No. 725,386. PATENTED APR. 14, 1903.

F. E. WHITNEY.

BELLOWS MOTOR CONTROLLER.

APPLICATION FILED JULY 29, 1902.

NO MODEL.

Fig. 1.

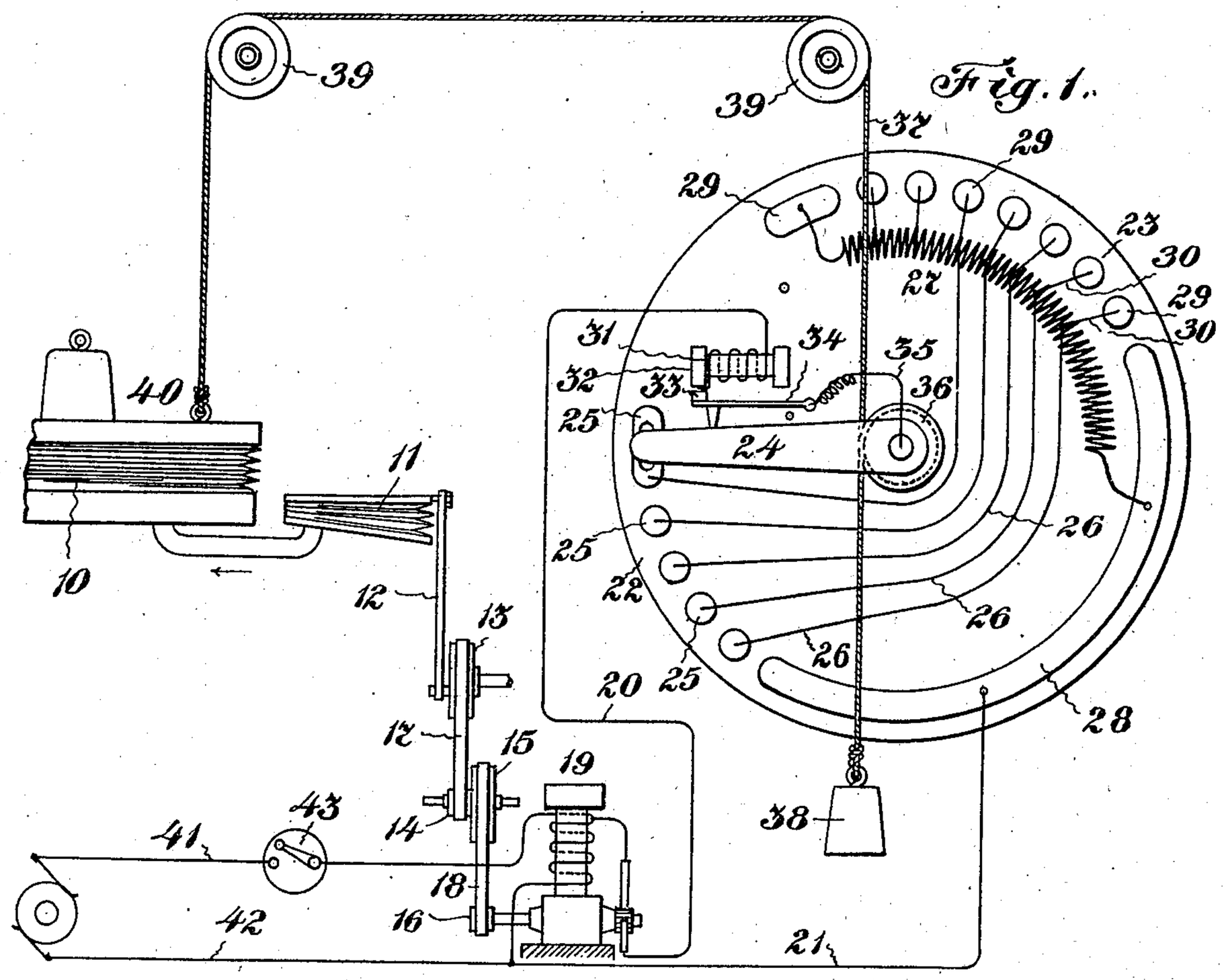
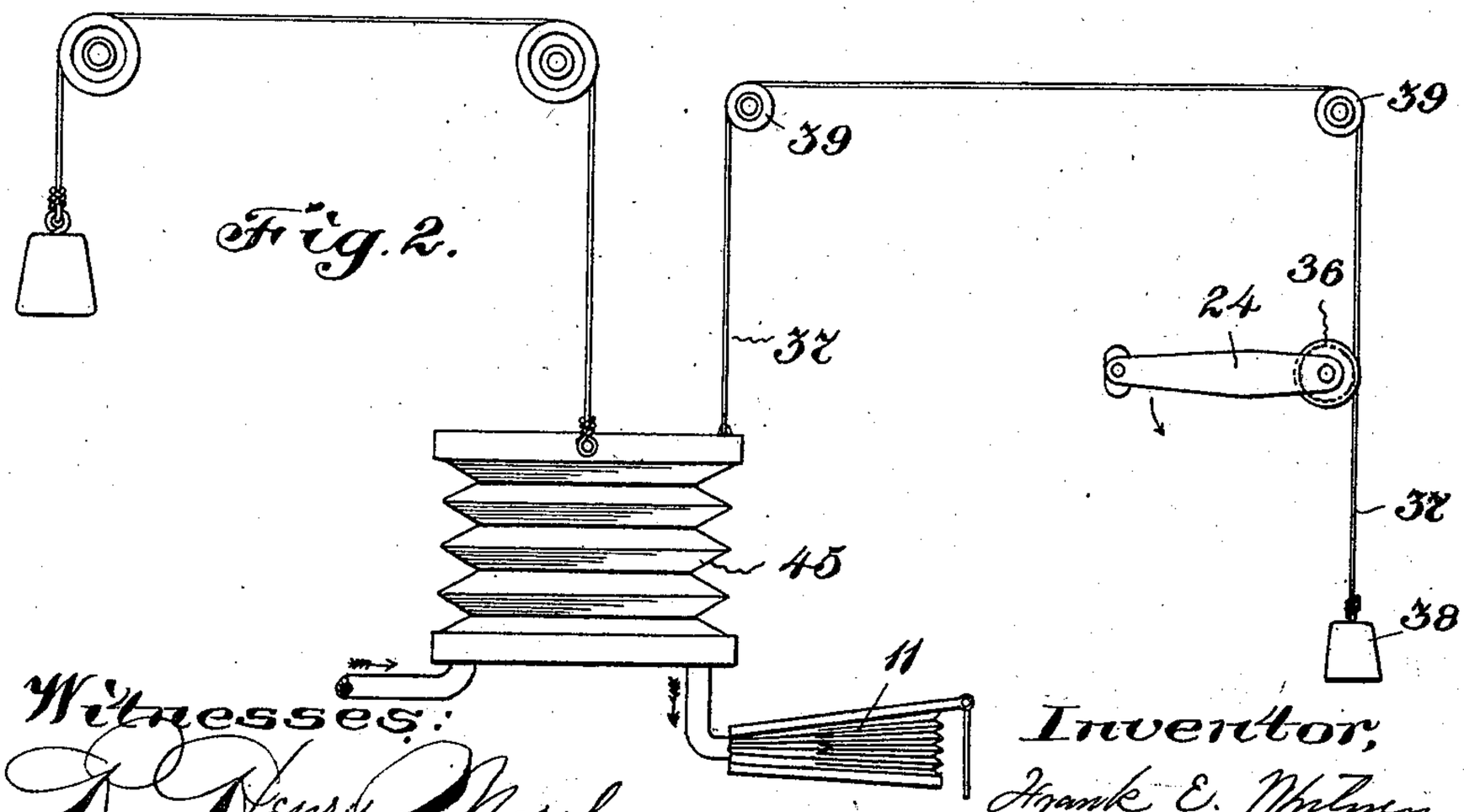


Fig. 2.



