Nov. 17, 1953 R. EASTON ET AL 2,659,121

POURING BOX FOR CONTINUOUS CASTING MACHINES

Filed June 5, 1952

Fig. 1.

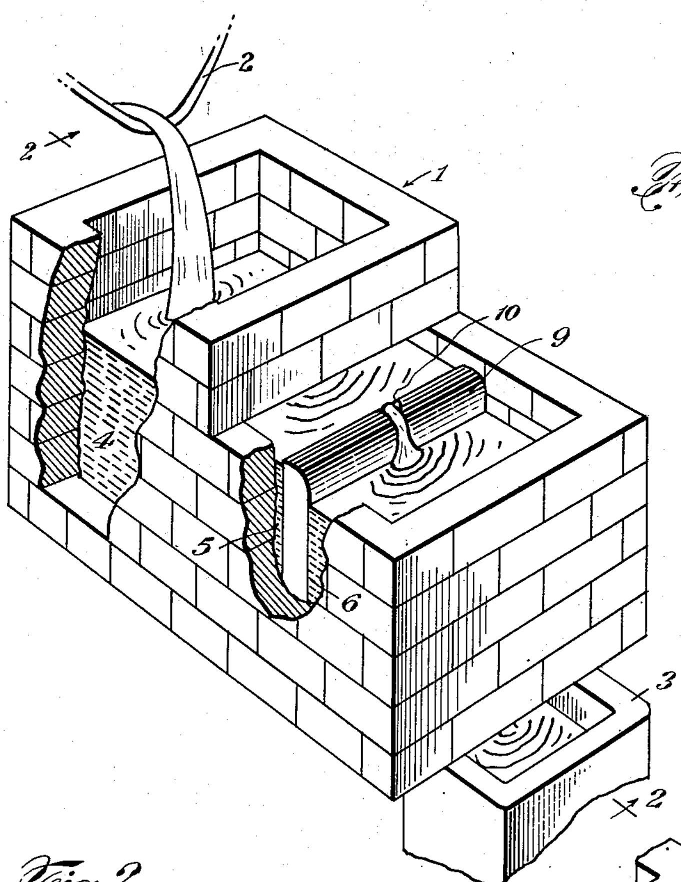


Fig. 2.

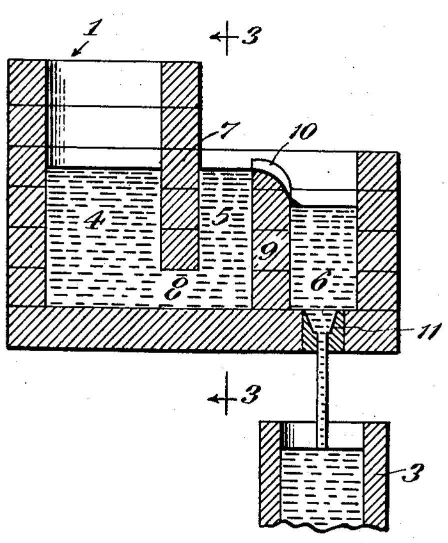
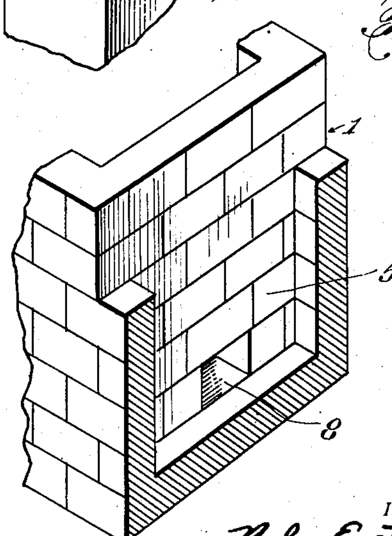


Fig. 3.



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POURING BOX FOR CONTINUOUS CASTING MACHINES

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3 Claims. (Cl. 22—79)

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This invention relates to the continuous casting of metals and pertains particularly to pouring boxes for controlling the flow of molten metal to the casting mold.

In the continuous casting of metals, and particularly in casting steel, the manner in which the molten metal is introduced into the mold influences the quality of the casting. It has been found, for example, that incorrect position or direction of the inflowing stream of molten metal may cause it to wash against the metal which is solidifying in contact with the mold wall. This sometimes causes the solidifying metal to remelt, resulting in bleeding of molten metal to the outside of the casting. If the velocity of the inflowing metal is high or is such as to cause turbulence of the pool of molten metal at the top of the mold, bubbles of gas and oxides, slag or dirt floating on the surface of the molten metal may be entrapped, causing holes and inclusions in the casting. Also, excessive velocities or uneven velocities may produce piping in the castings.

In the continuous casting of non-ferrous metals and alloys, the preferred method of pouring molten metal into the casting mold avoids these difficulties, for in such cases, the metal is poured through a tubular conduit or spout having its upper end connected to a source of metal supply such as a holding furnace and having its lower end projecting into the casting mold, usually below the level of the molten metal therein.

In casting steel, however, it has been found to be difficult to provide a conduit which will withstand the temperatures of molten steel, and pouring methods involving a free drop of molten metal from a ladle or other container have been employed. It is in such cases that the aforementioned difficulties arise.

