S. A. DAY.

Automatic Heat Regulator and Alarm.

No. 164,815. Patented June 22, 1875.

Fig. 1.

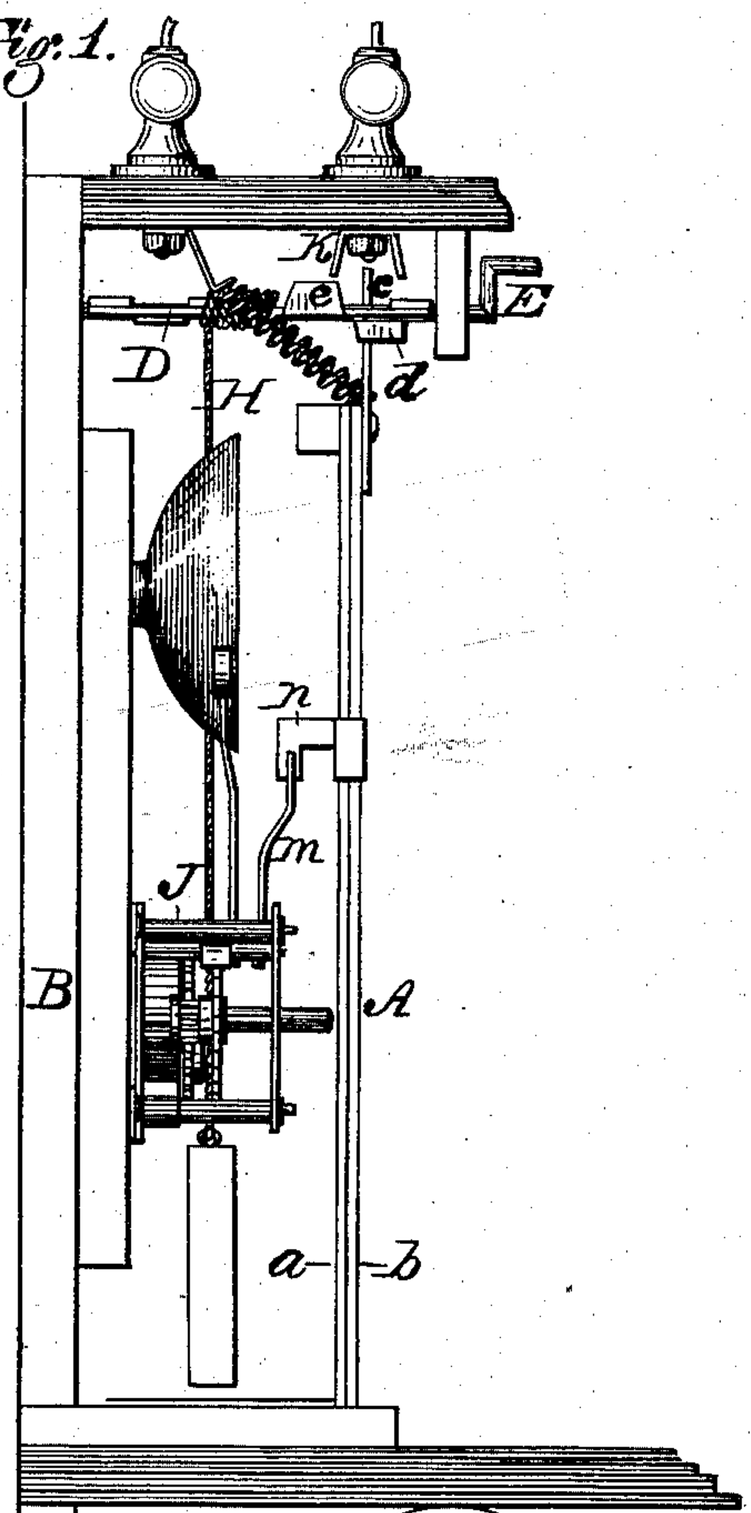


Fig. 2.

