

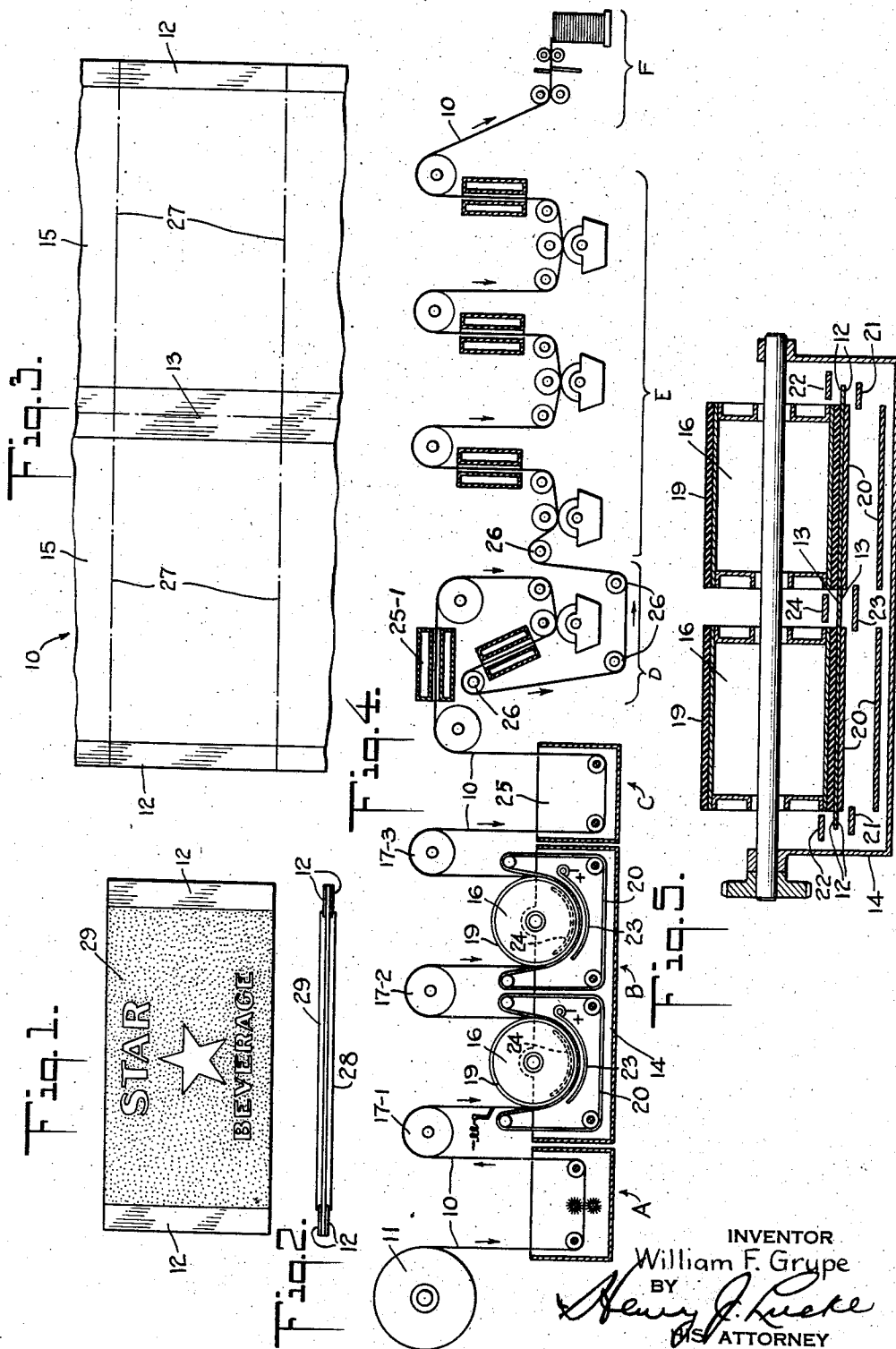
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CAN BLANK AND METHOD OF PRODUCING SAME

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CAN BLANK AND METHOD OF PRODUCING
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This invention relates to the art of manufacturing sheet metal containers of the type ordinarily known as "tin cans", and particularly to a method of producing novel sheet metal blanks applicable in the art. The present application is a continuation in part of application Serial No. 63,594, filed February 12, 1936.

