

[54] **INSTRUMENT CASE OF ASSEMBLED
MODULAR ELEMENTS**

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[52] U.S. Cl. **220/4 R, 220/3.9 A, 220/4 E**

[51] Int. Cl. **B65d 7/00**

[58] Field of Search.....220/4 R, 4 E, 3.94

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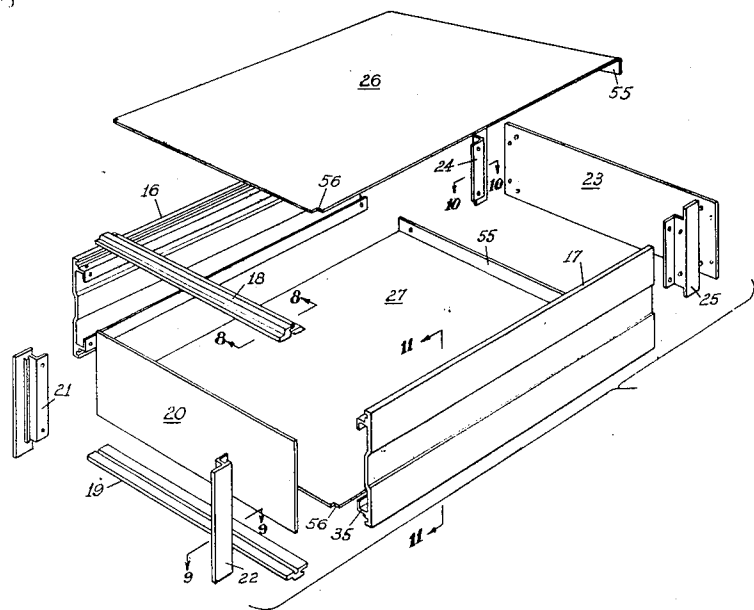
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Assistant Examiner—John J. Love
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[57] **ABSTRACT**

An instrument case formed from modular elements which can be assembled in different multiples and sizes to obtain cases of different sizes so as to vary the capacities of the respective cases. It consists of modular elements, certain of which are standardized metal extrusions and others of which are standardized sheet metal panels, which are varied in certain dimensions in accordance with the desired size of the case. Various of these elements interfit in assembling and are retained in assembled condition by fasteners which are not visible from the front of the case.

