W. F. WOLF.

CENTRIFUGAL CASTING MACHINE.

APPLICATION FILED MAR. 30, 1921.

1,425,927. Patented Aug. 15, 1922.

2 SHEETS—SHEET 1.

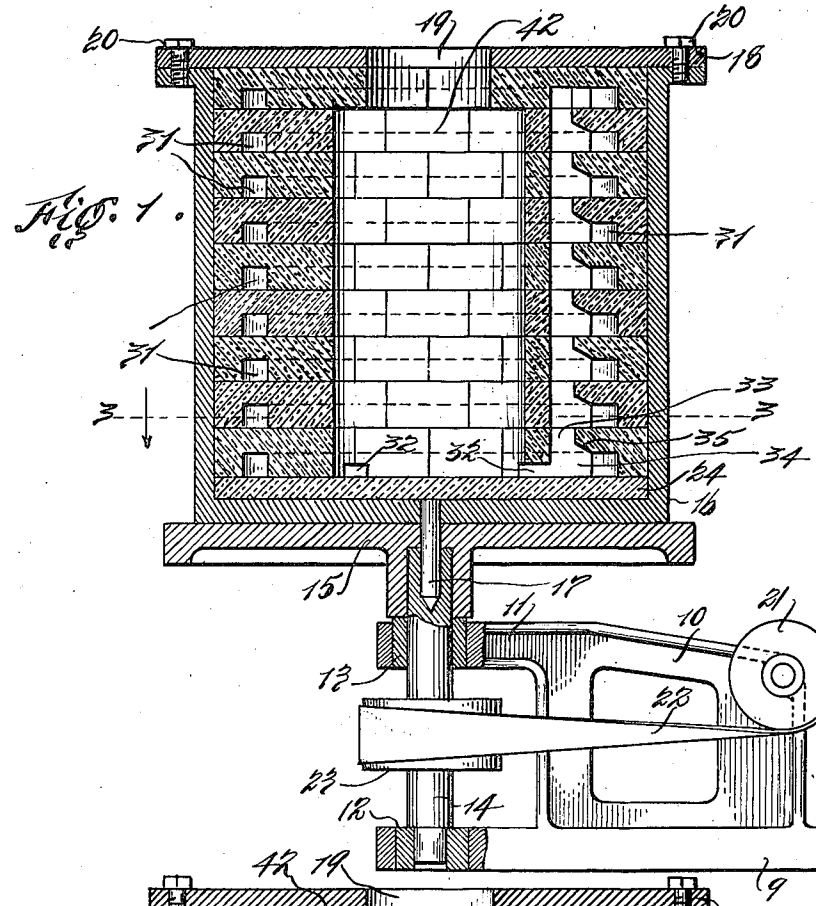


Fig. 1.

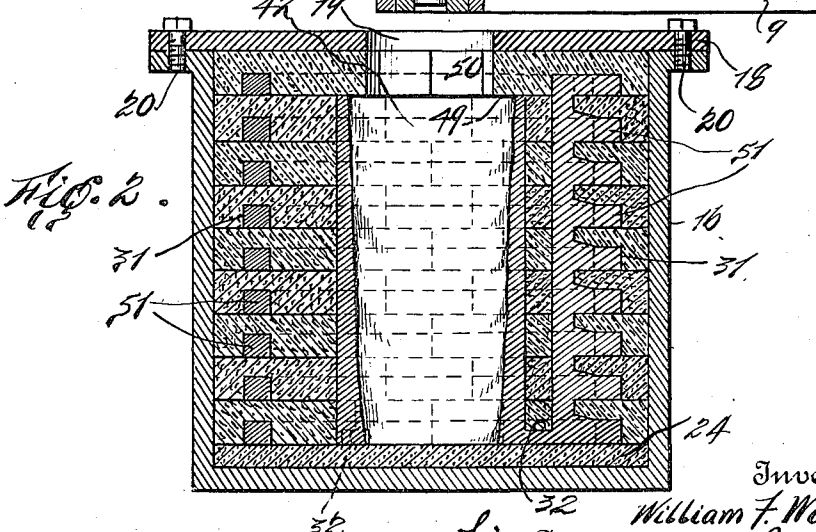


Fig. 2.

Inventor
William F. Wolf.
By his Attorney
Philip B. Keck

W. F. WOLF.

CENTRIFUGAL CASTING MACHINE.

APPLICATION FILED MAR. 30, 1921.

1,425,927.

Patented Aug. 15, 1922.

2 SHEETS—SHEET 2.

Fig. 3.

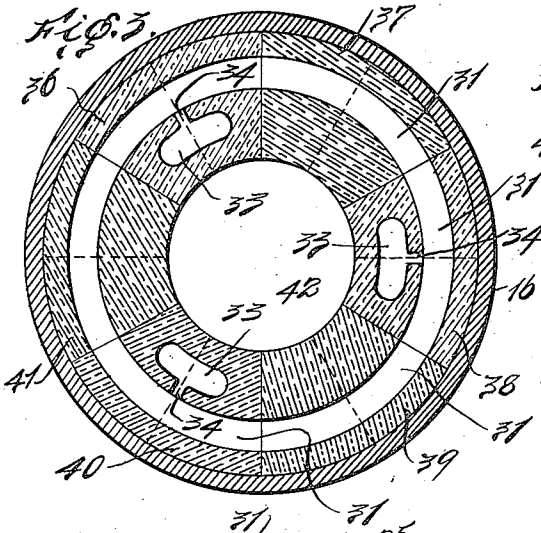


Fig. 4.

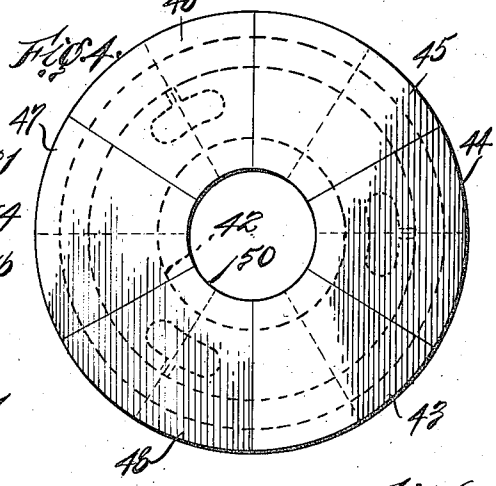


Fig. 5.

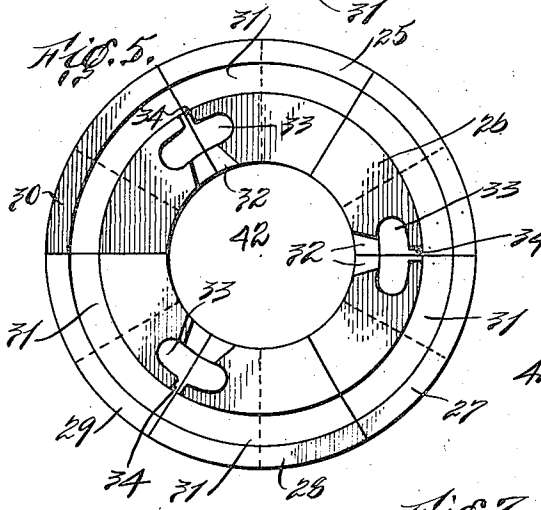


Fig. 6.

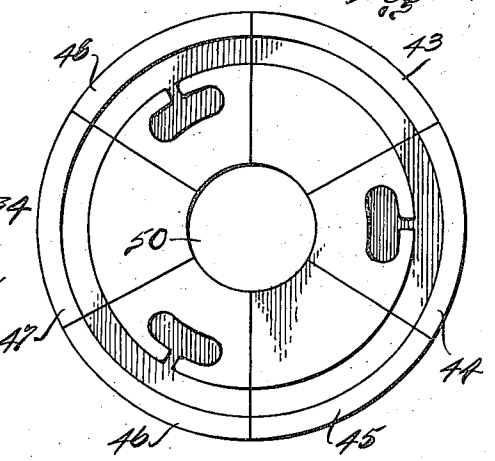
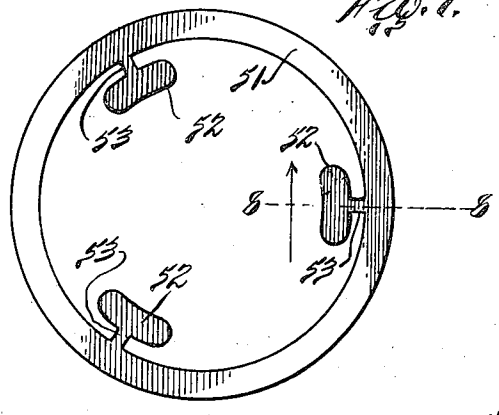


Fig. 7.



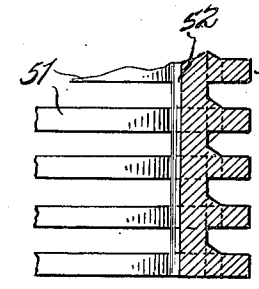


Fig. 8.

Inventor

William F. Wolf.

By his Attorney

Philip B. Kerr

UNITED STATES PATENT OFFICE.

WILLIAM F. WOLF, OF SOMERVILLE, NEW JERSEY, ASSIGNOR TO WASSON PISTON RING COMPANY, OF PLAINFIELD, NEW JERSEY, A CORPORATION OF NEW JERSEY.

CENTRIFUGAL CASTING MACHINE.

1,425,927. Specification of Letters Patent. Patented Aug. 15, 1922.

Application filed March 30, 1921. Serial No. 456,876.

To all whom it may concern:

Be it known that I, WILLIAM F. WOLF, a citizen of the United States, and a resident of Somerville, in the county of Somerset, in the State of New Jersey, have invented certain new and useful Improvements in Centrifugal Casting Machines, of which the following is a specification, reference being made to the accompanying drawings, forming a part thereof.

My invention relates to those machines devised to produce centrifugal castings, more particularly in providing improvements in rapid-production methods and machines for casting annular members, such as piston-rings, in groups and at a rapid rate with a uniform texture of metal in the completed ring.

The objects of my invention are, among other things, to provide an improved machine of this character in which the individual cores forming the molds for producing the rings may serve to form three sides of the completed ring while the subjacent core forms the fourth side, and also to provide the annular mold spaces with connecting gates or passages through which the molten metal rises and distributes itself in the ring mold with such shapes and arrangement with respect to such molds as to afford not only an even distribution of the molten metal but also reservoirs of greater section than the rings which are fed therefrom, so that in cooling with accompanying shrinkage the ring-metal within the ring molds proper may draw any required metal from such reservoir passages, thereby producing groups of rings of uniform thickness and having great homogeneity, and also avoiding the usual imperfections arising from disadvantageous shrinkage caused by the customary unequal cooling of the annulus.

A further object is to simplify and cheapen the construction of such centrifugal casting-machines without loss of efficiency in the rapid production of annular castings in groups wherein the assembled cores of predetermined size and contour shall provide the requisite annular molds for such piston-rings in coacting relationship with one another.

Further advantages and functions will hereinafter be more particularly set forth, and a preferred embodiment of my invention is illustrated in the accompanying drawings in which—

Fig. 1 is a vertical section of my improved machine showing the mold and arrangement of cores, the mechanism for revolving the rotatable table being shown partly in front elevation;

Fig. 2 is a vertical section showing the mold core cavities filled with metal and also an annular film of metal within the central trough;

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 1 looking in the direction of the arrows;

Fig. 4 is a top plan view of a nest of cores;

Fig. 5 is a bottom plan view of the bottom layer of cores;

Fig. 6 is a bottom plan view of the top layer of cores;

Fig. 7 is a top plan view of the ring castings when removed from the molds. and

Fig. 8 is a detail sectional view taken on the line 8—8 of Fig. 7 looking in the direction of the arrow.

Similar numerals refer to similar parts throughout the several figures.

Referring to Figs. 1 and 2, the base plate 9 supports the standard 10 having the horizontal bracket 11. Within the plate 9 is formed the journal bearing 12 while the bracket 11 also carries the journal bearing 13 in vertical alinement with the bearing 12. Rotatably mounted in the bearings 12 and 13 is the spindle 14 upon the upper end of which is secured the table 15 upon which is carried the circular mold flask 16 by the locating pin 17 passing through the table 15 and resting in the head of the spindle 14 as shown in Fig. 1. A suitable cover 18 having the central opening 19 is detachably secured to the top of the mold flask 16 by the screw bolts 20. Rotation is imparted to the spindle 14 through the pulley 21 by means of the belt 22 passing around the pulley 23 and pulley 21 as shown in Fig. 1, the belt 22 being driven from any suitable source of power (not shown).

Within the mold flash 16, the different cores are preferably arranged as shown in Figs. 1 and 2, the various details of which

arrangements are shown in Figs. 3, 4, 5 and 6. In the bottom of the flask 16 is placed the flat circular lining plate 24 which covers the entire bottom of such flask. Upon this plate 24 I preferably arrange the different layers of segmental cores, the bottom layer being shown in Fig. 5. These cores are herein shown as comprising six to the layer, and are indicated in the drawings by reference numerals 25, 26, 27, 28, 29 and 30. Each of these cores has the circular channel 31 formed therein to provide the necessary segment of the ring casting the channels 31 of all six cores forming a complete annular space for the ring of any desired size or cross-sectional thickness. It will be noted that the core surfaces about the channels 31 form three sides of the rectangular ring casting while the fourth side is formed by the top surface of the plate 24. Referring more particularly to Fig. 5, each of the cores 25, 26, 27, 28, 29 and 30 has formed in lower surface a cut-out portion 32 with a vertical channel or "riser" 33, which portion 32 and channel 33 comprise one-half of a lower gateway for the molten metal to flow into the three vertical channels or "risers" 33 from which the metal is centrifugally driven into the ring channel 31 through the passages 34 as shown in Figs. 2 and 5. The upper part of the cores forming such passages 34 are beveled at 35 to facilitate the removal of the cores from the annular casting shown in Figs. 7 and 8. Preferably the inner space formed in the "risers" 33 is of greater section than the ring channels 31.

In the embodiment shown I have arranged seven layers of segmental cores of six each to complete the circular mold tier for the individual castings. The arrangement of these cores in the second layer is shown in Fig. 3, and the cores are indicated by the reference numerals 36, 37, 38, 39, 40 and 41. Each of these cores 36 to 41 inclusive has the circular channel 31 formed therein to produce the annular casting, such core surfaces about the channels 31 forming three sides of the rectangular ring casting while the fourth side is produced by the top surfaces of the six cores 25 to 30 inclusive of the bottom layer as shown in Figs. 1 and 2. As illustrated in Fig. 3 the alternate cores 36, 38 and 40 each have formed therein vertical channels or "risers" 33 with passages 34 which will vertically aline themselves with the three vertical "risers" 33 and connecting passages 34 in the first layer shown in Fig. 5. Such alinement for the three "risers" 33 is further illustrated in Figs. 1 and 2.

Extending upwardly through the mold flask 16 as shown in Figs. 1 and 2, the several layers of cores 25 to 30 inclusive and of cores 36 to 41 inclusive are alternately arranged one above the other until the layer shown in Fig. 4 is completed, within which nest of cores the central trough 42 is formed into which the molten metal is poured through the opening 19. The top layer of six cores shown in Fig. 6 and numbered 43, 44, 45, 46, 47 and 48 inclusive each has a less radius than those of the lower cores so as to form the over-lapping rim 49 for the central trough 42 to prevent any surplus metal flying out of the trough 42 when the flask 16 is centrifugally driven as shown in Fig. 2. The opening 50 formed by the top layer cores (43–48) is preferably of the same diameter as that of the opening 19 as shown in Figs. 1 and 2 and the molten metal is poured into the trough 42 through such openings 19 and 50 from any ladle (not shown) after the several core layers have been assembled and set up within the mold flask 16.

The number of individual segmental cores to form the annular molds for the rings may be widely varied to suit the requirements as to the size and thickness of the ring castings to be produced; also the number of vertical channels or "risers" 33, there being a sufficient number to provide suitable reservoirs of molten metal from which the ring casting proper can draw metal through passages 34 upon cooling to obviate undue shrinkage causing imperfections in the completed casting.

Referring to Figs. 7 and 8, Fig. 7 shows a completed ring casting 51 with the three inner "riser" castings 52 connected to the inner periphery of the ring 51 by the necks 53 formed by the passages 34. When the group castings shown in part in Fig. 8 are removed from the mold flask 16, the several necks 53 are cut through to remove the three inner castings 52 and necks 53 and the rings 51 are then ready for further treatment by splitting and machining same to accurate form and thickness.

The operation of my improved casting-machine is substantially as follows: After the separate layers of cores have been arranged within the mold flask 16 as heretofore described to form the central trough 42 and the three vertical "risers" 33 as shown in Figs. 1 and 2, the cover 18 is secured to the flask which is then placed on the table 15 as shown in Fig. 1. The table 15 is then rapidly revolved and the molten ring metal is poured through the opening 19 into the central trough 42 from which it is driven through the lower gateways 32 into the "risers" 33 from which the metal passes through the connecting passages 34 to the ring channels 31 to produce the annular casting 51. Fig. 2 illustrates the filling up of the cores with the ring metal along with the central film of metal on the exterior of the trough 42, the rim 49 preventing this surplus metal from flying out of the mold

flask 16 during its rapid rotations. After the molten metal is driven into the channels 31 the outer surfaces cool first and upon shrinkage such ring casting 51 draws to itself through the passages 34 the required amount of metal from the still molten reservoir "risers" 33 to produce in the finally cooled casting 51 an annulus of uniform thickness in cross-section and of exceptional homogeneity. After the cores and group castings have been removed from the mold flask 16, the separate layers of cores are separated from the castings and the inner "riser" castings 52 and necks 53 are removed from the inner peripheries of the individual rings as hereinbefore explained.

Many variations and modifications may be made in the detailed construction of my improved machine and in the arrangement of the cores within the mold flask without departing from the principles of my invention as herein disclosed. Therefore I do not restrict myself to specific features of construction or arrangement of parts which I have herein illustrated and described.

I claim as my invention:

1. In a centrifugal casting-machine, a multiple-casting mold comprising successive layers of cores for forming the rings concentrically arranged to form an inner trough, a plurality of vertical channels within the body of the cores connecting the successive layers of cores, and gateways between said trough and channels.

2. In a centrifugal casting-machine, a multiple-casting mold comprising successive layers of cores for forming the rings concentrically arranged to form an inner trough, a plurality of vertical channels within the body of the cores connecting the successive layers of cores, and gateways connecting the bottoms of said trough and channels.

3. In a centrifugal casting-machine, a multiple-casting mold comprising successive layers of cores for forming the rings concentrically arranged to form an inner trough, a plurality of vertical channels within the body of the cores, of greater section than the rings connecting the successive layers of cores, and gateways between said trough and channels.

4. In a centrifugal casting-machine, a multiple-casting mold comprising successive layers of cores for forming the rings concentrically arranged to form an inner trough, a plurality of vertical channels within the body of the cores of greater section than the rings connecting the successive layers of cores, and gateways connecting the bottoms of said trough and channels.

5. In a centrifugal casting-machine, a multiple-casting mold composed of successive layers of ring cores and a plurality of vertical channels within the body of the cores connecting said layers to feed the molten metal to said cores from said channels.

6. In a centrifugal casting-machine, a multiple-casting mold composed of successive layers of ring cores and a plurality of vertical channels within the body of the cores of greater section than said ring cores connecting said layers to feed the molten metal to said cores from said channels.

7. In a centrifugal casting-machine, a multiple-casting mold composed of successive layers of ring cores, a plurality of vertical channels within the body of the cores connecting said layers to feed the molten metal to said cores from said channels, and tapered passages between said channels and cores.

8. In a centrifugal casting-machine, a multiple-casting mold composed of successive layers of ring cores, a plurality of vertical channels within the body of the cores of greater section than said ring cores connecting said layers to feed the molten metal to said cores from said channels, and tapered passages between said channels and cores.

9. In a centrifugal casting-machine, a multiple-casting mold comprising successive layers of cores for forming the three sides of disconnected mutually parallel rectangular rings and the exposed reverse surfaces of the cores in adjacent layers to form the fourth sides of the rings, in combination with a plurality of vertical channels within the body of the cores connecting said layers to feed the molten metal to said cores from said channels.

10. In a centrifugal casting-machine, a multiple-casting mold comprising successive layers of segmental cores for forming the three sides of disconnected mutually parallel rectangular rings concentrically arranged to form an inner trough and the exposed reverse surfaces of the cores in adjacent layers to form the fourth sides of the rings, in combination with a plurality of vertical channels within the body of the cores connecting said layers to feed the molten metal to said cores from said channels.

11. In a centrifugal casting-machine, a multiple-casting mold comprising successive layers of segmental cores for forming the three sides of disconnected mutually parallel rectangular rings concentrically arranged to form an inner trough, and gateways along said exposed reverse surfaces connecting the bottom of the trough with the cores and the exposed reverse surfaces of the cores in adjacent layers to form the fourth sides of the rings, in combination with a plurality of vertical channels within the body of the cores connecting said layers to feed the molten metal to said cores from said channels.

12. In a centrifugal casting-machine, a multiple-casting mold comprising successive layers of cores for forming the three sides of disconnected mutually parallel rectangular rings and the exposed reverse surfaces of the cores in adjacent layers to form the fourth sides of the rings, in combination with a plurality of vertical channels within the body of the cores of greater section than said ring cores connecting said layers to feed the molten metal to said cores from said channels.

13. In a centrifugal casting-machine, a multiple-casting mold comprising successive layers of segmental cores for forming the three sides of disconnected mutually parallel rectangular rings concentrically arranged to form an inner trough and the exposed reverse surfaces of the cores in adjacent layers to form the fourth sides of the rings, in combination with a plurality of vertical channels within the body of the cores of greater section than said ring cores connecting said layers to feed the molten metal to said cores from said channels.

14. In a centrifugal casting-machine, a multiple-casting mold comprising successive layers of segmental cores for forming the three sides of disconnected mutually parallel rectangular rings concentrically arranged to form an inner trough, and gateways along said exposed reverse surfaces connecting the bottom of the trough with the cores and the exposed reverse surfaces of the cores in adjacent layers to form the fourth sides of the rings, in combination with a plurality of vertical channels within the body of the cores of greater section than said ring cores connecting said layers to feed the molten metal to said cores from said channels.

15. In a centrifugal casting-machine, a multiple-casting mold comprising successive layers of cores for forming the three sides of disconnected mutually parallel rectangular rings and the exposed reverse surfaces of the cores in adjacent layers to form the fourth sides of the rings, in combination with a plurality of vertical channels within the body of the cores connecting said layers to feed the molten metal to said cores from said channels and tapered passages between said channels and ring cores.

16. A rotatable multiple-casting mold having a ring core and a reservoir inside the core but outside the axis of the mold from which metal is drawn during the rotation of the mold.

17. A rotatable multiple-casting mold having a ring core and a reservoir of greater section than said core inside the core but outside the axis of the mold from which metal is drawn during the rotation of the mold.

18. A rotatable multiple-casting mold composed of successive layers of ring cores and a common reservoir inside the cores but outside the axis of the mold from which metal is drawn during the rotation of the mold.

19. A rotatable multiple-casting mold composed of successive layers of ring cores and a common reservoir of greater section than said cores inside the cores but outside the axis of the mold from which metal is drawn during the rotation of the mold.

WILLIAM F. WOLF.