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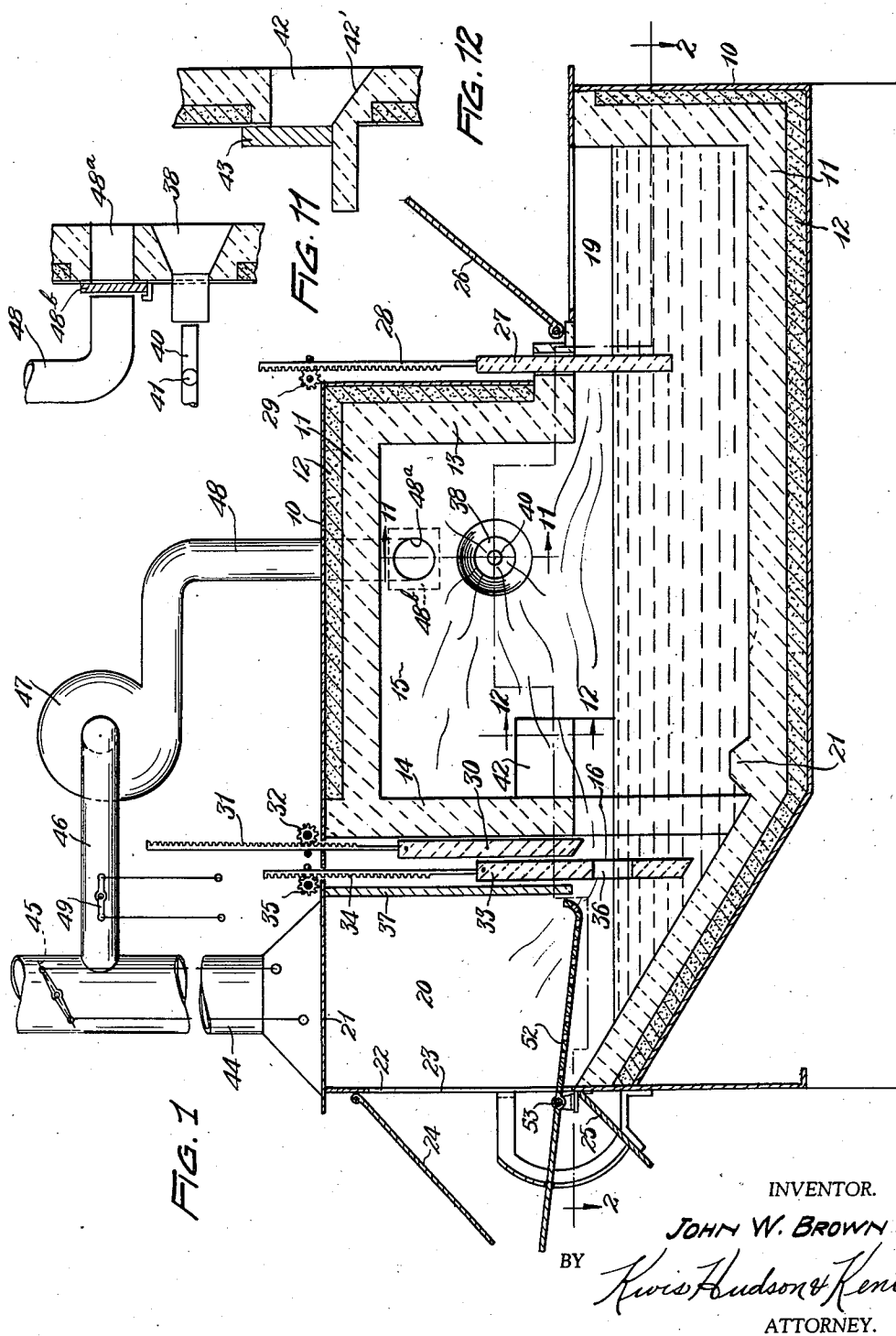
J. W. BROWN

