March 21, 1939. H. E. McWANE 2,151,131

CASTING APPARATUS

Filed Oct. 15, 1934

FIG. 1.

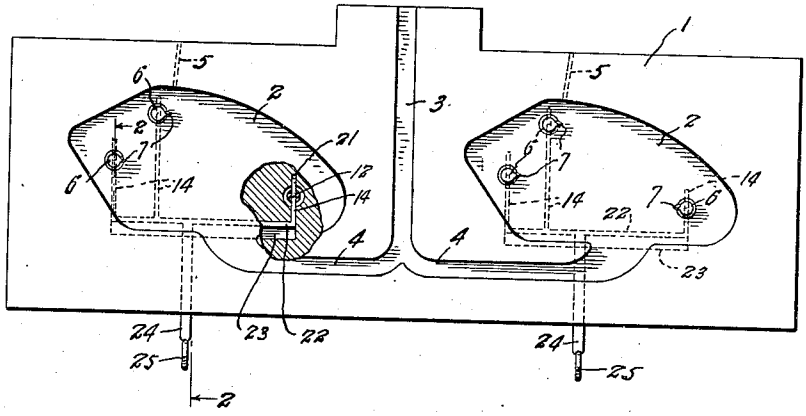


FIG. 2.

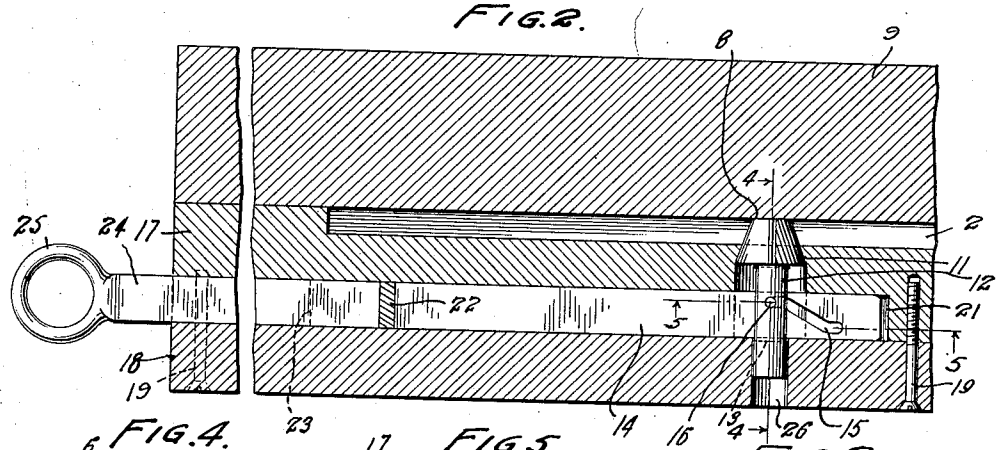


FIG. 4.

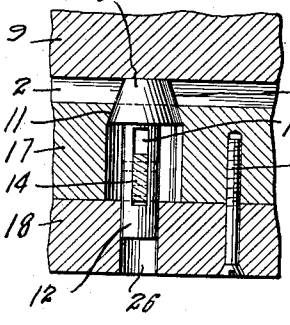


FIG. 5.

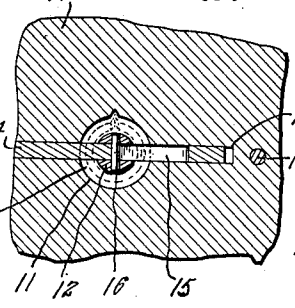
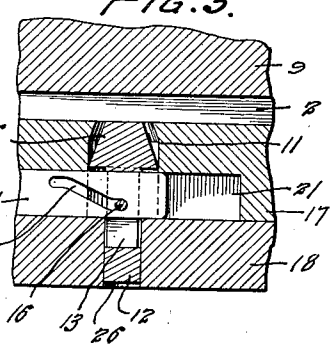


FIG. 3.



Inventor

HENRY E. McWANE

By Semmes & Semmes

Attorneys

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UNITED STATES PATENT OFFICE

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CASTING APPARATUS

Henry E. McWane, Lynchburg, Va.

