R. R. DUNLOP.

ELECTRIC BRAKE.

APPLICATION FILED JAN. 17, 1905.

973,926. **Patented Oct. 25, 1910.**

Fig. 1

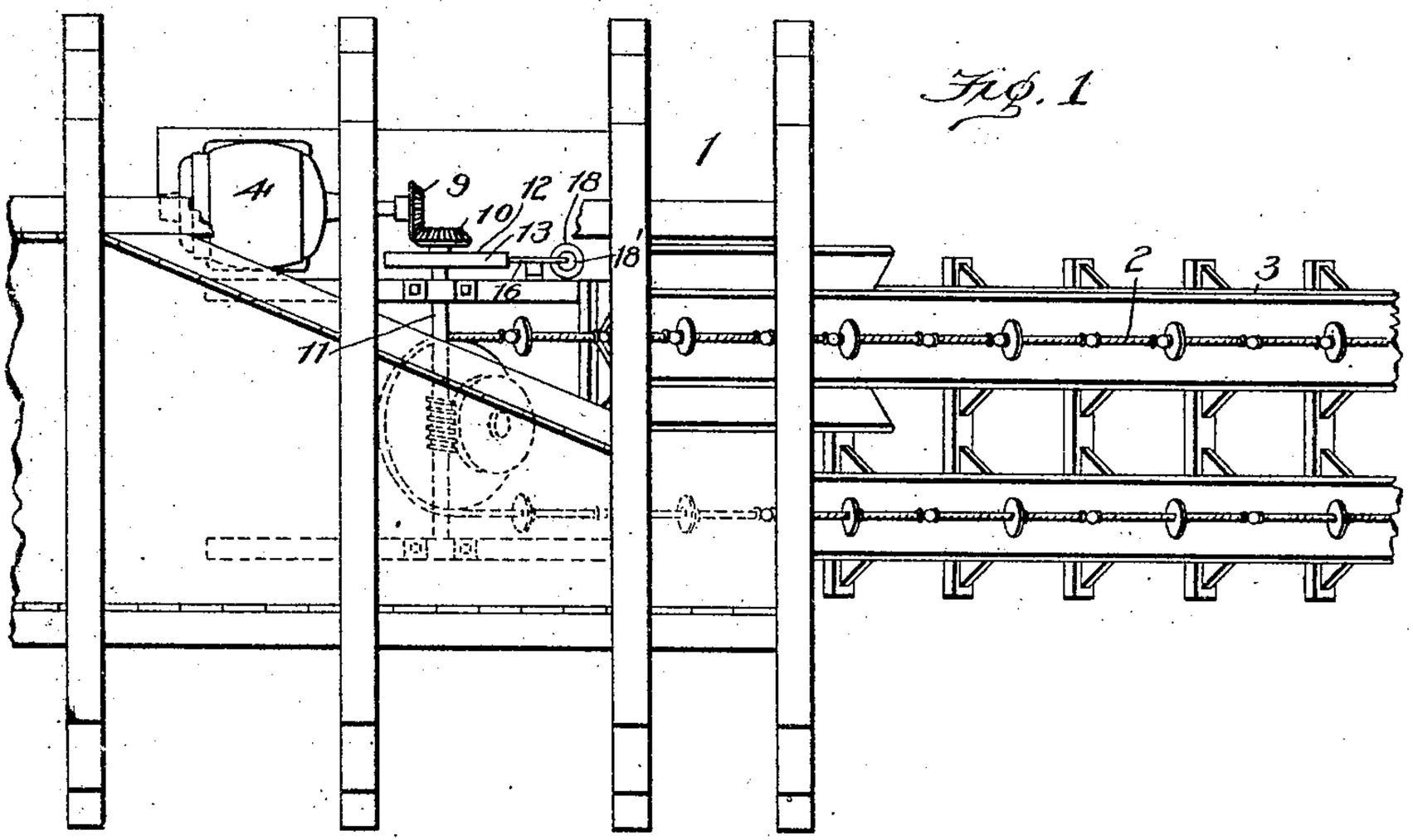
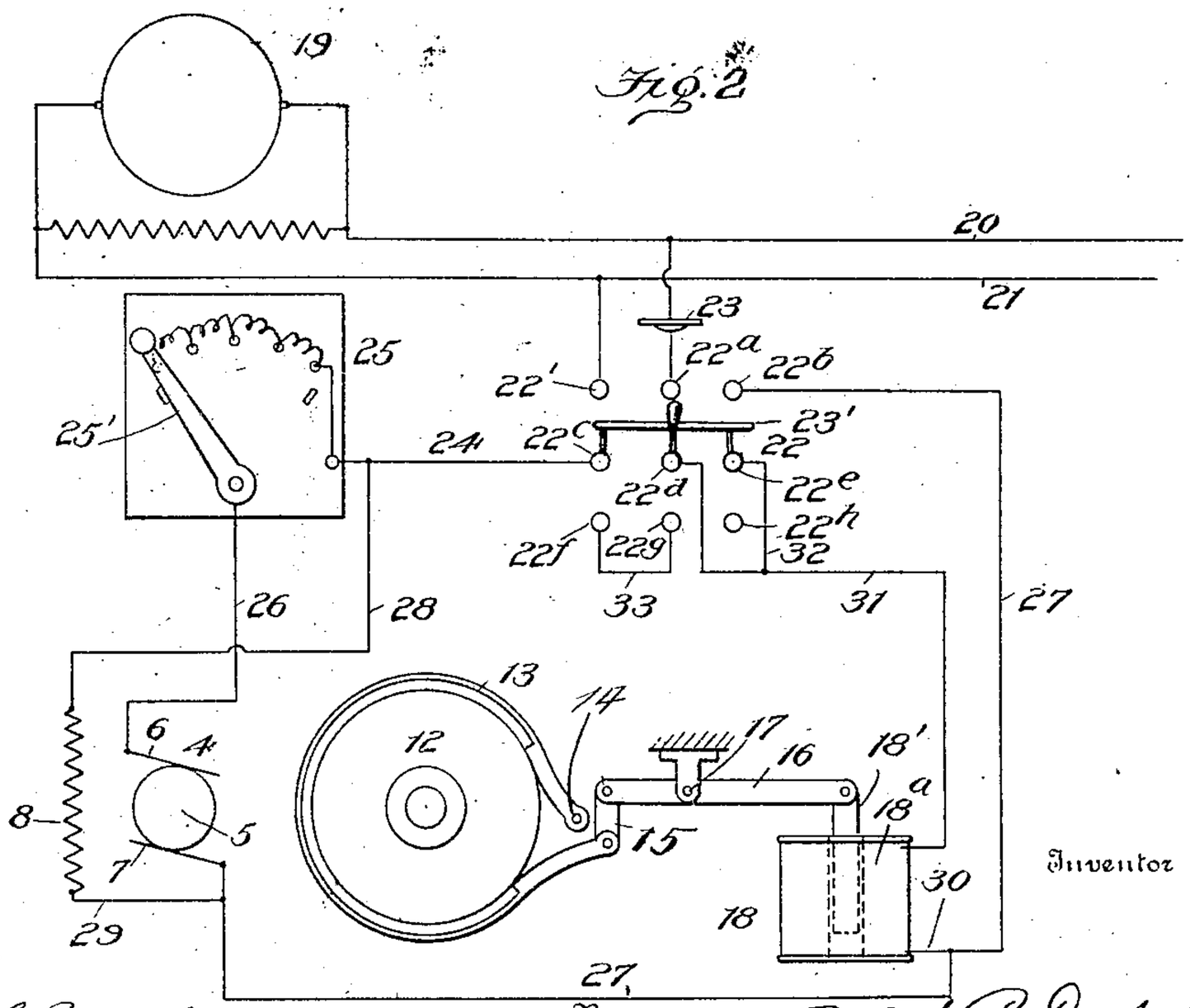


Fig. 2



Witnesses

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ELECTRIC BRAKE.

973,926. Specification of Letters Patent. **Patented Oct. 25, 1910.**

Application filed January 17, 1905. Serial No. 241,526.

To all whom it may concern:

Be it known that I, ROBERT R. DUNLOP, a citizen of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented certain new and useful Improvements in Electric Brakes, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to improvements in electro-magnetically operated brakes for conveyer or elevator systems adapted to prevent the too rapid descent of an elevator or conveyer under the action of gravity.

Figure 1 is a plan view of the upper part of said system. Fig. 2 is a diagrammatic view of the improved electro-magnet brake, the motor and the electrical circuit.

1 represents a tipple adapted to deliver material to an elongated endless carrier or conveyer 2, which is inclined to the horizontal and is adapted to retard the descent under gravity of the material received. 3 is a trough in which the said conveyer operates.

4 represents a shunt-wound motor having the armature 5, the brushes 6 and 7 and the shunt motor field 8. The armature has secured to it a pinion 9 which meshes with a gear 10 secured to the head or driving shaft 11 at the upper end of the conveyer. This latter shaft also has secured to it a brake pulley 12. 13 is a brake band adapted to engage with the periphery of said pulley. One end of this band is secured to a fixed pivot at 14 and its other end is connected by a link 15 near one end to the lever 16 which is pivotally suspended from a stationary shaft or pivot 17. To the other end of this lever 16 is pivotally connected the core 18′ of an electro-magnet 18.

19 represents a generator or source of electrical supply having the positive and negative conductors 20, 21 leading therefrom.

22 is a triple pole double throw switch to the binding posts 22′ and 22ª of which the conductors 20, 21 are respectively connected.

23 is a circuit breaker arranged in the circuit between the generator and the binding post 22ª, and 23′ is the switching lever of the switch 22. The pole 22ᶜ of the switch 22 is connected by a conductor 24 to one terminal of a starting box or resistance 25 having a switching lever 25′. The other terminal of this starting box is connected by a conductor 26 to the brush 6 of the motor.

27 is a conductor connecting the binding post 22ᵇ with the other brush 7 of the motor.

The field coils of the motor which are in shunt with the armature circuit are connected by conductors 28 and 29 to the conductors 24 and 27 respectively. The energizing coil 18ª of the electro-magnet has one of its ends connected by a conductor 30 to the conductor 27 and its other end connected by a conductor 31 to the central pole 22ᵈ of the switch 22.

32 is a conductor connecting the pole 22ᵉ with the conductor 31.

The binding posts at the lower side of the switch 22 are represented as 22ᶠ, 22ᵍ and 22ʰ, the former two of which are connected together by a conductor 33.

When it is desired to start the conveyer 2 in motion, the circuit breaker 23 is thrown in and the switching lever 23′ is thrown so as to connect the upper series of binding posts of the switch 22 into the electrical circuit, and current is applied to the motor by throwing the contact arm or lever 25′ of the starting box 25 so as to close the circuit to the motor.

It will be seen that when the switching lever 23′ is in its upper position the energizing coil 18ª of the electro-magnet 18 is short-circuited and no current will flow through it, the path of the current being over the conductor 20, to the binding post 22ª thence to the conductor 31 to conductor 32 and over the conductor 27 to the brush 7 and from this brush through the armature, field and the starting box to the pole 22ᶜ of the switch 22 and then over conductor 21 to the source of supply.

After the conveyer has been started in motion, its momentum, under the action of gravity, is, as a rule, sufficient to keep it running, and in order to prevent its running away and to utilize its momentum for power generating purposes, the contact arm or lever 25′ of the starting box 25 is thrown so as to place in the circuit the resistance of the box and the switching lever 23′ is thrown down into its lower position thus connecting the energizing coil 18ª of the electro-magnet 18 in series with the armature and in parallel with the field, the motor is now allowed to run as a generator and in view of the

fact that it is shunt-wound, its field will be energized in the same direction that it was energized when supplied from the source of electrical supply 19. The path of the current will be from the brush through the field 8 and over the conductor 27 to the electro-magnet 18 and through its coil 18^a to the conductor 31, thence to the pole 22^d of the switch 22, then over the conductor 24 to the starting box 25 and thence over conductor 26 to the brush 6.

The electro-magnet 18 and the resistance in the starting box 25 should be so designed as to give the proper amount of pull on the core 18′ of the electro-magnet to apply the brake with sufficient pressure to limit the speed of rotation of the armature shaft. Should the momentum of the conveyer exceed a certain predetermined amount, the consequent speed of rotation of the armature shaft will cause the generation of a sufficiently high electro-motive force to send an energizing current through the coils 18^a of the electro-magnet 18 sufficient to cause the core 18′ to exert a pull on the brake which will stop the too rapid rotation of the shaft 11. Should the action of gravity upon the conveyer be insufficient to cause it to travel so as to deliver its load the switching lever 23′ may be thrown upward and current applied for driving the motor as hereinbefore described. When the apparatus is to be brought to a standstill it is simply necessary to cut off the supply of material that is delivered to the carrier.

While in the drawings I have shown a brake embodying my improvements applied for controlling a retarding conveyer, it will be understood that I do not limit myself to its use in this connection. It may be applied to any other type of machinery in which it is desired to control the speed of operation of the machinery by means of an automatically actuated brake. Nor is my invention limited to the manner of completing the electrical circuits shown in the drawings as these may be varied without departing from the spirit of my invention.

What I claim is—

1. The combination of an electric current source of supply, a shunt-wound dynamo-electric machine adapted to run either as a motor or generator, a brake for controlling the speed of rotation of the armature of said machine, an electro-magnet for operating said brake, electric connections between the coil of the magnet and the commutator brushes of said machine, and switch devices adapted to connect said machine with the source of current supply without energizing the magnet so as to apply the brake, and also to entirely disconnect the machine from said current source and close the machine circuit through the energizing coil of the electro-magnet so as to apply the brake.

2. The combination of an electric current source of supply, a shunt-wound dynamo-electric machine adapted to run either as a motor or generator, a brake for controlling the speed of rotation of the armature of said machine, an electro-magnet for operating said brake, electric connections between the coil of the magnet and the commutator brushes of said machine, and switch devices adapted to connect said machine with the source of current supply and at the same time shunt the current around the energizing coil of said magnet, and also to entirely disconnect the machine from said current source and close the machine circuit through the energizing coil of the electro-magnet so as to apply the brake.

3. The combination of an electric current source of supply, a dynamo-electric machine adapted to run either as a motor or generator, a brake for controlling the speed of rotation of the armature of said machine, an electro-magnet for operating said brake, electric connections between the coil of the magnet and the commutator brushes of said machine, and switch devices having a single operating handle adapted to connect said machine with the source of current supply without energizing the magnet so as to apply the brake, and also to entirely disconnect the machine from said current source and close the machine circuit through the energizing coil of the electro-magnet so as to apply the brake.

4. The combination of an electric current source of supply, a dynamo-electric machine adapted to run either as a motor or generator, a brake for controlling the speed of rotation of the armature of said machine, an electro-magnet for operating said brake, electric connections between the coil of the magnet and the commutator brushes of said machine, switch devices adapted to connect said machine with the source of current supply without energizing the magnet so as to apply the brake, and also to entirely disconnect the machine from said current source and close the machine circuit through the energizing coil of the electro-magnet so as to apply the brake, and a rheostatic controlling device operable independently of said switch device and adapted to control both the current supplied to the machine when it runs as a motor and the current supplied to the electro-magnet by the machine when running as a generator.

5. The combination of a source of current supply, a dynamo-electric machine adapted to run either as a motor or generator, a brake for controlling the speed of rotation of the armature of said machine, an electro-magnet for operating said brake, and a triple-pole double-throw switch adapted when in one position to connect said machine with the source of current supply and

to short-circuit the energizing coil of said electro-magnet, and when in its other position to connect the energizing coil of said magnet into the machine circuit.

6. The combination with a source of current supply, a dynamo electric machine adapted to run either as a motor or generator, a pulley driven by said machine, a brake band associated with said pulley and a lever for operating said brake band, of an electro-magnet having its core arranged to operate said lever, and a triple-pole double-throw switch adapted, when in one position to connect the machine with the source of current supply and to short circuit the energizing coil of said electro-magnet, and when in its other position to connect the energizing coil of said magnet into the machine circuit.

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

ROBERT R. DUNLOP.

Witnesses:
C. E. WAXBOM,
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