July 30, 1940. H. R. BERGER 2,209,381

DENTAL CASTING APPARATUS

Filed Dec. 30, 1937 3 Sheets-Sheet 1

FIG. 2

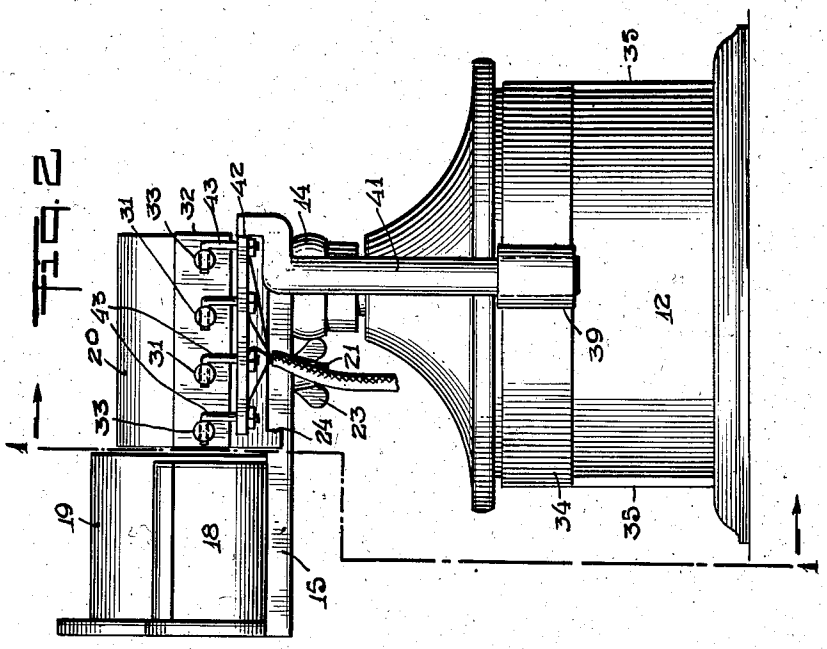


FIG. 1

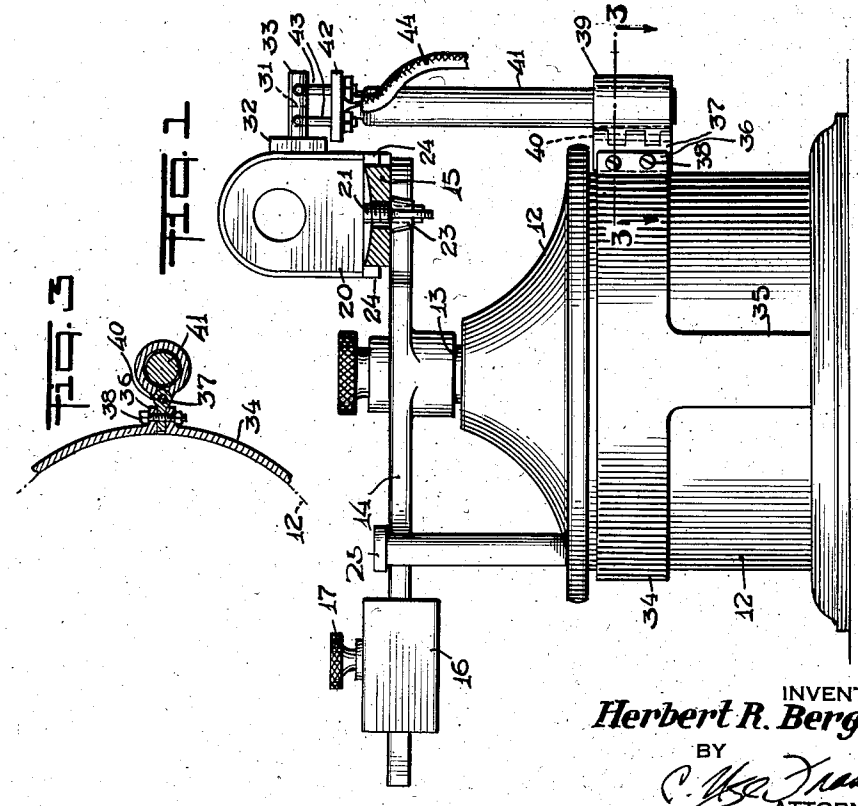


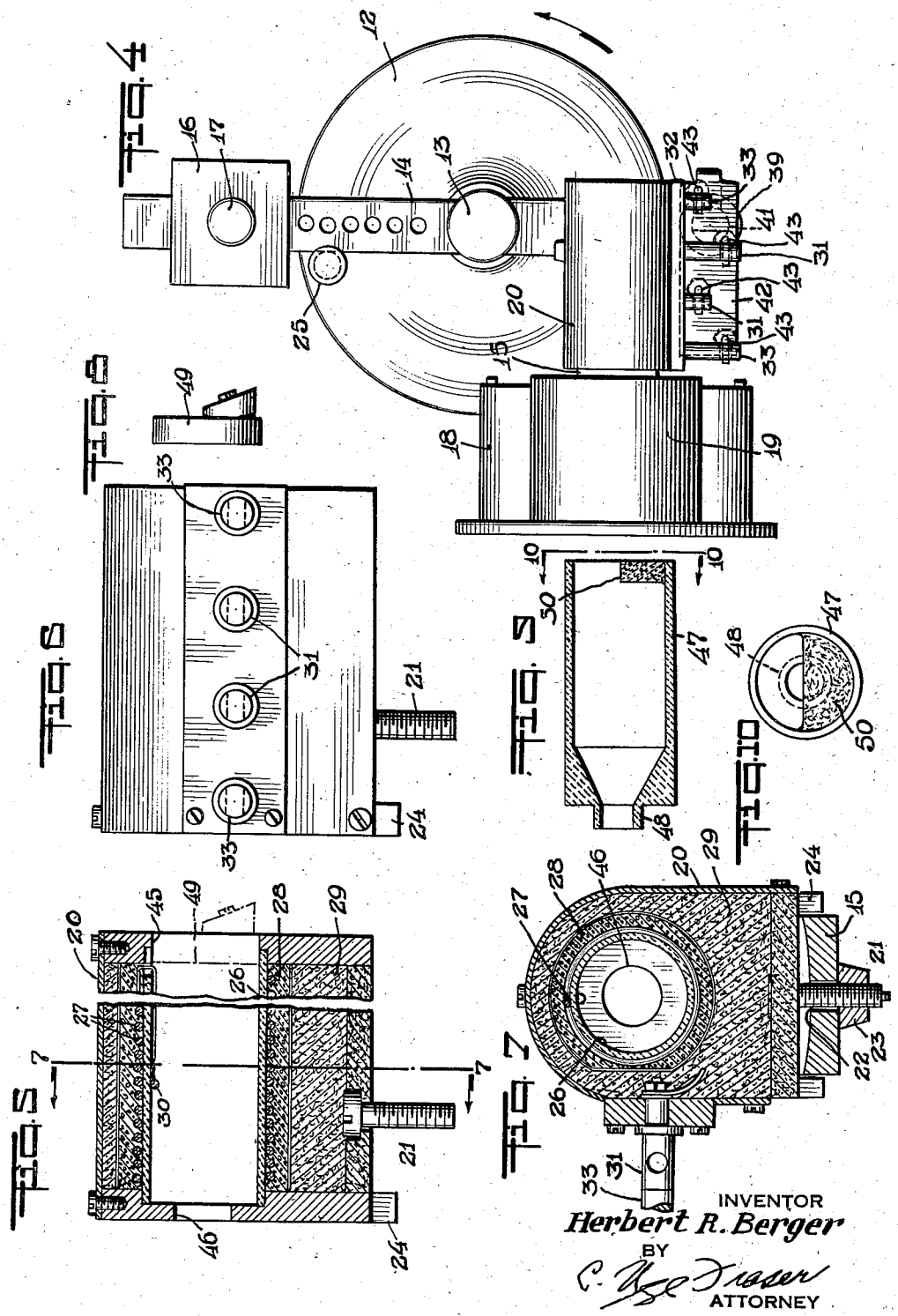
FIG. 3

INVENTOR
