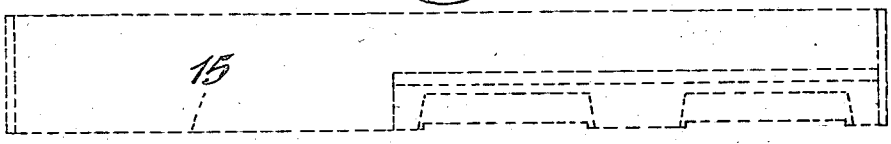
Jan. 21, 1936. W. M. GREENE ET AL 2,028,699

APPARATUS FOR MAKING PRINT ROLLERS AND THE LIKE

Filed Oct. 9, 1933 2 Sheets-Sheet 1

Fig. 1.



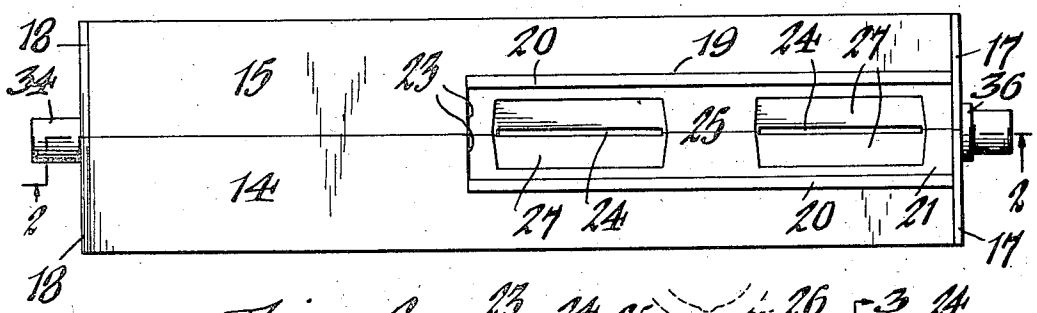
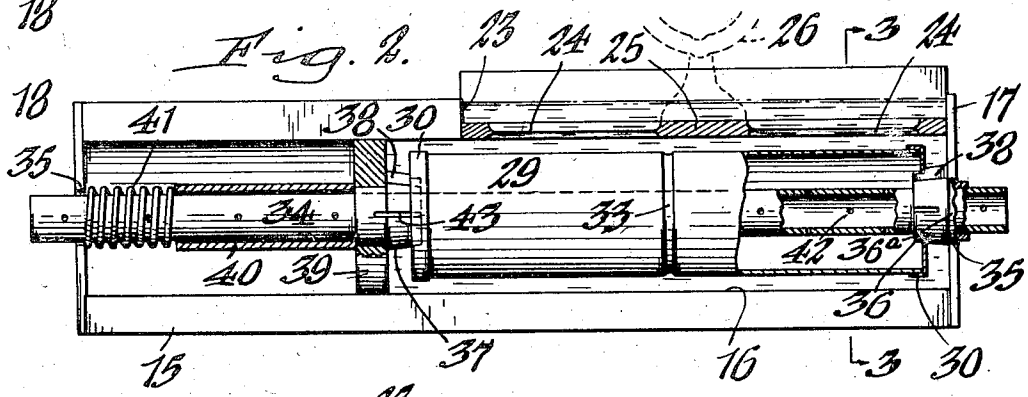


Fig. 2.



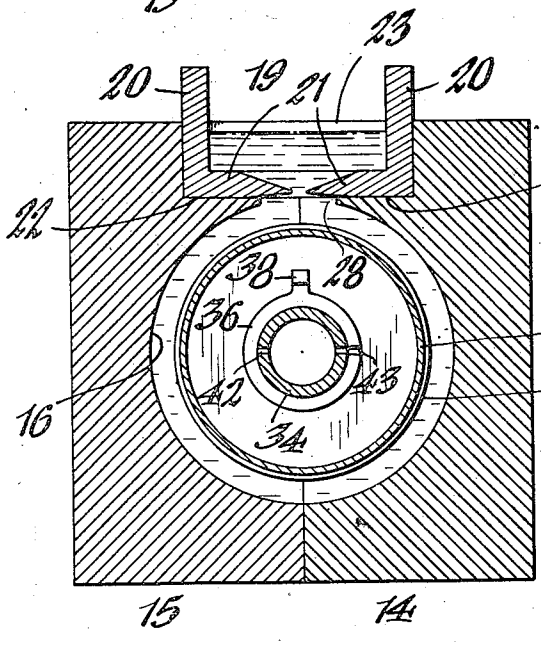


Fig. 3.

