

2 Sheets—Sheet 1.

No. 474,140.

Patented May 3, 1892.

Fig: 1.

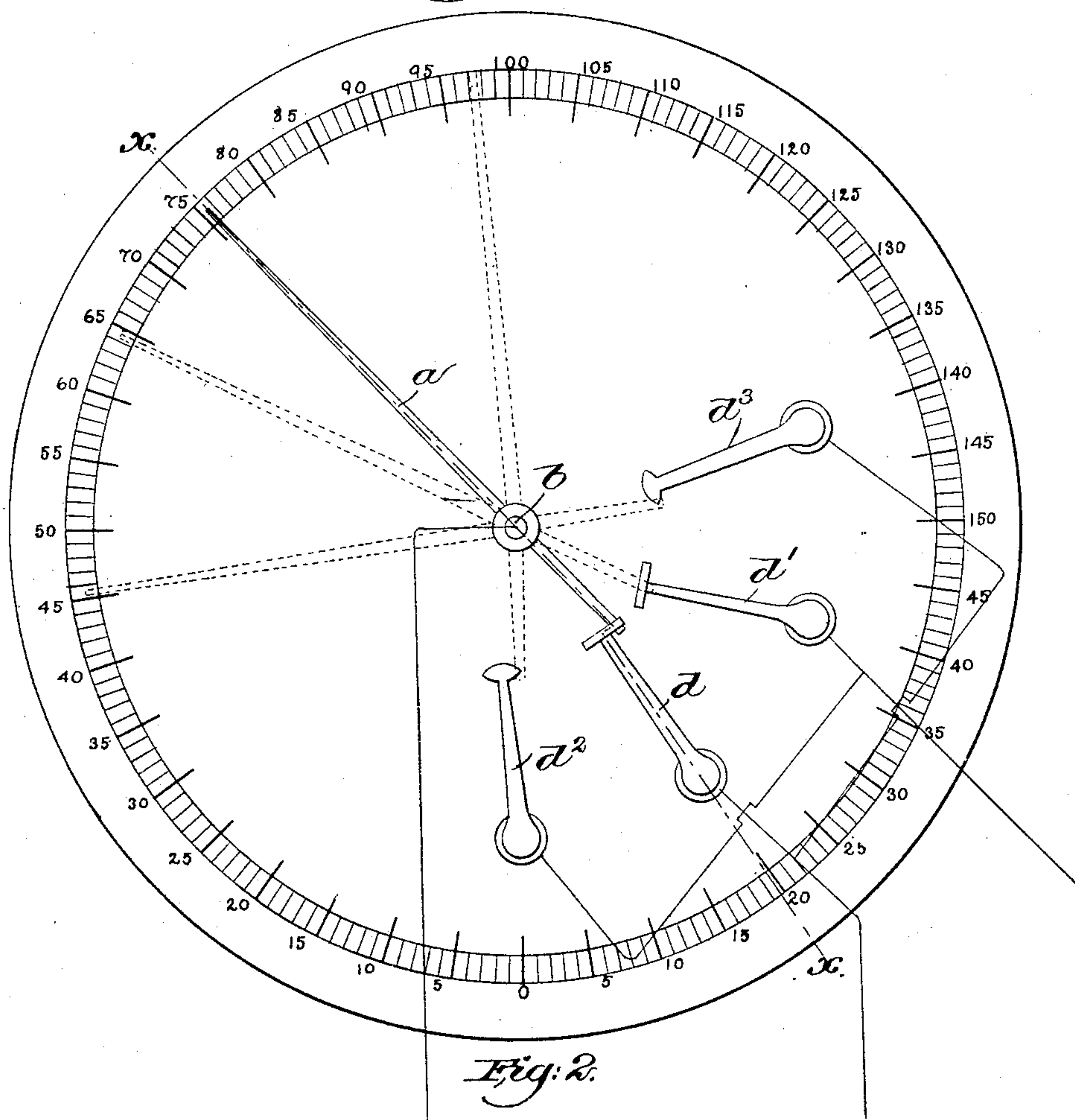