8 Claims, 12 Drawing Figures



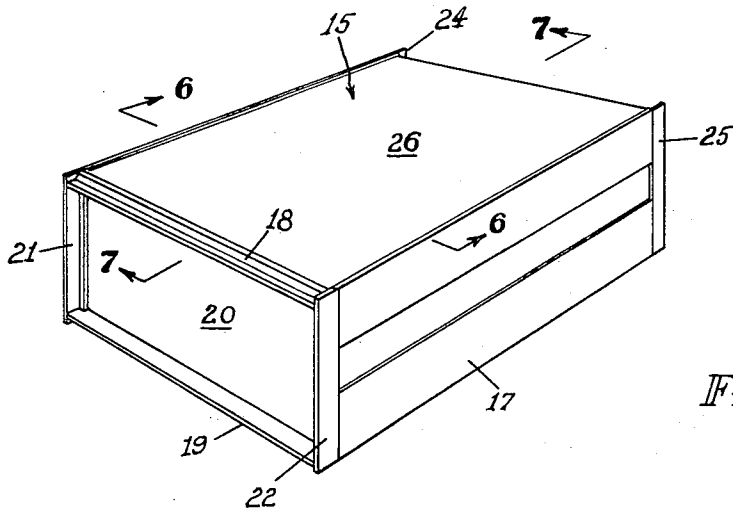


Fig 1

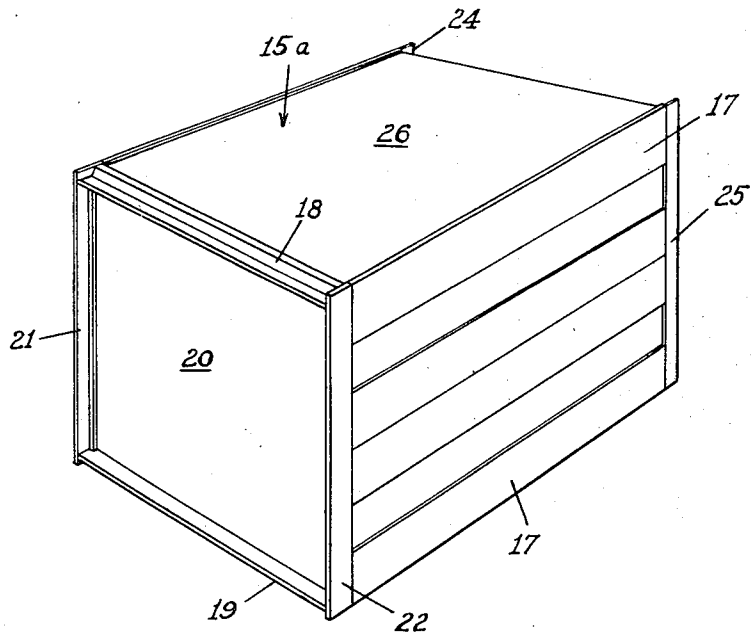


Fig 2

