

July 16, 1929.

W. A. HARRINGTON

1,721,115

CENTRIFUGAL CASTING APPARATUS FOR MOLDING METAL AND OTHER MATERIALS

Filed Feb. 1, 1928

2 Sheets-Sheet 1

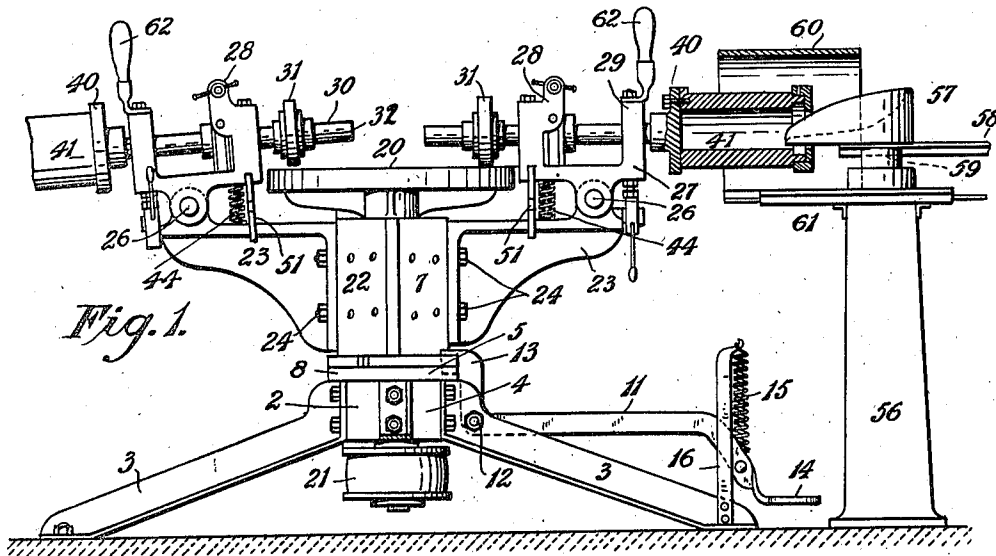


Fig. 1.

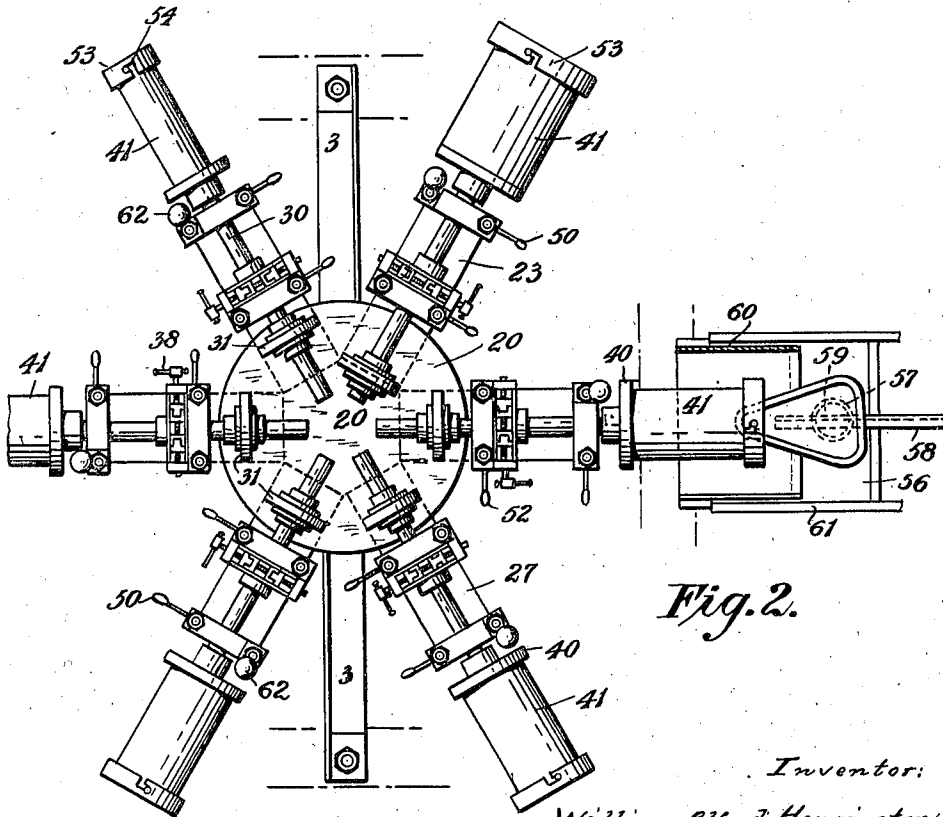


Fig. 2.

