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FABRIC PRINTING MACHINE

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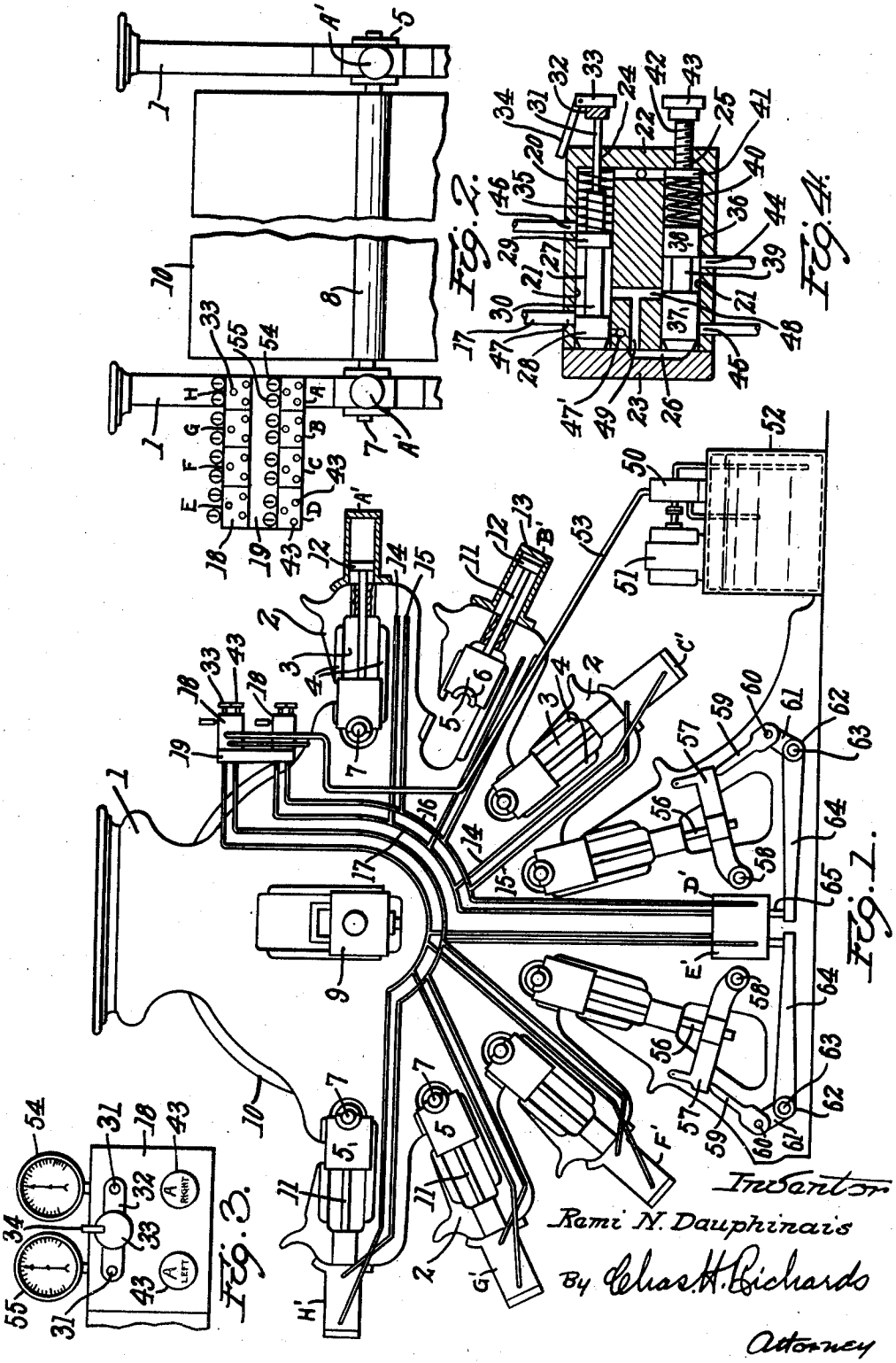

Fig. 1.

Fig. 3.

Fig. 2.

Fig. 4.

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FABRIC PRINTING MACHINE

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11 Claims. (Cl. 101—182)

The present invention relates to a printing machine of the rotary type having one or more pattern rolls that are used for embossing or printing designs or patterns on materials in a continuous strip, for example, print goods or wall paper. The designs may be of any configuration and in a number of colors so that it may be necessary to have one or more pattern rollers to transfer the required color or colors to the material being printed. The embossing or printing rolls are generally rotatably mounted in mandrel boxes or bearings that are slidably mounted in arms or nips having elongated bearing slots, said nips projecting from the machine frame radially of the blanket roll.

The common practice in adjusting the pattern or printing rolls so that they will bear against the material with sufficient pressure is to have a large screw in the end of each arm, said screw abutting the mandrel box mounted in the arm. With this method of adjustment there is no way of being sure that the pressure at each end of the roll is equal and furthermore if the roll is out of round there is no way to compensate for it so that the pressure will be the same during a complete rotation of the roll. The pressure required to properly transfer the pattern from the printing rolls varies with the style of pattern, the ink used and the material being embossed or printed, for instance fine engraving on a roll requires far greater pressure than open engraving.

By using a manual screw adjustment to obtain the proper pressure between the blanket roll and the print roll it is very difficult to get the same pressure at each end of the roll and if the roll should be out of round or slightly eccentric as frequently happens the solid backing provided by the screw forces the high side of the roll against the material with greater pressure than the low side of the roll and a great deal of material may be spoiled due to such variation in pressure.

There is also a great deal of waste of the material during the setting up of the machine as it is impossible to know just what pressure is on each roll with a screw adjustment and considerable material must be run through the press in order to get the proper pressure on each roll in order to transfer the pattern to the goods. The time to set up is also a great deal longer than it should be owing to the necessity of manually adjusting each mandrel box individually and when there are eight colors being transferred it means that the printer must adjust sixteen boxes one at a time; to do this he must walk all around the press.

It is accordingly an object of this invention to provide a control unit whereby one or more transfer rolls can be brought into contact with the material to be printed or embossed with a known pressure.

It is another object of this invention to provide hydraulic means to each mandrel box so that the printing or embossing rolls are pressed against the material to be printed or embossed with readily controlled pressure.

It is another object of this invention to provide control means for a plurality of printing rolls whereby all of the rolls may have the same pressure or varying pressures between some or all of the rolls.

It is another object of this invention to provide control means for equalizing the pressures exerted by an out of round roll whereby the high side of the roller will be pressed against the material with substantially the same pressure as the low side of the roller.

It is another object of this invention to provide a central control panel whereby the pressure on any or all of the printing or embossing rolls can be regulated at will and thereby save time and material in setting up a job.

Other and further objects and advantages of the invention will more fully appear from the following detailed description taken in connection with the accompanying drawing, in which

Fig. 1 shows one end frame of a printing machine incorporating the invention.

Fig. 2 is a diagrammatic view of a printing machine showing both end frames with the control panel on one of them.

Fig. 3 is an enlarged front view of a control unit.

Fig. 4 is a section through a control unit showing the reversing and equalizing valves.

Like reference numerals refer to like parts in the different figures.

In Fig. 1 only one side frame of a printing press is shown inasmuch as the opposite side frame is of the same general construction. The side frame 1 provides a plurality of nips 2 each of which has an open portion 3 in which are guideways 4. Slidably mounted on the guide ways 4 is a mandrel box 5, of standard construction, which carries a bearing 6 to support the mandrel 7 of the printing or embossing roll 8.

The side frames 1 also have bearings 9 in which is mounted the mandrel or shaft of the blanket roll 10.

In order to transfer the pattern from the print roll it is necessary to exert pressure of varying degrees on the print roll 8 and it is the standard practice today to do this by means of a screw abutting the rear side of the boxes 5. There is necessarily a great deal of uncertainty and guess work, when using a plurality of rolls, about getting all of the rolls adjusted so that each one will function properly. To overcome this uncertainty it is proposed to eliminate the screw ad-

justment and apply pressure to the boxes through the use of a fluid medium.

By using fluid under pressure it is possible to bring the control of the pressure exerted on the several mandrel boxes into a central station and also to provide means for informing the printer as to how much pressure is being exerted on each box. With this type of control the pressman can readily make the necessary adjustments on the various rolls when setting up and thereby save considerable yardage of material from being spoiled.

Referring once more to Fig. 1 it will be noted that the boxes 5 are provided with piston rods 11 having pistons 12 on the end thereof.

Each piston 12 is slidably mounted in a cylinder 13 which is connected by conduits 14 and 15 to supply lines 16 and 17 that lead from the valves in the control units 18 mounted on a panel 19.

The control units, there being one unit for each print roll, comprises a casing 20 having four cylindrical bores 21, two of which are shown in Fig. 4, which are closed by means of end caps 22 and 23. The end cap 22 has a pair of bearing holes 24 and a pair of screw threaded holes 25 while the rear cap has a pair of channels 26, the holes and the channels being in line with the bores 21.

