Oct. 6, 1942. C. A. HARDAGE 2,297,830

CONDENSATION DRAIN FOR EXPLOSIONPROOF FITTINGS

Filed March 11, 1941 2 Sheets-Sheet 1

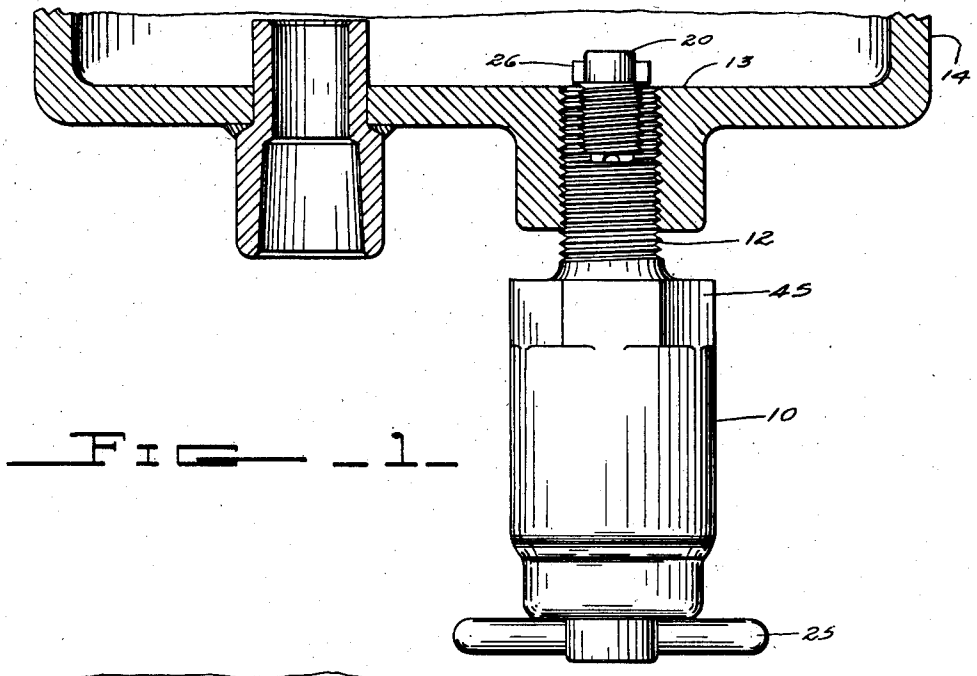

FIG. 1

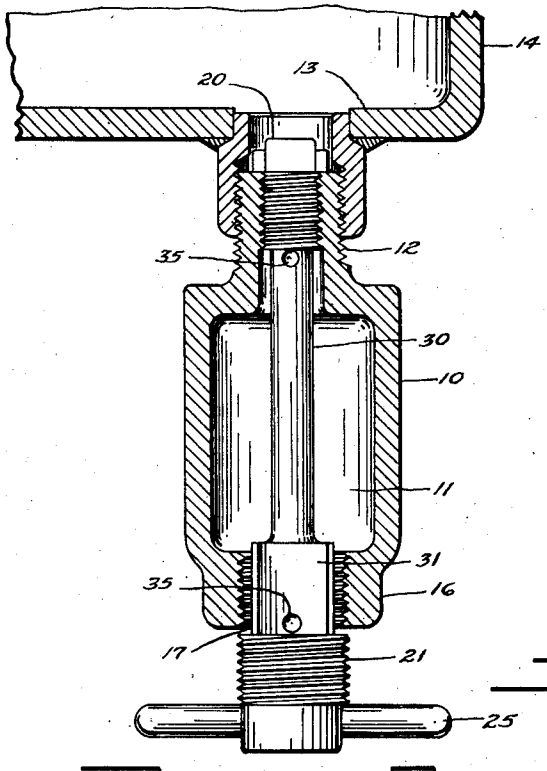

FIG. 2

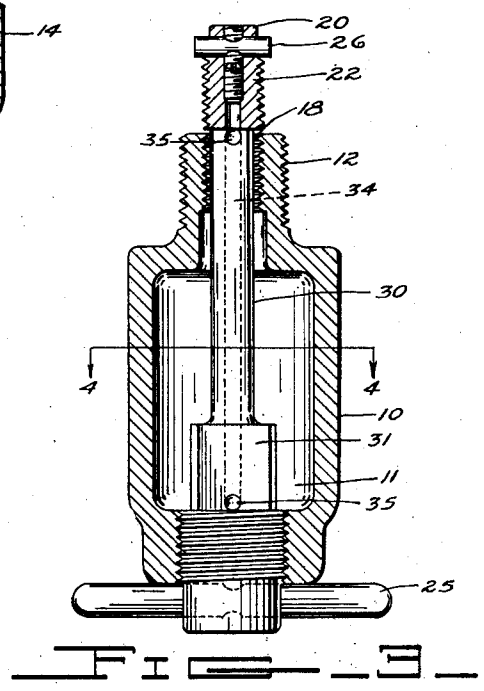

FIG. 3

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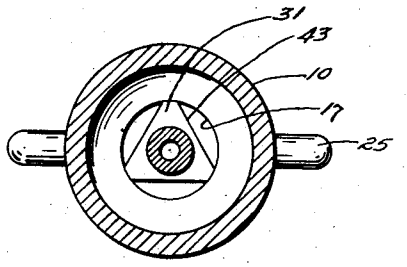

FIG. 4

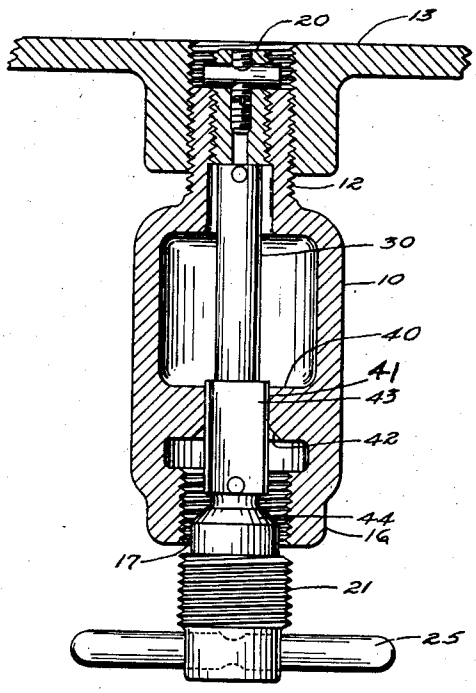

FIG. 5

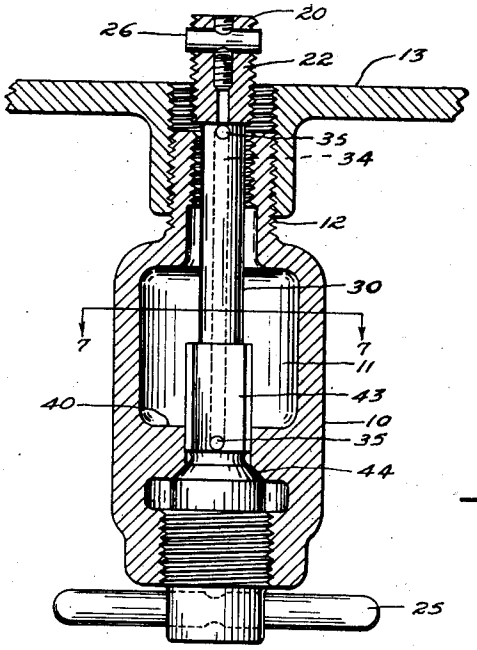

FIG. 6

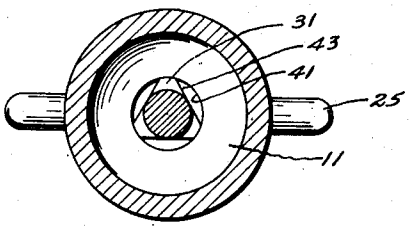

FIG. 7

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Patented Oct. 6, 1942

2,297,830

UNITED STATES PATENT OFFICE

2,297,830

CONDENSATION DRAIN FOR EXPLOSION-PROOF FITTINGS

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Application March 11, 1941, Serial No. 382,772

5 Claims. (Cl. 137—34)

This invention has as an object a particularly simple and efficient device for draining condensation from the interior of enclosed explosion proof housings in which electrical devices are mounted, the device being operable exteriorly of the housing and maintaining the explosion proof feature of the housing during the draining operation.

The invention consists in the novel features and in the combinations and constructions hereinafter set forth and claimed.

In describing this invention, reference is had to the accompanying drawings in which like characters designate corresponding parts in all the views.

Figure 1 is a side elevational view of a draining device embodying my invention and the contiguous portion of the bottom of a switch housing in section.

Figure 2 is a vertical sectional view of the device and contiguous portion of the bottom wall of the housing.

Figure 3 is a vertical sectional view of the device with the stem positioned to drain rapidly from the interior of the housing to the reservoir in the device.

Figure 4 is a view taken on line 4—4, Figure 3.

Figure 5 is a vertical sectional view of a modified form of the device particularly suited for the draining of housings in which the electrical devices are operated in oil.

Figure 6 is a view, similar to Figure 5, with the stem positioned to drain from the interior of the housing to the reservoir of the device.