Inventor:

William Alfred Harrington

By *Lucas Pinckney*
Attorney

July 16, 1929.

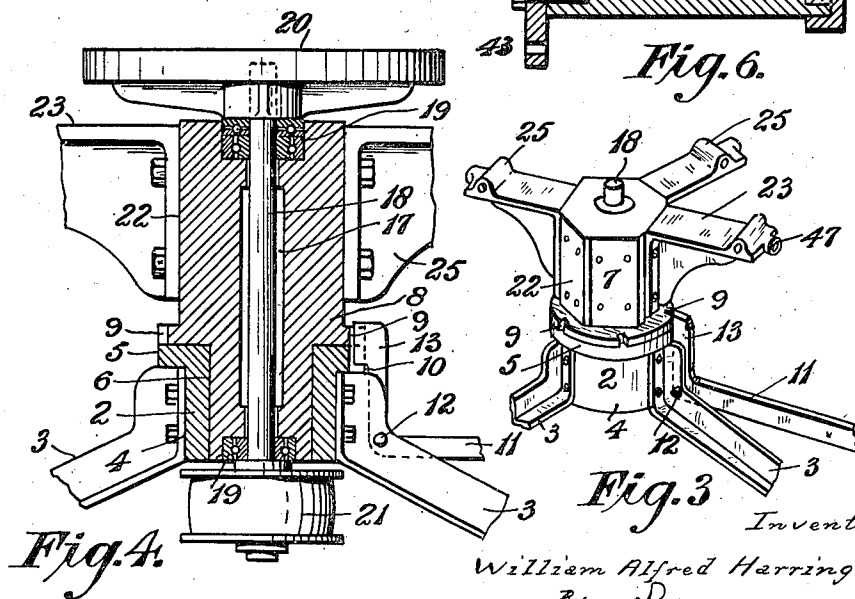
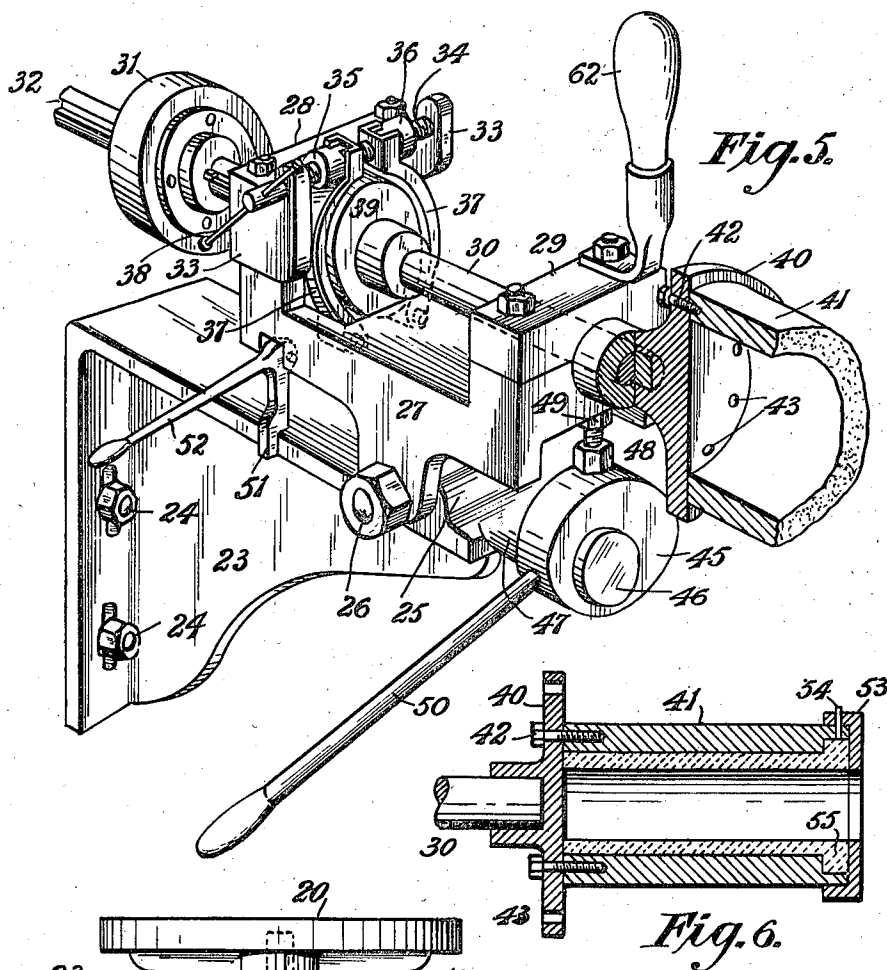
W. A. HARRINGTON

1,721,115

CENTRIFUGAL CASTING APPARATUS FOR MOLDING METAL AND OTHER MATERIALS

Filed Feb. 1, 1928

2 Sheets-Sheet 2



Inventor:
William Alfred Harrington
by *Paul Gmelke*
Attorney.

UNITED STATES PATENT OFFICE.

WILLIAM ALFRED HARRINGTON, OF LEICHHARDT, NEAR SYDNEY, NEW SOUTH WALES, AUSTRALIA.

CENTRIFUGAL CASTING APPARATUS FOR MOLDING METAL AND OTHER MATERIALS.

Application filed February 1, 1928, Serial No. 251,166, and in Australia February 24, 1927.

This invention relates to an improved centrifugal apparatus adapted principally for casting molten metal, but usable also for molding cement and other plastic substances.

5 In molding or casting operations, it is customary to employ rotating molds and to utilize centrifugal force to evenly distribute molten metal throughout the interior of the mold for the formation of hollow castings of specially dense nature. Centrifugal molding machines of turret type are known, such machines comprising a turntable supporting a plurality of molds capable of being rotated and brought into register with a pourer. My 15 invention provides a centrifugal molding apparatus of this type, but characterized by several novel and improved features which render it particularly efficient in expeditious handling of repetition work such as, for example, the casting of metal cylinders adapted to be subsequently cut and formed into piston rings, bearing bushes and other hollow articles.

In the accompanying exemplary drawings:—

Figure 1 is a view in elevation of the improved apparatus showing two of the molding units.

Figure 2 is a plan view of the complete apparatus.

Figure 3 is a perspective view of the base frame and turntable of the apparatus.

Figure 4 is a sectional view centrally through the frame and turntable.

Figure 5 is a perspective view of one of the molding units.

Figure 6 is a sectional detail view of one of the molds.

The improved apparatus, as illustrated in these views, has a base member 2 stationarily supported upon legs 3. Said base member is of tubular construction and has three principal portions 4, 5 and 6. The lower external portion 4 is shaped for the attachment of the legs 3, and the portion 5 is formed as a flange to support a turntable block 7, while the portion 6 forms a bearing in which the turntable block is rotatably fitted. The turntable block 7 has a flange 8 to bear upon the flange 5 of the base member. Said flange 8 has a series of notches 9 adapted when the turntable is rotated to successively align with a notch 10 in the flange 5. A locking lever 11 is pivoted at 12 to one of the legs 3 and it

has one end 13 shaped to engage the registering notches 9, 10 whereby the turntable can be locked in various rotated positions. The outer end of the lever 11 is provided with a pedal 14 enabling foot pressure to be used to disengage the locking end of said lever from the notches. A spring 15 connected to the lever 11 and to a bracket 16 automatically forces the locking lever into the notches when same are brought into alignment.

The turntable block 7 of the apparatus has an axial hole or bore 17 accommodating a vertical shaft 18 journaled in suitable thrust bearings 19. The upper end of said shaft supports a driving disc or element 20, while its lower end carries a pulley wheel 21 driven by a belt from a suitable power unit. Other approved means may be employed for rotating the driving disc 20.

