

April 2, 1935.

A. P. BALL

1,996,561

METHOD OF MAKING TRAYS

Filed May 9, 1932

3 Sheets-Sheet 1

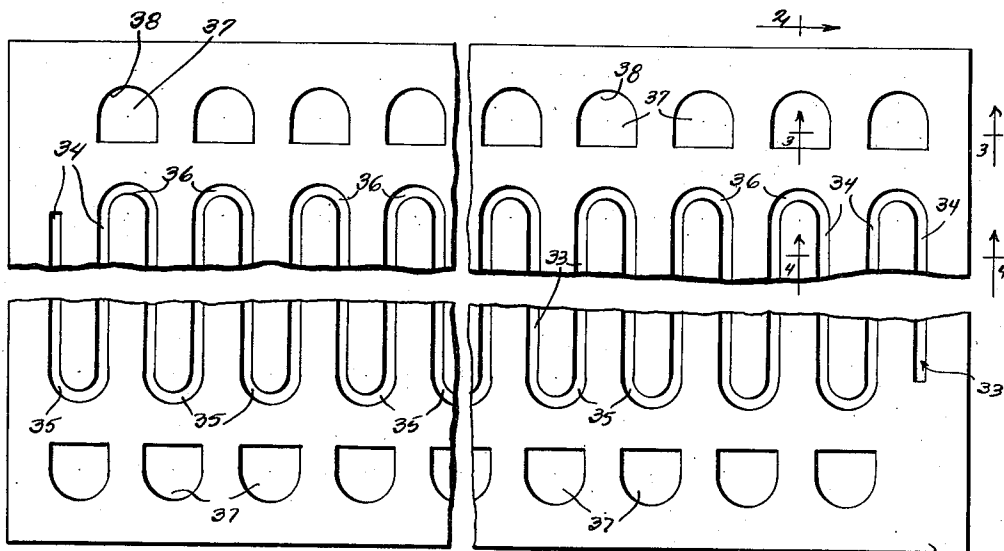


Fig. 1.

Fig. 2.

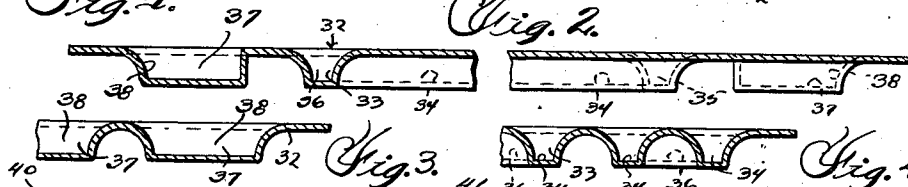
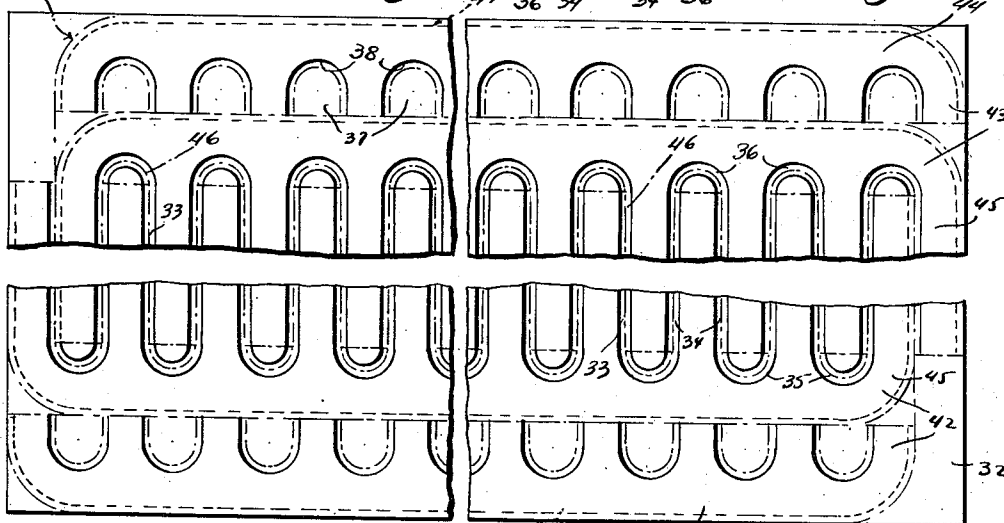


Fig. 5.

