June 29, 1943. N. H. GOLDSWORTHY 2,322,845

METHOD OF MAKING BLACK IRON SHEET METAL CONTAINERS

Filed July 3, 1940

Fig. 1.

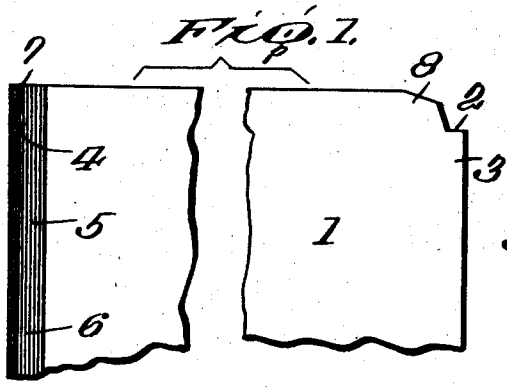


Fig. 2.

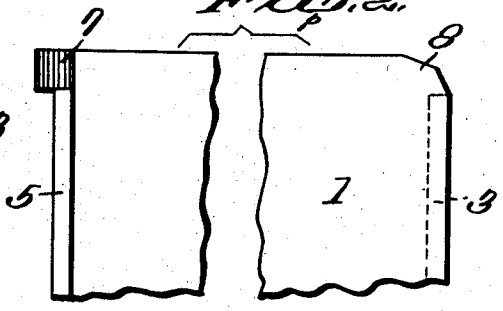


Fig. 3.

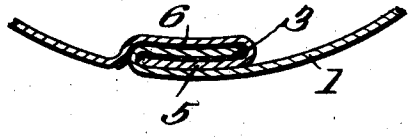


Fig. 4.

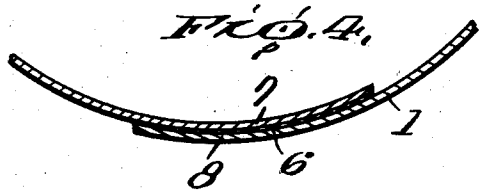


Fig. 5.

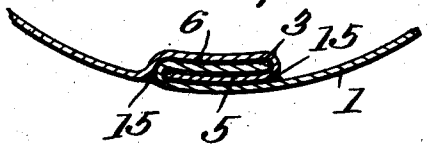


Fig. 6.

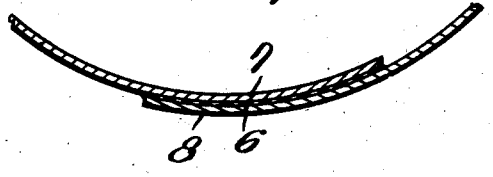


Fig. 7.

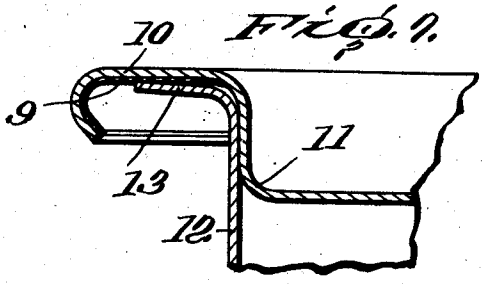


Fig. 8.

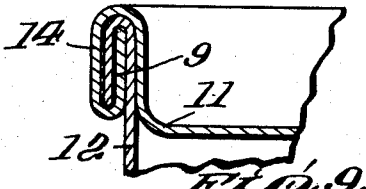


Fig. 9.

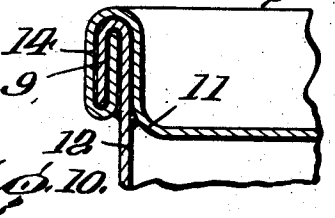
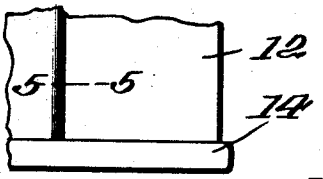


Fig. 10.



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METHOD OF MAKING BLACK IRON SHEET METAL CONTAINERS

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Application July 3, 1940, Serial No. 343,861

2 Claims. (Cl. 113—120)

The invention relates to new and useful improvements in the method of making a sheet metal can from black iron.

An object of the invention is to provide a method of making a sheet metal can of the above type wherein the side seam, at least, is rendered hermetic by metal brazing.

Another object of the invention is to provide a method of making a sheet metal can wherein the side and end seams are rendered hermetic by metal brazing.

