Feb. 17, 1925. 1,526,851

L. HALL.

MELTING FURNACE

Filed Nov. 2, 1922 3 Sheets-Sheet 1

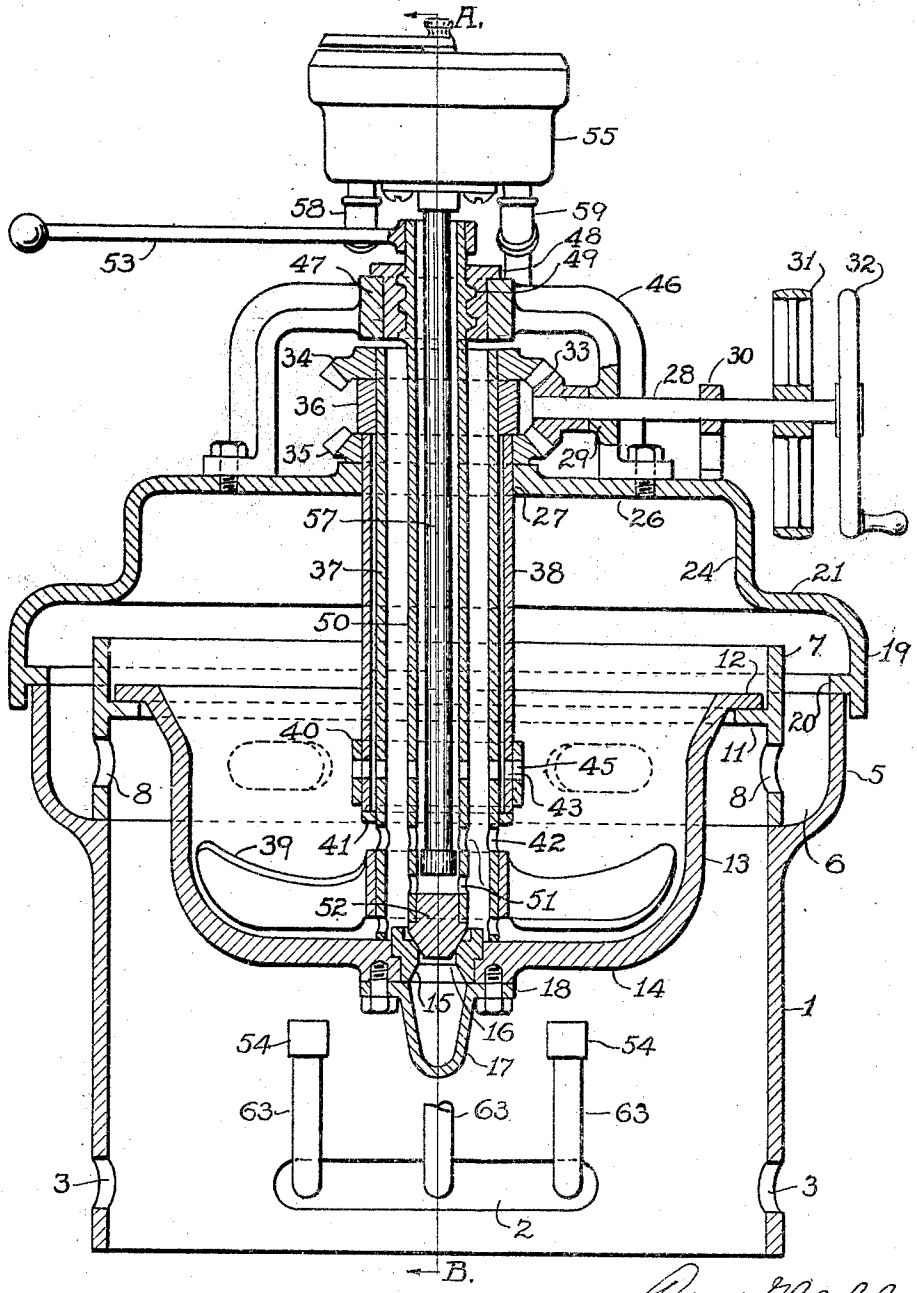

