THERMOSTATIC DAMPER REGULATING APPARATUS.

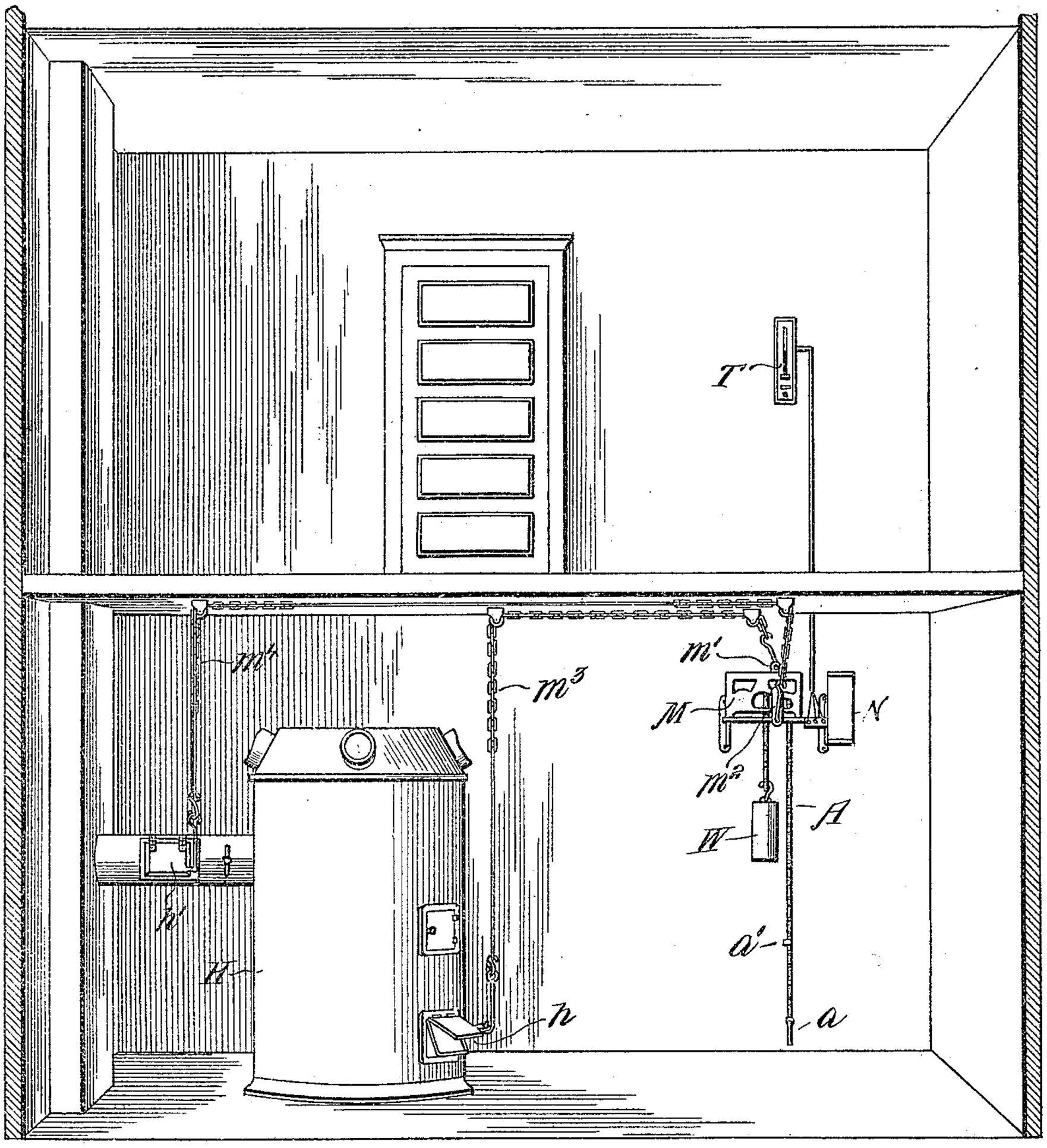
APPLICATION FILED MAR. 18, 1908.

952,855.

Patented Mar. 22, 1910.

5 SHEETS—SHEET 1.

Fig. 1.



