Sept. 29, 1931. W. H. BEATTY 1,825,302

CENTRIFUGAL MOLDING APPARATUS

Filed June 17, 1929 3 Sheets-Sheet 1

Fig. 1

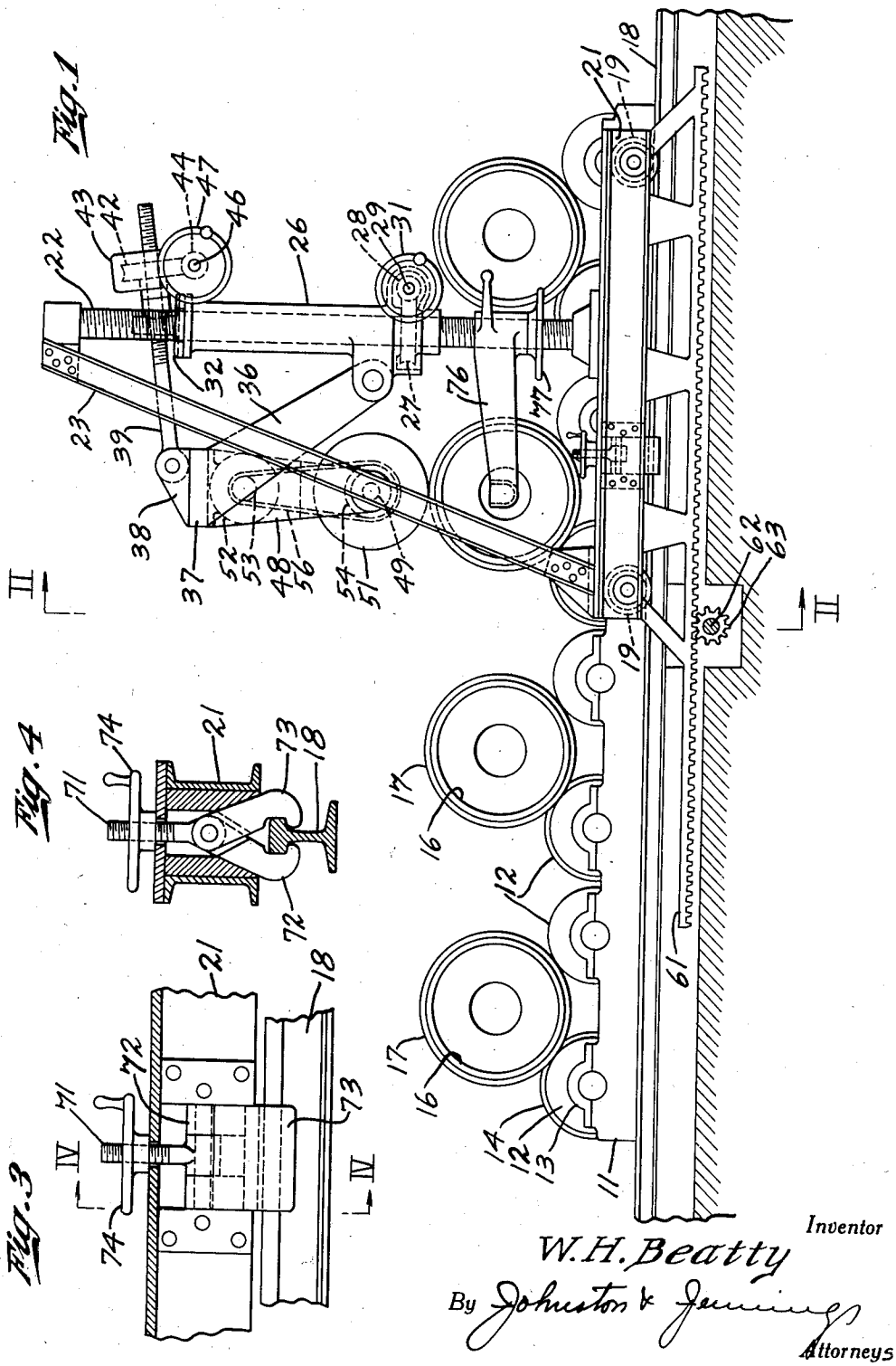


Fig. 4

Fig. 3

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CENTRIFUGAL MOLDING APPARATUS

