

July 19, 1955

R. W. JOHNSON ET AL
HUMIDITY-SENSITIVE ELEMENT

2,713,625

Filed April 29, 1953

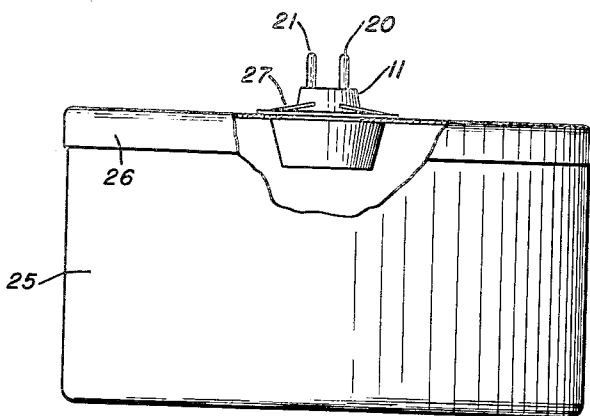
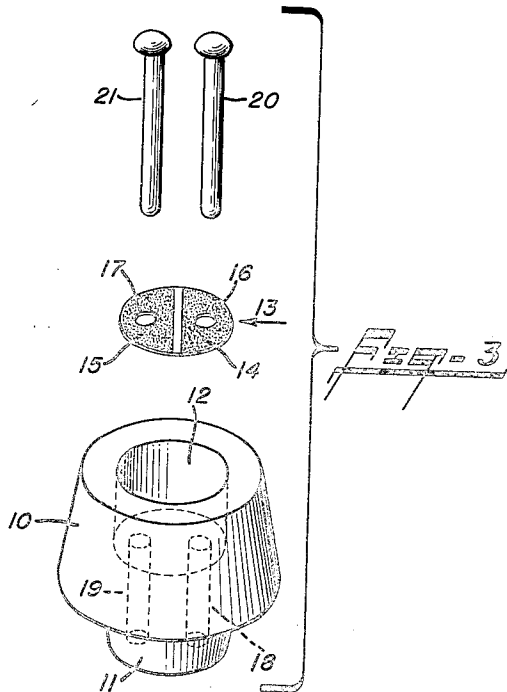
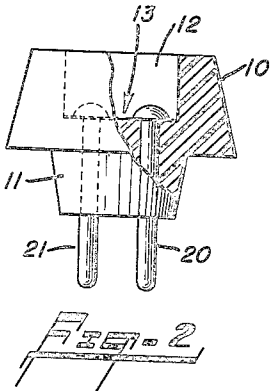
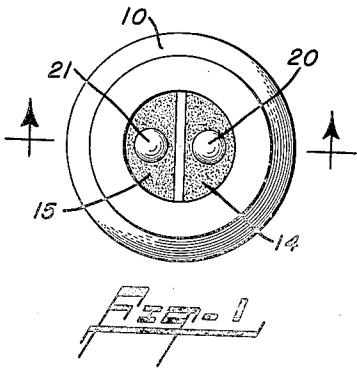


Fig. 4

EARL R. KEBBON and
ROBERT W. JOHNSON
INVENTORS

BY

Gaylor, Cifelli & Quirk
ATTORNEYS

2,713,625

HUMIDITY-SENSITIVE ELEMENT

Robert W. Johnson, Roselle, and Earl R. Kebbon,
Chatham, N. J., assignors to Weston Electrical Instru-
ment Corporation, Newark, N. J., a corporation of New
Jersey

Application April 29, 1953, Serial No. 351,798

3 Claims. (Cl. 201—63)

This invention relates to a humidity-sensitive element adapted for connection to an electrical circuit for the purpose of determining the relative humidity or moisture content of a medium.

While our humidity-sensitive device is suitable for general application the form to be described in detail hereinafter is particularly adapted for use in the determination of the moisture content within a sealed container and to this end the device is so constructed as to facilitate its installation on the container.

An object of this invention is the provision of a humidity-sensitive device that is economical to produce, readily installed in a sealed container and in which the actual sensitive material is protected against damage.

An object of this invention is the provision of a humidity-sensitive device adapted for connection in an electrical circuit and comprising a body of insulating material having a recess therein and a tapered shank adapted to be force-fitted in a hole in a container wall, a sensitive film disposed within the recess, said film being of the type which changes its resistance with moisture, a pair of contact elements connected to said film and extending through the tapered shank, and locking means for securing the body to the container.

