June 5, 1934. M. GUYOT 1,961,213

MOLD CLAMPING DEVICE

Filed July 24, 1931 3 Sheets-Sheet 1

Fig. 1.

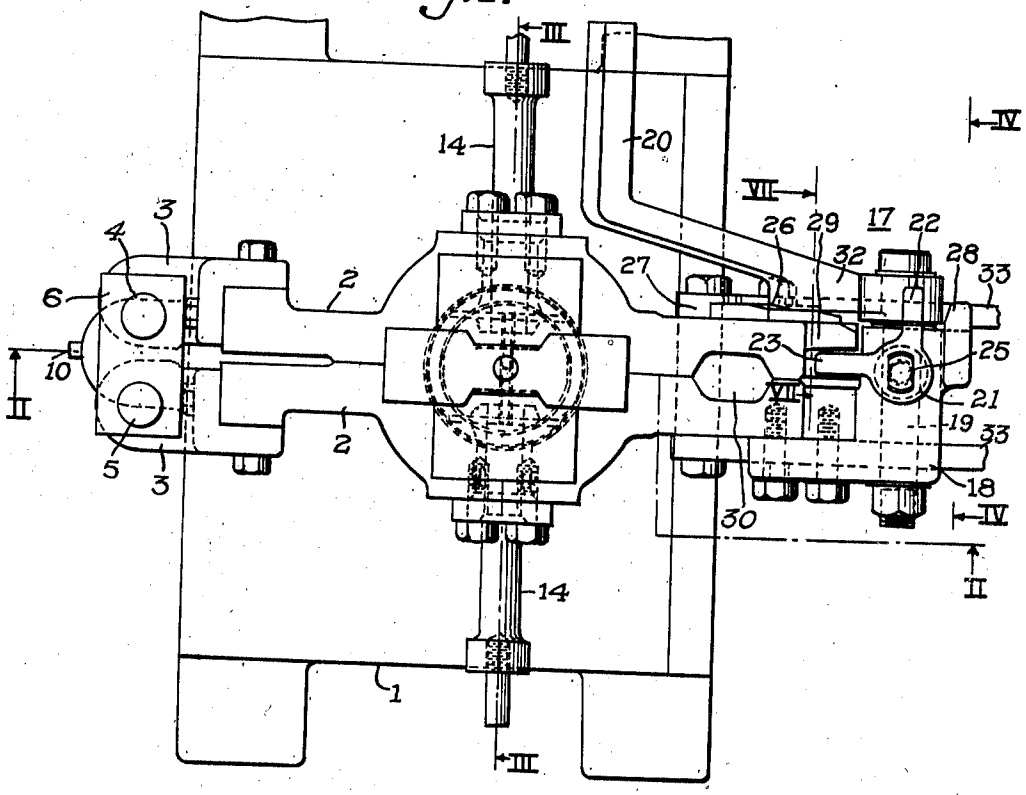
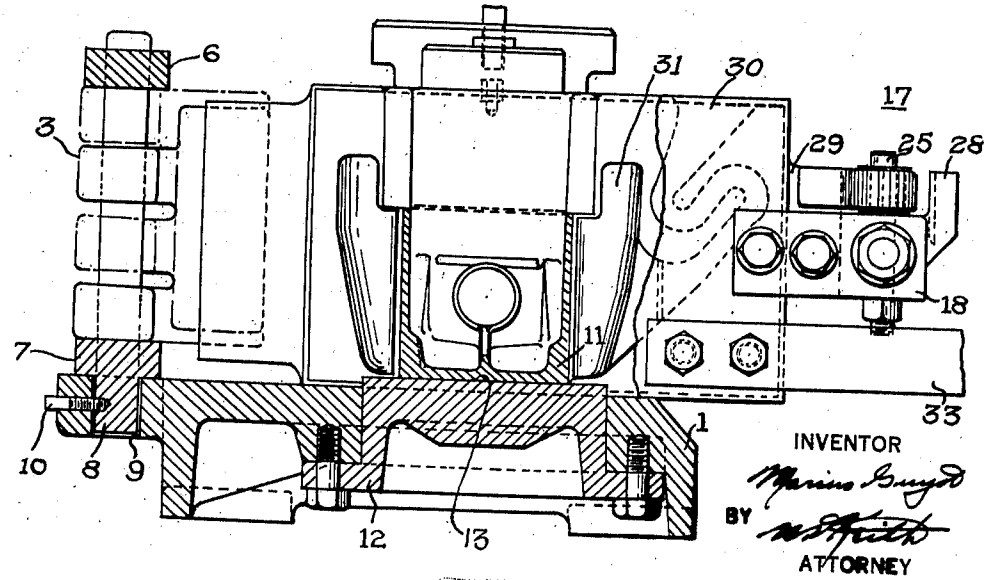


Fig. 2.