Herbert R. Berger
BY
C. W. Fraser
ATTORNEY

July 30, 1940. H. R. BERGER 2,209,381

DENTAL CASTING APPARATUS

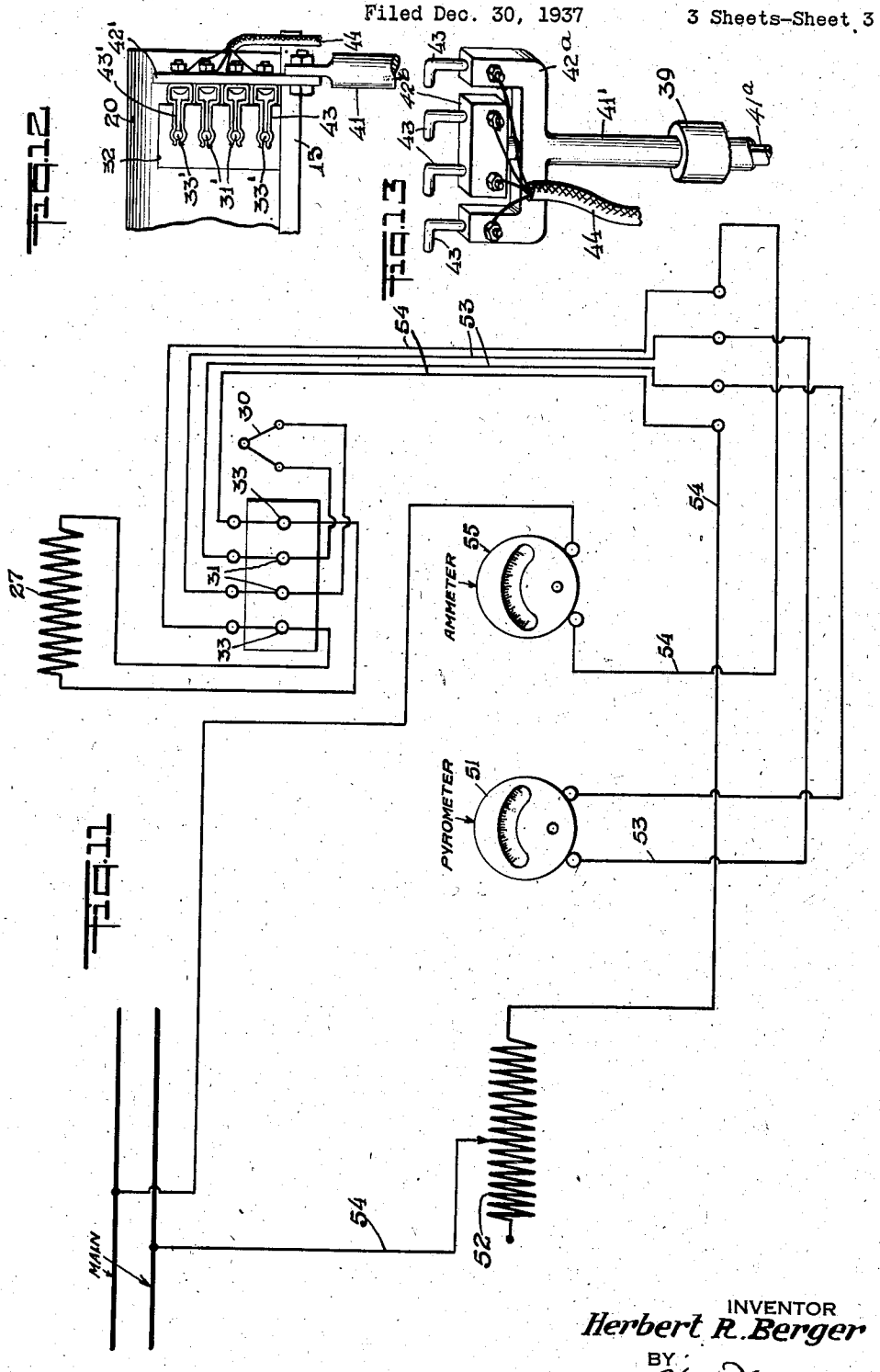
Filed Dec. 30, 1937 3 Sheets-Sheet 2



July 30, 1940. H. R. BERGER 2,209,381

DENTAL CASTING APPARATUS

Filed Dec. 30, 1937 3 Sheets-Sheet 3



INVENTOR
Herbert R. Berger
BY
C. Yoder Drosen
ATTORNEY

Patented July 30, 1940 2,209,381

UNITED STATES PATENT OFFICE

2,209,381

DENTAL CASTING APPARATUS

Herbert R. Berger, Brooklyn, N. Y., assignor to J. F. Jelenko & Co., Inc., New York, N. Y.

