May 18, 1965 C. B. MURTON 3,183,564

STOPPER FOR A LADLE OR SIMILAR RECEPTACLE

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Fig. 1.

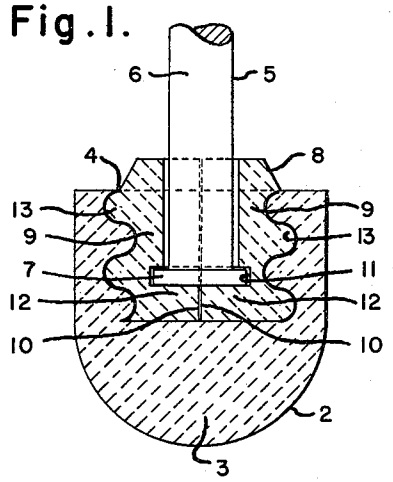

Fig. 2.

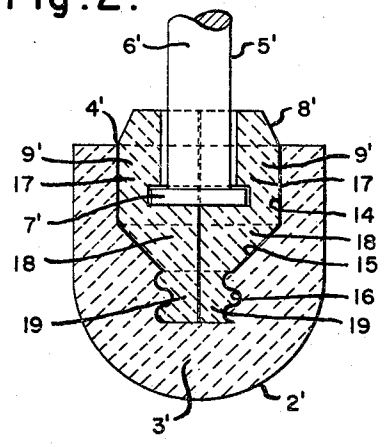

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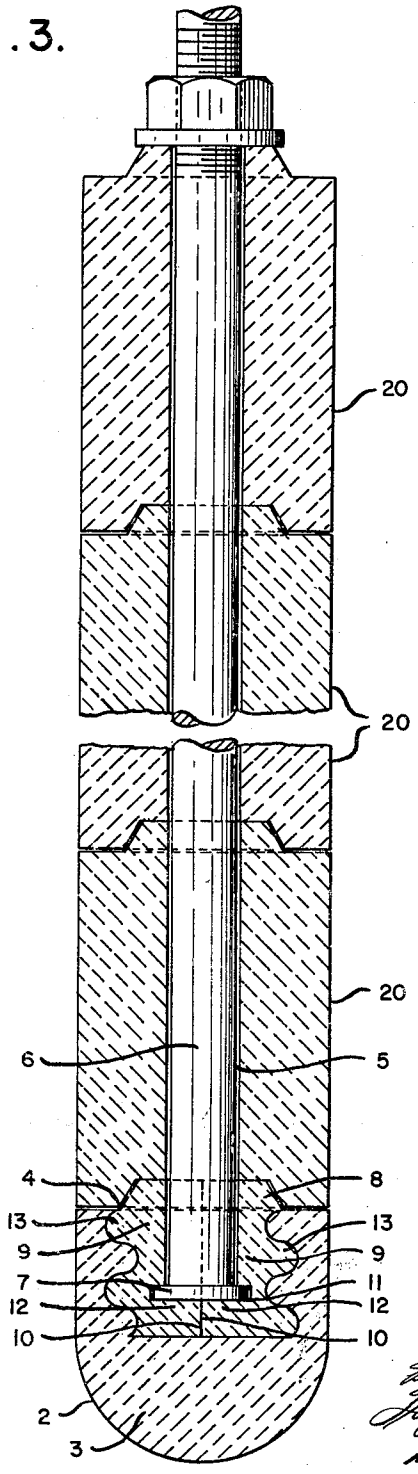
Fig. 3.



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United States Patent Office 3,183,564 Patented May 18, 1965

3,183,564

STOPPER FOR A LADLE OR SIMILAR RECEPTACLE

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5 Claims. (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. This invention is in the nature of an improvement over prior similar structures.

The stopper head may have a well extending downwardly thereinto into which the bottom of the stopper rod is inserted. The bottom of a stopper rod of conventional form has a lateral projection or flange. Attaching means may be provided which are adapted to be disposed about the lower portion of the stopper rod and to be connected with the head for maintaining the rod assembled to the head.

The well may be internally threaded and the attaching means may be externally threaded with threads adapted to mate with the internal threads of the well. The attaching means may comprise a plurality of sections adapted to be assembled about the lower portion of the stopper rod. The sections of the attaching means may have external thread portions which when the sections are assembled in predetermined axial relationship constitute continuous threads adapted to mate with the internal threads of the well.

