No. 705,379. Patented July 22, 1902.

A. M. BUTZ.

THERMOSTATIC CIRCUIT CLOSER.

(Application filed Feb. 5, 1902.)

(No Model.)

Fig. 1.

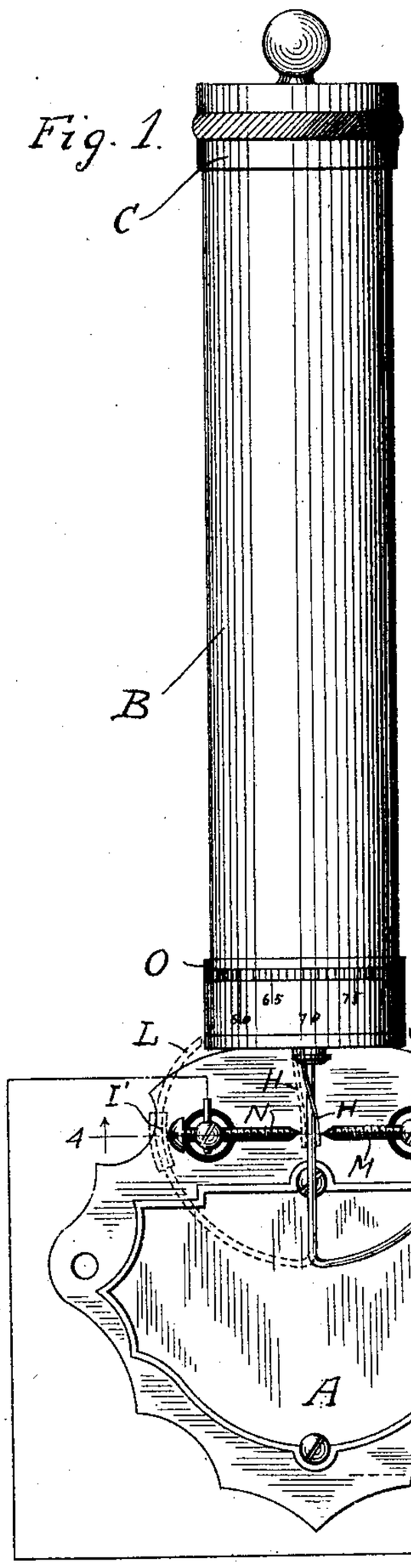


Fig. 3.