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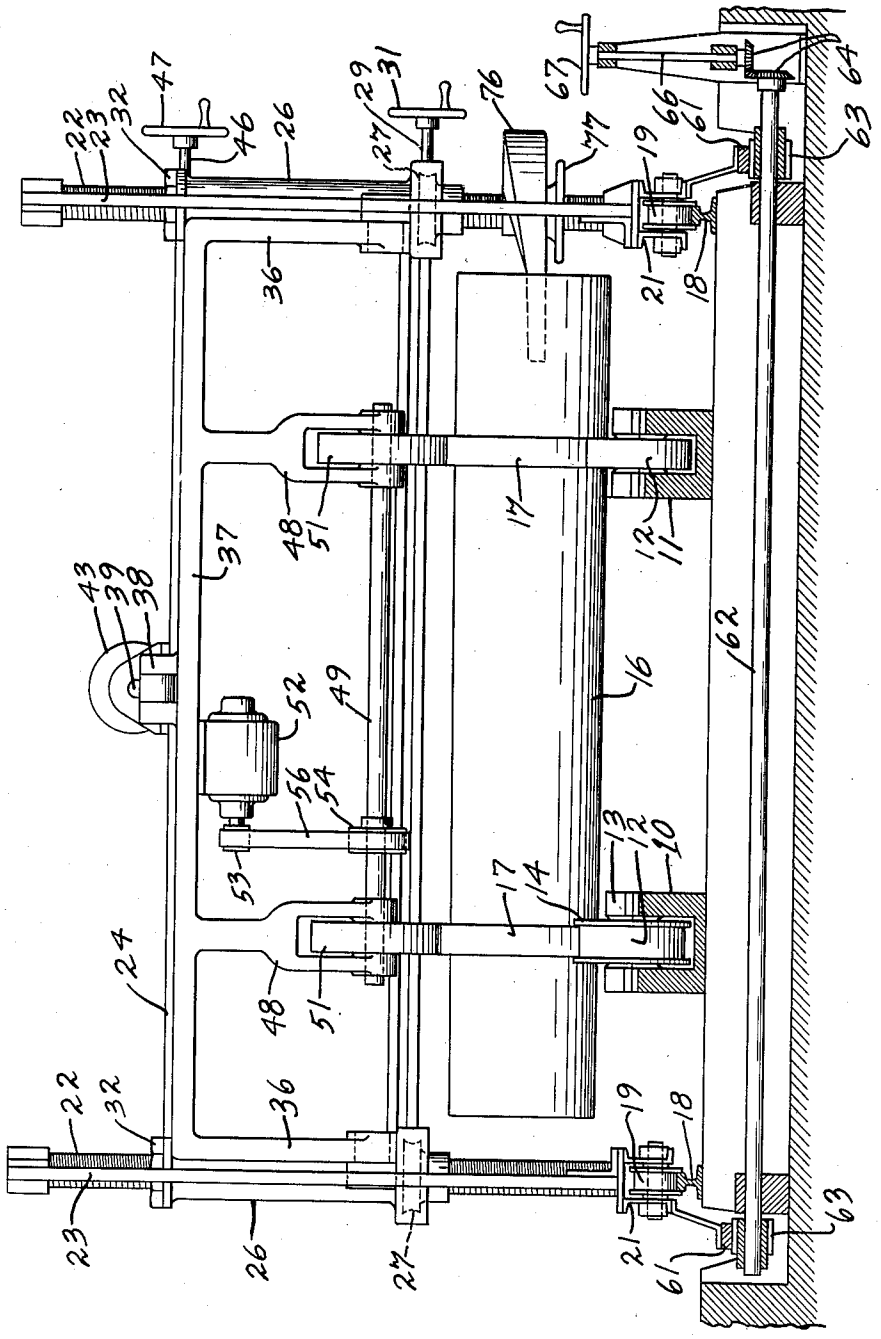