The invention achieves considerable economies in the art by:

1.—Making available a raw material possessing highly desirable characteristics but heretofore impractical of use in its most desirable web form.

2.—Affording a method of producing sheet metal blanks continuously from the web of raw material.

3.—Providing an improved sheet metal blank at a cost lower than heretofore.

Black iron, pack-rolled in individual sheets, is the base material ordinarily and commercially used for blanks in the can-making industry. The sheets are protectively coated with tin over their entire surface area by dipping in a bath of molten tin. That which is to become the inner surface of the cans may be additionally coated with a non-metallic protective lining, the opposite surface being usually imprinted with designating and/or design material, or being left for the reception of individual can labels. Proper portions of the tin coating are left uncovered by other coating or imprinting material to provide areas for soldering at the seam location of the manufactured can body. The prepared black iron sheets are cut into individual can blanks.

The method of this invention preferably employs cold-rolled steel sheet in web form as the raw material for the can blanks. Rolls of cold-rolled steel in web form are commercially available at a cost lower than black iron sheets. Because of its uniform texture and characteristic hardness, cold-rolled steel has a much greater strength than does pack-rolled black iron. But, in spite of its obvious advantages, cold-rolled steel in web form has never heretofore been successfully adapted to can manufacture.

The cold-rolled steel possesses a very smooth surface, greased as received from its producers. Heretofore, it has been considered necessary, in applying a tin coating of any kind to cold-rolled steel, to first roughen the smooth surface.

By my invention, I have overcome the difficulties which have heretofore prevented the use of cold-rolled steel in web form as the raw material for tin cans, and have departed altogether from the customary process of manufacturing tin can blanks and from the ordinary methods of apply-

ing tin to cold-rolled steel. I have accomplished this by providing a new process which, besides having the advantages of making available to the art this desirable raw material, of coating requisite areas with a very thin and uniform layer of tin, and of making possible complete protection of the base metal of the blank, has the additional advantage of being much more economical than the old processes because it is continuous in operation and effects a considerable saving of tin.

A complete and practical procedure in the present method consists in operating in a continuous manner upon a traveling web of cold-rolled steel in steps to effect the following results: (1) the electrolytic deposition of tin solely at localized areas on the surface of the web for service as component portions of the soldered seam of the resulting can body; (2) the application of a protective lining to one face of the web, slightly, but positively, overlapping the tinned areas which otherwise are left entirely uncovered; (3) the application of a protective, decorative and/or designatory coating to the opposite face of the web, slightly, but positively, overlapping the tinned areas which otherwise are left entirely uncovered; (4) the severing of the individual can blanks from the web.

By first applying tin over the requisite narrow band areas of the base metal and subsequently protectively coating the intermediate untinned areas thereof, the latter coating slightly, but positively overlapping the tinned areas, complete superficial protection of the base metal is afforded. Any possible zones of danger, from a protective standpoint, that might exist by reason of incomplete joinder between tinned areas and otherwise protectively coated areas of the base metal, were there no provision of overlap, are effectively eliminated.

The web may have a width equal to the width of the resulting blank. In this case it is preferable that the tinned areas be disposed proximate the lateral edges of the web and on both surfaces thereof in the form of respective, continuous, narrow bands substantially parallel with the stated lateral edges and having a width extending inwardly of the web and determined in dimension by the requisites of the soldered seam of the desired can body. The individual width of the strips will always be considerably less than the width of the web.

The web may have a width two or more times the desired width of the resulting blanks. In this case the tinned areas may be disposed proximate the lateral edges of the web as above explained,

and additional tinned areas in the form of continuous strips parallel to the lateral edge strips, and usually double the width of each, may be interposed at appropriate intermediate locations on both faces of the web, the exact locations depending upon the desired width of the resulting blanks.

In the first instance, the blanks are severed from the web as by making consecutive single cuts, transversely of the web, the distance between cuts determining the height of the resulting can body.

In the second instance, the individual blanks are severed from the web, as by making continuous longitudinal cuts dividing the stated intermediate strips, and by making consecutive single cuts transversely of the web.