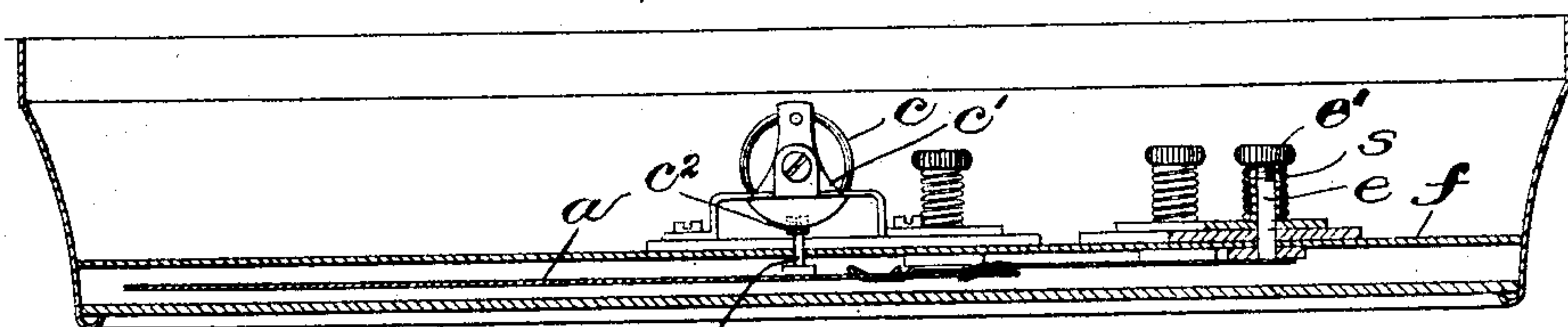
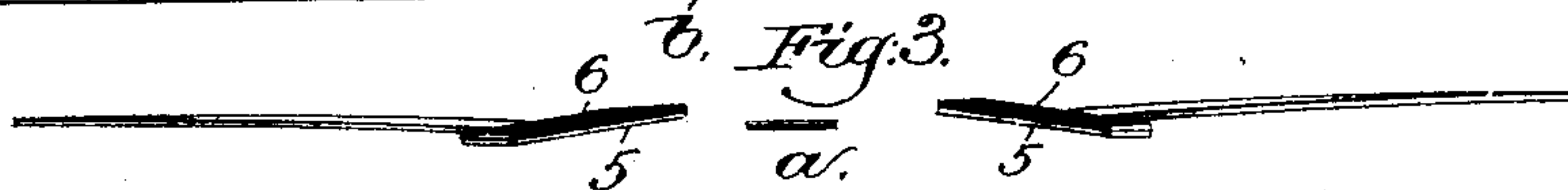


