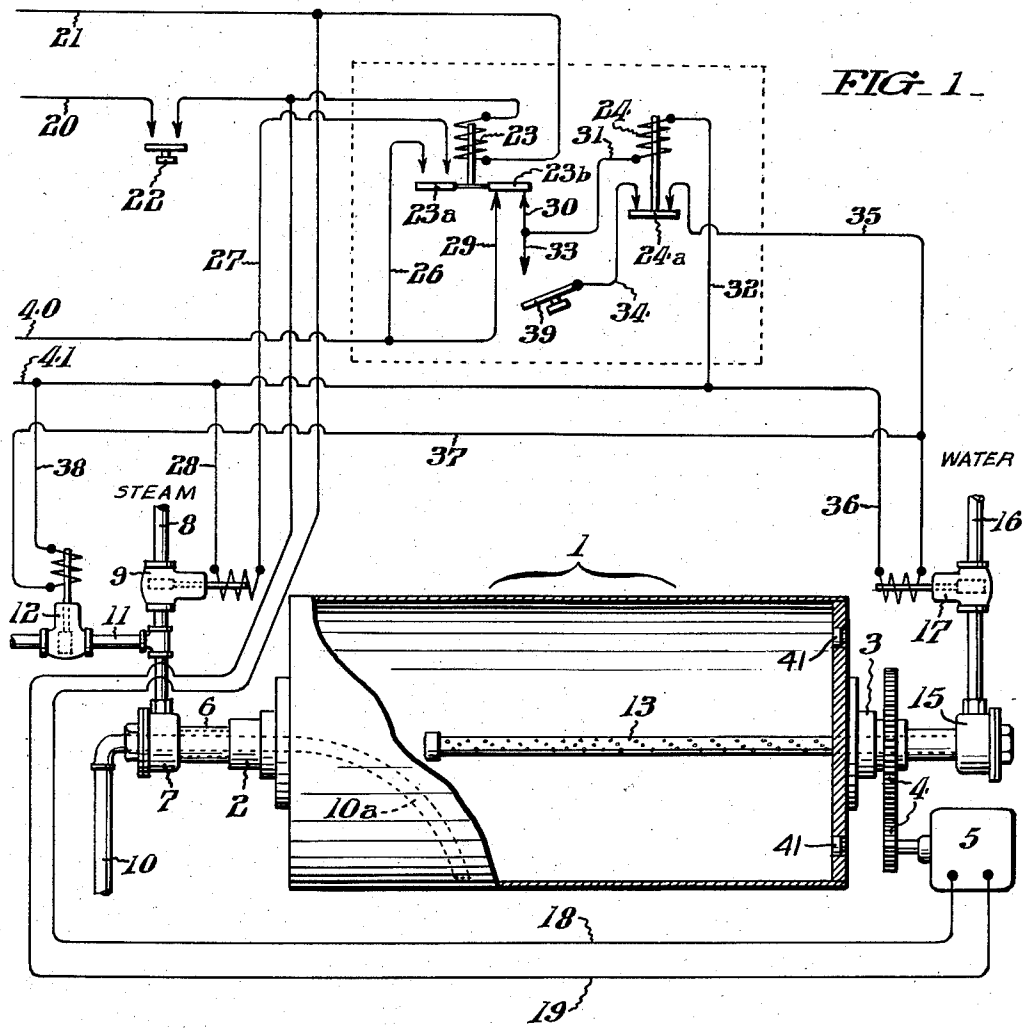
May 26, 1959 J. COCKER III 2,887,786

ROLL HEATING AND COOLING MEANS

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FIG. 1



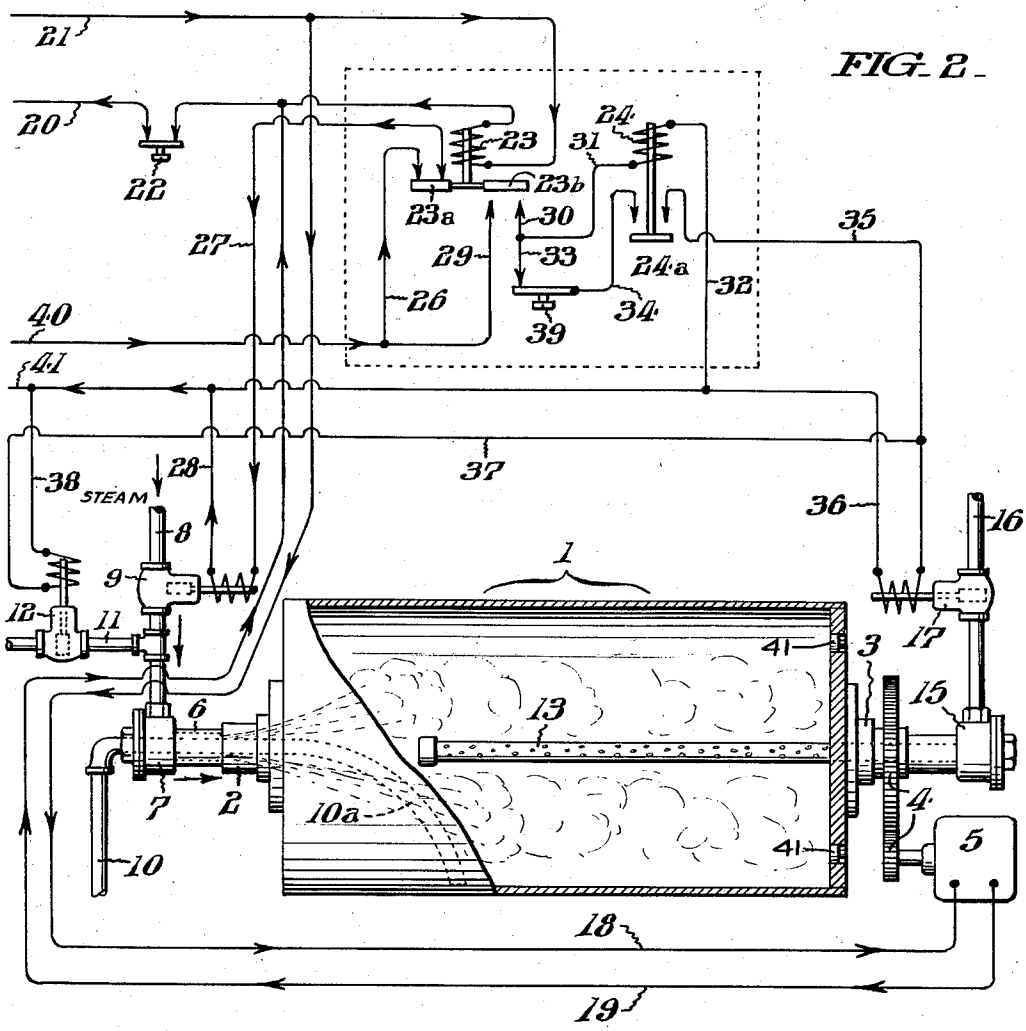
INVENTOR.
John Cocker III,
BY Paul & Paul
ATTORNEYS.

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FIG. 2.



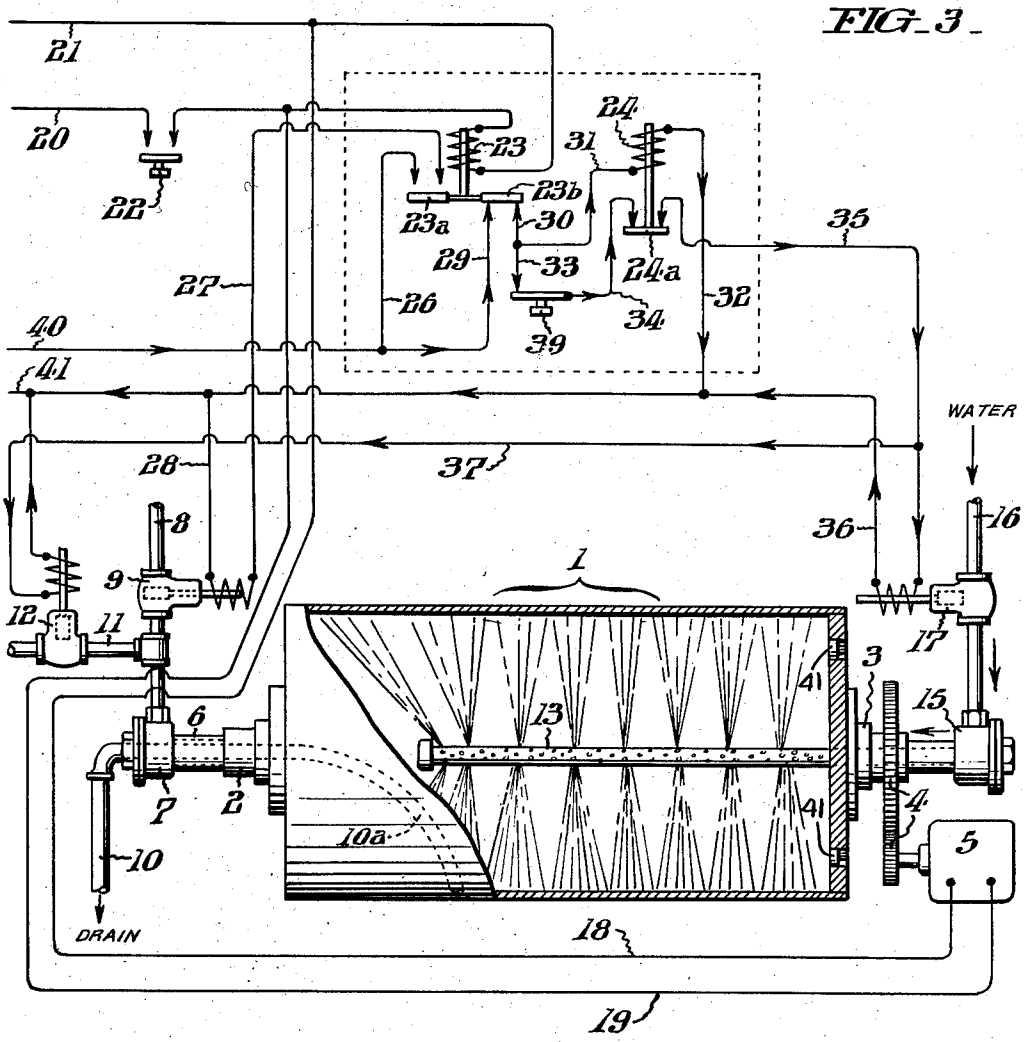
INVENTOR.
John Cocker III,
BY Paul & Paul

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FIG. 3



INVENTOR.
John Cocker III,
BY Paul & Paul

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ROLL HEATING AND COOLING MEANS

John Cocker III, Gastonia, N.C., assignor to Cocker Machine and Foundry Company, Gastonia, N.C., a corporation of North Carolina

Application April 20, 1956, Serial No. 579,579

4 Claims. (Cl. 34—87)

This invention relates to roll heating and cooling means. More particularly it is concerned with means for heating and cooling the hollow drying rolls (sometimes referred to as cans or drums) of slashers or the like about which warp yarns or textile fabrics are passed after being sized or otherwise treated with liquids. For various reasons it is necessary to stop the slashers occasionally during the processing with the result that the material surrounding the heated rolls is apt to be over dried and damaged during the intervals between stops.

My invention has for its chief aim to prevent such contingencies. This objective is realized in practice, as hereinafter more fully disclosed, through provision of improved heating and cooling means, and through the further provision of automatically-operative means whereby, upon stopping of the roll or rolls, the supply thereto of fluent heating medium is interrupted and fluent coolant is admitted to the roll; and whereby, upon restarting the apparatus, supply of coolant to the roll is interrupted and supply of heating medium to the roll is resumed.

Other objects and advantages will appear from the following detailed description of the attached drawings, wherein:

Fig. 1 is a more or less diagrammatic view of a roll heating and cooling means conveniently embodying my invention.

Fig. 2 is a view similar to Fig. 1 showing how the heating medium is supplied to the roll during normal operating conditions; and

Fig. 3 is a view in turn similar to Fig. 1 showing how the supply of heating medium is cut off and coolant is admitted into the roll when the latter is stopped in its rotation.

With more specific reference to these drawings, the numeral 1 comprehensively designates a drying roll or drum of a slasher or the like about which material such as a continuous sheet of warps or fabric, for example, is adapted to be passed after having been sized or otherwise treated with a liquid. It is to be understood that the hollow journals 2 and 3 of the roll 1 are rotatively supported in fixed bearings (not illustrated) in a manner well understood in the art. As shown, the roll 1 is arranged to be driven, through suitable speed reduction gearing 4, by an electric motor 5.

Extending with fluid tightness through the journal 2, is a pipe 6, and connecting laterally into a fitting 7 at the outer end of said pipe is a pipe 8 which leads from a supply source (not illustrated) of a heating medium such as steam, and in which is interposed a solenoid-actuated flow governing valve 9. Also connecting into the fitting 7 and through the pipe 6 is a smaller syphoning pipe 10 of which the curved end portion 10*a* terminates within the roll adjacent the cylindrical wall of the latter. As further shown, a relief pipe 11 having a solenoid flow governing valve 12 interposed therein,

connects with the pipe 8 in the internal between the fitting 7 and the valve 9.

Through the journal 3 of the roll 1 extends a pipe 13 which is perforated as shown, and to a fitting 15 at the outer end of said pipe is laterally connected a pipe 16 which leads from a source (not illustrated) of a fluent coolant such as water, the flow of which is controlled by means of a solenoid-actuated valve 17.

Through leads 18 and 19, the motor 5 is connected to the conductors 20 and 21 of a power line, its starting and stopping being controlled by a manual switch indicated at 22. The provision made the automatic actuation of the valves 9, 12 and 17 include a double pole relay 23 and a time delay relay 24. The coil of relay 23 is connected across the power line conductors 20 and 21 and is energized upon closing of the hand switch 22 and starting of the motor 5. Current for actuation of the valves 9, 12 and 17 is supplied from conductors 40 and 41 of a separate power line. As shown, the bridge 23*a* of the relay 23 is adapted to close the terminals of a circuit 26, 27 and 28 containing the actuating solenoid coil of the valve 9, and the bridge 23*b* of said relay to close a circuit 29, 30, 31 and 32 containing the coil of the time delay relay 24. The bridge 24*a* of the solenoid 24 is adapted to bridge the terminals of the circuits 33, 34, 35, 36, 37 and 38 containing the actuating coils of the solenoid valves 12 and 17. Interposed in the portions 33 and 34 of the last mentioned circuit is a hand switch 39. As is customary in apparatus of this sort, the roll or drum 1 is provided in one of its end heads with a pair of normally closed suction responsive relief valves 41 which may be of any well known commercially available type.

Operation

Fig. 1 shows the control system in dormant condition with the hand switches 22 and 39 open, the motor 5 stopped, and the valves 9, 12 and 17 all shut. Operation of the apparatus is started by closing the switch 22 as in Fig. 2, whereupon current will flow from the power line to the motor 5 through the leads 18 and 19, the roll 1 being thereby set into rotation. Also at the start, the hand switch 39 is closed, likewise as shown in Fig. 2. Upon closing the switch 22, the actuating coil of the double pole relay 23 is energized and said relay is operated to establish the circuits 40, 26, 23*a*, 27, 28, 41 through the actuating solenoid coil of valve 9 which opens as in Fig. 2 for admission of steam into the roll by way of the pipe 6. Thus, so long as the roll 1 is in rotation, it is constantly heated by the steam admitted through the piping 8, 7 and 6.