It is an object of the present invention to provide a pouring box, particularly adapted for use in the continuous casting of steel, in which, despite a free drop of molten metal from the pouring box to the mold, the position and direction of the metal stream remain the same regardless of the rate of pouring.

It is a further object of the invention to provide a pouring box which will deliver molten metal to the casting mold at low velocity and with a minimum of turbulence.

It is a further object of the invention to provide a pouring box in which the velocity of the stream may be quickly and easily controlled and adjusted to conform to the rate of withdrawal of the solidified casting.

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Other objects and advantages of the invention will appear hereinafter.

A preferred embodiment of the invention selected for purposes of illustration is shown in the accompanying drawings, in which,

Figure 1 is a perspective view.

Figure 2 is a section on the line 2—2 of Figure 1.

Figure 3 is a section on the line 3—3 of Figure 2.

Referring to the drawings, the pouring box, indicated generally by numeral 1 is located between a source of molten metal supply such as a furnace 2 and the casting mold 3, the furnace, pouring box and mold being at successively lower levels so that the molten metal may flow by gravity from one to the other. While a furnace is here indicated as the source of supply, it will be understood that molten metal could be supplied otherwise, as by ladles, for example.

The pouring box is preferably built up of refractory blocks, as shown, and may be lined with a suitable refractory lining in accordance with standard practice. The outside may, if desired, be insulated or encased in any suitable manner. The box comprises three communicating chambers or reservoirs 4, 5 and 6, the main or receiving reservoir 4 being considerably larger than either of the others. The reservoir 4 is separated from the reservoir 5 by a wall 7 having an aperture 8 at the bottom thereof through which molten metal may flow into reservoir 5. The wall 7, however, holds back any slag, dirt, oxides or other impurities on the surface of the pool of metal in reservoir 4.

The metal in the reservoir 5 will always assume the level of the reservoir 4 due to the communication through the aperture 8, and in operation, with metal being supplied to reservoir 4 from the furnace, the level of metal in reservoirs 4 and 5 will be determined by the dam 9 interposed between reservoirs 5 and 6. Said dam has a substantially V-shaped notch 10 formed in its upper lip through which metal overflows from reservoir 5 into reservoir 6.

The bottom of reservoir 6 is provided with a pouring aperture 11 through which molten metal flows directly from reservoir 6 into the upper end of the casting mold 3. Preferably the aperture 11 is a vertically disposed cylindrical passage through which the metal flows smoothly and easily into the casting mold. The mold is arranged immediately beneath the bottom of reservoir 6 so that the free drop of the metal need only be a few inches. The mold may be accurately centered beneath the pouring aperture so that the inflowing metal is deposited in the center of the mold.

The diameter of the pouring aperture is calculated to provide for flow of molten metal at approximately the desired rate, i. e. to equal the rate of withdrawal of solidified metal, and in practice, the depth of the head of molten metal in the reservoir **6** is varied to effect whatever adjustment may be required to bring the two into exact conformity. The pouring box of the present invention makes possible very accurate and sensitive control, for the lip pouring arrangement through the notch **10** permits large variation in flow with only very slight variation in head in the reservoirs **4** and **5**. For example, an increase of one-half inch in head in the reservoirs **4** and **5** will increase the head in reservoir **6** at least six inches in a matter of minutes, thus quickly increasing the rate of flow through the pouring aperture **11**. In practice, the level of molten metal in the mold is visible to the operator as well as the level in the reservoir **6**. By observing these, excellent control is possible.

It will be understood that the invention may be variously modified and embodied within the scope of the subjoined claims.

We claim as our invention:

1. A pouring box for controlling the flow of molten metal to a casting mold, comprising, a refractory container unit having three communicating reservoirs therein, said container unit having no moving parts, one of said reservoirs being a receiving reservoir into which metal is poured, said reservoir being separated from the second reservoir by a refractory wall having an aperture in the bottom thereof to provide communication between said reservoirs, said second reservoir being separated from the third reservoir by a dam having a lip over which metal flows from the second reservoir into the third, and said third reservoir having a pouring aperture in the bottom thereof the flow of metal from one reservoir to another being solely due to differences in metal level which may exist in said reservoirs at any time as a result of metal being poured into said first reservoir, and the rate of flow of metal from said third reservoir being determined solely by the metal level existing in said third reservoir.

2. Apparatus as claimed in claim 1 in which the lip of the dam is provided with a V-shaped notch through which metal flows into the third reservoir.

3. Apparatus as claimed in claim 1 in which said pouring aperture is a vertically disposed cylindrical passage.

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References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
2,130,202	Tama	Sept. 13, 1938
2,140,607	Thompson	Dec. 20, 1938
2,195,071	Bahney et al.	Mar. 26, 1940
2,284,704	Welblund et al.	June 2, 1942
2,290,083	Webster	July 14, 1942
2,310,635	Hopkins	Feb. 9, 1943
2,527,545	Goss	Oct. 31, 1950
2,568,525	Waddington et al.	Sept. 18, 1951