United States Patent

Paulson

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[54] PRINTING PRESS FEEDER

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[52] **U.S. Cl.** **271/29,** 271/41

[51] **Int. Cl.** **B65h 3/10**

[58] **Field of Search** 271/29, 41, 35, 32

[56] **References Cited**

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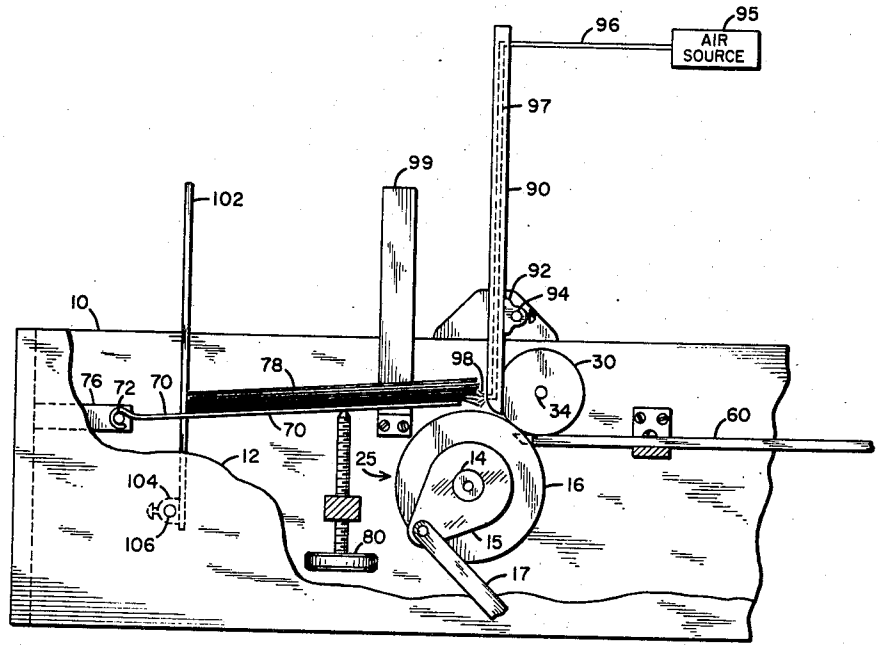
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[57] **ABSTRACT**

A mechanism for feeding lightweight sheets of paper, one at a time, to a printing press in which a rotationally oscillated vacuum drum with suction holes therein grasps pieces of paper off the bottom of a stack with each oscillation. The stack is adjustably supported at a predetermined height just above the oscillating feed drum to insure that only one piece of paper at a time is selected. An air jet is used to separate the edges of the paper sheets in the stack while a separating plate next to the drum operates to block off the suction holes at the end of each oscillation and separate each piece of paper from the oscillating drum.