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3 Sheets-Sheet 2

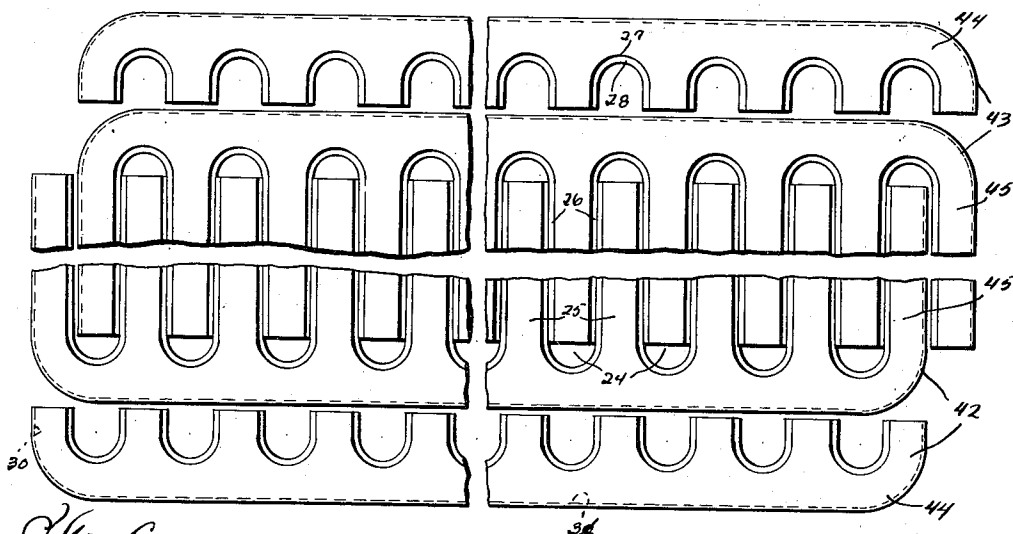


Fig. 6.

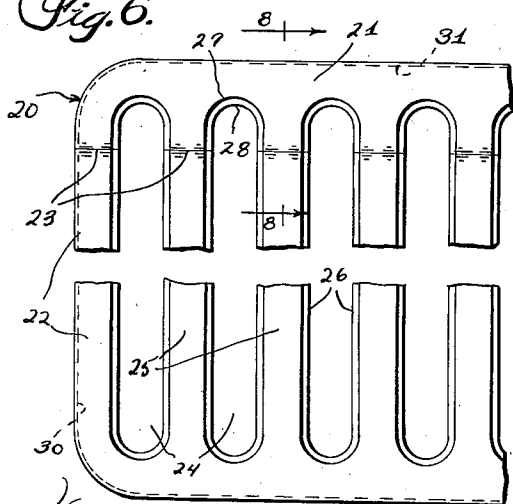


Fig. 7.

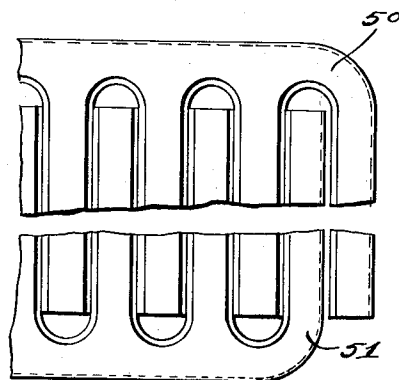


Fig. 10.

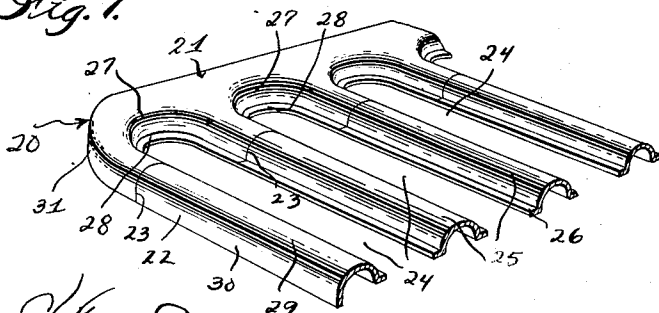


Fig. 9.

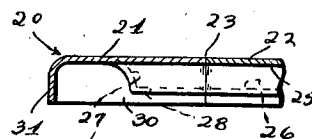


Fig. 8.

