J. A. McMANUS, Jr.

CASTING MACHINE.

APPLICATION FILED AUG. 5, 1910.

1,015,819.

Patented Jan. 30, 1912.

2 SHEETS—SHEET 1.

Fig. 1.

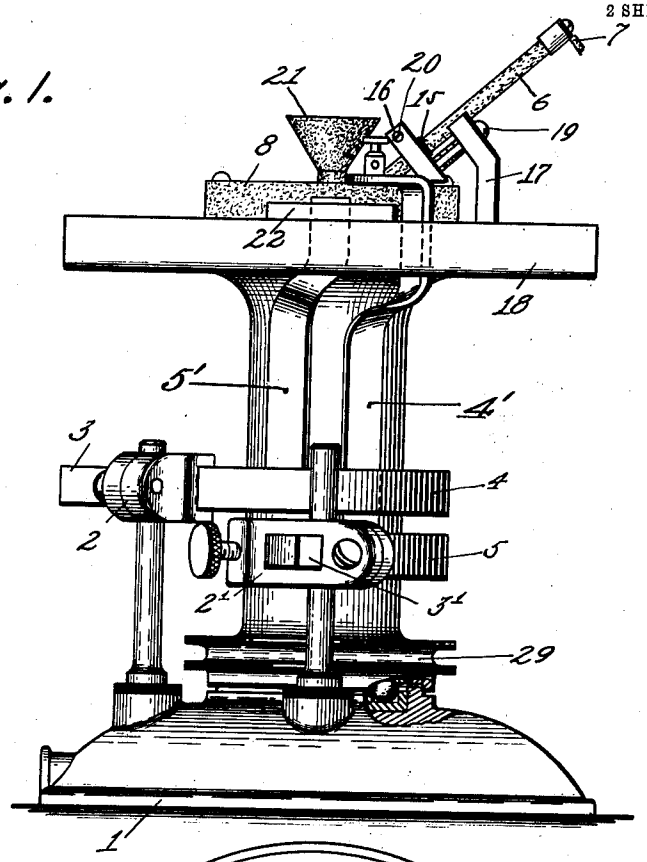
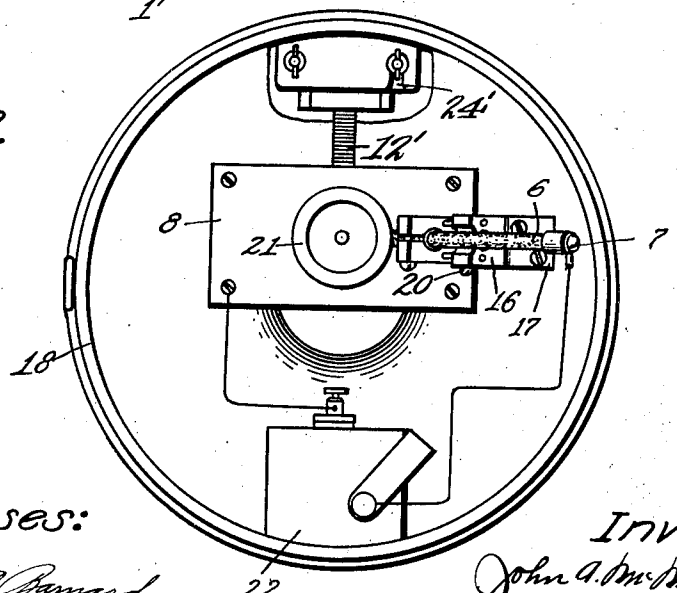


Fig. 2.



Witnesses:

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2 SHEETS—SHEET 2.

Fig. 5.

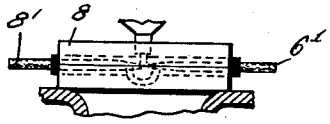


Fig. 3.

Fig. 6.

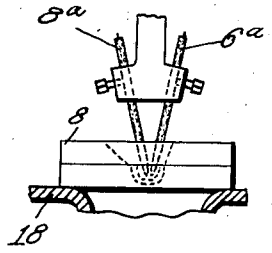
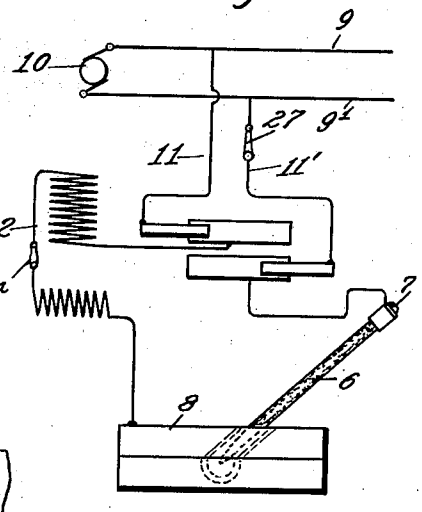


Fig. 4.

Fig. 7.



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UNITED STATES PATENT OFFICE.

JOHN A. McMANUS, JR., OF LYNN, MASSACHUSETTS.

CASTING-MACHINE.

1,015,819. Specification of Letters Patent. **Patented Jan. 30, 1912.**

Application filed August 5, 1910. Serial No. 575,788.

To all whom it may concern:

Be it known that I, JOHN A. McMANUS, JR., a citizen of the United States, residing at Lynn, in the county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Casting-Machines, of which the following is a specification.

The present invention is a modification of that described and illustrated in my pending application, Serial Number 459,864, filed October 28th, 1908, intended primarily for the casting of dental inlays, jewelry, etc. It is to be understood, however, that the invention is not limited in its application to such uses, but it is believed that the same principle can be utilized to advantage in larger electric furnace applications by the exercise of ordinary mechanical skill.

In the invention herein described, I make use of an arc maintained between revolving electrodes, this arc being utilized to fuse or reduce the material to be cast. A suitable source of electric current is provided, which, by the aid of collector rings and brushes conveys the said electric current to the electrodes which maintain the arc. After the material to be cast is fused or melted, it is thrown by centrifugal force from a suitable receptacle into a flask in which the mold to be filled is contained. The said flask may also be heated electrically by a winding of high resistance wire, of which there are a number on the market; such, for instance, as "Calorite"; wound around the flask in suitable electrical connection with the arc circuit, but preferably in series with said circuit. The invention and its modifications, however, will be more fully described in the accompanying specification and claims, and illustrated in the drawings in which—

Figure 1 is a side elevation of a casting machine embodying my invention; Fig. 2 is a plan view thereof, and Fig. 3 an enlarged sectional view of the crucible and arc heating means; Fig. 4 is a sectional elevation of the crucible and flask for receiving the material from said crucible after it has been fused; Fig. 5 is a modification in which the electrodes are horizontally disposed and in the same plane with each other. Fig. 6 is a modification of the invention, in which the electrodes are stationary and in which the crucible revolves; and Fig. 7 is a diagrammatic representation of the electrical connections of the invention as embodied in Fig. 3.

Referring now more particularly to the drawings, 1 represents a base or pedestal upon which is mounted suitable brush holders 2, 2′. These brush holders carry brushes 3, 3′ which bear on the collector rings 4 and 5. Leading from these collector rings are suitable conductors 4′ and 5′ for conveying electric current to the arc heating means. In Fig. 3 one of these conductors is connected by a flexible connection preferably to the carbon electrode 6 at the connecting clip 7, and the other is connected to the carbon block 8 forming the crucible, as in Fig. 2. These connections are best illustrated in Fig. 7, in which 9, 9′ are the mains conveying electric current from the generator 10 which supplies electric current to the machine. 11, 11′ represent taps which lead from the mains 9, 9′. 12 represents the high resistance circuit or winding for heating the mold or the flask 13, Fig. 4. This resistance circuit of high resistance wire is preferably in series with the arc. The carbon 6 is properly insulated from the carbon crucible 8 by the insulating sleeve 14 of fused quartz, or a sufficient air space can be left for air insulating this electrode. An insulating bushing 15 is also provided for insulating this electrode from the carbon holder 16. This carbon holder is composed of two parts, 16 and 17. The part 17 is screwed onto the carrier 18. The parts 16 and 17 are connected together by the screw 19. The carbon 6 is fastened in the split clip or part 16 by the screw 20. When it is desired to draw the arc, the carbon 6 is allowed to touch the bottom of the carbon crucible 8, which is hollowed out to form a receptacle for the casting material. The adjustment is accomplished by screwing the adjusting screw 19 in the required direction. Adjusting this screw 19 moves the carbon 6 and clip 16 as a single unit. A tunnel 21 of carbon is provided, which is inserted in a hole in the center of the crucible 8. This enables gold or other casting material to be dropped down therethrough into the part of the crucible where the arc is struck; and being in the center, it is even possible to

drop in casting material while the machine is revolving. As the tendency of the arc is to blow out the gold or casting material from the arc itself, and thus from its hottest part, the bottom of the crucible under the hottest part of the arc is hollowed in such a manner as to hold the material in a sort of cup against the blowing effect of the arc. From the bottom of this cup 26′ to the conduit 26 there is a slight inclination upward, and in this manner it will require a certain centrifugal effect to displace it from its position and start the casting material on its way to the mold.

22 represents a counterbalancing weight in order to balance the parts on the other side of the carrier while the machine is revolving.

The flask 13 can be made of metal, and suitably insulated from the carrier 18 by suitable insulating material 23, but in the present instance, in order not to short circuit the high resistance winding around the flask, I prefer to make it of talc. On the top of this flask is a metal cover 24 which is fastened to the flask by the thumb nuts 25. The thumb screws 25′ extend through the flask and carrier, being inserted from the bottom of the latter and thus securing the flask on the carrier. These thumb screws are suitably insulated from the metal flask and carrier by the insulating bushings and washers 25^a and 25^b. A slot 24′ in the cover 24 allows the cover 24 to swing out to one side after merely loosening the thumb nuts 25, thus allowing of easy access to the mold. Between the flask 13 and the crucible 8 is a conduit 26 of talc. The high resistance winding 12 Fig. 7 around the flask 13 is continued, and wound around the conduit 26 in order that this may be heated while the casting material is being transferred from the crucible into the mold. This is best shown in Figs. 2 and 4, and the winding above referred to is illustrated more specifically in its location around the conduit and flask by the numerals 12′ and 13′ respectively, Fig. 4. At 12^a, Fig. 7, is shown diagrammatically a disconnecting switch which allows the series connection between the conduit heating means and the flask heating means to be broken when it is desired to remove the flask from the carrier.

Referring to Fig. 5, this shows a modification of the arc heating arrangement, in which 6′, 8′ represent two ordinary carbon electrodes disposed horizontally. In this case these electrodes are suitably insulated from the carbon block 8 in order that the arc may be struck at the carbon points. The electrodes, in any case, may be disposed in such angular relation to each other as to afford the best condition for fusing or reducing the casting material. Fig. 6 represents a modification of the invention, in which the carrier 18 revolves, and the electrodes 6_a and 8_a are stationary above the center of the machine, the crucible 8 being hollowed out to form a receptacle into which the carbon electrodes 6_a and 8_a extend, and this hollowed portion being of such a dimension that the sides of the receptacle will not strike the electrodes while the carrier 18 is revolving. I find by experiment that notwithstanding the fact that the material to be cast may be very near the center of the crucible, the centrifugal effect is sufficient to start the material toward the mold.

The operation of the invention is as follows: As the crucible 8 can be made in two halves, the top half can first be taken off and the material to be fused inserted therein; or it can be dropped through the tunnel 21. The switch 27 in the circuit (Fig. 7) is then closed, and the carbon electrode 6 adjusted by means of the adjusting screw 19, to draw the arc. When the arc is drawn and the casting material has been melted, the machine is set into operation to throw the fused material into the mold 28, having the vent 28′. This material is thrown through the conduit 26, which, as stated before, is maintained hot together with the flask 13 by the high resistance winding 12 before referred to. This is to keep the casting material from cooling rapidly in its transit from the crucible into the mold. The centrifugal action is attained by revolving the machine at the desired moment by means of the pulley 29, (Fig. 1) which is belted or otherwise driven by a motor or other prime mover; or it can be driven by a suitable hand crank and gear arrangement of proper multiplying ratio to give the desired speed.

What I claim as new and desire to secure by Letters Patent of the United States is:—

1. In a casting machine, the combination of means for movably supporting the material to be cast, means for playing an arc upon the material while the latter moves, and a mold movable simultaneously with said first means to receive melted material from the latter.

2. In a casting machine, the combination of means for rotatably supporting the material to be cast, means for playing an arc upon the material while the latter rotates, and a mold simultaneously rotatable with the first mentioned means to receive melted material from the latter.

3. In a casting machine, the combination of means for supporting the material to be cast, a second means carried by said first mentioned means for playing an arc upon the material to melt it either while the support for the latter is stationary or moving, and a mold movable simultaneously with

the means for melting the material, to receive the latter after it has been subjected to the action of the arc.

4. In a casting machine, the combination of means for movably supporting the material to be cast, means for playing an arc upon the material while the latter moves, a mold movable simultaneously with said first means to receive melted material from the latter, and a means for conserving the heat of the melted material until the casting operation has been completed.

5. In a casting machine, the combination of means for movably supporting the material to be cast, means for playing an arc upon the material while the latter moves, a mold movable simultaneously with said first means to receive melted material from the latter, and a means for conserving the heat of the melted material during its transit into and after it reaches the mold.

6. In a casting machine, the combination of movable means for supporting material to be cast, a second means carried by said first mentioned means for playing an arc upon the material to melt it either while the support for the latter is stationary or moving, a mold movable simultaneously with the means for melting the material, to receive the latter after it has been subjected to the action of the arc, and a means for conserving the heat of the melted material until the operation of casting has been completed.

7. In a casting machine, the combination of a movable means for supporting the material to be cast, a stationary means for playing an arc upon the material to melt it either while the first mentioned means is stationary or moving, and a mold for receiving the melted material from the first means after said material has been melted.

8. In an electric casting furnace, the combination of arc electrodes, means for rotatably supporting said electrodes to form an arc while said electrodes are rotating for the purpose of melting material to be cast, a mold for receiving the molten material, an electrical resistance winding to which current is supplied surrounding said mold for the purpose of heating the latter, and means for actuating the rotatable support to cause the molten material to be forced into the mold by the action of centrifugal force.

9. In an electric casting furnace, the combination of arc electrodes, means for rotatably supporting said electrodes to form an arc while said means is rotating for the purpose of melting material to be cast, a mold for receiving the molten material, a passage for the transit of molten material from the arc to the mold, an electrical resistance winding surrounding said mold and said passage to conserve the heat of the melted material, and means for actuating the rotatable support to force metal into the mold by centrifugal action.

10. In an electric casting furnace, the combination of arc electrodes, means for rotatably supporting said electrodes to form an arc while said means is rotating for the purpose of melting material to be cast, a mold for receiving the melted material from the arc, a passage from the arc to the mold for the molten material, a resistance winding in series with the arc surrounding said mold and said passage to conserve the heat of the melted material after it leaves the crucible, and means for actuating the rotatable support to force metal into the mold by centrifugal action.

11. In an electric casting machine, the combination of a stationary element and a revolving element, a crucible and mold mounted on the latter, the said crucible and mold being in operative communication with each other, slip rings mounted on the revolving element, brushes bearing on the slip rings mounted on the stationary element, heating means for the crucible consisting of an electric arc maintained by a suitable current supply through the brushes and slip rings, and means for operating the revolving element to cause molten material to flow from the crucible into the mold by the action of centrifugal force.

12. In an electric casting machine, the combination of a stationary element and a revolving element, a crucible and mold mounted on the latter, the said crucible and mold being in operative communication with each other, slip rings mounted on the revolving element, brushes bearing on the slip rings mounted on the stationary element, heating means for the crucible consisting of an electric arc maintained by a suitable current supply through the brushes and slip rings, heating means for the mold in series with the crucible heating means, and means for operating the revolving element to cause molten material to flow from the crucible into the mold by the action of centrifugal force.

13. In a casting machine, the combination of means for movably supporting the material to be cast, means for playing an arc upon the material, means for adjusting said arc, and a mold movable simultaneously with said first means to receive melted material from the latter.

14. In a casting machine, the combination of means for movably supporting the material to be cast, means for playing an arc upon the material, means for enabling material to be melted to be fed to said arc while the first-mentioned means is stationary or moving, and a mold movable simultaneously with said first-mentioned means to receive melted material from the latter.

15. In a casting machine, the combination

of a movable support for the material to be cast, said support including means for restraining the material in place against the blowing effect of the melting arc, means for playing an arc upon the material, and a mold movable simultaneously with the said support for receiving the melted material therefrom.

In witness whereof, I have hereunto set my hand this 2nd day of August, 1910.

JOHN A. McMANUS, Jr.

Witnesses:
DUGALD McK. McKILLOP.
CHARLES A. BARNARD.