

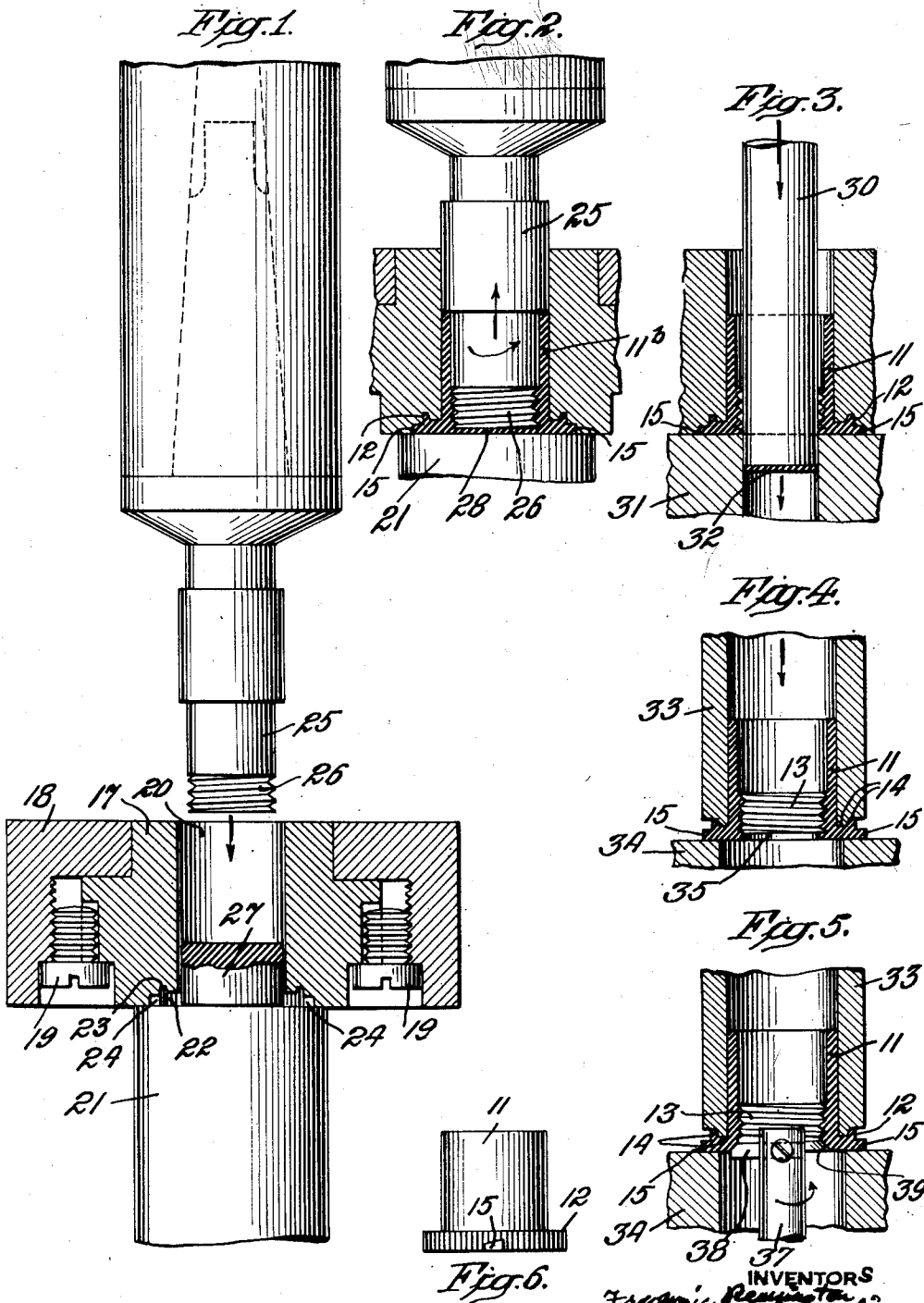
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METHOD OF MAKING LEAD ARTICLES

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METHOD OF MAKING LEAD ARTICLES

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This invention relates to a method of making a lead article.

