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CENTRIFUGAL CASTING APPARATUS

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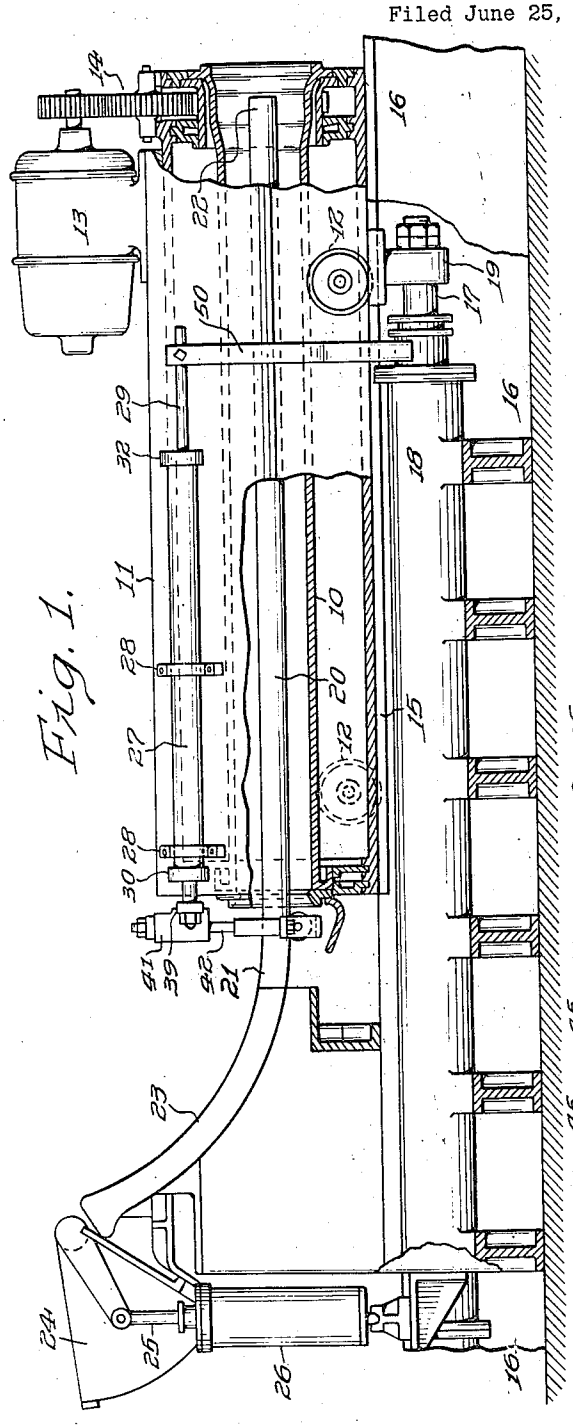


Fig. 1.

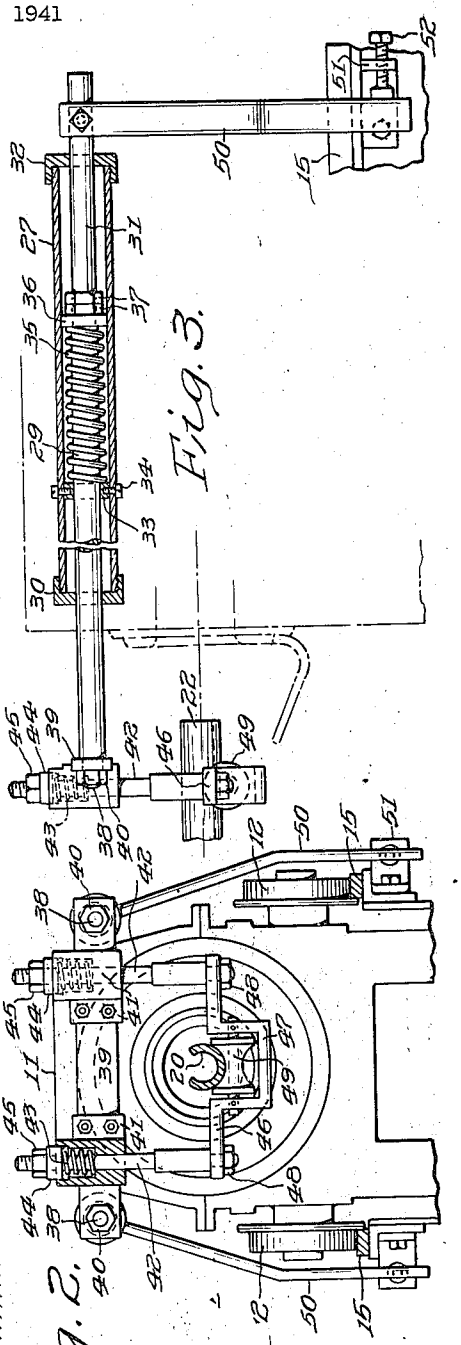


Fig. 3.

Fig. 2.

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CENTRIFUGAL CASTING APPARATUS

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9 Claims. (Cl. 22—65)

The invention relates to centrifugal casting apparatus and involves improved means for guiding and supporting the pouring trough in that type of casting apparatus in which a rotary mold and a pouring trough are relatively movable longitudinally with respect to each other to position the trough within the mold and to withdraw it therefrom during the casting operations.

In one arrangement of centrifugal casting apparatus heretofore used, the pouring trough is provided with a fixed support at one end and the rotary mold is movable longitudinally with respect to the trough so as to position the trough within the mold and to withdraw it therefrom, with the outlet end of the trough spaced outwardly from the mold upon completion of the casting operation. In such an arrangement the only customary support for the trough is that which is provided by a fixed support at the inlet end of the trough, and this is often insufficient to prevent lateral movement of the trough in the mold during the casting operations. In using such apparatus, the practice heretofore has been to guide the free or outlet end of the trough into the mold manually by means of a suitable manipulating bar placed beneath the free end of the trough. In this operation two men are required, one at each end of this bar. Attempts have been made heretofore to provide means for supporting the pouring trough, in addition to the fixed support at the inlet end thereof. Inasmuch as it is advisable to locate such additional supporting means close to the mold or the mold carriage in order that the maximum advantages may be obtained, such a support, fixed to the mold carriage, has been found to interfere with the necessary operations in the use of the casting apparatus if it is immovably attached to the mold carriage in close proximity thereto. On the other hand it does not furnish sufficient support for the trough if permanently spaced too far from the carriage.

One of the principal objects of the present invention is the provision of means to guide the outlet end of the pouring trough into the mold at the beginning of the centrifugal casting operation. Another object of the invention is the provision of means for steadying and supporting the pouring trough against lateral movement during the casting operation. A further object of the invention is the provision of trough supporting means which is arranged to move to and fro with the mold in the movements of the mold longitudinally of the trough, and at the same time is arranged to have limited movement longitudinally with respect to the mold in order that the support may be spaced different distances from the mold in various positions of the latter. A further object of the invention is the provision of means for moving such a support so as to position it close to the mold when the pouring trough is within the mold, and to space it away from the mold when the latter is in the position in which the pouring trough is withdrawn therefrom. A still further object of the invention is the provision in such a support of means for compensating for irregularities in the bottom of the pouring trough as the support moves from end to end thereof. Still further objects and advantages of the invention will be apparent from the following description, taken with the accompanying drawing, wherein:

Fig. 1 is a longitudinal sectional view, partly in elevation, showing centrifugal casting apparatus with the improved trough supporting device embodied therein, the supporting device being shown in the position which it occupies when the pouring trough is within the mold;

Fig. 2 is an enlarged end elevational view, partly in section, of the supporting device illustrated in Fig. 1, and

Fig. 3 is an enlarged side elevational view, partly in section, of the supporting device illustrated in Fig. 1, the parts being shown in the position which they occupy when the pouring trough is withdrawn from the mold.

While the improved trough support disclosed herein may be utilized with other forms of molding apparatus, the improvement is illustrated in connection with centrifugal casting apparatus such as that shown and described in Russell and Langenberg Patent No. 1,949,433, granted March 6, 1934, for Method and apparatus for casting pipes centrifugally.

As shown in the drawing herein, such apparatus comprises a mold 10 rotatably mounted in a water box 11 which is provided with wheels 12 and serves as a carriage for the mold. Rotary movement for the mold 10 may be provided by an electric motor 13 mounted on the water box 11 and operatively connected to the mold through suitable gearing 14. The wheels 12 of the mold carriage are arranged to travel upon rails 15 fixed to the base 16 of the casting apparatus. A piston 17 operating in a cylinder 18 secured to the base 16 has its outer end connected to the mold carriage at 19 for moving the carriage to and fro on the rails 15 during the casting operations.

A pouring trough 20 of well-known type is fixed at its inlet end 21 to a support rigid with respect to the base 16 so that the free or outlet end 22 may move into and out of the mold 10 as the mold carriage is moved back and forth on its track. Molten metal is supplied to the pouring trough 20 through a spout 23 curving downwardly from the outlet of a ladle 24 which is operated by a piston rod 25 connected to a piston in a suitable cylinder 26.

The particular casting apparatus described above is well-known in the industry, and it is believed that no further description thereof is necessary to a complete understanding of its structure and operation. It will be understood that the apparatus is of the type in which a stream of molten metal is deposited in the mold in the form of a spiral extending from end to end of the mold.

The present improved trough supporting mechanism comprises a pair of guide members 27, preferably cylindrical in form, rigidly secured to the opposite sides of the water box 11 adjacent one end thereof. The guide cylinders 27 may be attached to the water box by means of brackets 28 which engage about the cylinders and are bolted or otherwise secured to the water box. A plunger 29 is arranged in each of the cylinders 27 and the forward end of each extends outwardly through a suitable opening in a cap member 30. The rear end of each plunger 29 is provided with a reduced portion 31 which extends outwardly of the cylinder through a suitable opening in a cap member 32. A ring 33 surrounding the plunger 29 within the cylinder is secured to the cylinder by means of suitable screws 34 and forms an abutment for one end of a coiled compression spring 35 surrounding the plunger and having its opposite end engaging with a collar 36 on the reduced end 31 of the plunger and retained in place by means of lock nuts 37. The coiled spring 35 thus tends to move the plunger to the right as shown in Fig. 3, and the lock nuts 37 abut against the cap member 32 to limit this movement.

The front ends of both plungers are provided with reduced portions 38 which extend through suitable openings near the ends of a crossbar 39 secured thereon by nuts 40 threaded on the ends of the plungers. Two bracket members 41 are bolted to the crossbar 39 in spaced relation as shown in Fig. 2. Each of the bracket members 41 is provided with a vertical opening arranged to receive a suspender rod 42 with a sliding fit. The upper end of the opening through each bracket member 41 is enlarged to receive a coiled spring 43, the lower end of which rests upon the bottom of the enlargement and the upper end of which abuts against a washer 44 slidably fitting within the enlargement and retained on the rod by means of a threaded nut 45.

Lateral extensions 46 on a hanger or sheave block 47 are secured on the lower ends of the suspender rods 42 by means of nuts 48 threaded on the ends of the rods. A grooved roller 49 supported on a pin in the block 47 engages beneath the trough 20 in the various positions of the trough in the casting operations.

A stop bar 50 is secured at its upper end to the reduced rear end 31 of each of the plungers, outwardly of the cylinders 27. The stop bars 50 extend outwardly and downwardly so that their free ends are outside the base of the casting apparatus. A bracket 51 secured to the base 16 on each side of the casting apparatus is provided with a stop pin 52. The stop pins 52 are arranged to engage with the lower ends of stop bars 50 when the mold carriage moves into the position in which the outlet end 22 of the pouring trough is withdrawn from the mold. As shown herein, the stop pins 52 are threaded in the brackets 51 so that they may be adjusted to conform to the position of the mold carriage when the trough is withdrawn therefrom.

As will be apparent from the showing in Fig. 3, the coiled springs 35 are compressed when the mold is withdrawn from the trough so that these springs tend to restore the plungers 29 to their normal positions when the mold again moves into the casting position. From the structure described, it will be apparent that the expansive action of coiled springs 35 will move the plungers in a direction to maintain the trough supporting roller 49 near the mold carriage during the casting operation, that is, during that part of the casting operation in which the trough is being withdrawn from the mold. As the outlet end of the trough is withdrawn from the mold, the lower end of the stop bars 50 are moved into contact with the stop pins 52 and the plungers are moved in a direction to move the trough supporting roller 49 away from the mold carriage and thus leave the outlet end 22 of the pouring trough free of any parts of the apparatus which might otherwise interfere with the cleaning of this end of the trough, or interfere with such other work as is necessary at the adjacent end of the mold between casting operations. When the carriage again moves in the direction to position the trough within the mold, springs 35 operate to restore the roller 49 to a position adjacent the end of the carriage, and it remains in this position until stop bars 50 again contact with stop pins 52 as the mold withdraws from the outlet end of the trough. Inasmuch as the washers 44 on the upper ends of springs 43 are of a size to fit within the enlargements in the brackets 41, springs 43 provide a resilient mounting for the roller 49 so that the hanger may accommodate itself to irregularities in the bottom of the trough 20. The proper vertical adjustment of the roller 49 may be obtained by turning nuts 45 on the upper ends of suspender rods 42.

While one form of trough guiding and supporting apparatus is disclosed herein, together with certain arrangements of the parts thereof, this form and the arrangements of the parts are intended to be illustrative only, and it will be understood that such changes are contemplated as come within the scope of the appended claims

What we desire to claim is:

1. In centrifugal casting apparatus having a pouring trough and a rotatable mold relatively movable with respect to the trough to position the trough within the mold and withdraw it therefrom with the outlet end of the trough longitudinally spaced from the end of the mold, the combination therewith of a trough support mounted for movement longitudinally of said trough and for limited movement longitudinally of said mold to guide the outlet end of said trough into said mold and to restrain said trough against lateral movement with respect to said mold, means for moving said support toward said mold as said mold moves in the direction to position said trough within said mold, and means for moving said support away from said mold as said mold approaches the limit of its

movement to withdraw said trough from said mold.

2. In centrifugal casting apparatus having a pouring trough, a rotatable mold, and a mold carriage relatively movable with respect to the trough to position the trough within the mold and withdraw it therefrom with the outlet end of the trough longitudinally spaced from the end of the mold, the combination therewith of a trough support mounted on said carriage for limited movement longitudinally thereof to guide the outlet end of said trough into said mold and to restrain said trough against lateral movement with respect to said mold, means for moving said support toward said carriage as said carriage moves in the direction to position said trough within said mold, and means for moving said support away from said carriage as said carriage approaches the limit of its movement to withdraw said trough from said mold.

3. In centrifugal casting apparatus having a pouring trough and a rotatable mold movable with respect to the trough to position the trough within the mold and withdraw it therefrom with the outlet end of the trough longitudinally spaced from the end of the mold, the combination therewith of a trough support mounted outwardly of one end of said mold for movement with said mold longitudinally of said trough and for limited movement longitudinally with respect to said mold to guide the outlet end of said trough into said mold and to restrain said trough against lateral movement with respect to said mold, spring means tending to move said support with respect to said mold to the limit of its movement toward said mold, and stop means for moving said support away from said mold as said trough is withdrawn from said mold.

4. In centrifugal casting apparatus having a pouring trough, a rotatable mold, and a mold carriage relatively movable with respect to the trough to position the trough within the mold and withdraw it therefrom with the outlet end of the trough longitudinally spaced from the end of the mold, the combination therewith of trough supporting and guiding means comprising a pair of cylinders mounted on said carriage for movement therewith, a plunger in each of said cylinders and having one end of each projecting outwardly of its cylinder beyond said carriage, a crossbar secured to the projecting ends of said plungers, means on said crossbar for guiding the outlet end of said trough into said mold and for holding said trough against lateral movement with respect to said mold, a spring in each of said cylinders and cooperating with the plunger therein to resist movement of said crossbar away from said carriage, and stop means to move said crossbar away from said carriage when said trough is withdrawn from said mold.

5. In centrifugal casting apparatus having a pouring trough, a rotatable mold, and a mold carriage relatively movable with respect to the trough to position the trough within the mold and withdraw it therefrom with the outlet end of the trough longitudinally spaced from the end of the mold, the combination therewith of guide members on said carriage, supporting means mounted in said guide members for movement longitudinally of said carriage, a trough support on said supporting means for guiding the outer end of said trough into said mold and for holding said trough against lateral movement in said mold, means for moving said supporting means toward said carriage as said carriage moves to a position in which said trough is within said mold, and means for moving said supporting means away from said carriage as said trough is withdrawn from said mold.

6. Centrifugal casting apparatus comprising a mold carriage, a mold rotatably mounted thereon, a pouring trough supported at one end and having its opposite end free to extend into said mold, a cylinder mounted on each side of said carriage for movement therewith, a plunger in each cylinder and having one end projecting outwardly thereof beyond one end of said carriage, a crossbar secured to the projecting ends of the plungers, a trough support carried by said crossbar for guiding the free end of said trough into said mold and restraining said trough against lateral movement within said mold, a coiled spring surrounding the plunger in each cylinder and tending to resist outward movement of the plunger with respect to the cylinder, and fixed stop means operating when said carriage nears the limit of its movement away from said trough to move said trough support away from said carriage.

7. Centrifugal casting apparatus comprising a mold carriage, a mold rotatably mounted thereon, a pouring trough supported at one end and having its opposite end free to extend into said mold, a cylinder mounted on each side of said carriage adjacent one end thereof and movable with the carriage, a plunger in each cylinder and having its opposite end projecting outwardly therefrom, a crossbar secured on the ends of said plungers outwardly of one end of said carriage, supporting rods suspended from said crossbar on opposite sides of said trough, a roller mounted between the lower ends of said supporting rods for engagement beneath said trough to support and guide the same, a coiled spring surrounding the plunger in each cylinder and acting to resist movement of said roller away from said carriage, and stop means on the ends of said plungers opposite said crossbar to move said roller away from said carriage as said carriage nears the limit of its movement away from said trough.

8. Mechanism for supporting the pouring trough of centrifugal casting apparatus, comprising a pair of guide members for attachment to a mold carriage, a rod slidably mounted in each guide member, a crossbar secured on one end of each rod, a hanger suspended from said crossbar, a trough-supporting roller mounted in said hanger, and springs interposed between the rods and the guide members to resist movement of said roller away from said guide members.

9. Centrifugal casting apparatus comprising a mold carriage, a mold rotatably mounted thereon, a pouring trough supported at one end and having its opposite end free to extend into one end of said mold, and means mounted on said carriage to support said trough adjacent said end of the mold, said means including a roller engaging beneath said trough, a hanger for supporting said roller, and a resilient support for said hanger to permit said roller to acccommodate itself to irregularities in the bottom of said trough as said mold moves longitudinally of said trough.

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