April 7, 1931. C. B. D. WOOD 1,799,205

EDGE REENFORCED ARTICLES OF STAINLESS STEEL SHEET AND METHOD OF MAKING THE SAME

Filed Jan. 19, 1929

FIG. 1.

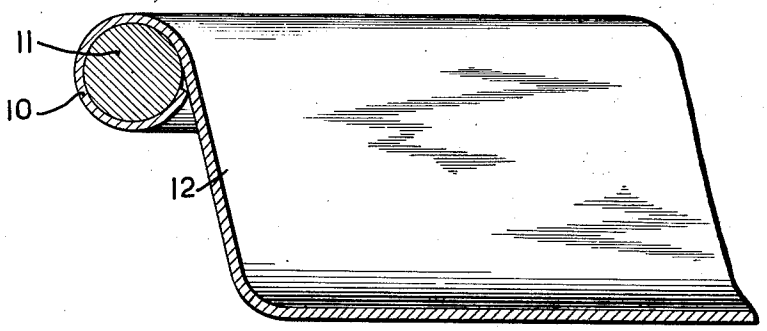
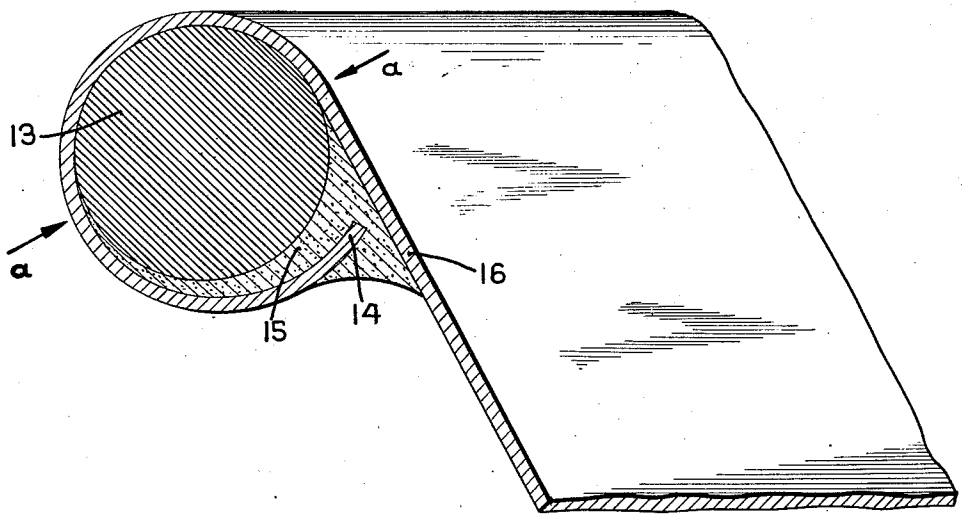


FIG. 2.



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UNITED STATES PATENT OFFICE

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EDGE-REENFORCED ARTICLES OF STAINLESS-STEEL SHEET AND METHOD OF MAKING THE SAME

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In making sheet metal trays, pans, stewpots, and like receptacles, it has long been customary to reenforce the edge with a wire of suitable gauge and stiffness, around and under which the sheet metal edge is tightly curled. This is easy enough with the metal commonly used, as for example sheet copper, brass, aluminum, iron and ordinary steel, as these metals are relatively soft and when bent firmly against the wire they will stay in place, hugging the wire closely, but it is otherwise when the same thing it attempted with so-called "stainless" steel. The latter metal, an alloy of iron, chromium and nickel, is stiff and highly resilient, with the result that no matter how firmly the metal is bent against the wire it inevitably springs away and leaves the wire loose. Moreover the sheet metal is not uniform in its physical properties, one part of a sheet being stiffer or more springy than another, and hence the recoil or uncurling of the lip off the wire is irregular, exposing sharp edges on which the fingers may be injured. The looseness of the wire not only makes the article rickety instead of firm and rigid, but the inside of the curl soon becomes foul. Since there is no practical way of drying the inside of the curl after washing, the wash water runs down the outside of the tray or pan, making the article disagreeable to handle. Attempts to hold the curl tightly in place against the wire by soldering its edge to the wall of the pan or vessel have failed because of the very slight adhesion or cohesion that can be obtained between solder and stainless steel, my experience being that however firm the bond may appear to be initially it soon gives way, leaving the wire loose, with a final result that is worse than if no solder had been used.

I have therefore been led to devise my present invention, which has for its chief object to overcome the defects described above, thus providing an article of sheet stainless steel with a wire-reenforced edge which is solid, rigid and strong, and hermetically closed so that cleaning fluids and foreign matter cannot enter the curl. The result is an article having all the advantages of stainless steel as regards strength, appearance, freedom from oxidation and discoloration, and ease of cleaning, with none of the disadvantages incident to prior attempts to use the metal for articles of the class referred to. To this and other ends the invention comprises the novel features hereinafter described.

In carrying out my invention in the preferred way I do not attempt to make the edge of the sheet metal hold itself in contact with the wire by its own "set". On the contrary the edge is allowed to spring away from the wire and the side wall of the vessel, even pressing the edge away from the wall if necessary, and I then cast a body of metal in the curl, in contact with the adjacent surface of the wire and embedding the edge of the curl in the casting.

The construction outlined above is illustrated in the accompanying drawing, in which

Fig. 1 is a sectional view of shallow vessel of sheet metal, as iron, copper, or aluminum, having its edge reenforced with wire in the usual manner.

