No. 672,965. Patented Apr. 30, 1901.

C. B. SHAW.

HEAT CONTROLLED ACTUATING DEVICE.

(Application filed Mar. 12, 1900.)

(No Model.) 3 Sheets—Sheet 1.

Fig. I.

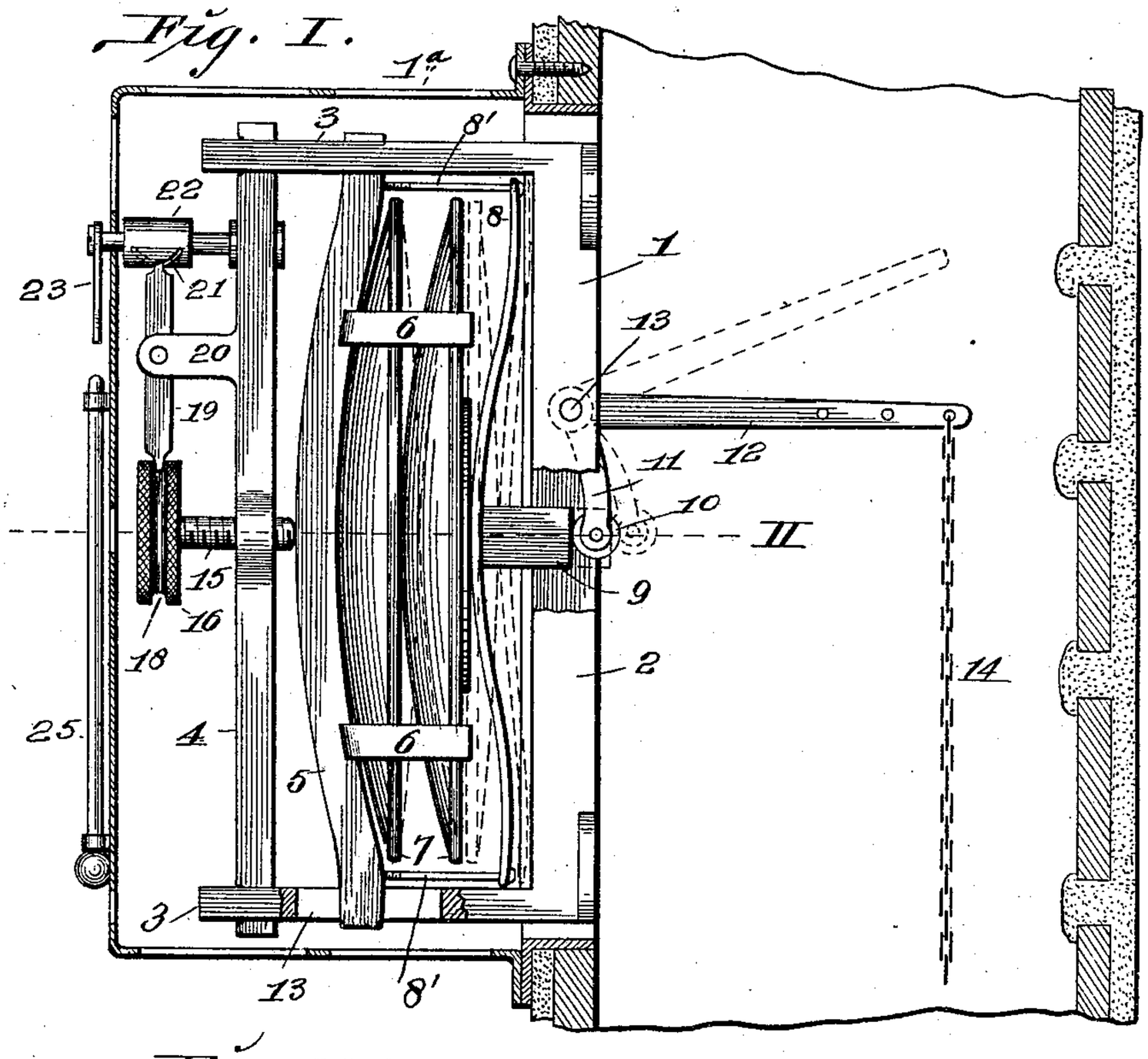

Fig. II.