Fig. 1

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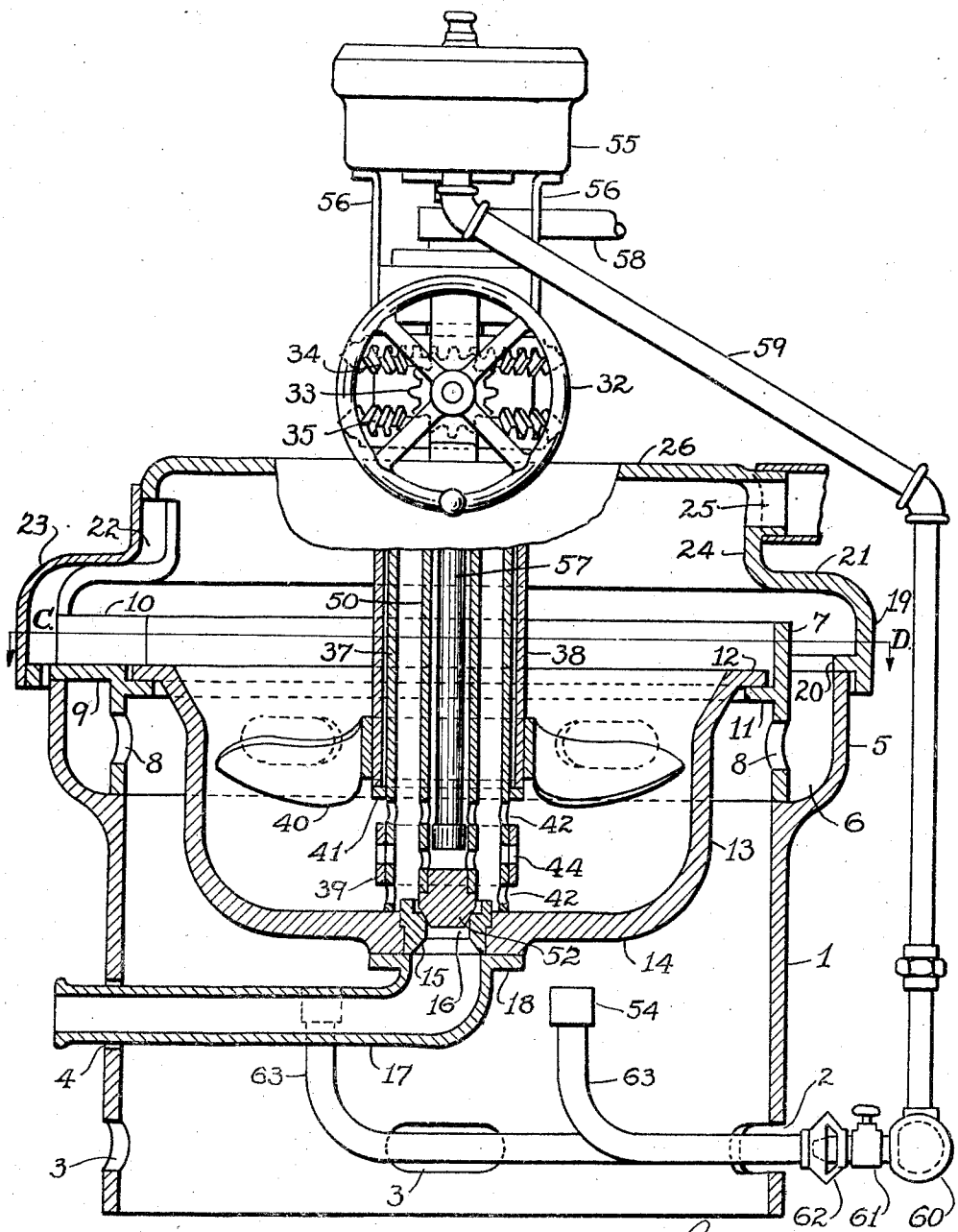

