

June 21, 1949.

A. W. JOHNSON

2,474,052

DOCTOR OPERATING MECHANISM

Filed May 6, 1946

2 Sheets-Sheet 1

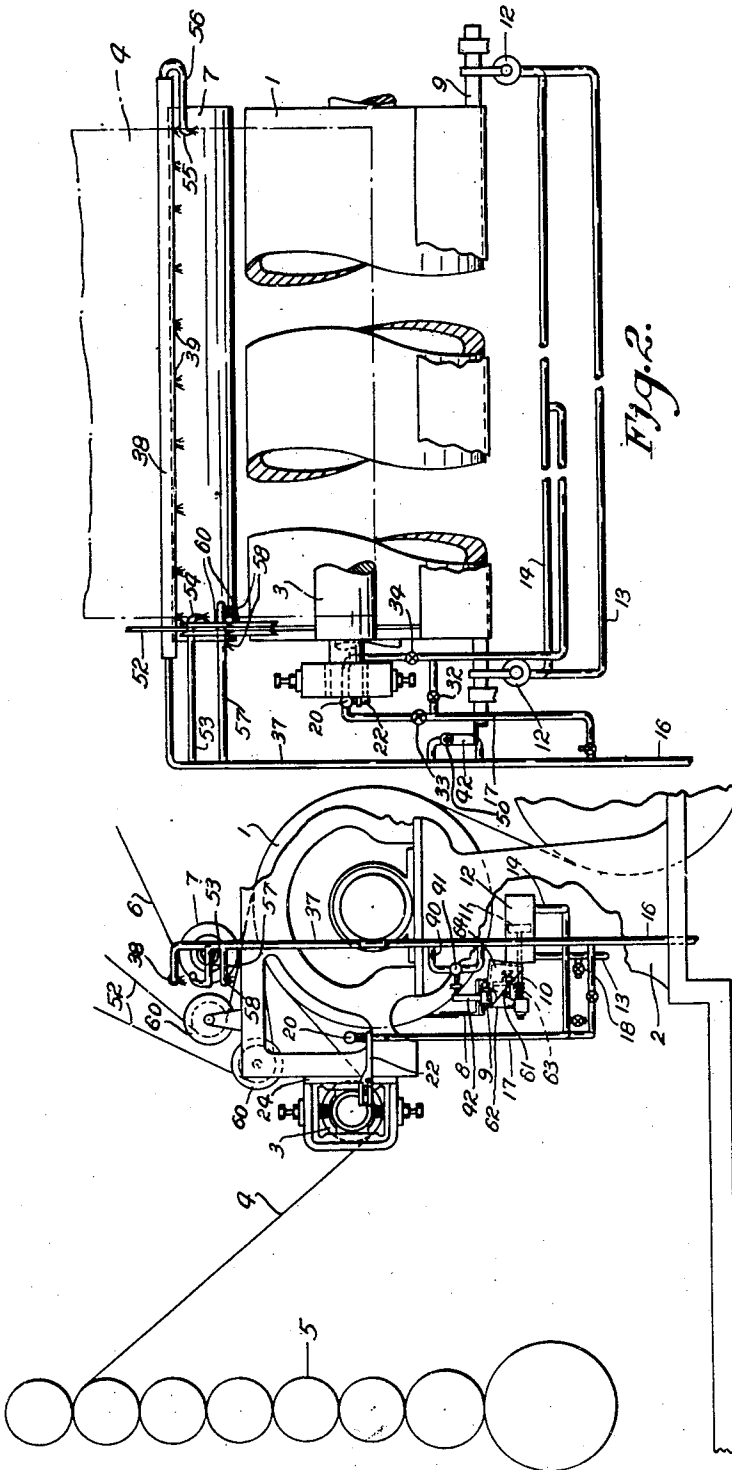


Fig. 1.

Fig. 2.

Inventor:
A. W. Johnson
By *W. E. Keeler*
Attorney.

