July 23, 1929. C. ADEY ET AL 1,722,124

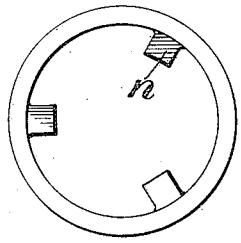
METHOD OF CASTING COPPER ALLOYS

Filed May 19, 1924

Fig. 1.



Fig. 2.



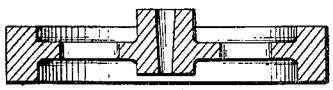


Fig. 3.

Fig. 4.

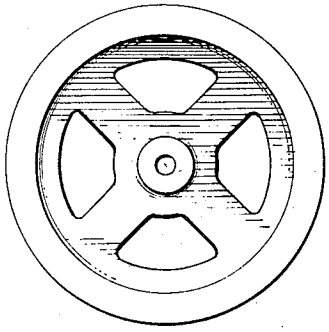


Fig. 5.

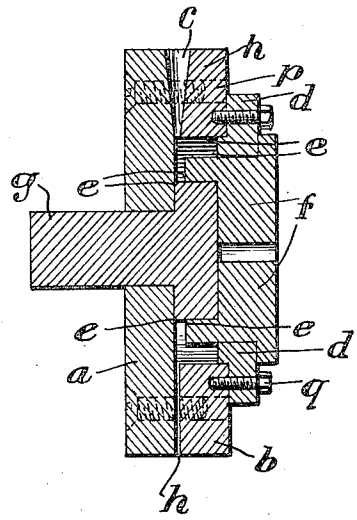
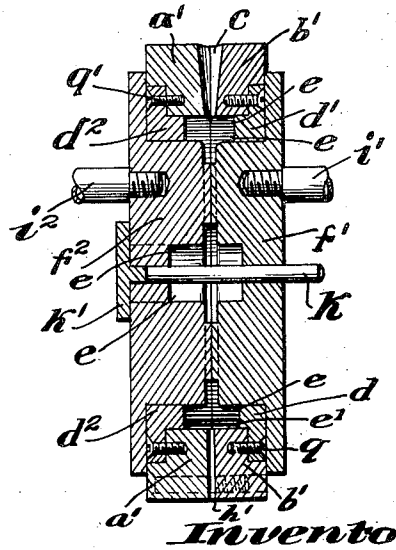


Fig. 6.



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UNITED STATES PATENT OFFICE.

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METHOD OF CASTING COPPER ALLOYS.

Application filed May 19, 1924, Serial No. 714,363, and in Germany May 22, 1923.

Our invention relates to improvements in the method of and apparatus for casting copper alloys of a comparatively melting point. It has heretofore been proposed to cast bronze of a specific composition in metallic moulds; but so far it was not possible to manufacture on a large scale fashioned bodies from copper alloys of high melting point in metallic moulds, and such bodies were always cast in sand moulds.

The object of the improvements is to provide a method of and an apparatus for casting formed bodies from copper alloys of high melting point, such as brass, red brass, phosphorus bronze, aluminum bronze, German silver, and the like in iron or steel moulds. With this object in view our invention consists in casting the said alloys in moulds provided at the parts where air might be included with the outlets or vents for the air, and casting the metal into the moulds while holding the same in inclined position so that the molten metal does not fall and heavily blow on any of the inner walls of the mould.

In many cases, for example in moulds for casting annular bodies, it is sufficient to provide an air vent at the bottom of the mould and to cast the molten metal through a runner provided at the top of the mould. In other cases, for example where the body to be cast shows very sharp edges, the mould is made in sections disposed so that seams are provided at the corners forming the said edges and the walls of the sections fit on each other so that at the most a thin fin is produced on the casting, and that the air confined within the mould has a free escape through the seam.

When casting formed bodies from copper alloys having portions surrounding parts of the mould we mount the said portions so as to be removable from the body of the mould without otherwise dismounting the same, and we remove the said portions by pulling, blowing, thrusting or pressing the same, immediately after solidification of the casting and before cooling, so that contraction of the casting being cooled is not interfered with by the said surrounded portions.

In the practice of the invention we have found that castings made from copper alloys of high melting point show sharp outlines and other details so that only slight finishing work if any need be applied to the castings, after removing the runner and the fins. As compared to castings made in sand moulds the castings made in our improved metallic moulds show smooth surfaces and a dense and homogeneous structure.

