

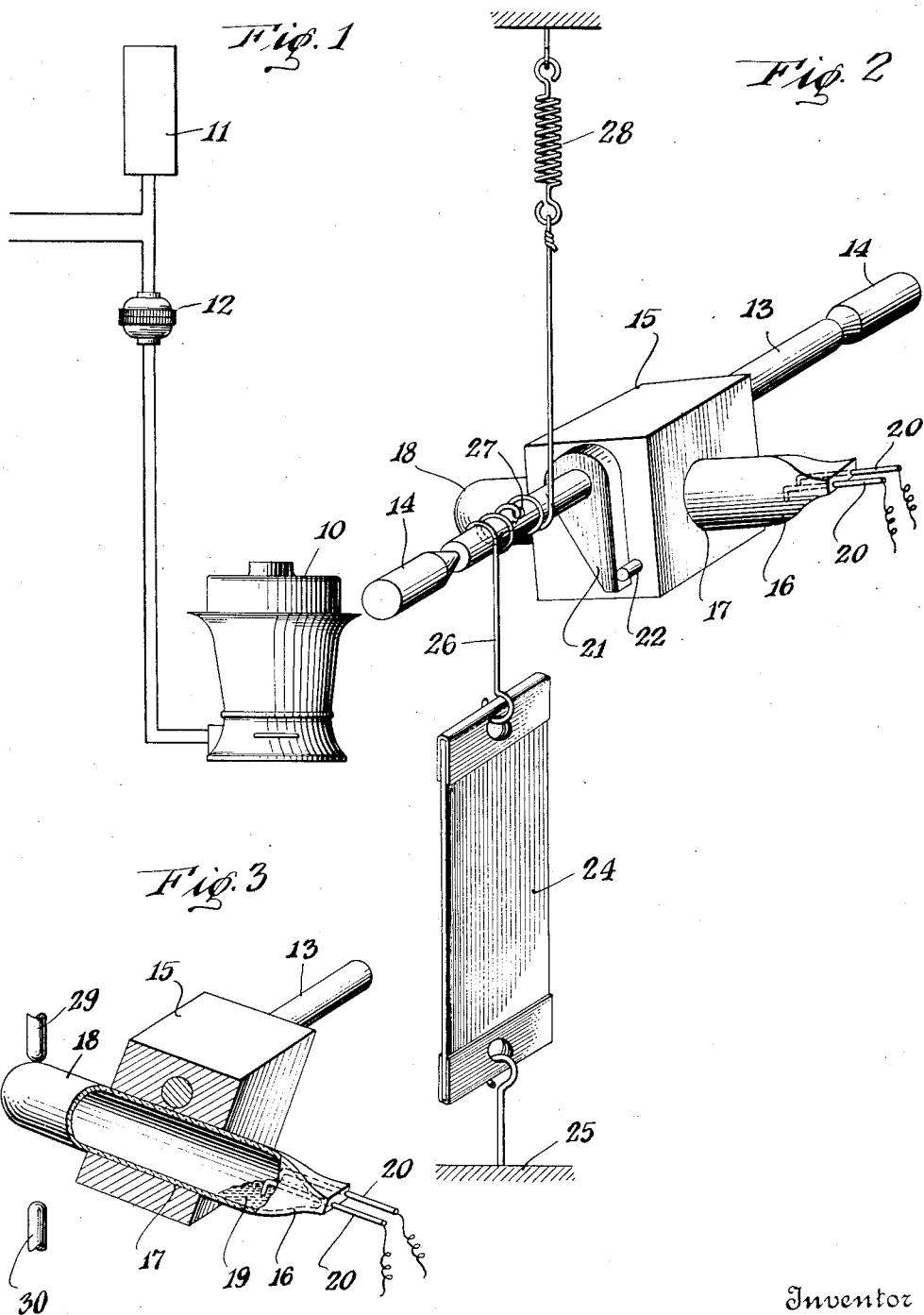
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HUMIDITY CONTROL SWITCH

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HUMIDITY CONTROL SWITCH

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6 Claims. (Cl. 200—52)

This invention pertains generally to humidity control mechanism and particularly to a humidity control adapted to control an electric circuit.

This invention herein relates more particularly to humidity control which is adapted for minute, accurate and permanent adjustment involving a minimum number of movable and/or jointed members. The construction preferably involves the use of a sensitive element capable of an immediate change in length upon a fairly small change in relative humidity. Any expansion or contraction of the sensitive element is translated directly to the switch. The construction permits unhampered and unlimited expansion and contraction of the sensitive element without undue strain thereon and without harmful effects upon the adjustment of the device or the results obtained. The device is positive in operation, simple in construction, has a minimum number of parts and may be readily manufactured at a relatively low cost.

By providing for unrestricted movement of the sensitive element, and by translating this movement without loss in joints, etc. directly to the switch, a high degree of accuracy and sensitivity is obtained.

