April 26, 1960 J. H. MOGULESCU ET AL 2,934,215

KNOCK-DOWN DISPLAY SUPPORT

Filed June 16, 1958 2 Sheets-Sheet 1

Fig. 1.

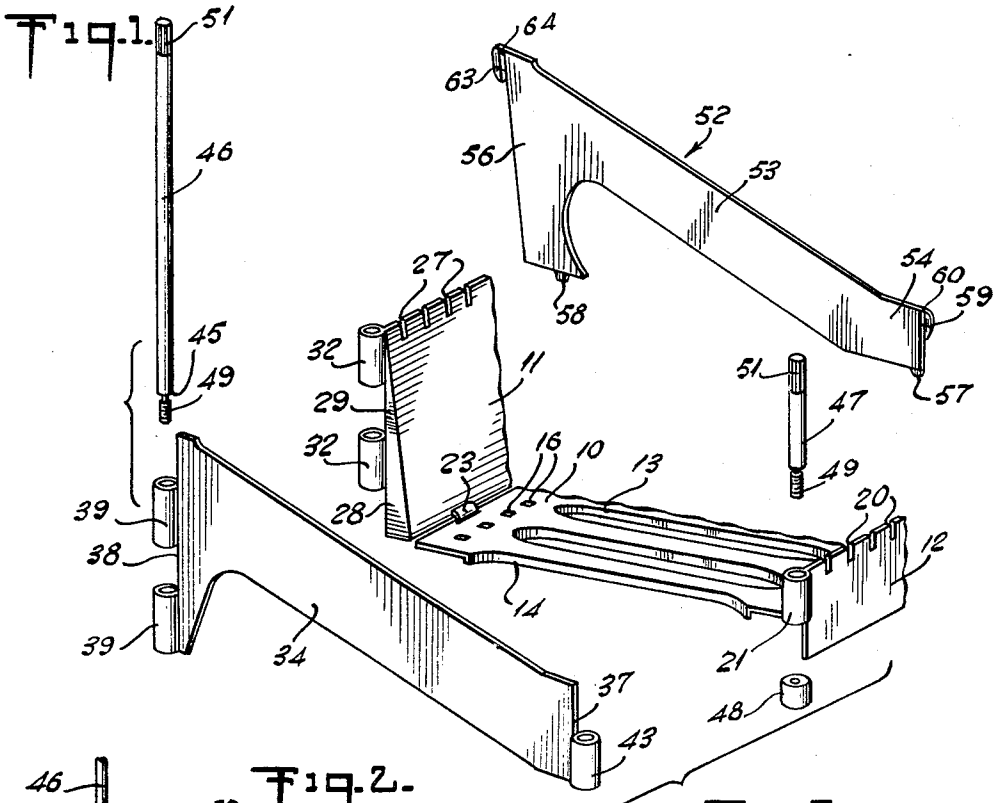


Fig. 2.

