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INSTRUMENT COVER SECURING MEANS

Filed Oct. 9, 1958

2 Sheets-Sheet 1

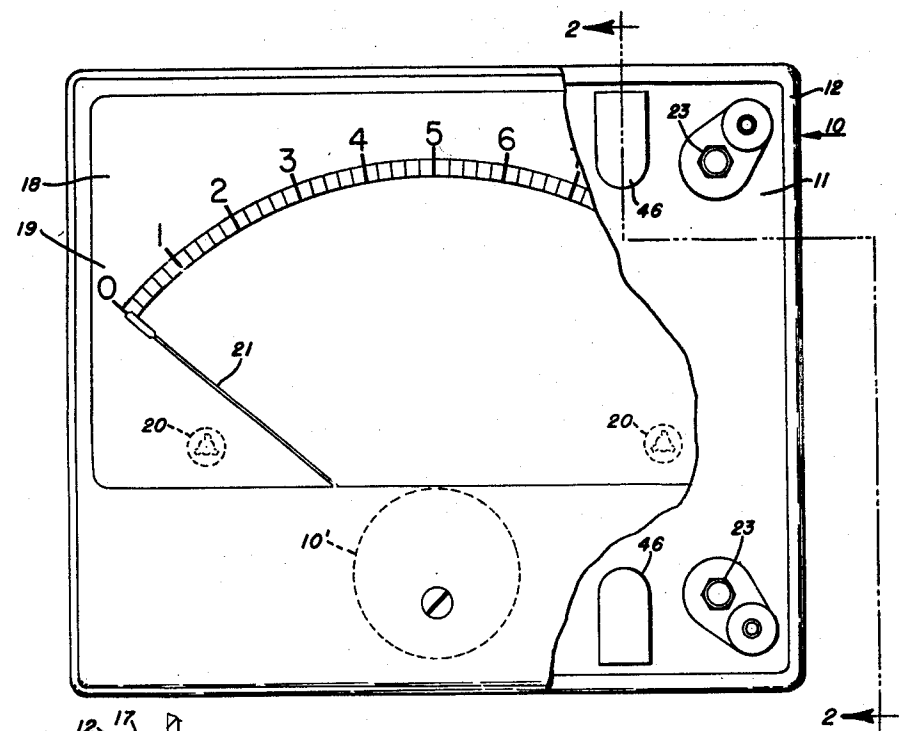


Fig-1

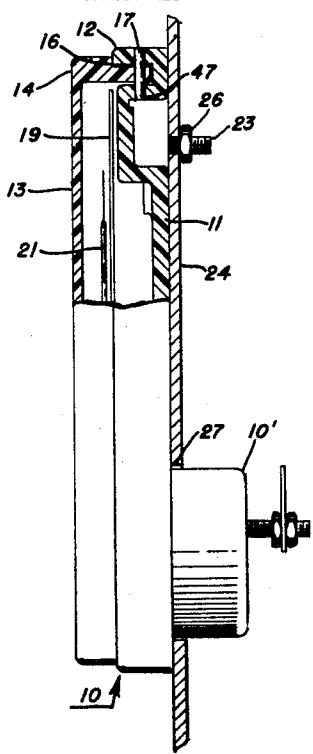


Fig-2

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2 Sheets-Sheet 2

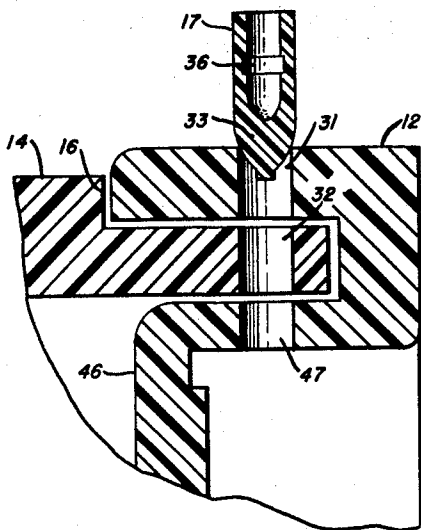


Fig. 3

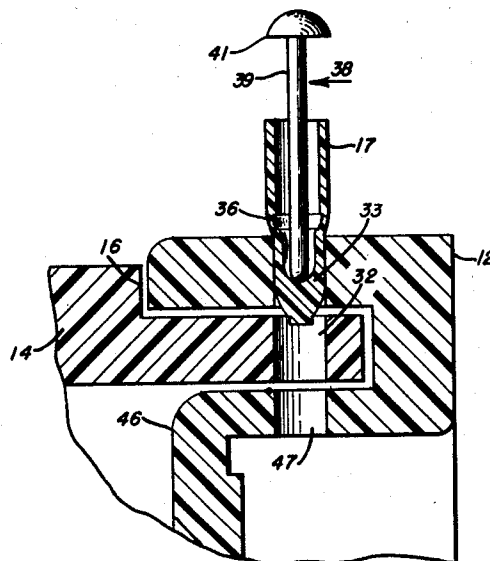


Fig. 4

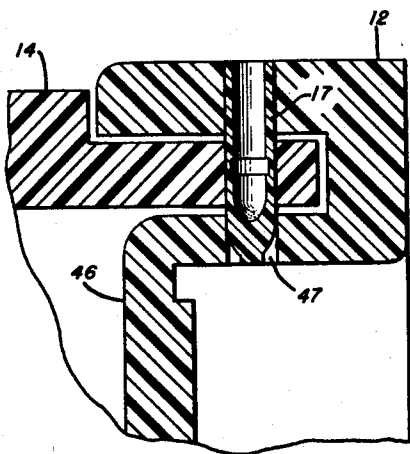


Fig. 5

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INSTRUMENT COVER SECURING MEANS

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3 Claims. (Cl. 220—4)

This invention relates to an instrument housing, or the like, which includes a cover removably secured to a case and more particularly to a novel fastening arrangement for removably securing the cover to the case.

Although the invention is described hereinbelow with specific reference to a housing for electrical indicating instruments, it will be understood that my invention is not limited to such application.

Instrument housings generally comprise a case within which the instrument mechanism, or the like, is mounted and a transparent cover through which the scale of the instrument is visible. Often, instrument housings made in accordance with prior art practice involve numerous separate parts which must be manufactured to fairly close tolerances, and which parts usually include screws and threaded members. The cost of producing such parts and assembling them adds materially to the overall cost of the instrument without contributing materially to the functioning or operation of the instrument.

An instrument housing made in accordance with my invention includes a case and cover which are fastened together by resilient fastening pins extending within mating holes in the case and cover. The resilient fastening pins, which are made of molded plastic, or the like, are sufficiently flexible such that misalignment of the mating parts joined thereby is permitted. Thus, the allowable tolerances permitted in the manufacture of the housing is greater than in many prior art devices. Further, since the fastening pins are resilient, unequal dimensional changes of the case and cover, such as caused by temperature or humidity, will not build up damaging stresses, as would occur with a rigid pin, or screw fastening device. Also, the cost of the fastening arrangement is low since no threaded parts are required.

