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INSTRUMENT ENCLOSURE ADAPTABLE TO VARIOUS HEIGHTS
AND INCLUDING REMOVABLE HANDLES

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2 Sheets-Sheet 1

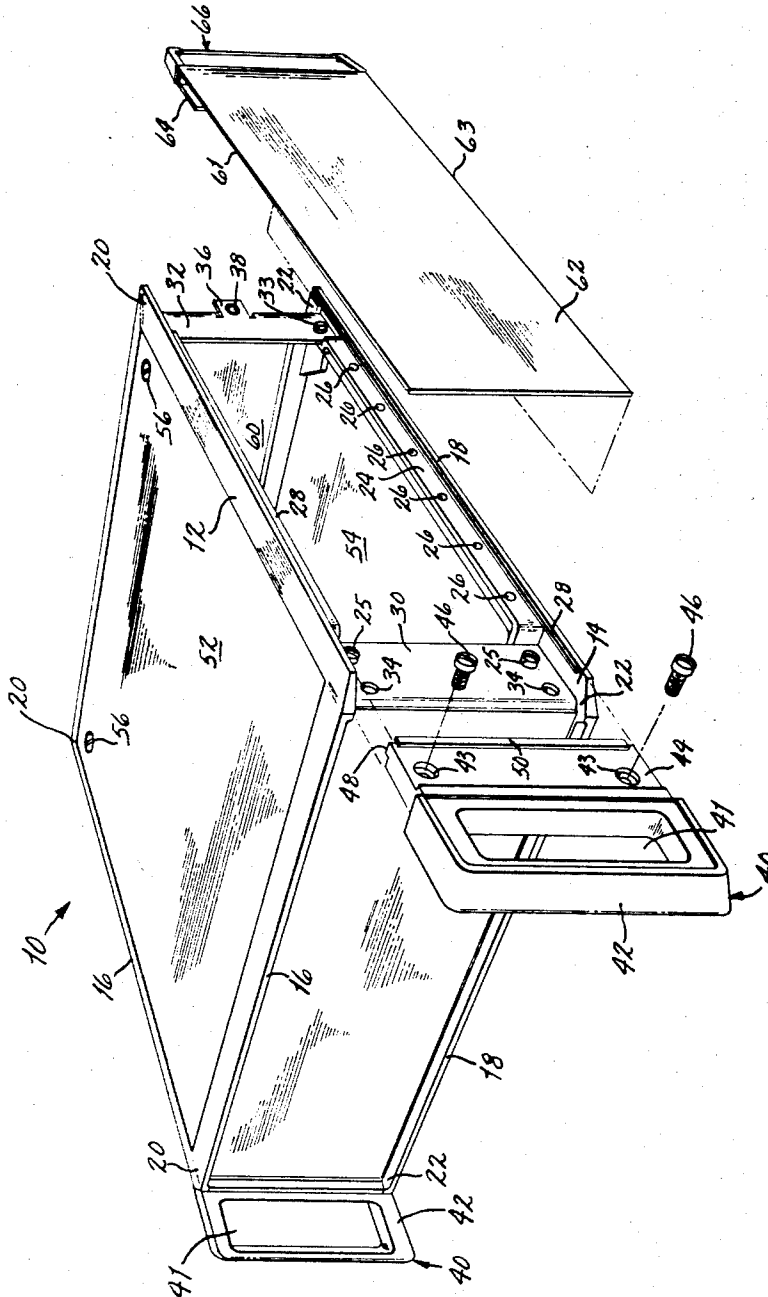


FIG. 1

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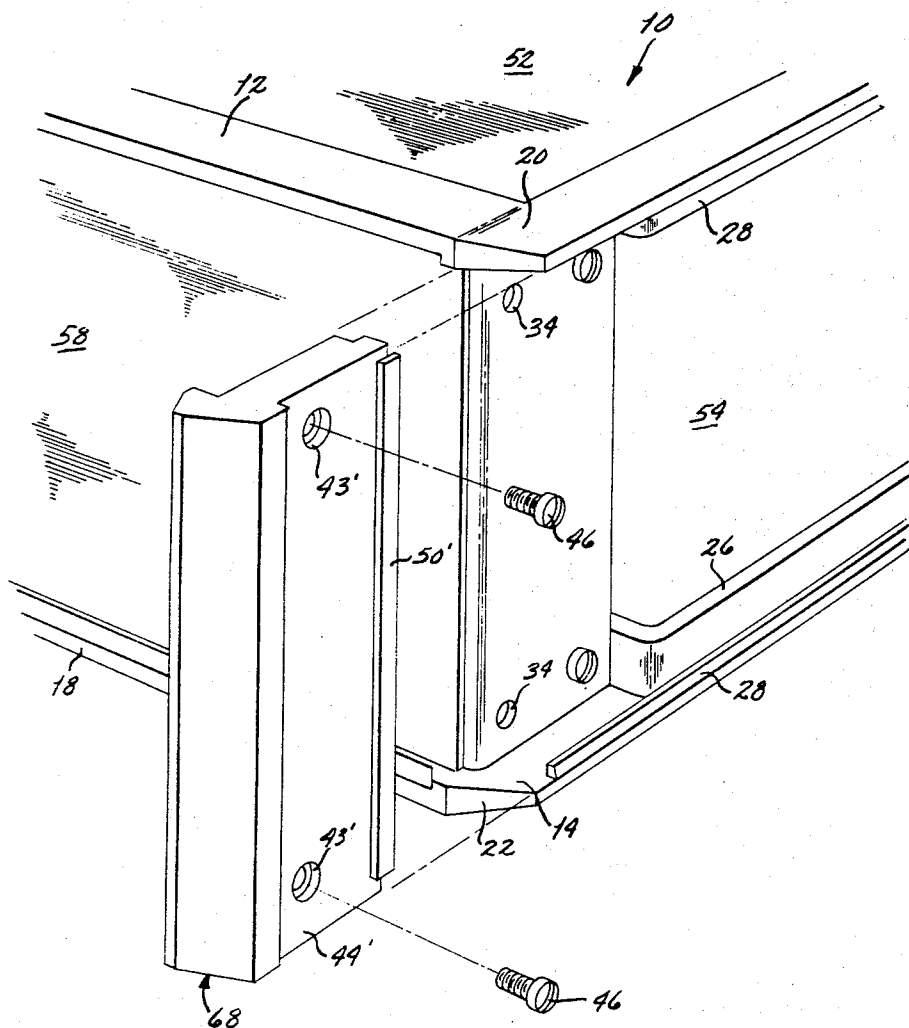


FIG 2

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1

2

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INSTRUMENT ENCLOSURE ADAPTABLE TO VARIOUS HEIGHTS AND INCLUDING REMOVABLE HANDLES

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ABSTRACT OF THE DISCLOSURE

The instant disclosure describes an instrument enclosure consisting of substantially identical die-cast upper and lower frame members which are fabricated to a predetermined size. These upper and lower frame members are spaced apart by means of structural spacer struts positioned at the four corners of the enclosure and inwardly of its peripheral edges. In this manner, recesses are provided so that either a removable handle or a decorative cap may be secured to the enclosure depending upon the environment in which it is to be used. Furthermore, the upper and lower frame members include grooved tracks into which the side members of the enclosure are securely held.

The present invention relates generally to instrument enclosures, and more particularly to an instrument enclosure which is readily adaptable to various heights and may be provided with or without handles depending upon the environmental use of the enclosure.

In the field dealing with the design and construction of instrument enclosures, it has been proposed that the side panels be of the integral construction, wrap-around frame type. In such enclosures the handles which protrude forward of the front panel are formed integrally with the side panel frames.

Although such enclosures have served the purpose, they have not proved satisfactory under all conditions of service for the reason that the protruding handles are undesirable and must be sawed from the integral side panel frame where the enclosure is to be mounted in a standing instrument rack. Furthermore, where it is desired to vary the height of the instrument, separate die-castings are required to provide a family of side panel frames to correspond to the desired standard heights.

The general purpose of this invention is to provide an instrument enclosure which embraces all of the advantages of similar employed enclosures, yet does not possess the foredescribed disadvantages. To attain this, the present invention utilizes a unique combination of integral, die-cast upper and lower frame members of a standard size and structural spacer struts which provide the desired height dimension of the enclosure. These spacer struts also serve to secure removable handles or decorative cap members to the enclosure, depending on whether it is to be rack-mounted or portable.

An object of the present invention is the provision of a novel instrument enclosure which utilizes common structural upper and lower frame members, which may be used throughout a family of enclosures having various heights.

