Aug. 16, 1927. 1,638,846

M. GUYOT

MULTIPART CORE

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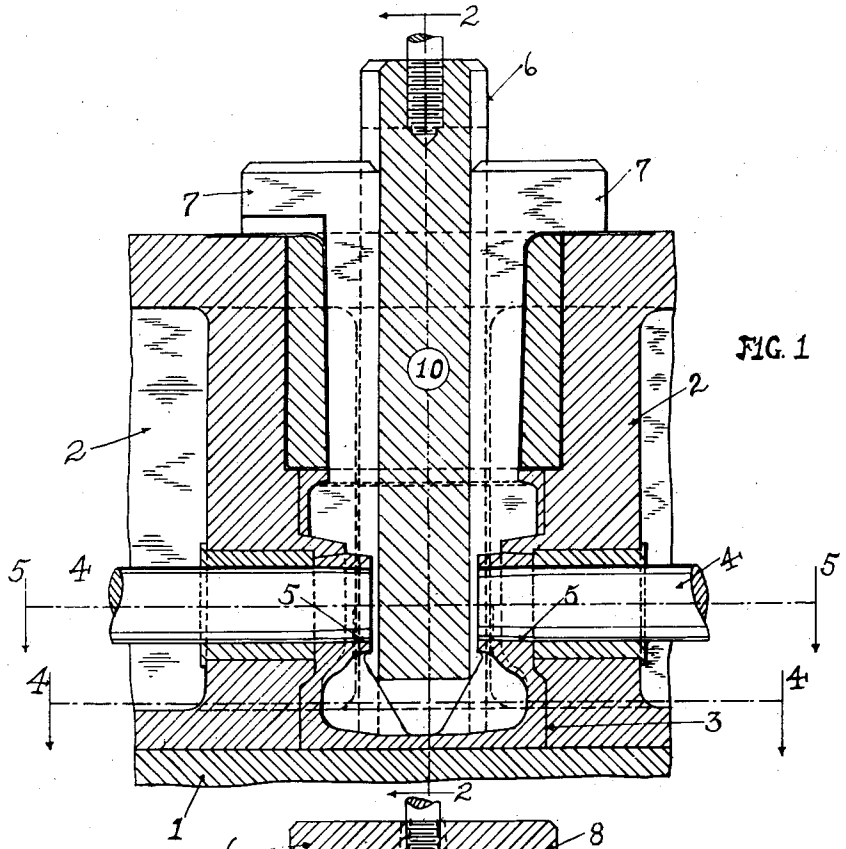