To facilitate removal of the cover from the case, a recess, or pocket, is formed in the case bottom, which recess is provided with a hole which communicates with the mating holes in the cover and case within which the resilient fastening pins are positioned. To remove the cover from the case, the pins are merely pushed through the holes into the recess. The arrangement is such that this may be done without removing the instrument from the mounting panel.

An object of this invention is the provision of a housing in which the cover is secured to the case without the use of screws.

An object of this invention is the provision of a fastening arrangement for securing a pair of members having aligned, or slightly misaligned, through holes formed therein, which arrangement includes a flexible fastening pin positioned in the holes.

An object of this invention is the provision of a hollow flexible fastening pin for fastening a pair of frangible members together, which pin extends through holes formed in the said members, the said pin being sufficiently flexible such that excessive stresses are not created upon unequal dimensional changes of the members due to temperature, humidity, or the like.

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An object of this invention is the provision of an instrument housing having a cover removable and replaceable on a base, when the instrument is secured to a mounting panel.

5 An object of this invention is the provision of an instrument housing comprising a case including a flange, a cover having a flange adjacent the case flange, means forming mating holes in the flanges of the cover and case, a hollow resilient pin having an end wall, the normal outside diameter of the flexible pin being somewhat greater than the hole diameters in the case and cover, the said pin being distended and extending into the mating holes in the case and cover, and means forming a recess in the case communicating with the mating holes in the case and cover within which recess the pin may be pushed in disassembly of the case and cover.

10 These and other objects and advantages will become apparent from the following description when taken with the accompanying drawings. It will be understood that 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.

