

March 9, 1926.

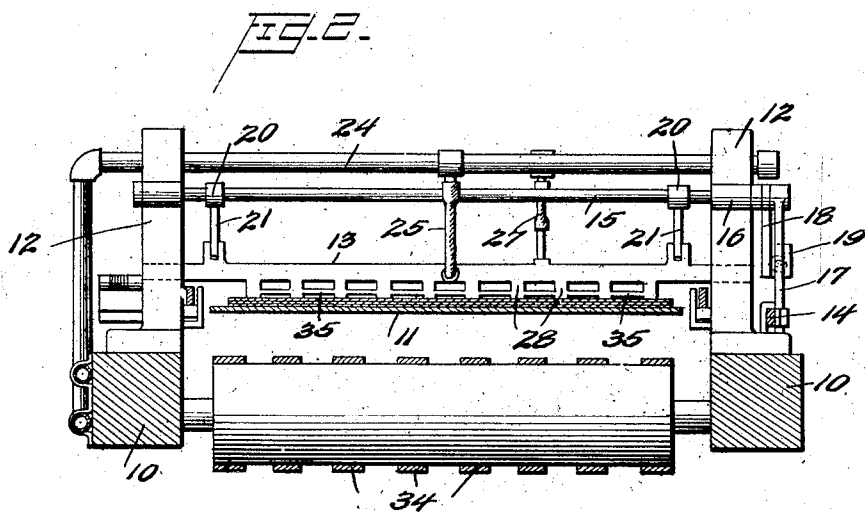
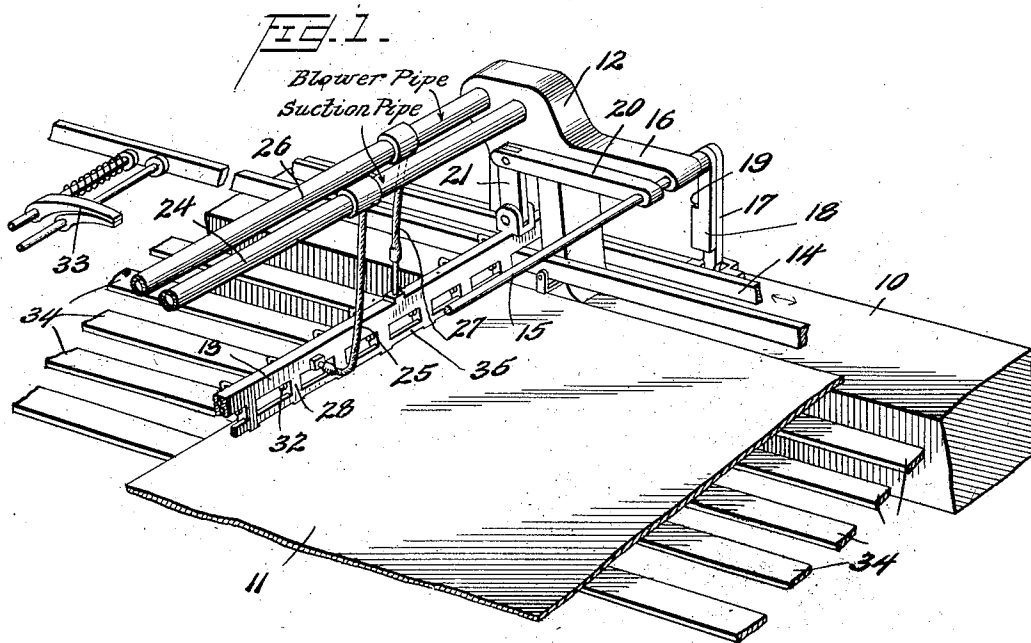
1,575,892