If for any reason it should be necessary to stop the roll, this is accomplished simply by opening the manual switch 22 whereupon the circuit through the coil of relay 23 will be broken, with incidental de-energization of the solenoid coil of the valve 9 which will thereupon immediately close to interrupt the supply of steam. Upon actuation of the relay 23 as just explained, the circuit 40, 29, 23*b*, 30, 31, 32, 41 will be established through the coil of relay 24 as in Fig. 3, with incidental establishment, by closing of the latter, of a circuit 40, 29, 23*b*, 30, 33, 34, 24*a*, 35, 36, 41 whereby the solenoid coil of the valve 17 is energized and said valve opened to admit cooling water into the roll 1, the water being jetted from the perforations in the pipe 13 against the cylindrical wall of the roll. Since the solenoid coil of the valve 12 is connected in parallel with the solenoid coil of valve 17, the valve 12 is opened concurrently with the valve 17 to relieve the steam pressure built up in the roll 1, the vacuum incidentally created by sudden condensation of the steam being relieved by automatic opening of the suction responsive valves 41. The wa-

ter collecting in the roll drains off through the syphoning pipe 10, 10a. In this way the roll is quickly cooled to prevent over drying and possible injury to the portion of the material contacting the roll.

In the event that the roll is stopped for protracted periods, the supply of water can be cut off simply by opening the switch 39 with consequent interruption of current flow through the actuating coils of the valves 12 and 17 which will thereupon close, the apparatus being then left in the dormant state in which it is shown in Fig. 1.

It is to be understood that the valves 9, 12 and 17 may be of any well known commercial type which close automatically upon de-energization of its actuating solenoid. While in accordance with the provisions of the statutes, I have illustrated and described the best forms of embodiment of my invention now known to me it will be apparent to those skilled in the art that changes may be made in the form of the apparatus described without departing from the spirit and scope of the invention, as set forth in the appended claims, and that in some cases certain features of my invention may be used to advantage without a corresponding use of other features.

Having thus described my invention, I claim:

1. In apparatus for drying continuous materials such as yarns or cloth after treatment with sizing or the like, a hollow roll about which the material is passed having in an end thereof a normally closed suction-responsive vacuum relief valve; power drive means for rotating the roll; a fluent heating medium conducting pipe connecting into one end of the roll and having interposed therein a normally closed valve; a fluent coolant conducting pipe connecting into the opposite end of the roll and likewise having a normally closed valve interposed therein; and control means connected to said drive means and automatically operative, upon starting the drive means, to open the valve in the heating medium supply pipe for admission of heating medium into the roll, and automatically operative, upon stopping the drive means to close the valve in the heating medium supply pipe and open the valve in the coolant medium supply pipe for admission of coolant into the roll.

2. The invention according to claim 1, wherein the drive means comprises an electric motor; wherein the valves respectively in the heating medium and cooling medium supply pipes are solenoid actuated; and wherein the control means includes a wiring system with instrumentalities automatically operative, upon starting the motor, to establish a circuit for the energization of the solenoid of the valve in the heating medium supply pipe to open said valve for the admission of heating medium into the roll, and other instrumentalities automatically operative upon stopping the motor, to break said circuit for interruption of the heating medium supply and to close another circuit for energization of the actuating solenoid of the valve in the coolant medium supply pipe to open it for admission of coolant into the roll.

3. In apparatus for drying continuous materials such as yarns or cloth after treatment with sizing or the like, a hollow roll about which the material is passed having in an end thereof a normally closed suction-respective vacuum relief valve; power drive means for rotating the roll; a fluent heating medium conducting pipe connecting into one end of the roll and having interposed therein a normally closed valve; a fluent coolant conducting pipe connecting into the opposite end of the roll and likewise having a normally closed valve interposed therein; a branch pipe connected to the heating medium conducting pipe beyond the valve therein; a normally closed relief valve in the branch pipe; and control means connected to said drive means and automatically operative, upon starting the drive means, to open the heating medium admission valve, and automatically operative, upon stopping the drive means to close the heating medium admission valve and to concurrently open the coolant admission valve and the relief valve in the branch pipe.

4. The invention according to claim 3, wherein the drive means comprises an electric motor; wherein the valves are all solenoid actuated; and wherein the control means includes a wiring system with instrumentalities automatically operative, upon starting the motor, to establish a circuit for the energization of the solenoid of the heating medium admission valve to open said valve for the admission of heating medium into the roll, and other instrumentalities automatically operative upon stopping the motor, to break said circuit for interruption of the heating medium supply and to establish another circuit for energization of the actuating solenoids of the coolant admission valve and the relief valve in the branch pipe to open said valves for admission of coolant into the roll and escape of residual heating medium from the roll.

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