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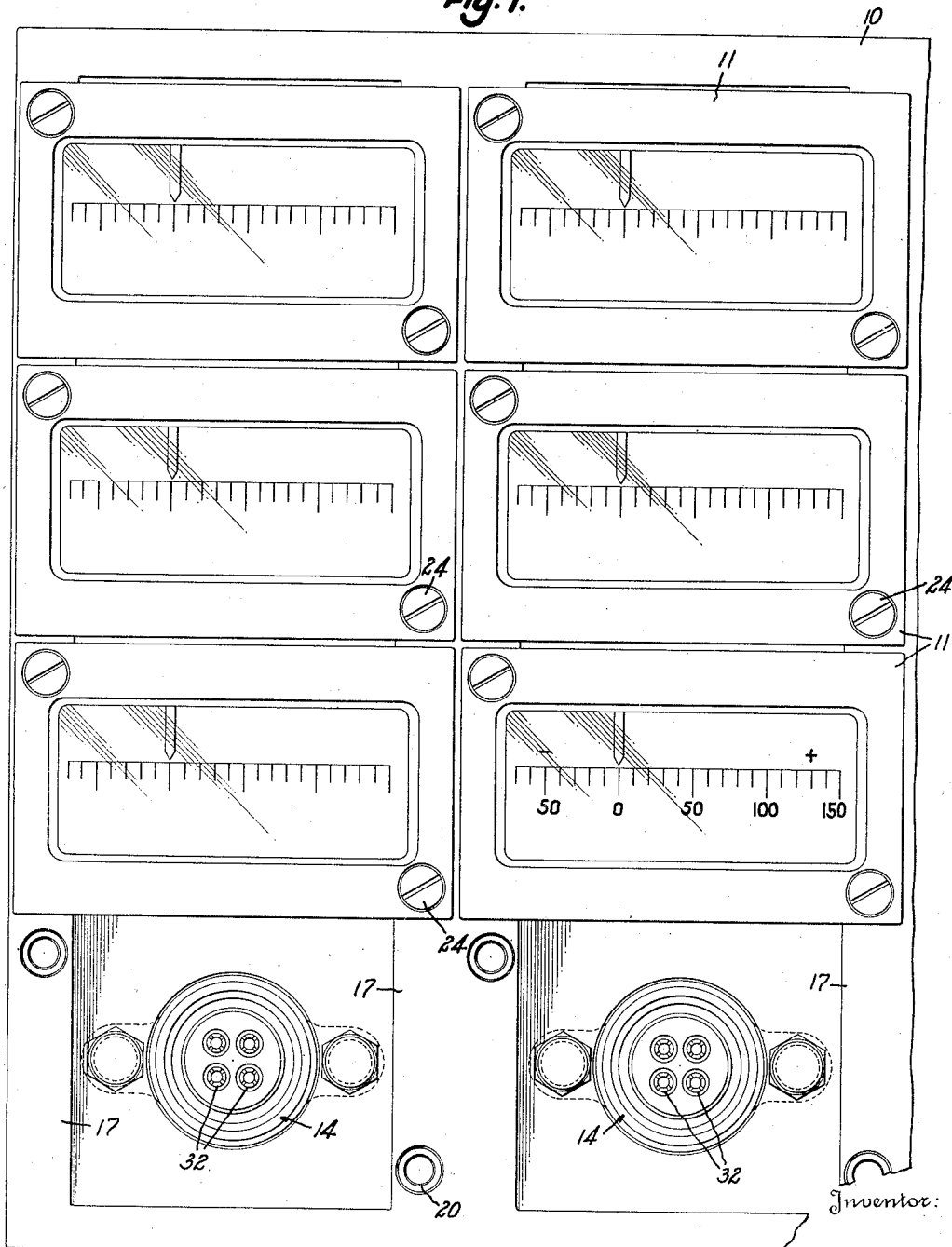
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INSTRUMENT PANEL ASSEMBLY

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Fig. 1.