7 Claims, 2 Drawing Figures



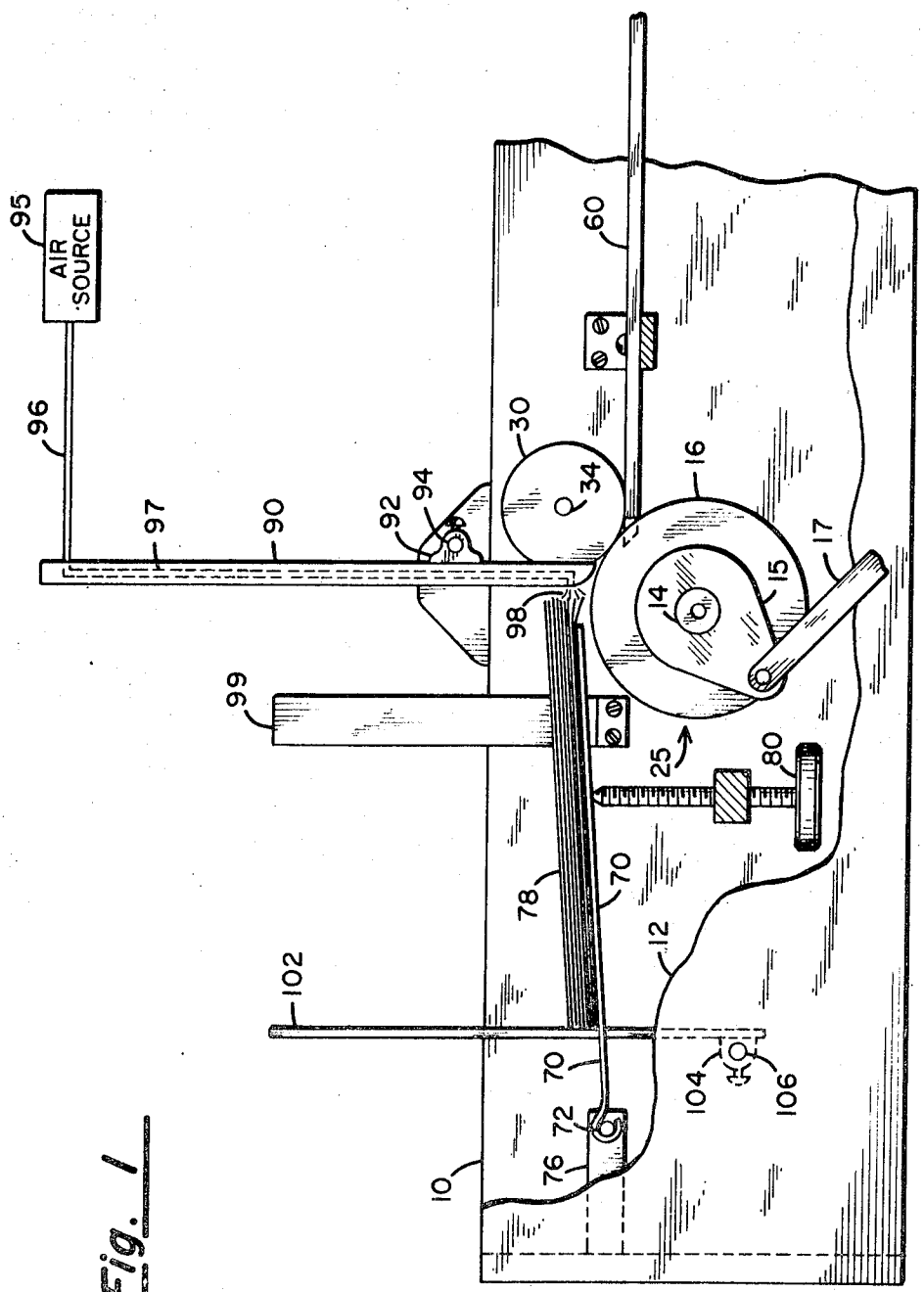


Fig. 1

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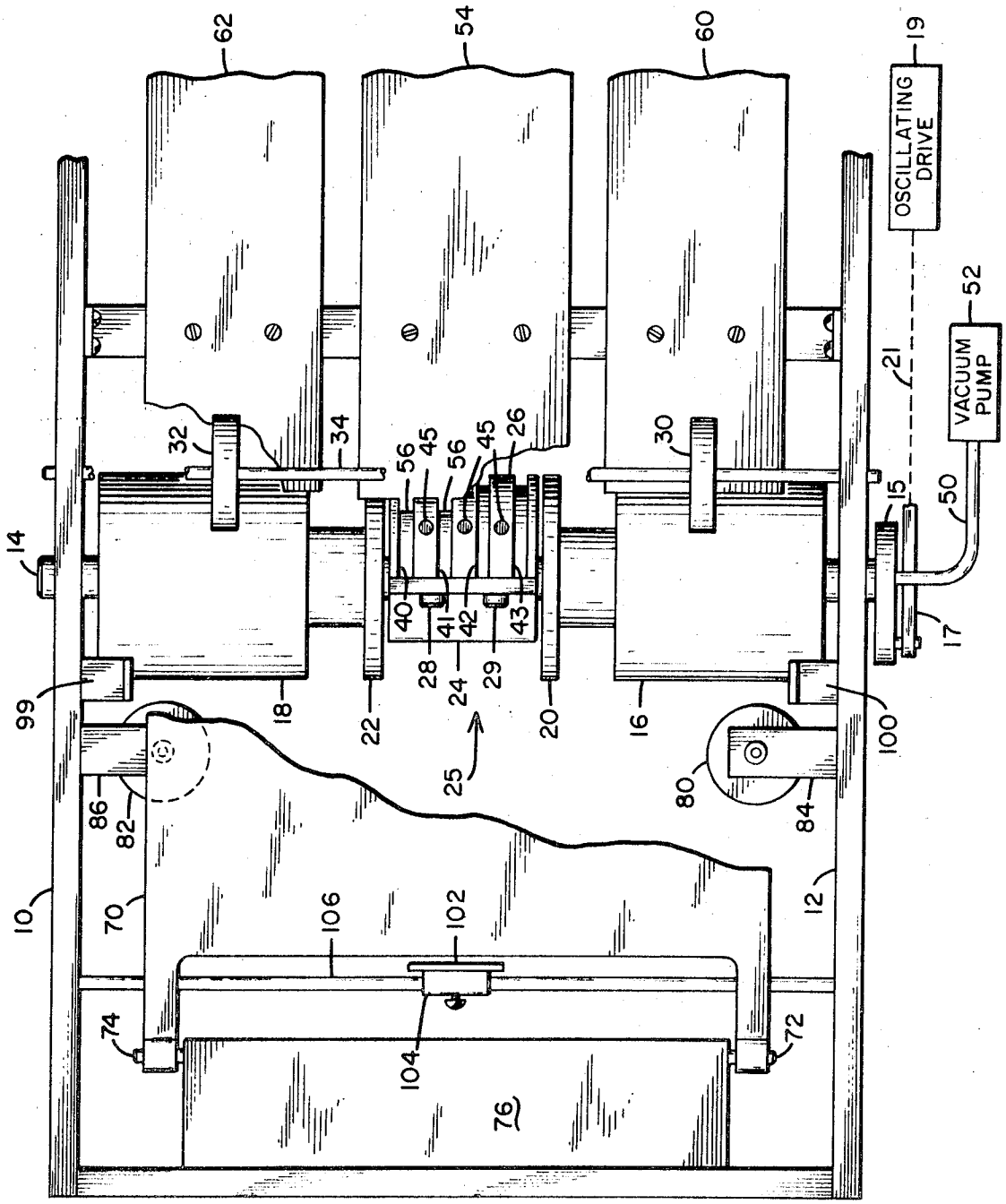


Fig. 2

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PRINTING PRESS FEEDER

BACKGROUND OF THE INVENTION

In the prior art, many types of printing press feeders have been used but all of them have inherent difficulties which makes them less than suitable. In an attempt to overcome these difficulties I have invented an oscillating drum printing press feeder which selects pieces of stock from the bottom of a stack. This invention is the subject of my co-pending patent application for "Printing Press Feeders," Ser. No. 68,819 filed on Sept. 2, 1970. The printing press feeder of the above referenced co-pending application comprises a compact long lasting feeding mechanism which is readily adjustable to many different sizes of stock without any changes in the basic pickup mechanism. However, a need has arisen for a feeding mechanism of this sort which can handle extremely thin lightweight paper which until the advent of my invention has posed a particular problem due to the fact that it is difficult to separate one thin piece of paper from another without damaging them.

SUMMARY OF THE INVENTION

Briefly, the present invention operates to feed a stack of paper or other suitable stock by means of a guide rack onto the top surface of an oscillating cylindrical feed drum. The drum is hollow and connected to a vacuum source which sucks the stock into contact with the oscillating drum through small holes in the surface of the drum. As the drum rotates away from the stack it pulls the bottom piece of paper with it and feeds that piece between a pair of transfer rollers. The rollers direct this paper into the printing press. As the oscillating vacuum feed drum rotates back underneath the stack of paper it grasps the next piece and repeats the cycle. In order to handle very lightweight paper a number of unique improvements have been incorporated into this feeder.