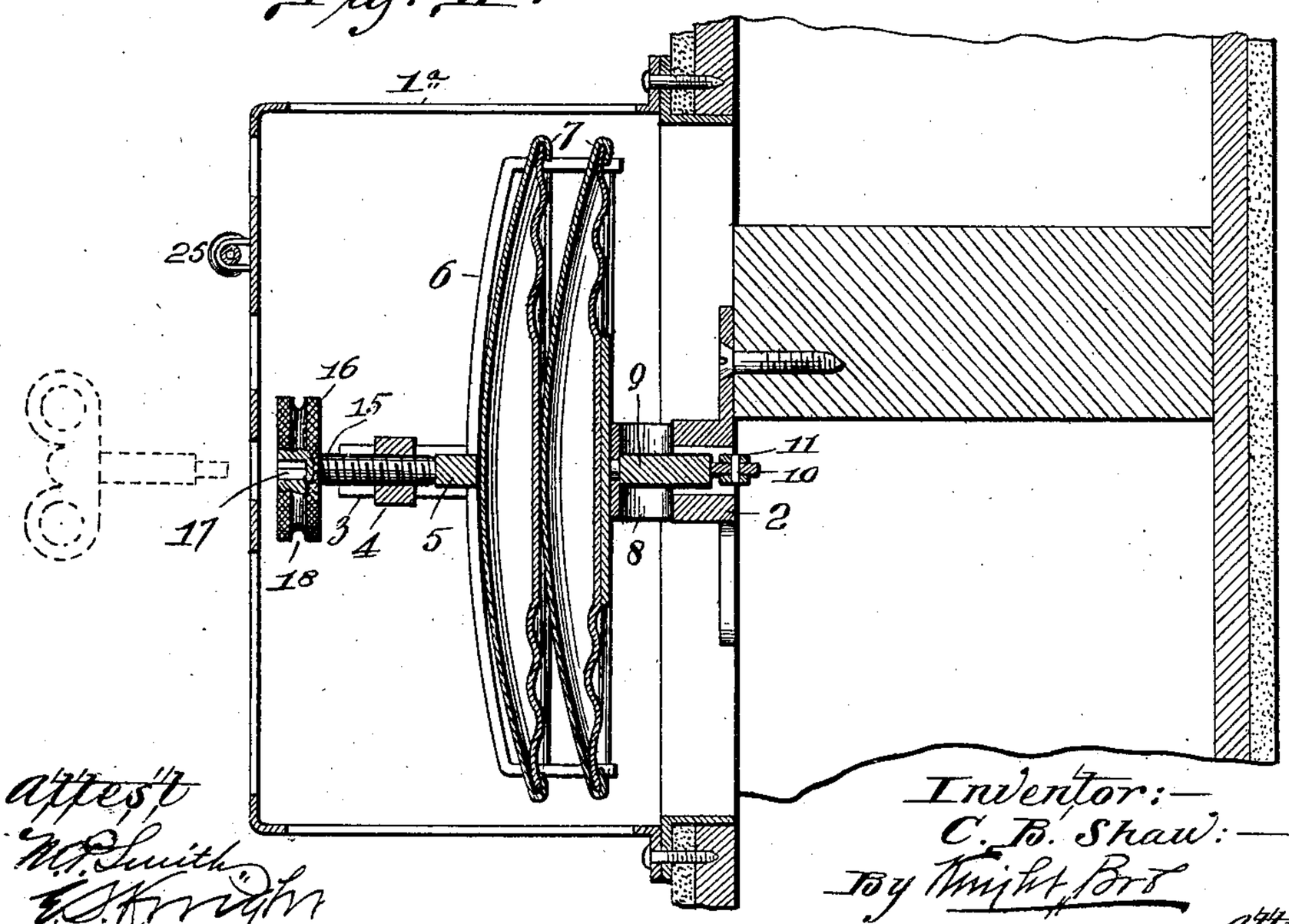

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Fig. III.