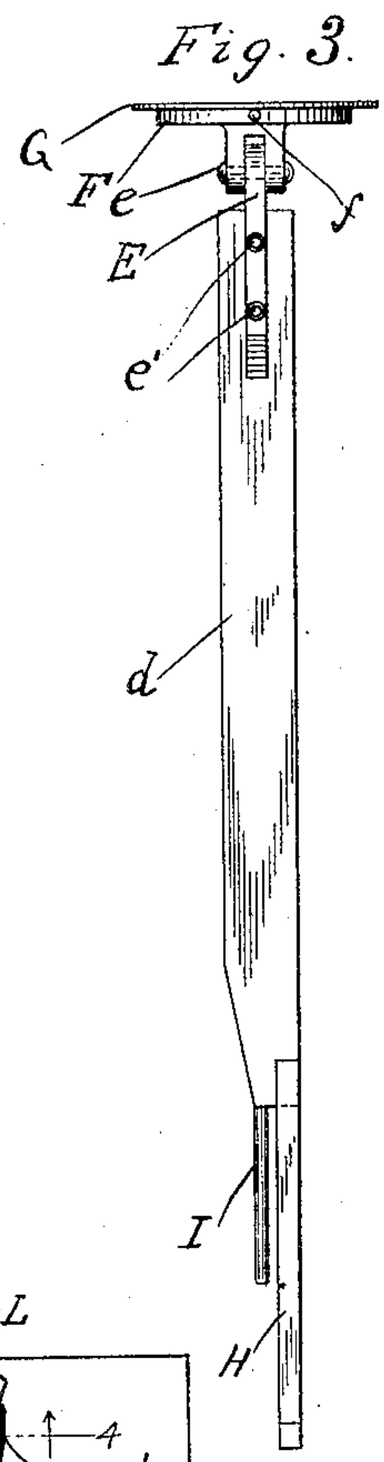
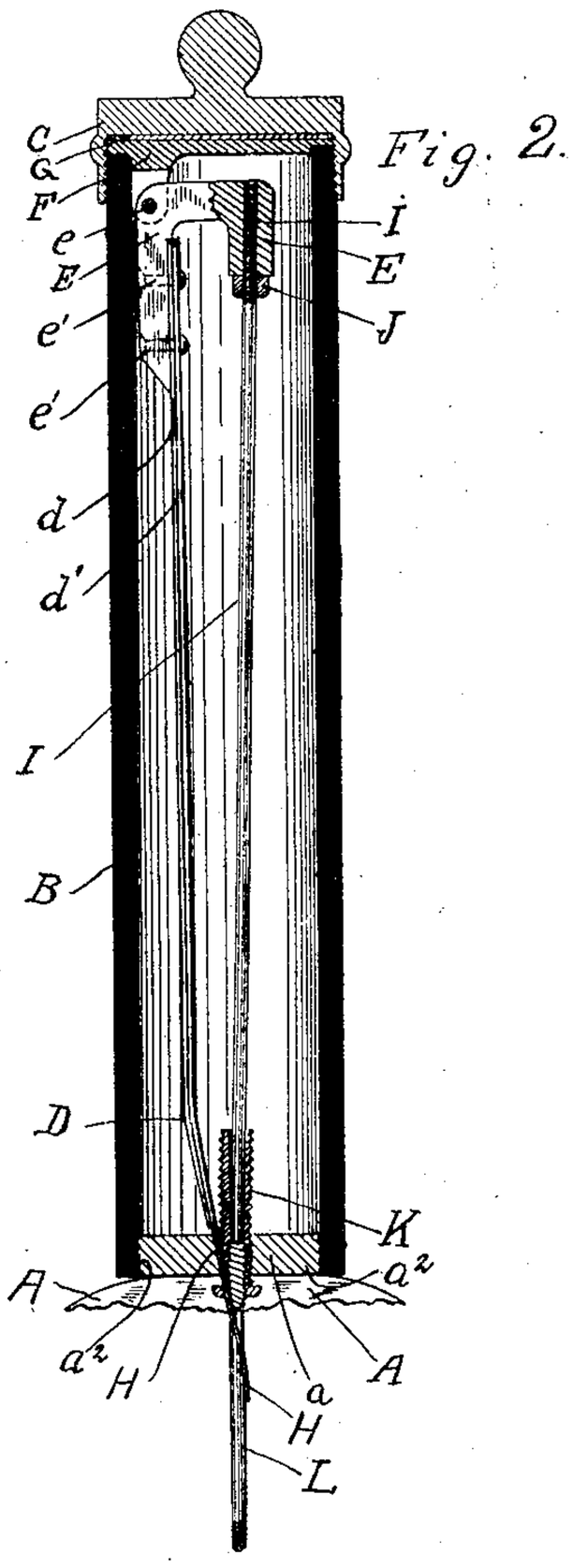


Fig. 2.