Fig. 2

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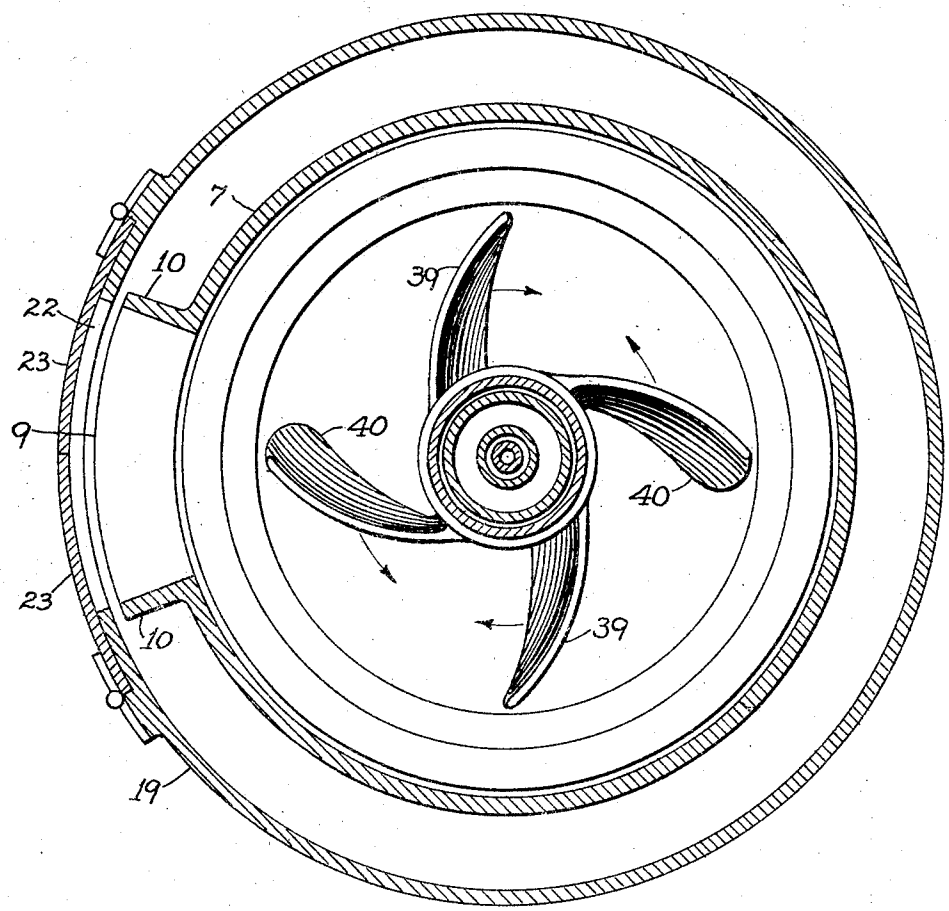

Fig. 3

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Patented Feb. 17, 1925. 1,526,851

UNITED STATES PATENT OFFICE.

LEES HALL, OF BALTIMORE, MARYLAND, ASSIGNOR TO ALFRED W. CHANNING, INC., OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

MELTING FURNACE.

Application filed November 2, 1922. Serial No. 598,608.

To all whom it may concern:

Be it known that I, LEES HALL, a subject of the King of England, residing at Baltimore, State of Maryland, in the United States, have invented a new and useful Improvement in Melting Furnaces, of which the following is a specification.

This invention relates to improvements in furnaces for melting and refining such metals as those known as type, stereo, lead, and babbitt, and all metals whatsoever having a melting point below that of aluminum, and which are used in general industries.

The objects which I seek to attain by my invention are to provide (1) an automatic control for governing the amount of fuel fed to the burners; (2) means for directing the fuel heat waves around the melting pot and then across the top of the metal; (3) means for thoroughly mixing and giving a grinding action to the molten metal thereby causing a homogeneous mass to form; and (4) means for tapping the melting pot at the bottom of same and for directing the molten metal to the outside of the furnace.

Other objects and advantages of my invention will be apparent from the following description when read in connection with the accompanying drawings wherein—

Figure 1 is a sectional elevation of the entire furnace.

Figure 2 is a sectional elevation on the line A—B of Figure 1, showing the furnace proper in section, and with an exterior view of the upper structure.

Figure 3 is sectional view on the line C—D of Figure 2.