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APPARATUS FOR MAKING PRINT ROLLERS AND THE LIKE

Filed Oct. 9, 1933 2 Sheets-Sheet 2

Fig. 4.

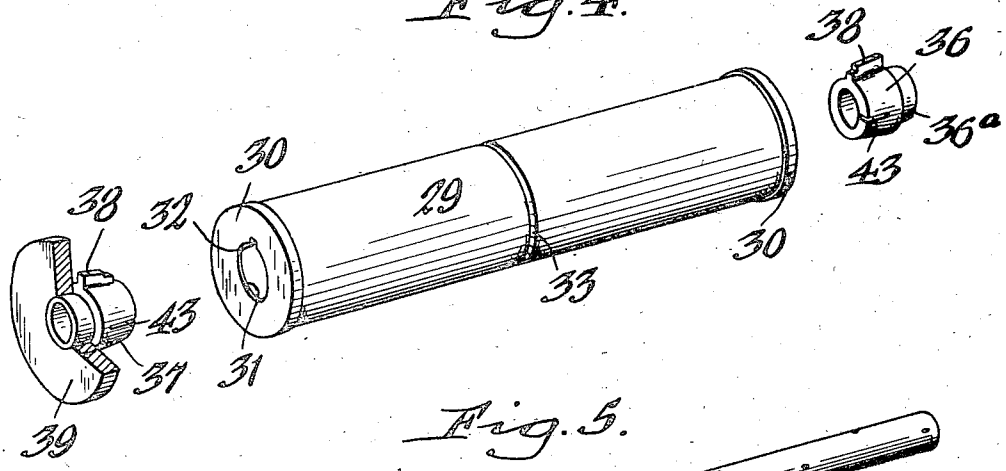


Fig. 5.

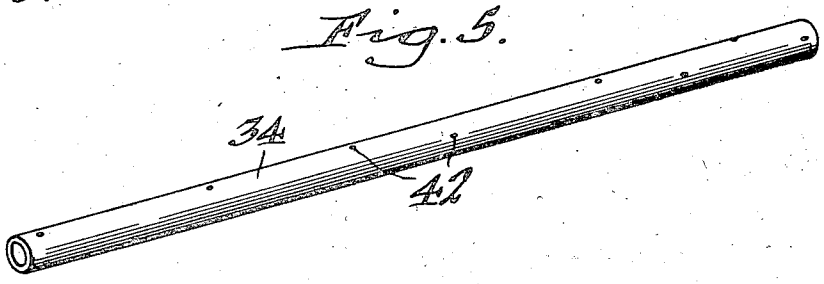
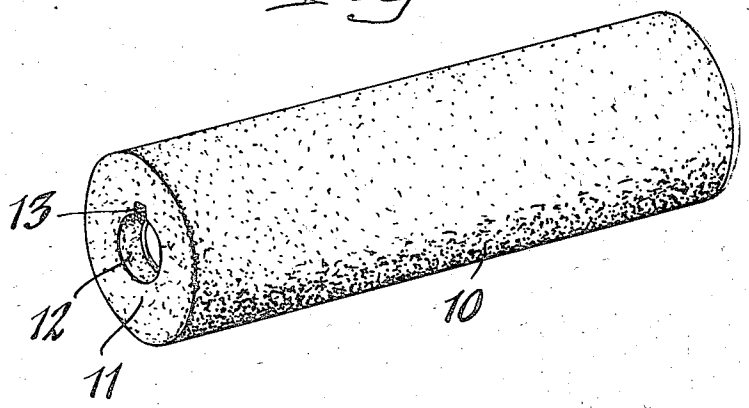


Fig. 6.



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UNITED STATES PATENT OFFICE

2,028,699

APPARATUS FOR MAKING PRINT ROLLERS AND THE LIKE

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Application October 9, 1933, Serial No. 692,746

9 Claims. (Cl. 22—153)

This invention relates generally to a method of and apparatus for making castings and more particularly to the casting of print rollers made of an aluminum alloy.

One of its objects is to provide a method and apparatus of this character wherein the castings are made in a permanent chill mold and wherein an even and uniform distribution of the molten metal in the mold is effected to intensify the metal and afford a compact smooth surface suitable for print rollers and the like.

Another object of the invention is the provision of a method and apparatus for making sound aluminum alloy castings, which combines simplicity of mold construction and assembly with ease of operation and reduces to a minimum the oxidation of the metal during the pouring of the mold.

