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APPARATUS FOR PRODUCING HOLLOW ALUMINIUM BOOT TREES BY TIP CASTING

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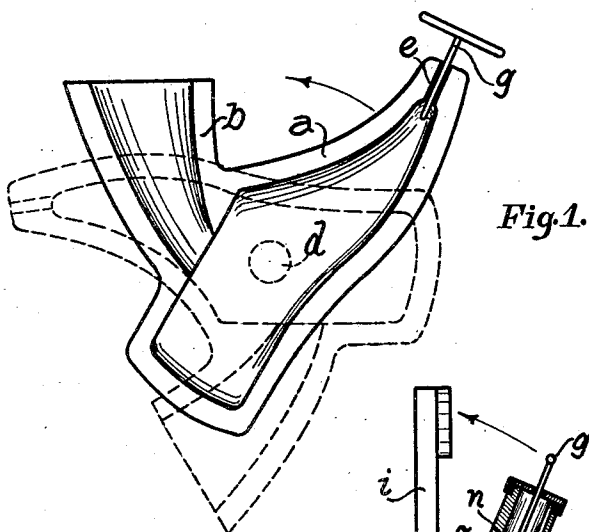


Fig. 1.

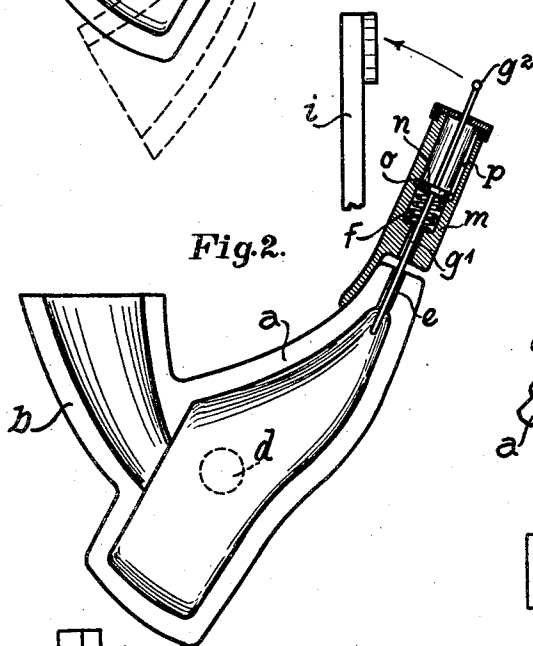


Fig. 2.

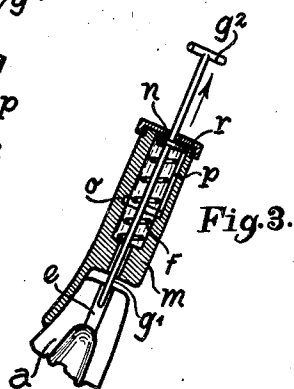


Fig. 3.

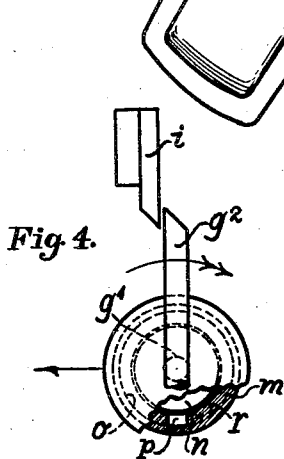


Fig. 4.

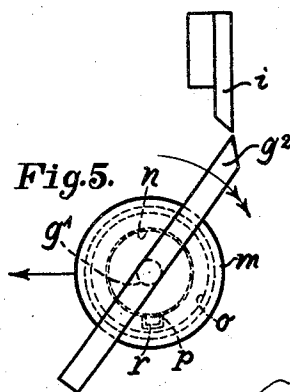


Fig. 5.

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APPARATUS FOR PRODUCING HOLLOW
ALUMINUM BOOT-TREES BY TIP CAST-
ING

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11 Claims. (Cl. 22-75)

The production of hollow boot-trees made especially of aluminum by means of tip casting is carried out in a longitudinal divided mold by employing inflow and outflow funnels which are situated diametrically opposite, one at the heel portion and the other at the toe portion, so that the method may be called a through-pouring method. This method is open to considerable objections. The mold becomes overheated at the inflow point where the whole of the molten metal must flow past at a high temperature. The remote outflow point remains cooler and is moreover flushed by metal which has already cooled. Consequently, at this point, approximately in the toe-portion, the metal deposits in thicker layers than near the inflow point, so that the wall of the work is of irregular thickness. It must also be borne in mind that the molten metal flows away more rapidly from the lightly heated heel portion of the mold during the through-pouring and remains longest in the cooler portion. The finished product possesses likewise certain defects. The funnels, necessary for guiding the molten metal into and out of the mold, leave large holes after they have been severed, the hole on the toe portion having to be closed by welding. Apart from the work and expense which this entails, seeing that the weld must be carefully removed, black spots remain on the tree owing to the decomposition of the particles of welding powder still enclosed in the weld seam, which spots are transferred to and soil the lining of the shoes which is often of light colour.