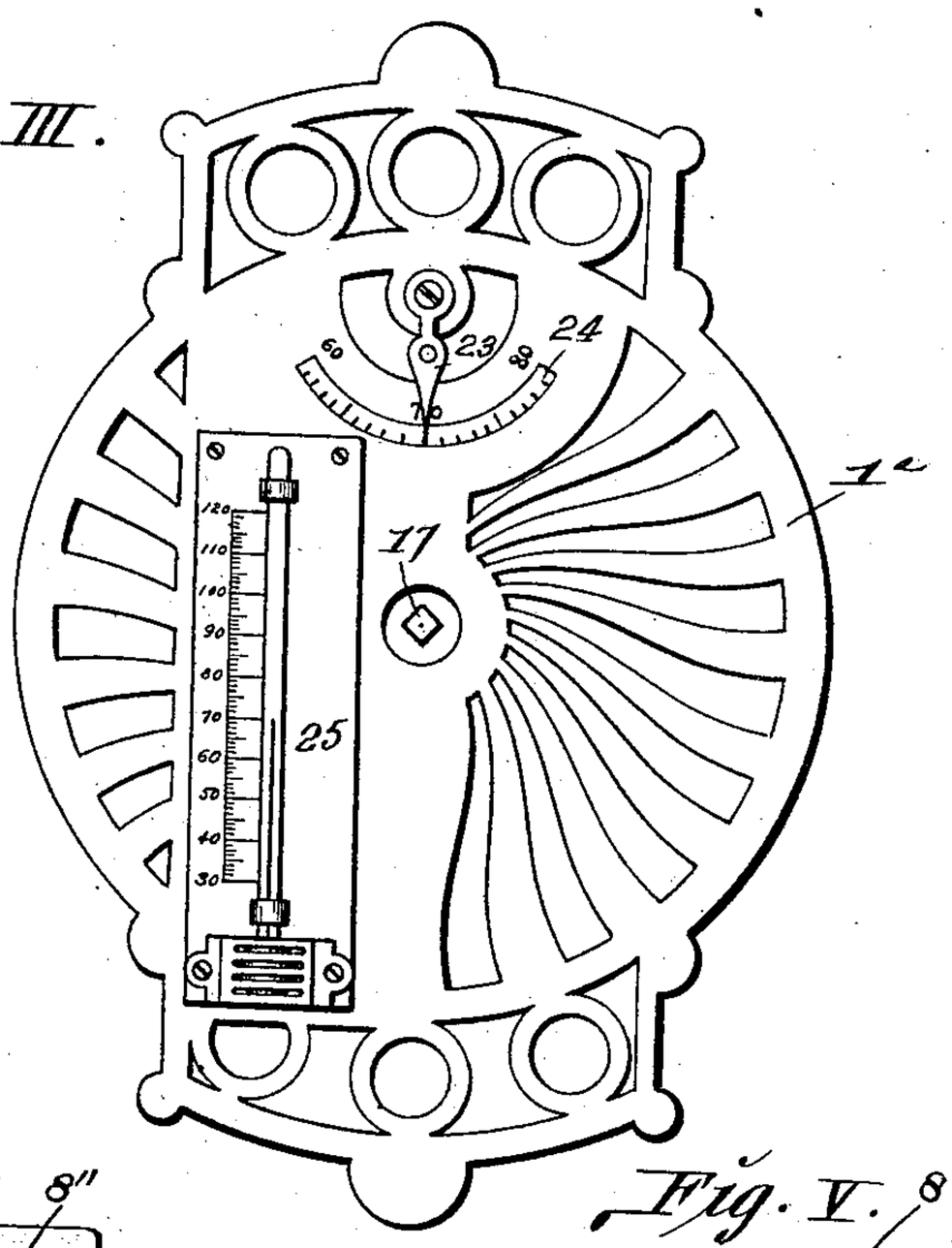


Fig. IV.

