Nov. 24, 1931. R. McC. JOHNSTONE 1,832,906

WEB ROLL CONTROLLING MECHANISM

Original Filed July 16, 1926 3 Sheets-Sheet 1

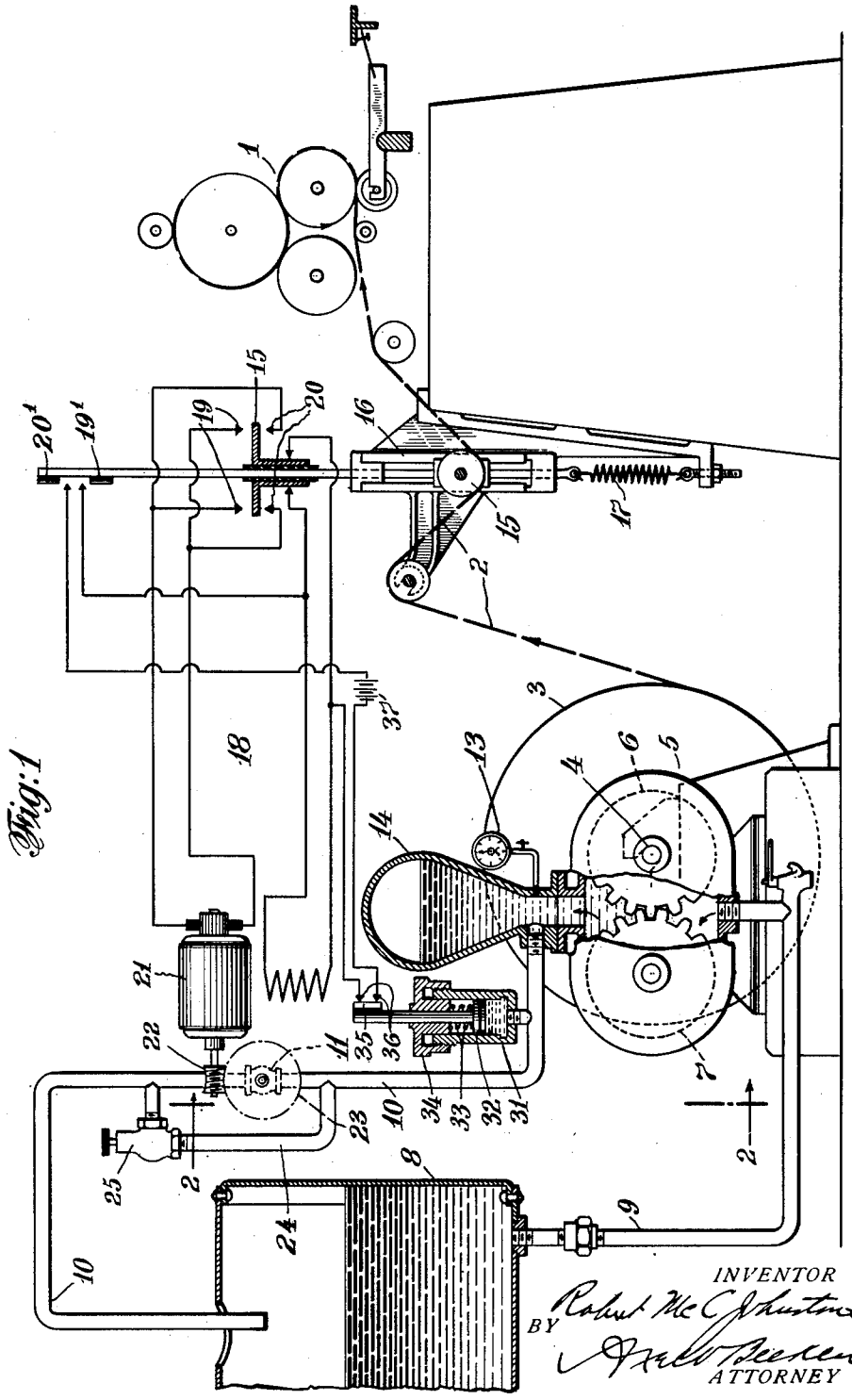


Fig. 1

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