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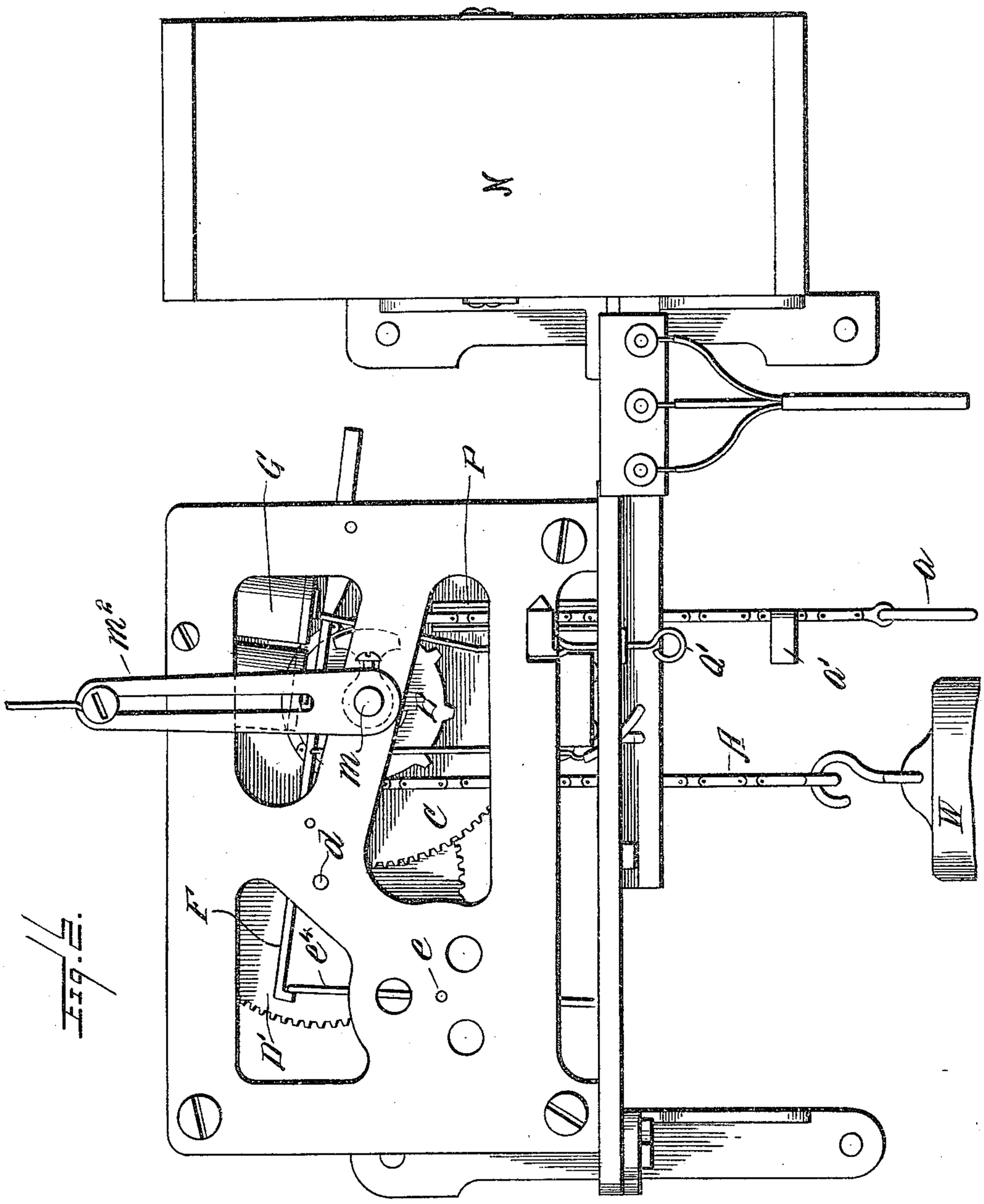

Fig. 1.

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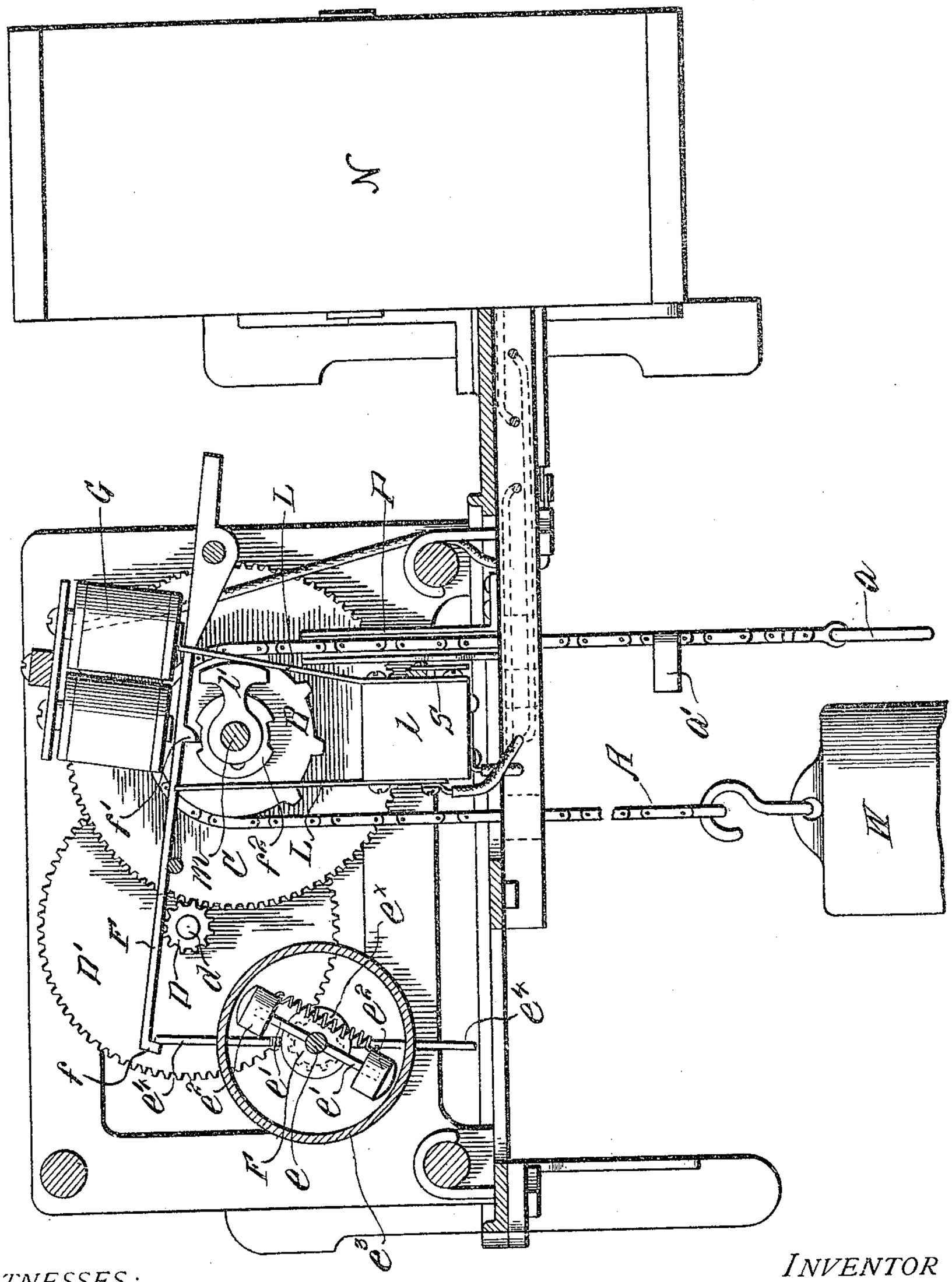