It has already been proposed to employ longitudinally divided molds with only one funnel serving for the inflow and outflow of the molten metal. However, in this proposal the fact has not been considered that, during the outflow, a vacuum must occur in the mold which results in the danger of the external pressure pressing in the wall of the work which has just been formed and is therefore still delicate. The invention has for its object, to overcome this objection and consists in the introduction of a ventilation, even if only slight, at the highest point of the mold from which the molten metal first flows off. It is true that in this instance it must be reckoned with, that the narrow air admission aperture could become clogged with metal. Consequently a further feature of the invention consists in that an element for keeping free the passage is inserted in the aperture and subjected to a continual displacement during the casting operation. A push pin is the simplest implement for this purpose. If it is desired to be independent of the care and

attention of the caster, the invention may be further developed by bringing an obstacle in the path to be travelled by the mold because as is known, the mold itself must perform an oscillating movement, which obstacle releases a control automatically actuating the pin for keeping open the aperture.

The two embodiments of the invention are illustrated by way of example in the accompanying drawing, in

Fig. 1 shows one half of a mold with a push pin in the toe portion for keeping open the air admission.

Fig. 2 shows one half of a mold with a pin in the toe portion for keeping open the air admission and in longitudinal section a mechanical device for controlling the movement of the pin.

Fig. 3 is a longitudinal section through the control device for the pin in another working position to that illustrated in Fig. 2.

Fig. 4 is a top plan view partly in cross-section on a larger scale, showing the controlling device for the pin in a position shortly before being set in operation.

Fig. 5 is a top plan view of the controlling device of the pin according to Fig. 4, the pin being shown turned at the instant of its release for the upward movement.

In the drawing one half of a mold *a* is shown with a single funnel *b* situated near the heel portion and adapted to be tipped around a pivot pin *d* into the position shown in dotted lines. At the toe point the mold has an aperture *e* about three to four mms. in width, serving for ventilation. In this aperture an easily movable pin *g* is inserted so far that when the metal is poured in the pin projects through the wall of the casting in course of formation and then, after the filling of the mold *a*, a turning and up and down movement is communicated to this pin. When a wall of sufficient thickness has formed in the mold, the pin *g* is pulled out and the mold tipped to pour out the excess of molten metal.

As a rule the small aperture *e* can remain on the finished tree, so that the welding otherwise usual is not necessary, or a small metal plug can be driven therein or the aperture closed by hammering.

For ensuring the automatic moving of the push pin an abutment *i* of a frame part is arranged in the path of the mold as shown in Figs. 2 to 5, in such a manner that the projecting portion of the pin strikes against this abutment and is displaced in the mold. In a cylindrical casing *m* arranged on the toe point the pin *g*¹, *g*² with a collar *n* is

guided under the action of a pressure spring *f*, this collar being held in lowered position in an annular groove *o* in the interior of the casing by a kind of bayonet joint, thereby compressing the spring *f*. The collar *n* has a nose *r* which can engage in a longitudinal groove *p* in the casing.

If during the oscillation of the mold in the direction of the single barbed arrow, the transverse arm *g*² of the pin *g*¹ comes into contact with the abutment *i*, the pin first carries out a partial rotation in the direction of the double barbed arrow (Figs. 4, 5) causing the nose *r*, which was hitherto held in the annular groove *o*, to enter the longitudinal groove *p*, so that the pin *g*¹, *g*² can be shifted and pressed outwards by the spring *f*, thereby freeing the air passage (Fig. 3).

I claim:—

1. Apparatus for producing hollow boot-trees, especially of aluminum, by means of tip casting comprising, in combination, a longitudinally divided mold having a ventilation hole at the extreme toe portion of the mold, means whereby the mold may be tilted to a position such that the extreme toe portion is at the highest point of the mold, said mold having a single funnel serving for filling the mold with molten metal and for pouring off the excess molten metal, a removable insert body in said ventilation hole, means in the path of tilting movement of the mold for rotating the insert body, and means for thereupon moving the insert body longitudinally.

2. Apparatus for producing hollow boot-trees, especially of aluminum, by means of tip casting comprising, in combination, a longitudinally divided mold having a single funnel which serves as inlet and outlet for the metal, a ventilation hole at the extreme toe portion of said mold, an insert body shiftable with play in said ventilation hole and in its inner position protruding within the cavity of the mold so far as to penetrate the wall of the boot-tree to be produced, means whereby the mold may be tilted to a position such that said extreme toe portion is at the highest point of the mold, whereby bubbling of the molten metal in the mold will be eliminated, and means for engaging and imparting a separate movement to said insert body, the funnel being positioned on the mold so that its weight will cause the mold to assume a position such that the ventilation hole is disposed at the highest point of the mold cavity when the mold is tipped and serves as an air outlet during the filling operation.

3. Apparatus for producing hollow boot-trees, especially of aluminum, by means of tip casting comprising, in combination, a longitudinally divided mold having a single funnel which serves as inlet and outlet for the metal, a ventilation hole at the extreme toe portion of said mold, an insert body shiftable with play in said ventilation hole and in its inner position protruding within the cavity of the mold so far as to penetrate the wall of the boot-tree to be produced, means whereby the mold may be tilted to a position such that said extreme toe portion is at the highest point of the mold, whereby bubbling of the molten metal in the mold will be eliminated, means for releasing the insert body when the mold is tilted, means for holding the insert body loosely in said ventilation hole prior to its release, and means for imparting a withdrawal movement to the insert body when the insert body is released.

4. Apparatus for producing hollow boot-trees

especially of aluminum by means of tip casting comprising, in combination, a longitudinally divided mold having a ventilation hole at the extreme toe portion of the mold, the mold having a single funnel serving for filling the mold with molten metal and for pouring off the excess molten metal, the mold being so weighted that the toe of the mold is at substantially its highest point when the mold is tipped, a removable insert body in said ventilation hole extending into the cavity of the mold a distance equal to or slightly greater than, but not substantially greater or less than, the thickness of the wall of the solidified boot-tree, whereby, upon removal of the body from the ventilation hole when the mold is tipped to cause the excess molten metal to become poured out after the molten metal adjacent to the walls of the mold have become solidified to a substantial thickness, air will enter freely through the ventilation hole into the interior of the solidified boot-tree through the ventilation hole and through the wall of the boot-tree at its highest point.

5. Apparatus of the character described comprising a mold having a ventilation hole, an insert body in the hole, means whereby the mold may be tilted to a position such that the ventilation hole is at the highest point of the mold, whereby bubbling of the molten metal in the mold will be eliminated, means for releasing the insert body when the mold is tilted, means for holding the insert body loosely in said ventilation hole prior to its release, and means for imparting a withdrawal movement to the insert body when the insert body is released.

6. Apparatus of the character described comprising a mold having a ventilation hole, an insert body in the hole, and provided with an external projection, an abutment, and means in the path of tilting movement of the mold for causing the projection to engage the abutment to actuate the body.

7. Apparatus of the character described comprising a mold having a ventilation hole, a cylindrical casing, a pin slidably mounted in the casing and the hole, means yieldingly tending to actuate the pin slidably in the casing and the hole, means for maintaining the pin against slidable movement, and means in the path of tilting movement of the mold and means for rendering the maintaining means ineffective and to permit the yielding tending means to effect the slidable movement of the pin.

8. Apparatus for producing hollow boot-trees especially of aluminum by means of tip casting comprising, in combination, a longitudinally divided mold having a ventilation hole, two pivot pins at the outer side of the mold parts, arranged opposite one another, the mold being adapted to oscillate round the common axis of said pivot pins, said mold having a funnel serving for filling the mold with molten metal and for pouring off the excess molten metal, said pivot pins, said ventilation hole and said funnel being arranged in such a position to one another that the ventilation hole is at substantially the highest point of the mold cavity during the filling operation as well as during the tilting movement for pouring off the excess molten metal, and a removable insert body shiftable with play in said ventilation hole and extending into the cavity of the mold a distance equal to or slightly greater than, but not substantially greater or less than the thickness of the wall of the solidified boot-tree, whereby, upon removal of the body from the ventilation hole

when the mold is tipped to cause the excess molten metal to become poured out after the molten metal adjacent to the walls of the mold has become solidified to a substantial thickness, 5 air will enter freely through the ventilation hole and through the hole in the wall of the boot-tree into the interior of the latter at its highest point.

9. Apparatus as claimed in claim 8 in which the insert body comprises a pin, and means for 10 shifting said pin in a longitudinal direction.

10. Apparatus of the character described comprising an oscillatable mold having a ventilation hole, an insert body in said hole and provided with an external projection, an abutment 15 adapted to engage said projection when the mold is tilted, thereby causing said insert body to rotate axially, and means for shifting said insert body in a longitudinal direction when the insert

body has become rotated by means of said abutment.

11. Apparatus of the character described comprising an oscillatable mold having a ventilation hole, a cylindrical casing, a pin slidably mounted 5 in said casing and the hole, means yieldingly tending to actuate the pin slidably in the casing and in the hole, means for maintaining the pin against slidable movement, said pin having an external projection, and an abutment adapted to 10 engage said projection when the mold is tilted, thereby causing said pin to rotate axially, this axial rotation of the pin rendering the maintaining means ineffective and permitting the yielding 15 tending means to effect the slidable movement of the pin.

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