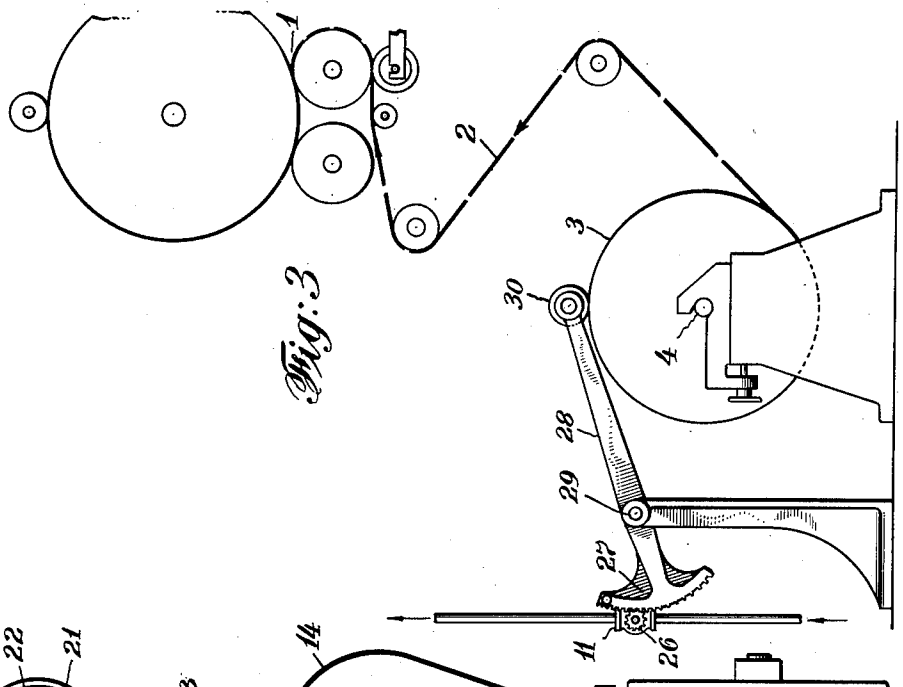


Fig. 3

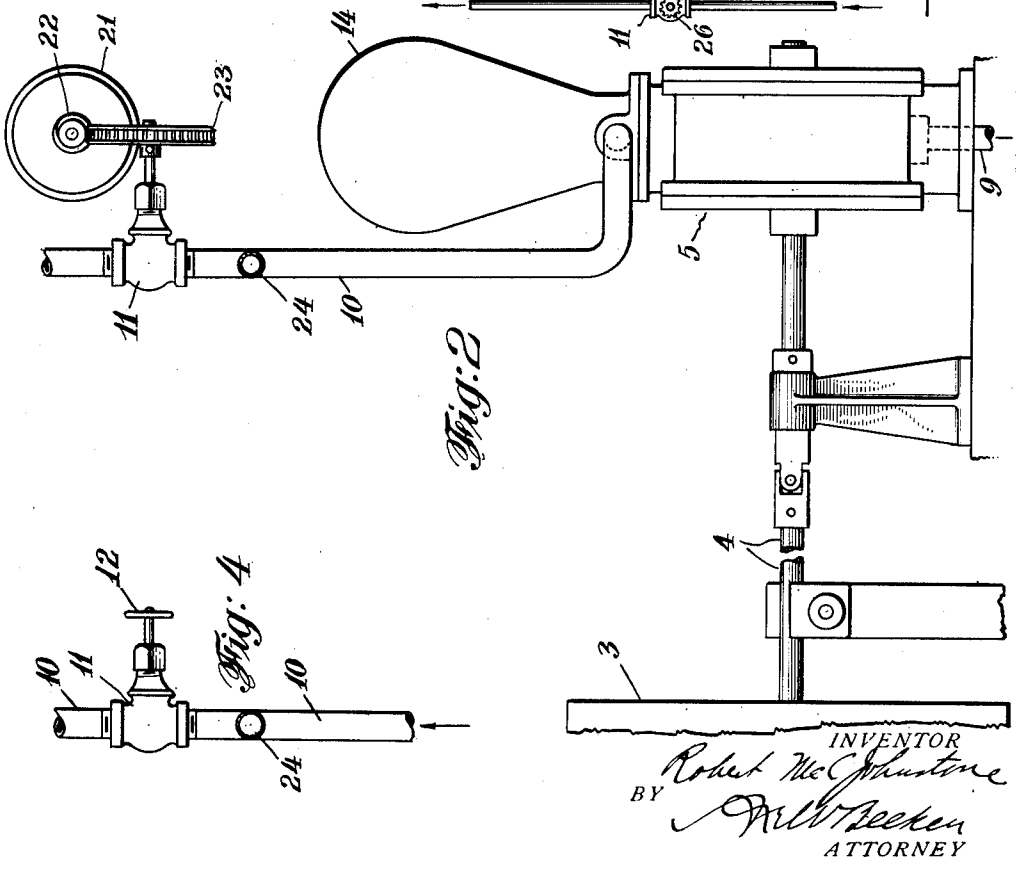


Fig. 2

Fig. 4

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WEB ROLL CONTROLLING MECHANISM