Unless the sections of the attaching means are assembled in proper or predetermined axial relationship the external thread portions thereof will not properly align with one another to constitute continuous threads. Proper alignment of the sections may be provided for by providing irregular formations such as undulations along the vertical edges of the sections so that they can only be fitted together in proper cooperative axial relationship. However this imposes difficulty and added expense in manufacture; also, when the attaching means are made of refractory material as is commonly the case the vertical edges of the refractory material after "burning" of the refractory may not properly mesh or fit together with the result that the external thread portions of the sections of the attaching means will be out of alignment and the attaching means will not thread into the well of the stopper head.

I eliminate irregular or undulating vertical edges on the sections of the attaching means and provide the sections with straight vertical edges which minimize not only the cost of the attaching means but also difficulties in properly fitting together the sections of the attaching means. I form the sections of the attaching means so that when they are assembled about the lower portion of the stopper rod they provide a laterally outwardly extending groove fitting about the lateral projection at the bottom of the stopper rod and thereby predeterminedly relatively positioning the sections axially of the stopper rod so that the external thread portions of the sections are in proper alignment and constitute continuous threads adapted to mate with the internal threads of the well. Thus I utilize the lateral projection at the bottom of the stopper rod to properly align the sections of the attaching means whereby the attaching means are simplified in form and reduced in cost and are more reliable in use. Also the attaching means, the material of which has heat insulating characteristics, have the added advantage of protecting the bottom of the stopper rod, including the lateral projection

thereon, against the intense heat of molten metal in the ladle.

I provide a stopper for a ladle or similar receptacle comprising a stopper head having a well extending downwardly thereinto, at least a portion of the well being internally threaded, a stopper rod having a lateral projection at its bottom inserted downwardly into the well and attaching means embracing the bottom of the stopper rod, the attaching means comprising a plurality of sections assembled about the bottom of the stopper rod, such sections when so assembled providing a radially outwardly extending groove fitting about the lateral projection at the bottom of the stopper rod and thereby predeterminedly relatively positioning the sections axially of the stopper rod, the sections having external thread portions which when the sections are thus assembled and predeterminedly relatively positioned axially of the stopper rod constitute continuous threads adapted to mate with the internal threads of the well, the attaching means being threaded into the well and thereby maintaining the stopper rod assembled to the stopper head. The attaching means preferably extend below the bottom of the stopper rod with the bottom of the groove provided by the assembled sections of the attaching means being below the lateral projection on the stopper rod and the top of such groove being above such projection. The extent of threading of the attaching means into the well of the stopper head may be limited by direct abutment of the attaching means and the inner face of the well.

The well of the stopper head may be internally threaded continuously from its top to its bottom or it may have an enlarged upper portion and a reduced lower portion, the reduced lower portion being internally threaded. In such case the stopper rod may be inserted downwardly into the enlarged upper portion of the well, the sections of the attaching means when properly assembled providing at the upper portion thereof the laterally outwardly extending groove fitting about the lateral projection at the bottom of the stopper rod. The attaching means may have a reduced lower portion and the sections of the attaching means may have external thread portions at the reduced lower portion thereof which when the sections are properly assembly and predeterminedly relatively positioned axially of the stopper rod constitute continuous threads adapted to mate with the internal threads of the reduced lower portion of the well, the reduced lower portion of the attaching means being threaded into the reduced lower portion of the well and thereby maintaining the stopper rod assembled to the stopper head.

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

In the accompanying drawings I have shown certain present preferred embodiments of the invention in which

FIGURE 1 is a vertical cross-sectional view through a ladle stopper head and rod showing one form of my invention for attaching the rod to the head;

FIGURE 2 is a view similar to FIGURE 1 showing another form which my invention may take; and

FIGURE 3 is a cross-sectional view of a ladle stopper with a portion broken away showing the ladle stopper head and rod shown in FIGURE 1 and refractory sleeves applied to the rod above the head to protect the remainder of the rod.

Referring now more particularly to the drawings and especially to FIGURE 1, there is shown a stopper head 2 which is preferably made of refractory material and which is adapted for use with a ladle or similar receptacle. The bottom portion 3 of the stopper head 2 is solid and imperforate. The stopper head 2 has a well designated generally by reference numeral 4 extending downwardly

thereinto in the upper portion of the stopper head. While the well 4 may assume various shapes it is shown in FIGURE 1 as of generally circular shape and formed to provide the well with a threaded inner face extending continuously from top to bottom of the well.

The stopper rod is designated generally by reference numeral 5 and has a shank 6 and a lateral projection or flange 7 at its bottom. The stopper rod is of conventional form.