Figure 7 is a view taken on line 7—7, Figure 6.

As previously stated, this device is arranged in the bottom wall of a totally enclosed explosion proof housing for electrical apparatus and is operable to permit the condensation within the housing to be drained without effecting the explosion proof feature of the housing. It will be understood that housings of the type referred to are located in hazardous places and are employed to house electrical apparatus such as switches, circuit breakers, motor starters etc., in such a manner as to prevent any explosion within the fitting igniting the surrounding inflammable gases. Accordingly, while the apparatus within the housing is in use, it is essential that the housing be not opened, or the explosion proof feature thereof otherwise affected.

The device consists of a body 10 which is preferably of cylindrical formation to provide a reservoir 11 and is formed with a reduced externally threaded end portion 12 which may be threaded directly in the bottom wall 13 of the housing 14 or, as shown in Figure 2, the end 12 may be threaded into a fitting welded or otherwise secured in the bottom wall 13.

The opposite end 16 is formed with a passage 17 leading from the reservoir 11 to the exterior of the fitting, and the reduced end portion 12 is provided with a passage 18 leading from the interior of the housing 14 to the reservoir 11. A movable member is arranged in the body and is operable in one position to close the passage 17 leading from the reservoir in flame tight relation and being movable to open said passage and simultaneously close the passage 18 leading from the interior of the housing to the reservoir. As here shown, the passages 17, 18 are threaded internally in step pitch. That is, the thread in one portion is a continuation of the thread in the other portion.

The movable valve member is in the nature of a stem 20 arranged in the passage of the body and is formed with axially spaced apart externally threaded portions 21, 22. These portions are also threaded in step pitch and, of course, are also of complemental diameter to the internally threaded portions 17, 18. The spacing between the externally threaded portions 21, 22 on stem 20 is such, relative to the spacing of the internally threaded portions 17, 18 of the body, that one of the threaded portions 21, 22 will engage the adjacent threaded portion of the body before the other externally threaded portion of the stem disengages from the other internally threaded portion of the body. That is, the extent of the threaded engagement between the movable member and the body always remains constant.

The stem 20 extends externally of the body 10 and is provided with a transversely extending pin 25 which serves as a convenient handle for threading the stem into and out of the body, and the upper end of the stem 20 is provided with a shorter pin 26, the purpose of which is to limit the outward movement of the stem relative to the body, and the handle pin 25 also serves as a stop for the inward movement of the stem.

Due to the number of threads always in engagement between the stem and the body 10, these threaded portions do not have to be of a close fit inasmuch as the long tortuous path afforded by the threaded connection, or connections, serves as a baffle to cool any ignited gas within the housing below the ignition point of any inflammable gas in the atmosphere before the ignited gases within the housing escape there-

from. Accordingly, there is a constant drainage between the threaded portions 18 and 22 when the stem is positioned as shown in Figure 2. That is, any condensate within the housing seeps through this threaded connection and into the reservoir 11 of the body, and with the stem thus positioned the threaded portion 21 is fully disengaged from the threaded portion 17, permitting the condensate to readily drain from the reservoir 11. However, over a substantial period of time the passage between the threaded portions 18, 22 may become filled up or plugged, in which event it is only necessary to screw the stem inwardly, threading the upper portion 22 of the stem out of the threaded portion 18, and in so doing cleaning these threaded connections. However, during this operation the lower threaded portion 21 of the stem will be threaded into the lower end of the body and thus a flame tight joint will be established at the lower end of the body previous to the time the flame tight joint at the upper end of the body is broken.

In order that the condensate may readily drain from the interior of the housing into the reservoir 11 when the stem is moved to the inward position shown in Figure 3, the portion 30 of the stem, intermediate the threaded portions 17, 18, is of reduced diameter throughout the greater portion of its length. The lower part 31 of this intermediate portion of the stem, adjacent the threaded portion 21, is of substantially the same diameter as the internally threaded portion 17 and engages the same to serve as a guide for the lower end of the stem. To assure proper drainage when the stem is in the out or down position, as shown in Figure 2, this lower portion 31 is relieved at one or more points as at 43, Figure 4. In this instance, the portion 31 is shown as of triangular formation.

In order to prevent the possibility of the reservoir 11 becoming air bound when the stem is moved to the out position, as shown in Figure 2, the intermediate portions 30, 31 of the stem are formed with an axially extending passage 34 which communicates at each end with a transversely extending passage 35.