Fig: 2.



6. Fig: 3.



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(No Model.)

2 Sheets—Sheet 2.

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THERMOSTAT.

No. 474,140.

Patented May 3, 1892.

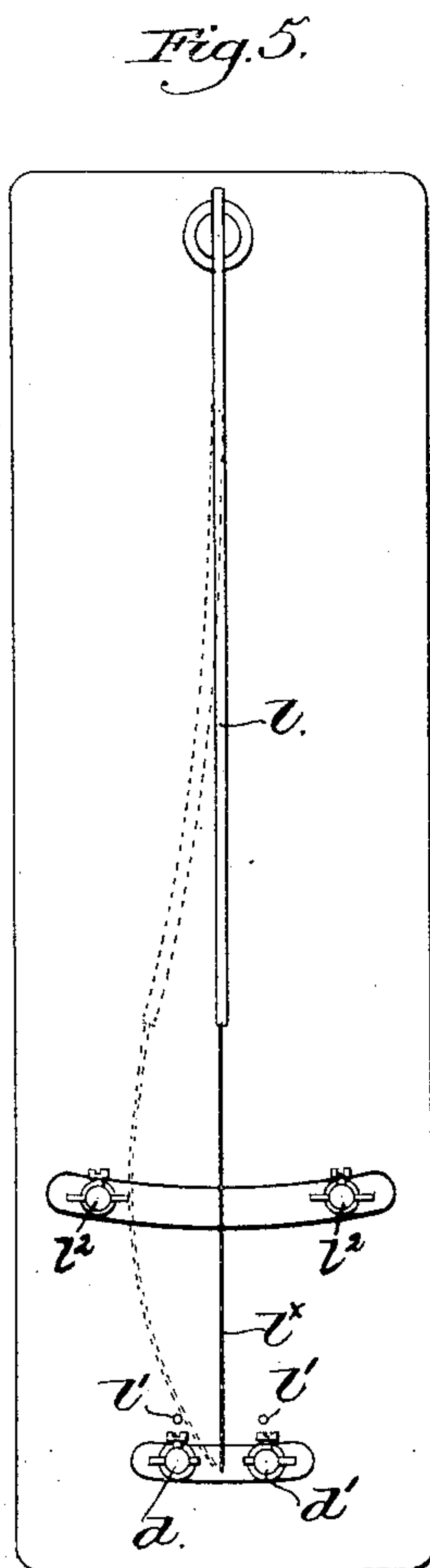
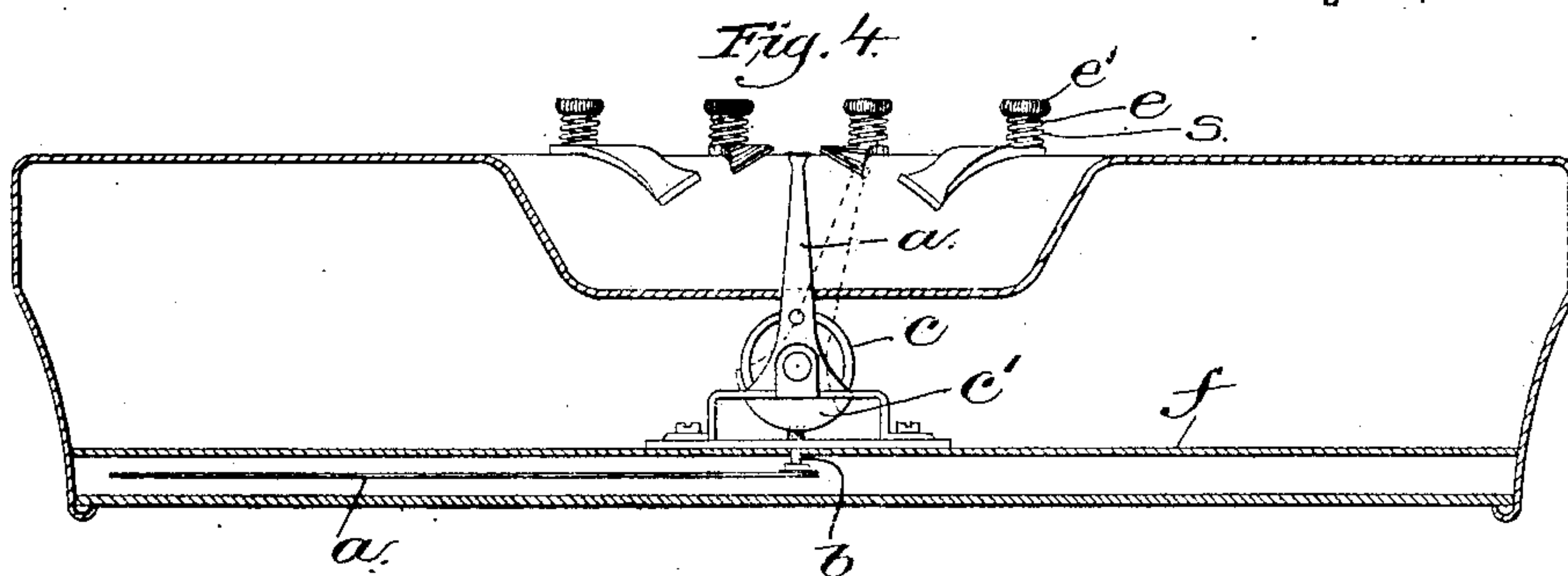


Fig. 6.
 $\frac{6}{5}$ *a.*

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UNITED STATES PATENT OFFICE.

ALFRED B. MORSE, OF EASTON, MASSACHUSETTS.

THERMOSTAT.

SPECIFICATION forming part of Letters Patent No. 474,140, dated May 3, 1892.

Application filed April 28, 1891. Serial No. 390,819. (No model.)