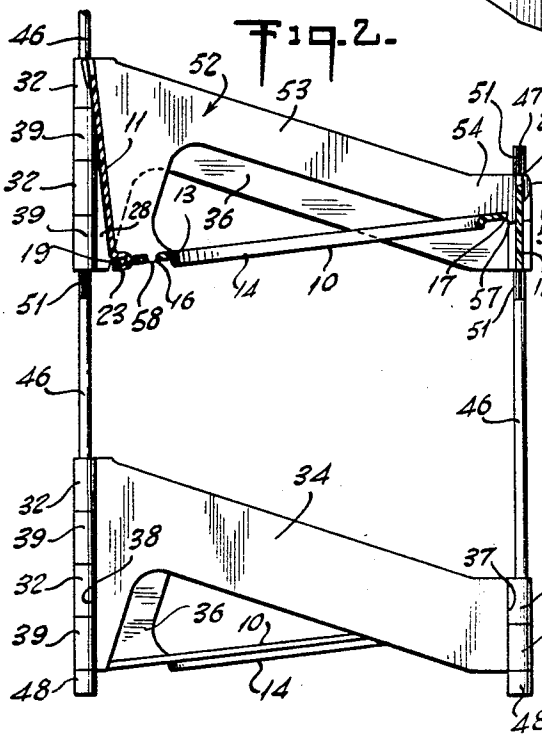


Fig. 7

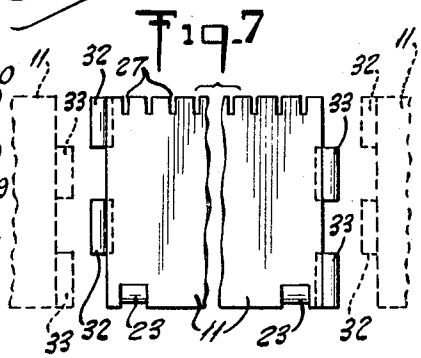
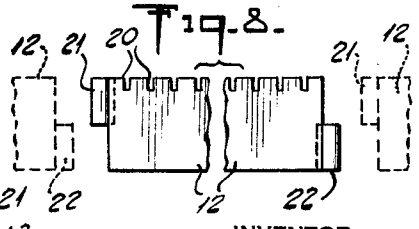


Fig. 8.



INVENTOR
IRVIN L. KOONS
JACK H. MOGULESCU
BY
William R. Liberman
ATTORNEY

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Fig. 3.

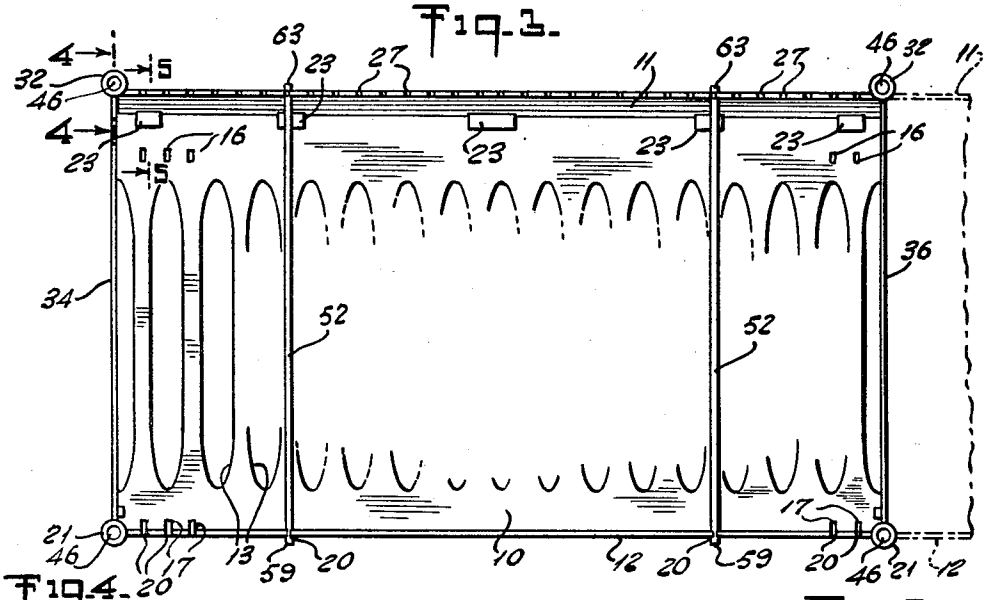


Fig. 4.

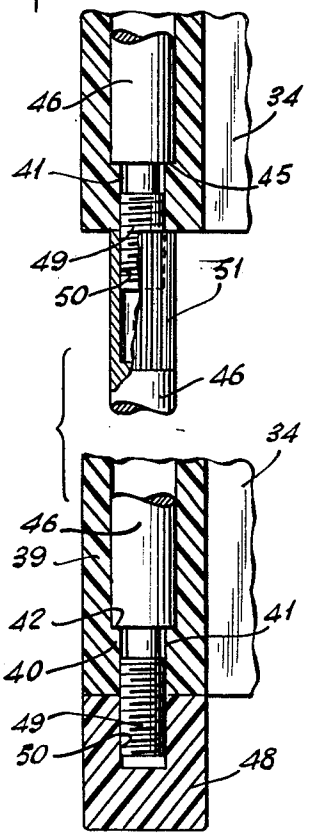


Fig. 5.