FIG. 1

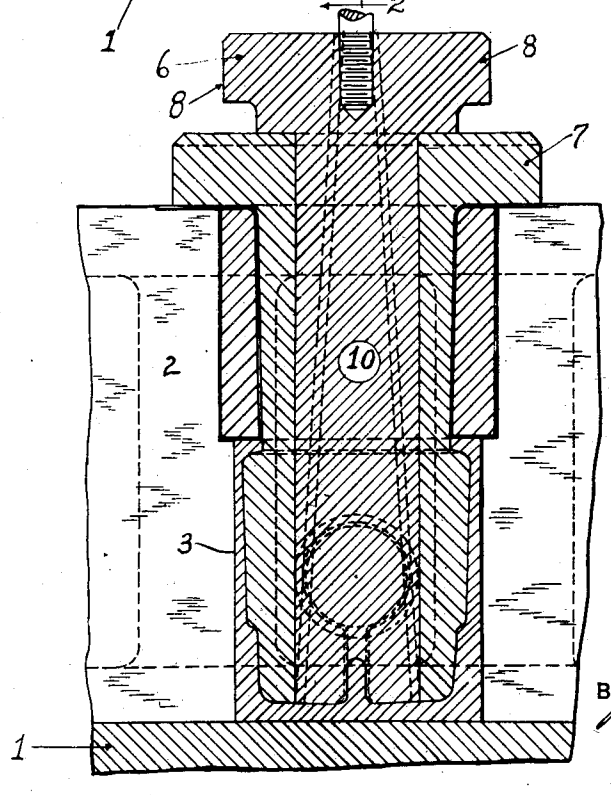



FIG. 2

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FIG. 4

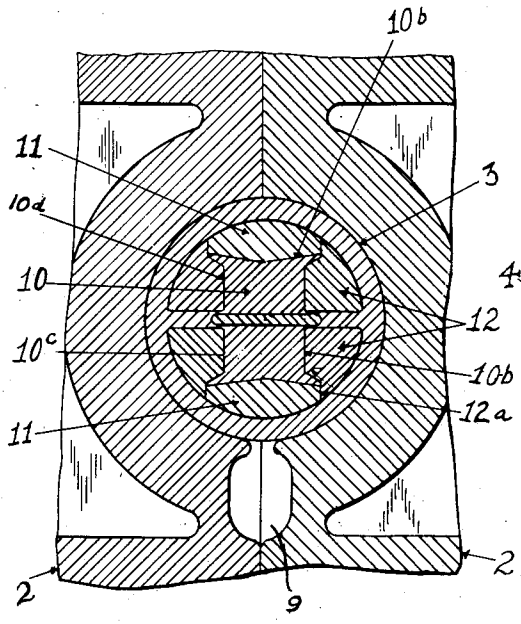



FIG. 5

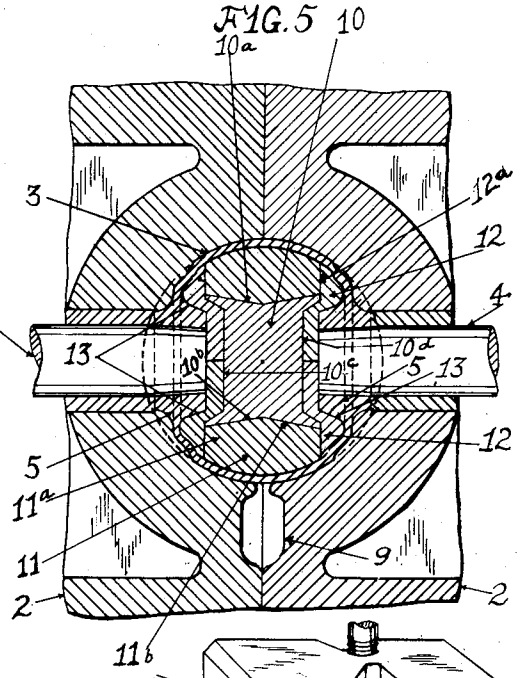
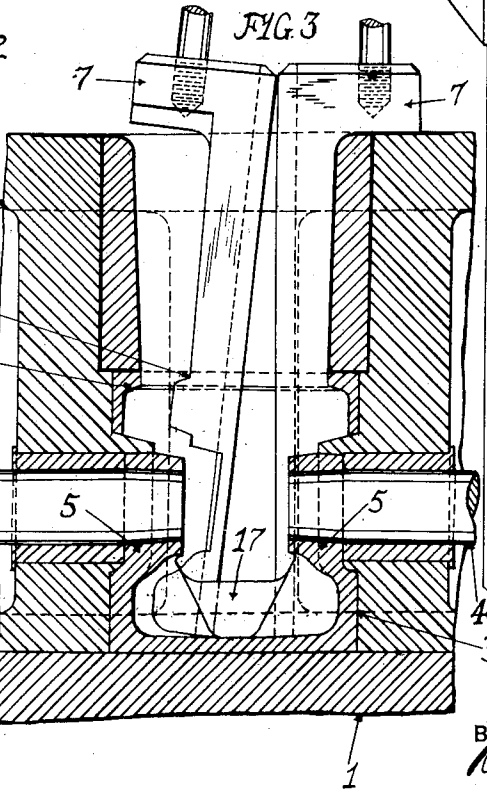