2,264,740

MELTING AND HOLDING FURNACE

Filed Sept. 15, 1934

4 Sheets-Sheet 1



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MELTING AND HOLDING FURNACE

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4 Sheets-Sheet 2

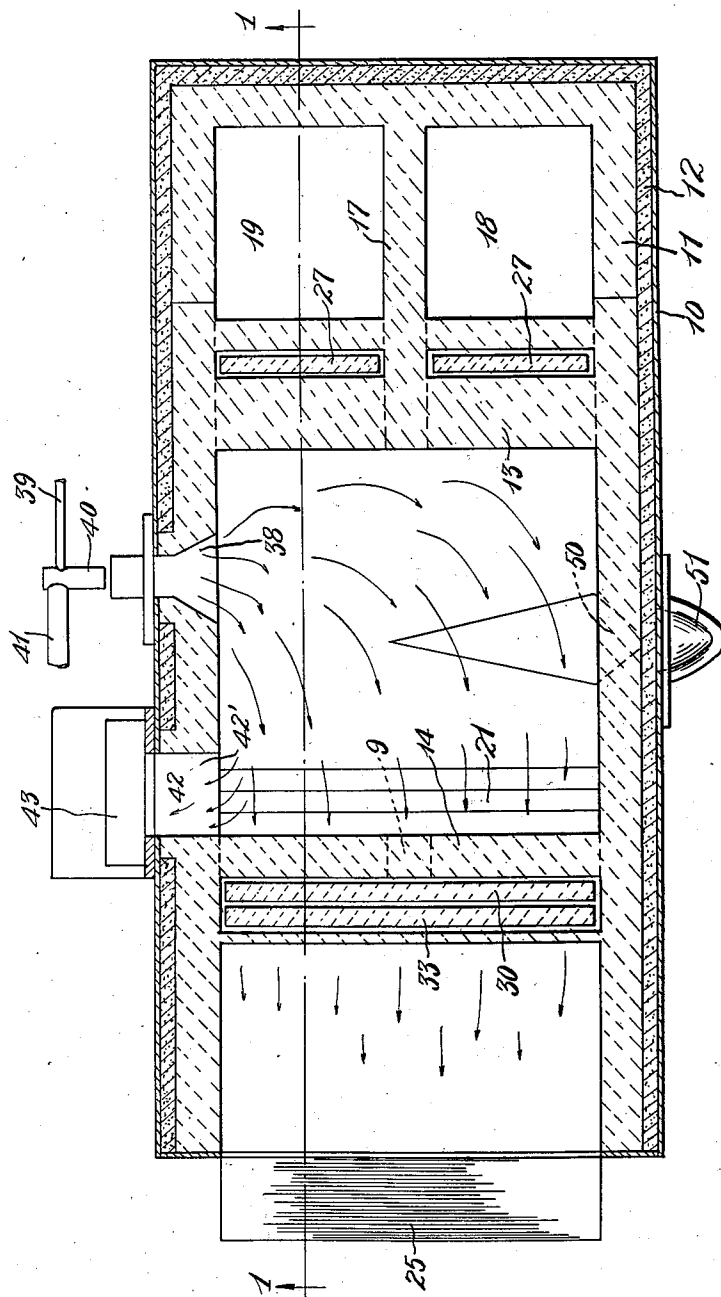


FIG. 2

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4 Sheets-Sheet 3

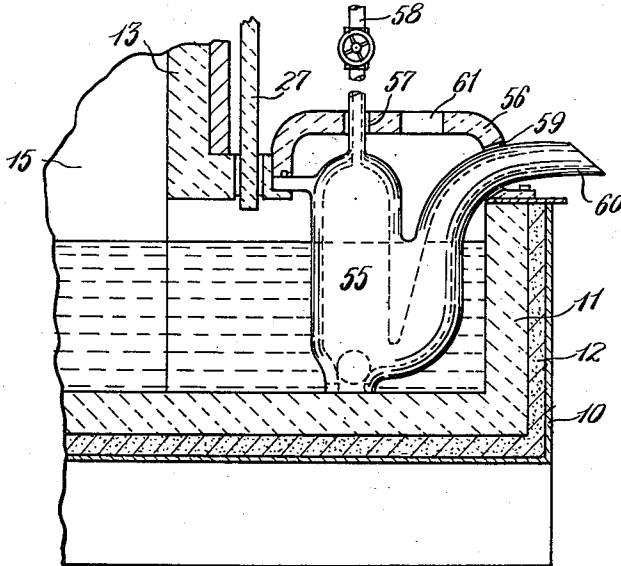


FIG. 3

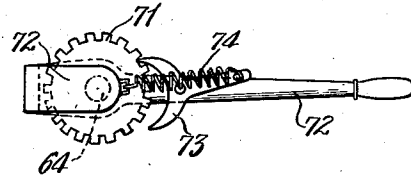


FIG. 5

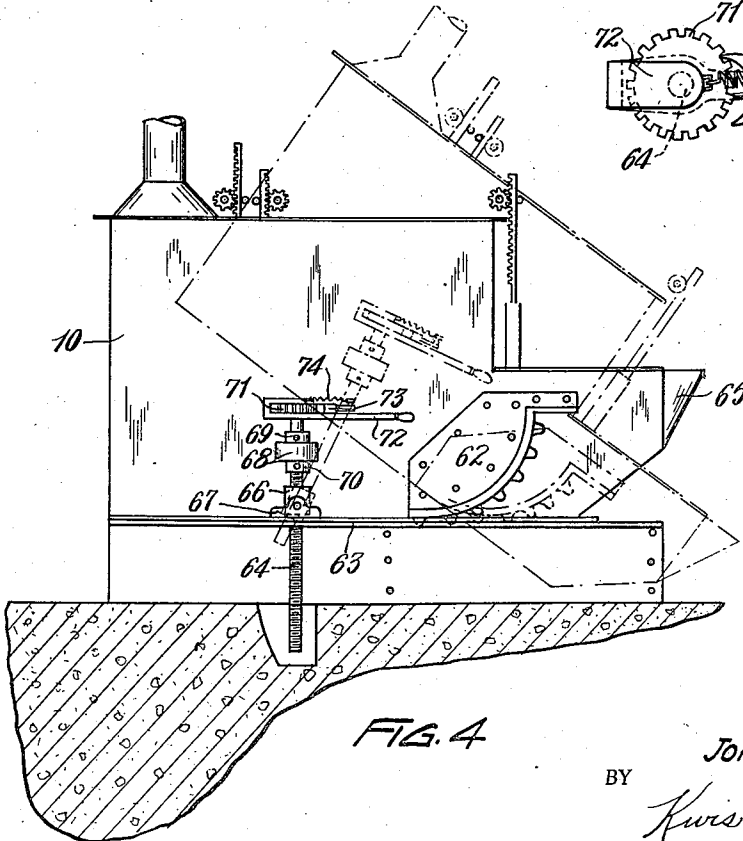


FIG. 4

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MELTING AND HOLDING FURNACE

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4 Sheets-Sheet 4

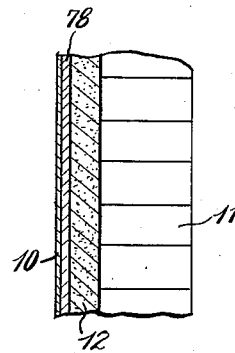
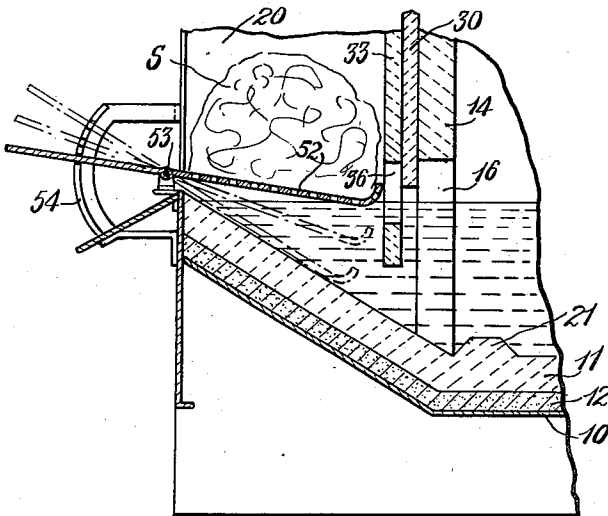


FIG. 8

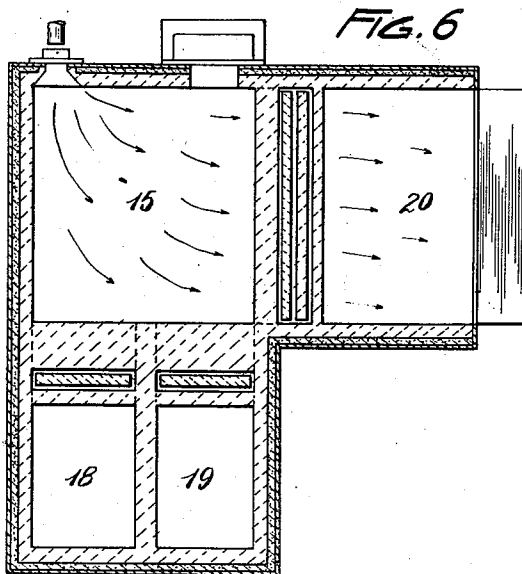


FIG. 7

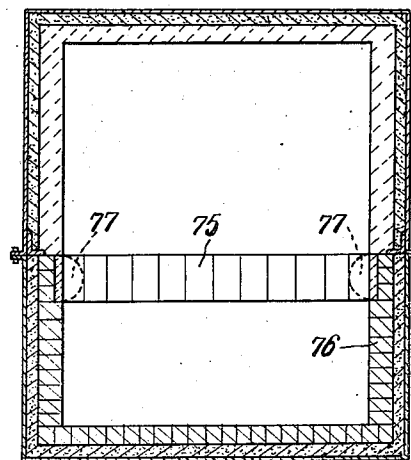


FIG. 9

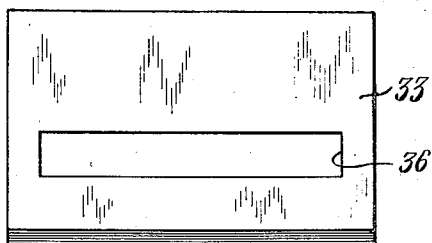


FIG. 10

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UNITED STATES PATENT OFFICE

2,264,740

MELTING AND HOLDING FURNACE

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Application September 15, 1934, Serial No. 744,254

27 Claims. (Cl. 266—33)

This invention relates to improvements in melting and holding furnaces, that is to say furnaces for melting non-ferrous metals and holding such melted metal in the molten state and at the desired temperature for casting purposes.

One of the objects of the invention is the provision of means in connection with a furnace similar to that disclosed in my copending application Serial No. 577,182, filed November 25, 1931, now Patent No. 2,020,101 issued Nov. 5, 1935, for controlling the temperature of the metal in the ladling pit to a considerable extent without varying that in the heating chamber, whereby the formation of castings of various kinds is facilitated, and whereby a plurality of ladling pits may be employed, and the flow of heat to them from the heating chamber may be regulated in such a way as to provide molten metal at different temperatures for different ladling pits, such a condition being highly desirable in order to secure castings of best quality when the character of the castings or the method of forming them varies.

Another object is to provide an improved furnace of the type mentioned such that the metal in the heating chamber and in the ladling pit may be maintained molten at a minimum cost overnight, or for other idle periods.

Another object is the provision of means permitting rapid heating of the feeding chamber and the ladling pit, as well as the heating chamber, after a shut-down or idle period.