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Fig. 5.

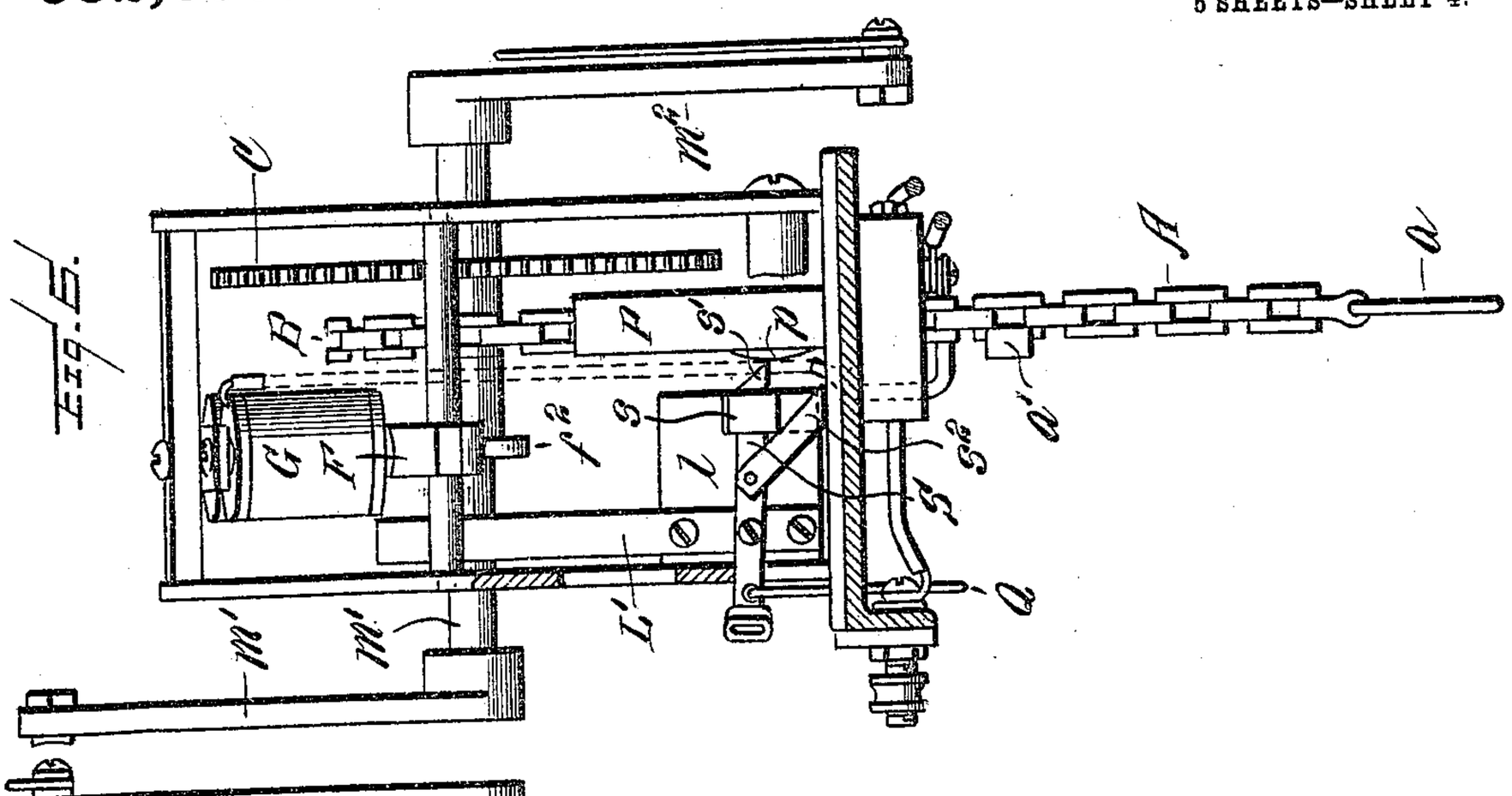

Fig. 5.

