No. 754,465. PATENTED MAR. 15, 1904.

D. N. LEIB.

# AUTOMATIC ELECTRIC HEAT REGULATOR.

APPLICATION FILED APR. 10, 1902.

NO MODEL. 3 SHEETS—SHEET 1.

Fig. 1.

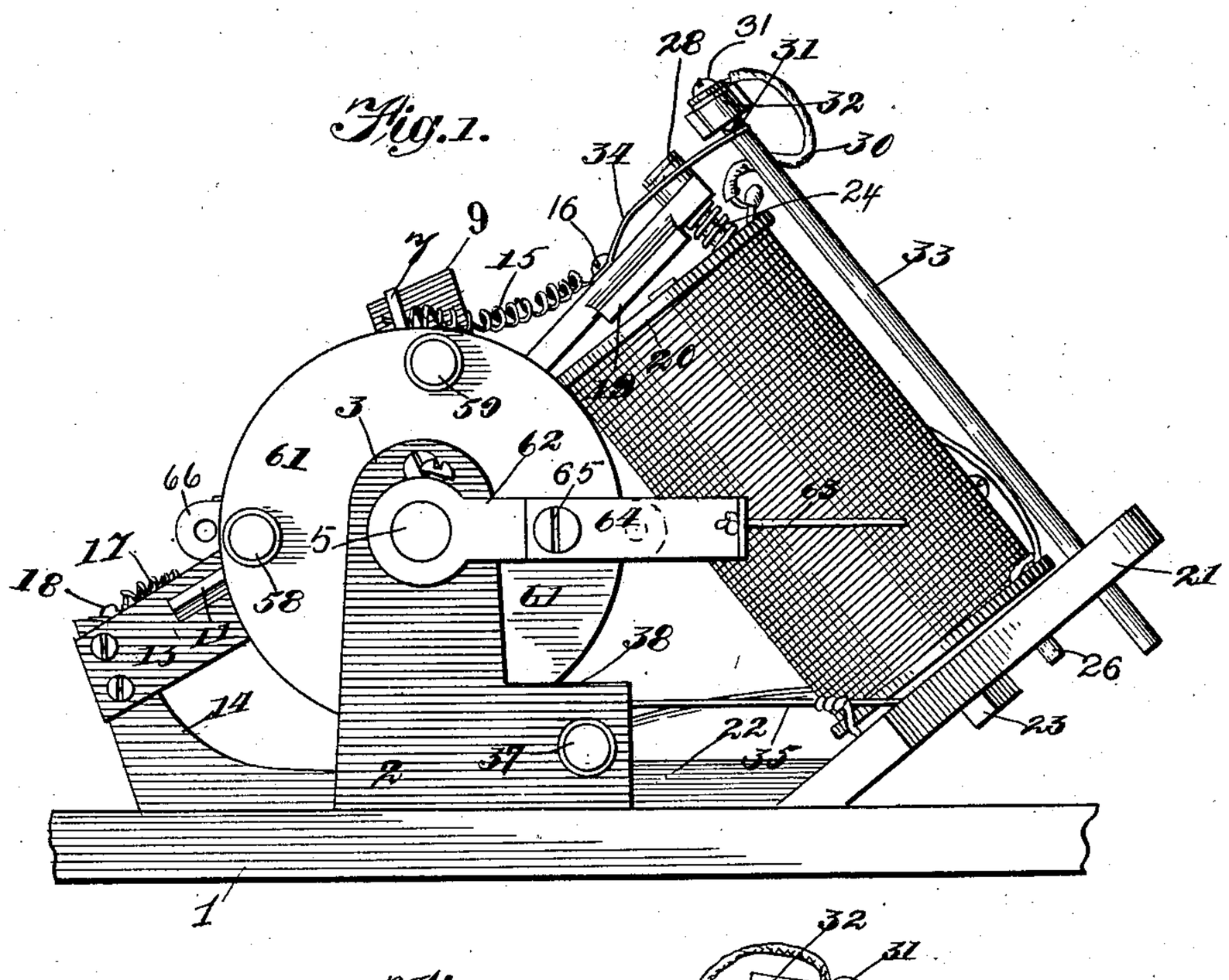
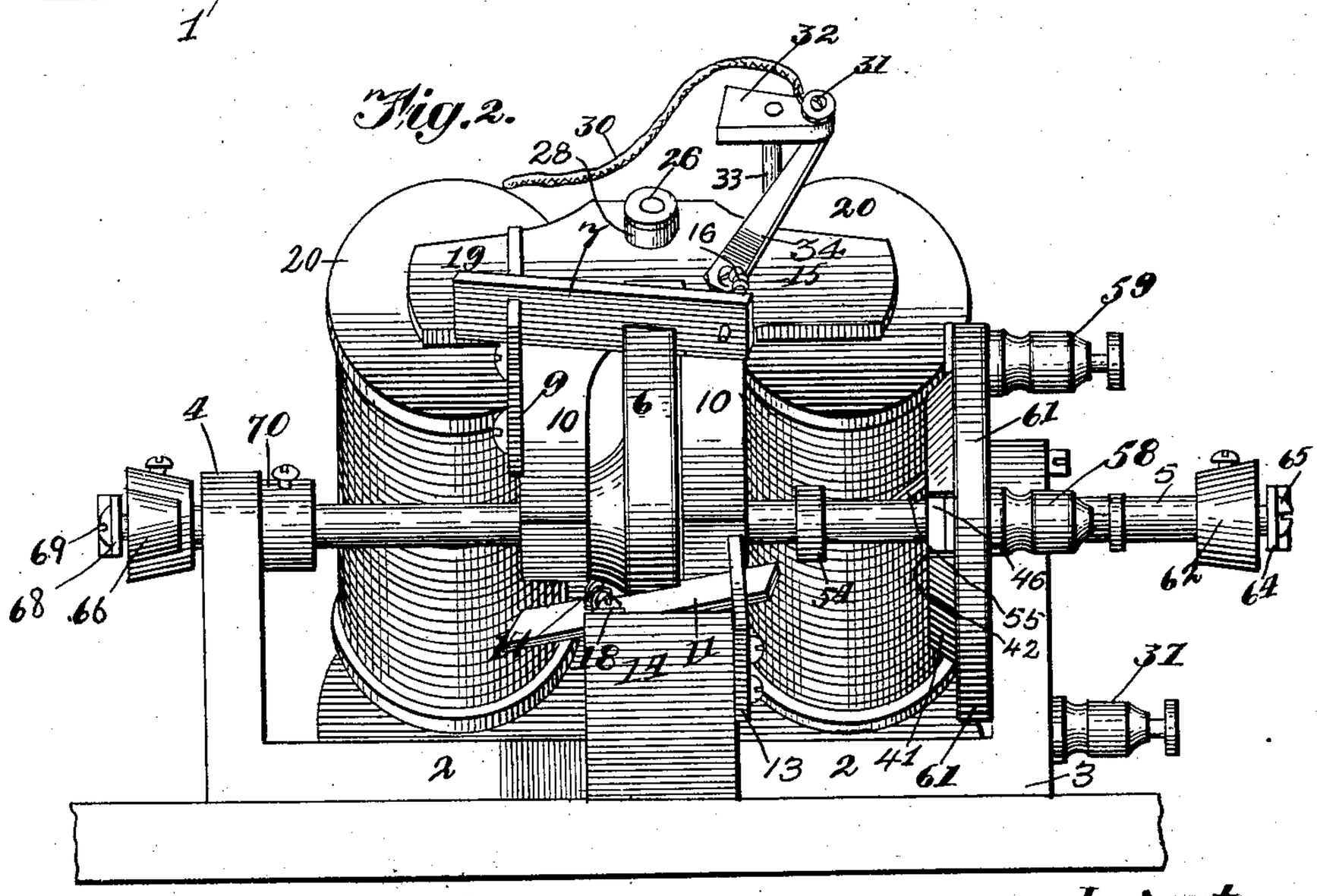



Fig. 2.

