

[54] **METHOD FOR MANUFACTURING METALLIC OBJECTS FROM CIRCULAR PLATES**

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[76] Inventors: **Maurice Lachaussee**, Rue de l'Yser, Ans, Belgium; **Andre Maigret**, Avenue de la Grange, Saint-Maur-des Fosses, France

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Attorney, Agent, or Firm—William Kaufman & Barry Kramer

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[58] Field of Search 83/39, 40, 41, 49, 50, 52, 83/678, 695, 108

[57] **ABSTRACT**

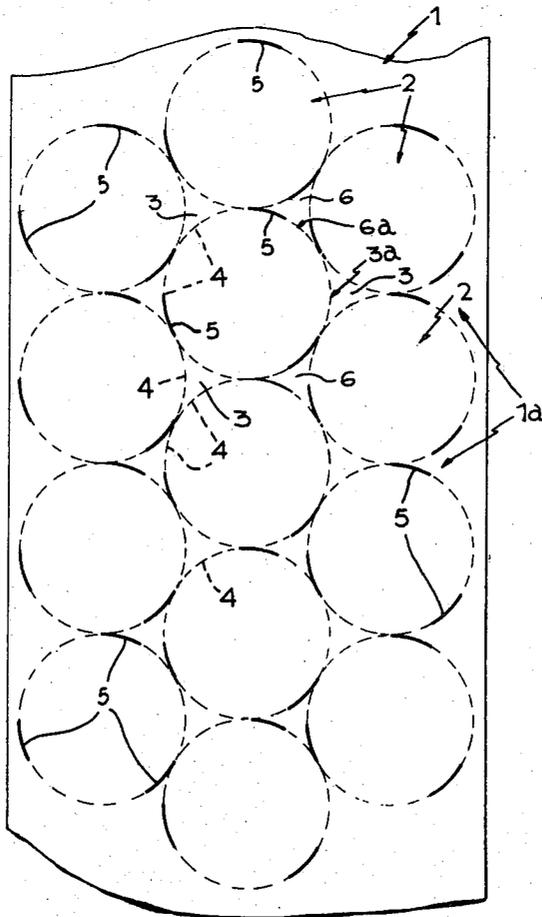
In a method for manufacturing metallic objects from circular plates which are in staggered arrangement and are perforated on a part of their outline exactly at the diameter of the serviceable part in order to be held in the metallic strip in which they are formed which passes step by step beneath the moulding tools there is provided the step which consists in arranging said plates in the strip in order to be immediately tangential in respect to each other and separated solely by equilateral triangles having concave sides which surround said plates.