The turntable block 7 is constructed having a series of flat faces 22 against which supporting brackets 23 are secured by bolts 24 or other means. In the construction illustrated, six of these brackets are provided, but it will be obvious that any number may be employed according to the number of molding units incorporated in the apparatus.

Each of the supporting brackets 23 is formed on its upper surface with an apertured boss 25 receiving a pivot pin 26 whereon a carrier 27 is pivotally mounted. This carrier has two end bearings 28 and 29 wherein is journaled a horizontal mold rotating shaft 30. Mounted on the inner end of said shaft 30 is a friction wheel 31, preferably of fibre, adapted to frictionally engage the upper surface of the driving disc 20 and be rotated thereby. The friction wheel 31 is capable of adjustment upon a long keyway 32 in the shaft 30 whereby said friction wheel can be moved towards or away from the centre of the driving disc 20, thus varying the speed of rotation of said shaft without alteration of the speed of the driving disc.

Formed on the end bearing 28 of the carrier are two lugs 33 supporting a horizontal lead screw 34 having right and left hand threads thereon. Nuts 35 and 36 are fitted on said lead screw and are connected to brake shoes 37 which are pivoted at their lower ends to the base portion of the carrier. The lead screw 34 is rotated by hand through a loose handle 38 causing the nuts 35 and 36 to be moved either inwardly or outwardly to actu-

ate the brake shoes. By rotating the handle in one direction, the brake shoes are forced into frictional engagement with a brake disc 39 mounted on the shaft 30, thus stopping the rotation of said shaft. By rotating the handle in the opposite direction, the brake shoes are moved out of engagement with the brake disc, allowing said shaft 30 to be freely rotated.

10 Fitted to the outer end of the shaft 30 is a face plate 40 to which a mold 41 is secured by means of bolts 42 passing through holes 43 in said face plate. The face plate can be used to support molds of various diameters, and for this purpose it has a series of holes 43 formed at different radii from its centre. Alternatively, radial slots may be provided in the face plate in lieu of said holes so that molds of various diameters may be secured thereto.

20 Fitted beneath the inner end of the carrier 27 is a compression spring 44 (see Figure 1) which exerts upward pressure on the carrier, normally tending to hold it in tilted position on the pivot 26 with its friction wheel 31 out of engagement with the driving disc 20. The carrier is adapted to be moved to driving position by means of a cam 45 mounted on a pin 46 which is supported in a boss 47 on the outer end of the bracket 23. The cam contacts with an adjustable screw 48 fitted to the undersurface of the carrier and provided with a lock-nut 49 whereby it can be locked in desired adjusted position. The purpose of said adjustment screw 48 is to enable any wear on the cam 45 to be conveniently provided for.

35 The cam 45 has a handle 50 whereby it can be conveniently rotated. By forcing the handle 50 downwardly, the cam exerts upward pressure on the outer end of the carrier. This action pivotally moves the carrier against the coiled spring 44, moving the friction wheel 31 downwardly into contact with the driving disc 20 and thus causing the shaft 30 and the mold to be rotated. By moving the cam handle 50 upwardly, the pressure of the cam on the screw 48 is relaxed, allowing the spring 44 to elevate the inner end of the carrier. The friction wheel 31 is thereby raised out of engagement with the driving disc, thus disconnecting the drive to the mold.

50 To prevent accidental engagement of the friction wheel 31 with the driving disc, a safety gravity catch 51 is pivoted to the inner end portion of the carrier, and is adapted to automatically fall to the position shown in Figure 5, thus engaging the edge of the bracket 23 and preventing the inner end of the carrier being lowered. The catch 51 is furnished with a handle 52 whereby it can be conveniently disengaged by the operator before he operates the cam lever 50 to move the friction wheel 31 into engagement with the driving disc 20.

65 The molds 41 are preferably of cylindrical shape, but may be of other shape if desired.

Each mold has a detachable end cap 53 provided with a bayonet coupling 54 whereby it can be readily fitted to and detached from the mold. The outer end of the mold has a portion of reduced thickness providing an annular recess or pocket 55 when the end cap 53 is fitted. The purpose of the recess 55 is to form an end flange on the casting for chucking purposes during subsequent machining operations.

