Dec. 16, 1924. 1,519,290

E. BAURICHTER

COMBINED SMELTER AND LADLE

Filed Nov. 25, 1921 2 Sheets-Sheet 1

Fig. 1

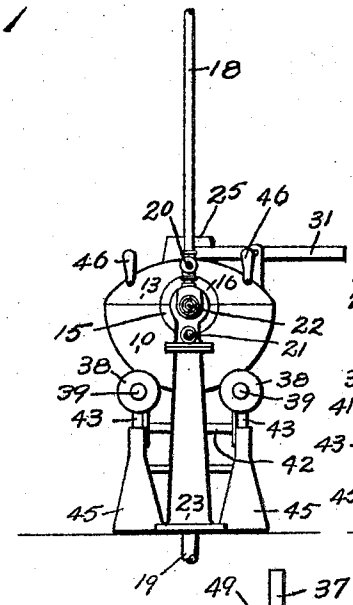


Fig. 2

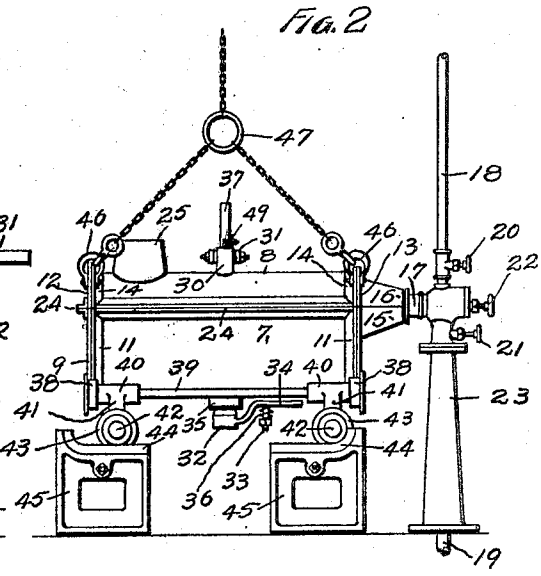
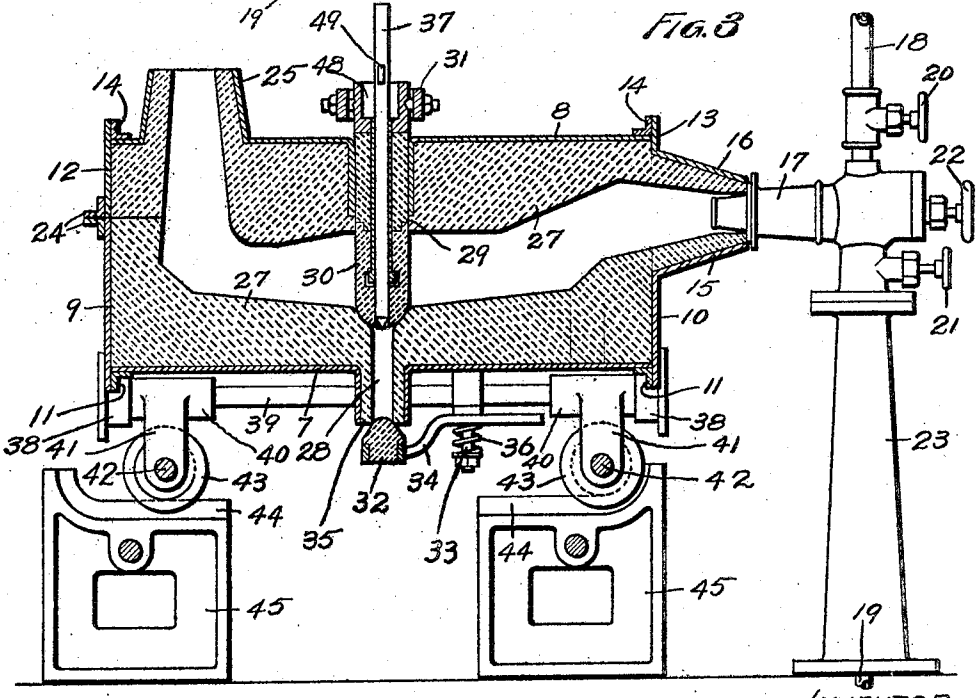


Fig. 3



INVENTOR
EMIL. BAURICHTER
By Edward E Lyon
ATTY.