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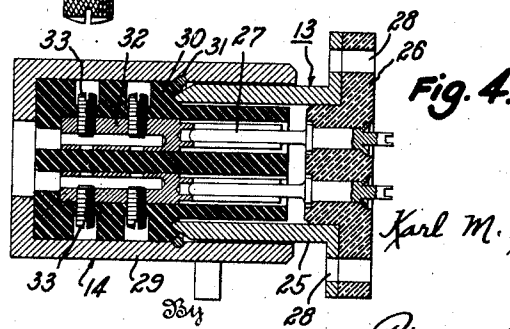
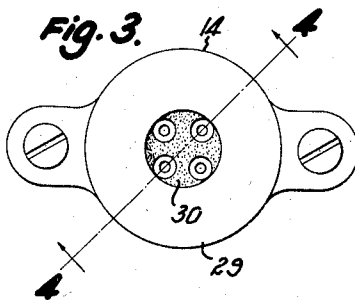
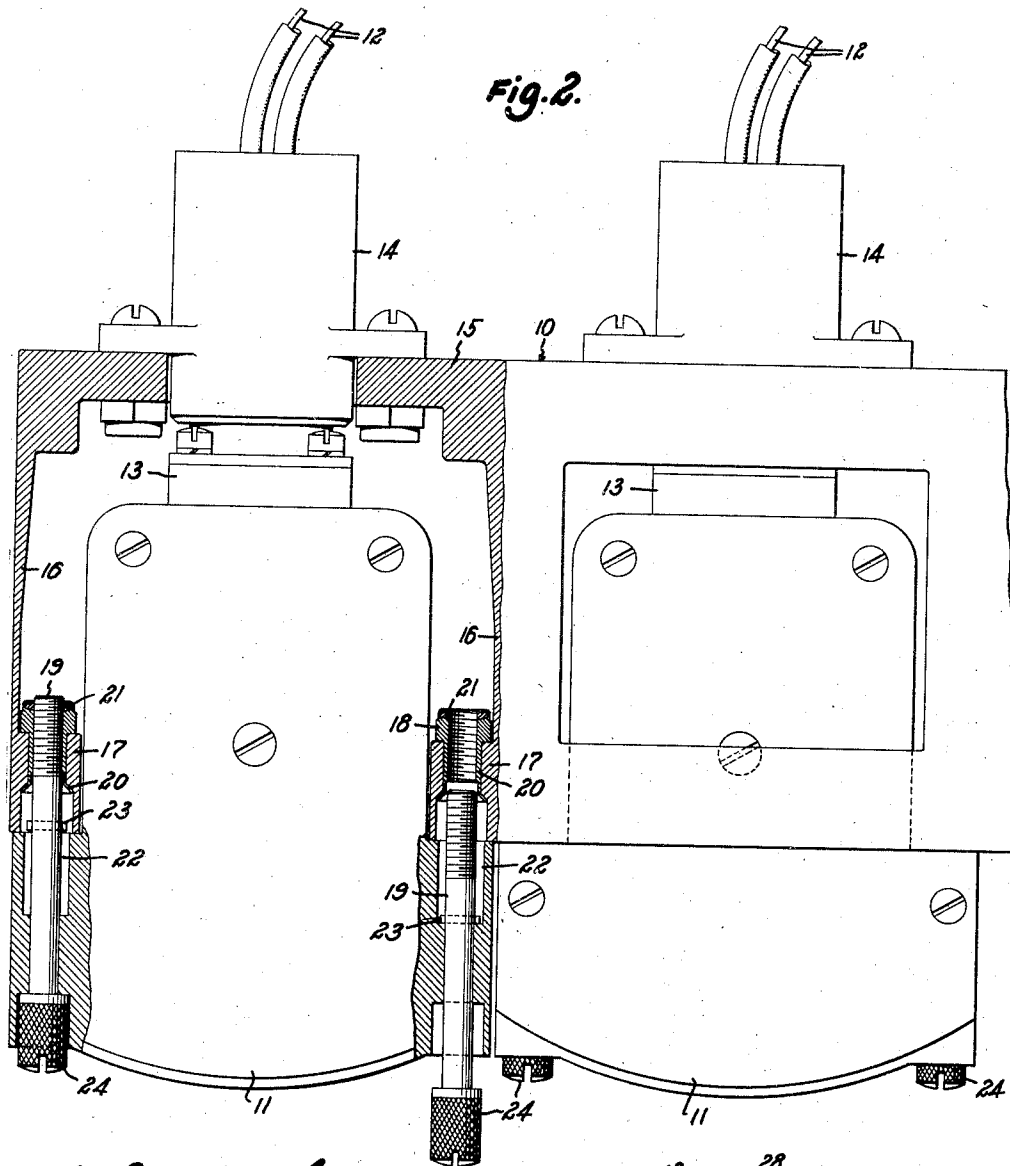
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INSTRUMENT PANEL ASSEMBLY