These and other objects and advantages will become apparent from the following description when taken with the accompanying drawings. It will be understood the drawings are for purposes of illustration and are not to be construed as defining the scope or limits of the invention, reference being had for the latter purpose to the appended claims.

In the drawings wherein like reference characters denote like parts in the several views:

Figure 1 is a top view of a humidity-sensitive device made in accordance with this invention;

Figure 2 is a side view of the device, with a portion broken away to show the disposition of the sensitive film and associated contacts;

Figure 3 is an exploded, isometric view of the device; and

Figure 4 is a front elevation of a container with a portion of the wall broken away to show the humidity-sensitive device attached to the container cover.

As shown in Figures 1, 2 and 3, the device comprises a base member of insulating material, preferably of polyethylene plastic, comprising a body portion 10 and an integral, tapered shank 11. The body portion includes an axial recess 12. A circular disc 13 comprises the sensing film. Such disc preferably is made of regenerated cellulose and one surface thereof is coated with two, thin, conducting films of silver, gold, etc., as by painting or vacuum metalizing to form the spaced electrodes 14, 15. Those skilled in this art will understand that the electrical resistance between the electrodes 14 and 15 will vary with the amount of moisture adsorbed and/or absorbed by the cellulose material and the extent of such resistance variations can be controlled by varying the spacing between the electrodes. By connecting

the electrodes in an appropriate electrical circuit including an indicating instrument and a source of electrical energy the resistance variations, brought about by changes in the moisture content, will result in corresponding changes in the indications of the instrument, whereupon the instrument may be provided with a scale calibrated directly in terms of moisture content or percent humidity. The disc 13 is provided with a pair of holes 16, 17 which are adapted for alinement with the holes 18, 19 passing through the shank 11 to accommodate the headed connecting pins 20, 21. It may here be pointed out that the holes 18, 19 in the insulator member, are undersize so that the connecting pins 20, 21 must be forced therethrough. Consequently, when the pins are forced into position the heads thereof establish good electrical contact with the electrode films 14, 15 and the pins remain in relatively fixed position throughout normal conditions of use of the device as a whole. We have found that a mechanical contact between the head of the connecting pins and the underlying conducting film is satisfactory for most purposes. However, in some cases it is desirable to paint over the pin head and the conducting film with a suitable conductive paint thereby providing a more uniform and permanent electrical continuity between these members.

In Figure 4 there is shown a container 25 provided with a cover 26. In order to install our humidity-sensitive element on such container it is only necessary to provide a hole in the container wall, said hole having a diameter slightly greater than the minimum diameter of the tapered shank 11 of the humidity-sensitive device. Actually, the amount of taper on the shank 11 is slight whereby the shank can be forced into the hole by finger pressure, yet the shank effectively seals the hole thereby retaining the sealed or moisture-tight character of the container. A push-button type locking washer 27 may be forced over the shank 11 to hold the device in place. It will be noted that the connection pins 20, 21 are accessible externally of the container whereby the device can be connected in an appropriate electrical circuit that includes a suitably-calibrated indicating instrument. The moisture content within the container determines the resistance of the sensitive film and such film resistance effects the magnitude of the current flowing through the indicating instrument. Consequently, the instrument scale may be calibrated directly in terms of percent moisture content. Those skilled in this art will understand that numerous specific electrical circuits can be used for this particular purpose and that the connection of the humidity-sensitive device into the circuit can be made by any suitable type of plug connector. While we have shown the connecting pins extending beyond the end of the shank 11 it will be apparent that the shank may be provided with an axial bore in which case the pins 18, 19 need not extend beyond the shank end.

Having now described our invention what we desire to protect by Letters Patent of the United States is set forth in the following claims.

We claim:

1. A humidity-sensitive member comprising an insulator member including a body portion and a tapered shank, said body portion having a recess therein, a film member made of a material whose electrical resistance varies with moisture and disposed in the bottom of the recess, a pair of spaced electrodes in intimate contact with a surface of the film member, and a pair of connecting terminals extending through the said shank, each said terminal being in electrical contact with one of the said electrodes.

2. The invention as recited in claim 1 wherein the film member is a regenerated cellulose and said electrodes

3

are formed on the surface thereof by metal evaporation.
3. The invention as recited in claim 2, wherein the terminals pass through the said electrode and said terminals include an integral head that is in pressure contact with the electrode.

References Cited in the file of this patent

UNITED STATES PATENTS

1,781,153	Allen	Nov. 11, 1930
2,493,745	Blodgett et al.	Jan. 10, 1950

5