The article may, for convenience, be termed a sleeve. It is intended primarily for use in a storage battery, such as an automobile battery. It comprises a short tube having an outwardly extending top flange and an internal thread. Further details are described hereinafter.

It is an object of the present invention to provide a method of and means for producing an article of the type described in an economical and practicable manner. Other objects and advantages will be apparent from the description that follows.

The accompanying drawing illustrates the article and various steps in its production, and shows, more or less conventionally, suitable apparatus for carrying out the various steps.

In the drawing:

Figure 1 is a view, partly in elevation and partly in vertical section, of an extrusion press for forming a blank;

Figure 2 is a similar view showing the parts after extrusion;

Figure 3 is a vertical sectional view of a punching apparatus;

Figure 4 is a vertical sectional view illustrating a coining step;

Figure 5 is a vertical sectional view illustrating a finishing step; and

Figure 6 is a view in elevation of the completed article as supplied to the battery maker.

Referring to the drawing and more particularly to Figures 5 and 6, the sleeve here under consideration is made of lead and comprises a tubular portion 11 and an outwardly extending top flange 12. In this connection it is noted that Figures 5 and 6 show the article in upside down position since, for convenience of manufacture, it is produced in such position, as appears in Figures 2-5. At the upper portion, i. e. at the flanged end, the sleeve has a relatively short internal thread 13. The underside of the flange is channeled or grooved as appears in Figure 5, to form a peripheral downwardly extending shoulder 14. Extending out from the side edge of flange 12, at diametrically located points, are two lugs 15, one of which appears in Figure 6.

It is deemed unnecessary, for the purposes of the present invention, to describe the functions of the various details of the sleeve's construction inasmuch as the described article, as such, is an article of commerce. Suffice it to say that the tubular portion 11, when the article is assembled in a battery box cover, serves as a conduit in

supplying the battery with water and the thread 13 is designed to receive the threaded stem of a battery closure cap or plug.

In carrying out the method of the present invention, a tubular blank is formed from a lead slug by extrusion and an internal thread is formed by metal displacement. These two operations may conveniently be accomplished as part of a single extrusion operation.

Figure 1 illustrates part of an extrusion press suitable for so forming the blank and thread. Except for certain features of the die and plunger, hereinafter referred to, the showing of the press is more or less conventional.

Referring to Figure 1, a die 17 is secured in a die block 18 by bolts 19. This die has a cylindrical die chamber 20 the diameter of which corresponds to the outer diameter of the blank to be produced. The die chamber 20 is closed at its lower end, during extrusion, by a die plunger 21 having vertical movement toward and away from the die. At the bottom of the die, and communicating with die chamber 20, is an annular space 22 having an upward annular enlargement or extension 23 to correspond with the shouldered flange of the blank to be produced. Communicating with annular space 22, at two diametrically opposite points, are spaces 24 to correspond with the lugs to be formed on the flange of the blank. The flange 12, as shown in Figure 6, has a knurled edge which may be considered optional. If such knurling is desired, the wall of annular space 22 in the die is suitably ribbed, as shown, to produce a knurled edge on the flange of the blank.

Cooperating with the die and die chamber described is an extrusion plunger 25 having a diameter to correspond with the inner diameter of the blank to be produced. The lower end of plunger 25 is threaded, as at 26, the thread crest diameter being substantially the same as the diameter of the unthreaded portion of the plunger.

Extrusion plunger 25 being elevated and die plunger 21 being in the position of Figure 1, a round lead slug 27 is inserted in die chamber 20. The diameter of the slug is such that the slug has a close but not tight fit in the die chamber. The thickness of the slug is such as to give a total metal content that will produce the blank desired.

The extrusion plunger 25 is then advanced into the die chamber and against the slug under suitable pressure. This causes the metal of the slug to be upset. Part of the metal flows into annular space 22, its extension 23 and the diametrically located spaces 24 to fill the same. Part of the

metal flows upwardly between the wall of die chamber and plunger 25 to form the tubular portion of the blank. The metal also flows into the thread 26 of the plunger to form an internal thread in the blank.

Figure 2 illustrates the completion of the extrusion operation and the blank 11b produced thereby. As there appears, the tubular portion of the blank is closed by a web of metal 28 at the flanged end. Except for this web and except for certain finishing operations to be described, this blank corresponds to the completed article of Figure 6.

Following extrusion, plunger 25 is given an upward twisting motion to release its threaded end 26 from the thread of the blank and to clear the plunger from the die chamber. It is to be understood that the plunger 25 may be operated in any suitable manner, extrusion presses of this general type being known in the art.

Upon withdrawal of die plunger 21, which may also be operated in any suitable manner, the extruded blank may be removed downwardly from the die. This may be accomplished in any suitable manner, for example, by a knock-out mechanism.

The next step in the procedure here described as an example is the elimination of the metal web 28. This may be accomplished in any suitable manner. Figure 3 illustrates, as an example, a punch 30 and punching die 31, the blank being held in any suitable manner. It will be apparent that the punch 30 must be of a diameter to pass the crests of the internal thread of the blank. Advance of punch 30 causes a round disk 32 to be punched out of the end of the blank, thus forming a hole 35 therein somewhat smaller than the thread crest diameter.

Figure 4 illustrates a coining plunger 33 for coining the under edge of the flange of the blank, the blank still being in upside down position and being supported on a suitable table or the like 34. Coining plunger 33 may be constructed and operated in any suitable manner, coining devices being known in the art.

The final step, in the procedure here described as an example, is to enlarge hole 35 so as to give proper access to the thread. Figure 5 illustrates apparatus suitable for attaining this end. The apparatus shown as an example is known as a fly-cutter and comprises a rotary spindle 37 carrying one or more cutters 38. As the spindle rotates, the cutter 38 cuts away metal from the blank to ream out the hole, as at 39, Figure 5. This so opens the entrance to the thread that it can receive the threaded stem of the battery box plug.

As shown, the reaming operation is carried out while the blank is still held by the coining plunger but the reaming may be done at a separate station and the blank held in any other suitable manner.

After the reaming operation is completed, spindle 37 and coining plunger 33 are withdrawn, leaving the article free to be removed.

The steps above described result in the article illustrated in Figures 5 and 6, a completed article as far as the present invention is concerned. While the battery maker may see fit to perform additional operations that can be performed only during or after assembly, e. g. flanging the lower end of the tube to anchor the sleeve in the box cover, the article of Figures 5 and 6 is, as such, an article of commerce to be supplied to the battery maker.

The method of the present invention makes possible the production of an article of the type described in an economical manner. More particularly, by forming the internal thread by metal displacement, the necessity of cutting a thread is avoided. This is advantageous because cutting a thread in lead usually results in excessive and costly dulling of the cutting tools.

It is to be understood that the various steps described need not necessarily follow the order above set forth.

What is claimed is:

1. The method of producing a tubular lead article having an internal thread extending inwardly from one end thereof, which comprises extruding a lead slug to form a hollow member which has one end closed by a web and also has an internal thread one end of which terminates in said web, removing said web, and reaming out the opening so formed to expose the end of said thread so that an exteriorly threaded element can be screwed into said tubular article.

2. The method of producing a tubular lead article having an internal thread extending inwardly from one end thereof, which comprises placing a lead slug in a die chamber, extruding said slug by means of an extruding plunger having an exteriorly threaded end to form a hollow member open at one end and closed at the other end by a web and having an internal thread one end of which terminates in said web, punching out a disk from said web of a diameter less than the crest diameter of said thread, and reaming out the opening so formed to expose the end of said thread so that an exteriorly threaded element can be screwed into said tubular article.

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