Dec. 16, 1924. 1,519,290

E. BAURICHTER

COMBINED SMELTER AND LADLE

Filed Nov. 25, 1921 2 Sheets-Sheet 2

Fig. 4

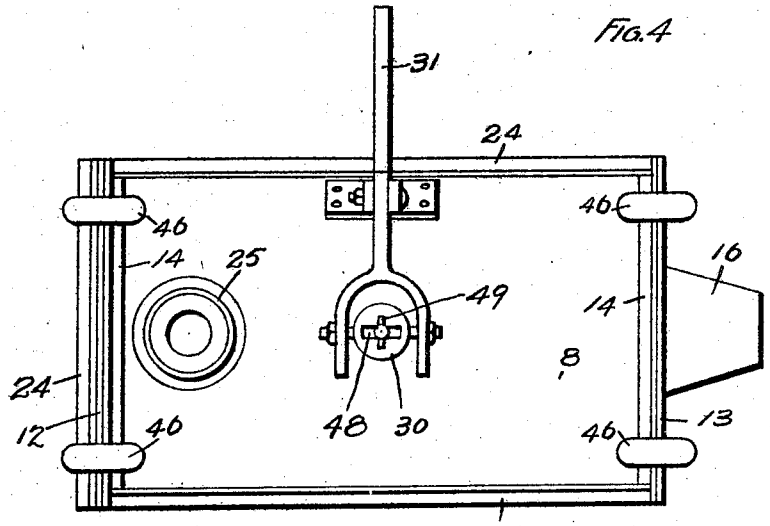


Fig. 5

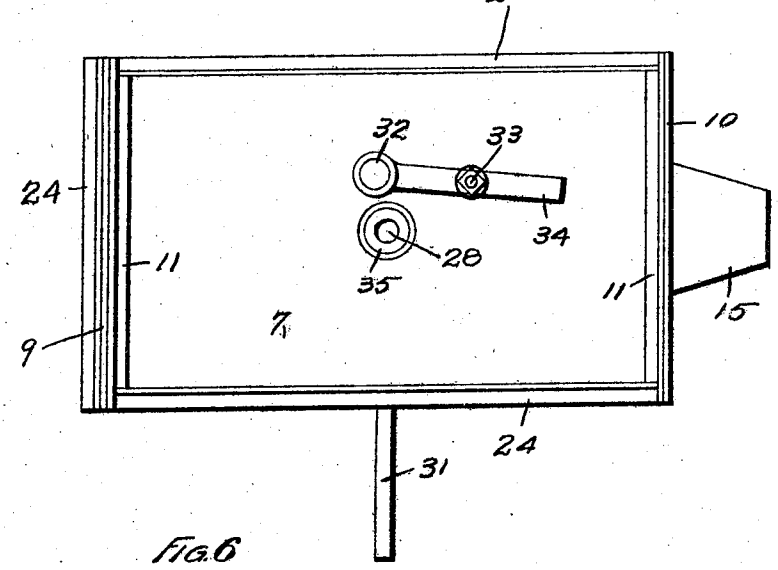
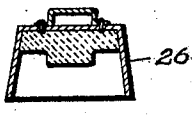


Fig. 6



INVENTOR
EMIL BAURICHTER
By Edmunds & Longan
ATTY.

Patented Dec. 16, 1924. 1,519,290

UNITED STATES PATENT OFFICE.

EMIL BAURICHTER, OF LUDWIGSHAFEN, GERMANY, ASSIGNOR TO CARL A. HAHN, OF ST. LOUIS, MISSOURI.

COMBINED SMELTER AND LADLE.