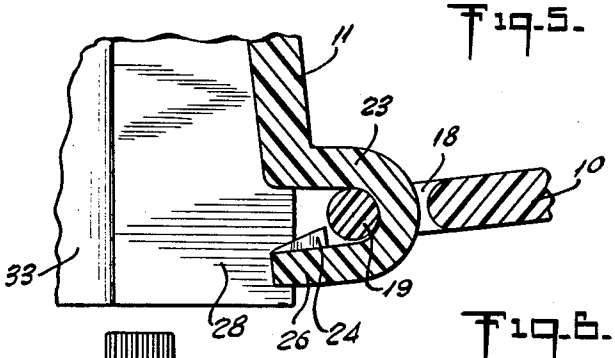
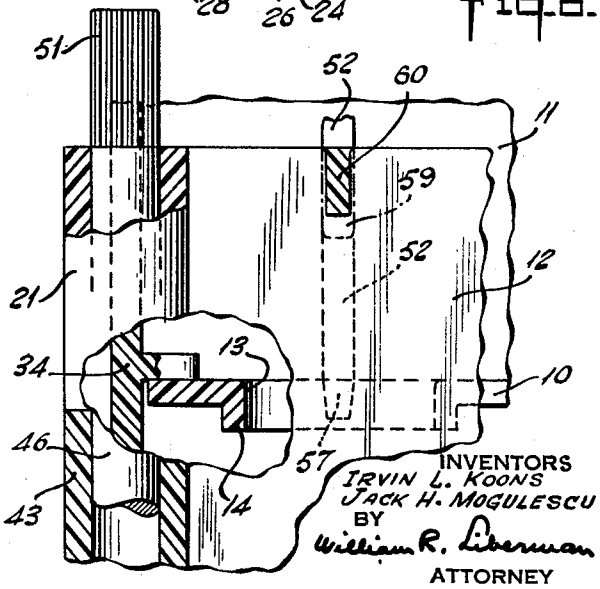


Fig. 6.



INVENTORS
IRVIN L. KOONS
JACK H. MOGULESCU
BY
William R. Liberman
ATTORNEY

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KNOCK-DOWN DISPLAY SUPPORT

Jack H. Mogulescu and Irvin L. Koons, New York, N.Y., assignors to Consolidated Cigar Corporation, New York, N.Y., a corporation of New York

Application June 16, 1958, Serial No. 742,334

6 Claims. (Cl. 211—126)

The present invention relates generally to improvements in receptacles and display devices, and in particular it relates to an improved collapsible tray unit which may be assembled with one or more similarly constructed units into any desired vertically stacked, and end-to-end linear or angulated relationship, thereby to provide a display device which may be readily modified for any particular display purpose or easily disassembled for storage or transportation purposes.

There have been proposed and employed many types of fixed or collapsible trays which may be separably stacked one upon the other affording access to the individual trays. However, these receptacles and trays are of very limited application and possess numerous drawbacks and disadvantages. The collapsible receptacles are generally constructed to form a single container of a specific configuration, whereas the stackable trays of fixed construction may be stacked in only one manner. It is thus apparent that collapsible receptacles and stackable trays heretofore available are of very limited versatility and flexibility. Moreover, they are usually complex and expensive and leave much to be desired.

It is thus a principal object of the present invention to provide an improved receptacle.

Another object of the present invention is to provide an improved display device.

Still another object of the present invention is to provide an improved tray unit which may be simply and easily assembled with one or more similarly constructed units to form a display device of any desired arrangement.

A further object of the present invention is to provide an improved tray unit of simple and rugged construction which may be arranged in vertically stacked assembly and in end-to-end linear or angular assembled relationship, permitting the fabrication of display devices of various configurations which may be readily disassembled to facilitate the transportation and storage thereof.

The present application is a continuation-in-part of copending application of Jack H. Mogulescu and Irvin L. Koons, filed September 26, 1957, Serial No. 686,372. In that application, there is also described a collapsible tray unit which may be assembled in various stacked and coupled arrangements.

The above and other objects of the present invention will become apparent upon the reading of the following description taken in conjunction with the accompanying drawings, wherein

Figure 1 is an exploded perspective view, partially broken away, of a tray unit embodying the present invention, some of the duplicated parts being omitted for convenience of illustration;

Figure 2 is a side elevational view, partially in section, of a multi-tier display rack employing the tray unit of the present invention;

Figure 3 is a top plan view thereof;

Figure 4 is an enlarged detailed sectional view taken along line 4—4 in Figure 3, partially broken away;

Figure 5 is an enlarged detailed sectional view taken along line 5—5 in Figure 3, partially broken away;

Figure 6 is a front enlarged detailed view of a pair of assembled tray units, partially broken away;

Figure 7 is a front elevational view, partially broken away, of the rear wall of the tray unit, adjacent units being shown in broken line; and

Figure 8 is a front elevational view of the front wall of the tray unit, walls of the adjacent units being shown in broken line.

