(No Model.)

W. G. RICHARDS.

MOLD FOR MAKING CASTINGS.

No. 459,047. Patented Sept. 8, 1891.

Fig. 1

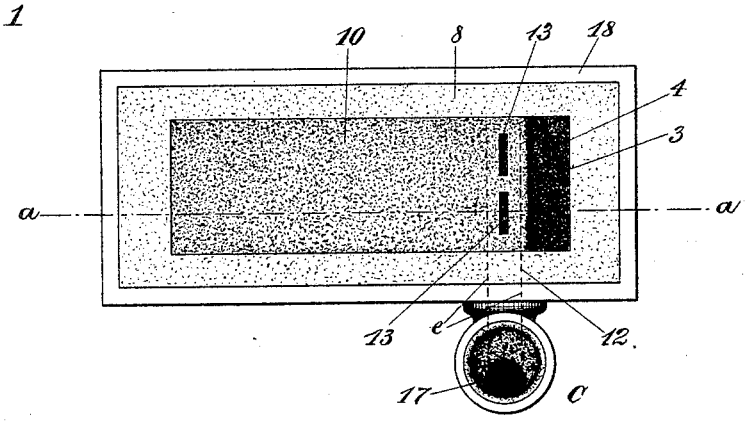


Fig. 2

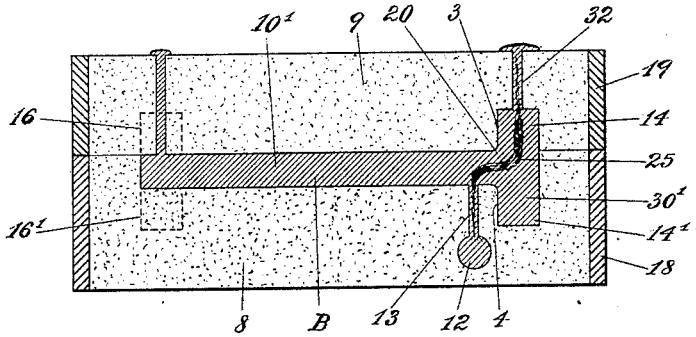
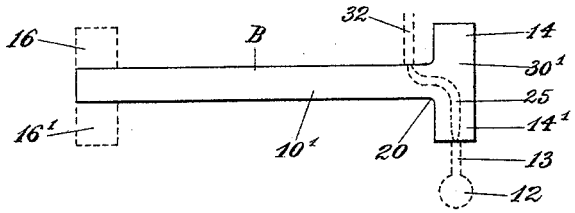


Fig. 3



Witnesses:
Henry L. Reckard.
H. Mallmer.

Inventor:
William G. Richards,
By his Attorney,
F. W. Richards

UNITED STATES PATENT OFFICE.

WILLIAM G. RICHARDS, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE AMERICAN STEEL WHEEL COMPANY, OF NEW JERSEY.

MOLD FOR MAKING CASTINGS.

SPECIFICATION forming part of Letters Patent No. 459,017, dated September 8, 1891.

Application filed April 11, 1891. Serial No. 388,438. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM G. RICHARDS, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Molds for Making Castings, of which the following is a specification.

This invention relates to molds for making castings by the process described and claimed in my prior application, Serial No. 369,296, filed October 25, 1890. The mold herein described is more especially designed for the making of steel castings by said process.

In the drawings accompanying and forming a part of this specification, Figure 1 is a plan view of the lower part or nowel of the mold. Fig. 2 is a vertical section in line *a a*, Fig. 1, of the complete mold, showing the mold-space filled, and illustrating also the carrying into practice of said process. Fig. 3 is a diagrammatic view drawn in projection with Fig. 2, showing a modification of the mold.

Similar characters designate like parts in all the figures.

The flask for containing the mold proper consists or may consist of the nowel-frame 18 and the cope-frame 19, constructed and combined substantially as in ordinary practice. The mold proper consists of the nowel 8 and the cope 9, set thereon, substantially as indicated in the drawings.

A suitable pouring-head (designated in a general way by C) is attached to one side of the mold at or near the base thereof and extends to a point at some elevation above the top of the mold. The main runner 12, through which the metal is conducted to a point adjacent to the under side of the mold-space, is formed in the nowel immediately under the said space and is supplied by the channel 17 of the pouring-head, which extends downward and connects with said horizontal runner, as indicated by dotted lines at *e* in Fig. 1. However, the particular mode and means for supplying the molten metal to the main runner is not essential to the principal features of my present invention.

The mold-space, which is formed, as usual, in or between the nowel and cope, consists of the space 10 (see Fig. 1) for the principal part—as the plate or bar—of the casting, and the flange-space or head-space 30 for the flange or like projecting part of the casting. In Fig. 2, the mold-space there being shown filled with metal, said spaces are designated by 10′ and 30′, respectively, and refer to the filled mold-spaces, or alternatively to the casting or metal in said spaces, the whole casting being designated in a general way by B. The main runner 12 communicates with the mold-space through one or more mold-filling passages, as 13, which branch off from the main runner at suitable distances apart, and are preferably of smaller cross-sectional area. As shown in Figs. 1 and 2, the said passage or passages 13 enter the mold-space adjacent to the "plate-and-flange juncture," which is at 20, Figs. 2 and 3.