By removing the air in the manner described the castings are free of defects caused by air confined in the moulds, such as unsharp reproduction of the edges and corners, cavities and blisters on the surface or internally of the casting. In many cases it is sufficient to provide for the escape of air only at the bottom of the mould and away from the runner provided at the top thereof, the air being forced to the bottom vent by the metal being cast into the mould for being discharged therethrough. Other parts of the mould endangered by confined air are for example the sharp corners of portions reproducing teeth and other projecting parts, sharp edges and the like. In moulds such as are now in use air is sometimes confined at such parts which is enclosed by the metal being cast so as to cause the defects referred to above. By composing the mould of sections placed on or against each other at the said parts, fine seams or joints are provided which permit the escape of the air so that also at such parts sharp outlines are produced.

In order that our invention be more clearly understood several moulds suitable in our improved method have been shown by way of example in the accompanying drawings in which

Fig. 1 is a sectional elevation of a collector ring of an electro-motor.

Fig. 2 is a top plan view of the ring shown in Fig. 1.

Fig. 3 is a sectional elevation of a wheel or a blank of a gear wheel.

Fig. 4 is a top plan view of wheel or blank shown in Fig. 3.

Fig. 5 is a sectional elevation of the mould used for manufacturing the ring shown in Figs. 1 and 2, and

Fig. 6 is a sectional elevation showing the mould for casting the wheel shown in Figs. 3 and 4.

In Fig. 5 we have shown a mould which is suitable for casting a collector ring m of an electric motor which ring is provided with internally projecting lugs n. As shown the mould is made in two main sections a and b adapted to be connected by bolts o engaging in sockets or bores p, as is known in the art. The pouring hole or runner c is provided at the top of the mould. The section b is annular in form and it has sectional members d, d se-

cured thereto by means of screws q and providing fine seams e permitting the escape of the air confined in the mould. The sectional members d include a block f having a socket r at its inner side engaged by a plunger g. The letter h indicates a vent for the discharge of the air from the bottom of the mould.

In the manufacture of the casting m, n the mould is inclined laterally and to the left in Fig. 5 so as to have a sloping side wall, so that the metal cast into the mould flows downwardly over the said sloping side wall and gradually fills the bottom part of the mould. The air is removed from the bottom part through the vent h. As the metal rises within the mould it tends to close the cavities provided for casting the lugs n, but the air escapes through the seams e. After solidification of the casting and before cooling thereof the plunger g is pushed forwardly, so that the block f is removed from the mould and contraction of the casting is not interfered with by any part of the mould. Thereby injury to the casting such as cracks, breaking or clamping on the said part of the mould is prevented.

The mould shown in Fig. 6 is designed for casting the blank shown in Figs. 3 and 4. The mould consists of two annular main sections a^1 and b^1 and sections d^1 and d^2 secured thereto by screws q^1, the joint between the said sections permitting the air to be expelled from the mould so that the casting shows sharp edges.

Within the portions d^1, d^2 disk shaped blocks f^1, f^2 are fitted the internal configuration of which corresponds to that of the wheel shown in Figs. 3 and 4. The blocks f^1 and f^2 are mounted so that they can be readily removed from the body of the mould without dismounting the same. Any preferred means may be provided for holding the blocks f^1 and f^2 in position within the mould and removing the same immediately after solidification and before cooling of the casting. Such means have been represented in a diagrammatical way by rods i^1, i^2 secured to the blocks and connected with a suitable gearing adapted to be operated by the foot of an attendant. The blocks f^1 and f^2 are formed with axial bores receiving a rod k forming the bore of the hub of the casting. The said rod is formed with a flange k^1 by means of which it is retracted together with the block f^2.

The method of casting is the same as has been described with reference to Fig. 5, the mould being inclined and the air escaping through a vent h^1 and the joints of the mould sections.

What we claim is:—

The herein described method of casting in practically closed metallic moulds copper alloys of high melting points, to produce formed bodies, which comprises flowing the molten alloy smoothly and gradually into the mould and causing air to escape thereby through fine outlets made in the wall of the mould from the portions thereof likely to be shut off by the molten metal, and removing surrounded portions of the mould immediately upon solidification of the cast alloy so as not to hinder free contraction of the casting upon subsequent cooling.

In testimony whereof we have affixed our signatures.

CARL ADEY.
CARL PIEL.