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A. G. SAMPSON

2,595,546

PNEUMATIC SHEET SEPARATING DEVICE

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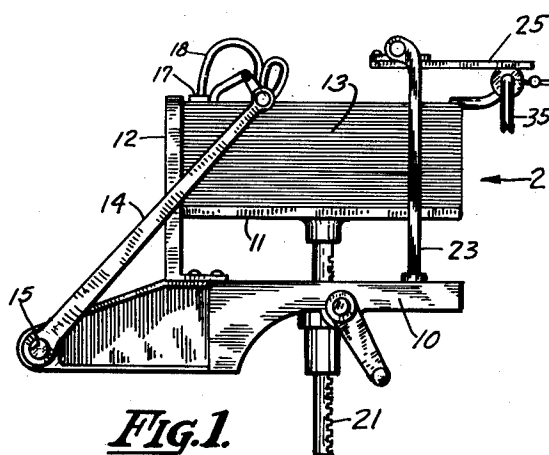


Fig. 1.

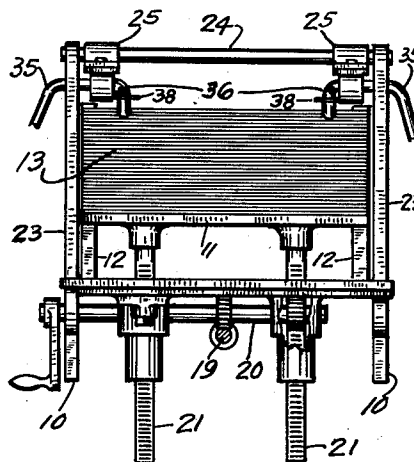


Fig. 2.

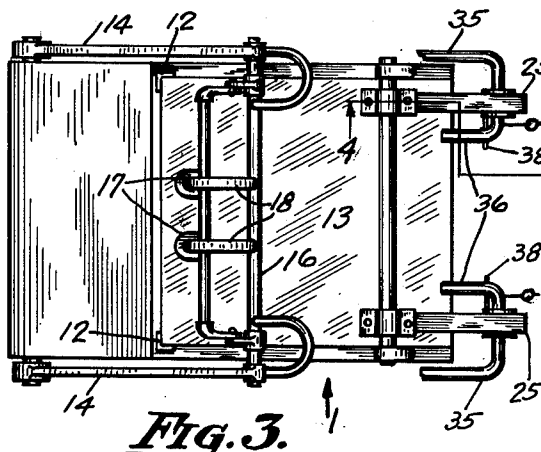


Fig. 3.

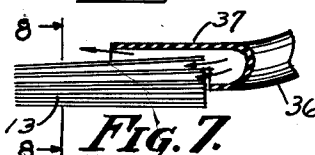


Fig. 7.

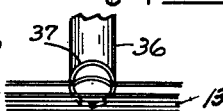


Fig. 8.

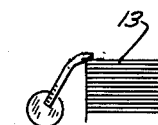


Fig. 9.

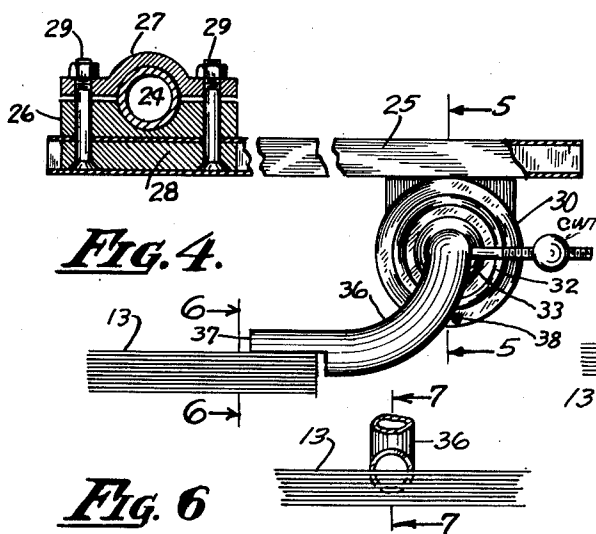


Fig. 4.

