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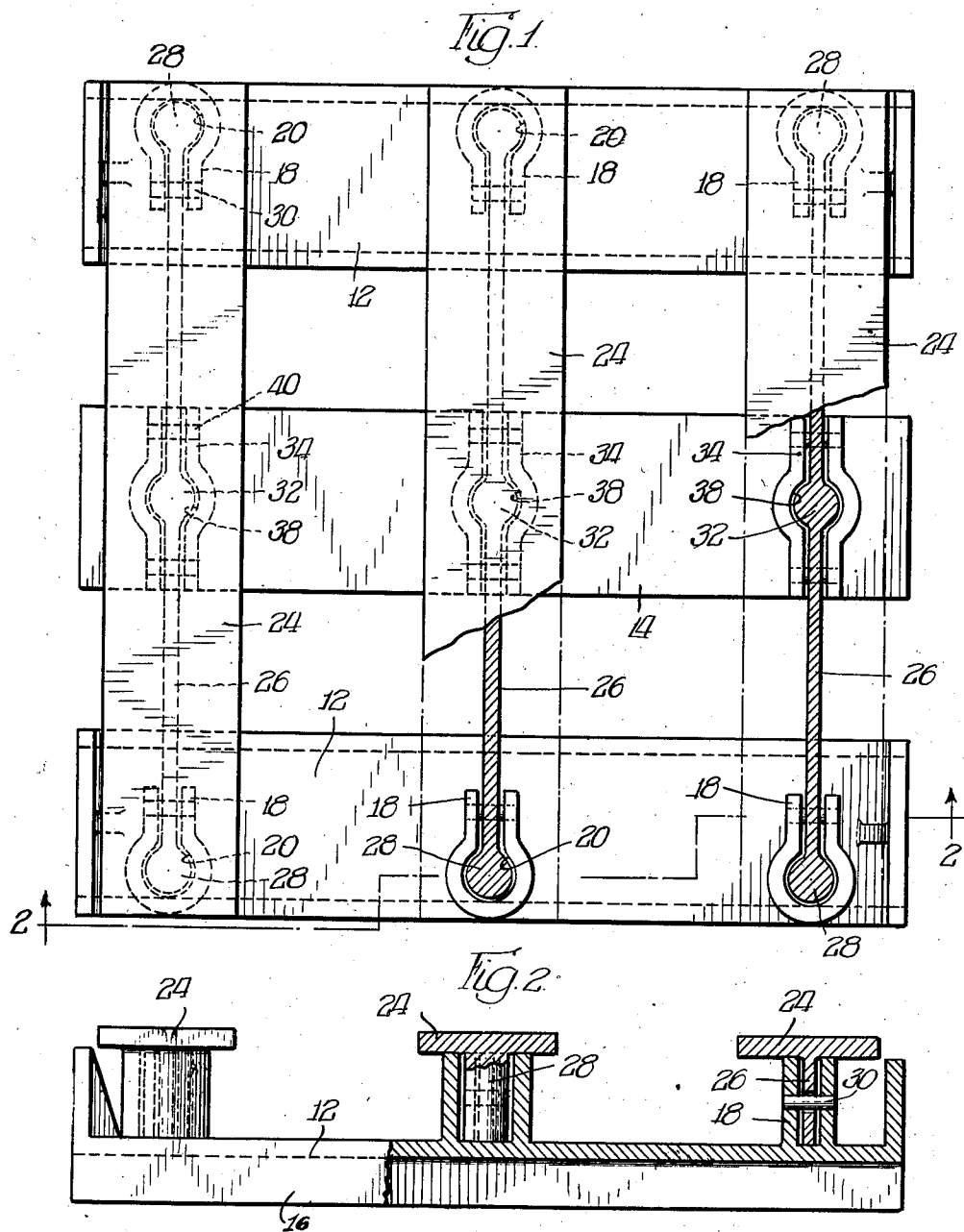
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2,297,054

