Aug. 20, 1935. E. G. TOUCEDA 2,011,955

CENTRIFUGAL CASTING MACHINE

Filed April 4, 1934

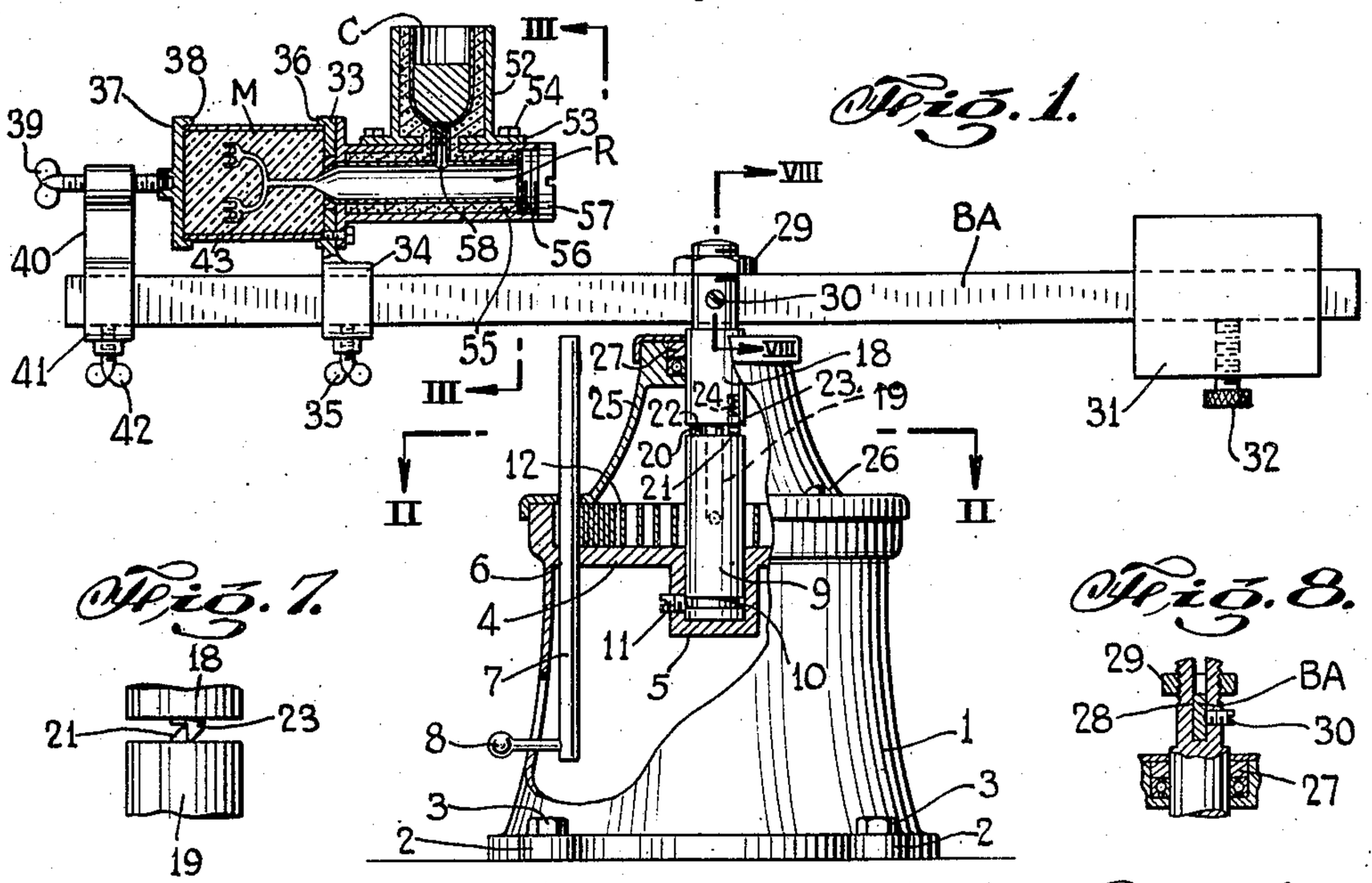


Fig. 1.

Fig. 7.

Fig. 8.

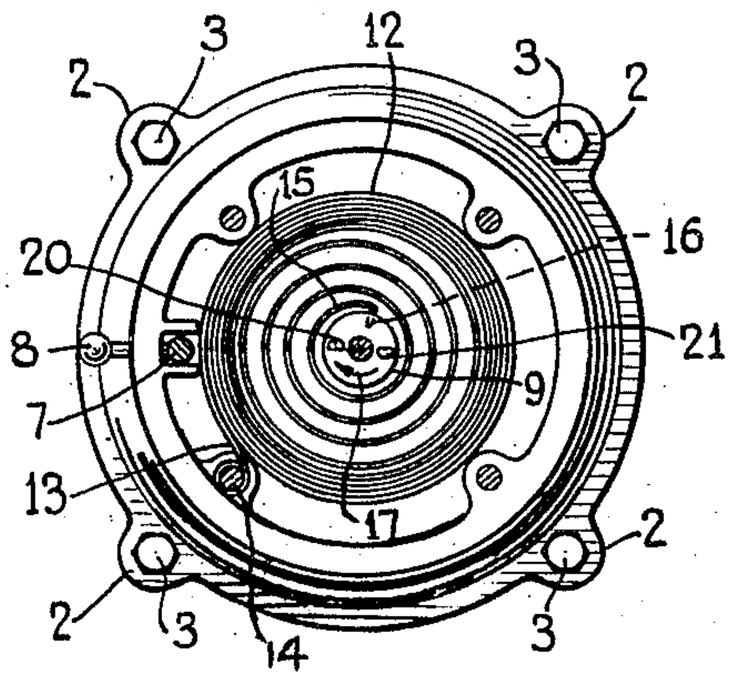


Fig. 2.

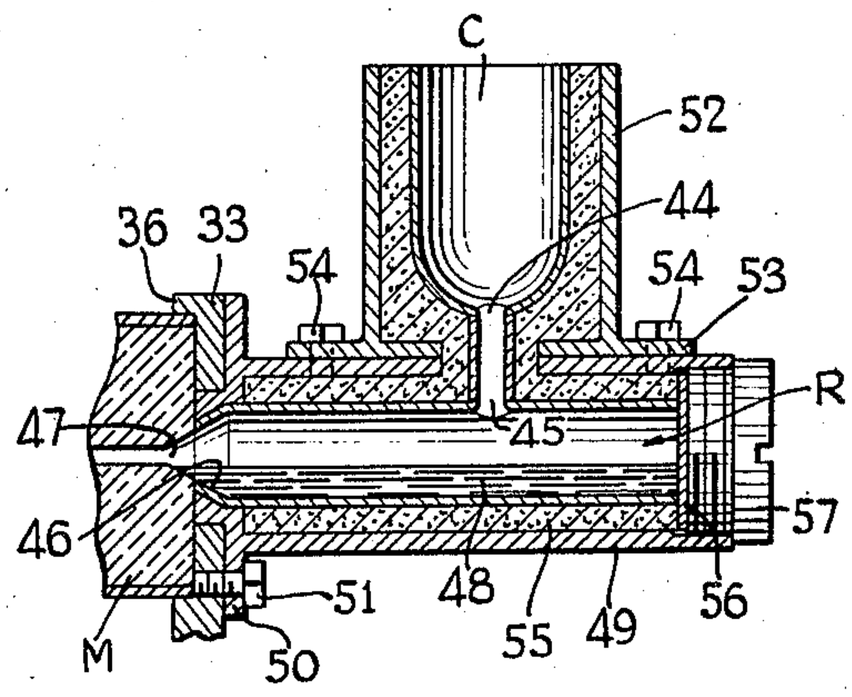


Fig. 4.

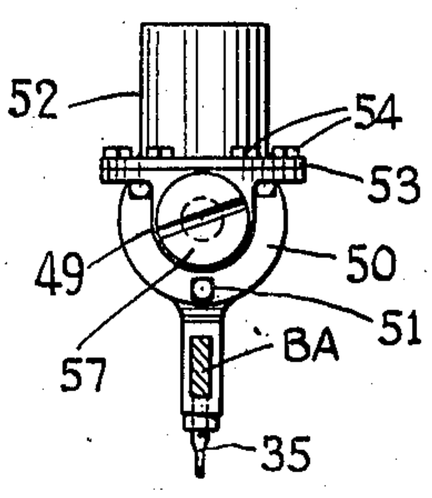
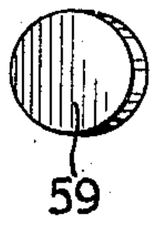


Fig. 3.

Fig. 5.



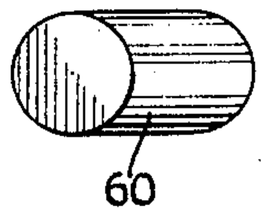


Fig. 6.