Another object is to provide an instrument enclosure which is readily adaptable for use without handles or for use with handles as a portable bench instrument.

In the present invention these purposes (as well as others apparent herein) are achieved generally by providing an enclosure consisting of upper and lower frame members which are integral, one-piece construction and

common to a family of various height enclosures. The upper and lower frame members are spaced-apart by vertically-extending struts positioned in close proximity to and inwardly of the enclosure corner edges. The spacer struts are so positioned as to provide recess areas into which either handles or decorative cap members may be inserted and securely fixed to the struts. The upper and lower frame members also have grooved tracks into which side panels, having height dimensions corresponding to the desired height of the instrument, may be inserted and securely held in place.

Utilization of the invention will become apparent to those skilled in the art from the disclosures made in the following description of a preferred embodiment of the invention as illustrated in the accompanying drawings, in which:

FIG. 1 is a perspective, partially-exploded view of the instrument enclosure of the present invention, illustrating the removable handle embodiment of the present invention;

FIG. 2 is an enlarged, perspective detail view of the instrument enclosure of FIG. 1, illustrating the enclosure with a decorative cap member exploded from its mounted position.

Referring now to the drawings, wherein like reference characters are designated by like or corresponding parts throughout the several views, there is shown in FIG. 1 an instrument enclosure, generally designated 10. The instrument enclosure 10 has substantially identical upper and lower frame members 12 and 14, respectively. Each of these frame members 12 and 14 is an integral, one-piece die-cast construction, preferably an aluminum die casting. As may be seen in FIG. 1, the frame members 12 and 14 are generally rectangular in shape and have outer edges 16 and 18, respectively, which define the peripheral outer dimensions of the instrument enclosure 10. The substantially rectangular shape of the upper and lower frame members 12 and 14 provides 90° upper and lower corners 20 and 22, respectively.

Formed integrally with the upper and lower frame members 12 and 14 are flanges 24 which extend along those portions of the upper and lower frame members 12 and 14 which form the sides of the instrument enclosure 10. The flanges 24 are provided with apertures 26 spaced along their vertical extending portion, so that internal parts of the instrument enclosure (for example; fans, motors, partitions, and the like) may be secured to them. It should be noted that the flanges 24 are offset at their ends so that they may be secured to vertically-extending spacer struts to be described hereinafter.

Grooved tracks 28 are also formed integrally with the upper and lower frame members 12 and 14 and parallel to the flanges 24. These grooved tracks 28 extend substantially the entire length of the side portions of the upper and lower frame members 12 and 14, and are positioned adjacent to the outer edges 16 and 18. As will become apparent hereafter, these tracks 28 receive and support the covering side panels of the instrument enclosure 10 within the grooves provided therein.

Four vertically-extending spacer struts 30 and 32 are located in close proximity to the corners of the instrument enclosure 10 and inwardly of the outer edges 18 and 20 of the upper and lower frame members 12 and 14. The front spacer struts 30 are spaced sufficiently inward of these outer edges 16 and 18 so as to provide a recess area into which the removable handles, to be described hereinafter, may be fitted without extending beyond the outer edges 16 and 18. The front spacer struts 30 are provided with four holes 34. Two of these holes are provided in registration with the offset portions of the flanges 24 of the upper and lower frame members 12 and 14. In this

manner, metal screws 25 may be inserted through the holes to secure the front spacer struts 30 to the flanges 24. So positioned, the spacer struts 30 along with the struts 32, fix the overall height of the instrument enclosure 10; they position the upper frame member 12 above the lower frame member 14 and in substantial vertical registration therewith.

For purposes of simplifying the illustration of the invention, only two of the four spacer struts are shown in the drawings. It should be understood that the left side of the enclosure 10, as viewed in FIG. 1 is identical in construction to the right side revealed by the exploded parts.

The rear spacer struts 32 are secured to the offset portions of the flanges 24 by means of metal screws 33. Unlike the front corner spacer struts 30, however, the spacer struts 32 include tabs 36 having rounded apertures 38. As will become more apparent hereinafter, the tabs 36 may be used to secure the rear portion of the side panels to the instrument 10.

It should be noted that the spacer struts 30 and 32 determine the overall height of the instrument enclosure 10. Therefore, the spacer struts are made to predetermined, assorted lengths, so that the overall height of the instrument enclosure may be varied between 3½", 5¼", 7" and on up to the various other accepted standard heights, by simply selecting the proper struts and using them with the substantially identical, interchangeable upper and lower frame members.