Application December 30, 1937, Serial No. 182,600

2 Claims. (Cl. 22—65.1)

This invention relates to improvements in casting apparatus of the type capable of use in dental and jewelry work.

In the casting of metals for dental work, jewelry, or other fine work, the metal is usually heated until the operator decides by visual inspection that the proper condition has been reached, at which time the metal is forced into the mold, as by centrifugal action. Many of the castings thus formed are defective and must be discarded, and uniformity of the castings is impossible to obtain by this method. The presence of oxide spots, blowholes, and porous portions in the castings render them unfit for many uses, and the porous conditions usually present not only retains dirt but prevents the metal from taking a high polish.

An important object of the present invention is the provision of a casting apparatus which can be operated to produce castings of a uniform character and high quality.

Another object of the invention is to provide a casting apparatus which is of simple construction, which melts the metal electrically and which is simple in operation.

A further object of the invention is the provision of apparatus of this character which may be easily applied to centrifugal casting machines now in use.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings, which form a part of this specification and wherein like characters of reference denote like parts throughout,

Figure 1 is an elevation of a casting apparatus embodying the present invention, parts being shown in section,

Figure 2 is an elevation at a right angle to Figure 1,

Figure 3 is a detail sectional view of the contact rod and its supporting mechanism, taken on line 3—3 of Figure 1,

Figure 4 is a top plan view of the apparatus,

Figure 5 is a longitudinal sectional view through the heating chamber,

Figure 6 is a side elevation thereof,

Figure 7 is a transverse section thereof, on line 7—7 of Figure 5,

Figure 8 is an edge elevation of the heating chamber closure,

Figure 9 is a longitudinal sectional view of the removable crucible,

Figure 10 is an end elevation thereof,

Figure 11 is a diagram of the electrical circuits employed,

Figure 12 is a detail elevation of a modified form of detachable contact mechanism, and,

Figure 13 is a perspective detail view of a further modification of the contact mechanism.

In the drawings, wherein for the purpose of illustration is shown a preferred embodiment of the invention, the numeral 12 designates the casing of a centrifugal casting machine which encloses a suitable power mechanism such as a spring motor which drives a vertical shaft 13 arranged centrally of the casing. A horizontal bar 14 is secured to shaft 13 at a point above the top of casing 12 and is adapted to rotate with shaft 13. A mold and furnace supporting bar 15 is normally disposed at a right angle to the bar 14 and is pivotally connected to one end thereof by means of a bolt or other connection. A counterweight 16 is adjustably supported on the opposite end of bar 14 by means of a set screw 17 or the like.

A mold supporting cradle 18 is secured to the end of arm 15 farthest from arm 14 and supports a removable flask or mold 19. A furnace or oven 20 is adjustably secured to the arm 15 adjacent the cradle 18 by means of a bolt 21 attached to the mold and extending through a slot 22 in the arm 15. A wing-nut 23 secures the furnace in position on arm 15. Suitable projections 24 on the under side of furnace 20 engage the sides of arm 15 to center the furnace.

A vertically movable rod 25 is slidably secured to casing 12 and has an enlarged upper end adapted to rest upon the upper edge of bar 14. When the spring motor is wound, rod 25 is moved up into engagement with bar 14, as seen in Figure 4, and prevents movement of the bar. When it is desired to release bar 14, the bar is moved away from rod 25 against the tension of the spring motor, permitting rod 25 to drop out of the path of bar 14, which is then released and allowed to spin. When bar 14 spins, bar 15 swings into longitudinal alignment therewith, and the molten metal in furnace 20 is forced into mold 19 by centrifugal action. The construction thus far described is of the usual construction.

In accordance with the present invention, the furnace 20 comprises a refractory muffle 26 spaced a substantial distance from the inner walls of the furnace casing and embedded in the end walls thereof. Electric resistance windings 27 encircle the outer periphery of muffle 26 and are covered by a layer of some suitable insulating material such as alundum cement 28 of substantial thickness. Suitable heat resistant material such as asbestos fiber 29 is packed between

the layer 28 and the furnace casing, which may be of metal or other suitable material. The insulation prevents heat losses.

A thermocuple 30 is disposed in the muffle 26 and is connected by suitable wiring to the two central contacts 31 on a contact panel 32 secured to one side of the furnace casing. End contacts 33 on board 32 are connected to the resistance elements 27. In Figures 2, 6, 7 and 11 the contacts 31 and 33 are shown as arranged in a horizontal row on panel 32, projecting laterally from the panel and the furnace in a horizontal direction. The contacts 31 and 33 have horizontal bores, as indicated by dotted lines, extending therethrough adjacent their ends.

A circular band 34, of metal or other suitable material, encircles casing 12 and is supported in position adjacent the top of the casing by means of depending side bars or legs 35 which rest upon the base of casing 12, as seen in Figures 1 and 2. The band 34 is split and has its ends turned out to form flanges 36 between which a plate 37 is secured by bolts 38. A vertical sleeve 39 is hingedly connected to the outer end of plate 37 by means of a vertically arranged pintle 40 which permits movement of sleeve 39 about a vertical axis.

A cylindrical rod 41 is loosely arranged in sleeve 39 to slide vertically therein and is secured at its top to a horizontal contact plate 42. Contact elements 43 extend vertically from plate 42 and are turned over at their ends to form horizontal extensions to be received in the bores of contacts 31 and 33. A flexible conductor 44 carries wires which are connected to contact elements 43 to carry electric current thereto. By reference to Figure 4 it will be seen that contacts 31 and 33 are staggered in length and that when arm 14 is moved to release rod 25, the contacts 31 and 33 will be pulled from engagement with contact elements 43, permitting rod 41 to drop in sleeve 39 and allowing arms 14 and 15 to be rotated by the motor in casing 12 without interference from rod 41 or contact plate 42.

By reference to Figure 5 it will be seen that the front end of the furnace casing is provided with a circular opening 45 which coincides with the inner periphery of the muffle 26. A smaller opening 46 is arranged in the rear wall of the furnace casing concentrically with the muffle and is arranged in alignment with the gate of mold 19. In Figures 9 and 10 is shown the crucible 47 removed from the furnace. This crucible is cylindrical in shape and is adapted to be snugly received within the muffle 26. The sprue 48 on the rear of the crucible extends through opening 46 to the gate of the mold 19. A dam 50 closes the lower half of the front end of the crucible, and a removable door 49 fits in opening 45 to close the muffle when the crucible is in place. The parts are held firmly in place by centrifugal force when the arm 14 is spun.

The crucible 47 may be made of any suitable material. For use with some metals, a refractory crucible can be employed, but for melting gold and other precious metals, a carbon crucible should be used to produce a reducing atmosphere and to prevent sticking of the metal to the walls of the crucible. The inner walls of the crucible taper at their ends to the opening in sprue 48. The dam 50 may be of any suitable material, such as alundum.

In Figure 11 is shown a diagram of the circuits connecting contacts 31 and 33 to the pyrometer 51 and current control device 52. Wires 53 connect the thermocouple contacts 31 with pyrometer 51 so that the temperature in the furnace can be read at 52. The variable resistance, rheostat or other control device 52 is arranged in circuit 54 with the furnace resistance contacts 33, and an ammeter 55 is included in this circuit.

In operation, the metal is heated in crucible 47 until the desired temperature has been reached, indicated on pyrometer 51. The arm 14 is then pulled back to release rod 25 and contact elements 43, and then released to be spun by the motor in casing 12. The molten metal is passed into the mold by centrifugal force and the casting is formed while the mold is spinning, in the usual manner. By the use of the thermocouple 30 and pyrometer 51, guesswork or visual inspection is not relied upon to determine the time for molding the metal. By experiment, the exact temperature for a given amount of a given metal may be determined, and the arm 14 may then be released when the previously determined temperature has been reached. In this way, castings of a uniform fine character and grain structure may be obtained from each molding operation Tables may be prepared for the guidance of the furnace operator.

By reason of the slot 22 in arm 15, the position of the furnace may be adjusted to accommodate molds of various sizes. The hinge 40 permits movement of rod 41 to align the contact elements 43 with the openings in the furnace contacts 31 and 33. Because of the staggered lengths of the furnace contacts 31 and 33 there will be no possibility of engaging the contact elements 43 with the wrong furnace contact.

In place of the arrangement of contacts shown in Figures 1, 2, 4, 6 and 7, the construction shown in Figure 12 may be employed in which the contacts 31′ and 33′ are disposed in a vertical row, and contact plate 42′ is vertically disposed. The contacts 31′ and 33′ are imperforate and contacts 43′ are in the form of horizontally arranged spring clips which engage the furnace contacts. Movement of the arm 14 to release rod 25 will disengage contacts 43′, 31′ and 33′ and will permit rod 41 to drop out of the path of arm 14.

In Figure 13 the outer contacts 43 are carried by a yoke 42^a which is mounted on the top of tubular sliding rod 41′. The two center contacts 43 are carried by a central support 42^b carried by a rod 41^a of substantially less diameter than tubular rod 41′ in which it is telescopically received. As the two pairs of contacts are independently supported and manipulated a much better contact engagement is obtained.

Any other suitable detachable contact construction may obviously be employed. If desired, the rod 25 may be omitted and the rod 41 and contact plate 43 relied upon to hold the arm 14 in a stationary position, in which case the rod 41 and plate 42 become the stop means.

Any suitable motive power for shaft 13 may be used. It will be seen that the band 34 and associated contact structure may be readily applied to casting apparatus now in use, and the furnace 20 readily substituted for the usual crucible and holder used with a blow torch in standard casting apparatus. By the use of this invention consistently uniform castings of fine quality may be obtained with ease by following a prepared chart or table, and any casting may be easily duplicated by following the instruments 51 and 55 in place of the usual procedure of visually inspect-

ing the metal to determine the time for casting.

While I have shown and described the preferred embodiment of the invention, it is to be understood that various changes in the size, shape and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

Having thus described my invention, what I claim and desire to protect by Letters Patent is:

1. In a centrifugal casting machine, a casing, a rotatable shaft extending vertically from the casing, an arm mounted on the shaft and rotatable therewith, a heating chamber adjustably mounted on said arm at a point spaced from the shaft, a mold carried by the arm adjacent the heating chamber, an electric heating element in the heating chamber, a thermocouple in the heating chamber, contacts carried by the heating chamer exteriorly thereof and connected to the heating chamber and thermocouple, a vertically disposed sleeve pivotally supported by said casing, a vertically movable member slidably engaging said sleeve, contacts carried by the vertically movable member and detachably engaging the heating chamber contacts, said contacts being disengaged when the arm is moved in one direction to permit the vertically movable member to drop out of the path of the arm, motive means in said casing to rotate the arm in the opposite direction, and electrical circuits connected to the contacts on the vertically movable member.

2. In a centrifugal casting machine, a casing, a rotatable shaft extending vertically from the casing, an arm mounted on the shaft and rotatable therewith, a furnace mounted on said arm at a point spaced from the shaft, a mold carried by the arm adjacent the furnace, an electric heating element in the furnace, a thermocouple in the furnace, contacts arranged on the exterior of the furnace and connected to the heating element and thermocouple, a split band secured to the casing adjacent the upper end thereof, a vertically disposed sleeve pivotally supported by said split band, a vertical rod slidably engaging the sleeve, contacts carried by the vertical rod and detachably engaging the furnace contacts, said contacts being disengaged when the arm is moved in one direction to permit the vertical rod to drop out of the path of the arm, motive means in said casing to rotate the shaft and arm in the opposite direction, and electrical circuits connected to the contacts on the vertically movable member.

HERBERT R. BERGER.