To all whom it may concern:

Be it known that I, ALFRED B. MORSE, of Easton, county of Bristol, State of Massachusetts, have invented an Improvement in Thermostats, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

This invention has for its object to provide an improved controlling device or thermostat.

In accordance with this invention a safety-contact is placed outside of or beyond the regular normal contacts between which the contact-arm normally moves, the said contact-arm when moved beyond the normal contacts co-operating with the safety-contact to reverse or oppose the action of the adjacent normal contact.

One part of this invention therefore consists of a controlling device having an automatically-movable contact-arm and containing three co-operating fixed contacts, the two outside contacts being arranged in circuit to effect a common operation when either is acted upon by said contact-arm, and the middle contact arranged in circuit to effect another and different operation when it is acted upon by said contact-arm, substantially as will be described.

Other features of this invention will be hereinafter described, and pointed out in the claims.

Figure 1 represents in face view a thermostat embodying this invention; Fig. 2, a section of the same, taken on the dotted lines xx , Fig. 1; Fig. 3, a detail to be referred to. Fig. 4 shows a thermostat wherein the contacts are arranged in different manner. Fig. 5 shows my invention applied to another type of thermostat, and Fig. 6 a modification to be referred to.

The invention herein contained may be embodied in various forms and constructions; but the form which I prefer to employ is illustrated in Figs. 1 to 3, inclusive, wherein the contact-arm a is pivoted or made fast on a staff or spindle b and automatically rotated by the lamina or thermal strip, herein represented as in the form of a coil or spiral c , expansion or contraction of which, due to changes in temperature, acts through the sec-

tor c' and pinion c^2 on the staff b to rotate the contact-arm a . The short arm of the contact-arm a plays between the adjustable contacts $d d'$, represented in the form of radially-arranged bars or arms fast at their outer ends on studs e , journaled in the face-plate f of the thermostat, the said studs being fitted at their inner ends with operating or adjusting heads e' , by which the studs e and contacts $d d'$, carried thereby, may be moved to adjust the points of contact, as will be described. Springs s are introduced between the heads e' on the studs e and the face-plate f to hold the studs and their contacts frictionally in adjusted position.

In accordance with this invention a safety-contact d^2 , preferably similar in construction to the contacts described, is placed beyond or outside of the controlling-contacts $d d'$, as represented in Fig. 1, said safety-contact being herein represented as in circuit with the opposite controlling-contact d' . The elongated heads 5 of the contacts $d d'$ are herein represented as placed obliquely, (see Fig. 3,) and, as herein represented, the outer surfaces of the said oblique heads have applied to them a layer of insulation 6, represented on the drawings by heavy black lines. The position of the contact-arm a with relation to the oblique heads of the contacts $d d'$ is such that when the arm is moved from its middle position in either direction it will be deflected under the heads 5 of the said contacts and will make electrical contact therewith; but when the contact-arm is returned again to its middle position from the outside of or beyond the said contacts the oblique heads will deflect the arm up over the outer insulated face of the contacts to avoid closing the circuit a second time through that contact.

The invention herein contained is particularly useful, among other things, to be employed in connection with automatic heat-regulating devices for houses and the like—as, for instance, such as shown and described in my application, Serial No. 389,804, filed April 21, 1891.

At the present time it is customary to employ two contacts between which the contact-arm vibrates, closing of the circuit through the contact-arm and either of the contacts acting

