

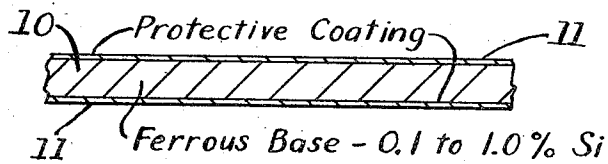
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CONTAINER STOCK OR THE LIKE

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CONTAINER STOCK OR THE LIKE

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1 Claim. (Cl. 29—181)

This invention relates to sheet metal and, in particular, to that class of sheet metal produced for use as container stock, i. e., thin sheet steel such as tin-plate.

The present standard specifications for tin-plate suited for container stock require that the steel from which the tin-plate is rolled have a low carbon content, i. e., .10% to .12% and that it be substantially free from metalloids. It has been supposed heretofore that steel containing substantial amounts of alloying elements such as silicon or the like would not be suitable for tin-plate because of the difficulty encountered in tinning it. Cold-rolled tin-plate, as now made, is not suitable for all applications in the container field. A specific example is the making of ends for beer cans. The trade requires that rephosphorized steel be used in rolling tin plate from which such ends are to be formed; because the ordinary cold-rolled product is too soft to withstand the pressure of the contents without bulging.

We have discovered a novel type of sheet metal particularly adapted for use as container stock. In a preferred embodiment, the sheet metal of our invention includes a substantial amount of an alloying element, e. g., from 0.1% to 1% of silicon or the like. If appropriately cold-rolled, it is characterized by a greater stiffness or resistance to deformation as well as a greater bendability or ability to withstand reverse bends, than ordinary cold-rolled tin-plate as now produced. The greater stiffness is indicated by the fact that under the so-called Schopper test (see "A Bend Test for Tin Plate," by C. C. Willits, page 50, "Metal Progress," Sept., 1936), our material, if properly cold rolled, exhibits a yield point of 40 kilograms per square millimeter or better. Its greater ductility is demonstrated by the fact that it can withstand from four to seven reverse bends over a sharp edge in a direction transverse to the direction of rolling.

The accompanying drawing is a section, considerably enlarged, through a piece of our improved sheet metal.

The material of our invention can be made with but little modification of present-day practice. Steel of the desired silicon content may be easily produced in the open-hearth furnace and, when reduced to the form of billets, is readily converted into hot-rolled strip by known rolling methods. The hot-rolled strip is then pickled, cold-rolled approximately to gauge and then subjected to the usual finishing operations such as normalizing or annealing, cleaning and the

like, and is then ready for the application of a protective coating, e. g., tin, silver, lacquer, etc.

Before coating, the material is preferably given a heavy reduction, i. e., around 15%, in a temper-pass, if the maximum stiffness is desired. Otherwise the conventional temper-pass reduction of 3-5% may be effected.

The material of our invention takes a uniform coating when subjected to the ordinary tinning process and is characterized by a firm bond between the base metal and the coating metal, an unusually bright finish, and the absence of excessive pin-hole porosity. The tinning of the base metal involves no special problems, contrary to the general supposition in the industry. The pin-hole porosity exhibited by the new material after tinning is not substantially greater than that of conventional tin-plate and it produces as good results as the latter in the hydrogen evolution test.

In the drawing, the ferrous base material is designated 10 and the protective coating, e. g., tin, is shown at 11.

We have also discovered that similar small additions of alloying elements other than silicon, such as aluminum, copper and manganese, also produce an increase in the stiffness or yield point, and the bendability of container stock, when properly cold-rolled, without any substantial increase in porosity or hydrogen evolution, compared to the material now being produced. The amount of such additions may be as high as 0.5% of aluminum and up to 0.3% of the other elements.

From the foregoing, it will be apparent that our invention provides a novel type of sheet metal having important advantages over the container stock now used. Since the material of our invention is stronger than present-day tin-plate, containers may now be made of stock thinner than that previously used, thereby effecting a substantial reduction in weight and saving in material, without impairing the resistance of the container to deformation. The increased bendability characterizing the new product, furthermore, is highly advantageous in container manufacture. The increase in stiffness of the material resulting from skin-passing it to give a reduction up to 5% is much greater than would be expected in the case of steel containing silicon or the other alloying elements mentioned in the amounts stated.

Although we have disclosed but a preferred embodiment of the invention with certain modifications, it will be understood that variations may be made in the sheet metal disclosed with-

out departing from the principles of the invention or the scope of the appended claim.

We claim:

As a new article of manufacture, can stock having a ferrous base .010" thick or less, including from .1% to 1% silicon, with the balance of iron except for the impurities usually present in tin-plate, and a protective coating thereon, said material being cold rolled sufficiently to give it a yield point of at least 30 kilograms per square 10

millimeter when subjected to the Schopper test and the ability to withstand at least 4 reverse bends over a sharp edge in a direction transverse to the direction of rolling, said stock being thereby particularly suitable for the manufacture of cans, because of its stiffness and bendability exceeding those of conventional tin-plate.

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