

July 29, 1924.

1,503.023

H. G. CARLSON

METHOD OF MAKING ARTICLES OF PRESSED METAL

Filed Dec. 15, 1922

2 Sheets-Sheet 1

Fig. 1.

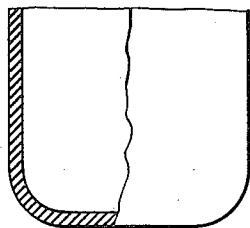


Fig. 2.

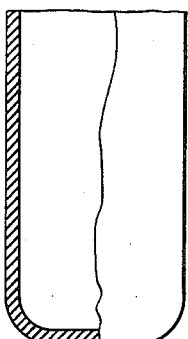


Fig. 3.

Fig. 4. Fig. 5. Fig. 6.

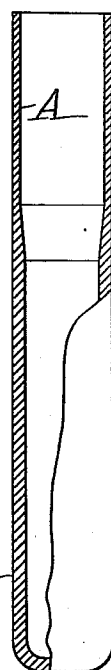
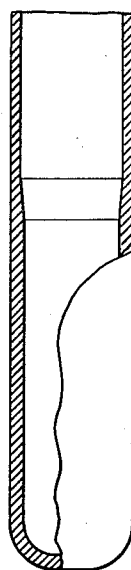
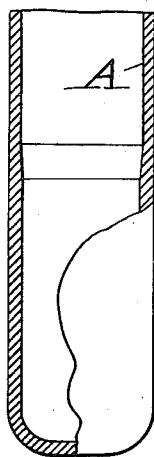


Fig. 7. Fig. 8.

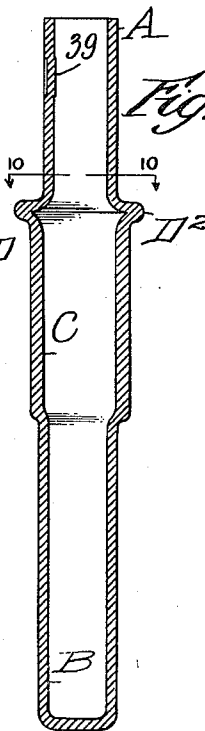
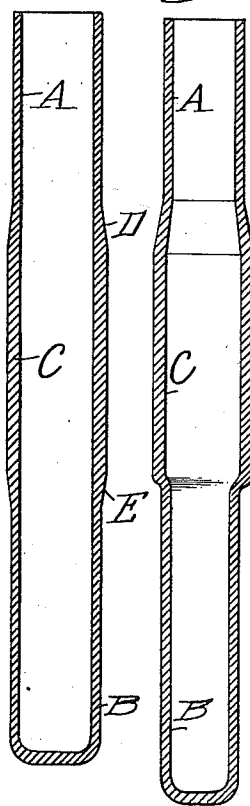


Fig. 9.

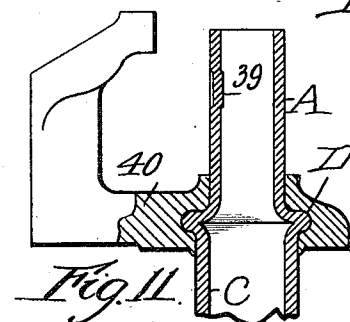


Fig. 11.

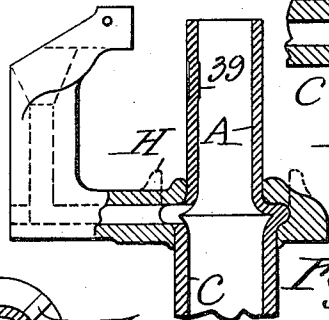
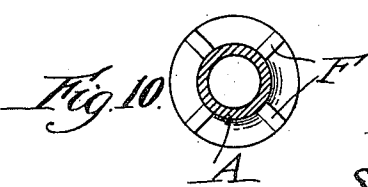


Fig. 13.

Fig. 12.