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NO MODEL. 3 SHEETS—SHEET 2.

Fig. 3.

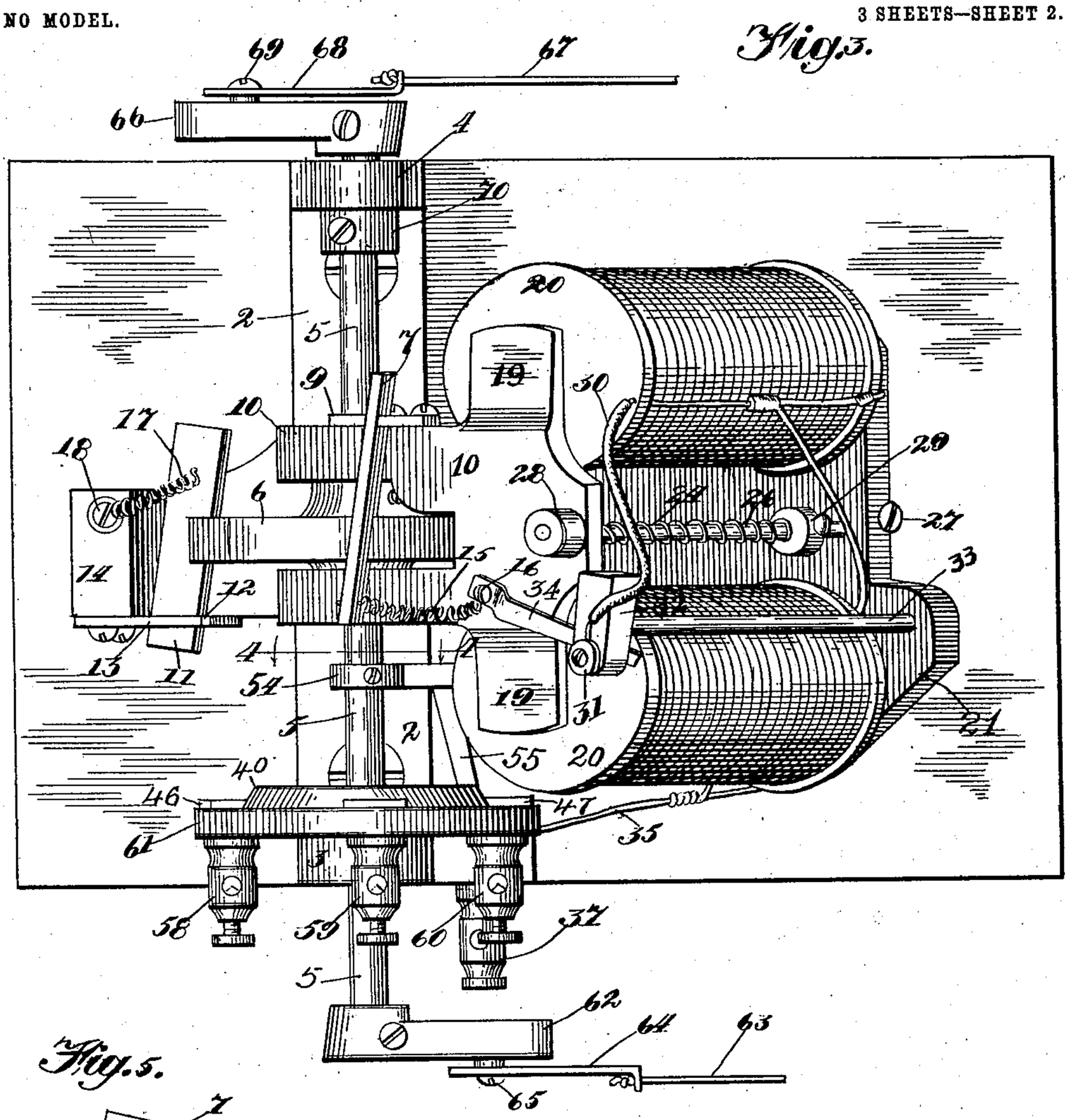



Fig. 5.

