May 1, 1928. 1,668,523

F. F. BENTLEY

SHEET METAL CAN AND METHOD OF MANUFACTURING THE SAME

Filed April 10, 1925 2 Sheets-Sheet 1

Fig. 1

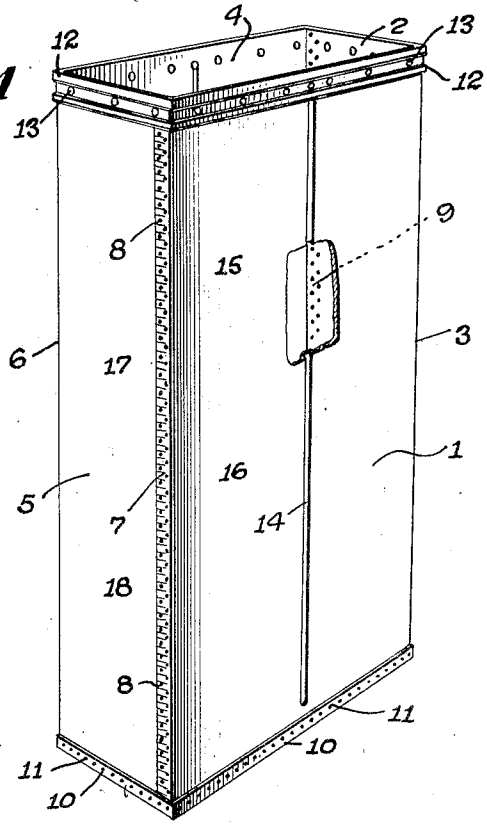


Fig. 6

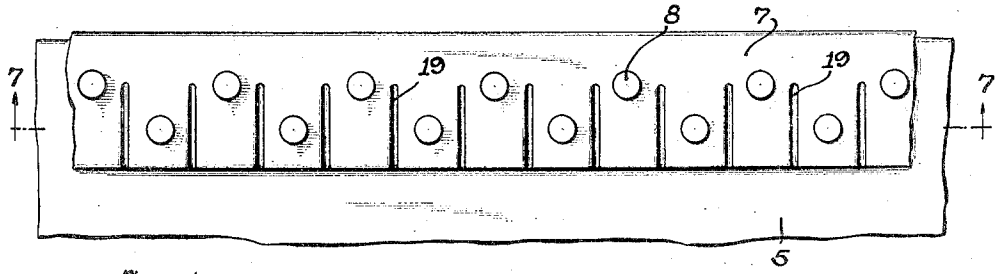
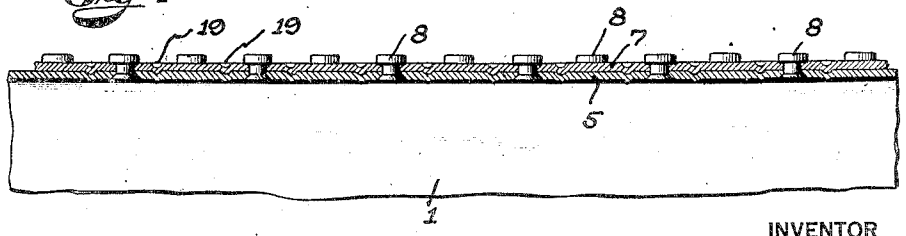


