March 30, 1943. H. E. McWANE 2,315,071

MOLD CONSTRUCTION

Filed April 25, 1941

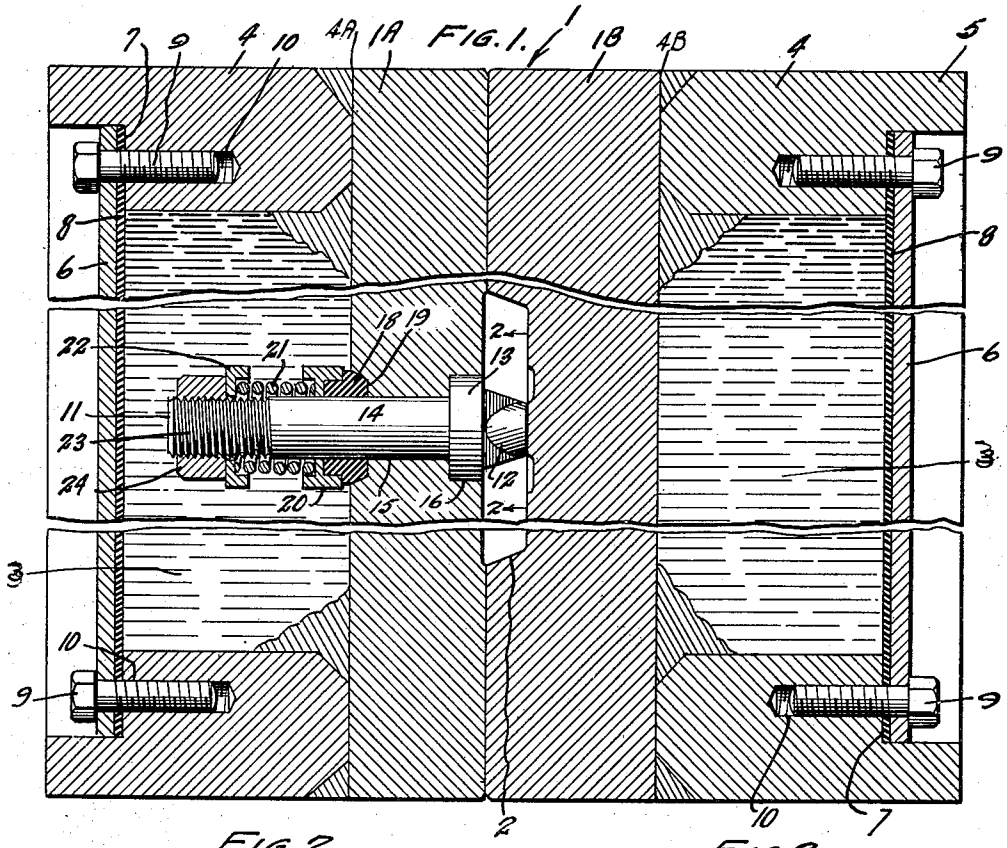



FIG. 2.

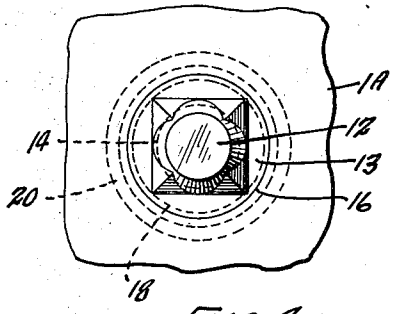



FIG. 3.

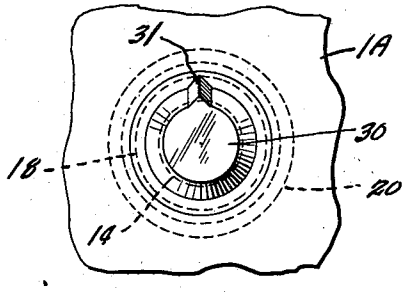



FIG. 4.

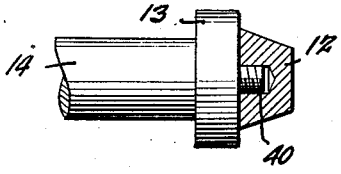
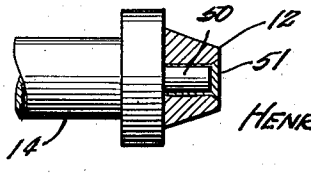



FIG. 5.




Inventor
HENRY E. McWANE

By Semmes, Keegin, Beale & Semmes
Attorneys

Patented Mar. 30, 1943

2,315,071

# UNITED STATES PATENT OFFICE

2,315,071

## MOLD CONSTRUCTION

Henry E. McWane, Lynchburg, Va.

Application April 25, 1941, Serial No. 390,410

8 Claims. (Cl. 22—136)

Generically, the present invention relates to a mold construction, and particularly to molds for casting molten materials, such as, molten metals at high temperatures. More specifically, the invention relates to a replaceable contact element or core that is adapted to extend into the molding cavity to form either a bolt hole, protrusion, or the like. This application is a continuation in part of my co-pending application, Serial No. 281,974, filed January 29, 1939, on Molds.