Attaching means are provided for attaching the rod 5 to the head 2, the attaching means also providing insulation against heat for the bottom of the rod including the flange 7. In FIGURE 1 the attaching means, designated generally by reference numeral 8, are shown as comprising two semicircular halves or sections each designated 9 applied to the lower portion of the stopper rod from opposite sides and having opposed vertically straight meeting faces 10. Each of the sections 9 is provided internally with a kerf 11 receiving a portion of the rod flange 7 as shown in FIGURE 1 so that when the sections 9 are assembled they provide a laterally outwardly extending groove fitting about the lateral projection or flange 7 of the stopper rod 5 and thereby predeterminedly relatively positioning the sections 9 axially of the stopper rod; in other words, the flange 7 is utilized to insure proper relative axial positioning of the sections 9 so that the attaching means will properly cooperate with the head to maintain the rod assembled to the head. The bottom portions 12 of the sections 9 of the attaching means 8 underlie the rod so that the attaching means embrace the bottom of the rod including the lateral projection 7 and have a portion underlying the lateral projection as clearly shown in FIGURE 1. Thus the attaching means, as above indicated, perform an insulating as well as an attaching function.

The attaching means 8 are externally threaded as shown at 13. Each of the sections 9 of the attaching means has external thread portions and when the sections are assembled in predetermined relative axial position by fitting of the groove made up of the kerfs 11 about the lateral projection 7 at the bottom of the stopper rod 5 the thread portions cooperatively constitute continuous threads which mate with the internal threads of the head. The sections 9 are assembled about the bottom of the rod 5 as shown in FIGURE 1, being relatively positioned by the lateral projection 7 as above explained whereupon the attaching means are screwed or threaded into the internally threaded well of the stopper head 2 maintaining the stopper rod assembled to the stopper head. Refractory sleeves 20 shown in FIGURE 3 are normally applied to the rod above the head to protect the remainder of the rod.

The sections 9 are applied to the rod before the rod is inserted into the head and the rod with such sections applied thereto and which function as the attaching means constitutes a unit which is applied to the head by screwing the attaching means into the internally threaded well of the head. When the head is to be changed it is unscrewed from the attaching means and a new head screwed on. The extent of threading of the attaching means into the well of the head is limited by direct abutment of the attaching means and the inner face of the well, in this case abutment of the bottom of the attaching means with the bottom surface of the well.

Another form of my invention is shown in FIGURE 2 in which the refractory head 2' has a solid and imperforate bottom portion 3' and a well designated generally by reference numeral 4' which is of a shape different than that of the well 4 of FIGURE 1. In FIGURE 2 the well 4' has an enlarged cylindrical upper portion 14, a conical intermediate portion 15 and a reduced internally threaded lower portion 16. The stopper rod 5' is of the same conventional form as in FIGURE 1, having a shank 6' and a lateral projection or flange 7' at its bottom. The attaching means 8' of FIGURE 2

comprises two halves or sections 9' fitted together about the lower portion of the rod in the same general manner as are the sections 9 of FIGURE 1, but in FIGURE 2 the rod extends down only into the cylindrical upper portion 14 of the well 4'. The attaching means 8' of FIGURE 2 have an upper externally cylindrical portion 17 disposed in the portion 14 of the well, an intermediate externally conical portion 18 disposed in the portion 15 of the well and a lower reduced externally threaded portion 19 disposed in and threaded into portion 16 of the well. The portion 17 of the attaching means fits the portion 14 of the well, the portion 18 of the attaching means fits the portion 15 of the well and the portion 19 of the attaching means fits the portion 16 of the well. The extent of threading of the attaching means into the well is in the case of FIGURE 2 as in the case of FIGURE 1 limited by direct abutment of the attaching means and the inner face of the well. In FIGURE 2 the direct abutment may be at the bottom of the well or at the portion 15 thereof or both. The form of FIGURE 2 provides somewhat increased stability and rigidity as well as somewhat greater insulation for the bottom of the rod.

In each of FIGURES 1 and 2 the attaching means may comprise sections in the form of complementary halves as above described or may comprise a greater number of sections or segments assembled about the lower portion of the rod and embracing the lower portion of the rod including the flange whereupon the assembly of the rod and attaching means is applied to and threadedly connected with the head. In both cases the bottom of the groove of the attaching means is below the flange or projection at the bottom of the rod and the top of the groove of the attaching means is above such projection and the fitting of the projection into the groove insures proper relative axial positioning of the sections of the attaching means so that the thread portions of the sections cooperatively constitute continuous threads to mate with the internal threads of the well of the stopper head.