Application filed November 25, 1921. Serial No. 517,818.

To all whom it may concern:

Be it known that I, EMIL BAURICHTER, a citizen of the Republic of Germany, and resident of the city of Ludwigshafen and State of Bavaria, Germany, have invented certain new and useful Improvements in Combined Smelters and Ladles, of which the following is a specification containing a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention relates to combined smelters and ladles, and has for its primary object an oil or gas fired smelting furnace in which the air supply for the combustion is regulated and controlled, thereby avoiding an excess of free oxygen which combines with the molten metal to form metallic oxides.

A further object is to construct a combined smelter and ladle which is especially adapted for melting brasses or other alloys containing zinc, and in which the loss of zinc by oxidization and volatilization is reduced to a minimum.

A further object is to construct a combined smelter and ladle of the drum type which can be freely moved by means of a chain block, crane, or other transporting means. The burner to heat the furnace is separable therefrom and stationary.

A still further object is to construct a combined smelter and ladle, in which the waste heat is utilized to a very large degree by means of a built up filling spout for a charging opening where the raw material comes in contact with the hot gases, and thereby become highly preheated before being smelted.

A still further object is to construct a combined smelter and ladle, whereby the smelting losses are reduced through the elimination of the skimming off of the oxides, and the consequent loss of metal.

In the drawings,

Fig. 1 is a front elevation of my device in position ready for firing.

Fig. 2 a side elevation of the same.

Fig. 3 an enlarged longitudinal section of the same.

Fig. 4 a top plan view of my combined smelter and ladle.

Fig. 5 a bottom plan view of the same.

Fig. 6 a cross section of the cap for the charging opening made use of when the smelter is used as a ladle.

In the construction of my device I employ a combined smelter and ladle, comprising a lower section 7 which is semi-circular in form and an upper portion 8, the upper portion being arched but not semi-circular. The lower portion 7 is provided with a rear end 9 and a front end 10, which are secured to the lower portion by means of angle-irons 11. The upper portion is provided with a rear portion 12 and front portion 13 which are secured to the portion 8 by means of angle-irons 14. The front end 10 is provided with an inclined projection 15 and the front portion 13 with the inclined projection 16. When the smelter is secured together a hollow projection is formed into which the nozzle 17 projects. The nozzle 17 is for the purpose of supplying air and fuel to the smelter and has secured thereto a fuel pipe 18 and air pipe 19. The fuel supply being regulated by the valve 20; the air supply by the valve 21; the air and fuel supply are designed to mix in any well known manner and the introduction of the mixture through the nozzle 17 is regulated by means of the valve 22. The entire fuel supply structure is supported on a standard 23. The members 7 and 8 as well as the front and rear walls of the smelter are provided with angle-irons 24 by which the two halves are joined together. The upper portion 8 is provided adjacent its rear end with an upwardly extending portion 25 which not only serves as an outlet for waste gases during the smelting period, but also as a charging opening. This is closed by means of a cap 26 (see Fig. 6) when the smelter is used as a ladle for conserving heat. Before the two halves are assembled they are lined with fire-clay or other refractory material 27, the material in the lower portion tapering or inclining from each end downwardly toward the center, where it terminates in a passage 28. This is for the purpose of pouring the metal after the same has been smelted. The lining on the upper portion is so constructed as to deflect the flame from the nozzle 17 downward and on to the metal and is provided with an opening 29 located directly above the pouring opening 28, and in this opening is located a stopper or valve 30. This valve is raised and lowered by means of a hand lever 31. Beneath the opening 28 is located a plug or closure 32 which is pivotally mounted on a stud 33 and is opened and

closed by means of a handle 34. The plug is held in closed position, that is, tightly forced against the outlet spout 35 formed in the bottom member, by means of a coil spring 36. The plug 30 is hollow and has extending therethrough a cleaning rod or poker 37, the purpose of which will be explained in detail later.

