Feb. 19, 1952 R. W. KURTZ 2,586,349

CENTRIFUGAL CASTING MACHINE

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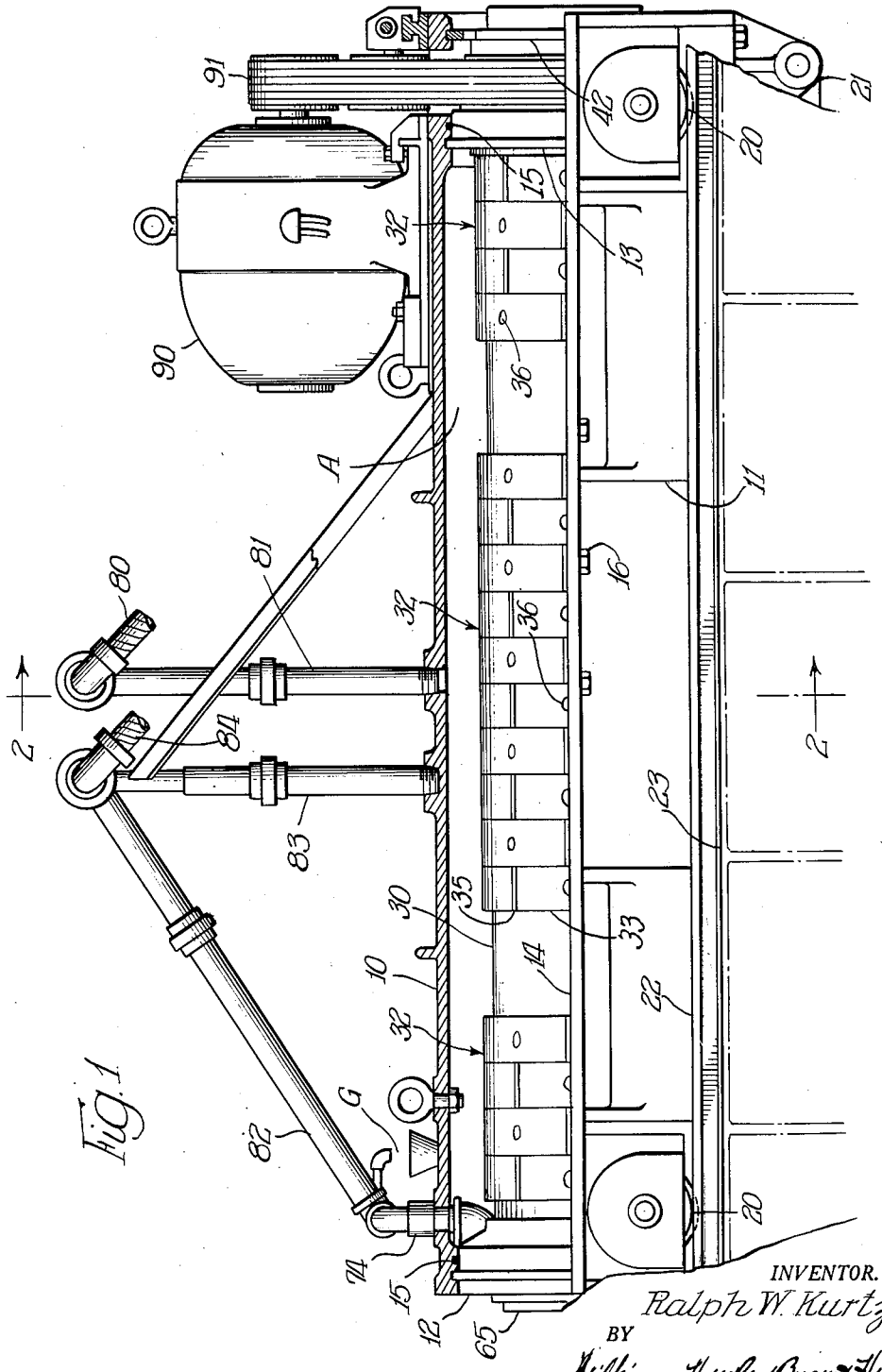