FIG. 3



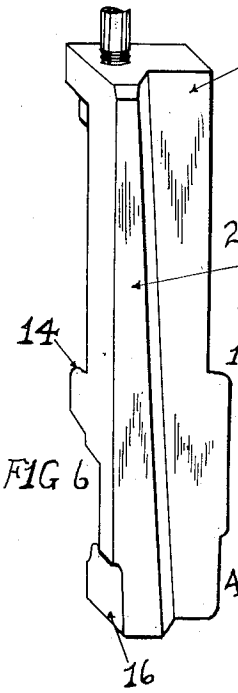




FIG 6

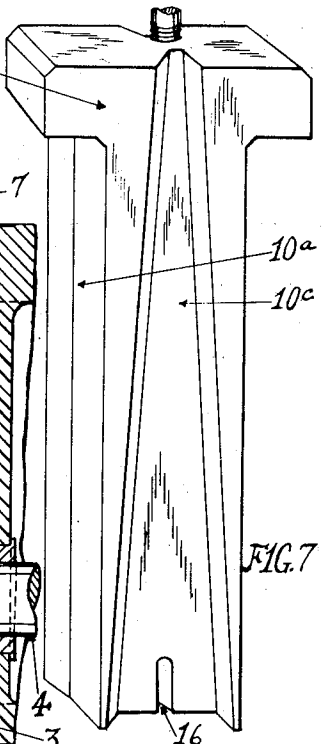



FIG. 7

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Patented Aug. 16, 1927. 1,638,846

# UNITED STATES PATENT OFFICE.

MARIUS GUYOT, OF CLEVELAND, OHIO, ASSIGNOR TO ALUMINUM COMPANY OF AMERICA, OF PITTSBURGH, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

## MULTIPART CORE.

Application filed February 29, 1924. Serial No. 695,902.

My invention relates to permanent molds for casting cup shaped articles, particularly internal combustion engine pistons, and is especially concerned with a seven part core for casting such articles having an enlarged inwardly extending annular projection at the open end thereof.

The principal object of my invention is to construct a new and improved multipart core for cup shaped castings having an enlarged circumferentially extending inwardly projecting flange adjacent to the open end thereof.

Other objects will appear and will be pointed out hereinafter and set forth in the claims.

Prior to my invention it has not been possible, so far as I am aware, to make cup shaped castings, and particularly piston castings, having at or near the open end thereof annular projections or flanges, the dimensions of which radially of the casting were comparatively large, the exact size within a certain range being independent of the extent to which certain of the outer core sections could be moved inwardly of the casting after the center section had been removed from the casting, the size and location of the bosses and the minimum permissible size of the said outer sections, it being understood that such sections tend to warp in use if smaller in cross section than certain permissible sizes.

By my invention, however, I am able to construct a core, the parts of which have dimensions larger than those of minimum size permissible for commercial purposes, and the core being capable of forming relatively large flanges, when measured radially of the casting, at or adjacent to the open end of the casting, as compared with flanges obtainable heretofore. I am able to accomplish these objects within a wide range of sizes, shapes and locations of the bosses. A core capable of accomplishing these objects and embodying my invention is hereinafter described.

In the drawings accompanying this specification and forming a part thereof:

Figure 1 is a fragmentary vertical cross sectional view through a mold for a piston casting provided with a core embodying my invention.

Figure 2 is a fragmentary cross sectional view taken on line 2—2 of Fig. 1.

Figure 3 is a fragmentary cross sectional view similar to Fig. 1 but showing the center core section removed and one of the side core sections partly removed from the casting.

Figures 4 and 5 are respectively fragmentary cross sectional views taken on lines 4—4 and 5—5 respectively of Fig. 1.

Figure 6 is a perspective view of one of the outer core sections embodying my invention, and

Figure 7 is a perspective view of the center core section of my improved core.

In describing my invention I have elected to disclose it in connection with a conventional form of permanent mold for a cup shaped casting of the piston type. Since these molds are not only shown in U. S. Letters Patent 1,296,588 issued March 4, 1919, to J. H. Bamberg but are also well known to those skilled in the art, only sufficient portions thereof have been shown in the drawings attached to this specification to render clear and understandable the cooperation thereof with my improved core. For more complete disclosure of the mold itself which forms no part of my present invention reference may be had to the patent mentioned.