As will be noted from the drawings, the angle-irons 14 together with the rear and front walls of the upper and lower members 7 and 8, form flanges which are adapted to rest on wheels 38. These wheels being mounted on shafts 39. The shafts in turn being mounted in bearings or boxes 40. These bearings or boxes have downwardly projecting bearings or boxes 41 in which shafts 42 are mounted, and on these shafts are mounted rollers 43. The rollers 43 being adapted to fit on tracks 44 formed integral with standards 45. These standards are for the purpose of allowing the smelter to be placed thereon and pushed forward on the rollers 43 so that the nozzle can enter the smelter, while the rollers 38 are for the purpose of rocking the smelter during the smelting process, so that a thorough mixture of metals can be obtained. Secured to the flanges on the upper member are eyes or links 46 for the purpose of attaching the same to a hoisting or carrying mechanism 47—this may be either a chain block, a crane, or other suitable carrying mechanism. The stopper or plug 30 is provided on its upper portion with a slot 48 into which the key 49 carried by the cleaning rod 37 is adapted to fit when it is desired to lower the cleaning rod for cleaning the passage 28.

The operation of my device is as follows: After the two members 7 and 8 have been lined with the refractory material 27, the parts are bolted together, the entire device hoisted by means of the hoisting mechanism 37 and placed on the standards 45. The hoisting member is then disconnected and the device moved forward so that the nozzle 19 will project therein. The passage way 28 being closed by means of the plug 32 and then filled with dry sand or ashes. The plug 30 is raised upward so as to leave the smelting chamber clear. The fuel and air valves 20 and 21 are first opened, then the valve 22 opened, and the resulting mixture issuing from the nozzle ignited. The valves 20 and 21 are then regulated so as to give the proper flame and ore or metal is placed in the filling opening. As the ore or metal gradually melts, more is added through the filling opening until the desired charge has been obtained—then in case the metal has oxidized during the smelting, the air supply is cut down by means of the valve 21, and more raw fuel is injected into the furnace. This raw fuel in burning will extract the oxygen from the oxides and restore the metal. When the entire mass has been sufficiently melted, the plug 30 is lowered; the plug 32 moved from its position and the ashes or sand in the passage way 28 allowed to drop out. In the event that the passage way 28 should become clogged, the cleaning rod 37 is turned so that the key 39 will enter the slot 48, and the cleaning rod forced downward and in this way the passage way cleaned. During the smelting of the metals, it is possible to rock the smelter on the rollers 38, thus insuring a complete mixture in case several metals are smelted at the same time and desired to be mixed, as is the case in making brass, bronze, or Babbitt metal, and the like. After the plug 30 has been lowered and the passage way 28 opened, the cap 26 is placed over the charging opening, the device rolled back on the standards 45, and a plug inserted in the opening in which the nozzle 17 formerly projected. This closes out practically all of the air from the smelter. The hoisting mechanism 47 is then attached to the eyes 46 and the device raised from the rollers 38 and moved directly over the moulds. The lever 31 is then pulled downward, raising the plug or stopper 30, and the metal allowed to flow downward through the passage 38 directly into the moulds. In this way the carrying of metal from the smelter to the moulds in open ladles is eliminated. The contact of the molten metal with the air and consequent oxidization of the same, reduced to a minimum, and consequently castings free of blowholes are obtained.

By the use of my device easy regulation of the firing is obtained and consequently the danger of over heating the metal is eliminated. The cost of crucibles is also eliminated. A better utilization of heat obtained since the heat is applied directly to the metal and not through the walls of a crucible. The going cold of the metal is prevented, the pouring can be done without heating the metal many degrees higher then is ultimately wanted—the absorption of gases is eliminated—the skimming off of oxides or other impurities is done away with, and the smelting temperature reached a great deal sooner than is the case where solid fuel such as coal or coke is used. Furthermore, the air supply can be so regulated as to prevent the formation of oxides, and in the case of an alloy containing zinc, the loss by volatilization is reduced, due to the rapidity which the pouring temperature can be reached, while the oxidization of zinc can be reached by cutting down the air supply after the mixture has been melted and using the oxygen in the mixture for the combustion of the fuel. Another feature is, the metal being tapped through the bottom, any impurities which might rise to the top are not drawn into the mould, and in this

way nonporous castings or castings free from blowholes are obtained. It is also possible to use my device as an oxidizing furnace by merely turning in an excess of oxygen or air after the metal has been melted, in which case the metal due to its high temperature will readily absorb the oxygen and be turned into oxides.

Having fully described my invention, what I claim is:

1. A combined smelter and ladle comprising a casing having an upper and a lower section secured together, a charging opening formed in the upper section, a pouring opening formed in the lower section, means for closing said pouring opening, and means for introducing heat directly into the casing.

2. A combined smelter and ladle comprising a casing having an upper and a lower section secured together, a charging opening formed in the upper section, a pouring opening formed in the lower section, separate means for closing each of said openings, and a valve controlled heating member for introducing heat directly into the casing.

3. A combined smelter and ladle comprising a casing having an upper and a lower section secured together, a charging opening formed in the upper section, a pouring opening formed in the lower section, means for closing said pouring opening, means for introducing heat into the casing, and means for permitting said casing to be rocked during the smelting.

4. A combined smelter and ladle comprising a casing having an upper and a lower section secured together, a charging opening formed in the upper section, a pouring opening formed in the lower section, independent means for closing said openings, a valve controlled heating member for introducing heat into the casing, and means for permitting said casing to be rocked during the smelting.

5. A combined smelter and ladle comprising a casing having an upper and a lower section secured together, a charging opening formed in the upper section, a pouring opening formed in the lower section, means for closing said pouring opening, means for introducing a heating agent into the casing, and a frame for supporting said casing during the smelting.

6. A combined smelter and ladle comprising a casing having an upper and a lower section, a charging opening formed in the upper section, a pouring opening formed in the lower section, a closure for the pouring opening extending through the upper section, a lever for operating said closure carried by the upper section, a firing opening formed in said casing, and a valve controlled heating mechanism adapted to be inserted into the firing opening for introducing heat into said casing.

7. A combined smelter and ladle comprising a casing having an upper and a lower section, a charging opening formed in the upper section, a pouring opening formed in the lower section, a closure for the pouring opening extending through the upper section, a lever for operating said closure carried by the upper section, a firing opening formed in said casing, a valve controlled heating mechanism for introducing heat into said casing, and a cleaning rod movably located in the closure for the pouring opening.

8. A combined smelter and ladle comprising a casing composed of an upper and a lower section secured together, said casing being provided with a charging opening, a pouring opening and a firing opening, a closure for said pouring opening, means for transporting said casing and valve controlled means adapted to be inserted in the firing opening for introducing a heating agent into said casing.

9. A combined smelter and ladle comprising a casing composed of an upper and a lower section secured together, said casing being provided with a charging opening, a pouring opening and a firing opening, a closure for said pouring opening, means for transporting said casing when the same is used as a ladle, a frame for supporting said casing while being used as a smelter, and a nozzle adapted to be inserted in said firing opening for introducing a heating agent within said casing.

10. A combined smelter and ladle comprising a casing composed of an upper and a lower section secured together, said casing being provided with a charging opening, a pouring opening and a firing opening, a closure for said pouring opening, means for transporting said casing when the same is used as a ladle, a frame for supporting said casing while being used as a smelter, and means for permitting said casing to be rocked during the smelting.

11. A combined smelter and ladle comprising a casing composed of a lower and an upper section secured together, said casing being provided with a charging opening, a pouring opening, and a firing opening, a closure for the pouring opening, means for transporting said casing when the same is used as a ladle, a cap for closing the charging opening when the casing is used as a ladle, a frame for supporting said casing while being used as a smelter, a valve controlled mechanism for introducing heat into said casing while being used as a smelter, and means for permitting said casing to be rocked during the smelting.

In testimony whereof, I have signed my name to this specification.

EMIL BAURICHTER.