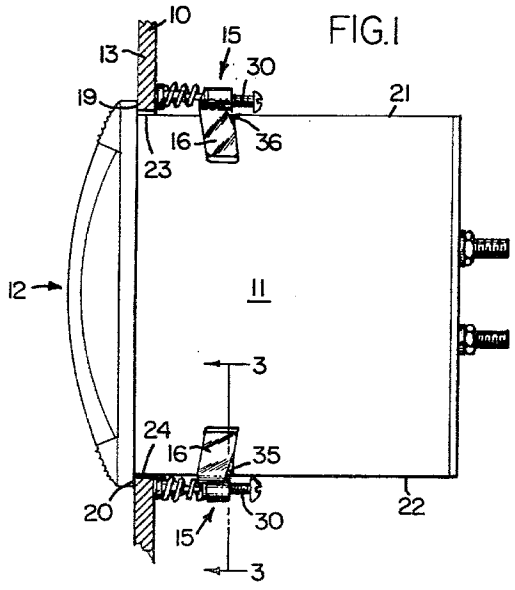
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INSTRUMENT PANEL MOUNTING SYSTEM

Filed Dec. 7, 1962

FIG.1



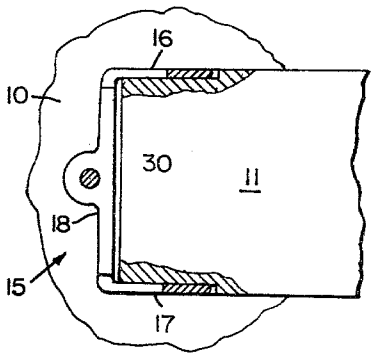
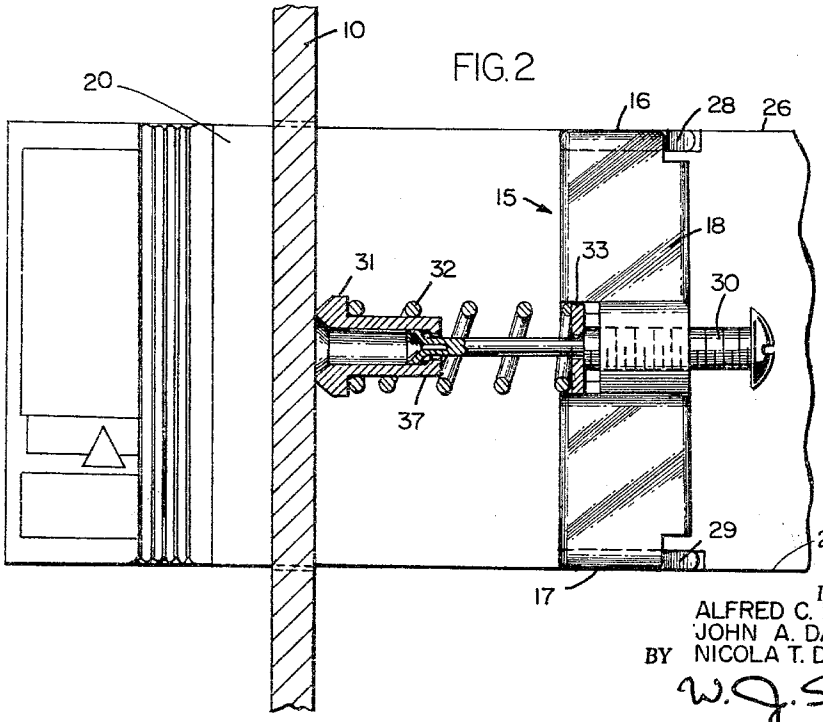


FIG.3

FIG.2



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INSTRUMENT PANEL MOUNTING SYSTEM

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This invention relates to an instrument mounting system, and more particularly, to mounting systems especially adapted for panel mounting instruments.

Panel mounting of instruments, and the various techniques for mounting instruments upon panels, have lately assumed new importance because of the significant trend towards automation in industry which makes extensive use of panel mounted instrumentation. This has generated an increased interest in panel construction and has demonstrated a need for improved techniques which will be more economical and facilitate the rapid installation of instruments upon panels.