Still another object is the provision of means in the heating chamber for causing the flame and hot gases of combustion to circulate directly above the molten metal to a greater extent than heretofore in order to conserve heat and render the furnace more efficient, with less damage to the roof and less heat loss through the roof.

Another object of the invention is the provision of a feeding chamber, for scrap metal particularly, so arranged as to make use of the heat of the exhaust gases from the heating chamber of the furnace.

Another object is the provision of means for controlling the amount of heated gases passing into this feeding chamber in order to avoid burning or oxidation of the metal and in order to bring about melting of the metal at the desired rate during periods of furnace operation.

Another object is the provision of means for readily and easily removing bits of iron and the like released from the scrap as it is melted.

A further object is the provision of means for

burning the vapors rising from a new batch of scrap in which there is more or less oil and grease, and thereby utilizing the same as fuel while preventing smoke nuisance.

Other objects and features of novelty will appear as I proceed with the description of those embodiments of the invention which, for the purposes of the present application, I have illustrated in the accompanying drawings, in which

Fig. 1 is a longitudinal vertical sectional view of a furnace embodying the invention.

Fig. 2 is a horizontal sectional view of the same taken substantially on the line 2—2 of Fig. 1.

Fig. 3 is a fragmental vertical sectional view through the delivery end of the furnace, showing a gooseneck in position in the ladling pit.

Fig. 4 is a side view of a further modification in which means is provided for tilting the furnace in order to pour the contents of the same.

Fig. 5 is a detail plan view of an operating mechanism.

Fig. 6 is a fragmental view corresponding to one end of Fig. 1, but showing the scrap pan in an elevated position, and showing also a different position of one of the adjustable doors between the chambers.

Fig. 7 is a view similar to Fig. 2 but on a smaller scale and showing the feeding chamber arranged at right angles to the ladling pits.

Fig. 8 is a large scale fragmental sectional view of a portion of the furnace wall in which a polished metal reflecting surface is employed for heat insulating purposes.

Fig. 9 is a transverse vertical sectional view of the furnace showing a course of replaceable lining blocks at or about the level of the molten metal where freezing and adherence of the metal to the furnace wall principally occurs.

Fig. 10 is an elevational view of a sliding door or partition.

Figs. 11 and 12 are detail vertical sectional views taken substantially on the lines 11—11 and 12—12 of Fig. 1, respectively.

In the drawings, the furnace has been shown as provided with an outer metallic casing 10 and a lining 11 of refractory material, with heat insulating material 12 of suitable character interposed between the casing and lining. Two transverse walls 13 and 14 of refractory material are provided, forming the front and rear walls, respectively, of the combustion and heating chamber 15. The front wall 13 and the rear wall 14 both terminate well above the level of the molten metal in the furnace, as indicated clearly in Fig.

1 of the drawings. The rear wall preferably rests upon and is supported by a central pier or column 9 which extends all the way down to the bottom lining of the furnace, with large openings or passages 16 on either side thereof.

The forward end of the furnace beyond the wall 13 is the delivery end, from which molten metal may be dipped or otherwise removed for casting purposes. In the preferred form of the invention this part of the furnace is divided by a central longitudinal wall 17 into two ladling pits 18 and 19. It will be apparent, however, that a single pit or a number of pits greater than two could be employed if desired. While the compartments 18 and 19 are primarily ladling pits, they sometimes receive metal. For instance some material, such as defective castings, hot from the molds, is often put back in the ladling pits.

The rear end of the furnace beyond the wall 14 constitutes the feeding chamber 20. The bottom of this chamber is inclined downwardly and inwardly as disclosed in Fig. 1, and at approximately the point where it joins the bottom of the heating chamber 15 I provide a transverse dam 21, the function of which is to catch and hold ferrous or other solid foreign material released from the melting scrap and sliding down the inclined bottom surface of the feeding chamber.

The bottom of the feeding chamber and the side walls thereof, at least as high as the maximum level of the molten metal, are covered with refractory and are heat insulated. The top 21 and the rear wall 22 of the chamber may also be heat insulated if desired, but are herein shown as constructed merely of sheet metal.

The rear wall 22 is provided with a large opening 23 through which scrap metal may be fed into the chamber, a door 24 being provided to cover this opening normally. 25 is a metallic apron attached to the outer wall of the furnace. Over this apron foreign material, dross and skimmings may be discharged when drawn over the rear end of the bottom of the chamber by a rake or a skimmer.

Above each of the ladling pits 18 and 19 I mount a hinged door 26 which is of a size sufficient to completely cover the opening above the pit. Each ladling pit is adapted to be cut off to a greater or lesser extent from the combustion and heating chamber of the furnace by a slide or partition 27 which consists preferably of a slab of refractory material. This slide may be raised and lowered and held in any adjusted position by suitable means, that illustrated consisting of a vertical rack 28 attached to the slide and a pinion 29 mounted for rotation upon the furnace casing and adapted to be rotated by suitable means such as a crank (not shown). The slide 27 may be lowered to any desired extent into the molten metal to thereby control the extent of communication between the molten metal in the heating chamber and in the ladling pit. The slide may also be raised far enough to cause its lower edge to clear the surface of the metal, thus providing a passage above the metal for combustion gases and controlling the size of that passage.

In order to control the size of the opening 16 in the rear wall 14 of the heating chamber, I provide a slide 30, a rack 31 and a pinion 32 similar to the parts 27, 28 and 29 above described. I also provide a slide 33 with a rack 34 and a pinion 35, this slide having a horizontally

elongated window 36 therein of approximately the same height as that part of the opening 16 which is above the normal level of molten metal. The slide 30 by adjustment can be used to regulate the extent of communication above the level of molten metal, or with that communication cut off entirely it can be used to regulate the extent of communication below the level of molten metal. When the slide 30 is raised above the top of opening 16, slide 33 can be adjusted to regulate the extent of communication above the metal level while interposing more or less obstruction to the flow of metal. Also, with the slide 33 in a given position, slide 30 may be caused to cut off more or less of the opening 16 above the metal level, thereby obtaining conditions of communication between the two chambers which it would be impossible to obtain with either slide alone. 37 is a guard or housing element used to prevent scrap from getting into the slide ways for the slides 30 and 33.

In one wall of the combustion and heating chamber I form a bell shaped opening 38 through which flame may be introduced into the chamber. If gas is the fuel employed, it may be delivered through a pipe 39 to a burner 40, the necessary air to support combustion being conducted to the burner through a pipe 41. In the same wall in which the flame opening 38 is located, I provide a second opening 42 with an inclined bottom 42' leading down to the level of the molten metal in the furnace. This opening is used both as a feed opening for ingot metal and as an exhaust opening for the combustion gases, and because of its location in the same wall with the opening 38 the gases that are exhausted through the opening 42 are caused to circulate over a considerable part of the surface of the metal in the heating chamber before they make the turn and find an exit through that opening. The opening 42 may be closed by a slab 43 of refractory material or other suitable door. By placing an ingot on the bottom of the opening 42 the heat in the chamber gradually melts the ingot and the melted metal flows down the inclined surface 42' into the mass in the heating chamber, without splatter, and hence with less oxidation. If the door 43 is left open to a greater or lesser extent at such times the hot exhaust gases flow over the ingot, causing it to melt more rapidly.

Extending from the top of chamber 20 there is a flue 44 provided with a damper 45. Normally the greater part of the combustion gases are discharged through this flue. When a new batch of scrap, upon which there is more or less grease and oil, is put into the feeding chamber, this oily material is vaporized by the heat of the combustion gases, forming a dense smoke which would be objectionable if carried off through the flue 44. In order to correct this smoke nuisance I have provided a pipe 46 branching from the flue 44 and leading to a blower 47, from the outlet end of which extends a pipe 48, the lower end of which registers with an opening 48a through the furnace wall directly above opening 38. When the pipe 48 is not in use the opening 48a is closed by a slide or other shut-off 48b. A damper 49 is mounted in pipe 46. When a new batch of scrap is to be placed in the feeding chamber 20 the damper 45 is closed, the damper 49 opened, and the slide 48b retracted. The blower 47 is then started. The vapors of oil are then drawn from the flue by the intake for blower 47 and directed into the furnace above

the flames from burner 40. The oil vapors are thereby ignited. In this manner therefore the smoke nuisance is eliminated, and at the same time some benefit is realized from the use of the vapor as fuel. When the oil is all driven off the damper 45 may be opened, the damper 49 and slide 48b closed, and the blower 47 stopped.

In one side wall of the furnace I may provide a tap hole 50 opposite a spout 51 mounted on the casing, in order that the metal in the furnace may be drawn off when the operation of the furnace is to be interrupted or discontinued for any reason.

Although it is not essential, I prefer to support the metal scrap introduced into chamber 20 upon a perforate pan 52 which is adjustable up and down so as to keep the scrap all above the level of the molten metal or to submerge it partly, as may be considered best under varying conditions. For this purpose the pan 52 may be mounted upon pivots 53 supported by the furnace casing, and it may be held in the desired positions of adjustment by slotted sectors 54. The scrap itself is designated in Fig. 6 by the reference character S. All large pieces of iron or other foreign solids are retained in the pan 52, and when the non-ferrous metals forming a given charge are all melted the pan 52 may be tilted to such an extent as to discharge the foreign material backwardly out of the furnace. Upon withdrawal of the pivots 53, the pan 52 may be removed.

In Fig. 3 I have shown a gooseneck 55, such as is used in connection with die casting machines, it being positioned in a ladling pit of my furnace. In this instance the pit is provided with a special cover 56 having an opening 57 through which the air line 58 to the gooseneck extends and an opening 59 through which the spout 60 of the gooseneck extends. This cover is also provided with an opening 61 through which combustion gases flowing into the pit from the chamber 15 may be discharged. By raising the slide 27 above the level of the metal, as indicated in Fig. 3, this exit for the gases is provided, and they are caused to flow over the upper portions of the gooseneck keeping the latter at such a temperature as to prevent the chilling of metal in the gooseneck or the freezing of metal onto the inner walls of the gooseneck. The gooseneck may also be used as a mechanical ladling device for purposes other than die casting, for example in pouring permanent mold or sand castings, or ladling out the metal into ingot molds. In these cases the gooseneck acts as a pump for the molten metal.

Fig. 4 illustrates a modification of the invention wherein provision is made for pouring the contents of the furnace rapidly when occasion arises to do so. Toothed rockers 62 are secured to the sides of the furnace casing and engage perforated flanges 63 on supporting rails 64. The furnace casing forward of these rockers is of less width than the distance between the rails 64, and at its forward extremity has a pouring spout 65. Suitable means are provided for raising or lowering the rear part of the casing. As shown herein this means may consist of a nut 66 swiveled in a bracket 67 mounted on the flange 63 with a screw 64 threadably mounted in the nut and extending through a bracket 68 which is swiveled to the casing 10. On either side of bracket 68 the screw 64 is provided with collars 69 and 70 which are pinned or otherwise fixed upon the screw. The smooth upper end of the screw 64 carries a circular rack 71 which is fixed

to the screw. An operating handle 72 turns upon the smooth upper end of the screw and carries a reversible ratchet pawl 73 which is held in either of its two positions of adjustment by a coil spring 74. When it is desired to raise the rear end of the furnace the pawl 73 is thrown to one position, and when it is desired to lower the casing the pawl is thrown to the opposite position. As the furnace rises or rolls on its rockers 62 the nut 66 tilts and the bracket 68 swivels upon its mounting. When the furnace is in pouring position the various parts of the operating mechanism occupy the positions illustrated in dotted lines in Fig. 4.

Under some circumstances it may be disadvantageous to have the three chambers of the furnace arranged in line. Where it is considered preferable, I may arrange the ladling pits 18 and 19 at right angles to the feeding chamber 20, as shown in Fig. 7. By making the heating chamber 15 square in horizontal dimensions I am enabled to make this change in arrangement without any change in the proportions of the parts entering into the ladling pits and feeding chamber.

In Fig. 9 I have shown a belt of readily removable and replaceable material, preferably brick splits 75, which are supported by the refractory lining 76 of the furnace. This belt is positioned at the level of the molten metal, where adherence of metal to the furnace walls occurs principally. After a period of operation this adhering metal builds up more or less as indicated by dotted line 77 in Fig. 9. When that occurs the surface of the metal is appreciably decreased and the heating thereof correspondingly interfered with. Heretofore it has been necessary to entirely remove at least a part of the furnace lining and build it up again with new refractories in order to overcome this difficulty. By the present invention, however, it is necessary merely to remove this belt of extra refractory material 75 and replace it at relatively small expense and with a relatively short shut-down.

Preferably as a part of the heat insulation of my furnace I employ metallic plates 78 forming a part of the furnace wall, as illustrated in Fig. 8. These plates have highly polished inner surfaces for the purpose of reflecting the heat waves. The preferred material is steel, plated with chromium, and polished.

The furnace herein described is adapted for operation either with ingot metal or scrap metal, or both. When scrap metal is used partially or wholly, the slides 30 and 33 are so adjusted as to deliver the proper amount of hot gases to the feeding chamber to heat and melt the scrap rapidly with a minimum of burning or oxidation. Of course the necessary rapidity of the melting will depend upon the rapidity of withdrawal from the ladling pits and the rate at which ingot metal is added to the mass. In some cases communication between the heating chamber and the feeding chamber may be mostly below the level of molten metal, it being obvious that no oxidation of the scrap can occur if it is submerged within the molten metal.

Frequently scrap and ingot metal are combined. In such case I usually cause part of the combustion gases to pass out of the heating chamber through the opening 16 and part of them through the opening 42, and by regulating the sizes of these openings the relative amounts of scrap and ingot melted may be controlled to a considerable extent.

Generally during periods of operation when castings are being made the slides 27 will be extended downwardly into the molten metal to a greater or lesser extent, communication below the metal level being sufficient to maintain the metal in the ladling pits at the proper casting temperature. The best temperature for casting will vary more or less with the character of the castings being made. For instance castings having small delicate parts can be better made from a metal of a relatively high temperature, whereas the usual run of castings do not require such hot metal. By adjustment of the slides 27 to different heights the temperature of the metal in the ladling pits can be changed considerably without any other change in furnace operation. The rate of withdrawal of the metal from the ladling pit also affects the temperature of the metal therein. For instance, if large castings are being made and the rate of withdrawal is consequently rapid, the rate of flow of hot metal into the pit from the heating chamber is rapid and the temperature in the pit therefore more closely approximates that in the heating chamber. Where two operators are working with metal drawn from the same furnace to produce two castings of different character, the metal in the two pits 18 and 19 may be maintained at different temperatures by adjusting the slides 27 to different heights, and thus the single heating chamber may be caused to furnish metal at the ideal temperatures for both jobs.

When it is desired to maintain a charge of metal in the furnace molten during a period of idleness, as for example over night, I close the doors 24, 26 and 43, and raise the slides 27, 30 and 33 entirely out of the metal. The burner 40 is then turned down to reduce the size of the flame projected into the heating chamber, thereby conserving fuel. The combustion gases then divide, part of them passing through the openings 16 and flowing over the metal in the feeding chamber 20, and part of them passing into the ladling pits 18 and 19. At such times the doors 26 may be closed completely, or may be opened slightly in order to create a draft. The metal in the feeding chamber and in the pits is thereby maintained molten.