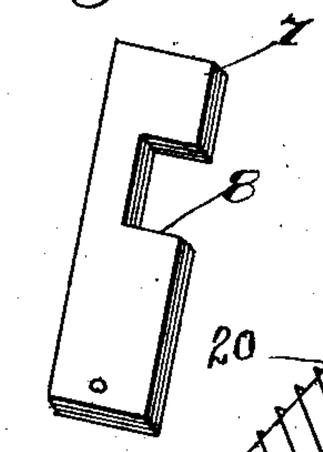
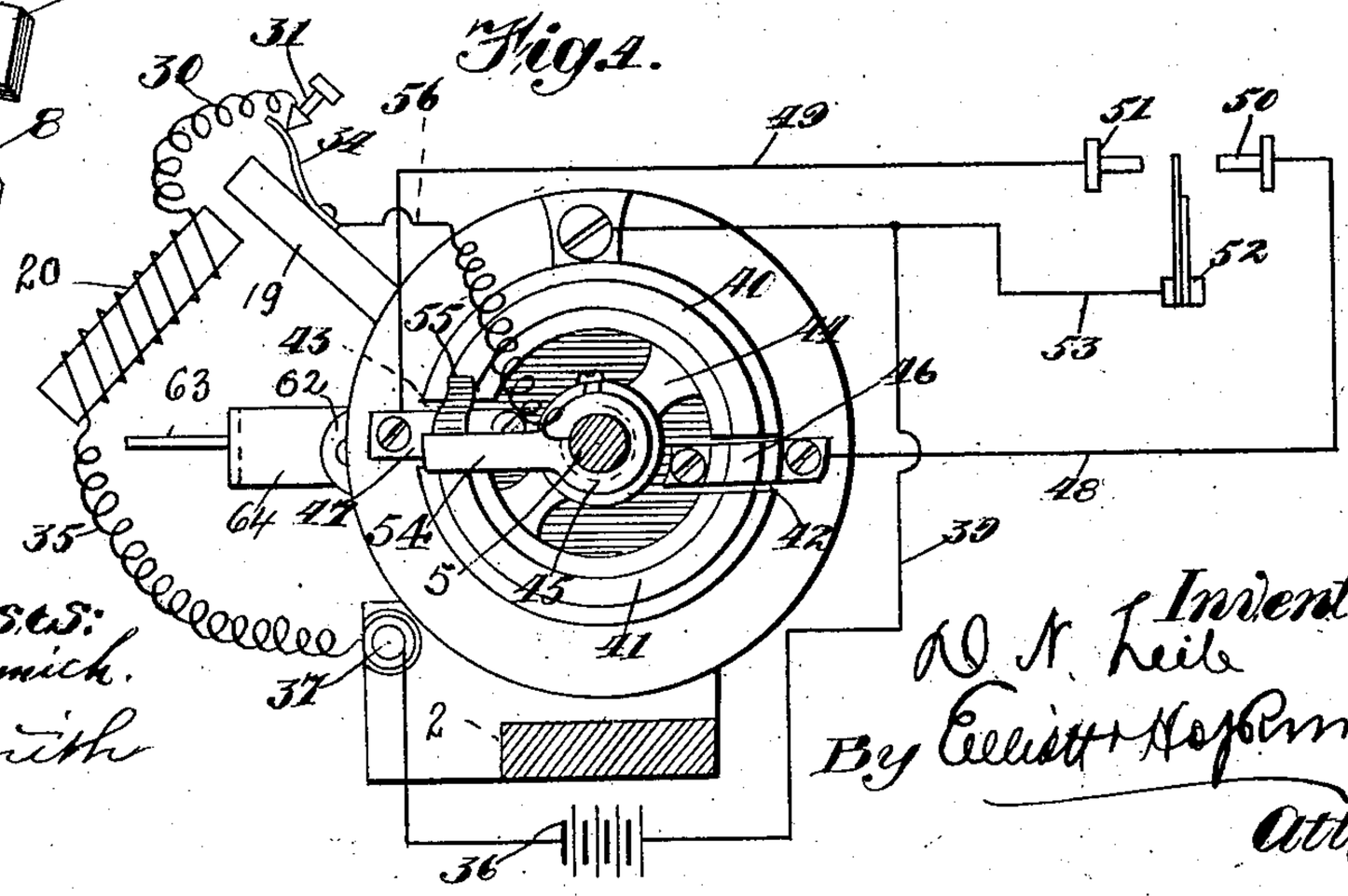



Fig. 4.

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AUTOMATIC ELECTRIC HEAT REGULATOR.

APPLICATION FILED APR. 10, 1902.

NO MODEL. 3 SHEETS—SHEET 3.

Fig. 6.

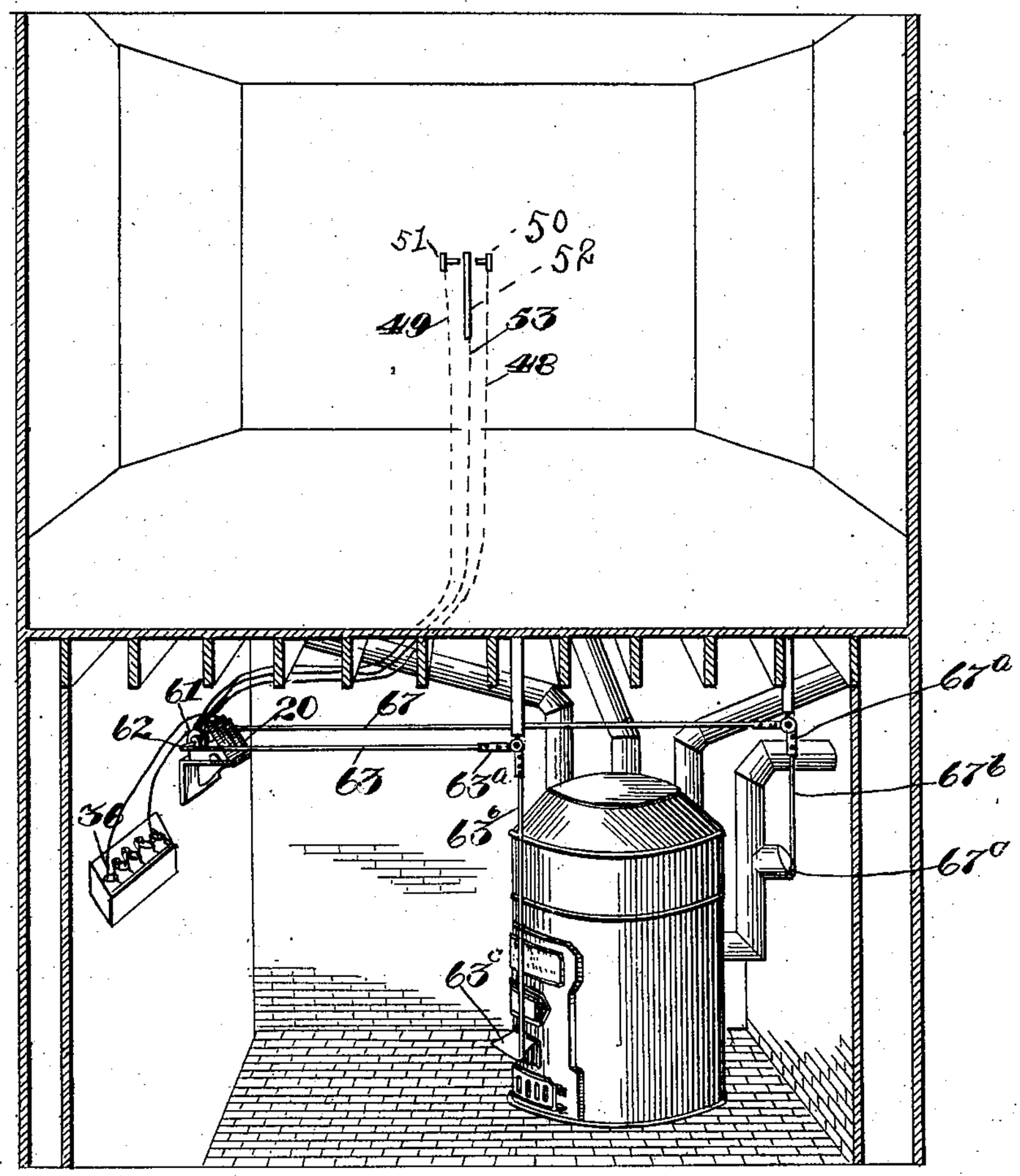
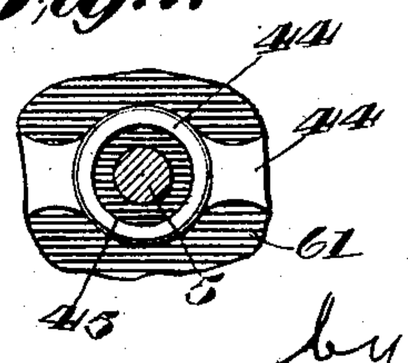



Fig. 7.

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No. 754,465. Patented March 15, 1904.

# UNITED STATES PATENT OFFICE.

DANIEL N. LEIB, OF ELKHART, INDIANA, ASSIGNOR TO THE AUTOMATIC HEAT REGULATOR COMPANY, OF ELKHART, INDIANA, A CORPORATION.

## AUTOMATIC ELECTRIC HEAT-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 754,465, dated March 15, 1904.

Application filed April 10, 1902. Serial No. 102,172. (No model.)

*To all whom it may concern:*

Be it known that I, DANIEL N. LEIB, a citizen of the United States, residing at Elkhart, in the county of Elkhart and State of Indiana, have invented certain new and useful Improvements in Automatic Electric Heat-Regulators, of which the following is a full, clear, and exact specification.

My invention relates to that class of automatic electric heat-regulators in which the dampers of the furnace or any other devices whereby the heat is controlled are operated by means of an electromagnet whose coils are placed in circuit alternately with two different circuits by means of a thermostat, serving to close one of said circuits when the temperature falls and to close the other when the temperature rises, whereby the electromagnet is caused to actuate the damper in one direction when one of said circuits is closed and to actuate it in the opposite direction when the other is closed; and my invention has for its primary object to provide improved, efficient, and simple mechanism whereby the electromagnet may be enabled to thus actuate the dampers or heat-controlling devices.

With these ends in view my invention consists in certain features of novelty in the construction, combination, and arrangement of parts by which the said objects and certain other objects hereinafter appearing are attained, all as fully described in the accompanying drawings, and more particularly pointed out in the claim.

In the said drawings, Figure 1 is a side elevation of my improved automatic electric heat-regulator. Fig. 2 is a front elevation thereof. Fig. 3 is a plan view. Fig. 4 is a detail section, partly on the line 4 4, Fig. 3, showing the relation of such part to the various circuits and other mechanism illustrated diagrammatically. Fig. 5 is a detail view of one of the clutch-bars hereinafter described. Fig. 6 is a general view showing the device in its operative relation, and Fig. 7 is a detail section taken across the shaft between the members 54 and 44.