June 21, 1949.

A. W. JOHNSON

2,474,052

DOCTOR OPERATING MECHANISM

Filed May 6, 1946

2 Sheets-Sheet 2

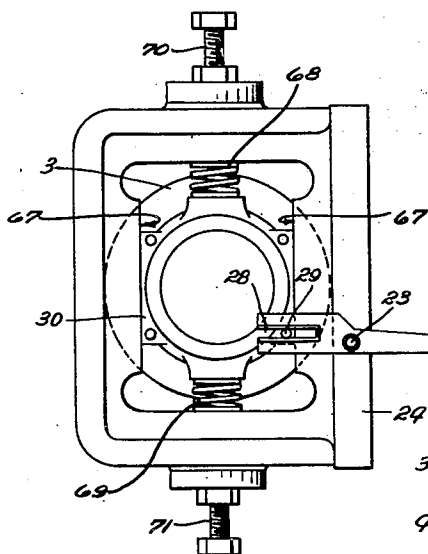


Fig. 3.

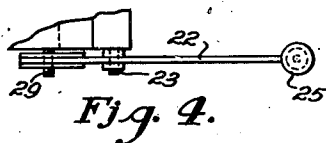


Fig. 4.

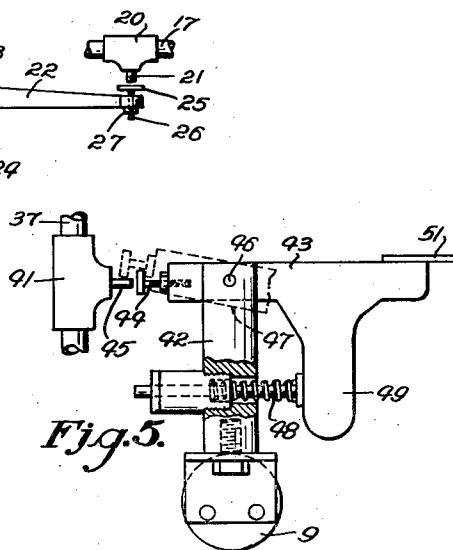


Fig. 5.

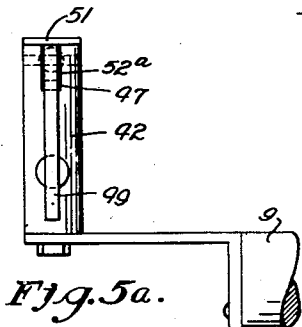


Fig. 5a.

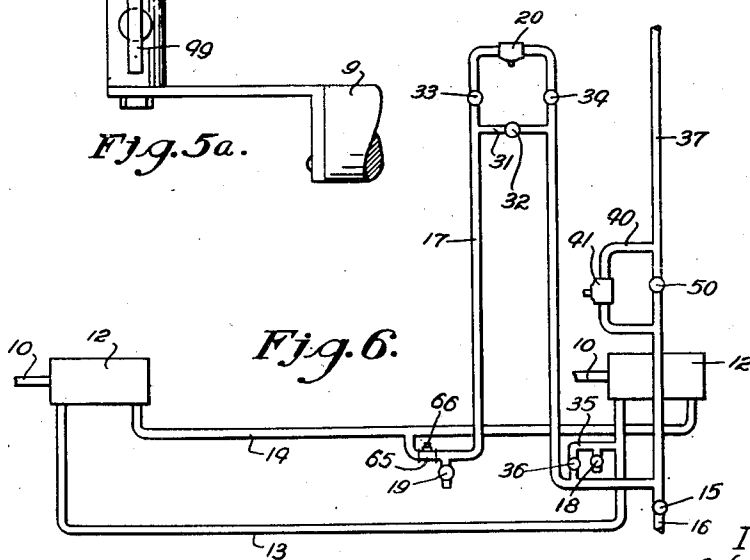


Fig. 6.

Inventor:
A. W. Johnson
By *Alfred E. Radner*
Attorney.