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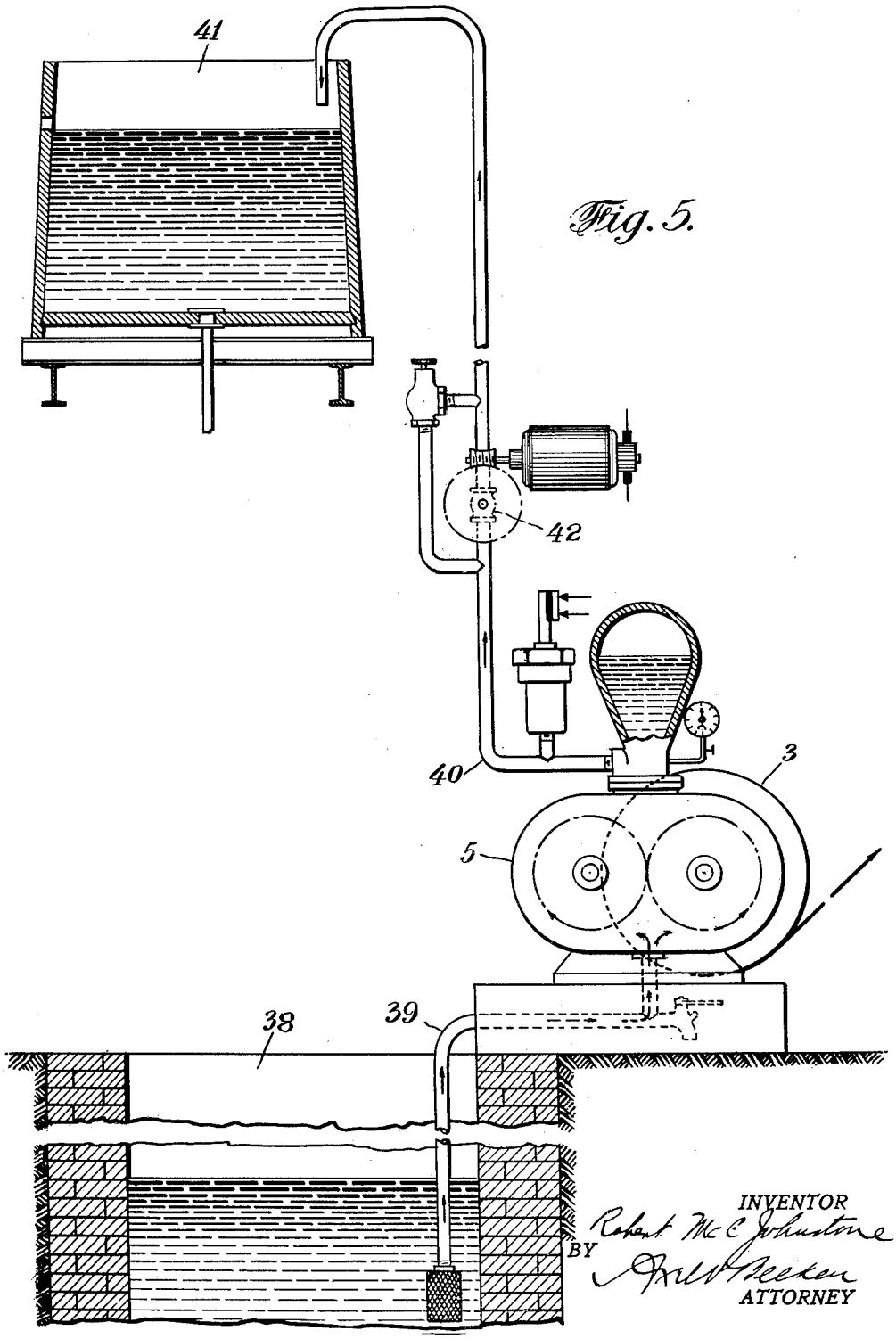


Fig. 5.

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UNITED STATES PATENT OFFICE

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WEB ROLL CONTROLLING MECHANISM

Application filed July 16, 1926, Serial No. 122,850. Renewed January 12, 1931.

This invention relates to web roll controlling mechanism, particularly of the type used in controlling the unwinding of a web from a mill roll in a winding or a slitting and winding machine.

