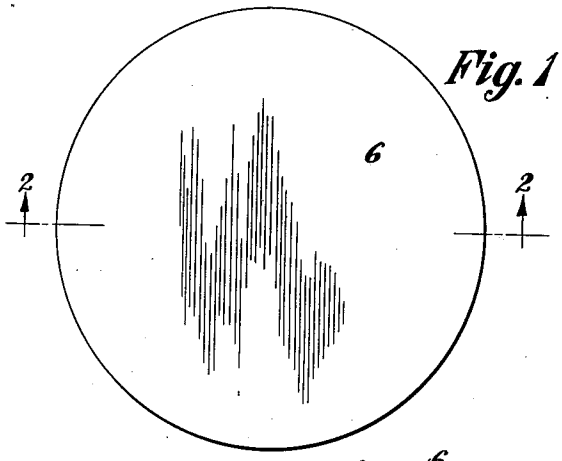
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METHOD OF DRAWING METAL

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Fig. 1



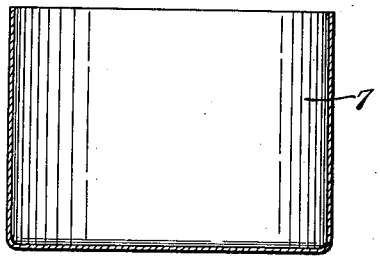


Fig. 3

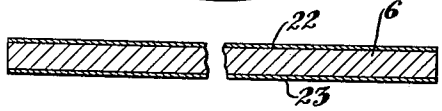


Fig. 2

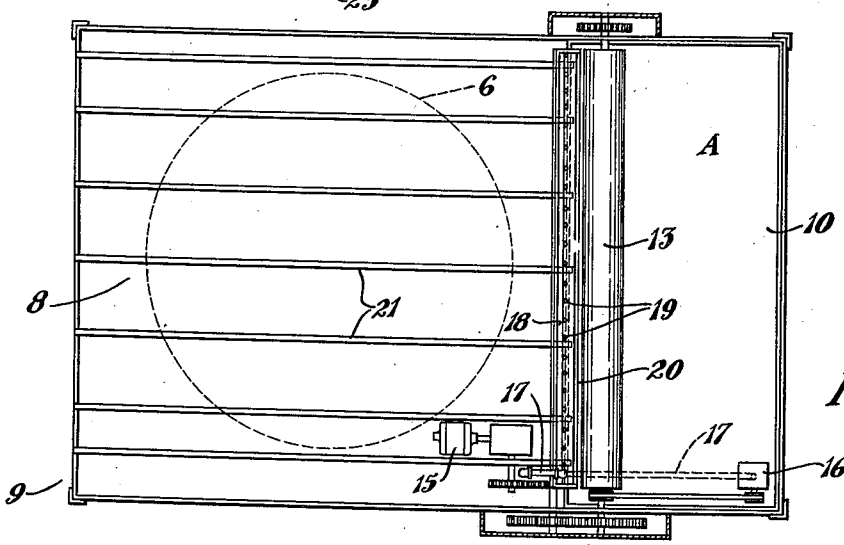


Fig. 4

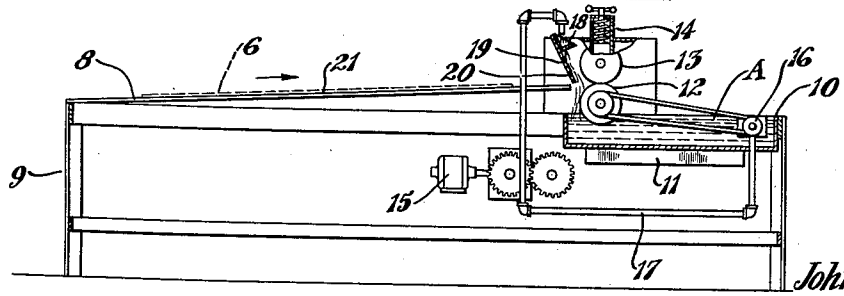


Fig. 5

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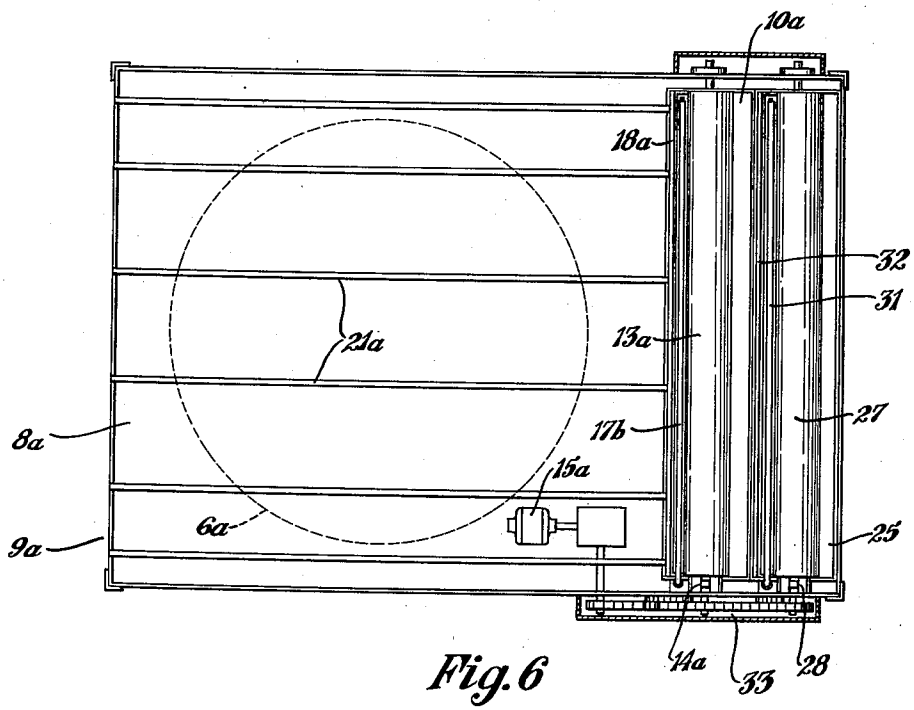


Fig. 6

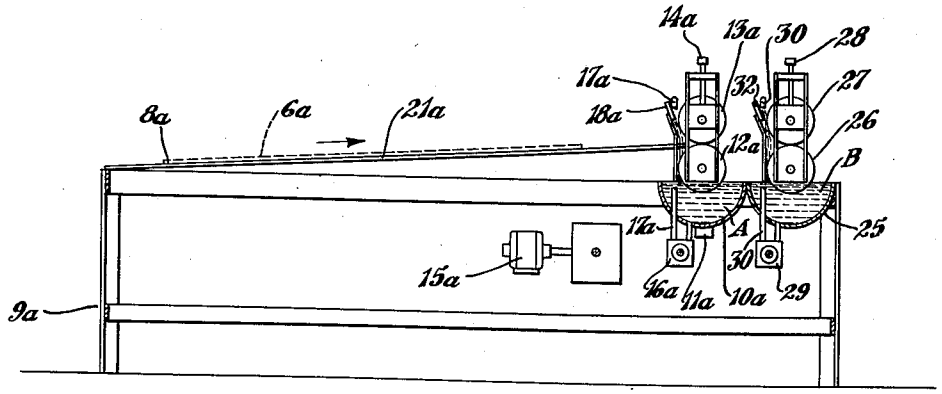


Fig. 7

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UNITED STATES PATENT OFFICE

2,199,627

METHOD OF DRAWING METAL

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Application April 30, 1937, Serial No. 139,980

1 Claim. (Cl. 113—51)

The invention relates to the deep drawing of sheet metal and more particularly to the preliminary treatment of sheet metal blanks preparatory to performing a deep drawing operation.

A lubricant is generally provided in carrying out a stamping, pressing or drawing operation upon a sheet or strip metal blank; and although many types or kinds of lubricants are used, depending upon the particular operation being carried out, such lubricants are usually fluid at room temperatures and may therefore be readily applied to the metal blank.

However, in carrying out certain deep drawing operations, where the draw is excessive, tallow seems to be the most desirable lubricant; but tallow, at room temperatures, is a solid.

Heretofore, tallow, which is usually in the form of large cakes, has been applied to the surfaces of metal blanks by rubbing the tallow cakes on the metal surfaces by hand. This is not only an expensive operation, because it may sometimes take a number of men to apply tallow by hand to the metal blanks for one press; but it is also an extremely slow operation due to the character of the material being applied and the necessity for applying the same to both surfaces of the metal blanks. Thus, if the metal blanks are large, as for instance those used in making washing machine tubs, or sheet metal sinks, or the like, they are necessarily heavy and awkward to turn over in coating both surfaces thereof with tallow.

We have discovered that these difficulties can be avoided and eliminated by applying hot tallow, in fluid state, simultaneously to both surfaces of a sheet metal blank, preparatory to carrying out a deep drawing operation.

Furthermore, we have discovered that if the hot tallow is applied by and between pressure rolls, the thickness of the resulting tallow coating on the surfaces of the metal blank may be accurately controlled, and a tallow coating of uniform thickness throughout may be provided on the surfaces of the metal blank.

The uniformity of and the control of the thickness of a tallow coating on a metal blank seem to explain a further discovery which we have made. We have discovered that when metal blanks are treated in the above manner, it is possible to perform excessive and difficult deep drawing operations thereon, heretofore impossible to do by any means known to us.

Accordingly, it is an object of the present invention to provide an improved manner of applying tallow to a metal blank preparatory to carrying out a deep drawing operation.

It is a further object of the present invention to provide a way of applying tallow to the surfaces of a metal blank in which the thickness and uniformity of the resulting coating on both surfaces of the metal blank may be controlled.

Another object is to provide an improved manner of applying tallow to a metal blank, and then immediately applying a coating of drawing compound preparatory to a deep drawing operation.

Moreover, it is an object of the present invention to provide for carrying out difficult and excessive deep drawing operations heretofore apparently impossible of accomplishment.

Finally, it is an object of the present invention to reduce the cost of and improve the character of a tallow coating applied to sheet or strip metal blanks preparatory to deep drawing the same.

The foregoing and other objects are attained by the steps, methods, procedures, processes and apparatus which comprise the present invention, the nature of which is set forth in the following general statement, a preferred manner of accomplishing the same being set forth in the following description and particularly and distinctly pointed out and set forth in the appended claim forming part hereof.

The nature of the improved method of the improved invention may be stated in general terms as including among others, the steps of providing a sheet metal blank of the desired thickness and shape, applying hot fluid tallow uniformly to and simultaneously upon the surfaces of the blank, controlling the thickness of the tallow coating, permitting the same to solidify, preferably applying a coating of liquid drawing compound, and then deep drawing the metal blank.

By way of example, a preferred embodiment of improved apparatus for carrying out the improved method, and the improved method itself, are illustrated diagrammatically in the accompanying drawings forming part hereof in which

Figure 1 is a diagrammatic plan view of a flat sheet metal blank which may be used for forming a deep drawn closed bottom receptacle, such as a washing machine tub or the like, the blank having the improved tallow coating thereon;

Fig. 2 is an enlarged section taken as on the line 2—2, Fig. 1, diagrammatically illustrating the improved uniform thickness tallow coating on both surfaces of a flat metal blank such as shown in Fig. 1;

Fig. 3 is a diagrammatic sectional view of a closed bottom receptacle, deep drawn from the metal blank shown in Fig. 1;

Fig. 4 is a diagrammatic plan view of improved apparatus for applying hot tallow to the surfaces of the flat metal blank shown in Fig. 1;

Fig. 5 is a diagrammatic side elevation partly in section, of the apparatus shown in Fig. 4;

Fig. 6 is a diagrammatic plan view of a modified apparatus for applying hot tallow and then fluid drawing compound to the surface of a flat metal blank; and

Fig. 7 is a diagrammatic side elevation partly in section, of the apparatus shown in Fig. 6.

Similar numerals refer to similar parts throughout the various figures of the drawings.

A substantially round flat blank **6** of sheet steel is shown in Fig. 1 from which a washing machine tub blank **7** shown in Fig. 3 is to be deep drawn. Of course, further operations are performed upon the drawn blank **7** before the tub is completed; and it is to be understood that the blank **6** might have another flat shape for the deep drawing of another article such as a sink, or a dishwashing machine receptacle, or a refrigerator box.

In preparing for the deep drawing operation, sheet metal blanks such as **6**, are placed on the receiving rack **8** of the tallow applying or spreading machine indicated generally at **9** in Figs. 4 and 5. The tallow applying or spreading machine **9** is shown somewhat diagrammatically, and includes a tank **10** into which cakes of tallow are introduced when needed; and the tallow is maintained melted or fluid in the tank **10** by any suitable heating means or elements indicated diagrammatically at **11**. A pair of driven rolls, including a lower roll **12** and an upper roll **13** are mounted adjacent to the tank **10** so that the under portion of the lower roll **12** runs in the molten tallow A; and suitable pressure means **14** is provided for adjusting the pressure between the rolls **12** and **13**.

The rolls **12** and **13** may be driven through suitable gearing by a motor **15**, which may also drive a pump **16**, communicating with the tank **10** and discharging through pipes **17** into a trough **18** mounted adjacent to and extending the length of the upper roll **12**. The trough **18** may be provided with a suitable number of apertures **19** discharging onto the spreader plate **20**, which extends downward adjacent to the nip of the rolls **12** and **13** just above the plane of the receiving rack skids **21**.

Thus, fluid tallow is continuously picked up by the lower roll **12** and a continuous sheet of fluid tallow flows from the spreader plate **20**. As sheet blanks **6**, placed on the receiving rack **8** are fed to the rolls, the sheet of tallow issuing from the plate **20** spreads onto the upper surface of the blank and the tallow on the lower roll spreads on the lower surface of the blank. As the blank is passed between the rolls **12** and **13**, the tallow is applied uniformly and simultaneously to both surfaces of the blank and the thickness of the tallow coating is uniform on both surfaces of the blank throughout the extent of such surfaces, as indicated at **22** and **23** in Fig. 2.

The blank **6**, of course, is cold relative to the hot tallow, so that the tallow, upon being applied to the surfaces of the blank, immediately cools and solidifies on the blank surfaces. At the time the tallow is applied to the blank it is in a molten or fluid state and entirely covers the surfaces of the blank and spreads or fills into any minute surface holes or imperfections in the blank surfaces which might otherwise cause difficulties during a subsequent deep drawing operation if not properly lubricated or covered with tallow.

By adjusting the tensioning device **14**, the pressure between the rolls **12** and **13** may be increased or decreased so as to control the thickness of the resulting coating **22—23** on the flat blank surfaces.

We have found that a sheet blank, uniformly coated with hot tallow as described herein, may be subjected to most difficult and excessive deep drawing operations. Such difficult draws may be much more easily accomplished, accompanied by less breakage than heretofore; and in certain cases, difficult deep draws heretofore impossible of accomplishment by any means known to us have been accomplished when the blanks are treated as set forth above.

Moreover, the use of the improved method eliminates the expensive and non-uniform operation of applying tallow from tallow cakes by hand to the surfaces of sheet blanks.

It is customary to apply a coating of liquid drawing compound to a tallow coated metal blank before subjecting it to a deep drawing operation, and the improved apparatus shown diagrammatically in Figs. 6 and 7 is adapted for uniformly applying hot tallow and then immediately applying a coating of liquid drawing compound to a metal blank.

The modified apparatus indicated generally at **9a** includes a rack **8a** having skids **21a** for receiving a flat sheet metal blank **6a** and guiding it into the nip of a pair of driven rolls **12a** and **13a**, suitable pressure means **14a** being provided for adjusting pressure between the rolls. A tank **10a** is provided under the rolls for containing tallow maintained in a melted or fluid condition by heating means **11a**, and the under portion of the lower roll **12a** runs in the molten tallow A.

The fluid tallow A is preferably pumped from the tank **10a** by pump **16a** through a pipe **17a** to a dispensing pipe **17b** provided with a series of apertures for discharging the tallow into a trough **18a**, from which a continuous sheet of fluid tallow flows downward adjacent to the nip of the rolls and spreads over the upper surface of the blank **6a**, while the tallow picked up by the lower roll **12a** spreads over the lower surface of the blank.

A tank **25** is provided preferably immediately adjacent to the tallow tank **10a** for containing liquid drawing compound B, and driven rolls **26** and **27** having a tensioning device **28** are located above the tank **25**, the blank **6a** passing through the rolls **26** and **27** immediately after passing through rolls **12a** and **13a**.

The liquid drawing compound B, which may contain soap, white lead, oil and pulverized sulphur, is preferably pumped by a pump **29** from tank **25** through a pipe **30** to a dispensing pipe **31** having a series of apertures, from which it is discharged into a trough **32** and flows downwardly in a continuous sheet adjacent to a nip of rolls **26** and **27**.

The rolls **12a** and **13a** and **27**, as well as pumps **16a** and **29**, may all be driven from a motor **15a** by suitable gear and chain driving connections indicated generally at **33** in Fig. 6.

Thus as the blank passes through the rolls **26** and **27**, it is given a uniform coat of the drawing compound over the uniform coat of tallow applied by rolls **12a** and **13a**, and is ready to be subjected to difficult and excessive deep drawing operations.

It is to be understood, that in many instances it may be desirable to pump the liquid drawing compound, or the tallow, to the lower rolls as well as to the upper rolls, so that in case the level of the liquid in the tanks 10*a* and 25 becomes low, the pumps 16*a* and 29 will supply sufficient liquid to the lower rolls. This may be accomplished by providing dispensing pipes and troughs adjacent to the lower rolls 12*a* and 26 in a manner similar to those provided for the upper rolls 13*a* and 27.

In the foregoing description, certain terms have been utilized for brevity, clearness and understanding; but no unnecessary limitations are to be implied therefrom beyond the requirements of the prior art; because such words are utilized for descriptive purposes herein and not for the purposes of limitation, and are intended to be broadly construed.

The words "sheet metal blank" are intended to include sheet, strip and plate metal of the desired or necessary gauge and configuration, including steel, stainless steel, and other metals which it may be desired to subject to deep drawing operations; and the words "deep drawing" as used herein and in the claim, are intended to refer to the operation of reforming or reshaping metal by flowing operations as distinguished from mere bending or stretching operations.

We claim:

The method of drawing metal which includes the steps of rolling a coating of melted tallow under pressure onto the surface of a flat metal blank to form a tallow coating of uniform thickness thereon, then immediately applying a uniform coating of liquid drawing compound to said uniformly tallow coated blank, and then subjecting the uniformly coated blank to a deep drawing operation.

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