No. 668,242. Patented Feb. 19, 1901.

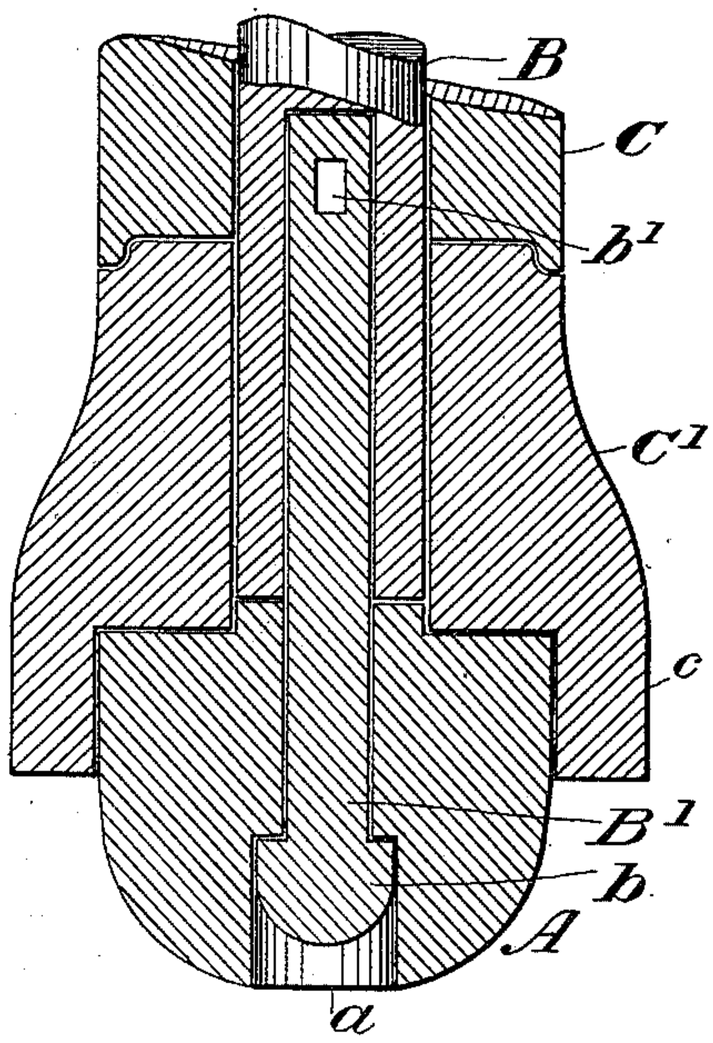
W. J. WATKINS.

MEANS FOR PROTECTING STOPPER RODS.

(Application filed Apr. 21, 1900.)

(No Model.)

Fig. 2.



