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VACUUM AND PRESSURE CONTROL VALVE FOR PRINTING PRESSES

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This invention relates to printing presses equipped with suction feeders, and more particularly to air valve means for use therewith.

As is well known, when paper stock is fed to a printing press via a suction feeder, one or more cam operated suction feet lift individual sheets of paper from a stack on a feeder elevator, and transfer the sheets to a position from which they are fed into the printing couple. The sheet grasping ability of the suction feet is effected, as usual, by a partial vacuum supplied thereto by a pump. In addition to the suction feet, air blowers are provided, adjacent the stack of paper on the feeder elevator, which force air between the sheet being lifted and the sheet directly beneath it, in order to insure that only one sheet at a time is transported by the suction feet. Ordinarily, the same pump which supplies the suction feet with reduced pressure supplies the air blowers with increased pressure.

Both the line which supplies the air blowers and the line which supplies the suction feet are furnished with air valves having air valve adjusting screws. These adjusting screws are used to bleed air into the suction line or out of the pressure line, thus regulating the pressures at the suction feet and air blowers respectively, e.g., as the adjusting screws are opened, more air is bled through them, hence the regulated pressures approach atmospheric pressure. The pressures employed in any particular case, of course, depend on the weight of paper stock being printed.

While the printing press is running, it is occasionally desirable to stop the feeding of paper or curtail operation of the air blowers without shutting off the press or the pump. To accomplish this by means of the air valve adjusting screws is cumbersome since the screw must first be opened fully and then, when paper feeding or air blowing is to be resumed, the particular adjusting screw must be readjusted until the desired pressure at the suction feet or air blowers is once again attained. Even then, it is uncertain whether the exact pressure desired has been attained until operation begins again, at which time further adjustment may be necessary.

It is the object of the present invention to obviate this burdensome situation by providing both the suction line and pressure line of the suction feeder with conveniently accessible air valves whereby operation of the suction feeders and air blowers may be temporarily cut off without having to readjust the valves when operation is resumed.

Other objects and advantages of the present invention will be apparent from the following description, in which reference is made to the accompanying drawings.

In the drawings:

Fig. 1 is a side elevational view of a printing press and suction feeder combination, showing the valves of the present invention disposed thereon;

Fig. 2 is an axial cross-sectional view of the new valve adjusting means;

Fig. 3 is a vertical cross-sectional view taken on line 3—3 of Fig. 2.

Referring to the drawings, particularly Fig. 1, a conventional two cylinder printing press 10 is shown equipped with a suction feeder 11. As usual, a plate-platen cylinder 12 and a blanket cylinder 13 are mounted on shafts 14 and 15 respectively, both shafts being rotatably journaled adjacent their ends in the side frames of the press, one of which is 16. A chain delivery mechanism 19 carries a paper gripper (not shown) which transports the individual sheets of paper stock through the printing couple, and delivers the printed sheets to a paper catcher 20. A paper retaining wire 21 helps to guide the printed sheets into the proper position and prevents the top sheets from falling on to the floor as the paper catcher is filled.

The suction feeder 11 is of conventional design being composed of a feeder elevator 34, which holds a stack of paper stock to be printed, an elevator crank 35, for manually raising and lowering the elevator 34, a conveyer feed table 36, which transports individual sheets from the suction feeder to the printing press, a pair of time off the feeder elevator and transferring it to the cam operated suction feet 39, for lifting one sheet at a conveyer feed table, and a number of air blowers 40, which help to separate sheets that stick together as the top one is being lifted by the suction feet.

Two identical valves 32 and 33 of the present invention, one acting as a suction feet pressure control, and the other controlling the air blower pressure, are mounted on the printing press 10 in the location shown in Fig. 1. This location is most advantageous, since the valves are easily accessible to an operator from his normal machine operating position in which he controls, among other things, the inking and dampening fountain roll hand-wheels 24 and 25, and the inking and dampening from roller levers 26 and 27.

A rotary pump 41 disposed in the base of the printing press 10 provides the air pressure required by the air blowers 40, and the partial vacuum for the suction feet. The pump 41 is driven by an electric motor 42 through a belt 43. A tube 44 connects the delivery or pressure side of the pump 41 to a fitting 45 (see Fig. 2) which is associated with valve 32 of the present invention. A second tube 46, which is ramified at 49 into three branches, connects the fitting 45 to the three air blowers 40. The intake or suction side of the pump 41 is connected to an accumulator tank 50 which smooths out any pulsations in the vacuum pressure arising from pump operation and from there is connected to another fitting 45 associated with valve 33, which is identical to the fitting 45 associated with valve 32. A line 51 connects fitting 45 to the usual air control valve 52, following which the line 51 is bifurcated to supply the pair of suction feet 39. As is well known, the cover 53 of air control valve 52 is lifted periodically in order to periodically cut off the suction at the suction foot, and allow sheets of paper being carried by the foot to be dropped on to the conveyer table 36.

For a description of the new valve itself, reference will be made to Figs. 2 and 3. The fitting 45 has a nose portion 53 which projects through an aperture in the side frame 16 of the printing press 10. The nose portion 53 is threaded internally and is threaded externally to the extent that it projects outwardly of the machine frame. The external thread accommodates a locknut 54, and the internal thread is adapted to cooperate with the threaded portion of an adjusting screw 55. The adjusting screw 55 has an axial bore or air channel 56 running its entire length, and has two radial slots 57 in its periphery, disposed 180° from one another, both of which extend through to the center bore 56, but which only run for about one-half the length of the screw. A cup shaped

shell portion 59 completely surrounds the exposed extremity of the adjusting screw, and is integral therewith.