The first step of this process, and particularly the peculiar disposition of the electrolytically deposited tin, overcomes the difficulties heretofore encountered in attempting to satisfactorily tin cold-rolled steel. While molten tin cannot satisfactorily be mechanically applied to the smooth surface of cold-rolled steel even after cleaning, and electrolytic deposition over the full faces of the web is not uniform as required, I have found that if the grease be removed from the surface of the steel by a suitable cleansing bath such as an ordinary cyanide bath, it is possible to obtain perfect intimate adherence and a very thin uniform spread of tin by electrolytic deposition over narrow band areas of the cleansed surface. Most desirably, the deposition is affected as follows: A travelling web of cold-rolled steel is passed, after cleansing, through a bath of suitable electrolyte. While in the bath, the not-to-be-tinned areas of the web between the narrow band areas to be tinned are protected from electrolytic deposition, as by endless rubber shields which lie against and travel with each portion of the web while it is in the bath and separate from it as it leaves the bath.

The second and third steps of the process may be carried out economically by means of any of the many coating and printing devices adapted to operate upon a traveling web.

A blank produced by this method has a body of cold-rolled sheet steel of great strength and even texture. The sheet steel body is covered by uniformly thin, closely and strongly adhering, electrolytic deposits of tin solely at localized narrow band areas which are to become component portions of the soldered seam of the resulting can body. The surface of the blank which is to become the inner face of the can body is coated with a protective lining leaving the tinned areas entirely uncovered except for a slight, but positive, overlap along the lines of joinder between the intermediate protectively coated areas and the narrow band tinned areas. The surface of the blank which is to become the outer face of the can body is protectively imprinted with designatory and/or design material in the same manner, or is protectively prepared over the same area for the reception of a label.

The usual blank prepared pursuant to this method has its body of cold-rolled sheet steel covered on both of its faces with electrolytic deposits of tin extending solely over narrow band areas proximate, respectively, two of the opposing end portions of the blank for serving as component portions of the soldered seam of the manufactured can body, the surface areas intermediate the narrow band areas plus a slight, but

positive, area of overlap being protectively coated as above described.

Further to clarify the nature of my invention, I hereinafter described a preferred embodiment thereof with reference to the accompanying drawing, in which:

Figs. 1 and 2 are a plan view of the outside, and an edge view, respectively, of a can-blank embodying my invention, the thickness of the tinned layers and non-metallic protective layers being exaggerated in Fig. 2 for sake of clarity;

Fig. 3 is a plan view of a portion of the metal web from which the blank shown in Figs. 1 and 2 may be produced;

Fig. 4 is a diagrammatic view illustrating apparatus suitable for carrying out a preferred procedure pursuant to the invention; and

Fig. 5 is a vertical section of Fig. 4.

In the specific method illustrated in the drawing, a long continuous strip or web of cold-rolled steel 10 is drawn from a roll 11 through a cleansing apparatus A, an electro-plating apparatus B, a final cleansing apparatus C, a coating apparatus D, printing apparatus E, to a severing apparatus F. Continuous travel of the strip is effected by driving some or all of the rollers and pulleys over which the strip 10 passes, at advantageously a uniform peripheral speed.

The cleansing apparatus A is of any suitable character, and includes a bath of a suitable medium, preferably cyanide, primarily for effecting removal of grease from the faces of the strip. It is not necessary nor desirable that the smooth surface of the cold-rolled steel be roughened during this cleansing operation. Adhering liquid from the cyanide bath may be removed by suitable washing treatment for priming the faces of the strip for the succeeding electroplating operation.

The electroplating apparatus B, which in itself constitutes part of my invention, serves to electrolytically deposit coatings of tin on a plurality of selected band-like areas, usually on both sides of the strip. In the form illustrated, and considering a single face of the strip, two of the band-like areas, designated 12, 12, are located respectively, at the lateral edges of the strip, and a third band-like area, designated 13, extends along the middle line of the strip and is twice the width of the band-like areas at the edges of the strip, as appears from Fig. 3. The electroplating apparatus B, for depositing tin on the areas 12, 12 and 13 of both faces of the strip, as shown, includes a tank 14, containing the electrolyte, means for guiding the traveling strip 10 into and out of the electrolyte in the tank, and shields for protecting the intermediate areas 15, 15 between the band-like areas 12, 12 from electrolytic action. In the form of apparatus shown diagrammatically in the drawing, the traveling strip is directed twice into and out of the electrolyte by rollers 16, 16, journaled on the tank and dipping into the electrolyte, and by pulleys 17-1, 17-2, 17-3 located above the tank. Each roller 16, as shown, is formed of two separate parts mounted on a common shaft, as appears from Fig. 5.

Traveling rubber shields 18, 18 and 20, 20 are provided for protecting the intermediate areas 15, 15 of both faces of the strip from electrolytic action. The shields 18, 18 may consist of rubber layers formed on the periphery of the two-part rollers 16, 16. Each has a width equal to the width of an intermediate area 15 of the strip. These shields 18, 18 protect the inner surface areas 15, 15 of the strip from electrolytic action 75

while leaving the band-like areas 12, 12 of the inner surface of the strip exposed to electrolytic deposit, as appears from Fig. 5.

The shields 20, 20, as shown, consist of two endless rubber bands, each guided over two pulleys within the tank and two pulleys above the tank in such manner that it comes into contact with the outer surface of the strip 10, as the strip enters the electrolyte, travels with it through the electrolyte, and separates from it as it leaves the electrolyte. The width of each rubber band, constituting a shield 20, is equal to the width of one of the intermediate areas 15, so that each shield 20 protects an outer surface area 15 of the strip, while leaving the band-like areas 12, 12, of the outer surface of the strip exposed to electrolytic deposit.

Sets of anodes 21, 22 and 21, 22 are located in the tank. The component anodes of each set are formed and positioned, respectively, to lie at short and preferably uniform distances from oppositely positioned band-like areas 12, 12 of the strip passing through the electrolyte. The anodes 21, 21 and 22, 22 have the form of bands of approximately the same width as the band-like areas 12, 12. Consequently, they do not interfere with the circulation of the electrolyte as would wide anodes, and, by their form, they concentrate the electrolytic action on the band-like areas 12, 12. A set of anodes 23 and 24 is provided for effecting electroplating of the intermediate band-like areas 13 on both faces of the strip. The anode 23, adjacent the outer surface of the band-like area 13 is shown placed between the actual shield locations of the traveling shields and the return reaches thereof, so that the latter do not interfere with the electrolytic action.

Electrical connections to the anodes and to the strip 10, which serves as a cathode, may be made in the conventional manner. For convenience, it is desirable that the electric circuit be designed to maintain the strip 10 at ground potential, so that insulating precautions need not be taken to safeguard the operators from electrical shock.

Beyond the electroplating apparatus B, the traveling strip may be passed through a final cleansing apparatus C, which comprises a tank 25, to wash it free from residue of the electrolyte. It may thereafter be dried by passing it through a heater 25-1.

The coating apparatus D and the printing apparatus E may be of any conventional construction appropriate for operating upon a traveling web and may include heaters for drying the coatings applied. Means, such as the pulleys 26, are provided for reversing the strip after it passes through the coating apparatus D, so that the printing apparatus E may operate upon the side of the strip opposite to that operated upon by the coating apparatus D.

The coating apparatus D applies to one surface of the strip a protective lining, such as a resinous coating. It is designed to apply this lining to the intermediate areas 15, 15, with a slight, but positive, overlapping on the band-like areas 12, 12 and 13.

The printing apparatus E applies to the other side of the strip a decorative and protective coating which may be formed of inks containing resinous or other film-forming binders. The plurality of printing rollers of the printing apparatus E are designed to effect, by combined action, coatings of the entire intermediate areas,

15, 15, with a slight, but positive, overlapping of ink on the band-like areas 12, 12, and 13.

The severing apparatus F, which is shown only diagrammatically, may be of conventional construction. Such severing apparatus serves to sever the strip 10 along the dot and dash lines 27, see Fig. 3, to divide it into can-blanks, such as that shown in Figs. 1 and 2.

The blank shown in Figs. 1 and 2 has a body consisting of a sheet of cold-rolled steel. At the lateral sides of the sheet on each face are narrow band areas 12, 12, of uniformly thin, strongly adherent electrolytic deposits of tin. The area of one face of the sheet between these spaced band areas of tin coating has a protective non-metallic lining 28, which slightly, but positively, overlaps adjacent edges of the stated band areas of tin coating. The corresponding area of the other side of the sheet between its spaced band areas of tin coating has a decorative and protective coating 29, which slightly, but positively, overlaps adjacent edges of its stated band areas of tin coating. Thus, all parts of the sheet are protected against oxidation, and tinned areas are provided solely at those portions of the blank which will serve as component members of the soldered seam of the manufactured container.

In the case of processing a web of cold rolled steel, cleaning may advantageously be accomplished electrolytically prior to passage of the web through the electro-plating bath. An electrolytic cleansing bath of common type utilizing the web as one electro-terminal may be supplied in place of the chemical cleansing bath illustrated at A, Fig. 4.

Also, it may be desirable to burnish the incompletely plated surfaces of the traveling web as the latter passes through the electro-plating bath B, Fig. 4. This may be accomplished by mounting suitable means, such as agate stones, at various locations adjacent the path of travel of the web through the electro-plating bath, for light rubbing action over the incompletely plated surfaces. Burnishing will remove any porous, spongy deposition of tin that might tend to form on the surfaces undergoing plating, and will insure exposure of a fresh polished surface at all times during the actual plating process.

While this invention is directed primarily to making available to the canning industry cold-rolled steel in web form as raw material for can blanks, in its broadest aspect the invention includes the use of any type and character of sheet base material, suitable for can bodies, on which, solely at localized spaced band areas of its surface, a metallic solder-receptive material may be electrolytically deposited in a uniformly thin, strongly adhering coating.

Whereas this invention has been described and illustrated with respect to a preferred form thereof, it should be clearly understood that changes may be made from time to time as the art progresses without departing from the spirit of the invention as set forth in the specification and generalized in the following claims.

I claim:

1. A method of making blanks for the manufacture of containers, which comprises coating with tin both sides of a plurality of widely spaced, longitudinal, narrow, band-like portions of a traveling strip of metal at one point in its travel, applying non-metallic coatings to the portions of both sides of said strip between the so formed narrow band-like areas at further points in the travel of the strip, and cutting the strip into

blanks, each of which has its intermediate portion covered by said non-metallic coating and its end portions covered by tin.

2. A method of making blanks for the manufacture of containers, which comprises directing a traveling strip of metal into and out of a tin-depositing bath, applying a movable shield to the strip as it enters the bath and withdrawing said shield from the strip as it leaves the bath, and at a further point in the travel of the strip applying a non-metallic coating to the portion of the strip which was covered by said shield.

3. A method of making blanks for the manufacture of containers, which comprises directing a traveling strip of smooth-surfaced cold-rolled steel into and out of a tin-depositing electrolytic bath, and protecting wide longitudinal areas of both surfaces of the strip from the electrolyte so that tin is deposited in narrow widely-spaced band-like areas on both sides of the strip.

4. A method of making blanks for the manufacture of containers, which comprises directing a traveling strip of smooth-surfaced cold-rolled steel into and out of a tin-depositing electrolytic bath, protecting wide longitudinal areas of both surfaces of the strip from the electrolyte so that tin is deposited in narrow widely-spaced band-like areas on both sides of the strip, and thereafter applying a non-metallic coating to the portions of the strip which were protected from the electrolyte.

5. A method of treating a continually traveling web of sheet metal which comprises electrolytically depositing a protective metallic coating solely over narrow band-like areas spaced relative to one another on the surface of the web and extending continuously along the length of the web, while protecting the remaining surface of the web from electrolytic deposition by means independent of and separable from the so protected surface of the web.

6. A method of treating a continually traveling web of sheet metal which comprises submerging the web at one stage of its travel in a metal-depositing bath; protecting continuous portions of the faces of the web along its length from metal adherence during travel through the said bath by means independent of and separable from the so protected faces, meanwhile allowing metal adherence, over continuous unprotected portions along the length of the web; and thereafter coating the protected portions of the faces of the web with a protective material.

7. A method of treating a continually traveling web of sheet metal which comprises submerging the web at one stage of its travel in a metal-depositing bath; protecting continuous portions of the faces of the web along its length from metal adherence during travel through the said bath by means independent of and separable from the so protected faces, meanwhile allowing metal adherence, over continuous unprotected portions along the length of the web; and thereafter coating the protected portions of the faces of the web with a protective material which slightly overlaps the applied metal coatings along the lines of joinder therewith.

8. A method of producing blanks for the manufacture of containers which comprises, passing a continually traveling web of sheet metal through a solder-receptive-metal depositing electrolytic bath, meanwhile protecting from electrolytic deposition of metal that portion of the surface area of the traveling web which forms the area of the blank not necessarily solder receptive

in the manufacturing of the containers from the said blanks the protecting means being independent of and separable from the said surface area of the web; thereafter coating the so protected areas of the traveling web with a non-metallic protective material which slightly overlaps the areas of metal deposition along the lines of joinder therewith, and severing the individual blanks from the traveling web.

9. A method of producing blanks for the manufacture of containers which comprises, passing a continually traveling web of smooth surfaced cold-rolled steel through a tin-depositing electrolytic bath, meanwhile protecting from electrolytic deposition of tin that portion of the surface of the traveling web which lies between narrow band-like areas extending continuously along the length of the web parallel to the respective lateral edges of the web; coating the so protected area of one face of the web with a protective lining material which slightly overlaps the said band-like areas of deposited tin along the lines of joinder therewith; protectively covering the so protected area of the other face of the web with designatory and/or ornamental material which slightly overlaps the said band-like areas of deposited tin along the lines of joinder therewith; and severing the individual blanks from the traveling web.

10. A can blank consisting of a sheet of metal having narrow bands of solder-receptive material extending along opposite marginal edge portions on both sides, and non-metallic coatings extending between said bands and slightly overlapping the inner edges of the said bands.

11. A can blank consisting of a sheet of metal having narrow bands of solder-receptive metal extending along opposite marginal edge portions on both sides, and non-metallic coatings extending between said bands and slightly overlapping the inner edges of the said bands.

12. A blank for the manufacture of containers, comprising a sheet of metal having solely those portions which will serve as component members of the to-be-soldered seam of the manufactured container, coated, respectively, with narrow bands of intimately adhering, uniformly thin, electrolytic deposits of solder-receptive metal, and having the remaining area of its faces coated with a non-metallic protective material which slightly overlaps said narrow bands of deposited solder-receptive metal along the lines of joinder therewith.

13. A blank for the manufacture of containers, comprising a sheet of metal having solely those portions which will serve as component members of the to-be-soldered seam of the manufactured container, coated, respectively with narrow bands of soldered-receptive metal, and having the remaining area of its faces coated with a non-metallic protective material which slightly overlaps said narrow bands of deposited soldered-receptive metal along the lines of joinder therewith.

14. A web for the production of container blanks, comprising a sheet of base metal, tin-coating applied to said web at its portions disposed immediately adjacent opposite edges thereof and on both faces of the web and extending about both said edges, and tin-coated portions of the web disposed intermediate said first named tin-coated portions and on both faces of the web, said tin-coating serving as the to-be-soldered areas, the remainder of the facial areas of both faces of the web being free from tin, one face of the web having varnish or equivalent applied

over the whole of the remainder of its said face between its said tin-coated portions.

15. A web for the production of container blanks, comprising a sheet of base metal, tin-coating applied to said web at its portions disposed immediately adjacent opposite edges thereof and on both faces of the web and extending about both said edges, and tin-coated portions of the web disposed intermediate said first named tin-coated portions and on both faces of the web, said tin-coatings serving as the to-be-soldered areas, the remainder of the facial areas of both faces of the web being free from tin, one face of the web having varnish or equivalent applied over the whole of the remainder of its said face between its said tin-coated portions, the other face of the web having decoration applied thereto.

16. A blank for the production of a container, comprising a sheet of base metal, tin-coating applied to said blank at its portions disposed immediately adjacent opposite edges thereof and on both faces of the blank and extending about both said edges, said tin-coating serving as the to-be-soldered areas, the remainder of the facial area on one face of the blank being free from tin, said one face of the blank having varnish or equivalent applied over the whole of the remainder of its said face between its said tin-coated portions.

17. A blank for the production of a container, comprising a sheet of base metal, tin-coating ap-

plied to said blank at its portions disposed immediately adjacent opposite edges thereof and on both faces of the blank and extending about both said edges, said tin-coatings serving as the to-be-soldered areas, the remainder of the facial areas of both faces of the blank being free from tin, one face of the blank having varnish or equivalent applied over the whole of the remainder of its said face between its said tin-coated portions, the other face of the blank having decoration applied thereto.

18. A method of treating a continually traveling web of sheet metal, which comprises submerging the web at one stage of its travel in a metal depositing bath; protecting a continuous portion of at least one face of the web along its length from metal adherence during travel through the bath by means independent of and separable from the so protected faces, while allowing metal adherence over a continuous unprotected portion along the length of the web; and thereafter coating at least the protected portions of the face of the web with a protective material.

19. A can blank consisting of a sheet of metal having narrow bands of solder receptive material extending along opposite marginal edge portions of at least one side thereof, and non-metallic coatings extending between said solder receptive bands and overlapping said bands.

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