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CENTRIFUGAL CASTING MACHINE

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Application April 4, 1934, Serial No. 718,902

3 Claims. (Cl. 22—65.1)

This invention relates to metal founding, particularly to casting, and more especially to centrifugal casting.

A principal object of this invention is the production of a method and means whereby more perfect results may be more conveniently obtained in the casting of prosthetic articles, such as dentures.

Other objects and advantages will appear as the description of the particular physical embodiment selected to illustrate the invention progresses, and the novel features will be particularly pointed out in the appended claims.

In describing the invention in detail and the particular physical embodiment selected to illustrate the invention, reference will be had to the accompanying drawing, and the several views thereon, in which like characters of reference designate like parts throughout the several views, and in which:

Figure 1 is an elevational view, with some parts in section and some parts broken away to more clearly show the construction, of a device embodying applicant's invention usable for practicing his method; Fig. 2 is a sectional view on the plane indicated by the line II—II of Fig. 1 viewed in the directions of the arrows at the ends of the line; Fig. 3 is a sectional view on the plane indicated by the line III—III of Fig. 1; Fig. 4 is an enlarged cross-sectional view corresponding to a portion of the cross-sectional view shown in Fig. 1; Fig. 5 is a perspective view of a formed material used in applicant's invention; Fig. 6 is a perspective view of another form of material used in applicant's method; Fig. 7 is a view illustrating a detail; Fig. 8 is a cross-sectional view on the plane indicated by the line VIII—VIII of Fig. 1.

In general, applicant proposes to produce a body of molten metal alloy in a suitable container, illustrated generally by C, which when thoroughly molten is allowed to flow into a receptacle illustrated generally by R. After the metal has been received in the receptacle R, it is thrown by centrifugal force into a mold, illustrated generally by M. This centrifugal action is obtained by mounting the receptacle R and the mold M upon an arm designated generally by BA mounted revolvably upon a vertically positioned axis.

In the practice of applicant's method, it is necessary to whirl a member. In Figure 1, applicant has shown a suitable form of apparatus for producing the whirling motion. The device, in the selected form includes a hollow pedestal like member 1 provided with a broad flat base and with spaced orificed ears 2 in which bolts, as 3 may be placed to fasten the pedestal to a suitable support.

The pedestal 1 is preferably provided with a horizontal partition 4 formed with a well 5 and with an orifice 6 through which a stop rod 7 is slidable vertically when manipulated by the handle 8 upwardly or by gravity downwardly, when free.

The well 5 serves as a bearing for a vertically positioned shaft 9. This shaft 9 is preferably provided with means for preventing its longitudinal movement as by a groove 10 into which the end of a set screw 11 may be positioned. The set screw 11 being screwed into the wall of the well 5 allows the shaft 9 to rotate but prevents longitudinal movement.

In order to get the whirling motion necessary, applicant provides a helical spring 12 coiled about the shaft 9 and having one end 13 attached to the pedestal 1, as by screw 14, and the other end 15 attached to the shaft 9, by inserting the same in an orifice as 16. This construction is such that when the shaft 9 is rotated in the direction of the arrow 17, that is, clockwise, the spring 12 will be wound up, so that if the shaft 9 is then free, it will be rotated in a direction contrary to the arrow 17.

As the body to be whirled by the rotation of the shaft 9 is of some considerable size, and as it is not desired to have the spring 12 unwound by the rotation of shaft 9 in a direction contrary to the arrow 17, it is necessary to provide the body to be whirled and the shaft 9 with cooperating means, which will allow relative movement therebetween so that after the wound spring has become completely unwound in whirling the body, the body may then continue to whirl free from spring 12 and the shaft 9. Applicant's construction whereby the desired result is obtained includes a shaft 18 positioned with its axis in line with the axis of shaft 9. The shaft 18 is provided with a reduced bearing portion 19 seated in an axial bearing orifice in the shaft 9. The shafts 9 and 18 are each provided with mutually engaging projections, as 20 and 21 on shaft 9, and 22 and 23 on shaft 18. These projections engage one with the other so that when shaft 9 rotates counterclockwise, as viewed in Fig. 2, shaft 18 revolves with it, that is, when shaft 9 moves in response to the wound spring 12, shaft 18 is turned. After the spring has become completely unwound, shaft 18 continues to rotate in the same direction, that is, in a counterclockwise direction, due to the momentum of the parts, but the members 22 and 23 due to the springs, as 24, back of them are pushed upwardly, aided by the sloping faces so

that the members 22 and 23 move by the members 20 and 21 until the momentum of the bodies connected to the shaft is dissipated.

