

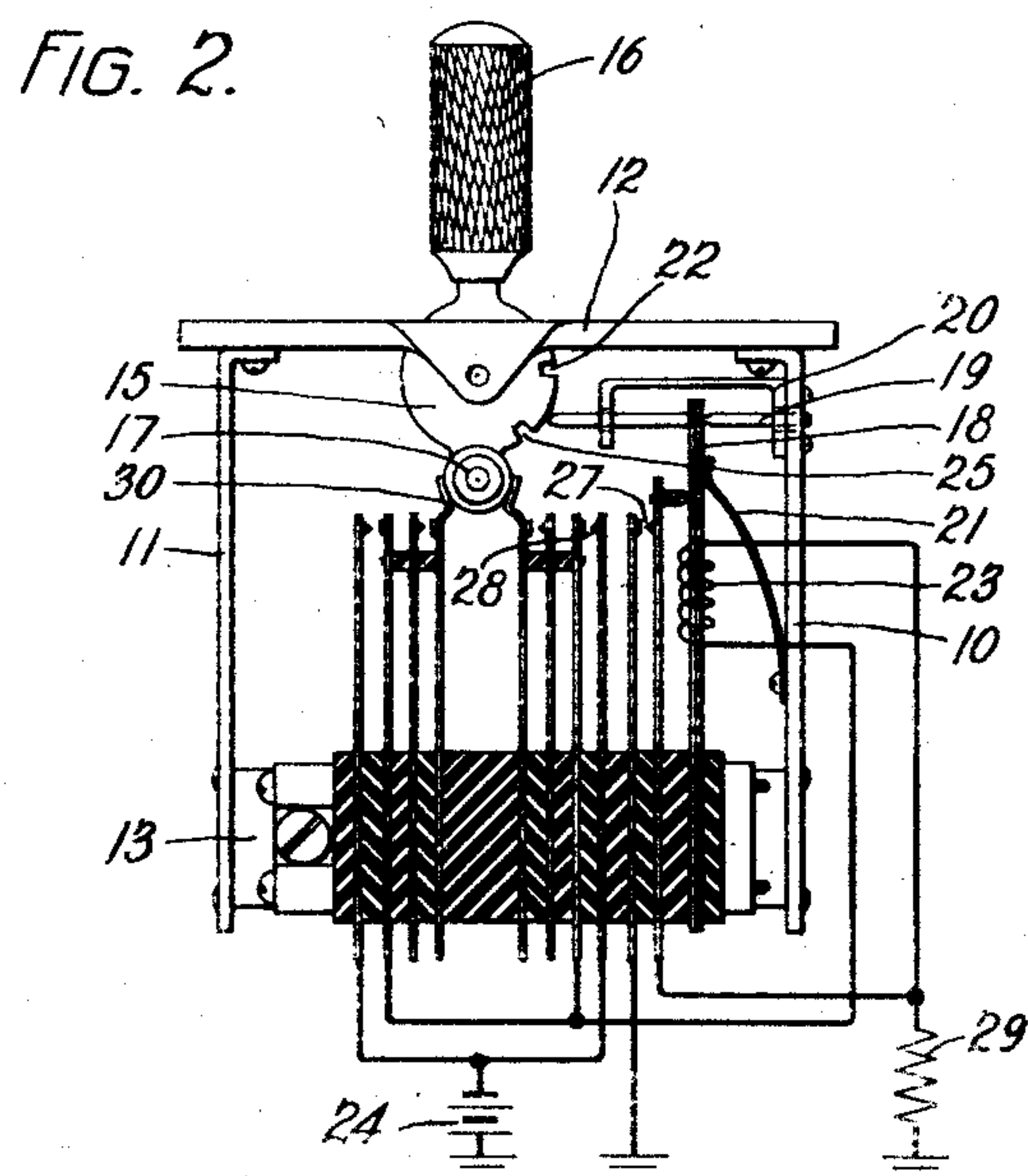
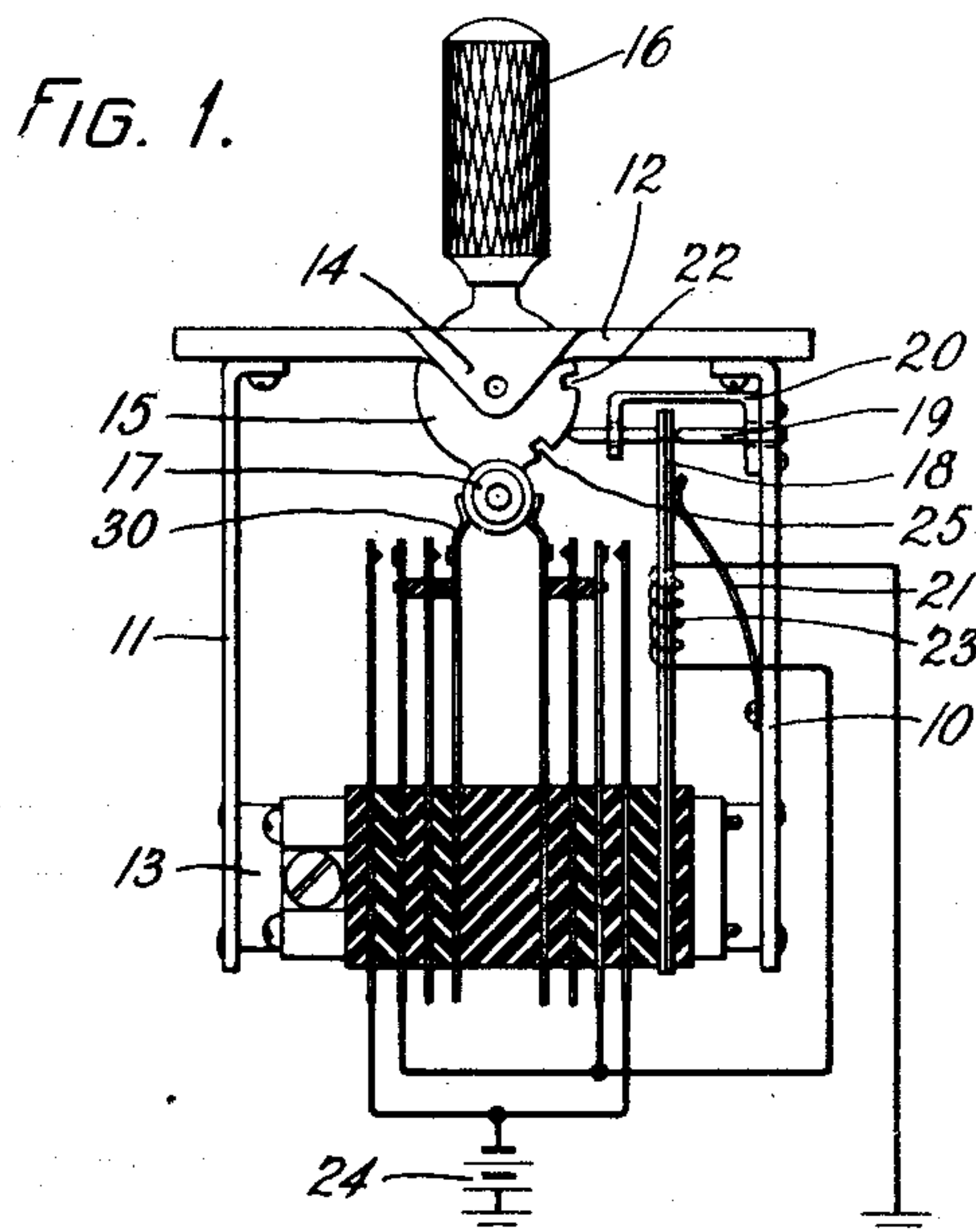
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TELEPHONE EXCHANGE EQUIPMENT

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TELEPHONE-EXCHANGE EQUIPMENT

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This invention relates to telephone exchange equipment and more particularly to circuit controlling devices of a thermostatic nature.