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

I claim:

1. A stopper for a ladle or similar receptacle comprising a stopper head having a well extending downwardly thereinto, at least a portion of the well being internally threaded, a stopper rod having a lateral projection at its bottom inserted downwardly into the well and attaching means embracing the bottom of the stopper rod, the attaching means comprising a plurality of sections assembled about the bottom of the stopper rod and having opposed straight meeting faces, such sections when so assembled providing a radially outwardly extending groove fitting about the lateral projection at the bottom of the stopper rod and thereby predeterminedly relatively positioning the sections axially of the stopper rod, the sections having external thread portions which when the sections are thus assembled and predeterminedly relatively positioned axially of the stopper rod constitute continuous threads adapted to mate with the internal threads of the well, the attaching means being threaded into the well and thereby maintaining the stopper rod assembled to the stopper head.

2. A stopper for a ladle or similar receptacle comprising a stopper head having a well extending downwardly thereinto, at least a portion of the well being internally threaded, a stopper rod having a lateral projection at its bottom inserted downwardly into the well and attaching means embracing the bottom of the stopper rod and extending therebelow, the attaching means comprising a plurality of sections assembled about the bottom of the stopper rod and having opposed straight meeting faces, such sections when so assembled providing a radially

outwardly extending groove fitting about the lateral projection at the bottom of the stopper rod with the bottom of the groove below such projection and the top of the groove above such projection and thereby predeterminedly relatively positioning the sections axially of the stopper rod, the sections having external thread portions which when the sections are thus assembled and predeterminedly relatively positioned axially of the stopper rod constitute continuous threads adapted to mate with the internal threads of the well, the attaching means being threaded into the well, the extent of threading of the attaching means into the well being limited by direct abutment of the attaching means and the inner face of the well, the attaching means maintaining the stopper rod assembled to the stopper head.

3. A stopper for a ladle or similar receptacle comprising a stopper head having a well extending downwardly thereinto, the well being internally threaded continuously from its top to its bottom, a stopper rod having a lateral projection at its bottom inserted downwardly into the well and attaching means embracing the bottom of the stopper rod, the attaching means comprising a plurality of sections assembled about the bottom of the stopper rod and having opposed straight meeting faces, such sections when so assembled providing a radially outwardly extending groove fitting about the lateral projection at the bottom of the stopper rod and thereby predeterminedly relatively positioning the sections axially of the stopper rod, the sections having external thread portions which when the sections are thus assembled and predeterminedly relatively positioned axially of the stopper rod constitute continuous threads adapted to mate with the internal threads of the well, the attaching means being threaded into the well and thereby maintaining the stopper rod assembled to the stopper head.

4. A stopper for a ladle or similar receptacle comprising a stopper head having a well extending downwardly thereinto, the well having an enlarged upper portion and a reduced lower portion, the lower portion of the well being internally threaded, a stopper rod having a lateral projection at its bottom inserted downwardly into the enlarged upper portion of the well and attaching means embracing the bottom of the stopper rod, the attaching means comprising a plurality of sections assembled about the bottom of the stopper rod and having opposed straight meeting faces, such sections when so assembled providing at the upper portion thereof a laterally outwardly extending

groove fitting about the lateral projection at the bottom of the stopper rod and thereby predeterminedly relatively positioning the sections axially of the stopper rod, the attaching means having a reduced lower portion, the sections of the attaching means having external thread portions at the reduced lower portion of the attaching means which when the sections are thus assembled and predeterminedly relatively positioned axially to the stopper rod constitute continuous threads adapted to mate with the internal threads of the reduced lower portion of the well, the reduced lower portion of the attaching means being threaded into the reduced lower portion of the well and thereby maintaining the stopper rod assembled to the stopper head.

5. A stopper for a ladle or similar receptacle comprising a stopper head having a well extending downwardly thereinto, the wall of the well having downwardly facing shoulder means, a stopper rod having a lateral projection at its bottom inserted downwardly into the well and attaching means embracing the bottom of the stopper rod, the attaching means comprising a plurality of sections assembled about the bottom of the stopper rod and having opposed straight meeting faces, such sections when so assembled providing a radially outwardly extending groove fitting about the lateral projection at the bottom of the stopper rod and thereby predeterminedly relatively positioning the sections axially of the stopper rod, the sections having external means which when the sections are thus assembled and predeterminedly relatively positioned axially of the stopper rod underlie said shoulder means whereby to fasten the rod to the head.

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MARCUS U. LYONS, *Examiner.*

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,183,564 May 18, 1965

Crawford B. Murton

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 2, line 43, for "assembly" read -- assembled --; column 6, line 8, for "to" read -- of --; line 37, for "Projean" read -- Prejean --.

Signed and sealed this 21st day of December 1965.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents