

[54] EQUIPMENT ENCLOSURE

[75] Inventor: **Robert C. Kay, Rochester, Minn.**  
[73] Assignee: **International Business Machines Corporation, Armonk, N.Y.**  
[22] Filed: **Mar. 2, 1971**  
[21] Appl. No.: **120,238**

[52] U.S. Cl..... 220/4 F  
[51] Int. Cl..... B65d 7/12, B65d 7/24  
[58] Field of Search..... 220/4 R, 4 A, 4 F

[56] **References Cited**

## UNITED STATES PATENTS

1,224,234	5/1917	Taber .....	220/4 R
2,774,808	12/1956	Bullock .....	220/4 R X

## FOREIGN PATENTS OR APPLICATIONS

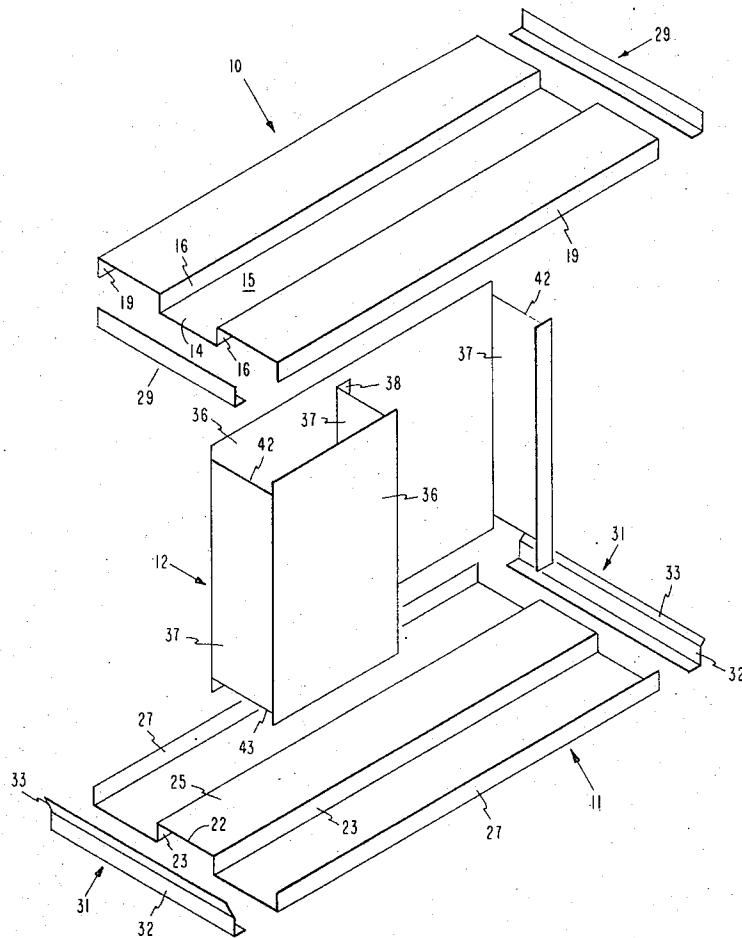
123,192 1/1947 Australia ..... 220/4 R

*Primary Examiner*—George E. Lowrance  
*Attorney*—Hanifin & Jancin and Robert W. Lahtinen

[57] ABSTRACT

This invention provides an enclosure in which the principle structural support is provided by a pair of generally horizontal sheet metal planes separated by a central column with each of the members being formed of a continuous piece of sheet metal. The central column cooperates with the top and bottom structural members, not only to support, but to provide alignment and gauging functions and may further simultaneously provide for shielding, compartmentalization and ducting functions. The enclosure is completed by top and side covers supported from the principle structural elements.