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2 Sheets-Sheet 2



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INSTRUMENT PANEL ASSEMBLY

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2 Claims. (Cl. 175-298)

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This invention relates to an instrument panel assembly and more particularly to a compact assembly for use where space and weight requirements are critical.

An object of this invention is to provide an instrument panel assembly wherein a plurality of instruments are grouped to economize space and are arranged to give an extremely high ratio of scale length to face area. Another object is to provide an assembly of this type wherein the instruments are mounted on a rack in such manner that they may be quickly detached and replaced. Another object is to provide in such an assembly an instrument rack which is relatively light for the number of instruments it will support. A further object is to provide an improved arrangement for securing an instrument to a supporting rack in such manner that alterations or repairs of the connections to the instrument may be made without removing or otherwise interfering with the instruments.

Still other objects and advantages of the invention will be in part apparent and in part pointed out in the following description of a preferred embodiment that is shown in the accompanying drawings wherein:

Fig. 1 is a front view of a panel assembly, the two lower instruments being removed to show the lower part of the supporting rack;

Fig. 2 is a top view of the assembly with parts being broken away to show certain details of construction;

Fig. 3 is an end elevation of one of the socket connectors of the rack; and

Fig. 4 is a section, as seen on line 4-4 of Fig. 3, through a socket and plug.

Referring to the drawings, there is shown a skeleton rack 10 to which a plurality of instruments 11 are secured to form an electrical instrument panel assembly. Electrical connection is made to each instrument through lead wires 12 and a plug-and-socket connector, the plug element 13 being carried by the instrument and the cooperating socket element 14 being attached to the rack.

The rack 10 comprises a rear panel 15 with forwardly projecting webs 16 that each terminate in a widened rail or flange 17 to which nuts 18 are secured to receive the threaded mounting screws 19 of the instruments. The details of the nuts and screws will be described more fully hereinafter.

As shown, the rack is of cast metal construction but, of course, may be constructed in any desired way, as by welding metal strips and/or stampings.

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The webs 16 may be solid, or, in the interest of saving weight, they may be provided with holes as may be consistent with strength. The depth of the webs 16 may be varied or, as one limiting value, the webs may be omitted entirely by mounting the nuts 18 directly in the rear panel 15. As an alternative construction, the mounting screws may be secured to the base, and the nuts may be attached to the instrument.

The illustrated instruments 11 are conventional electrical instruments of the ammeter or voltmeter type, etc., which are in use on aircraft, the instruments being calibrated and connected to measure values such as oil temperature, coolant temperature, current, voltage, and the like. The instrument cases differ, however, from the usual cylindrical or rectangular cases in that they are of a blunt T-shape in plan, see Fig. 2, with the under surfaces of the head resting against the flanges 17 and the shank of the T-shaped case extending rearwardly between adjacent webs 16 nearly to the rear panel 15 of the rack. In front view, as seen in Fig. 1, the instruments 11 are of rectangular shape and they are closely arranged to form, in effect, the front surface of the panel assembly. The instrument cases seat against the flanges 17 at about the center of gravity of the instruments, thereby resulting in minimum stresses in the cases when the panel assembly is subject to mechanical shocks and vibration.