In a sense, the present invention contemplates the provision of an improved tray unit which may be assembled, as desired, in various vertically stacked, linear and angular or side-by-side relationship, the unit comprising a forwardly upwardly inclined base plate, a rear wall projecting upwardly from said base plate and having opposite parallel end edges and vertically spaced interlock elements disposed along said end edges, said interlock elements being relatively staggered along said opposite edges, the interlock edges preferably being in the form of tubular knuckles.

A further feature of the improved tray unit is the provision of inwardly directed flanges on the knuckles which surround openings aligned with the respective knuckles, and coupling rods registering with the knuckles and having threaded shank portions of reduced cross section projecting through said openings and surrounded by a shoulder abutting the face of said flange, and including threaded members engaging said threaded shank portions and abutting the opposite face of the respective flanges.

In accordance with a preferred form of the present invention, the tray includes an upwardly forwardly inclined base member having a vertical forward wall extending above and below the base member. The forward wall has an upper tubular knuckle along one end thereof and a lower tubular knuckle along the other end thereof, the height of the tubular knuckle being substantially one-half the height of the front wall. A rear wall is provided and along its lower edge it is formed with laterally spaced depending rearwardly directed hook-shaped members which engage corresponding openings formed along the rear edge of the base to provide a hinged connection between the rear wall and the base. Triangular end plates are carried by the rear wall and have trailing edges which are vertical when the rear wall is perpendicular to the base plate. Vertically spaced knuckles are disposed along the rear edges of the end walls, which knuckles are staggered relative to the knuckles on the end plates.

Side walls extend transversely of the base member and carry along their forward and rear edges tubular knuckles which are in axial alignment with the knuckles carried by the front and rear walls. The lowermost of each set of aligned knuckles is provided along its lower edge with an inwardly directed flange which surrounds an opening of reduced cross section axially aligned with the tubular knuckles. Coupling rods register with each of the aligned knuckles and are provided with threaded shanks of reduced cross section which extend through the openings and which are engaged by threaded members so as to effect a locking of the assembled tray. The front and rear walls have transversely aligned laterally spaced notches formed therein which are in the same vertical plane with rectangular apertures formed along the forward and rear borders of the base plate. Partition members are provided having lengthwise extending forward and rear hook elements along their upper corners which hooks are adapted to register with aligned recesses in the rear and front walls and are also provided with depending lugs which are adapted to engage corresponding apertures formed in the base plate.

With the above elements it is possible to construct

multi-tier trays disposed in various side-by-side or corner-to-corner arrangements as will be hereinafter set forth.

Referring now to the drawings which illustrate a preferred embodiment of the present invention, the tray unit includes a normal forwardly and upwardly inclined base portion generally designated by the numeral **10**, the base portion being of substantially rectangular configuration having a rear wall **11** along the trailing edge of the base **10** and a forward wall **12** along the front edge thereof. Base **10** has a plurality of transversely extending oval shaped openings **13** formed therein, the edges of opening **13** being provided with depending lips or flanges **14** (see Figure 1) to reinforce and impart rigidity to base **10**, said openings **13** being short of the forward and rear edges of the base plate. Formed in base **10** also are a plurality of regularly laterally-spaced rectangular openings **16**, forward and parallel to the rear edge of the base **10**, together with a plurality of regularly spaced rectangular notches or openings **17** in transverse alignment with openings **16** and extending to the front edge of base **10**. Rearwardly of openings **16** and immediately forwardly of the rear edge of base **10** there are formed a plurality of laterally-spaced laterally extending rectangular openings **18**, the rear borders **19** of which are of substantially circular cross section and define hinge pintles, as seen in Figure 5.

