

Jan. 8, 1924.

1,480,191

T. E. P. WILSON

MOLD AND METHOD FOR MAKING CASTINGS

Filed July 12, 1920

Fig. 2.

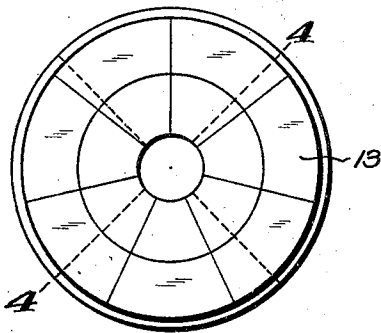


Fig. 3.

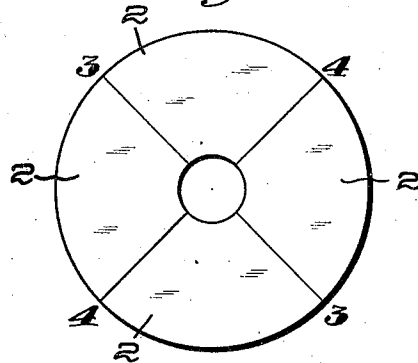


Fig. 1.

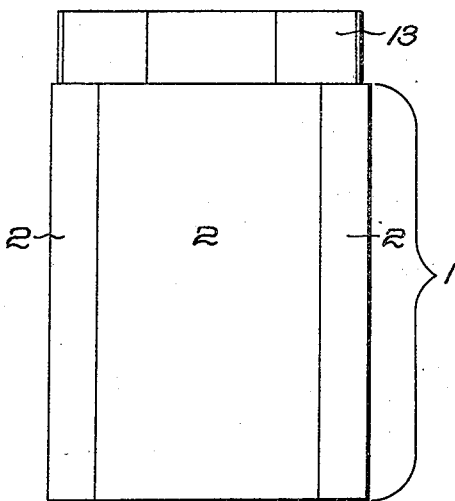
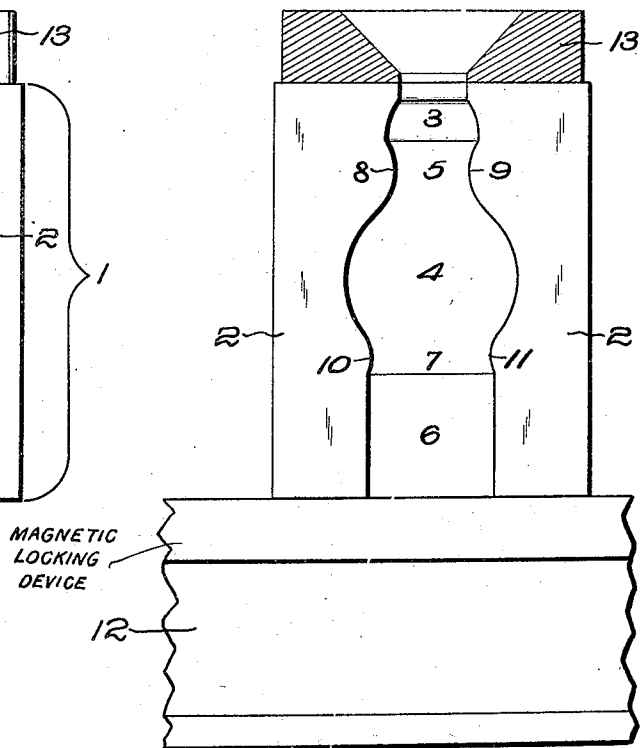


Fig. 4.



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UNITED STATES PATENT OFFICE.

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MOLD AND METHOD FOR MAKING CASTINGS.

Application filed July 12, 1920. Serial No. 395,631.

To all whom it may concern:

Be it known that THOMAS E. P. WILSON, a citizen of the United States, and resident of Lynn, county of Essex, and Commonwealth of Massachusetts, has invented an Improvement in Molds and Methods for Making Castings, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to molds and methods for casting metals and other substances and its object is to provide an improved mold and method having, among others, the advantages hereinafter pointed out.

It is well known to those familiar with the art that great difficulty is experienced in making hard castings, such as steel, of irregular shape. If a steel or other non-yielding chill mold is used, the casting, while shrinking as it cools, is likely to crack wherever the outline of the mold interferes with the free shrinking of the casting. This usually results in an injury to the casting, and sometimes to a degree which is fatal.

The foregoing difficulty has resulted in the practice of using at times molds made of sand or other fine comminuted material which may be packed sufficiently firm to fashion the casting, and yet yield slightly where necessary when the casting begins to cool and shrink, or in other words accommodate itself to any movement of the casting and thus prevent its cracking. This type of mold avoids the first difficulty, but a sand mold does not give a chill to the casting which is required for cutting tools and other purposes, and the mold is of course destroyed each time by use. This results in great expense both of labor and time. My invention overcomes the difficulties above mentioned and makes possible the casting of steel and other metals in a chill mold.

In the drawing of one embodiment of my invention selected for illustration and description,

Fig. 1 is a side elevation, showing also the gate on top of the mold;

Fig. 2, a plan thereof;

Fig. 3, a plan of the mold proper with the gate removed; and

Fig. 4, a vertical section on the line 4—4 Fig. 2, showing the interior of the mold and outline of the casting.

In this instance the mold is for casting a hammer head, and referring to Figs. 1, 3, the mold 1 is shown divided vertically along the lines 3—3 and 4—4 resulting in the formation of substantially triangular or wedge shaped mold parts 2.

The portion of the mold chamber corresponding to the small or riveting head is marked 3, the body 4, neck between the head and body 5, large or hammer head 6, and neck between the body and large head 7.

It will be clear that when the casting in such a mold is chilled or begins to cool, the inwardly or convex curved mold faces 8, 9, 10, 11, will act to prevent free, natural longitudinal shrinking of the casting at those points, and the casting accordingly will be either distorted in outline or cracked at or near these neck or narrowed sections.

If now the mold parts carrying these convex surfaces be free to move slightly at the instant the casting is chilled, the casting can move naturally, as may be necessary, and retain its proper outline and perfectness.

To that end I have conceived the novel plan of first properly dividing the mold into parts and then holding or locking the several mold parts together by any suitable means. For quick results and convenience, I prefer to use electro-magnetism, the current being turned on before the metal is poured, thus firmly locking the parts, and then turned off and the mold demagnetized at the instant of chilling the casting, leaving each mold part free to move under pressure from the casting. The mold may be made of iron or any suitable material that will stand the heat of the casting and is susceptible of being magnetized.

Accordingly when the casting shrinks if the heads 3 and 6 are drawn slightly toward the body 4, the pressure on the convex neck surfaces 8, 9, 10, 11, will force the wedge shaped mold parts slightly apart radially and the casting will cool without being distorted or injured.

As stated, any suitable means may be used for the purpose of controlling the movement of the mold parts, but in the present instance I have shown the mold as positioned upon a conventional magnetic surface chuck 12. It will be obvious that any other device or construction may be used as well as a chuck,

so long as it is capable of being magnetized and is of sufficient area and outline to support the particular mold.

The mold having been so constructed and divided as to make the parts movable, it is assembled upon the magnetizing base, the gate 13 is positioned on the mold and the mold is then magnetized sufficiently to hold the parts and gate all firmly together. For this purpose it is of course necessary that the faces of the several mold parts be carefully machined and polished to fit closely each other. The hot metal is poured into the mold through the gate until the mold is filled, and then, at the proper instant, the operator demagnetizes the mold by turning off the current. As the casting cools and contracts, the several parts of the mold will yield wherever and to the extent necessary to permit the casting to cool as a whole without cracking or straining any portion of the same.

