

July 22, 1930.

A. FRY

1,771,114

LADLE

Filed May 3, 1929

Fig. 1.

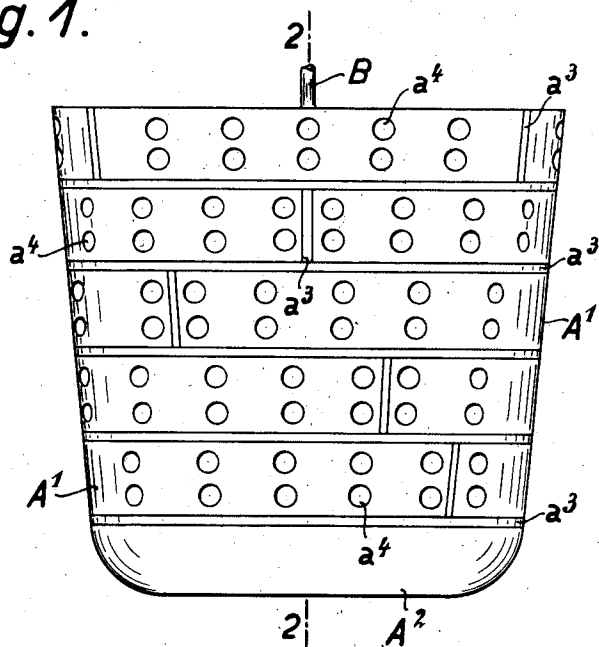
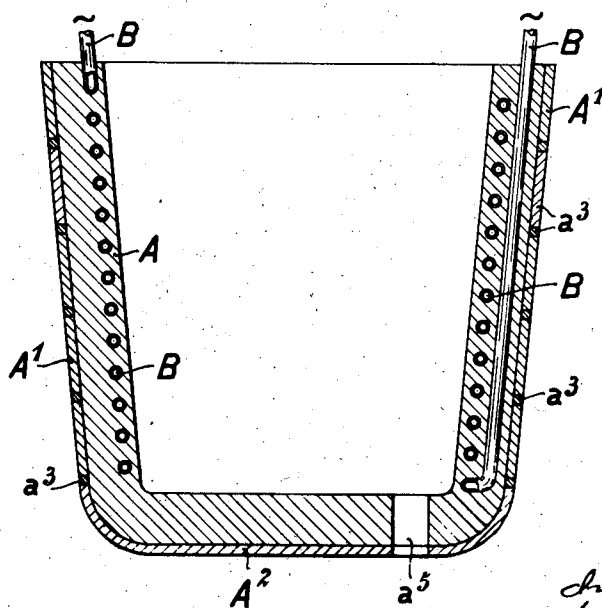


Fig. 2.



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LADLE

Application filed May 3, 1929, Serial No. 360,262, and in Germany May 18, 1928.

The object of the invention is a heatable ladle intended to cast metals and metal alloys, more particularly steels and steel alloys. The invention therefore primarily consists in the fact that the ladle is equipped with means for heating it by alternating current of high frequency.

In order that the invention can be more easily understood, a preferred embodiment of the same is illustrated by way of example in the accompanying drawing in which

Figure 1 is a view of a ladle intended to cast steel and steel alloys, and

Figure 2 is a section on line 2—2 of Figure 1.

Referring to these figures, the ladle is composed of an inner body A and a shell surrounding it and composed of annular sections A¹ and a bottom piece A². The inner body A is made of an electrically non-conductive material, e. g. concrete. A spirally wound electric coil B is embedded in the inner body A at the ends of which coil can be connected to an electric main of alternating current of high frequency, e. g. 8000 cycles. The coil B consists e. g. of a copper pipe which can be cooled by a water current flowing through it. The annular sections A¹ and the bottom piece A² of the shell advantageously are made of a non-magnetic steel alloy, e. g. of austenite chromium-nickel steel and separated from one another by electrically insulating intermediate pieces a³. The annular sections are further provided with holes or depressions a⁴ the object of which is to reduce the generation of eddy currents in the sections A¹.

In the bottom of the inner body A is provided a tap hole a⁵ that passes also through the bottom piece A² and can be closed by a plug (not shown).

When to be used the described ladle is filled from the furnace with the steel alloy to be cast. Thereupon the coil B is connected to the alternating current main and a cooling water current sent through it. Under the action of the electric current passing through the coil B an induction current is generated in the steel alloy which powerfully heats the latter. This heating of the

alloy enables to quiet it in the ladle and to obtain thereby a very satisfying separation of the slag constituents therein which rise to the surface. In case of need the usual additions, such as deoxidizing means can be added to the alloy while in the ladle. The formation of eddies occurring owing to the induction heating then produces a quick and uniform distribution of these materials within the steel bath. In tapping the ladle, the plug is withdrawn as usual, whereupon the steel alloy flows out of the ladle into the chill.

The chief advantage offered by the described ladle consists in the fact that the foreign bodies contained in the steel alloy easily have the opportunity, as indicated above, to separate from the steel alloy bath that remains thinly liquid due to its being heated. The steel cast in this manner is therefore remarkable over known steels for a quite particularly high purity of foreign bodies. The described ladle further enables to perform the heating of the steel alloy also in vacuo and to further increase thereby the purity of the steel.

I claim:—

1. A ladle composed of an inner body of refractory material carrying a coil adapted to be fed by alternating current of high frequency, and of a shell made of a non-magnetic iron alloy and composed of annular sections electrically insulated from one another, and of a bottom piece.

2. A ladle composed of an inner body of refractory material carrying a coil adapted to be fed by alternating current of high frequency, and of a shell made of a chromium-nickel-iron alloy and composed of annular sections electrically insulated from one another, and of a bottom piece.

3. A ladle composed of an inner body of refractory material carrying a coil adapted to be fed by alternating current of high frequency, and of a metal shell composed of annular sections electrically insulated from one another, and of a bottom piece, said sections having holes passing through them from outside.

4. A ladle comprising an inner body, a coil

in said body, said coil being adapted to be fed by alternating current, a shell composed of annular sections, electrically insulated from one another, each of said sections comprising a plurality of arcuate strips electrically insulated from one another, and of a bottom piece.

The foregoing specification signed at Cologne, Germany, this 19 day of April, 1929.

ADOLF FRY.

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