April 26, 1938. E. R. O'NEIL 2,115,535

LADLE

Filed Sept. 13, 1937 2 Sheets-Sheet 1

FIG. 1

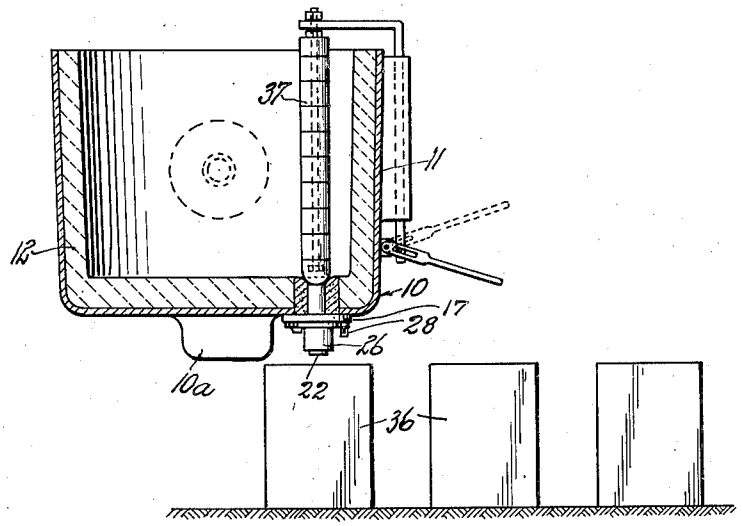


FIG. 2

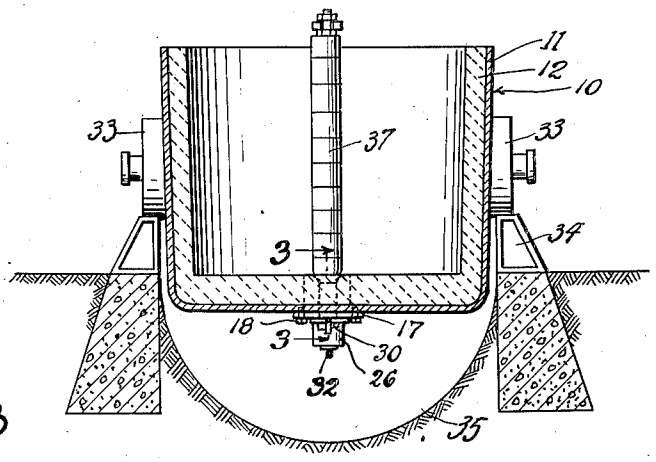


FIG. 3

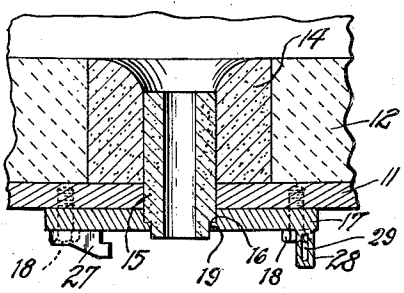
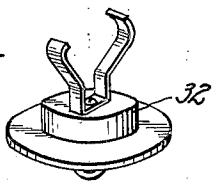


FIG. 4



Inventor:
Edmund R. O'Neil
By: Henry Koch
Attorney

April 26, 1938. E. R. O'NEIL 2,115,535

LADLE

Filed Sept. 13, 1937 2 Sheets-Sheet 2

FIG.5

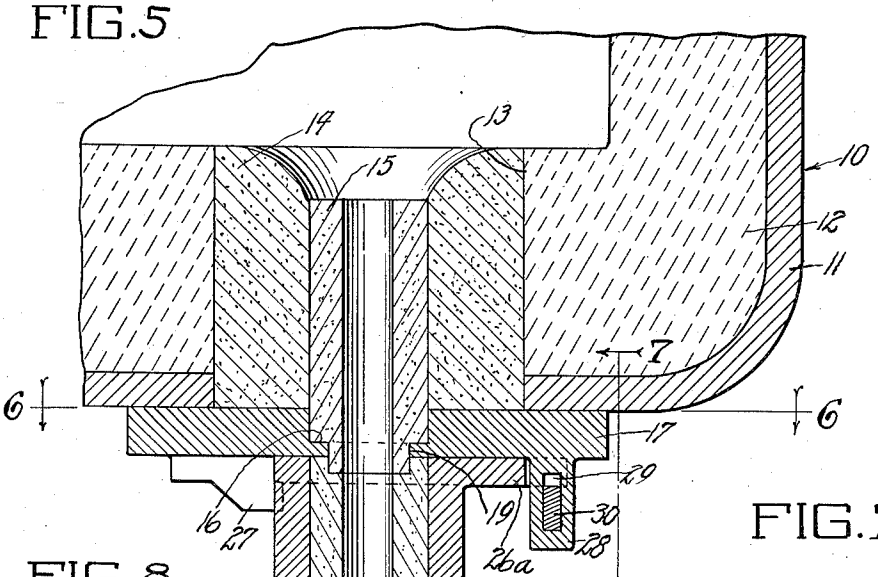


FIG.7

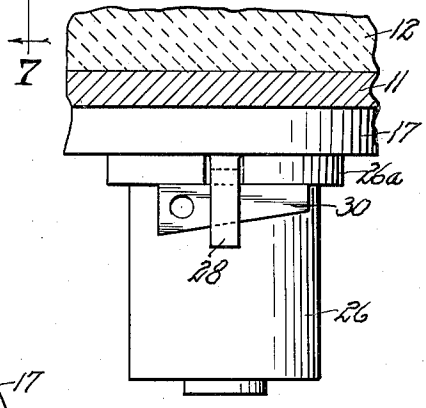


FIG.8

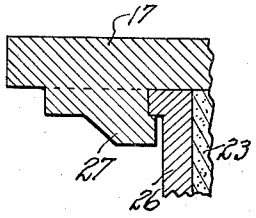
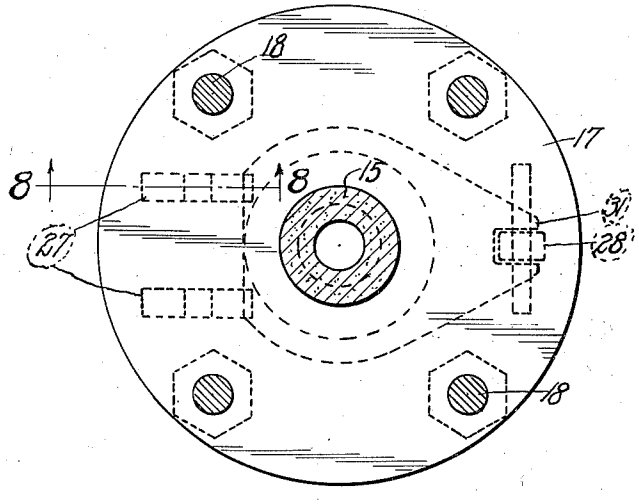


FIG.6



Inventor:
Edmund R. O'Neil
By: Henry Peck
Attorney

Patented Apr. 26, 1938

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UNITED STATES PATENT OFFICE

2,115,535

LADLE

Edmund R. O'Neil, Gary, Ind.

Application September 13, 1937, Serial No. 163,538

3 Claims. (Cl. 22—84)

The invention relates to ladles, and more particularly, to an attachment for a ladle used in the pouring of steel ingots.

In pouring steel ingots, due to the characteristics of molten metal, quite a few factors must be considered to obtain satisfactory ingots.

It is important that the stream of molten metal shall emit from the ladle from a certain height and at the center of the mold; that the stream, when issued from the nozzle of the ladle, shall not flare, but remain uniform, to eliminate scabs and splashing of the molds; that the velocity of the stream of molten metal should be of such degree that laminations, due to slow pouring, shall be obviated.

It, therefore constitutes the principal object of the invention to provide an attachment or a nozzle for a ladle, which insures perfect ingots.

Another object aims at providing a nozzle which may be secured to ladles already in existence without any appreciable change of the ladle, so as to minimize the cost of installation.

A still further object aims at providing a nozzle for a ladle which may be readily installed and removed.

A further object aims at providing an extended passage for the metal, upon emission from the ladle, which passage is of the same dimension and concentric with the passage provided in the ladle.

With these and other equally important objects in view, which will become apparent from a perusal of the invention, the latter comprises the means described in the following specification, particularly pointed out in the claims forming a part thereof, and illustrated in the accompanying drawings, in which

Fig. 1 is a section view of a ladle constructed in accordance with my invention, and arranged above a mold ready for pouring.

Fig. 2 is a sectional view of the ladle at right angles to the section shown in Fig. 1 and arranged over a slag pit for filling.

Fig. 3 is a section on the line 3—3 of Fig. 2, showing the means for releasably securing the extension.

Fig. 4 is a perspective view of a stopper used during the filling of the ladle, to prevent slag entering the nozzle.

Fig. 5 is a fragmentary enlarged section of the lower part of the ladle, and the attachment secured thereto.

Fig. 6 is a section on the line 6—6 of Fig. 5.

Fig. 7 is a section on the line 7—7 of Fig. 5, and

Fig. 8 is a detail section on the line 8—8 of Fig. 6.

Referring to the several views of the drawings, 10 generally designates a ladle which comprises a casing 11, lined with a layer 12 of clay brick. The layer 12 at the bottom is provided with a vertical port 13 in which is inserted a sleeve 14 of fire clay surrounding a tube 15, also made of fire clay, and reduced at the lower end to provide a shoulder 16.

A nozzle plate 17 of circular shape is provided with a plurality of screws 18 to be screwed to the casing 11. At the center, the plate 17 has an aperture 19 which is countersunk to form a seat for the shoulder 16 of the tube 15.

A plate 26a, adapted to contact with the plate 17, is formed with a cylindrical extension 26, in co-axial relation to the tube 15, and is closed at the bottom by a portion 20, provided with an aperture 21 for the clearance of the reduced end 22 of a tube 23 of fire clay. The tubes 15 and 23, which are in axial alignment, form a continuous and uninterrupted passage for the metal.

The plate 17 is provided with cleats 27 and with a depending lug 28, which is slotted, as at 29, for the reception of a key 30.

The plate 26a and the tube 23 are secured to the nozzle plate by inserting the plate 26a into the cleats and placing the bifurcated end of the plate 26, so as to clear the lug 28, thereafter the key 30 is inserted.

It is evident that the extension of the nozzle may be quickly applied or removed by the insertion or withdrawal of a key.

When the extension is removed, the lower end of tube 15 may be closed by a stopper 32, as will be readily understood by reference to Figs. 3 and 4. This becomes necessary when the ladle 10 is supported by its lugs 33 on bearings 34, over a slag pit 35 when being filled with molten metal.

In use, the ladle is first arranged over a slag pit to be filled, as shown in Fig. 2, with the extension 26 applied thereto. The extension is closed by the stopper 32, so as to prevent the slag from getting into the nozzle. Thereafter the ladle is conducted by means of a crane (not shown) over the molds 36 to cast the ingots, and controlled by a stopper 37.

The extent to which the ladle may be lowered over the molds is limited by reason of the fact that the lugs 10a of the ladle prevent the nozzle to be placed in close proximity to the mold.

For this reason, the extension 26 is provided to bridge the gap between the lowermost part of the ladle and the topmost part of the mold. The extension provides a continuous, uninterrupted passage for the metal, so that a steady stream

of the proper velocity, without splashing, is obtained from the point of emission of the ladle to the entrance opening of the mold.

While the drawings show a preferred embodiment of the invention, numerous changes and alterations may be made without departing from the spirit of the invention.

I, therefore, do not limit myself to the details of construction, nor the arrangement of parts, as shown, but wish to include all modifications and revisions constituting departures within the scope of the invention, as defined by the appended claims.

I claim:

1. In combination with a ladle having lugs at the bottom and provided with a nozzle held in place by a plate, an attachment removably secured to said plate and providing a passage in unrestricted continuation of the passage through said nozzle, said attachment being of a length to correspond with the depth of said lugs.

2. In combination with a ladle provided with lugs at the bottom and a nozzle secured by a plate, a tubular member detachably secured to said plate, and a plug in said member providing a passage in alignment with the passage through said nozzle, said tubular member being of a length to correspond with the depth of said lugs.

3. In combination with a ladle having lugs at the bottom and a nozzle secured thereto by a plate, said plate being provided with cleats and an eye-lug, a tubular member having a flange fitted in said cleats and encompassing said eye lug, a key in said eye lug bearing against said flange, and a plug in said tubular member providing a passage in alignment with the passage through said nozzle, said tubular member being of a length to correspond with the depth of said lugs.

EDMUND R. O'NEIL.