A further object of the invention is to provide a method of making a can of the above type, wherein the brazing material is secured to the blank or blanks from which the can is made and is placed in the seams during the forming and assembling of the parts to form the seam.

A still further object of the invention is to provide a method of making a can body of the above type, wherein the brazing material is melted and caused to flow by capillary attraction throughout the limits of the side seam by heat applied to the seam in a non-oxidizing atmosphere.

These and other objects will in part be obvious and will in part be hereinafter more fully described.

In the drawing—

Figure 1 is a plan view of a body blank cut to shape for the making of a body;

Fig. 2 is a similar view showing the edge portions bent to form interlocking hooks;

Fig. 3 is a horizontal sectional view through the side seam in the region of the hooks after the hooks have been interlocked and bumped;

Fig. 4 is a sectional view through the lap portions of the side seam;

Fig. 5 is a view on the line 5—5 of Fig. 10, after the body has been heat treated and the edge portions joined by a metallic bond;

Fig. 6 is a transverse sectional view through the lap portions of the side seam after said lap portions have been bonded;

Fig. 7 is a sectional view through one end portion of a body with an end applied thereto preparatory to the joining of the end to the body;

Fig. 8 is a sectional view radially through the seam after the end and body flange have been rolled into interlocked engagement;

Fig. 9 is a view similar to Fig. 8, after the parts have been heat treated for providing a metal bond between the end and the body, and

Fig. 10 is a side view of a portion of a can body with the bottom end attached embodying the improvements.

The present invention has to do with the method of making can bodies from black iron and the can produced thereby. It is thought that both the method and the article produced will be better understood by a description of the employment of the invention in the making of a can from black iron. The method of making the can body will first be described, and then the method of attaching the ends thereto.

The can body blank indicated at 1 in the drawing is cut from a sheet of black iron to suitable shape for the forming of a can body. It is notched as indicated at 2, setting off the portion which is to form the outer hook 3. It is also provided with slits 4 adjacent each end of the blank, setting off the portion which is to be bent so as to form the inner hook 5. Before notching and cutting the blank, a thin strip of copper 6 is secured to the blank in the region where the inner hook is to be formed.

This strip may be of any desired width, but as shown it is of sufficient width to cover the entire inner surface of the inner hook and overlie a portion of the body blank adjacent the hook. This film of copper may be secured by an adhesive or in any suitable way to the body blank. All that is necessary is to secure it to the blank so that it will retain its position on the blank as the blank passes to the notching, slitting and hook-forming stations, and also to the body forming and bumping station.

Instead of applying the copper in the form of a film, it may be applied in the form of a paste, that is, the copper ground up and mixed with a suitable adhesive for affixing the copper to the blank. It may also be applied by electro-deposition. The essential thing is that a strip of copper shall be applied to the blank in the region of the edge portion which is to form one of the hooks of the side seam. This strip is also extended so as to lie between the lap portions at the ends of the hooks. While the copper strip is shown as applied to the inner hook, it may be applied to the edge portion of the blank which is to form the outer hook. Here again, the essential feature consists in the placing of the copper strip so that it will be disposed within the seam when the parts are interlocked.

In Fig. 2 of the drawing, the body blank is shown as provided with hooks 3 and 5. After the body blank is thus formed, it is then shaped into a can body and the hooks interlocked and bumped in the usual manner. Fig. 3 shows a section through the interlocked hooks, after the bumping operation. It will be noted that the copper strip 6 extends throughout a considerable portion of the seam. The copper strip 6 also extends between the lap portions 7 and 8 at the end of the side seam.

The invention may be applied to the making of the side seam only of the can body and the ends secured thereto in the usual way by rolling the end flange and the body flange together with a sealing composition into a double seam. The same method of making the side seam may

be likewise applied to the end seams, and if both ends are attached to the can body by completed end seams, then of course, one of the ends will be provided with a filling opening with a suitable hermetic closure therefor.

The forming of the end seams when the invention is applied thereto will be now described in detail. A can end is stamped from a sheet of black iron and shaped so that it is ready for attachment to the can body by seaming. A thin copper annulus 9 is secured in the channel of the end flange 10 of the can end 11. The can body which is indicated at 12, is provided with a flange 13 in the usual manner. The flange of the can end 10, and the flange 13 of the can body are rolled into a seam 14 as shown in Fig. 8. It is noted that the copper annulus extends throughout the greater portion of the seam 14. This copper annulus 9 may be formed from a thin sheet of copper, or by mixing copper with paste, or may be electro-deposited upon the can end. Here again, the essential feature is that the copper shall be attached to the end so as to become a unit therewith for handling and seaming purposes.