Forward wall **12** is of substantially rectangular configuration and, as illustrated in Figure 2, lies in a vertical plane forming an upper dihedral angle of greater than 90° with base **10**. Wall **12** is formed integral with base **10** and is joined thereto along a horizontal line intermediate the upper and lower edges of said front wall. Located along the upper edge of front wall **12** are a plurality of laterally spaced, rectangular recesses **20** in vertical alignment with the openings **17** formed in base **10**.

Located along the opposite end edges of the front wall **12** are upper and lower vertically extending tubular knuckles **21** and **22** respectively. Knuckles **21** and **22** are substantially half the height of front wall **12** and are staggered relative to each other. Thus, the front walls **12** of tray units arranged side-by-side may be interconnected by bringing adjacent knuckles **21** and **22** into vertical alignment. As will be hereinafter set forth in respect to other knuckles, the lowermost knuckle **22** on front wall **12** is provided along its bottom edge with an inwardly directed annular flange, the inner border of which surrounds an opening in vertical alignment with the opening in the knuckle **22** and of smaller diameter.

Rear wall **11** is of substantially rectangular configuration and is provided along its lower edge with laterally spaced forwardly extending rearwardly opening hook-shaped members **23** formed integral with wall **11**. Members **23** hingedly engage corresponding pintles **19**, the cross arms of members **23** freely passing through openings **18** in order to facilitate the hinged assembly of wall **11** and base **10**. Forwardly upwardly inclined protuberances or detents **24** are formed on the inner face of free leg **26** of each of hook-shaped members **23**, the detent extending from the free end of leg **26** and terminating at a point forward of the cross arm thereof. Thus, pintles **19** may be slid into registry with the hook members **23** by urging them through the openings thereof, legs **26** being urged downwardly by pintles **19** by reason of the cam surfaces of the detents **24**, and snapping back into position after the pintles **19** pass detents **24** to hingedly interlock wall **11** and base **10**. Formed along the upper edge of the wall **11** are a plurality of laterally rectangularly spaced notches or recesses **27** in alignment with corresponding openings **16** and **17**. It should be noted that in assembled condition, wall **11** is swung to an upwardly rearwardly inclined position forming a right dihedral angle with base **10**.

Located along the opposite edges of wall **11** are a pair of rearwardly directed end walls **28** of triangular configuration having upwardly directed apices and rear

vertical edges **29**. Disposed along opposite end rear edges **29** are vertically aligned vertically spaced tubular knuckles **32** and **33** respectively. Each of knuckles **32** is slightly less in length than one quarter the height of edge **29**, upper knuckle **32** extending to the upper edge of the rear wall **11** and being spaced from the lower knuckle **32** a distance slightly greater than knuckle length. Similarly, knuckles **33** are each of a length slightly less than one quarter the length of the edge **29**, lower knuckle **33** extending to the bottom of edge **29**, the distance between knuckles **33** being slightly greater than the knuckle length. Thus, rear walls **11** of adjacent trays may be connected in end-to-end relationship by bringing the knuckles **32** and **33** of adjacent edges **29** into interdigitating relationship and interlocking the knuckles by means of locking rods as will be hereinafter set forth. It should be noted that the lowermost knuckle **33** is provided at its lower edge with an inwardly directed flange of a configuration similar to that of the lowermost knuckle **22** mounted on the front wall **12**.

Each tray includes a pair of side walls **34** and **36** respectively provided with a vertical front edge **37** of substantially the same height as front wall **12** and a vertical rear edge **38** of substantially the same height as the end wall edge **29**, edges **37** and **38** being connected by an upwardly rearwardly inclined vertical panel having a short forwardly directed leg and flaring rearwardly outwardly to the rear edge **38** as best seen in Figures 1 and 2 of the drawing. Disposed along the rear edge **38** of wall **34** are a pair of vertically aligned and vertically spaced tubular knuckles **39** of substantially the same dimensions as knuckles **32**, the lower knuckle **39** extending to the lower end of the edge **38** and being spaced from the upper knuckle **39** by a distance slightly greater than the length of a knuckle **39**. As seen in Figure 4 of the drawing an inwardly directed flange **40** is formed at the bottom of the lowermost knuckle **39** and has a vertical opening **41** formed therein of smaller diameter than the bore of knuckle **39** and having a shoulder **42** along its upper periphery. Located along the lower portion of the front edge **37** of the wall **34** is a tubular knuckle **43** which is of the same dimensions as the front wall knuckle **21** and is provided with a bottom inwardly directed flange corresponding to the flange **40**. Wall **36** is likewise provided with knuckles corresponding to knuckles **39** and **43** but vertically offset relative thereto, the upper knuckle **39** and the knuckle **43** extending respectively to the upper ends of the forward and rear edges of wall **36**.