The instrument enclosure 10 is provided with two removable handles 40. These handles include a gripping portion 42 having a suitable hand-access opening 41 and a bracket portion 44. The bracket portion 44 has about the same dimensions as the access area provided between the front spacer struts 30, the outer edges 16 and 18, and the lower and upper surfaces of the frame members 12 and 14, respectively. They are provided with screw holes 43 which may be registered with the two rearward holes 34 of the spacer struts 30, and secured thereto by means of the machine screws 46. In the secured position the rear edge 48 of the bracket portion 44 abuts the surface presented by the forward offsets of the upper and lower flanges 24.

Provided adjacent to and somewhat overlapping the rear edge 48 is a retaining strip 50 which extends vertically along the bracket portion 44 of the removable handles 40. As will become apparent hereinafter, these retaining strips 50 are used to overlap the forward edges of the enclosure side panels, thereby to prevent it from any outward movement.

Top and bottom panels 52 and 54 are provided to enclose the top and bottom of the instrument enclosure 10. These panels are preferably vinyl-clad aluminum sheets which may be recessed under lips (not shown) provided along the front portions of the upper and lower frame members 12 and 14, and secured to the rear portions of such members by means of screwdriver-actuated tabs 56. Front and rear panels 58 and 60, respectively, are preferably U-shaped sheet members whose bent edges are pressed against and secured to the inside surfaces of the front and rear spacer struts 30 and 32. In most instances the front panel 58 is used for display purposes, and, therefore, will preferably be a plastic material having transparent window portions and openings for knobs, dials, switches, and the like. The rear panel 60, like the top panels, is preferably a vinyl-clad aluminum sheet.

Side panels 62 are provided to cover the sides of the instrument enclosure 10 between the upper and lower frame members 12 and 14. Preferably these side panels 62 are similar to the top and rear panels 52 and 60; that is, they are vinyl-clad sheet metal members. An assortment of these side panels 62 are cut to meet the various standard heights of instrument enclosures desired.

At the rearward end of the side panels 62, they are wrapped around or bent into a U-shaped configuration to

provide a latching leaf 64. Secured to this U-shaped configuration of the side panel 62 are rear bumper assemblies 66. Preferably the rear bumper assemblies 66 are made of a resilient plastic material. They serve as pedestal feet to support and cushion the instrument enclosure 10 when it is gripped by its removable hands 40 and stood on end.

The side panels 62 may be secured to the instrument enclosure 10 by fitting their upper and lower edges 61 and 63 into the grooves of tracks 28 of the upper and lower frame members and positioned with their front edges overlapped by the retaining strips 50 of the removable handles 40. At the other end of the side panels 62, the latching leaf 64 are positioned to overlap the tabs 36 formed integrally with the rear spacer struts 36. In this manner machine screws (not shown) may be inserted through the rounded apertures 38 in the tabs 36 and into the latching leaf 64 to secure the rearward ends of the side panels 62 and bumper assemblies 66 to the instrument enclosure 10.

Referring now to FIG. 2 there is shown an alternative embodiment of the instrument enclosure 10. In this particular embodiment the removable handles 40 shown in FIG. 1 have been removed and replaced by decorative caps, generally designated 68. These decorative caps 68 consist of a bracket portion 44', including a retaining strip 50' similar to that provided on the handle bracket 44. The front portion of decorative cap 68 mounts flush with the front edges 18 and 16 of the upper and lower frame members 12 and 14.

It should be apparent that the decorative caps 68 enable the instrument enclosure 10 to be rack mounted in such a manner that there are no portions of the enclosure which extend forward of the front panel. This is accomplished by simply backing off the machine screws 46 and replacing the removable handles 40 with the decorative caps 68.

In summary, the instrument enclosure 10 provides the advantage of being constructed from substantially identical upper and lower frame members which are spaced apart by structural strut members that determine the overall height of the enclosure. Furthermore, these spacer struts serve to secure removable handles and the side panels of the instrument enclosure 10.

Obviously, many modifications and variations of the present invention are possible in light of the above teachings. Therefore, the invention may be practiced otherwise than as specifically described.

We claim:

1. An instrument enclosure of the type which is adaptable to various heights, comprising

upper and lower rectangular frame members defining the upper and lower peripheral edges of such enclosure, each member being an integral, die-cast construction of a predetermined size,

four vertically-extending spacer struts positioned between said upper and lower frame members in close proximity to and inwardly of the respective corners thereof, two of said spacer struts being positioned inwardly of the outer edges of said frame members to define two handle recesses on each side and to the front of said enclosure,

two removable handle members having bracket portions inserted, respectively, and secured to said two spacer struts within said handle recesses and including gripping portions protruding outwardly of said peripheral edges of said enclosure, and

panel members extending vertically and horizontally between said frame members to form front, rear, side, bottom and top panels for said enclosure.

2. An instrument enclosure of the type which is adaptable to various heights, comprising

upper and lower rectangular frame members defining the upper and lower peripheral edges of such en-

5

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closure, each member being an integral, die-cast construction of a predetermined size,
 four vertically-extending spacer struts positioned between said upper and lower frame members in close proximity to and inwardly of the respective corners thereof, two of said spacer struts being positioned inwardly of the outer edges of said frame members to define two handle recesses on each side and to the front of said enclosure,
 two removable handle members having bracket portions inserted, respectively, within said handle recesses and including gripping portions protruding outwardly of said peripheral edges of said enclosure, and
 panel members extending vertically and horizontally between said frame members to form front, rear, side, bottom and top panels for said enclosure,
 the outer two spacer struts including an integral tab means,
 said panel members forming said side panels having a wrapped-around portion in registration with said tab means,
 together with means for securing said wrapped-around portion of said panel members to said tab means.
 3. The instrument enclosure as defined in claim 2, wherein
 said bracket portions of said handle members include retaining strips positioned to overlap the front edges of said side panel members, thereby to prevent outward movement thereof.
 4. An instrument enclosure of the type which is adaptable to various heights, comprising
 upper and lower rectangular frame members defining the upper and lower peripheral edges of such enclosure, each member being an integral, die-cast construction of a predetermined size,
 four vertically-extending spacer struts positioned between said upper and lower frame members in close proximity to and inwardly of the respective corners thereof, two of said spacer struts being positioned inwardly of the outer edges of said frame members to define two handle recesses on each side and to the front of said enclosure,
 two removable handle members having bracket portions inserted, respectively, within said handle recesses and including gripping portions protruding outwardly of said peripheral edges of said enclosure, and
 panel members extending vertically and horizontally between said frame members to form front, rear, side, bottom and top panels for said enclosure,
 said frame members including horizontally grooved tracks formed integrally with and toward the outer edge thereof, said grooved tracks being of sufficient width to receive said panel members therein.
 5. An instrument enclosure of the type which is adaptable to various heights, comprising
 upper and lower rectangular frame members defining

the upper and lower peripheral edges of such enclosure, each member being an integral, die-cast construction of a predetermined size,
 a plurality of vertically-extended spacer struts positioned between said upper and lower frame members in close proximity to and inwardly of the respective corners thereof, two of said spacer struts being positioned sufficiently inward of said edges of said frame members to define two handle recesses on each side and to the front of said enclosure,
 two decorative cap members having bracket portions inserted respectively within said handle recesses with their front portions in substantial vertical alignment with the front edges of said upper and lower frame members, and
 panel members extending vertically and horizontally between said frame members to form front, rear, side, bottom and top panels for said enclosure.
 6. The instrument enclosure as defined in claim 5, wherein
 said bracket portions of said decorative cap members include retaining strips to overlap the front edges of said side panel members, thereby to prevent outward movement thereof.
 7. An instrument enclosure of the type which is adaptable to various heights, comprising
 upper and lower frame members defining the upper and lower peripheral edges of such enclosure, each frame member being an integral, one-piece construction of a standard size and having formed integrally thereof a vertically-extending flange,
 vertically-extending spacer struts fixedly secured at their ends to said flanges of said upper and lower frame members to space and rigidly support said upper frame member vertically above said lower frame member and in registration therewith, two of said spacer struts being positioned inwardly of said edges of said frame members to define two handle recesses on each side and to the front of said enclosure,
 removable handle members having bracket portions secured within said handle recesses and including gripping portions protruding outwardly of said peripheral edges of said enclosure, and
 panel members extending vertically and horizontally between said frame members to form front, rear, side, bottom and top panels for said enclosure.

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