I may also vary the extent of communication between the combustion and heating chamber on the one hand and the feeding chamber and ladling pits on the other hand by altering the height of the metal in the furnace.

Sometimes it is desirable to add considerable ingot metal at one time by dropping ingots into the ladling pits, and then to melt this metal and heat up the entire mass to casting temperature rapidly. To accomplish this it is necessary merely to raise the slides 27, 30 and 33 to cause the combustion gases to flow over the surface of the metal in the pits and in the feeding chamber, whereby the total surface of metal in the furnace is greatly increased and the heating action correspondingly accelerated. During normal operation it is usually desirable to have the slides 27 extend into the molten metal, since the dross in the ladling pits cannot then pass into the heating chamber where it would act to insulate the metal more or less against the heat of the flame in the chamber.

When the slides 27, 30 and 33 are up, dross can be skimmed from the entire surface of the metal in the furnace and drawn off over the apron 25, or out into the ladling pits.

Having thus described my invention, I claim:

1. In a melting and holding furnace for non-ferrous metals, a covered heating chamber, a ladling pit adjacent to and communicating with said heating chamber, and adjustable means for varying the extent of said communication below the metal level.

2. In a melting and holding furnace for non-ferrous metals, a covered heating chamber, a ladling pit communicating with said heating chamber above and below the metal level, means for opening or closing said communication above the metal level, and a cover for said ladling pit movable into or out of operative position.

3. In a melting and holding furnace for non-ferrous metals, a covered heating chamber, a ladling pit communicating with said heating chamber both above and below the normal level of the molten metal in the furnace, and adjustable means for varying the extent of communication above the level of the molten metal.

4. In a furnace of the class described, a covered heating chamber, a ladling pit communicating with said heating chamber both above and below the normal level of the molten metal in the furnace, and a vertically sliding partition between said chamber and ladling pit adapted to be lowered to cut off some or all of the said communication above the level of the molten metal, and to be lowered into the metal to a variable depth in order to cut off more or less of the said communication below the level of the molten metal.

5. In a melting and holding furnace for non-ferrous metals, a covered heating chamber, a plurality of ladling pits adjacent to and communicating directly with said heating chamber below the metal level, and adjustable means for varying the extent of the said communication between the heating chamber and one of said ladling pits below the level of the metal.

6. In a furnace of the class described, a covered heating chamber, a ladling pit communicating with said heating chamber both above and below the normal level of the molten metal in the furnace, means extending through a wall of the chamber for projecting flame into the chamber, one wall of the chamber having an exit opening for the combustion gases above the normal level of the molten metal in the furnace, and means for blocking off some or all of said exit opening, whereby the combustion gases can be discharged either through the said exit opening or through said ladling pit or divided between the exit opening and ladling pit in desired proportions.

7. In a melting and holding furnace for non-ferrous metals, a heating chamber, a feeding chamber with an inclined base, said feeding chamber being positioned adjacent the heating chamber and in communication therewith at its lower end, and a dam extending transversely of the furnace near the junction point between the two chambers below the liquid level for preventing solid foreign material from entering the heating chamber.

8. In a melting and holding furnace for non-ferrous metals, a heating chamber, a feeding chamber adjacent the heating chamber and in free communication therewith at its lower end below the liquid level, the bottom of the feeding chamber being inclined downwardly from a height slightly above the normal common level of molten metal in the two chambers to substantially the level of the bottom of the heating chamber, whereby a large surface of molten metal

is provided in the feeding chamber as compared with the volume of molten metal in that chamber, and whereby the raking of solid foreign material out of the feeding chamber is facilitated.

9. In a melting and holding furnace for non-ferrous metals, a heating chamber, a feeding chamber adjacent the heating chamber and in communication therewith at its lower end, the bottom of the feeding chamber being inclined downwardly and inwardly to substantially the level of the bottom of the heating chamber, and a dam extending along the joint between the bottom of the feeding chamber and the bottom of the heating chamber below the normal-common level of molten metal in the two chambers.

10. In a furnace of the character described, a heating chamber, a feeding chamber in communication with the heating chamber, means for varying the extent of the communication between the heating chamber and feeding chamber above the level of molten metal therein, and separate means for varying the extent of communication between the heating chamber and feeding chamber below the level of molten metal therein.

11. In a furnace of the character described, a heating chamber, a feeding chamber in communication with the heating chamber, and a perforate pan for holding scrap metal in said feeding chamber, said pan being adjustable to any one of a plurality of positions above or below the level of molten metal in the chamber.

12. In a furnace of the class described, a heating chamber, a covered feeding chamber adjacent thereto and in communication therewith, means for opening or closing and regulating the extent of that part of the said communication which is above the level of molten metal in the furnace, said feeding chamber having an opening for the reception of metal to be melted, and a door for closing said opening.

13. In a furnace of the character described, a heating chamber, a burner for fluid fuel arranged to project flame into said chamber, a feeding chamber in communication with said heating chamber above the level of the molten metal in the furnace, a flue for said feeding chamber, and controllable means for directing vapors and gases from said flue into said heating chamber adjacent said flame.