The cylindrical portion of the feed drum is provided with a plurality of generally rectangular circumferential grooves. As the drum rotates it passes underneath a separation plate which separation plate has a number of generally rectangular teeth extending from its edge into the circumferential grooves. As the drum rotates, the vacuum holes pass underneath the separation plate thus cutting off the suction force on the paper. Simultaneously, the projections on the separation plate gently lift the paper away from the feed drum and direct it into the transfer rollers. In order to insure that only one piece of paper is selected at a time by the feed drum the stack of paper is supported on a rack which is very accurately adjustable in height so that the edges of the bottom of the stack are positioned at an exact predetermined distance above the feed drum. In addition, a jet of air is directed at the edges of the bottom pieces of paper so as to separate them and insure individual selection. It may therefore be seen that it is an object of the present invention to provide an improved printing press feeding means. It is another object of the present invention to provide a feeding means which can handle extremely lightweight sheets of paper. Other objects and advantages will become apparent upon consideration of the following description and drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic side view of the primary components of my invention demonstrating how each piece of paper is selected and fed into the printing press.

FIG. 2 is a schematic top view of most of the same primary components shown in FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring simultaneously to both FIG. 1 and FIG. 2, a pair of frame members 10 and 12 are shown which carry a shaft 14 therebetween. Connected to shaft 14 is the oscillating feed drum indicated generally by the numeral 25. Feed drum 25 is formed in two halves, one a bracket portion 24 and the other a

grooved cylindrical portion 26. These two portions are connected together by suitable bolts such as bolts 28 and 29. Shaft 14 is connected by means of a crank 15 to a push rod 17 which in turn is connected to an oscillating drive 19. This connection is shown only in FIG. 2 by means of a dashed line 21. Also disposed for rotation on shaft 14 are a pair of transfer rollers 16 and 18 upon which rotate another pair of transfer rollers 30 and 32. Rollers 30 and 32 are supported for rotation about a shaft 34. Shaft 34 is cut away in two places in FIG. 2 so as to better expose the components underneath. Transfer rollers 16, 18, 30 and 32 are all powered by means not shown in the present drawings. Reference should be had to the above referenced co-pending application for similar apparatus and a more detailed explanation of its operation.

In order to handle lightweight pieces of paper the present invention contemplates a number of substantial design improvements as can be seen most readily in FIG. 2. In FIG. 2 it can be seen that cylindrical portion 26 of feed drum 25 is provided with four generally rectangular grooves numbered 40 through 43. Disposed between grooves 40 through 43 are three suction holes 45 which connect with the interior of feed drum 25. The interior of feed drum 25 is further connected through shaft 14 and a flexible hose 50 to vacuum pump 52. These connections are similar to those disclosed in my co-pending patent application mentioned earlier. By means of this connection to vacuum pump 52 a desired suction is maintained through holes 45 in the grooved cylindrical portion of feed drum 25. Immediately adjacent to feed drum 25 is a separating plate 54 which has four projections 56 thereon which extend snugly into grooves 40 through 43. Plate 54 is cut away for clarity so only two projections 56 are visible in FIG. 2. As feed drum 25 is oscillated back and forth by oscillating drive 19 the vacuum holes periodically pick up a piece of paper and carry it over onto the top of the projections 56 and thence onto the top of separator plate 54. Simultaneously, as this happens, holes 45 pass underneath separator plate 54 so that the suction force is cut off preventing any damage to the lightweight pieces of paper. As the paper passes on to separator plate 54 and the suction from holes 45 is cut off the leading edge of the paper is fed between transfer rollers 18 and 16 and transfer rollers 30 and 32 which maintain the motion of the paper to the right in FIG. 2 across the top of separator plate 54 and also across a pair of plates 60 and 62. This motion to the right is additionally encouraged by a pair of rollers 20 and 22 which are formed as extensions from the end of transfer rollers 16 and 18 respectively. It should be noted that transfer rollers 30 and 32 slide on rod 34 and in operation are usually positioned to ride on rollers 20 and 22.