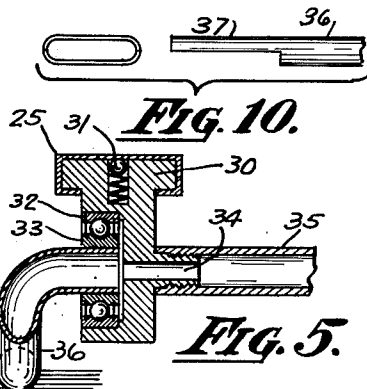


Fig. 5.

INVENTOR.
Alvin G. Sampson
BY
Anderson & Muller
ATTORNEYS

UNITED STATES PATENT OFFICE

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PNEUMATIC SHEET SEPARATING DEVICE

Alvin G. Sampson, Decorah, Iowa

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6 Claims. (Cl. 271—26)

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This invention relates to improvements in printing presses and has reference more particularly to a pneumatic sheet separating device by means of which the top sheet is raised and separated from the remainder of the sheets to a position where it may be grasped by the grippers or suckers.

It is the object of this invention to produce a blower pipe or nozzle of such construction and design that it will automatically retain the right height relative to the top of the paper pile and which will deliver a blast of air both above the top sheet and below the same.

A further object is to produce a blower nozzle and mounting of such construction that a portion thereof will rest lightly on the top sheet, being held in position by the action of gravity, and in which the portion resting on the top of the paper will direct a stream of air over the top sheet and parallel therewith to effect a lifting of the top sheet to a point where it is separated from the sheet directly below.

A further object is to produce a device that will effect automatic adjustments of its position to compensate for variations in the top of the pile of paper as sheets are removed.

The above and other objects that may become apparent as the description proceeds are attained by means of a construction and an arrangement of parts that will now be described in detail, for which purpose reference will be had to the accompanying drawing in which the invention has been illustrated, and in which:

Figure 1 is a side elevation of a printing press feed table, looking in the direction of arrow in Figure 3;

Figure 2 is an end elevation looking in the direction of arrow 2 in Figure 1;

Figure 3 is a top plan view of the table;

Figure 4 is a view, partly in elevation and partly in section, taken on line 4—4, Figure 3;

Figure 5 is a section taken on line 5—5, Figure 4;

Figure 6 is a section taken on line 6—6, Figure 4;

Figure 7 is a section taken on line 7—7, Figure 6;

Figure 8 is a section taken on line 8—8, Figure 7;

Figure 9 is a fragmentary view, partly in section and partly in elevation, showing a slight modification; and

Figure 10 shows a slightly modified form of nozzle cross section.

Referring now to the drawing, reference nu-

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meral 10 designates the base of a printing press feed table and 11 designates a vertically adjustable stock table on which the pile 13 of paper is supported and from which the sheets are individually removed and fed to the printing press. Guides 12 are attached to the upper surface of feed table 10 in position to receive and properly position the corners of the sheets that are supported on table 11 and which have been designated by numeral 13. Reference numerals 14 designate a pair of arms that are connected to opposite ends of shaft 15. Connecting the upper ends of arms 14 is a pipe 16 whose interior is connected with a source of partial vacuum. Suction cups 17 are connected to pipe 16 by suitable means and to the interior of pipe 16 by tubes 18.

It is not the intention to describe in detail the intricate feed mechanism of the printing press, but only such parts thereof as may have to be mentioned in describing applicant's improvement. When the top sheet is lifted from the stock pile it is necessary to introduce air underneath the sheet that is to be removed so that it will float on a layer of air. Various devices have been invented and used for this purpose, and attention is called to blast nozzle 12 in U. S. Patent 2,233,935 and to blower nozzles 23 in U. S. Patent 1,867,038, which are examples of such means. It is common practice to raise the stock table an amount roughly equal to the thickness of a sheet as each sheet is removed, for which purpose a mechanism comprising worm 19, shaft 20, a rack 21 and a pinion 22 is employed. It is evident that when the thickness of the stock varies, the rate at which the height of the stock pile decreases varies directly with the thickness of the sheets, and unless the automatic compensating device is accurately adjusted the level of the top sheet will either rise or fall as the printing proceeds. The usual blast means does not automatically adjust itself to the exact height of the stock, and the adjustment often becomes so faulty that the machine must be stopped for manual adjustment.