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

20 Figure 1 is a front view of the instrument with portions of the cover and scale plate broken away for clarity;

25 Figure 2 is a partial vertical sectional view taken on line 2—2 of Figure 1, and showing the instrument secured to a mounting panel;

30 Figure 3 is an enlarged fragmentary sectional view of the cross-sectional portion of Figure 2, but showing one of the flexible fastening pins prior to engagement in mating holes in the case and cover;

35 Figure 4 is similar to Figure 3 only showing the fastening pin being pushed into the holes; and

40 Figure 5 is also similar to Figure 3 but showing the fastening pin in cooperative engagement in the holes.

Reference is first made to Figures 1 and 2 of the drawings wherein an instrument housing comprising a case 10, which includes a cup-shaped portion 10' and an outwardly-extending flange 11 at the open end thereof is shown. A forwardly-extending flange 12 is integrally formed at the outer peripheral edge of the flange 11. A cover 13, having a rearwardly-extending flange 14 which is formed with a peripheral shoulder 16, is attached to the case 10 by means of my novel fastening arrangement, which includes flexible fastening pins 17. In the illustrated embodiment of the invention, the reduced thickness portion of the cover flange 14 is positioned inwardly of the case flange 12.

45 The cover 13 is provided with an area 18 which serves as a window through which is visible the entire operating range of the calibrated scale carried by the scale plate 19. The scale plate is secured to the case by suitable removable rivet devices 20 which extend through holes on the scale plate and into suitable holes formed in the flange 11 of the case. The instrument mechanism, not shown, is suitably secured within the cup-shaped portion 10' of the case and is provided with a pointer 21 which cooperates with the calibrated scale on the scale plate 19. The instrument mechanism, which forms no part of my invention, may comprise a device responsive to a physical, chemical, or electrical parameter, or the like. Mounting bolts 23 extend through, and rearwardly of the flange 11 of the case, and are suitably secured thereto. As seen in Figure 2, the bolts 23 extend through a mounting panel 24 and are secured thereto by threaded nuts 26. A suitable hole 27 is provided in the mounting panel through which the cup-shaped portion of the case may extend.

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Reference is now made to Figure 3, which is substantially an enlarged view of the cross-sectional portion of the housing of Figure 2, but showing the fastening pin 17 prior to insertion in aligned holes 31 and 32 formed in the forwardly extending flange 12 on the case and the rearwardly extending flange 14 on the cover, respectively. The fastening pin comprises a hollow, cylindrical-shaped member, one end of which is closed by an end wall 33 which is preferably rounded for ease of insertion into the holes. The pin is made of a suitable deformable flexible material which is preferably resilient, such as rubber or plastic. Polyethylene plastic molded into the illustrated shape has been found to be a suitable plastic. The short extension 34 on the end wall is left by the molding process, while the annular undercut 36 within the pin is required to draw the pin from the die in the manufacture of the pin; the extension and undercut forming no part of this invention. The nominal outside diameter of the pin is somewhat greater than the holes 31 and 32 formed in the case and cover flanges, such that the pin fits snugly therein in the engaged position.

If the fastening pin is sufficiently rigid, if the holes 31 and 32 are in alignment, and if the pin diameter is not too much larger than the diameter of the holes, the pin may be pushed into the holes with the fingers, by hand. For ease of insertion, however, particularly if there is some misalignment of the holes, a tool 38 (shown in use in Figure 4) and comprising a solid, rigid, pin 39 with a head 41 thereon, if desired, is inserted into the hollow resilient fastening pin. As the fastening pin is forced into the undersized case and cover holes by pressing on the tool, resistance to insertion is encountered. The force of the solid pin 39 causes the flexible pin to elongate, thereby reducing its diameter so that it is inserted into the mating case and cover holes. When the flexible pin is in the desired position in the mating holes, the solid pin is withdrawn and the flexible pin tends to regain its nominal diameter thereby securely fastening the case and cover together, as shown in Figure 5.

