

[54] **FLAME-PROOF FITTING**

[75] Inventors: **Glenda F. Kaesser**, St. Louis;
Marshall G. Zavertnik, Manchester,
both of Mo.

[73] Assignee: **Killark Electric Manufacturing
Company**, St. Louis, Mo.

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[56] **References Cited**

UNITED STATES PATENTS

2,496,402 2/1950 McVeigh 285/323

2,022,529 11/1935 Townsend 73/375
3,107,107 10/1963 Guarnaschelli 285/90

Primary Examiner—Richard C. Queisser

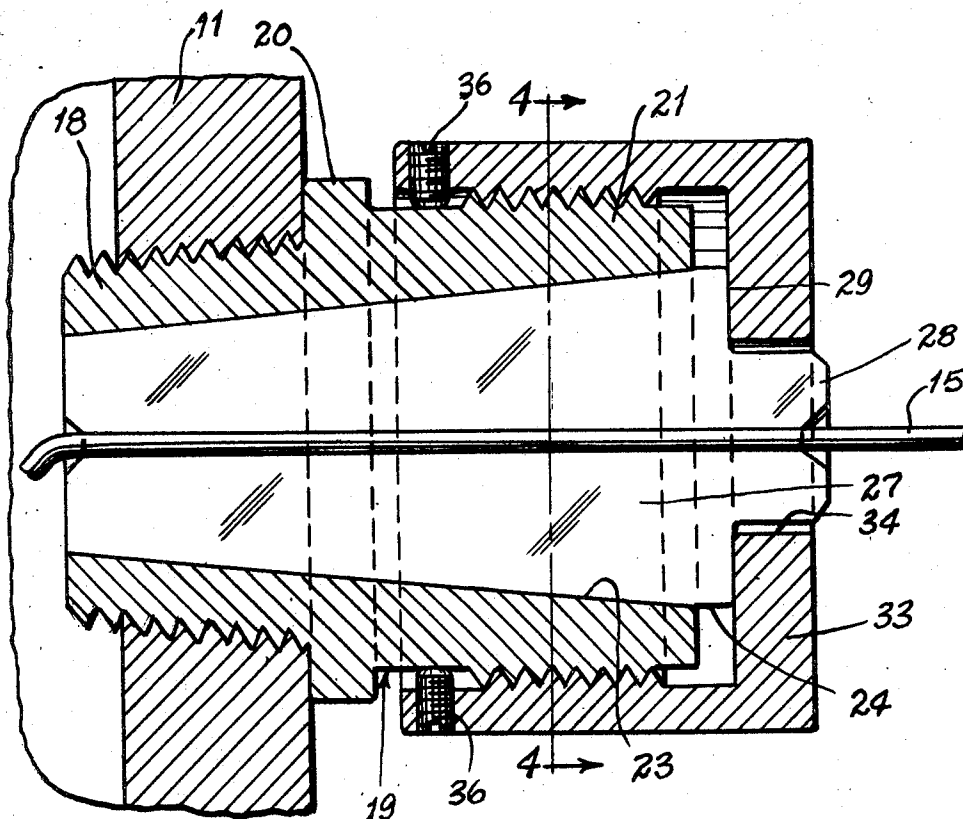
Assistant Examiner—Denis E. Corr

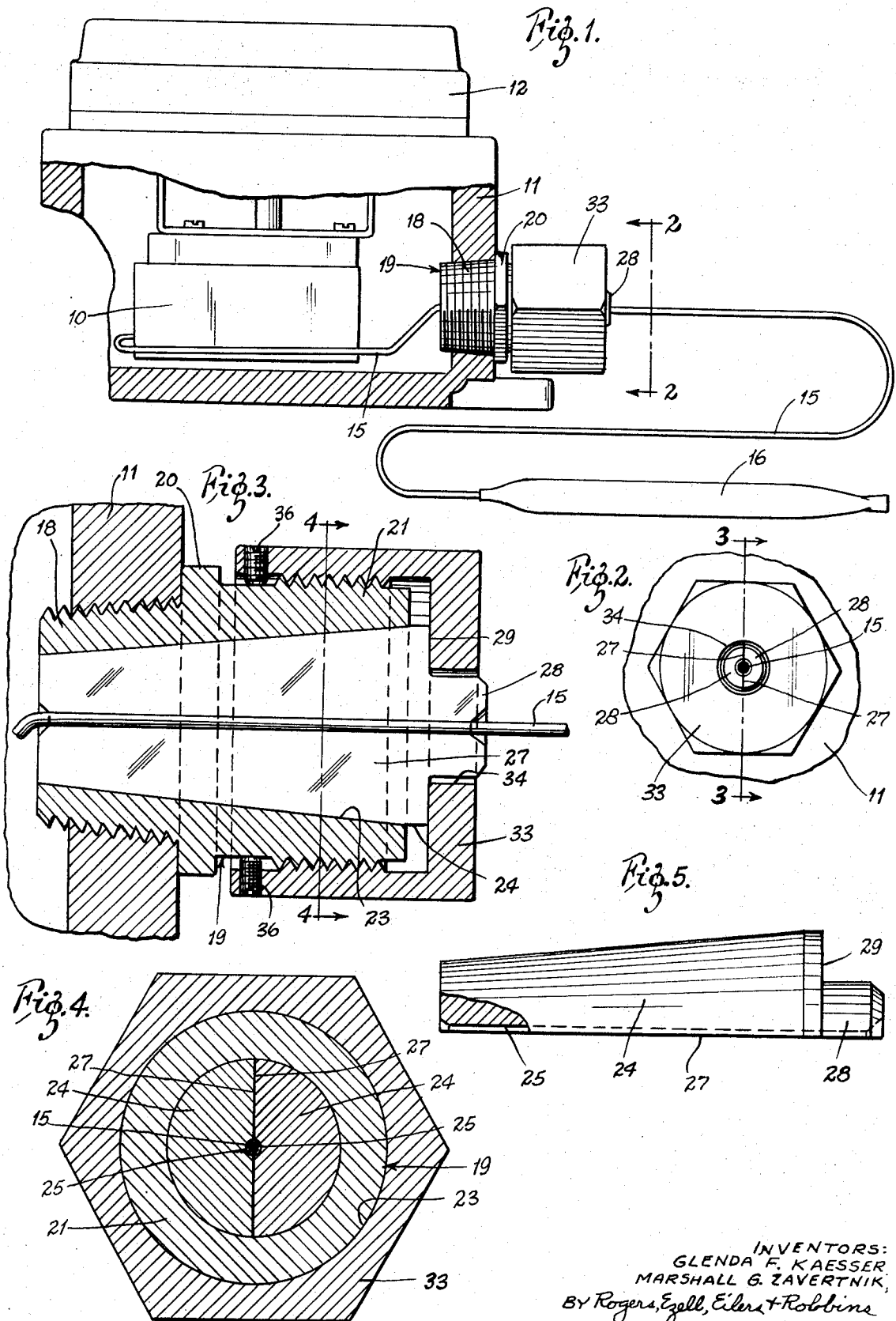
Attorney—Edmund C. Rogers

[57] **ABSTRACT**

A flame-proof fitting for conducting a capillary tube through the wall of a box including a bushing threaded through the wall, having a tapered passage through it, two semi-frusto-conical wedges having axial grooves to receive the tube when placed together, and a cap threadable onto the bushing to force the two members tightly into the tapered passage in the bushing, compressing them together tightly, and compressing them tightly against the tube.

7 Claims, 5 Drawing Figures





INVENTORS:
 GLENDA F. KAESSER
 MARSHALL G. ZAVERNIK,
 BY Rogers, Egell, Eilers & Robbins
 ATTORNEYS

FLAME-PROOF FITTING

BACKGROUND OF THE INVENTION

Heretofore controls and like devices, such as thermostats having capillary tubes, have been contained in flameproof boxes or housings only with difficulty because of the problem of conducting the capillary tube and sensing element through the wall of the housing. Potting compounds have been employed but they must be broken down each time the thermostat is removed from the box for servicing or for being replaced. No mechanical means has been provided that would not only provide for no flame path about the capillary, but also would exclude flame path about its own components. If a mechanical fitting were used, it had to be tailored to each size of tubing to be accommodated.