If desirable for any reason, either for convenience or economy of time or material, the mold may be fashioned of any granular or finely comminuted material susceptible of being magnetized, such as iron or steel filings or crushed iron ore with a binder if necessary of suitable material, as clay or molasses. This material may be firmly fashioned in a flask or other suitable receptacle and then the whole mass, magnetized as before, thus holding the mold together until after the casting has been poured, when it will be demagnetized. In such a case the particles of material constituting the mold will yield under the pressure of the contracting casting and the desired result obtained, the particles of material corresponding to the several mold parts in the present instance.

If desirable the inner face of the mold may be copper surfaced or otherwise prepared with any material or substance which will neutralize any tendency of the material of the casting to adhere to the face of the mold and destroy the same.

Of course the particular form of mold illustrated is a very simple one and most convenient for the present purpose, but it will be clear that, by my invention, castings of very irregular outline can be successfully made that could not otherwise be done.

My invention is not restricted in all details to the present illustrative embodiment thereof, but is rather defined by the appended claims.

Claims—

1. A mold comprising a plurality of parts so fashioned that when assembled the parts will be unrestrained to move in various directions under the influence of pressure exerted from within the mold, and means for locking the parts together.

2. A mold comprising a plurality of parts

so fashioned that when assembled the parts will be free to move under the influence of pressure exerted from within the mold, and non-mechanical means for locking the parts together.

3. A mold comprising a plurality of parts so fashioned that when assembled the parts will be free to move under the influence of pressure exerted from within the mold, and electro-magnetic means for locking the parts together.

4. A mold comprising a plurality of parts so fashioned that when assembled the parts will be free to move under the influence of pressure exerted from within the mold, and electrically controlled means for locking the parts together.

5. A mold comprising a plurality of movable parts having smooth adjacent faces and non-mechanical means for locking the parts together.

6. The method of making castings which consists in assembling the mold parts, magnetizing the parts to hold them in position, pouring the casting, and finally demagnetizing the mold parts to permit free shrinkage of the casting.

7. The method of making castings which consists in assembling the mold parts, passing an electro-magnetic current through the parts to hold them in position, pouring the casting, and then discontinuing the electro-magnetic current to permit the mold parts to yield under pressure from the casting.

8. The method of making castings which consists in first forming a mold of a plurality of parts, the parts so fashioned that they will be free to move relative to the casting under pressure therefrom, next magnetizing the mold parts to hold them together, pouring the casting, and lastly demagnetizing the mold parts to permit them to accommodate themselves to any movement of the casting.

9. A mold comprising small particles of mold material, a binder therefor, and electro-magnetic means for holding the bound particles together.

10. A multi-part mold having a plurality of segmental mold parts with convex surface areas 8, 9, 10, 11, and adjacent concave surface areas and non-mechanical means for holding the parts together.

11. A multi-part segmental mold comprising the mold parts 2, having the convex surface areas 8, 9, 10, 11, with concave surface areas between and connecting said convex surface areas, the mold forming, when assembled, the mold chamber 4 with curvilinear extensions 3, 6, of the chamber 4 and openings therein and separated from the chamber 4 by the restricted necks 5, 7.

12. The method of making a mold for castings which consists in assembling the mold parts in such relation to each other

that each is unrestrained to move bodily under the influence of pressure by the casting while cooling.

13. The method of making a mold for
5 castings which consists in assembling the mold material particles with a binder and locking them with an electromagnetic current.

14. The method of making a mold for
10 castings which comprises assembling the mold material particles and fashioning the material into mold parts of desired outline, and holding the parts in position by non-mechanical means.

15 15. The method of making a mold for

castings which comprises assembling the mold material particles and fashioning the material into mold parts of desired outline, and holding the parts in position by an electrical binder.

16. The method of making castings comprising assembling mold parts in desired relation, locking them into such relation by non-mechanical means during the pouring of the casting, and simultaneously unlocking
25 the several mold parts to allow expansion while cooling.

In testimony whereof, I have signed my name to this specification.

THOMAS E. P. WILSON.