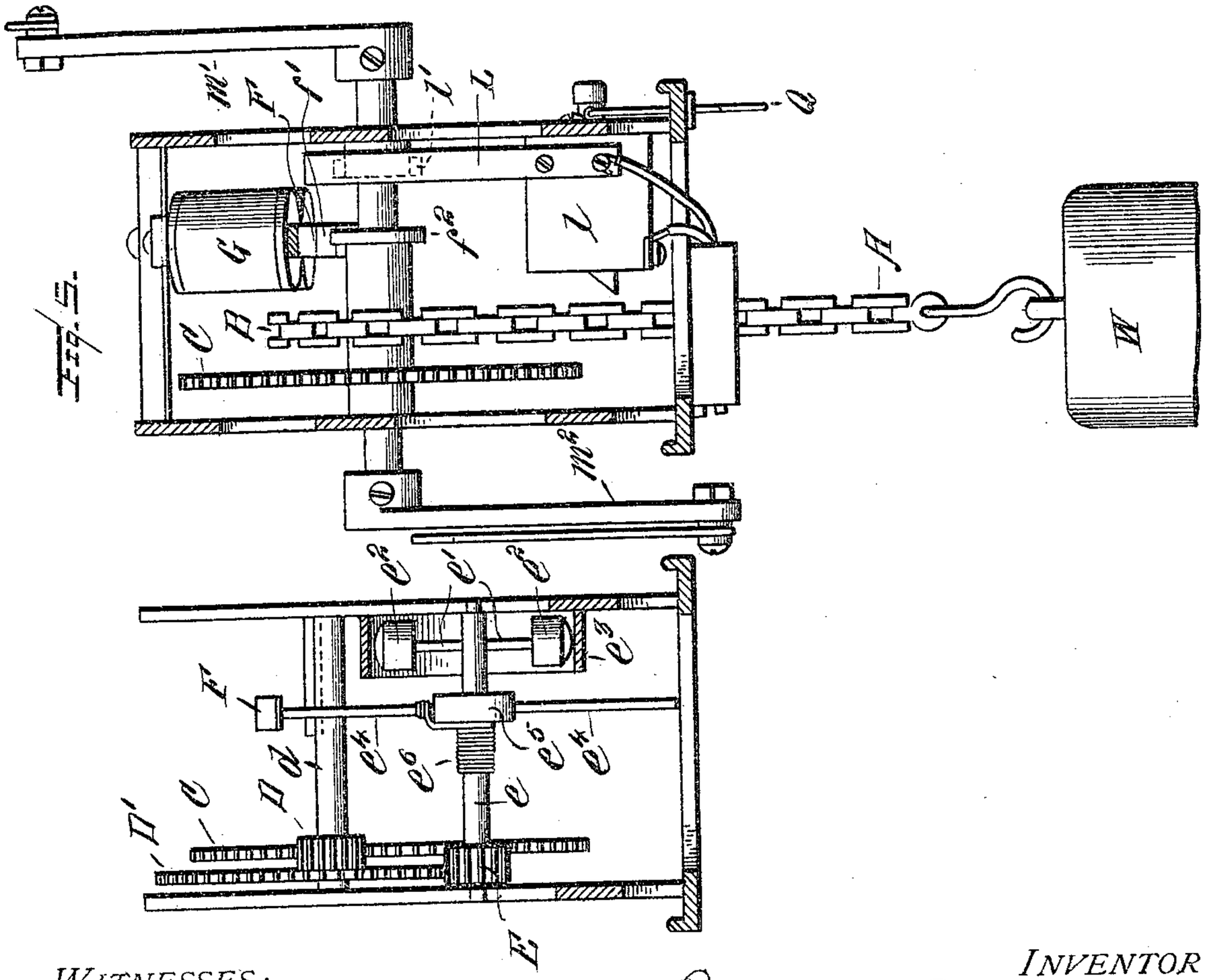

Fig. 4.

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Fig. 7.