To facilitate removal of the cover 13 from the case 10, the mating holes 31 and 32 comprise through holes which continue through the respective flanges 12 and 14. The flange 11 on the case is formed with pockets, or recessed members, 46 opening rearwardly of the flange. The recessed members are spaced from the forwardly-extending flange 12 a sufficient distance to permit the reduced thickness portion of the cover flange 14 to extend therebetween. A hole 47 is formed in the wall of the recessed member in alignment with the hole 31 in the flange 12, and in the secured condition of the case and cover, as seen in Figure 5, the fastening pin extends into the hole 31. Although a satisfactory fastening arrangement is provided with a pin of sufficient length to extend through the holes 31 and 32 only, it will be apparent that a more secure arrangement results from the use of a fastening pin of sufficient length to extend within the three holes 31, 32 and 47. A prime function of the pocket, or recessed member, 46, however, is to provide a receptacle within which the fastening pins 17 may be pushed when it is desired to remove the cover from the case. The cover may be removed from the case, without removing the instrument from the mounting panel 24, by pushing the fastening pins 17 into the recesses 46 by use of the tool 38 having the rigid pin 39. The fastening pins remain in the pockets formed by the recesses and mounting panel, without damage to the instrument mechanism, and are not retrieved until the instrument is removed from the mounting panel. To replace the cover without removing the instrument, new fastening pins are inserted in the holes.

Among the advantages of this fastening means are: (1) misalignment of mating parts is tolerated by the flexible fastening pin; (2) unequal dimensional changes

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in the case and cover, such as caused by temperature, or humidity, will not build up damaging stresses, as would occur with a rigid fastening pin, particularly if the cover and/or case were made of an acrylic resin, such as "Lucite," a relatively frangible transparent plastic; (3) the cover may be removed from the case, and then replaced, without the necessity of removing the instrument from its mounting panel, and; (4) the cost of the fastening means is low, as no threaded parts are required.

Having now described my invention in detail, in accordance with the patent statutes, various changes and modifications will suggest themselves to those skilled in this art. It is intended that such changes and modifications shall fall within the spirit and scope of the invention as recited in the following claims.

I claim:

1. An arrangement for securing an instrument cover having a rearwardly-extending flange to a case having a cup-shaped portion, an outwardly-extending integral flange at the open end of the cup-shaped portion, and a forwardly-extending flange formed at the outer peripheral edge of the outwardly-extending flange, the forwardly and rearwardly extending flanges on the respective case and cover being positioned adjacent each other; the said arrangement comprising means forming a pair of aligned holes in the adjacent rearwardly and forwardly extending flanges, a recessed member formed on the outwardly-extending flange on the case a spaced distance from the forwardly-extending flange thereon, the said recessed member opening rearwardly of the outwardly-extending flange, means forming a hole in said recessed member and in alignment with the holes formed in the adjacent rearwardly and forwardly extending flanges, an elongated hollow cylindrically-shaped pin of resilient material having an end wall at one end thereof, the nominal undistorted diameter of the pin being greater than the diameter of the said aligned holes, said pin being snugly positioned within the said aligned holes and being adapted to be pushed into the recessed member for removal of the cover from the case.

2. An arrangement for securing an instrument cover having a rearwardly extending flange to a case having a cup-shaped portion, an outwardly-extending flange integrally formed at the open end of the cup-shaped portion, and a forwardly-extending flange formed at the outer peripheral edge of the outwardly-extending flange, the forwardly-extending flange being positioned outwardly of and adjacent the rearwardly-extending flange; the said arrangement comprising means forming a recessed member on the outwardly-extending flange a spaced distance from the forwardly-extending flange, the said recessed member opening rearwardly of the outwardly extending flange, means forming substantially aligned holes in the forwardly-extending flange, rearwardly-extending flange, and wall of the recessed member, and a pin positioned within the holes, the recessed portion forming a pocket into which the pin may be pushed for removal of the cover from the case.

3. In combination, an instrument comprising a case having a cup-shaped portion, an outwardly extending flange integrally formed at the open end of said cup-shaped portion and a forwardly extending flange formed at the outer peripheral edge of said outwardly extending flange, a cover for said case having a rearwardly extending flange positioned inwardly of the adjacent the outwardly extending flange of said case, a recessed portion on the outwardly extending flange having a wall disposed a distance from the forwardly extending flange and opening rearwardly of the outwardly extending flange, means forming substantially aligned holes in the forwardly and rearwardly extending flanges and the adjacent wall of the recessed portion, and a headless hollow pin of resilient material opening outwardly from an end wall thereof and

at the forwardly extending flange of the case and snugly received in said aligned holes while traversing the distance between the outer surface of said flange and the inner surface of the outer wall of said recessed portion and flush at its outer end with said outer surface, whereby it is removable by an elongated tool pushed axially against its said end wall from the outside until it drops into said recessed portion.

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