April 28, 1964 L. W. ERATH 3,131,010

CONVERTIBLE ELECTRICAL ASSEMBLIES

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Fig. 1

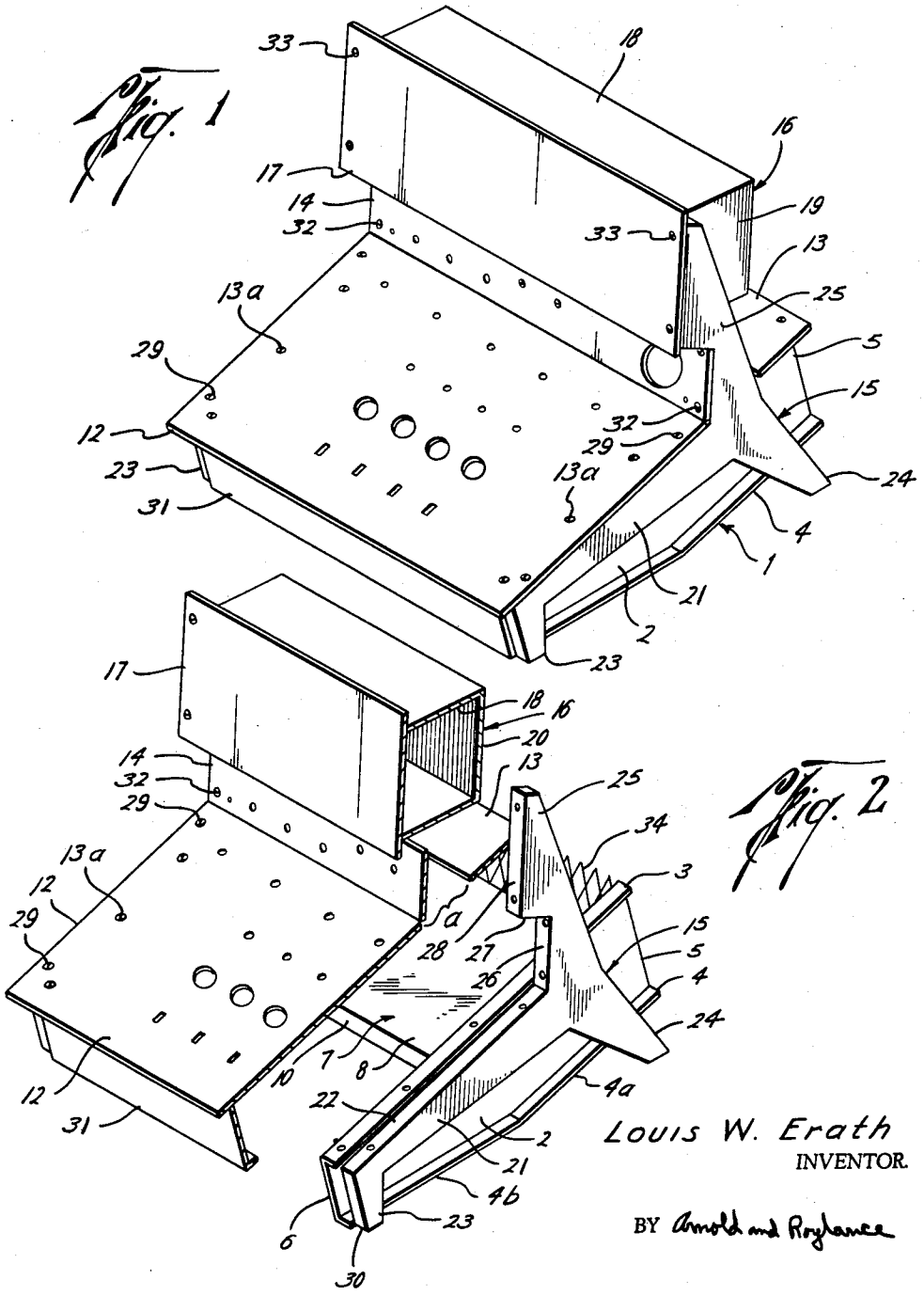

Fig. 2

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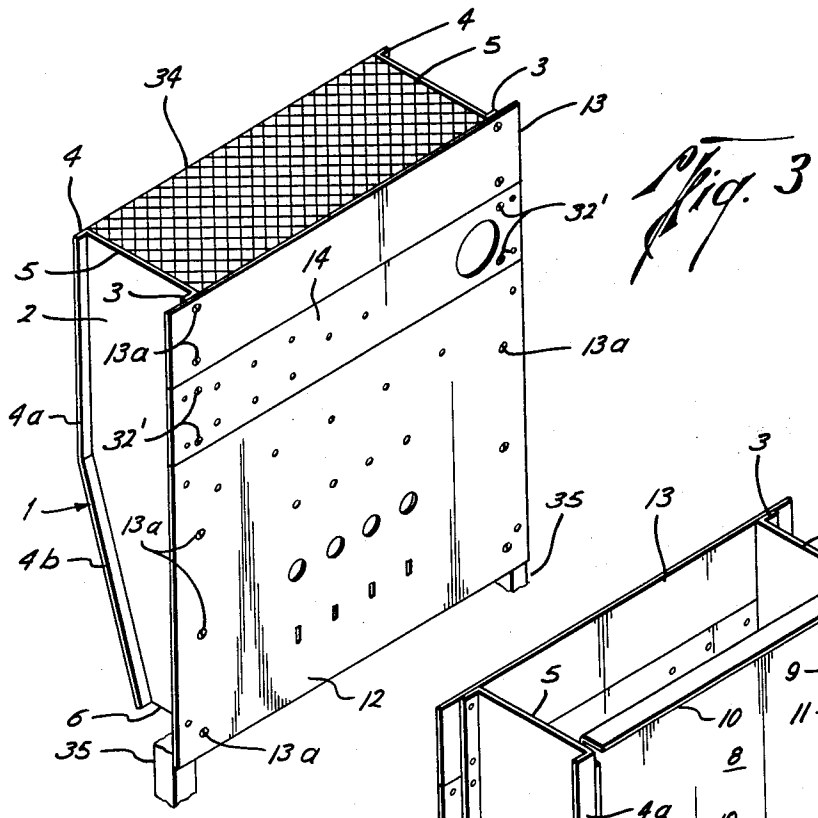

Fig. 3

Fig. 4

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CONVERTIBLE ELECTRICAL ASSEMBLIES

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This invention relates to electrical apparatus generally and, more particularly, to electrical assemblies wherein a relatively large number of electrical components are combined electrically and mechanically into a unitary apparatus which, by reason of its intended function, must present certain of its components for view and/or convenient manual manipulation. Typically, the invention can be embodied in electrical test apparatus, electrical communications equipment, and many types of automatic electrical systems.

Electrical assemblies of the type referred to have long taken either of two general forms. The first can be termed a rack assembly in which a plurality of electrical units, each including a front panel, are supported one above another on uprights in such fashion that the panels are presented vertically. The second can be termed a console configuration, in which a plurality of electrical units, each including a panel, are all supported by a single cabinet-like structure with the panels presented forwardly but at different angles. Rack assemblies are usually floor-mounted. Console assemblies are usually supported on a horizontal work table, bench or similar support surface elevated above the floor.

For reasons of economy and convenience, it has been recognized in the trade that it would be highly desirable to have electrical assemblies so constructed that they could be employed either as a rack assembly or in console configuration and could be converted from one such form to the other. Few, if any, truly successful ways have heretofore been proposed for providing such convertibility.

A general object of the invention is to devise an improved electrical assembly.