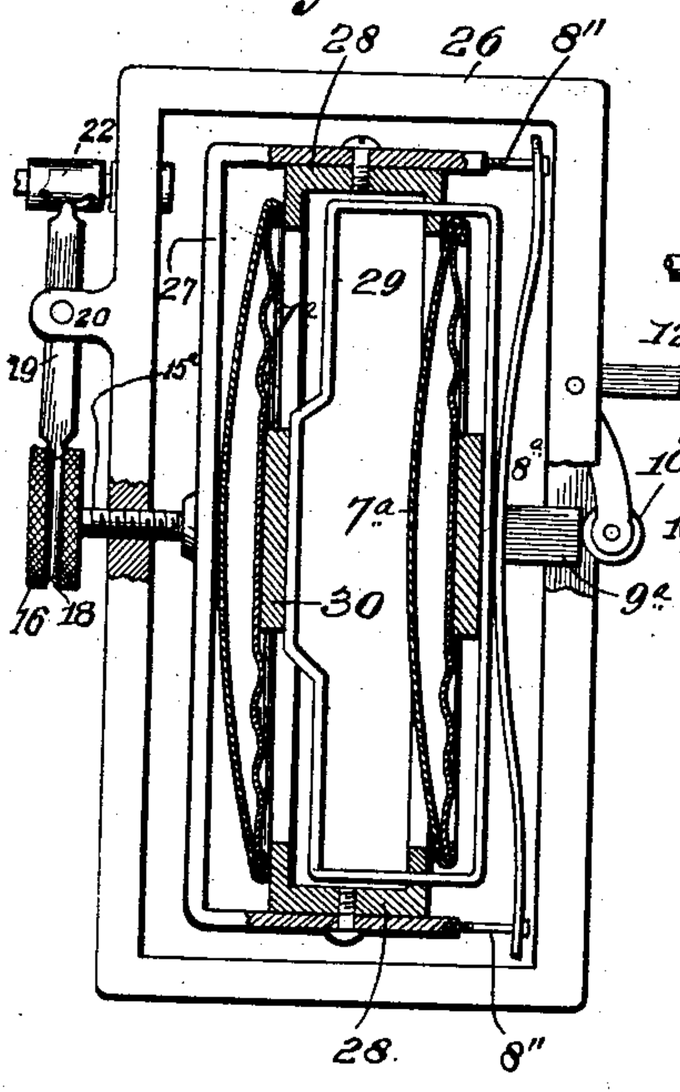
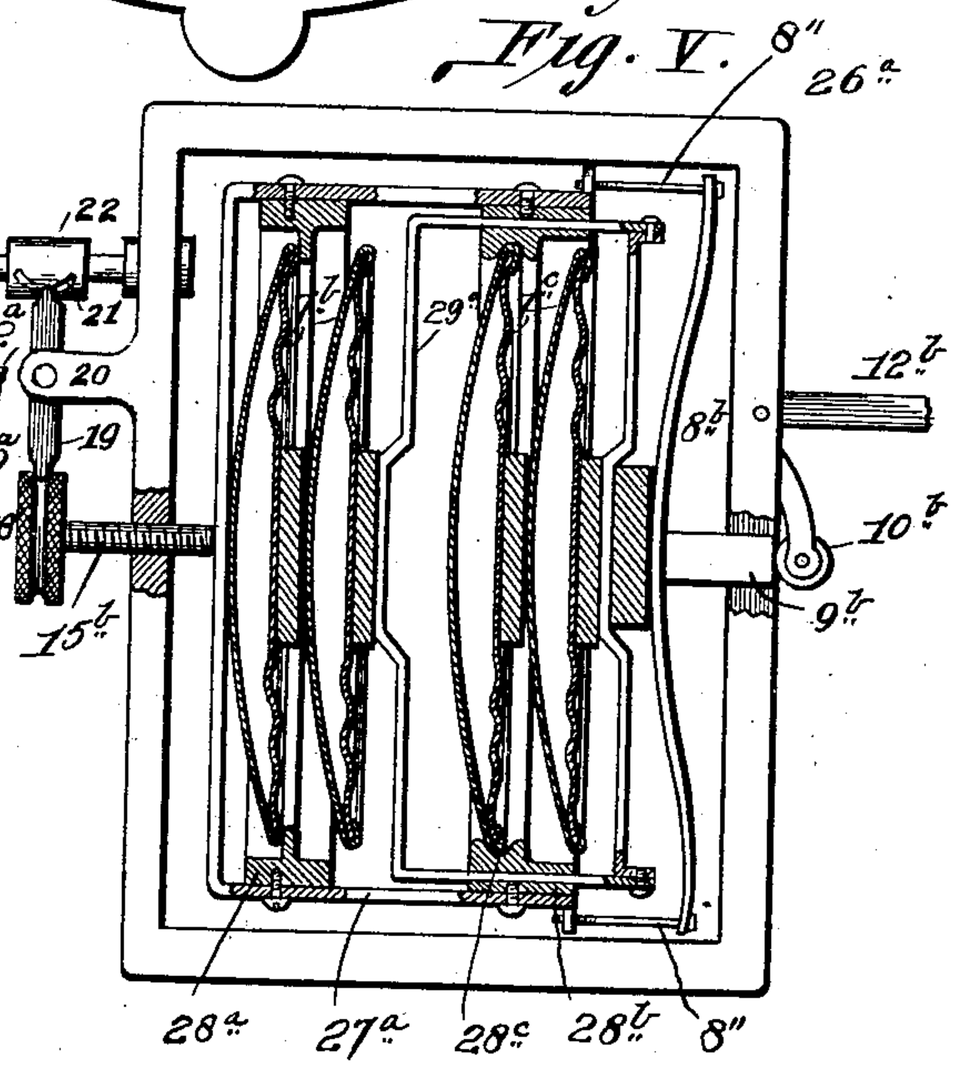