A further object is to provide novel means for gating the mold so as to effectually and positively control the flow of the molten metal to distribute it uniformly over the entire length of the mold; to cause pooling of the metal at the gate and reduce to a minimum the length of travel of the molten metal and to prevent the gathering of oxide and impurities while the metal flows or drains into the mold.

A still further object of the invention is to provide a method of and apparatus for casting print rollers of an aluminum alloy which embodies a permanent mold and a metal core so designed and constructed as to prevent distortion of the core and cracking of the cast roller during molding thereof, and which at the same time allows the metal to flow into the mold only as fast as it will chill without setting until the mold-cavity is filled.

Other features of the invention reside in the construction and arrangement of parts hereinafter described and particularly pointed out in the appended claims.

In the accompanying drawings:—

Figure 1 is a top plan view of the permanent mold employed for casting a print roller, one of the mold sections being shown in dotted lines in a retracted position for assembling the core or removing the finished casting. Figure 2 is a central longitudinal section of the mold taken on line 2—2, Figure 1. Figure 3 is an enlarged cross section thereof taken in the plane of line 3—3, Figure 2. Figure 4 is a detached perspective view, partly in section, of the core parts of the mold. Figure 5 is a perspective view of the supporting member or mandrel for the core. Figure 6 is a perspective view of the finished print roller casting.

Similar characters of reference indicate corresponding parts throughout the several views.

With our improved method of and apparatus for making print rollers from an aluminum alloy, the use of sand cores and molds is dispensed with and a permanent chill mold and metal core are employed, these parts being constructed and designed to not only expeditiously produce uniformly sound and perfect castings with a dense, smooth printing surface appropriate for the cutting of patterns thereon for the printing of wall paper and the like, but also to produce castings free from blow holes and like imperfections and, by the method employed, prevent the introduction of oxide and impurities into the molten metal while the same is poured or drained into the mold-cavity.

Referring now to the drawings, wherein is illustrated the preferred embodiment of our invention, attention being directed first to Figure 6, 10 indicates one of the cast print rollers made in accordance with the invention from an aluminum alloy composed for example, of aluminum, tin and zinc, this roller being cast hollow and closed at each end by an integrally-cast head 11 having an opening 12 therein containing a key-way 13 for mounting it on the shaft of the printing press.

In Figures 1, 2 and 3, the chill mold and the metallic core for casting the print roller are in their assembled positions ready for pouring the molten metal. As there shown, the chill mold preferably consists of two companion metallic sections 14, 15 which may be suitably supported in a horizontal position on a suitable frame or platform (not shown) with the meeting joint of the sections disposed in a vertical plane and with one of the sections movable relatively to the other section to effect the insertion of the core-assembly preparatory to pouring or to effect the removal of the casting and its core-assembly after the pouring operation. Each one of the mold-sections contains in its inner wall a longitudinal mold cavity 16 of substantially semi-circular shape in cross-section, which, together with the companion cavity of the other section, jointly form a cylindrical cavity for producing the cylindrical wall of the print roller. At its ends the mold-sections have companion end plates 17 and 18, respectively, which form end closures for the cavity 16.

Applied to the top side of the mold sections 14, 15 and preferably longitudinally split in the plane of the joint thereof is a gate or pouring well

indicated generally by the numeral 19 which may be rectangular shape in plan, and which is formed in part by a channel-shaped member including side walls 20 and a bottom wall 21 seated in companion longitudinal recesses 22 formed in the top sides of the corresponding mold-sections 14, 15, the bottom face of the channel being disposed substantially tangentially to the top of the mold-cavities 16. The end walls of the gate or pouring well are produced in part by the opposing inner portions of the companion plates 17 and in part by the opposite or closed ends 23 of the recesses 22, as shown in Figures 1 and 2. As also seen in Figure 2, the top edges of the end plates 17, 17 and the corresponding top edges of the recess-walls 23 constitute a gauge for aiding the molder in determining the depth of molten metal which may be poured into the gate or well 19. In its bottom wall 21 the gate is provided with a plurality of long-narrow discharge openings or slits 24 for conducting the molten metal in a thin or sheet-like stream from the gate into the mold cavity. As shown in Figures 1 and 3, these openings are disposed longitudinally of the mold and centrally of the bottom wall of the gate in the plane of the meeting joint of the mold, and in the example shown, two of such openings are provided which are spaced apart lengthwise to provide between them a solid pouring face 25 in the gate-bottom 21 and onto which the metal from the crucible 26 is directly poured, in the manner shown in Figure 2. By this construction, the direct flow of the metal into the mold-cavity is prevented and the metal is caused to pool in the gate, thus holding the oxide and impurities while the metal drains in thin sheets or streams through the discharge openings 24 into the mold. This method of gating effectually controls the flow of the molten metal and distributes the same uniformly throughout the entire length of the mold; it reduces to a minimum the length of travel of the molten metal and thereby prevents the gathering of oxide; and at the same time it allows the metal to flow into the mold only as fast as it will chill without setting until the mold is filled.