Another object is to provide an electrical assembly which can be installed either as a rack assembly or as a console unit and can be converted quickly and easily from one configuration to the other.

A further object is to devise an electrical assembly including a number of panel units securely mounted on support means in such fashion that the units can be easily removed and rearranged.

In order that the manner in which these and other objects are attained in accordance with the invention can be understood in detail, reference is had to the accompanying drawings, which form a part of this specification, and wherein:

FIG. 1 is a frontal perspective view of a convertible electrical assembly constructed in accordance with one embodiment of the invention and arranged in console configuration for support on a horizontal surface;

FIG. 2 is a view similar to FIG. 1 but with parts broken away for clarity;

FIG. 3 is a frontal perspective view of the device of FIG. 1 converted for upright rack mounting; and

FIG. 4 is a perspective view similar to FIG. 3 but showing the assembly from the rear.

Turning now to the drawings in detail, it will be seen that the embodiment of the invention chosen for illustration comprises a pair of identical spaced, parallel side members 1 each formed of relatively stiff sheet metal in such fashion as to have a transverse cross section in the form of a shallow U, the base of the U being provided by main web 2 and the legs by narrow flanges 3 and 4

which extend from end edge 5 to end edge 6. Flange 3 is flat and straight throughout its length. Commencing at end edge 5, flange 4 has a portion 4*a* which extends parallel to flange 3 for approximately half the length of the side member. Remaining portion 4*b* slants obliquely toward flange 3. End edges 5 and 6 extend at right angles to flange 3. The two side members 1 are arranged with the flanges 3, 4 projecting outwardly, the flanges 3 lying in a common plane, and the flanges 4 lying in a common plane. Since the two side members are identified, end edges 5 lie in a common plane and end edges 6 lie in a common plane.