to operate the heat-regulating mechanism. If the thermostat is located in a closed room and a window in that room be thrown open, the temperature will be suddenly cooled, while the temperature in the remaining portion of the house will be unaffected by the window and remain at normal; but nevertheless the thermostat in the room would immediately be affected by the lowering of the temperature and would move its contact-arm to close the circuit to open the dampers of the heater for more heat. The heater would respond and send more heat into the already properly-heated house, heat it to an abnormal temperature, and still without warming the room in which the thermostat is placed, owing to the open window. The result is that the dampers would be held open until the window was closed and the room warmed, the remainder of the house being in the meantime heated to an excessive degree; but if we employ a thermostat embodying this invention the effect would be as follows: If the window in the closed room should be thrown open, the arm a would immediately be moved by the contraction of the lamina to make contact with one of the normal controlling-contacts, as d , which would operate through suitable mechanism to open the damper of the heater and cause the same to give forth more heat; but the window being open the temperature of the room would still continue to drop, and the contact-arm a would be moved under and beyond the contact d and would make contact with the safety-contact d^2 , as shown by dotted lines in Fig. 1, which contact being in circuit with the contact d' , will act to reverse the action of the adjacent controlling-contact d and again close the dampers to prevent the remainder of the house from becoming heated to an abnormal temperature, the action being precisely the same as though the circuit had been closed through the contact d' . Thus though the temperature of the particular room in which the thermostat is placed may remain considerably below normal, the temperature of the remaining portion of the house will be preserved at normal. If now the window should be closed, the room would then heat up and the contact-arm a would be returned to its middle position again; but as it is returned it would pass over the contact d , as hereinbefore described, without again closing the circuit therethrough, thus leaving the dampers in the condition in which they were last moved, and to be operated again only by the normal movements of the arm a between the contacts d d' when it shall have reached its normal position between the said contacts. If desired, the normal or controlling contacts may be employed without the insulated backs, the circuit then being closed by the contact-arm every time it passes over one of them in either direction. In either case the closing of the circuit through the safety-contact d^2 will operate to check or reverse the operation caused by the previous closure with the adjacent

normal contact d' . I have herein represented a safety-contact d^3 placed beyond the contact d' , which latter operates to close the dampers to the heater when the temperature reaches the required point. This latter contact d^3 may be placed in circuit with the contact d , as represented in Fig. 1, if desired, and operate in connection therewith in precisely the same manner that the contact d^2 co-operates with the contact d' .

Instead of arranging the contact in an oblique position with relation to the contact-arm, I desire it to be understood as within the scope of this invention that the contact-arm may be formed to present an oblique end with relation to the contact, as represented in Fig. 6, and thus perform the same operation—viz., to pass under the contact when moving in one direction and pass over the contact when moving in the opposite direction; or both the contact-arm and contact may be arranged obliquely, and the contact-arm may, if desired, be provided with insulation, as shown in Fig. 3.

It is evident that in applying the invention herein described to various uses it may be further varied and still come within the scope of this invention.

Fig. 4 shows a modified form of my invention wherein the contact-arm is made fast to the sector c , moving therewith, the end of the arm moving under the circumferentially-arranged contacts, as shown.

Fig. 5 shows my invention in connection with a thermostat of another and common form. The lamina l is therein shown as a straight bar having a contact-pen l^x as its free end. As the arm is curved in one or the other direction by its expansion or contraction the pen l^x will close the circuit through one or the other of the normal contacts d d' . If the lamina should continue to expand or contract after closing the circuit through either of the contacts d d' , the pen l^x on the end of the lamina will be bent and will first strike against one or the other of the fixed pins l' , further movement of the lamina bending the pen l^x still further until it shall close the circuit through one or the other of the safety-contacts d^2 , further bending of the pen after it has come in contact with one or the other of the pins l' causing the portion of the pen below the said pins to be lifted off or removed from the contact d or d' , with which it was previously in contact, as represented by dotted line, Fig. 5, to thus break the circuit through the said contact and constituting the contacts d^2 the working contacts. These contacts d^2 are arranged in circuit to operate in like manner to the safety-contacts d^2 d^3 , Figs. 1 and 2.

I claim—

1. In a thermostat, a controlling device having an automatically-movable contact-arm and containing three co-operating fixed contacts, the two outside contacts being arranged in circuit to effect a common operation when

either is acted upon by said contact-arm and the middle contact arranged in circuit to effect another and different operation when it is acted upon by said contact-arm, substantially as described.

5 2. In a thermostat, a contact-arm, combined with contacts d d' and the safety-contacts d^2 d^3 , arranged in circuit, respectively, with the contacts d' and d , to operate substantially as described.

10 3. In a thermostat, a contact-arm, combined with a rotatable stud e , a contact thereon to

co-operate with said contact-arm, an adjusting-head at one end of said stud, a plate in which said stud is journaled, and a spring interposed between said head and plate, to operate substantially as described. 15

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ALFRED B. MORSE.

Witnesses:

BERNICE J. NOYES,
EDWARD F. ALLEN.