As usual, when the adjusting screw 55 is threaded out of the nose portion 53 of fitting 45, air begins to bleed out of or into slots 57, depending on whether the pressure valve or suction valve is being used. In either case, as more air is bled through the adjusting screw, the pressure at the air blowers or suction feet approaches atmospheric. A compression spring 60 surrounding the adjusting screw and confined between the side frame 16 and the shell portion 59 serves to maintain the selected setting of the screw by preventing it from turning due to machine vibration.

The shell portion 59 of the adjustment screw 55, which is made of a non-magnetic material, such as brass, is provided with two annular grooves 61 and 62 for accommodating two retaining rings 63 and 64, the rings being made of a magnetic material such as steel. Disposed between the rings 63 and 64 is a magnetized block 65 of generally rectangular shape having arcuately shaped ends (Fig. 3) which conform to the shape of the inner surface of shell 59.

In the present description, a magnetic element refers to one which will be attracted by a magnet, a non-magnetic element refers to one which will not be so attracted, and a magnetized element refers to one which will attract a magnetic element.

A knurled rod 66 fastened to the block 65 projects perpendicularly therefrom and is of such length that it extends past the edge of the shell portion 59 so that it may be easily grasped by a machine operator. A pad 67, preferably of a resilient material, and larger than the cross-sectional area of the bore 56 in adjusting screw 55, is fastened to the magnetized block 65 in such a position that it will completely close off the end of bore 56 when the block 65 is in contact with plate 61, as shown in Fig. 2. The pad 67 must, of course, be small enough to fit through the opening in ring 63. The pad 67, the block 65 and the rod 66 are held together to form a magnetized plug by a machine screw 68, which is threaded axially into rod 66.

In operation, the suction valve adjusting screw is set in accordance with the pressure desired at the suction feet. At this time the magnetized block 65 is in contact with ring 63. After printing has begun, should the operator wish to suspend the feeding of paper, he may do so without changing his position by merely pulling rod 66 toward him, toward the right in Fig. 2, thereby bringing block 65 into contact with ring 64. This moves pad 67 toward the right thus uncovering the end of the bore, or air channel, 56 in screw 55, and effectively opening the adjusting screw completely. The partial vacuum at the suction feet will disappear and sheets will no longer be fed. The magnetized plug will cling to ring 64 until the operator wishes to resume paper feeding. At that time, the rod 66 is merely pushed back to its original position wherein the pad 67 closes the end of bore 56. Notice that the desired pressure at the suction foot is obtained instantly with no further adjustment necessary. The operation of the pressure valve is exactly the same as that just described.

It will be appreciated, then, that no matter how many times the printing press operator wishes to suspend paper feeding or suspend the operation of the air blowers, he may do so without changing his normal operating position and without ever resetting a valve adjusting screw.

The invention has been shown and described in preferred form only and by example, but many variations and modifications may be made therein and in its mode of application which will still be comprised within its spirit. For example, rings 63 and 64 may be magnetized

and block 65 made merely magnetic. Furthermore, magnetic means need not be employed at all, e.g., the plug may be positioned by spring biased means. It is understood, therefore, that the invention is not limited to any specific form or embodiment, except insofar as such limitations are specified in the appended claims.

What is claimed is:

1. A sheet feeding mechanism for a printing press including a suction foot for transferring individual sheets of paper from a stack to a conveyer table, a vacuum pump for supplying said foot with a partial vacuum, an air line connecting said suction foot to said pump, a periodically actuated valve disposed in said air line for permitting release of the sheets carried by said suction foot as they are brought to the conveyer table, and a second valve independent of said periodically actuated valve disposed in said air line for providing an auxiliary air intake whereby the vacuum at said suction foot may be interrupted at any point in the suction foot cycle, said second valve comprising a main fitting, an adjustable bleed member having an air channel therein and a shell portion integral therewith accommodated by said fitting, said bleed member being capable of permitting various quantities of air to be bled by said second valve, and a magnetized plug disposed in said shell portion, said plug serving, when placed in one position, to close one end of said air channel, said plug remaining in said position under magnetic force until manually moved, and said plug serving, when placed in a second position, to open the same end of said air channel, said plug remaining in said second position under magnetic force until manually moved.

2. A sheet feeding mechanism as described in claim 1 wherein said pump supplies air at a pressure through a second air line to an air blower which separates sheets being lifted off said stack by said suction foot, and a third valve means, identical to the second, disposed in said second air line, provides an auxiliary air escapement whereby the operation of the air blower may be interrupted as desired.

3. In a suction feeding mechanism for a printing press, a valve for interrupting the suction at any point in the sheet feeding cycle, said valve comprising a main fitting, an adjustable bleed member having an air channel disposed therein accommodated by said fitting, said member being capable of permitting various quantities of air to be bled by said valve when one end of said air channel is closed, a shell portion integral with said bleed member, a pair of spaced magnetic members disposed within said shell portion, and a magnetized plug disposed within said shell portion between said magnetic members, said plug serving, when in contact with one of said magnetic members, to close one end of said air channel, said plug remaining in contact with said one of said magnetic members until manually moved and said plug serving, when in contact with the other of said magnetic members to open the same end of said air channel, said plug remaining in contact with said other of said magnetic members until manually moved.

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