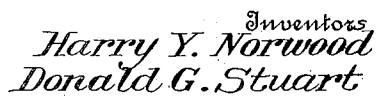


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HUMIDIFYING APPARATUS.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that we, HARRY Y. NORWOOD, of Rochester, county of Monroe, and State of New York, and DONALD G. STUART, of Detroit, county of Wayne, and State of Michigan, have invented certain new and useful Improvements in Humidifying Apparatus; and we do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the reference-numerals marked thereon.

Our invention relates to improvements in humidifying apparatus and it has for its purpose to provide a mechanism for automatically supplying moisture to a room or inclosure or other area in accordance with the changes in the humidity from a normal or standard point.

A further object of the invention consists in the provision of a mechanism that is reliable and certain in its operation and is capable of responding to very slight changes in the humidity condition so as to maintain the amount of moisture in the atmosphere at any given point very nearly constant.

A further purpose of our improvement is to afford an apparatus which, while extremely sensitive, is of substantial construction and of such character that it can stand ordinary usage without becoming disarranged or injuriously affected.

To these and other ends the invention consists of certain improvements and combinations of parts all as will be hereinafter more fully described, the novel features being pointed out in the claims at the end of the specification.

The drawing is a view, partly in elevation and partly in section, showing the preferred form of invention as applied to a conveniently constructed apparatus.

The invention may be carried out in a number of different ways, one of the essential features being to place a liquid controlling valve under the influence of fluid pressure which in turn is controlled by a second valve, the movements of which are governed and affected by moisture controlled means. With this method, it is possible to operate a liquid controlling valve by a very slight change in the condition of the moisture controlled means as no great movement of the

latter is required to effect movement of the liquid controlling valve.

In the present embodiment, A designates a liquid or water pipe provided with discharge openings *a* through which a liquid may be sprayed or otherwise discharged in a room or other confined space where the humidity is to be maintained at a given point. Flow of liquid through the pipe A to the openings *a* is governed by the valve B which coöperates with the valve seat C and is mounted upon the valve stem B. The latter is connected suitably to a diaphragm E which is attached to a diaphragm chamber F, the valve being held normally closed by means of a spring G surrounding the valve stem and positioned between the diaphragm and the stuffing box H.

I is a pipe communicating with the diaphragm chamber and adapted to receive fluid pressure supply such as compressed air, that is furnished from any suitable source, which it is deemed unnecessary to show in the present arrangement. The fluid pressure supply to the diaphragm chamber is governed by a suitable valve, and for this purpose, the pipe I leads to a valve casing J which has suitable ports therein and also includes a valve seat *j*. Arranged for co-operation with the valve seat *j* is a valve, which is operated and connected with the moisture controlled means, and in the form of device which is illustrated, such valve comprises a ball *j'* which is mounted upon a stem *j''*, the latter being suitably guided in the openings of the valve casing. It will be understood that for the purpose of the present invention the valve *j'* may be of any form, or may be any device or member which it is desired to have respond to temperature conditions, and the essential novel feature of our invention consists in the form and arrangement of the moisture controlled means which is now to be described.

It will be seen that a very slight movement of the valve *j* serves to admit fluid pressure, sufficiently to operate the liquid controlling valve C, and for this purpose we employ a moisture controlled means that is delicately sensitive, and at the same time responsive to large variations in humidity. The moisture controlled means may be of any suitable substance which is expansible and contractible upon subjection to moisture,

and we have found the most successful results to be derived from using a series of strands of such material, arranged in close relation to each other and held together suitably at their ends. From the experiments which have thus far been conducted, the best results have been found to be obtained by using human hair although more or less successful results attend the use of silk, cat-gut and other similar substances, and we do not limit ourselves to any one particular substance for this purpose. In the present construction, the moisture controlled means is designated at K, comprising a series of hairs arranged in parallelism and closely associated with each other, they being held at their ends by suitable holders k and k' . The upper holder k carries a threaded post k^2 which passes through a lug k^3 mounted on the support L, and is engaged by an adjusting nut k^4 . The lower holder k' carries a link k^5 which is connected to one end of a lever M pivotally mounted at m , and having its opposite end m' arranged to engage the lower end of the valve stem j^2 . The valve j' is normally closed, to prevent passage of fluid pressure to the diaphragm chamber when the humidity conditions are normal, and to this end there is employed a spring N having one end connected to the pivoted lever M and the opposite end attached to the support L. The attaching means is preferably arranged so as to adjust the tension of the spring, and for this purpose we employ a threaded bolt n connected to the upper end of the spring and engaging a bracket n' the bolt being held in the desired relation with the bracket by means of the nut n^2 . In order to adjust still further the action of the spring upon the lever, the latter is provided with a series of notches m^2 with any one of which the lower portion of the spring may cooperate. The bracket n' may be provided with a plurality of openings to accommodate the bolt n , enabling the lower end of the spring to be adjusted to different points on the lever while at the same time maintaining it substantially in a vertical position.

In the operation of the device, assuming that there is a normal or standard amount of moisture in the atmosphere, the parts will be in the position shown in the drawing, and

will remain there until the amount of moisture decreases to such an extent as to contract the moisture controlled means and thereby elevate the corresponding end of lever M. This will cause the opposite end of the lever to be lowered, and thereby permit the valve j' to drop away from its seat. Fluid pressure is then admitted to the diaphragm chamber F, lowering the valve B, and admitting liquid to the pipe A. This condition continues until the amount of moisture is increased sufficiently to expand the moisture controlled means, and permit the valve j' to be closed.

We claim as our invention.

1. In a humidifying apparatus, the combination with a device which it is desired to have respond to humidity conditions, of moisture controlled means operatively associated therewith and comprising a flat strip formed of a series of strands of substance expansible and contractible under influence of moisture.

2. In a humidifying apparatus, the combination with a device which it is desired to have respond to humidity conditions, of moisture controlled means operatively associated therewith and comprising a series of strands of substance expansible and contractible under influence of moisture and arranged in parallel relation in a single plane.

3. In a humidifying apparatus, the combination with a device which it is desired to have respond to humidity conditions, of moisture controlled means operatively associated therewith and comprising a series of strands of substance expansible and contractible under influence of moisture arranged flatwise in a single plane, and attached at their ends to a pair of holders, one of which is adjustably supported while the other is connected to said device.

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