UNITED STATES PATENT OFFICE

2,474,052

DOCTOR OPERATING MECHANISM

Anton Walter Johnson, Masson, Quebec, Canada

Application May 6, 1946, Serial No. 667,681

1 Claim. (Cl. 92-74)

1

This invention relates to doctor operating mechanism for paper making machines.

Many operating difficulties are traceable to presently employed doctors and their actuating means, particularly in conjunction with the last dryer roll, which is usually the sweat dryer, of paper machines. In some cases, the doctor is maintained in closed position, i. e., in engagement with the dryer roll at all times, but this results in excessive wear on the doctor blade. Moreover, in machines employing a sweat dryer roll, wherein a film of water is present on the roll for adsorption by the paper web, a closed doctor removes such film and little benefit is derived therefrom. In the latter case, a worn or burred edge on the blade produces streaks in the paper web. If the doctor is normally maintained in open position, it must be closed immediately when a break in the web occurs to prevent the latter from continuing around the roll. In some cases, the operation of the doctor is dependent on manual operation, which requires the constant attention of a skilled operator. This is not only undesirable but is frequently subject to manual failure. Means have been proposed for automatically closing the doctor on breaking of the web, but such means have not been completely dependable under all operating conditions.

It is an object of this invention to provide a doctor actuating mechanism of the automatically operable type which is of simple and inexpensive manufacture and which is substantially free from the possibility of operating failure. Another object is to provide, in association with the doctor actuating mechanism, means for preventing a broken paper web from adhering to the dryer felt and associated rolls.

The invention contemplates the provision of a doctor actuating device which is automatically operable in response to movement of the usual spring roll. It also contemplates the provision of an air blast operable simultaneously with the doctor actuating mechanism to maintain a broken web in engagement with the dryer roll forwardly of the doctor thereon.

Other objects, details and advantages of the invention will become apparent as the description proceeds with particular reference to the accompanying drawings, in which

Figure 1 is a side elevation of a portion of a paper making machine showing the doctor and actuating mechanism associated therewith,

Figure 2 is a partial end elevation,

Figure 3 is an enlarged side elevation showing a detail of the doctor actuating device,

2

Figure 4 is a plan view of the detail shown in Figure 3,

Figure 5 is a side elevation of a valve operating detail,

5 Figure 5a is a front elevation of the detail shown in Figure 5, and

Figure 6 is a diagram of the air conduits or pipes.

The paper making machine illustrated is of usual type and the portion shown includes dryer roll 1, mounted in frame 2, a spring roll 3, engaged by the paper web 4 on its way to the calendar 5, a dryer felt 6 and supporting roll 7, rope sheaves 60, and ropes 52. The dryer roll 1 is the last in the usual series of such rolls, and, in some machines, is the sweat dryer. A doctor, also of usual type, is indicated at 8, the doctor being opened and closed by rotation of the shaft 9 in response to reciprocation of the piston rods 10 connected to pistons 11 in the pneumatic motors or air cylinder 12. The forward ends of air cylinders 12 are in communication with each other by means of the air pipe 13, and the rearward ends are in communication with each other by means of the air pipe 14, reciprocation of the pistons and piston rods being controlled in the well known manner by the admission of air under pressure to the cylinders. A main air supply line 16, controlled by a valve 15, supplies air under pressure to pipe 14 through an inverted U-shaped branch line 17. An air release valve for pipe 13 is indicated at 18 and an air release valve for pipe 14 is indicated at 19.

In accordance with the invention, means are provided for automatically permitting a supply of air under pressure to flow through line 17 from the main line 16 to the cylinders and include a normally closed valve 20 in the branch line 17, such valve being preferably of the whistle valve type having plunger 21 movable inwardly to open the valve. Means for opening the valve 20 comprises a lever 22 pivoted at 23 to the fixed frame 24 of the spring roll 3. One end of the lever is provided with an adjustable disc or like member 25 normally positioned below and in slightly spaced relation to the end of plunger 21. The member 25 is carried on the end of a screw-threaded bolt 26 provided with a locknut 27 whereby vertical adjustment of the member may be effected as required. The other end of the lever is provided with a horizontally extending slot 28 and a pin 29 carried by the vertically movable bearing 30 of the spring roll projects through the slot. It will be observed that the pin 29 is spaced a relatively short distance from

the pivot 23 of the lever as compared with the distance of the member 25 from the pivot whereby a relatively slight vertical movement of the pin will swing the lever on its pivot and impart a considerably greater vertical movement to the member 25 on the outer end of the lever.

The spring roll 3 is of conventional type, the bearings 30 thereof being supported between vertically extending surfaces 67 of the frame by means of upper and lower springs 68 and 69. Vertical adjustment of the bearings 30 to vary the degree of tension applied to the paper web is effected by usual means as indicated at 70 and 71.

Means may be provided for placing the air line 14 in constant communication with the main supply line 16 and comprises a by-pass 31 connecting the two legs of branch line 17, a valve 32 in the by-pass, and valves 33 and 34 in the respective legs above the by-pass.

Means may also be provided for placing the air line 13 in constant communication with the main supply line 16 and comprises a by-pass 35 leading from the supply line to the pipe 13 and controlled by valve 36.

In normal operation, valves 15, 18, 33 and 34 are opened and valves 20, 36, 32 and 19 are closed, the doctor being in open position. Should the paper web break, the spring roll 3 with its bearing 30 will move downwardly a very slight distance but sufficient to swing the end of lever 22 and member 25 upwardly to engage plunger 21 and open valve 20. Air under pressure will then be admitted to the rearward ends of air cylinders 12 to reciprocate the pistons and piston rods and thereby close the doctor. This action is substantially instantaneous following breaking of the web and the doctor is in engagement with the roll before the adhered web reaches the doctor blade. As soon as the machine is again in normal operation with the web in tensional engagement with the spring roll, the lever is automatically actuated to disengage the plunger and close valve 20 with resultant opening of the doctor.

If, for any reason, it is desired to close the doctor by hand, it is simply necessary to open valve 32.

If it is desired to maintain the doctor in open position, as, for instance, while working on or changing a doctor blade, valves 33 and 18 are closed and valves 36 and 19 are opened.

In accordance with a further feature of the invention, means are provided for automatically ensuring that a broken paper web will adhere to the dryer roll until removed by the doctor. As is well known, a broken web frequently adheres to the dryer felt instead of remaining on the dryer roll and occasions considerable inconvenience. As shown, the means comprises a branch air line 37, leading from the main air supply line 16, and having a portion 38 provided with air jet openings 39 extending transversely of the dryer felt roll adjacent the top thereof. A by-pass 40 having a normally closed whistle or like type of valve 41 is located in the air line 37. Means for opening the valve when the paper web breaks comprises a bar or post 42 fixed to the doctor shaft 9 and extending upwardly therefrom, a member 43 carried by the upper end of the bar, and an adjustable pin 44 mounted in the member 43 and adapted to engage the valve actuating plunger 45 of the whistle valve 41. Figures 5 and 5a illustrate a preferred form of valve actuating mechanism wherein the member 43 extends through a groove 52a in the upper end of bar 42 and is pivoted at 46 thereto. The lower surface of groove 52 is

inclined as indicated at 47 to provide limited swinging movement of the member 43. The latter is maintained in normal horizontal or valve actuating position by means of a spring-pressed plunger 48 carried by bar 42 and engaging an extension 49 on the member 43.

A branch 53, leading from air line 37, has an air nozzle 54 directed at the edge of the web on the dryer felt roll 7 slightly below the portion 38, and a complementary nozzle 55 on a branch 56 leading from portion 38 at the other side of the dryer felt is similarly directed at the other edge of the web. These nozzles act to "break" the web from the felt, following which the jets 39 direct it downwardly.