In the event the housing 14 is filled with oil, the body 10 is provided with a partition 40 formed with an aperture 41 to receive the stem 20, and the bottom side of the partition 40 is formed with a valve seat 42. In this instance, the lower portion of the stem 20 is provided with a relieved portion 43 which is positioned in the aperture 41 of the partition 40 and serves as a guide for the stem 20, and the stem 20 is formed with a valve surface 44 which is cooperable with the valve seat 42 when the stem is threaded inwardly, as shown in Figure 6.

With this arrangement, any water that may collect in the oil in the housing will settle and drain into the reservoir 11 above the partition 40 when the stem is positioned as shown in Figure 6, and the reservoir 11 is drained by threading the stem 20 outwardly to move the valve 44 out of engagement with the valve seat 42, as shown in Figure 5. In the meantime however, the upper threaded portion of the stem has engaged the upper internally threaded portion of the body, with the result that the condensate may be drained with a minimum loss of oil. The body 10 may be provided with a square or hex surface 45 for the reception of a wrench or tool for threading the body into the bottom wall of the housing.

What I claim is:

1. A condensate drain adapted to be arranged in the bottom wall of an enclosed explosion proof switch housing, said drain comprising a body formed with a passage extending therethrough and adapted to communicate with the interior of the housing, said passage being formed with axially spaced apart portions threaded internally in step pitch, a stem formed with axially spaced apart portions, said portions being provided with external threads in step pitch complemental to the threaded portions of the passage, with the portion of the stem intermediate said threaded portions being of reduced cross section, the threaded portions of said stem being so spaced that when one threaded portion of the stem is moved out of engagement with the complemental threaded portion of the passage, the other threaded portion of the stem is in threaded engagement with the other threaded portion of the passage, and said stem being provided with stop means cooperable with the body to prevent disengagement of both threaded portions simultaneously.

2. A condensate drain adapted to be arranged in the bottom wall of an enclosed explosion proof switch housing, said drain comprising a body formed with a passage extending therethrough and adapted to communicate with the interior of the housing, said passage being formed with axially spaced apart portions threaded internally in step pitch, a stem formed with axially spaced apart portions, said portions being provided with external threads in step pitch complemental to the threaded portions of the passage, with the portion of the stem intermediate said threaded portions being of reduced cross section, the threaded portions of said stem being so spaced that when one threaded portion of the stem is moved out of engagement with the complemental threaded portion of the passage, the other threaded portion of the stem is in threaded engagement with the other threaded portion of the passage, and said stem being formed with vent apertures adjacent each of said threaded portions, and the intermediate portion of the stem being formed with a vent passage connecting said apertures.

3. A condensate drain for explosion proof switch housing and the like comprising a body adapted to be arranged in the bottom wall of the housing and being formed with a passage adapted to communicate with the interior of the housing, said passage being formed with axially spaced apart internally threaded portions threaded in step pitch, a partition arranged in said passage between said threaded portions and being formed with an aperture in register with said threaded portions, said partition being formed with a valve seat, a stem arranged in the passage and being formed with axially spaced apart portions provided with external threads complemental to the threads in said passage, the threaded portions of said stem being so spaced relatively to the threaded portions of the passage that one threaded portion of the stem engages the complemental threaded portion of the passage before the other threaded portion of the stem disengages from the other threaded portion of the passage, said stem being provided with a valve surface cooperable with said valve seat to close the aperture in said partition when one of the threaded portions of the stem is in threaded engagement with the adjacent threaded portion of the passage.

4. A condensate drain for enclosed explosion proof switch housings and the like comprising

a body adapted to be arranged in the bottom wall of the housing and being formed with a passage adapted to communicate with the interior of the housing, said passage being formed with axially spaced apart internally threaded portions threaded in step pitch, a stem arranged in the passage and being formed with axially spaced apart portions provided with external threads complemental to the threads in said passage, the threaded portions of said stem being so spaced relative to the threaded portions of the passage that one threaded portion of the stem engages the complemental threaded portion of the passage before the other threaded portion of the stem disengages from the other portion of the passage, means cooperable with the body and stem to limit axial movement of the stem relative to the body in both directions, and said stem being operable exteriorly of the body.

5. A condensate drain for enclosed explosion proof switch housings and the like comprising a body member having a stem adapted to be threaded into an aperture in the wall of the housing, said body being formed with a reservoir for the accumulation of condensate, the stem of said body being formed with an axially arranged passage communicating with said reservoir and with an outlet passage leading from said reservoir to the exterior of the body, said passages being arranged in axial alinement and being internally threaded in step pitch, a stem extending through both of said passages and being formed with axially spaced apart externally threaded portions comparable to the respective internally threaded passages, the portion of said stem intermediate said externally threaded portions being of reduced cross section, the threaded portions of said stem being so spaced relative to the threaded passages that one threaded portion of the stem is always in engagement with one of said threaded passages.

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