Nov. 25, 1924. 1,516,667

G. W. BUNGAY

DIE FOR PRESSURE CASTING

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Fig. 1.

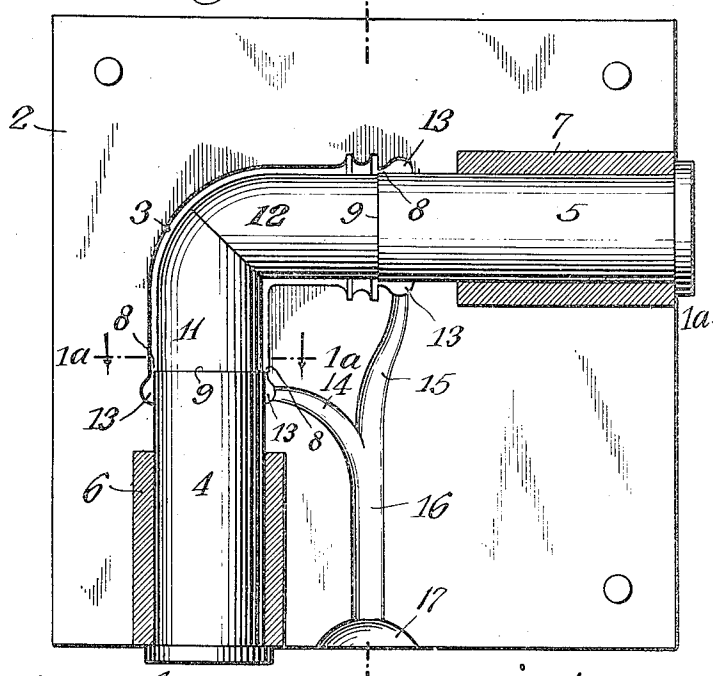


Fig. 1b.

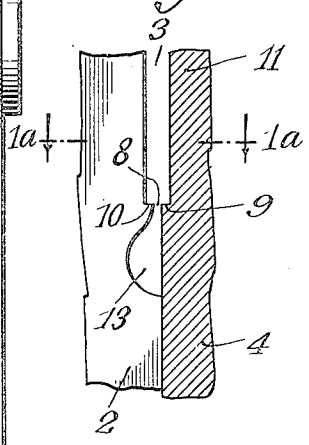


Fig. 2.

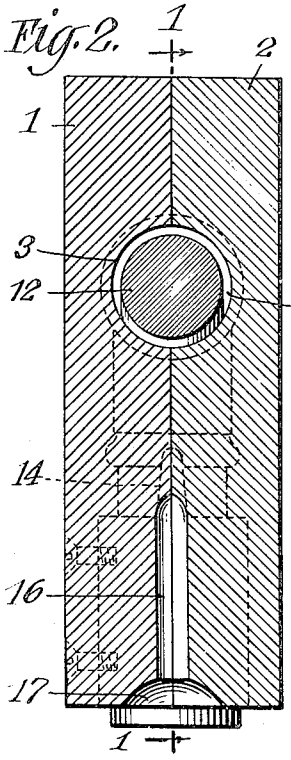


Fig. 1a.

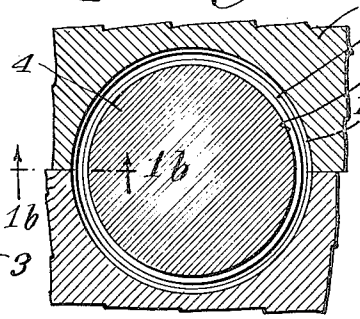


Fig. 3.

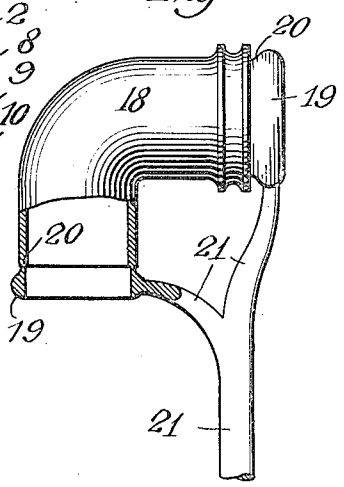
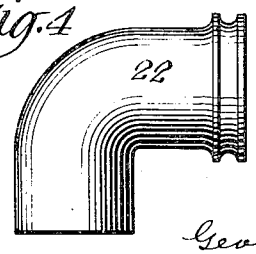


Fig. 4



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Fig. 5.