The stack of paper is supported just above feed drum 25 by an adjustable plate 70 which is cut away in FIG. 2. To better understand how plate 70 carries the stack, reference should be had to FIG. 1. In FIG. 1 it can be seen that stack supporting plate 70 is pivoted at its rear edge about a pair of pivot pins 72 and 74 which pins extend out from a frame member 76. A stack of paper 78 is supported on stack supporting plate 70 with the edges of the paper extending slightly over and just above feed drum 25. A pair of thumb screws 80 and 82 are located on each side of the machine threaded through a pair of mounting blocks 84 and 86. These thumb screws bear against the underside of support plate 70 and permit a precise adjustment of the height thereof. By turning thumb screws 80 and 82 one can be sure that the bottom of the stack of paper 78 is exactly the right distance above feed drum 25 so that one piece of paper at a time is selected by the grasping force of the suction holes 45. Each selected piece of paper must pass between feed drum 25 and a vertical separator bar 90 which extends almost down to the top of feed drum 25. Vertical spearator bar 90 is supported by a bracket 92 mounted on a cross bar 94 extending between the two frame members 10 and 12 of the printing press. Vertical separator bar 90 and its supports are not shown in FIG. 2 for clarity. In FIG. 1 it may additionally be seen that an air source 95 is connected by means of any suitable conduit 96 to vertical separator bar 90. A hollow passage

way **97** down the center of vertical separator bar **90** serves to direct the flow of air from air source **95** to a nozzle **98** positioned at the bottom of vertical separator bar **90**. Nozzle **98** directs a jet of air toward the bottom of stack **78**. This jet of air serves to separate the various pieces of paper so as to further insure that only the bottom most piece of paper is selected with each oscillation of feed drum **25**. It should also be noticed in FIG. **1** that the bottom of the projections **56** from separator plate **54** are beveled to match the bottom of the grooves **40** through **43** in the cylindrical grooved portion of the feed drum **25**. A pair of stack indexing bars **99** and **100** are fastened to frame members **10** and **12** in a position to retain the edges of the stack of paper **78**. The rear of the stack is located in place by an indexing bar **102** which is mounted by means of a bracket **104** to a cross bar **106** which extends from frame member **10** to frame member **12**. These indexing bars are examplary only and many other forms of supports and guides may be substituted therefore. In the preferred embodiment the essential invention resides in the use of a grooved feed drum and a separator plate as shown to insure a positive but gentle separation of the pieces of paper from the feed drum. In addition, the combination therewith of the adjustable stack supporting plate **70** and the air jet **98** provides additional assurance that one piece of paper at a time is selected by the feed drum. The combination of these features permits extremely light pieces of paper to be fed from stack **78** with reliable individual selection and accurate registration. The vacuum source **52** may be connected to the interior of the feed drum **25** through a valved line. However, as the suction holes are open to atmosphere once the paper passes on to the separator plate, the vacuum within the drum is lost until the suction holes are again closed by the next piece of paper.

Since the preferred embodiment is shown only schematically in the drawings it is obvious that a number of variations can be made without departing from the spirit and scope of the invention. Hence, the following claims are presented with the intention of describing the patentable improvements herein contemplated.

I claim:

1. A printing press feeding means comprising in combination:

a feed drum having a generally cylindrical portion with a plurality of circumferential grooves on said cylindrical portion, said cylindrical portion having at least one hole therein connected to a vacuum source so as to adapt said drum to grasp pieces of stock by suction;

means connected to said feed drum adapted to rotationally oscillate said feed drum;

a separation plate abutting said drum, said separation plate having a plurality of projections extending from the abutting edge of said plate and into said circumferential grooves, the oscillation of said feed drum being long enough to carry the vacuum holes periodically under said separation plate;

a stack supporting member, adjustable in height, positioned to hold a stack of stock with the edges of the stock at a predetermined height above said drum; and

air jet means just above said feed drum positioned to direct a jet of air at the edges of the stock near the drum so as to help separate them for easier grasping by said feed drum.

2. The apparatus of claim **1** in which said supporting member is pivotally supported on a frame which frame also supports said feed drum, said means connected to said drum, said separation plate, and said air jet means.

3. The apparatus of claim **2** in which said supporting member is adjustable in height by means of at least one threaded adjusting bolt on said frame positioned to engage the underside of said supporting member.

4. The apparatus of claim **3** in which said grooves have a generally rectangular cross section.

5. The apparatus of claim **4** in which said plurality of projections on said separation plate are generally rectangular so as to be congruent to said grooves.

6. The apparatus of claim **5** in which the drum contacting portions of said plurality of projections are beveled to a shape approximating the bottom of said grooves.

7. The apparatus of claim **6** in which there are a plurality of holes in said feed drum connected to a vacuum source, said holes being positioned in the cylindrical portion of said feed drum between said grooves.

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