Jan. 14, 1936. M. E. HENNING 2,027,689

HYGROSCOPIC CONTROL SWITCH

Filed March 25, 1932

Fig. 1.

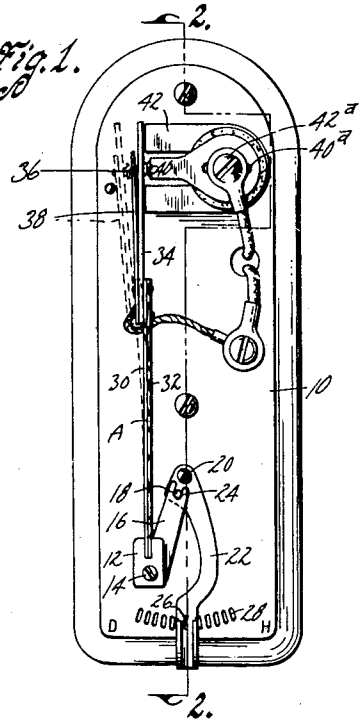


Fig. 2.

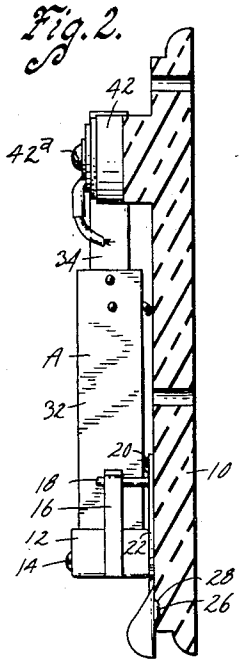


Fig. 6.

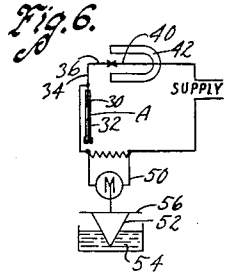


Fig. 5.

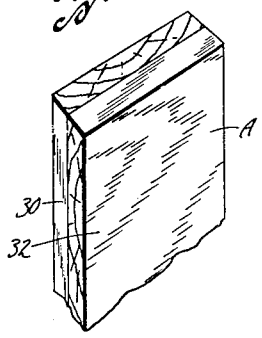


Fig. 3.

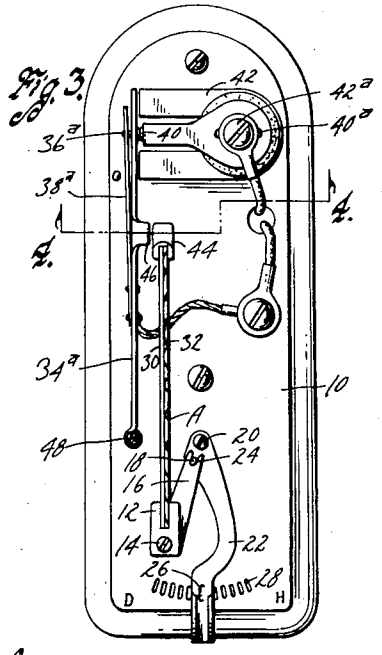
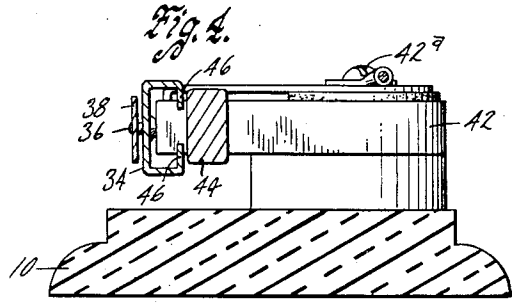


Fig. 4.



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UNITED STATES PATENT OFFICE

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HYGROSCOPIC CONTROL SWITCH

Malcolm E. Henning, Des Moines, Iowa, assignor to Penn Electric Switch Co., Des Moines, Iowa, a corporation of Iowa

Application March 25, 1932, Serial No. 601,125

1 Claim. (Cl. 200—52)

An object of my present invention is to provide a hygroscopic control switch or hygrostat of simple, durable and inexpensive construction.

A further object is to provide a hygroscopic control switch for automatically operating humidity control devices, the mechanism being specifically designed to produce a sensitive and positively acting hygroscopic switch for opening and closing an electric circuit, depending on humidity conditions of the atmosphere surrounding the mechanism.

A further object is to provide a hygroscopic switch which is quick acting so as to eliminate arcing of the contacts as they are separated.

More particularly, it is my object to provide a switch structure comprising a hygroscopic element, an armature actuated thereby, a magnet affecting movement of the armature and contacts to be engaged and separated by movements of the armature.

A further object is to provide a humidity responsive element for actuating a switch, the switch being used to control mechanism for producing a humid condition whereby the atmosphere of a room or the like may be automatically maintained at a given degree of humidity without manual attention.

With these and other objects in view my invention consists in the construction, arrangement and combination of the various parts of my device, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claim, and illustrated in the accompanying drawing, in which:

Figure 1 is a front elevation of a hygrostat embodying my invention with the casing removed.

