

L. M. PARKHURST.
DIE CASTING MACHINE.
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1,054,789.

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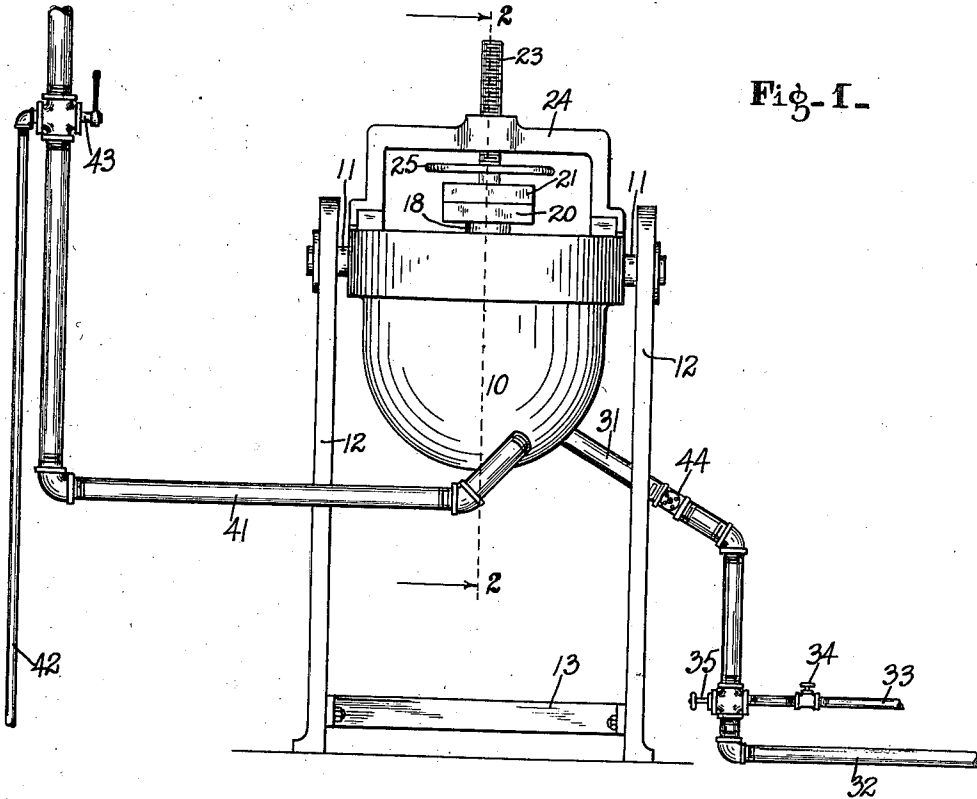


Fig. 1.

Fig. 3.

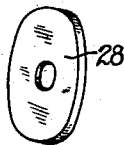
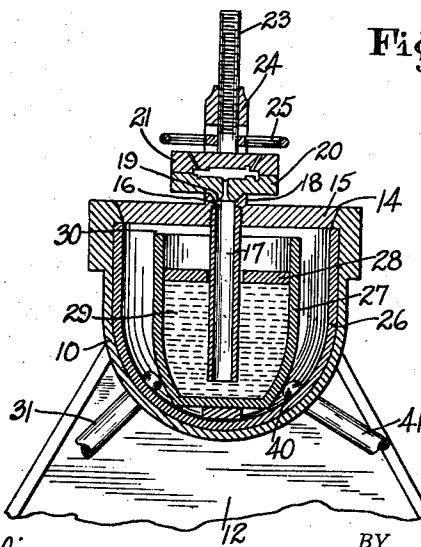


Fig. 2.



WITNESSES:

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LAYTON M. PARKHURST, OF INDIANAPOLIS, INDIANA, ASSIGNOR TO THE INDIANA
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DIE-CASTING MACHINE.

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To all whom it may concern:

Be it known that I, LAYTON M. PARKHURST, a citizen of the United States, and a resident of Indianapolis, county of Marion, and State of Indiana, have invented a certain useful Die-Casting Machine; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings.

The object of this invention is to improve the construction and operation of stationary die casting machines whereby the manufacture of castings from certain metals will be facilitated and their quality, particularly their density, be improved.

The chief feature of the invention consists in utilizing the products of combustion for forcing the molten metal out of the crucible into the die. It is accomplished by reversing the movement of the products of combustion by introducing compressed air into the exhaust passageway far enough away from the crucible so that the pressure of the air will force the products of combustion backward under sufficient pressure to force out the molten metal and keep the air entirely out of contact with the metal. Also a floating plunger plate rides loosely upon the metal in the crucible and around the outlet pipe therein. The foregoing not only facilitates the operation of such a device, but it enables the use of compressed air or the like for causing the discharge of the metal into the mold without said air or the like coming into contact with the molten metal. This prevents oxidation and other disadvantages resulting from an outer contact of the air or the like with the molten metal. It also simplifies the construction and mode of operation of the mechanism.

