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HYDRAULICALLY BALANCED PRESSURE ROLL FOR GLUE MACHINES

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FIG. 1.

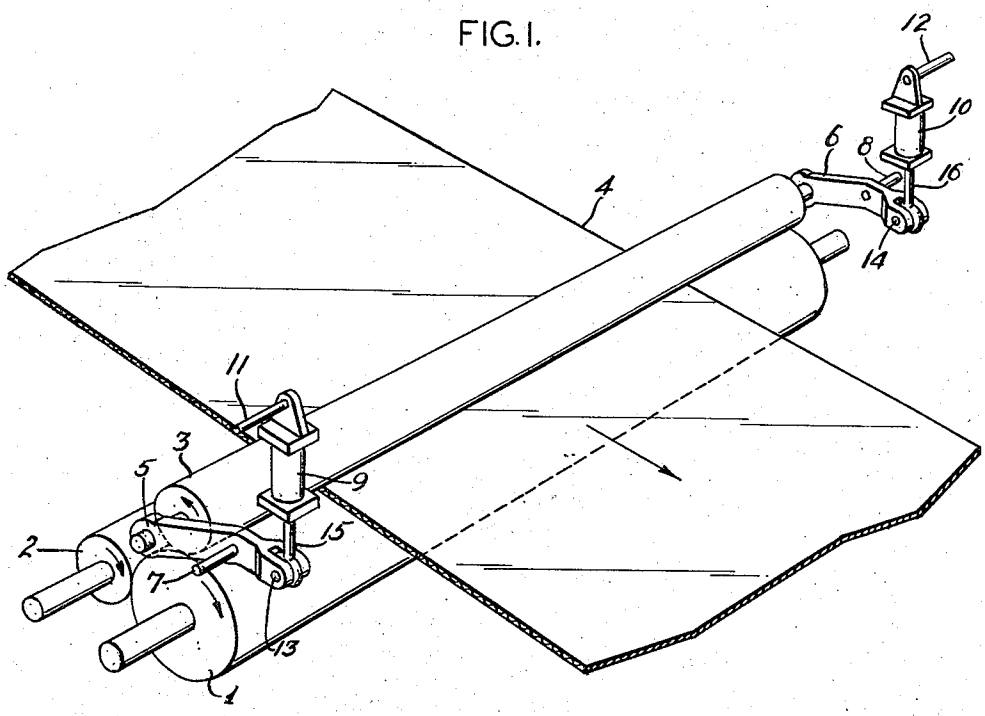
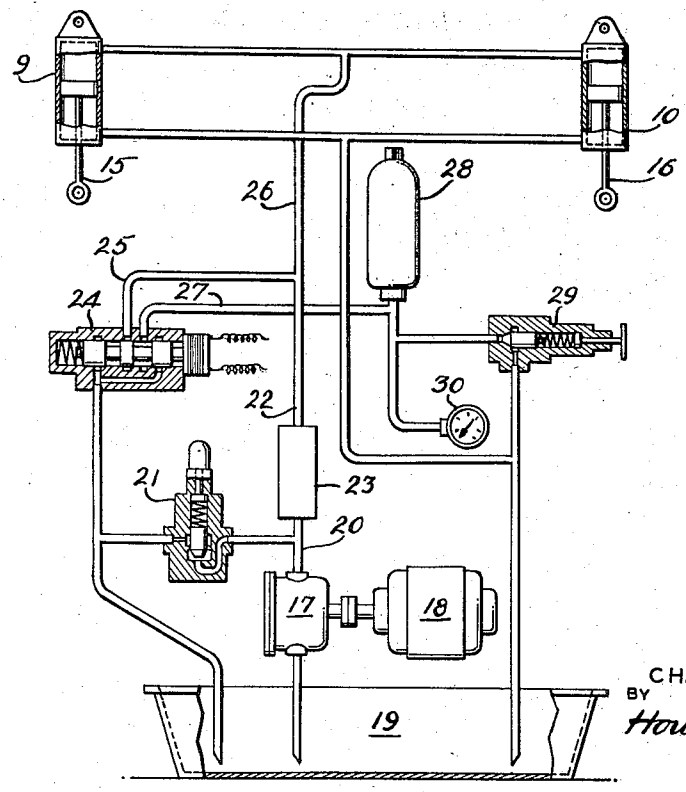


FIG. 2.



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HYDRAULICALLY BALANCED PRESSURE ROLL FOR GLUE MACHINES

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9 Claims. (Cl. 118—249)

In the production of double faced corrugated board, it is necessary after application of the facing liner on one face of the board to apply glue to the tips of the flutes at the other face prior to application of the second facing liner. Conventionally, this is accomplished by means of a glue machine comprising a glue applicator roll, a doctor or metering roll, and a rider or pressure roll. The function of the rider roll is to press the single faced corrugated web down into the film of glue on the applicator roll to insure transfer of adhesive.