Fig. V.



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(No Model.) (Application filed Mar. 12, 1900.)

3 Sheets—Sheet 3.

Fig. VI.

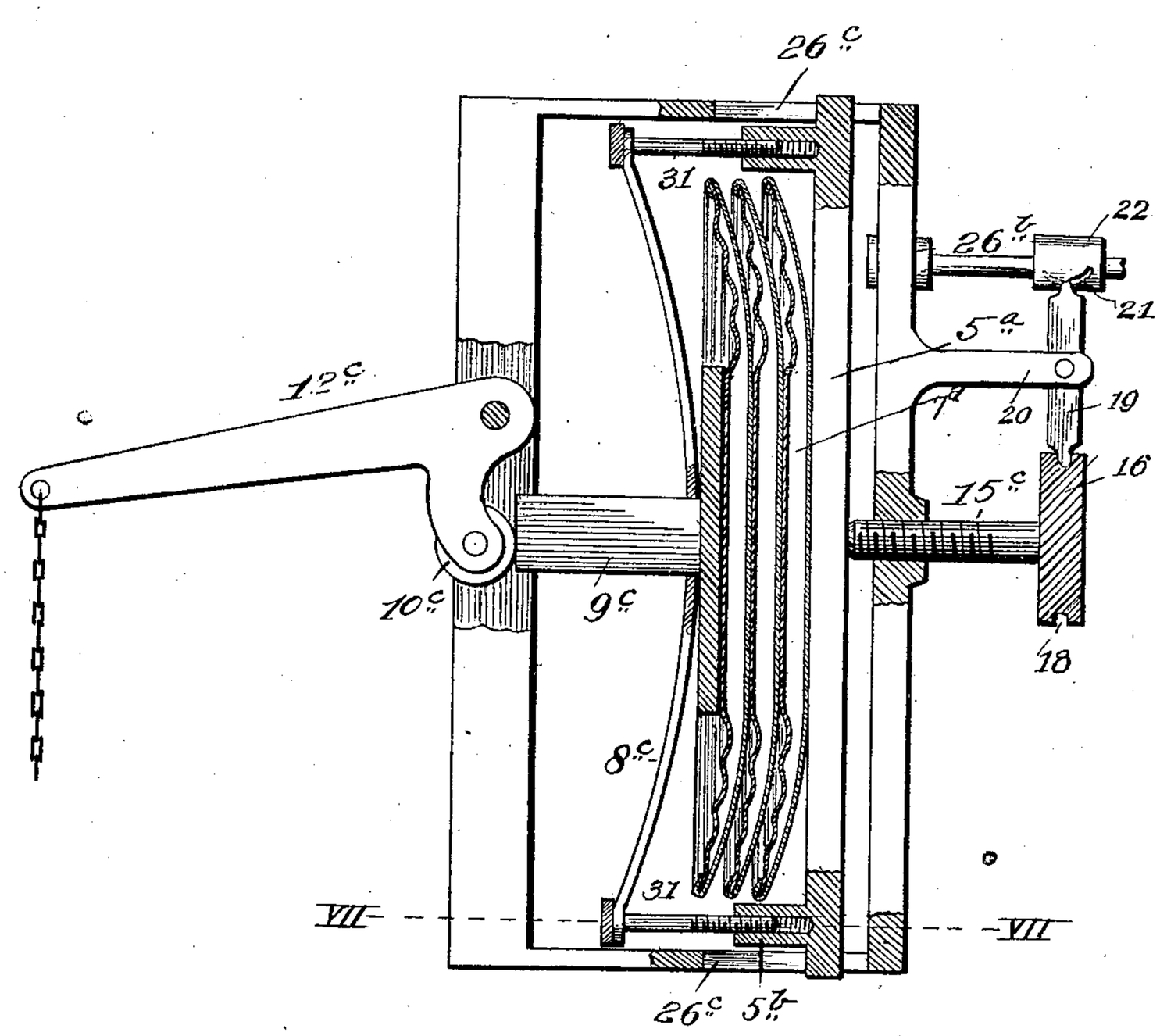
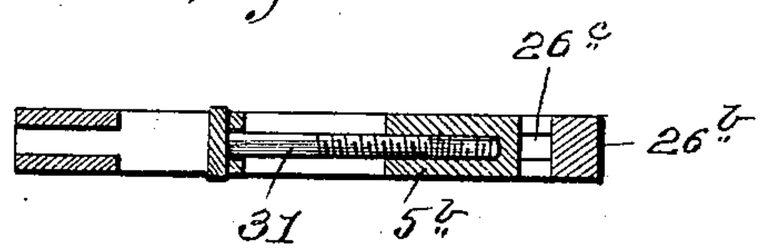


Fig. VII.



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UNITED STATES PATENT OFFICE.

CAMPBELL B. SHAW, OF KIRKWOOD, MISSOURI.

HEAT-CONTROLLED ACTUATING DEVICE.

SPECIFICATION forming part of Letters Patent No. 672,965, dated April 30, 1901.

Application filed March 12, 1900. Serial No. 8,316. (No model.)

To all whom it may concern:

Be it known that I, CAMPBELL B. SHAW, a citizen of the United States, residing at Kirkwood, in the county of St. Louis and State of Missouri, have invented certain new and useful Improvements in Heat-Controlled Actuating Devices, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to a thermostatic device by which dampers or other valves or similar objects may be actuated by reason of the presence of heat surrounding the device, the device being arranged to connect with or engage the part or parts to be moved.

The prime object of my invention is to produce a device of the character named wherein sufficient force and travel of the thermostatic appliance may be obtained to automatically manipulate large dampers or valves without assistance.

My invention consists in features of novelty hereinafter fully described, and pointed out in the claims.

Figure I is a view in side elevation of my device, the casing being shown in section. Fig. II is a horizontal sectional view taken on the line II II, Fig. I. Fig. III is a front elevation. Fig. IV is a sectional view of a modified form, the casing being omitted. Fig. V is a sectional view of another modified form, the casing being omitted. Fig. VI is a sectional view of a modification, showing still another form, the casing being omitted. Fig. VII is a sectional view taken on the line VII VII, Fig. VI.

For the purpose of illustrating a practical use of my device I have shown it in Figs. I and II applied to the wall of a building as used in thermostatically operating a damper at a predetermined temperature to regulate the temperature of the room in which the device is located.

1 designates the fixed inner frame of the device, formed with a slotted cross-bar 2, having two projecting slotted arms 3.

4 is a cross-bar having its ends permanently fixed to the outer ends of the arms 3, and 5 is a slide-bar having its ends arranged in the slots in said arms, (see Fig. I,) so that it is capable of adjustment to and fro with relation to the cross-bar 4.