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2 Sheets-Sheet 2

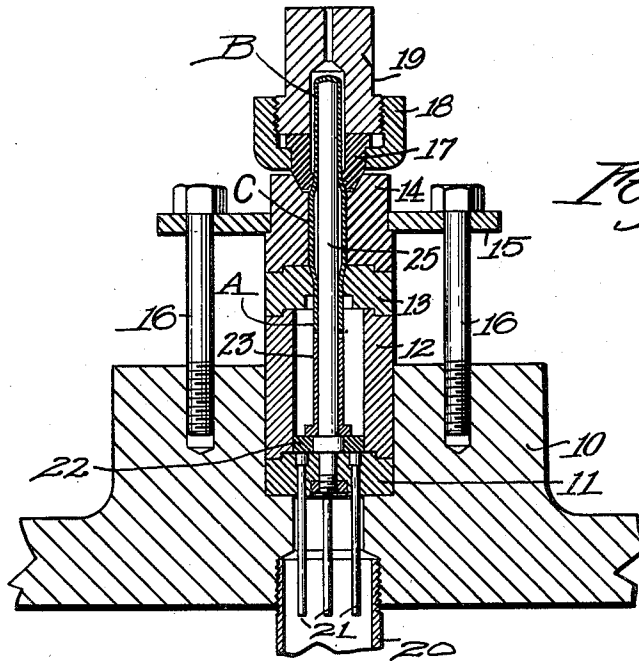


Fig. 14.

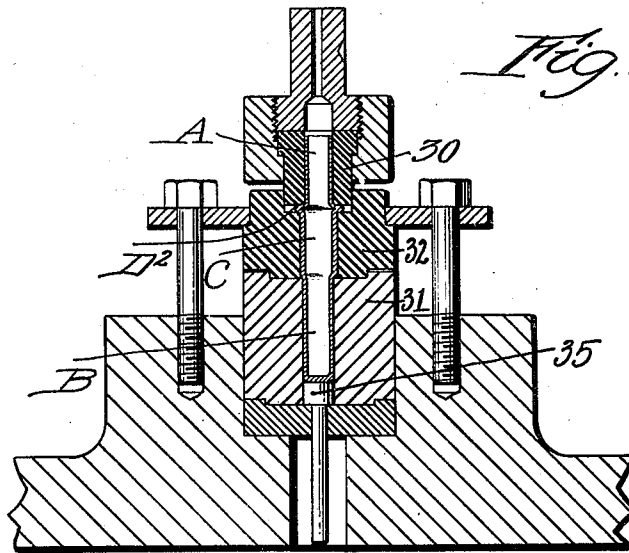


Fig. 15.

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UNITED STATES PATENT OFFICE.

HJALMAR G. CARLSON, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO ROCKWOOD SPRINKLER COMPANY OF MASSACHUSETTS, OF WORCESTER, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

METHOD OF MAKING ARTICLES OF PRESSED METAL.

Application filed December 15, 1922. Serial No. 607,195.

To all whom it may concern:

Be it known that I, HJALMAR G. CARLSON, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Method of Making Articles of Pressed Metal, of which the following is a specification.

This invention relates to a method of making of pressed metal hollow articles which have different portions of varying diameters and thickness of stock, such as bolster cases for spinning spindles.

The principal object of this invention is to provide for making such articles of pressed metal instead of machining castings or bar stock as heretofore, so that when they are made in large numbers the expense of manufacture will be much reduced and the articles themselves will be lighter in weight and, in the particular use mentioned, bolster cases, oil tight.

Reference is to be had to the accompanying drawings, in which—

Figs. 1 to 9 inclusive are side views, partly or wholly in section, showing successive steps in the manufacture of a spinning spindle bolster case in accordance with this invention;

Fig. 10 is a sectional view on the line 10—10 of Fig. 9;

Fig. 11 is a view of the article shown in Fig. 9 with a piece cast on it to complete the bolster case;

Figs. 12 and 13 are similar views of modifications; and

Figs. 14 and 15 are central sectional views of sets of dies for performing some of the operations.

As stated, the completed bolster case has the appearance indicated in Fig. 11 and the completed part of it that is of pressed metal is shown fully in Figs. 9 and 10.

The process may have more or less steps than indicated in these drawings, but with certain kinds and thicknesses of metal this number of steps is suitable. In the first place a round flat blank of sheet steel (Fig. 1) is pressed by an ordinary die-pressing operation to form a cup as indicated in Fig. 2. By one or more additional operations of the same character an elongated cup of smaller diameter is produced as

shown in Fig. 3. The only difference between the two cups shown in Figs. 2 and 3 is in the dimensions. No matter how far the reduction is to be made or how many steps are required, a cup is thus provided which, in the three succeeding operations results in cups like Figs. 4, 5 and 6, is further elongated and reduced in external diameter and also has its walls near the open end reduced in thickness, by being forced in successive operations through dies by suitable punches, the lower contacting part of each punch being slightly smaller in diameter than its upper portion. It will be noticed that the thickness of metal of the closed end B has not been changed but remains the same as that of the original blank.