Heretofore, a heavy rider roll has been used and this roll has been positioned dimensionally from the glue roll a fixed distance so that pressure of each flute into the glue film is assured. Adjustment of the roll has been by manual feel, the practice being to set the roll by means of suitable adjustment devices so that the roll, which is driven by contact with the paper, exhibits a certain torque by feel when grasped with both hands.

Conventionally also, the roll is pivotally mounted on arms so that it may swing up. To prevent bouncing, however, its weight has had to be such that in the absence of positive stops it would crush the corrugations. Obviously, with a fixed adjustment of this character, if the thickness of the single faced board changes, and if the operator is not alert, the flutes are either crushed or receive insufficient adhesive.

A principal object of this invention is to provide means whereby a constant pressure may be exerted on the web by the rider roll irrespective of variations in the thickness of the web.

Another object of the invention is to provide means, not dependent solely on the weight of the roll, for preventing bouncing of the latter.

Still another object of the invention is to provide means for regulating the amount of pressure applied through the roll to suit various operating conditions and requirements.

The invention contemplates also a means for automatically lifting the rider roll from the web when the machine stops, and to lower it when the machine starts.

The invention will be more readily understood by reference to the attached drawings wherein:

Fig. 1 is a fragmentary view in perspective of a typical glue machine illustrating the relative arrangement of rolls and

Fig. 2 is a schematic diagram of the hydraulic system.

With reference to Fig. 1 of the drawings, the numeral 1 indicates the conventional applicator roll of a glue machine, and the numeral 2 indicates the doctor or metering roll which is associated in conventional manner with the applicator roll 1. 3 is the rider or pressure roll which functions generally as described above. These three rolls and their relative arrangements are in general conventional, as also is their operative relation to the paper or other web to which the adhesive is to be applied, such web, indicated by the reference numeral 4, travelling between and in contact with the rolls 1 and 3 as illustrated.

In accordance with the present invention, the roll 3 is

journalled in arms 5 and 6 at opposite ends respectively of the roll. These arms are pivotally mounted on pins 7 and 8 respectively in the fixed frame (not shown) of the machine. Hydraulic cylinders 9 and 10 are also pivotally mounted, by way of trunnion pins 11 and 12 respectively, in the said frame, and clevis pins 13 and 14 connect the piston rods 15 and 16 of the hydraulic cylinders to the ends of the arms 5 and 6 respectively.

Referring to the hydraulic circuit illustrated in Fig. 2, a pump 17 driven by motor 18 draws oil or other suitable hydraulic medium from a reservoir 19 and supplies it under pressure to pipe line 20. A relief valve 21 protects the system from excessive pressure. A metered quantity of oil or other hydraulic medium is supplied to line 22 through a pressure compensated orifice 23 of well known commercial form which responds to variations in system pressure to maintain a substantially constant volume delivery of the hydraulic medium to the system from the pump. A solenoid valve 24 when de-energized, as illustrated, closes pipe line 25 so that oil flows through line 26 under full pressure to the head end of cylinders 9 and 10 thereby extending the piston rods 15 and 16, rocking the arms 5 and 6 clockwise (as viewed in Fig. 1) on their respective pivot pins 7 and 8, and elevating pressure roll 3 out of engagement with the web 4. The solenoid of valve 24 is preferably connected across the circuit of the prime mover of the machine (not shown) so that when the operation of the machine and the travel of the web 4 is interrupted, the solenoid will be de-energized and the roll 3 will be elevated, as described; and when the machine is started the roll 3 is automatically returned to operative position with respect to the moving web.

When the machine starts the solenoid valve 24 is energized, as described, so that line 25 is connected to line 27 and therethrough with accumulator 28, manually adjustable pressure relief valve 29 and gauge 30. Under these conditions, the pressure in line 26 and cylinders 9 and 10 is reduced to the setting of relief valve 29, which may be adjusted to apply pressure through cylinders 9 and 10 to the arms 5 and 6 so as to counterbalance part of the weight of the roll 3 and to allow it to contact the paper with desired regulated pressure.

Variations in the thickness of the web and the resultant variations in the system pressure will be compensated by the cushioning action of the accumulator 28, the accumulator also affording the degree of resilience in the system which is necessary to permit the minor adjustments of the roll 3 required for maintenance of a constant pressure relation with the variable web. Increased thickness in the web tends to reduce system pressure, and decreased thickness tends to increase system pressure. The variations are small and the compensation is immediate.

