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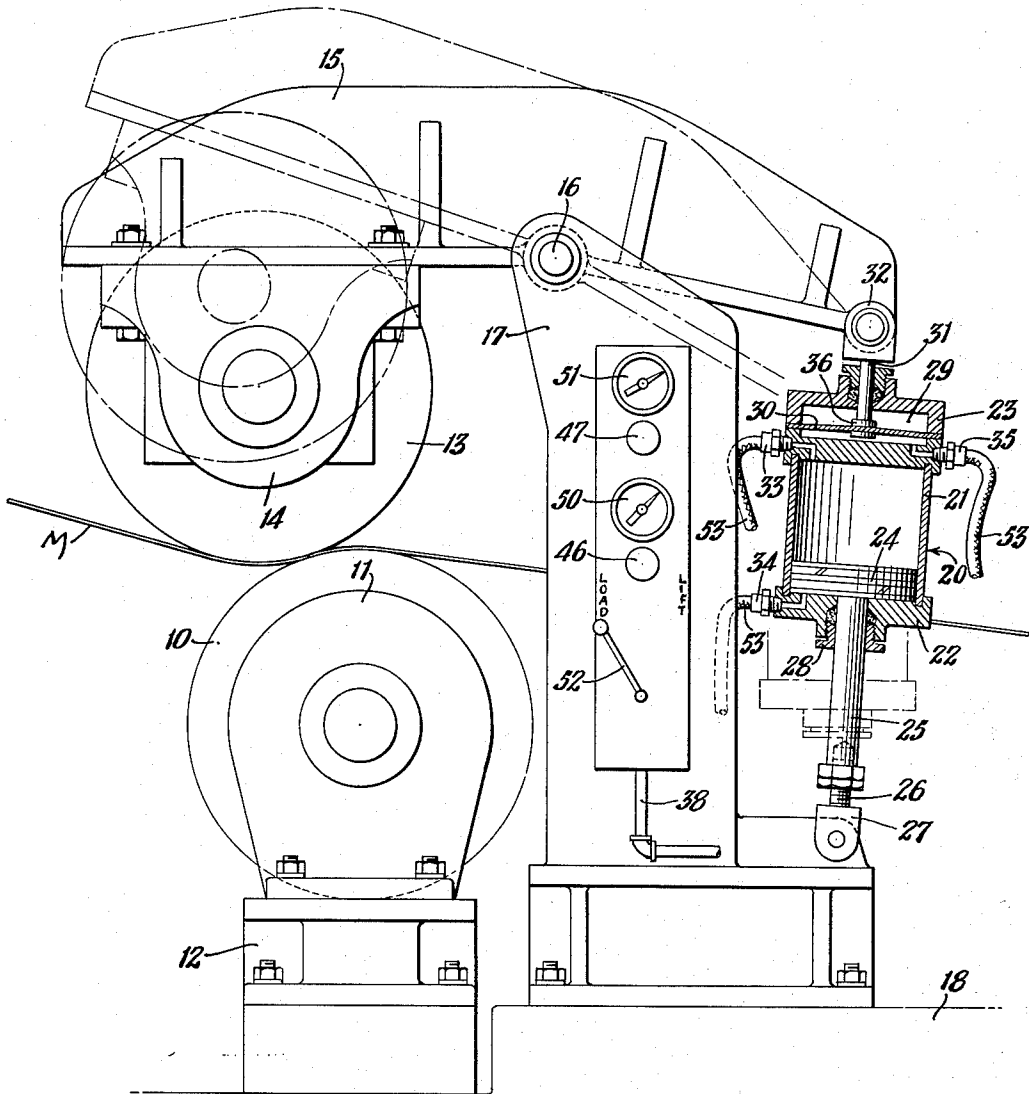
2,738,663

PRESSURE LOADING CONTROL

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2 Sheets-Sheet 1

Fig. 1.