After the can body has been formed in the manner above described and an end attached thereto, then the formed can is placed in an electric furnace provided with a non-oxidizing atmosphere, which furnace is heated to a temperature of approximately 2100° F. The cans may be placed on endless conveyors and passed into and through the furnace. This will cause the copper to melt as the temperature of the furnace is above the melting temperature of copper. It is, however, below the melting point of black iron. The non-oxidizing atmosphere prevents oxidation of the metals and frees them from any already formed oxides, thus preparing the surface to be wetted by the molten brazing metal. The copper when it is melted will move by capillary attraction throughout all parts of the seams forming a bonding alloy with the iron. The cans are then passed into a cooling chamber having a controlled non-oxidizing atmosphere, where the bonding metal is cooled and set. In this manner, the parts are joined by a tight metal bond and the surfaces in the region of the seams are clean and un-oxidized. Smooth fillets 15, 15 will also be formed at the entrance to the side seam.

If the body is to be completed and ends secured thereto by joining the same to the body by double seaming with a sealing composition, then the body after the copper strip has been attached thereto, and the hooks formed and bumped, is placed in the furnace and treated in the manner above stated. The body may be flanged before or after the heat treatment. In either case, the copper will melt and flow by capillary attraction throughout the entire limits of the side seam, metal bonding the parts together and forming an hermetic seam.

While the invention is shown as applied to a can body having a lock and lap side seam, it will be understood that it may be applied to a lap seam can body wherein the edge portions of the body blank are lapped. The copper metal for brazing is placed between the lap portions of the side seam and the lap portions may be held properly placed relative to each other after the body is shaped and in contact with the brazing metal, by spot welding.

While copper has been referred to as the brazing material for bonding the metal parts of the seams together, it will be understood that other brazing materials might be used in the place of copper, which brazing materials melt at a temperature lower than that at which the black iron melts. It is preferred, however, that the brazing material shall melt at a temperature near that of the black iron, so that the heat treatment of the metal parts in a non-oxidizinnz atmosphere will free the metal parts from formed oxides and thus prepare the surface to be joined. Furthermore, when the brazing material melts at a temperature near that of the black iron, a firmer bonding alloy of brazing metal and iron can be produced and a stronger joint obtained.

After the can body is formed, the inner surface may be covered by a lacquer, if desired, and the outer surface may be likewise covered with a lacquer or a suitable label applied thereto. The can body thus formed is very strong and durable and may be of light weight. Such a can is particularly adapted for use in the sale of lubricating oil and like products.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent, is—

1. The method of making a sheet metal can body from black iron including cutting a blank from a sheet of metal of proper size to form a can body having a side seam comprising interlocked hooks and lap sections at the ends of the hooks, attaching a thin strip of brazing material having a melting temperature near that of black iron to the edge portions of the blank so that said strip will be disposed within the hooks and extend between the lap sections in the formed can body, cutting and notching said blank, bending the edge portions to form the hooks, shaping the blank into a can body and joining the hooks and bumping the same so as to enclose the brazing strip in the bumped seam and heating the formed body in a non-oxidizing atmosphere to a temperature sufficient to melt the brazing material and cause the same to flow by capillary attraction throughout the entire limits of the seam and form an alloy with the black iron firmly uniting the edge portions of the body blank.

2. The method of making a sheet metal can from black iron including cutting a blank from a sheet of metal of proper size to form a can body having a side seam comprising interlocked hooks and lap sections at the ends of the hooks, attaching a thin strip of brazing material having a melting temperature near that of black iron to the edge portions of the blank so that said strip will be disposed within the hooks and extend between the lap sections in the formed can body, cutting and notching said blank, bending the edge portions to form the hooks, shaping the blank into a can body and joining the hooks and bumping the same so as to enclose the brazing strip in the bumped seam, flanging the ends of the can body, die shaping a black iron blank to form a can end adapted to be double seamed to the flanged end of the can body, attaching a similar strip of brazing material to the inside of the channel of the can end, double seaming the bottom end to the can body so as to join the end to the body and enclosing the brazing strip within the double seam, and heating the formed can in a non-oxidizing atmosphere to a temperature sufficient to melt the brazing material and cause the same to flow by capillary attraction throughout the limits of the side seam and throughout the limits of the double seam.

NORMAN H. GOLDSWORTHY.