In practice, the spring 18 is wound up by turning arm BA in a clockwise direction. This causes pins 20, 21, 22 and 23 to engage and move shaft 9 and so spring 12. When the spring has been sufficiently wound rod 7 is projected upwardly sufficiently to contact with the side of arm BA. The contact exerted by the arm BA against rod 7 is sufficient to keep the rod 7 from falling. When it is desired to allow arm BA to whirl, it is simply moved so as to be out of contact with rod 7 whereupon rod 7 drops and then the arm BA is free.

In order to cover the inner mechanism of the pedestal 1 and to provide a steadying bearing for shaft 18, applicant provides the cover member 25 which is screwed to the lower portion of the pedestal 1 as by screws 26 and has a bearing 27 in its upper portion for receiving the shaft 18 and steadying the same.

Applicant prefers to make the arm BA of rectangular cross-section, and to hold it in a slot 28 formed in the end of the shaft 18. The arm BA is held in the slot 28 both by the nut 29 screw threaded upon the end of the shaft 18 and by the set screw 30 screwed into and through one of the bifurcated portions.

One end of the arm BA supports an adjustable balancing weight 31 slidable along the arm BA and secured in an adjusted position by any suitable or appropriate means, as by the threaded screw 32, which is threaded into the mass 31 and bears against the arm BA.

The mold for the prosthetic, denture or similar article is mounted upon the arm BA. In the preferred form, a support 33 is provided. This support is preferably formed integral with the embracing member 34 which surrounds the arm BA, is slidable therealong, and is held in adjustable position by the wing screw 35. This flask or mold abutting member 33 is provided with a flange 36 which serves to receive and position the end of the mold M.

The other end of the mold M is supported and clamped by the mold end plate 37 provided with a flange 38 for receiving and positioning the end of the mold M. The end plate 37 cooperates with a threaded screw 39 passing through the end plate bracket 40 which is provided with an embracing portion 41 which surrounds and embraces the arm BA, and which is slidable therealong, and which is held in adjusted position by the thumb screw 42.

After member 34 is fastened in position by thumb screw 35, the mold M is placed in position with one end against plate 33, and then the end plate 37 is brought against the other end of the mold by moving member 41 along the arm BA. The thumb screw 42 is then tightened, and then thumb screw 39 is tightened sufficiently to securely hold the mold M between the flanges 36 and 38 and the plates 33 and 37.

In order to provide the molten metal to fill the cavity 43 of the mold M, applicant provides a crucible C. This crucible may be made of any suitable or appropriate material of a refractory nature. In order to best utilize the alloy which applicant intends to use, it is highly desirable that the crucible C be free from carbon or any substance which under the conditions of melting may give up carbon to the molten alloy. Alundum is a suitable material.

The crucible C is provided with an orifice 44 preferably at its lowest portion which connects with a channel 45 opening into a receptacle R. The channel 45 is preferably formed of an alundum tube. At any rate, both the channel 45 and the receptacle R should be such that they may withstand the heat of the molten alloy and have no substance therein which may be taken up by the molten alloy to its detriment.

The receptacle R is preferably somewhat contracted, as at 46, and is in alignment with the pouring orifice 47 of the flask or mold M.

When molten metal is present in the receptacle R, a rotation of arm BA about the axis of shaft 18 will cause this molten metal, as 48, to flow from the left hand end of the receptacle R as viewed in Figs. 1 and 4 and flow into the mold and cavity therein producing the cast form desired, corresponding to the cavity 43.

In order to support the crucible C and the receptacle R, applicant provides a receptacle support 49 formed with a flange 50 by which the receptacle container 49 may be attached, as by bolts 51, to the plate 33. The receptacle container 49 also supports the crucible container 52 which is provided with flange 53 which may be bolted, as by bolts 54, to the receptacle container 49.

The receptacle container 49 and the crucible container 52 are both made, preferably, of metal such as iron, but are made sufficiently large so that a considerable body of heat insulating material 55, such as asbestos, may be positioned between the receptacle R and the walls of the receptacle container 49, and between the crucible C and the walls of the crucible container 52.

In order to provide means for easily inspecting and cleaning the receptacle R, applicant provides an end closing plate 56, made preferably of alundum, held in place by a threaded end plug 57, threaded into the end of the receptacle container 49.

In order to produce a body of molten metal 48 in the receptacle R, applicant places the requisite quantity of metal oxides mixed with the proper amount of powdered aluminium together with a sufficiently large strip of magnesium ribbon with its end projecting from the mixture to give the requisite quantity of molten alloy. In order to prevent this mixture from immediately passing through the channel 45, applicant places a plug 58 of a corresponding mixture in the channel.

After the crucible is suitably charged a suitable flame is played upon the same so as to ignite the magnesium and cause the well known reaction between the powdered aluminium and the metallic oxides to take place so that molten metal is produced in the crucible which when sinking to the bottom causes the reaction to take place in the plug 58 so that it is destroyed and the molten metal flows into the receptacle R. Any slag which is formed will naturally float upon the top of the molten metal and would be displaced by the molten metal when whirled so that the molten metal being the heavier would flow into the mold.

The mixture which applicant uses for producing his molten alloy corresponds in general to the well known thermite mixture commonly used to produce molten metal in situ by the action of powdered aluminium upon appropriate metal oxides.

Applicant prefers to provide the mixture in the form of pellets, as 59, as shown by Fig. 5, or as small cylinders, as shown in Fig. 6, each of a definite known weight, and compounded to give a

definite weight of molten metal, and to ignite these pellets or cylinders when charged into the crucible either by a short length of magnesium wire or by oxy-hydrogen flame directed upon the pellets or cylinders.

A complete practice of applicant's method by the use of the machines shown in the figures would consist in first making a cavity, as 43, in a suitable mold; then positioning that mold as shown in Fig. 1; then charging the crucible C with the necessary amount of thermite mixture; then balancing by means of the weight 31 so that the arm BA is substantially level; then the spring 12 would be wound by turning the arm BA in a clockwise direction and held in wound position by moving the rod 7 upwardly so as to contact arm BA; then the heat would be applied to the thermite mixture so as to start the reaction, preferably by preliminarily igniting a piece of magnesium ribbon buried in the mixture; then when the mixture has sufficiently reacted to destroy the plug 58 and the molten metal 48 has flowed into the receptacle R, the rod 7 would be depressed by pressing down on the handle 8 whereupon the arm BA would be whirled about by the rotation of shaft 9; and then when the spring 12 had become entirely unwound the arm BA with shaft 18 would continue to rotate independently of the shaft 9 until the momentum previously generated has been dissipated; then when the contents of the mold have become sufficiently cold it would be removed from its position and the cast article secured therefrom.

Of course, it is to be understood that if applicant does not desire to centrifugally cast, then the metal may be allowed to flow by gravity into the mold from the receptacle.

Although I have particularly described one particular physical embodiment of my invention and explained the operation, construction and principle, thereof, nevertheless, I desire to have it understood that the form selected is merely illustrative, but does not exhaust the possible physical embodiments of the idea of means underlying my invention.

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

1. In a centrifugal casting machine, in combination: a rotatable member; means for rotating the member; a mold provided with an inlet positioned on the member; a receptacle on the member formed with a receiving inlet and with an outlet communicating with the inlet of the mold; a crucible formed of inert material on the member and having an outlet communicating with the receiving inlet of the receptacle; said elements constituting a self-contained organization whereby a plug composed of a thermite mixture may be placed in the said outlet of the crucible and a thermite mixture may be reacted in the crucible causing a reaction in the plug and a flow of metal into the receptacle and thence into the mold upon rotating the member, thus effecting the complete casting operation by an exclusively exothermic reaction, gravity and centrifugal force.

2. In a prosthetic article casting device, in combination: a mold provided with an inlet; a receptacle provided with an inlet and with an outlet communicating with the inlet of the mold; and a crucible having a bottom outlet communciating with the inlet of the receptacle, and means to apply centrifugal force to said combined elements; said assembly of elements constituting a self-contained organization whereby a plug composed of a thermite mixture may be placed in the said outlet of the crucible and a thermite mixture may be reacted in the crucible causing a reaction in the plug and a flow of metal into the receptacle and thence into the mold, thus effecting the complete casting operation by an exclusively exothermic reaction, gravity and centrifugal force.

3. The method of casting articles of the class described, in centrifugal apparatus including a receptacle, a crucible superimposed thereon and a mold disposed laterally with relation to said receptacle, said receptacle having an overhead open port to receive the contents of said crucible and a lateral port communicating with said mold, said method comprising the step of charging said crucible with a fusible thermite mixture and maintaining said mixture in said crucible by a fusible closure of thermite reagents in said port leading to said receptacle, the step of initiating a thermite reaction to fuse the mixture and closure whereby the fused mixture and closure descend by gravity from said crucible through said port into said receptacle, and the step of applying centrifugal force to said receptacle, whereby it discharges said fused charge the closure material into said mold through said lateral aperture.

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