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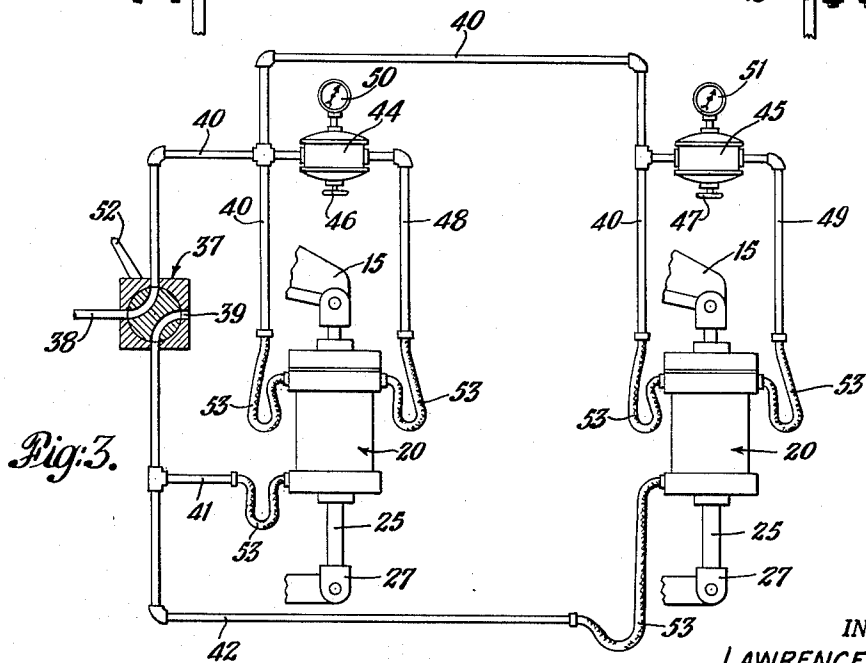
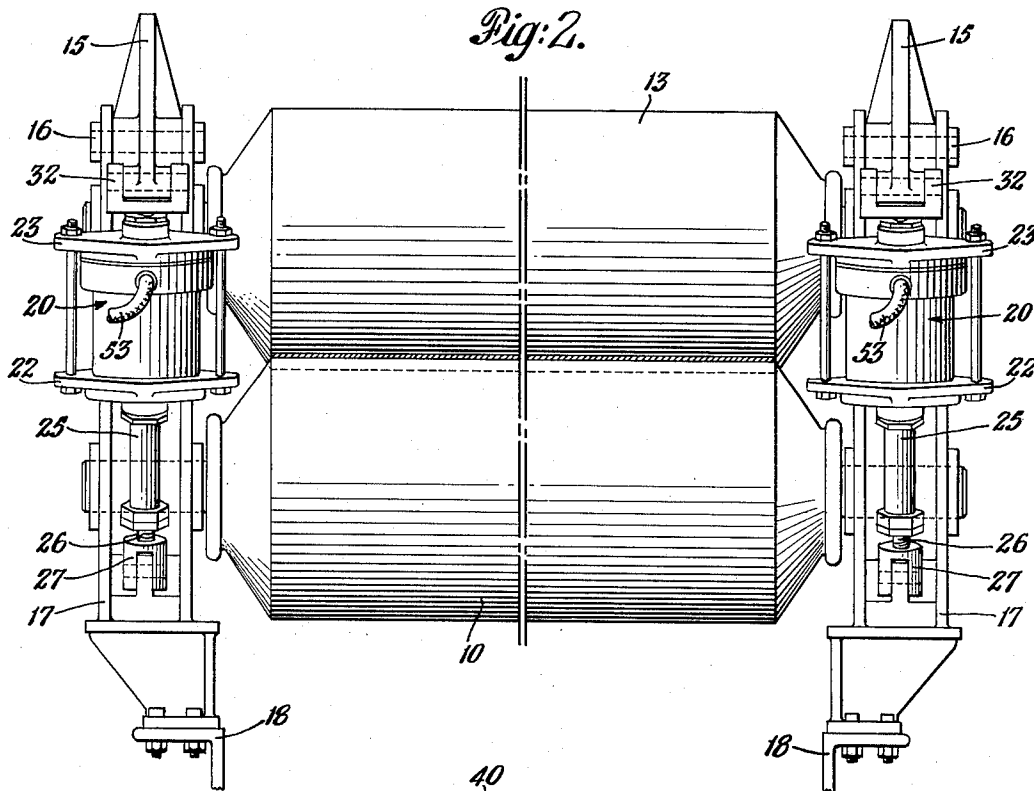
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PRESSURE LOADING CONTROL

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3 Claims. (Cl. 68—258)

This invention relates to machinery used in the manufacture of sheet material such as textiles or papers and more particularly to apparatus for subjecting the sheet material to pressure.