It is the principal object of this invention to produce a blast nozzle of such construction that it will automatically adjust itself to the correct height as the top of the stock pile rises or lowers during the printing operation.

Printing press feed tables are usually provided with a pair of vertical arms 23 whose upper ends are joined by a bar or pipe 24 that serves as a support for various elements that have not been shown. Applicant utilizes pipe or bar 24 for the support of the blast nozzles, whose construction and operation will now be described.

Referring now more particularly to Figures 4 and 5, which show the parts to a larger scale than in Figures 1, 2 and 3, it will be observed that two supporting or guide channels 25 are attached to bar 24 by some suitable means. The attaching means illustrated consists of two blocks 26 and 27 having complementary recesses that are positioned so as to embrace pipe 24. A block 28 is positioned in the channel of guide 25 and carries two bolts 29. When the parts are assembled as shown in Figure 4 and the bolts tightened, guide 25 will be clamped in any rotary position. Mounted in the channel of guide 25 is a block 30 that is held frictionally by a spring pressed ball 31. A sealed ball bearing having outer and inner ball races 32 and 33, respectively, is positioned in a recess in block 30. Extending from the side of block 30 opposite from the recess is a hub 34 to which the air hose 35 is connected. A tubular nozzle 36, shaped as shown in Figures 4 and 5, has one end positioned in the opening in ball race 33, secured thereto by a press fit. The nozzle is freely rotatable. The outer or free end of the nozzle has a portion cut away leaving a substantially semi-cylindrical portion 37 that extends over and rests on the top sheet of the stock pile. A pin 38 extends from one side of block 30 and serves as a stop limiting the downward movement of the nozzle. Due to the shape and the weight of the nozzle the semi-cylindrical portion 37 rests lightly on the top sheet in the manner shown in Figure 4. When air under pressure is applied to the interior of the nozzle the greater portion thereof will flow out above the top sheet, while the rest will strike the edges of the upper sheets. The air stream goes both above and below the top sheet, and this lifts the top sheet and lets more air between the top sheet and the one directly below in a manner shown in Figures 7 and 8. The flow of the air is in accordance with Bernoulli's law. When the front end of the sheet is raised by the suction cup and the air blast raises the rear end, the entire sheet will float on a layer of air, and this permits free movement of the sheet.

Pin 38 acts as a stop to limit the downward movement of the nozzle when new piles of stock are applied. The flow of air through hose 18 is controlled by suitable valves, in the usual way.

Nozzles like those described may be provided at the front and/or sides or in any desired position.

In the drawing the nozzle has been shown as having a circular cross section. It is sometimes desirable to make the cross section elliptical, as shown in Figure 10.

Each nozzle is preferably provided with an adjustable counterweight as shown in Figure 4 for adjusting the pressure with which the nozzle rests on the paper.

Although a ball bearing has been shown for supporting the nozzle for pivotation, any other suitable bearing may be used.

Where heavy stock is printed a light spring may be attached to the nozzle to overcome its inertia and speed its movement.

Having described the invention, what I claim as new is:

1. In combination, a printing press having a feed table, a stock sheet support positioned above the table and supported thereby for relative vertical movement, a pile of stock sheets on said support and pneumatic means for raising the upper sheet of the stack relative to the next lower sheet,

comprising, a bracket supported from the feed table, a bearing block attached to the bracket, the block having a cylindrical bearing, an air nozzle having its intake end mounted for rotation about the axis of the bearing, the discharge end of the nozzle having its axis substantially perpendicular to the axis of the bearing, substantially one-half of the under surface said discharge end being removed forming a notch, the under surface of the notch resting lightly on the upper surface of the top sheet of the pile, the discharge opening extending partly above and partly below the top sheet, whereby when air under pressure is discharged from the nozzle a portion will be discharged above the top sheet and another portion underneath the same, the air discharged above the sheet serving to raise the sheet and to separate it from the sheet below, the air discharge beneath serving to space it from the second sheet and permit free movement of the top sheet.

