July 28, 1931. J. LEDWINKA 1,816,594

METHOD OF AND APPARATUS FOR MAKING SHEETS AND IRREGULAR SURFACE CONTOURS

Filed May 29, 1930

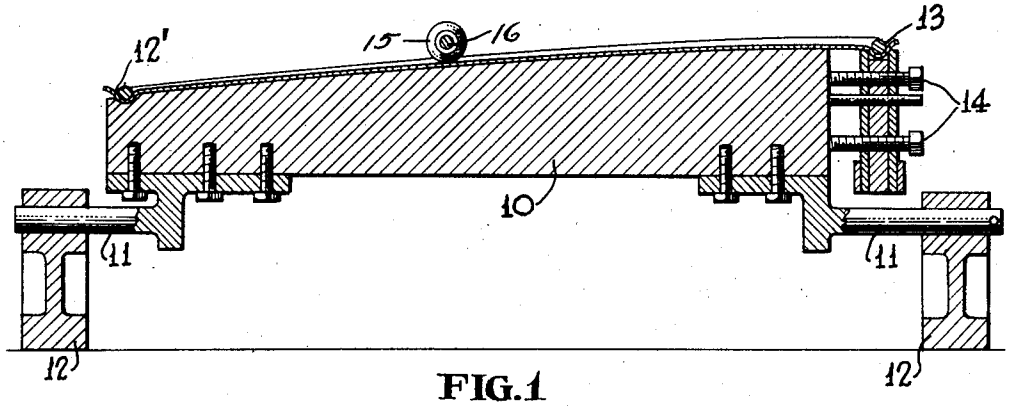


FIG. 1

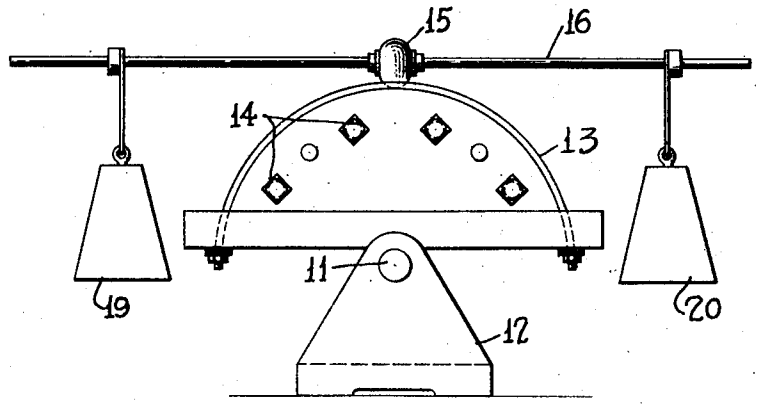


FIG. 2

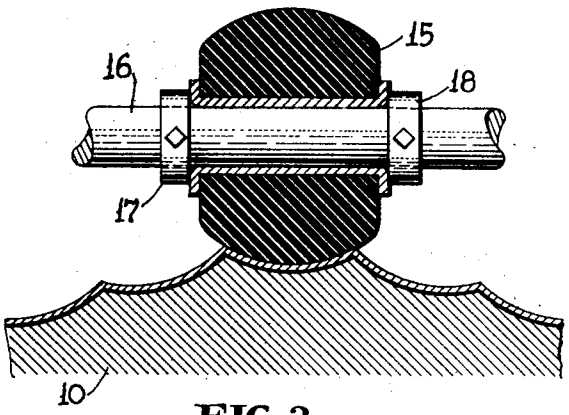
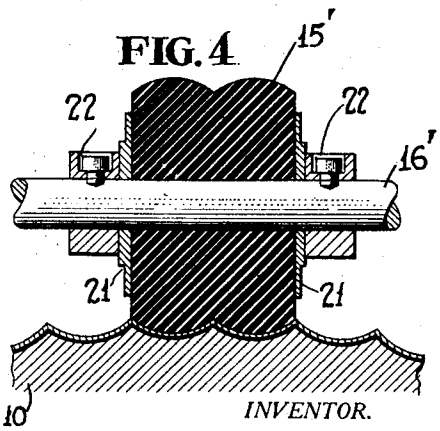


FIG. 3

FIG. 4



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UNITED STATES PATENT OFFICE

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METHOD OF AND APPARATUS FOR MAKING SHEETS AND IRREGULAR SURFACE CONTOURS

Application filed May 29, 1930. Serial No. 456,996.

My invention relates to a method and apparatus for making sheets having irregular surface contours, such as corrugated sheets from flat sheet-metal stock.

Such a method and apparatus is generally disclosed in the prior application of myself and Earl J. W. Ragsdale entitled Fuselage construction, Serial No. 426,479, filed February 7, 1930, where it is shown applied to the corrugating of sheets adapted to be used in aircraft surfaces.

The prior method and apparatus contemplated the use of a corrugated form and a roller having a perimeter of a transverse cross-section conforming to the arcuate cross-section of the corrugations for pressing the sheet into the corrugations. In the use of that method and apparatus, it was found that where a roller of relatively unyielding material was used, some difficulty was experienced in rolling the corrugations in the metal smoothly, and without the formation of surface irregularities such as wrinkles.

It is the main object of the present invention to avoid this difficulty, i. e., to provide a method and apparatus which will avoid all surface irregularities or wrinkles in the finished sheet. In other words, the sheet after corrugation by my improved method and apparatus, will match the form throughout and have a smooth surface.

I attain this object by using in my improved method and apparatus, a roller or rollers having its peripheral portion at least formed of a yielding deformable material, whereby it will assume, under pressure, the exact contour of the corrugations in the form and thus press the sheet firmly yet yieldingly into exact conformity with the form.

In the accompanying drawings, I have illustrated one form of apparatus by which the method may be practiced.

In the drawings,

Fig. 1 is a longitudinal vertical section of a form of arched press which may be used to carry out the invention,

Fig. 2 is an end elevation thereof, and

Figs. 3 and 4 are sectional views of two different types of rollers which may be used.

The method and apparatus are disclosed in the drawings in connection with the formation of sheet-metal panels of longitudinally and transversely curved configuration, such as are adapted for use in the construction of monocoque fuselages for aircraft; but it will be evident that the method and apparatus are adapted for the formation of corrugated sheets of other forms and for widely different uses, and even for the formation of sheets of irregular surface configuration other than corrugated.

In the drawings, the form indicated by numeral 10 is transversely arched on the surface to which the work is applied and formed with longitudinal corrugations preferably having the same radius of curvature from end to end, but decreasing in the width. It is supported on the trunnions 11, 11 projecting from its opposite ends and supported in standards 12, 12. This mounting permits the form to be turned during the rolling operation.

A flat stock sheet of duraluminum or other metal which it is desired to corrugate is stretched over the form by securing it at its opposite ends to the form by the clamps 12′ and 13. The clamp 13 is movable through the adjusting screws 14 to adjust it away from the end of the form to stretch the sheet over the form.

The roller, as shown in Figs. 2 and 3, comprises a yieldable deformable roller 15 of rubber or rubber composition, or other material having the desired yielding characteristics. The peripheral portion of the roller conforms generally in cross-section to the curvature of the corrugations, but its exact conformation is not important in view of the fact, that under the pressure applied, it is deformed to take this exact configuration, and thus press the sheet to the exact configuration of the form. Because of its yielding character, there is no tendency to push the metal in front of it, as in the case of a non-yielding roller, which would result in wrinkling of the metal.

The roller is shown mounted to rotate on the shaft 16, between the fixed collars 17,

18 and it is pressed to the form by the weights 19 and 20 suspended from opposite ends of the shaft. It may be moved along the form manually or by suitable mechanism not shown. Other means for pressing the roller to the form could also be employed in carrying out the method.

In Fig. 4, I have shown a modified form of roller 15′ of a width sufficient to span two corrugations or, at least, to extend over the peak between two corrugations and to the center of the corrugations. In this form I have shown the roller clamped to the shaft 16′ to turn with it by the opposed clamping plates 21, 21 and the collars 22, 22.

The manner in which the method is practiced will be clear from the foregoing description, and further description of the operation of the apparatus is believed unnecessary.

It will be obvious to those skilled in the art that changes and modifications may be made without departing from the spirit and scope of the invention as expressed in the appended claims.

What I claim is:

1. A method of manufacturing sheets having irregular surface configuration, which consists in stretching the flat sheet stock over a form, and in rolling the sheet to the shape of the form by a roller yieldable to conform itself to the irregularities of the form.

2. A method of manufacturing corrugated metal sheets, which consists in stretching the flat sheet stock longitudinally over a form corresponding to the corrugations desired, and longitudinally rolling in the corrugations by a roller yieldable to conform itself to the corrugations in the form.

3. Apparatus for manufacturing corrugated metal sheets comprising a form corrugated longitudinally to the desired form, means for stretching a flat stock sheet over said form, and means for rolling the stock sheet so stretched longitudinally to make it correspond to the form including a yielding roller capable of adapting itself to the exact contour of the corrugated form.

4. Apparatus for manufacturing corrugated metal sheets including a form over which the flat stock sheets are stretched, and a roller having surface contour conforming generally to the form of the corrugations, said roller being made of yieldable material adapted to adjust itself precisely to the form of the corrugations when under pressure.

5. Apparatus for manufacturing corrugated metal sheets including a form over which the flat stock sheets are stretched, and a roller of rubber or rubber composition for rolling the sheet to the shape of the form.

6. Apparatus for shaping sheet metal to irregular form, comprising a form corresponding to the surface configuration it is desired to give the metal, and a yielding roller for pressing a flat stock sheet to the form to make it correspond with the surface configuration thereof.

7. In an apparatus for manufacturing corrugated sheets from flat sheet stock, the combination of a corrugated form and a roller of yieldable material for cooperating with the form to press corrugations in a sheet.

In testimony whereof I hereunto affix my signature.

JOSEPH LEDWINKA.