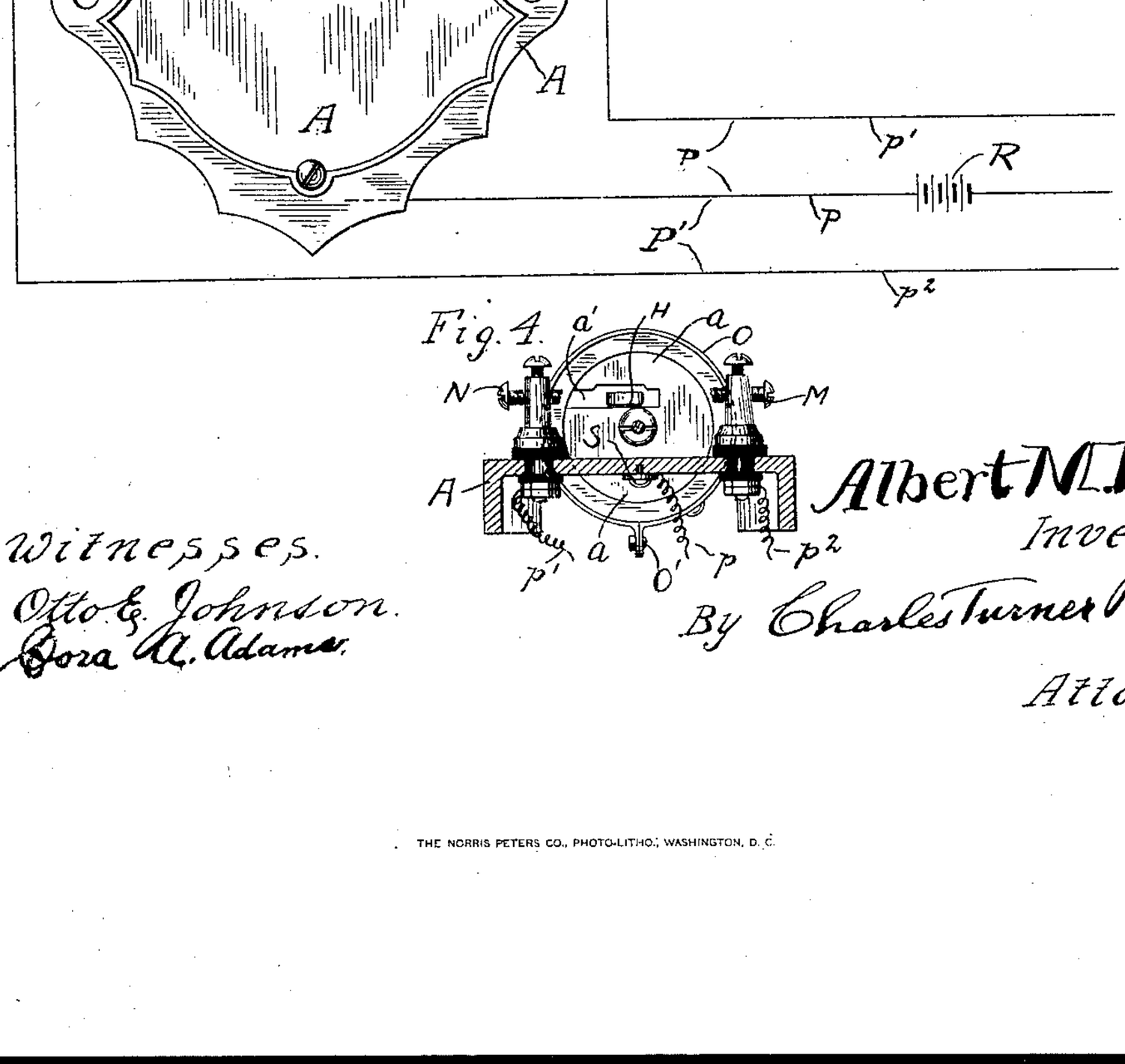


Fig. 4.

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ALBERT M. BUTZ, OF OAKPARK, ILLINOIS.

THERMOSTATIC CIRCUIT-CLOSER.

SPECIFICATION forming part of Letters Patent No. 705,379, dated July 22, 1902.

Application filed February 5, 1902. Serial No. 92,746. (No model.)

To all whom it may concern:

Be it known that I, ALBERT M. BUTZ, a citizen of the United States, residing at Oakpark, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Thermostatic Circuit-Closers, of which the following, when taken in connection with the drawings accompanying and forming a part hereof, is a full and complete description, sufficient to enable those skilled in the art to which it pertains to understand, make, and use the same.

This invention relates to the class of thermostatic circuit-closers wherein a change in temperature above or below an adjustably-determined point will automatically close one or the other of two electric circuits; and the object of this invention is to obtain an apparatus of the kind named whereby the closing of the electric circuits in which it is placed will be effected at a slight change in temperature, the operative parts of the apparatus will be protected from injury or damage, the construction will be simple, the apparatus durable, and the adjustments easily made and by one not particularly skilled in the art.

In the drawings referred to as forming a part of this specification, Figure 1 is a front elevation of a thermostatic circuit-closer embodying this invention. Fig. 2 is a vertical sectional view of the expansible members of the apparatus and the adjuncts thereto, and Fig. 3 is a front plan view of one of the expansible members of the apparatus and of the contact-piece (or circuit-closer) of the circuit-closing part of the apparatus. Fig. 4 is a sectional view on line 4 4 of Fig. 1 viewed in the direction indicated by the arrows.

A reference-letter applied to designate a given part is used to indicate such part throughout the several figures of the drawings wherever the same appears.

A is the base of the apparatus.

a is a circular part of the base A, extending at right angles to the main body part of such base, and *a'* is a slotted aperture through circular part *a* of the base.

a^2 represents screw-threads on the periphery of part *a* of the base.

I prefer to construct the base A of some metallic substance which is an electric conductor and to use such base as a part of an electric circuit.

B is an expansible member consisting of a tube, such tube screw-threaded on the interior thereof at one end and on the exterior thereof at the other end. Tube B is preferably made of the ordinary rubber composition used in the art for expansible members. The internal screw-threads in tube B correspond with the external screw-threads a^2 a^2 of part *a* of base A, and such tube B is secured in place by engaging such screw-threads.

C is a cap provided with internal screw-threads corresponding with the external screw-threads at the upper end of the tube B, and such cap is secured in place on the tube by the engagement of the screw-threads.

D is an expansible member built up of the metal strips *d d'*, joined together to form a compound thermostatic bar in the ordinary way. Strip *d* may be made of tin and strip *d'* may be made of zinc, if preferred.

E is the base to which the compound bar D is attached, as by rivets *e' e'*. The base E is L-shaped and is pivotally attached to base F, as by the pivot *e*. Base F is placed on the upper end of the tube B underneath the cap C and is provided with the projection *f*, fitting into a corresponding recess in the upper end of such tube B, (or with other suitable means for registering such base with the tube,) so that the base F may readily be dropped into proper position on the tube B for the circuit-closer H (which is rigidly attached to the lower end of the compound bar D) to pass freely through the recess *a'* in circular part *a* of the base A.

G is a washer interposed between the base F and the cap C.

I is a rod which is preferably screw-threaded at its upper end, as at *i*, and attached to the L-shaped base E by such screw-threads fitting into corresponding screw-threads in base E.

J is a lock-nut, by means of which the rod I is locked in base E in an adjusted position.

K is a sleeve provided with external screw-threads fitting into corresponding screw-threads in part *a* of base A and also provided with internal screw-threads corresponding

with the external screw-threads *l* on the temperature-adjusting arm L. The inner diameter of the sleeve K is slightly larger than the diameter of the rod I, so that the rod fits loosely in the sleeve to rest on the upper end of the screw-threaded portion of the temperature-adjusting arm L. The rod I and the temperature-adjusting arm L are adjusted relative to each other and to the base E and the expansible member B, so that when the temperature-adjusting arm L is in the position illustrated in Fig. 1 by the full lines the circuit-closer H is near to contact with the terminal screw M, and when such temperature-adjusting arm L is in the position indicated by the broken lines in such Fig. 1 such circuit-closer H is close to contact with the electric terminal screw N.

O is a band provided with marks on the outer surface, such band fitting around the tube B near the lower end of such tube and there secured in place, as by the set-screw O'. (See Fig. 4.) The temperature-adjusting arm L terminates near to the band O at the bent-up end of such temperature-adjusting arm, and the marks on the band are arranged so that the end adjacent thereto of such bent-up temperature-adjusting arm constitutes a pointer indicating a mark numbered with figures indicating the degrees corresponding with the temperature at which contact of the circuit-closer H with one of the terminals M N will occur. P and P' are electric circuits. I prefer to construct these circuits P P' so that the apparatus by means of which the current traversing the circuit is generated will be on the line common to both circuits, as is indicated by the electric generator R on line *p*. The electric lines (or conductors) *p*, *p'*, and p^2 extend, respectively, to an electrically-actuated apparatus; but as such (or similar) apparatus forms a part of such circuits as ordinarily constructed and forms no part of this invention it is not shown.

It will be observed that the rod I is rigidly attached at its upper end to the L-shaped lever forming the base E of the compound bar D by the screw-threads on such rod engaging with corresponding screw-threads in the lever or base and that therefore when the lower end of such rod I is raised by the raising of the end of the temperature-regulating bar L (by means of the screw-threads on such bar L) to move the base E on its pivot *e*, and thereby move the contact-piece H into a determined adjusted position between the terminals M N, a lateral strain or spring is put upon the rod I, and hence when the expansible member B is lengthened by a raising of the temperature the pivot *e* is raised—that is, the distance between such pivot *e* and circular part *a* of base A is lengthened—the tension or spring of the rod tends to turn the L-shaped lever or base on its pivot *e*, and thereby move the lower end of the compound bar D to the left, carrying therewith contact-piece H. When such rod I is raised by the turning of the temperature-regulating arm L to the right, as illustrated in Fig. 1, so that the circuit-closer is near to contact with terminal M, greater expansion of the expansion members B D is required to convey the circuit-closer H from its adjusted position into electrical contact with the terminal N and less contraction of such expansible members is required to convey such circuit-closer into electrical contact with the terminal M than when the adjustment of the circuit-closer (by means of the temperature-regulating bar L) is close to terminal N, and the degree of temperature which must prevail in the expansible members of the apparatus to transfer the circuit-closer H to the left to the terminal N is the temperature indicated by the marks on the band O by the bent-up end of the temperature-regulating bar L.

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

1. In a thermostatic circuit-closer a tubular expansible member, a base to which the expansible member is secured, an expansible member consisting of a compound bar within the tubular expansible member, an L-shaped base to the compound bar, an additional base on which such L-shaped base is movably mounted, such additional base attached to the tubular expansible member to be moved by the expansion and contraction of such member, electric terminals, a circuit-closer between the electric terminals, such circuit-closer attached to the compound bar, means to yieldingly maintain the circuit-closer in electrical contact with one of the terminals, and means to adjust and to indicate the adjustment of the compound bar and circuit-closer attached thereto; substantially as described.

2. In a thermostatic circuit-closer, a tubular expansible member, a base to which the expansible member is secured, an expansible member consisting of a compound bar within the tubular expansible member, an L-shaped base to the compound bar, an additional base on which such L-shaped base is movably mounted, such additional base attached to the tubular expansible member to be moved by the expansion and contraction of such member, electric terminals, a circuit-closer between the electric terminals, such circuit-closer attached to the compound bar, an adjustable sleeve in the base of the tubular expansible member, a temperature-adjusting arm one end whereof is screw-threaded, such screw-threaded end fitting into corresponding screw-threads in the adjustable sleeve, and a rod fitting loosely at the lower end thereof in the adjustable sleeve to rest on the temperature-adjusting arm and at the upper end thereof attached to one arm of the L-shaped base of the compound bar; substantially as described.

3. In a thermostatic circuit-closer, a tubu-

lar expansible member, a base to which the expansible member is secured, an expansible member consisting of a compound bar within the tubular expansible member, an L-shaped base to the compound bar, an additional base on which such L-shaped base is movably mounted, such additional base attached to the tubular expansible member to be moved by the expansion and contraction of such member, electric terminals, a circuit-closer between the electric terminals, such circuit-closer attached to the compound bar, an adjustable sleeve in the base of the tubular expansible member, a temperature-adjusting arm one end whereof is screw-threaded, such screw-threaded end fitting into corresponding screw-threads in the adjustable sleeve, and a rod fitting loosely at the lower end thereof in the adjustable sleeve to rest on the temperature-adjusting arm and at the upper end thereof adjustably attached to one arm of the L-shaped base of the compound bar, and a collar provided with marks thereon at the lower end of the tubular expansible member; substantially as described.

ALBERT M. BUTZ.

In presence of—
CHARLES TURNER BROWN,
CORA A. ADAMS.