5 In the establishment of telephone connections wherein the application of ringing current to a line is effected manually, it is necessary that the operator maintain the ringing key actuated sufficiently long to insure the proper functioning of the signaling apparatus associated with the line. According to usual practice, this requires the operator to keep her hand in engagement with the key in the case of non-locking keys, 15 for a relatively long period of time.

It is an object of this invention to insure the application of ringing current to a circuit for a predetermined period of time subsequent to the actuation of a manually operated key. 20

This object is attained in accordance with a feature of the invention by the provision of a mechanically locking key which, when actuated, effects the closure of a circuit 25 which controls the operation of a thermostatic element to release the locking means and restore the key to normal.

A further feature of the invention resides in a circuit arrangement whereby the operation of the thermostatic element reduces the current in the heating winding thereof to such an extent as to maintain the locking means in disengagement with the ringing key should the operator hold the key in an operated position for an abnormal period of time. This arrangement permits a comparatively high value of energy to be used in the primary operation without danger from overheating. 30 35 40

The invention will be readily understood from the following detailed description made with reference to the accompanying drawing in which:

45 Fig. 1 is a side elevation of the structure of a ringing key employing the thermostatic release arrangement involved in this invention;

50 Fig. 2 is a side elevation of the structure of a ringing key employing the thermo-

static release involving the protective circuit arrangement.

Referring in general to Figs. 1 and 2 the ringing key frame comprises two vertical supports 10 and 11 to which are rigidly secured horizontal mounting members 12 and 13. The member 12 is provided with a flange 14 on either side, which serve as a means for pivotally mounting the ringing key thereon. The key itself comprises a disc 15 provided with a knurled handle 16 and a camming element 17, the particular functions of which will hereinafter be specified. 55 60

Secured to the lower mounting member 13 is a regular contact mounting block 65 which consists of alternate layers of insulating material and contact springs. The springs are divided into two sets, the set on the left being actuated when the key is moved in a clockwise direction and the set on the right being actuated when the key is moved counter-clockwise. 70

A bracket 20 is secured to the vertical frame member 10 in any suitable manner and together with the member 10 is provided with holes by virtue of which the movement of the pin on bolt 19, under the action of the thermostatic metal strip 18 is confined to a straight line. The metal strip 18 is secured at one end to the contact mounting block in the same manner as the spring sets, whereas its free end is provided with a notch which normally engages the pin 19, the latter being cut to a smaller diameter at its point of contact with the metal strip 18. The active or operating end of pin 19 is normally biased against the edge of the disc 15 by means of a steel spring element 21 which is secured at one end to the upright frame member 10, the other end impinging on the thermostatic strip 18. 75 80 85 90

Referring specifically to Fig. 1 the operation is as follows: Assuming the operator to have actuated the key in a clockwise direction, the slot 22 in disc 15 is moved until it is aligned with the active end of pin 19 whereupon the pin is forced inwardly under the action of spring 21, so that the pin be- 95 100

comes recessed in slot 22, locking the key in its actuated position. As a result of the operation of the key, the cam 17, by virtue of its engagement with spring 30 causes the contacts of the left-hand set of springs to be closed. The inner set of contacts controls the application of ringing current to an external circuit (not shown) whereas the outer contacts on closing effect an obvious circuit from the current source 24 through the heating winding 23 of the thermostatic element 18. As the thermostatic element becomes heated due to the flow of current through the winding 23 it deflects in such a manner as to force the pin 19 outwardly, thereupon disengaging its active end from the slot 22. The key then returns to normal. The return to normal of the key opens the circuit for the heating winding, whereupon the thermostatic element resumes its original condition.

Should the operator have occasion to actuate the key to the left or counter-clockwise, the outer contacts of the right-hand set would close and the active end of pin 19 would be forced into the slot 25. The closure of the outer right hand contacts causes the heating of the thermostatic element in a manner similar to that just described in connection with the reverse actuation of the key. It is apparent that by adjusting the heating winding 23 and varying the dimensions of the thermostatic element 18 the key may be caused to release at any predetermined period of time after its actuation. From the foregoing it is readily understood that the operator need only depress the key a sufficiently long period of time to effect the closure of the key contacts, whereupon she may remove her hand from the key; the locking means will then hold the key operated until the thermostatic device functions.

Referring now to Fig. 2, it will be noted that upon the actuation of the key, pin 19 is forced into the slot 22 or slot 25, depending in which direction the key is moved, under the action of spring 21. The movement of the thermostatic element 18 causes the extra contacts 27 to be closed, whereupon, current flows from the source 24, by way of the closed contacts 28, heating winding 23, closed contacts 27 to ground. It will be noted that the contacts 27 when closed, short circuit the high resistance element 29. When the heat becomes sufficiently great the thermostatic element 18 deflects to move the active end of pin 19 from engagement with either of the slots 22 or 25. It may occur that the operator holds the key depressed after the thermostatic release has functioned, in which case the heating current may be of such a strength as to cause damage by overheating. In Fig. 2 this contingency is provided for by the provisions of the contacts

27. When the thermostatic element operates to remove pin 19 from a slot in the disc 15, the contacts 27 open, removing the shunt from the resistance element 29 and placing the resistance in circuit with the heating winding 23, thereby reducing the current to a value just sufficient to maintain the pin 19 in its disengaged position. With this arrangement the operator may hold the key actuated as long as she desires without doing any damage to the equipment. When she restores the key the heating circuit is opened and the thermostatic element resumes its original condition.

What is claimed is

1. A ringing key comprising a slotted disc, a pin adapted to engage a slot in said disc when said key is actuated, and thermostatic means for disengaging said pin from said slot to effect the release of said key.
2. A ringing key comprising a slotted disc, a pin, a strip of thermostatic metal associated with said pin, means engaging said strip of thermostatic metal for moving said pin into engagement with a slot in said disc to lock said key in its operated position, and means for heating said strip of thermostatic metal to cause it to deflect in such a manner as to disengage said pin from said disc.
3. The combination of a ringing key, locking means therefor, thermal-controlling means for actuating said locking means subsequent to the actuation of said key, and means for controlling the heat in said thermal-controlling means.
4. The combination of a ringing key, locking means therefor, a thermostatic device controlling said locking means, means effective upon the actuation of said key for causing said device to function at a certain temperature, and means effective upon the operation of said device and the continued actuation of said key for varying the temperature of said device.
5. The combination of a ringing key, locking means therefor, a thermostatic device controlling said locking means, a heating circuit for said device, means effective upon the actuation of said key for completing said circuit to cause said device to function and release said locking means, and means effective upon the operation of said device and the continued actuation of said key for varying the resistance of said circuit.
6. The combination of a ringing key, locking means therefor, a thermostatic device controlling said locking means, a heating circuit for said device including a low resistance path and a high resistance path, means effective upon the actuation of said key for including said low resistance path in said heating circuit to cause said device to function and release said locking means,

and means effective upon the operation of said device and the continued actuation of said key for including said high resistance path in said heating circuit.

5 7. In combination, a circuit controlling device and thermostatic means rendered operable by the actuation of said device to automatically restore said device a predetermined period of time after its actuation.

10 8. In combination, a key and thermostatic means incorporated in the structure of said key and rendered operable by the actuation of said key to automatically restore said key a predetermined period of
15 time after its actuation.

In witness whereof, I hereunto subscribe my name this 8th day of September A. D. 1927.

PAUL B. MURPHY.

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