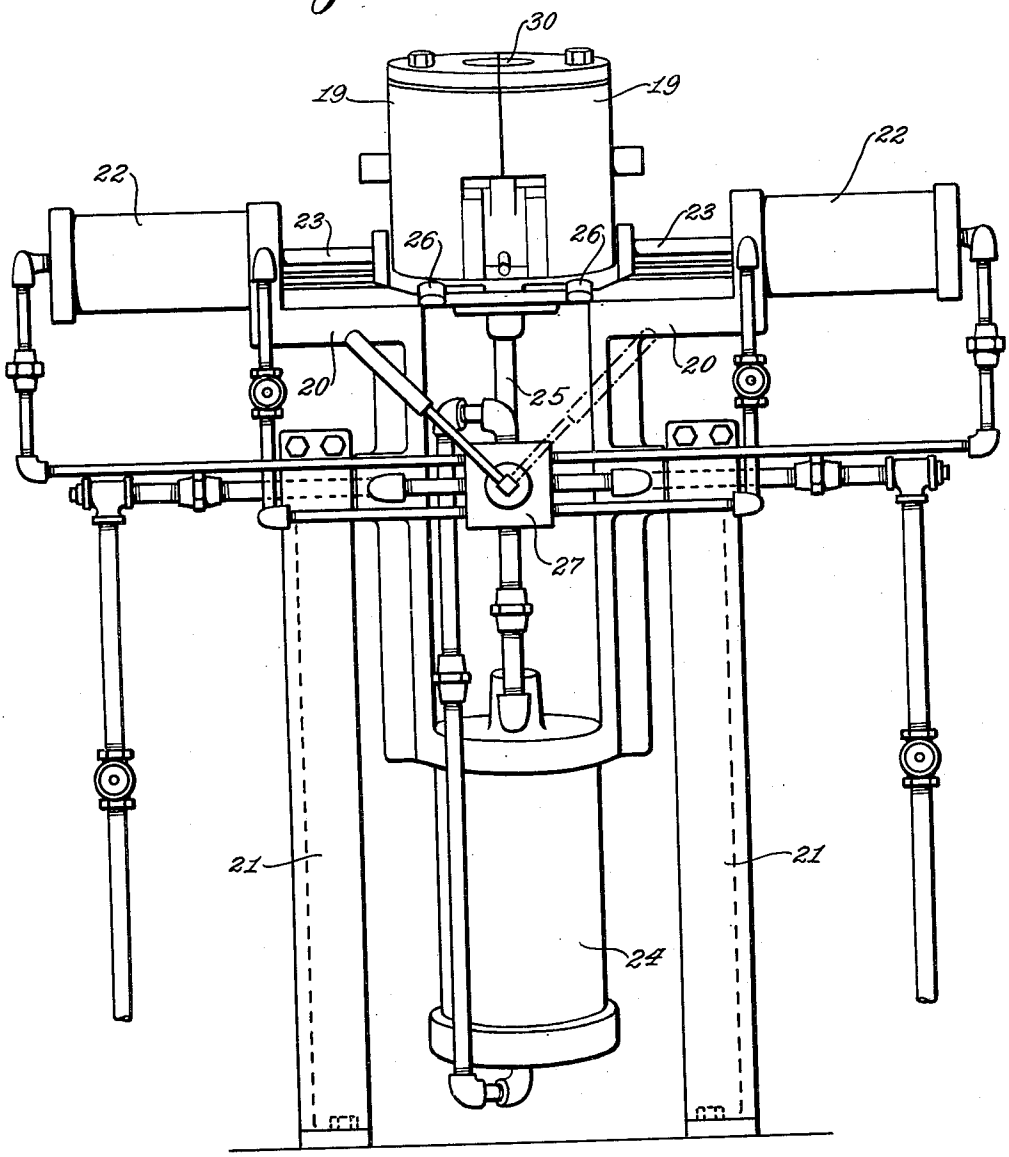
March 5, 1935. J. FLAMMANG ET AL 1,993,438

MOLD

Filed March 3, 1932 3 Sheets-Sheet 1

Fig. 1.