In the manufacture of sheet material, it is necessary to subject the material to pressures of high magnitudes in order to perform various operations such as removal of moisture, reduction of the thickness, treatment of the surface, etc. The pressures required are often obtained by passing the sheet materials between large cylindrical rolls which are used in pairs or in stacks called calendaring units.

In applying pressure by this method, it is essential that pressures of high magnitudes be obtained. In addition, it is often desirable or necessary that the pressure on each end of the cylindrical rolls be independently adjustable to compensate for changes in moisture, thickness and the like. It is also desirable that provision be made for moving the cylindrical rolls apart a considerable distance in order to provide sufficient space for repairs and threading of the sheet material. A further requirement of the apparatus is that the pressure be easily and quickly controlled by a minimum of control devices.

It is therefore an object of this invention to provide an apparatus for increasing the pressure between the cylindrical rolls.

It is a further object of this invention to provide such an apparatus wherein the pressure on either end of the cylindrical rolls may be individually adjusted.

Another object of this invention is to provide such an apparatus wherein provision is made for moving the cylindrical rolls into and out of contact with a web travelling therebetween.

A further object of this invention is to provide such an apparatus which involves a minimum of control devices for operating the same.

Basically this invention comprises a stationary cylindrical roll and a movable pressure roll including means connected to either end of the pressure roll for moving it into contact with the stationary roll. In addition, means are provided for applying an increased pressure of predetermined magnitude to either end of the pressure roll.

Referring to the accompanying drawings:

Fig. 1 is a part sectional elevational view of the cylinder roll mechanism in which my invention may be embodied;

Fig. 2 is a side elevational view of the same; and

Fig. 3 is a diagram of the air line connections to the various parts of the apparatus and the controls therefor.

Referring to Fig. 1, a stationary roll 10 is mounted in brackets 11 fastened to a base 12. A movable pressure roll 13 is mounted in trunnions 14 on lever arms 15. The lever arms 15 are pivoted at 16 in stationary vertical supports 17 fastened to a base 18. The pressure roll 13 is movable by the pivoting action of the lever arms 15 into and out of contact with the stationary roll 10, i. e. into and out of contact with the web of sheet material M which is pressed between rolls 10 and 13. The

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means for moving the pressure roll in such a manner comprises cylinder motors 20 operatively connected respectively to the lever arms 15 (Fig. 2).

Each of the cylinder motors 20 comprises a cylinder housing 21, a lower cap 22 and an upper cap 23. A piston 24 is connected to a piston rod 25 which projects through the lower cap 22. The piston rod 25 is provided with a bolt 26 and yoke 27 which pivotally connect the piston rod 25 to the rigid support 17. Suitable packing surrounds the piston rod 25 and is held in position by the nut 28.

The upper cylinder cap 23 is provided with a chamber 29 in which a diaphragm 30 is placed. A short shaft 31 is connected at one end to the diaphragm and is formed at the other end with a yoke 32 which is pivotally connected to the lever arm 15. The diaphragm is made of a suitable flexible material such as neoprene. The short shaft 31 is provided with a head or collar 36 to prevent shearing of the diaphragm when the short shaft moves upwardly relative to the cylinder housing.

Air connections 33 and 34 are provided for each motor to supply air under pressure to either end of the motor cylinder 20 thereby causing it to move up or down, carrying with it the diaphragm 30 and short shaft 31. The shafts 31 in turn cause the lever arms 15 to pivot, moving the pressure roll 13 into or out of contact with the stationary roll 10. An air connection 35 is also provided for supplying air under an adjustably regulated super-atmospheric pressure to the underside of the diaphragm 30 at the same time that the pressure roll is moved into contact with the stationary roll 10. Atmospheric pressure is maintained on the upper surface of the diaphragm at all times. This diaphragm arrangement provides the means for increasing the pressure between the rolls 10, 13 and accurately adjusting the same.

The diagram shown in Fig. 3 indicates the various air line connections and the controls therefor. A four-way valve 37 is provided for controlling the air which enters through pipe 38 and exhausts through opening 39. In the position shown in Fig. 3, the mechanism is shown in the load or pressure applying position. The air enters through pipe 38 and is supplied through lines 40 to the upper end of each of the cylinder motors 20 thereby forcing the motor cylinder upward relative to the piston and pivoting the lever arms 15 to bring the pressure roll 13 into contact with the stationary roll 10.

