J. E. McCULLOUGH.

LADLE NOZZLE PROTECTING DEVICE.

APPLICATION FILED JUNE 25, 1921.

1,406,746. Patented Feb. 14, 1922.

Fig. 1.

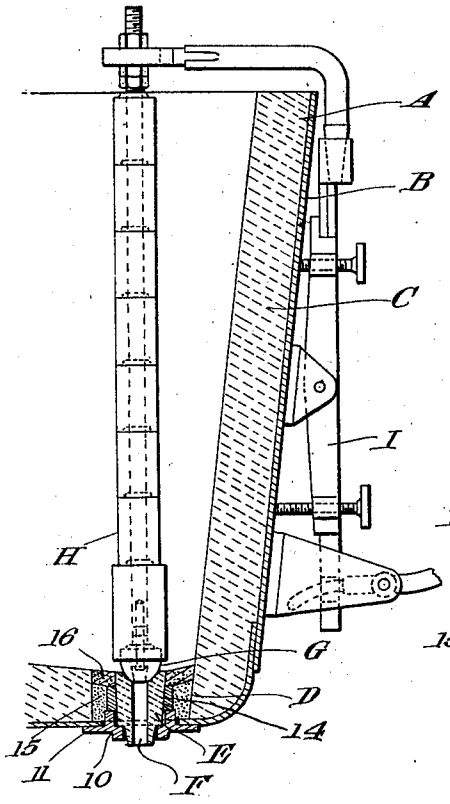
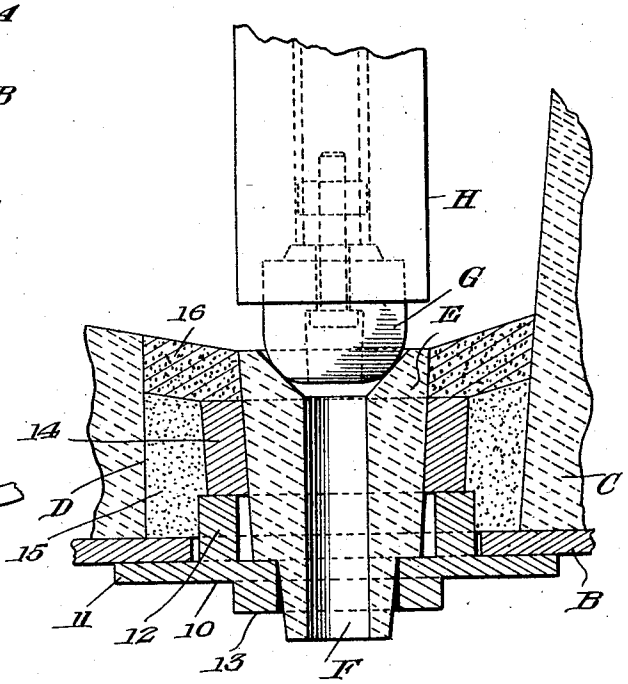


Fig. 2.



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WITNESS:

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LADLE-NOZZLE-PROTECTING DEVICE.

1,406,746. Specification of Letters Patent. Patented Feb. 14, 1922.

Application filed June 25, 1921. Serial No. 480,355.

To all whom it may concern:

Be it known that I, JOHN E. McCULLOUGH, a citizen of the United States, residing at Maywood, in the county of Cook and State of Illinois, have invented new and useful Improvements in Ladle-Nozzle-Protecting Devices, of which the following is a specification.

This invention relates to the metallurgical art, particularly to devices for handling molten metal, and has for its object the provision in a ladle provided with a pouring nozzle, of means associated with the usual refractory discharge nozzle whereby to conduct away from the nozzle the excessive heat which might cause injury thereto.

In the art of melting and casting metal, it is well known that the usual pouring nozzles, which are formed of refractory material, frequently becomes damaged by the high temperatures to which they are subjected so that the usual stopper member associated therewith fails to seat properly and the molten metal consequently leaks out. It is with this fact in view that the present invention has been designed, this present invention contemplating the use of metallic members associated with the refractory discharge nozzle whereby to conduct away therefrom the heat so as to form an adequate protection for the nozzle which will tend to prevent its breaking down at an early period in its life.

An additional object is the provision of a device of this character which will be simple and inexpensive in manufacture and installation, a great labor and expense saver and a general improvement in the art.

With the above and other objects and advantages in view, the invention consists in the details of construction to be hereinafter more fully described and claimed, and illustrated in the accompanying drawings, in which:

Figure 1 is a longitudinal sectional view through a ladle having my invention applied thereto, and

Figure 2 is an enlarged sectional view through the discharge nozzle and the associated parts.