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March 5, 1935. J. FLAMMANG ET AL 1,993,438

MOLD

Filed March 3, 1932 3 Sheets-Sheet 2

Fig. 2.

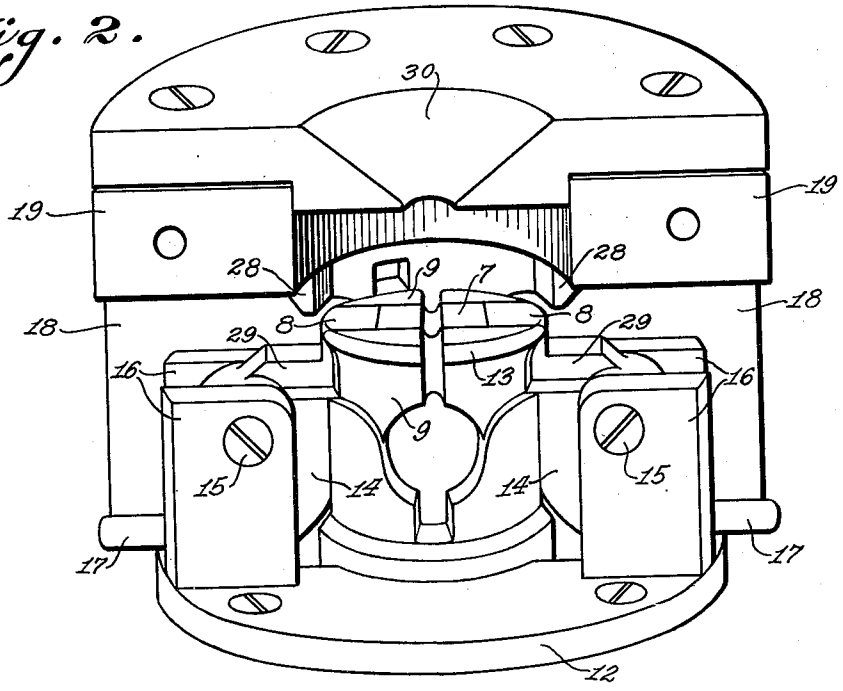


Fig. 3.