1 is a base upon which is secured a U-shaped frame comprising a bottom member 2 and two end standards 3 4, in which latter is journaled a horizontal shaft 5, carrying a friction-wheel 6, which constitutes one member of a friction-clutch whose driving member is constituted by a grip-bar 7, provided with a notch 8, which embraces the edge of the wheel 6 and rests upon the periphery thereof, one end of the bar 7 being seated in a slotted bracket 9, which is secured to the side of an armature-arm 10, the wheel itself holding the bar 7 against longitudinal movement, while the bracket 9 holds it against transverse movement. The arm 10 is pivoted loosely on the shaft 5, while the wheel 6 is secured thereto, so that when the armature-arm oscillates in one direction it causes the grip-bar 7 to bind the wheel 6, and thereby rotate the shaft. When it oscillates in the opposite direction, it slides around the friction-wheel without moving it; but in order that the retrograde movement of the wheel may be further insured against a holding-dog is provided in the form of a second grip-bar 11, which is similar in construction and operation to the bar 7, it being provided with a notch like the notch 8, which grips the wheel 6, and it is held in a slot 12 in a bracket 13, secured to a projecting arm 14 on the frame 2. These grip-bars 7 11 are set oppositely, so that they will act alternately—that is, one will act on the wheel moving in one direction and the other on it when moving in the opposite direction—and in order to insure their positive gripping of the wheel each is pressed in one direction by a spring or any other suitable means. The spring for the bar 7 is shown at 15 in the form of a coil-spring, having one end passed through one end of the bar and the other end secured by a screw 16 to armature-arm 10, and the spring is compressed between these two points of attachment, so that its effect will be to push the bar 7 toward the left as viewed in Fig. 3. The spring for bar 11 is shown at 17 in the form of a coil-spring which has one end secured by screw 18 to arm 14 and the other end passed through the bar 11, and this spring, like the spring 15, bears between these two points of attachment, so as to force bar 11

toward the right as viewed in Fig. 5, spring 15 being arranged on one side of wheel 6 and spring 17 on the opposite side, the supporting-brackets 9 and 13 for the fixed ends of the grip-bars being also arranged on opposite sides of the wheel.

The armature-arm 10 is bifurcated, as better shown in Figs. 2 and 3, and straddles the wheel 6, whereby the longitudinal movement of the arm on the shaft 5 is prevented by the wheel.

19 is an armature, preferably cast in one piece with the armature-arm 10 and arranged to be attracted by an electromagnet 20, which is supported on an oblique extension 21 of an arm 22, which extends laterally from the frame member 2 and is formed in one therewith, the cores of the electromagnet being attached to the oblique extension 21 by bolts or screws 23. The armature 19 is normally forced away from the magnet by a spring 24, sleeved on a rod 26, secured by screw 27 or other suitable means in the extension 21 and passing upwardly in an inclined direction through the armature 19, above which the rod carries a cushion or buffer 28, composed of rubber or any other suitable material for deadening the noise or shock resulting from the upward movement of the armature.

29 is an adjustable collar on the rod 26 for regulating the tension of spring 24.

One terminal, 30, of the electromagnet is connected to a contact-point 31, which is supported on a block of insulation 32 by a standard 33, secured in the extension 21, and which contact-point 31 is adapted to make electrical connection between shaft 5 and the electromagnet when the armature rises through the intermediary of a contact-spring 34, secured to the armature by the screw 16, which is connected directly with the grip-bar 7 by the spring 15, and inasmuch as this bar 7 has rubbing contact with the wheel 6 it affords perfect electrical connection and avoids the possibility of the circuit being interrupted by dirt or rust. The other terminal, 35, of the electromagnet is connected to one pole of a battery or other source of electrical energy, (represented diagrammatically at 36.) To facilitate this connection, the terminal 35 is secured to a binding-post 37, supported in but insulated from an extension 38 on the standard 3. The other pole of battery 36 is connected by conductor 39 with a contact-disk composed of two semicircular portions 40 41, having gaps 42 43 between their ends, but electrically connected together by a web 44, through which latter the shaft 5 passes, but is insulated therefrom, the hole 45 in the web 44 being larger than the shaft. Arranged in the gaps 42 43, respectively, and insulated from the contact-disk members 40 41 are two contact-plates 46 47, which are connected by conductors 48 49, respectively, with the fixed contacts 50 51 of the thermostat, of which the movable member is shown at 52 and is permanently connected by conductor 53 with contact-disk 40 41. The shaft 5 carries an arm 54, which is provided with a brush 55, adapted to sweep around the contact-disk members 40 41 and the plates 46 47, and thereby place the electromagnet in electrical communication with either the said contact-disk or with one or the other of the contact-plates 46 47. In the diagrammatic illustration shown in Fig. 4 the electrical connection between the contact-spring 34 and the shaft 5 is indicated by a conductor 56, corresponding to the spring 15, bar 7, and wheel 6, so far as their electrical conductivity is concerned.