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June 5, 1934. M. GUYOT 1,961,213

MOLD CLAMPING DEVICE

Filed July 24, 1931 3 Sheets-Sheet 2

Fig. 4.

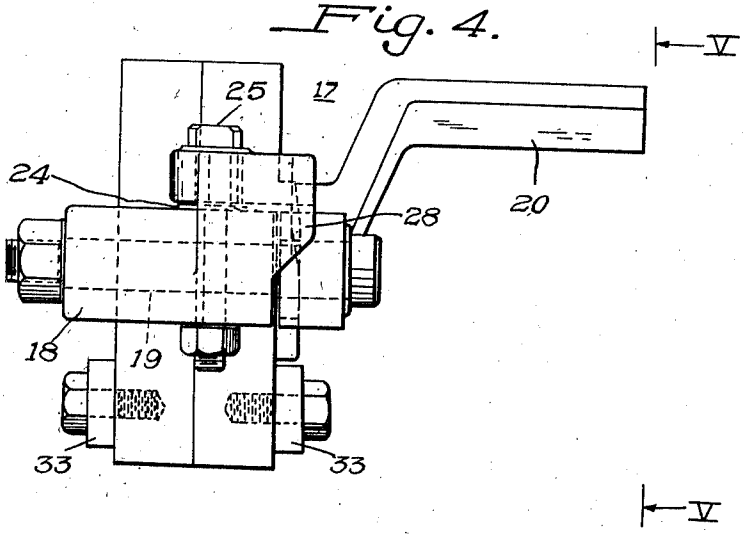
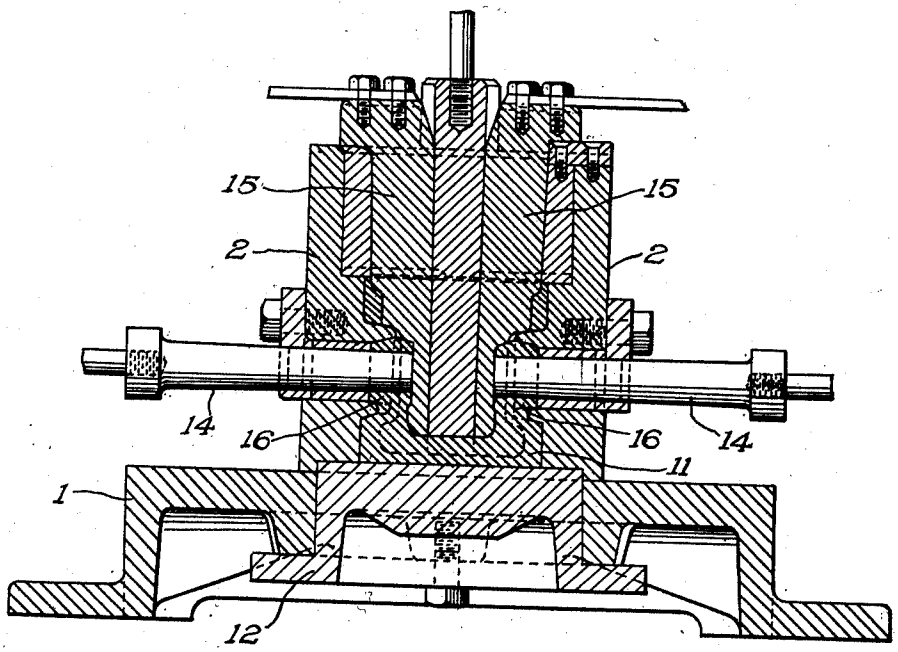


Fig. 3.



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June 5, 1934. M. GUYOT 1,961,213

MOLD CLAMPING DEVICE

Filed July 24, 1931 3 Sheets-Sheet 3

Fig. 5.