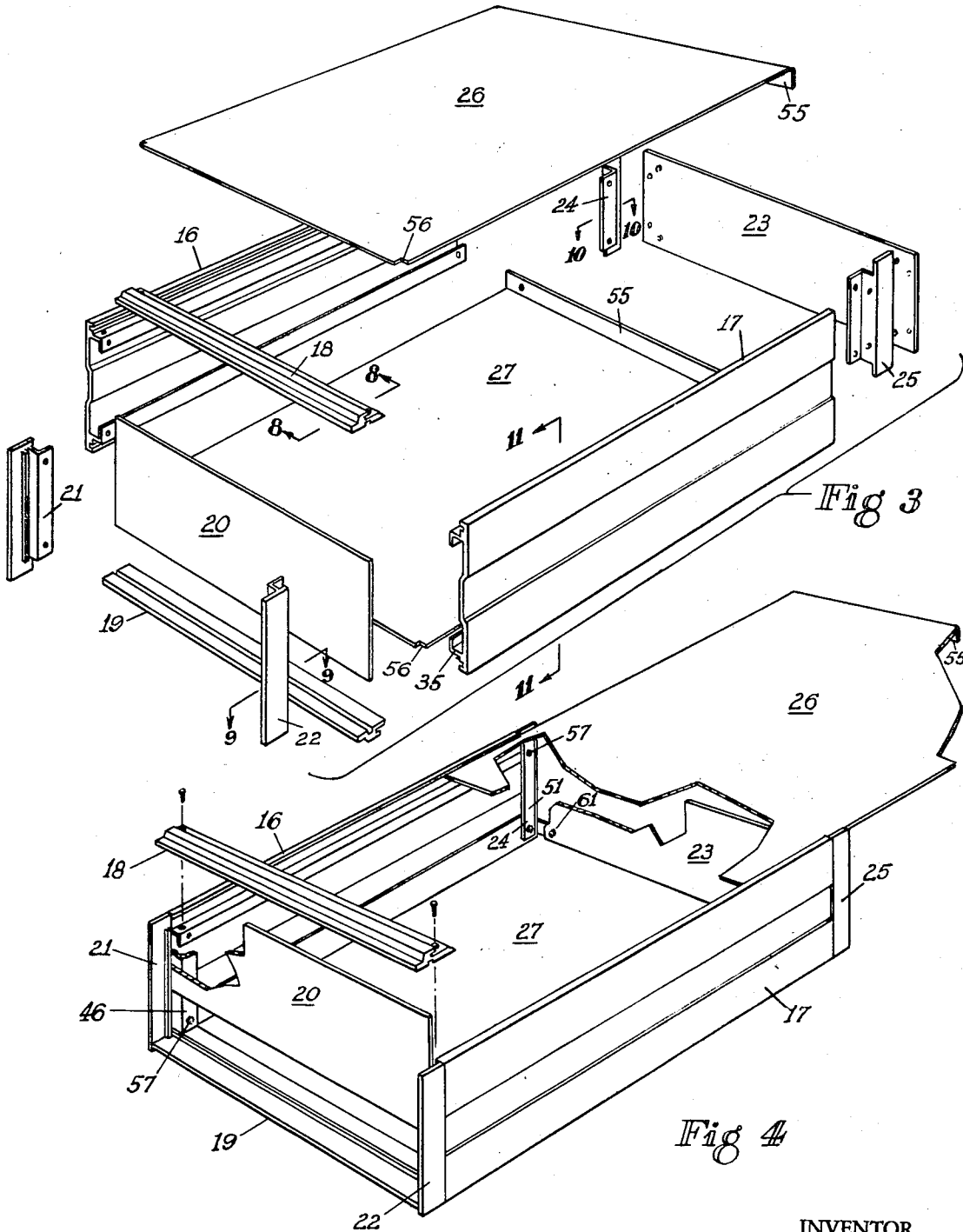
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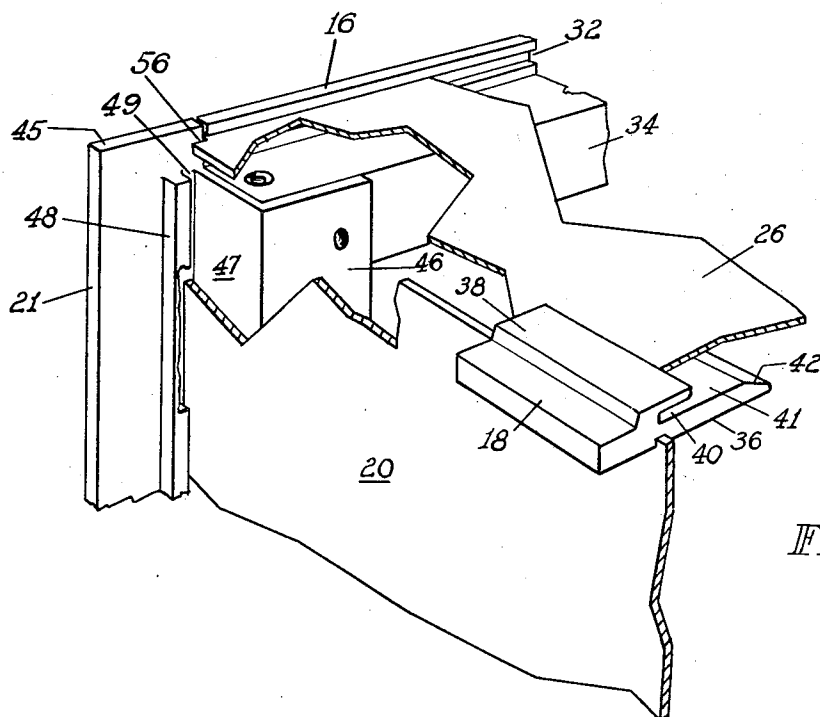