Fig. 2 is a similar view on a larger scale, showing a similar vessel reenforced by my invention.

When the vessel is made of sheet copper, iron, aluminum or other relatively soft metal, the edge of the curl 10, Fig. 1, around the wire 11, can be brought up under the wire and if desired can be set firmly against the wall 12, as indicated in the figure, making practically a liquid tight joint. The nature of the metal used permits it to take a permanent set so that it has virtually no tendency to uncurl or spring away from the wire. In fact in most cases the wire is held so tightly that some little force must be used to pry the edge of the sheet metal away from it. But "stainless steel" is so stiff and springy that it will not take the necessary set, nor can it be wedged between the wire and the wall of the vessel tightly enough to hold it there against the spring or tension of the outer portions of the curl.

This natural and in effect ungovernable tendency of the metal to uncurl is utilized in my invention. Wrapping it tightly around and under the wire 13, Fig. 2, I allow

it to spring back, as indicated at 14, and as stated I may even aid its back-spring in order to provide sufficient clearance for entry of the molten metal between the edge of the curl and the wall of the vessel. I then (the vessel being upside down) fill with molten metal, preferably metal of relatively low melting point, the space between the wire and the curl and between wire and wall, and also outside of the curl, covering the outer surface thereof well out from its edge and extending the molten metal well over the adjacent surface of the wall. This body of metal is shown at 15, in Fig. 2, and as will be seen it extends well under the wire and up into the bight between the wire and the wall 16, and embeds the edge 14 of the curl. The casting operation is conveniently effected by laying a bar of the fusible metal in the groove formed by the wall 16 and edge 14, and then heating the whole to the proper temperature. As the fusible metal becomes more and more fluid it penetrates and fills the space inside the curl and spreads over the outside of the latter as indicated in the drawing. In some cases it may be necessary or desirable to clamp the curl down on the wire, say at the points indicated by the arrows *a*, *a*, to prevent distortion during the casting operation.

Holding the vessel undisturbed until the molten metal has solidified and hardened, it will be found that the curl is securely held by the metal encasing its edge. The tendency to uncurl or unwrap is, I believe, chiefly radial in direction, and this tendency is resisted by the adhesion or cohesion of the cast metal to the wire, especially when the latter is made of iron, brass, or ordinary steel, while the edge 14 cannot spring radially outward except by shearing off the outside metal. Such tendency as there may be to uncurl or move circumferentially is resisted not only by the adhesion or cohesion of the metal to the curl itself but also by the mechanical effect of casting the metal in place, whereby it conforms perfectly to all the slight bulges and other irregularities that may be present in the curled sheet. It is also probable that atmospheric pressure aids in holding the parts in place. At the casting temperature the air in the curl expands and part of it is thus forced out, sometimes bubbling out through the molten metal, as I have observed. Then when the parts cool down, after solidification of the cast metal, the pressure of the residual air in the curl is less than that of the atmosphere and since the space between the edge of the curl and the wall of the vessel is hermetically sealed the partial vacuum inside is not relieved.

The preferred fusible metal is ordinary solder, but regard must be had to the use to which the vessel is to be put. For cooking purposes, where temperatures approaching 500° F. are encountered, ordinary solder (half tin, half lead) would melt too easily and a metal of higher melting point must be used, as zinc; or the melting point of the solder may be raised by suitable increase in the lead content. In the case of trays used in restaurants, for example cafeterias, the highest temperature to which the trays are ordinarily subjected is that of the water in which they are washed, and for such articles a low melting solder may be used, or even pure tin, but a higher melting point is safer. Brass or copper may be used where high temperatures must be resisted. The reenforcing wire may be of stainless steel but ordinarily hard drawn iron wire is satisfactory. It may be tinned or coppered. Any suitable flux may be used when necessary or desirable.

It is to be understood that the invention is not limited to the specific procedure and arrangement herein illustrated and described but may be carried out in other ways without departure from its spirit. I also do not limit myself to stainless steel strictly so-called as the invention is useful with other metals which are hard, stiff and highly resilient. Nor is it confined to the reenforcement of the edges of vessels strictly so-called but may be used to advantage to reenforce the edge or edges of any article made of sheet metal. I have referred to the reenforcing member as a "wire" but of course it may be thicker than that term would ordinarily suggest, depending largely upon the size of the vessel or other article and the thickness of the sheet metal.

What I claim is:

1. An article made of stainless steel sheet, having its edge reenforced by a wire around which the edge portion of the sheet is curled or wrapped with its edges spaced from the wire, and a body of metal cast in place between the wire and the sheet and in the space between the wire and the edge portion of the wrap or curl and embedding the edge of the latter.

2. An article made of stainless steel sheet, having its edge reenforced by a wire around which the edge portion of the sheet is wrapped or curled, the edge and a portion of the wrap or curl of the sheet back of the extreme edge thereof being embedded in a body of metal cast around the edge and against the wire and the adjacent portion of the sheet.

3. An article made of stainless steel sheet having its edge reenforced by a wire around which the edge portion of the sheet is wrapped or curled, and a body of fusible metal cast inside of the wrap or curl against the wire and embedding the edge of the wrap or curl and a portion thereof back of the extreme edge.

In testimony whereof I hereto affix my signature.

CHARLES B. D. WOOD.