2. A nozzle for use with a printing press for lifting one edge of the top sheet of a pile of paper and introducing a layer of air between the top sheet and the sheet below, comprising, a bracket fixed to the press adjacent the stock support table, a bearing block secured to the bracket, said block having a bearing whose axis is horizontal, an elongated air discharge nozzle having its intake end in rotary engagement with the bearing, the vertical plane of the axis of the discharge end of the nozzle being substantially perpendicular to the axis of the bearing, the under portion of the discharge end of said nozzle being notched, the upper surface of the notch resting lightly on the top sheet of the pile of paper which therefore divides the nozzle discharge opening into an upper and a lower portion, whereby a blast of air emerging from the nozzle will be discharged partly above the top sheet for raising it and partly underneath said top sheet providing a layer of air between it and the sheet directly beneath.

3. A device in accordance with claim 1 in which the bearing is a sealed ball bearing, the bearing block having a recess on one side for the reception of the outer ball race, the inner ball race having an opening, the intake end of the nozzle being positioned in said opening, the discharge end of the nozzle being positioned to move in a plane substantially perpendicular to the axis of the bearing.

4. An air blast nozzle assembly for use with printing presses in which sheets are fed from the top of a pile, comprising an elongated bracket, means at one end of the bracket for adjustably attaching it to a stationary portion of a press, a bearing block mounted on the bracket for movement therealong, means for holding the bearing block in any desired position along said bracket, the bearing block having a circular recess in one side, a sealed ball bearing having annular inner and outer ball races, positioned in the recess, a nozzle having its intake end positioned in the inner ball race, the nozzle being curved through an angle of substantially ninety degrees to bring its discharge end to a position in which its axis is substantially perpendicular to the axis of the bearing, the discharge end of the nozzle being notched by removing substantially one-half thereof for a short distance, and an adjustable counterweight carried by the nozzle, the bearing block having an opening communicating with the space between the bottom of

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the recess and the bearing, for the periodic admission of air under pressure.

5. An air blast nozzle assembly for use with sheet feeding mechanisms of printing presses having automatically vertically adjusted feed tables for supporting piles of paper to be printed, said nozzle assembly comprising, a bearing block adapted to be attached to the printing press, an elongated nozzle having its intake end pivotally connected with said bearing block for limited pivotal movement, the discharge end being notched by having substantially the lower one-half of the nozzle removed from the tip inwardly, leaving an upper wall portion of concavo-convex cross section whose edges are adapted to rest on the upper surface of the uppermost sheet of the pile, the nozzle wall forming the end of the notch extending along the edge of the paper pile, whereby, when a blast of air is released through the nozzle a portion thereof will be delivered adjacent the upper surface of the top sheet and parallel therewith, raising the top sheet, the remainder of the air being released against the edge of the sheet to form an air layer on which the top sheet can float.

6. An air blast nozzle assembly for use with printing presses of the type having automatically adjustable tables for supporting piles of paper to be printed, comprising, a bearing block adapted to be rigidly attached to the press, a

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tubular blast nozzle having its intake end mounted in the bearing for limited pivotation, the discharge end of the nozzle being notched by the removal of substantially the lower one-half for some distance inwardly from said end, leaving an upper forwardly projecting wall having a concavo-convex cross section for resting on the top sheet, the inner end of the notch terminating adjacent the edge of the paper pile, whereby, when a blast of air is released, a portion of the air will be released above the top sheet and parallel thereto producing an upwardly acting force lifting the sheet, the remainder of the air being released against the edge of the sheet forming a layer of air on which the sheet may float.

ALVIN G. SAMPSON.

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