The nature of the invention will be understood from the accompanying drawings and the following description and claims.

In the drawings, Figure 1 is a front elevation. Fig. 2 is a central vertical section through a portion of the crucible on the line 2-2 of Fig. 1. Fig. 3 is the disk plunger shown in perspective.

In detail there is shown a semi-spherical melting oven 10 fixedly supported by the arms 11 on triangular end frames 12 which are held in place by cross bars 13. The sort of frames whereby the melting oven 10 is secured rigid in place is immaterial to the

invention. The oven is open at the top and provided with a slightly beveled mouth 14 so that the top 15 can wedge down into place and fit tightly. The top 15 has a centrally located outlet opening 16 for the molten metal, the lower part of said opening being threaded to receive a tube 17 which extends downward and the upper part of the opening 16 is surrounded by an annular projection 18 which surrounds a projection 19 on the lower part 20 of the die whereby the die is centered and held in place. The upper member 21 of the die is held in place beneath the lower end of a screw 23 which screws through a frame 24 and is turned by a wheel 25. In this manner the die is held upon the top 15 and outlet 16 from the crucible and after releasing, the screw 23 may be removed. The die may be of the usual construction.

The melting oven 10 is provided with suitable fire clay lining 26 and within said oven there is a crucible 27 having an oval bottom resting upon the fire clay lining and being open at the top and being held upright by means of a disk plunger 28 which lies loosely in said crucible and loosely surrounds the tube 17. This disk plunger 28 is made of fire clay or other incombustible material and such as will ride upon the surface of the molten metal 29 in the crucible. The tube 17 projects down near the bottom of the crucible and below the wider portion thereof which is of the same diameter as the plunger so that said disk plunger cannot move so low in the crucible as to escape from the outlet tube 17. The crucible extends up within the proximity of the top 15, but a space 30 is left between said top and the crucible for the passage of compressed air or gas from the oven into the upper end of the crucible. The metal in the crucible is maintained heated by gaseous fuel coming in through a pipe 31 which is supplied with gas through a pipe 32 and air through a pipe 33. A valve 34 controls the air and a valve 35 controls the gas and the mixture. The fuel pipe 31 enters the melting oven on one side of the crucible and there is an exhaust port at 40 from said oven at the other side of the crucible through a pipe 41. There is a compressed air pipe 42 connected with the air exhaust pipe and having a three-way valve 43 arranged so that when the valve is in one position, the exhaust will

pass out through the pipe 41, but when the valve is in the other position, it will close the outer portion of the pipe 41 and open communication between pipes 41 and 42 and then the compressed air will rush in from the pipe 42 through the pipe 41. There is a check valve 44 in the fuel pipe 31.

The operation is as follows: The crucible is filled with molten metal and then the disk plunger 28 is placed therein and the top 15 put in place with the outlet tube 17 projecting centrally through the plunger disk 28. The mold is moved down into a tight fit and the fuel turned into the heating chamber. This heats or maintains the heat of the molten metal in the crucible and the heated gases cannot reach the molten metal on account of the plunger disk 28. The products of combustion pass out through the pipe 41 which serves as a sort of flue. When it is desired to force the metal into the die, all that is necessary is to close the valve 35 to stop the flow of the mixture and operate the valve 43 so as to close the exhaust pipe 41 and turn in the compressed air through the pipe 42 and pipe 41. The air is under a rather high state of compression and it rushes into the chamber surrounding the crucible and over the tube in the crucible above the plunger disk and suddenly and effectively forces the disk down and thus forces the metal up through the tube 17 into the die.

The arrangement of the pipes 41 and 42 and valve 43 is not necessary, but done for convenience. The advantage of the arrangement of the tubes 41 and 42 and valve 43 is that only the heated gases from the pipe 41 would return into the outer chamber and upper end of the crucible and the cool compressed air would not reach said members and tend to cool them. As they are arranged in the drawings, the compressed air forces the products of combustion which are held in the pipe 41, back into the oven chamber and crucible, but with the same degree of pressure as the compressed air possesses. That does no harm to the metal in the crucible, however. All that is necessary is that there be some exhaust pipe leading from the oven chamber and also a means for turning compressed air or the like into said chamber. It is immaterial how this is done, whether exactly as shown or otherwise.

The compressed air tube 42 is connected with the exhaust tube 41 remotely from the outer chamber 10 so that the capacity of the portion of said exhaust tube 41 between its connection with the tube 42 and the outer chamber will at least be equal to the unoccupied space in the outer chamber 10 and the crucible 27. With this construction, when the compressed air is turned on from the tube 42 through the operation of the valve 43, it will force the warm and inert

gases in the tube 41 back into the unoccupied portion of the outer chamber 10 and the crucible so that the air will not enter said chambers, but only said inert and warm gases will enter the chamber, and, therefore, not tend in any way to cool the crucible and contents and it will prevent the oxygen of the air from reaching the crucible. Inasmuch as the crucible and contents thus remain very hot, the heat thereof will suffice to ignite the fuel mixture whenever it is introduced through the pipe 31 into the chamber 10. The pipe 31 has a check valve 44 in it which will close under the influence of the extreme back pressure caused when the compressed air is turned on through the pipe 42. With this arrangement the continuous operation of the apparatus is possible and only one valve 43 needs to be operated after the device is under way.

The outlet pipe or nozzle 17 is readily removable and, therefore, can be inserted, after the metal has become heated, into the crucible and through the plunger plate 28. This enables the tube 17 to be lifted out of the crucible while casting and then said metal can be heated outside and introduced into the crucible highly heated and the casting operation be commenced at once. When the nozzle 17, however, is thus removed, since it is secured to the top 15, another lid should preferably be placed upon the outer chamber while the casting operation is in progress, to keep the metal hot until time to begin the casting operation.

I claim as my invention:

1. A die casting machine including a crucible, a conduit from the lower part thereof through which the metal may be forced to a die, means for supplying heat to the crucible, and means for applying products of combustion under pressure upon the metal in the crucible for forcing the same out through said tube.

2. A die casting machine including a crucible, an oven forming a chamber surrounding said crucible and in communication with the upper part thereof, a conduit from the lower part of the crucible through which the metal may be forced to a die, means for introducing heat into the oven chamber, and means for compressing the products of combustion into said oven chamber and crucible for forcing out the metal during the casting operation.

3. A die casting machine including a crucible with an opening in the upper end, an oven surrounding said crucible leaving a chamber between the crucible and the oven in communication with the upper part of the crucible, means for introducing heat into said oven, an exhaust passageway from said oven, a conduit from the lower part of the crucible through which the metal is forced to a die, and means for returning the prod-

ucts of combustion in the exhaust passage-way into the oven and crucible under pressure for forcing the metal out through said tube to the die.

5 4. A die casting machine including a crucible, a conduit leading from the lower part thereof through which the molten metal may be forced to a die, an oven forming a chamber surrounding the crucible, valve controlled means for introducing heat into the
10 oven chamber, an exhaust tube leading from the oven chamber, a compressed air tube connected with the exhaust tube, and a valve at the connection between said tubes for
15 turning the compressed air into the exhaust tube and forcing the products of combustion backward into the crucible under pressure during the die casting operation.

5 5. A die casting machine including a crucible, a conduit leading from the lower
20 part thereof through which molten metal may be forced to a die, an oven forming a chamber surrounding the crucible, valve controlled means for introducing heat into
25 the oven chamber, an exhaust tube leading from the oven chamber, a compressed air tube connected with the exhaust tube away from the oven so that the capacity of the exhaust tube between the compressed air
30 tube and the oven will exceed the unoccupied space in the crucible and oven chamber, and a valve at the connection between said tubes for turning the compressed air into
35 the exhaust tube and forcing the products of combustion backward into the cruci-

ble under pressure during the die casting operation.

6. A die casting machine including a crucible open at its upper end with an outlet for the molten metal, a plunger plate 40 adapted to fit snugly but loosely into said crucible upon the molten metal, an outer chamber inclosing said crucible, a fuel supply tube entering said outer chamber at one side of the crucible, an exhaust tube leading 45 from said outer chamber at the other side of the crucible, a compressed air pipe leading to said exhaust tube, and a valve for simultaneously opening the exhaust tube and closing the compressed air tube when in one 50 position and for closing the exhaust tube and opening the compressed air tube when in the other position.

7. A die casting machine including a crucible open at its upper end, an oven surrounding the same, a plunger plate adapted 55 to lie upon the metal in the crucible and having an opening therethrough, a removable tube insertible loosely through said plunger plate into the crucible, means for securing 60 a die at the outer end of the tube, and means for introducing air under pressure into said oven and crucible.

In witness whereof, I have hereunto affixed my signature in the presence of the 65 witnesses herein named.

LAYTON M. PARKHURST.

Witnesses:

G. H. BOINK,
E. H. MAYO.