Application October 15, 1934, Serial No. 748,406

3 Claims. (Cl. 22—136)

This invention relates to casting, and more particularly has reference to a mold and core therefor. The present device is related in some respects to the invention disclosed in my copending application Serial No. 748,124 filed October 12, 1934.

Certain difficulties have been encountered in the use of cores of the prior art. As is well known, a casting during solidification and cooling shrinks to a certain extent, and, particularly if this is impeded, stresses and strains are set up in the casting which frequently result in cracks and other imperfections in the finished casting. A core that is not free to move during such period of shrinkage is of course to be avoided, but even in those cores which are freely movable there reside certain objections. These cores are not usually of the permanent type, thus necessitating the formation of a new core for each operation. Furthermore, the prior cores, whether permanent or destructible, require the accurate positioning of the core in the mold cavity, for otherwise the apertures or recesses formed by the cores in the finished casting will not be uniformly placed. The accuracy of such positioning depends upon the skill of the operator, and appreciable losses have resulted from careless placing of the core in the mold cavity.

To overcome the above disadvantages is one of the objects of my invention.

Another object of my invention is to provide a core that is inexpensive to manufacture and which is capable of operation over a long period of time.

Yet another object of my invention is to provide a movable core which thereby permits of the free shrinkage of the casting, and which is quickly returned to a uniform position in the mold cavity for the succeeding pouring operation.

To accomplish the above and other important objects as will more fully appear herein, my invention in general comprises a core that may be moved and which permits the free shrinkage of the casting, in association with means whereby the core may be positively and accurately returned to the desired position for a succeeding pouring operation.

To aid in understanding my invention, reference is made to the accompanying drawing which discloses one specific embodiment, it being distinctly understood, however, that various modifications may be made therein without exceeding the scope of my invention as defined by the appended claims.

In the drawing, in which corresponding numerals refer to the same parts:

Figure 1 is a top view of a mold section of my invention partly in plan and partly cut away.

Figure 2 is a sectional view along the line 2—2 of Fig. 1, looking in the direction of the arrows, and showing the core in extended position.

Figure 3 is a fragmentary view of Fig. 2, showing the core in retracted position.

Figure 4 is a sectional view along the line 4—4 of Fig. 2, looking in the direction of the arrows.

Figure 5 is a sectional view along the line 5—5 of Fig. 2, looking in the direction of the arrows.

While my invention is by no means limited thereto, I shall describe it in connection with the casting of a plate-like member in which it is desired to provide apertures, such as, for instance, a plow plate containing bolt holes.

In Fig. 1 I have shown the lower half 1 of a mold in which a pair of castings may be cast. The section 1 is provided with mold cavities 2 which may be filled through main runner 3 and branches 4. Risers 5 may be provided as necessary.

Cores designated generally 6 are arranged in the cavity for the purpose of forming bolt holes or other apertures or recesses therein. If round or conical bolt holes are desired, a rib 7 may be provided upon the core in order to provide a channel in the bolt hole which is adapted to receive a rib upon the bolt head.

In Fig. 2 I have shown the core of frusto-conical shape, but it will of course be appreciated that it may be frusto-pyramidal or certain other shapes. The top of the core 8 is preferably flat, and, when it is desired to have an aperture extending through the casting, the top 8 is adapted to bear against the upper half 9 of the mold.

When in extended position the core is seated in a tapered channel 11 which opens into the mold cavity. It will be appreciated that an accurate seating of the core at a uniform place in the mold is therefore always assured.

Secured to the base of each core is a stem 12 which is preferably, though not necessarily, cylindrical. As best shown in Fig. 4, the stem 12 is provided with a transverse slot 13. As also shown in Fig. 4, an arm 14 is adapted to extend through the slot 13. The arm 14 is provided with a cammed slot 15 which is adapted to receive a pin 16 extending through the stem 12.

It will therefore be appreciated that longitudinal movement of arm 14 raises or lowers the core 6.

The lower half 1 of the mold is preferably

made up of a main section 17 in which the mold cavity 2 is formed and a lower section 18 adapted to be secured to the body portion 17 by screws 19 or other suitable fastening means.