## 6 Claims, 8 Drawing Figures



PATENTED APR 3 1973

3,724,702

SHEET 1 OF 3

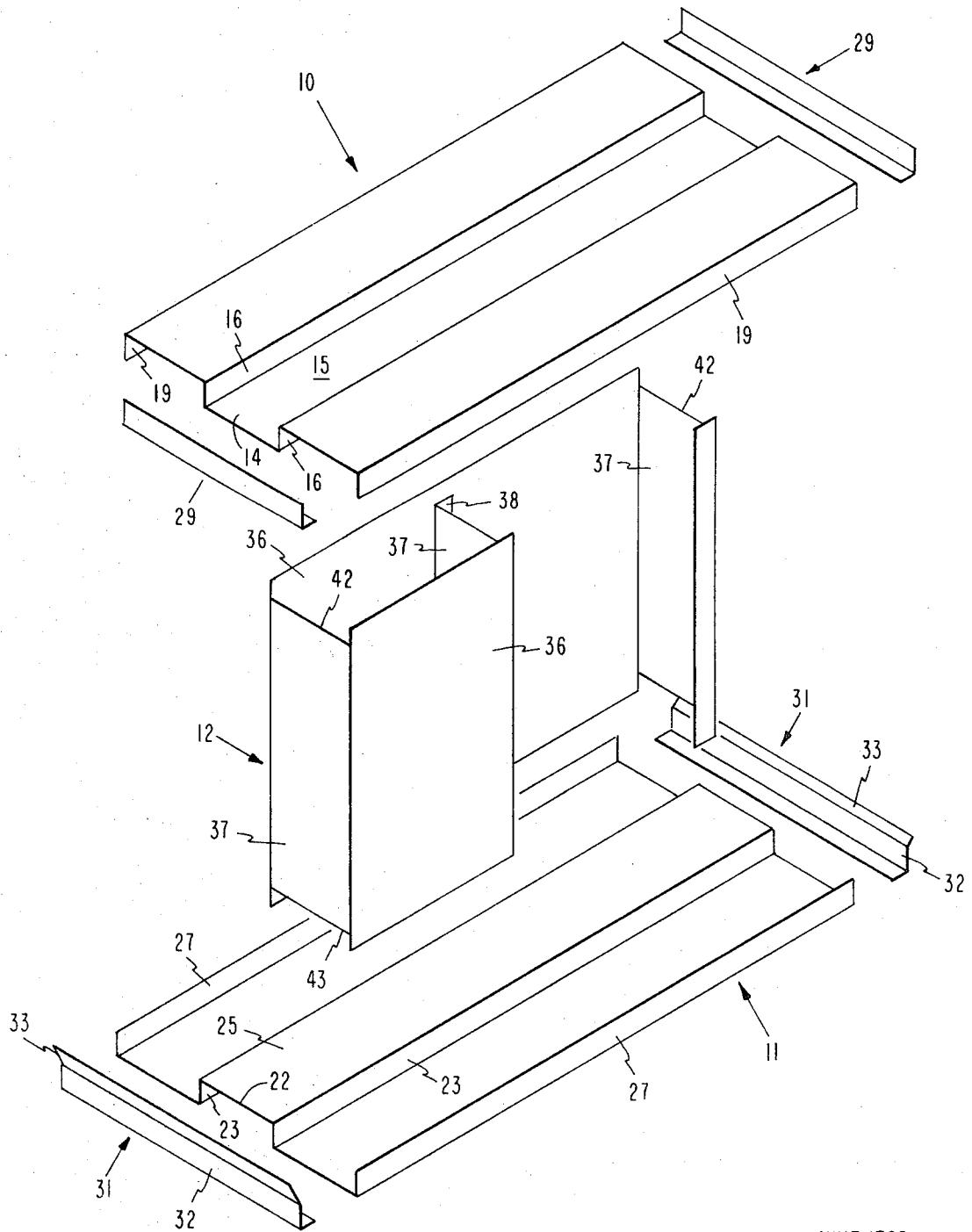


FIG. 1

INVENTOR

ROBERT C. KAY

BY