75 The turntable is adapted to be rotated to successively bring the molds into position in front of a stand 56 supporting a metal pourer 57. This pourer is provided with a handle member 58 which is slidable in slots 59 in the upper end of the stand, thus enabling the pourer to be conveniently advanced into or withdrawn from the mold.

A hood or shield 60 is slidably mounted on supports 61 on the stand 56 and is adapted to partially enclose the mold and the pourer as shown in Figure 1, thus intercepting any molten metal which may be flung by the mold during pouring.

In the operation of the apparatus, molds of suitable size are secured to the face plates 40 and the cam handles 50 are actuated to tilt the carriers 27 and move the friction wheels 31 into engagement with the driving disc 20, thereby setting the molds in rotation. The molds while rotating are coated with a suitable mixture to prevent adhesion of the molten metal. The turntable is now manually rotated by handles 62 on the carriers to bring one of the rotating molds into position opposite the stand 56 and the turntable is then locked in set position by the locking lever 11. The pourer 57 is moved forwardly into the rotating mold by its handle 58, and the shield 60 is slidably moved to the forward position to cover the mold and the pourer.

Molten metal from a ladle or the like is now delivered into the pourer 57 and discharged into the rotating mold wherein it is evenly distributed by centrifugal action throughout the body of the mold to form the hollow casting of desired thickness. The pourer 57 and the shield 60 are then withdrawn, enabling the turntable to be partially rotated to move the succeeding mold into position for casting. While each successive casting operation is in progress, the casting which has been completed just previously is withdrawn from its mold by the operator who raises the cam handle 50 to disengage the friction wheel 31 from the driving disc 20. The safety catch 51 is simultaneously set, thus preventing accidental re-engagement of the friction wheel 31.

125 The operator now stops the rotation of the mold by actuating the handle 38 to apply the brake and when the mold has ceased to rotate, the end cap 53 is removed. Tongs or like tools are inserted into the hollow 130

casting and the latter is withdrawn from the mold and allowed to cool in desired manner.

After the removal of the casting, the cam handle 50 is again actuated to set the mold in rotation, following which it may be cooled by a spray of water or cooling fluid directed thereon. If desired, the cooling fluid may contain the coating mixture for the internal surface of the mold, the mixture remaining on the surface of the mold after evaporation of the cooling fluid.

The speed at which the molds are rotated will depend upon the sizes of the molds the particular metal or material being cast and other conditions. Ordinarily, molds of small diameter will be rotated at higher speed than large molds. Consequently, the friction wheels 31 of units supporting small molds will be adjusted furthest from the centre of the driving disc 20.

What I do claim is:—

1. A centrifugal apparatus of the turret type, comprising a driving element, a turntable, a series of bracket members carried by said turntable, shafts supported from said brackets and arranged radially around the driving element, a mold at the outer end of each of said shafts, a pourer for fluid material under treatment, means for rotating the turntable to successively bring the molds into position to receive material from the pourer, a driving wheel on the inner end of each of said shafts to engage the said driving element whereby the molds are rotated, and means for tilting each of said shafts whereby the driving wheels are disengaged from the said driving element to disconnect the drive to each of the molds independently.

2. A centrifugal apparatus of the turret type, comprising a frame, a driving element, a turntable rotatably mounted on said frame, a series of bracket members supported from said turntable, carriers pivotally mounted on said brackets, shafts supported in said carriers, a mold at the outer end of each of said shafts, a driving wheel at the inner end of each shaft to engage the driving element whereby the molds are rotated, a pourer for fluid material under treatment, means for rotating the turntable to successively bring the molds into position to receive material from the pourer, and means for pivotally moving the carriers independently whereby the driving wheels on the shafts are disengaged from the driving element to stop the rotation of the molds.

3. A centrifugal apparatus according to claim 2, wherein the carriers have springs tending to hold the driving wheels out of engagement with the driving element, and wherein cam means are provided for pivotally moving the carriers to force the driving wheels into engagement with the driving element.

4. A centrifugal apparatus according to claim 2, wherein braking means are provided on each of the mold supporting carriers for braking the rotation of the mold shafts independently when the driving wheels have been disengaged from the driving element.

