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STOPPER FOR A LADLE OR SIMILAR RECEPTACLE

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Fig. 1.

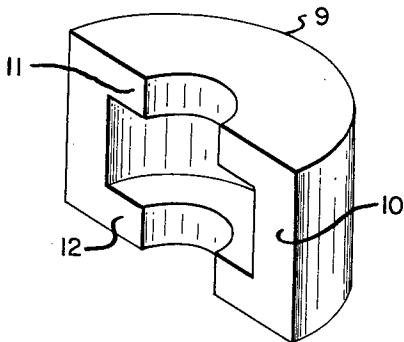
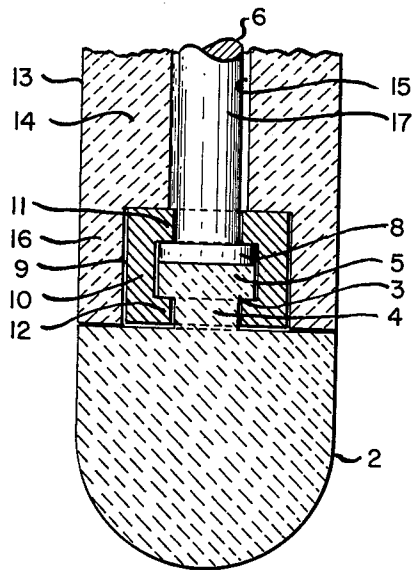


Fig. 2.

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3,091,823  
**STOPPER FOR A LADLE OR SIMILAR  
 RECEPTACLE**

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 1 Claim. (Cl. 22-85)

This invention relates to a stopper for a ladle or similar receptacle and has to do particularly with the manner of attachment of the stopper rod to the stopper head. I provide an unprecedentedly simple and inexpensive means for attaching the stopper rod to the stopper head utilizing parts of simple form cooperating in novel manner to effectively lock together the stopper rod and the stopper head. The effective portion of the stopper head is solid and free from an interior well such as is frequently employed to receive the bottom of the stopper rod. The expense incident to formation of the well is avoided and the head by virtue of the fact that it is solid is stronger and has increased useful life. I preferably utilize the bottom sleeve surrounding the rod as a locking device to insure locking of the rod and head together, although other locking means may be utilized.

I provide a stopper for a ladle or similar receptacle comprising a refractory head having at its top a connecting portion having a lateral projection, a rod having at its bottom a lateral projection, the rod being superposed over the head with the lateral projections of the connecting portion of the head and of the rod in juxtaposition, and means embracing the juxtaposed lateral projections and thereby attaching the rod to the head. Preferably the embracing means is of generally U-shape in cross section with a portion overlying the lateral projection of the rod and a portion underlying the lateral projection of the connecting portion of the head, the stopper having means maintaining the embracing means thus disposed to insure maintaining the rod attached to the head. The stopper preferably has an annular member disposed about the embracing means maintaining the embracing means in position to insure maintaining the rod attached to the head.

I find it desirable to form the embracing means of a plurality of members of generally U-shape in cross section which are applied to the connecting portion of the head and the rod at different peripheral portions thereof, and I prefer to provide an annular member disposed about the embracing means maintaining the embracing means thus applied to insure maintaining the rod attached to the head. Desirably the plurality of members of generally U-shape in cross section constituting the embracing means collectively substantially surround the rod, and I prefer to utilize a sleeve, which may be the lowermost protective sleeve surrounding the rod, disposed atop the head and about the embracing means maintaining the embracing means thus applied to insure maintaining the rod attached to the head.

Other details, objects and advantages of the invention will become apparent as the following description of a present preferred embodiment thereof proceeds.

In the accompanying drawings I have shown a present preferred embodiment of the invention in which

FIGURE 1 is a fragmentary axial cross-sectional view through a ladle stopper head and the lower portion of the stopper rod showing one form of my novel means for attaching the stopper rod to the stopper head; and

FIGURE 2 is a perspective view of one of the embracing members or segments for embracing portions of the head and rod to attach the rod to the head.

Referring now more particularly to the drawings, the

ladle stopper head is designated generally by reference numeral 2, the head being formed of refractory material as well known to those skilled in the art. The head is preferably of circular cross section at all portions thereof. The head has a connecting portion through which it is adapted to be connected with the stopper rod, the connecting portion being designated generally by reference numeral 3 and comprising a neck 4 projecting axially upwardly from the body portion of the stopper head 2 surmounted by a lateral projection or flange 5 of somewhat greater radial dimension than the neck 4 as clearly shown in FIGURE 1. In the form shown the lateral projection or flange 5 is symmetrical about the axis of the stopper although it need not necessarily be symmetrical.