With more particular reference to the drawings, wherein similar characters of reference denote similar parts in the several views:

The numeral 1 denotes a hollow cylindrical main body having in the lower part thereof an opening 2 for the passage of the fuel pipes, a plurality of openings 3 for the admission of air to the fuel burners, and an opening 4 (Fig. 2) for the passage of a pouring spout. At the upper end of said main body 1 the walls extend outwardly as at 5, thereby forming a pocket or chamber 6 into which is inserted a hollow cylindrical intermediate body 7. In the lower part of the body 7 are a plurality of openings 8 for the passage of the heat waves from the fuel burners. A horizontally outwardly extending lip 9 (Fig. 2) and vertically outwardly extending lips 10 (Fig. 2) are shown at the metal charging opening in the dome (Fig. 3). Numeral 11 designates an inwardly extending flange on which rests flange 12 of a bowl shaped melting pot 13 having in its bottom wall 14 an opening for the insertion therein of a valve seat 15 centrally apertured, as at 16, to receive a valve plug and for the passage of the molten metal into a pouring spout 17 which is bolted to the bottom wall 14 of the melting pot 13 by the flange 18.

The inverted bowl shaped dome 19 extends around and beyond the main body 1 and is supported by means of the inwardly extending flange 20 resting on the top of the circular wall 5 of the main body. The horizontal intermediate wall 21 of the dome 19 extends inwardly so as to deflect the heat waves from the fuel burners and direct them over the top of the molten metal in the melting pot. For charging the furnace there is provided in the dome a charging opening 22 (Fig. 2) covered by charging doors 23 hinged to the dome in the manner shown by Figure 3.

At the top of the side wall 24 of the dome, there is provided an opening 25 (Fig. 2) through which the fumes from the gases in the furnace are carried off. The top wall 26 of the dome supports the mechanism for mixing the metal. In said top wall 26 is a centrally disposed bearing 27 through which passes the tubular bodies on which are fastened the metal mixing propellers.

The mechanism for mixing the metal in the melting pot consists of a driving shaft 28 supported by the bearings 29 and 30, and rotated either by power through the pulley 31, fastened to the shaft, or manually by means of the hand-wheel 32.

A bevel gear pinion 33 is keyed on one end of the driving shaft 28, and there operates in mesh with the bevel gears 34 and 35 which are separated by the collar 36. Bevel gears 34 and 35 are secured to the tubular bodies 37 and 38, respectively, on the bottom end of which the mixing propellers 39 and 40 are fastened.

At the bottom of the tubular body 38 and

resting thereon is a ring 41 fastened to the body 37. The tubes 37 and 38 have a plurality of perforations as at 42 and 43, for the passage of the molten metal from the melting pot through the opening 16 and to the pouring spout 17. Another function of these perforations is for the passage of the heat from the molten metal to surround the regulator rod of the automatic control which governs the amount of fuel to be fed to the fuel burners beneath the melting pot 13. Opening 44 (Fig. 2) and opening 45 between the propeller blades serve the same purposes as the perforations 42 and 43.

For tapping the melting pot there is provided a valve rod support 46 bolted to the wall 26 of the dome 19, and having at its lower part a shaft bearing 29 and at its upper part a hub 47. The hub 47 is bored to receive a valve operating screw bushing 48 which is interiorly screw threaded to receive the upper screw threaded end 49 of a tubular valve rod 50 which passes down through the bore of the propeller driving tubular body 37. The walls of the tubular valve rod 50 have holes 51 for the passage of the heat from the molten metal to the regulator rod of the automatic fuel supply control and has in its lower end a valve plug 52 for stopping the flow of the molten metal to the pouring spout 17.

The lever 53 is provided on the upper end of the valve rod 50 to govern the flow of the molten metal. On being manually operated in a horizontal direction, the manipulation of the lever causes the threads 49 of the valve rod to turn in the screw bushing 48, thereby raising or lowering the valve plug 52 from or to its seat 15.