The mold, which I have shown, comprises a base 1, side mold members 2, cooperating with each other and the base to form between the meeting faces thereof a casting cavity 3 for forming a piston casting. Core pins 4 project through the mold members 2 and extend into the casting cavity 3 to form hollow bosses 5 on the piston casting. A multipart core 6 consisting of seven parts extend into the casting cavity 3, the outer surface of the assembled core forming the inner end and side walls of the casting cavity 3. The assembled core is supported in the casting cavity by laterally extending flanges 7 on the upper or outer end of certain of the sections to seat on the top surface of the mold halves 2 and by similar flanges 8 on the center core section adapted to seat on certain of the other sections. When the assembled core 6 is supported on the mold halves 2 as shown in Figures 1 and 2 and core pins 4 are inserted, molten metal

may be led into the casting cavity 3 through any suitable gate 9 (Fig. 5) to fill the cavity. As the metal therein solidifies the core pins and the main core sections are withdrawn after which the mold halves 2 may be separated and the casting removed from the mold.

Since my present invention relates more particularly to the configuration of the multipart core, I will describe it in some detail.

I preferably form the core 6 in seven parts comprising a center or inner section and six outer sections surrounding the same with one section on each of the narrow edges of the center section and two sections on each of the wider side surfaces. The center section 10 which is substantially rectangular in cross section has its opposite, narrow sides or edges $10^a$ provided with substantially uniform recesses $10^b$ extending from end to end and its wider sides $10^c$ provided with wedge shaped recesses $10^d$ varying in width from a maximum at the inner end to a minimum at the outer end. Outer sections 11 which are of approximately the same width as the greatest width of the center section 10 are provided with inner surfaces shaped to cooperate with the edges $10^a$ and recesses $10^b$ of center section 10. These three sections 10 and 11 when assembled constitute a row of sections of about the same width across the center of the core. On opposite sides of the row of sections formed by sections 10 and 11 are positioned pairs of sections 12, each pair having their inner surfaces formed with raised upwardly tapered portions $12^a$ to engage with the longitudinally extending recesses $10^d$ of the center section 10 and flat surfaces $12^b$ to engage with the adjacent side surfaces $10^c$ of section 10 and $11^a$ of sections 11. Each pair of sections 12 have their meeting faces recessed to provide cavities 13 in which inwardly extending wrist pin bosses 5 in the casting may be formed. The assembled core thus comprises two pairs of oppositely disposed sections 12 between which is located a row of sections comprising sections 10 and 12.

In addition to the boss recesses 13 formed in the outer surfaces of the assembled core I provide near the outer or open end of the casting cavity a circumferentially extending recess 14 which is formed in the outer surface of the core to provide an inwardly extending annular or circumferential flange 15 at or adjacent to on the open end of the casting. The inner end of the assembled core may, if desired, be suitable recessed as at 16 to provide a rib 17 connecting the two bosses and the head of the casting. Additional cross ribs may be similarly formed if desired by merely recessing the core as may be understood by those skilled in the art.

In assembling the core in the mold preliminary to making the casting the pairs of side sections 12 are inserted into the casting cavity so that the flanges 6 rest upon the top of mold halves 2. Sections 11 are inserted so that the corresponding flanges 7 rest on mold halves 2 and the sections occupy substantially the position shown in Figures 4 and 5. Then section 10 is inserted between the outer sections and forced down into the position shown in Figure 2.

The recesses $10^b$ prevent lateral movement of sections 11 relative thereto while tapered recesses $10^d$ not only prevent lateral movement of sections 12 relative thereto but also serves to lock sections 12 together, thereby forming a compact core, with parts held in assembled position in the mold in a manner to resist mechanical displacement or warping of the thinner sections.

After the molten metal has filled the casting cavity and solidified and the sections are ready to be removed, the center section 10 is first withdrawn, then sections 11 are moved inwardly at the bottom and tilted in at the top sufficiently to clear the inwardly projection 15 on the casting and then withdrawn substantially longitudinally from the casting. Next the sections 12 are removed by rotating the same away from the bosses on the casting, moving the lower or inner ends slightly inward and tilting the upper or outer end of the core sections until they approach or contact with the opposite pair of sections 12 after which the section may be withdrawn from the casting by a slight rotational motion to clear completely the bosses and projection 15 and then longitudinally out of the casting. The remaining pair of sections 12 are removed in a similar manner.