Fig. 1

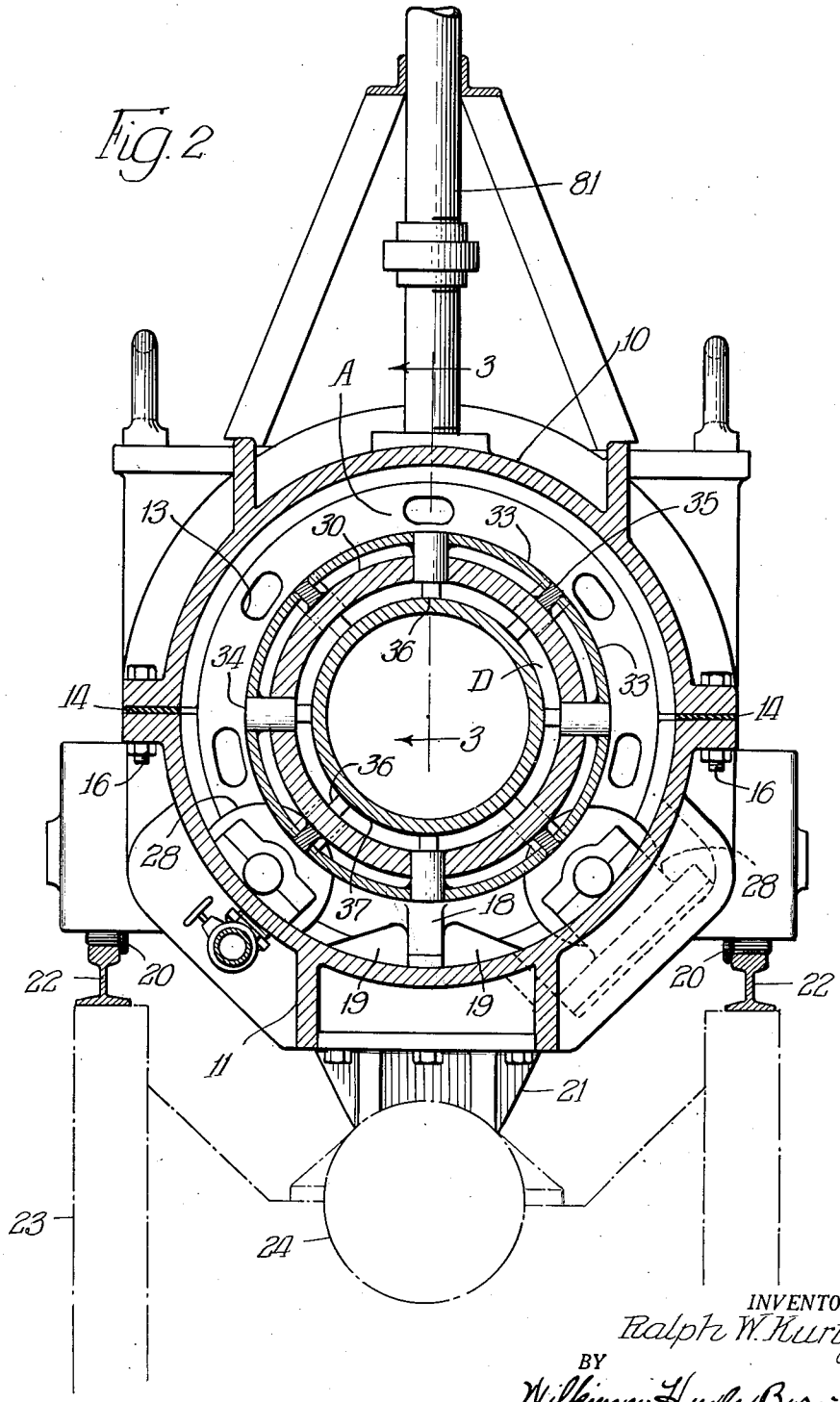
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Fig. 2



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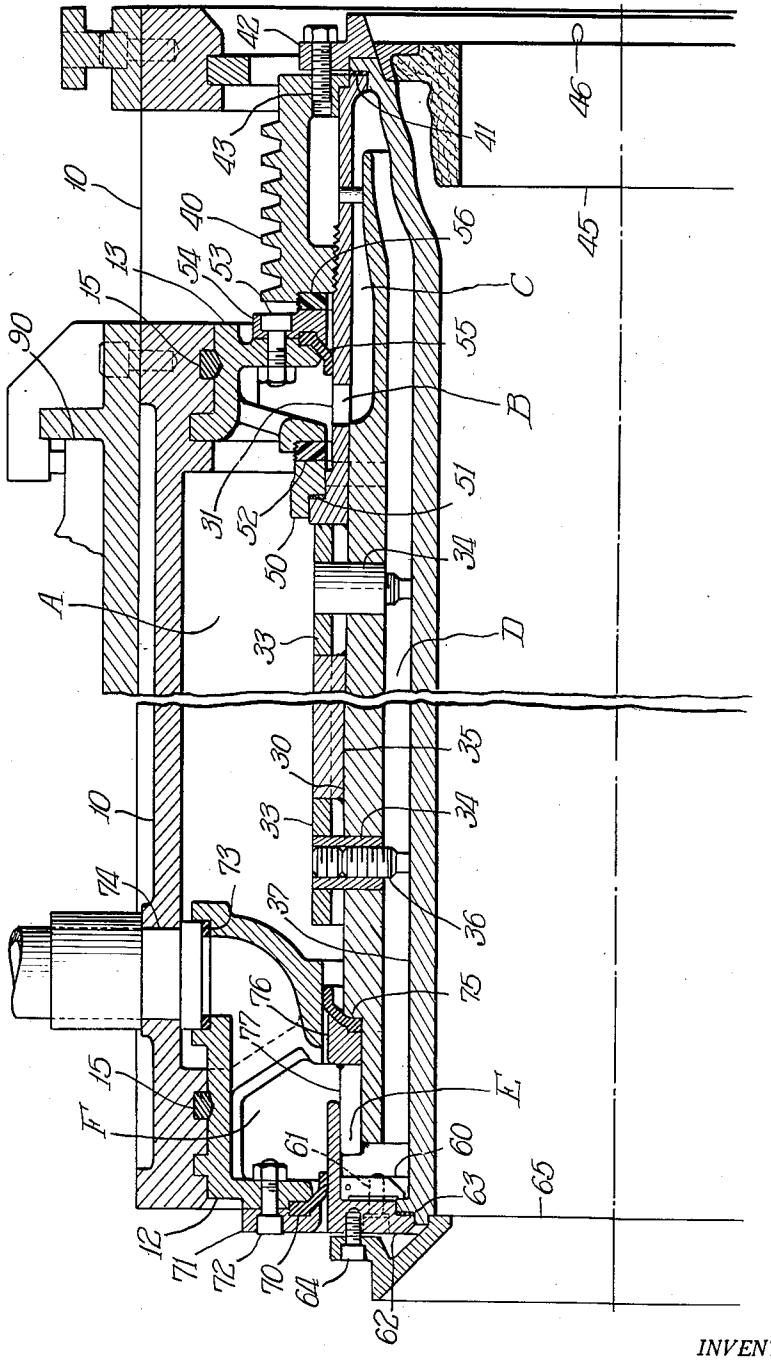


Fig. 3

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CENTRIFUGAL CASTING MACHINE

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4 Claims. (Cl. 22—65)

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This is a continuation-in-part of the applicant's copending application for a centrifugal casting machine, which was filed June 4, 1949, and assigned Serial No. 97,291, now abandoned.

This invention relates specifically to the construction of the mechanism employed to centrifugate molten iron in water-cooled molds of the type commonly used in the production of pipe.

These molds are usually made of steel and mounted in a "water-box" of the detachable top type. Supported by rollers in the lower half of the box, the mold assembly is rotated by means of a motor mounted on the top half of the box. This convenient arrangement is not disturbed by this invention. Described is a new mold-stiffening sleeve which has unique, streamlined provisions for mold expansion. Cooling water is passed axially along the mold from one feed chamber to another. Seals are of a hydrostatically adjusted type. Thrust is taken by water lubricated rings.

In the accompanying drawings:

Figure 1 is a side elevational view, partly sectional, of a casting machine which embodies the present invention;

Figure 2 is a transverse sectional view taken on the line 2—2 of Figure 1; and

Figure 3 is a fragmentary sectional view taken on the line 3—3 of Figure 2.

Depicted is a centrifugating unit comprising a housing or box which has the upper member 10, the lower member 11, the annular end members 12, 13, the gaskets 14, 15, and a series of bolts 16 binding all together. It is to be understood that the housing member 12, like housing member 13, is provided with a projection such as 18 which engages a pair of spaced lugs such as 19 of the housing member 11 (Figure 2).

As in prior practice, the housing member 11 is equipped with wheels 20 and a depending bracket 21. Accommodating the wheels, are track members 22 of a bed such as 23 (dashed outline). Connected to the bracket 21 and mounted on cross members of the bed, is a hydraulic cylinder such as 24 (dashed outline), whereby the centrifugating unit is drawn back and forth along the bed in the course of pouring and stripping operations which, in the instance of a 6" pipe eighteen feet long, may consume a total interval of ninety seconds or less.

Inwardly at two widespread points, the housing member 11 is adapted to accommodate a pair of rollers such as 28. Supported by these rollers and extending from a point within the housing member 12 to a point beyond and outside of the

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housing member 13, is a sleeve comprising tandem members 30, 31, in pinned and welded engagement (Figure 3). Surrounding the sleeve member 30 is an axial series of bands 32 which comprise curved plates 33, posts 34, and splice bars 35. Disposed centrally in each plate and welded thereto inwardly, is the post 34, which extends slidingly through an adapted hole of the sleeve. Welded to the sleeve and to the spaced ends of the plates, are the bars 35. Engaging the posts 34 are set-screws 36 (Figure 3), which radially locate the tubular mold 37.

Before it is placed in the machine housing, the mold is centered in the sleeve by adjusting the axially inmost and outmost screws. The rest of the screws 36 are next brought into contact with the mold; then the first applied screws are backed off and reset like the others.

When centrifugally filled with molten iron, the mold 37 can be expected to expand and press on the screws 36 with a force equal to the resistance of the curved plates 33. If it should also tend to bow, the mold will meet with the combined resistance of several plates in the plane of the action. Having a supportive means then, which may be made axially strongly and radially weakly, it is possible to inhibit the mold from bowing without seriously reducing its freedom to expand.

It is to be noted that the outer rows of screws are disposed very close to the housing end members 12, 13, and that this proximity is not influenced by the length of the plate 33. Also, since the plates are stressed as bows rather than as beams, the structural mass is relatively light.

Molds in diameter greater than 10% of their length, run very well without axial reinforcement. Below this figure, are molds which run very well when provided with a thick, short-lived wall, but give trouble when thinned; and the above-described support is directed most particularly toward the larger molds in this range. In the case of a mold in diameter so small that the diametrical expansion is well within the tolerable variation in the wall of the product, for instance, a four inch pipe, screw rings may be dispensed with in the construction of the sleeve member 30. In lieu thereof, the mold may be satisfactorily supported by a multiplicity of set-screws, such as 36, disposed in adapted holes of the sleeve wall. Under this option, and after the mold is centered in the sleeve, the set-screws are backed off an amount approximately equal to the expected radial expansion of the mold.

Disposed between the sleeve member 31 and the "bell end" brim or shoulder of the mold, is

the preferably asbestos gasket 41. Mounted on the sleeve member 31 in preferably acme-threaded engagement, is a gearing element such as the sheave 40. In abutting relation to the mold and in axially spaced relation to the sheave, is the bell-collar 42 which accommodates a series of cap-screws 43 engaging the sheave.

Abutting an inner shoulder of the mold, is a typical coring element 45 engaged by wedges 46 as in prior practice. Mounted on the axially inner and radially protruding end of the sleeve member 31 is the preferably bronze ring 50 which may be adjusted axially by means of the annular shims 51. The radially outer opposed surfaces of the ring and the sleeve are preferably given a slight degree of eccentricity with the axis of rotation so that the associated parts will radially wedge together. Constructed in this way, the shimmed ring 50 can be quickly disengaged by a few light hammer blows delivered in an axial direction.

In thrust-bearing relation to the ring 50 and threadingly attached to the housing member 13, is the preferably laminated plastic ring 52. On the opposite side of this housing member, a series of bolts 53 hold the ring 54 in compact engagement with the flexible packing ring 55, preferably made from rubber and wicking. The annular outer face of the ring 54 has thrust-bearing relationship with the ring 56 (duplicate of ring 52), threadingly attached to the sheave 40.

In abutting relation to the "spigot end" brim of the mold, is a pair of semicircular cleats 60 which engage a series of cap-screws 61 carried by the hat-flange 62. Disposed between the flange 62 and the mold is a preferably asbestos gasket 63. Under the heads of the screws 61 are gaskets of the type commonly supplied for spark-plugs. Abutting an internal shoulder of the mold and secured to the flange 62 by the cap-screws 64, is the flared ring 65 which serves to limit the flow of molten metal spigotward.

Disposed in sealing engagement with the flange 62 is the lip of the packing ring 70 (duplicate of ring 55). Adapted to cooperate with the housing member 12 in supporting the packing ring 70 is the ring 71, secured by a series of bolts 72. Upwardly, the elbow of the housing member 12 is provided with the gasket 73 which serves to establish tight connection with the pipe coupling 74 secured to the housing member 10. Inwardly, the housing member 12 has sealing engagement with a flexible packing ring 75, mounted on an adapted shoulder of the sleeve member 30. Disposed in compact engagement with the axially outer face of the packing ring 75 is the ring 76, which is welded to a series of preferably bronze fingers 77. Tack-welded to the end of the sleeve, the fingers 77 have sliding engagement with a surrounding portion of the flange 62 which is subject to axial displacement as the mold is heated and cooled.

In common with the bell-collar 42 and the sleeve member 31, the flange 62 is of internal diameter equal to the distended external diameter of the mold at radially adjacent points. Like the packing rings 55, 70, the packing ring 75 is by shape constituted to accommodate an appreciable amount of erosion without leaking seriously under hydraulic pressure.

The swinging hose 80 (Figure 1) is connected to a water source in the usual manner. From the hose 80 the water passes through the pipe 81 into the chamber A, defined jointly by the housing members 10, 11, 12, 13, 14, 15, 55, 73, 74 and

the sleeve members 30, 31, 75. From the chamber A, the water flows through ports B (Figure 3) of the sleeve member 31, into the annular passage C between the sleeve members 30 and 31. Turned next, at the bell end of the mold, the water flows through the duct D defined jointly by the mold and sleeve member 30, to the aperture E, between the sleeve members 30, 77, and the hat-flange 62, and thence into the annular chamber F, defined jointly by the housing members 12, 70, 73, 74, the sleeve member 30, 75, 76, 77, and the flange 62. From the chamber F the water flows through the coupling 74 to the pipe 82 which is supported by the post 83. From pipe 82 a small amount of water is led off for visual observation at a point such as G. The balance passes on through the swinging hose 84 to a customary means (not shown) whereby the water is cooled a desirable amount and returned to the machine.

It is to be noted that when the chambers and passages are filled with water, the submerged parts are buoyed an amount equal to the weight of the water displaced between the sealed ends of the housing. Except for the ports B, the sleeve has a substantially streamlined periphery. The packing ring 75 is under only slight differential pressure and is water-lubricated from each side. The thrust ring 52 is completely inundated and the thrust ring 56 is in position to be lubricated automatically by seepage from the packing ring 55. The frictional characteristics of the assembly may be judged from the life expectancy of the rings 50, 52, 54, 56, and 75, which is measured in years; that of the outer packings 55 and 70, in months.

Favored by the aforenamed factors, a motor such as 90 and a gearing means such as the belt 91 are employed to rotate the mold at a peripheral speed as great as fifteen feet per second. Filled with molten iron, the rotating mold rises in temperature until the heat is being dissipated outwardly as rapidly as it is being absorbed inwardly. If the external washing action is not vigorous enough to erase steam bubbles as promptly as formed, the inner face will tend to reach a damaging temperature.

To obtain a strong washing action then, along with good economy in the power required to pump and to rotate the applied water, passage D is preferably in width not over twice as great as the wall thickness of the cast product. With the sleeve member 30 thus restricted in internal diameter and since the construction of the mold is simplified by the use of detachable end-members, such as 62, 65, the competent manner in which these parts are related bears significantly on the value of the present invention.

If desired, the flow can, of course, be expedited during that portion of the production cycle wherein the mold is heated, by means of a centrifugal pump in the discharge line from the machine. Also, if desired, the packing ring 75 can be mounted so as to accommodate flow through the passage D in a bell-ward direction.

What is claimed is:

1. A centrifugal casting machine, comprising a housing composed of cooperating enclosing members and annular members disposed therebetween, an assembly mounted for rotation in said housing, said assembly comprising a sleeve protruding from one end of said housing, an elongated flange protruding from the other end of said housing, and a tubular mold disposed within said sleeve and flange and having its ends in closing engagement with the protruding ends of

said sleeve and flange, respectively, rollers for rotatably supporting said assembly having supporting engagement with said sleeve, and a gearing element mounted on the protruding end of said sleeve, said sleeve and flange being formed to provide with said mold a narrow annular coolant duct extending substantially the full length of the mold, a portion of said housing being formed to provide with said sleeve a coolant chamber communicating with one end of said duct through ports in said sleeve, and another portion of said housing being formed to provide with said sleeve and said flange a coolant chamber communicating with the other end of said duct through an aperture defined by the opposed ends of said flange and said sleeve, respectively.

2. The construction described in claim 1, further characterized by having a non-metallic ring in thrust bearing relationship with said sleeve at a location in which the bearing surfaces are continuously moistened by coolant.

3. The construction described in claim 1, further characterized by having flared packings between said housing and radially adjacent portions of said sleeve.

4. The construction described in claim 1, further characterized by having an axial series of bands disposed around said sleeve, each band comprising a series of bars fixed to said sleeve intermediate a series of curved plates affixed to the bars in radially spaced relationship to said sleeve, a post projecting from each of said plates into a hole extending through said sleeve midway each bar, and a set screw projecting from each of said posts and having engagement with said mold.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,573,089	Rice	Feb. 16, 1926
1,988,471	Arnold	Jan. 22, 1935
2,123,037	Carrington	July 5, 1938
2,412,601	Carrington	Dec. 17, 1946
2,487,424	Cavallier	Nov. 8, 1949

FOREIGN PATENTS

Number	Country	Date
492,240	Great Britain	Sept. 16, 1938