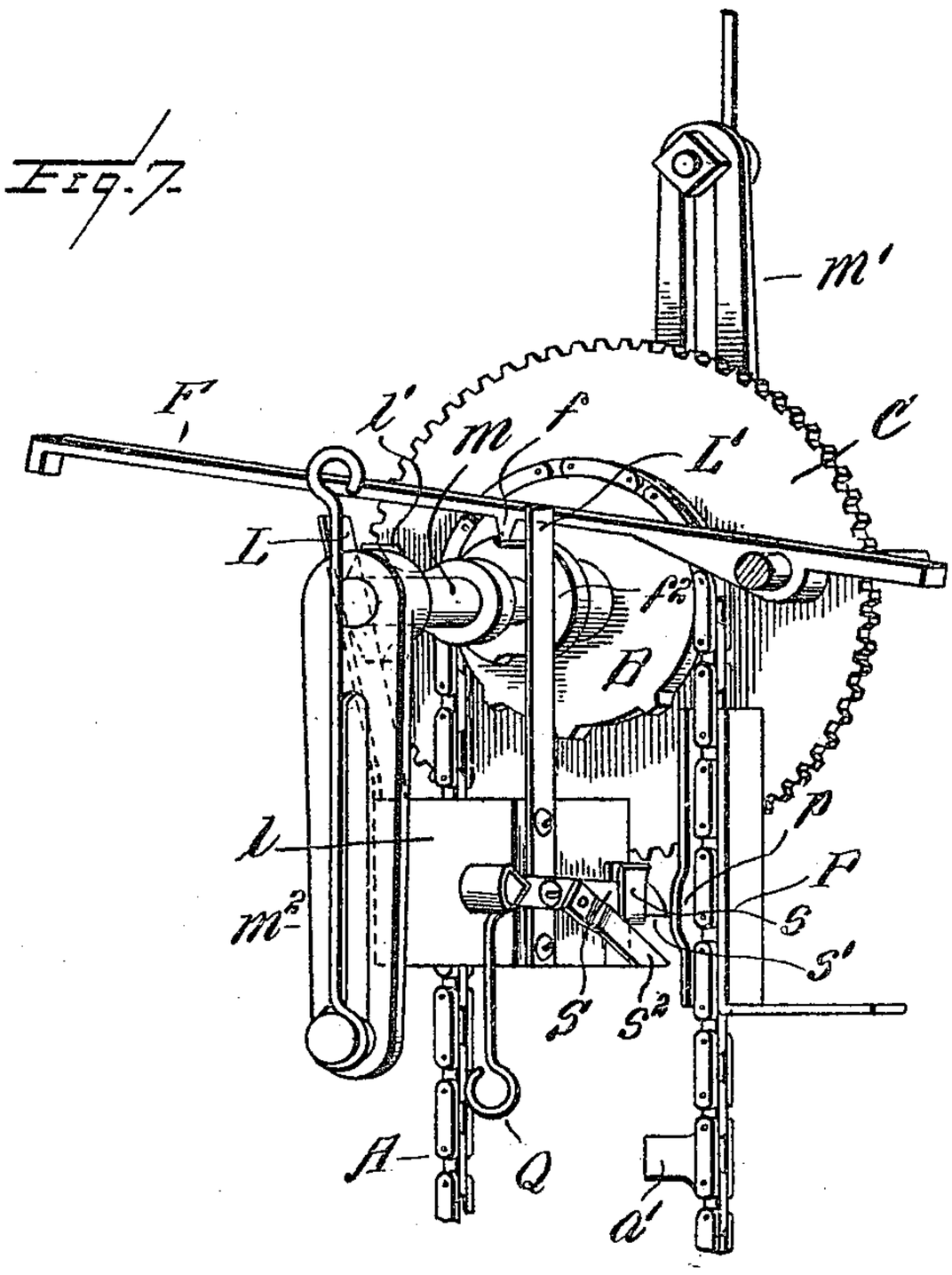


Fig. 8.

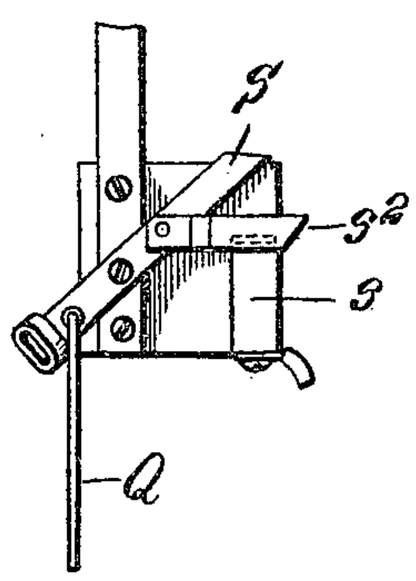
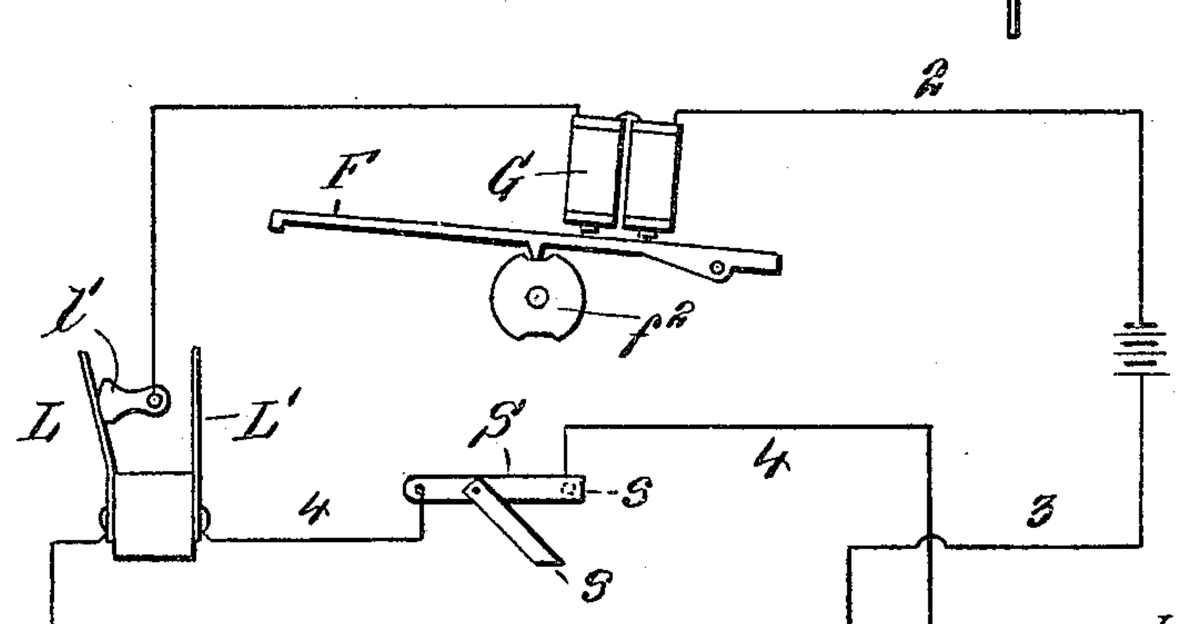