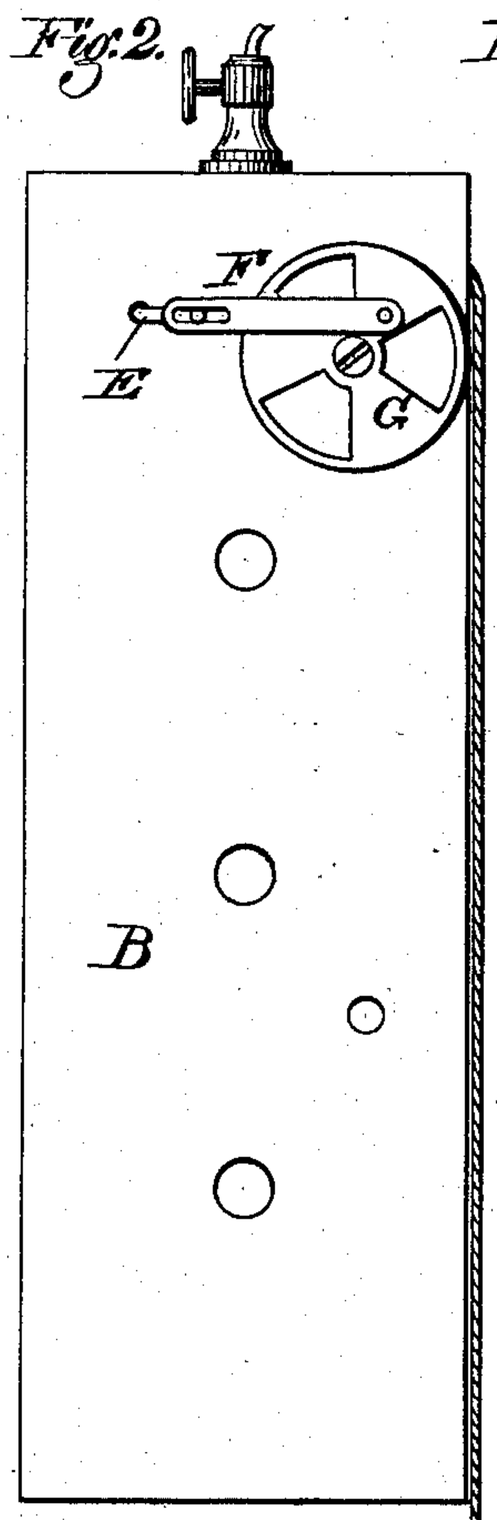


Fig. 3.

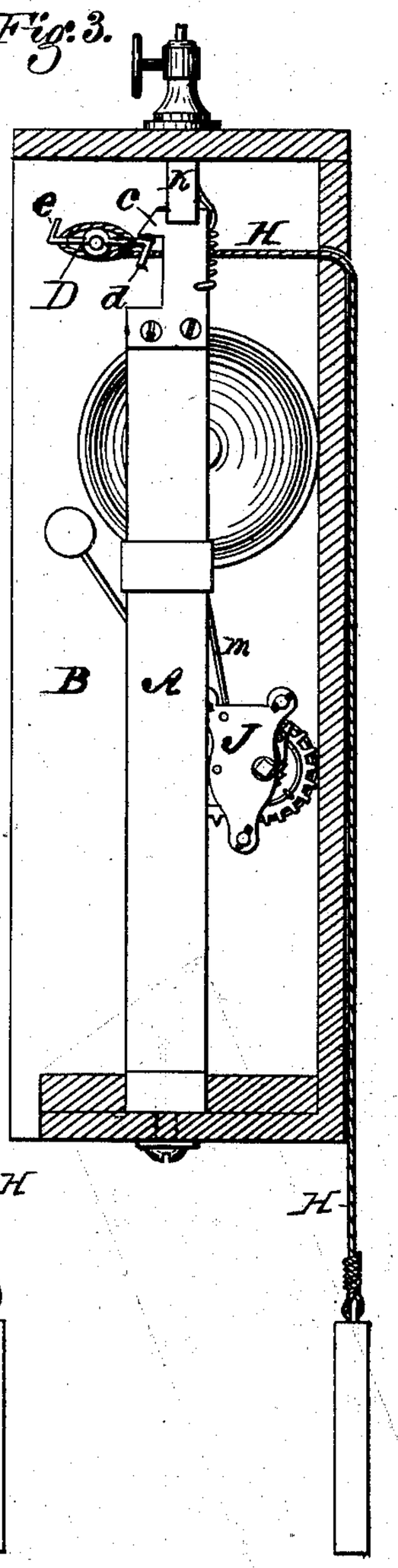
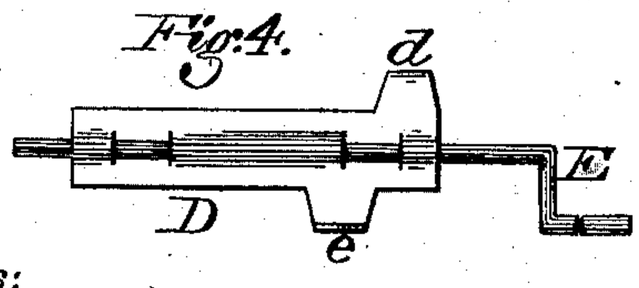