Figure 2 is a vertical sectional view on the line 2—2 of Figure 1.

Figure 3 is an elevation similar to Figure 1 showing another form of connection between the hygroscopic element and the armature.

Figure 4 is an enlarged sectional view on the line 4—4 of Figure 3.

Figure 5 is an enlarged perspective view of a portion of the hygroscopic element; and

Figure 6 is an electric diagrammatic view showing the hygroscopic switch and a humidifier electrically connected with each other.

On the accompanying drawing, I have used the reference numeral 10 to indicate a base. Pivoted to the base 10 is an anchor member 12, the pivot therefor being shown at 14. The position of the anchor member 12 may be adjusted in any desired manner.

I have illustrated the following mechanism as one way in which the position of the anchor member 12 may be adjusted. An arm 16 extends from the anchor member 12. A slot 18 is formed in the end thereof. Pivoted at 20 is an adjusting arm 22 having a pin 24 in the slot 18.

The adjusting arm 22 may be of resilient material and provided with a projection 26 adapted to enter any one of a series of depressions 28 in the base 10. Thus the anchor member 12 and the hygroscopic element A carried thereby may be adjusted for operation at different humidity conditions of the atmosphere, as will hereinafter become obvious as the description proceeds.

The hygroscopic element A may be any form of element which warps, depending on humidity conditions of the atmosphere. Preferably I show strips 30 and 32 of wood cemented together with their grains crossing each other as clearly shown in Figure 5.

Referring to Figure 1 or 3, it will be obvious that the greater the humidity in the atmosphere surrounding the element A the more the upper end will warp toward the left because the strip 32 swells lengthwise or across the grain, while the strip 32 retains practically the same length, this being a characteristic of wood. Inversely, dry atmosphere causes the upper end of the element to swing toward the right.

In Figure 1, I have shown an armature 34 directly connected with the hygroscopic element A. A shouldered contact 36 is carried loosely by the armature 34. A leaf spring 38 is connected with the contact 36 and the armature 34.

A stationary contact 40 is adapted to coact with the contact 36 when the armature 34 is adjacent the poles of a magnet 42.

In Figure 3 I have shown a different arrangement of hygroscopic element and armature. Similar parts bear the same reference numerals with the addition of the letter *a*. It will be noted that a head 44 is provided on the upper end of the hygroscopic element A which is adapted to contact with lips 46 bent from the armature 34*a* and that the armature itself is pivoted as indicated at 48.

Thus when the hygroscopic element moves toward the left, the head 44 engages the lips 46 for separating the contacts 36*a* and 40*a* and when moving in the other direction, an overrun as caused by excessive dryness will merely cause the head 44 to leave the lips 46 as illustrated, after the contacts engage.

In Figure 6 I have shown the contacts 36 and 40 connected in an electric circuit including a motor 50. The motor 50 may operate a humidifier such as a cone 52 immersed in water 54 and a centrifugal mist disk 56 or any other type of humidifier. For instance, the electric current can operate a water spraying valve.

By the particular combination of a hygroscopic element and an armature and magnet I am able to provide snap acting operation for an electric circuit without the necessity of great energy for moving the contacts from one position to another. It will be obvious that as the hygroscopic element tends to separate the contacts, energy will be stored therein until it is sufficient to overcome the magnetic pull of the magnet on the armature whereupon the armature will start moving away from the magnet and enter a progressively weaker magnetic field to accelerate the opening action. Immediately thereafter the armature will strike the leaf spring 38 for quickly separating the contacts. The contacts, being separated in a magnetic field, any arc will be immediately extinguished because of the magnetic field tending to blow out the arc.

When the condition of the atmosphere becomes dry enough to again bring the armature into close proximity to the poles of the magnet 42, the contacts will be quickly engaged without any hovering tendency. The degree of humidity at which the switch will operate can be predetermined by adjusting the lever 22. The differential of the switch can be increased by adjusting the contact 40 so that the armature 34 will not come so close to the poles of the magnet, a screw 42*a* and a slot 40*a* being shown for this purpose.

Some changes may be made in the construction and arrangement of the parts of my device without departing from the real spirit and purpose of my invention, and it is my intention to cover by my claim, any modified forms of structure or use of mechanical equivalents, which may be reasonably included within its scope.

I claim as my invention:

In a hygroscopic control switch, the combination of an armature, means for pivotally supporting one end of said armature, a magnet tending to swing said armature in one direction and a humidity responsive, warpable element anchored at one end and having its opposite end arranged to engage said armature intermediate its ends when the element warps in one direction and thereupon move the armature away from the magnet and to disengage the armature and move away from it when the element warps in the opposite direction, the means for anchoring one end of said element being pivoted and having a portion spaced from the pivot thereof, an adjusting lever pivotally mounted and having a portion adjacent its pivot engaging said portion of said means to cause slight adjustment of the element upon considerable movement of the adjusting lever.

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