Fig 5

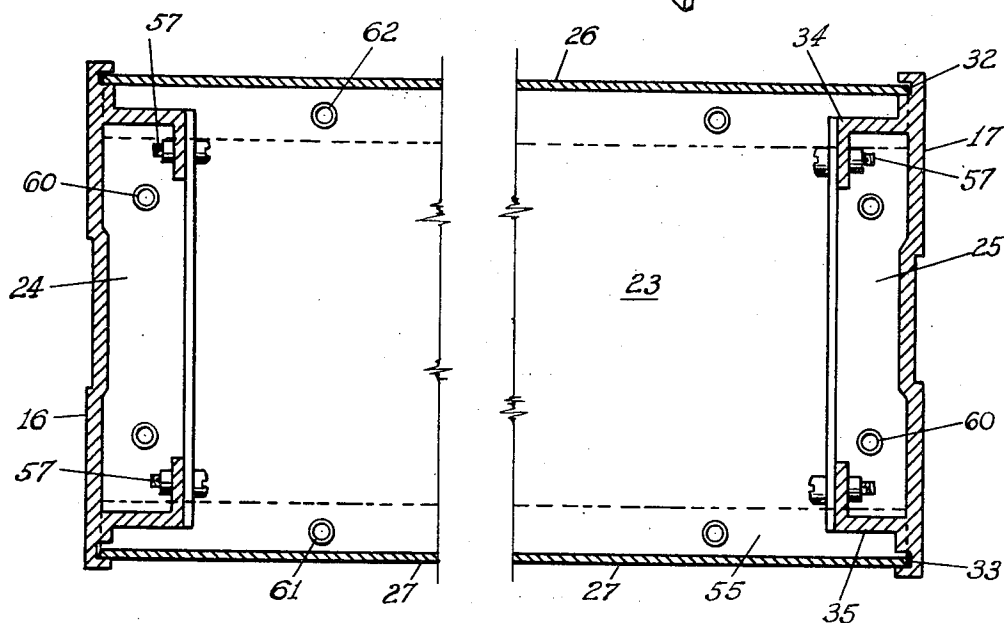


Fig 6

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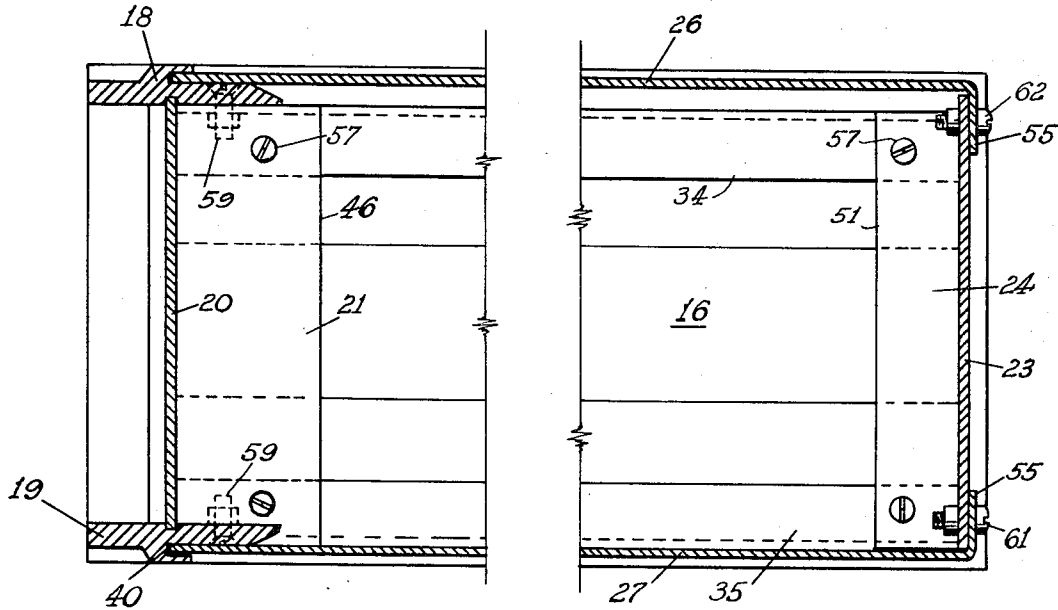


Fig 7

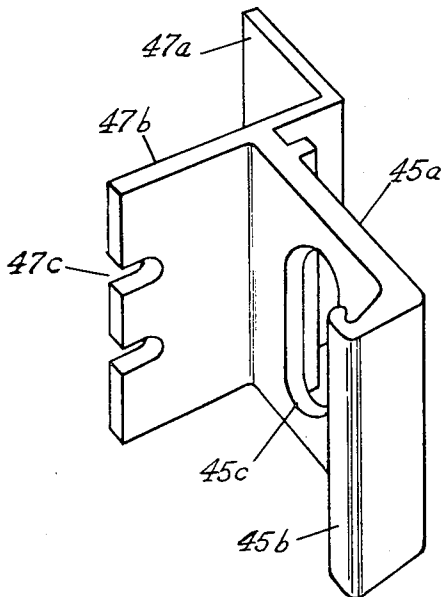


Fig 9a

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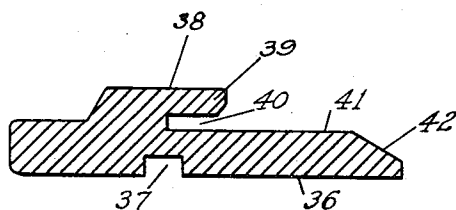