Slidably mounted in the upper pair of bores 21 are a pair of spool shaped valve members 27 having full sized portions 28 and 29 which are separated by a reduced portion 30. The valve members 27 have stems 31 which extend through the bearing holes 24, said stems being suitably fastened to a plate 32. A knob 33, attached centrally of the plate 32, Fig. 2, carries a latch 34 and is used to move the valves 27 to the right, as viewed in Fig. 4, against the action of springs 35, said springs normally holding the valves 27 to the left as shown. When it is desired to hold the valves 27 to the right the latch 34 abuts the end cap 22 and prevents the springs 35 from moving the said valves.

Slidably mounted in the lower pair of bores 21 are valve members 36 having full size portions 37 and 38 separated by a reduced portion 39. The valves 36 are normally in balance and held to the left, as viewed in Fig. 4, by compression springs 40 one end of which abuts the valve members 36 and the other end abuts buttons 41. In order to adjust the pressure of the springs 40, screw threaded members 42, mounted in the screw threaded holes 25, are provided with knobs 43. By turning the knobs 43, Figs. 3 and 4, the members 42 will change the position of the button 41 and thereby change the action of the springs. If the button 41 is moved to the left the springs will exert a greater force than when they are in the position as shown.

The control unit casing 20 is also provided with ports 44, 45, 46, 47, channels 48, connecting the upper and lower bores 21, and channels 49 which intersect the channels 48 and connect them to the channels 26.

Fluid under pressure is provided by a pump 50, driven by a motor 51, which draws fluid from a sump 52. A conduit 53 from the pump connects with the ports 44 in the several control units from which point it is directed to the cylinders as will presently be explained.

In the drawing is shown for the purpose of illustration a rotary printing press set up for an eight color job and for the sake of clearness of the description, the control units are designated as A—B—C—D—E—F—G—H while the cylinders which are controlled by the said units are respectively designated as A'—B'—C'—D'—E'—F'—G'—H'. The cylinders are in pairs, Fig. 2, there being one cylinder for each end of each print roll. Referring to Figs. 1 and 2 it will be noted that a single control unit A controls the pressure in each cylinder of the pair of cylinders A' associated with the print roll 8.

Fluid under pressure entering the port 44, in the control units, from the pump 50 passes around the reduced portion 39, of the valve member 36, through passage 48 around the reduced portion 30, of the valve 27 to the outlet port 47 and to supply pipe 17. The conduit 14, cut into the pipe 17, directs the fluid to the outer end of the cylinders 13 and causes the piston 12 to move the box 5 to press the print roll against the material to be printed.

The amount of pressure necessary to cause the print rolls to transfer the pattern thereon to the material is controlled by means of the regulating valve 36 which is held in balance by the adjustable compression spring 40. When the spring 40 is set to meet given requirements the fluid under pressure in passages 48, 49 and 26 will maintain the regulating valve 36 in balance as shown in Fig. 4. In order that the pressman may know what pressure is being applied to each end of the print roll pressure gauges 54 and 55, Figs. 2 and 3, are provided in the pressure lines of each cylinder, said gauges being suitably mounted on the control unit.

If a print roll should be out of round or eccentric in relation to the centerline of the mandrel boxes the eccentricity will cause variations in the pressure on the line of contact between the blanket roll and the print roll depending on whether the high side or the low side of the roll is in contact with the blanket roll. If, as is the practice today, the print rolls are held against the material to be printed by a screw the quality of the printing will vary as the pressure varies but with the control valves of this invention the pressure between the print rolls and the material is maintained substantially even regardless of whether the high side or low side of the roll is in contact. Even should one end of the roll be eccentric the pressure can be so regulated that the whole roll will have a substantially equal pressure along the line of contact.

As above stated the valve 36 is normally in balance due to the fluid under pressure on one side and the spring 40 on the other side so that should a roll be eccentric the high side of the roll will cause a back pressure in the cylinder 13 corresponding to that roll and this back pressure being in excess of the pressure exerted by the spring 40 will cause the valve 36 to move to the right, Fig. 4, and open up the exhaust port 45 so as to relieve the system of the said excess. By relieving the system of the excess pressure as it occurs it is possible to maintain a substantially even pressure on the print rolls at all times.

Any time it becomes necessary to remove a print roll from the machine the operator needs only to pull out the reverse valves 27 by means of the knob 33 and the fluid under pressure to that particular pair of cylinders will be reversed. Upon pulling the reverse valves 27 to the right the exhaust port 46 is closed to exhaust and opened to pressure while the pressure port 47 is closed to pressure and opened to exhaust 47' thereby directing the fluid under pressure through supply pipe 16 to conduit 15 and the front end of the cylinder 13 thereby withdrawing the box 5

quickly away from the blanket roll as shown at B', Fig. 1.