The next step involves the provision of a central enlarged cylindrical part C (Fig. 7). This is done by means of the dies shown in Fig. 14. They involve a base or table 10 having a depression for receiving a plate 11 carrying a cylinder 12 which supports a female die 13. This carries an external die 14 held down by a plate 15 adjusted and held by bolts 16. Above this a female shaping die 17, held in a die plate 18 by a threaded block 19, is pressed down by the press head above (not shown).

Below in a guide 20 are a set of ejecting plungers 21 adapted to be forced up through the plate 11 to raise a hollow disc 22 in the cylinder 12. On the disc 22 rests an ejector 23 adapted to contact with the bottom A of the article and eject it when the die 17 is raised. The central mandrel 25 is fixed in the center of the bottom plate 11 and cannot move. This mandrel is the same size throughout and its upper end projects above the die 14 to serve to center the cup when inserted by the operator and to hold it when the dies separate so that the operator can remove it. Its main function is to regulate the inside diameter at the two ends of the cup. It does not come into contact with the interior of the enlarged center C which it is the purpose of these dies to form by the reduction of the ends more than the center. The thickness of the central portion is still the same as that of the original flat blank and is not changed at all throughout the process.

In this operation the blank shown in Fig. 6 is put in the dies over the mandrel 25 with the open end A resting on the conical depression in the top of the die 14. Now the die 18, attached to the press head or plunger, descends from above and moves down to the position shown in Fig. 14. This reduces the open end A by forcing it through the die 13 and gives it the reduced inside diameter of the exterior of the mandrel 25. Its walls are thickened slightly in the process.

This die 13 also forms a conical shoulder at D and the die 17 forms a similar but opposite shoulder at E and also reduces the closed end B. The diameter and thickness of the cylindrical walls of the closed end are both reduced. The central portion C is not modified except at its ends D and E.

By a similar operation this cup is transformed into that shown in Fig. 8. The conical sloping shoulder E is shortened to form a more abrupt shoulder. The cylindrical closed end is lengthened and reduced in diameter but not changed in thickness. The open cylindrical end is modified a little by reducing its length and its diameter. The thickness of its walls is increased slightly.

All this time the thickness of the metal throughout the part C has not been interfered with. In other words, it has been kept substantially at the original thickness of the blank.

The final metal pressing operation is performed in changing this shape to that shown in Fig. 9 in which the parts A, B and C are retained in the same shape and relative arrangement as they have been in Fig. 8. Now the shoulder E is pressed down by an upsetting die 30 (Fig. 15) from above to form an integral projecting ring or shoulder D² surrounding the article at the end of the central cylindrical portion C. At the same time it is preferably provided with a plurality of lugs F integral of course and standing up from the plane of the shoulder. The open end of the cylindrical portion is also reduced by this die 30 to its final shape, and is of substantially the same internal diameter as the closed end, which is shaped by a die 31, and the metal being of nearly the same thickness. The object in leaving the metal of the central portion C (held in a central die 32) considerably thicker than that of the parts A and B and the same thickness as the original blank, is to provide sufficient metal for screw threading. The article is simultaneously pressed down against the ejecting plunger 35 which flattens the closed end. The article is shaped in this die the other side up from that shown in Fig. 14.

In a further operation an inward longitudinal projection 39 may be formed. Such a projection is a substitute for the key that

has hitherto been applied to the spindle bolster, (not shown). It involves a material saving because by its use the necessity of inserting a key in the spindle bolster is avoided as well as the formation of a groove on the interior of the bolster casing.

For the purpose of finishing the article, the cup shown in Fig. 9, is placed in a mold and a casting 40 of malleable cast iron or any other desired metal is cast around it. The lugs F are for the purpose of fixing it so that it cannot turn on the spindle and the shoulder D² is for holding it against motion longitudinally. This casting is of the same shape as has been employed heretofore, for conducting oil to the bearing and supporting the hold down. It can be cast in its final shape as shown in Fig. 11 or can be cast separately, applied to the casing and then secured in position by swedging down a cylindrical projection H as shown in Fig. 12. Fig. 13 shows another modification in which the part C is screw threaded and the casting screwed on.

The foregoing series of operations produces in the forms illustrated, a hollow pressed metal article useful for bolster cases and other purposes.

By this method of construction the cost of production in large quantities can be very greatly reduced. Not only this, but the number of defective articles is almost eliminated. It is a difficult thing to bore into a piece of cast metal the length of this article and secure a central hole leaving the metal walls of uniform thickness, and it is also difficult to stop the boring operation in exactly the right place. Furthermore, the porosity of castings has been found in practice to make the oil-tightness of cast articles of this type uncertain; for, although such cast articles may test up all right in response to the ordinary tests, oil will eventually leak through many of the finished articles. My bolster casings, besides being oil tight, are lighter, stronger and cheaper than those made heretofore. The oil-retaining enlargement in part C has had to be bored out by a special device hitherto, while by my process the enlargement C is cheaply made without employing any extra operation. These pressed metal articles can be produced accurately in large quantities in a small plant with inexpensive tool equipment.

Although I have shown and described the process in manufacturing only one kind of article, I am aware of the fact that it may be applied to the making of other articles of similar general shape without departing from the scope of the invention as expressed in the claims and that the exact number of steps shown and described is not always essential within the scope of the claims. Therefore, I do not wish to be limited to all the details herein shown and described nor

to the use of the method for producing any one article, but what I do claim is:—

1. The method of making a long hollow article of pressed metal having a central portion with reduced ends, which consists in drawing out a blank of sheet metal to a general cylindrical cup-shape having a closed end and an open end, reducing the diameter and the thickness of metal of the open end by a series of steps, reducing the diameter and thickness of the extreme closed end thereof, leaving an intermediate portion between the open and closed ends of the cup, and then further drawing out the extreme ends without materially modifying the thickness of the intermediate portion.

2. The method of making a long hollow article of pressed metal which consists in drawing out a flat blank of sheet metal to a general cylindrical shape having a convex closed end and an open end, reducing and elongating the cup and further reducing the thickness of metal of the extreme open end, reducing the diameter and the thickness of metal of the open and closed ends by a series of steps, leaving an intermediate cylindrical portion between the open and closed ends, providing a conical shoulder between the intermediate portion and each end, then further drawing out the ends without modifying the intermediate portion, but at the same time reducing the thickness of the metal at the open end, and maintaining the original thickness of metal in the intermediate portion throughout the process.

3. The method of making a long hollow article of pressed metal which consists in drawing out a flat blank of sheet metal to a general cylindrical shape having a closed end and an open end, reducing the open end and elongating it, reducing the extreme closed end, leaving an intermediate cylindrical portion between the open and closed ends, providing a conical shoulder between the intermediate portion and the closed end, further drawing out the extreme closed end, reducing the diameter and the thickness of metal of the open end by a series of steps, and compressing the shoulder to provide an abrupt shoulder at that point.

4. The method of making a long hollow article of pressed metal which consists in drawing out a flat blank of sheet metal to a general cylindrical shape having a closed end and an open end, reducing the diameter of the open end and elongating it, reducing the diameter of the extreme closed end, leaving an intermediate portion between the open and closed ends, further reducing and

elongating the extreme closed end, reducing the diameter of the open end by a series of steps until it assumes substantially the external diameter of the closed end, and compressing the metal at the point between the intermediate portion and the open end to form an integral circumferential rib as a shoulder between the two sections.

5. The method of making a spinning spindle bolster casing of pressed steel which consists in drawing out a blank of sheet metal to a general cylindrical cup shape having a convex end and an open end, drawing out the open end to reduce and elongate it, further drawing out the extreme closed end, leaving an intermediate cylindrical portion between the open and closed ends of the cup, then further drawing out, reducing and elongating the extreme closed end without materially modifying the intermediate portion, drawing out and reducing the diameter and the thickness of metal of the open and closed ends of the cup without materially modifying the intermediate portion, upsetting the metal at a point between the intermediate portion and the open end to form an integral circumferential rib or shoulder between the two sections, and at the same time forming integral lugs on said shoulder spaced apart to form a finished pressed metal article, and finally casting metal around the shoulder and lugs, whereby said shoulder will prevent the casting from moving longitudinally and the lugs will prevent it from moving circumferentially.

6. The method of making a hollow article of sheet metal which comprises drawing out a flat circular blank of sheet metal by a succession of drawing operations into a cup shape, drawing down the thickness of its open end, elongating and reducing the external diameter of the entire cup, flattening the closed end thereof, leaving a portion near the thinned open end of substantially the thickness of the original blank.

7. The method of making a hollow article of sheet metal which comprises drawing out a blank of sheet metal by a succession of drawing operations into a cup shape, drawing down the thickness of its open end, elongating and reducing the external diameter of the cup, leaving a portion near the thinned open end of substantially the thickness of the original blank, and the cup of uniform external diameter, and thereafter further drawing out the open end.

In testimony whereof I have hereunto affixed my signature.

HJALMAR G. CARLSON.