Reference numeral 6 designates generally a ladle stopper rod which may be of conventional form. The stopper rod is normally made out of metal such as steel and consists of a body or shank portion 7 having at its bottom a lateral projection 8 shown as being in the form of a flange which is symmetrical about the axis of the rod although it need not necessarily be symmetrical. The diameter of the flange 8 is shown as being substantially the same as the diameter of the flange 5. The rod is superposed over the head with the flanges 8 and 5 in juxtaposition.

For attaching the rod to the head I provide means embracing the juxtaposed flanges. The embracing means is preferably of generally U shape in cross section with a portion overlying the flange 8 and a portion underlying the flange 5. In the form shown the embracing means comprises two substantially semicircular members one of which is shown in FIGURE 2 and is designated generally by reference numeral 9. Each of such members comprises an annular body portion 10 with upper and lower annular inwardly projecting flange portions 11 and 12 respectively. The two members 9 are fitted together about the connecting portion 3 of the head and the lower portion of the rod so as to embrace the flanges 8 and 5 as shown in FIGURE 1. Collectively the two members 9 substantially surround the connecting portion of the head and the lower portion of the rod. It would be possible to attach the rod to the head by using only one of the two members 9 but I prefer to use both members together since the stress exerted between the rod and the head when the rod is pulled upwardly is distributed substantially uniformly about the axis of the connecting portion 3 of the head. Instead of utilizing two members 9 each of substantially semicircular shape I may provide a greater number of such members of less than semicircular shape in peripheral dimension, but for greatest strength and most efficient operation such members, whatever their number, preferably collectively substantially surround the connecting portion of the head and the lower portion of the rod.

Means are provided to maintain the member or members 9 in operative position embracing the flanges 8 and 5. Such means preferably comprises an annular member, and I find it desirable to employ for the purpose the lowermost sleeve surrounding the stopper rod. It is conventional to provide a series of sleeves atop the head surrounding the stopper rod to protect the stopper rod against the heat of the molten metal in the ladle. In FIGURE 1 I have shown the lower portion of the lowermost sleeve which is designated generally by reference numeral 13 and comprises a body portion 14 of normal diameter within which is a bore 15 receiving the portion of the rod above the flange 8 and a lower extremity 16 of normal external diameter but of greater internal diameter than the portion 14 so that the sleeve may be seated atop the head with the portion 16 thereof surrounding the em-

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bracing means consisting of the member or members 9. Thus the sleeve acts as a positive locking device maintaining the embracing means in position embracing the flanges 8 and 5, insuring maintaining the rod attached to the head. The lowermost sleeve 13 performs the dual function of a locking device locking the rod to the head and a protective device protecting the embracing means, the lower portion of the rod and the connecting portion of the head from the heat of the molten metal.

In applying the member or members 9 such member or members is or are applied about the flanges 8 and 5 when the sleeve 13 has been withdrawn upwardly and after the member or members 9 is or are applied the sleeve 13 is dropped down into the position shown in FIGURE 1. When the head is to be removed from the rod the sleeve 13 is slid upwardly to clear the member or members 9 whereupon such member or members is or are laterally withdrawn from embracing relationship to the flanges 8 and 5 permitting removal of the head from the rod and replacement thereof by a new head of similar form which is adapted to be attached and locked to the rod by the same means.

The member or members 9 may be made of any suitable material. In situations in which great strength is required such member or members may be made of steel although in other instances they may be made of refractory material similar to the refractory material of which the head and sleeve are made as well known to those skilled in the art.

While I have shown and described a present preferred embodiment of the invention it is to be distinctly understood that the invention is not limited thereto but may be otherwise variously embodied and practiced within the scope of the following claims.

I claim:

A stopper for a ladle or similar receptacle comprising

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a refractory head having a body and having integral with the body and projecting upwardly therefrom a connecting portion having a lateral projection, a rod having at its bottom a lateral projection, the rod being superposed over the head with the lateral projections of the connecting portion of the head and of the rod in juxtaposition, connecting means embracing the juxtaposed lateral projections, part of the connecting means extending into position overlying the lateral projection at the bottom of the rod throughout substantially the entire circumferential extent of such lateral projection and part of the connecting means extending into position underlying the lateral projection of the connecting portion of the head throughout substantially the entire circumferential extent of such lateral projection, the connecting means being of less transverse dimension than the body, and holding means seated atop the head closely surrounding and maintaining in place the connecting means with the bottom of the holding means in juxtaposition to the upper surface of the body, whereby to attach the rod to the head.

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