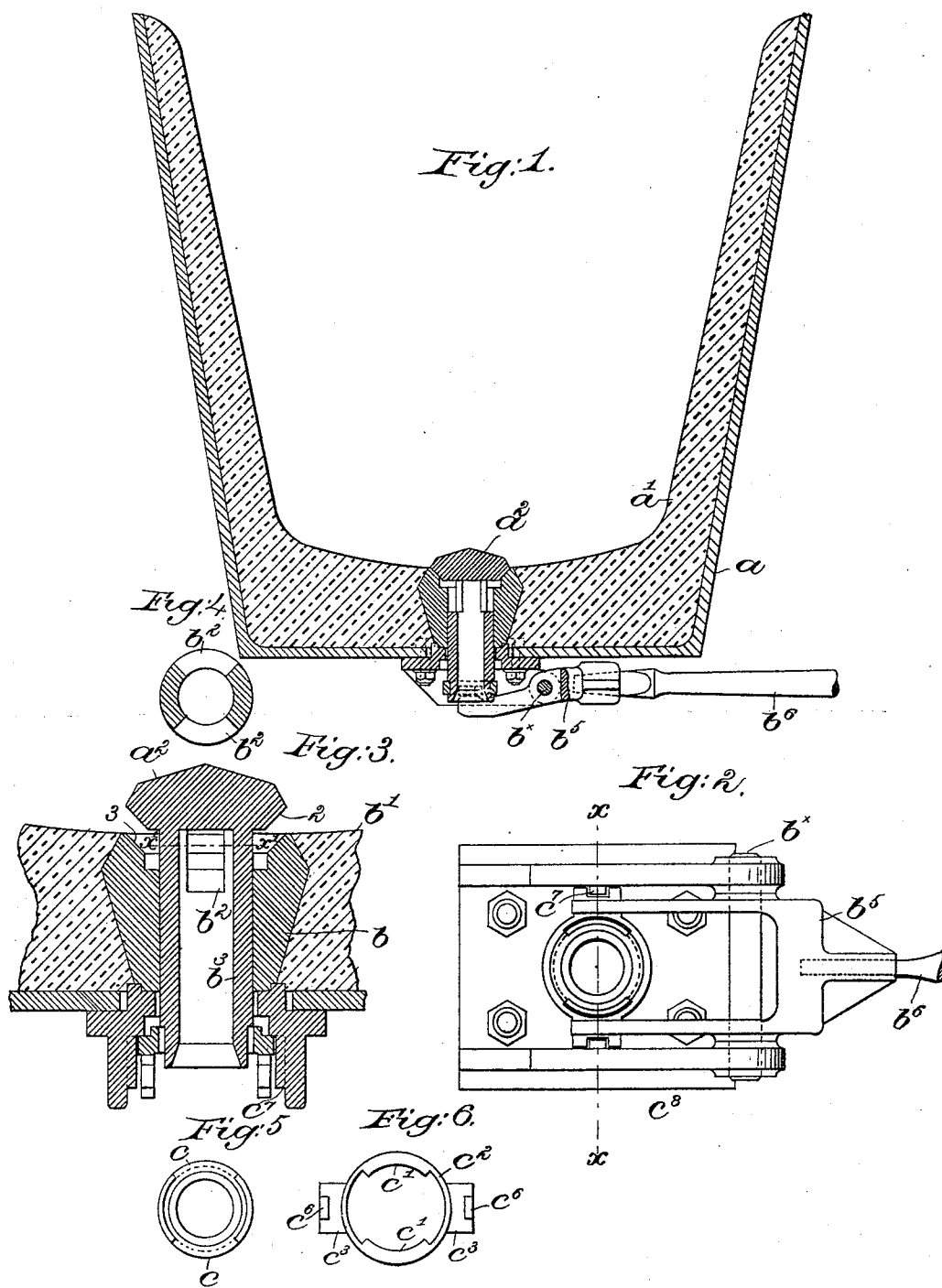


(No Model.)

R. W. GRACE.
LADLE.

No. 460,575.

Patented Oct. 6, 1891.



Witnesses.

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UNITED STATES PATENT OFFICE.

ROBERT W. GRACE, OF WORCESTER, MASSACHUSETTS.

LADLE.

SPECIFICATION forming part of Letters Patent No. 460,575, dated October 6, 1891.

Application filed March 23, 1891. Serial No. 386,042. (No model.)

To all whom it may concern:

Be it known that I, ROBERT W. GRACE, of Worcester, county of Worcester, State of Massachusetts, have invented an Improvement in Ladles, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to vessels or receptacles, and is especially applicable to that class of vessels known as "ladles," used in mills, foundries, and like places to contain molten metal.

This invention has for its object to provide ladles and like vessels with a valve mechanism, as will be described, which is simple, cheap in construction, and most efficient in operation, and which can be readily replaced when worn out at a minimum expense. The valve is operated by a suitable mechanism, as will be described, from outside the vessel.

My invention therefore consists, essentially, in the combination, with a ladle provided with a discharge-orifice, of a valve to normally close said orifice, and mechanism located outside the ladle and operatively connected to the valve through the shell of the ladle, substantially as will be described.

Other features of my invention will be pointed out in the claims at the end of this specification.

Figure 1 is a vertical section of a receptacle or ladle embodying my invention; Fig. 2, an under side view of the valve-operating mechanism shown in Fig. 1; Fig. 3, a sectional detail, on an enlarged scale, to more clearly show the valve and its operating mechanism, the section being supposed to be taken on line x , Fig. 2; Fig. 4, a sectional detail of the valve-stem, taken on line x' , Fig. 3; Figs. 5 and 6, details to be referred to.

The vessel or ladle composed, as herein shown, of an outer metallic shell a and a lining a' , of ganister or other refractory material, such as now commonly employed, is provided, as herein shown, with a discharge-orifice, preferably located near the center of the bottom of the vessel or ladle. The discharge-orifice is normally closed by a valve a^2 , preferably of graphite or other refractory material and preferably beveled on its under side, as at 2, (see Fig. 3,) to fit a correspondingly-

beveled valve-seat, herein shown as a sleeve b , of graphite or other refractory material, beveled at its upper end, as at 3. The sleeve b is preferably cut away or formed to leave an annular chamber or port b' , with which register one or more port-openings b^2 in the hollow valve-stem b^3 , which is herein shown as an integral part of the valve, there being two such port-openings herein shown substantially diametrically opposite each other, as clearly represented in Figs. 3 and 4.

The hollow valve-stem b^3 , as herein shown, is extended through the bottom of the outer shell of the ladle, and is operatively connected to the valve-actuating mechanism, shown as a forked lever b^5 , pivoted, as at b^x , in any suitable manner to the ladle and provided, as shown, with a handle b^6 . As herein represented, the valve-stem is provided on substantially diametrically-opposite sides with lugs or projections c , (see Fig. 5,) which are engaged by two sets of lugs or projections c' on substantially diametrically-opposite sides of a ring or collar c^2 , provided with guiding lugs or ears c^3 , extending from the outer circumference of the said ring or collar substantially at right angles to the inwardly-projecting lugs c' , the said outwardly-projecting lugs having notches c^6 to embrace guide bars or rods c^7 , secured to or forming part, as shown, of side bars or frames c^8 , secured to or forming part of the bottom of the ladle. The inwardly-projecting lugs c' are separated by a space sufficiently large to permit the ring to pass by or over the projecting lugs c on the valve-stem when the ring c^2 or collar is fitted in place upon the said valve-stem, the said ring or collar being given a quarter-turn to place the lugs c on the valve-stem between the lugs c' on the ring, and thus lock the said collar or ring to the valve-stem. The forks of the lever b^5 are extended under and engage the guiding lugs or ears c^3 on the ring c^2 , and act through the said collar, its lugs c' , and the lugs c on the valve-stem to raise the valve-stem and thereby the valve. The valve is normally seated, and when the ladle contains the fluid to be discharged, such as molten metal, the said valve is kept pressed onto its seat by the weight of the mass of metal or otherwise.

In operation the valve may be raised from

its seat by depressing the handle b^6 , and the extent to which the valve is opened may be accurately governed, thereby controlling to a nicety the amount of metal discharged from the ladle. As soon as the power is removed from the handle, the valve a^2 is seated, as herein shown, by gravity, assisted by the weight of metal above it, and the valve is accurately seated as soon as the power is removed from the valve-actuating mechanism or lever, thereby avoiding any possible waste of metal. Furthermore, the valve and its seat when worn out may be readily and quickly renewed at a minimum expense without disturbing the lining. So, also, the valve may be placed in any desired part of the bottom of the ladle, and, if desired, it may be placed in the side of the ladle.

I claim—

1. The combination, with a ladle having a lining and provided with a discharge-orifice, of a sleeve of refractory material extended through said lining and ladle, a valve located within the ladle and normally seated on said sleeve, and mechanism located outside the ladle and operatively connected to the valve within the ladle, substantially as described.

2. The combination, with a ladle having a lining and provided with a discharge-orifice, of a sleeve of refractory material extended through said lining and ladle, a valve located within the ladle normally seated on said sleeve, a hollow valve-stem connected to the

valve and provided with one or more port-openings, and an actuating mechanism located outside the ladle and acting on the said valve-stem, substantially as described.

3. The combination, with a ladle provided with a discharge-orifice, of a sleeve of refractory material extending through said orifice, a valve located within the ladle and normally seated on said sleeve, a hollow valve-stem provided with one or more port-openings, a guiding collar or ring, a locking device to secure said collar or ring to the said valve-stem, and a mechanism to operate on said collar or ring to operate the valve, substantially as described.

4. The combination, with a ladle provided with a discharge-orifice, of a sleeve of refractory material extended through said orifice and provided with an annular chamber b' , a valve located within the ladle and normally seated on said sleeve, a hollow valve-stem provided with one or more port-openings, a guiding collar or ring, and a locking device to secure said collar or ring to the said valve-stem, and mechanism to operate on said collar or ring to operate the valve, substantially as described.

In testimony whereof I have signed my names to this specification in the presence of two subscribing witnesses.

ROBERT W. GRACE.

Witnesses:

BERNICE J. NOYES,
EDWARD F. ALLEN.