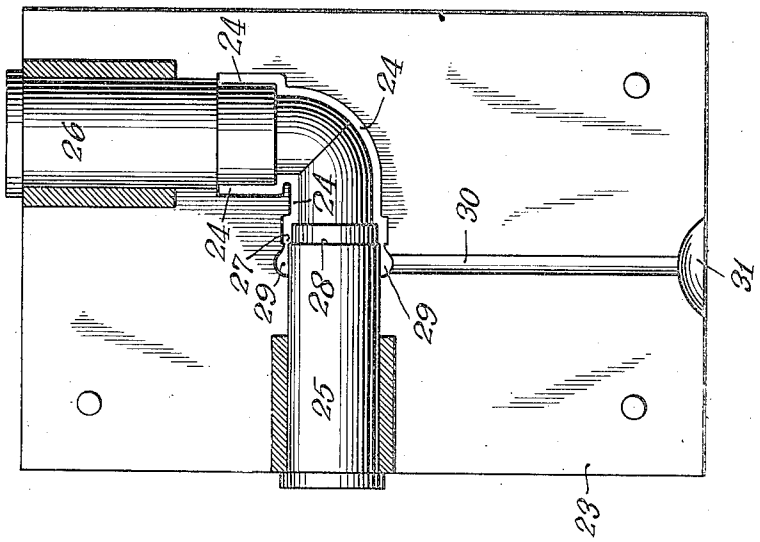
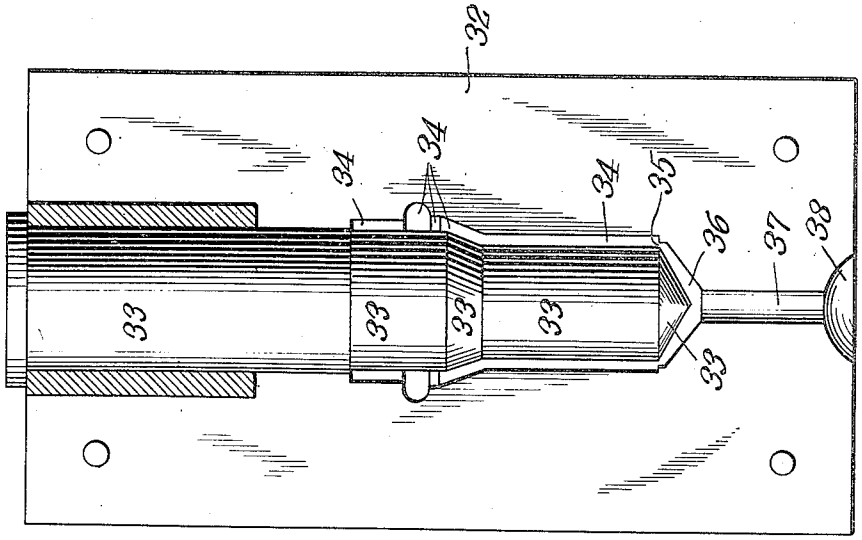


Fig. 6.



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Patented Nov. 25, 1924. 1,516,667

UNITED STATES PATENT OFFICE.

GEORGE WALDEMAR BUNGAY, OF BROOKLYN, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO ALUMINUM DIE-CASTING CORPORATION, OF GARWOOD, NEW JERSEY, A CORPORATION OF NEW JERSEY.

DIE FOR PRESSURE CASTING.

Original application filed April 20, 1917, Serial No. 163,405. Divided and this application filed May 23, 1917. Serial No. 170,388.

To all whom it may concern:

Be it known that I, GEORGE WALDEMAR BUNGAY, a citizen of the United States, residing at borough of Brooklyn, city of New York, in the county of Kings and State of New York, have invented certain new and useful Improvements in Dies for Pressure Casting, of which the following is a specification, reference being had therein to the accompanying drawings, forming part thereof.