6 designates yokes fixed to the slide-bar 5 and extending at angles from said slide-bar. The yokes 6 embrace corrugated plano-convex hollow expansion-disks 7, that may contain any suitable expansive substance that will distend the disks under the action of the heat.

8 designates springs that rest in contact with the corrugated plane side wall of one of the expansion-disks 7 to yieldingly confine and hold the disks in the embracing-yokes 6 and between the spring and the slide-bar 5. The spring is adjustably held at its ends by adjustment-screws 8′, inserted in the slide-bar 5. (See Fig. I.) The spring 8 carries a stem 9, adapted to bear against the part to be moved on the expansion of the disks 7. In the drawings I have shown this stem bearing against a roller 10, carried by the short arm 11 of a bell-crank lever 12, pivoted at 13 in the slotted cross-bar 2. The bell-crank lever 12 is adapted to be connected by a chain 14 or other suitable means to a furnace-damper or other object to be manipulated in the action of the expansion-disks in the presence of heat.

I utilize two of the expansion-disks, as shown, or a greater number in order that by so doing I may achieve a greater amount of travel therefrom to actuate the object to be moved thereby, as in such arrangement or use one expansion-disk acts against the other, and the expansion of both of them results in a compounding of the travel of the thermostatic appliance.

In order to gain the greatest efficiency from the expansion-disks, the slide-bar 5 is movably mounted, as stated, so that it may be more or less tightly adjusted in engagement with the expansion-disks, according to the conditions under which the device is to operate. The adjustment of the slide-bar is obtained by an adjustment-screw 15, seated in the cross-bar 4 and provided with a head 16, that may be turned by the fingers in the absence of the casing 1^a or by a key (shown in dotted lines, Fig. II) inserted through the casing into a socket 17 in the screw-head. By adjusting the slide-bar 5 the proper pres-

sure may be obtained against the expansion-disks, according to the temperature or other conditions under which it is desired to cause the device to actuate the part or parts to be moved thereby.

For the purpose of indicating the proper adjustment of the set-screw 15 I utilize an indicator constructed as follows: 19 is a rocking link pivotally mounted in an arm 20, projecting from the cross-bar 4 and having one end thereof arranged in a groove 18 in the head of the adjustment-screw 15. The opposite end of this rocking link is arranged in a spiral groove 21, contained by a rocking shaft 22, journaled in the cross-bar 4 and casing 1^a. The outer end of the rocking shaft carries a pointer 23, arranged in front of a temperature-scale 24 on the face of the casing 1^a. (See Fig. III.) In adjusting the adjustment-screw 15, the pointer 23 is moved by the described connection between it and the adjustment-screw. The parts are so arranged that the temperature at which the expansion-disks shall actuate the parts to be moved is indicated by the pointer 23 when said pointer is adjusted by manipulating the said adjustment-screw. For instance, if it is desired to have the device actuate an object in a temperature of 70°, the temperature indicated by the pointer in Fig. III, the pointer would be turned to that position by turning the adjustment-screw and the parts to be actuated accordingly.

25 designates a thermometer placed for convenience upon the casing 1^a.

In some instances it is desirable to gain an increased force in the actuating device, and for the purpose of obtaining such increase I have shown in Fig. IV a construction wherein two coacting expansion-disks are utilized to obtain compound force by mounting one of said disks in a sliding frame against which the other disk is arranged to press, so that the sliding frame may be caused to travel on the expansion of the pushing-disk. 26 designates the frame in which the disks are contained. 27 is a yoke-frame containing an interior channel-ring 28. 15^a is the adjustment-screw that bears against the yoke-frame 27. Within the yoke-frame and bearing thereagainst is a pushing expansion-disk 7^a, the edges of which are confined by one of the flanges of the channel-ring 28. The other flange of the channel-ring is provided with apertures that receive the slide-frame 29, within which is the second expansion-disk 7^a. The yoke-frame 27 receives by screws $8''$ the connection of the spring 8^a, provided with a stem 9^a, adapted to press against the roller 10^a, carried by the bell-crank lever 12^a to be actuated. The first or pushing expansion-disk 7^a presses against the slide-frame 29 through an interposed block 30 and moves said slide forwardly, and at the same time the second expansion-disk expands and exerts its force in combination with the first disk, so that while the stem 9^a is moved by the exertion of both of the expansion-disks, as in the form of device shown in Figs. I and II, it is at the same time moved with an increase of force.

In Fig. V, I have shown a construction of device wherein both compound force and compound travel are obtained. In this construction 26^a designates the frame containing the yoke-frame 27^a. On the interior of the yoke-frame are rings 28^a and 28^b. Within the frame is a pair of expansion-disks 7^b, one of which is confined by the ring 28^a and bears against the body of the yoke-frame, while the second disk 7^b is arranged beside the first, but is not confined by the ring 28^a. The second expansion-disk 7^b bears against the slide-frame 29^a, loosely mounted in the ring 28^b, so as to be capable of moving therein. Within the slide-frame is a pair of expansion-disks 7^c, one of which is confined in a groove 28^c in the ring 28^b, while the other lies beside the first, but is unconfined by said ring. In this form of construction the first or confined one of each pair of expansion-disks 7^b and 7^c operates to afford force, while the second or unconfined disk of each pair affords travel, and thus the disks of the two pairs operate in conjunction to furnish both compound force and compound or increased travel.

In Figs. VI and VII, I have shown another construction wherein the pressure-spring, against which the expansion-disks bear, is provided with means of adjustment with relation to the slide-bar of the device. In this construction 26^b designates a containing-frame provided with slots 26^c, that receive the ends of the slide-bar 5^a, against which the adjustment-screw 15^c bears. The slide-bar 5^a is provided with interior threaded arms 5^b, that receive adjustment-screws 31, by which the ends of the spring 8^c are confined. The expansion-disks 7^d bear against the slide-bar 5^a and exert their pressure against the spring 8^c and convey the stem 9^c against the part 12^c to be actuated on.

I claim as my invention—

1. The combination of a supporting-frame, a slide-bar within the frame, a spring carrying a bearing-stem, adjustment-screws connecting the slide-bar with the spring, hollow expansion-disks located between the slide-bar and the spring, and a screw for adjusting the slide-bar.

2. The combination of a supporting-frame, a slide-bar within the frame, a spring carrying a bearing-stem, adjustment-screws connecting the slide-bar with the spring, corrugated plano-convex hollow expansion-disks located between the slide-bar and the spring, and a screw for adjusting the slide-bar.

3. The combination of a supporting-frame, a slide-bar within the frame, a spring carrying a bearing-stem, adjustment-screws connecting the slide-bar with the spring, a channel-ring within the sliding bar, a sliding frame in the channel-ring, a hollow expansion-disk located between the slide-bar and the chan-

nel-ring, a hollow expansion-disk located within the sliding frame between the channel-ring and the spring, and a screw for adjusting the slide-bar.

4. The combination of a supporting-frame, a slide-bar within the frame, a spring carrying a bearing-stem, adjustment-screws connecting the slide-bar with the spring, channel-rings within the sliding bar, a sliding frame within one of the channel-rings, hollow expansion-disks between the slide-bar and the sliding frame, hollow expansion-disks within the sliding frame, and a screw for adjusting the slide-bar.

5. The combination of a supporting-frame, a slide-bar within the frame, a spring carrying a bearing-stem, adjustment-screws connecting the slide-bar with the spring, hollow expansion-disks located between the slide-bar and the spring, a screw for adjusting the slide-bar having a peripheral groove, a rocking shaft having a pointer and a rocking link connecting the rocking shaft with the peripheral groove.

6. In a device of the character described, a series of expansion-disks, a spring against which said disks are arranged to press, a slide-bar bearing against the side of said series of disks opposite said spring, a cross-bar, an adjustment-screw working through the cross-bar having a grooved head and bearing against said slide-bar, a grooved rocking shaft, a link pivoted to the cross-bar engaging at one end the grooved head of said screw, and at the other end the grooved rocking shaft and an indicating-pointer carried by said shaft, substantially as described.

CAMPBELL B. SHAW.

In presence of—
E. S. KNIGHT,
M. P. SMITH.