

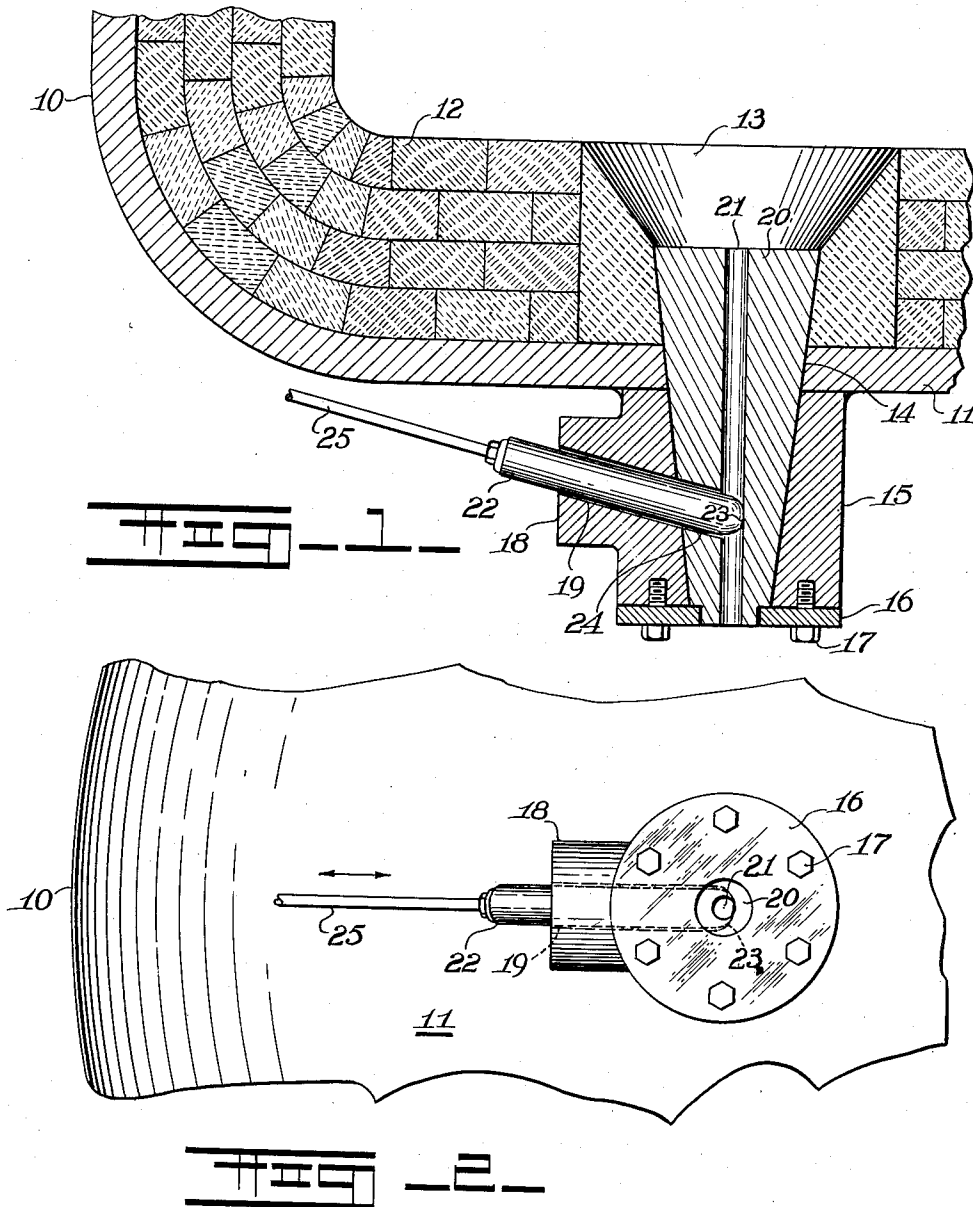
Jan. 17, 1961

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2,968,075

HOT METAL VALVE

Filed Oct. 1, 1958



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2,968,075

HOT METAL VALVE

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Filed Oct. 1, 1958, Ser. No. 764,563

2 Claims. (Cl. 22—84)

This invention relates to a hot metal valve applied to a ladle.

The principal object of the invention is the provision of a hot metal valve for a ladle and incorporating replaceable valve members.

A still further object of the invention is the provision of a hot metal valve for a ladle and providing a valve element movable into and out of a hot metal passageway.

A still further object of the invention is the provision of a valve structure for a ladle in which the valve element may be replaced during a pouring operation.

A still further object of the invention is the provision of a valve structure for a hot metal ladle incorporating a carbon nozzle and a carbon plug arranged to enter the said nozzle transversely thereof so as to close a passageway therethrough.

The hot metal valve disclosed herein comprises an improvement in the art of controlling the flow of molten metal from a ladle. Many and various structures have been proposed for this purpose, some of which have been useful for a limited time. The heat and weight of the molten metal in the ladle tend to rapidly destroy the valve elements used for controlling the flow of the molten metal. The weight of the metal in a ladle requires that the valve structure be durable while the temperature of the molten metal requires that it be capable of withstanding the same without softening and losing its ability to control the pouring orifice. The present disclosure provides that the ladle be lined with a refractory brick, as customary, with a pocket brick positioned over the pouring orifice in the ladle and a nozzle disposed partially within the pocket brick and extending through the pouring orifice of the ladle and therebelow so that a plug valve element disposed at an angle to the passageway in the nozzle may be removed into and out of the passageway to control the flow of molten metal therethrough. The valve structure comprising the nozzle and the plug valve element are formed of carbon capable of withstanding the temperatures of the molten metal as well as the weight thereof and the valve structure is such that only a very small portion of the movable plug valve element is subjected to the action of the molten metal and/or its weight.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being the intention to cover all changes and modifications of the example of the invention herein chosen for purposes of the disclosure, which do not constitute departures from the spirit and scope of the invention.

The drawing is illustrated in the accompanying drawing, wherein:

Figure 1 is a cross sectional elevation of a portion of a hot metal ladle with a hot metal valve therein.

Figure 2 is a partial view of the bottom of the hot metal ladle and valve shown in Figure 1.

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By referring to the drawings and Figure 1 in particular it will be seen that a hot metal ladle 10 is provided with a bottom portion 11 and a lining of refractory brick 12. A pocket brick 13 is disposed in the ladle 10 on the bottom 11 and in registry with an orifice 14 in the bottom 11. A nozzle frame 15 is secured to the bottom 11 of the hot metal ladle 10 and has a vertical passageway therethrough in registry with the orifice 14. A plate 16 is removably secured to the lower end of the nozzle frame 15 by a plurality of fasteners 17 as best illustrated in Figure 2 of the drawings. The nozzle frame 15 has a sideward extension 18 and an angularly disposed opening 19 is formed through the nozzle frame 15 and the extension 18 as best seen in Figure 1 of the drawings.

A nozzle 20 having a passageway 21 axially thereof is formed in a conical shape and disposed in the area defined by the pocket brick 13, the orifice 14 and the nozzle frame 15. The lower most end of the nozzle 20 engages the plate 16.

The nozzle 20 is formed of dense hard carbon capable of withstanding the weight and the heat of molten metal in the ladle 10. A plug valve element 22 comprising an elongated cross sectionally circular member having a rounded forward end 23 is movably mounted in the angularly disposed opening 19 and in a registering angularly disposed secondary opening 24 in the nozzle 20 so that the rounded end 23 moves into and blocks the passageway 21 in the nozzle 20. An operating rod 25 is connected to the plug valve element 22 and extends outwardly therefrom and provides means by which the plug valve element may be moved. The plug valve element 22 is formed of dense hard carbon capable of withstanding the weight and temperature of the molten metal in the ladle 10.

In operation the plug valve element is positioned as shown in Figures 1 and 2 of the drawings wherein the inner end 23 thereof effectively blocks the passageway 21 through the nozzle 20. It will be observed that the diameter of the plug valve element 22 is double the diameter of the passageway 21 in the nozzle 20 so that the molten metal in the passageway 21 and the nozzle 20 is in direct contact with a relatively small portion of the plug valve element 22. When metal is poured the plug valve element 22 is moved in the openings 19 and 24 and outwardly thereof to bring the rounded end 23 of the plug valve element out of the passageway 21 in the nozzle 20.

It will be seen that in the event replacement of the plug valve element is necessary it can be easily replaced during the pouring operation and it will also be seen that deterioration of the nozzle 20 and the plug valve element 22 will be comparable in rate due to the relative sizes and areas thereof exposed to the action of the hot metal.

It will thus be seen that a hot metal valve has been disclosed which meets the several objects of our invention and having thus described our invention, what we claim is:

1. A hot metal valve for a ladle including a nozzle frame secured to the ladle and having a vertically disposed opening therein, a nozzle disposed within said vertical opening in said nozzle frame said nozzle having an axially disposed hot metal passageway therein, a secondary passageway in said nozzle angularly disposed with respect to said hot metal passageway and being circular in cross section throughout its length and extending from the hot metal passageway outwardly to the side of the nozzle, an angularly disposed passageway in said nozzle frame disposed in alignment with said secondary passageway in said nozzle, an elongated solid plug valve circular in cross section rotatably and reciprocally movable in

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said angular disposed passageways in said nozzle frame and nozzle and movable into and out of said hot metal passageway to restrict flow of hot metal therethrough, the diameter of said plug valve being at least twice the diameter of said hot metal passageway in said nozzle so as to allow closure of said passageway by rotary and reciprocatory movement of the plug valve, and means for actuating said valve.

2. The hot metal valve as set forth in claim 1, wherein the nozzle and plug valve are formed of carbon and wherein an apertured plate is secured to the bottom of

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said nozzle frame engaging the bottom of said nozzle and defines a secondary pouring orifice.

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