Fig. 9.



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THERMOSTATIC DAMPER-REGULATING APPARATUS.

952,855. Specification of Letters Patent. Patented Mar. 22, 1910.

Application filed March 18, 1908. Serial No. 421,861.

To all whom it may concern:

Be it known that I, BENJAMIN C. WICKES, citizen of the United States, residing at Auburn, in the county of Cayuga and State of New York, have invented certain new and useful Improvements in Thermostatic Damper-Regulating Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention consists in the novel features hereinafter described reference being had to the accompanying drawings which illustrate one form in which I have contemplated embodying my invention and said invention is fully disclosed in the following description and claims.

The invention is applicable particularly to thermostatic damper regulators, for furnaces or heaters, which are operated by a motor driven by a power, which is operative for a limited period only, and then requires the attention of an operator to insure its further operation for another period. Such motors are ordinarily driven by springs or weights which require rewinding at certain intervals, although my invention is also applicable to motors operated by other forms of stored power, as by compressed air, etc. In apparatus of this kind the motor is employed to drive a rotary part carrying crank arms or other actuating devices operatively connected to the dampers, and a detent mechanism is employed to arrest the rotary part and its actuating devices in certain predetermined positions. In one position, for example, the dampers are held so that the draft damper of the furnace is closed and I term this the "closed draft position". In another position the draft damper is held open and I term this the "open draft position". Suitable tripping mechanism is employed for releasing the detent mechanism under the control of a thermostatic device, so that the temperature of apartments can be automatically controlled, so long as the motor is in operative condition.

In apparatus of the character described, it frequently happens that the motive power gives out, owing generally to the failure of the attendant to rewind or recharge the same, and should this occur while the dampers are in "open draft position" the thermostatic controller will be unable to cause the closing of the drafts, and serious injury of the heating apparatus, if not danger to human life may result.

The object of my invention is to provide a safety mechanism, actuated by the motor itself previous to the end of its period of operation, whereby the last movement of the damper actuating mechanism by the motor must leave the dampers in the "closed draft position", thus insuring safety of the heating apparatus and the occupants of the building.

Referring to the accompanying drawings, which illustrate a damper controlling apparatus having my invention embodied therein, Figure 1 is a perspective view, partly in section, illustrating a building having a heater with my improved damper controlling apparatus applied thereto. Fig. 2 is a side elevation of the motor for operating the dampers. Fig. 3 is a vertical sectional view of the same. Figs. 4, 5 and 6 are transverse vertical sectional views of the motor. Fig. 7 is a detail perspective view of a portion of the mechanism of the motor. Fig. 8 is a detail elevation of the cut out switch located in one of the circuits. Fig. 9 is a diagrammatic view showing the electric circuits.

In Fig. 1, H represents a heater of any ordinary or preferred construction, having a draft damper h, and a check draft damper h', which are to be controlled by the apparatus. M represents the motor shown in detail in the other figures and provided with a rotary shaft m having actuating crank arms m', m^2, the arm m' being connected by a flexible connection m^3 with the draft damper h, and the arm m^2, which is preferably set opposite to the arm m', is similarly connected by a flexible connection m^4 to the check draft damper h'. T represents a thermostatic circuit closer of ordinary or preferred construction located in one of the apartments to be heated and controlling the motor. The motor M derives its power in this instance from a weight W, which is secured to a flexible connection, in this instance a sprocket chain A, which passes over a sprocket wheel B, mounted loosely on the shaft m of the motor, and connected thereto by pawl and ratchet mechanism (not shown) in a well known way, so that the weight can be raised to wind up the motor by drawing down on the opposite end of the chain A, which is provided with a ring a for the purpose