[56] **References Cited**

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8 Claims, 2 Drawing Figures



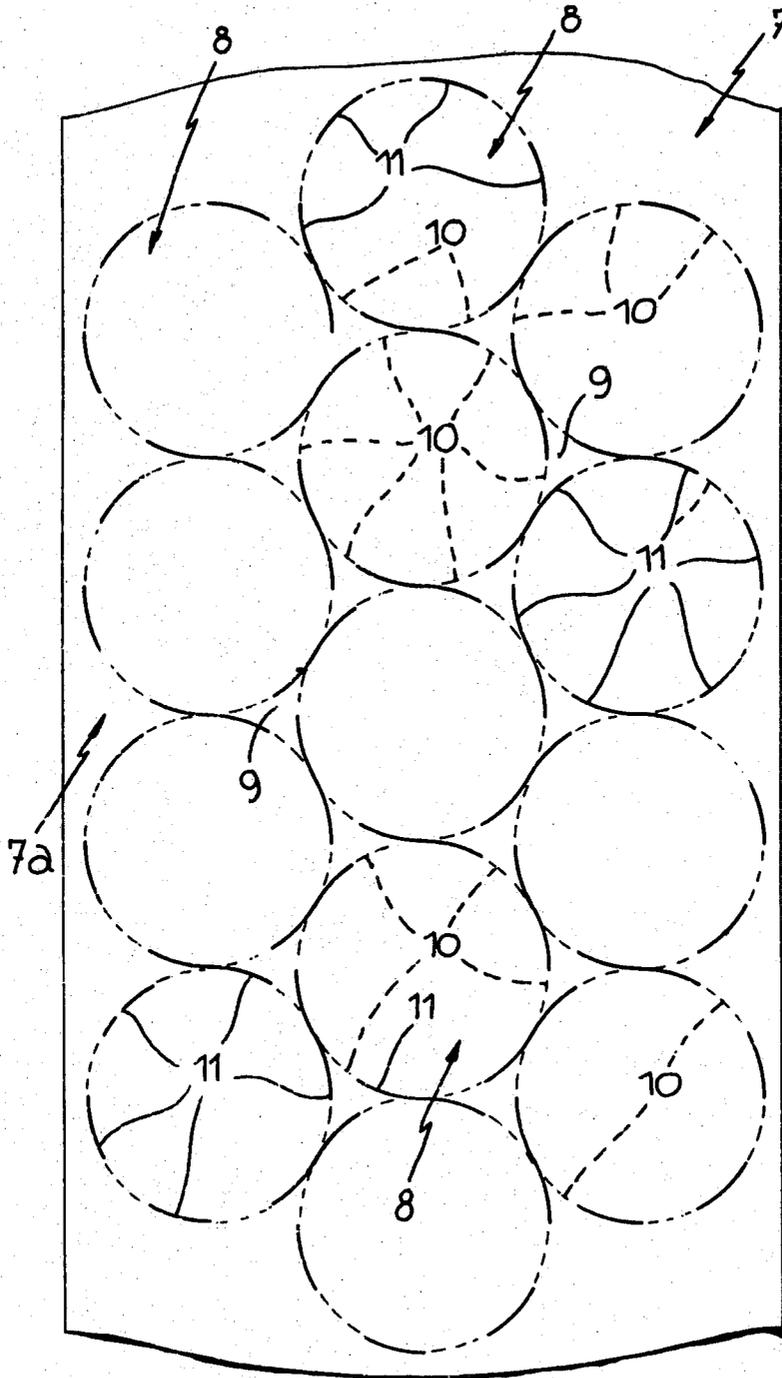


FIG. 2

METHOD FOR MANUFACTURING METALLIC OBJECTS FROM CIRCULAR PLATES

The present invention relates to a method for manufacturing metallic objects by stamping out plates which are formed in staggered arrangement in a metal strip and are held there in the course of manufacture.

In order to avoid annular rings surrounding the plates and to obtain a saving in material by reducing the waste in the manufacture of metallic objects by stamping out the plates formed and retained in a metal strip, a stamping out process is already known in which the opening which frame the plates which are to be stamped out and which are then formed by cutting solely along part of their periphery are finished with the exact diameter of their effective surface and then remain linked with the separating walls only by the points of attachment.

In this method, it is first necessary to perforate the openings surrounding the plates to be stamped out, and then to partially cut the periphery of the said plates; this manner of operation leads to the formation of separating walls between the plates, which walls are hexagonal having three large concave sides and three small concave sides and thus cover quite a large area resulting in a considerable waste.

The object of the present invention is to avoid perforating the opening surrounding the plates, thereby avoiding the separating walls, which results in important economical advantages owing to the reduction in the processes which are to be carried out and in the amount of waste.

The invention relates to a method for manufacturing metallic objects from plates which are set in staggered arrangement in a metallic strip in which they are maintained after having been cut out with a diameter exactly equal to the diameter of the part used, on only a part of their periphery, characterized in that the said plates are arranged in the strip in order to be immediately tangential in respect of each other and separated solely by equilateral triangles having concave sides which surround the said plates.

According to a characteristic of carrying out this method, each plate has along its periphery alternately a separation slit of one curve-sided triangle and a connecting segment for a following curve-sided triangle.

Moreover, each separation slit extends over the entire length of one side of a given curve-sided triangle and over approximately half the length of a side of a curve-sided triangle following the half of the length of this latter side which constitutes the connecting segment.

According to another characteristic of carrying out this present method, each plate has along its periphery at each of the curve-sided triangle which surround it a separation slit and a connecting segment for the said triangles. Moreover, the separation slit of each given curve-sided triangle and the connecting segment with each triangle each extend over a part of one side of each triangle, which can be about half of one side of each triangle.

Further characteristics will be apparent from the following description with reference to the accompanying drawings.

FIG. 1 is a schematic plan view of a strip of sheet metal, showing the slits and segments in one application of the method, and FIG. 2 is a view similar to FIG. 1 in another application of the method.

The present description does not describe a method as such for manufacturing an object by stamping out circular plates, since any known process can be used; however it should be noted that the production output controls the use of one or other known machines which is neither illustrated nor described here as it has no bearing on the invention, but in which a strip of sheet metal, for example of copper, is used and is passed through various fixed points where the shaping tools carry out the working processes which are provided for manufacturing an object by stamping out.

The present specification is thus restricted to describing two arrangement for the production of plates in a metal strip.

In order to apply the present method, a strip of sheet metal is used whose width is adapted to the number of rows of plates to be formed and thus of objects to be made. FIG. 1 shows a strip 1 comprising three rows of circular plates 2. These plates are set in staggered arrangement so that they are directly tangential in respect of each other, so that there exists therebetween sections of the strip having the shape of equilateral triangles, respectively 3 and 6, whose respective sides 3a and 6a are curved and concave; since the circular plates 2 meet each other at their points of contact, they are surrounded solely by curve-sided equilateral triangles 3 and 6, in this way, the sections formed by these triangles have a minimum area. The plates 2 have a size exactly equal to the part of the sheet metal which is strictly necessary for punching out an object, i.e. these plates 2 only comprise the part of the sheet metal necessary for stamping out the finished object; in other words, the weight of a finished object is very near the weight of a plate; there is no waste other than the triangles 3 and 6, the side strips 1a and some possible waste when trimming the last object.