It is, of course, particularly important that the contact member or core be maintained at a low temperature and that this member be of a material that will resist wear and warpage during the repeated cycles of heating and cooling which are necessary in casting articles in molds of the type here under consideration. I have discovered that a core made of a high speed tool steel is particularly efficacious in that it is not materially affected by the repeated casting operations and possesses relatively great longevity.

To keep the contact member or core at the desired temperature, I provide the core with a shank that extends into the water jacket for the mold. A packing gland surrounds the shank at the point where it enters the water jacket and a helical spring compresses the gland, thereby assuring a constant water-tight seal between the contact member and the mold regardless of the expansion or contraction of the shank. In addition, the helical spring will maintain the shank under tension and as a consequence hold the core in its proper place in the molding cavity.

An object of this invention is to provide a replaceable contact element made of a material that is not materially affected by repeated casting cycles.

And another object of this invention is to provide a contact element or core for use in metal molds which is provided with means to maintain the core in its proper position in the molding cavity and yet permit the ready removal of the core from the casting cavity when desired.

A further object of this invention is to provide a mold construction having a water jacket with a contact element or core, the contact element or core having a shank that is adapted to project into the water jacket for maintaining the contact member or core at the desired temperature.

Still a further object of this invention is to provide a water jacketed mold with a core, the core having a shank which projects into the water jacket and the shank being provided with means for insuring a constant water-tight seal between the core and the mold.

And a still further object of this invention is to provide a replaceable element or core made of a high speed tool steel.

With these and other objects in view, which may be incident to my improvements, the invention consists in the parts and combinations to be hereinafter set forth and claimed, with the understanding that the several necessary elements comprising my invention may be varied in construction, proportions and arrangements, without departing from the spirit and scope of the appended claims.

In order to make my invention more clearly understood, I have shown in the accompanying drawing means for carrying the same into practical effect without limiting the improvements in their useful applications to the particular constructions which, for the purpose of explanation, have been made the subject of illustration.

In the drawing:

Figure 1 is a transverse sectional view of a permanent mold showing the replaceable element or core in its position within the casting cavity.

Figure 2 is a view taken along the line 2—2 of Figure 1 looking in the direction of the arrows.

Figure 3 is a view similar to Figure 2 showing another type of core that may be employed.

Figure 4 is a detail view, partly in section, showing another type of core member that may be employed.

Figure 5 is a view similar to Figure 4 illustrating a still further type of core member.

Referring to the drawing, I have shown a mold 1 comprising complemental parts 1A and 1B which are preferably made of a material of high heat transferring properties such as copper. A casting cavity 2 is formed in the face of the mold part 1B and defines the shape of the particular article to be cast. Each mold part 1A and 1B is provided with a water jacket designated generally by the numeral 3. The jacket 3 is substantially the same for both parts 1A and 1B, and it will be noted that it is made by welding to the plane face of the members 1A and 1B as shown at 4A and 4B a wall 4. The wall is formed with an external flange 5 and a closure plate 6 fits within the flange 5 against a shoulder 7. Intermediate the inner face of the plate 6 and the shoulder 7 is disposed a layer of moisture impervious material 8, and the cover plate 6 and the layer 8 are held in position by bolts 9 which are threaded into apertures 10 formed in the wall 4, thereby forming a water-tight cover for the jacket.

The contact member or core is indicated gen-

erally by the numeral 11 and comprises a head 12 that projects into the cavity 2, a shoulder 13 and a shank 14. The head, shoulder and shank are integral and made of a high speed tool steel known by the trade names Rex AA or Rex AAA. This metal in its hardened state has the property of good red hardness which results in maintaining the shape of the core and increases its life during the heatings incident to the casting operations.

The shank 14 extends through an aperture 15 formed in the mold part 1A and the shoulder 13 fits in a recess 16 provided adjacent to the plane face of the part 1A. The shank 14 is of such length as to project into the water jacket which of course insures that there will be rapid heat exchange between the head 12 and the shank 14.

Due to the difference in coefficients of expansion between the metal of the mold and the metal of the core, the aperture 15 in the mold part 1A must be sufficiently large to permit expansion and contraction without producing strains.

To hold the head 12 and the shoulder 13 in position and at the same time to provide a watertight seal between the shank 14 and the aperture 15, it will be observed that a resilient packing element 18 surrounds the shank 14 and fits within a recess 19 formed in the inner face of the member 1A. A recessed washer 20 fits over the element 18, as clearly shown in Figure 1, and one end of a helical spring 21 bears against the washer. The opposite end of the spring contacts a recessed member 22 fitted onto the shank 14. A nut 24 is threaded onto the end of the shank and its inner end bears against the member 22.

It will be appreciated that the spring 21 presses against the washer 20, thus forcing the packing element 18 tightly around the shank 14 and into the depression 19, thereby affording a leak-proof union and preventing the passage of water from the jacket around the shank into the molding cavity 2. This is particularly important in that it positively prevents any danger of explosion by inhibiting the seepage of water into the casting cavity. In addition, the spring 21 will hold the related parts in proper position while enabling expansion of the shank 14 and its associated parts without binding.

