

25,152

SHEET FEEDING APPARATUS

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14 Claims. (Cl. 271--30)

Matter enclosed in heavy brackets [] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue.

This invention relates generally to sheet feeding apparatus for feeding sheets from a pile or supply thereof to a printing press or other machine, and refers more particularly to the sheet separator mechanism of such apparatus by which the topmost sheets of a pile or supply of sheets are preliminarily separated in turn so that feeding of single sheets only to the machine to be fed is assured.

One of the objects of the present invention is to provide sheet feeding apparatus with an improved sheet separator mechanism of the suction type wherein the proper elevational operative position of the suction sheet engaging and lifting device with respect to the topmost sheet of the pile or supply thereof is maintained regardless of variations in the height or the level of the top of said pile or supply.

Another object of the invention resides in the provision of an improved sheet separator mechanism of the character above described wherein the extent of movement of the suction sheet engaging and lifting device toward the sheet pile or supply is automatically varied in accordance with the location of the top of said pile or supply, whereby proper engagement of said suction device with the topmost sheet and lifting of said sheet only by said suction device is always assured.

Another object is to eliminate, in a sheet separator mechanism of the character above described, the manual adjustment of the suction sheet engaging and lifting device heretofore required and necessary during the normal operation thereof to enable accurate engagement and lifting of the topmost sheet only thereby from the sheet pile or supply, and to accomplish said adjustment automatically under the control of said pile or supply.

Another object is to provide in a sheet feeder having means for preliminarily separating a portion of each topmost sheet in turn from a supply of sheets and suction or other means for gripping each sheet at the separated portion thereof and lifting said sheet from said supply, novel cyclically operable means for determining the location of the top of the supply and varying the extent of downward movement of the suction or other means accordingly so as to advantageously provide for engagement of said suction or other means with the sheet at substantially the level of the separated portion thereof.

Still another object is to provide for use in existing sheet feeders having a suction sheet lifting device movable downwardly toward and upwardly away from the top of a pile or supply of sheets, and a sheet holding foot clamp device movable downwardly and upwardly into and out of engagement, respectively, with the top of said pile or supply, novel means operated by said foot clamp device and controlled by said pile or supply for automatically controlling and determining the extent of downward movement of said suction sheet lifting device.

The above and further objects and novel features of the present invention will more fully appear from the following detailed description when the same is read in connection with the accompanying drawings. It is to

be expressly understood, however, that the drawings are for the purpose of illustration only, and are not intended as a definition of the limits of the invention.

In the drawings, wherein like reference characters refer to like parts throughout the several views,

FIG. 1 is a fragmentary rear elevational view of a sheet feeder embodying the present invention, certain of the parts having portions thereof broken away for purposes of clearer illustration;

FIG. 2 is an enlarged side elevational view, partly in section, of one of the sheet separator mechanisms shown in FIG. 1 and as viewed from the position indicated by the line 2--2 of FIG. 1, the cover plate for the housing of said mechanism being removed for purposes of clearer illustration, and said view showing in full lines the operative parts of said mechanism in the positions they occupy when the sheet holding foot clamp is engaged with the pile of sheets and the sheet lifting sucker is about to be lowered toward said pile;

FIG. 3 is an enlarged side elevational view, partly in section, of one of the sheet holding foot clamp mechanisms shown in FIG. 1 and as viewed from the position indicated by the line 3--3 of FIG. 1, the cover plate for the housing of said mechanism being removed for purposes of clearer illustration;

FIG. 4 is a view similar to FIG. 2, but showing the operative parts of the sheet separator mechanism in the positions they occupy when the sheet holding foot clamp is disengaged from the pile of sheets and the sheet lifting sucker has been lowered and is about to grip the topmost sheet of said pile, one of the springs having a portion thereof broken away for purposes of clearer illustration;

FIG. 5 is an enlarged vertical sectional view substantially on the line 5--5 of FIG. 4;

FIG. 6 is an enlarged vertical sectional view substantially on the irregular line 6--6 of FIG. 4;

FIG. 7 is a vertical sectional view on the line 7--7 of FIG. 6; and

FIG. 8 is a horizontal sectional view substantially on the line 8--8 of FIG. 3, the spring having an intermediate portion thereof broken away for purposes of clearer illustration.

For purposes of description only, the present invention is herein illustrated in a form particularly adapted for use in connection with known sheet separator mechanisms and sheet holding foot clamp mechanisms which are incorporated in existing types of sheet feeding machines. It is accordingly to be understood, even though the following specification refers to a specific type of sheet feeder and to a specific type of sheet separator mechanism and sheet holding foot clamp mechanism embodied in said feeder, that the present invention is not limited to said feeder or said mechanisms. Various changes may be made in the form of the invention illustrated to adapt the same to other sheet separator mechanisms having a suction or other type of sheet separating device movable toward and away from a pile or supply of sheets, and to provide for operation of the same under the control of the usual foot clamp or other feeder member which is periodically operated into and out of engagement with said sheet pile or supply the same as or comparable to said foot clamp.

Referring to the drawings, 10 and 11 (FIG. 1) indicate, in rear elevation, the side frames of an existing sheet feeder which includes a pile elevator comprising front and rear cross beams 12 adapted to support a pile board 13 and pile of sheets 14 thereon. The cross beams 12 are supported by side bars 15 which are connected adjacent their front and rear ends to cables 16 that pass over suitable sheaves and around suitable winding drums