Fig. 7



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Fig. 2

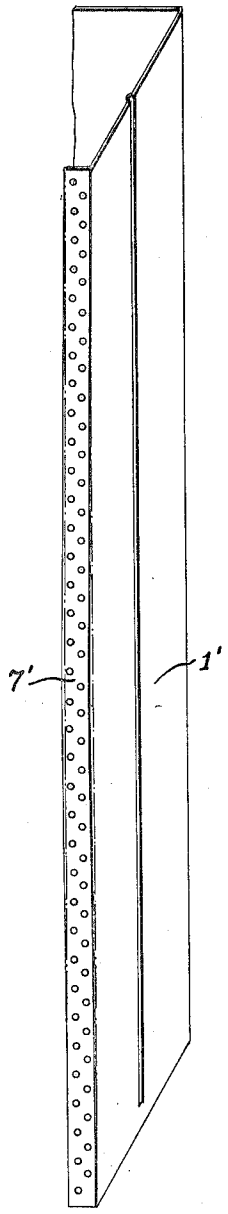


Fig. 3

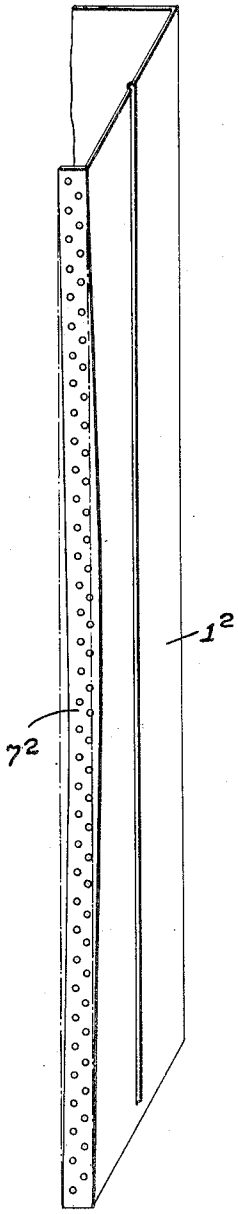


Fig. 4

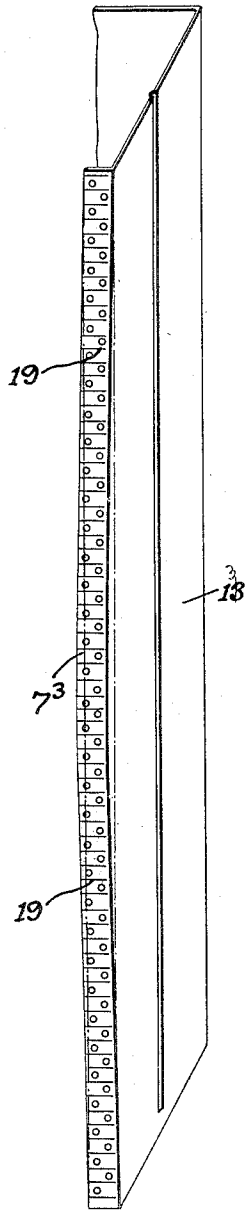
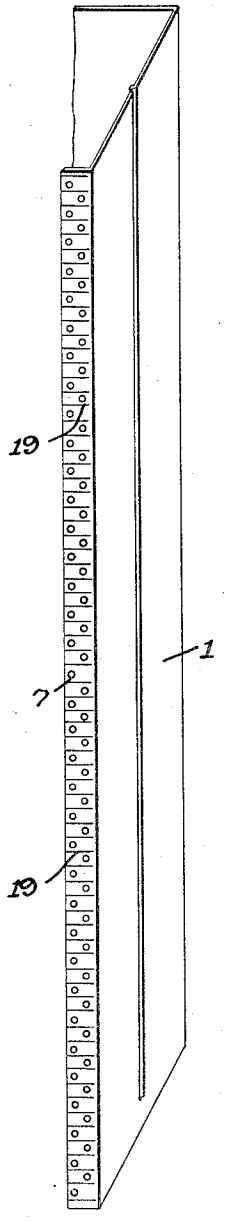


Fig. 5



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Patented May 1, 1928. 1,668,523

UNITED STATES PATENT OFFICE.

FRANK F. BENTLEY, OF WARREN, OHIO, ASSIGNOR TO OHIO GALVANIZING & MANUFACTURING COMPANY, OF NILES, OHIO, A CORPORATION OF OHIO.

SHEET-METAL CAN AND METHOD OF MANUFACTURING THE SAME.

Application filed April 10, 1925. Serial No. 22,021.

This invention relates to improvements in the manufacture of sheet metal containers, particularly such containers of rectangular cross section commonly used in the manufacture of ice. The invention has been developed in connection with the manufacture of so-called freezing cans for use in connection with ice making apparatus and in describing the invention particular reference will be made thereto.

The object of the invention is to produce a can which shall conform to the intended dimensions and be free from such distortion as is often found in cans as now manufactured.

The invention will be described in connection with the accompanying drawings wherein,

Figure 1 is a perspective view of a finished can such as may embody and be made in accordance with the present invention.

Figures 2, 3, 4 and 5 are fragmentary perspective and more or less diagrammatic views which will be referred to in describing the manufacture of the can shown in Figure 1, and

Figures 6 and 7 are respectively a plan and a section of a part of the can, the line of the section of Figure 7 being indicated by the line 7—7 of Figure 6.

It will undoubtedly lead to a clearer understanding of the present invention if the structure of the can shown in Figure 1 and a commonly used method of manufacture are first described.

The can shown in Figure 1 has a side wall 1 and an end wall 2 formed from a single sheet of metal 3. Galvanized sheet steel of a gauge suitable to the particular can being manufactured is commonly employed. The other side wall 4 and end wall 5 are likewise made from a similar sheet of metal 6. The outer edge of the side wall 1 is bent at right angles to form an overlap 7 which, when the can is assembled, overlaps the end wall 5 and is fastened thereto in any suitable manner as by staggered rows of rivets 8. The outer edge of the other side wall 4 is similarly formed to provide an overlap 9 cooperating with and fastened to the end wall 2.

The bottom 10 of the can may be formed in accordance with any accepted practice but it is preferred to form the same in accordance with my Letters Patent No. 1,027,802 of May 28, 1912. The said bottom is retained in place by a row of rivets 11 attaching it to the lower edges of the side and end walls.