In machines of this type the web roll or mill roll is mounted on a rotatable support or shaft and this shaft rotates as the paper is unwound by the pull of the winding machine. For various reasons it is necessary or desirable to have braking means to control the unwinding of the web roll. For instance, it may be desired to vary the tension of the web for purposes connected with the slitting, separating or winding of the paper; or it may be desired to control the speed of the mill roll especially when stopping or starting the device and this is an important problem because the momentum of the mill roll is at times very considerable.

Heretofore this braking control has usually been effected by means of brake drums and brake bands, a construction that has been found unsatisfactory because of wear of the parts and because of the heat generated by the great friction necessary.

The main object and feature of this invention is to provide means whereby an adequate braking effect can be obtained without excessive wearing away of parts or generation of heat and whereby, at the same time, great flexibility may be obtained.

In the accompanying drawings the invention is illustrated in several preferred forms in which

Fig. 1 is a more or less diagrammatic view, partly in section, of a machine embodying one form of the invention.

Fig. 2 is a view substantially on the plane of line 2—2 of Fig. 1.

Fig. 3 is a more or less diagrammatic view showing a modified form of the invention.

Fig. 4 is a detail view showing manual means to control the valve of the fluid circuit.

Fig. 5 is a view similar to Fig. 1 but showing a modified form of the invention.

1 indicates a slitting and winding machine which pulls web 2 from web roll 3. 4 is a support for the web or mill roll which rotates under the impelling influence of the unwinding web or the pull exerted by machine 1. 5 is a pump here consisting of a casing and two intergeared rotating members 6 and 7 and this pump is interposed in a fluid pressure conduit here shown as a fluid pressure circuit consisting of tank 8, pipe 9, pump 5, and pipe 10. It will be understood that rotation of the pump draws fluid from tank 8, through pipe 9 and pump 5 by way of pipe 10 back to tank 8. Any suitable driving connection may be employed to drive the pump from support 4, and, in the present case, this connection is afforded by mounting member 6 on shaft 4. The character of the fluid pressure is immaterial and may be, for instance, oil, water or air. It will be seen that rotation of web roll 3 is retarded by the action of the pump forcing fluid through the conduit or in circulating fluid through the fluid circuit and that by increasing or diminishing the resistance offered to the flow of this fluid the speed of rotation of member 4 is controlled. Any suitable valve means may be employed for this purpose such as valve 11 in pipe 10 and this valve may be controlled manually as by handwheel 12 shown in Fig. 4. When such handwheel is used the operator can adjust the valve at will by watching the tension on the web or he can consult gage 13, associated with the pump, and make his adjustment accordingly. The pump may be of any suitable type and may have an equalizing dome as 14 in which a body of air is trapped. It is desirable, at times, to control this valve automatically and in Figs. 1 and 2 are shown means for accomplishing this purpose. As there indicated, a member 15 is employed and controlled by the tension of the web for automatically controlling the adjustment of the valve. This member, in the present instance, is slidably mounted in guides 16 and is normally urged against web 2 by means of spring 17. The tension of web 2 supplies a counter force, and, according to the tension of the web, member 15 will move up or down. In its upper position it will close electric circuit 18 fed by battery 37 at contacts 19 and point 19′ and in its lower position it will close the circuit at contacts 20 and at point

20'. The electric circuit, when closed, will actuate motor 21, the direction of rotation of said motor depending upon the contacts through which the circuit is closed. Rotation of motor 21 will cause worm 22 to drive worm wheel 23 of valve 11 and will thus operate the latter to diminish or increase resistance to the flow of fluid. A safety feature may also be added to the system by providing a by-pass 24 around valve means 11 and by interposing in said by-pass a safety valve 25 normally closed but adapted to be opened by excessive fluid pressure to admit of flow of fluid around valve means 11.

In case the paper passing over 15 breaks, or when the machine is idle, circuit 18 would be closed and motor 21 would therefore continue to turn valve 11 until the parts break. To obviate this condition a hand switch may be employed to open circuit 18, or the switch may be opened by a speed governor device. In the present instance, however, it is preferred to employ the following means: connected to the fluid circuit is a chamber 31 in which is contained a piston 32 normally urged into its lowermost position by spring 33 adjustable by means of threaded cap 34. Cylinder 32 carries bridging member 35 to bridge contacts 36 of circuit 18. When fluid is flowing the pressure thereof will raise piston 32 and complete the circuit at 35—36 but when mill roll 3 stops, the fluid pressure will cease and spring 33 will move piston 32 down and will break contacts 35—36.