The present invention requires no potting compound. It can be taken apart at any time and replaced with no difficulty. Thus, it can readily permit the thermostat to be removed from the box and a sensing element to be drawn through the wall of the box in a reversible operation of dis-assembly rather than destruction of parts. The arrangement affords no flame path either around the capillary or through the parts of the assembly itself. It, in fact, can straighten a capillary tube, causing it to fit snugly in the passage formed between the elements of the cone that make up the passage.

The fitting can easily be adapted to different sizes of tubes, since either the entire fitting can be unscrewed from the wall and one of different dimensions substituted, or the frusto-conical wedges along may be changed for wedges having different sized axial grooves.

IN THE DRAWINGS

FIG. 1 is a side elevation partly broken away showing the assembly mounted in a box;

FIG. 2 is an enlarged view on a line 2—2 of FIG. 1;

FIG. 3 is a more enlarged diametrical section taken on the line 3—3 of FIG. 2;

FIG. 4 is a section taken on the line 4—4 of FIG. 3; and

FIG. 5 is an elevation partly broken away of one of the semi-frusto-conical elements.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In the description to follow, the invention is described in connection with conducting a capillary tube of a thermostat in a flame-proof manner through the wall of a box. This is a preferred application of the invention, which can, however, be used to conduct other elongated components through walls in a flame-proof manner, i.e., in a way that restricts passage of flame through the wall to the extent of the standards of the industry, usually represented in terms of closeness of fit and length of the potential flame paths.

In FIG. 1 a thermostat is mounted in a box 11 having a removable cover 12 that is held onto the box by screws (not shown). The purpose of the box is to provide a flameproof enclosure for the thermostat 10 or like device.

The thermostat has an elongated capillary tube 15 extending from it, on the end of which there is an enlarged sensing element 16 to be located at some control point outside of the box 11. Hence, the capillary tube 15 must be passed through the wall of the box, posing

the problem of providing an opening through the wall of the box without an accompanying flame path. The hole through the wall must be sufficiently large to accommodate the size of the sensing element 16.

In FIG. 3, the wall of the box 11 is shown as having a threaded opening to receive the externally threaded inner end 18 of a bushing 19 having a hexagonal wrench-receiving portion 20. The quality of the threads and the thickness of the wall are such as to provide no flame path through the wall past the threads.

The outer end 21 of the bushing 19 is externally threaded with machine threads. The bushing 19 has a tapered frusto-conical passage 23 through it, the walls of which are machined true and smooth. The small inner end of the opening 23 preferably is large enough to pass the sensing element 16 of all of the standard thermostats or other controls for which the box is designed.

Two semi-frusto-conical wedge members 24 are shaped so that when placed together they form a frusto-conical subassembly that can be wedged into the passage 23 and forced tightly together, bringing their external surfaces against the walls of the passage 23 and their diametrical faces 27 together so closely and over such lengths as to inhibit flame passage. Each has a semi-cylindrical groove 25 axially through it, such that when the two members 24 are together, the two semi-cylindrical slots 25 will form a cylindrical passage axially through the member.

Each of the wedges 24 has a semi-cylindrical projection 28 extending outwardly from an arcuate shoulder 29. A cap nut 33 fits over the threaded end 21 of the bushing 19. It has a hole 34 to receive the projections 28, and it bears against the shoulder portions 29 to force the wedges inwardly and hence together. A lock screw 36 may be provided to secure the cap nut 33 in its final position.

USE

In use, in assembling, the bushing 19 is threaded into the wall, with the cap nut 33 and the wedges 24 removed. The bulb 16 of the thermostat is passed through the passage 23 of the bushing 19. The two wedges 24 are placed around the capillary 15 and are slid into the conical passage 23 in the bushing 19. As they seat themselves within that passage 23, they bear upon the capillary 15 so that if it is bent or otherwise misshapen, they straighten it out. The cap nut 33 is passed over the sensing element 16, the size of the opening 34 being large enough to permit this. The nut 33 is tightened into place, engaging the shoulder 29 and driving the wedges 24 very tightly into place so that they closely embrace the capillary 15, closely fit within the tapered opening 23, and have their faces 27 brought into intimate contact with each other. In this action, the projections 28 fitting through the opening 34 do not interfere with the positioning. Finally, the screws 36 are tightened down.