It will be observed that the longitudinal recesses $10^b$ on center section 10 tend to prevent side movement of sections 11 with respect to the center section 10 especially when the assembled sections are clamped in a mold preliminary to or during the casting. Likewise the longitudinal recesses $10^d$ of the center section 10 prevent relative sidewise movement of the sections 12 with respect to the center section 10 and furthermore due to the upward tapering of these recesses $10^d$ each pair of sections 12 may be tightly wedged together. The center section thus prevents relative sidewise movement of all of the outer core sections with respect to the center section 10 and in addition assists in bringing the pairs of side sections 12 into close operative position and maintaining them in such position during the casting. It will further be observed that the recesses $10^d$ and raised portions $12^a$ of sections 12 permits ready removal of the core section 10 from the assembled core and consequent collapse and easy removal of the remaining core sections from a casting. When center

section 10 is removed side sections 11 may be moved inwardly at the bottom a short distance until they contact with raised portion 12a on side sections 12 but the top may be tilted toward the core center until it strikes along the length of the inclined surface of raised portion 12a. Such tilting is sufficient to clear the sections from projecting flange 15 on the casting and permit withdrawal of the section from the casting. In this manner I am able to cast a cup-shaped article having an enlarged inwardly extending circumferential projection adjacent its open end, without being limited to certain sizes, shapes, and locations of the bosses and without conflict with the minimum permissible sizes of the outer core sections.

Having thus described my invention, what I desire to secure by Letters Patent is defined in what is claimed, it being understood that changes or alterations of the structure claimed and not amounting to invention are within the limits of my invention.

What is claimed is:

1. A new and improved multipart core, for a cup shaped casting having an inwardly directed circumferentially extending flange adjacent to the open end thereof which comprises a center core section having longitudinally recessed side surfaces, the said recesses of two opposite sides gradually decreasing in width from the inner ends of the section to the outer end thereof and also from the outer side of the section inwardly thereof, and outer core sections surrounding the said center section and having raised portions corresponding to and seating in the said recesses when the core parts are assembled, the assembled core sections having an annular recess in their outer surfaces to form an inwardly extending projection on the casting.

2. A multipart core, for a flanged piston casting, comprising six exterior sections having an annular recess in the outer surfaces thereof, two opposite pairs of the said sections having boss recesses formed therein, and an interior section having surface engagement with each of the outer sections, each surface of the said interior section lying adjacent to the said two pairs of sections being provided with a recess having side walls converging toward the outer end of the sections and inclined at an obtuse angle to the inner wall of the recess, the said two opposite pairs of sections having raised portions corresponding to and adapted to seat in the said recesses.

3. A seven part core comprising a center section having four longitudinally recessed surfaces, two outer sections each engaging one of the said recessed surfaces, and a pair of outer sections engaging each of the remaining oppositely disposed recessed surfaces, each said pairs of sections having a raised, laterally and longitudinally tapering, wedge shaped portion extending longitudinally thereof, each pair having meeting faces recessed to form a boss, and the assembled core having an annular recess in the outer surface remote from the inner end thereof.

4. A seven piece core comprising a center section having two opposite side surfaces each provided with a longitudinally extending, laterally and longitudinally tapering, wedge shaped recess and two oppositely disposed edge surfaces; two outer sections, each substantially as wide as the greatest width of the said center section and disposed on opposite sides of the center section and engaging the said edge surfaces; and a pair of outer sections arranged on either side of the said center section and engaging with the said wedge shaped recess and the adjacent sides of the said two outer sections.

5. A seven piece core comprising a center section having two opposite side surfaces each provided with a longitudinally extending wedge shaped recess and two oppositely disposed edge surfaces; the said wedge shaped recesses each having side walls converging inwardly and also longitudinally of the section two outer sections, each substantially as wide as the greatest width of the said center section and disposed on opposite sides of the center section and engaging the said edge surfaces; and a pair of outer sections arranged on either side of the said center section and engaging with the said wedge shaped recess and the adjacent sides of the said two outer sections, the assembled outer sections having a circumferentially extending recess formed in the outer surface remote from the inner end thereof, and also having oppositely disposed boss recesses.

In testimony whereof I hereunto affix my signature this 18th day of February, 1924.

MARIUS GUYOT.