At the same time the air line to the lower ends of the cylinder motors 20 is connected through lines 41, 42 to the exhaust opening 39.

While air under pressure is being applied to the upper end of each of the cylinder motors, air under reduced pressure is also applied to the underside of the diaphragm 30. The magnitude of this pressure is controlled by individually adjustable reducing valves 44 and 45 having control knobs 46, 47 which adjustably regulate and control the degree of air pressure supplied through lines 48, 49 to the underside of the diaphragm 30. Air lines 40, 41, 42, 48 and 49 include flexible sections 53. The elbows and joints connecting these air lines as schematically shown in Fig. 3 are conventional open connections. Each of the reducing valves is provided with a pressure gauge 50, 51 for readily observing the magnitude of the pressure applied to the diaphragm.

When it is desired to remove the pressure and lift the pressure roll 13 out of contact with the stationary roll 10, a lever 52 may be used to change the position of a four-way valve 37 to the lift position. In this position the upper ends of the cylinder motors 20 and the underside of the diaphragms are each connected to the exhaust opening 39 and air under pressure is applied to the lower ends of the cylinder motors 20 causing the cylinder housings and associated apparatus to move downwardly with re-

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spect to the pistons and thereby lift the pressure roll 13 out of contact with the stationary roll 10. This position is shown by broken lines in Fig. 1.

The control valve 37, reducing valves 44, 45 and associated gauges 50, 51 and knobs 46, 47, may be mounted on the single panel fastened to the vertical support 17, thereby providing an easily accessible and compact control panel.

It will of course be understood that any sheet material passing between the rolls would be subjected to the pressure between the rolls. The sheet material will usually, but not necessarily, be threaded between the rolls when they are apart.

It can readily be seen that this invention provides an apparatus for easily and effectively moving the pressure roll into contact with the stationary roll and in addition, accurately adjusting the pressure between the rolls at either end thereof. The cylinder motors proper are utilized to provide the large displacement necessary to move the pressure roll into and out of contact with the stationary roll and the diaphragms are utilized to provide the sensitive and accurate pressure regulation at each end of the rolls, which is necessary to effectively control the pressure between the rolls. The control valves provide a simple and efficient means for controlling the operation of the apparatus with a minimum of variation.

Throughout the specification and claims, where reference is made to movement of the movable roll into and out of "contact" with the stationary roll, the term "contact" is used in a relative sense since it is understood that in operation of the apparatus the web of material being processed will be between the two rolls as the movable roll is being pressed into close proximity to the stationary roll and substantially in contact therewith.

Modifications may be resorted to within the spirit and scope of the appended claims.

I claim:

1. The combination of a cylindrical roll rotatably mounted in fixed position, a second roll spaced above the first roll, a pair of lever arms, said second roll rotatably mounted at its ends in said lever arms for movement into and out of contact with a web interposed between the first and second rolls, cylinder motors connected to said lever arms and operable to actuate said lever arms and move the second roll into and out of contact with the first roll,

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each said cylinder motor comprising a cylinder housing, a piston, a piston rod connected to the piston at one end thereof and projecting through one end of the cylinder housing and pivotally connected to a rigid support, said cylinder housing being provided with a chamber on the other end thereof opposite said one end, a diaphragm mounted in said chamber, a shaft connected to the diaphragm and projecting through said other end of the cylinder housing, said shaft being in alignment with the piston rod and pivotally connected to the lever arm and thereby forming an operative connection with the cylinder motor, means for reversibly applying air under pressure to the opposite ends of each cylinder motor and thereby moving each cylinder housing, chamber, diaphragm, and shaft relative to the respective piston and piston rod, and thereby actuating the lever arms for moving the second roll into and out of contact with a web interposed between the first and second rolls, and means for supplying air under pressure against each said diaphragm at the same time that said second roll is being moved into position to thereby impart an increased pressure to the web.

2. The combination set forth in claim 1, including a single valve for controlling the flow of air to the ends of the cylinder motors.

3. The combination set forth in claim 1, in which the means for supplying air under pressure against the diaphragms include individually adjustable reducing valves individual to the diaphragms.

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