The plates 2 are formed by providing along their periphery, at their exact diameter, alternately separation slits 4 which only extend for a part of the periphery interspersed by connecting segments 5; the separation slits 4 extend for the entire length of the sides 3a and only for a part of the sides 6a. Each of the said plates is surrounded alternately by a triangle 3 and by a triangle 6; the slits 4 are illustrated by dotted lines whilst the connecting segments 5 which only extend for a part of the side 6a are illustrated by solid lines. These slits 4 are set at 120° to each other; the segments are also at 120° to each other. After having made the slits 4 and allowed the segments 5 to remain, the part of the strip corresponding to the triangles 3 is disengaged and removed whilst that part corresponding to the triangles 6 remains and is linked with the plates by the said segments 5.

With the arrangement described, the various plates thus remain in the strip 1 and are connected with each other solely by the triangles 6.

After making the peripheral separation slits 4, it is possible to advance the strip in order to carry out on the plates located on said strip the other working processes, namely the stamping-out proper, in order to obtain the finished articles which in the end, are simply separated by cutting the segments 5 linking the triangles 6 and side strips 1a of the metal strips, and are finally trimmed.

A second arrangement for the plates is shown in FIG. 2.

In this arrangement, a strip of sheet metal 7 comprises three rows of circular plates 8 set in staggered arrangement, directly tangential in respect of each other so that only curve-sided equilateral triangles 9 remain which surround the said plates. Thus the parts of the strip formed by these triangles which constitute the waste, have a minimum area. Similarly in this case, the plates 8 are cut partly along their periphery to a size exactly equal to that intended in the manufacture of the objects and there is no waste other than the triangles 9 and the side strips 7a.

According to its periphery, each plate 8 has alternately a separation slit 10 and a connecting segment 11, with regard to each triangle 9; each slit 10 and each segment 11 each extend over approximately half the sides of each triangle; the slits 10 which are set at 60° to each other and are shown in dotted lines, whilst the connecting segments 11 likewise set at 60° to each other are shown in solid lines.

After making the separation slits 11, the plates 8 which remain in the strip 7 by way of the connecting segments 11 and triangles 9 can undergo the shaping processes by advancing the said strip step by step, resulting in objects which are separated at the end of the process by cutting the segments 11 and are then subjected to trimming.

Among the advantages of the process can be mentioned the omission of certain operations which reduces the manufacturing time of an article and consequently increases the output of a machine, moreover the reduction in waste represents an important saving in material. The method described can also be applied to the manufacture of any articles stamped-out from circular plates and from more than two rows of plates.

1. A method for manufacturing metallic objects from circular plates located side by side in echelon formation in a metal strip comprising the steps of: cutting said circular plates with a shaping tool along portions of the outer periphery of said plates leaving segments therealong uncut, while forming around said plates a plurality of concave-sided equilaterally shaped triangles, the concave sides of which define respective portions of the outline of said circular plates, said circular plates

remaining linked to said triangles by said segments; passing said metal strip with said triangles in a step by step manner beneath said shaping tool for shaping said plates in said strip by stamping to obtain finished articles; and finally cutting said segments for removing said articles from said strip.

2. Method for manufacturing metallic objects according to claim 1, characterized in that each plate has along its periphery alternately a separation slit of one curve-sided triangle and a connecting segment for a following curve-sided triangle.

3. Method for manufacturing metallic objects according to claim 2, characterized in that each separation slit extends over the entire length of one side of a given curve-sided triangle and over approximately half the length of a side of a curve-sided triangle following the half of the length of this latter side which constitutes the connecting segment.

4. Method for manufacturing metallic objects according to claim 3, characterized in that corresponding portions of said separation slits are set at 120° to each other in the same way as corresponding portion of said connecting segment.

5. Method for manufacturing metallic objects according to claim 1, characterized in that each plate has along its periphery at each of the curve-sided triangles which surround it a separation slit and a connecting segment for the said triangles.

6. Method for manufacturing metallic objects according to claim 5, characterized in that the separation slit of each given curve-sided triangle and the connecting segment with each triangle each extend over a part of one side of each triangle.

7. Method for manufacturing metallic objects according to claim 6, characterized in that the separation slit and the connecting segment extend over approximately half of one side of each triangle.

8. Method for manufacture according to claim 5, characterized in that the two successive separation slits in the same way as two successive connecting segments are separated by an angle at the center of about 60°.

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