In assembled condition walls **34** and **36** are disposed along the sides of the trays, with knuckles **39** interdigitating and being in vertical alignment with knuckles **32** of the rear wall, and knuckles **43** being in vertical alignment with the knuckle **21** of the front wall, and the knuckles **39** of side wall **36** interdigitating and being in vertical alignment with the rear wall knuckles **33**, and knuckle **43** being in vertical alignment with the front wall knuckle **22**.

The trays may be releasably locked in assembled condition either in vertically stacked arrangement, in side-by-side linear or angular arrangement, or in any desired combination by the provision of a plurality of locking rods **46** and **47** of various lengths and cylindrical cap nuts **48** which serve as feet or pedestals. Coupling rods **46**, **47** are provided at their lower ends with depending axial threaded shanks **49** surrounded at their bases by annular shoulders **45** and have formed in their upper ends threaded bores **50**, the outer surface of the upper ends being scored or serrated as at **51** to facilitate their manipulation during assembly and disassembly. The diameter of rods **46**, **47** is such as to permit a snug fit thereof within the bores to allow for free relative sliding movement. Threaded shanks **46** are of a diameter to permit their free passage through the openings **41** surrounded by flanges **40** and of lengths sufficient to accept cap nuts **48** or another rod **46**, **47** which will effect a tight engagement of the flanges **46**

between the confronting shoulders of the cap nuts 48 or rods 46, 47 and the registering rods.

In assembling a single tray unit, rear wall 11 is swung to a position perpendicular to the base 10 and the side walls 34 and 36 are coupled to the front and rear walls 11 and 12 by bringing the corresponding rear coupling knuckles into vertically aligned interdigitating registry and the corresponding front knuckles into vertical registry as seen in Figure 2 of the drawing. Rods 46 are inserted through the rear aligned coupling knuckles, the shank 49 passing through the opening 41 and screw caps 48 are applied to the lower exposed portions of shank 49 to effect a tight engagement of flange 40. Locking rods 47 are then inserted through the vertically aligned front knuckles and similarly locked in position by means of cap nuts 48 engaging the threaded shanks 49.

If it is desired to stack two or more trays in vertically spaced arrangement, a first tray is brought into locked assembly as aforesaid but elongated rods 46 are substituted for the front rods 47. Thereafter, a second tray is assembled and rods 46 inserted through the aligned rear knuckles and the depending threaded shank 47 screwed into the threaded bores 50 of the rear lower rods 46 to engage tightly rear knuckle flanges 40 of the upper tray assembly. The forward knuckles are similarly locked in position by means of rods 47 inserted therethrough and screw engaging the forward lower rods 46. The trays may be connected in linear or angulated side-by-side arrangement as well as in stacked arrangement by joining the front and rear walls by bringing the corresponding coupling knuckles into interdigitating and vertically aligned positions and interlocking the knuckles by means of coupling rods in the manner previously described and as illustrated in Figures 7 aand 8 of the drawing. When the trays are so joined the side walls at the confronting ends of the trays are omitted. Furthermore, the trays may be arranged in angulated arrangement by joining either the front or rear walls thereof, leaving the opposite walls disconnected.

The versatility of the improved tray is further increased by the provision of a plurality of removable partition members 52 each of which includes a forwardly downwardly inclined intermediate portion 53 having a forwardly directed front leg 54 terminating in a vertical leading edge and a depending rear leg 56 having an upwardly rearwardly inclined trailing edge. The legs 54 and 56 have colinear horizontal bottom edges, the bottom edge of the leg 54 being provided at its forward corner with a depending lug 57, and the bottom edge of the leg 56 having a depending lug 58 disposed forward of the trailing edge of the leg 56. The front leg 54 is provided at its upper corner with downwardly opening hook elements including a forwardly spaced vertical leg 59 joined at its upper portion to the upper end of the leg 57 by a cross piece 60 of reduced cross section. Similarly, a downwardly opening coupling hook is located at the upper corner of the leg 56 and includes a vertical leg 63 joined at its upper portion to leg 56 by a cross arm 64 of reduced cross section. One or more of the partitions 52 may be applied to the assembled tray by bringing the cross arms 60 and 64 of reduced section into registry with corresponding front and rear wall notches or recesses 20 and 27, and by inserting the depending lugs 57 and 58 into corresponding apertures 17 and 16. The partitions may be removed simply by lifting them from the tray. It should be noted that the height of the leading edge of partition 52 is approximately half the height of the front wall 12 and the height of the trailing edge is approximately equal to the height of the wall 11.