The tension of the helical spring 21 can be regulated by the proper manipulation of the nut 24 to afford the desired adjustment.

The above construction is readily replaceable if and when the head 12 becomes worn or distorted through numerous casting operations, but, as previously pointed out, this member possesses great longevity due to the fact that it is made of a high speed tool steel. This replacement can be effected in a minimum of time and the construction is far superior to the customary practice of soldering the core into the face of the mold. With this latter type of construction, the whole mold has to be heated to such a temperature as to permit the melting of the solder before the core can be removed from the mold. Then the wall must be cleaned and a new core soldered in place. This operation takes a great deal of time and in addition necessitates the employment of skilled workmen.

A further type of contact member or core is shown in Figure 3. In this form the head comprises a conical portion 30 which is formed with a ridge 31. This core may be used in those operations where it is desired to provide an aperture having a keyway or the like.

In Figure 4, I have shown a type of contact member or core wherein the shank and head are separate members. In this form the shank 14 and shoulder 13 may be made of bronze or other metal and the head 12 is of high speed tool steel. In this particular embodiment, the shank is provided with a threaded extension 40 which screws into internal threads provided in the face 12.

Referring to Figure 5, I have shown a structure which is quite similar to that illustrated in Figure 4. The face 12 in this form is welded or brazed to an extension 50 formed on the shank 14 as indicated at 51.

While I have shown and described the preferred embodiment of my invention, I wish it to be understood that I do not confine myself to the precise details of construction herein set forth by way of illustration, as it is apparent that many changes and variations may be made therein, by those skilled in the art, without departing from the spirit of the invention, or exceeding the scope of the appended claims.

I claim:

1. A mold construction comprising a mold body of high heat conductivity having a casting cavity, a water jacket for the mold body, a core extending into the casting cavity and having a shank which projects through the mold body and into the water jacket, and means to effect a constant seal between the core and the mold body whereby leakage of water into the mold cavity by spaces effected by the different coefficients of expansion of the mold body and core is prevented.

2. A mold construction comprising a mold body having a casting cavity therein, a water jacket for the mold body, a core extending into the cavity and provided with a shank which extends through an aperture in the mold body into the water jacket, and means to effect a constant seal between the core and the mold body whereby leakage of water into the mold cavity by spaces effected by the different coefficients of expansion of the mold body and core is prevented.

3. A mold construction comprising a mold body having a casting cavity therein, a water jacket for the mold body, a core extending into the cavity and provided with a shank which extends through an aperture in the mold body into the water jacket, a compressible packing element surrounding the shank where it enters the water jacket, and spring means exerting tension on the shank and compressible packing element to prevent the leakage of water from the jacket into the cavity.

4. A mold construction comprising a mold body having a casting cavity therein, a water jacket for the mold body, a core extending into the cavity and provided with a shank which extends through an aperture in the mold body into the water jacket, a compressible packing element surrounding the shank where it enters the water jacket, a helical spring surrounding the shank and exerting tension on the shank, and a compressible packing element to afford a leak-proof union thus preventing the seepage of water from the water jacket into the cavity, and means to vary the tension of said helical spring.

5. A mold construction comprising a mold body having a casting cavity, a water jacket for the mold body, a core extending into the casting cavity and provided with a shank, an aperture in the mold body communicating with the casting cavity and the water jacket through which said shank extends, a compressible packing element around the shank where it extends into the water jacket, a helical spring surrounding the shank,

a washer against which one end of the spring bears, the other end bearing against the compressible packing element whereby tension is exerted on the shank and packing element to afford a leak-proof union thus preventing leakage of water from the water jacket into the casting cavity, and means attached to said shank to vary the tension of the spring.

6. In a permanent metal mold, a pair of mold parts cooperating to define therebetween a casting cavity, a water jacket for each of said mold parts, an aperture in one of said mold parts extending from the casting cavity to the water jacket, a core extending into the casting cavity and having a shank which extends through the aperture and projects into the water jacket, said aperture having a diameter slightly larger than the diameter of the shank whereby the core may expand and contract without producing strains, a compressible packing element surrounding the shank where it enters the water jacket, and spring means exerting tension on the shank and compressible packing to prevent the leakage of water from the water jacket into the casting cavity.

7. A mold construction comprising a mold body of high heat conductivity having a casting cavity therein, a water jacket for the mold body, a core extending into the casting cavity and provided with a shank which extends through an aperture in the mold body into the water jacket, a compressible packing element surrounding the shank where it enters the water jacket, and spring means exerting tension on the shank and compressible packing element to prevent the leakage of water from the water jacket into the casting cavity.

8. A mold construction comprising a mold body of high heat conductivity having a casting cavity formed therein, a water jacket for the mold body, a core element extending into the casting cavity and formed with a shank which extends through an aperture in the mold body into the water jacket, a compressible packing element surrounding the shank where it extends into the water jacket, a helical spring surrounding the shank, a washer against which one end of the spring bears, the other end of said spring bearing against the compressible packing element whereby tension is exerted on the shank and packing element to afford a leak-proof union preventing leakage of water from the water jacket into the casting cavity.

HENRY E. McWANE.