14. The method of operating a melting and holding furnace for non-ferrous metals wherein there is incorporated a closed heating chamber and a ladling pit adjacent thereto with communication both above and below the normal level of metal, which method includes the step of varying the extent of said communication for the purpose of controlling the temperature of the metal in the ladling pit.

15. The method of operating a melting and holding furnace for non-ferrous metals wherein there is incorporated a closed heating chamber and a ladling pit adjacent thereto with communication both above and below the normal level of metal, which includes the step of varying the extent of communication above the said level for the purpose of controlling the heating effect in the ladling pit.

16. The method of operating a melting and holding furnace for non-ferrous metals wherein there is incorporated a closed heating chamber and a ladling pit adjacent thereto, which includes the step of varying the extent of communication below the level of the metal, whereby the temperature of the metal in the ladling pit

may be regulated during periods when metal is being withdrawn from the ladling pit.

17. In a melting and holding furnace for non-ferrous metals, a covered heating chamber, a ladling pit communicating with said heating chamber below the normal level of the molten metal in the furnace, means for projecting flame into the chamber, and means providing an exit of limited extent from said chamber into said ladling pit above the level of the molten metal in the furnace.

18. In a melting and holding furnace for non-ferrous metals, a covered heating chamber, a ladling pit communicating with said heating chamber both above and below the normal level of the molten metal in the furnace, and means for projecting flame into said chamber, whereby the combustion gases may be discharged from the heating chamber into the ladling pit above the molten metal.

19. In a melting and holding furnace for non-ferrous metals, a covered heating chamber, a ladling pit communicating with said heating chamber below the normal level of the molten metal in the furnace, and a feeding chamber communicating with the heating chamber both above and below the normal level of molten metal in the furnace, whereby fresh metal may be added in the feeding chamber and preheated and melted therein by waste gases from the heating chamber, and whereby the effect upon the temperature of the molten metal in the ladling pit of metal entering the heating chamber from the feeding chamber will be minimized.

20. In a melting and holding furnace for non-ferrous metals, a covered heating chamber, a ladling pit communicating with one side of said heating chamber below the normal level of the molten metal in the furnace, and a feeding chamber communicating with the heating chamber both above and below the metal level at a point remote from the first named communication, whereby fresh metal may be added in the feeding chamber and melted therein and whereby the effect upon the temperature of the metal in the ladling pit of metal entering the heating chamber from the feeding chamber will be minimized.

21. In a melting and holding furnace for non-ferrous metals, a covered heating chamber, a feeding chamber in communication with the heating chamber both above and below the normal level of the molten metal in the furnace, and a support in said feeding chamber adapted to hold solid metal above the said normal level of molten metal, whereby waste gases entering the feeding chamber from the heating chamber may melt said solid metal and cause the melted metal to drop into the molten metal in the feeding chamber.

22. A metal melting furnace for non-ferrous metals having a melting chamber with a metal charging opening in the side of said furnace and means for carrying a supply of metal to be melted in front of such opening, means for supplying heat to said chamber, a flue communicating with the interior of said furnace, and means for controlling the passage of gases from said furnace by way of said flue whereby the passage of gases by way of the charging opening also may be controlled.

23. A melting furnace for non-ferrous metals having a melting chamber with a flue opening for the venting of heated gases and a second opening in one side of said chamber for the intro-

duction of metal into the furnace, means for supplying heat to said chamber, means for controlling the passage of gas through said flue, and an inclined chute discharging into the stated furnace opening and adapted for holding materials to be fed to the furnace in position where they are exposed to the radiant heat generated in the melting chamber of the furnace.

24. A melting furnace for non-ferrous metals having a melting chamber, means for supplying heat to said chamber including a burner adapted to impinge a flame against a wall of the melting chamber, said furnace having an opening located in a wall opposite to the first named wall of the melting chamber for the supplying of metal to the melting chamber and a damper controlled flue for the venting of heated gases from the furnace, and means for supporting a supply of metal to be fed to the furnace in a position adjacent to the stated opening so that such metal is subjected to radiant heat from the interior of the furnace.

25. A metal melting and holding furnace for non-ferrous metals having a covered heating chamber, a ladling pit communicating with said heating chamber during normal operation below the metal level only, and a feeding chamber communicating with the heating chamber below the normal level of molten metal, a barrier between the heating and feeding chambers at the normal metal level to prevent dross from passing

from one of said chambers to the other, whereby fresh metal may be added in the feeding chamber and melted therein by conduction and convection, and whereby the effect upon the temperature of the molten metal in the ladling pit of metal entering the heating chamber from the feeding chamber will be minimized.

26. In a melting and holding furnace for non-ferrous metals, a covered heating chamber, a ladling pit communicating with said heating chamber below the normal level of the molten metal in the furnace, a barrier normally cutting off communication between the heating chamber and ladling pit above the level of molten metal, and means for raising said barrier to open up communication temporarily above the level of molten metal.

27. In a melting and holding furnace for non-ferrous metals, a covered heating chamber, a feeding chamber in communication with the heating chamber below the normal level of the molten metal in the furnace, and supporting means in said feeding chamber adapted to hold solid metal above the bottom of the feeding chamber, whereby the amount of solid metal which can be immersed in the molten metal at any one time is limited, and the cooling of the molten metal by solid metal is proportionately limited.

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