As best seen in FIGS. 2 and 4, a rectangular sheet metal panel or chassis 7, carrying electrically components (not shown) which need not be displayed for view, extends between the side members 1 and has its ends secured to the respective webs 2 immediately adjacent to flange portions 4*a*. Formed of sheet metal, panel 7 has a flat rectangular main body 8, end flanges 9 and side flanges 10. Directly engaged with the respective ones of the opposed faces of webs 2, the end flanges 9 are secured to the webs, as by conventional fastening means 11, FIG. 4.

Flanges 3 of the side members are directly bridged by a larger flat rectangular sheet metal panel 12 and a smaller flat rectangular sheet metal panel 13, both panels extending across the outer faces of flanges 3 and being rigidly secured thereto, as by conventional fastening means 13*a*. Panels 12 and 13 are of equal width, their width being such that the panels project beyond the free edges of flanges 3 so that there is a distinct overhang on each side of the assembly, as seen in FIGS. 3 and 4. The adjacent edges of panels 12 and 13 are parallel and spaced apart by a distance *a*, FIG. 2, effectively equal to the narrow dimension of an elongated flat rectangular panel 14.

When arranged in console configuration, for support on a horizontal surface, as seen in FIGS. 1 and 2, the assembly includes a pair of identical uprights 15 adapted both to support the structure as a whole and to mount panel 14 and an additional housing 16 which includes a front panel 17, top and bottom walls 18, end walls 19, and a rear wall 20.

Each upright 15, as best seen in FIG. 2, comprises an elongated portion 21 having a straight, flat top edge surface 22. A front leg 23 depends from one edge of portion 21, and a back leg 24 depends from the other. Front leg 23 is shorter than back leg 24 and the free ends of the legs are slanted, both lying in a common plane which slants forwardly toward edge 22 at substantially the same angle as portion 4*b* of flange 4 slants toward flange 3 in each side member 1.

At the rear end of portion 21, each upright 15 includes an upwardly projecting portion 25 which can be considered as an extension of back leg 24. If the top edge 22 of portion 21 be extended across portion 25, the width of portion 21 here is effectively equal to the distance *a* between the adjacent edges of panels 12 and 13. A portion 26 of the front edge of upwardly projecting portion 25 joins the adjacent end of edge 22 and slants upwardly and rearwardly therefrom. At the top of portion 26, portion 27 of the front edge of portion 25 slants forwardly and upwardly, extending at right angles to portion 26. The distance between the juncture of edge portion 26 with edge 22 and the juncture of edge portions 26 and 27 is equal to the distance *a*. The remaining portion 28 of the front edge of portion 25 slants upwardly and rearwardly, parallel to edge portion 26. Edge portions 26, 27 and 28 are all straight and flat.

Consider that side members 1 have been joined together by panel 7, and that panels 12 and 13 have been affixed

to flanges 3 of the side members, as earlier described. Each upright 15 is now positioned beside one of the side members 1, with portion 25 of the upright projecting upwardly between the adjacent edges of panels 12 and 13 and with the upper edge 22 of portion 21 extending along the lower surface of the overhanging portion of panel 12. The upright is fixed rigidly in place by being secured to the overhanging portion of panel 12, as by conventional removable fasteners indicated at 29. With upright 15 thus mounted, the front edge 30 of front leg 23 lies in the same plane as do front edges 6 of webs 2 of side members 1. Back legs 24 slant downwardly and rearwardly, so that their free ends are located below panel 13. A front wall member 31 closes the space between front edges 6 of webs 2 of side members 1, wall member 31 being secured in place in any suitable fashion, as by angle brackets (not shown) attached to webs 2. Legs 23 and 24 can be of such length as to extend below the plane defined by flange portions 4*b*, or can have their slanted tips flush with the bottom faces of flange portions 4*b*.

Panel 14 having the same long dimensions as do panels 12 and 13, is secured to edge portions 26 of uprights 15 by removable fasteners 32, with the lower edge of the panel engaging the adjacent edge of panel 12.

Housing 16 is mounted by attaching the overhanging ends of panel 17 to edge portions 28 of uprights 15 by removable fasteners 33. In this connection, it will be understood that panel 17 is secured to the front edges of walls 18 and 19 and that end walls 19 are spaced apart by a distance such that, when enclosure 16 is centered relative to supports 15, end walls 19 lie against the inner faces of support portions 25.

The assembly is completed by a rear closure 34, bridging the space between edges 5 of webs 2. Formed of expanded metal or like perforate material, closure 34 is secured to side members 1 in any conventional fashion.

Arranged thus in console fashion, the assembly constitutes a stable device in which panels 12, 14 and 17 are conveniently presented to view from the front. Panels 7 and 13 lend rigidity to the structure and afford accommodation for electrical components which need not be presented for view or manipulation.