One of the areas of interest relates to methods for increasing the density of instrumentation that can be conveniently mounted upon a panel. The desire to increase the density of instrumentation upon the panel arises out of a need for conserving space by minimizing the size of panel necessary for any given number of instruments. One way of accomplishing this with instruments of a given size is to minimize the space which is necessary between adjacent instruments for receiving the mounting system. However, providing an improved mounting system is not only a matter of minimizing the space which such a system would occupy, but in addition, it is also necessary for it to be inexpensive and easy to install. When considering the expense of a system, consideration has to be given not only to the cost of the hardware for attaching the instrument to the panel, but consideration also has to be given to the manufacturing cost of the instrument case which is attributable to constructional features necessary to secure the mounting system to the case.

It is therefore an object of our invention to provide a new and improved panel mounting system for instruments.

It is another object of our invention to provide a new and improved panel mounting system which permits higher density of instrumentation upon a panel by minimizing the space necessary for the mounting system.

It is yet another object of our invention to provide a panel mounting system for instruments which permits the stacking of instruments so that surfaces of adjacent instruments are in intimate contact.

It is another object of our invention to provide a mounting bracket which can be secured to the instrument case without requiring any additional hardware.

A further object of the invention is to provide a rugged and inexpensive mounting bracket which is joined to the instrument case by sliding the mounting bracket into grooves in the case.

These and other objects and advantages of this invention will become apparent to those skilled in the art upon reference to the accompanying specification, claims and drawing, in which:

FIG. 1 is a plan view of the instrument case and bracket of the invention shown in cooperating relationship with a panel;

FIG. 2 is a side view of the embodiment of FIG. 1; and

FIG. 3 is a partial sectional view taken along lines 3—3 of FIG. 1 showing the manner in which the bracket cooperates with the grooves in the instrument case to securely support the instrument.

Referring to the drawings, 10 designates a panel upon which instrument case 11 is mounted with its face 12

substantially flush with the front surface 13 of panel 10. In accordance with the invention, instrument case 11 is supported in the positions indicated in the figures by means of brackets 15 which are generally U-shaped elements having legs 16 and 17 which are joined by a central portion 18.

Referring now to FIG. 2, grooves 28 and 29 which start at side 22 and terminate at points remote therefrom are respectively provided in planar surfaces 26 and 27 to provide means for securing one of the brackets to the case. The other bracket may be secured to case 11 by corresponding grooves in surfaces 26 and 27 which intersect side 21.

Case 11 is mounted in panel 10 by sliding it rearwardly through the opening in the panel until the rear surfaces of flanges 19 and 20 come in contact with the front surface 13 of the panel. Brackets 15 are then secured to case 11 by inserting their legs into the grooves which are provided in surfaces 26 and 27. In order to insert the brackets in the grooves, screw 30, which is threaded in the tapped hole in the center portion 18, is backed off until seat 31 clears the rear surface of panel 10.

Spring 32 is provided to bias seat 31 away from collar 33 which is secured to screw 30. After brackets 15 are secured to case 11, screw 30 is advanced so as to bring seat 31 into engagement with the rear surface of panel 10 in order to draw the flanges into contact with the front surface 13 of said panel. Spring 32 is provided as a means for preventing destructive forces from being applied to case 11 during the installation of the instrument by limiting the forces that can be exerted upon case 11. Spring 32 is selected so that the compressive force, exerted by the spring after its proportional limit is exceeded, is below the point at which the case would be damaged. Of course, this protection will be afforded only when the thickness of panel 10 is such that collar 33 does not come in contact with rear surface 37 of seat 31 throughout the limits of travel of screw 30. Normally this should be of no concern since the thickness of panel 10 will usually falls within a narrow range, due to economic considerations.

Instrument cases constructed in accordance with this invention have been molded from a Lucite plastic material thus leading to the previously mentioned economy in construction which is facilitated by the invention. Relief of stresses which might build up at points 35 and 36 is accomplished by leaving a slight spacing between the side of the grooves and the legs of the brackets in proximity to the case sides so as to prevent the concentration of stresses at these points. This is accomplished by rounding off the corners at these points as well as slightly tapering the trailing edges of the legs away from these points.

Referring now to FIG. 2, it can be seen that legs 16 and 17 of each bracket have outer surfaces which are in the same plane as surfaces 26 and 27. Thus, if the cutout portion in panel 13 is of the proper dimensions and orientation a plurality of instruments can be stacked either in a vertical or horizontal direction with the surface 27 of one case in direct contact with the surface 26 of another instrument case. It may be seen that it is only necessary when installing instruments in a stacked relationship to slide them rearwardly through the opening in panel 10 so that they come to rest in contact with the adjacent instrument. Brackets 15 are then installed on each side of the case in a manner previously described. Increased density of instrumentation is thus accomplished in one dimension in accordance with the invention by recessing the legs within the grooves so that the instrument cases may be stacked without interference from the mounting brackets.

Increased density of instrumentation is accomplished in the other dimension by minimizing the spacing on the sides of the instrument, necessary to accomodate the brackets. This facilitates close side by side placement of instruments or the placement of the sides of an instrument close to any other panel mounted device. The limiting factor with respect to such spacing is governed by the amount of space necessary for the insertion or the removal of bracket **15**. Since this primarily depends upon the length of the legs, the length of these legs should be minimized consonant with the requirements that they be able to adequately secure the instrument within the cutout without causing failure of the case due to excessive concentration or stress in any particular area.

The bracket of the invention is of simple construction, strong and relatively inexpensive to manufacture, and is extremely simple to utilize during the installation operation since there is nothing to assemble and no holes to be drilled or tapped. It is merely necessary to slip the preassembled bracket assembly into the grooves in the case and advance screw **30** until the case is tightly held in its proper position.

While there has been described what is at present considered to be a preferred embodiment of the invention, it will be apparent to those skilled in the art that various changes and modifications may be made therein without departing from the spirit or scope of the invention.

What we claim as new and desire to secure by Letters Patent of the United States is:

1. The combination of a panel having an opening therein,

an instrument case having an outwardly extending flange on a side of said case to limit the rearward movement of said case when placed in said opening, said case having first and second opposed surfaces which intersect said side of the case, each of said opposed surfaces having a groove therein which starts at said side of the case and terminates at a point remote therefrom,

a mounting bracket having first and second legs joined by a central portion, said legs being spaced apart so that each may be received in a corresponding one of said grooves when the legs of said mounting bracket are advanced into said grooves, and

means adjustably connected to said central portion for forcing said bracket and attached case rearwardly upon being advanced into engagement with the rear surface of said panel,

said grooves running in a rearwardly direction from their starting point at said side so that said flange is drawn into contact with the front surface of said panel when said forcing means is advanced into contact with said rear surface.

2. The combination of a panel having an opening therein,

an instrument case having an outwardly extending flange on a side of said case to limit the rearward movement of said case when placed in said opening, said case having first and second opposed surfaces which intersect said side of the case, each of said opposed surfaces having a groove therein which starts at said side of the case and terminates at a point remote therefrom,

a mounting bracket having first and second legs joined by a central portion, said legs being spaced apart so that each may be received in a corresponding one of said grooves when the legs of said mounting bracket are advanced into said grooves,

said central portion having a threaded aperture which is generally at right angles to said flange when said legs are in said grooves, and

means threaded in said aperture for forcing said bracket and attached case rearwardly upon being advanced into engagement with the rear surface of said panel,

said grooves running in a rearwardly direction from their starting point at said side so that said flange is drawn into contact with the front surface of said panel when said forcing means is advanced into contact with said rear surface.

3. The combination of claim 2 in which said forcing means comprises a screw threaded in said aperture, an element for contacting said rear surface and resilient means interposed between said screw and element for limiting the force that can be exerted upon said case by said screw when said screw is advanced.

4. The combination of claim 3 in which said grooves are of substantially constant depth and cross section throughout their lengths, said legs each having a generally constant cross section, the shape of which generally complements the shape of said grooves whereby the surface of said legs exposed when said legs are in place within said grooves lies generally in the same plane as said opposed surfaces.

5. The combination of claim 4 in which said grooves and legs have a configuration so as to provide a spacing between the side of said grooves at their starting points and the trailing edges of the corresponding legs thus preventing concentration of stresses at these points.

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