July 27, 1937. J. HULIN ET AL 2,088,265

DIES FOR THE MANUFACTURE OF METAL WHEELS

Filed Aug. 16, 1933

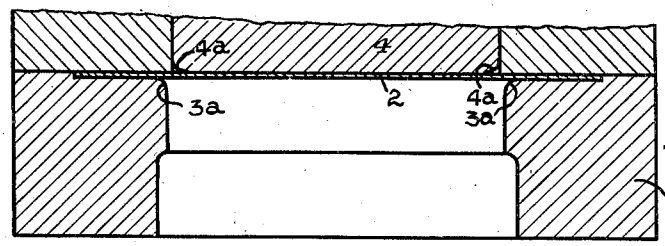


Fig. 1.

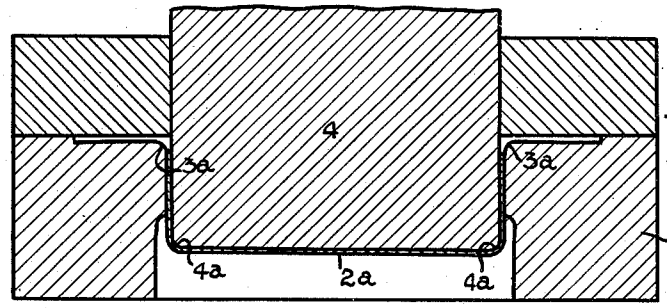


Fig. 2.

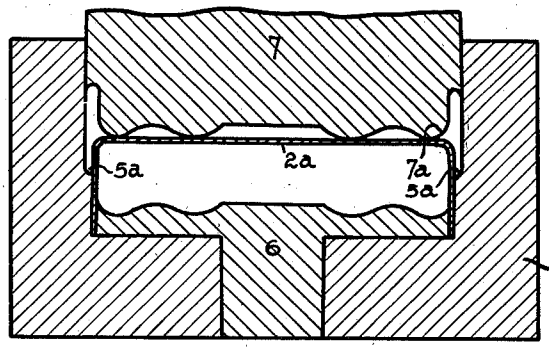


Fig. 3.

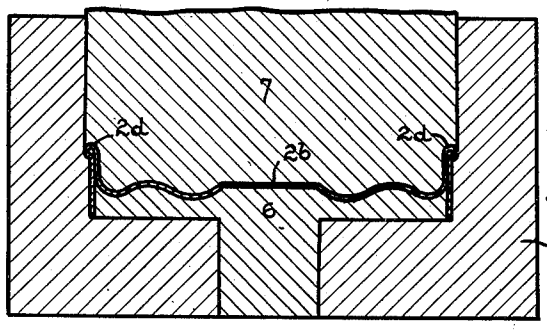


Fig. 4.

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DIES FOR THE MANUFACTURE OF METAL WHEELS

Jules Hulin and George Ford, Nivelles, Belgium

Application August 16, 1933, Serial No. 685,466
In Belgium September 8, 1932

1 Claim. (Cl. 113—49)

The present invention relates to dies for the manufacture of metal wheels in a single piece made from metal sheets.

Attemps have already been made to construct metal wheels in a single piece from metal sheets by bending and dishing the latter, but it has never been possible to carry this in practice, because of the considerable waste produced during manufacture owing to the formation of defects in the sheet metal.

In order to remedy this disadvantage, according to the invention, after having dished a metal sheet so as to convert it into a dish, the bottom of the dish is pressed towards the interior thereof by stamping.

In order to carry out this process advantageously, according to the invention, the radius of curvature of the rounded edges of the dies and punches employed for dishing is equal to about 3.6 times the thickness of the metal sheet.

Other details and features of the invention will appear in the course of the description of the accompanying drawing which represents the invention diagrammatically.

Figure 1 shows a metal sheet about to undergo the first stage of the process.

Figure 2 shows the piece obtained at the end of this first stage.

Figure 3 shows the metal sheet about to undergo the second stage of the process.

Figure 4 shows the wheel obtained at the end of this second stage.

In order to produce a metal wheel according to the invention, a metal sheet **2** (Figure 1) is placed on a dishing die **3**. For a metal sheet of one millimetre in thickness, a value equal to about 3.6 millimetres is chosen for the radius of curvature of the rounded edge **3***a*. The same value is also chosen for the radius of curvature of the rounded edge **4***a* of the dishing punch **4**. The ratio between these radii of curvature and the thickness of the metal sheet to be dished is therefore very much smaller than ordinary.

The elements having been placed in the position shown in Figure 1, the punch is driven into the die until the position shown in Figure 2 is reached. The dished metal sheet thus appears in the form of a dish **2***a* of a depth varying according to the dimensions of the wheel.

In order to carry out the second stage of the process, the said dish **2***a* is first of all placed in a stamping matrix consisting for example of two pieces **5** and **6** (Figure 3). The stamping punch **7** is then introduced into the piece **5**.

The second stage comprises pressing the bottom of the dish **2***a* towards the interior thereof by stamping, so that the elements appear as shown in Figure 4. As the bottom of the dish is pressed inwardly, the lateral wall thereof is bent back within itself, as may easily be understood from the showing in Figs. 3 and 4 of the drawing. In other words, the bottom is forced partially through the cylindrical wall of the dish in a manner somewhat similar to that employed in turning an ordinary bag or sack inside out. The width of the rim of the wheel **2***b* represented in Fig. 4 is in fact smaller than the depth of the dish **2***a* represented in Fig. 3 by a quantity approximately equal to the width of the part bent back at the interior of the rim.

During the bending of the lateral wall of the dish back on itself, the upper part of the wall in Fig. 3 is pressed toward the exterior by the rounded edge **7***a* of the punch **7** in the circular groove **5***a* of the matrix, the diameter of which is greater than that of the part receiving the lateral wall of the dish. The diameter of the punch **7** is such that the part bent back upon itself is applied against the interior of the rim. The part which undergoes bending is in these conditions formed to enter in the groove **5***a* during the bending. The presence of groove **5***a* makes it easy to avoid the formation of cracks, wrinkles or other defects at the place where the disc or web joins the rim. Moreover, at the end of the bending back operation groove **5***a* effects the formation of a flange **2***d* in the body of the wheel which advantageously reinforces it without supplemental operations. It is obvious that the form of the recess **5***a* and of the edge **7***a* of the punch will be modified according to the form to be given to the flange **2***d*.

The lower portion of the punch **7** is of a diameter equal to the external diameter of the cylindrical lateral wall of the blank minus four times the thickness of the sheet. The cylindrical member **6** is of a diameter equal to the diameter of the lower cylindrical part of the die minus two times the thickness of the sheet.

The wheel made according to the process herein described is covered by our copending application Serial No. 749,110, filed October 19, 1934.

The invention is not limited to the form of construction shown, and many modifications may be made in the form and constitution of the elements taking part in its construction, without departing from the scope thereof.

What we claim is:

An apparatus for manufacturing a metal wheel, comprising a die, for receiving a dished blank

with a cylindrical lateral wall, having a cylindrical wall of diameter equal to the external diameter of said cylindrical lateral wall of the blank and of a height equal to the width of the rim of the wheel to be made, said die also having above said cylindrical wall another cylindrical wall of greater diameter, a punch adapted to bend a part of the said cylindrical lateral wall of the blank along and in contact with a part of the inner surface thereof, said punch having an upper cylindrical part of the same diameter as the larger cylindrical wall of the die and a lower cylindrical part of a diameter equal to the external diameter of the said cylindrical lateral wall of the blank minus four times the thickness of the sheet, and a cylindrical member of a diameter equal to the diameter of the lower cylindrical part of the die minus two times the thickness of the sheet, said last-mentioned cylindrical member being located concentrically within said die to provide between it and said lower cylindrical part a space for receiving the open end of the cylindrical lateral wall of the blank.

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