Referring to the drawing in which like reference characters are appended to like parts in the various views.

Figure 1 is a diagrammatic view illustrating the manner of connecting the humidity control to a humidifier.

Figure 2 is a perspective view showing the construction of the device.

Figure 3 is a perspective view illustrating a section of the switch proper.

A humidifier is shown diagrammatically at 10 in Figure 1. The humidity control is shown generally at 11. The circuit through the humidifier 10 and the humidity control 11 is shown for convenience as being completed through a house plug 12. It is, of course, understood that any other arrangement or circuit may be provided.

Referring now to Figures 2 and 3, at 13 is shown an arbor or shaft mounted between adjustable centers 14. This construction permits easy rotary movement of the arbor 13 and yet provides for accurate adjustment which prevents any other movement. A block, or other suitable support, 15 is mounted upon the arbor 13. The arrangement is such that the block 15 may have relative rotational movement with respect to the arbor 13. A mercury switch 16 is supported by the block 15. The construction shown consists of an aperture 17 through the block 15 in which tube 18 of

mercury switch 16 is secured. It is, of course, understood that any other construction may be provided.

The center of gravity of block 15 and switch 16 is such that if these parts are permitted to move freely about the arbor 13 of their own weight the mercury 19 in tube 18 will flow to one end of tube 18 to close a circuit through electrodes 20.

A dog 21 secured to the arbor 13 is adapted to contact a pin 22 on block 15 when the arbor 13 is rotated counterclockwise. After the dog 21 contacts pin 22 any further counter clockwise rotation of arbor 13 will lift the electrode end of tube 18, and if this movement is continued it will cause the mercury 19 to flow toward the opposite end of the tube 18 to break the circuit through the electrodes 20. Assuming now that the circuit is broken due to a counterclockwise movement of the arbor 13, a clockwise movement thereof will cause a corresponding clockwise movement of switch 16 to lower the electrode end thereof inasmuch as pin 22 will follow dog 21. The result will be that the mercury 19 will again accumulate in the electrode end of the tube 18 to close the circuit.

Movement of the arbor 13 is directly controlled by the sensitive membrane 24. Membrane 24 has one end secured to a stationary member 25 and its other end secured to a cord, thread or similar elongated flexible element 26, which is wrapped about the arbor 13. Some suitable means such as passing the element 26 through an aperture 27 in the shaft 13, may be provided to prevent any slippage. The element 26 is held taut by means of a spring 28 attached to the other end thereof.

Membrane 24 is capable of exerting a force upon contraction. The movement of the membrane 24 during contraction is transmitted to arbor 13 causing it to rotate in a clockwise direction. Contraction of the membrane 24 is caused by drying. Assuming that switch 16 is open, as the contraction continues switch 16 is eventually closed by mercury 19 contacting electrodes 20 and the humidifier 10 is placed in operation. As the relative humidity begins to rise membrane 24 lengthens in proportion thereto. Spring 28 keeps element 26 taut thus causing arbor 13 to rotate in a counterclockwise direction. Dog 21 engages pin 22, or is already in contact therewith, causing block 15 to follow the movement of the arbor. When the electrode end of tube 18 is raised sufficiently, the mercury 19 flows away from the electrodes 20, thus breaking the circuit. Humidifier 10 stops and is not placed in operation again

until electrode end of tube 18 is lowered sufficiently to close the circuit through the electrodes 20.

It can be readily seen that the device is highly sensitive and that it requires only a very small movement of membrane 24 to lift or lower the electrode end of tube 18 sufficiently to open and close the circuit through the electrodes 20.

The construction permits the membrane 24 to move freely and unrestrictedly so that sudden changes in humidity will not harm the device or throw it out of adjustment by placing undue stresses on the membrane 24. For instance, should the membrane 24 continue to contract after the switch is closed, dog 21 will merely leave pin 22 and may continue its clockwise movement unrestricted. On the other hand, should the membrane 24 lengthen excessively the element 26 would still be held taut by spring 28 with the result that block 15 and switch 16 might be rotated counterclockwise to a slightly greater extent without any harmful or undesirable results.

For convenience I have provided a stop 29 shown in Figure 3 to limit the free clockwise movement of the tube 18. I have also provided a stop 30 to limit the counterclockwise movement of the tube 18. Any elongation of the membrane 24 beyond the point where tube 18 would engage stop 30, would, of course, cause no harm for the membrane 24 is not placed under any stresses. It would merely hang freely between the element 26 and the stationary member 25. It is, of course, understood that the words "clockwise" and "counterclockwise" are used merely for illustrative purposes and that these terms and movements may be reversed without departing from the spirit of the invention.

Having described my invention it is obvious that many modifications may be made in the same within the scope of the claims without departing from the spirit thereof. The particular description is given merely for the purposes of illustration and the invention is not to be considered as limited thereto. For instance, any other similarly sensitive material may be substituted for the membrane 24, and other types of mountings may be provided for the switch. It would also be possible to use some other type of switch, particularly for certain types of work. Other modifications will suggest themselves to persons skilled in the art and familiar with this invention.

I claim:

1. A humidity control comprising a membrane adapted to change in length in response to changes in humidity, means for securing one end of said membrane, the other end being movable, a tension producing means, a connection between the movable end of said membrane and said tension producing means, a pivotally mounted switch, means for limiting the movement of said switch in either direction, and means associated with said connection and said switch for causing movement of said switch in one direction under the influence of said tension producing means upon expansion of said membrane and in the other direction under the influence of said membrane upon contraction thereof, said last-named means being adapted to release said membrane from said switch upon contraction of said membrane in excess of that necessary to cause a full movement of said switch, whereby the subjection of said membrane to injurious tension is avoided.

2. A humidity control comprising a membrane

adapted to change in length in response to changes in humidity, means for securing one end of said membrane, the other end being movable, a tension producing means, a flexible elongated element connecting the movable end of said membrane and said tension producing means, a rotatable arbor, the intermediate portion of said flexible element being wrapped around said arbor so as to cause rotation thereof upon movement of said flexible member, a block loosely mounted on said arbor, a mercury switch secured to said block, a dog secured to said arbor, said dog being adapted to engage said block upon rotation of said arbor in one direction under the influence of said tension producing means upon expansion of said membrane, said switch and block being adapted to tend to follow said dog upon rotation of said arbor in the opposite direction under the influence of said membrane upon contraction thereof, and means for limiting the movement of said block and switch in either direction, said dog being adapted to disengage itself from said block after rotation of said arbor in said opposite direction in excess of that sufficient to cause said switch to reach the limit of its movement, whereby the subjection of said membrane to injurious tension is avoided.

3. A humidity control comprising a membrane adapted to change in length in response to changes in humidity, means for securing one end of said membrane, the other end being movable, a tension producing means, a connection between the movable end of said membrane and said tension producing means, a rotatable member and a switch loosely carried thereby, means for limiting the movement of said switch in either direction, said switch being adapted to move in one direction under the influence of said tension producing means upon expansion of said membrane, means including an element secured to said rotatable member and adapted to releasably engage said switch to move the same in the other direction under the influence of said membrane upon contraction thereof, said last-named means being adapted to release said membrane from any connection to said switch so that any contraction of said membrane in excess of that necessary to cause a full movement of said switch in the corresponding direction will be free from resistance either directly or indirectly by said switch or its associated parts, whereby the subjection of said membrane to injurious tension is avoided.

4. A humidity control comprising a membrane adapted to change in length in response to changes in humidity, means for securing one end of said membrane, the other end being movable, a tension producing means, a flexible elongated element connecting the movable end of said membrane and said tension producing means, a rotatable arbor, the intermediate portion of said flexible element being wrapped around said arbor so as to cause rotation thereof upon movement of said flexible member, a block loosely mounted on said arbor, a mercury switch secured to said block, a dog secured to said arbor, said dog being adapted to engage said block upon rotation of said arbor in one direction under the influence of said tension producing means upon expansion of said membrane, said switch and block being adapted to tend to follow said dog upon rotation of said arbor in the opposite direction under the influence of said membrane upon contraction thereof, and means for limiting the movement of said block and switch in either direction, said dog being adapted to disen-

gage itself from said block after rotation of said arbor in said opposite direction in excess of that sufficient to cause said switch to reach the limit of its movement in the corresponding direction so that any contraction of said membrane in excess of that necessary to bring about said limit of movement of said switch will be free from resistance directly or indirectly by said switch or its associated parts, whereby said membrane is insured against injurious tension.

5. A humidity control comprising a rotatable arbor, a mercury switch mounted for free rotation upon said arbor, said mercury switch adapted to normally close when its movement is unrestricted, means secured to said arbor adapted to engage said switch to move the same to open position when said arbor is rotated in one direction, said means being freely releasable from said switch so as to be free to travel away from said switch when said means is moving in the opposite direction, a member adapted to change in length in response to the changes in humidity, and

means for transmitting the changes in length of said member to said arbor to rotate said arbor.

6. A humidity control comprising a rotatable arbor, a mercury switch mounted for free rotation upon said arbor, said mercury switch adapted to normally close when its movement is unrestricted, means secured to said arbor adapted to engage said switch to move the same to open position when said arbor is rotated in one direction, said means being freely releasable from said switch so as to be free to travel away from said switch when said means is moving in the opposite direction, a member adapted to change in length in response to the changes in humidity, and means for transmitting the changes in length of said member to said arbor to rotate said arbor, said means comprising a flexible element having an intermediate portion wrapped about said arbor, said element having one end attached to said member, and means attached to the other end of said element to exert a pulling force thereon.

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