The motor is provided with means for retarding its movement, and with detent mechanism for stopping it in a plurality of predetermined positions. In this instance the motor shaft m is provided with a large gear C, meshing with a pinion D, on a stud d, and connected with a large gear D′, the latter meshing with a pinion E on a shaft e, which is provided with a centrifugal brake for retarding the revolution of said shaft e, when the latter is in rotation. This brake comprises a pair of radial arms e' e' on shaft e, carrying friction blocks e^2 e^2 capable of radial movement thereon, and a fixed friction ring e^3, secured to the frame of the motor, said blocks being normally held out of contact with the ring e^3 by a connecting spring e^x, but I may employ other means of retarding the operation of the motor. The detent mechanism comprises a pair of radial arms e^4 e^4, secured to a collar e^5 loosely mounted on shaft e and secured thereto yieldingly by a coiled spring e^6 to prevent jar and strain in stopping the motor, and a pivoted detent lever F, supported in the motor frame and having a detent f adapted to engage the arms e^4 and stop the motor. The detent lever F is provided with a tooth or projection f' which engages a notched disk f^2 on the motor shaft m, the notches being of sufficient depth to permit the lever to drop into position to engage the arms e^4 and stop the motor (see Fig. 3) and said notches are in this instance disposed opposite to each other, in the periphery of the disk, the portions between the notches being designed to hold the lever F out of operative relation with the arms e^4, and thus permitting a half revolution of the motor shaft m each time the lever is tripped. The tripping of the delever F is effected by an electromagnet G, which is controlled by the thermostatic device T. There are two electric circuits from the thermostat, each of which includes the magnet G, as will be more fully hereinafter explained.

L, L′ represent spring contacts secured to a block l of insulating material and disposed on opposite sides of the shaft m of the motor, one of said contacts being in each of the electric circuits before referred to. The shaft m carries a contact arm l' which is so placed with respect to the notched disk f^2, that it will be held in contact with one or the other of said contacts, when the motor is stopped by the detent mechanism.

N represents the battery which consists of one or more cells, as may be required to insure the proper operation of the magnet.

The circuits are illustrated diagrammatically in Fig. 9 and are as follows. Circuit No. 1, includes wire 1, leading from one of the contacts of the thermostat T to the contact L, thence through arm l' (when in contact therewith as shown in Fig. 9) to shaft m, to disk f^2, thence through the lever F, and motor frame to magnet G, thence by wire 2 to battery N and by wire 3 to the thermostat. Circuit No. 2 includes wire 4, leading from the other contact of the thermostat, to the contact L′, and thence through arm l' to magnet and returning through wires 2 and 3 and the battery to the thermostat. In Fig. 9 this second circuit is cut out by the arm l'. In one of these circuits (in this instance in circuit No. 2) I locate a safety cut out switch S, as shown in Fig. 9, which is operated by the motor a little before the power stored therein is entirely depleted. This switch which is shown best in Figs. 6 and 7 is located on the block l, and consists of the pivoted knife switch lever S, constructed to engage the contact s, and having its outer end s' lying in the path of a tripping projection a' secured to the chain A, adjacent to the end thereof most remote from the weight, so that the trip a' is brought into contact with the switch lever and raises it out of engagement with contact s, just before the weight reaches its lowest position, thus breaking the circuit No. 2. In wiring the apparatus the circuit in which this switch S is located is the one operated by the thermostat to effect the movement of the dampers into the "open draft" position, so that after the switch S is opened, the apparatus cannot be operated through this circuit to open the draft damper, but circuit No. 1 is not interfered with. It follows therefore, that if the operation of the motor at the time the switch S is opened is the one which closes the draft damper the further operation of the dampers is positively prevented. If, however, the motor has acted to open the draft damper at the time the switch S is open, the parts will be left in the position indicated in Fig. 9 the arm l' being in engagement with contact L, hence circuit No. 1 may be closed by the thermostat T as soon as the temperature rises to the point for which it is set, thereby operating the motor by closing circuit No. 1 and thus restoring the dampers to "closed draft" position or safe position. During this operation the arm l' will be removed from contact L, thus breaking circuit No. 1 and placed in engagement with contact L′, but as circuit No. 2 is broken at the switch S, no further operation of the device can be had until the motor is rewound. I also provide the switch arm S with an actuating arm s^2 normally out of the path of the trip a', but which is brought into the path of and below the trip a' when the switch is opened. Hence when the motor is rewound by drawing down the free end of the chain, the trip will pass the arm S, and engage the arm s^2 carrying it downward and closing the switch S, thus leaving the circuits in

normal condition, and placing the thermostat in control of both circuits.