5. A centrifugal apparatus of the turret type comprising, a frame, a driving disc supported on said frame, means for rotating said disc, a turntable rotatably mounted on said frame, means for locking said turntable in set rotated position, a series of brackets supported from the turntable, carriers pivotally mounted on said brackets, shafts supported in said carriers, a mold at the outer end of each of said shafts, a driving wheel on the inner end of each of said shafts, means for pivotally moving the carriers to engage the driving wheels with the driving disc to rotate the molds, braking means for stopping rotation of the molds when the driving wheels are disengaged, a pourer for fluid material under treatment, and means for rotating the turntable to successively bring the molds into position to receive material from the pourer.

6. In a centrifugal apparatus of the turret type, a frame, a turntable rotatable on said frame, a central driving disc, a series of brackets supported from said turntable, radially arranged shafts supported from said brackets, a mold at the end of each of said shafts, a member on each of said shafts engaging the driving disc whereby the molds are rotated, means for delivering fluid material into the rotating molds, and means for independently disconnecting each of said mold shafts from the driving disc at will.

7. In a centrifugal machine of the turret type, a driving element, a series of shafts each having at one end a mold and at the other end a driving wheel to engage the said driving element whereby the mold is rotated, carriers supporting said shafts, and means for tilting said carriers to disengage the driving wheels of the shafts from the said driving element.

8. In a centrifugal machine of the turret type, a driving element, a series of shafts arranged radially about said driving element and each having a mold at one end and a driving wheel at the other end to engage the said driving element whereby the mold is rotated, and means for adjusting the driving wheel of each shaft radially from or towards the centre of the driving disc to vary the speed of rotation of the mold.

9. A centrifugal apparatus of the turret type, comprising a frame, a driving element, a turntable rotatably mounted on said frame, a series of bracket members supported from said turntable, carriers pivotally mounted on said brackets, shafts supported in said carriers, a mold at the outer end of each of said shafts, a driving wheel at the inner end of

each shaft to engage the driving element whereby the molds are rotated, a pourer for fluid material under treatment, means for rotating the turntable to successively bring the molds into position to receive material from the pourer, said pourer being mounted on a handle which is slidable in a stand whereby it can be advanced into and withdrawn from the rotating mold, and means for pivotally moving the carriers independently whereby the driving wheels on the shafts are disengaged from the driving element to stop the rotation of the molds.

10. A centrifugal apparatus according to claim 2, wherein catch devices are provided to hold the carriers in tilted position with the driving wheels out of engagement with the driving element; and wherein braking means are provided on each of the mold supporting carriers for braking the rotation of the mold shafts independently when the driving wheels have been disengaged from the driving element.

11. A centrifugal apparatus of the turret type, comprising a frame, a driving element, a turntable rotatably mounted on said frame, a series of bracket members supported from said turntable, carriers pivotally mounted on said brackets, shafts supported in said carriers, a mold at the outer end of each of said shafts, a driving wheel at the inner end of each shaft to engage the driving element whereby the molds are rotated, said driving wheels being adjustable towards or away from the center of the driving element whereby the speed of rotation of the molds may be varied without changing the speed of the

driving element, a pourer for fluid material under treatment, means for rotating the turntable to successively bring the molds into position to receive material from the pourer, and means for pivotally moving the carriers independently whereby the driving wheels on the shafts are disengaged from the driving element to stop the rotation of the molds.

12. A centrifugal apparatus according to claim 2, in which a safety catch is pivoted to each carrier for engagement with the corresponding bracket to hold the carrier in tilted position with the associated driving wheel out of engagement with the driving element.

13. In a centrifugal machine of the turret type, a driving element, a series of shafts each having at one end a mold and at the other end a driving wheel to engage the said driving element whereby the mold is rotated, carriers supporting said shafts, and a manually-rotated cam associated with each carrier and operable at will to tilt the respective carrier and thereby disengage the driving wheel of the carrier from the driving element.

14. In a centrifugal machine of the turret type, a driving element, a series of shafts each having at one end a mold and at the other end a driving wheel to engage the said driving element whereby the mold is rotated, carriers supporting said shafts, means for tilting the carriers to disengage the driving wheels of the shafts from the driving element, and means individual to each carrier for holding it in tilted position.

In testimony whereof I affix my signature.
WILLIAM ALFRED HARRINGTON.