A channel 21 is formed in the body portion and is adapted to receive and permit the sliding therein of arm 14. As best shown in Fig. 1, I have disclosed a plurality of cores 6 for which I provide a common operating means to raise and lower the core. In this figure it will be noted that all of the arms 14 are joined to a single cross bar 22 which is transversely reciprocable in a channel 23 formed in the body portion 17 of the mold. A single operating arm 24 is joined to the cross bar 22, and is provided at its end with a ring 25, or other suitable means for engagement by the operator. It will of course be appreciated that the channels 21 and 23 are formed to provide sufficient clearance to permit of the ready sliding of the arm 14 and cross bar 22.

While I have shown a single operating means for all of the cores, it is of course to be appreciated that each core may have its independent operating means if such should be desired for any reason.

The lower portion 18 of mold section 1 is provided with a channel 26 adapted to receive that part of stem 12 extending below the arm 14. The stem 12 is free to reciprocate in channel 26 upon extension or recession of the core, and the channel 26 therefore serves as a guide for the core and maintains the latter aligned at all times.

The operation of my device is believed to be obvious from the description. Prior to the pouring operation the arm 24 is pushed in, which in turn pushes in each of the arms 14. The cores 6 are thereby raised into their extended position in seat 11 by virtue of cammed slot 15 and the pin 16, which rides therein. As heretofore stated, in this position the top 8 of the core rests against the upper half 9 of the mold.

The molten metal is then poured into the mold cavity and fills the same except at those points at which the cores are located. Upon cooling, the metal solidifies and starts to shrink. As is well known, this shrinkage is accompanied by a withdrawal of the casting from the side walls of the cavity and by corresponding displacement of the apertures which were formed by the cores.

My invention is designed for the purpose of permitting such free displacement of the apertures. Immediately upon solidification of the casting, but prior to any shrinkage thereof, the arm 24 is pulled outwardly by the operator, and the cam slot 15 and pin 16 cause the core 6 to be withdrawn into the channel 11 so that the top 8 of the core is flush with the bottom of the mold cavity. When the core is in this position there can, of course, be unlimited shrinkage without any danger of the casting contacting with the core. It should be pointed out that any skilled and practiced operator can accurately estimate the moment at which the casting begins to shrink and can therefore operate the arm 24 accordingly.

After the casting has been removed, the cores are reset by merely pushing the arm 24 in.

The advantages of my invention are obvious. In the first place, the casting is free to shrink without being impeded by the core, thus preventing the imposition of stresses and strains in the casting and the possibility of cracks of other imperfections therein. Furthermore, I am enabled to use a permanent mold having a long life, and a plurality of such cores may be readily positioned within the mold cavity. Particularly to be noted is the fact that the cores are accurately seated in the mold at uniform places, and consequently each casting is assured of having the necessary apertures or recesses at the exact positions desired.

I have referred herein to a few modifications that may be made in my invention, but it will of course be obvious that various additional changes may be made without exceeding the scope of my invention as defined in the appended claims.

I claim:

1. A casting apparatus comprising a mold, a channel communicating with the mold cavity, a core slidable in the channel and adapted to extend therefrom into the mold cavity, a tapered seat for the core in said channel to determine the position of the core in the cavity, an arm reciprocable at right angles to the channel and provided with a cammed slot, a pin extending from the core through said slot, and means to reciprocate the arm to thereby slide the core in the channel.

2. In a mold construction embodying cope and drag members, a mold cavity in the drag, a channel communicating with the mold cavity, a core slidable in the cavity, a tapered seat for the core in said channel to determine the position of the core in the mold cavity, a second channel extending transversely of the drag member and in communication with said first channel, and an arm reciprocable in said second channel with respect to the core and provided with means cooperating with the core to slide the core in the first-mentioned channel.

3. In a mold construction embodying cope and drag members, a mold cavity in the drag, a channel communicating with the mold cavity, a core slidable in the cavity, a tapered seat for the core in said channel to determine the position of the core in the mold cavity, a second channel extending transversely of the drag member and in communication with said first channel, and an arm reciprocable in said second channel with respect to the core and provided with cammed means cooperating with the core to slide the core in the first-mentioned channel.

HENRY E. McWANE.