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I. H. SHAPIRO

AUTOMATIC CASTING MACHINE

Filed Feb. 20, 1926

FIG. 1

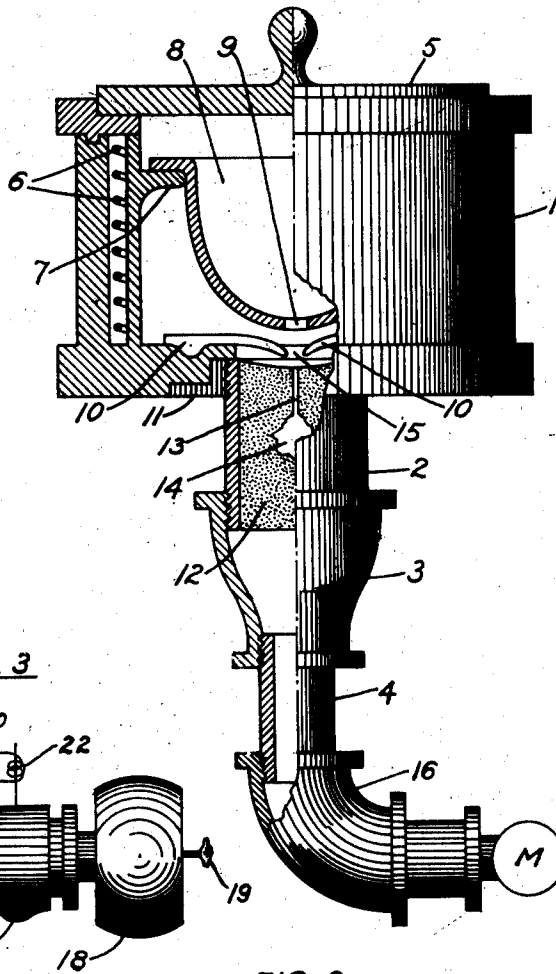


FIG. 3

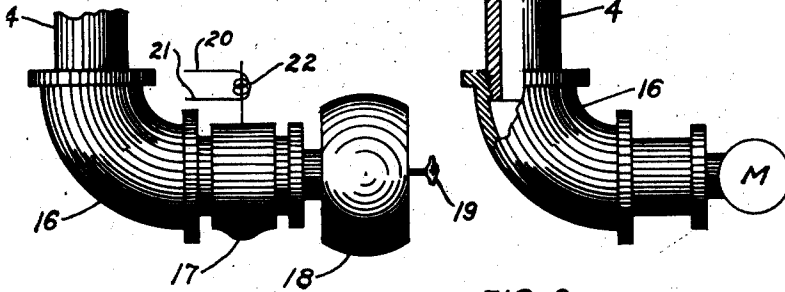
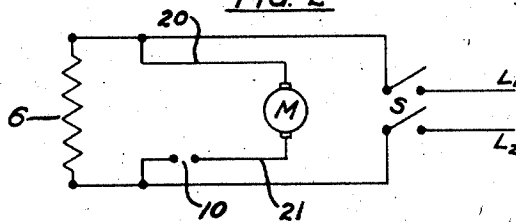


FIG. 2



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AUTOMATIC CASTING MACHINE.

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In making castings under pressure, more specifically, in making dental castings, it is essential that the pressure be applied at the proper time, that is, exactly when the metal is ready to be cast. If the pressure is applied prematurely, the metal will commence to flow into the mold before it is hot enough, and entering the mold, will solidify too soon, that is, before it can enter all the fine crevices in the mold; as a result, the casting will be useless, for in dental work, the casting must conform exactly to the pattern. If the pressure is applied too late, the metal will oxidize, again making the casting useless.

It is the object of this invention to provide a machine that will overcome the difficulties in determining when the pressure should be applied.

It is a further object of this invention to provide a casting machine wherein there is provided means for automatically applying the pressure when the metal is ready to be cast, which means will function properly without the necessity of adjustment for use with different metals having different melting points.

Referring to the drawings which illustrate a preferred embodiment of my invention,

Fig. 1 is a general view of the machine, partly in section.

Fig. 2 is a schematic showing of the electric wiring connections.

Fig. 3 illustrates a modified form of a portion of the apparatus shown in Fig. 1.

In the drawings, 1 represents an electric furnace, although it is obvious that the furnace may be heated by any other means. The flask 2 contains the plaster 12, which is porous to air, and in which a mold cavity 14 of the object to be cast has been made. The crucible 8 rests upon the shelf 7 in the furnace, and has an opening 9 through which the molten metal drops into the space 15 between the two electrodes 10. The furnace is provided with a cover 5, a heating coil 6, and a flange 11, into which the flask 2 is threaded. The molten metal enters the mold cavity 14 through the sprue 13, which is of such small diameter that the metal will not flow through it unless pressure is applied. To the bottom of the flask 2 is screwed a pipe-reducer 3, which is connected by any suitable means to a suction pump operated by an electric motor.

Referring to the wiring diagram, a switch S is provided whereby the apparatus may be connected to the lines L_1 , L_2 representing a source of electrical energy. The heating element 6 is connected directly across the line, while the motor which drives the pump is connected across the line through the two electrodes 10.

The operation of the machine is as follows: The closure of the switch S causes the heater 6 to heat the metal within the crucible. The motor, which drives the pump, is, however, not energized, because of the gap 15 between the two electrodes. When the metal has become molten, it drops through the opening 9, bridging the gap 15 between the two electrodes, thus closing the circuit for the motor of the pump, thereby applying the negative pressure below the mold, and causing the metal to flow through the sprue into the mold cavity.

In the modification shown in Figure 3, the pipe 4 leads from the reducer 3 thru the solenoid operated valve 17 to the exhaust chamber 18 which is exhausted in any convenient manner. As illustrated, it is exhausted by means of the hand operated pump indicated by the handle 19. When this modification is used, the metal to be cast is placed in the furnace and the furnace heated as before. The operator, however, exhausts the chamber 18, creating therein a partial vacuum. The valve 17 is normally closed, and therefore no pressure is applied to the apparatus. When the metal melts and bridges the gap between the electrodes as previously explained, it will in this case establish a circuit to the solenoid 22 and cause the opening of the valve 17 thereby applying the pressure to the apparatus. It is, of course, understood from the description thus far given that the solenoid is electrically connected as shown in Fig. 2 in place of the motor operated pump M there shown.

In the apparatus as shown the difference in pressure is obtained by creating a partial vacuum beneath the mold while the pressure above is atmospheric. It is, however, within the purview of this invention to create the necessary difference in pressure by keeping the pressure beneath the mold at atmospheric and increasing the pressure within the furnace.

Having now described my invention, it is, of course, obvious that various changes may

be made without departing from the spirit of the invention, and I do not wish to be limited to the exact construction above shown.

What I claim as my invention is

- 5 1. A dental casting machine, comprising in combination a heating chamber, a flask connected to the heating chamber, a pump for establishing a higher pressure within the chamber than within the flask, electric operating means for the pump, electrodes within the chamber, said electrodes being in circuit with the electric operating means.
- 10 2. A furnace for melting metal to be cast, said furnace having an opening through which the molten metal flows, two electrodes placed adjacent the opening so that the metal in flowing through the opening establishes contact between the electrodes.
- 15 3. A structure as set forth in claim 2 with the addition of electric operated pressure applying means, said electrodes being in circuit with the pressure applying means.
- 20 4. In a machine for making metal castings wherein the metal is made to flow from a furnace into a mold by the application of pressure, automatic means for applying the pressure as the metal flows toward the mold.
- 25 5. In a machine for making metal castings, wherein the metal is made to flow from a furnace into a mold by the application of pressure, means within the furnace for actuating pressure applying means as the metal flows toward the mold.
- 30 6. In a machine for making metal castings under pressure wherein the metal is caused to flow from a furnace into a mold by the application of pressure, electrodes within the furnace for actuating pressure applying means as the metal flows toward the mold.
- 35 7. In a metal-casting apparatus where the metal is cast under pressure, a furnace, means within the furnace for causing the actuation of pressure applying means, said means being in the path of the metal as it flows to leave the furnace.
- 40 8. In combination, a furnace for heating metal to be cast under pressure, electrically operated means for causing the application of pressure thereto, spaced contacts in said furnace, a series circuit including said means and said contacts, means in the furnace for causing the molten metal to flow in a defined path, said spaced contacts being in the path of flow of the metal.
- 45 9. In combination, a furnace for heating metal to be cast under pressure, electrically operated means for causing the application of pressure thereto, spaced contacts in said furnace, a series circuit including said means and said contacts, means in the furnace for causing the molten metal to flow in a defined path, said spaced contacts being in the path of flow of the metal, and electric heating means in said furnace connected in parallel with said series circuit.
- 50 10. A machine for making metal castings under pressure including a molding flask whereunto the molten metal flows, said molding flask having an opening leading to a cavity therein, the opening being of such small size that the liquid metal does not flow there-through, contacts arranged to be bridged by the molten metal, and means actuated when the contacts are bridged to apply pressure to force the metal through the opening.
- 55 11. In combination, an apparatus wherein metal is melted, means for forcing the metal to flow from said apparatus, and means depending upon the fluidity of the metal for actuating said first named means.
- 60 12. In combination, a metal casting apparatus including a melting furnace, a molding flask connected thereto, electrical heating means for the furnace, electrically controlled means for applying a pressure to force the molten metal into the flask, the circuits for the two named means being connected in parallel, the circuit for the second named means being normally ineffective, and means in the branch of the circuit containing the second named means for rendering the circuit effective, said last named means being dependent upon the fluidity of the molten metal.
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