Around the top of the can is placed a reinforcing or stiffening band 12 which is attached to the side and end walls by a row of rivets 13. If desired, the side walls may be stiffened by an embossed rib or corrugation 14.

In accordance with commonly used methods of manufacture the two sheets of metal 1 and 6 are first cut to shape, punched if they are to be riveted, and formed. Then they are assembled and riveted together by automatic or semi-automatic machinery or otherwise fastened to form a box-like structure open at its ends. The reinforcing band 12 may now be applied or it may be applied at some later stage in the manufacture of the can. The vertical corner or side seams are next soldered in order to render them water tight. This soldering operation is commonly accomplished by first subjecting the corner of the can to the action of a suitable flux and then lowering the corner into a trough of molten solder maintained at suitable temperature which may be about 425° F. so that the corner is immersed therein sufficiently to cover the overlapped portions of the can. First one side seam is thus soldered and then the other. Thereafter the bottom is attached by riveting and the bottom seams soldered, thus completing the can.

It has been the experience of manufacturers of freezing cans of the character just described that a substantial percentage of cans when completed show an appreciable buckling of the side walls. This buckling occurs from time to time no matter how carefully the cans are made and handled during the steps of manufacture and is of a sufficient extent to render a number of cans unsalable. The extent and location of this buckling varies and the exact cause or causes are not readily ascertainable. One typical instance may be cited for illustration although in this instance the distortion and buckling of the can was relatively slight in comparison with the distortion and buckling which sometimes takes place. It will be readily understood that any appreciable inward or outward buckling of the side walls of a freezing can is a serious detriment to the removal therefrom of the formed ice cakes.

An incompleted can about sixty inches

deep manufactured of the usual materials in the usual manner as above described was observed to be substantially free from distortion immediately following the side seam soldering operation but as the can cooled the side and end walls buckled inwardly adjacent the soldered seam. Substantial depressions appeared in the side wall approximately at points indicated by the reference numerals 15 and 16 in Figure 1 of the drawings, the maximum depression from the normal outer surface of the wall 1 being approximately ¼ of an inch at the point 15 and approximately ⅛ of an inch at the point 16. The end walls also showed depressions approximately at the points indicated by the reference numerals 17 and 18 in Figure 1, the maximum extent of these depressions being approximately $\frac{3}{16}$ of an inch and $\frac{1}{16}$ of an inch respectively. The soldered corner of the can was observed to shrink or contract approximately $\frac{1}{16}$ of an inch as the can cooled.

For further illustration an incompleted forty-five inch can cut, formed and riveted as described above was disassembled after the riveting operation and it was observed that the edge of the sheet 1′ having the overlap 7′ became deflected or bowed slightly to the left as indicated in Figure 2, the extent of this deflection amounting to approximately $\frac{1}{16}$ of an inch. The side and end walls appeared to be straight and true before disassembly.

A similar incompleted can was disassembled after the soldering operation and it was observed that the edge of the sheet 1^2 having the overlap 7^2 became slightly bowed or deflected to the right as indicated in Figure 3, the extent of the deflection amounting to approximately $\frac{9}{32}$ of an inch, although this deflection did not appear before disassembly. The side and end walls of the can of Figure 3 showed an appreciable buckling of the character heretofore described which buckling disappeared when the can was disassembled and the parts permitted to assume a condition free from strain.

As a result of extended investigation of which a part only has been described above, and of extended experiment, I have provided a method of manufacture which overcomes the difficulties heretofore described and enables me to produce cans having side and end walls without any observable buckling or distortion. I will describe a preferred method which has been successfully followed by me in the manufacture of cans with the result that the buckling or distortion heretofore incident to the manufacture of cans in the usual way has been entirely eliminated.

The usual procedure is followed except that the metal along the seams, in this instance the corner seams, is subjected to a treatment which apparently neutralizes or offsets the strains set up during the manufacture of the can and which are evidenced by the buckling or distortion which appears after the soldering operation. This treatment of the metal along the seam may be effected in any suitable way to set up the desired strain. For example, I have secured the desired result by subjecting the metal at spaced intervals along the seam to the blows of a blunt instrument such as a blunt cold chisel, swage or cross peen hammer with the incidental effect of producing slight depressions 19 transversely of the longitudinal axis of the seam as shown in Figures 6 and 7. Obviously the inner surface of the sheet 5 is supported upon an anvil during this treatment and the precise form of the depressions 19 will depend upon the character of the tool employed. It will be readily understood that both of the side seams are similarly treated.

After the treatment above described the partially assembled can is subjected to the usual soldering operation, that is, the side seams are successively immersed in a suitable flux and then in the molten solder. As the can cools no buckling appears and the side and end walls, so far as can be observed, are straight and true. The can is then subjected to the further operations in the usual way, that is, the bottom is applied, riveted and soldered.

