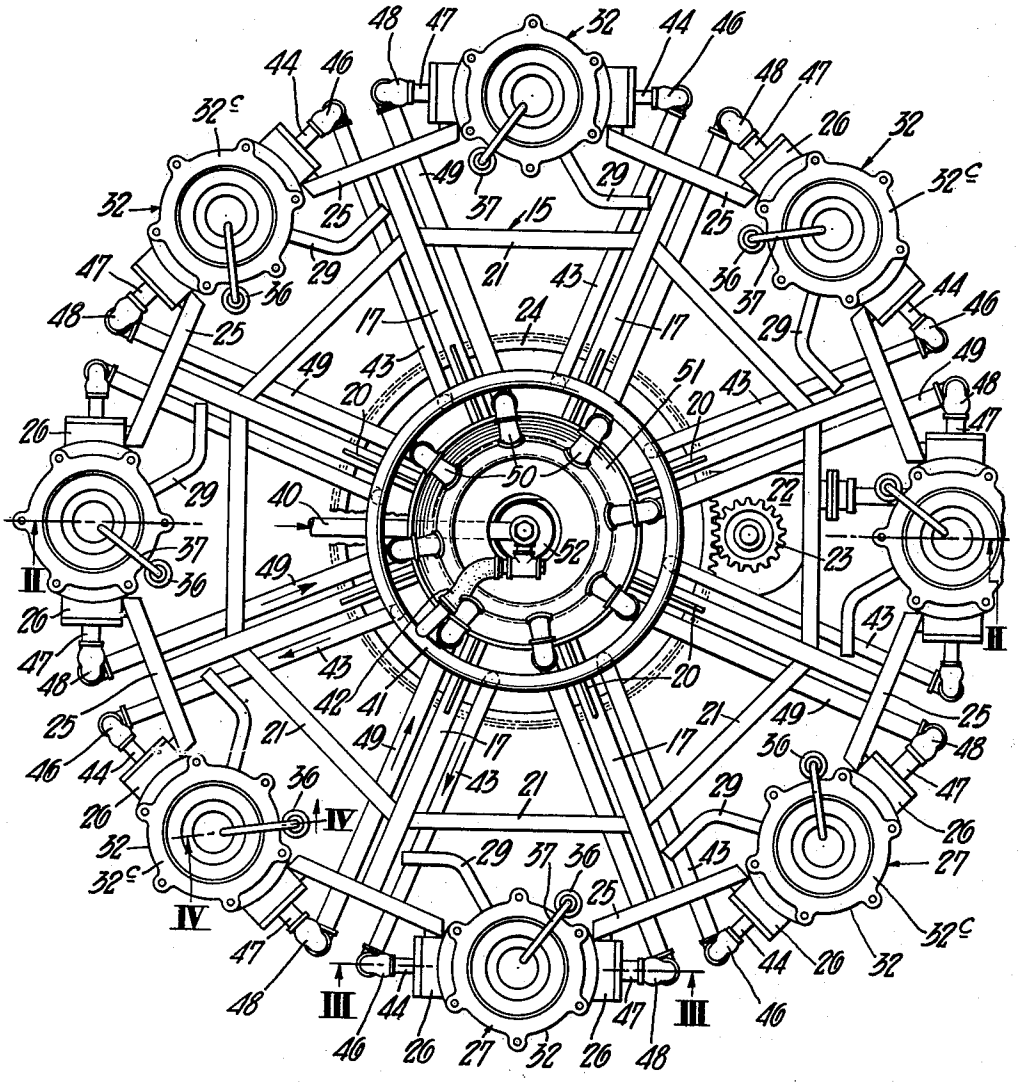
March 23, 1954 S. N. LUTZ 2,672,661

ROTARY-TABLE CASTING APPARATUS WITH WATER-COOLED MOLDS

Filed July 9, 1951

3 Sheets-Sheet 1

FIG. 1.



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3 Sheets-Sheet 2

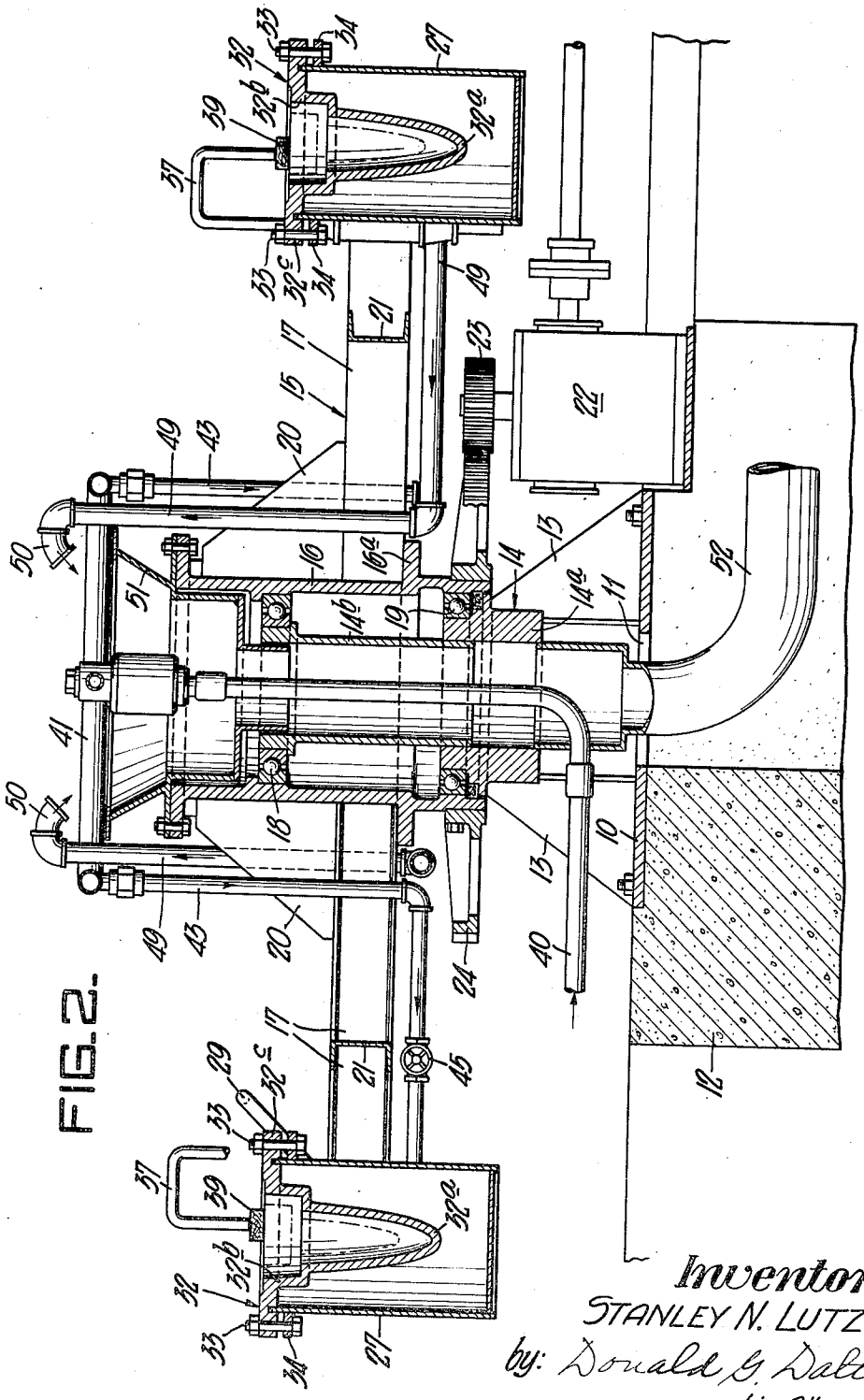


FIG. 2.

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3 Sheets-Sheet 3

FIG. 3.

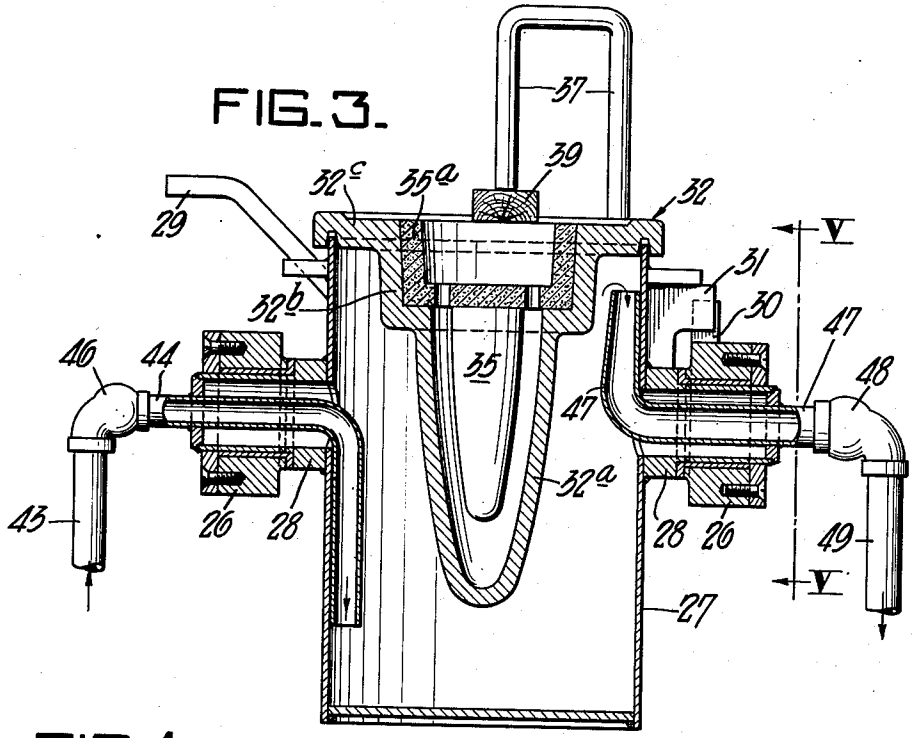


FIG. 4.

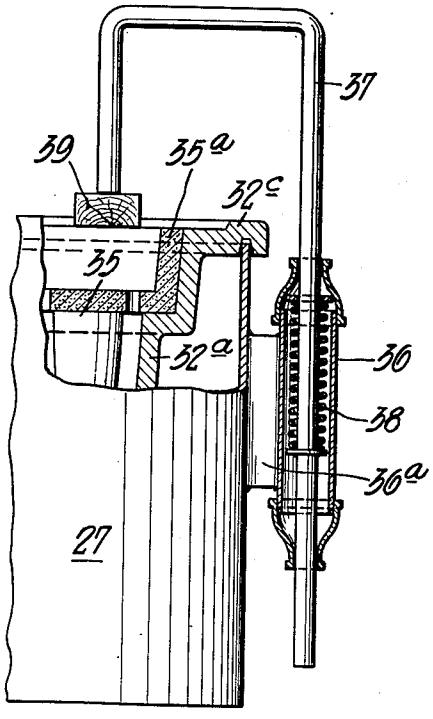
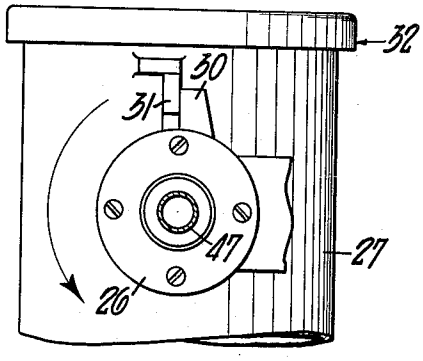


FIG. 5.



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UNITED STATES PATENT OFFICE

2,672,661

ROTARY-TABLE CASTING APPARATUS WITH WATER-COOLED MOLDS

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Application July 9, 1951, Serial No. 235,826

1 Claim. (Cl. 22—63)

1

This invention relates to apparatus for supporting and conveying a series of molds past a pouring station whereby metal castings may be produced rapidly and efficiently.

Many types of rotary-table casting apparatus have been proposed heretofore. It is the object of my invention to improve generally on such known apparatus and, in particular, to provide apparatus particularly adapted for casting articles which may be made in one-piece permanent metal molds. Further objects are to provide suitable water-cooling for such molds and mountings therefor which will facilitate dumping of the castings when cooled. Other more specific objects of the invention will become apparent hereinafter.

In a preferred embodiment of the invention, I provide a rotary table or horizontal wheel in the form of a spider-like skeleton having a plurality of arms radiating from a central hub. The hub is journaled on a vertical tubular spindle. Mold-carrying buckets spaced circumferentially of the table have trunnions pivoted in bearings carried by the arms, the common axis of the bearings of each bucket lying generally tangentially of the table. A mold is removably secured in each bucket by a flange which serves as a cover, and inlet and outlet connections for cooling water are provided for each bucket. Water is supplied to the inlet connections from a main extending through the spindle. The hub has a collector basin for receiving water discharged from the outlet connections.

A complete understanding of the invention may be obtained from the following detailed description and explanation which refer to the accompanying drawings illustrating the present preferred embodiment. In the drawings,

Figure 1 is a plan view of my improved casting apparatus;

Figure 2 is a cross-section thereof taken along the plane of line II—II of Figure 1;

Figure 3 is a cross-section to enlarged scale through one of the buckets, taken along the plane of line III—III of Figure 1;

Figure 4 is a partial section through one of the buckets taken along the plane of line IV—IV of Figure 1; and

Figure 5 is a partial side elevation of one of the buckets showing a portion in section taken along the plane of line V—V of Figure 3.

Referring now in detail to the drawings and, for the present, to Figures 1 and 2, a base plate 10 having a central opening 11 therein, is secured to a foundation 12. Spaced web plates 13 disposed radially about the opening 11 support a

2

vertical hollow spindle or post 14 including a bottom ring 14a and a sleeve 14b extending upwardly therefrom. A horizontal wheel or table indicated generally at 15 is composed of a central hub 16 and arms 17 radiating therefrom. The hub is journaled on the spindle by an upper thrust-and-radial bearing 18 and a lower radial bearing 19. The arms rest on a flange 16a adjacent the bottom of the hub, are braced by gussets 20 welded thereto and to the hub, and are tied together intermediate their ends by bars 21. The table is driven at low speed (from ⅓ to 1 R. P. M.) by a variable-speed motor (not shown) through a reduction gear 22 having a vertical low-speed output shaft on which is secured a pinion 23. The pinion meshes with a gear 24 secured to the hub 16 at the lower end thereof.

Cross bars 25 at the ends of arms 17 carry a bearing 26 at each end. In each pair of bearings including one on each of two adjacent cross bars, a bucket 27 is journaled by means of trunnions 28 thereon (see Figure 3). As shown in Figure 1, the arrangement of the pairs of bearings supporting each of the several buckets is such that the latter are tiltable about horizontal axes generally tangential to the table 15. The trunnions are located at a level such that the buckets normally hang vertical in the bearings. Each bucket has a handle 29 by which it may be tilted outwardly at the top until it is substantially inverted. A lug 30 is fixed to one of the bearings of each bucket for cooperation with a radial lug 31 secured to the latter (see Figures 3 and 5) thus providing a stop limiting the return swing of the bucket after tilting.

Each bucket contains a one-piece metal mold 32. The mold includes a cavity-forming portion 32a, a stepped portion 32b and a flange 32c which rests on the rim of the bucket and serves as a cover therefor. The underside of the flange has a groove for a sealing gasket which seats on the bucket rim. The mold is removably secured to the bucket by bolts 33 extending through holes in flange 32c and through lugs 34 projecting radially from the bucket. A sand core 35 including a pouring basin 35a is fitted into each mold before pouring molten metal therein. The basin fits snugly in the stepped portion of the mold. The cavity in the molds may be of any desired shape. That shown is for the production of plugs used in rolling seamless tubes.

A guide tube 36 is secured to each bucket by a web plate 36a. A U-shaped plunger or yoke 37 has a long leg reciprocable through the tube, a short leg adapted to exert a downward thrust

on the core and a horizontal portion connecting the two legs. A spring 38 on the long leg of the plunger is compressed between a washer thereon and the upper end of the tube and constantly urges the plunger downwardly. An expendable spacer block 39 is disposed between the short leg of the plunger and the core to prevent splashed metal from freezing on the plunger and interfering with removal of the casting from the mold. The plunger is turned to a position in which the short leg is out of alinement with the mold when a core is being placed therein.

In order to insure quick freezing of the molten metal poured into the molds and keep the latter at a safe temperature, I provide means for circulating cooling water through the buckets 27. A supply pipe 40 extends below ring 14a and upwardly through spindle 14. A pipe ring or annulus 41 above hub 16 is connected to pipe 40 by a hose 42 and has connections 43 extending to inlet pipes 44 inserted through one of the trunnions 28 of each bucket. Each connection 43 includes a control valve 45 and a swivel 46 at the joint with the inlet pipe. The other trunnion of each bucket has an outlet pipe 47 inserted therethrough and connected by a swivel 48 to an outlet pipe 49. Pipes 49 have downturned nozzles 50 at their inner ends which discharge into a collector basin 51 secured on top of hub 16 and having a bottom outlet fitting in the upper end of spindle 14. A drain pipe 52 connected to the bottom ring of the spindle extends through a void in foundation 12 to the sewer. The elevation and visibility of the nozzles 50 and the discharge jets therefrom make it possible for the operator constantly to verify the maintenance of continued circulation of cooling water through each bucket and to leave out of service any bucket through which circulation may be reduced by partial stoppage of its supply pipe or maladjustment of its control valve, for example, until the necessary corrective measures may be taken.

The apparatus is prepared for operation by bolting a set of molds 32 of the desired size in buckets 27. The water is turned on and an inspection is made to detect leaks. The entering water is preferably held at about 110° F. since a lower temperature may permit condensation of atmospheric moisture in the molds. Cores 35 of the proper size are then placed in the molds and held by means of plungers 37 and wood blocks 39. Molten metal is then poured into the molds, usually by two operators from a small ladle. The pouring operation is the slowest part of the process and therefore the limiting factor in output. A convenient location is chosen as the pouring station and as soon as one mold is filled, the table is rotated to bring another mold up to the pouring station. The table is stopped while each mold is being poured.

After three or four molds have been poured, the first casting is usually cool enough for dumping and this operation is performed by an operator stationed in the proper location who lifts the plunger 37, turns it free of the mold, grasps handle 29 and tilts bucket 27 outwardly through an angle sufficient to cause the casting to fall out of the mold by gravity. If any sticking occurs, it can usually be overcome by swinging the bucket back so that lug 31 strikes stop 30 a sharp blow. This jarring action loosens the casting so that it falls out readily when the bucket is again swung outwardly. In the case of rolling-mill plugs, the symmetrical tapered shape of the castings facilitates their removal from the molds. Another operator then places new cores in the molds and secures them in place by means of the plungers 37 and new wood blocks 39. These molds are then ready to receive molten metal for additional castings and the process may be continued as long as a supply of molten metal is available.

It is possible to set up different sizes of molds in the several buckets at one time. In this case, however, the output is limited by the pouring time on the largest casting.

It will be apparent from the foregoing that my invention provides casting apparatus having peculiar advantages for the production of small articles suited for casting in one-piece metal molds. The construction is simple and inexpensive yet rugged and sturdy enough to withstand a considerable degree of rough usage. Progressive rotation of the table brings the molds successively up to the pouring station so that the casting may proceed with little interruption. The provisions for water cooling effect prompt solidification and cooling of the castings so they may be quickly dumped and the molds fitted with new cores for the next cycle. The apparatus is quite flexible in that the pouring, dumping and core-fitting stations may be located where desired around the periphery of the table, so long as they are properly spaced and in correct sequence.

Although I have disclosed herein the preferred embodiment of my invention, I intend to cover as well any change or modification therein which may be made without departing from the spirit and scope of the invention.

I claim:

Casting apparatus comprising a base, a vertical tubular post upstanding on said base, open at the top, a hub telescoped over said post, vertically spaced bearings on said post rotatably supporting said hub thereon, a plurality of horizontal arms spaced circumferentially of the hub and extending radially therefrom, a pair of fixed bearings mounted on the outer end of each arm, the adjacent bearings of each pair of adjacent arms being spaced apart, a mold-carrying bucket pivoted in said adjacent bearings and depending therebetween, an open-topped collector basin fitting in the top of said hub and having a bottom outlet discharging into said post, an annulus lying in a horizontal plane above said basin, an inlet pipe extending upwardly through said post and connected to said annulus, supply pipes extending radially outward from said annulus and radial return pipes extending inwardly and upwardly above the top of the basin and discharging thereinto over the rim thereof whereby the flow from said return pipes is readily visible, one of the supply pipes and one of the return pipes being connected to each bucket through the two bearings, respectively, supporting each bucket.

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