applied to the compartment 41 through the pipe 42, the piston 26 is moved to the left with the admission of air to the right of the piston through the slightly enlarged bore 36 against the tension of the spring 35 thereby withdrawing the tip 29 of the bar 27 from engagement with the shoulder 30 of the latch-rod 24. The release of the latch-rod 24 causes the piston 14 and sucker 21 to move downwardly (from Fig. 1 to Fig. 2) under the influence of the coil-spring 16 so as to bring the sucker 21 into engagement with the top sheet 11 of the buckled portion 9 of paper as shown in Fig. 2. The transverse movement of the piston 26 to the left also brings the annular groove 44 into alinement with the ports 40 and 45 thereby creating an exhaust pressure in the main cylinder 13 and sucker 21 through the tube 19 so that the top sheet 11 adheres to and is gripped by the sucker 21 as shown in Fig. 2. The suction or exhaust pressure so created in the main cylinder 13, tube 19 and sucker 21 immediately causes the piston 14 to be raised against the spring 16 which is again put under compression, and the top sheet 11 is therefore lifted from the pile 6 to its dotted line position shown in Fig. 1 and then released, while the shoulder 30 of the latch-rod 24 is raised slightly above the tip 29 of the bar 27 which enables the latch to be reset with the latch-rod 24 bearing on the bar 27 when the suction is released from the compartment 41, while the force of the spring 16 is not enough to lower the piston 14 when the suction is reduced sufficiently to permit the piston 26 to be moved to the right under force of the spring 35, the parts again taking their respective positions as shown in Fig. 1 for the succeeding cycle in separating the next sheet.

This improved telescopic suction separator hereinbefore described may also be embodied in the horizontally reciprocating carriers

which seize the front portion of the winded sheet and advance same to the feed-rolls of the press.

While the foregoing sets forth one embodiment of my invention, many changes in the structural details may be made without departing from the principles and scope of the invention or sacrificing the chief advantages involved.

I claim:

1. A sheet-separator comprising a suction cylinder, a sheet-gripping sucker movable in said cylinder, expansible means controlled by a latch for lowering said sucker to grip a sheet, and means controlled by the sheet sealing said sucker for raising the latter relatively to said cylinder and resetting said latch.

2. A sheet-separator comprising a suction cylinder, a sheet-gripping sucker movable in said cylinder, expansible means controlled by a latch for lowering said sucker to grip a sheet, and means controlled by the sheet sealing said sucker for raising the latter relatively to said cylinder while compressing said expansible means and resetting said latch.

3. A sheet-separator comprising a suction cylinder, a sheet-gripping sucker movable in said cylinder, expansible means controlled by a latch for lowering said sucker to grip a sheet, and suction-actuated means controlled by the sheet sealing said sucker for raising the latter relatively to said cylinder and resetting said latch.

4. A sheet-separator comprising a suction cylinder, a sheet-gripping sucker movable in said cylinder, expansible means released by a latch controlled by suction applied to said cylinder for lowering said sucker to grip a sheet, and means controlled by the sheet sealing said sucker for raising the latter relatively to said cylinder and resetting said latch.

5. A sheet-separator comprising a suction cylinder, a sheet-gripping sucker movable in said cylinder, expansible means for lowering said sucker to grip a sheet, a latch normally holding said expansible means in inoperative position, but released upon suction being applied to said cylinder, and means controlled by the sheet sealing said sucker for raising the latter relatively to said cylinder.

6. A sheet-separator comprising a vacuum cylinder, a sheet-gripping sucker movable in said cylinder, latch-controlled means for lowering said sucker to grip a sheet when suction is applied to said cylinder, and means controlled by the sheet sealing said sucker for raising the latter relatively to said cylinder, said last means resetting said latch when the sucker is raised and suction is cut off from said cylinder.

7. A sheet-separator comprising a vacuum cylinder, a sheet-gripping sucker movable in said cylinder, latch-controlled means for lowering said sucker to grip a sheet when suction is applied to said cylinder and suction-actuated means controlled by the sheet sealing said sucker for raising the latter relatively to said cylinder, said last means resetting said latch when the sucker is raised and suction is cut off from said cylinder.

8. A sheet-separator comprising a suction cylinder, a sheet-gripping sucker movable in said cylinder, a compressible spring controlled by a latch and normally tending to lower said sucker to grip a sheet, and means controlled by the sheet, sealing said sucker for releasing said latch and raising the sucker while compressing said spring.

9. A sheet-separator comprising a suction cylinder, a sheet-gripping sucker movable in said cylinder, a compressible spring controlled by a latch normally tending to lower said sucker to grip a sheet, and means controlled by the sheet sealing said sucker for raising the latter and compressing said spring while resetting the latch.

10. A sheet-separator comprising a suction cylinder, a sheet-gripping sucker movable in said cylinder, latch-controlled expansible means normally tending to lower said sucker to grip a sheet, suction means to release said latch-controlled means, and means for resetting said latch.

CHARLES W. HARROLD.