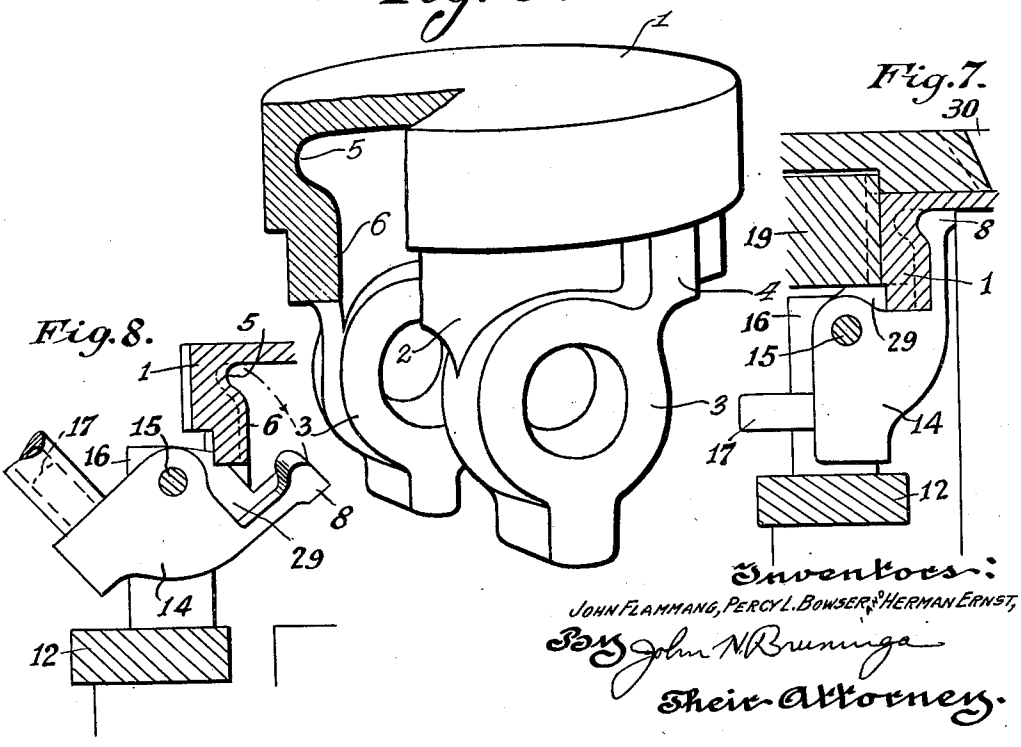


Fig. 7.

Fig. 8.

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March 5, 1935. J. FLAMMANG ET AL 1,993,438

MOLD

Filed March 3, 1932 3 Sheets-Sheet 3

Fig. 4.

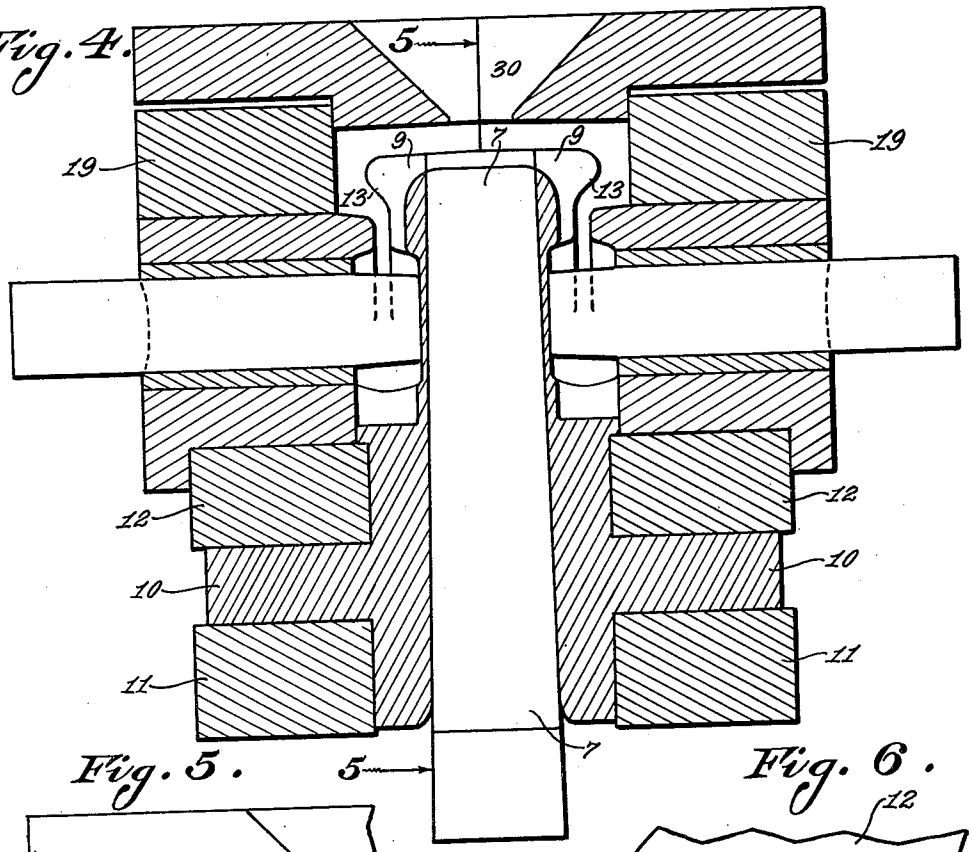


Fig. 5.

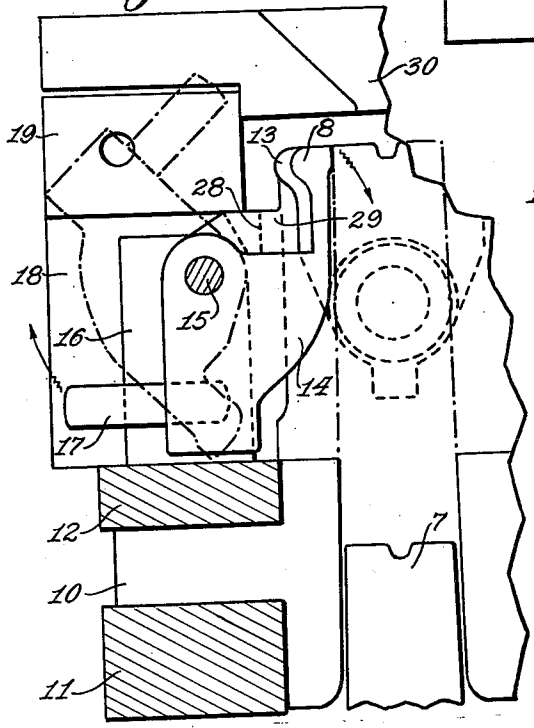
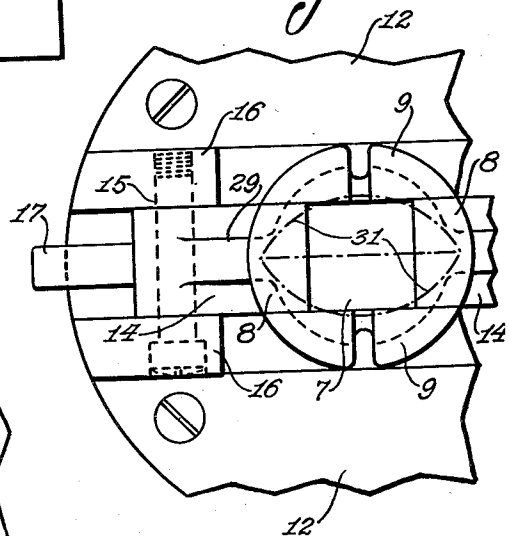


Fig. 6.



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UNITED STATES PATENT OFFICE

1,993,438

MOLD

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Application March 3, 1932, Serial No. 596,544

4 Claims. (Cl. 22—93)

This invention pertains to molding devices and more particularly to permanent molds used for casting pistons and the like.

In casting such devices as pistons, which are usually constructed of aluminum or its alloys, it is customary to use permanent metal molds. The inner surface of the matrix of such a mold is formed by a core, which is usually constructed in sections, so that, by withdrawing a center section, the outer sections may be collapsed and withdrawn so as to clear any projections formed on the inside of the casting. In order to provide for rapid production, it is desirable to mount the core sections mechanically in such a way that their movements for withdrawing the same may be controlled in a simple manner. With such an arrangement, the manipulation of these parts is simplified, and the rapidity of operation is increased.

With castings which have an inner surface expanded at one portion thereof and contracted at another, the arrangement of cores for easy withdrawal sometimes presents a difficult problem. In the case of pistons, where the cores must be withdrawn through the contracted portion of the casting, a five-part core is usually provided. In this arrangement, there are four peripheral core sections and a center section. In order to free the casting, the center section is first withdrawn, then two opposite side sections are collapsed and withdrawn axially, after which the other two side sections may be similarly collapsed and withdrawn.

One of the objects of this invention is to provide means whereby a core arrangement of this type may be mounted mechanically so that the cores may be removed in a simple and rapid manner.

Another object is to provide such a construction so arranged that certain operations may be performed by mechanical power appliances.

Further objects will appear from the following description, taken in connection with the accompanying drawings, in which

Figure 1 is a front view of a casting machine provided with a mold constructed in accordance with this invention;

Figure 2 is a perspective view of the core assembly, together with one mold section, illustrating their relation to one another.

Figure 3 is a perspective view, partly in section, of a casting made in the mold of Figure 2;

Figure 4 is a vertical section of the assembled core and mold taken along the axis of the wrist pin bearings of a piston casting;

Figure 5 is a detail side view of the mounting of one of the core elements;

Figure 6 is a plan view of Figure 5; and

Figures 7 and 8 are sectional details illustrating the manner in which the lateral core sections are withdrawn.

Figures 3 illustrates the type of casting which may be formed by a mold in accordance with this invention. The casting illlustrated is intended for the head portion of a piston to which a skirt portion is to be attached later. The casting comprises a head portion 1, which is intended to receive the packing ring grooves. This has depending therefrom a pair of webs 2, each of which carries a wrist pin bearing 3. A certain arrangement of lugs 4 may be cast on this device to provide fastening elements for the skirt portion. As these features form no part of the present invention, they need not be described in detail. The interior surface of this casting has an expanded portion 5 near the head and a contracted portion 6 at the open end thereof. This casting forms no part of the present invention and is illustrated simply in order to clarify the description so that the purposes of the invention may be more clearly understood.

The collapsible core used in the device selected for illustration comprises five core-parts. These are the central portion 7, a pair of side portions 8 positioned opposite to each other, and a second pair of side portions 9 also positioned opposite to each other but on an axis at right angles to that of the parts 8. The parts 9 have formed therein the required shape of the inside surface of the matrix wherein the wrist pin bearings 3 are cast. These portions 9 are supported on laterally extending plate portions 10, which may be formed integrally with the portions 9 or which may be attached thereto in any suitable manner. The plates 10 are adapted to move between guide blocks 11 and 12 supported in any suitable manner on the machine base, as will be more fully described hereinafter.

The core parts 8 are mounted so that in their normal position they stand between the ends of the parts 9, as shown more clearly in Figure 2. All of the parts 8 and 9 are provided with outwardly projecting rim portions 13 adapted to form the expanded portion 5 of the inner surface of the casting. The presence of this outward projection renders it impossible to withdraw these core portions by a simple axial movement. They must be moved inwardly and then axially in order to be withdrawn from the interior of the casting.

Furthermore, the portions 8 should be entirely removed from between the portions 9 so that the latter may be moved toward each other or collapsed in order that the rim 13 may clear the portions 6 of the casting. In accordance with this invention, the core parts 8 are permanently mounted for movement, to be withdrawn not only from the casting but also from between the parts 9.

For this purpose, the parts 8 are each formed as an upward projection on a body portion 14 pivoted at 15 on a pair of fixed supports 16 upstanding from the block 12. This pivotal mounting provides for moving the core parts 8 inwardly of the casting and then axially by simply rotating the same on the pivot 15, as indicated by the arrows in Figure 5. This rotation may be continued until this part assumes the position shown in broken lines in Figure 5, in which position it is entirely removed from between the core parts 9. In order to facilitate manipulation of these parts, a manipulating element in the form of a stout pin 17 is attached to the body portion of each of these core parts. This pin is short, so that it may be housed in a cavity 18 formed in the outer mold part to receive the supports 16. As it sometimes takes an appreciable force to separate the core part from the casting, a length of pipe or other manipulating handle may be attached to the element 17 to initialy move the core part 8.

Mounted so as to be collapsible upon or around the assembled core, is a pair of outer mold portions 19. These may be mounted for sliding movement laterally on a suitable base 20 supported in any suitable manner on a support or frame 21. In the arrangement shown in Figure 1, a pair of pneumatic or hydraulic cylinders 22 may be provided, whose piston rods 23 may be attached to the mold parts 19. Another cylinder 24 may have its piston rod 25 connected to the central core section 7 so that said core section may be withdrawn by operation of the cylinder 24. Handles 26 may be attached to the plates 10 for manipulating the core sections 9. Suitable fluid connections controlled by a manually operated valve 27 may be provided for operation of the cylinders 22 and 24. As these power appliances form no part of the present invention, detailed description will be unnecessary. Suffice it to say that the connections may be made in any suitable manner so as to move the parts as described.

In the operation of this device, the core parts are assembled as shown in Figure 2, the central core portion 7 being positioned between the parts 8 and 9 so as to maintain them in their proper relation. The outer mold sections 19 are closed upon the assembled core. In Figure 2 the mold section 19 is shown somewhat withdrawn from its normal position; when the mold is closed, the surface 28 of the outer mold section abuts the rear surface of the upstanding rib 29 of the core part 8. This portion 28 of the mold is shaped to form the outer surfaces of the web 2 and the lugs 4, or any other shape required in the finished casting. With the mold closed on the assembled core, the metal may be poured into the gate 30 so as to fill the matrix formed by the mold and core.

When the casting has set, the valve 27 is operated and the cylinders 24 and 22 act to withdraw the central core section 7 and to separate the outer mold sections 19. This leaves the finished casting upon the core sections. The operator now applies a suitable handle to each of the pins 17 and rotates each core section 18, as indicated in Figure 5, to move it away from the casting inwardly and downwardly, and turns it around far enough to clear the core sections 9. By operation of the handles 26, these two core sections 9 are then collapsed upon one another to the position indicated in broken lines at 31 in Figure 6. All the core parts are now clear of the internal projections of the casting, and the latter may now be lifted off with a pair of tongs or otherwise.

It will be noted that the withdrawal of the central core section clears a space through which the sections 14 may move to clear them from the casting. After these sections have been cleared the sections 9 are then collapsed into the same space. In this way provision is made for withdrawing the core sections whereby an enlarged upper portion of the interior cavity of the casting may be formed.

The casting having been finished, the sections 9 are again separated, the sections 8 turned back to their normal position and the valve 27 is operated to reinsert the central section 7 and close the outer mold sections 19.

It will be seen that this invention provides a molding device by means of which castings of the type described may be handled in a rapid and efficient manner. It has been found that in this type of work, the mechanical mounting of the various core elements, such that their movements are uniform and accurate, greatly enhances the speed of operation and therefore increases production. Accordingly, as a result of the special mounting of the core elements 8, their movements to clear the casting and back again to their normal position are determined and can be carried out by unskilled labor in an efficient manner.

While this molding device has been described as a unitary machine, it will be understood that certain individual features or subcombinations thereof may be useful of themselves without reference to other features. It is understood, therefore, that the employment of such individual features and subcombinations is contemplated by this invention and is within the scope of the appended claims. It is further obvious that various changes may be made, within the scope of the appended claims, in the details of construction without departing from the spirit of this invention; it is to be understood, therefore, that this invention is not limited to the specific details shown and/or described.

Having thus described the invention, what is claimed is:

1. In a permanent mold of the character described, an outer mold section having an axis, a core section cooperating with said mold section to provide a matrix having an inner surface expanded at one portion and contracted at another forming an inwardly extending obstruction, said core section having a part embracing said obstruction and preventing axial withdrawal of said core section, a support for said mold section, means immovably secured relative to said support, and means engaging said immovable means and constrained to a definite path of movement with relation thereto and connected with said core section so as to guide the latter for withdrawing movement in a definite path inwardly and axially of said mold section.

2. In a permanent mold of the character described, a movable outer mold section having an axis, a core section cooperating therewith to provide a matrix having an inner surface expanded at one portion thereof and contracted at another, said core section having a part embracing the ex-

panded portion of the matrix and preventing axial withdrawal thereof, a support for the mold section, and means immovably secured relative to the support for mounting said core section on said support and for guiding the same for movement inwardly and axially of said mold section.

3. In a permanent mold of the character described, an outer mold section having an axis, a plurality of core sections cooperating therewith to provide a matrix having an inner surface expanded at one portion thereof and contracted at another forming an inwardly extending obstruction, one of said core sections having a part embracing the obstruction, a support for said mold section, means immovably secured relative to said support for pivotally mounting the core section embracing the obstruction for rotary withdrawing movement in a fixed path inwardly and axially of said mold section, and means for movably mounting said other core sections.

4. In a permanent mold of the character described, a movable outer mold section having an axis, a sectional core having side and center sections cooperating with said mold section to provide a matrix having an inner surface expanded at one portion and contracted at another, said side core section having a part embracing the expanded portion of the matrix and preventing axial withdrawal thereof, a support for said mold section, means immovably secured relative to said support for pivotally mounting said side core sections for movement inwardly and axially on its pivot clear of said mold section.

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