O. M. DONALDSON.

PAPER THICKNESS REGULATOR.

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1,135,000. **Patented Apr. 13, 1915.**

Fig. 1.

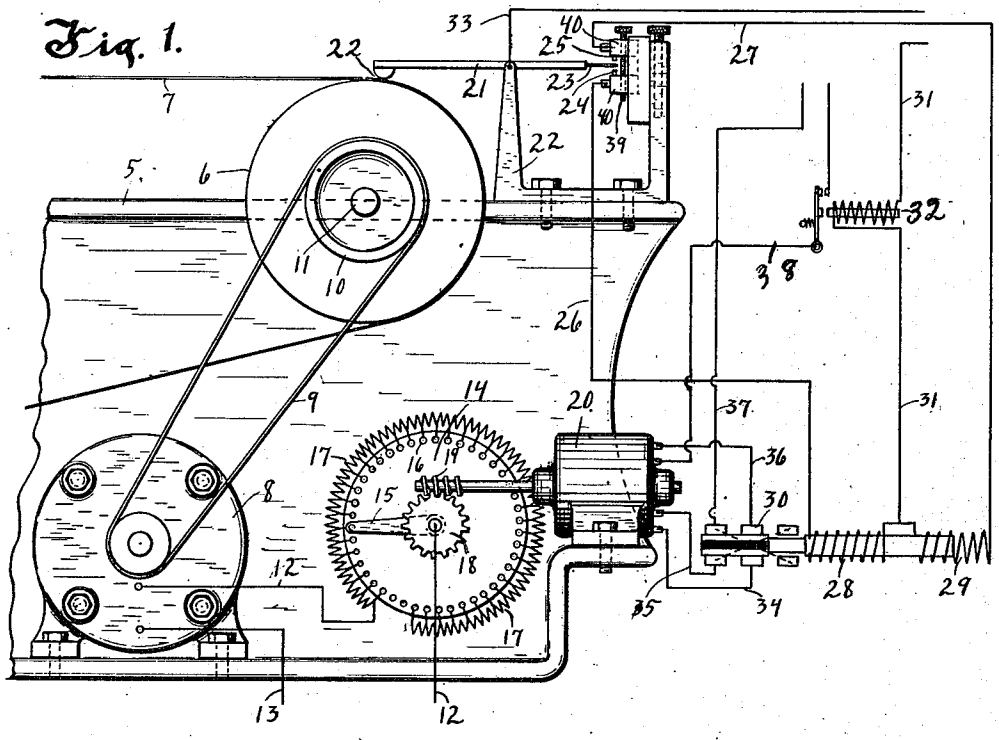
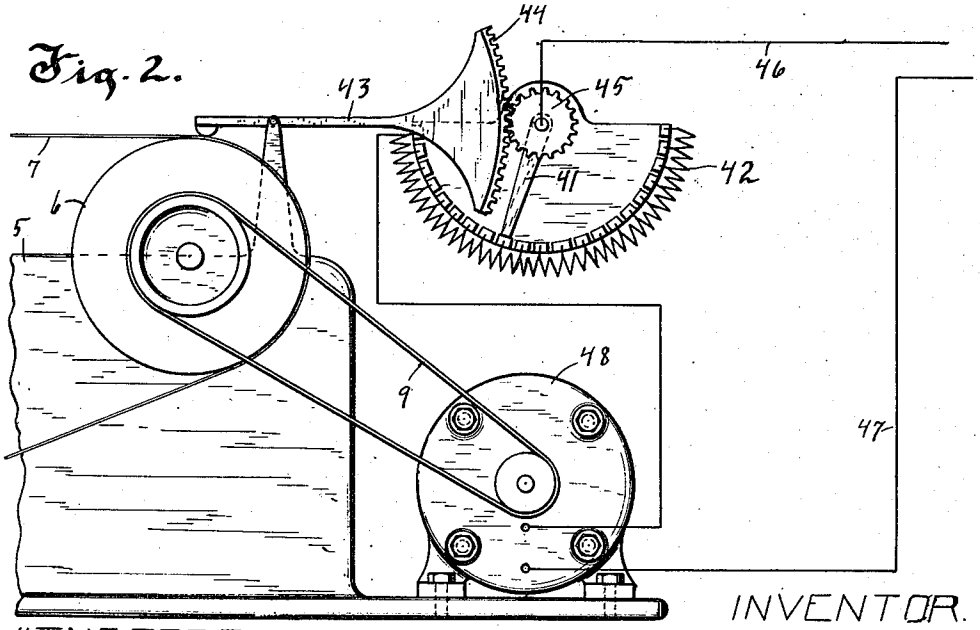


Fig. 2.



WITNESSES.