The cope of the mold is or may be vented in the usual manner for the escape of gases, and has over the flange-space 30 one or more overflow-passages, as 32, through which any surplus of metal may escape, and whereby, after the mold has been filled, a stream of metal 25 may be maintained for suitably continuing the "through-flowing" of the plate-and-flange juncture during the contraction of the plate portion 10′ of the casting.

The casting shown in the mold-space in Fig. 2 consists of the plate or bar 10′, having at one end thereof the upper and lower flanges 14 14′; but either one of said flanges may obviously be omitted without thereby affecting the essential features of my present improvement. In some cases one or more flanges or projections, as shown by dotted lines at 16 16′, Figs. 2 and 3, are formed at the end of the mold opposite to the main runner. When the mold, it being of the construction described, is filled with molten iron or steel, the said flanges 14 and 16 are drawn by the shrinkage of the plate 10′ forcibly against the shoulders 3 and 4 of the mold, thereby causing a longitudinal tension in the plate, tending to rupture the same at the weakest point thereof, which point will naturally be the point where the plate retains its heat the longest.

In the making of steel castings the molds employed, in order to resist the intense cutting action of the white-hot metal, are neces-

sarily formed of firm material, while on the other hand the steel, owing to its peculiar physical character, is without much strength at the moment of its greatest shrinkage, so that on the solidifying of the plate 10′ said plate is naturally ruptured at or near the plate-and-flange juncture. To overcome this breakage, I fill the mold and feed the casting by a method in which the plate-and-flange juncture is through-flowed during the contraction of the plate, whereby said space or separation is refilled as fast as formed, thus in effect lengthening the plate to counteract the shrinkage thereof, as more fully set forth in my aforesaid application. This operation of flooding or through-flowing the plate-and-flange juncture and thereby overflowing the flange during the shrinkage of the plate is shown in Fig. 2 by the representation at 25 of a stream of metal which passes from the main runner 12 through the mold-filling channel 13, traverses the plate-and-flange juncture at 20, passes through the interior of the flange, and escapes by an overflow through the cope-vent 32. In passing from the plate into the upper part of the flange said current 25 reaches to the pipe-forming region of the flange, and thus prevents piping in the through-flowed flange.

In molds of the particular form shown in Figs. 1 and 2, wherein the plate-space is of considerable width and has a flange along one side or end thereof, the main runner 12 should extend along adjacent to the flange and be connected with the plate-space through a series of mold-filling passages which are adjacent or contiguous, substantially as shown, to the place of the plate-and-flange juncture. This is illustrated in Fig. 1, where the dotted lines *e* represent the main runner as extending nearly across the mold-space and have a series of (two or more) mold-filling passages extending in a line substantially parallel to said plate-and-flange juncture.

In Fig. 3 is shown a modification of the mold shown in Figs. 1 and 2, the modification consisting in the change of direction of the mold-filling current, which here enters the lower side of the flange-space, passes from the flange-space through the plate-and-flange juncture into the plate-space, and escapes through the vent-passage 32, here shown extending upward from the plate-space; but it is evident that the nature of the process and of the mold for carrying the same into practice is not essentially modified. The action of the feed-current through the plate juncture is more effective when its direction is toward the flange; but in some cases it is deemed practicable to have it run in the opposite direction, as indicated in Fig. 3, where the passage 13 is connected with the lower edge of the flange-space.

In pouring the mold the mold-filling current is continued to "feed" the casting, the final overflow being, according to the well-known law of the flow of fluids, in the direction of least resistance. For this reason the mold-filling passage is made adjacent or contiguous to the plate juncture, since at the latter stages of the casting operation this arrangement effectually prevents overflowing the opposite end of the mold.

The term "plate-space" is used herein in a strictly technical sense and refers to the mold-space 10′, (usually formed horizontal,) whether the same be broad and in the form commonly known as a "plate" or whether it be narrow or of irregular cross-sectional outline and of the form commonly designated as a "bar." In like manner the term "flange" is used in a strictly technical sense of a flange-head or other projecting part branching or extending laterally of the general direction of the plate-space, for it is obvious that the nature of the process described in my aforesaid application is not affected by mere variations in the form of the plate-space or flange-space, and that similarly my present invention is not limited to said particulars.

Having thus described my invention, I claim—

1. In a mold, the combination, with the nowel having the main runner, of the vented cope, the nowel and cope having formed therein the mold-space consisting of the plate-space and flange-space, said main runner communicating with the mold-space adjacent to one side of the plate-and-flange juncture and the cope-vents communicating with the mold-space on the opposite side of said juncture, whereby said juncture may be through-flowed during the contraction of the plate of the casting, substantially as described.

2. In a mold, the combination, with the nowel having the main runner, of the vented cope, the nowel and cope having formed therein the mold-space consisting of the plate-space and flange-space, said main runner communicating with the plate-space adjacent to the plate-and-flange juncture and the cope-vents communicating with the mold-space on the opposite side of said juncture, whereby said juncture may be through-flowed during the contraction of the plate of the casting, substantially as described.

3. In a mold, the combination, with the nowel having the main runner, of the vented cope, the nowel and cope having formed therein the mold-space consisting of the plate-space and a flange-space, substantially as described, extending along one edge of the plate-space, said main runner communicating with the plate-space through a series of passages opening thereinto and extending alongside of the plate-and-flange juncture, and the cope-vents communicating with the mold-space on the opposite side of said juncture, substantially as described.

WILLIAM G. RICHARDS.

Witnesses:
D. P. MINER,
W. E. MUMFORD.