Fig. 4.



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UNITED STATES PATENT OFFICE.

SELDEN ALLEN DAY, OF BOWLING GREEN, OHIO.

IMPROVEMENT IN AUTOMATIC HEAT-REGULATORS AND ALARMS.

Specification forming part of Letters Patent No. **164,815**, dated June 22, 1875; application filed May 13, 1875.

To all whom it may concern:

Be it known that I, SELDEN ALLEN DAY, of Bowling Green, in the county of Wood and State of Ohio, have invented certain Improvements in Automatic Heat-Regulator and Alarm for Dwellings, &c., of which the following is a specification:

The object of my invention is to produce an automatic apparatus which will maintain any given temperature in the apartment in which it is located, and also give an alarm in the event of a fire occurring.

The invention consists in the employment of a compound bar, composed of two materials which expand and contract unequally as the temperature varies, to control mechanism which operates the damper, register, or other device which regulates the temperature of the apartment. The invention also further consists in combining with said compound bar a mechanical bell-alarm and an electrical alarm.

At a certain temperature the bar remains straight, but, owing to the difference in the expansibility and contractibility of the two materials, it will bend in one direction when the temperature is raised, and in the opposite direction as it is lowered; and it is this fact that I avail myself of in the application of the bar for the purposes stated.

In the practical application of my invention the construction and operation of the mechanism may be varied in many respects; but I prefer to employ the apparatus represented in the accompanying drawings, in which the compound bar is arranged to control the action of a drum which is operated by a weighted cord, and connected by a crank and pitman with the register in such manner as to alternately open and close the same.

Figure 1 represents a side or edge view of the apparatus; Fig. 2, a face view of the same, showing clearly the manner in which the register is operated; Fig. 3, an inside face view of the apparatus, the side of the body or casing being removed; Fig. 4, a face view of the drum and crank for operating the register.

A represents the compound bar, composed of the two strips or layers *a* and *b*. B represents a body or frame, in which the bar A is mounted in an upright position, the lower end of the bar being fastened rigidly in place, while its upper end is left free to move sidewise, as the bar is bent by the changes in the temperature of the surrounding air. D represents a drum mounted crosswise in the upper end of the body B, and provided at one end with two lips, *d* and *e*, which engage alternately with a catch or hook, *c*, secured to the upper end of the bar A, as hereinafter more fully explained. Around the drum D there is wound a weighted cord, H, which sets the drum in motion whenever the catch *c* releases its hold. To the end of the drum there is connected a crank, E, which is connected by a pitman, F, with the register G, which latter controls the temperature of the apartment, the arrangement of the parts being such that when the register is open it will be closed by a half-revolution of the drum and crank, and that when it is closed it will be opened by a half-revolution of said parts. The two lips or detents *d* and *e* of the drum are arranged on opposite sides of the same, and at different distances from its ends, as shown in Figs. 1 and 4, so that as the end of the bar moves right and left its catch *c* engages with the two lips alternately, permitting the drum and crank to make half a revolution at a time, in order to open and close the register.

When the air in the apartment is at the proper temperature the parts of the apparatus stand in the positions represented in Figs. 1 and 3, the register being open, and the catch *c* engaged over the lip *d* of the drum. In case the temperature rises the bar A bends to the left, releasing the catch from the lip *d*, and allowing the drum to turn and close the register, which is held shut by the catch engaging with the lip *e* of the drum. When the temperature falls to the proper point the bar resumes its original position, and the drum makes another half-revolution, thereby opening the register.