Regulator 55, supported above the furnace by the brackets 56 (Fig. 2), is provided for the purpose of automatically controlling the supply of gas fuel to the burners 54 set beneath the melting pot 14. Any type of commercial regulator utilizing the expansion and contraction of a rod as the agent to open or close the fuel passages in the regulator can be used. The regulator rod 57 is shown centrally disposed in the bore of the valve rod 50. The gas fuel is supplied through the pipe 58 to the regulator, then through the pipe 59 to the gas equalizing chamber 60 (Fig. 2), from which the gas is supplied to the burners 54 after passing successively through the valves 61, the air chamber 62 and the pipes 63, all as shown in Figure 2.

The furnace is operated in the following manner:

The melting pot is charged with cold metal through the charging opening 22 in the dome 19. The regulator is so adjusted as to permit a flow of gas to the burners 54 where the fuel is ignited, the heat so produced passing from the burners to the outer surface of the melting pot which, on being heated, causes the metal therein to form into a liquid state. From beneath and around the melting pot, the gases pass through the openings 8 and into the anti-oxidation chamber 6, then upwardly and out of the said chamber until the wall 21 of the dome 19 deflects the gases in a direction across the top of the molten metal. The flue 25 in the dome 19 carries the spent gases from the furnace.

The mixing propellers function to mix the molten metal into a homogeneous mass. These mixing propellers, located in the melting pot, are revolved by means of power through a belt on the pulley 31, or manually by the hand-wheel 32 fastened to the shaft 28. On being rotated, shaft 28 causes the keyed pinion 33 to impart contra-wise directions of rotation to the bevel gears 34 and 35, fastened to the tubular bodies 37 and 38 on which the mixing propellers 39 and 40 are fastened.

The relative positions of the bevel gears 34 and 35 to each other will be given a contra-wise direction of rotation by the bevel gear pinion 33 and will thereby cause the mixing propellers 39 and 40 to revolve in opposite directions. The design of the propeller 39 in such as to cause it to lift the molten metal and at the same time push it around and toward the center of the pot 13. The propeller 40 is designed to push the molten metal down again toward the lower propeller 39, and in a direction outward of its plane of rotation.

For tapping the melting pot, the lever 53, attached to the upper end of the valve rod 50, is turned in a horizontal direction which causes the valve plug 52 to be raised from its seat by means of the screw thread 49 on the valve rod turning in the screw threaded bushing 48. When the valve plug 52 is raised, the molten metal passes through the openings in the propeller tubular bodies and into the opening 16 to the pouring spout 17 where the metal can be directed to the exterior of the furnace and into moulds.

When gas fuel is used as a heating agency, the supply thereof is controlled by inserting the regulator rod 57 of the automatic fuel control through the bore of the valve rod 50. The molten metal passes through openings 51 of the valve rod and surrounds the rod 57, causing the same to expand or contract, according to the heat temperature, thereby opening or closing the passages in the regulator 55 for the passage of the gas fuel to the burners 54.

While there has been described the use of an automatic gas fuel control with my furnace, I do not intend thereby to limit myself since it is obvious that oil or coal may be used as a metal heating agent by

placing a door in the bottom of the main body 1, the gas fuel control being eliminated.

It is also desired to make clear that, while I describe and show a main body 1 and an intermediate body 7, these two elements may be cast in one piece. The intermediate body 7 and the melting pot 13 may also very well be cast as one piece.

I claim:

1. In a furnace for melting metal, a main body portion forming a combustion chamber, and provided with an offset upper end defining a flange, an apertured, internally flanged intermediate body seated on said flange and provided with said offset upper end, a chamber, a melting pot supported by the flange of said intermediate body and depending into said main body portion, a cover for said main body portion, a plurality of sets of mixing elements within the melting pot, and means for rotating said mixing elements, one of said sets of mixing elements being so formed as to raise the material being melted toward the other set of mixing elements, and the latter set being adapted to force said material toward the first mentioned set.

2. In a furnace for melting metal, a combustion chamber, a melting pot supported therein, a cover and a plurality of sets of mixing elements within said melting pot, means for rotating said sets of mixing elements in opposite directions, one of said sets of mixing elements being so formed as to force the material being melted toward the other set of mixing elements and the latter set being so formed as to force said material towards the first mentioned set.

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

LEES HALL.

Witnesses:
J. McMULLEN,
THOS. J. SEELEY.