Nov. 3, 1936. W. T. TAYLOR 2,059,292

ART OF WORKING SHEET METAL

Filed April 13, 1933

Fig. 1.

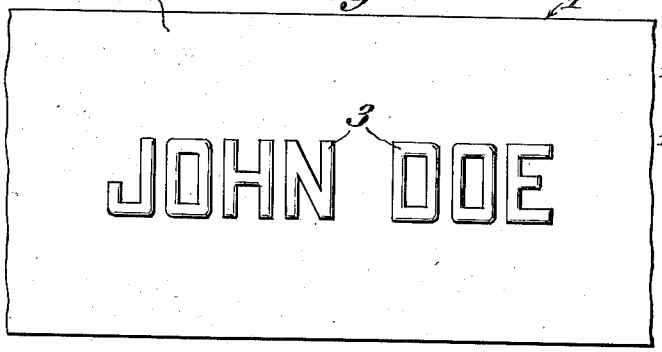



Fig. 3.

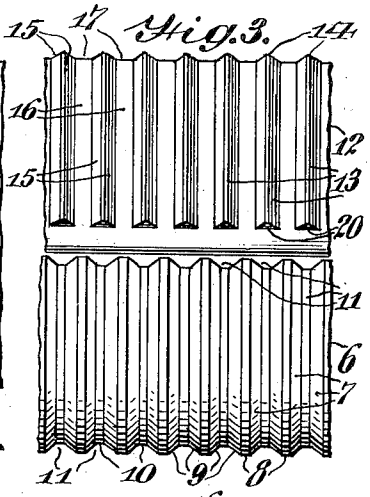


Fig. 2.

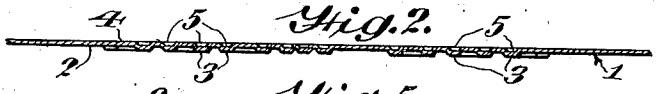


Fig. 5.

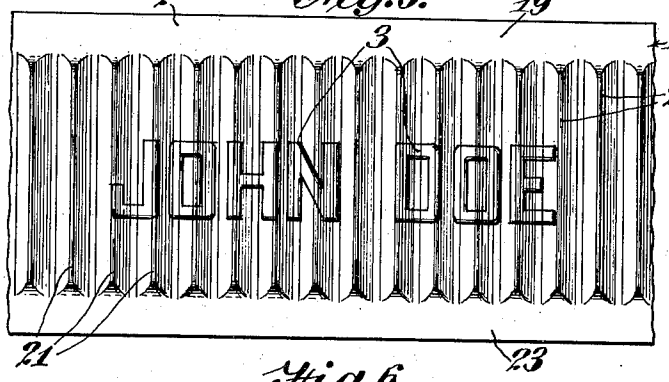



Fig. 4.

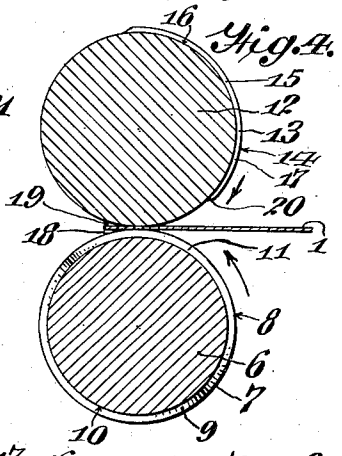


Fig. 6.



Fig. 10.

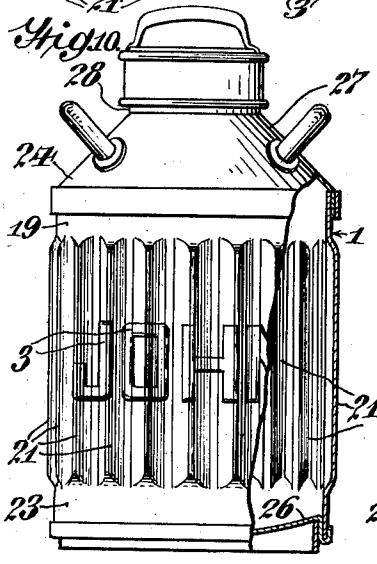


Fig. 11.



Fig. 7.

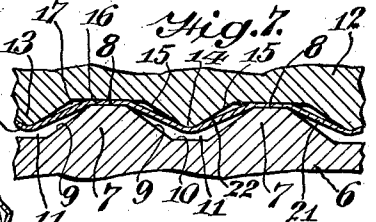


Fig. 8.

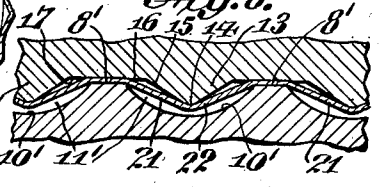


Fig. 9.



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## ART OF WORKING SHEET METAL

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Application April 13, 1933, Serial No. 665,887

5 Claims. (Cl. 153—2)

This invention relates to the art of working sheet metal and has to do particularly with a process whereby a sheet of metal which has thereon an embossed name or other design may be provided with corrugations or similar indentations or strengthening ribs without effacing the embossing to any substantial extent. As described herein, the improvement is particularly adapted for use in the manufacture of sheet metal containers such as are ordinarily employed with delivery trucks in handling gasoline, oil and similar products, although it is equally adapted for use in the manufacture of other sheet metal articles.

In containers of the character referred to, it is desirable to have the name of the owner affixed thereto in such a manner that it is clearly visible and may not be readily removed. It is also customary and desirable to provide the side wall of such containers with corrugations for the purpose of strengthening the container and for preventing it from being easily deformed when subjected to rough usage. Various means have heretofore been employed in affixing the name of the owner to the container, such as by riveting or soldering a name plate to a suitable portion thereof, or by indenting or embossing the name in a smooth surface of a portion of the wall of the container.

The preferable practice heretofore employed in affixing the name of the owner to the container has been to emboss the name on a smooth portion of the vertical wall, the remaining portions of the vertical wall being provided with strengthening corrugations. Such a construction, however, has been objectionable to the bureaus of weights and measures of many States and municipalities for the reason that it necessitates a broken, irregular, inner surface which impedes the proper flow of the contents of the container and results in the dispensing of inaccurate quantities of oil or other liquids for which the container is used.

In order to avoid the objections inherent in containers in which the name of the owner has been embossed in a portion of the side wall which is free from the strengthening corrugations, it also has been the practice heretofore to utilize a double vertical wall, the inner one of which is smooth throughout its extent so as not to impede the flow of the contents of the container, and the outer of which is provided with the necessary strengthening corrugations and such embossed names or other designs as may be desired. As will be apparent, however, the manufacture of this double-jacketed type of container is more expensive than a container which has only a single vertical wall, and it is one of the purposes of the present improvement to avoid the necessity of utilizing the double wall structure heretofore employed.

Various methods have heretofore been attempted for corrugating an embossed sheet of metal without interrupting the corrugations over that portion of the surface occupied by the embossing. If the embossing is applied to the metal sheet, and the sheet is then passed through the usual corrugating rolls, the embossing is practically effaced or ironed out by the action of the corrugating rolls, and the name or other design becomes so unsightly as to be unsuited for the purposes for which it was intended. If the sheet of metal is first corrugated and the name or other design is then embossed thereon by the usual embossing dies, both the corrugations and the embossing are unsightly and not well adapted for use.

It has also been proposed to corrugate the sheet of metal and emboss the name or other design thereon by the same operation. However, such a method necessitates the use of individual dies for each name or other design embossed on the sheet, and inasmuch as the production of a combined corrugating and embossing die involves an unusual expense, such a method of corrugating and embossing is objectionable from that standpoint, as will be readily appreciated. It has also been proposed to first corrugate the sheet of metal and then emboss the name or other design thereon by means of a corrugated embossing die having a contour designed to interfit with the corrugations previously applied to the sheet of metal. The manufacture of such an embossing die also entails an unusual expense, and this expense is prohibitive of the use of such a die for ordinary commercial purposes.

In an endeavor to overcome the objections which are inherent in the various methods heretofore proposed, I have found that suitable corrugations or other strengthening indentations may be applied to a previously embossed sheet of metal and superimposed over the embossing without destroying or effacing the embossed design. In general, this is accomplished by supporting the embossed sheet at intervals on one side thereof and applying pressure to the opposite side of the sheet substantially midway between the supported portions so that the corrugating ribs are produced by stretching the material of the sheet in each of the corrugations. By supporting the sheet at spaced intervals and applying pressure substantially along a line midway of the unsupported portions, I avoid iron-

ing out or effacing the embossed design to any substantial extent.

It is one of the objects of the present invention, therefore, to corrugate or strengthen an embossed sheet of metal without effacing the embossing previously applied thereto. It is a further object of the invention to provide a method of embossing and corrugating a sheet of metal wherein the embossing and corrugating or other strengthening means may be applied without the necessity of discontinuing the corrugations over the embossed portion of the sheet. A further object of the invention is the provision of a process whereby strengthening corrugations may be superimposed upon an embossed design without effacing the design. It is a still further object of the invention to provide a method of corrugating a blank of sheet metal without decreasing the linear dimensions of the blank. A still further object of the invention is the provision of protective means for embossing on a sheet of metal.

In order that the invention may be clearly understood reference may be made to the accompanying drawing, wherein:

Fig. 1 shows a plan view of a portion of a sheet metal blank having a name embossed thereon;

Fig. 2 is a longitudinal sectional view through the embossed blank shown in Fig. 1;

Fig. 3 is an elevational view showing portions of the corrugating rolls;

Fig. 4 is a transverse sectional view through the corrugating rolls shown in Fig. 3;

Fig. 5 is a view similar to Fig. 1, with the corrugations applied to the embossed sheet;

Fig. 6 is a longitudinal sectional view through the corrugated, embossed sheet shown in Fig. 5;

Fig. 7 is an enlarged longitudinal sectional view showing the details of the structure of the corrugating rolls, with a sheet of metal therebetween;

Fig. 8 is a view similar to Fig. 7, showing a modified form of the lower corrugating roll or supporting roll;

Fig. 9 is an enlarged longitudinal sectional view through the embossing on the blank shown in Fig. 5;

Fig. 10 is an elevational view, partly in section, showing a container made in accordance with the improvement; and

Fig. 11 is a transverse sectional view through the container shown in Fig. 10.

In the practice of the improved process to which the invention relates, a sheet metal blank 1 is provided on a face 2 thereof with an embossed name or other design 3, preferably by impressing the same in the opposite face 4 of the blank, as indicated at 5, by means of embossing dies in any well-known manner. This blank, with the desired name or design embossed thereon, is then passed between a pair of corrugating rolls in order that it may be provided with suitable corrugations designed for strengthening and protective purposes. The lower or supporting roll 6 is provided with a series of annular supporting ribs 7 spaced from each other at such a distance as to determine the width of the corrugations to be applied to the blank. Preferably, the supporting ribs 7 are provided with a flat supporting surface 8 and tapering side walls 9, which, taken with the bottom wall 10, provide a series of spaced, annular channels 11 on the supporting roll.

The upper or pressure roll 12 is provided with a series of corrugating ribs 13 spaced from each other at such a distance as to engage between the supporting ribs 7 on the lower roll 6. The edges of the corrugating ribs are preferably slightly rounded, as shown at 14, and the ribs have tapering walls 15 diverging from the rounded edges 14 at an angle slightly in excess of the angle between the tapering walls 9 of the annular channels 11 in the supporting roll 6. The tapering walls 15 of adjacent corrugating ribs 13 merge into a substantially flat wall 16 forming the bottom of annular channels 17 extending about the pressure roll 12 between adjacent corrugating ribs. Preferably, as shown in Fig. 4, the supporting ribs 7 on the lower roll 6 extend entirely around the roll, while the corrugating ribs 13 on the upper roll 12 extend only partially thereabout. The extent of the corrugating ribs 13 about roll 12 will be such, however, as to provide corrugations of such length as may be desired in the sheet metal blank worked upon. It will be understood that the supporting ribs 7 may extend only partially around the roll 6 and have a length substantially equal to or slightly greater than the ribs 13.

In Fig. 4 I have disclosed an embossed blank, such as that shown in Fig. 1, entering between the corrugating roll 12 and the supporting roll 6, and supported at 18 upon the faces 8 of the ribs 7. Inasmuch as the corrugating ribs 13 extend only partially around the corrugating roll, the edge 19 of the blank which first enters between the rolls will not be corrugated, but will remain smooth, as clearly shown in Fig. 5. When the rolls rotate to such an extent as to bring the lower ends 20 of the corrugating ribs 13 into contact with the blank, the portions of the blank between the supporting ribs 7 of the lower roll are progressively forced downwardly into the channels 11 between the supporting ribs to form strengthening corrugations 21. Inasmuch as the blank is supported only upon the upper faces 8 of the supporting ribs 7, and pressure is progressively applied substantially midway of the unsupported portions 22 by the rounded edges 14 of the corrugating ribs 13, the material of the unsupported portions 22 of the blank is progressively forced into the channels 11 between the supporting ribs of the lower roll. By reason of the fact that the blank is supported only at transverse intervals and pressure is applied along lines substantially midway of the unsupported portions of the blank, and by reason of the angular relation of the sloping walls of the corrugating ribs and the supporting ribs, the unsupported portions 22 contact with the rolls only at the edges 14 of the ribs 13, and the embossing is not effaced to any substantial extent, as occurs in the use of ordinary corrugating rolls where pressure is applied throughout the extent of the inclined walls of the corrugations.

It will be understood that the size of the rolls 6 and 12 and the length of the corrugating ribs 13 on the upper roll 12 will be such that the corrugations in the blank may terminate at a considerable distance from the edge of the blank, thus leaving a smooth portion 23, as shown in Fig. 5. It will also be understood that the width of the blank measured in the direction of the length of the corrugations, as well as the length thereof, will be such as may be desired for the purpose intended. In the case of the particular container 24 illustrated in Fig. 10, the width of the blank 1 is substantially equal to the height of the vertical side wall of the container, and the length

of the blank 1 is substantially equal to the circumference of the container. In the practice of the improved process disclosed herein, it will be noted that there is no decrease in the overall dimensions of the sheet metal blank 1 by the application of the corrugations thereto. This is due to the fact that the corrugations themselves are formed by stretching the material of the blank in opposite directions in adjacent walls of the corrugations, the portions of the blank supported upon the faces 8 of the ribs 7 remaining free from lateral movement thereon. By reason of this, it is unnecessary to provide any surplus length in the blank from which the vertical wall of the container is made.

After the blank has been embossed and provided with corrugations in the manner hereinbefore described, the ends are bent into overlapping relation and welded or soldered together, as shown at 25 in Fig. 11, to thus form the vertical wall of the container. The bottom 26, the tapering top 27, and the neck 28 are then secured thereon in any suitable manner, but inasmuch as the structure of the container in its entirety forms no part of the present invention a detailed description thereof is omitted.

In the form of supporting roll shown in Fig. 8, the channels 11' are formed with curved walls 10' extending between adjacent supporting surfaces 8'. As will be apparent, the precise shape of these channels is immaterial and they may be of any suitable form so long as the walls are spaced from the corrugating ribs 13 sufficiently to prevent the corrugations 21 formed in the sheet from being forced into contact therewith by the corrugating ribs 13 on the upper roll 12.

While my improved process of embossing and corrugating is illustrated herein in connection with a sheet metal container, it will be understood that the improvement is equally applicable to sheet metal blanks of other types and for other purposes. It will also be understood that the improvement is not to be limited to the precise manner disclosed herein for providing corrugations or other strengthening or protecting means. For example, I have shown corrugating rolls as the means by which the corrugations are applied to the embossed blank. It will be understood, however, that the corrugations may be applied to a previously embossed blank by means of corrugating dies, and that such dies would be so formed as to stretch the material of the blank and form the corrugations without ironing out or effacing the embossing. Irrespective of the particular means employed in applying the corrugations or other strengthening means to the blank, my improvement involves the method wherein the blank, previously embossed, is supported at intervals over inconsequential areas of the blank, and the corrugations are formed by the application of pressure to the blank substantially along lines intermediate the supported portions. By producing the corrugations in this manner, the embossed design is more or less uniformly stretched, and is not effaced or marred to any substantial extent. By my improved method the corrugations or strengthening means are thus superimposed upon the embossed design without any detrimental effects upon the design.

Having thus described my invention, what I desire to claim by United States Letters Patent is:

1. The method of affixing a name or other design to a sheet of metal, which consists in impressing said design in one side of said sheet to thereby emboss said design on the opposite side of said sheet, supporting said sheet on the embossed side thereof substantially along transversely spaced lines, and applying pressure to the impressed side of said sheet along lines substantially midway of the unsupported portions of the sheet to form corrugations in said sheet across said design without effacing the design.

2. The method of affixing a name or other design to a sheet of metal, which consists in impressing said design in one side of said sheet to thereby emboss said design in the opposite side of said sheet, supporting said sheet on one side along transversely spaced lines and applying pressure to the opposite side of said sheet along lines substantially midway of the unsupported portions of the sheet to form corrugations in said sheet across said design and simultaneously stretch said design in the plane of said sheet without effacing the design.

3. The method of affixing a name or other design to a sheet of metal, which consists in impressing said design in one side of said sheet to thereby emboss said design in the opposite side of said sheet, progressively supporting said sheet on one side along transversely spaced lines and progressively applying pressure to the opposite side of said sheet along lines substantially midway of the unsupported portions of the sheet to form corrugations in said sheet across said design without effacing the design.

4. The method of affixing a name or other design to a sheet of metal, which consists in impressing said design in one side of said sheet to thereby emboss said design in the opposite side of the sheet, and forming corrugations in said sheet across said design and simultaneously stretching said design in the plane of the sheet without effacing the design.

5. The method of affixing a design to a sheet of metal, which consists in impressing the desired design in one side of said sheet to thereby emboss said design in the opposite side of said sheet, and impressing a protective design in the first mentioned side of said sheet across the desired design and simultaneously stretching said design in the plane of the sheet without effacing the design.

WILLIAM T. TAYLOR.