When the operation is thus completed, there is no flame path along the capillary because the cylindrical passage formed for it fits it sufficiently closely and is sufficiently long to meet flame-proofing standards. Likewise, the fit of the two wedge members 24 together and into the tapered passage 23 is sufficiently close and sufficiently long to meet flame-proofing standards.

If the thermostat 10 must be serviced, requiring removal of the capillary 15 from the box 11, it is neces-

sary only to release the set screws 36, remove the cap nut 33, withdraw the wedges, and draw through the passage 23 the capillary, the sensing element passing through the hole 34 in the cap nut, and through the passage 23.

The invention lends itself to adaptation to different sizes of capillary tubes. If desired, a whole substitute assembly of bushing, wedges and cap nut can be substituted by only a threading operation. More easily, a different pair of wedges can be substituted in the same bushing, as the bushing passage 23 is designed to pass all standard sensing elements. Hence wedges having grooves 25 of desired dimension can be substituted, the other parts remaining the same. This permits one box 11 to be used with many brands of thermostat.

It is evident that the flame-proof fitting can be used to conduct other elongated devices through walls without flame paths.

Various changes and modifications may be made within this invention as will be readily apparent to those skilled in the art. Such changes and modifications are within the scope and teaching of this invention as defined by the claims appended hereto.

What is claimed is:

1. In a flame-resistant fitting for conducting elongated elements through a wall, the combination of: means providing an elongated, smooth, tapered passage through the wall, the means having a projection extending free of the wall; a plurality of wedges of hard material having smooth interfaces so that the wedges constitute together a tapered solid that can fit into the tapered passage, each wedge having an axial groove, the grooves together providing an elongated opening to receive the elongated element, compressing means interengaging between the projection and the wedges to force the wedges tightly into the passage until their interfaces are in engagement, their grooves then forming an uninterrupted passage, the smooth interfaces of the wedges being of complementary shape, smooth, and interengageable closely enough and for a great enough extent under force of the compressing means to restrain flame passage between them and the grooves being shaped to complement the outside of the elongated element and of such shape that the wedges like-

wise cause the grooves to embrace the elongated element closely enough and over sufficient length to restrain passage of flame, the material of the wedges being hard so that the wedges are not permanently deformed under the force of the compressing means, and do not crush the elongated element, the wedges being also removable and replaceable.

2. In the fitting of claim 1: the means providing the tapered passage including a member threaded for removable engagement in the wall.

3. In the fitting of claim 1: the tapered passage and the tapered wedges being circular in cross-section.

4. In the fitting of claim 1: the tapered passage being frusto-conical, the wedges being two in number, each comprising a semi-frusto-conical member with a finished diametric flat surface in which the axial groove extends; and each having a smooth outer tapering surface.

5. In the fitting of claim 5: the compressing means comprising a nut threaded onto the projection and abutting the wedges, the nut having a central opening larger than the elongated element to enable an enlarged component on the element to be drawn through it.

6. In the fitting of claim 1 adapted for use with an elongated element comprising a capillary tube to which is secured an enlarged sensing element, the small end of the tapered passage being enlarged to be greater than the size of the sensing element, to enable the sensing element to be drawn through it when the wedges are removed, the elongated opening being of small cross section to receive and closely surround the capillary tube, the said opening being substantially smaller than the cross section of the tapered passage, leaving the interfaces of the wedges of substantial size, the said interfaces being smooth and complementary so that they can fit closely to prevent flame passage between them when they are wedged tightly together.

7. The fitting of claim 1, with a thermostat having a capillary tube constituting the elongated element, the capillary tube having an enlarged sensing device on it; the passage being large enough to pass the sensing element, the wedges engaging the capillary tube.

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