My invention relates to pressure casting or die casting and relates more particularly to means for the forming of tubular bodies, such, for example, as the usual tone arms of phonographs, and is a division of the subject matter originally included in my application for patent Serial No. 163,405, filed April 20, 1917. The usual means heretofore of casting these tone arms has been to have the gate through which the molten metal is supplied to the mold or die at a middle point of the tone arm and when the tone arm is of the usual curved or elbow shape, this gate is commonly placed in the die or mold so as to be located at the outer side of the bend or elbow, and there is left on the casting at this point when the sprue is removed an unsightly spot which, after the casting is finished, is porous and which also may contain blow holes in the adjacent body of the tone arm, so that in plating the casting the porous metal at this point absorbs most of the plating metal, leaving the spot rough and in an unsightly condition. I have discovered that by providing means for gating the casting at one or both ends and by providing feeding chambers or distributing chambers in the die or mold from which the molten metal flows through narrow and preferably annular gates into the end or ends of the interior mold space for forming the tubular body or tone arm, the above noted difficulty is overcome, by reason of the fact that the casting for the tone arm when removed from the mold or die will have formed thereon, at one or both ends thereof a projecting boss which, when a core is employed at that end, will be of annular form, and this boss will be united to the adjacent end of the tone arm by a thin neck corresponding to the narrow annular gate and this boss, having the sprue thereon, can be sawed off or severed from the body of the tone arm, and this detached or severed boss will be found to contain any porous metal and the body of the casting or tone arm can be finished and plated without having therein blow holes and such finished casting will not have thereon any rough or unsightly spots.

I shall now describe the die or mold of my invention with reference to the accompanying drawings, illustrating several embodiments thereof, and shall thereafter point out my invention in claims.

Figure 1 is a vertical section on a plane indicated by the line 1—1 of Figure 2 as viewed from the left, and is an inner face view of one of the die members together with the cores appearing in elevation.

Figure 1^a is an enlarged partial transverse horizontal section on a plane indicated by the line 1^a—1^a of Figures 1 and 1^b as viewed from above and illustrates the narrow annular gate or inlet for the molten metal opening from the feeding chamber into the cylindrical end of the mold cavity.

Figure 1^b is a further enlarged partial section on the plane of Figure 1 and on a plane indicated by the line 1^b—1^b of Figure 1^a as viewed from below.

Figure 2 is a vertical transverse section on slightly offset planes indicated by the line 2—2 of Figure 1 as viewed from the right.

Figure 3 is a side elevation, partly in central vertical section, of the unfinished casting for a phonograph tone arm after this casting has been removed from the mold or die illustrated in Figures 1 and 2.

Figure 4 is a side elevation of the casting appearing in Figure 3 after it has been finished.

Figure 5 is a view similar to Figure 1 illustrating a modification in which the casting is gated at one end only.

Figure 6 is a similar view illustrating a further modification in which the casting is gated centrally at one end thereof.

The mold or die illustrated in Figures 1, 1^a, 1^b and 2 of the accompanying drawings as an embodiment of my invention comprises complementary die members 1 and 2 having complementary recesses in

the contiguous faces thereof for forming a mold cavity 3 of bent or elbow shape and into which cores 4 and 5 extend from opposite ends, between the members 1 and 2, in a direction parallel with the meeting surfaces of these members and occupying equal spaces in each of the recesses forming the mold cavity 3. These cores are held in place by means of usual guide sleeves 6 and 7 carried by one of the die members in the usual way. At the opposite ends of the mold cavity 3, in the construction shown in the drawings, similar narrow annular gates 8 are provided between slight external shoulders 9 on the core members 4 and 5 and similar internal shoulders 10 (Figures 1^a and 1^b) formed by the die members 1 and 2. The cores 4 and 5 have reduced inner portions 11 and 12 inward from the shoulders 9, and the rounded beveled ends of these inner portions meet or come together at the turn or bend in the body cavity 3, as appears in Figure 1. The narrow annular gates 8 form inlets into the opposite ends of the main chamber or cavity 3 from enlarged end parts of the mold cavity which form similar annular feeding chambers or distributing chambers 13, shown as formed by rounded annular grooves in the die members 1 and 2.

The two feeding chambers or distributing chambers 13 are adapted to have molten metal forced into them substantially simultaneously through supply ducts or runners 14 and 15 which join to form a main supply duct or trunk 16. These supply ducts 14, 15 and 16 are formed by grooves in the face of one or both of the die members 1 and 2, and in the construction illustrated in the drawings such duct-forming grooves are shown as provided in both of the die members 1 and 2, as will be clear from Figure 2. The main supply duct or trunk 16 leads from or communicates with a recess 17 shown as formed in the edges of the die members 1 and 2, this recess 17 being for the reception of the nozzle of a die-casting machine for forcing the molten metal under pressure through the ducts or runners 16, 14 and 15 into the distributing chambers or feeding chambers 13, from which it is forced through the narrow annular gates 8 concurrently into the opposite ends of the main chamber 3 of the die or mold. The feeding chambers 13 have sufficient capacity to distribute the molten metal completely around their circular course, and, in the construction shown in the drawings, this metal is forced from the feeding chambers 13 all of the way around or throughout the extent of the annular gates 8 into the cylindrical ends of the main casting cavity or space 3 so that this space will be quickly and evenly filled with the inflowing molten metal, the flow of which is distributed around the complete circle of the cylindrical ends thereof.

The rough casting 18 (Figure 3) as it comes from the mold or die will have formed thereon thickened rounded enlarged parts forming end bosses 19, corresponding to the location of the feeding chambers or distributing chambers 13 in the die or mold and which will be connected to the body of the casting 18 by means of thin annular necks 20, corresponding to the narrow annular gates 8. From the end bosses 19 a branching sprue 21 is shown as extending and corresponding to the inlet ducts 14, 15 and 16 in the die or mold. It will be noted as of importance that this sprue 21 does not connect directly to the body of the casting 18 but only to the surplus metal forming the end bosses 19 thereon, therefore any imperfect metal adjacent to the sprue 21 will be found in the bosses 19 and not in the main casting 18. In finishing the casting 18 the bosses 19 are sawed off at the necks 20, thereby to produce the finished casting 22 which is illustrated in Figure 4. When the end bosses 19 are sawed off, any porous metal contained therein will of course be removed therewith. It is much easier to finish the plane cylindrical ends of the casting 22 upon the narrow annular surfaces where the necks 20 were sawed through than it would be, or has heretofore been in the prior art, to finish a casting from which a sprue has been detached from its curved surface in a conspicuous place, and which commonly has been at a middle point thereof upon its outward rounded surface, and where, as hereinbefore mentioned, a rough place is thereby left into which most of the plating metal is absorbed, so that a good finish cannot be obtained at this point, which is left in an unsightly condition, and this serious trouble has been entirely done away with by my present invention.

The casting 22 shown in Figure 4 is a phonograph tone arm of the bent or elbow shape there appearing, and at its ends is of cylindrical cross-section, as is indicated in the drawings, particularly in Figures 1^a and 2 thereof. Such tone arms of any desired length according to the particular phonograph upon which they are designed to be used, and in some instances of considerably greater length than the illustrated tone arm 22, may be successfully cast by means of my invention. The annular gates 8 and feeding chambers or distributing chambers 13 provide for the successful casting of these long tone arms, by supplying the molten metal under pressure at both ends thereof around which it is distributed and from which it flows and is united at the middle

of the central chamber 3 of the die or mold, the distribution of the metal being better than has been heretofore secured by forcing the metal in through a gate at a middle point, and having also the other advantages hereinbefore pointed out.

In cases where it is desired to cast a tone arm which is comparatively small and particularly if it is comparatively short in length, gating may take place at one end only thereof, and such a carrying out of my invention is illustrated in Figure 5 of the drawings. In the mold or die construction there illustrated as an embodiment of my invention, a die member 23 is shown as provided, and which is co-operative with a substantially complementary die member not shown and which forms therewith a main casting-receiving die cavity 24 into which projects from opposite ends thereof meeting cores 25 and 26 shown as arranged at right angles to each other, similar in this respect to the cores 4 and 5 illustrated in Figure 1 and also for similarly forming a casting of an elbow shape corresponding to the mold cavity 24 illustrated in Figure 5. As is shown in the drawings, the upper or vertically arranged core 26 closes the mold cavity 24 at the upper end thereof, no gate being provided at this point. At the other or lower and left end of the mold cavity 24, however, a narrow annular gate 27 is provided at the end of the cavity 24 surrounding the core 25, this gate 27 being shown as formed between an external shoulder 28 on the core 25 and a corresponding oppositely arranged internal shoulder shown as formed in the die member 23. An annular feeding chamber or distributing chamber 29, of sufficient capacity is shown as provided. A runner or inlet duct 30 communicates with a recess 31 in the edge of the mold and opens into the feeding chamber 29, and this runner or duct 30 may be formed only in the die member 23, as appears in Figure 5, or it may be formed by co-operating grooves in both of the die members. The operation and results of the construction illustrated in Figure 5 are substantially the same as have been hereinbefore explained in reference to Figures 1 to 4 inclusive.

In cases where the tone arm or other similar tubular casting is straight, so as not to require the inserting of a core from each end, the gating of the casting may take place centrally of the end opposite to which the core is inserted, and the carrying out of my invention in this way is illustrated in Figure 6, with a die member 32 which is co-operative with a complimentary die member, not shown. There is provided a single core 33 together with which the die members form the main casting-receiving mold cavity 34. A narrow annular gate 35 opens into the lower end of the mold cavity 34 and is formed in the mold members around the lower end of the core 33 and provides an inlet or gate into the mold cavity 34 from a centrally arranged upwardly and outwardly extending feeding chamber or distributing chamber 36, into the center of which at the lowest point thereof there opens a supply duct or runner 37 which communicates with or leads from a nozzle-receiving recess 38 in the end of the die.

By referring to Figure 6, it will be evident that the casting produced in the die or mold there illustrated will, as it comes from the mold in rough form, have at one end thereof a cap-shaped boss corresponding to the feeding chamber 36 and this boss will have a sprue projecting therefrom corresponding to the duct 37, and this boss will be united to the end of the casting by a thin annular neck corresponding to the gate or inlet 35, and in finishing the casting this end boss is severed or sawed off from the casting through such thin neck at the end thereof, as will be readily understood, and whereby the outer curved surfaces of the finished casting will be in perfect condition without the heretofore usual rough place or imperfection due to the detachment therefrom of a sprue.

It is obvious that various modifications may be made in the constructions shown in the drawings and above particularly described within the principle and scope of my invention.

I claim:

1. A die for pressure-casting having a tubular mold cavity and a flow conduit leading into the annular end thereof through a gate-stricture formed to mold a reduced sprue section on the annular end of a tubular casting.

2. A die for pressure-casting having a tubular mold cavity and a flow conduit leading into the annular end thereof through an annular gate-stricture formed to mold a reduced annular sprue section projecting from the annular end of a tubular casting.

3. A die for pressure-casting having a tubular mold cavity and a flow conduit leading into the annular end thereof through an annular gate-stricture formed to mold a reduced annular sprue projecting from the annular end of a tubular casting with a demarcating shoulder at the juncture of the casting and sprue.

4. A die for pressure-casting comprising a core and separable complementary parts recessed to form a tubular mold cavity around said core and a gate-stricture around said core leading into the end of said tubular mold cavity and a flow conduit leading into said gate-stricture.

5. A die for pressure castings comprising complementary die sections having formed

therebetween a mold cavity provided with a flow conduit communicating therewith, a core disposed within said cavity, said core being spaced from the wall of said mold cavity and forming at its jointure with said conduit a gate stricture of less cross sectional area than said cavity and conduit respectively.

6. A die for pressure castings comprising complementary die sections having formed therebetween a mold cavity provided with a flow conduit communicating therewith, a core disposed within said mold cavity, said core being spaced from the wall of said conduit but forming therewith a gate stricture intermediate said cavity and conduit of less cross sectional area than said cavity and flow conduit respectively.

7. A die for pressure castings comprising complementary die sections having formed therebetween a mold cavity provided with a flow conduit communicating therewith and of a less cross sectional area than the cavity, a core disposed within said mold cavity, said core being so positioned with respect to said flow conduit and mold cavity as to form therebetween a gate stricture adapted to accommodate an integral section formed at the end of the casting, the surface of said section at its jointure with the casting being receded with respect to the surface of the casting.

8. A die for pressure castings comprising complementary die sections recessed to form a mold cavity having a flow conduit communicating concentrically therewith and of a less cross sectional area than the cavity, a core disposed within said cavity, said core being so positioned with respect to said flow conduit and cavity as to form therebetween an annular gate stricture adapted to accommodate an integral section formed at the end of the casting, the peripheral surface of said section at its jointure with the casting being receded with respect to the peripheral surface of the casting and concentric therewith.

9. A die for pressure castings having a tubular mold cavity of a given diameter formed therein and a flow conduit of less diameter leading into the cavity, a core disposed within said cavity, said core being so spaced from the wall of said conduit and cavity as to provide therebetween an annular gate stricture of less cross sectional area than said cavity and conduit respectively, said stricture being adapted to accommodate an integral section formed at the end of the casting with a demarking shoulder at its jointure therewith the depth of which corresponds to the difference between the diameter of the conduit and cavity respectively.

In testimony whereof I have affixed my signature.

GEORGE WALDEMAR BUNGAY.