Thus it will be seen the flexion of the compound bar, caused by the changes in temperature, controls perfectly the devices which govern or regulate the temperature, so that the temperature is automatically maintained at the desired point.

In order to render the apparatus sensitive and delicate in its action, the drum is flat-

tened, as shown in Fig. 3, and the parts so arranged that when the drum is held at rest the weighted cord draws edgewise thereon across its face, from a point nearly in line with its center, so that the weight exerts but little force to turn the drum, the consequence of which is that the lips of the drum bear very lightly upon the catch *c*, so that the latter is very easily released.

In order that the register may be operated with certainty notwithstanding the fact that the weight exerts so little force in starting the drum, the end of the pitman which receives the crank is slotted, as shown in Fig. 2, so that it is not moved by the crank until the latter is thrown off the center, and the drum turned so that the cord acts with increased effect thereon, by drawing from a point farther from the center.

In order that the temperature of the apartment may be fixed at any desired point, the lower end of the bar A is mounted in a sliding block, held by a set-screw, as shown in Figs. 1 and 3, so that the bar may be adjusted sidewise, and caused to hold the register or its equivalent open until any required temperature is reached.

In order to allow the drum to be turned backward by means of the crank, to wind up the cord, the edges of the lips *d* and *e* are bent backward and beveled on the inner corners, as shown in Figs. 1 and 4, so that they will slip past the catch *c* without taking hold thereon.

While in the drawings I have represented the pitman in connection with a register, it is obvious that connection may be made with a damper, steam-valve, or other heat-controlling device, whatever it may be. It is also obvious that the compound bar may be arranged in connection with different mechanism for accomplishing the same result as that shown.

For the purpose of giving an alarm in the event of a fire breaking out, or of the temperature reaching a very high point from any other cause, or in the event of the temperature falling to an extremely low point from the failure of the heating apparatus, I employ, in connection with the compound bar, a mechanical bell, and, when desired, an electrical alarm, also.

In Figs. 2 and 3, J represents an ordinary bell-alarm, operated by a spring and gearing, secured in the body by the side of the bar A. The bell hammer or striker is provided with an arm, *m*, which, when the alarm is set, bears upon a lip, *n*, on the bar A. When the temperature either rises or falls to an extreme point, the flexion of the bar moves the lip from under the arm, and permits the alarm to operate.

When it is desired to have the alarm transmitted to a distant point I locate at such point an electrical alarm, and, bringing the wires therefrom to the apparatus, attach one of them to the upper end of the bar A, and the other to a forked plate, K, which is secured in the top of the body, in such position that its ends extend down on opposite sides of the bar A, as shown, so that when the bar bends to a great extent in either direction, it will bring the end of the wire in contact with one arm or the other of the plate, and thereby complete the circuit and set the alarm in operation.

The bar A may be composed of any two suitable materials which expand and contract unequally when subjected to the same changes in temperature; but the best combination which I have yet discovered is of wood and hard rubber.

Either of the two alarms may be omitted when desired; but it is considered desirable to use one of them, in order to dispense with an attendant.

I am aware that the direct application of the expansive power of metal to operate heat-controlling devices is not new; but in my apparatus the heat-controlling devices are operated by a weight or its equivalent, and the expansive bar used merely as a detent, whereby I am enabled to lessen the strain on said bar, and to render the apparatus quicker and more delicate in its action.

Having described my invention, what I claim is—

1. The combination of a register or equivalent device for controlling the temperature in an apartment, mechanism, substantially such as herein described, tending constantly to operate said regulating device, and an expansion-bar arranged to detain and release said mechanism as the temperature varies, substantially as shown and described.

2. The combination of the register G, or its described equivalent, the compound bar A, drum D, weighted cord H, crank E, and pitman F.

3. In combination with the laterally-moving catch *c*, the drum D, provided with the lips *d e*, and connected with the register or its described equivalent, for the purpose of opening and closing the same, substantially as shown and described.

4. The flattened drum, provided with lips *d e*, in combination with the weighted cord H and the catch *c*.

5. In combination with the crank E and register G, the slotted pitman F.

6. In combination with the bar A, constructed and arranged to operate in connection with the heat-controlling devices, substantially as described, one or more alarms to give warning of an extremely high or low temperature.

SELDEN ALLEN DAY.

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