Instead of inserting the mounting bolts into the instrument through the front wall thereof, the front wall of the instrument may be provided with two flanges or ears, protruding one from each side of the instrument, for this purpose. These ears then provide means for mounting and retaining the bolts 19 which, in this case, extend rearwardly along each side of the instrument casing, and external thereto, to the web of the mounting rack.

Referring particularly to Fig. 2, the instruments 11 are secured to the flanges 17 by screws or bolts 19 that are carried by the instrument case and threaded into the nuts 18 that are rigidly secured to the flanges 17. Each nut 18 has a tubular extension 20 that fits snugly in an opening through a web 17, the extension 20 being slipped into the opening from the rear and having its forward end spun or staked into firm engagement with the flaring outer portion of the opening. The crown of each nut 18 is provided with a conventional fiber washer or like insert 21 for locking the screw 19 against inadvertent rotation from shock and vibration.

The screws 19 are slidable and rotatably supported in openings 22 through the outer portions

or T-heads of the instrument cases, these openings being counterbored from the rear to provide clearance for small pins 23 that extend through the screws 19 to lock them against removal from the instrument casings. The outer ends or heads 24 of the screws 19 are cylindrical and knurled to facilitate a rapid turning of the screws by hand so long as the resistance to rotation is not so great as to require a screwdriver. The outer ends of the openings 22 are counterbored to leave only a small portion of the screw heads 24 in front of the instrument case when the screws are turned down.

From the foregoing description of the means for attaching an instrument to the rack, it will be evident that the mounting and removal of an instrument are greatly facilitated as the nuts 18 cannot become detached from the rack and lost, and the screws 19 likewise cannot become detached from the instrument but are always in position to be driven home when the instrument is placed in its location in the panel assembly. A particular advantage of this new mounting arrangement is that the instruments may be mounted upon or removed from the rack without opening the instrument casings and without going to the rear of the rack to remove clamping nuts.

As has been briefly mentioned hereinbefore, current is led to each instrument through a connector comprising a plug 13, attached to the back of the instrument, and a socket 14, secured in the rear panel of the rack. The socket is shown in front view in the lower part of Fig. 1 and in section in Fig. 4.

Referring particularly to Fig. 4, the plug 13 has a metallic shell 25 on an insulating base 26 of molded synthetic resin or the like in which conducting prongs 27 are embedded or secured. The cylindrical shell 25 extends rearwardly just beyond the rear tips of the prongs 27 and serves as a protecting sleeve therefor. Holes 28 are provided in the plug for the passage of screws for attaching the plug to the back of an instrument.

The socket 14 has an outer metallic cup 29 within which an insulating body 30 of plastic material is retained by a spring ring 31. Metallic sleeves 32 are mounted in bores of the body 30 in complementary relation to the pins or prongs 27 of the plug 13, the forward ends of the sleeves being tubular and preferably split to provide spring fingers to receive and tightly grip the prongs of the plug. The sleeves are retained in the insulating body 30 by set screws 33 that also serve to secure the ends of the lead wires in the inserts.

In order to provide for a tight seal between the outer cup 29 of the socket 14 and the shell 25 of the plug 13, the insulating body 30 in the socket preferably is formed of a plastic material having a degree of flexibility such that the rearwardly facing rim of the shell 25 presses into the flexible plastic when the two sections of the connector are brought together to establish electrical connection. Thus, the interior of the connector is protected against outside atmospheric influences when the two sections of the connector are engaged.