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3 Sheets-Sheet 3

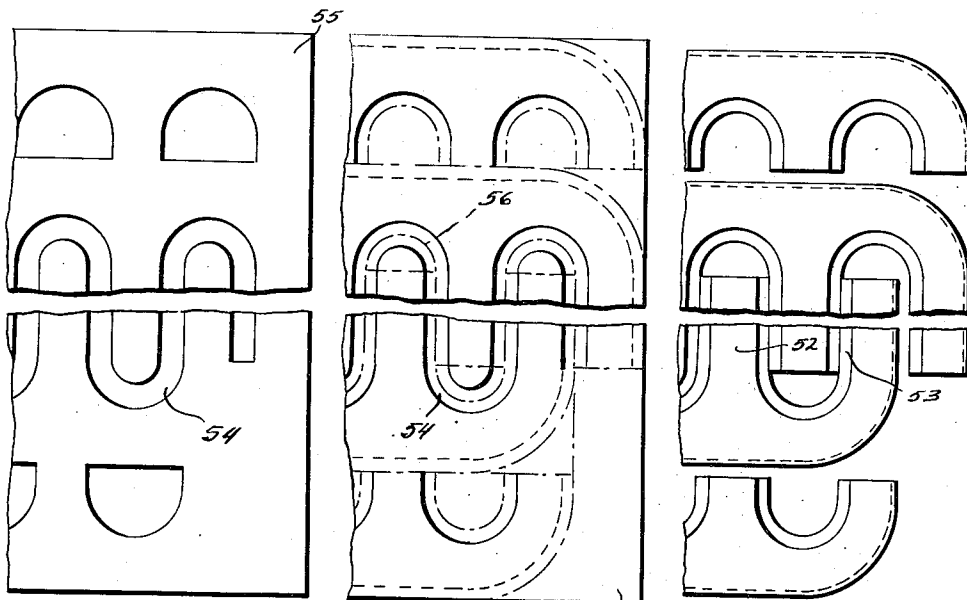


Fig. 11.

Fig. 12.

Fig. 13

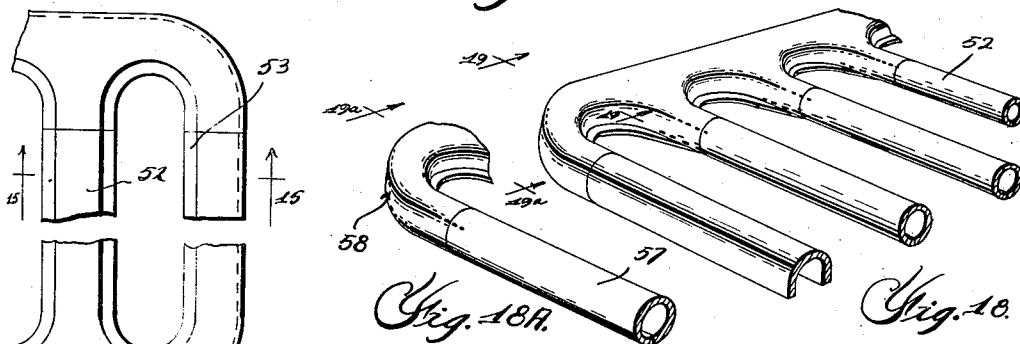


Fig. 14.

Fig. 18A.

Fig. 19.



Fig. 15.

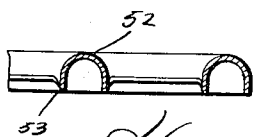


Fig. 16.

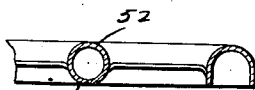


Fig. 17.

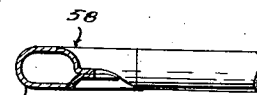


Fig. 19A.

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METHOD OF MAKING TRAYS

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Application May 9, 1932, Serial No. 610,241

18 Claims. (Cl. 113—116)

This invention relates generally to trays or shelving and refers more particularly to improved methods of forming the same.

One of the principal objects of the present invention resides in the provision of a strong and durable tray construction capable of being readily and inexpensively manufactured.

The present invention contemplates reducing the cost of forming shelving or trays by providing an improved method of manufacture distinguished from prior methods in the relatively few inexpensive operations involved which are capable of being expediently and systematically performed with a negligible amount of waste.

A further advantageous feature of this invention which contributes materially in reducing the cost of manufacture of the trays consists in forming a tray from a portion of sheet metal having a perimeter substantially smaller than the perimeter of a completed tray.

In addition to the foregoing, the present invention contemplates a method of manufacturing trays which consists in forming a plurality of trays from a single blank having a perimeter approximating the perimeter of one of the completed trays.

The foregoing as well as other objects will be made more apparent as this description proceeds, especially when considered in connection with the accompanying drawings, wherein:

Figure 1 is a top plan view of a blank of sheet metal from which a plurality of trays are adapted to be formed;

Figures 2, 3 and 4 are sectional views taken respectively on the planes indicated by the lines 2—2, 3—3 and 4—4 of Figure 1;

Figure 5 is a view similar to Figure 1 illustrating one step in the method of forming the trays;

Figure 6 is a view similar to Figure 5 showing still another step in the method;

Figure 7 is a fragmentary plan view of a completed tray;

Figure 8 is a sectional view taken on the line 8—8 of Figure 7;

Figure 9 is a fragmentary perspective view of the construction shown in Figure 7;

Figure 10 is a fragmentary plan view of a blank of sheet metal showing a slight modification of the method illustrated in the above figures;

Figures 11, 12, 13 and 14 are fragmentary plan views of a sheet metal blank illustrating various different steps in still another modified method of forming trays;

Figure 15 is a sectional view taken substantially on the line 15—15 of Figure 14;

Figure 16 is a sectional view similar to Figure 15 showing a further step in the method illustrated in Figures 11 to 14, inclusive;

Figure 17 is a sectional view illustrating still another step in the above method;

Figure 18 is a fragmentary perspective view similar to Figure 9 showing the tray resulting from the various steps indicated in Figures 11 to 17, inclusive;

Figure 19 is a cross sectional view taken on the line 19—19 of Figure 18;

Figure 18A is a fragmentary perspective view of still another modified form of the invention;

Figure 19A is a sectional view taken on the line 19A—19A of Figure 18A.

Although the present invention may be employed with facility in association with various articles of manufacture, nevertheless, it finds particular utility when employed in connection with trays of the type commonly employed in refrigerator cabinets to form shelving for supporting articles within the same. Referring now more in detail to the specific embodiment of the invention illustrated in Figures 1 to 9, inclusive, and with special reference to the tray 20 shown in Figures 7 and 9, it will be noted that this tray comprises two sections 21 and 22 butt-welded or otherwise suitably secured together as at 23 to form an integral construction. In order to provide for minimizing the weight of the tray and at the same time reducing the cost of manufacture, the same is provided with a plurality of transversely extending slots 24 spaced equal distances from each other longitudinally of the tray by means of bars 25 having the opposite ends thereof integrally connected with the front and rear edge portions of the tray. The width of the slots 24 is substantially equal to the width of the bars 25 for reasons which will be more fully hereinafter understood when considering the method of forming the tray. Each of the bars 25 are approximately semi-circular in cross section as shown in Figure 9 and terminate at the lower edges thereof in laterally outwardly extending reinforcing flanges 26. The portions of the opposite sides of the tray forming the end walls 27 of the slots 24 are also provided with inwardly extending reinforcing flanges 28 corresponding to the flanges 26 and forming a continuation of the latter. The opposite end bars 25 differ from the intermediate bars in that the reinforcing flanges 30 extend downwardly so as to cooperate with similar flanges 31 depending from the marginal edges on opposite sides of the tray to provide a

continuous downwardly extending reinforcing flange around the tray.

Referring now to the method of forming the tray 20 hereinbefore described, it will be noted that there is illustrated in Figure 1 a blank of sheet metal 32 having a perimeter substantially equal to the perimeter defined by a completed tray. The first step in the method of manufacture consists in subjecting the blank 32 to suitable forming apparatus designed to fashion the several impressions in the sheet illustrated in Figure 1. In detail, the sheet 32 is formed with a continuous groove 33 therein extending lengthwise of the sheet substantially centrally thereof transversely of the same. The groove 33 is of predetermined irregular contour and is made up of a plurality of parallel grooves 34 extending transversely of the sheet in equal spaced relation to each other longitudinally of the sheet. The lower ends of adjacent grooves of each pair are connected together by arcuate grooves 35, while the upper ends of adjacent grooves of each pair are connected together by the arcuate grooves 36 so as to form the continuous groove 33. The space between the end grooves 34 and the adjacent ends of the sheet corresponds substantially to the width of the end bars 29 of the tray, while the distance between the center lines of adjacent grooves corresponds substantially to the width of the bars 25 and foot flanges 26.

Formed in the sheet 32 between the continuous groove 33 and the side edges of the sheet is a plurality of longitudinally spaced depressions 37. The outer vertical walls 38 of the depressions are arcuate in shape and correspond in radius to the arcuate outer walls of the connecting grooves 35 and 36. As will be observed from Figure 1, the depressions 37 are formed in the sheet 32 in such a manner that a depression is positioned opposite each arcuate groove connecting the transverse grooves 34. The object in placing the grooves in this manner will be more fully understood as the description of this method proceeds. It is to be further noted in connection with the above operations that at the same time the continuous grooves 33 and depressions 37 are formed in the blank 32, the metal between the transverse sections 34 of the grooves as well as the metal intermediate the depressions 37 is fashioned by suitable dies (not shown) to the cross sectional contours illustrated in Figures 2, 3 and 4 which correspond substantially to the cross sectional contours of the bars 25 of the trays.

Upon completion of the foregoing operations, the blank 32 is severed on the dot and dash lines designated by the reference character 40 in Figure 5 and is subsequently bent on the dotted lines represented by the character 41 in the same figure. The results of the severing and bending operations are clearly shown in Figure 6 wherein it will be seen that two groups of sections 42 and 43 are formed. Both of the aforesaid groups of sections are formed from a sheet metal blank 32 having a perimeter substantially equal to the perimeter defined by the marginal edges of one completed tray, and each of the groups of sections comprise two units 44 and 45 corresponding respectively to the sections 21 and 22 of the trays with the result that two trays are developed from the blank.

Referring now more in detail to the manner in which the two groups of sections are severed from the blank 32, it will be noted from Figure 5 that in severing the blank along the center line 46 of the continuous groove 33, the metal removed

from one of the sections 45 to provide perforations therethrough forms the transverse bar portions of the other section 45, and since the distance between the center lines of the transverse portions 34 of the grooves as well as the shape of metal therebetween is identical in all cases, it necessarily follows that the aforesaid sections are duplicates of each other. The depressions 37 are severed on a radius equal to the radius of the center line of the curved connecting portions 36 of the grooves 33 to form perforations and bars in the sections 44 capable of being registered with the corresponding portions of the sections 45. In severing the sections on the center lines indicated above, the reinforcing flanges 26 and 28 of the trays are formed upon the respective sections so that after the sections of each group are united, the foot flanges extend continuously around the perforations through the trays. It is to be understood that the above severing operations as well as the operation of cutting the groups of sections from the blank as shown in Figure 6 are effected simultaneously, and the step of bending the marginal edges of the sections on the line 41 is accomplished subsequent to the severing operations. Upon completion of the severing and bending operations referred to above, the sections of each group are positioned in abutting relation and are brazed, butt-welded or otherwise suitably united together to form integral tray constructions. Thus, from the above description, it will be apparent that the foregoing method offers the possibility of developing two trays of identical size from a blank having a perimeter substantially equal to the perimeter defined by the marginal edges of one of the completed trays.

An alternative method of forming the tray illustrated in Figures 6 and 7 is shown in Figure 10 wherein one tray is fashioned from a sheet metal blank having a perimeter substantially less than the perimeter defined by the marginal edges of the completed tray. The modified method briefly designated above is substantially the same as the method of manufacture hereinbefore referred to with the exception that it is not necessary to form the depressions 37 in the blank, and, as a consequence, the latter may be considerably narrower than the one featured in Figure 1 of the drawings. The remaining operations in producing a single tray from a blank may be the same as previously set forth in connection with the first modification of the invention in that a continuous groove, simulating the groove 33, may be formed in a blank and the latter severed on the center line of the groove to form two sections 50 and 51 similar to the sections 45 hereinbefore described. After the sections 50 have been severed and formed from the blank in the same manner as the sections 45, the former are positioned with the perforations therethrough and bar portions thereof in registration with each other and are united together. The tray resulting from this method is substantially the same as the tray shown in Figure 6 with the exception that the line of weld is substantially centrally of the tray transversely of the same.

In Figures 18 and 19, I have shown a slightly modified form of tray which differs from the tray shown in Figure 6 in that the intermediate bars 52 are substantially tubular in shape so as to provide a more durable construction. Briefly described, the intermediate bars are formed tubular by curling the lower portions of opposite sides of

the bars inwardly to form a tubular cross sectional area.

Inasmuch as the tray illustrated in Figure 18 differs from the one shown in Figure 6 only in that the reinforcing flanges instead of extending laterally outwardly from the bars are curled to impart a tubular cross sectional area to the intermediate bars of the tray, it will be apparent that substantially the same method may be employed to form the tray shown in Figure 18 as hereinbefore described in fashioning the tray featured in Figure 6 with the exception of the steps of curling the intermediate bars 52. The several steps in the method of forming the tray illustrated in Figure 18 are designated by Figures 11 to 17, inclusive, and by comparing the steps shown particularly in Figures 11 to 15, inclusive, with the steps shown in Figures 1 to 7, inclusive, it will be noted that the two methods correspond with the exception that provision is made in the present embodiment of the invention to provide wider reinforcing flanges 53 so as to obtain sufficient metal to form the tubular intermediate bars. The required width is given to the reinforcing flanges by forming the irregular groove 54 in the blank 55 substantially wider than the corresponding groove 33 shown in Figure 1 so that when the groove 55 is severed on the center line 56 thereof shown in Figure 12, the combined width of the reinforcing flanges on opposite sides of each transverse bar 52 will be sufficient to complete the desired tubular cross sectional contour of the bars 52. Inasmuch as the method of forming the tray illustrated in Figure 18 is the same up to and including the step shown in Figure 15 as set forth in the first described form of the invention, reference will be specifically made in this instance only to the additional steps shown in Figures 16 and 17. The aforesaid additional steps consist in bending the foot flanges 53 illustrated in Figure 15 downwardly to the position shown in Figure 16 whereupon they are curled inwardly to form with the upper portions of the transverse bars a tubular cross sectional area.

In Figures 18A and 19A, I have shown a slight modification of the embodiment illustrated in Figure 18 in that the marginal portions 57 of the tray 58 shown in Figures 18A and 19A are also fashioned to form a closed section in cross sectional area. The foregoing is accomplished by curling the marginal flanges on the tray illustrated in Figure 18 inwardly so as to impart a substantially tubular cross sectional area to the sides of the tray as well as the intermediate bars of the same.

While several illustrative embodiments of the invention have been shown and described herein somewhat in detail, nevertheless, it is to be noted that each modification of the invention provides for forming a tray from a portion of sheet metal having a perimeter substantially smaller than the perimeter defined by the marginal edges of one completed tray. It will further be apparent that each of the methods of manufacture set forth herein embody a relatively few number of simple steps capable of being inexpensively and expediently effected with the minimum waste of material. It is to be noted that the sequence of the several steps in each of the foregoing methods may be re-arranged if desired without departing from the spirit and scope of this invention, and, accordingly, reservation is made to make such changes as may come within the purview of the accompanying claims.

What I claim as my invention is:

1. Those steps in the method of forming trays which consist in fashioning a blank to form a continuous groove therein and equally spaced transversely extending channel portions of the same depth as said groove and having portions connecting successive ends of the transverse portions, and severing the blank along the base of said groove to form sections having alternate channel bars and perforations.

2. Those steps in the method of forming trays which consist in fashioning a blank to form a continuous groove therein having equally spaced parallel channel portions of the same depth as said groove and having curved portions connecting successive ends of the parallel portions and severing the blank along the center line of said groove at the base thereof to form sections having alternate perforations and bars with reinforcing flanges formed from the metal of the groove.

3. Those steps in the method of forming trays which consist in fashioning a blank to form a deep continuous groove therein having laterally spaced portions and having portions connecting successive ends of the aforesaid portions, and severing the blank along the base of said groove to provide disconnected tray forming sections.

4. Those steps in the method of forming trays which consist in fashioning a blank to form a continuous deep groove therein having laterally spaced portions and having portions connecting successive ends of the aforesaid portions, severing the blank along the base of said groove to form sections having projecting bars, positioning the sections with the ends of the bars in abutting relation and uniting the adjacent ends of said bars.

5. Those steps in the method of forming trays which consist in severing the central portions of a blank to form sections having interfitting bars, severing the opposite side portions of the blank to form additional sections with bars spaced laterally from each other a distance corresponding to the spacing of the first named bars, positioning each of the last named sections relative to the aforesaid sections to form independent groups of sections with the free ends of the bars on the sections of each group in abutting relation and uniting the abutting ends of the bars of each group together to form a plurality of trays.

6. Those steps in the method of forming trays which consist in fashioning the central portions of a blank to form a continuous groove therein having equally spaced parallel portions and having portions connecting successive ends of the parallel portions, severing said blank along the center line of the groove to form sections with interfitting bars having laterally extending reinforcing flanges, severing the opposite side portions of the blank to form additional sections with bars corresponding to the bars of the first named sections, registering each of the second mentioned sections with each of the first named sections to form two groups of sections and uniting the groups together to form two trays.

7. Those steps in the method of forming trays which consist in fashioning a blank to form a continuous deep groove therein having equally spaced raised parallel portions and having curved portions connecting successive ends of the parallel portions, severing the blank along the base of said groove to form sections having interfitting bars, bending the marginal portions of the sections to form depending flanges, and curl-

ing the flanges to impart a substantially tubular cross sectional area to the sections.

8. In the method of producing a tray the steps of pressing a sheet metal blank to form between 5 opposite longitudinal edges thereof a continuous tortuous groove defining parallel channel rib portions, and severing said blank on a tortuous line centrally of the groove to provide a plurality of similar disconnected tray sections each being 10 formed with spaced parallel channel bars terminating in edge flanges formed from the metal of said groove.

9. The method of making a tray which comprises pressing a sheet metal blank to form between 15 opposite longitudinal edges thereof a continuous tortuous groove defining parallel channel shaped rib portions, severing said blank on a tortuous line centrally of the groove to form a plurality of similar disconnected tray sections, and joining said sections by uniting said rib portions 20 end to end.

10. In the method of making a tray the steps of stamping a sinuous groove in a blank to define a series of oppositely extending parallel rib 25 members, and severing the blank on a sinuous line centrally of the groove to form disconnected sections having parallel ribs terminating along their edges in reinforcing flanges produced from the metal at the base of said groove.

11. In the method of making a tray the steps of stamping a blank to form parallel channel 30 shaped ribs each defined by a tortuous groove, and severing the blank centrally of the grooves to form disconnected sections having parallel channel ribs terminating at their edges in flanges 35 formed from the metal at the base of said groove.

12. In the method of making a tray the steps of stamping a blank to form parallel channel 40 shaped ribs each defined by a tortuous groove, severing the blank centrally of the grooves to form disconnected sections having parallel channel ribs terminating at their edges in flanges 45 formed from the metal at the base of said grooves, and forming said ribs into tubular shape from the metal of said flanges.

13. The method of producing two metal trays from a single metal blank, which comprises forming by stamping and severing operations two 50 pairs of disconnected sections, the sections of at least one pair comprising base portions having projecting parallel nested bars extending in opposite directions and formed from contiguous

portions of the metal blank, and joining a section of each pair with a section of the other pair to form two trays.

14. The method of producing two metal trays from a single metal blank, which comprises 5 stamping and severing the blank to form two pairs of disconnected sections, the sections of each pair comprising base portions having projecting parallel bars extending in opposite directions and forming each tray by joining a section 10 of each pair with a section of the other pair by uniting the bars thereof end to end.

15. The method of producing two metal trays from a single metal blank, which comprises 15 stamping and severing the blank to form two pairs of disconnected sections, each section of each pair comprising a base portion having spaced parallel bars projecting from one longitudinal edge, the sections of one pair being formed from separated marginal areas of the 20 blank and the sections of the other pair having their bars formed in nested relation from contiguous portions of the blank, and joining together end to end the bars of one section of each 25 pair.

16. The method of making a tray or the like which includes the steps of stamping a blank to provide therein reversely formed parallel channel 30 portions of substantially the same depth in cross section, and severing said blank along the base of alternate channel portions to provide disconnected sections having parallel channel bars extending in opposite directions.

17. The method of making a tray or the like which includes the steps of stamping a blank to 35 provide therein reversely formed parallel channel portions of substantially the same depth in cross section, severing said blank along the base of alternate channel portions to provide disconnected sections having parallel channel bars extending in opposite directions, and joining the 40 bars of said sections together end to end.

18. The method of making a tray or the like which includes the steps of stamping a blank to provide therein reversely formed parallel channel 45 portions of substantially the same depth in cross section, severing said blank along the base of alternate channel portions to provide disconnected sections having parallel channel bars extending in opposite directions, and forming said 50 bars into tubular members.

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