Fig 8

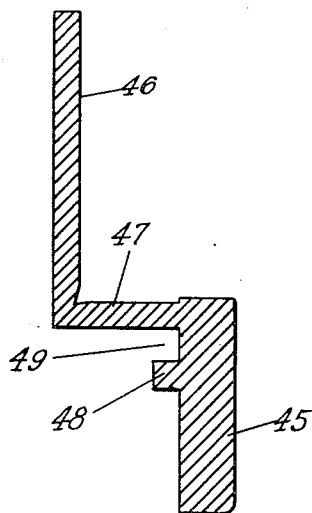


Fig 9

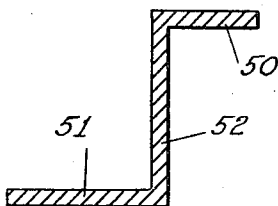


Fig 10

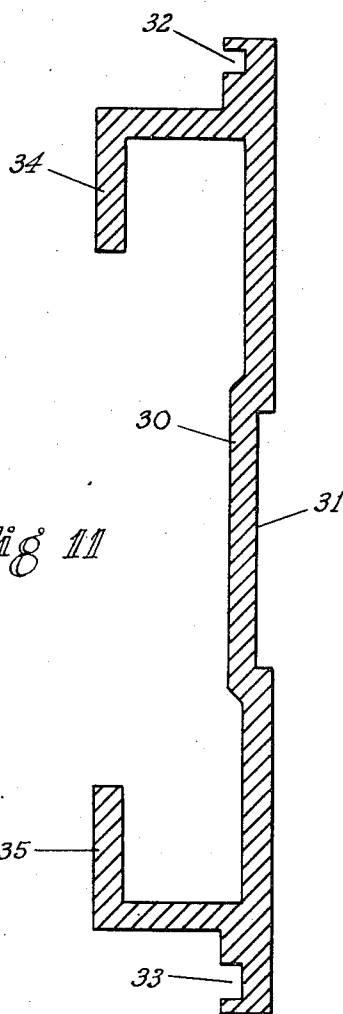


Fig 11

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INSTRUMENT CASE OF ASSEMBLED MODULAR ELEMENTS

Instrument cases for electronic instruments are needed in various capacities depending on the nature of the instruments to be disposed therein. Many of these instruments are custom made and custom made cases are usually needed to contain them. These custom made cases are usually quite expensive. The present invention provides for considerable flexibility in customizing an instrument case but making it possible to do this at a low cost due to the use of standardized low-cost modular elements. The best mode contemplated in carrying out this invention is illustrated in the accompanying drawings in which:

FIG. 1 is a perspective view of a case of minimum height assembled of elements in accordance with this invention.

FIG. 2 is a similar view but showing a case twice the height of the one shown in FIG. 1.

FIG. 3 is an exploded view showing all the parts of the case in spaced relationship.

FIG. 4 is a perspective view showing most of the parts assembled.

FIG. 5 is a detail in perspective, partly broken away, showing details of a front corner structure.

FIG. 6 is a vertical sectional view taken along line 6—6 of FIG. 1.

FIG. 7 is a vertical sectional view taken along line 7—7 of FIG. 1.

FIG. 8 is an enlarged vertical sectional view taken through one of the top or bottom front trim strip extrusions along line 8—8 of FIG. 3.

FIG. 9 is an enlarged horizontal sectional view taken through one of the front corner extrusions along line 9—9 of FIG. 3.

FIG. 9a is a perspective view showing a modified front corner extrusion with an integral handle portion.

FIG. 10 is an enlarged horizontal sectional view taken through one of the rear-corner extrusions along line 10—10 of FIG. 3.

FIG. 11 is an enlarged vertical sectional view taken through one of the side panel extrusions along line 11—11 of FIG. 3.

With reference to the drawings, as previously indicated, the case fabricated according to this invention is assembled from low-cost metal extrusions and sheet-metal panels which are standardized except as to certain dimensions which will be selectively varied in varying the size of the case. Also, in varying the size of the case, different numbers of certain of the standardized extrusions can be used. Some of these members interfit and others are fastened together by separate fasteners to custom-build a case of the desired size. Thus, in FIG. 1, there is illustrated a case 15 of minimum height and in FIG. 2, there is illustrated a case 15a which is double the height of that shown in FIG. 1. Furthermore, although it has not been specifically illustrated in the drawings, the width and the depth, from front to rear, of the case may be readily varied by variations in transverse extend and depth of certain members.