The binding-posts 58 59 60 are for facilitating the connection of the conductors 39, 48, and 49, respectively, and such posts are supported in a plate of insulation 61, secured to the standard 3 and also constituting a means for the support of contact-disk members 40 41 and the contact-plates 46 47.

One end of the shaft 5 is projected beyond the heads of the binding-posts and is provided with a crank-arm 62, to which one of the cords or chains 63 which actuates the damper or draft is secured by a plate 64, pivoted to the crank-arm 62 by wrist-pin 65 or other suitable means, and the opposite end of shaft 5 is equipped with a similar crank-arm 66, to which is secured the other cord or chain 67, which actuates the draft or the damper by means of a plate 68, pivoted to the crank-arm by a wrist-pin 69. These crank-arms 62 66 are set opposite each other, and it is of course understood that one of the cords 63 67 is attached to the draft $63^c$ and the other to the damper $67^c$, so that when the draft closes the damper opens, and vice versa. The shaft 5 is held against longitudinal movement in its bearings by collar 70, secured thereon and abutting against one side of standard 4, while at the other side of the standard is arranged the crank-arm 66.

With the construction thus described it will be seen that with the parts in the position represented in Fig. 4 the circuit is closed through 39 40 55 54 5 56 34 31 30 20 35 37 and the battery 36, thereby causing the armature of the magnet to vibrate and turn the brush 55 until it leaves contact-disk member 40 and falls against the insulated contact-plate 47, whereupon the current is broken and the movement of the brush 55 ceases. Should the temperature of the room now change sufficiently to deflect the movable member 52 of the thermostat until it contacts with one or the other of the fixed members 50 51 of the thermostat—the fixed member 51, for example—the circuit would be closed through 39, 53, 52, 51, 49, 47, 55, 54, 5, 56, 34, 31, and 30, the electromagnet, 35, 37, and back to the battery 36, thereby again energizing the magnet and causing the brush 55 to travel around the lower member 41 of the contact-disk until interrupting the current by springing across onto the insulated contact 46, where-

upon the circuit would be opened and the motion would cease, the brush 55 remaining in contact with plate 46 until the temperature again changed sufficiently to deflect thermostat member 52 to the other extreme, bringing it in contact with contact-point 50, and thereby again setting up motion in the brush 55, as before described, until the brush again arrives at the contact-plate 47.

The device thus described may be attached to the furnace or stove in any suitable way. An example of such attachment is shown in Fig. 6 of the drawings and in which it appears that the cord or connection 63 is secured to one arm of a bell-crank lever $63^a$, to the other arm of which is secured the upper end of a cord $63^b$, whose lower end is secured to the draft $63^c$, and that the cord or connection 67 is connected to one arm of a bell-crank $67^a$, whose other arm is connected to the upper end of a cord or connection $67^b$, whose lower end is connected to the damper $67^c$.

Having thus described my invention, what I claim as new therein, and desire to secure by Letters Patent, is—

In a device for the purpose described the combination of an electromagnet, an insulated contact-point connected with one terminal thereof, a battery connected with the other terminal of said magnet, a shaft, a notched friction-wheel on said shaft, an armature for said magnet, a clutch-bar operatively connected with said armature and gripping and embracing the edge of said wheel, a contact-spring on said armature adapted to contact with said insulated contact-point, a spring electrically connected with said contact-spring and with said clutch-bar and compressed between the latter for holding the bar in position and placing it in electrical communication with said contact-spring, a two-part contact-disk having its parts electrically connected together, insulated contact-plates, a brush carried by said shaft and adapted to sweep said insulated contact-plates and contact-disk, a thermostat and means whereby said thermostat alternately closes the circuit through said contact-plates and brush, substantially as set forth.

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