The assembly is quickly and easily convertible to the configuration seen in FIGS. 3 and 4, which configuration is especially adapted for vertical mounting on a conventional rack support. Conversion is accomplished by removing fasteners 29 and 32, removing the pair of fasteners 33 at one end of panel 17, removing the one of uprights 15 thus freed, then removing the combination of the remaining upright 15 and housing 16, and finally employing the fasteners 32' to secure panel 14 directly to flanges 3 of side members 1. With the assembly thus converted, panels 12, 13 and 14 all lie in the same plane and, because the narrow dimension of panel 14 effectively equal distance *a*, panels 12, 13 and 14 are in edge-to-edge contact so as to coact to form a complete closure across the space between side members 1. The converted assembly is mounted, with panels 12, 13 and 14 vertically disposed, by means of fasteners extending through openings previously occupied by fasteners 29 and 32. The mounting fasteners are engaged in spaced uprights 35, FIG. 3, of the usual support rack.

It will be obvious from the foregoing that, when assembled as shown in FIGS. 3 and 4, the device can be quickly and easily converted to the console configuration of FIGS. 1 and 2. Regardless of which configuration exists, any of panels 12, 13, 14 and 17, with the electrical components carried thereby, can be easily removed from the assembly and replaced by other panels of the same size and shape.

The invention is particularly useful in connection with relatively complex electrical test equipment, for example, involving numerous meters and the like, which must be viewed by the user, and switches and controls which must be so situated that their operating elements are presented for convenient manual manipulation.

Though one advantageous embodiment has been chosen for illustrative purposes, it will be understood by those skilled in the art that various changes and modifications can be made without departing from the scope of the invention as defined in the appended claims.

What is claimed is:

1. In a convertible electrical assembly of the type described, the combination of

two side members each having an elongated edge;

means mechanically interconnecting said side members to maintain the same in spaced relation with said edges lying in a common plane;

a first panel extending over said edges of both of said side members and secured thereto,

said first panel having an edge extending transversely relative to said side members,

said side members both having portions projecting away from said edge of said first panel;

a second panel extending over both of said projecting portions of said side members and secured thereto,

said second panel having an edge spaced from said edge of said first panel;

two support members each disposed beside and extending at least generally parallel to a different one of said side members and removably attached to the combination of said side members and said first and second panels, each of said support members including

a panel mounting portion projecting through the space between said edges of said first and second panels and thence away from said first and second panels, and

foot means adapted to engage a generally horizontal supporting surface; and

a third panel detachably secured to said panel mounting portions of said support members,

said third panel being of such size and shape as to fill the space between said edges of said first and second panels, whereby, upon removal of said support members and detachment of said third panel therefrom, said third panel can be positioned between said first and second panels and secured to said side members.

2. An assembly in accordance with claim 1 and wherein

said first panel has opposed end portions each projecting beyond the corresponding one of said side members, and

said support members each have a portion extending along a different one of said projecting end portions of said first panel and secured thereto.

3. In a convertible electrical assembly of the type described, the combination of

two side members each having an elongated straight edge;

means mechanically interconnecting said side members to maintain the same in spaced relation with said straight edges lying in a common plane;

a first flat rectangular panel extending over said straight edges of said side members and secured thereto,

said first panel having an edge extending transversely across said side members and said side members both having portions projecting away from said edge of said first panel,

said first panel also having end portions each projecting beyond a different one of said side members;

a second flat rectangular panel extending over said straight edges of said side members and secured thereto,

said second panel having an edge spaced from said edge of said first panel;

two support members each comprising
an elongated portion disposed beside one of said side members,
foot means dependent from said elongated portion, and
a panel mounting portion projecting from said elongated portion;
said elongated portion of each of said support members having a straight edge engaged with the corresponding one of said end portions of said first panel and being removably attached thereto to mount such support member on the combination of said panels and said side members;
said foot means being adapted to engage a bench top or like supporting surface;
said panel mounting portions projecting through the space between said edges of said first and second panels and thence away from said panels on the side thereof opposite said side members; and
a third flat rectangular panel detachably secured to said panel mounting portions of said support members,
said first, second and third panels being of effectively equal dimension transversely of said side members,
the other dimension of said third panel being effectively equal to the space between said edges of said first and second panels, whereby, upon removal of said support members and detachment of said third panel therefrom, said third panel can be positioned between said first and second panels and secured to said side members in such fashion that said first, second and third panels then combine to form a panel assembly completely covering the space between said side members and having end portions projecting beyond said side members for attachment to uprights of a conventional rack.

4. An assembly in accordance with claim 3 and wherein
the effective length of said foot means is shorter at the end of said elongated portion most distant from said edges of said first and second panels and longer near the opposite end, whereby said foot means, when disposed on a horizontal surface, so positions the assembly that said first panel slants downwardly and away from said panel mounting portions.

5. An assembly in accordance with claim 4 and wherein
said panel mounting portions have front edges slanting upwardly away from said edge of said first panel, said third panel being secured to said front edges and having one of its edges extending along said one edge of said first panel.

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