The bottom wall of the gate on laterally opposite sides of the openings 24 is preferably beveled or sloped inwardly and downwardly in the manner indicated at 27 in Figures 1 and 3 to provide the discharge openings with comparatively thin knife-like longitudinal edges, which construction, together with the accumulated metal in the gate, permits drawing from the gate for final shrinkage of the cast roller. It will also be noted, from Figure 3, that the top edges of the mold-cavities 16 terminate short of each other below the gate-openings 24 to provide an inlet 28 to the mold-cavity.

The metallic core used in the casting of the hollow print roller is preferably in the form of a pipe 29 of sheet metal or like material closed at its ends by flanged metallic heads or caps 30 each having an axial opening 31 therein containing a key-way 32. This core and its heads are cast directly with and form a part of the completed print roller. To prevent distortion of the core-pipe 29, it may provided between its ends with one or more annular beads 33.

For the purpose of supporting the core-pipe within the mold-cavity, a mandrel in the form of a tube 34 is provided which is adapted to extend at its ends through suitable axially-alined openings 35 formed in the end plates 17, 18 of the mold-sections 14, 15. Slidably mounted on this mandrel adjacent to its ends, are substantially cone-shaped collars or sleeves 36 and 37, respectively, which are provided with keys 38 adapted to engage the corresponding key-ways 32 in the pipe-heads 30. The inner coupling collar 37 is provided with a circular stop-off plate or centering disk 39 which is of a diameter to fit snugly within the mold-cavity 16, in the manner shown in Figure 2, and which serves to not only center the core-pipe 29 in the mold but which also constitutes the inner abutment wall of the mold cavity. In other words, one end of the mold cavity for a given length print roller is formed by the plates 17, 17 at the right hand end of the mold, while the opposite end of the mold cavity is formed by the circular plate 39. This centering plate together with its coupling collar 37 is held against endwise outward displacement by a spacing sleeve 40 surrounding the adjoining end of the mandrel 34 and a spring 41 interposed between said spacing sleeve and the plates 18, 18, at the left hand end of the mold, as clearly shown in Figure 2. The companion or outer coupling collar 36 has an extension 36a thereon which is adapted to engage the opening 35 of the end plates 17 and thereby support the outer end of the mandrel 34 and center the corresponding end of the core 29 in the mold cavity. These coupling collars and keys constitute a part of the core and provide the openings 12 and key-ways 13 in the cast roller 10.

For casting print rollers of different lengths, corresponding spacing sleeves 40 of different lengths are employed to properly locate the coupling collar 37 and its plate 39 at the proper distance from the right hand end of the mold cavity.

In assembling the core 29 and its associated parts, the mandrel 34 is inserted through the end openings 31 of the core-heads 30; the coupling collar 36 is then slipped over the right hand end of the mandrel and its tapered portion forced into gripping engagement with the corresponding core-head 30 with its key 38 engaging the key-way 32 of the companion head-opening 31, after which the companion coupling collar 37 with its combined centering and closure plate 39 is slipped over the opposite end of the mandrel with its tapered portion forced into like fitting engagement with the opposite head 30 of the core-pipe. The sleeve 40 and spring 41 are then applied to the left hand end of the mandrel and the whole core-assembly inserted as a unit into the mold cavity 16, it being understood that the mold-section 15 is in its retracted, dotted line position shown in Figure 1 at this time. Upon supporting the ends of the mandrel in the openings 35 of the mold and properly centering the core 29 in the mold, the mold-section 15 is shifted toward the companion mold section 14 and clamped firmly thereto, whereupon the mold is ready to receive the molten metal to cast the print roller.

In pouring the mold, the crucible is located at a point directly over the solid pouring face 25 of the gate 19, so that when the crucible is tipped the molten metal will strike such face and break or intercept the direct flow of the metal into the mold. Thereupon the metal pools in the gate to hold the oxide and other impurities therein while the metal drains in thin streams through the discharge openings 24 into the mold-cavity. For the purpose of providing for the escape of the gases in the mold, the mandrel 34 has vents 42 therein.

After the casting has properly set, the movable mold-section 15 is unclamped and retracted from

the companion mold-section **14**, after which the casting, together with the entire core assembly, is removed. The mandrel **34** and core-forming coupling collars **36** and **37** are then removed, and to effect the ready disconnection of these collars from the ends of the roller without cracking its head-ends, said collars are preferably split as indicated at **43**.

We claim as our invention:—

1. An apparatus of the character described, comprising a chill including companion mold-sections having end walls and shaped to form a cavity, a pooling gate applied to the chill immediately above and substantially centrally of the cavity to receive the molten metal and having a plurality of narrow discharge openings in its bottom and at spaced intervals for directing the molten metal in a thin stream into the mold cavity, said openings terminating substantially at the periphery of the cavity in knife-like horizontal edges for permitting drawing from the gate for final shrinkage of the casting, a metal core, and means for supporting and centering the core in said cavity, said means including a hollow mandrel extending through the core and having collars slidably mounted thereon and detachably fitted in said core and supported at its ends in the chill, said mandrel having vent opening therein.

2. An apparatus of the character described, comprising a chill including companion mold-sections having end walls and shaped therebetween to form a cavity, a gate applied to said chill in communication with its cavity, a metal core, means detachably fitted in said mold-cavity for supporting and centering the core therein, said means at one end engaging the adjoining end wall of the chill and provided at its opposite end with a member adjustable axially of the mold-cavity in accordance with the length of the casting to be made, said member being shaped to fit the mold-cavity and forming a closure for the corresponding end of said cavity, and means interposed between said closure member and the adjoining end wall of said cavity for holding such member in a predetermined set position.

3. An apparatus of the character described, comprising a chill including companion mold-sections having end walls and shaped therebetween to form a cavity, a gate applied to said chill in communication with its cavity, a hollow, metal core having openings in its ends, and means detachably fitted in said mold-cavity for supporting the core therein, including a mandrel extending through said core and supported at its ends in the end walls of the chill, and coupling collars constituting a part of the metal core and slidingly mounted on said mandrel for frictional clamping engagement with the end-openings of the core.

4. An apparatus of the character described, comprising a chill including companion mold-sections having end walls and shaped therebetween to form a cavity, a gate applied to said chill in communication with its cavity, a metal core having end heads containing axially-alined openings and key-ways therein, and means detachably fitted in said mold-cavity for supporting the core therein, including a mandrel extending axially through the core and its head-openings and supported at its ends in the end walls of the chill, and coupling collars constituting a part of said core slidingly mounted on said mandrel for engagement with the core-head openings, said collars having keys thereon engageable with the key-ways in said head-openings.

5. An apparatus of the character described, comprising a chill including companion mold-sections having end walls and shaped therebetween to form a cavity, a gate applied to said chill in communication with its cavity, a metal core having end-heads, and means detachably fitted in said mold cavity for supporting and centering the core therein, including a mandrel extending through the core and coupling collars applied to said mandrel for detachable interlocking engagement with the end-heads of said core, one of said collars engaging the adjoining end wall of the chill and the other collar having a member thereon fitted in and conforming to the mold-cavity and constituting a closure for the adjoining end of said cavity.

6. An apparatus of the character described, comprising a chill including companion mold-sections shaped to form a cavity, a gate applied to said chill in communication with its cavity, a metal core, and means for supporting and centering the core in said cavity, said means including a hollow mandrel extending through the core and having shiftable collars thereon detachably fitted in said core and supported at its ends in the chill, said mandrel having vent openings therein.

7. An apparatus of the character described, comprising a chill including companion mold-sections shaped to form a cavity, a gate applied to said chill in communication with its cavity, a metal core, and unitary means detachable from said core for supporting and centering the core in said cavity, said means including a vented mandrel extending freely through the core, core-forming collars slidingly fitted on said mandrel for coupling engagement with the opposite ends of said core, a member applied to one of said collars and engaging the mold-cavity and constituting a closure for the adjoining end of said cavity, and a spacing sleeve and spring applied to said mandrel and interposed between said closure member and the adjoining end wall of the chill.

8. A core for use in casting print rollers and the like, comprising a hollow cylindrical body having end-heads containing axially-alined openings, a mandrel extending axially through said body and its openings, and coupling collars constituting a part of the core-body and slidingly mounted on said mandrel for engagement with said head-openings.

9. A core for use in casting print rollers and the like, comprising a hollow cylindrical body having end-heads containing axially-alined openings and key-ways therein, a mandrel extending through said body and its head-openings, and coupling collars constituting a part of the core-body and slidingly mounted on said mandrel for detachable engagement with the core-head openings, said collars having keys thereon engageable with the key-ways in said openings.

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