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UNITED STATES PATENT OFFICE.

FRANK E. WHITNEY, OF AUGUSTA, GEORGIA.

BELLOWS-MOTOR CONTROLLER.

SPECIFICATION forming part of Letters Patent No. 725,386, dated April 14, 1903.

Application filed July 29, 1902. Serial No. 117,536. (No model.)

To all whom it may concern:

Be it known that I, FRANK E. WHITNEY, of Augusta, in the county of Richmond and State of Georgia, have invented certain new and useful Improvements in Bellows-Motor Controllers, of which the following is a specification.

This invention relates to controlling devices for electric bellows-operating motors; and its principal objects are to avoid the liability to injury of the motor from cutting out the starting resistance too rapidly, to reduce the complication and cost of the apparatus, and to prevent the burning out of the motor by the turning on of current when the starting resistance is out of circuit. To effect these objects, I arrange to automatically cut out the starting resistance by the movement of the bellows instead of by hand, to consolidate the starting and controlling rheostats into one structure, and to electromagnetically control the existence of the motor-circuit and establish it by the return of the rheostat-arm or movable member to starting position.

Of the accompanying drawings, Figure 1 represents a diagrammatic view of a bellows-motor controller constructed in accordance with my invention. Fig. 2 represents a similar partial view showing a modification.

The same reference characters indicate the same parts in both figures.

In Fig. 1, 10 is a main compression-bellows filled by a small auxiliary bellows 11, operated through the usual pitman 12, pulleys 13 14 15 16, and belts 17 18 from the shaft of an electric motor 19. The latter is indicated as shunt-wound, and in its armature-circuit 20 21 are located the starting-rheostat 22 and controlling-rheostat 23, having a common resistance-varying pivoted arm 24. (Indicated in its starting position in the drawings.)

25 25 are the contacts of the rheostat 22, connected by wires 26 26 with the several sections of a resistance 27, the arrangement being such that as the arm 24 moves downward over the contacts 25 it cuts out resistance from the armature-circuit. A continuation of such movement of the arm carries it onto an elongated contact 28, common to the rheostats, and from thence onto the short contacts 29 29 of the controlling-rheostat 23. Said contacts are connected by wires 30 30 with the sections of the resistance 27, but in a reverse direction from the connections of the starting-rheostat, so that as the arm 24 moves over the contacts 29 in a left-handward or anticlockwise direction the individual sections or resistances are cut in in succession and the resistance in the armature-circuit increases. The wire 21 of the armature-circuit connects with the elongated contact 28, and the wire 20 connects with one terminal of the coil of an electromagnet 31, the other terminal of said coil connecting with the pole-piece 32 of the magnet, said pole-piece in this instance constituting a switch-point. The armature 33 of the magnet is mounted on a pivotal arm 34 and constitutes a complemental switch-point, the current passing from said arm by way of a wire 35 to the arm 24. The latter in its initial position makes contact with the arm 34 and closes the switch 32 33, thereby closing the armature-circuit. The switch 32 33 is held closed by magnetic attraction as the rheostat-arm 24 moves away; but should the circuit become broken the arm 34 will drop, and the subsequent closing of said circuit will be prevented until the rheostat-arm 24 has returned to its initial position and placed the starting resistance in circuit.

