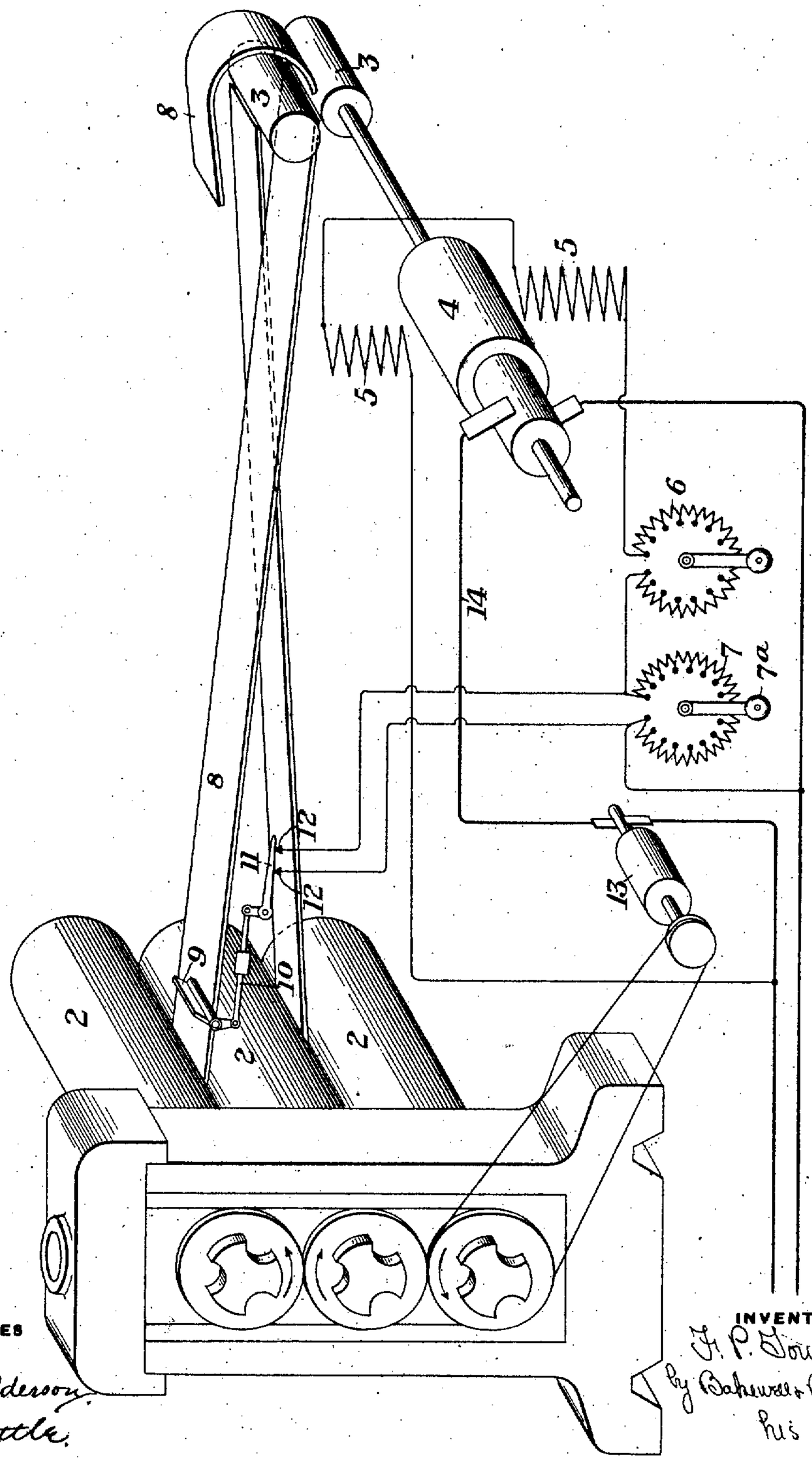
No. 848,581. PATENTED MAR. 26, 1907.

F. P. TOWNSEND.

CONTROLLER FOR ROLLING MILL REPEATERS.

APPLICATION FILED NOV. 12, 1906.



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CONTROLLER FOR ROLLING-MILL REPEATERS.

No. 848,581. Specification of Letters Patent. Patented March 26, 1907.

Application filed November 12, 1906. Serial No. 342,929.

To all whom it may concern:

Be it known that I, FRANK PILGRIM TOWNSEND, of Elyria, Lorain county, Ohio, have invented a new and useful Improvement in Controllers for Rolling-Mill Repeaters, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing, which is a perspective diagram showing my invention and its application.

My invention has relation to controlling means for rolling-mill repeaters.

In ordinary rolling-mill practice where roller-driven repeaters are used the repeaters are driven from the roll-train or train-engine by belts or gears, and the speeds therefore are always in a fixed proportion to the mill speeds. This fixed-speed proportion is objectionable in a number of ways, as is also the means of driving the repeater. The speed of the repeater and the distance it stands from the roll-train are usually determined by lengthy experiments. Even when these factors are determined the peripheral speed of the repeater will vary as wear diminishes the diameter of the repeater-rolls. Also as wear diminishes the diameter of the mill-rolls the peripheral speed of the repeater should be correspondingly lower. This with ordinary mechanical connection from the mill is difficult, so that a means of varying the peripheral speed of the repeater through a wide range should be of some value. It is also desirable in order to locate the repeater as close to the roll-train as possible to raise the speed of the repeater while it is receiving a piece from the rolls and to lower the speed of the repeater while it is delivering a piece to the rolls. I have accomplished all of these speed variations simply by electrical means by providing suitable controlling arrangements inserted in the shunt-field of an ordinary direct-current motor which I use to drive the repeater-rolls. In its more simple arrangement the repeater-drive motor is connected directly to the general power-circuits and all the control accomplished by means of variable field strength.

Where the mill speed is liable to considerable fluctuations, I have arranged to provide an auxiliary generator, belted or otherwise connected to the roll-train engine, which will vary the voltage impressed on the armature of the repeater-motor, tending to increase the speed of the motor should the mill speed increase or diminish this speed should the mill speed decrease. This small generator is connected as a booster in series with the armature-circuit. Should there not be any power-circuit available for operating the repeater-motor, then the generator may be made large enough to furnish the power for operating the repeater or repeaters.

My control arrangement for the automatic speed increasing and decreasing of the repeater while receiving and delivering pieces from and to the rolls and for securing the variation of the maximum and minimum speeds to compensate for wear in either the repeater-rolls or the mill-rolls is substantially as follows:

In the drawing, 2 indicates the rolls of a three-high mill, and 3 3 a pair of repeater-rolls which are driven by the electric motor 4. 5 5 designate the field-coils of this motor, which are shunt-wound. Connected in series with these field-coils is an adjustable rheostat 6, and 7 is a second similar rheostat which is also in series with said coils.

8 designates the repeater-guide, and 9 is a trigger device which is located immediately behind the mill-pass which delivers the piece to the repeater. This trigger is connected to a lever 10, which actuates the movable contact member 11, which normally rests upon two stationary contacts 12, which are connected with the terminals of the rheostat 7 to constitute a short circuit for such rheostat.

13 indicates a generator which is connected in the circuit 14 of the armature of the motor 4 to operate as a booster and which is indicated as being belted or otherwise connected to be driven from the roll-train or train-engine.

When the piece issues from the rolls, it strikes the trigger 9, thereby opening the two contacts 12 and causing the current which has been flowing through this contact to pass

through the rheostat 7. The amount of resistance which is inserted by this rheostat is controlled by the position of its handle 7ª in the usual manner. The action of this rheostat is of course to increase the resistance of the field-circuit of the motor 4, and thereby increase the speed of the motor. As soon as the piece has left the roll-pass the trigger 9 is returned to its normal position by means of gravity or a suitable spring, thereby closing the circuit between the contacts 12 and short-circuiting the rheostat 7. This reduces the resistance in the field-circuit, which immediately lowers the motor speed, and the piece may now be delivered to the roll-pass, following the repeater at such a speed that there will be no buckling of the piece being rolled. The rheostat 6 is employed to compensate for wear of the rolls of both the repeater and the mill. This rheostat will raise or lower both the high and the low speed, but will not effect to any great extent the speed variation which is determined by the rheostat 7. When the rheostat 6 is turned in one direction, it will raise both the low speed and the high speed a certain per cent. and if turned in the opposite direction will lower the high and the low speed a certain per cent. Both rheostats are used in combination for the purpose of controlling the speed variation when it is desired to increase or decrease the reduction in the passes following the repeater, which is a feature of great practical value.

The advantages of my invention consists in the simplification of the repeater-drive, the possibility of placing the repeater much closer to the rolls and thereby reducing the time that the piece is out of the rolls, and the elimination of the time required for the adjustment of the repeater for different sizes and weights of material being rolled. The invention also provides convenient means for taking care of the variation in roll diameters on both rolls and repeater. It allows all the adjustment of the mill-rolls to be made independently of any consideration for the repeater and permits a larger variation in engine speed, which will be automatically followed by the motor when the booster is used.

It will be obvious that my invention may be applied to rolling-mills in various ways without departing from its spirit and scope, since

What I claim is—

1. In a rolling-mill, a repeater having rolls, a motor for driving the repeater-rolls, and a device arranged to be controlled by the piece being rolled, and having connections arranged to vary the speed of the motor; substantially as described.

2. In a rolling-mill, a repeater having rolls, an electric motor for driving the repeater-rolls, a rheostat in the motor-circuit for varying the speed of the motor, and a switch device for the rheostat arranged to be actuated by the piece being rolled; substantially as described.

3. In a rolling-mill, a repeater having rolls, a shunt electric motor for driving the rolls of the repeater, a rheostat in the field-circuit of the motor, means for normally short-circuiting the rheostat, and a switch operated by the piece being rolled for removing the short circuit; substantially as described.

4. In a rolling-mill, a repeater having rolls, an electric motor for driving the repeater-rolls, a speed-controlling rheostat in the circuit of the motor, means for normally short-circuiting the rheostat, a device arranged to be moved by the piece being rolled to temporarily remove the short circuit, and a second speed-controlling device also in the motor-circuit for modifying the speed changes effected by the rheostat; substantially as described.

5. In a rolling-mill, a repeater having rolls, an electric motor for driving the rolls of the repeater, adjustable speed-controlling rheostats in the circuit of the motor, and a switch device having an operating member in the path of movement of the piece being rolled, the switch device being arranged to control the operative circuit connections of one of the rheostats, substantially as described.

6. In a rolling-mill, a repeater having rolls, an electric motor for driving the rolls of the repeater, a speed-controlling rheostat in the circuit of the motor, contact devices normally short-circuiting the rheostat, and a trigger device located in the path of the piece being rolled, and having connections to operate the contact devices; substantially as described.

7. In a rolling-mill, the combination of reducing-rolls, a repeater having feed-rolls, an electric motor connected to and arranged to drive the feed-rolls, a generator connected in the circuit of the motor to act as a booster, and connections for driving the generator by the reducing-roll-driving engine; substantially as described.

8. In a rolling-mill, the combination of reducing-rolls, a repeater having feed-rolls, an electric motor connected to and arranged to drive the feed-rolls, a generator connected in the circuit of the motor to act as a booster, and a positive driving connection between the generator and the reducing-rolls; substantially as described.

9. In a rolling-mill, a repeater-guide and repeater feed-rolls operating in conjunction with said guide, a power-motor constructed and arranged to drive the feed-rolls, a con-

trolling member adjacent to the repeater-guide and normally held in one position, and arranged to be moved and held out of normal position by a piece which passes over the guide, the said controlling member constructed and arranged to operate the controlling means of a speed-controlling device, said controlling device being connected to the motor and arranged to vary the speed of the motor; substantially as described.

In testimony whereof I have hereunto set my hand.

FRANK PILGRIM TOWNSEND.

Witnesses:

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