March 20, 1945. F. REMINGTON ET AL **2,372,011**

METHOD OF MAKING LEAD ARTICLES

Filed Oct. 16, 1941 2 Sheets-Sheet 1

Fig. 1.

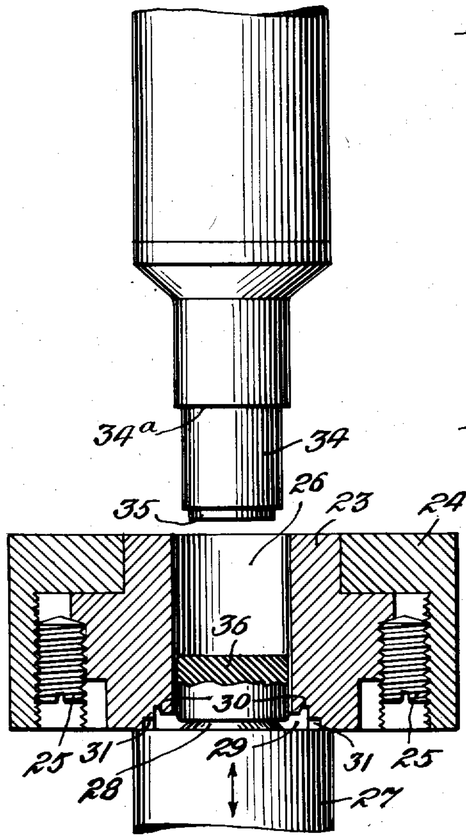


Fig. 2.

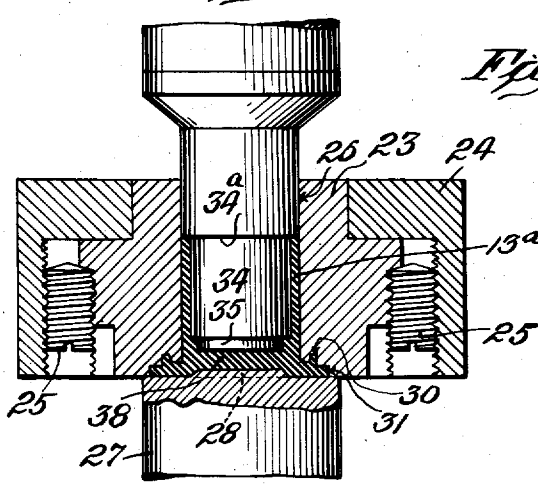


Fig. 4.

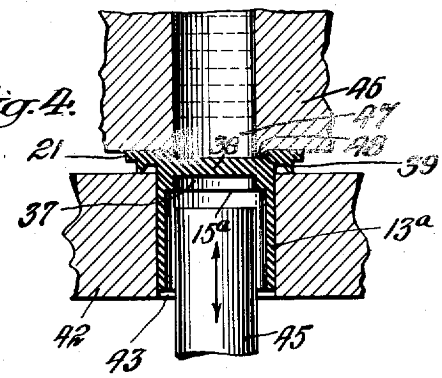


Fig. 5.

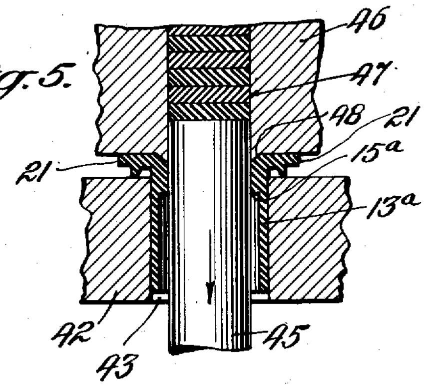
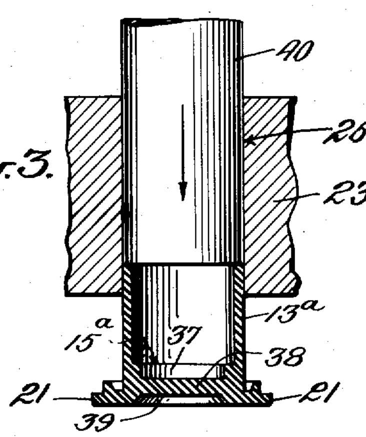


Fig. 3.



INVENTORS

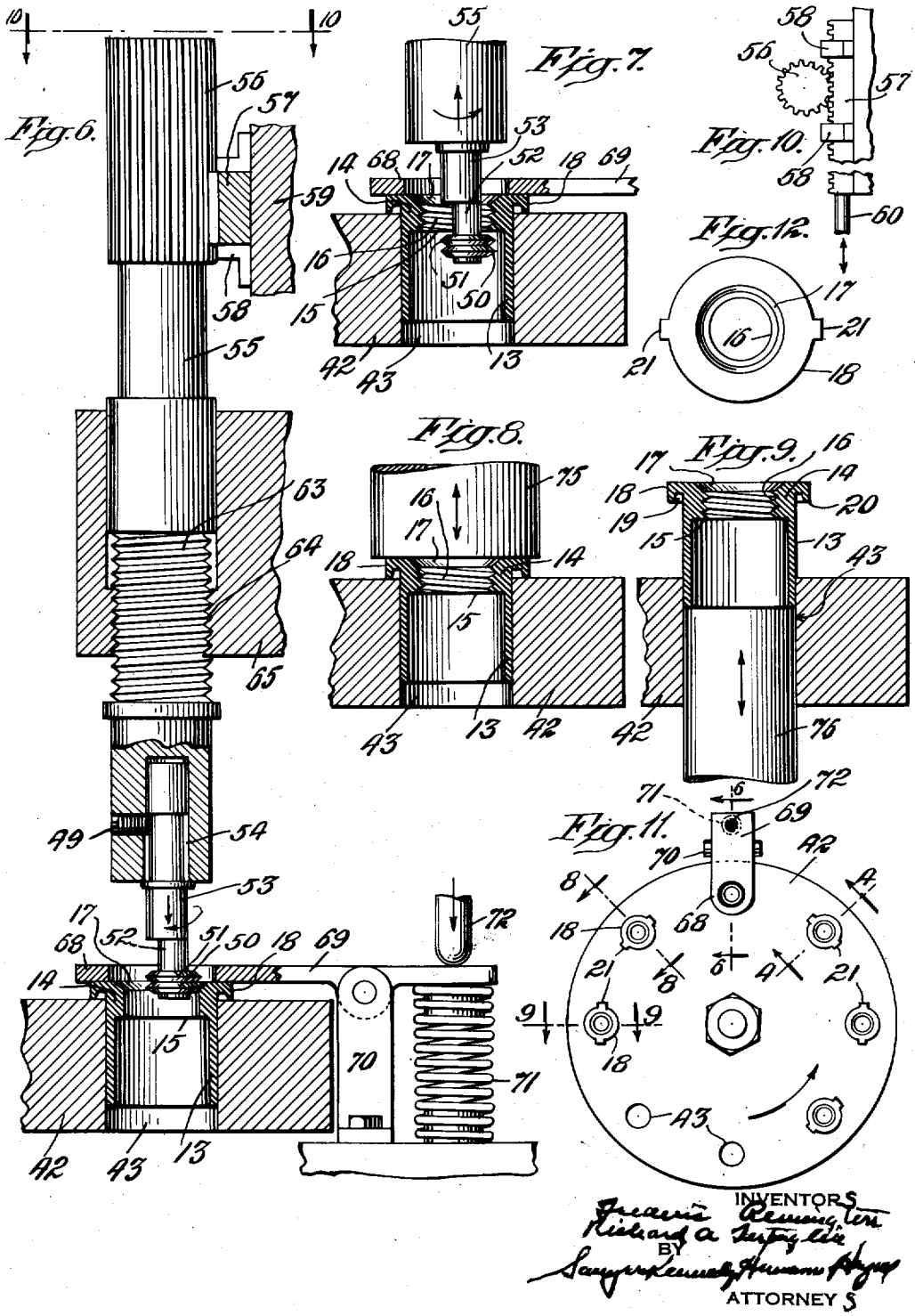
BY

ATTORNEYS

March 20, 1945. F. REMINGTON ET AL 2,372,011

METHOD OF MAKING LEAD ARTICLES

Filed Oct. 16, 1941 2 Sheets-Sheet 2



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2,372,011

METHOD OF MAKING LEAD ARTICLES

Frederic Remington, Elizabeth, and Richard A. Tartaglia, East Orange, N. J., assignors to Peerless Tube Company, Bloomfield, N. J., a corporation of New Jersey

Application October 16, 1941, Serial No. 415,232

3 Claims. (Cl. 29—148.2)

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 the principal object of the present invention to provide a method of 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 drawings illustrate the article and various steps in its production and show, also, apparatus suitable for carrying out the various steps.

In the drawings:

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

Figure 2 is a similar view showing a different position of the parts;

Figure 3 is a view partly in vertical section and partly in elevation of a knock-out mechanism;

Figure 4 is a sectional view (enlarged) taken on the line 4—4 of Figure 11;

Figure 5 is a similar view showing a different position of the parts;

Figure 6 is a sectional view (enlarged) taken on the line 6—6 of Figure 11;

Figure 7 is a detail view showing parts of Figure 6 in a different position;

Figures 8 and 9 are sectional views (enlarged) taken on the lines 8—8 and 9—9, respectively, of Figure 11;

Figure 10 is a sectional view (reduced) taken on the line 10—10 of Figure 6;

Figure 11 is a plan view of a rotary table for presenting blanks to the various finishing mechanisms; and

Figure 12 is a top plan view of the completed article.

Referring to the drawings, the tubular sleeve itself is illustrated in Figures 9 and 12. It is made of lead and comprises a main tubular portion 13. At the upper end is a relatively short portion 14 having a thicker wall and a smaller bore than the main tube 13, the two portions being separated by an internal shoulder 15. This thicker portion 14 has an internal thread 16 terminating, at the top, in a beveled mouth 17. The upper end of the sleeve has an outwardly extending flange 18. The underside of flange 18 is channeled or grooved at 19 to form a peripheral downwardly extending shoulder 20. Extending out from the side edge of flange 18, at diametrically located points, are two lugs 21 (Figure 12).

It is deemed unnecessary, for present purposes, to describe the function 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 13, when the article is assembled in a battery box cover, serves as a conduit in supplying the battery with water and the thread 16 is designed to receive the threaded stem of a battery closure cap or plug.

While the manufacturing steps hereinafter described may be carried out in various ways and at various stages, the apparatus here illustrated as an example consists of two separate pieces of apparatus, namely, an extrusion press and a finishing machine.

In carrying out the method of the present invention, a blank is formed from a lead slug by extrusion. Such blank, except for threading and other finishing operations hereinafter described, accords with the article above described.

While this extrusion step may be carried out in any desired manner, Figures 1 and 2 illustrate an extrusion press suitable for the purpose. Except for certain features of the die and plunger, hereinafter referred to, the showing of the press is more or less conventional.

The press here illustrated as an example comprises a die 23 secured in a die block 24 by bolts 25. This die has a cylindrical die chamber 26 of a diameter to correspond to the outer diameter of the blank to be produced. The die chamber 26 is closed at its lower end, during extrusion, by a die plunger 27 having vertical movement toward and away from the die. This die plunger has a short boss 28 having a beveled edge, the boss extending into the die chamber during extrusion, as appears in Figure 1. It is here noted that for convenience of manufacture the blank is produced in an upside-down position. At the bottom of the die, and communicating with main die chamber 26, is an annular space 29 having an upward annular enlargement or extension 30 to correspond with the shouldered flange of the blank to be produced. Communicating with space 29, at diametrically opposite points, are spaces 31 to correspond with the lugs to be formed on the flange of the blank.

Cooperating with the die and die chamber is an extrusion plunger 34 having a diameter to accord with the inner diameter of the blank to be produced. At the lower or advance end of plunger 34 is a short tip 35 of reduced diameter. The

diameter of tip 35 is substantially the same as the top diameter of boss 28.

The extrusion plunger 34 being raised and die plunger 27 being in the position of Figure 1, a round lead slug 36 is inserted in die chamber 26. 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 plunger 34 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 29, its extension 30 and the diametrically located spaces 31 to fill the same. Part of the metal flows upwardly between the wall of die chamber 26 and plunger 34 to form the tubular portion of the blank. This upward flow is limited by a shoulder 34a on the plunger.

Figure 2 shows the parts at the end of the extrusion operation, the extruded blank being illustrated more clearly in Figure 3. The flanged end of the blank is closed by a web of metal 38. The main tubular portion 13a, which later becomes tube 13, terminates in an internal shoulder 15a formed by the difference in diameter between the extrusion plunger 34 and its tip 35. This tip has also formed a shallow space 37 beyond the shoulder, the diameter of this space being less than the internal diameter of the main tube 13a. This space 37 thus starts what is to become the thicker portion 14 of the finished blank. Boss 28 on die plunger 27 has formed a shallow, beveled depression 39 in the outer end of the closed blank, thus starting what is to become mouth 17.

Following extrusion, plungers 34, 27 are withdrawn to permit ejection of the blank. It is to be understood that these plungers may be operated in any suitable manner, extrusion presses of this general type being known in the art.

The blank may be ejected in any suitable manner, as by a knock-out plunger 40 (Figure 3).

While the remaining steps may be carried out in any suitable manner, the invention in its entirety includes means for advancing a series of blanks by a step-by-step movement to a succession of operating mechanisms. Although capable of various constructions, the apparatus here illustrated as an example comprises a rotary supporting table 42 (Figure 11). This table has a number of angularly spaced holes or sockets 43 for receiving the blanks, the blanks being suspended therein by their flanges. The blanks may be fed to table 42 in any suitable manner, as by hand. Table 42 is given a step-by-step angular movement in any suitable manner, as by a Geneva drive (not shown), to present the blanks to the several finishing mechanisms.

At the first operating station (Figures 4–5), the webs 38 are punched out. To this end, as here shown as an example, below the table is a punch 45 of a diameter to pass closely into the space 37 of the blank. Above the table is a punching die 46 having a bore 47 dimensioned to receive punch 45. At the lower end of bore 47, the die has a beveled lip 48 which engages the beveled wall of depression 39 of the blank (Figure 4).

A blank having reached this station and during the pause in the table's movement punching die 46 is lowered to the position of Figure 4 and punch 45 is moved upwardly against the web 38 and beyond. This causes a circular disk of metal to be punched out (Figure 5), there being a clean-cut shearing action between said lip 48 and the punch. The punch 45 and die 46 are then withdrawn to permit advance of the blank to the next station.

As appears in Figure 5, the successive punched out disks accumulate in die bore 47, the fit therein being sufficiently tight to prevent the disks from dropping out. Each stroke of the punch adds another disk and pushes the pile of disks one step higher in the bore 47. At any convenient point (not shown), the advance disk, at each step, drops out to be collected as may be desired.

This punching operation leaves a portion of the blank corresponding to the thicker portion 14 of the finished article. As later described, the internal thread is formed by metal upset. It follows that the bore of the blank left by the punching operation has a diameter greater than the ultimate thread crest diameter.

There is provided a thread-upsetting roller and means for advancing the roller against the internal wall of the thicker portion of the blank in such a manner as to cause the metal thereof to be upset into the form of a thread. Although capable of various constructions, in that here shown as an example (Figures 6, 7 and 10), double upsetting rollers 50, 51 are freely mounted on an offset stud 52 on a pin 53. This pin is mounted in an eccentric socket 54 in the lower end of a spindle 55, being locked therein by a set screw 49. To rotate spindle 55, its upper end has an elongated pinion 56 meshing with a rack 57. Rack 57 slides in bearings 58 on a bracket 59 and is reciprocated by a connecting rod 60 operated in any suitable manner. A portion of spindle 55 has a thread 63 meshing with an internal thread 64 in a stationary bracket 65. With the construction described, the spindle has a combined rotary and axial movement.

There is provided means for holding the blank against movement during the thread rolling operation. Although capable of various constructions, in that here shown as an example, a hold-down ring 68 is carried on the end of a lever 69 pivoted in a bracket 70. The outer end of the lever is acted on by a spring 71 which tends to force the hold-down ring 68 down against the top of the supported blank (Figure 6). This pressure serves to hold the blank against rotary or axial movement. To release the hold-down ring, a plunger 72, operated in any suitable manner, is moved against the lever to swing hold-down ring 68 upwardly away from the blank.

As a given blank approaches the thread-rolling station, spindle 55 is in elevated position and plunger 72 is moved down to elevate hold-down ring 68, to permit the blank to clear. As table 42 pauses, plunger 72 is withdrawn to permit spring 71 to move hold-down ring 68 into holding position. Connecting rod 60 is moved to rotate spindle 55 which, through thread connections 63—64, also advances axially. This movement, together with the eccentric mounting of rollers 50, 51, causes the rollers to be advanced against the internal wall of the thicker portion of the blank to upset the metal thereof into the form of a thread. The second roller 51 serves to true up the thread initially upset by roller 50.

Figure 6 shows the thread-upsetting mechanism at the point where roller 50 is about to engage the wall of the blank. Figure 7 shows the parts at the completion of the threading operation.

Connection rod 60 is now reversed to withdraw spindle 55 upwardly to initial position. After rollers 50, 51 have cleared the blank, plunger 72 is advanced against lever 69 to swing hold-down ring 68 away from the blank. This clears the blank as table 42 is again stepped ahead to carry the blank to the next station.

By loosening set screw 49 and rotating pin 53 in socket 54, the depth of the thread formed may be adjusted within limits.

At the next station (Figure 8), a plunger 75, operated in any suitable manner, presses the blank against supporting table 42 to coin the under edge of the blank flange. This completes the finishing operations.

At the next station (Figure 9), a knock-out plunger 76, operated in any suitable manner, ejects the article from the supporting table.

The steps above described result in the article shown in Figures 9 and 12, 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 9 and 12 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. It avoids, for example, the necessity of cutting a thread which is a distinct advantage in that cutting a thread in lead usually results in excessive dulling of the tools.

While the thread-rolling step must necessarily follow the punching out of the web, it is to be understood that the coining step need not follow the order above set forth.

What is claimed is:

1. The method of producing an article having internal threading extending inwardly from one end thereof, which comprises extending a metal slug into a hollow member which has a tubular portion one end of which is open while the other end is closed by a web of metal and to form an internal shoulder in said member adjacent said web to produce a relatively shallow space of a diameter less than the internal diameter of the main tubular section of the hollow member and simultaneously produce a relatively shallow beveled depression in the outer surface of said closed end, the root diameter of said depression being equal to the diameter of said shallow space, punching out a round disc of metal from said web of a diameter substantially equal to the diameter of said shallow space whereby the resulting open ended tube has a beveled mouth at one end thereof and a short tubular section leading inwardly from said mouth and of an internal diameter less than the internal diameter of the main tubular section, and rolling an internal thread in said short tubular section of said hollow member.

2. The method of producing a tubular article having an internal thread extending inwardly from one end thereof which comprises extruding a metal slug to form a hollow member which has one end closed by a web of metal and simultaneously forming a depression having outwardly beveled side walls in the outer surface of said end of said hollow member, punching out said web to form an opening in said end of said hollow member having a beveled mouth, and thereafter rolling an internal thread into the walls of said member leading inwardly from said beveled mouth so that a screw threaded element can be screwed into said tubular article.

3. The method of producing an article having an internal thread extending inwardly from one end thereof which comprises extruding a metal slug into a hollow member which has a tubular portion one end of which is closed by a web of metal and simultaneously forming a shallow depression having beveled walls in the outer surface of said end of said member, the root diameter of said depression being equal to the internal diameter of the end of said tubular portion adjacent said web, punching out a round disc of metal from said web of a diameter equal to the diameter of said end of said tubular portion to form an opening in said end of said hollow member having a beveled mouth, and thereafter displacing the metal of the walls of said tubular portion to form an internal thread therein leading inwardly from said beveled mouth so that a screw threaded element can be screwed into said article.

FREDERIC REMINGTON.
RICHARD A. TARTAGLIA.

CERTIFICATE OF CORRECTION.

Patent No. 2,372,011. March 20, 1945.

FREDERIC REMINGTON, ET AL.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, first column, line 43, for the word "extending" read --extruding--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 19th day of June, A. D. 1945.

Leslie Frazer

(Seal) Acting Commissioner of Patents.

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2. The method of producing a tubular article having an internal thread extending inwardly from one end thereof which comprises extruding a metal slug to form a hollow member which has one end closed by a web of metal and simultaneously forming a depression having outwardly beveled side walls in the outer surface of said end of said hollow member, punching out said web to form an opening in said end of said hollow member having a beveled mouth, and thereafter rolling an internal thread into the walls of said member leading inwardly from said beveled mouth so that a screw threaded element can be screwed into said tubular article.

3. The method of producing an article having an internal thread extending inwardly from one end thereof which comprises extruding a metal slug into a hollow member which has a tubular portion one end of which is closed by a web of metal and simultaneously forming a shallow depression having beveled walls in the outer surface of said end of said member, the root diameter of said depression being equal to the internal diameter of the end of said tubular portion adjacent said web, punching out a round disc of metal from said web of a diameter equal to the diameter of said end of said tubular portion to form an opening in said end of said hollow member having a beveled mouth, and thereafter displacing the metal of the walls of said tubular portion to form an internal thread therein leading inwardly from said beveled mouth so that a screw threaded element can be screwed into said article.

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