The case 15 which is of minimum height according to this invention is illustrated more in detail in FIGS. 3 to 7. It is assembled from the following members: left and right side panel extrusions 16 and 17 which are identical and of a standardized height or transverse dimension;

top and bottom front trim strip extrusions 18 and 19 which are identical and of a standard width or transverse dimension; a front panel 20 of sheet metal; left and right front corner extrusions 21 and 22 which are identical; a rear panel 23 of sheet metal; left and right rear corner extrusions 24 and 25 which are identical; and top and bottom panels 26 and 27 of sheet metal which are identical. It is preferred that the metal used by aluminum although this invention is not limited to that material.

The side panel extrusions 16 and 17 are of a detailed cross-sectional shape shown in FIG. 11. Each of the panels comprises a main web or body 30 which has a decorative wide longitudinal groove 31 in its outer face although this is not necessary for its proper functioning. At its upper edge, the web 30 has an inwardly directed panel-receiving slot 32 extending the full length thereof and at its lower edge it has an identical slot 33 similarly disposed. Spaced slightly below the slot 32 is a support flange 34 of inverted L-form and spaced slightly above the slot 33 is an L-shaped flange 35. These flanges are disposed on the inner surface of the web 30 and act as reinforcing ribs as well as support flanges for instrument components adapted to be disposed in the case.

The top and bottom front connector trim strips 18 and 19 are of the detailed cross-sectional shape shown in FIG. 8. Each strip comprises a main web or body 36 having a downwardly opening panel-receiving slot 37 extending its full length. A rib 38 is formed on its upper side with a rearwardly or inwardly lip 39 providing a rearwardly opening slot 40 extending the full length thereof. At the bottom of this slot, is a rearwardly extending support surface 41. The rear corner of the lip 36 is chamfered as indicated at 42.

The front panel 20 is merely a sheet or plate of sheet metal of proper size. It is indicated as being of rectangular form of any suitable length and of a vertical extent just slightly less than the vertical dimension of the respective side panels 16 and 17. The rear panel 23 is like the panel 20 and is of substantially the same size.

Each of the front corner extrusions 21 or 22 is of the cross sectional shape shown in detail in FIG. 9. It includes an outer thicker flange 45 and an inner thinner flange 46 disposed in spaced parallel relationship by a connecting flange 47 at a right angle thereto. The outer flange 45 is of less depth than flange 46 and is provided with a rib 48, in spaced parallel relationship to the outer surface of the flange 47 to provide an inwardly opening panel-receiving slot 49.

The identical rear corner extrusions 24 and 25 are of the cross-sectional shape illustrated in FIG. 10. Each of these corners includes the outer outwardly directed flange 50, the inner inwardly directed flange 51, and the connecting flange 52, which connects the flanges 50 and 51 in spaced parallel relationship. It will be apparent that flange 50 is of less depth than flange 51.

The upper and lower panel sheets 26 and 27 are of identical form and size. It will be noted from FIG. 3 that each sheet has an inwardly projecting lip 55 at one end extending its full width and at its opposite end, two notched corners, as indicated at 56.

In assembling the elements to form the case, it is first decided what height of case is desired. The height will be multiples of the height of a side panels extrusion 16 or 17. In the example shown in FIG. 1, the case 15 is of

a height corresponding to that of a single panel. In the example shown in FIG. 2, two of the side panels are stacked at each side of the case 15A. However, as indicated, any multiples of the side panels may be used. The depth of distance from front to rear of the case is selected and the side panels are cut to the desired length. A front corner 21 and a rear corner 24 are applied to the front and rear ends of the side panel extrusion 16 and a front corner 22 and a rear corner 25 are applied to the front and rear ends of the side panel extrusion 17. These corner extrusions are previously cut to the desired length depending on the height of the case, that is, whether it is the height of a single side panel or multiples of the panel. The side panels 16 and 17 are disposed with their grooves 33 lowermost and opening inwardly. The ends of each of the side panels are bolted to the corner extrusions by bolts 57 passed through the inner flanges 46 of front corners and the inner flanges 51 of the rear corners into the vertical portions of the respective flanges 34 and 35 on the respective side panels.