When a can so treated is disassembled prior to the soldering operation, it will be observed that the edge of the sheet 1^3 having the overlap 7^3 will take a position appreciably bowed to the left as indicated in Figure 4, the extent of this deflection depending of course upon the extent to which the above described treatment is carried and also upon the size of the can. In one instance an examination of a forty-five inch can showed a maximum deflection of approximately $\frac{9}{32}$ of an inch and an elongation of approximately $\frac{3}{64}$ of an inch.

Upon disassembling, after the soldering operation, a can manufactured in accordance with the above described method it is observed that there is no bowing or deflection of the edge of the sheet 1 having the overlap 7, but that the same is straight and true as shown in Figure 5.

It will of course be understood that the observable buckling or distortion of cans made in accordance with the usual manufacturing methods varies from time to time and with different sizes of cans and different thicknesses of metal and it should also be understood that the treatment of the metal along the seam in accordance with the present invention will vary in degree with the varying characteristics of cans such as their size and the thickness of sheet metal form-

ing the walls thereof, but nevertheless the principle of the present invention is applicable and may be variously modified within the scope of the subjoined claims.

I claim as my invention:

1. The improvement in the art of manufacturing sheet metal containers having a soldered seam which comprises working the metal along the seam in parallel transverse to the length of the seam to neutralize distortion caused by the soldering operation.

2. The improvement in the art of manufacturing sheet metal containers having a soldered seam which comprises working the metal along the seam in parallel lines transverse to the length of the seam prior to the soldering operation to offset distortion caused by the soldering operation.

3. The improvement in the art of manufacturing sheet metal containers having a soldered seam which comprises elongating the metal along the length of the seam but not transversely thereof to set up a strain in the metal of proper magnitude and location along the seam to neutralize the strain set up by the soldering operation thereby producing a container free from appreciable distortion.

4. The improvement in the art of manufacturing sheet metal containers having a riveted and soldered seam which comprises riveting and slightly elongating the metal of the seam solely in the direction of the length thereof to neutralize distortion caused by the soldering operation.

5. The improvement in the art of manufacturing sheet metal containers having a riveted and soldered seam which comprises in riveting and applying a compressive force to the metal along the seam between adjacent rivets and thereafter subjecting the seam to a soldering operation.

6. The improvement in the art of manufacturing sheet metal containers having a soldered seam which comprises subjecting the metal along the seam and in approximately parallel transverse lines to hammer blows tending to distort the metal to an extent sufficient to compensate for the distortion tendency of the subsequent soldering operation.

7. The improvement in the art of manufacturing sheet metal containers having a riveted and soldered seam which comprises riveting and subjecting the metal to hammer blows at spaced intervals between adjacent rivets along the seam and thereafter soldering the seam.

8. The improvement in the art of manufacturing sheet metal containers of rectangular cross section having a longitudinally extending soldered seam which comprises securing the overlapping sheets together at the seam at spaced intervals, subjecting the formed seam to a force tending to distort the container in a manner similar to but in a direction opposite to the tendency normally resulting from the soldering operation and then soldering the seam.

9. The method of manufacturing sheet metal containers of rectangular cross section which comprises cutting, forming and assembling in overlapping relation sheets of metal to form the side and end walls of said container, working the overlapped metal in generally parallel transverse lines to set up a strain therein tending to neutralize any tendency to distortion produced by subsequent soldering, soldering the overlapped metal of each seam simultaneously along the whole length of the seam and thereafter affixing a bottom member to complete the receptacle.

10. The method of manufacturing sheet metal containers which comprises cutting and forming sheet metal for the walls thereof, assembling the same in partially overlapping relation and fastening the overlapping edges together, subjecting the sheet metal adjacent the seams thus formed to treatment tending to distort the same and thereafter subjecting said seams to a soldering operation whereby the seam is rendered watertight and the tendency to distortion eliminated and thereafter assembling a bottom member with said side members.

11. Improvement in the art of manufacturing sheet metal containers having longitudinally extending riveted and soldered side seams which comprises riveting and subjecting the sheet metal adjacent the seams to a treatment, subsequent to the riveting operation and prior to the soldering operation, tending to distort the seam in a direction and to an extent sufficient to compensate for the distortion caused by the soldering operation.

In testimony whereof, I have signed my name to this specification this 7th day of April, 1925.

FRANK F. BENTLEY.

4

CERTIFICATE OF CORRECTION.

Patent No. 1,668,523. Granted May 1, 1928, to

FRANK F. BENTLEY.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, line 9, claim 1, after the word "parallel" insert the word "lines"; same page, line 39, claim 5, strike out the word "in"; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 5th day of June, A. D. 1928.

(Seal)

M. J. Moore,
Acting Commissioner of Patents.