The various components forming the base and walls of the tray are preferably formed of any suitable synthetic, organic, thermoplastic or thermosetting material by injection molding or the like. The rods 46 and 47 as well as the cap nuts 48 are, on the other hand, preferably formed

of any suitable metal such as aluminum, steel or the like.

While there has been described and illustrated a preferred embodiment of the present invention, it is apparent that numerous alterations and omissions may be made without departing from the spirit thereof.

We claim:

1. An improved tray unit comprising a forwardly and upwardly inclined base plate, an inclined rear wall projecting upwardly from said base plate and substantially perpendicular thereto, and vertical coupling knuckles disposed along opposite ends of said rear wall axially angled with respect to the plane of said rear wall, said knuckles being relatively staggered along said opposite ends.

2. An improved tray unit comprising a forwardly and upwardly inclined base plate, an inclined rear wall projecting upwardly from said base plate and substantially perpendicular thereto, parallel end plates located along opposite side edges of said rear wall, directed rearwardly therefrom and having trailing vertical edges angled axially with respect to the side edges of the said rear wall, and vertical coupling knuckles located along the trailing edges of said end plates, said knuckles being relatively staggered along said opposite edges.

3. An improved tray unit comprising a base plate, a rear wall projecting upwardly from said base plate, vertical tubular coupling knuckles disposed along opposite ends of said rear wall and being relatively staggered along said opposite ends, the axis of said knuckles being angled with respect to the plane of the rear wall, an inwardly directed shoulder formed on one of said knuckles, and a coupling rod registering with said knuckle, having a shoulder abutting the shoulder of said knuckle, and having a threaded portion extending below the lower end of the knuckle.

4. An improved tray unit comprising a base plate, a rear wall projecting upwardly from said base plate, vertical tubular coupling knuckles disposed along opposite ends of said rear wall axially angled with respect thereto and being relatively staggered along said opposite ends, an inwardly directed flange formed on one of said knuckles and surrounding an opening axially aligned with said knuckle, a coupling rod registering with said knuckle, said rod having a threaded shank portion of reduced cross section projecting through said opening and surrounded by a shoulder abutting a face of said flange, and a threaded member engaging said threaded shank portion projection and abutting the opposite face of said flange.

5. An improved tray unit comprising a base plate, a rear wall projecting upwardly from said base plate and having a rearwardly directed end plate at the opposite ends thereof, vertical tubular coupling knuckles disposed along the rear ends of said rear wall plates and being relatively staggered along said opposite ends, side walls disposed along the opposite end plates, coupling knuckles located along the trailing edges of said side walls and in vertical alignment with said rear wall plate coupling knuckles, inwardly directed flanges located along the lowermost of said knuckles and surrounding openings of reduced cross section aligned with said knuckles, coupling rods extending above and below the side and rear walls registering with said aligned knuckles and having threaded shanks of reduced cross section projecting through said openings and surrounded by a shoulder which abuts the confronting face of a corresponding flange, and a threaded member engaging the free projecting end of said shank and abutting the opposite faces of said flanges.

6. An improved tray unit in accordance with claim 5, including a substantially vertical front wall disposed along the front edge of said base plate, tubular coupling knuckles disposed along opposite ends of said front wall in parallelism to the knuckles on the rear wall plates and being relatively staggered along said opposite ends, vertical tubular coupling knuckles disposed along the forward edges of said side walls in alignment with said front

wall knuckles, inwardly directed flanges formed on at least one of said aligned forward knuckles and surrounding an opening of reduced cross section, coupling rods registering with said aligned forward knuckles and having a threaded shank surrounded by a shoulder abutting a face of each of said flanges, and threaded members engaging said shanks and abutting the opposite faces of said flanges.

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