The top and bottom trim strips 18 and 19 are cut to the desired length which will depend on the desired width of the case. The bottom strip 19 is then connected to the lower ends of the front corners 21 and 22 which have been attached to the respective side panels 16 and 17. The strip 19 is disposed with its groove 40 at its lower side and opening inwardly. For this purpose, bolts 59 may be passed upwardly through the ends of the strip 19 through the lower horizontal portion of the side panel flange 35. At this time, the ends of the strip 19 will abut the inner surfaces of the corner flanges 45, the rib 48 being ground away at this point to provide a flat inner surface on the flange 45. With the structure so far assembled, the front panel 20 may be slid downwardly into the opposed inwardly opening slots 49 on the corner members 21 and 22. The panel 20 will be previously cut to the desired length and height. At this time, the slots 49 in front corners 21 and 22 and the groove 37 in the bottom strip 19 will be in a common vertical plane so that the panel 20 may be moved downwardly in the slots 49 until its lower edge is disposed in the slot 37. It will be noted that the plane of the panel 20 will be offset inwardly or rearwardly. Also, at this time, the inwardly opening slot 40 in bottom strip 19 will be in a common horizontal plane with the inwardly opening bottom slots 33 of the side panels 16 and 17.

Next, the bottom panel 27 is mounted on the partial assembly. It is cut to the desired width and depth which has been previously determined by cutting the strips 18 and 19 and the side panels 16 and 17. The panel 27 is disposed with its lip 55 upturned (FIG. 6) and its front edge, with the notches 56, is slipped into the rear ends of the side panel grooves 33. It will be understood that the flange portions 51 and 52 of the corners 24 and 25 are terminated above the rearwardly opening slots 33 to permit insertion of the panel 27. The panel 27 is moved forwardly until its forward edge enters the slot 40 of the strip 19. The notches 56 will fit around the inner edges of the outer flanges 45 of the respective front corners 21 and 22 to permit movement of the panel edge into the slot 40.

The back panel 23 is now mounted on the partial assembly, it being understood that it has been previously

cut to the correct size, being substantially identical with that of the front panel 20. It will be positioned at the rear sides of the rear corners 24 and 25 in contact with the rear surfaces of the flanges 52 thereof and be secured thereto by bolts 60 to serve as a transversely extending connecting means between the side panels 16 and 17 as well as the rear wall of the case. The lower edge of the rear panel 23 will be disposed within the lip 55 in the bottom panel 27 (FIG. 7) and be bolted thereto by the bolts 61.

The only remaining member is the upper panel 26 and it is mounted in a similar manner by inserting its notch end into the upper slots 32 of the side panels which will be in a common horizontal plane with the inwardly opening slot 40 of the front upper trim strip 18. The rear ends of the slots 32 will be exposed since the upper edge of the panel 23 will terminate directly below them. The inner end of the panel 26 will be in the slot 40 and the notches 56 will fit around the inner edges of the outer flanges 45 of the respective front corners 21 and 22 as shown in FIG. 5 which shows the left hand upper front corner which is identical with all the other front corners. The flange 55 of the panel 26 will depend and overlap the outer surface of the rear panel 23 and may be bolted thereto by the bolts 62, it also serving as a transversely extending connecting means between the panels 16 and 17. To gain access to the case, it is merely necessary to remove the bolts 62 and slide the panel 26 rearwardly.

In FIG. 9a, there is shown a modification of a corner extrusion for the front corner. In this instance, the flange 45a is extended outwardly and has a flange 45b formed on its outer edge so as to serve as a handle portion, the flange 45a being provided with a finger-receiving vertical slot 45c. It may be desirable to provide this type of corner extrusion so as to provide handles at both front corners by means of which the case may be lifted or moved. Also, the flange 47 may be extended outwardly at 47b and is provided with bolt receiving notches 47c in its outer edge to be used in mounting the cases in a supporting rack.

It will be apparent from the above description that this invention provides an instrument case which can be readily customized in a desired size since it is assembled from standardized modular elements. These elements are easily made as metal extrusions and sheet-metal panels and, therefore, the cost is low.