To the axis of the arm 24 is fixed a drum 36, around which is coiled a cord 37, whose lower end is provided with a weight 38, tending to move the arm 24 anticlockwise. Said cord passes over pulleys 39 39 and is attached to the movable top 40 of the bellows 10. When the latter is flat, the arm 24 is in its initial or starting position with full starting resistance in the armature-circuit. The closing of the line-circuit 41 42 by the switch 43 at the organ-bench starts the motor 19 in operation slowly, and the latter starts to pump air into the bellows 10. The speed of the motor increases as the arm 24 travels around by reason of the filling of the bellows, and when said arm reaches the long contact 28 all resistance is out of the armature-circuit. Owing to the length of said contact 28, the motor remains at full power until the bellows is nearly full of wind. If the outdraft from the bellows 10 is less than the supply from the bellows 11, the rheostat-arm 24 moves onto the contacts 29 of the controlling-rheo-

stat 23 and inserts resistance in the armature-circuit, thereby slowing down the motor as the rheostat-arm continues to move outwardly. When the arm has moved onto the last contact at the left of rheostat 23, I arrange so that there is then sufficient resistance in the motor-circuit to stop the motor entirely. It is evident that this arrangement avoids opening the circuit, and hence avoids the occurrence of destructive sparking between the rheostat-arm and contacts. The rheostat 23 automatically controls the power of the motor according to the demand on the bellows.

By employing the movement of the bellows to automatically cut out the starting resistance from the motor-circuit I avoid the well-known annoyances due to controlling this resistance by hand, such as burning out of the motor by cutting out the resistance too rapidly and injury to the bellows caused by the motor starting too quickly, and by consolidating the starting and controlling rheostat into one structure I reduce the complication, cost, and size of the apparatus as a whole. The feature of the elongated contact 28 enables me to maintain the bellows nearly full when there is the greatest demand upon it, thereby obtaining evenness of air-pressure.

Fig. 2 shows a modification in which my invention is applied to a suction-bellows. The bellows is represented at 45 and is normally full, so that it is necessary to reverse the winding of the cord 37 on the drum 36 in order to cause the rheostat-arm 24 to move in an anticlockwise direction as the bellows empties.

In both arrangements herein shown the resistance-varying arm 24 operates to decrease the starting resistance in the motor-circuit upon an increase in the working capacity of the bellows.

I claim—

1. In a bellows-motor controller, the combination of a bellows, an electric motor for operating the same, a variable resistance in the motor-circuit, and resistance-varying means controlled by the bellows and operating to decrease the resistance in circuit upon an increase in the working capacity of the bellows.

2. In a bellows-motor controller, the combination of a bellows, an electric motor for operating the same, and a rheostatic device comprising a starting-rheostat and a controlling-rheostat having a common set of resistance-conductors connected in reverse order to the respective rheostats, and resistance-varying means controlled by the bellows and operating in the respective rheostats in succession upon an increase in the working capacity of the bellows.

3. In a bellows-motor controller, the combination of a bellows, an electric motor for operating the same, a rheostatic device having a series of starting-contacts and a series of controlling-contacts, resistance-conductors connected reversely to the respective sets of contacts, and a resistance-varying arm common to the two sets of contacts and controlled by the bellows, whereby the initial movement of said arm cuts out resistance on the starting-contacts and a continuation of such movement inserts resistance on the controlling-contacts.

4. In a bellows-motor controller, the combination of a bellows, an electric motor for operating the same, and a rheostat controlled by the bellows and controlling the motor-circuit, said rheostat having provisions for maintaining the circuit without substantial change in resistance throughout the major portion of its operative range.

5. In a bellows-motor controller, the combination of a bellows, an electric motor for operating the same, a starting-rheostat controlling the motor-circuit and provided with a movable resistance-varying device controlled by the bellows, a switch controlling the motor-circuit and controlled by said device, and electromagnetic means controlled by said circuit and controlling the switch.

6. In a bellows-motor controller, the combination of a bellows, an electric motor for operating the same, and a rheostat controlled by said bellows and having provisions for inserting sufficient resistance in the motor-circuit to stop said motor at the limit of the operative range of the rheostat.

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

FRANK E. WHITNEY.

Witnesses:
W. A. PLUMB,
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