

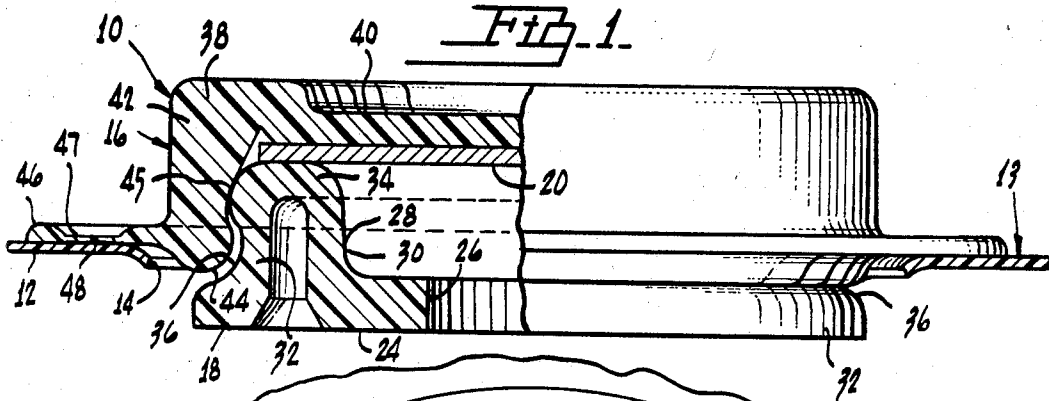
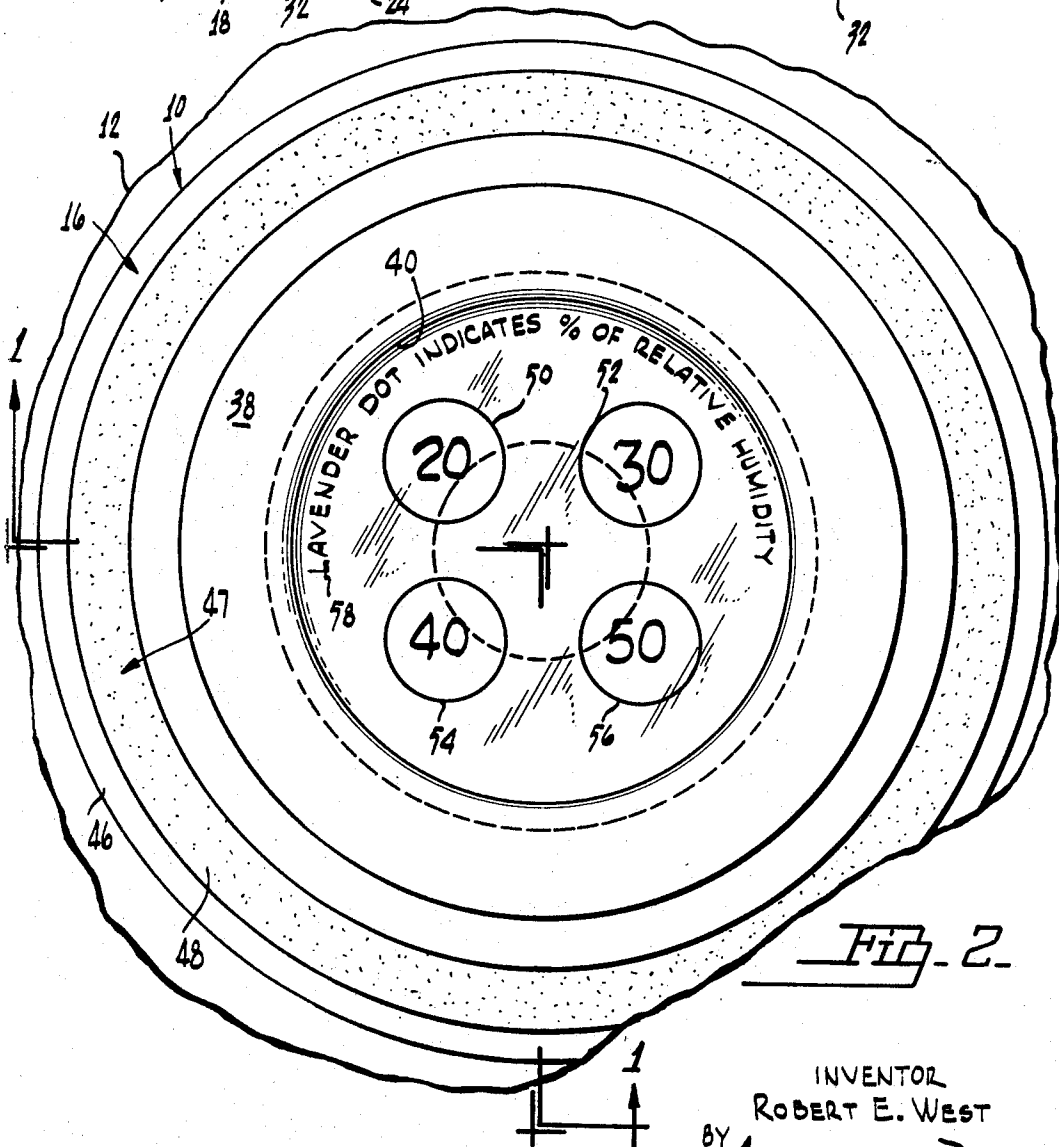
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HUMIDITY INDICATOR

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HUMIDITY INDICATOR

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ABSTRACT OF THE DISCLOSURE

Separately connected, cuplike inner and outer support members clamp between them a humidity-responsive element. The members are sealably mounted in an opening of a plastic container, by heat-sealing a peripheral lip of the outer member to the edge of the container opening. The inner member allows free communication between the container interior and the humidity-responsive element, different areas of which change color according to the percentage of humidity within the container. The outer member has a central sight window through which said areas can be viewed.

BACKGROUND OF THE INVENTION

Field of the invention

The invention pertains to the art of providing visual indication of the humidity level within a sealed enclosure, in particular a wrapping or container for a product the nature of which requires that the humidity within the container be maintained between upper and lower critical levels. Within this general category, the field of art to which the invention pertains is further narrowed, in that the humidity indicator must be of a single-use, disposable type capable of being cheaply made and easily attached to the wall of the container or wrapping, to be discarded therewith when the wrapping is removed.

Description of the prior art

Heretofore, inexpensive humidity indicators, for mounting in the walls of product packaging, have been devised, but the cost of the indicators themselves, and/or the cost of attaching the same to the wall of the packaging, has still been above desirable, low figures. This has presented a problem, since the overall cost of the packaging has inevitably been increased to an appreciable extent by the presence of a humidity indicator therein that cannot be made or mounted as cheaply as might be hoped. In particular, the prior art has utilized comparatively expensive means for sealably attaching the humidity indicator to the wall of the packaging, wrapping, or container, it being important to keep in mind that the sealable mounting must be such as to be completely proof against the passage of moisture therethrough. A failure to provide a perfect seal results in, obviously, the entry of humidity into the container, thereby adversely affecting the enclosed product. Further, the absence of a perfect seal renders inaccurate, to a degree, a reading of the humidity level as reflected by the humidity indicator. Thus, the end purpose of the humidity indicator is adversely affected, if not completely destroyed.

SUMMARY OF THE INVENTION

In order to overcome the problems noted above, I have designed a humidity indicator which comprises only three parts: an outer, cuplike, plastic support member, an inner cuplike plastic support member, and an element clamped between said members and responding to the presence of humidity to provide a visual indication of the humidity level. The outer member is of a transparent ma-

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terial, thus defining centrally thereof a sight window through which the humidity-responsive element can be viewed. An important feature of the outer member is the provision of an outwardly directed, thin flange integrally formed thereupon and adapted to be sealably adhered to the edge portion of a mounting opening provided for the indicator in the container wall, responsive to the application of heat and pressure to said flange. The peripheral wall of the outer member, further, has an inwardly directed bead engageable in an outwardly directed groove of the side wall of the inner member, said side wall of the inner member being resiliently deformable when the members are brought together, so as to snap into the outer member and effect the desired clamping action upon the periphery of the humidity-responsive element. The inner member has an opening providing free communication between the container interior and said element, and the element itself has a number of individual indicia seen through the sight window, each of which indicia responds separately to a different humidity level, thus to provide a viewer with an inexpensive yet sufficiently accurate means for noting the percentage of humidity within the container.

BRIEF DESCRIPTION OF THE DRAWING

FIGURE 1 is a view partly in side elevation and partly in section of a humidity indicator according to the present invention, taken substantially on line 1-1 of FIGURE 2; and

FIGURE 2 is a fragmentary top plan view of the indicator, as it appears when mounted in a wall of a container.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The reference numeral 10 has been applied generally in the drawing to a humidity indicator according to the present invention. In a preferred embodiment, the indicator is of circular outer configuration, and is sealably mounted in the wall 12 of a container or wrapping 13 extending about and providing a sealed, moisture-proof enclosure for a humidity-sensitive product, not shown. The humidity indicator, in this connection, is intended specifically for use with a wall 12 of relatively thin, plastic material of a type capable of being sealably connected to the peripheral portion of the humidity indicator 10, responsive to the application of heat and pressure to lapsing areas of the container wall and indicator.

As seen from FIGURE 1, the container wall 12 is formed with a circular opening 14 providing a mounting opening for the humidity indicator 10.

The indicator constituting the invention comprises only three parts, these being an outer support member 16, an inner support member 18, and a humidity responsive element 20 clamped between the support members.

Considering first the construction of the member 18, this as seen from FIGURE 1 is a single piece of plastic material, and in the preferred embodiment would be a thermoplastic, having the characteristic of resilient deformability, whereby to permit the inner member to snap into the outer member, providing a swift, inexpensive, and easy means for connecting the same in clamping engagement with the humidity-responsive element 20.

Inner member 18 includes a flat base portion 24, of circular outer configuration, having a central aperture 26 intended to provide free communication between the interior of the container and the inner face of the element 20. Thus, element 20 is fully exposed to humidity within the container, whereby to respond to the particular humidity level and give the viewer a visual indication of said level through a sight window centrally provided upon the outer member.

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Extending about the flat base 24 is a side wall 28 of the inner support member, having a U-shaped cross section as clearly seen in FIGURE 1, thereby defining an inner wall portion 30, an outer wall portion 32, and a bight portion 34 connecting the same.

The bight portion 34 provides a seat of annular form, upon which the peripheral area of element 20 is supported, again as seen in FIGURE 1.

The provision, further, of a U-shaped cross section for side wall 28 of the inner support member 18 produces ready deformability in the outside wall portion 32, allowing said wall portion 32 to be temporarily forced radially inwardly from its normal position when the members 16, 18 are being interengaged.

To this end, in the outer surface of wall portion 32 I form a continuous, circumferential groove 36 extending fully about the cuplike inner support member, said groove being adapted to receive an inwardly facing annular, complementary bead provided upon the side wall of the outer support member 16.

Considering now the construction of the outer support member, this, like the inner support member, is integrally molded as a single piece of plastic material. The outer support member, in this connection, is also of thermoplastic material, and is transparent, whereby to provide a circular, centrally disposed, depressed sight window 40 therein concentric with element 20 and disposed in direct, flatwise engagement with the outer surface of the element 20. Window 40 thus provides the viewer with a view of the major area of element 20, so that one can quickly check the humidity level within the container.

Referring to FIGURE 1, the outer support member 38 is formed with a side wall 42 extending through its full circumference, about the sight window 40, said side wall 42 being formed with the internal, continuous bead 44.

To interengage the members, one need only force, by manually exerted pressure, the inner support member 18 into the cuplike, mating, outer support member. The side wall 42 may also be resiliently deformable, and may expand radially during this operation, while at the same time the side wall 32 may be radially forced inwardly, thus to allow the bead 44 to clear portion 45 of wall 32 disposed in juxtaposition to groove 36. As soon as the bead 44 clears portion 45, it snaps into the groove 36, with the wall portion 32 and the wall 42 returning, as far as possible, to their original positions.

This interconnects the members, and at the same time, causes the peripheral area of element 20 to be clamped between bight portion 34 and the peripheral area of sight window 40.

Also integrally formed upon outer support member 10 is a relatively thin, continuous, outwardly directed sealing flange 46, adapted to overlie the edge portion of the mounting opening 14 of container wall 12. With the member 10 in this position, means, not shown, is employed to apply pressure throughout the annular area 47 of flange 46, and at the same time apply heat in said area, to heat-seal flange 46 to the wall 12. This provides a moisture-impervious mounting of the humidity indicator upon the wall 12, within opening 14.

