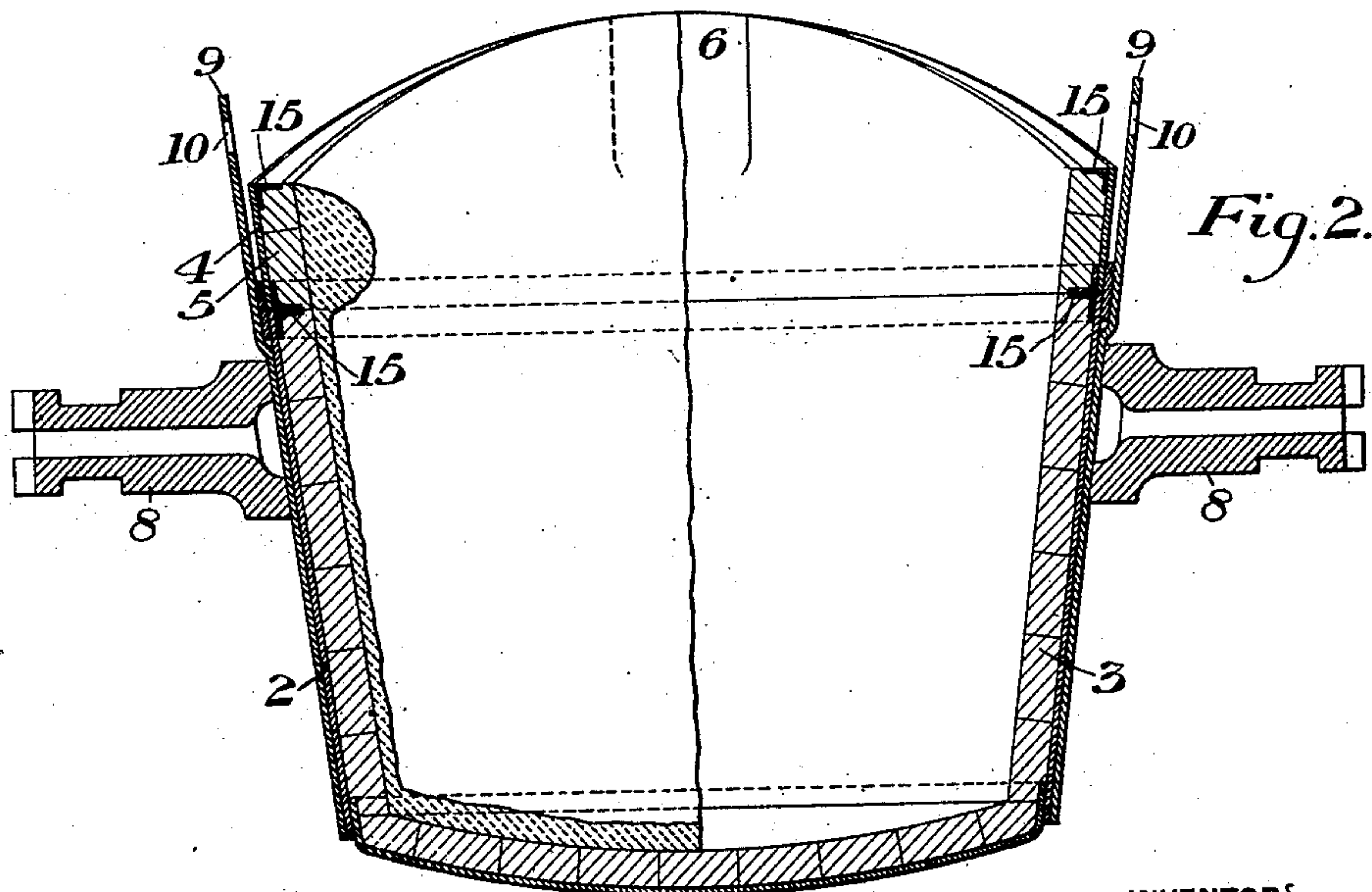
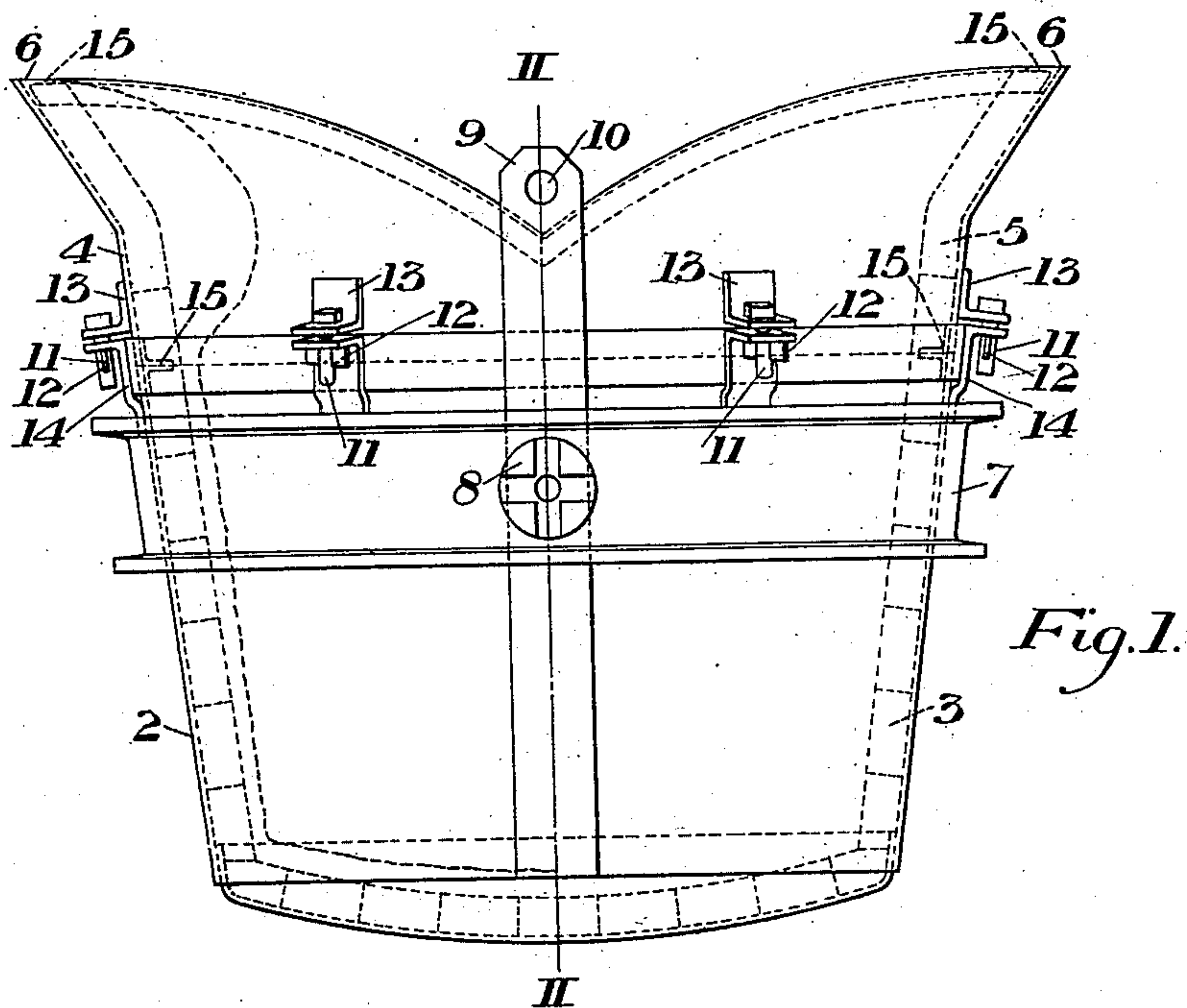


A. E. MACCOUN & M. KILLEEN.
 LADLE FOR MOLTEN METAL.
 APPLICATION FILED JAN. 31, 1908.

914,738.

Patented Mar. 9, 1909.



WITNESSES

W. W. Swartz
 R. A. Balderson

INVENTORS

A. E. Maccoun
 Michael Killeen,
 by Babcock, Byrnes & Parmelee,
 Attys.

UNITED STATES PATENT OFFICE.

ANDREW E. MACCOUN AND MICHAEL KILLEEN, OF BRADDOCK, PENNSYLVANIA.

LADLE FOR MOLTEN METAL.

No. 914,738.

Specification of Letters Patent.

Patented March 9, 1909.

Application filed January 31, 1908. Serial No. 413,539.

To all whom it may concern:

Be it known that we, ANDREW E. MACCOUN and MICHAEL KILLEEN, both of Braddock, Allegheny county, Pennsylvania, have invented a new and useful Improvement in Ladles for Molten Metal, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a side elevation of our improved ladle; Fig. 2 is a sectional side elevation on the line II—II of Fig. 1, the left hand side of each of these views showing the outline of the skull as it forms in the ladle, the right hand side showing a newly lined ladle.

Our invention relates to the ladles which are used in conveying molten metal and it more particularly relates to ladles which are placed upon ladle cars and are used in transporting molten metal from one place to another.

Heretofore in such ladles the metallic shell has been provided with a lining composed of brick or other refractory material. After these ladles have been used for a short time, a skull forms in such ladles which very materially reduces their capacity. The skull forms quicker on the top of the ladles at about the level of the metal when the ladle is full. This causes the skull on the top of the ladle to be thicker than that formed upon the bottom and sides of the ladle. Usually the skull forms on the top portion of the ladle to such an extent that it is impossible to entirely drain the molten metal from the ladles, the hump or projection formed by the skull on the top portion of the interior of the ladle forming a stop or dam which retains a quantity of the molten metal in the ladle, which if not removed will solidify in the ladle.

Our invention is designed to provide a ladle in which these difficulties are overcome and by which the time required in relining the ladles is greatly reduced and the life of such linings is largely increased.

The invention is further designed to provide improved means for removing the large skull which forms in the top of the ladle at the level of the metal when the ladle is full without removing the entire lining from the ladle.

The invention consists in constructing a sectional ladle in which the top metallic shell portion is removably secured to the lower metallic shell of the ladle.

It also consists in constructing the ladle so as to bring the joint between the sections at such point as will permit the large upper portion of the skull to be removed with the removable top section of the ladle.

In the drawings, 2 represents the lower metallic shell of the ladle which is provided with a refractory lining 3. 4 is the metallic shell of the upper removable top portion or section of the ladle which also is provided with a refractory lining 5. The top section of the ladle is provided with the usual pouring spouts 6. The ladle is placed in the trunnion ring 7 having the trunnions 8 by which the ladle is mounted upon the ladle car and the ladle is also provided with straps 9 having holes 10 through which may be inserted chain hooks or other devices by which the ladle is handled in removing it from and replacing it in the trunnion ring 7. The top section 4 of the metallic shell is secured to the lower section 2 by means of bolts 11 and keys 12 which secure together the horizontal legs of the lugs 13 and 14. Suitable angle plates 15 are provided on the top rim of the lower ladle section 2 and on the top and bottom rim of the upper section 4 to retain the bricks or other refractory lining in place and prevent the lining from becoming dislodged.

When the ladle has become skulled after being used for some time and it is desirable to remove the skull which forms in the top portion of the ladle in order that the molten iron may be entirely drained from the ladle or to again bring the ladle to somewhere near its normal capacity, the bolts 11 are removed from the lugs 13 and 14 and the top section 4 of the ladle is lifted from the bottom section 2. The skull formed in the bottom portion of the ladle will frequently be removed from the bottom portion of the ladle in removing the top portion of this ladle or the skull will be broken around the line of the meeting edges or joint of the ladle sections. A newly lined top section of the ladle is then easily and quickly placed in position on the bottom section 2 and is secured to this section by means of the bolts 11 as before. The ladle is then in readiness to be again used in transporting molten metal. The skull can then be removed from the top section 4 of the ladle which has been taken from its place on the bottom section 2. Usually this operation causes the lining of the top section of the ladle to be broken or become loosened to such an extent that it is

necessary to reline this top section of the ladle.

The advantages of our invention arise from the increased life of the lining in the lower portion of the ladle, as a number of the top sections can be used without the necessity of relining the bottom section. The expense of keeping the ladles in condition to carry a maximum amount of molten material and in keeping them in condition to be entirely drained after each filling operation is very largely reduced as by removing the top section and replacing it with a fresh top section the pool of metal which is generally impossible to remove from the top of the ladle after it has been used for some time is then easily drawn from the ladle and the capacity of the ladle is larger.

The apparatus is simple and is easily kept in repair. By keeping a number of extra top sections the equipment necessary to handle a large amount of molten metal is less than when the ladles are made in the usual manner.

We claim:—

1. A sectional open top ladle for molten metal having a metallic shell, a separable refractory lining for each section of the shell, means to retain the refractory lining in each section and detachable means for securing the shell sections together; substantially as described.

2. An open top ladle for molten metal having a lower metallic shell portion, a refractory lining in said shell portion, an upper metallic shell portion removably secured to said lower portion, the inner face of the metallic shells being in alinement with each other, a separable refractory lining for the upper shell portion, and means for securing the upper to the lower shell portion; substantially as described.

3. An open top ladle for molten metal having a metallic shell and a refractory lining within said shell, said ladle having a

separable upper shell portion and its lining detachably secured to a lower shell portion, and means to retain the refractory lining in each section; substantially as described.

4. An open top ladle for molten metal having a sectional separable metallic shell, an independent refractory lining in each section of the shell means to retain the refractory lining in each section, and means for separably securing together the lined sections of the shell; substantially as described.

5. A ladle for molten metal having a removable open top section and means for securing the removable section to the body portion of the ladle, the top section and body portion having separable refractory linings whose inner surfaces are alined to form a continuous lining of gradually increasing diameter toward the top; substantially as described.

6. A ladle for molten metal, consisting of a body portion having a trunnion ring surrounding its upper edge portion, a shallow removable interchangeable top section carrying the pouring lips, said portion and section being detachably connected and having separate refractory linings, and means to retain the lining in the top section and body portion; substantially as described.

7. An open top ladle section for molten metal having a metallic shell and a refractory lining within said shell, said ladle having a separable upper shell portion and lining removably secured to the lower shell portion, and angle bars secured to the inner walls of each shell for retaining the refractory lining, substantially as described.

In testimony whereof, we have hereunto set our hands.

ANDREW E. MACCOUN.
MICHAEL KILLEEN.

Witnesses:

G. E. F. GRAY,
FRANK A. POWER.