Feb. 26, 1935. W. J. BURCHETT 1,992,170

APPARATUS FOR CASTING HELICAL OBJECTS AND THE LIKE

Filed Dec. 30, 1931

Fig. 1.

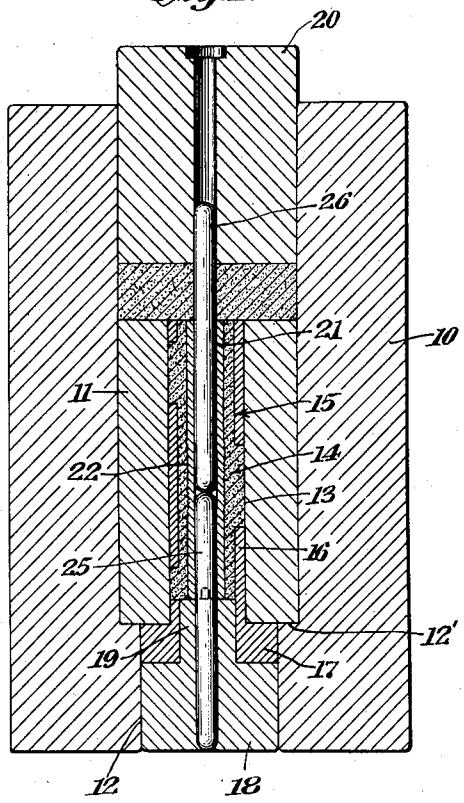


Fig. 2.

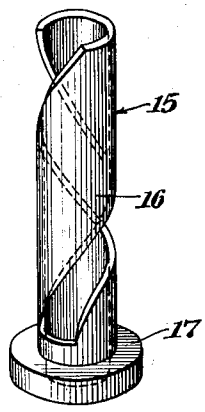


Fig. 4.

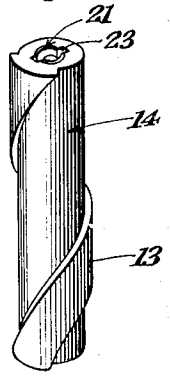


Fig. 5.

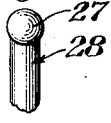
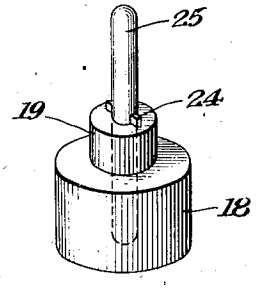


Fig. 3.



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APPARATUS FOR CASTING HELICAL OBJECTS AND THE LIKE

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Application December 30, 1931, Serial No. 583,870

3 Claims. (Cl. 18—34)

This invention relates to methods and apparatus for casting helical objects, such for example as objects formed of phenolic condensation material cast into cylindrical shapes carrying threaded or helical surface formations. This invention is particularly adaptable to the manufacture of sharpening rollers formed of a plastic composition, including abrasive or polishing material. One example of such a sharpening roller is shown in the patent to Louis V. Aronson, No. 1,826,410, issued October 6, 1931.

The objects of the invention include the provision of efficient, economical and accurate methods and apparatus of the character above indicated. The invention is particularly adaptable for use in connection with the manufacture of sharpening rollers of the type above referred to, since in accordance with this invention such rollers may be produced rapidly and with a high degree of uniformity and with the helical sharpening surface entirely free of flaws, fins and the like imperfections.

Various further and more specific objects, features and advantages will clearly appear from the detailed description given below taken in connection with the accompanying drawing which forms a part of this specification and illustrates merely by way of example one embodiment of the apparatus of the invention.

The invention consists in such novel features, arrangements and combinations of parts as may be shown and described in connection with the particular casting and die herein disclosed by way of example only and as illustrative of a preferred embodiment, together with such novel methods and process steps as may also be described herein.

In the drawing, Fig. 1 comprises a vertical sectional view through the assembled parts of a die comprising one embodiment of the invention;

Figs. 2 and 3 are perspective views illustrating parts of said die;

Fig. 4 is a perspective view of a finished sharpening roller as cast in said die; and

Fig. 5 is a perspective view of a tool used for removing the cast article from the die.

The die assembly as shown in Fig. 1 may comprise a cylindrical outer shell member 10 within which a hollow cylindrical member 11 is embraced, the shell member 10 having an internal cavity of a diameter closely fitting the exterior of the member 11, this cavity being restricted as at 12 to form an abutment at 12', against which the lower end of the member 11 rests. In the example shown, the interior bore of the member 11 is of a diameter equal to the maximum outside diameter of the element which is to be cast in the assembly. That is, in the particular example shown, the interior bore of the member 11 is of a diameter equal to the outside diameter of the helical or threaded area 13 of the sharpening roller 14 shown in Fig. 4.

A member 15, which is illustrated in Fig. 2, has an elongated spiral portion 16 of which the outside diameter is such as to closely fit within the member 11, this portion also being of the proper dimensions to fill in the space between the convolutions of the spiral area 13 of the product. The member 15 may be provided at its lower end with a flanged portion as at 17 abutting against the lower end of the element 11.

An end plug member 18 is fitted into the portion of the cavity at 12 within the shell member 10, this plug member also having a reduced portion 19 extending within the flanged portion 17 and into abutment with the lower end of the cast element 14.

A top end plug or plunger member may be provided as indicated at 20 closely fitting within the upper portion of the shell member 10.

As indicated in Figs. 1 and 4, the sharpening roller 14 may be cast integral with an internal hollow metallic tubular insert as at 21, which provides an accurate and rigid bearing means for the roller and serves to strengthen the same. As is indicated at 22, the central exterior areas of the member 21 may be roughened in order to provide secure engagement between this metallic insert and the adjacent plastic molded material. If desired, the end portion of the metallic insert 21, as well as the adjacent areas of the plastic molded material, may be slotted as at 23 whereby the finished element if desired may be securely retained within a grinding machine or other device in the event it is desired to mechanically rotate the sharpening roller during the sharpening operation, or in the event it is desired to refinish or polish the roller after long use. To provide for the slotted areas in the plastic composition, the upper end of the portion 19 of the plug member 18 may be provided with formations as at 24 corresponding to the dimensions of the desired slotted areas.

In order to initially retain the metallic insert 21 in the desired central position in the molding operation, and to exclude the molding material from the interior of this insert, the plug 18 may carry a rod 25 fitting into the lower end of the insert 21 and the top plug 20 may carry a rod 26 fitting into the upper end of the insert.

In using the above described die, the members 11, 15, 18 and 25 may first be put in place within the shell member 10. Thereupon, one of the metallic inserts 21 may be put in place upon the pin or rod 25. The pin or rod 26 is then put in place within the member 21. Thereupon a proper measured quantity of the molding material is placed in the die and the top plug or plunger member 20 is forced into place as by the use of a hydraulic press. Various parts of the die may of course be heated if necessary, in accordance with the requirements of the particular molding composition used.

As soon as the cast element is suitably hardened within the die, the plug member 18 may be removed, together with the pin 25. Thereupon the spherical end 27 of the tool 28 (see Fig. 5) may be placed against the lower end of the cast member 14 or its insert 21, this tool then being used to force or drive the cast element in a direction toward the top of the assembly as shown in Fig. 1. As the cast element becomes hardened, it will shrink slightly in respect to the adjacent wall areas of the die so that the cast surfaces will freely slide over the polished interior surfaces of the die. As the cast element is thus forced outwardly in a direction longitudinally of the die, it will also turn in respect to the die member 15 so that it is freely removable from the die.

Despite the helical shape of the active surfaces of the sharpening roller, with the above described die and method of using the same, it is apparent that the active surfaces of the finished sharpening roller may readily be made to take on the finished polished surface of the interior parts of the die and will be free of any defects and fins which would otherwise be present, as for example if the die parts, as with the usual constructions, were joined along lines such as would interrupt these helical surfaces.

In case the die is used with a material which does not shrink after hardening and if for any reason difficulty is had in removing the cast object, the same may be forcibly turned as it is pushed from the mold by engaging a suitable tool in the slotted portions 23.

From the above described die construction, it will be apparent that the pitch as well as the character and depth of the helical threaded portion of a finished product may readily be varied merely by substituting an element in place of the die element 15 and having the desired shape, depending upon the desired surface contours of the finished product. Also, if a finished roller of a different diameter is desired, it is merely necessary to substitute die elements 11 and 15 of the proper diameters. Several of the die parts may therefore conveniently be used in connection with the manufacture of roller elements of various different dimensions and contours.

While the invention has been described in detail with respect to a particular preferred example which gives satisfactory results, it will be understood by those skilled in the art after understanding the invention, that various changes and modifications may be made without departing from the spirit and scope of the invention, and it is intended therefore in the appended claims to cover all such changes and modifications.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. A die for casting helical objects and the like comprising a body portion having an internal cavity of cylindrical shape, a helical element therein providing a cavity corresponding to the object to be cast, a removable end plug at one end of said element, the said body portion and element at such end being free of obstructions whereby the cast object upon removal of said plug may be removed from said end by longitudinal and rotary movement, and a removable end plug at the other end of said element whereby access may be had to the cast object at said other end to force such object from the die by the said longitudinal and rotary movements.

2. A die for casting a cylinder provided with a helical rib, comprising an outer member having a cylindrical cavity of two different diameters providing an inwardly facing shoulder at one end of the member, a cylindrical die member located within the larger portion of said cylindrical cavity with one end in contact with said shoulder, said second mentioned die member having a cylindrical cavity of less diameter than the smaller portion of the cylindrical cavity of the outer die member providing an outwardly facing shoulder in alignment with said first mentioned shoulder, a third die member of cylindrical form located within said second element and provided with a head at one end resting against said second mentioned shoulder and with a spiral slot extending from a point adjacent said head through the other end of said third die member, said last mentioned member being provided with a cylindrical cavity, a plug fitting in the smaller section of said cylindrical cavity of the outer die member and within the cylindrical opening in the last mentioned die member, and a movable plunger located in the other end of said cavity of said outer die member for forcing and compressing material into said second and third mentioned die members.

3. A die for casting a cylinder provided with a helical rib, comprising an outer member having a cylindrical cavity of two different diameters providing an inwardly facing shoulder at one end of the member, a cylindrical die member located within the larger portion of said cylindrical cavity with one end in contact with said shoulder, said second mentioned die member having a cylindrical cavity of less diameter than the smaller portion of the cylindrical cavity of the outer die member providing an outwardly facing shoulder in alignment with said first mentioned shoulder, a third die member of cylindrical form located within said second member and provided with a head at one end resting against said second mentioned shoulder and with a spiral slot extending from a point adjacent said head through the other end of said third die member, said last mentioned member being provided with a cylindrical cavity, a plug fitting in the smaller section of said cylindrical cavity of the outer die member and within the cylindrical opening in the last mentioned die member, a movable plunger located in the other end of said cavity of said outer die member for forcing and compressing material into said second and third mentioned die members, said plug and plunger being provided with cylindrical openings and pins within said openings for supporting a tubular insert in concentrical relation with respect to said second and third mentioned die members.

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