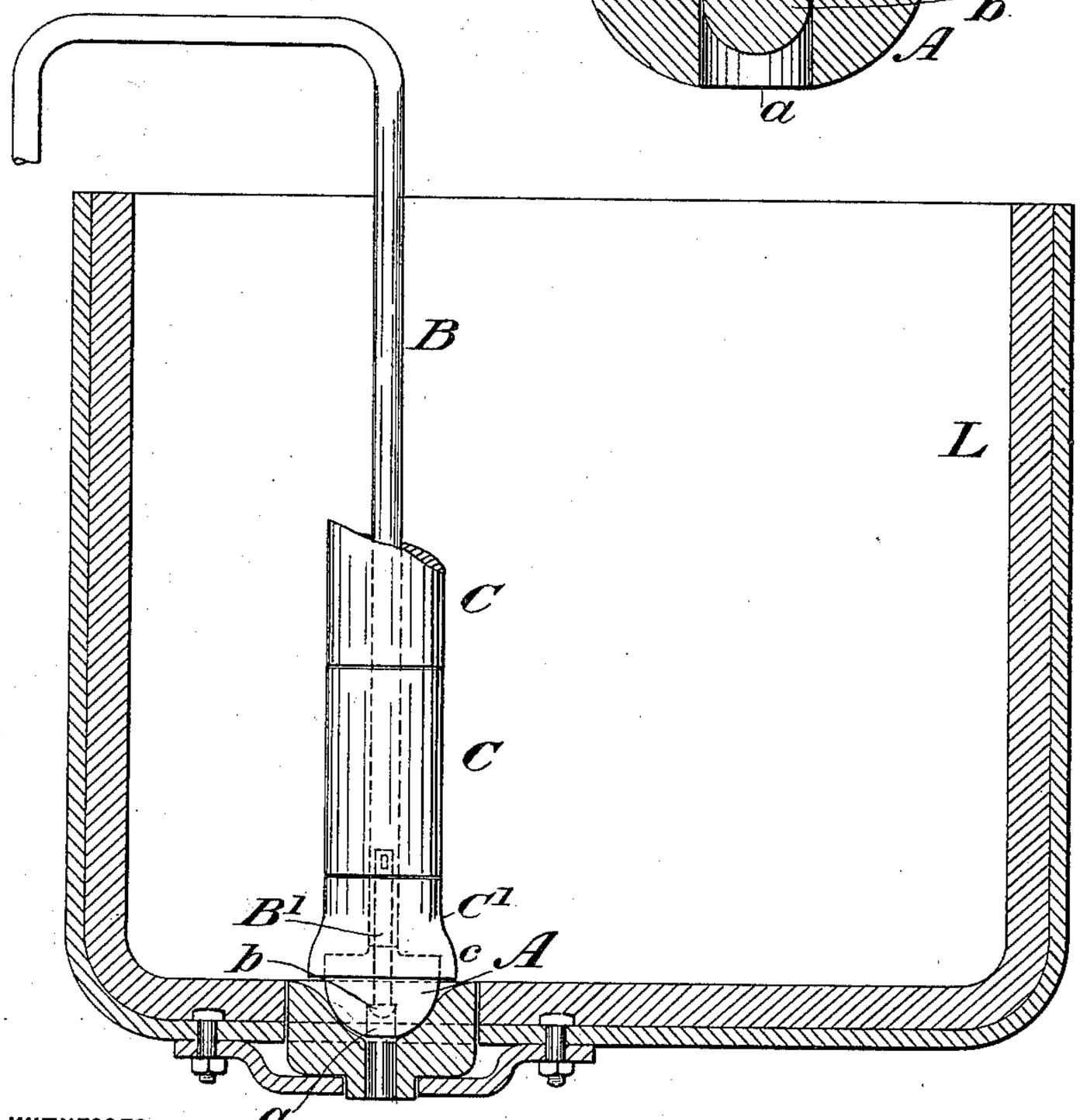


Fig. 1.

WITNESSES:

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MEANS FOR PROTECTING STOPPER-RODS.

SPECIFICATION forming part of Letters Patent No. 668,242, dated February 19, 1901.

Application filed April 21, 1900. Serial No. 13,720 (No model.)

To all whom it may concern:

Be it known that I, WILLIAM J. WATKINS, of Johnstown, in the county of Cambria and State of Pennsylvania, have invented a new and useful Improvement in Means for Protecting Stopper-Rods, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

My invention has relation to certain new and useful means for protecting the stopper-rods of ladle-stoppers. It is well known that great trouble is experienced by reason of the fact that the hot metal in the ladle will find its way to the rod between the stopper and the lower sleeve-section and burn off the rod or its stopper-fastening devices. This may and often does occur in the middle of pouring a heat, the balance of which must then be poured out of the top of the ladle. My invention is designed to prevent this trouble to a very large extent, if not entirely, and also to provide means for this purpose which will operate to assist the raising of the stopper should the latter stick to its seat in the nozzle-brick.

With these objects in view my invention consists in providing the lower section of the usual protection-sleeve with a flared guard flange or lip which surrounds and extends down over a considerable portion of the body of the stopper. The lower face of this guard or lip forms a surface which is subject to the upward pressure of the liquid metal in the ladle, which is thereby made effective to assist the operation of raising the stopper.

My invention also consists in the novel construction and combination of parts, all as hereinafter described, and pointed out in the appended claims, reference being had to the accompanying drawings, which form a part of the specification.

In the drawings, Figure 1 is a vertical section of a ladle, showing a stopper and stopper-rod provided with my invention. Fig. 2 is a vertical section of the stopper and a portion of the stopper-rod and sleeve.

The letter A designates a stopper which is of the usual construction and which is arranged to seat in the usual nozzle-brick of the ladle L.

B designates the stopper-rod, having in its lower end portion a socket in which is secured, by a key b', a bolt B', having a head b engaging a seat a in the stopper, and thus secures it to the rod.

C C' designate a protection-sleeve on the rod B. The upper sections C of this sleeve are of the usual construction, but the lower section C' is of special form, being flared to a larger diameter at its lower portion to form a lip or flange c, which fits over and incloses the upper portion of the body of the stopper, which it preferably fits quite snugly. It will be readily seen that this lip or flange makes it extremely difficult for hot metal to find its way to the stopper-rod, owing to the distance it must travel and the several angles which it must pass. It will also be seen that, as has been already stated, the lower face of said lip or flange forms a surface which is exposed to the action of the upward pressure of the fluid metal in the ladle, which is of very material assistance in unseating the stopper. The additional thickness of refractory material which the lip or flange provides also protects the bolt B' in and adjacent to the stopper from the heat of the metal in the ladle. These bolts becoming carbonized by use have their melting-point very considerably lowered and are apt to melt away and drop the stopper, although no hot metal comes directly in contact therewith.

As usually constructed the expansion of the stopper-rod when heated causes the lower sleeve-section to be lifted somewhat from the stopper, thus opening the joint between them to the entrance of hot metal. This is particularly the case when the stopper sticks by reason of a "pasty" condition of the nozzle, so that the rod is stretched somewhat in freeing or unseating the stopper. In the present construction the overlap of the sleeve on the body of the stopper is sufficient to prevent any such separation.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination with a stopper and its rod, of a sleeve of refractory material surrounding the said rod, and having a flange extension or lip which fits over and surrounds

a portion of the body of the stopper, the lower face of said lip or flange being exposed to the contents of the ladle.

2. The combination with a stopper and its rod, of a sleeve of refractory material surrounding the said rod, and having at its lower portion a flared flange or lip which surrounds the upper portion of the stopper, and whose lower face is exterior of the periphery of the body of the stopper and is exposed to the contents of the ladle.

3. A refractory sleeve-piece for stopper-rods having its lower portion formed with an annular flange extension whose inner diameter is greater than the diameter of the body of a stopper.

4. The combination with a ladle-stopper and its rod, of a sleeve of refractory material on said rod and having at its lower portion an enlargement which fits over and surrounds the upper portion of the body of the stopper.

5. The combination with a ladle-stopper, its rod, and a connecting pin or bolt secured in the stopper at one end and in the rod at its opposite end, of a sleeve of refractory material surrounding said rod, and enlarged to fit over the upper portion of the body of the stopper, the enlarged portion of said sleeve forming an extra thickness of refractory material between said connecting pin or bolt and the contents of the ladle.

In testimony whereof I have affixed my signature in presence of two witnesses.

WILLIAM J. WATKINS.

Witnesses:
BLANCHE SMITH,
H. W. SMITH.