Referring more particularly to the drawings the letter A designates a pouring ladle in general consisting of the usual metallic shell B lined by fire brick C. At some convenient point in its bottom this ladle is formed with an opening D with which is associated my novel discharge nozzle and associated parts. The letter E designates the discharge nozzle proper which is formed of the refractory material and which is provided with a longitudinal bore F having its upper end adapted to be closed by a stopper member G carried by the lower end of an operating rod device H which has operating means indicated broadly by the numeral I located exteriorly of the ladle. The present invention is not concerned at all with the means for operating the discharge mechanism so as to elevate the rod member H for lifting the valve or stopper G out of engagement with its seat in the nozzle E. Under ordinary conditions it has been found in actual practice that this nozzle E of refractory material breaks down so that the stopper G does not seat properly at the upper end thereof so as to cut off the flow of molten metal and the molten metal consequently leaks out through the nozzle.

In carrying out my invention I make the hole D of considerably larger diameter than the diameter of the nozzle E and I secure against the underside of the steel shell of the ladle a circular plate 10 including a flanged portion 11 bearing against the underside of the metallic cover of the ladle, and further including an upwardly extending flange 12 which is disposed within the opening D and which is designed to engage against the outer periphery of the nozzle, and which also includes an outwardly extending flange 13 having an opening of less diameter than the diameter of the inside of the flange 12, this latter mentioned flange 13 extending downwardly below the bottom of the flanged portion 11 and engaging against the reduced lower end of the nozzle. I also make use of a ring member 14 which is likewise constructed of metal and which is disposed upon the upper edge of the flange 12 in contact with the periphery of the nozzle E. Disposed within the opening D is a mass 15 of sand which extends to a point at the level of the top of the flange 14 and disposed upon the top of the flange 14 and the mass 15 of sand is a similar mass 16 of fire clay mixed with sand. While I have specified sand and a mixture of sand and fire clay it is of course to be understood that any suitable insulating material might be used in these two particular locations provided always that the ring member having the various flanges thereon and the ring member 14 be

employed, both of these elements contacting with the nozzle.

In the use of a ladle having its discharge nozzle equipped with my invention it will be apparent that the operation is exactly the same as in the operation of any other device of this character except that the provision of the metallic member 10 and the ring member 14 insures the conduction of the heat at the nozzle away from the nozzle so that the nozzle will be protected against the extremely high temperatures which are bound to exist in ladles of this character so that disintegration or damage to the nozzle will be prevented which might result, and which actually in practice does result, in breaking down of the nozzle so that the stopper usually associated therewith becomes more or less inoperative and permits leakage of molten metal.

While I have shown and described the preferred embodiment of my invention, it is of course to be readily understood that I reserve the right to make such changes in the form, construction and arrangement of parts as will not depart from the spirit of the invention or the scope of the subjoined claims.

Having thus described my invention what is claimed is:—

1. In combination with a molten metal ladle including an outer metallic shell lined with fire brick and also including a discharge nozzle of refractory material located in its bottom portion and projecting beyond the bottom, a metallic member disposed in encircling relation to the projecting portion of the nozzle and contacting with the metallic shell of the ladle, said metallic member being formed with an upwardly extending flange, and a ring member embedded within the lining of the ladle in contact with the nozzle and engaging the top of said flange.

2. In combination with a molten metal ladle including an outer metallic shell lined with fire brick and also including a discharge nozzle of refractory material located in its bottom, a metallic member disposed in encircling relation to said nozzle and contacting with the lower surface of the outer metallic shell of the ladle, an upwardly extending flange formed on said metallic member and arranged in spaced relation to the nozzle, and a ring member of metal embedded within the lining of the ladle in contacting relation to said nozzle and engaging upon said flange.

3. In combination with a molten metal ladle including an outer metallic shell lined with fire brick, also including a discharge nozzle of refractory material located in its bottom; a metallic member disposed in encircling relation to the portion of the nozzle which projects below the ladle; said metallic member contacting with the metallic shell of the ladle, and a ring member embedded within the lining of the ladle and contacting with the nozzle and also contacting with said first named metallic member.

4. In combination with the discharge nozzle located in the bottom of a molten metal ladle including a metallic shell lined with heat resisting material; protecting means for the nozzle comprising a metallic plate member disposed in encircling relation to the portion of the nozzle which projects beyond the bottom of the ladle, said metallic plate member bearing against the outer side of the bottom of the metallic shell of the ladle and further including an upwardly extending flange contacting with the nozzle, the opening within which said nozzle is disposed being of considerably greater diameter than the nozzle, a metallic ring member encircling the nozzle in contact therewith and disposed upon the top of said flange, and masses of insulating material surrounding said ring member, said flange and terminating at their upper surfaces at the bottom of the lining of the ladle.

In testimony whereof I affix my signature.

JOHN ELWOOD McCULLOUGH.