Arthur F. Miller.

Clara J. Muehlbach

INVENTOR.

Orville M. Donaldson

By Morsell and Caldwell.

ATTORNEYS.

UNITED STATES PATENT OFFICE.

ORVILLE M. DONALDSON, OF WEST ALLIS, WISCONSIN, ASSIGNOR OF ONE-HALF TO BENJAMIN F. PEISCH, OF MILWAUKEE, WISCONSIN.

PAPER-THICKNESS REGULATOR.

1,135,000. Specification of Letters Patent. Patented Apr. 13, 1915.

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To all whom it may concern:

Be it known that I, ORVILLE M. DONALDSON, a citizen of the United States, and resident of West Allis, in the county of Milwaukee and State of Wisconsin, have invented new and useful Improvements in Paper-Thickness Regulators, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

This invention relates to improvements in paper thickness regulators.

In the manufacture of paper the pulp from which the paper is made is fed in a continuous stream to a carrying belt which supports the pulp until it becomes sufficiently dry and firm to support itself on drying rollers over which it is carried to a point where it is wound in a roll and finally removed. It is the usual custom to feed the pulp through a certain size opening for the thickness of paper desired and the paper is then gaged, and if found to run too thick, the paper carrying mechanism is speeded up to draw the pulp in a stream of less thickness and in the event of the paper running thin the speed of the carrying mechanism is decreased to give the desired thickness. Manufacturing paper in this manner requires careful attention and frequent gaging by a person skilled in the art to make paper of a commercial uniform thickness and the cost of manufacture is increased thereby.

It is one of the objects of the present invention to provide a means for automatically regulating the thickness of the paper being manufactured which may be adjusted to respond to the slightest variation in thickness and will insure a constant run of paper of uniform thickness.

A further object of the invention is to provide a paper thickness regulator which automatically controls the speed of rotation of the paper carrying mechanism.

A further object of the invention is to provide a paper thickness regulator in which the paper is constantly gaged so that the slightest variation will be indicated and the motor driving the carrying mechanism will be controlled to regulate the speed of said carrying mechanism and thus regulate the thickness of the paper being manufactured.

A further object of the invention is to provide a paper thickness indicator which may be adjusted to control variations in the thickness of paper to any extent desired.

A further object of the invention is to provide a paper thickness indicator which is of simple construction, is very sensitive in responding to varying thicknesses of paper and is well adapted for the purpose desired.

With the above and other objects in view, the invention consists of the improved paper thickness regulator, and its parts and combinations as set forth in the claims, and all equivalents thereof.

In the accompanying drawing in which the same reference characters indicate the same parts in all of the views: Figure 1 is a diagrammatic view of the improved paper thickness regulator shown in connection with a portion of the paper carrying mechanism of a paper making machine; and Fig. 2 is a similar view of a modified form thereof.

The drawings show, somewhat diagrammatically, a portion of a paper making machine including a part of the frame 5 and the take-off roller 6, which is a part of the paper carrying mechanism, and over which passes the newly made paper. The take off roller is rotated by an electric motor 8 having a belted connection 9 with a belt wheel 10 mounted on the shaft 11 of the said take-off roller, and it is understood that the other portions of the paper carrying mechanism of the machine are preferably driven by said motor 8, so that all will be operated synchronously. The circuit wires 12 and 13 supplying current to the motor include a rheostat 14 having a switch arm 15 connected to the wire 12 which is adapted to be turned to engage the rheostats contacts 16 to insert or cut out the resistance units 17 forming part of said rheostat. A worm wheel 18 carried by the rheostat switch arm 15 is in mesh with a worm 19 mounted on the shaft of a rheostat motor 20 which controls the movement of said rheostat arm.

A lever gage arm 21 fulcrumed on the supplemental frame 22 is provided on its outer longer end with a rounded knob or projection 22 which rests upon the paper on the take off roller so that any variation in the thickness of the paper will cause a movement of the gage lever. The opposite

inner end 23 of the gage lever is positioned to swing between a pair of contacts 24 and 25 which are adjustably mounted on the supplemental frame and are connected by circuit wires 26 and 27 to the opposing coils 28 and 29 of a solenoid reversing switch 30. The return wire 31 connected to both coils 28 and 29 extends to a source of current supply and includes within its circuit a relay coil 32. The supplemental frame 22 is connected to a circuit wire 33 which completes the circuit just described. The solenoid switch is of the ordinary reversing type with three of its six contact posts connected to the rheostat motor 20 by wires 34, 35 and 36 and a fourth contact post extending to the line by wire 37. The remaining two contact posts are cross connected in the usual manner to reverse the current to the motor. This last mentioned circuit is completed by circuit wire 38 which leads to the line circuit (not shown). The contacts 24 and 25 are adjusted by means of the adjusting screw 39 which is provided with a right and left handed thread which engage the blocks 40 of which the contacts form a part.

From the description thus far given it will be seen that as the paper varies in thickness the gage lever will be swung to engage one or the other of the contacts and the resistance will be cut out or inserted to diminish or increase the speed of rotation of the paper carrying mechanism and correct the variation indicated. By adjusting the distance apart of the contacts the gage lever is adapted to respond to any variation in thickness desired.

Assuming that the parts are in the position shown and that the paper being carried around the take off roller should decrease in thickness the inner end of the gage lever will be swung upwardly to engage the upper contact and complete the circuit of the solenoid coil on the right and energize the same and draw the solenoid switch to the right and connect the rheostat motor to turn in a direction to insert resistance. The completion of this circuit will also energize the relay coil and cause its armature to complete the rheostat motor circuit and the said motor will rotate the rheostat switch arm to insert resistance in the circuit of the motor 8 and the speed thereof will be increased and consequently that of the carrying mechanism and the paper will become thinner. As soon as the paper becomes of the proper thickness the gage lever will be swung upwardly and break the contact and the circuit to the rheostat motor will be open. If now the paper should run too thin the connections will be made to cut out the resistance and the motor 8 speeded down to decrease the speed of the carrying mechanism and thus thicken the paper.

In the modified form of regulator the rheostat switch arm 41 of the rheostat 42 is controlled directly by the gage lever 43 by means of a segmental gear 44 formed on the inner end of the said gage lever which meshes with a pinion 45 mounted on the switch arm. The circuit wires 46 and 47 of the paper roll motor 48 include the resistance and the switch arm of the rheostat. In this form the parts are operated in substantially the same manner to increase or diminish the speed of the motor to increase or diminish the speed of the carrying mechanism and consequently increase or diminish the thickness of the paper.

While the drawing shows and the specification describes but two preferred forms of embodiment of the invention, it is to be understood that the apparatus may be changed and modified to a considerable extent and accomplish the same results and still come within the terms of the invention as set forth in the claims.

What I claim as my invention is:

1. In a paper making machine, the combination of the paper carrying mechanism, a paper thickness regulator, comprising a gaging member in contact with the paper for gaging the thickness thereof, and means automatically actuated by a movement of the said member for increasing or diminishing the speed of movement of the paper carrying mechanism.

2. In a paper making machine, the combination of the paper carrying mechanism, a paper thickness regulator, comprising means in contact with the paper for gaging the thickness thereof, and means actuated by the gaging means for controlling the speed of movement of the paper carrying mechanism to regulate the thickness of the paper.

3. In a paper making machine, the combination of the paper carrying mechanism, a paper thickness regulator, comprising a gage lever in contact with the paper for gaging the thickness thereof, a motor for actuating the paper carrying mechanism, and means actuated by the gage for controlling the speed of the motor to control the speed of the paper carrying mechanism to regulate the thickness of the paper.

4. In a paper machine, the combination of the paper carrying mechanism, a paper thickness regulator, comprising a gage lever in contact with the paper for gaging the thickness thereof, a motor for actuating the paper carrying mechanism, and an electric connection between the gage lever and the motor for controlling the speed of the motor to control the speed of the paper carrying mechanism to regulate the thickness of the paper.

5. In a paper making machine, the combination of paper the paper carrying mechanism, a paper thickness regulator, compris-

ing a paper thickness responsive device in contact with the paper, and means actuated by the responsive device for controlling the speed of movement of the paper carrying mechanism to regulate the thickness of the paper.

6. In a paper making machine, the combination of the paper carrying mechanism, a paper thickness regulator, comprising a paper thickness responsive device in contact with the paper, an electric motor for driving the paper carrying mechanism, a resistance controlling the speed of the motor, and means actuated by the responsive device for controlling said resistance.

7. In combination with a machine for making paper comprising paper carrying mechanism, of a paper thickness regulator therefor, comprising a paper thickness responsive device in contact with the paper, a motor for actuating the paper carrying mechanism, and means actuated by the responsive device for controlling the speed of the motor to thereby control the speed of the paper carrying mechanism.

8. In combination with a machine for making paper comprising paper carrying mechanism, of a paper thickness regulator therefor, comprising a paper thickness responsive device in contact with the paper, an electric motor for actuating the paper carrying mechanism, a resistance controlling the speed of the motor, and a means actuated by the responsive device for regulating said resistance.

In testimony whereof, I affix my signature, in presence of two witnesses.

ORVILLE M. DONALDSON.

Witnesses:
B. F. PEISCH,
C. H. KEENEY.