In Fig. 3 is shown a modified form of the invention. Here valve means 11 is provided with a pinion 26 with which meshes a sector 27 carried by lever 28 which latter is pivoted at 29 and carries a roller 30 engaging web roll 3. With this construction valve 11 will be set to cause a given retardation of the full size mill roll, and as the mill roll gradually decreases in diameter the amount of retardation or braking effect would be decreased so as to compensate progressively for loss of momentum and diameter of the mill roll.

In Fig. 5 is shown a modified form of the invention. Here there is no complete fluid circuit but only a partial circuit which extends from well 38 by way of pipe 39 to pump 5 and thence by pipe 40 to tank 41. In this case the pump is likewise driven by mill roll 3, and, by offering more or less resistance to the flow of fluid through the conduit from the well to the tank as by means of valve 42, unwinding of the web is controlled. Valve 42 may be hand operated, or it may be controlled by a motor as in Fig. 1 and the safety devices described in connection with Fig. 1 may also be employed. The advantage of this construction is that a functional by-product is obtained, i. e., water is raised from a well to a tank say on the roof of the building containing the machine.

I claim:

1. A rotatable member, a fluid pressure conduit, a pump to force fluid through said conduit, connections from the rotatable member to the pump to drive the latter by rotation of the former, valve means to vary the resistance offered by the fluid under pressure to the action of the pump to thereby control the speed of the rotatable member, and an air dome associated with the pump to counteract, under certain conditions, the throttling effect of the valve means upon the speed of rotation of the rotatable member.

2. A rotatable member, a fluid pressure conduit, a pump to force fluid through said conduit, connections from the rotatable member to the pump to drive the latter by rotation of the former, valve means to vary the resistance offered by the fluid under pressure to the action of the pump to thereby control the speed of the rotatable member, motor means to actuate the valve means, and a controlling device responsive to fluid pressure in the conduit to render the motor means inactive when the fluid pressure drops below a certain point.

3. A rotatable member, a fluid pressure conduit, a pump to force fluid through said conduit, connections from the rotatable member to the pump to drive the latter by rotation of the former, valve means to vary the resistance offered by the fluid under pressure to the action of the pump to thereby control the speed of the rotatable member, motor means to actuate the valve means, a controlling device responsive to fluid pressure in the conduit to render the motor means inactive when the fluid pressure drops below a certain point, and an air dome associated with the pump to counteract, under certain conditions, the throttling effect of the valve means upon the speed of rotation of the rotatable member.

4. A rotatable member, a fluid pressure conduit, a pump to force fluid through said conduit, connections from the rotatable member to the pump to drive the latter by rotation of the former, valve means to vary the resistance offered by the fluid under pressure to the action of the pump to thereby control the speed of the rotatable member, a reversible electric motor to actuate the valve means, a source of current, and circuit closing means to establish circuits to drive the motor in either direction.

5. A rotatable member, a fluid pressure conduit, a pump to force fluid through said conduit, connections from the rotatable member to the pump to drive the latter by rotation of the former, valve means to vary the resistance offered by the fluid under pressure to the action of the pump to thereby control the speed of the rotatable member, a reversible electric motor to actuate the valve means, a source of current, circuit clos-

ing means to establish circuits to drive the motor in either direction, and controlling devices responsive to fluid pressure in the circuit to rupture the circuits when the fluid pressure drops below a certain point.

6. A rotatable member, a fluid pressure conduit, a pump to force fluid through said conduit, connections from the rotatable member to the pump to drive the latter by rotation of the former, valve means to vary the resistance offered by the fluid under pressure to the action of the pump to thereby control the speed of the rotatable member, and an air dome associated with the pump to temporarily counteract, when starting the elements from a state of rest, the throttling effect of the valve means upon the speed of rotation of the rotatable member.

7. A rotatable member, a fluid pressure conduit, a pump to force fluid through said conduit, connections from the rotatable member to the pump to drive the latter by rotation of the former, valve means to vary, in response to variations in speed of the rotatable member, the resistance offered by the fluid under pressure to the action of the pump to thereby control the speed of the rotatable member, and an air dome associated with the pump to temporarily counteract, when starting the elements from a state of rest, the throttling effect of the valve means upon the speed of rotation of the rotatable member.

8. A rotatable member, a fluid pressure conduit, a pump to force fluid through said conduit, connections from the rotatable member to the pump to drive the latter by rotation of the former, valve means to vary the resistance offered by the fluid under pressure to the action of the pump to thereby control the speed of the rotatable member, and a mechanism associated with the pump to temporarily counteract, when starting the elements from a state of rest, the throttling effect of the valve means upon the speed of rotation of the rotatable member.

Signed at Brooklyn, in the county of Kings, and State of New York, this 13 day of July, 1926.

ROBERT McC. JOHNSTONE.