In order to insure the proper operation of the switch S by the trip a' in both directions, the motor frame is preferably provided with a vertical guide P for holding the chain in proper relation to the switch arms S and s^2, and the side of said guide adjacent to the switch is preferably provided with a cam portion p to engage the projection or trip a' on the chain and force it into proper relation with the switch arms while passing the same, as clearly shown in Fig. 7. I also provide hand operated means for operating the switch, consisting in this instance of a depending handle Q. This is convenient at certain times; for example when the operator is about to shake the grate, and the dampers under the control of the thermostat are in "open draft" position. In such case if the operator were to manually trip the lever F, to close the draft, it would be instantly reopened by the thermostat through circuit No. 2. If, however, the operator pulls down handle Q and opens the switch, the lever F may be tripped by hand to move the dampers to "closed draft" position, and after the grate has been shaken, the pulling up of the handle Q will put the motor in complete charge of the thermostat and if the circuit No. 2 is closed in the thermostat, the dampers will be instantly moved to "open draft" position.

I do not desire to be limited to the exact details of construction herein shown and described as the same may be varied without departing from the spirit of my invention.

What I claim and desire to secure by Letters Patent is:—

1. In a damper regulating mechanism, the combination with a motor operable for a determinate period, actuating mechanism for moving the dampers, a thermostatic controlling device, connections between said thermostatic device and said motor for moving the dampers into closed draft position, separate connections between the thermostatic controlling device and the motor for moving the dampers into open draft position, safety mechanism for throwing the last named connections out of operative condition, without interfering with the other connections, and a part operated by the motor for actuating said safety mechanism, substantially as described.

2. In a damper regulating mechanism, the combination with damper actuating devices and a motor for operating the same, operable for a determinate period, a thermostatic controlling device for said motor and actuating devices, electric connections between the thermostatic controller, including separate circuits for causing the movements of the dampers into open draft and closed draft positions, a safety cut out switch in the circuit for causing the dampers to be moved into open draft position and a device operated by the motor, for operating said switch to break said circuit, substantially as described.

3. In a damper regulating apparatus, the combination with damper actuating mechanism, a motor for operating the same, detent mechanism for arresting the damper actuating mechanism and motor with the dampers in open draft and closed draft positions, electric tripping mechanism for said detent mechanism, a thermostat, a plurality of circuits from the thermostat to the electric tripping mechanism, a safety cut out switch in one of said circuits only and means operated by the motor for actuating said switch, without interfering with the other circuit or circuits, substantially as described.

4. In a damper regulating apparatus, the combination with damper actuating mechanism, a motor for operating the same, detent mechanism for arresting the damper actuating mechanism and motor with the dampers in open draft and closed draft positions, electric tripping mechanism for said detent mechanism, a thermostat, an electric circuit from the thermostat to the tripping mechanism for moving the dampers to closed draft position, a separate circuit for moving the dampers into open draft position, a normally closed safety switch in the last named circuit, a contact in each of said circuits, a movable contact device operated by said motor, and adapted to be moved into engagement with said contacts alternately, and a trip actuated by the motor for operating said safety switch to break the circuit therethrough, substantially as described.

5. In a damper controlling apparatus, the combination with the damper actuating mechanism, of a motor therefor including among its members a weight and a flexible connection therefor, means for arresting said actuating mechanism with the dampers in open draft and closed draft positions, a thermostat, an electromagnetic device for controlling the actuating mechanism and motor, two separate electric circuits from the thermostat to said electromagnetic device, a normally closed safety switch in one of said circuits, a trip on said flexible connection for throwing said switch into inoperative position, an auxiliary restoring arm for said switch adapted to be brought into the path of said trip by the opening of the switch, whereby said switch will be closed by the winding up of the motor, substantially as described.

6. In a damper controlling apparatus, the combination with the damper actuating mechanism, of a motor therefor including among its members a weight and a flexible connection therefor, means for arresting said actuating mechanism with the dampers in

open draft and closed draft positions, a thermostat, an electromagnetic device for controlling the actuating mechanism and motor, two separate electric circuits from the thermostat to said electromagnetic device, a normally closed safety switch in one of said circuits, a trip on said flexible connection for throwing said switch into inoperative position, and a guide for portions of said flexible connection, for insuring the proper operation of said trip, substantially as described.

7. In a damper controlling apparatus, the combination with the damper actuating mechanism, of a motor therefor including among its members a weight and a flexible connection therefor, means for arresting said actuating mechanism with the dampers in open draft and closed draft positions, a thermostat, an electromagnetic device for controlling the actuating mechanism and motor, two separate electric circuits from the thermostat to said electromagnetic device, a normally closed safety switch in one of said circuits, a trip on said flexible connection for throwing said switch into inoperative position, and a guide for portions of the said flexible connection, provided with a cam portion for forcing said trip into proper engagement with said switch, substantially as described.

8. In a temperature controlling apparatus, the combination of two electric circuits, a motor, provided with a crank shaft, means for controlling the starting and stopping of the crank shaft at each half revolution thereof, including an electric device in both of said circuits, a thermostat for making and breaking both of said circuits, means for connecting the crank shaft to draft controlling devices, and additional means controlled by the motor cutting the thermostat out of one of said circuits, during a half revolution of the crank shaft, whereby said motor may complete the revolution after the breaking of said circuit, to close the draft controlling devices.

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

BENJAMIN C. WICKES.

Witnesses:

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P. J. MURPHY.