Fluid under pressure may be applied to the boxes directly by the cylinder and piston units or it may be applied through an intermediate system of levers whereby very high resultant pressures can be applied to certain of the rolls. In Fig. 1 it will be noted that the two lower print rolls are pressed toward the blanket roll through the medium of such a system in which the rod **56** on the box **5** is suitably fastened to a lever **57** fulcrumed at **58**. One end of a link **59** is connected, as by a ball and socket joint, to the lever **57** while the other end of said link is fulcrumed at **60** to an arm **61** of a two armed lever **62**, said lever being fulcrumed on a stud **63** fastened to the machine frame **1**. The other arm **64** of said lever **62** abuts a piston rod **65** provided by the cylinder D'. Fluid under pressure entering the top of cylinder D' will move the piston rod **65** downward by rocking the lever **62** about its fulcrum **63** and thus, through the link **59**, force the print roll associated therewith against the material. Only one system of this linkage has been described owing to the fact that they are both of the same construction and operation.

From the above explanation and description of this invention it will be readily seen that the control and operation of a printing press for strip materials has been greatly simplified and improved whereby better printing can be obtained owing to the ability to obtain closer adjustments of pressures. Also the fact that the pressman has a central station from which he can control the various mandrel boxes and know just what pressures he has at all points of the press. With this invention it is also possible to make instant adjustment for repeat work and to make quicker changes for new print rolls.

I claim:

1. In a printing or embossing machine having engraved rollers operated by fluid under pressure, a piston connected to each end of each roller, a cylinder for each piston, means to supply fluid under pressure, and manually adjustable means actuated by the fluid to maintain a substantially equal pressure in each cylinder.

2. In a printing or embossing machine having a plurality of engraved rollers, means to apply pressure to each of said rollers comprising a pair of cylinders and pistons associated with each of said rollers, a source of supply of fluid under pressure for said cylinders, and manually adjustable means actuated by the fluid to maintain a substantially constant pressure on each of said rollers.

3. In a printing or embossing machine having in combination a blanket roll, a plurality of rolls spaced about the periphery of said blanket roll, and hydraulically actuated means to apply pressure to said rolls, of a control unit associated with said hydraulically actuated means to automatically regulate and maintain a given pressure between said blanket roll and said rolls.

4. In a printing or embossing machine having in combination a blanket roll, a plurality of rolls spaced about the periphery of and in contact with said blanket roll, and hydraulically actuated means to apply pressure to each end of each of said rolls, of a control unit for each of said rolls associated with said hydraulically actuated means comprising a pair of pressure actuated regulating valves whereby the pressure at each end of each of said rolls can be individually controlled and maintained.

5. In a printing or embossing machine having in combination a blanket roll, a plurality of rolls spaced about the periphery of and in contact with said blanket roll, and hydraulically actuated means to apply pressure to each end of each of said rolls, of a control unit for each of said rolls comprising a pair of reversing valves and a pair of pressure regulating valves, said regulating valves acting individually to control the pressure at each end of one of said rolls and said reversing valves acting simultaneously to reverse the flow of fluid under pressure to withdraw one of said rolls from contact with said blanket roll.

6. In a printing or embossing machine having in combination a blanket roll which provides a backing for material to be printed or embossed, a plurality of engraved rolls in contact with the material on the blanket roll, a mandrel box for each end of each of said engraved rolls, a cylinder and piston for each box, and fluid under pressure for said cylinders and pistons, of a plurality of centrally located control units for said engraved rolls, each of said units containing means for compensating for any change in pressure between its associated engraved roll and the blanket roll whereby the pressure of the engraved roll on the material will remain constant.

7. In a printing or embossing machine having one or more pattern rollers operated by fluid under pressure, a piston connected to each end of each roller, a cylinder for each piston, means to supply fluid under pressure to said cylinders, and means remote from the cylinders to indicate the amount of pressure in said cylinders.

8. In a printing or embossing machine having one or more pattern rollers operated by fluid under pressure, a cylinder and piston unit operatively connected to each end of each roller, means to supply fluid under pressure, and a remote control device for automatically controlling variations in the pressure in each cylinder and piston unit.

9. In a printing or embossing machine having one or more pattern rollers operated by fluid under pressure, a cylinder and piston unit operatively connected to each end of each roller, means to supply fluid under pressure, and a remote control device for controlling the pressure in each cylinder and piston unit including means for visual comparison of the pressures in each cylinder.

10. In a printing or embossing machine having an engraved roller operated by fluid under pressure, a piston connected to each end of said roller, a cylinder for each of said pistons, means to supply fluid under pressure, and manually adjustable means actuated by the fluid to maintain a substantially equal pressure in each cylinder.

11. In a printing or embossing machine having in combination a blanket roll, a roll in contact with said blanket roll, and hydraulically actuated means to apply pressure to said roll, of a control unit associated with said hydraulically actuated means to automatically regulate and maintain a given pressure between said blanket roll and said roll.

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