The usual instrument 11 requires only two leads 12 but the illustrated plug and socket connectors 13, 14 have four conducting paths to permit the mounting of various instruments that have three or four terminals. The plug and socket connectors also provide mechanical support for the rear ends of the instrument casings.

The illustrated embodiment provides a mounting for two or more columns of four instruments each, but other arrangements may of course be used according to the number of instruments and the available space. A dominant advantage of the invention is the substantial elimination of all waste space at the surface of the panel assembly, thereby greatly reducing the total panel area required for a number of instruments of a given scale length. The total panel area for an assembly of eight circular type instruments is nearly twice as great as the total panel area of the illustrated assembly of four rectangular instruments 11 having comparable scale lengths.

From the foregoing description it will be seen that the invention provides an electrical instrument panel assembly of compact and sturdy construction that is characterized by a very high ratio of scale length to panel area. The invention is not restricted to assemblies of square instruments, however, as other forms of instrument housings may be employed when there is ample space for mounting the larger housings. Nor is the invention restricted to instrument panel assemblies as the described construction may be used for mounting mechanical instruments of the pressure actuated type. The flexible tubing connections to such instruments may be made through telescoped sleeve connectors similar in general to the illustrated plug and socket connectors for electrical instruments. With both the electrical and the mechanical instruments, the construction of the assembly admits of ready removal and replacement of individual instruments without requiring removal of the panel assembly as a whole from its installation. Also, the plug-and-socket connector arrangement makes it unnecessary to go behind the panel to connect or disconnect wires when installing or removing individual instruments.

The invention is not limited to the particular embodiment thereof herein shown and described; it may be embodied in various combinations and subcombinations as defined in the appended claims.

I claim:

1. An instrument panel assembly comprising a rack including a rear panel, horizontally spaced, vertically extending, forwardly projecting webs carried by said panel and a vertically extending flange on the front of each web; a column of instrument casings with the rear ends thereof disposed in each vertical space defined by adjacent webs, the forward ends of said casings being rectangular and constituting per se the entire face of the panel assembly, each casing having lateral extensions with rear surfaces transversely aligned at about the center of gravity of the casing for seating against the flanges of the adjacent forwardly projecting webs, fastener elements carried by said lateral extensions and operable from the front of the instrument casing, complementary fastening elements carried by said flanges for securing said casings thereto, and means mechanically supporting the rear ends of said instruments upon the rear panel, said supporting means comprising complementary electrical connector elements carried by said instruments and by said rear panel.

2. An instrument panel assembly comprising a rack including a rear panel, horizontally spaced, vertically extending, forwardly projecting webs carried by said panel and a vertically extending flange on the front of each web; a column of instrument casings of rectangular form in trans-

verse cross-section disposed in each space defined by adjacent webs, the rectangular faces of adjacent casings being in approximate contact to constitute per se the entire face of the panel assembly; each casing having lateral extensions with rear surfaces transversely aligned at about the center of gravity of the casings for seating against the flanges of adjacent webs; locknuts secured to said flanges in line with the lateral extensions of each instrument casing; screws carried by the lateral extensions of said casings in complementary relation to said locknuts, the heads of said screws being exposed at the front faces of said instruments; and complementary connector elements carried by said instruments and by said rear panel.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,755,166	Cannon	Apr. 22, 1930
1,855,614	Sparkes	Apr. 26, 1932
1,958,916	Hammerly	May 15, 1934
2,020,913	Schramm	Nov. 12, 1935
2,043,904	Pierce	June 9, 1936
2,050,378	Randall	Aug. 11, 1936
2,126,674	Stout	Aug. 9, 1938
2,210,696	West	Aug. 6, 1940
2,336,121	Pampallona	Dec. 7, 1943
2,359,247	Rowe	Sept. 26, 1944
2,387,468	Ritzel	Oct. 23, 1945
2,438,371	Marholz	Mar. 23, 1948