Having thus described my invention, what is claimed is:

1. An instrument case comprising an assembly of standardized elements including:

opposed upright side panels each of which is in the form of a one piece structural member having a transverse cross-section which provides a vertical web with upper and lower longitudinally extending parallel edges and forward and rearward ends and inwardly opening slots adjacent its upper and lower edges parallel to those edges and extending the full length thereof to said ends with open ends as well as inwardly directed upper and lower horizontal flanges adjacent said slots and parallel thereto and extending the full length thereof;

a front bottom panel-connector strip and a front top panel-connector strip each of which is in the form of a one piece structural member having a trans-

verse cross-section which provides a horizontal web with longitudinally extending parallel front and rear edges and opposed ends with a rearwardly opening slot which opens toward the rear edge thereof and extends the full length thereof to said ends;

upper and lower panel sheets each having parallel side edges and parallel forward and rearward edges;

the assembly having the upper and lower front connector strips extending transversely between the panel members at their forward ends overlapping the horizontal flanges and being secured thereto with their ends abutting the inner surfaces of the respective panels, the rear connector means extending transversely between the panels at their rear ends and fastened thereto to aid the front connector strips in holding said side panels in laterally spaced parallel relationship, the upper and lower panels being horizontally disposed between the respective side panels and each having its opposed side edges positioned in the opposed inwardly opening slots thereof and its forward edge positioned in the rearwardly opening slot of the respective front connector strip.

2. An instrument case according to claim 1, in which: each of said front connector strips has its web formed with a rearwardly extending lip on its one surface spaced therefrom to provide the rearwardly opening slot and with an outwardly opening slot in its other surface;

a front panel sheet is provided and has upper and lower parallel edges and opposed parallel ends; said top and bottom connector strips being disposed horizontally in vertically spaced relationship between said side panels with the lips thereof extending rearwardly and with the slots thereof disposed at the respective lower and upper surfaces thereof in opposed relationship to receive the front panel which has its upper and lower edges positioned therein.

3. An instrument case according to claim 2, in which: vertically extending front and rear corner members are provided each of which is in the form of a one-piece structural member having upper and lower ends with a transverse cross-section to provide an angle flange with an inwardly extending portion and a laterally extending portion; each of said inwardly extending side panel flanges

being of angular form with a horizontal portion and a vertical portion;

said front and rear corner members being vertically disposed with their inwardly extending portions overlapping and being secured to the vertical portions of the flanges on the respective side panels and their laterally extending portions overlapping the adjacent ends of the respective side panels;

said top and bottom front connector strips extending over the respective upper and lower ends of said corner members which are disposed vertically therebetween.

4. An instrument case according to claim 3, in which: each of said corner members has an additional integral outer flange which is spaced laterally outwardly from the inwardly extending portion of the angle flange; said additional outer flange of each corner member being disposed in substantially the same vertical plane as the respective side panel and abutting the adjacent end thereof.

5. An instrument case according to claim 4, in which: each of the front corner members has a forwardly extending handle portion integral with the outer flange and an integral attaching flange extending outwardly opposite said laterally extending portion of the angle flange for mounting the case on a support.

6. An instrument case according to claim 4, in which: each of the front corner members also has an integral vertical rib formed on said outer flange and spaced forwardly of said laterally extending flange portion of the angle flange to provide a vertical groove therebetween;

the respective ends of said front panel being positioned in the adjacent grooves.

7. An instrument case according to claim 6, in which: a rear panel sheet is provided and has upper and lower parallel edges and opposed parallel ends; said rear panel extending transversely between said side panels, overlapping the laterally extending portions of said rear corner members and fastened thereto to provide said rear connector means.

8. An instrument case according to claim 7, in which: said upper and lower panels have intumed lips on their rear edges; said lips overlapping said rear panel at its upper and lower edges and being fastened thereto to provide part of said rear connector means.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,687,325 Dated August 29, 1972

Inventor(s) Ira W. Simons

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

Column 1, line 63, cancel "extend" and substitute therefor
--extent--.

Column 2, line 9, cancel "by" and substitute therefor --be--,
line 11, cancel "a" and substitute therefor --the--,
line 31, after "inwardly" insert --extending--.

Column 3, line 3, cancel "15A" and substitute therefor --15a--,
line 5, cancel the first "of" and substitute
therefor --or--.

Column 5, line 7, insert the following as a separate line
--rear connector means;--.

Signed and sealed this 22nd day of May 1973.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents