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APPARATUS FOR FORMING SHEET METAL

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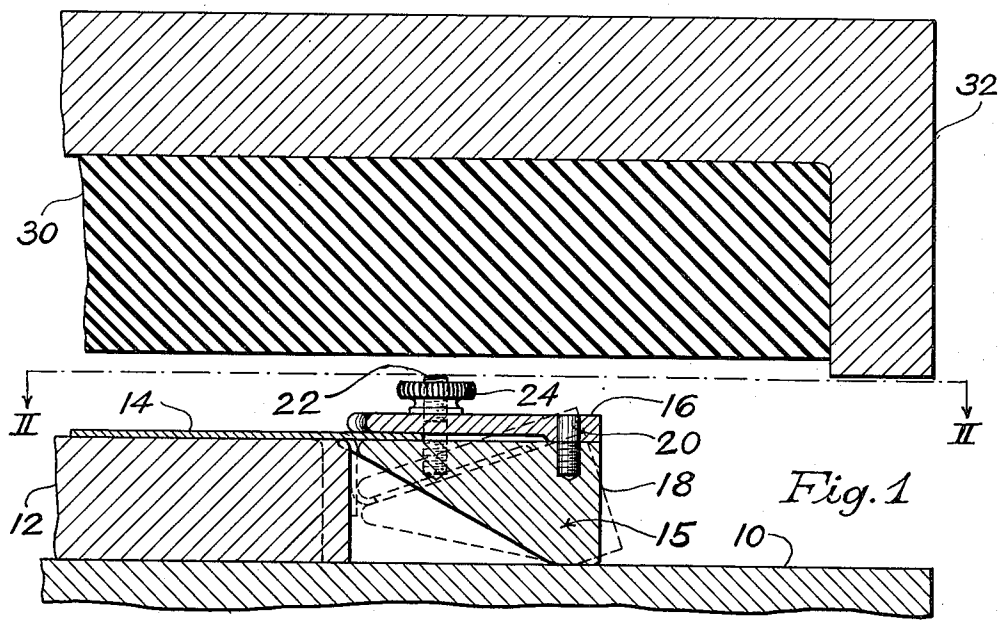


Fig. 1

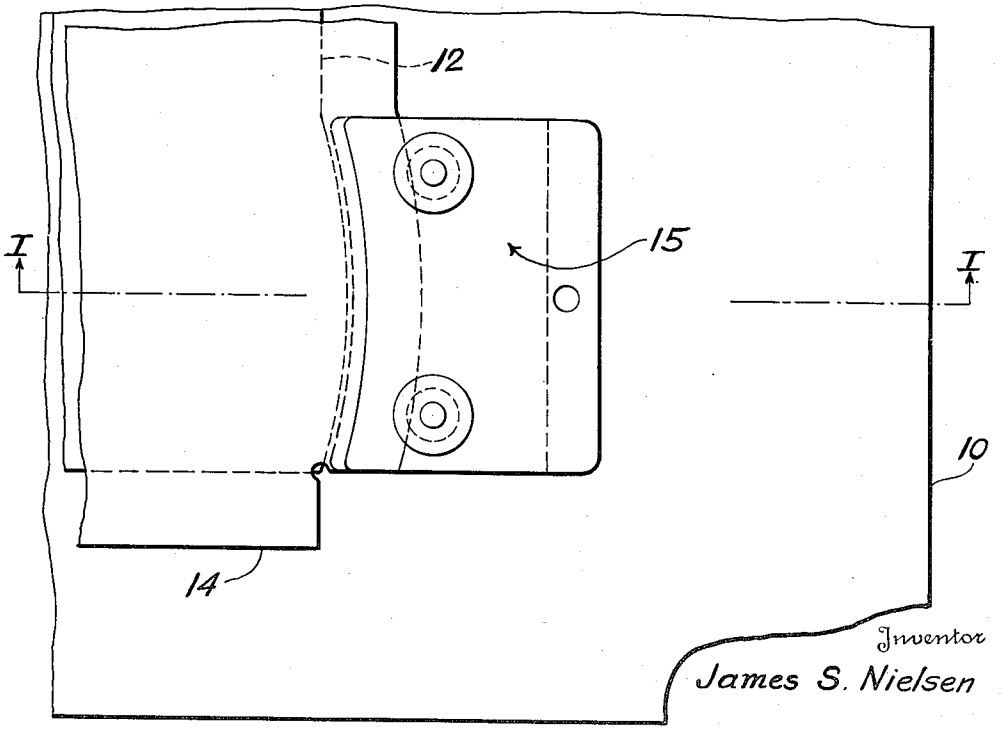


Fig. 2

Inventor
James S. Nielsen

By A. A. Oldham
Attorney

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APPARATUS FOR FORMING SHEET METAL

James S. Nielsen, Stow, Ohio, assignor to Goodyear Aircraft Corporation, Akron, Ohio, a corporation of Delaware

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5 Claims. (Cl. 113—44)

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This invention relates to apparatus for forming sheet metal, and, more particularly, is concerned with improved apparatus for use in conjunction with rubber platen presses wherein sheet metal parts are flanged around or shaped over forming-dies.

It is old and well known to employ so-called rubber platen presses for shaping sheet metal. Apparatus of this type possesses the important characteristic that only one die is needed, instead of a mating male and female die, with the rubber platen serving to apply relatively high pressure over the entire area of a piece of sheet metal positioned over the forming die. However, in forming flanges on sheet metal by apparatus of this type, and, specifically, where such flanges are curved or contoured, as is so often the case, it has usually been necessary to partially form the sheet metal with the rubber platen apparatus, and follow this forming operation with extensive and laborious hand-finishing operations or other machine-finishing operations.

It is the general object of this invention to avoid and overcome the foregoing and other objections to and difficulties of known rubber platen-press apparatus and the like, by the provision of improved means for facilitating forming curved and contoured edges on sheet metal in a single rubber pressing operation.

Another object of the invention is the provision of improved apparatus of relatively inexpensive, readily operated character which facilitates forming contoured flanges and the like on sheet metal during a rubber platen-press sheet-metal-forming operation.

Another object of the invention is the provision of apparatus of the character described and wherein an overhanging sheet metal edge is gripped by adjustably actuated clamping plates to provide a progressive bending and stretching of the sheet metal edge and a progressive slipping of the sheet metal edge out from between the clamping means.

The foregoing objects of the invention, and other objects which will become apparent as the description proceeds, are achieved by the provision of a method for forming sheet metal which includes the steps of gripping an edge to bend progressively and simultaneously to stretch the edge to the desired contour. The apparatus of the invention includes in combination, means for supporting sheet metal with an overhanging edge, a pair of contoured shaping means, means for adjustably clamping the shaping means against each other on opposite sides of the overhanging

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edge, and means for effecting relative movement between the shaping means and the support to progressively bend the overhanging edge around the support with a progressive slipping of the overhanging edge out from between the shaping means.

For a better understanding of the invention, reference should be had to the accompanying drawing, wherein Figure 1 is a vertical cross-sectional view through typical apparatus incorporating the invention (with the sectional view being taken on line 1—1 of Figure 2); and Figure 2 is a plane view of a portion of the apparatus as taken substantially on line 2—2 of Figure 1.

Having specific reference to the drawing, the numeral 10 indicates generally a bed or platen adapted to mount thereon a support or die 12 for a piece of sheet metal 14, with the sheet metal being supported so as to have an edge portion overhanging the die or support 12. The overhanging edge of the sheet metal 14 is adapted to be adjustably gripped by contoured shaping means, indicated as a whole by the numeral 15, which conveniently take the form, as illustrated, of a pair of opposed metal shoes, draw-blocks, or dies in the form of plates 16 and 18, having one or more aligning pins 20. The plates 16 and 18 of the shaping means are adjustably secured together by any suitable means, such as threaded studs 22, secured in the plate 18, extending through holes in the plate 16, and receiving thumb nuts 24.

Some means are provided for mounting the shaping means 15 so that the metal-gripping edges thereof can have relative movement with respect to the support 12 for the sheet metal. One particularly practical way of achieving the desired result is to form the plate member 18 of a wedge shape and with the plate tapering to a relatively thin edge adjacent the die or support 12. When the plate 18 is shaped in this way, the contoured shaping means 15 have bodily movement as a whole of pivoting character from the full-line position shown to beyond the dotted-line position shown. The movement of the contoured shaping means from the full to the dotted-line position is achieved by any desired means, for example by the use of a rubber platen including a rubber body 30 supported in the metal platen member 32. The rubber body 30 not only serves to force the sheet metal 14 into shaped contact with the die or support 12 but also serves to apply pressure to the top plate 16 of the contoured shaping means 15, and this pressure causes the contoured shaping means 15 to tilt with a

pivoting action from the full-line to and beyond the dotted-line position.

During the movement of the contoured shaping means 15 from the full-line position to and beyond the dotted-line position, the overhanging edge of the sheet metal gripped by the contoured shaping means progressively slips out from between the shaping means to cause a progressive bending and a simultaneous progressive stretching of the overhanging sheet metal edge, so that the edge of the sheet metal is contoured and shaped to the particular form desired. From the drawing it will be recognized that a longitudinally curved flange can be formed on the sheet metal edge, and the flange can extend at any desired angle with respect to the main body of the sheet metal.

From the foregoing, it will be recognized that the objects of the invention have been achieved by the provision of simplified and improved means and method for forming sheet metal and particularly for shaping curved and contoured flanges on sheet metal parts during a rubber platen-pressing operation. The flanges are formed to the desired shapes and contours substantially without spring-back and to substantially eliminate the necessity for subsequent hand-forming or additional shaping operations. Of course, any number of contoured shaping means, such as particularly illustrated, can be employed, and the contour of the shaping means can be widely varied to suit any specific required shaping operation.

While, in accordance with the patent statutes, the invention has been specifically illustrated and described, it will be understood that the invention is not limited thereto or thereby, but that the scope of the invention is defined in the appended claims.

I claim:

1. Apparatus for shaping sheet metal and including a die support, a die on the support, said die carrying and positioning the sheet with an overhanging edge, multi-part contoured shaping means adapted to grip the overhanging edge of the sheet, the lowermost part of said shaping means having a wedge shape in vertical section and resting loosely on the die support in pivotal relation therewith, said shaping means being pivotally supported on the die support at a point spaced from the die and to the underside of the plane of the overhanging edge, a rubber block, and means for forcing the rubber block against the upper surface of the sheet to form it into the die and simultaneouly to rock the shaping means about the pivotal support progressively to bend and stretch the overhanging edge.

2. Apparatus for forming sheet metal, comprising a die support, a die resting on said support and having straight or substantially straight as well as curved circumferential contour portions, said die carrying the sheet to be formed with its edges overhanging, rubber platen means movable to and from the die, and supplementary

gripping means, independent of the overall configuration of the main die, used only adjacent said curved die portions and conforming to the contours thereof, the outer bottom portion of said gripping means being in sliding and tilting contact with said die support and its inner portion being in slidable and adjustable clamping engagement with the metal sheet, so that the straight edge portions of said sheet are flanged directly by the rubber platen, but which acts upon the curved portions by means of said gripping means in order to obtain smooth wrinkleless flanges.

3. Apparatus for forming sheet metal, comprising a die support, a die resting on said support and having straight or substantially straight as well as curved circumferential contour portions, said die carrying the sheet to be formed with its edges overhanging, rubber platen means movable to and from the die, and a supplementary, relatively short, tiltable gripping die independent of the overall configuration of the main die and adjustable for various sheet thicknesses, in sliding contact with said die support and in slidable engagement with only the curved edge portions of the metal sheet in order to prevent wrinkling of said curved portions.

4. Apparatus for forming sheet metal, comprising a die support, a die resting on said support and having straight or substantially straight as well as curved circumferential contour portions, said die carrying the sheet to be formed with its edges overhanging, rubber platen means movable to and from the die, and at least one supplementary flanging die independent of the overall configuration of the main die in cooperation with said first mentioned die and said rubber platen means for flanging only the curved portions of said metal sheet, said supplementary die being wedge-shaped in cross section with its thin portion gripping the sheet edge and with its wide portion resting in sliding and tilting relation on said die support.

5. Apparatus for forming sheet metal, comprising a die support, a die resting on said support and having straight or substantially straight as well as curved circumferential contour portions, said die carrying the sheet to be formed with its edges overhanging, rubber platen means movable to and from the die, and a separate supplementary flanging die in cooperation with the die and said rubber platen means, said flanging die including means for clamping with adjustable pressure on the overhanging edge of the sheet adjacent the curved portions of the die, that portion of the flanging die remote from the sheet resting in tilting and sliding relation on the die support, so that movement of the rubber platen means against the die will flange the overhanging sheet edge against the straight portions of the die and will simultaneously move the flanging die with a tilting and wiping movement to form a curved flange in the sheet without wrinkling the curved flange.

JAMES S. NIELSEN.