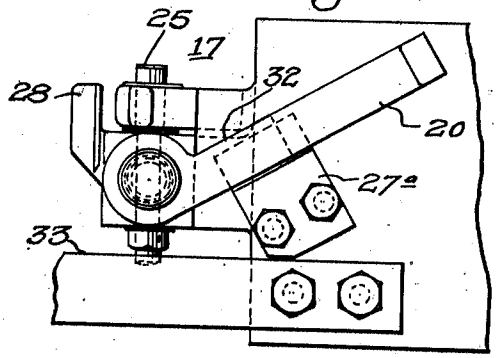


Fig. 6.

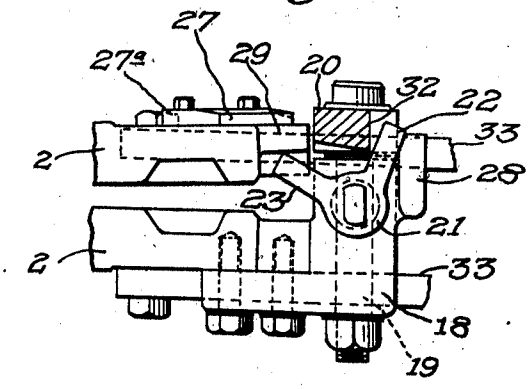
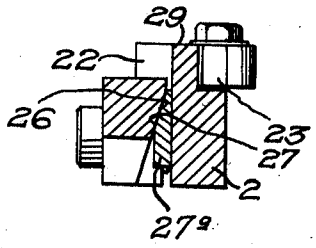


Fig. 7.



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UNITED STATES PATENT OFFICE

1,961,213

MOLD-CLAMPING DEVICE

Marius Guyot, Cleveland, Ohio, assignor to Aluminum Company of America, Pittsburgh, Pa., a corporation of Pennsylvania

Application July 24, 1931, Serial No. 552,893

3 Claims. (Cl. 22—156)

The invention relates to multipart permanent molds for casting metals. It particularly relates to a locking device whereby certain movable mold parts can be quickly and easily secured in the proper aligned relationship to one another.

Articles made from aluminum and its allows or other light metals and their alloys are, as regards physical properties, especially suited to commercial usage if their design is such that they can be cast in metal molds, frequently termed permanent molds, or chill molds. A very successful form of mold consists of a stationary base and hinged mold parts so connected thereto as to permit of alignment of the movable mold parts to form a casting cavity and gate and riser cavities within the metal mold parts. In practice the mold parts are moved into alignment, the cores are inserted, the mold parts are clamped together, and the molten metal poured into the gate cavity. After the casting has solidified, these motions are gone through in the reverse order, namely, the clamp is released, the cores are removed, the mold parts swung apart, and the casting removed.

Attention is directed to the clamping operation since my invention is concerned with an improved clamping device. A satisfactory clamp or lock should firmly secure the parts which must be held in close relationship. It should be capable of easy application so as to require only a slight expenditure of energy since the operator must perform the operation repeatedly and rapidly. It should be easy to release for the same reasons. It is desirable, in addition, that the device which serves to move the mold sections together should simultaneously function as a lock to maintain the alignment until it is released by the operator.

Heretofore in the operation of such molds, when the casting had solidified, the operator released the clamp and then usually inserted a lever between projections on the mold parts and, by the application of force on the end of the lever, separated the mold parts. This has been quite customary although it was sometimes possible by a certain amount of physical exertion to separate the mold parts manually without a lever.

Accordingly one object of the invention is the provision of a manually operated mold clamp by means of which sufficient pressure may be applied with very little energy expenditure on the part of the operator.

A further object of the invention is the provision of a mold clamp which will simultaneously or in very rapid sequence, close, clamp and lock or secure the mold parts to which it is connected.

A further object is the provision of a mold clamp which can be easily released when desired, and with which the operation of releasing the clamp simultaneously separates the mold parts.

A further object is the provision of a mold clamp of increased ease and speed of operation by means of which a greater number of castings per man-hour can be produced from a certain mold.

Although the novel features which are believed to be characteristic of this invention will be particularly pointed out in the claims appended hereto, the invention itself, as to its objects and advantages, the mode of its operation, and the manner of its organization, may be better understood by referring to the following description taken in connection with the accompanying drawings forming a part thereof, in which;

Fig. 1 represents a plan view of a permanent mold and its associated parts to which my clamping mechanism has been adapted;

Fig. 2 represents a transverse section taken on the line II—II of Fig. 1;

Fig. 3 represents a transverse section taken on the line III—III of Fig. 1;

Fig. 4 represents a fragmentary end elevation as viewed in the direction of the arrows IV—IV in Fig. 1;

Fig. 5 represents a fragmentary side elevation as viewed in the direction of the arrows V—V in Fig. 4;

Fig. 6 represents a fragmentary top plan view of the clamping mechanism in its open position;

Fig. 7 represents a fragmentary sectional view taken on the line VII—VII in Fig. 1.

In describing my improved form of locking device, I have elected to disclose it in connection with a conventional form of permanent mold for an internal combustion engine piston. This type of permanent mold is well known to those versed in the art, and a general example of such is shown in my United States Letters Patent No. 1,679,861 issued August 7, 1928.

Referring to the drawings attached to this specification and forming a part thereof, 1 is a mold base, slidably mounted on the surface of which are two similar mold halves 2 to which are attached, as by means of cap screws, the hinge lugs 3. The hinge lugs 3 are pivoted to pins 4 and 5, which are disposed in a yoke member consisting of a top plate 6 and a bottom plate 7, the bottom plate having on its lower side a pin-like projection 8 adapted to extend through an aperture 9 in the base plate 1. A stud 10 ex-

tending into the pin-like projection 8 through the base prevents rotation or lateral shifting of the projection 8 in the aperture 9 and hinge pins 4 and 5 are snugly fitted in hinge lugs 3 thus preventing all movement of the hinge lugs relative to the pins 4 and 5 except the necessary turning movement for closing and opening the mold halves 2. This construction is clearly described and explained in my above-mentioned Patent 1,679,861.

The mold halves 2, which have their adjacent meeting faces suitably recessed to form the side walls of a casting cavity in which the casting 11 is formed, are centered upon the base 1 by means of a pilot member 12 which projects thorugh an opening in the base plate and is secured thereto as by cap screws. The top surface of this pilot member 12 forms the bottom surface 13 of the casting 11. A suitable multipart core, in association with pins 14 projecting through the mold halves 2 into engagement with the multipart core members 15 to form hollow wrist pin bosses 16, forms the inner surfaces of the casting cavity.

The mold-clamping mechanism, which is represented in its entirety by the numeral 17, comprises a bracket 18 attached to one half 2 of the mold, as by cap screws. Extending through the bracket 18 is a pin 19 in the form of a shouldered bolt by means of which an operating lever or handle 20 is rotatably attached to the bracket 18. A mold opening and closing element 21 having two projecting fingers 22 and 23, is rotatably mounted upon a boss 24 on the top surface of the bracket 18 and is held in place by means of a bolt 25 which extends through the aforementioned pin 19 thereby further securing the operating lever pin 19 against becoming loose in service.

The operating lever 20 has formed integral with its hub an inclined surface 26 which in combination with a complementary inclined surface 27 in the form of a plate or shoe 27*a*, bolted or otherwise attached to the mold half 2, acts to wedge the complementary inclined surfaces into locking relationship as shown to best advantage in Fig. 7. Although the inclined surface 27 on the mold half 2 has been disclosed as formed on a separate plate or shoe 27*a*, it is quite evident that this inclined surface could be machined on the mold half or otherwise formed integral therewith.

A lug 28 is formed integral with the bracket 18 and projects upwardly therefrom into the plane of movement of the finger 22 of the closing and opening element 21, thereby forming a definite stop. Also, a lug 29 formed integral with and projecting upwardly from one of the mold halves 2 into the plane of movement of finger 23 is provided for a purpose hereinafter described.

In the operation of a mold to which my improved form of clamping device has been applied, the molten metal is directed into the mold cavity through the gate 30 and risers 31, the mold parts being in their closed position as shown in Fig. 1. When the casting has solidified, the operator lifts upwardly on the handle 20, which procedure first releases the pressure on the co-acting inclined surfaces 26 and 27. Continued raising of the handle 20 brings the edge 32 of the handle into contact with finger 22 which imparts rotation of the element 21. Rotation of the element 21 brings the finger 23 into contact with the lug 29 and the mold halves are separated to a degree governed by the contact of the finger 22 with stop lug 28. Further opening of the mold halves is accomplished through the medium of the handles 33 attached to the mold sections.

When the casting has been removed, it is only necessary to bring the mold halves into approximate alignment by means of the handles 33. The actual aligning and securing of the mold halves, in close fitting relationship, is accomplished through the medium of the lug 29, which makes contact with the finger 23 of the mold-separating element 21 during the closing of the mold halves by means of the handles 33. Rotation of the element 21 brings the finger 22 into contact with the edge 32 of the operating handle 20, which causes the handle 20 to fall under the action of gravity to bring its inclined surface 26 into clamping relationship with the inclined surface 27 on the shoe 27*a*.

Having thus described and explained my invention and its manner of operation, it is to be understood that the apparatus selected was merely for purposes of illustration and that variations in the form of the arrangement of parts shown and described herein may be made without departing from the nature and scope of my invention except as defined in the appended claims.

What I claim is:

1. A permanent mold comprising at least two mold parts hingedly connected together for relative movement with respect to each other, a bracket attached to one mold part, said bracket having a longitudinal bore provided therethrough for receiving a reduced portion of a shouldered bolt, an operating lever rotatably mounted on the shoulder portion of the bolt, said operating lever being adapted to be rotated into and out of engagement with the other mold part, a mold-separating and lever-actuating element rotatably mounted on the aforementioned bracket, said element being rotatably secured thereto by means of a vertical bolt extending through said bracket and the reduced portion of said shouldered bolt and thereby insuring against the shouldered bolt becoming loose, said element having a projecting finger for engagement with the second-mentioned mold part and a second projecting finger extending into the path of rotation of said operating lever, whereby closing of the mold parts actuates the mold-separating and lever-actuating element to throw the operating lever into engagement with the second-mentioned mold part to secure the mold parts in closed relationship, and rotation of the operating lever out of closed position actuates said mold-separating and lever-actuating element to separate the mold parts.

2. A mold assembly comprising a plurality of mold parts, hinge means for connecting said mold parts together for relative movement with respect to each other, handles secured to adjacent mold parts for opening and closing the mold assembly, a bracket having a longitudinal bore provided therein attached to one handle-bearing mold part, a shouldered bolt the reduced portion of which is supported in said bore, an operating lever having an inclined surface portion rotatably mounted on the shoulder portion of said bolt, said operating lever being adapted to be rotated into and out of engagement with a complementary inclined portion on the adjacent handle-bearing mold part, a mold-separating and lever-actuating element rotatably mounted on the aforementioned bracket, said element being rotatably secured to said bracket by means of a vertical bolt

extending through said bracket and the reduced portion of said shouldered bolt, said element having a projecting finger for engagement with the second-mentioned mold part and a second projecting finger extending into the path of rotation of said operating lever, whereby closing of the mold parts by means of the handles actuates the mold-separating and lever-actuating element to throw the operating lever into contact with the inclined surface on the adjacent mold part, and rotation of the operating lever out of contact with said inclined surface actuates said mold-separating and lever-actuating element to separate the adjacent mold parts.

3. A mold assembly comprising a plurality of mold parts, hinge means for connecting said mold parts together for relative movement with respect to each other, handles secured to adjacent mold parts for opening and closing the mold assembly, a bracket having a longitudinal bore provided therein attached to one handle-bearing mold part, a shouldered bolt the reduced portion of which is supported in said bore, an operating lever having an inclined surface portion rotatably mounted on the shoulder portion of said bolt, said operating lever being adapted to be rotated into and out of engagement with a complementary inclined portion on the adjacent handle-bearing mold part, a mold-separating and lever-actuating element rotatably mounted on the aforementioned bracket, said element being rotatably secured to said bracket by means of a vertical bolt extending through said bracket and the reduced portion of said shouldered bolt, said element having a projecting finger for engagement with the second-mentioned mold part, a second projecting finger extending into the path of rotation of said operating lever, and a stop element for controlling the extent of rotation of said operating lever, whereby closing of the mold parts by means of the handles actuates the mold-separating and lever-actuating element to throw the operating lever into contact with the inclined surface on the adjacent mold part, and rotation of the operating lever out of contact with said inclined surface actuates said mold-separating and lever-actuating element to separate the adjacent mold parts, said stop element being adapted to interrupt rotation of the mold-separating and lever-actuating element.

MARIUS GUYOT.