Since the roll 3 may be counterbalanced to any desired degree to prevent crushing, and since the movements of the piston rods 15 and 16 are dampened by flow of the hydraulic medium into and from the accumulator 28, bouncing of the roll 3 is inhibited.

As long as the machine remains in operation, the resultant energization of the solenoid valve 24 will maintain the system in operative condition with respect to the pressure function of the roll 3 with the accumulator and the valve 29 connected in the system with the cylinders 9 and 10. If the operation of the machine is interrupted, the valve 24 will be de-energized and will move automatically into the position shown in the drawings. The valve 29, and the accumulator will then be disconnected from the pump 17 and full pump pressure will then be applied to the head ends of the cylinders 9 and 10 to elevate the roll 3 from the web.

I claim:

1. In a mechanism for applying substantially constant pressure within a localized area to a surface of a continuously travelling web, a pressure roll seating against said surface, a movable mount for the roll providing for displacement of the roll by the web, and fluid pressure means for regulating the seating pressure of the roll on the web, said regulating means comprising a fluid pressure system including piston means operatively connected to the roll and actuated by pressure in said system to counterbalance the seating pressure of the roll on the web, means for maintaining the system at a predetermined substantially constant pressure, and means in said system for absorbing minor variations in the pressure in said system resulting from displacements of the roll by the web.

2. Mechanism according to claim 1 including means for adjusting the system to the desired constant pressure.

3. In a mechanism for applying substantially constant pressure within a localized area to a surface of a continuously travelling web, a pressure roll seating against said surface, a movable mount for the roll providing for displacement of the roll by the web, and fluid pressure means for regulating the seating pressure of the roll on the web, said regulating means comprising a hydraulic system including piston means operatively connected to the roll mount and actuated by pressure in the system to exert force on the mount counterbalancing the seating pressure of the roll on the web, means for adjusting the pressure in said system and thereby the said counterbalancing force, means for maintaining the system substantially constant at the adjusted pressure, and pneumatic means in said system for absorbing minor variations in the system pressure resulting from displacements of the roll by the web.

4. In a mechanism for applying substantially constant pressure within a localized area to a surface of a continuously travelling web, a pressure roll seating against said surface, a movable mount for the roll providing for displacement of the roll by the web, hydraulic piston means connected with the mount in counterbalancing relation with the roll and constituting a means for regulating the pressure of the roll on the web, a constant volume hydraulic pressure source connected to the piston means for actuating the latter to counterbalance the roll, pressure relief means connected to the piston means for limiting the hydraulic pressure applied to the latter, and means for adjusting said relief means to regulate the pressure of the roll on the web.

5. Mechanism according to claim 4 including pneumatic means connected to the piston means for absorbing minor variations in the hydraulic pressure imposed upon the relief means by displacements of the rolls by the web.

6. In a mechanism for applying substantially constant pressure within a localized area to a surface of a continuously travelling web, a pressure roll seating against said surface, a movable mount for the roll providing for displacement of the roll by the web, hydraulic piston means connected with the mount in counterbalancing relation with the roll and constituting a means for regulating the pressure of the roll on the web, a constant volume hydraulic pressure source, a pipe line forming a direct connection between the source and the piston means, a relief valve for limiting the hydraulic pressure on the piston means and means for adjusting the valve to regulate said pressure, an accumulator for absorbing minor pressure fluctuations in the line resulting from displacement of the roll by the web, and a valve for selectively connecting and disconnecting the said accumulator and relief valve to the pipe line.

7. In a mechanism for applying adhesive to the tips of the corrugations at one face of a continuously travelling corrugated web, an adhesive applicator roll at said face, a pressure roll exerting pressure on the opposite face of the web to press the said tips against the applicator roll, a movable mount for the pressure roll providing for displacement of the roll by irregularities in the web, hydraulic piston means connected to the pressure roll mount in counterbalancing relation to the roll and constituting a means for regulating the pressure of the roll on the web, a constant volume hydraulic presure source and a line connecting the source to the piston means for actuating the latter to counterbalance the roll, means for regulating the pressure applied to the piston means from said source, and means for absorbing minor pressure fluctuations in said line resulting from displacement of the roll by the web.

8. Mechanism according to claim 7 wherein the means for regulating the pressure applied to the piston means comprises an adjustable relief valve connected to said line, and wherein further valve means is provided for selectively breaking and making said connection.

9. Mechanism according to claim 7 wherein the means for absorbing pressure fluctuation in the line consists of a pressure accumulator connected between the said pressure source and the piston means.

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