Referring now to FIGURE 2, element 20 is provided with suitable indicia 50, 52, 54, 56, 58 designed to afford a viewer a swift and easy determination of the existent humidity level within the container. Thus, indicia 50, 52, 54, 56 respectively comprise circles bearing numerals "20," "30," "40," and "50," indicating percentages of humidity. Each circular area 50, 52, 54 or 56 responds to a humidity condition denoted by the percentage value shown in said circular area, by changing color. Thus, if the humidity level rises to 20%, circular area or indicium 50 changes to a lavender color. If the level rises to 30%, area 52 turns to the lavender color, etc. These indicia are clearly observable through the sight window 40.

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In use of the device, one can connect the three parts 10, 18, 20 thereof prior to mounting of the device in opening 14. Or, one can mount the outer support member 10 in said opening in the manner described above, after which, prior to application of the container material to the humidity-sensitive product, element 20 and inner support member 18 can be assembled with the outer support member.

The device, as will be noted, is of maximum simplicity, comprising only three parts, each of which is inexpensively designed, thus to permit the indicator to be manufactured as a single use device capable of being discarded with the container material in which it is mounted.

Of equal importance is the fact that the humidity indicator can be sealably attached to the wall of the container 12 cheaply, and by mass production, rapid methods.

I claim:

1. A humidity sensor and indicator intended to be sealably mounted in an opening provided therefor in the wall of a container for the purpose of providing a visual indication of the humidity within the container, comprising:

- (a) an outer support member having a sight window;
- (b) an inner support member connected to said outer support member and having an aperture, at least one of said members including at its periphery means for sealably connecting the same to the container wall about said mounting opening; and

- (c) a humidity-sensitive element engaged between said members and visible through the sight window to provide a visual indication of the value of the humidity to which said element is exposed, said aperture providing communication between the container interior and the element to expose the element to humidity within the container, the means at the periphery of said one member comprising a continuous flange extending radially outwardly from said one member, said flange being of a material forming a moisture-proof bond with the container wall responsive to the application of heat, said members being in the form of discs having circumferentially extending side walls one of which side walls extends into and is peripherally engaged by the other side wall, said one side wall including a circumferential bead engaging in a complementary circumferential groove of the other side wall to detachably connect the members.

2. A humidity sensor and indicator as in claim 1 wherein one of said side walls includes a portion resiliently deformable in a radial direction for snap-engagement of one of said members with the other.

3. A humidity sensor and indicator intended to be sealably mounted in an opening provided therefor in the wall of a container for the purpose of providing a visual indication of the humidity within the container, comprising:

- (a) an outer support member having a sight window;
- (b) an inner support member connected to said outer support member and having an aperture, at least one of said members including at its periphery means for sealably connecting the same to the container wall about said mounting opening; and

- (c) a humidity-sensitive element engaged between said members and visible through the sight window to provide a visual indication of the value of the humidity to which said element is exposed, said aperture providing communication between the container interior and the element to expose the element to humidity within the container, said outer and inner members being formed as cupped discs of resiliently deformable plastic one of which snaps into the other to clamp said element therebetween, the outer member including an integral, thin, peripheral

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flange adapted to be sealably adhered to the container wall about said opening.

4. A humidity sensor and indicator as in claim 2 wherein at least the outer support member is of transparent plastic to form the sight window as an integral part thereof. 5

5. A humidity sensor and indicator as in claim 4 wherein the outer support member includes a side wall extending about the sight window, an internal bead on said side wall of the outer members, and an external flange thereon adapted to be sealably adhered to the container wall, the inner support member including a side wall of U-shaped cross section extending about the aperture thereof and having a bight part forming a seat for the periphery of said element, said side wall of the inner support member further including an outer wall portion having an outwardly facing groove receiving said bead. 10 15

6. A humidity sensor and indicator as in claim 5 wherein said element includes a plurality of indicia visible 20 73—73; 220—60

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through the sight window, each of which indicia responds individually to a predetermined humidity level to indicate said level to a user.

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