FLEXIBLE TRAY

Filed March 15, 1941

4 Sheets-Sheet 1



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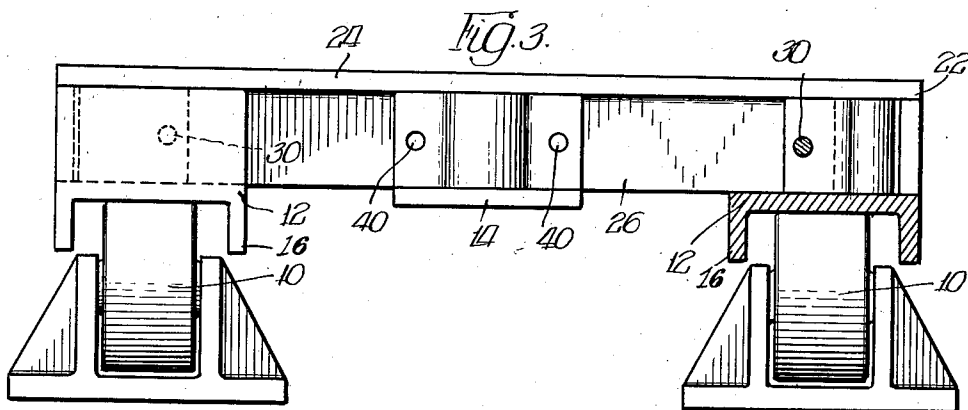
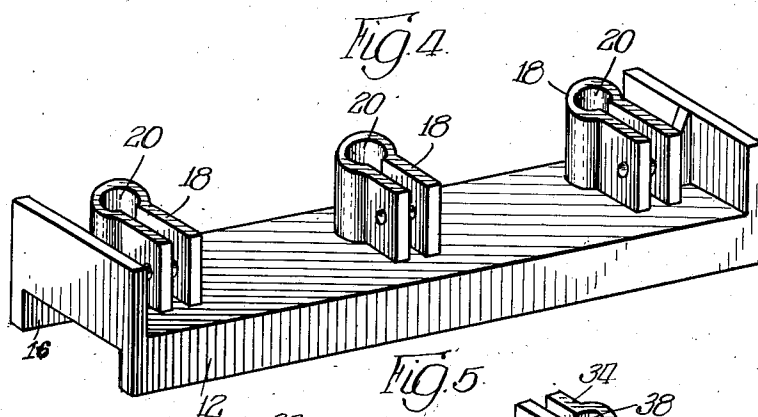
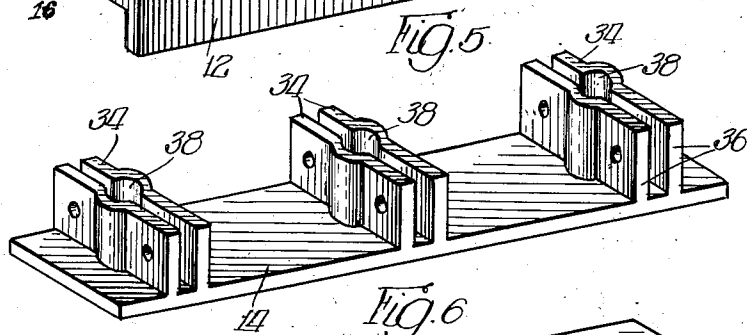
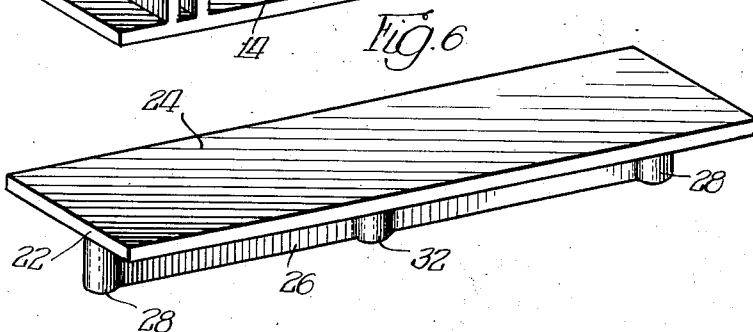
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Fig. 7

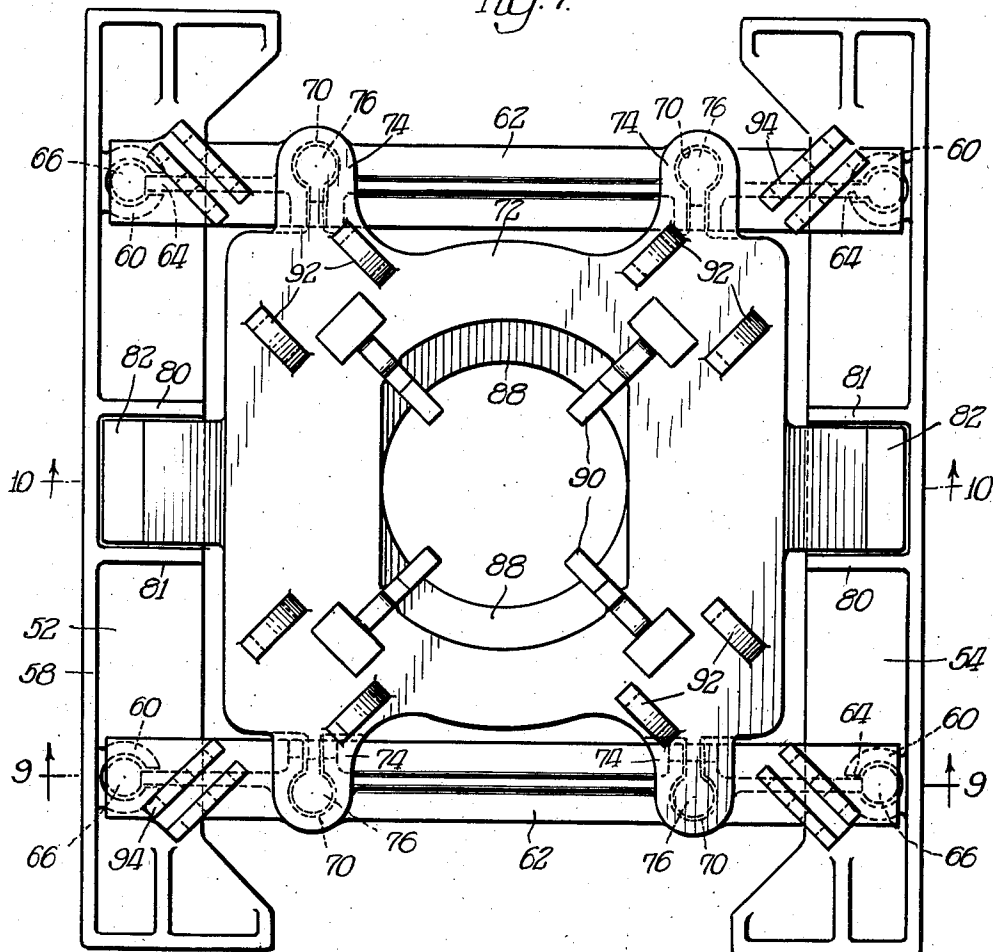
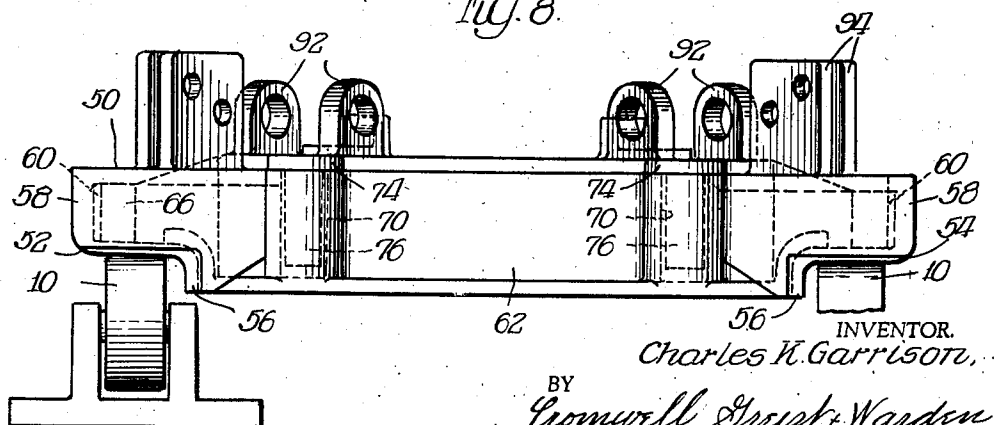


Fig. 8



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Fig. 9.

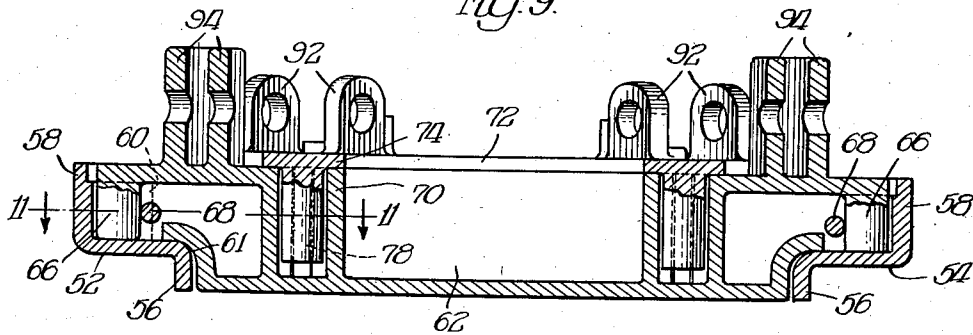


Fig. 10.

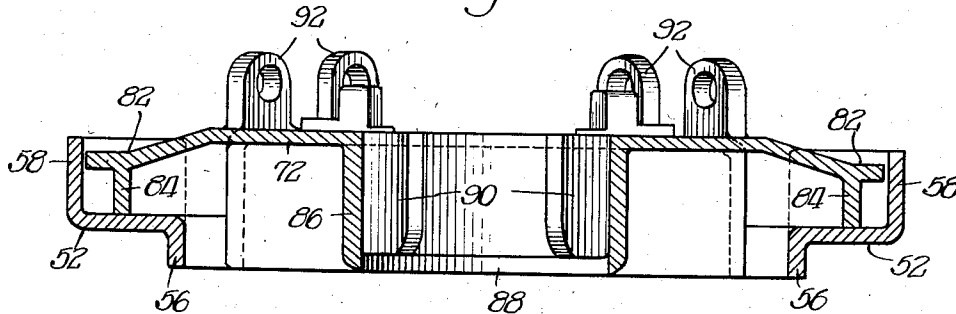
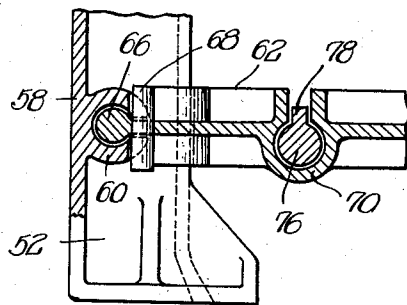


Fig. 11



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UNITED STATES PATENT OFFICE

2,297,054

FLEXIBLE TRAY

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Application March 15, 1941, Serial No. 383,615

7 Claims. (Cl. 263—47)

The present invention relates to flexible trays, and more particularly to a tray for carrying articles of various sizes and kinds through a heat treating furnace.

In furnaces of this type, not only are the articles themselves subjected to extremely high temperatures for treating purposes, but the supporting members or trays are subjected to the same temperatures which produce tremendous stresses and strains in the trays and cause warping and even the breaking off of various portions of the trays in use. To overcome this tendency and to meet uneven track or conveyor conditions necessarily caused by the heat conditions, attempts have been made to produce articulated supporting members that will permit relative movement between the various parts to counteract the warping and distortion to which they are subjected.

For this purpose heavy beams have been used for base members with lugs or fingers provided thereon to interfit with cross girders for supporting the articles to be treated. These lugs frequently break off under the strains to which they are subjected or become so distorted as to seize tightly on to the cross members at one treatment only to be snapped off during a subsequent treatment.

One object of the present invention is to provide a tray having greater flexibility and strength with minimum weight.

Another object is to provide a flexible tray having parts less subject to breakage under the temperatures met in treatment than trays heretofore produced.

A further object is to provide a sturdy tray that will flex in various directions without warping or breaking under annealing temperatures and yet support several times its weight in articles to be treated.

Two embodiments of the invention are set forth in the drawings for purposes of exemplification and are described herein. Other embodiments will be apparent to those skilled in the art upon an understanding of the following description.

In the drawings

Fig. 1 is a view in plan of one form of tray broken away in part to show the underlying structure;

Fig. 2 is a view taken on line 2—2 of Fig. 1;

Fig. 3 is a view in end elevation of the tray of Fig. 1 with a portion broken away to show a receiving member;

Figs. 4, 5 and 6 are views in perspective of

various members used in constructing the tray shown in Fig. 1;

Fig. 7 is a view in plan of a modification of the tray;

Fig. 8 is a view in end elevation of the tray of Fig. 7;

Fig. 9 is a view taken on line 9—9 of Fig. 7;

Fig. 10 is a view taken on line 10—10 of Fig. 7; and

Fig. 11 is a view taken on line 11—11 of Fig. 9.

In one embodiment of this invention, applicant provides a plurality of spaced supporting members having track following means to guide the tray through a furnace. Article supporting members are flexibly mounted on these supporting members and keyed thereto by flexible joints to permit relative movement between all of the members. The members may be so mounted relative to each other that they are substantially spaced from one another throughout a major portion of their adjacent surfaces to permit a maximum freedom of movement and of warping and twisting without harmful contact with each other to cause breakage or other harmful action.

For this purpose, the principle of a ball and socket connection may be utilized at all junctions between members thus eliminating protruding lugs or fingers that may be broken or badly twisted under the high temperatures.

In furnaces of the type wherein the present invention is peculiarly adapted to be used, there is a guide means for the trays such as a track or a series of longitudinally spaced oppositely disposed rollers, properly aligned and mounted, over which the trays may be conveyed or moved from one portion of the furnace to another. The trays may have wheels attached thereto to run over rails or the trays may be merely slid over rails if that is preferred. In the drawings a plurality of rollers forming a guide means or track 10 is indicated for this.

As shown in Figs. 1 to 6 of the drawings, the tray may include a plurality of substantially parallel, spaced supporting members including channelled end members 12 and a centrally disposed member 14. The downwardly disposed flanges 16 of the channel members may form a positioning means for holding the tray to the track 10.

On the upper surface of the end members are shown substantially U-shaped or arcuate receiving members 18 having enlarged portions 20 at their base forming a socket means for flexibly receiving portions of cross members for support-

ing articles on the tray. The end members 12 are positioned to align with the track 10 with receiving members oppositely disposed and having their open or slotted ends extending inwardly toward each other.

Cross members 22, which may be generally T-shaped in cross section, have an article supporting surface 24 and a downwardly depending flange portion 26. Other configurations in cross section may likewise be used for these members. At either end of this flange member is an enlargement 28, forming the ball portion of the ball and socket member. The receiving members 18 and the flange 26 with its enlargements 28 may be so arranged that the enlargements may be received within the enlarged portion 20 of the receiving member in spaced relation and the flange 26 may be spaced within the legs of the U-shaped members 18 as shown in Fig. 1. Pins 30 are then inserted through openings in the receiving members and flange to hold the parts together but permitting relative flexible movement therebetween.

The cross members have the further enlargement 32 for securing the strengthening member 14 thereto. Other enlargements may be provided for mounting additional strengthening members should this be desired. This member 14 is shown in Fig. 5 as having a plurality of further socket or receiving members 34 in alignment with receiving members 18. These receiving members 34 have the flange receiving portions or slots 36 and the enlarged recessed portion 38 for receiving the enlargement 32 of the strengthening member 14 and the adjacent portions of its flange 26 in spaced relation. Further rods 40 extend through the receiving members 34 and the flange 26 to hold the member 14 to the cross member 22.

In Figs. 7 to 11 a different structure is disclosed utilizing the invention as hereinbefore described. With reference to these figures, it will be seen that a track 10 is used, supporting a tray designated generally as 50. Two supporting members 52 and 54 are shown extending longitudinally of the track 10 and have downwardly extending guide flanges 56 for holding the tray in alignment on the track while traveling therealong. On the outer sides of these supporting members are upstanding terminal flanges 58 defining the outer side portions of the tray.

Extending inwardly from the lateral flanges 58 are spaced arcuate receiving members 60 forming a socket means for flexibly receiving portions of cross members 62. These receiving members are disposed oppositely one another on their respective supporting members 52 and 54 with their open slotted ends 64 towards each other. Cross members 62 have enlargements 66 adjacent their ends forming substantially the ball portion of a ball and socket arrangement that are received within oppositely disposed sockets 62. The enlargements 66 and the socket members are so proportioned that they may be fitted together loosely and held in place by their own weight, the enlargements resting on the base of the members 52, or they may be so held by means of rods 68 passing therethrough as shown in Figs. 9 and 11.

Adjacent their ends the cross members 62 may be curved upwardly and outwardly as shown in Fig. 9 to form a bearing portion 61 for the cross member on the supporting member 52. At this point the cross member may be so curved as to be spaced from the flange 56 to permit relative movement of the parts.

While articles to be treated might be supported

on the structure so far described, this modification discloses the use of a further platform flexibly mounted thereon and may be provided with further article supporting means adjustable to conform the tray to various sizes and shapes of articles without requiring a differently shaped or sized tray. This platform also tends to strengthen the tray.

As shown the respective cross members may have further pairs of platform receiving members or socket means 70 formed therein in proper alignment opposite each other. A generally rectangularly shaped platform 72, best shown in Fig. 7, is formed with laterally extending lugs 74 with downwardly depending key members or enlargements 76 for fitting within socket means 70 and may be joined to the main body of the platform throughout their lengths by the flanges or webs 78. Preferably the parts 70, 76 and 78 are constructed to fit loosely in spaced relation as shown.

Centrally of their lengths, the supporting members 52 may have the flanges 80 and 81 extending inwardly from the lateral flange 56 to form a housing for further limiting lugs 82 formed on platform 72 that terminate short of flanges 56 and are spaced laterally from the housing flanges 80, 81 as shown in Fig. 7. The lugs 82 have the downwardly depending skirt portion 84 (Fig. 10) that rests on and is movable with respect to the base of the supporting member 52.

A large aperture may be provided centrally of the platform 72, as defined by skirt 86, which may be flanged inwardly at its bottom end as at 88 and strengthening ribs 88 may be formed therebetween. Upstanding lugs or ears 92 may be formed on the platform 72 upon which pivotally mounted supporting arms, not shown, may be positioned. These arms may be held in predetermined adjusted angles by the positioning means 94 that may be formed on cross members 62. Various article supporting members may thus be used in connection with these trays. The spaced relationship of all joints through the use of a ball and socket principle gives greater flexibility in both of these modifications with no tendency for the breakage or chipping off of exposed rods or fingers.

Various other modifications of structure will be apparent to those skilled in the art without departing from the spirit of the invention. All such modifications are intended to be included which are within the scope of the appended claims.

I claim:

1. A flexible tray, including spaced supporting members, a plurality of pairs of oppositely disposed upstanding arcuate receiving members on said supporting members, a plurality of cross members extending between said supporting members, said cross members having enlargements insertable in said receiving members for relative movement with respect to each other, and means for holding said enlargements within said receiving members.

2. A flexible tray, including spaced supporting members, a plurality of pairs of substantially U-shaped members mounted on said supporting members in oppositely disposed co-operating alignment, said receiving members having enlarged portions forming socket means, cross members extending between said supporting members and having enlargements for insertion within said oppositely disposed receiving members, and article supporting means on said cross members.

3. A flexible tray as defined in claim 2 wherein said article supporting means comprises a platform mounted to said cross members by a ball and socket arrangement.

4. A flexible tray, including spaced supporting members, spaced cross members extending between said supporting members, said cross members being mounted on said supporting members by ball and socket arrangements.

5. A flexible tray, including spaced supporting members, spaced cross members extending between supporting members, a plurality of oppositely disposed pairs of upstanding substantially U-shaped receiving members on said supporting members, enlarged recesses within said receiving members, said cross members having downwardly extending flanges insertable through the open ends of oppositely disposed receiving members and having enlargements on said flanges for

insertion within said recesses, the flanges and enlargements of said cross members being flexibly movable within said receiving members.

6. A flexible tray, including spaced supporting members, and a cross member mounted on said supporting members by cooperating ball and socket arrangements.

7. A flexible tray, including spaced supporting members, a plurality of pairs of oppositely disposed upstanding arcuate receiving members on said supporting members, a plurality of cross members extending between said supporting members, said cross members having enlargements vertically insertable in said receiving members to provide a loose fitting locking engagement between said supporting members and said cross members.

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