H. V. ASHBY

SHEET FEEDING DEVICE

Filed July 6, 1923

2 Sheets-Sheet 1



Inventor

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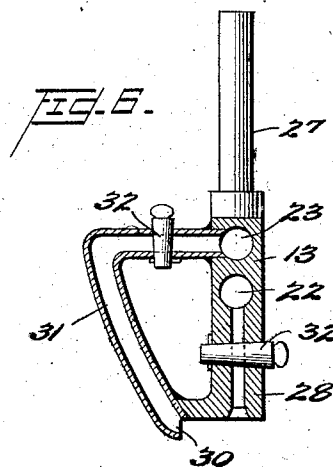
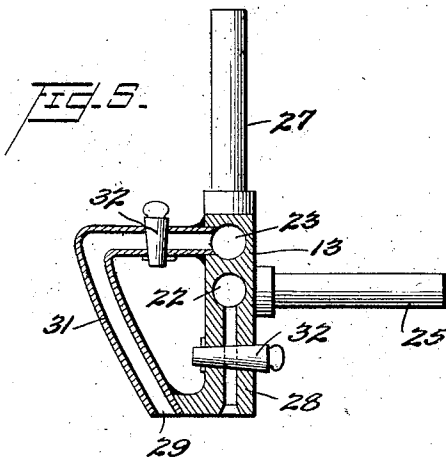
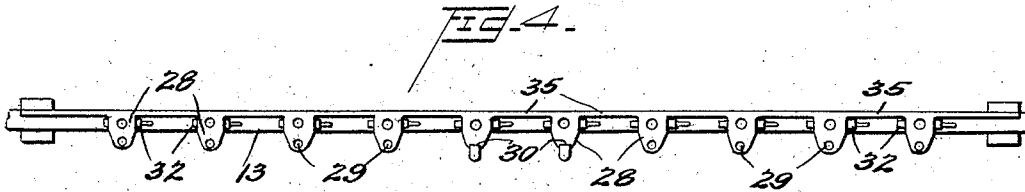
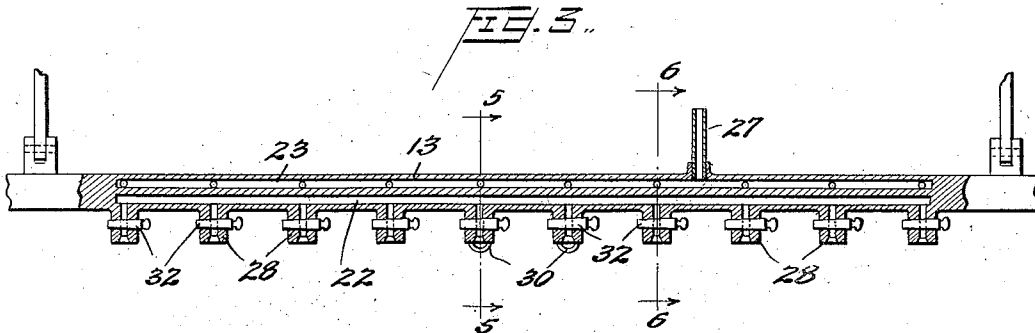
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE.

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SHEET-FEEDING DEVICE.

Application filed July 6, 1923. Serial No. 649,964.

To all whom it may concern:

Be it known that I, HARRY V. ASHBY, a citizen of the United States, and residing at Erie, Erie County, State of Pennsylvania, have invented certain new and useful Improvements in Sheet-Feeding Devices, of which the following is a specification.

The present invention relates to automatic sheet feeding mechanism and particularly to pneumatic means for separating and lifting sheets singly from a pile.

The object of this invention is to provide a simple and effective sheet separating and lifting device adapted for use in sheet feeding machines generally, but more particularly designed as a substitute for the sheet lifting mechanism of the collating machine described and claimed in my co-pending application, Serial No. 631,920, filed April 13, 1923. The machine described in this application comprises a frame, a set of conveyor tapes mounted in the frame and adapted to convey sheets in sets to a common receptacle, a plurality of support or trays, each adapted to hold a pile of sheets, mounted above the conveyor tapes at longitudinally spaced positions on the frame, a sheet lifter for each pile of sheets adapted to lift sheets singly by means of suction nozzles, and a set of sheet grippers for each sheet lifter adapted to grasp the lifted sheet and convey it to a suitable point above the conveyor tapes and then permit the sheet to fall thereon. In the operation of this machine some trouble has been experienced in properly separating the top sheet of the pile, and sometimes two or more sheets would be lifted simultaneously from the same pile. The present invention is the successful result of an effort to overcome this difficulty, and provides in combination with the suction nozzles a plurality of blast nozzles, some of which are directed to deliver blasts downwardly on the margin of the top sheets to separate any sheets which may adhere to the top sheet, and others of which are directed to deliver blasts against the edge of the sheet substantially in the plane thereof to positively lift and separate said top sheet. The top sheet of the pile is thus

effectively separated and caused to adhere to the lifter by the suction nozzles.

Referring to the accompanying drawings for a particular description of one form of the invention:

Fig. 1 is a fragmentary perspective view of a sheet feeding machine having my improved sheet lifter applied thereto.

Fig. 2 is a transverse sectional view of said machine.

Fig. 3 is a vertical longitudinal sectional view of the sheet lifter.

Fig. 4 is a bottom plan view of the lifter.

Figs. 5 and 6 are transverse vertical sectional views taken on the lines 5—5 and 6—6 of Fig. 3.

As the present invention is limited to the sheet lifting mechanism per se, only so much of a sheet feeding machine is illustrated by the drawings as will conveniently serve to show the application of the sheet lifting mechanism. The machine fragmentarily illustrated is fully shown and described in my co-pending application referred to above. It comprises two longitudinal frame bars 10; a tray 11 supported by said bars in any suitable manner and adapted to hold a pile of sheets; and a pair of transversely aligned pillars 12, in which the sheet lifter is mounted for up and down reciprocation above the forward edge of the sheet pile. The sheet lifter comprises an elongated bar 13 provided with suitable nozzles and channels for subjecting the top sheet of the pile to suction and separating blasts. The ends of bar 13 are mounted in substantially vertical slots formed in the opposed faces of pillars 12 and are adapted to be reciprocated in said slots by mechanism shown in detail in my co-pending application. Said mechanism comprises a longitudinal reciprocating pitman 14 which has a one-way connection with a shaft 15 journaled in rearward extensions 16 of the pillars 12. In the drawings, the one-way connection comprises an arm 17 loosely mounted on the end of shaft 15 and having its outer or lower end articulated with pitman 14, an arm 18 fixed to shaft 15 and having a flange 19 adapted to be engaged

by arm 17; arms 20 fixed to shaft 15; and links 21 connecting the free ends of arms 20 to bar 13. This one-way connection causes bar 13 to be positively raised when pitman 14 is moved forwardly but permits bar 13 to fall by gravity when pitman 14 is moved rearwardly. Thus the downward movement of bar 13 is automatically accommodated to the height of the sheet pile irrespective of the rearward throw of pitman 14.

Referring now to Figs. 3 to 6, inclusive, for a description of the specific structure of the sheet separator and lifter, bar 13 has formed therein two interior longitudinal conduits 22 and 23. Conduit 22 communicates with a pipe 24 by means of a flexible connection 25, and conduit 23 communicates with a pipe 26 by means of a flexible connection 27. Pipes 24 and 26 are supported in the upper ends of pillars 12 and are suitably connected to a suction pump and a blower, respectively, whereby suction is supplied to conduit 22 and compressed air to conduit 23. Formed with, or otherwise attached to, the lower face of bar 13 are a plurality of downwardly projecting extensions 28 provided with bores communicating with conduit 22 and opening through flared mouths in substantially the same horizontal plane. These are the suction nozzles of the lifter. Combined with each of the suction nozzles is a blast nozzle 29 or 30, the said blast nozzles communicating with the compressed air conduit 23 by means of elbow connections 31. Nozzles 29 are directed so as to deliver blasts downwardly on the marginal edges of the top sheets, thereby functioning to force down and away from the top sheet, any sheets which may adhere thereto. Nozzles 30 are directed so as to deliver blasts against the edges of the top sheets and thereby positively force air between the top sheets to hold the top sheet separated from the next sheet. In the illustration, there are two nozzles 30 associated with the two central suction nozzles, and the remainder of the suction nozzles have associated therewith buckling nozzles 29. This arrangement, of course, may be varied according to the conditions. All or any desired number of the nozzles may be cut out of action selectively as required, by providing cocks 32 in the elbow connection and suction nozzles.

In order to limit the buckling of the sheet between adjacent nozzles, the lower ends of the nozzles are connected by a bar 35, the lower edge of which is spaced slightly above the ends of the nozzles. In this manner the front edge of the sheet is held horizontal so that none of the grippers 33 will fail to seize the sheet.

When the sheets are raised by the sheet lifter the forward edges thereof are grasped

by grippers 33 which are reciprocated and operated in timed relation to the sheet lifters. After the sheet is grasped by the grippers the suction in channel 22 is broken and the grippers move forward transferring the sheets to positions over the constantly running tapes 34 to be conveyed to a common receptacle. Reference may be had to my co-pending application for more detailed description and showing of the operating mechanism for the grippers, tapes and sheet lifters.

Various changes may of course be made in the construction of the sheet lifter shown by the drawings without substantially varying the mode of operation thereof.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In sheet feeding mechanism, a frame having means for supporting a pile of sheets, a transverse bar mounted to reciprocate up and down above said support, mechanism for reciprocating said bar including a one-way connection adapted to positively raise said bar and permit it to fall by gravity, said bar having two interior separated conduits extending longitudinally thereof, flexible connections for supplying suction in one of said conduits and compressed air in the other, a plurality of nozzles extending downwardly from said bar communicating with said suction conduit, and a plurality of nozzles communicating with said compressed air conduit directed at different angles to deliver air blasts obliquely and horizontally against the edges of the sheets.

2. In sheet feeding mechanism, a frame, a support for a pile of sheets on said frame, a transverse bar mounted to reciprocate up and down above said support, mechanism for reciprocating said bar, said bar having two interior separated conduits extending longitudinally thereof, connections for supplying suction in one of said conduits and compressed air in the other, and a plurality of suction and blast nozzles connected to said bar and communicating with said conduits respectively, said blast nozzles being directed at different angles to deliver a plurality of blasts obliquely to the plane of the sheets and a plurality of blasts substantially in the plane of the sheets.

3. In sheet feeding mechanism, a unitary sheet separator and lifter comprising an elongated member adapted to extend parallel and adjacent to the edge of a pile of sheets and having two separated interior conduits extending longitudinally thereof adapted to be connected to a suction and blast source respectively, said member also having a plurality of downwardly extending conduits opening in the same plane and communicating with the longitudinal suction conduit and a plurality of conduits com-

municating with the longitudinal blast conduit and opening at different angles to the plane of the sheets.

4. In sheet feeding mechanism, a unitary sheet separator and lifter comprising a rigid elongated member adapted to extend parallel and adjacent to the edge of a pile of sheets, said member having two interior separated conduits longitudinally thereof adapted to be connected to a suction and blast source respectively, said member also having a plurality of downwardly extending conduits opening in the same plane and communicating with the longitudinal suction conduit and a plurality of conduits communicating with the longitudinal blast conduit and directed to deliver air blasts against the edges of the sheets and at different angles to the plane thereof.

5. In sheet feeding mechanism, a support for a pile of sheets, a bar mounted above said support to reciprocate up and down, said bar having two interior longitudinal conduits separated from each other and adapted to be connected to a suction and blast source respectively, a plurality of nozzles communicating with the suction conduit extending downwardly and opening in the same plane and a plurality of nozzles communicating with the blast conduit, some of said last named nozzles being directed to blow air obliquely on the top sheet of the pile and others of said nozzles being directed to blow air substantially horizontally against the edge of said sheet.

6. In sheet feeding mechanism, a unitary sheet separator and lifter comprising a rigid elongated member adapted to extend parallel and adjacent to the edge of a pile of sheets and having two separated interior conduits extending longitudinally thereof adapted to be connected to a suction and blast source respectively, said member also having a plurality of downwardly extending suction and blast nozzles connected with said longitudinal conduits respectively, said blast nozzles being directed to deliver blasts against the edges of the sheets and at different angles to the plane thereof.

7. In sheet feeding mechanism, a unitary sheet separator and lifter comprising a rigid elongated member adapted to extend parallel and adjacent to the edge of a pile of sheets and having two separated interior conduits extending longitudinally thereof adapted to be connected to a suction and blast source respectively, said member also comprising a plurality of pairs of downwardly extending suction and blast nozzles communicating with said longitudinal conduits, the nozzles of each pair being located in a plane substantially perpendicular to the front edges of the sheets.

8. In sheet feeding mechanism, a unitary sheet separator and lifter comprising a rigid

elongated bar adapted to extend parallel and adjacent to the edge of a pile of sheets and having two separated interior conduits extending longitudinally thereof adapted to be connected to a suction and blast source respectively, a plurality of suction nozzles extending downwardly from said bar and communicating with the longitudinal suction conduit, and a plurality of blast nozzles communicating with the compressed air conduit and rigidly connected at their lower ends to said suction nozzles and directed to deliver blasts against the edges of the sheets and at different angles to the plane thereof.

9. In sheet feeding mechanism, a support for a pile of sheets, a plurality of rigidly connected combined suction and blast nozzles mounted to reciprocate up and down above said support, said suction nozzles being directed substantially vertically and said blast nozzles being directed at a plurality of angles to the vertical.

10. In sheet feeding mechanism, a support for a pile of sheets, a plurality of pairs of rigidly connected suction and blast nozzles mounted to reciprocate up and down above said support, said suction nozzles being directed substantially vertically and said blast nozzles being located in the same longitudinal planes with their associated suction nozzles and directed at different angles to the vertical.

11. As an article of manufacture, a sheet separator and lifter comprising an elongated bar having two interior separate conduits extending longitudinally thereof and having openings into said conduits for connecting the same to suction and blast sources respectively, a plurality of suction nozzles extending at right angles to said bar communicating with the suction conduit and opening in the same plane, and a plurality of blast nozzles communicating with the blast conduit and opening at different angles to the plane of said suction nozzles.

12. As an article of manufacture, a sheet separator and lifter comprising an elongated bar having two interior separate conduits extending longitudinally thereof and having openings into said conduits for connecting the same with suction and blast sources respectively, and combined suction and blast nozzles rigidly connected to said bar and communicating with said conduits.

13. As an article of manufacture, a sheet separator and lifter comprising an elongated bar having two interior separate conduits extending longitudinally thereof and having openings into said conduits for connecting the same to suction and blast sources respectively, a plurality of rigid suction nozzles projecting at right angles from said bar and opening in the same plane, bars connecting the lower ends of said suction nozzles, and a plurality of blast nozzles communicating

with the blast conduit and rigidly connected to said suction nozzles, some of said blast nozzles being directed substantially at right angles to said suction nozzles and others at an acute angle thereto.

14. As an article of manufacture, a sheet separator and lifter comprising an elongated bar having two interior separate conduits extending longitudinally thereof and having openings into said conduits for connecting the same to blast and suction sources respectively, combined suction and blast nozzles rigidly connected to said bar at spaced points thereof and communicating with said conduits, and connections between the lower ends of said nozzles.

15. As an article of manufacture, a sheet separator and lifter comprising an elongated bar having two interior separate conduits extending longitudinally thereof and having

openings into said conduits for connecting the same to suction and blast sources respectively, a plurality of rigid suction nozzles projecting at right angles to said bar at spaced points thereon and opening in the same plane and communicating with the longitudinal suction conduit, a plurality of blast nozzles communicating with the longitudinal blast conduit and rigidly connected to said suction nozzles, some of said blast nozzles opening at substantially right angles to said suction nozzles and others opening at an acute angle thereto, and valves in the suction and blast nozzle connections for selectively cutting out of action any desired number of said nozzles.

In testimony whereof I hereunto affix my signature.

HARRY V. ASHBY.