Fig. 2

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Fig. 5

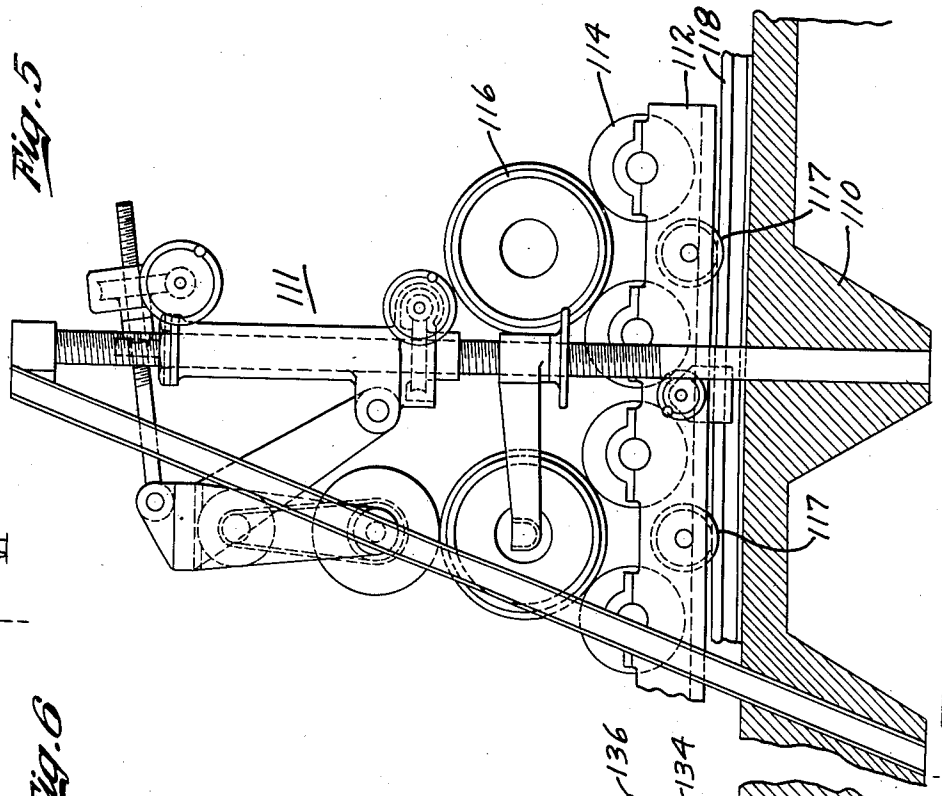


Fig. 6

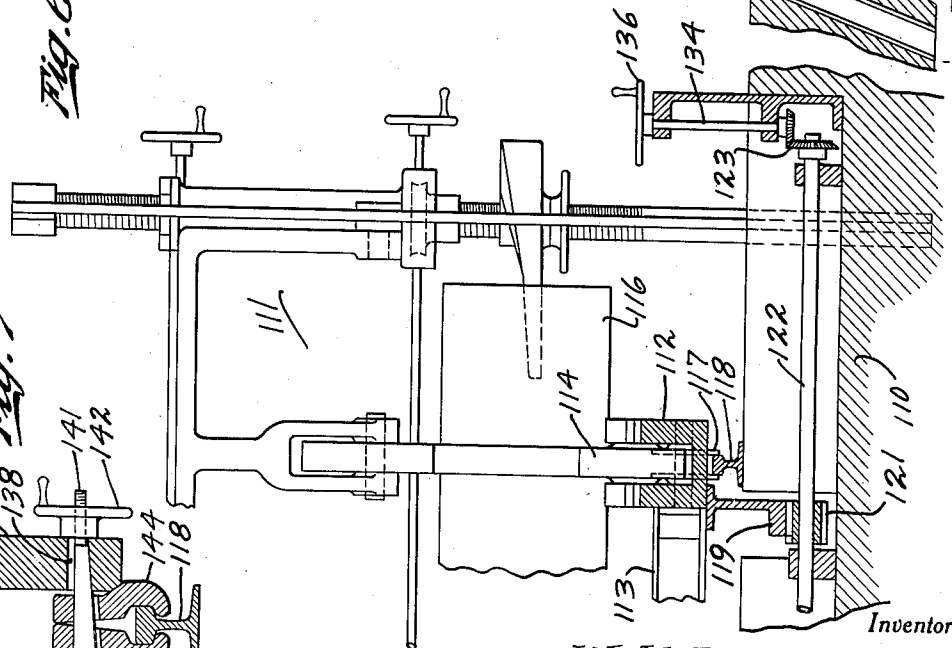


Fig. 7

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UNITED STATES PATENT OFFICE

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CENTRIFUGAL MOLDING APPARATUS

Application filed June 17, 1929. Serial No. 371,349.

My invention relates to centrifugal molding apparatus, more particularly to that employed in the manufacture of cast iron pipe and has for its object the provision of apparatus of the character designated which shall be simple and sturdy of design and which shall be effective to carry out a casting operation in a minimum of time.

A further object of my invention is to provide a centrifugal molding machine employing a plurality of sets of flask supporting rollers, together with a power operated means adapted for successively rotating flasks on the rollers.

A still further object of my invention is to provide a centrifugal molding apparatus embodying a plurality of sets of flask supporting rollers and a single friction roller means, together with means for readily moving the roller means from one set of supporting rollers to the other.

In my prior Patent, No. 1,694,763, issued December 11, 1928, there is shown, described and claimed centrifugal molding apparatus embodying a pair of idler rollers for supporting a flask, an overhead hold down and driving roller, and means for raising and lowering the driving roller to permit the mounting and removal of a flask from the supporting rollers. My present invention, while embodying the broad features disclosed in my prior patent aforesaid, provides a means whereby there may be secured a greater rate of production, greater flexibility in operation, and better adaptability for molding pipe of different sizes on the same machine. Briefly, my invention comprises a roller bed embodying a plurality of sets of parallel idler roller means extending transversely of the roller bed, each set being adapted to support a flask, a driving roller means adapted to bear against a flask supported on said idler rollers and drive it by frictional contact therewith, and means for effecting relative bodily movement of the driving roller means and the flask supporting roller sets.

Apparatus embodying features of my invention is illustrated in the accompanying drawings, forming a part of this application, wherein

Fig. 1 is a view in side elevation showing my improved apparatus;

Fig. 2 is a sectional view taken along line II—II of Fig. 1;

Fig. 3 is a view in sectional elevation showing in detail the hold down means employed;

Fig. 4 is a sectional view taken along the line IV—IV of Fig. 3;

Fig. 5 is a view in side elevation showing a modified form of my invention;

Fig. 6 is a partial sectional view taken along the line VI—VI of Fig. 5; and

Fig. 7 is a detail view of the hold down means employed with the apparatus shown in Figs. 5 and 6.

Referring to the drawings for a better understanding of my invention, my improved apparatus comprises a roller bed embodying parallel channel members 10 and 11 extending longitudinally of the bed. Mounted on the channel members 10 and 11 are a plurality of sets of idler flask supporting rollers 12, there being four sets shown in the drawings, though it will be apparent that a greater or lesser number might be employed. The idler rollers 12 are mounted in suitable bearings 13 provided on the channels 10 and 11 and at least one of each set of rollers is provided with a flange 14. Adapted for mounting on the several supporting roller sets 12 are flasks 16 each provided with turned rings 17 which are adapted to rest on the rollers 12. The flange 14, provided on the roller of each set, prevents longitudinal displacement of a flask when it is being rotated.

At each side of the roller bed and extending longitudinally thereof is provided a rail 18. Mounted on the rails 18 by means of flanged rollers 19 is a movable carriage embodying foundation members 21. Secured to the carriage foundation members 21 and extending upwardly therefrom, on each side of the machine, is a heavy threaded post 22, the posts 22 being braced by means of diagonally extending members 23 secured to the tops of the posts and to the forward ends of the foundation members 21.

Extending transversely of the roller bed

and spanning the rollers is a relatively heavy beam 24 secured at its ends to sleeves 26 which fit over the posts 22. Housed in the lower end of each of the sleeves 26 is a worm gear nut 27 for supporting the sleeves and beam 24 on the threaded post 22. The nuts 27 are operated by means of worms 28 secured to a shaft 29 which extends across the machine and which is operated by means of a hand wheel 31. By the means just described, the sleeves 26 may be raised and lowered to adjust them to the required position and once adjusted are held permanently in place by means of lock nuts 32.

Pivotally mounted to the lower end of each of the sleeves 26 is a crank arm 36 which crank arms support a beam 37 which extends transversely of the roller bed. Secured midway of the beam 37 is an anchoring member 38 which has pivotally connected thereto an adjusting bolt 39 which bolt extends rearwardly through the upper part of the beam 24, the beam 24 being provided with a slotted hole 41 through which the bolt 39 passes. Threaded onto the rearward end of the adjusting bolt 39 is a worm gear nut 42 carried in a housing 43 which surrounds the bolt 39 and which is operated by means of a worm 44 secured to a shaft 46 and operated from the side of the machine by means of a hand wheel 47. By the means described, the beam 37 may be moved forwardly and rearwardly to cause it to raise or lower as the arms 36 swing about their pivotal connections with the sleeves 26.

Secured to the beam 37 and extending downwardly therefrom are a pair of driving roller supporting arms 48 having journaled in their roller ends a shaft 49. The shaft 49 has secured thereto driving rollers 51 which are adapted to bear against the rings 17 of the flask to be rotated. The driving rollers 51 should be constructed of some suitable friction material such as what is commercially known as "friction paper".

Mounted on the beam 37 is a motor 52 having a driving pulley 53. Mounted on the shaft 49 is a driven pulley 54 and connecting the two pulleys is a belt or other suitable driving means 56. It may thus be seen that the beam 37 with the motor 52 and driving rollers 51 may be lowered to contact the rollers 51 with a flask to be rotated and raised off the flask when the casting operation is completed.

In order that the driving roller means may be readily moved from one flask 16 to another, I secure to each of the foundation members 21 a rack 61 which extends longitudinally of the roller bed and parallel with the rails 18. Extending across beneath the bed is a shaft 62 having mounted thereon pinions 63 which mesh with the racks 61. The shaft 62 may be conveniently operated by beveled gears 64 from an upright shaft 66 having mounted at its upper end a hand wheel 67.

In order that the driving mechanism may be securely held in position when a flask is being rotated, I provide a hold down device at each side of the apparatus which is more particularly shown in Figs. 3 and 4. Extending downwardly through the foundation members 21 on each side of the machine is a jack bolt 71 having a pair of relatively wide hooks 72 and 73 pivotally connected to its lower end and which straddle the rail 18. Threaded onto the upper end of the jack bolt 71 is a hand wheel 74 which serves to draw the hooks 72 and 73 into tight engagement with the rail 18.

Pivotally mounted on the threaded post 22 on one side of the machine is a pouring spout 76 through which the molten metal is adapted to be poured into the flask.

The pouring spout 76 is adjustable vertically on the threaded post 22 by means of a hand wheel 77 whereby it may be adjusted to deliver molten metal to flasks of different diameters.

From the foregoing description the operation of my improved apparatus as so far described will be readily apparent. One or more flasks 16 being placed in position on the supporting roller sets 12, the driving roller mechanism and carriage may be readily positioned with respect to the flask to be rotated by means of the hand wheel 67 and the pinion shaft 62. When properly positioned, the carriage is firmly held in place by means of the hooks 72 and 73 secured to the jack bolt 71. The driving rollers 51 are next lowered to contact with the rings 17 on the flasks 16, whereupon the driving rollers 51 are driven by the motor 52 and the flask is rotated, pouring of the metal being done through the pouring spout 76. When the casting operation for one flask has been completed, the driving mechanism is raised and moved to another flask and rotates it while the previously rotated flask is being moved away and is being replaced by another flask. In some installations it may be desirable to handle the flasks in pairs and for that reason I have shown supporting roller sets to accommodate four flasks, the purpose being to rotate and pour two flasks while two others are being placed in position. It will be apparent however that my improved apparatus possesses distinct advantages with any number of sets of flask supporting rollers within practical limits.

Where a change in the size of pipe to be molded is desired, it is only necessary to raise or lower the beam 24 with the driving mechanism and which may be accomplished by means of the worm gear nuts 27 operated by the worms 28 and hand wheel 31 and by raising or lowering the pouring spout 76 to accommodate the different sized flasks.

Referring to the apparatus shown in Figs. 5 to 7, I may construct my improved molding apparatus so that instead of moving the driving roller longitudinally of the roller bed and across the idler flask supporting rollers, the roller bed may be so mounted as to be movable beneath a stationary driving roller supporting means. In Figs. 5 and 6 I show a foundation 110 in which is solidly mounted a driving roller supporting means 111 which is, in all essential parts, similar to the driving roller supporting means heretofore described in connection with Figs. 1 and 2 of the drawings. The detailed description of the various parts will accordingly be omitted. In accordance with this modification the idler supporting roller bed is mounted in a relatively heavy frame structure comprising channels 112 joined together by transverse frame members 113. Journaled in the channels 112 are a plurality of sets of idler rollers 114, each set being adapted to support a flask 116 for rotation in the same manner as the roller bed heretofore described.

The channels 112 have journaled therein a plurality of flanged rollers 117 which ride upon rails 118 suitably supported from the foundation 110. Secured to one side of each of the channels 112, only one being shown, is a rack 119 which meshes with a pinion 121 carried by a shaft 122. The shaft 122 is operated through beveled gears 123 and a shaft 134 extending upwardly along side the apparatus and provided with a hand wheel 136. With the mechanism described, it will be apparent that when one flask has been rotated, the roller bed may be moved bodily beneath the driving roller supporting mechanism until another flask 116 is placed in proper position to be rotated.

In order that the roller bed may be anchored firmly in place while a flask is being rotated, I provide a hold down mechanism, a suitable form of which is illustrated in Fig. 7. I provide, at suitable intervals along the channels 112, a bottom opening 137 and side openings 138. The bottoms of the side openings 138 are inclined as shown and support a transversely extending wedge member 139 having a threaded end 141 upon which is screwed an adjusting hand wheel 142. The wedge member 139 extends through a pair of relatively wide hooks 143 and 144 which extend downwardly and straddle the rail 118. With this hold down mechanism, when the roller bed is positioned with a flask 116 beneath the driving roller, the hand wheel 142 is turned to draw the wedge member 139 through the channel 112, thereby drawing the hooks into tight engagement with the rail 118.

From the foregoing it will be apparent that I have devised an improved centrifugal molding apparatus which is simple and sturdy of design and extremely flexible in operation. The employment of a single source of power for driving a plurality of flasks greatly decreases the initial cost of installation, while the ease of movement of the power unit relative to the roller bed renders the output of the apparatus limited only by the rate of solidification of the metal. Furthermore, the manner of applying the power for rotating the flasks leaves the ends free and open to expedite cooling of the metal.

While I have shown my invention in but two forms it will be obvious to those skilled in the art that it is not so limited but is susceptible of various other changes and modifications, without departing from the spirit thereof, and I desire therefore that only such limitations shall be placed thereupon as are imposed by the prior art, or as are specifically set forth in the appended claims.

What I claim is:

1. In a centrifugal molding apparatus, a roller bed embodying a pair of flask supporting roller means, a hold down means adapted to bear downwardly on the flask, means to drive the flask, and means for effecting relative transverse movement of the hold down means and the flask supporting roller means.

2. In a centrifugal molding apparatus, a roller bed embodying a pair of flask supporting rollers, a driving roller adapted to bear downwardly on a flask on said rollers and drive it by frictional contact therewith, a supporting means for the driving roller, and means for effecting relative bodily movement of the driving roller support and the flask supporting rollers.

3. In a centrifugal molding apparatus, a roller bed comprising a plurality of sets of parallel flask supporting rollers, an over head roller adapted to bear downwardly on a flask supported on said rollers to be rotated, means for supporting the overhead roller, means for driving a flask through one of the rollers, and means for effecting relative bodily movement between the overhead roller and the roller bed transversely of the sets of flask supporting rollers.

4. In a centrifugal molding apparatus, a plurality of sets of idler rollers, each set adapted to receive and rotatably support a flask, a single flask driving roller means, and selective means to associate said driving roller means with any desired set of supporting rolls.

5. In a centrifugal molding apparatus, a roller bed comprising a plurality of parallel sets of flask supporting rollers, an overhead roller adapted to bear downwardly on a flask to be rotated and supported on one of said sets, means for raising and lowering the overhead roller, a carriage movable longitudinally of the roller bed for supporting the overhead roller, and means for driving a flask so supported through the overhead roller.

6. In a centrifugal molding apparatus, a roller bed comprising a plurality of sets of flask supporting rollers extending transversely of the bed, a carriage spanning the rollers and movable longitudinally of the bed, and a driving roller mounted on the carriage.

7. In a centrifugal molding apparatus, a roller bed comprising a plurality of sets of flask supporting rollers extending transversely of the bed, a carriage spanning the rollers and movable longitudinally of the bed, a driving roller mounted on the carriage, and means to raise and lower the driving roller.

8. In a centrifugal molding apparatus, a roller bed comprising a plurality of sets of flask supporting rollers extending transversely of the bed, a carriage comprising end members and a transverse frame member spanning the rollers and joining the end members, means for moving the carriage longitudinally of the roller bed and transversely of the flask supporting rollers, and a driving roller pivotally mounted on the transverse member.

9. In a centrifugal molding apparatus, a roller bed comprising a plurality of pairs of flask supporting rollers extending transversely of the bed, a carriage comprising end members and a transverse frame member spanning the rollers and joining the end members, means for moving the carriage longitudinally of the roller bed and transversely of the flask supporting rollers, a driving roller pivotally mounted on the transverse member, and means for adjusting the position of the transverse member with respect to the end members.

10. In a centrifugal molding apparatus, a roller bed comprising a plurality of pairs of flask supporting rollers extending transversely of the bed, a carriage spanning the rollers and movable longitudinally of the bed, a driving roller mounted on the carriage, and hold down means for securing the carriage in position.

11. In a centrifugal molding apparatus, a roller bed comprising a plurality of parallel transversely extending sets of flask supporting rollers, an overhead hold down roller means, and means for moving the roller bed longitudinally thereof to selectively associate a set of flask supporting rollers with the overhead roller.

12. In a centrifugal molding apparatus, a plurality of sets of idler rollers, each set adapted to receive and rotatably support a flask, a single flask driving roller means, and selective means to associate said driving roller means with any desired set of supporting rolls, said set of supporting rolls being mounted in a bed shiftable relative to the driving roller.

13. In a centrifugal molding apparatus, a roller bed comprising a plurality of parallel transversely extending sets of flask supporting rollers, an overhead hold down roller means, means for moving the roller bed longitudinally thereof to selectively associate a set of flask supporting rollers with the overhead roller, and means to raise and lower the overhead roller means.

14. In a centrifugal molding apparatus, a roller bed comprising a plurality of parallel transversely extending sets of flask supporting rollers, an overhead hold down roller means, means for moving the roller bed longitudinally thereof to selectively associate a set of flask supporting rollers with the overhead roller, means to raise and lower the overhead roller means, and means for driving the overhead roller means.

15. In a centrifugal molding apparatus, a roller bed comprising a plurality of parallel transversely extending sets of flask supporting rollers, an overhead hold down roller means, means extending transversely of the roller bed for supporting the overhead roller means, means for raising and lowering the supporting means, means for moving the roller bed longitudinally thereof to selectively associate a set of flask supporting rollers with the overhead roller, and power means for driving the overhead roller.

In testimony whereof I affix my signature.

WILLIAM H. BEATTY.