A branch 57 having several air jet openings 58 located above the ropes 52 acts to prevent any adherence of the free web to the ropes.

Means are preferably provided for preventing the doctor blade, in its opening movement, from moving away from the dryer roll more than the required distance to just disengage the roll, in order that the closing movement will be of small degree and quickly accomplished. Such means may comprise an adjustable pin or bolt 61 mounted on a fixed bracket 63 carried by the frame member 64 and engageable with the doctor operating lever 62.

Means may also be provided for oiling the doctor cylinders 12 and comprises a T pipe 65 in the air line 17 having a plug 66 through which a supply of oil may be introduced into the line. The introduced oil, under the subsequent influence of the air under pressure in the line, will be forced through pipe 14 to the two cylinders.

A hand-operated valve 50 is located in the air line 37 to place the same into or out of operation as desired.

It will thus be observed that, when the doctor is closed pursuant to a break in the paper web, the mechanism 42, 43, 44 will be swung forward by rotation of the doctor shaft and the plunger 45 actuated to open valve 41 and cause the air jets 39 to direct the web downwardly away from the dryer felt. However, when it is desired to close off these air jets 58, 39, 54 and 55 during the time the doctor is closed, as is necessary for instance when the paper web is being directed into the calenders, manual pressure is applied to the end 51 of member 43 to swing it downwardly into engagement with the inclined surface 47 and thus disengage the pin 44 from the end of plunger 45 to permit closing of the valve 41, as illustrated in dotted lines in Figure 5, in which position the lower edge of member 43 coincides with the inclined surface 47. When the doctor opens and the member 43 is swung out of engagement with the plunger 45, it will automatically fall into its normal position.

It will be understood that various changes in the described details may be made without avoiding the basic inventive ideas herein illustrated. For instance, the lever 22, its mounting and association with valve 20 to actuate the latter may be constructed and arranged in various ways to accomplish the desired function.

The dimensions of the lever may be chosen to achieve the required results. It has been found that a lever 18 inches long, 12 inches from pivot to valve actuating end, and 4 inches from pivot to the lever operating pin 29, operates very satisfactorily in response to a slight vertical movement, say $\frac{1}{8}$ inch, of the pin 29. In other words, the effective length of one arm of the lever is

5

approximately three times the effective length of of the other arm.

The device described is simple and inexpensive to manufacture, its installation is convenient and presents no mechanical problems, and its operation is fully automatic and subject to little or no mechanical failure.

I claim:

A paper making machine including a frame, a dryer roll mounted in the frame, a calender forwardly of the dryer roll and adapted to receive a paper web therefrom, a spring roll between the dryer roll and the calender and adapted to engage and to impose a normal degree of tension on a paper web passing thereunder from the dryer roll to the calender, said spring roll being mounted in vertically movable bearings on the frame, springs carried by the frame and resiliently supporting said bearings to limit the vertical movement thereof, said spring roll and bearings moving downwardly a slight distance on breakage of such paper web, a doctor member cooperating with but normally disengaged from said dryer roll, fluid actuating means for shifting the doctor member into engagement with said dryer roll, a lever pivoted intermediate its ends on the frame with one end thereof in the path of movement of

6

one of the bearings of the spring roll, whereby slight downward movement of said bearing effects pivotal motion of the lever, and a control member for the actuating means of the doctor member engageable by the other end of said lever upon pivotal motion of said lever in response to downward movement of said spring roll bearing induced by breakage of such paper web, the pivotal point of the lever being closer to the bearing than to the control member.

ANTON WALTER JOHNSON.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,140,711	Pope	May 25, 1915
1,369,124	Pope	Feb. 22, 1921
1,605,067	Read	Nov. 2, 1926
1,620,037	Peschl	Mar. 8, 1927
1,789,515	Cram et al.	Jan. 20, 1931

FOREIGN PATENTS

Number	Country	Date
4,316	Great Britain	1915