*Robert W. Ralston*

ATTORNEY

PATENTED APR 3 1973

3,724,702

SHEET 2 OF 3

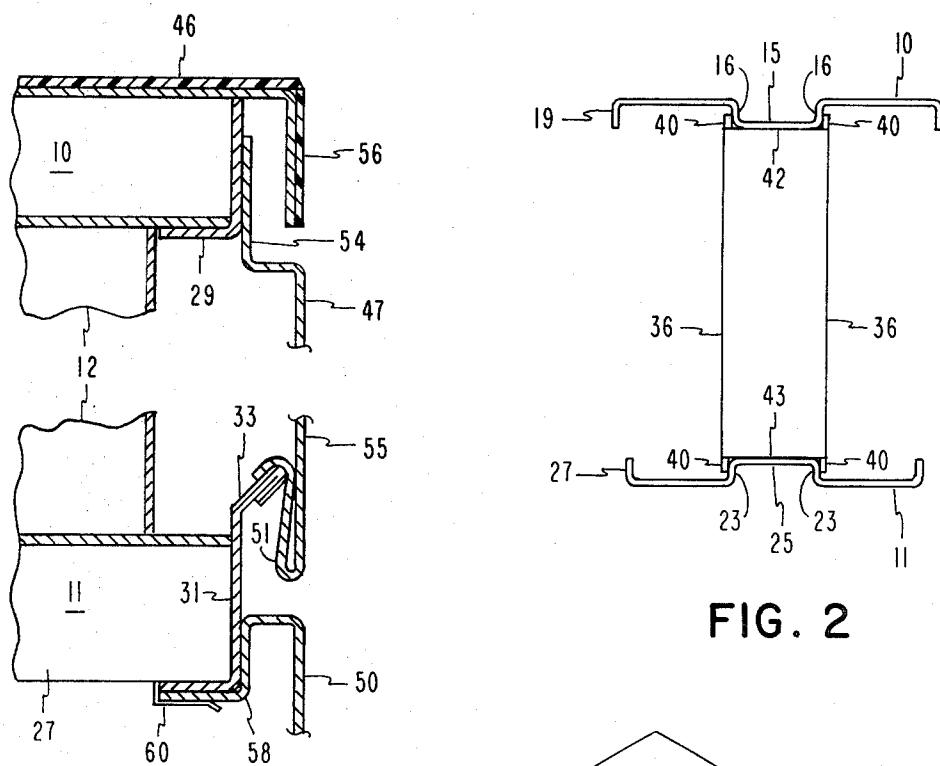


FIG. 2

FIG. 4

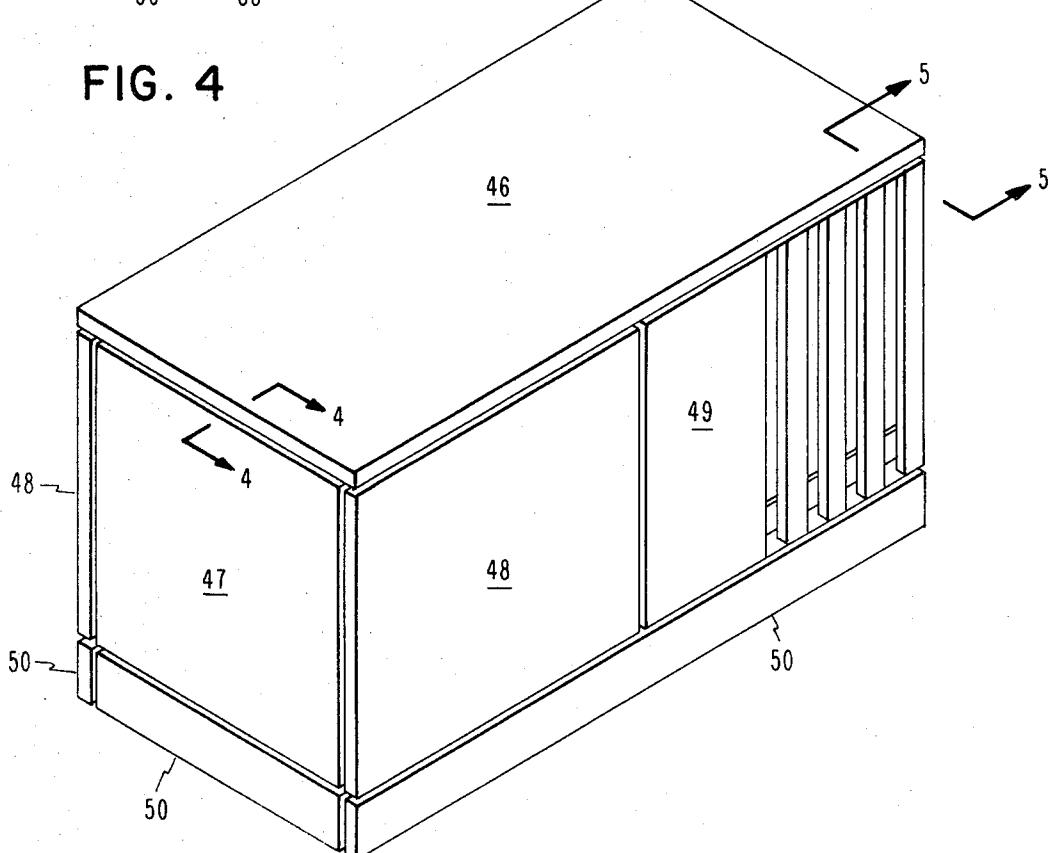


FIG. 3

PATENTED APR 3 1973

3.724,702

SHEET 3 OF 3

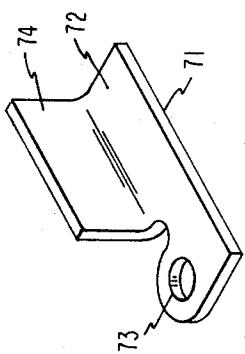
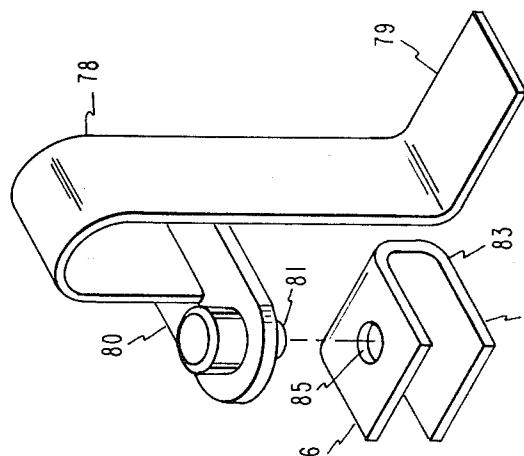


FIG. 7



88

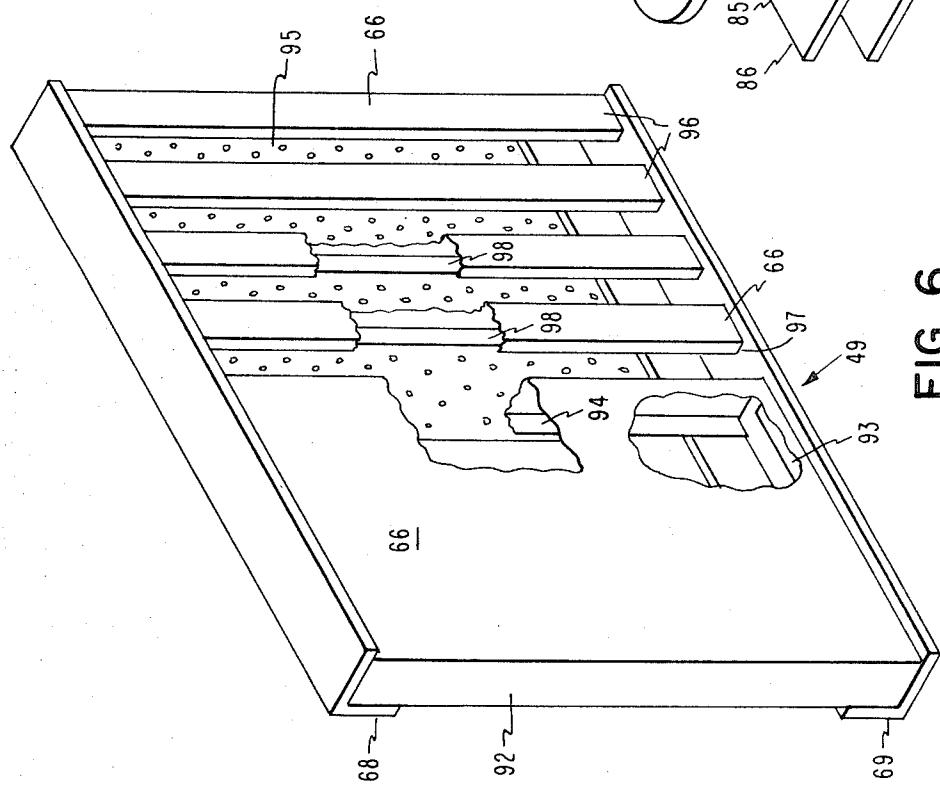
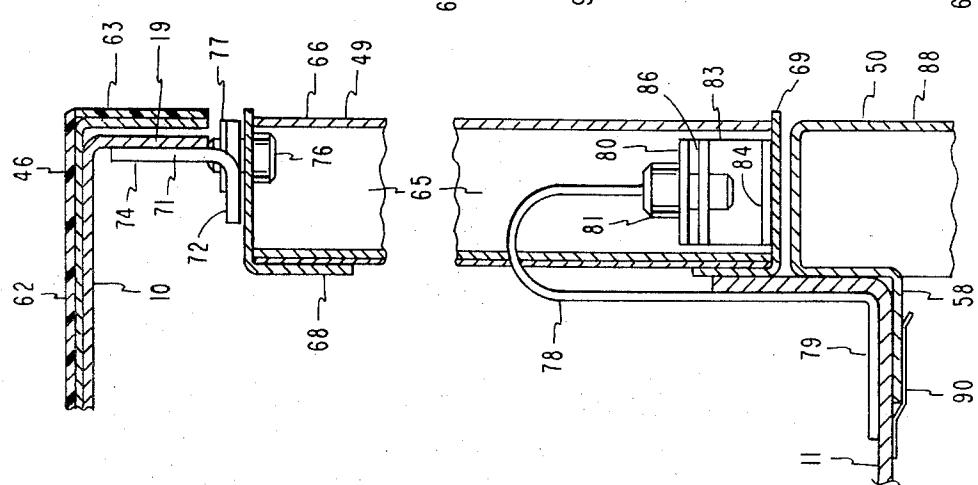


FIG. 6



१०

## EQUIPMENT ENCLOSURE

## FIELD OF THE INVENTION

This invention pertains to mechanical packaging devices and more particularly to equipment enclosures.

## BACKGROUND OF THE INVENTION

In the present invention, the principle structural support for an enclosure is provided by a pair of sheet metal planes interconnected by a column of formed sheet metal. The top and bottom planes are formed with a longitudinal channel, the flange portions of which form attachment surfaces. The column member is formed with longitudinally extending terminal flange portions with the upper and lower margins abutting the top and bottom channel flange surfaces and secured thereto to initially provide transverse alignment and thereafter afford interconnection. The column is formed with the marginal edge surfaces of the sheet portions transversely interconnecting or extending from the longitudinally extending column wall portions engaging the lower surface of the web of the top channel and the upper surface of the web of the bottom channel to gauge the vertical spacing between top and bottom planes.

The column member provides design flexibility in affording not only the principle support, but also enabling simultaneous provision for isolating various portions of the resulting enclosure. Such isolation may effect electromagnetic or acoustic shielding of various portions of the enclosed space one from the other or provide ducting for fluid such as cooling air or vacuum supply. In the latter instance, the resulting closed column provides added torsional resistance between top and bottom planes. Where cooling is required pressurizing a closed section of the central column to afford a static head provides a plenum structure from which air can be ducted from bleed points to afford air for cooling and other functional requirements.

The support structure allows the use of standard tooling in the form of a press brake and permits wide flexibility in size and configuration to meet application requirements without the employment of special tooling.

The enclosure may be completed by installing fixed end plates and hinged front and rear cover sections. When it is necessary to furnish free opening area for the ingress or egress of air while retaining a compatible appearance, a louvered door section can be generated by the use of a perforate sheet extending between the upper and lower angle elements that form a portion of the cover with vertical louver sections extending between and secured to such angle elements. The louver sections each have a flange secured along the surface of the perforate sheet and present an external surface co-planar with the outer surface of the solid panel portion of the cover or the solid panel exterior surface of an adjoining door or cover.

It is an object of this invention to provide an equipment enclosure utilizing readily available material and requiring no special tooling. It is a further object of this invention to provide an enclosure structure readily adaptable to variations in size and application requirements. It is also an object of this invention to provide an enclosure wherein the structural elements may also flexibly function to compartmentalize and electromag-

netically shield discrete portions within the enclosure. It is also a function of the invention to provide an enclosure wherein the principle structural parts are self aligning and self gauging. These and other objects, features and advantages of the invention will be apparent from the following more particular description of a preferred embodiment of the invention as illustrated in the accompanying drawings.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an exploded isometric view of the principle supporting structure of the enclosure of this invention.

FIG. 2 is an end view of the top and bottom members and central column element of the enclosure support of FIG. 1.

FIG. 3 is an isometric view of the assembled structure of FIG. 1 to which has been added the top and side covers and kickstrips.

FIG. 4 is an interrupted partial section view of the enclosure taken along line 4-4 of FIG. 3 showing the attachment of the end cover.

FIG. 5 is an interrupted partial vertical section view of the enclosure taken along line 5-5 of FIG. 3 illustrating the attachment of a hinged cover member.

FIG. 6 is an isometric view partially broken away of a louvered cover member.

FIG. 7 is an isometric view of a bracket that forms a portion of the upper hinge structure of FIG. 5.

FIG. 8 is an exploded isometric view of a bracket and cooperating apertured channel portion which forms a part of the lower hinge structure of FIG. 5.

## DETAILED DESCRIPTION

Referring to the drawings, FIG. 1 shows an exploded isometric view of the top member 10, bottom member 11 and central column element 12 which provide the principle structural support of an enclosure. Top member 10 is formed of a continuous sheet of metal with a central longitudinally extending channel 14 downwardly depressed from the upper surface which includes a central web portion 15 and attachment flange portions 16. A downwardly turned flange 19 along each of the transverse margins provides structural rigidity and also a surface for the attachment of other enclosure components. The bottom member 11 is similar to top member 10, having a longitudinally extending central channel 22 projecting upwardly from the lower surface. Channel 22 presents a pair of parallel attachment flanges 23 and a connecting web 25. The bottom member also provides a turned flange 27 along each transverse marginal edge for attachment and structural rigidity purposes. An end plate 29 is attached at each longitudinal end of top member 10 by being welded to the abutting marginal edge surface. Similarly, end plates 31 have lower planer portions 32 welded to the edge surfaces along the longitudinal ends of the bottom member 11, with each of such plates presenting an upper portion 33 diverging upwardly and outwardly. Central column element 12 is formed of a single continuous sheet of metal with longitudinal wall portions 36 connected by cross members 37 and a final terminal flange 38 welded to the adjoining longitudinal wall portion. In constructions requiring a complex central column element, it may be more economical to fabricate such column of two or more pieces to achieve

the required alignment and parallelism and avoid problems of handling large sheets.

As seen in the partially assembled condition of FIG. 2, the column element longitudinal wall portions 36 present alignment flanges 40 which project upwardly and downwardly respectively along the surfaces of the top and bottom member channel attachment flanges 16 and 23. These flanges 40 terminate before they reach the top and bottom member surfaces respectively. The cross member of upper marginal edge surfaces 42 abut the lower surface of the channel web 15 of top member and the lower cross member edge surfaces 43 abut the upper surface of the bottom member channel web 25. Accordingly, the spacing and parallelism of the upper and lower cross member edge surfaces 42, 43 in cooperation with the web surfaces channels 14 and 22 gauge the vertical distance between the top and bottom members while the column element alignment flanges 40 in cooperation with the top and bottom member channel attachment flanges 16 and 23 transversely align top member 10, bottom member 11 and central column element 12 with respect to one another.

Each of the principle structural members, top member 10, bottom member 11 and central column element 12 are each formed of a single, continuous sheet of metal which require, as necessary tooling, only a press brake. The length and width of the top member and the bottom member can be varied according to the design requirements while the height of the overall structure may be varied by changing only the width of the sheet used to form center column element 12.

FIG. 3 shows an isometric exterior view to which a top cover 46, and covers 47, hinged doors 48, 49 and kickstrips 50 have been attached.

The end covers 47 are secured as shown in FIG. 4 with the lower marginal portion 51 turned back on itself and formed into a curved channel in which is received the longitudinal margin of the diverging portion 33 of lower end plate 31. The upper margin of the end cover 47 is flanged to present a surface 54 in abutting contact with the exterior major surface of the top member end plate 29. The end cover 47 is configured so that in cooperation with the bottom member end plate 31 and the top member end plate 29 a vertical surface 55 is presented which is co-planar with the end surface 56 of top cover 46. The kickstrip 50 is fabricated of formed sheet metal with a securing strip 58 projecting therefrom and held captive against the lower surface of bottom member 11 by a series of spring clips 60.

Hinged covers 48, 49 are pivotally connected to the top member 10 and bottom member 11 about a vertical axis as shown in FIG. 5. The top cover 46 is secured over top member 10 and presents a planar top surface 62 to the completed enclosure and a series of vertical surfaces 63 adjoining the margins thereof which are co-planar with the adjoining end cover or hinged cover. The cover is formed of a shrouding sheet metal portion 65 which provides the major external surfaces 66 and extends between an upper angle 68 and a lower angle 69. An upper bracket 71, shown in FIGS. 5 and 7 which includes a horizontal portion 72 with an aperture 73 and a turned tab 74 is secured to the top member flange 19 by welding the tab in abutting relation with such top member flange. A pin 76 having an annular groove pro-

jects upwardly from the surface of angle 68 forming the top of the hinged cover and projects through the aperture 73 in bracket 71 wherein it is retained by a retaining ring 77 received in the annular groove to provide the vertical support for the cover.

Adjoining the lower portion of the door, a bracket 78 (also shown in FIG. 8) has a lower turned portion 79 welded to the upper surface of bottom member 11 with the opposite leg of the U-shaped portion projecting beyond the transverse side of the bottom member and carrying a plate 80 which has secured thereto a downwardly depending pin 81. A channel shaped bracket 83 has the lower flange 84 welded to the lower angle 69 which forms a portion of the cover and includes an aperture 85 in the upper flange 86 through which is received the depending pin 81 and which is coaxial with the aperture of the upper bracket 71 to guide the pivotal action of the cover. Beneath the pivotal cover is a kickstrip 50 which presents a major surface 88 co-planar with the major surface 66 of the pivotally mounted cover and at its opposite side presents a longitudinally extending securing flange 58 which is held against the lower surface of the bottom member by a series of spring clips 90.

Cover 49 as shown in FIG. 6 is constructed to provide a louvered section with free opening area through which cooling air may be admitted or exhausted. A solid panel portion 92 extends between upper angle 68 and lower angle 69 and is formed with upper and lower turned flanges 93 (one of which is shown) adjoining and secured to the lower surface of upper angle horizontal portion and the upper surface of the lower angle horizontal portion respectively. Vertical flanges 94 adjoin and are secured to the adjoining vertical upper and lower angle surfaces. A foraminous sheet 95 extends from beneath cover panel portion turned flange 94 to the end of the cover assembly and extends from upper angle 68 to lower angle 69. A series of 40 equally spaced louver sections 96 extend between the upper and lower angles, each being a four sided configuration with an inwardly projecting wall 97 at one margin adjoining the wall surface 66 that is co-planar with the major exterior surface 66 of the solid panel portion 92. A third wall portion extending inwardly to the foraminous sheet 95 connects to a short marginal flange 98 secured to both the foraminous sheet 95 and the angles 68 and 69 to provide an integrated unitary structure.

While the invention has been particularly shown and described with reference to a preferred embodiment thereof, it will be understood by those skilled in the art the various changes in form and details may be made therein without departing from the spirit or the scope of the invention.

What is claimed is:

1. An enclosure comprising a continuous sheet metal top member having a longitudinally extending channel formed therein to present a pair of longitudinally extending attachment flanges;
- a continuous sheet metal bottom member having a central longitudinally extending channel formed therein to present a pair of longitudinally extending attachment flanges; and
- a central sheet metal column element extending from said top member to said bottom member,

said column element having a first vertical wall portion presenting an upper alignment flange abutting and secured to said top member along one of said pair of attachment flanges at longitudinally spaced positions and a lower alignment flange abutting and secured to said bottom member along one of said pair of attachment flanges at longitudinally spaced positions,

said column element including second and third wall portions projecting angularly from said first wall portion, each of said second and third wall portions having upper and lower marginal edge surfaces respectively abutting the web portions of said top member and said bottom member channel portions,

whereby said alignment flanges and attachment flanges transversely position said members and said column with respect to one another and said marginal edge surfaces gauge the vertical separation between said top member and said bottom member.

2. The enclosure of claim 1 wherein said column element has a fourth vertical wall portion substantially parallel to said first vertical wall portion and presenting alignment flanges along the upper and lower marginal edges,

said first and fourth wall portion alignment flanges respectively abutting said attachment flanges at opposite transverse side of said formed channels.

3. The enclosure of claim 2 wherein said column element further comprises a fifth wall portion extending between said first and fourth wall portion to form a

closed column portion extending from said top member to said bottom member.

4. The enclosure of claim 1 further comprising cover means extending vertically from the marginal edge portion of said top member to the underlying marginal edge portion of said bottom member, at least one unit of said cover means being swingably connected about a vertical axis by coaxial first and second pivot means disposed respectively between the top member and said cover unit and said bottom member and said cover unit, one of said pivot means permitting said cover unit and the other said pivot means permitting limited axial relative motion between said cover unit and said pivotally interconnected member.

15 5. The enclosure of claim 4 wherein one said cover unit comprises upper and lower horizontal supports; a foraminous sheet extending between and secured to said supports, and a plurality of parallel partial rectangular channel struts extending between and respectively fastened at the ends thereof to said upper and lower supports.

6. The enclosure of claim 5 wherein said struts each have a first surface abutting and secured to said foraminous sheet at a second planar surface, said second planar surfaces being co-planar and horizontally spaced from said foraminous sheet and from one another, whereby a louvered surface is formed with the space intermediate said struts affording access to the free opening area of said foraminous sheet.

\* \* \* \* \*

35

40

45

50

55

60

65

UNITED STATES PATENT OFFICE  
CERTIFICATE OF CORRECTION

Patent No. 3,724,702 Dated April 3, 1973

Inventor(s) R. C. Kay

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the claims:

Column 6, line 11, "permitting" should be  
--supporting--.

Signed and sealed this 19th day of February 1974.

(SEAL)

Attest:

EDWARD M.FLETCHER, JR.  
Attesting Officer

C. MARSHALL DANN  
Commissioner of Patents