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1,664,296

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MACHINE FOR DIE CASTING PULLEYS AND THE LIKE

Filed July 31, 1926

2 Sheets-Sheet 1

FIG. 1

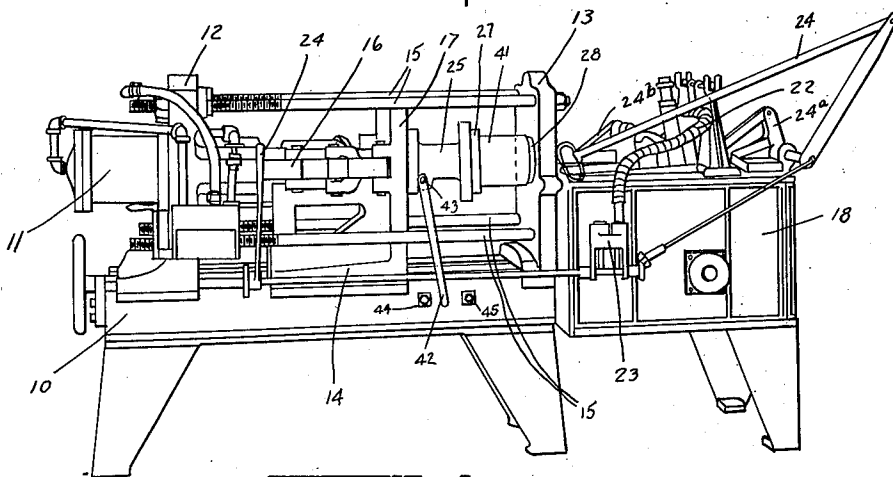


FIG. 4

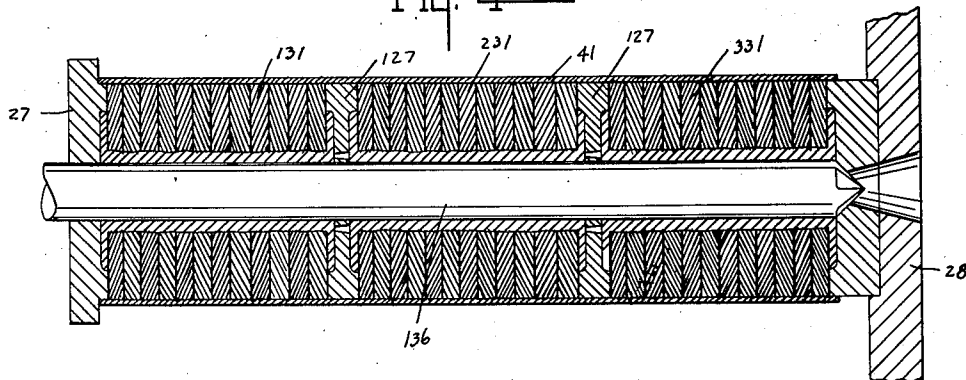
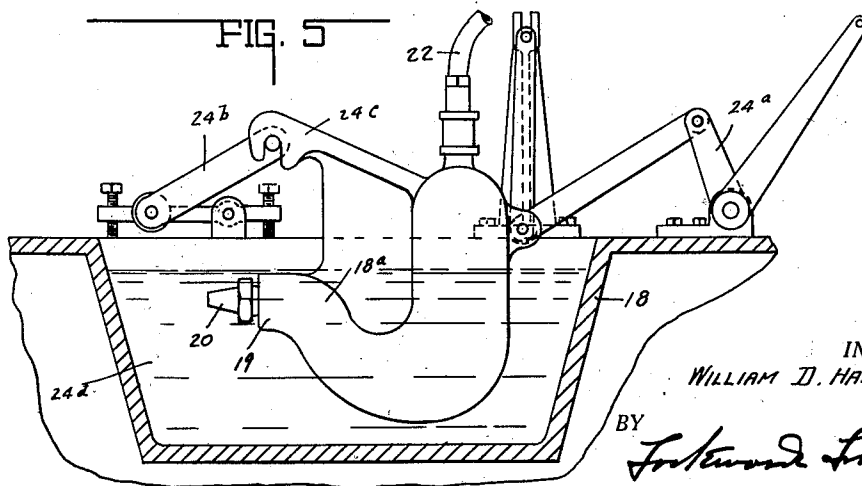


FIG. 5



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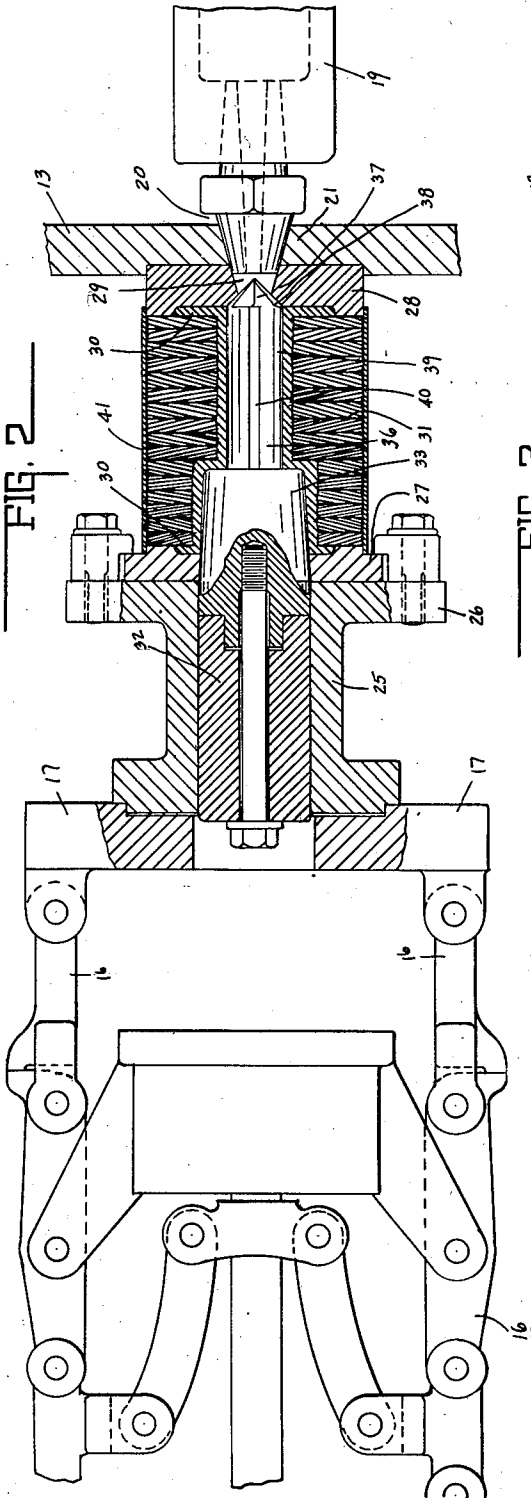
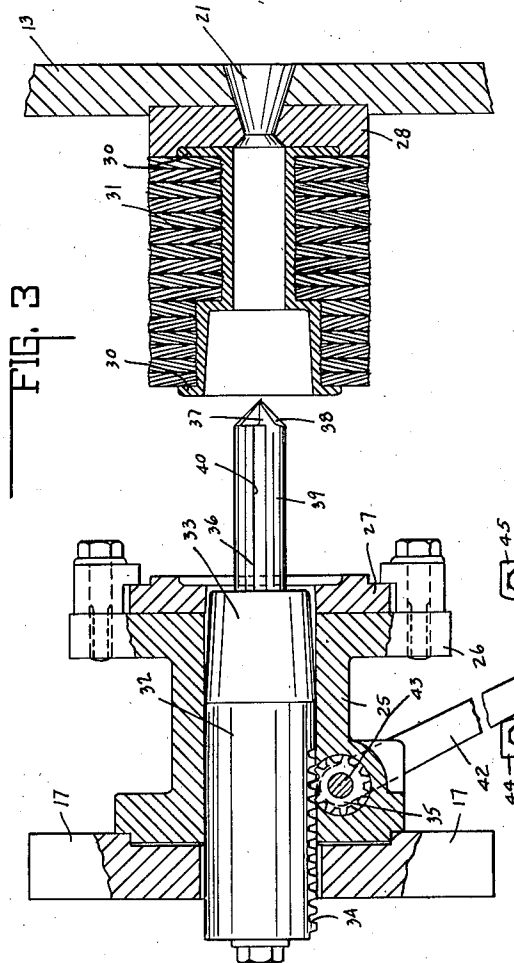
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE.

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MACHINE FOR DIE-CASTING PULLEYS AND THE LIKE.

Application filed July 31, 1926. Serial No. 126,262.

This invention pertains to a mechanism for die casting the hubs or bearings of paper or fibre pulleys and the like in accordance with Letters Patent 1,535,134 issued April 28, 1925 and 1,536,410 issued May 5, 1925.

The object of the invention is to provide a die-casting machine of the usual type with means for simultaneously supporting a paper or fibre pulley shell, compressing the same, providing a suitable core for the hub or bearing portion, as well as forms for the end flanges and forcing the metal under pressure so as to be properly formed and engage and bond with the fibrous surface of the shell. By means of this mechanism one operation accomplishes what has heretofore required a plurality of operations, and completes the formation of the pulley with the exception of surfacing the same.

The full nature of the invention will be understood from the accompanying drawings and the following description and claims.

Fig. 1 is a perspective view showing the die-casting machine with the mechanism mounted thereon for die-casting a pulley. Fig. 2 is a plan view looking down on the mechanism showing a pulley shell mounted therein. Fig. 3 is a central vertical section through a portion of the machine showing the pulley after completion of the operation. Fig. 4 is a central vertical section showing a modified form thereof. Fig. 5 is a section through the metal pot.

In the drawings there is shown a die-casting machine of the usual character, and upon which no invention is claimed herein, comprising a bed 10, an air cylinder 11, end plates 12 and 13 and carriage 14 which is adapted to slide upon the bed 10 toward and from the end plate 13. The longitudinally extending rods 15 are connected between the end plates 12 and 13. Said carriage is actuated through the medium of the toggle link mechanism 16 actuated by the air cylinder 11 to force the carriage 14 forwardly toward the end plate 13 and retain it in its forward position. The carriage 14 carries a die supporting plate 17 thereon. On the other side of the end plate 13 there is a pot 18 for the die-casting metal, said pot being provided with a gooseneck dipper 18^a having a discharge nozzle 19 provided with a conical nipple 20 communicating therewith and adapted to extend into a corresponding conical opening 21 in the plate 13 when raised to discharging position. The die-casting metal is forced under high pressure through the nozzle and nipple 20 through the medium of air pressure passing through the flexible tube 22 and controlled by a valve 23 operated from a lever 24.

As is common practice, the mechanical action of the lever 24 first actuates the links 24^a which causes the toggles 24^b which are pivotally supported upon the pot 18, to engage the arm 24^c secured to the gooseneck dipper for raising it into discharging position after having been filled with the molten metal 24^d.

As shown herein, this invention comprises a fixed head 25 which is rigidly mounted upon the supporting plate 17 which is formed with the flange 26 to which the die plate 27 is rigidly clamped. Secured to the end plate 13 there is a corresponding end die plate 28 having a central orifice 29 extending therethrough with its forward end flared outwardly. The end die-plates 27 and 28 are recessed intermediate their peripheries to form the end clamping flanges 30 of the metal hub or bearing to be cast in the pulley.

A pulley shell 31 comprising a plurality of paper laminations provided with a cylindrical outer pulley forming surface, and having been previously cored out, is mounted between the die-plates 27 and 28. The carriage 14 is then moved forwardly through the action of the links 16 so that the pulley shell 31 is clamped in position as shown in Fig. 2, under sufficient pressure to compress the laminations forming the body of the shell.

Slidably mounted in the head 25 there is a plunger 32. Said plunger is provided with rack teeth 34 meshing with the pinion 35 rotatably mounted in the head 25. Secured to the plunger 32 there is a core 36 adapted to protrude through a suitable opening in the die-plate 27 and having its forward end tapered at 37 and formed with grooves 38, the tapered end extending into the tapered recess and opening 29 of the end plate 28. The core 36 may be formed with an enlarged portion adjacent the plunger 32 for conforming to a correspondingly enlarged portion cored out in the pulley shell. Said core is also provided with a rib 40 for forming a keyway in the hub or bearing. For rapidly in-

serting the core, upon the pulley shell being clamped in position, as well as forcing the core loose from the metal upon releasing the mechanism, a rod 42 is connected with the shaft 43 upon which the pinion 35 is keyed, said rod extending downwardly in position to engage a block 44 fixedly secured to the bed of the machine as the carriage pulls back to release the pulley shell. This engagement slightly rotates the pinion and acts to force the core loose from the metal so that the operator may then freely grasp the arm and lift it up for further removing the core as shown in Fig. 3.

There is also positioned on the bed of the machine a block 45 which will engage the arm after the operator has brought it to its downward position for moving the core forwardly into place, such engagement acting to jam the end of the core into the orifice 29 for making a tight fit. While the blocks 44 and 45 are rigidly secured, they may be repositioned for accommodating the movement of the core to pulley shells of varying lengths or compressibility.

It will further be noted that it is essential that the core be movable with respect to the carriage to compensate for variations and compressibility of the pulley shell which will cause variations in the distance between the plates 27 and 28.

In operation, the laminated shell 31 of the pulley is mounted in a tubular casing 41 open at both ends. The operator mounts one end thereof over the periphery of the plate 28 and causes the air cylinder to actuate the links 16 for gradually moving the head 25 forwardly until the plate 27 abuts the other end of the pulley shell when he adjusts that end of the casing 41 over a shoulder provided for that purpose on the plate 27. The power is then applied so that the desired pressure is exerted by the head 25 against the shell for clamping and compressing it, the operator having just previously moved the arm 42 so as to cause the core to extend into position. The final compressing position taken by the head 25 against the shell will move the arm 42 against the block 45 so that the core is finally jammed into the orifice of the plate 28. The valve 23 is then operated for raising the gooseneck dipper into discharging position and applying the compressed air thereto for forcing the metal under high pressure between the core and shell. Sufficient pressure is thereby exerted upon the metal to force it into any irregularities of the fibre surface and cause it to bond with the exposed fibres thereof.

After the metal has been thus die-cast, the pressure exerted on the links 16 and plunger 33 is quickly jerked loose by the lever 42 striking the block 44, and the head 25 is drawn back out of engagement with the shell

as shown in Fig. 3. The operator then manually lifts the lever 42 so as to withdraw the plunger 32 with the core 36 thereon by rotating the pinion 35 as shown in Fig. 3, leaving the pulley, with the metal cast therein, free to be removed.

In the modified form shown in Fig. 4, a plurality of small pulleys may be die cast in the same operation. In this structure the tubular casing 41 is shown to contain 3 pulley shells 131, 231 and 331. Intermediate each shell there is positioned a double surface end plate 127, the surfaces of which match the end plates 27 and 28. The core 136 as shown herein is cylindrical throughout its length so as to be adapted to extend through all three pulleys.

Whereas the pulley shell is shown supported herein by the cylindrical casing 41, it may be supported and centered by other means such as horizontally extending rods. However, the cylindrical casing is preferable to prevent danger from the pressure of the metal accidentally breaking through the shell by reason of its high pressure and causing injury or damage.

From the foregoing it will be obvious that various formations of hubs, bearings, end flanges, and the like may be provided, as well as variations in the nature of the shell. While the operation of the machine has been described more or less step by step for the sake of clearness, it will be apparent that the actual operation is almost instantaneous. In this substantially single operation the shell is supported, the laminations are compressed together, and the entire hub and end flanges of the pulley are cast integral and in bonding relation with the shell. The operation may likewise include the casting in a shell end plates, dowel pins or any other parts comprising the metal portion of a pulley or similar structure.

The invention claimed is:

1. In a mechanism of the character described, the combination with a pulley shell of a removable core insertible therein, and a common means for simultaneously exerting a pressure longitudinally of said shell for compressing the same, positioning said core within said shell and discharging die casting metal intermediate said core and shell under pressure for bonding therewith while in compressed position.

2. In a mechanism of the character described, the combination with a pulley shell of a fixed plate provided with an orifice therein against which one end of said shell is adapted to abut, a movable plate engageable against the opposite end of said shell, means for forcing said last mentioned plate thereagainst for compressing said shell against said fixed plate, a core fixedly mounted on said movable plate in position to extend into said shell to a position slight-

ly spaced from the orifice in said fixed plate, means for discharging die casting metal through said orifice and between said core and shell under pressure for bonding therewith, and a separate means for retracting said core from said shell independently of said movable plate.

3. In a mechanism of the character described, the combination with a pulley shell of a fixed plate having an orifice therein against which one end of said shell is adapted to abut, a movable plate engageable against the other end of said shell for compressing the same against said fixed plate, a core movably mounted in said movable plate and adapted to extend into said shell, means for discharging die casting metal through the orifice in said fixed plate between said core and shell under pressure for bonding therewith, means for actuating said movable plate, and a rack and pinion for moving said core with respect thereto for permitting the same to be retracted from the shell before the compression thereon is released.

4. In a mechanism of the character described, the combination with a pulley shell formed of a plurality of laminated fibrous discs positioned adjacent each other, of means for supporting said shell in position, a fixed plate having an orifice therein against which one end of said shell is adapted to abut, a movable plate, means for moving said movable plate against the other end of said shell in position to engage and clamp the same against said fixed plate, a plunger longitudinally movable with respect to said movable plate, a rack and pinion for actuating said plunger, a core secured to said plunger in position to extend into said shell, and means for discharging die casting metal intermediate said core and shell under pressure for bonding therewith and holding said laminated discs in compressed relation.

5. In a mechanism of the character described, the combination with a pulley shell of means for engaging and exerting a pressure thereagainst for compressing the same, a cylindrical casing adapted to surround the pulley shell, and means for supporting said casing on said compressing means for supporting and centering said shell with respect thereto.

6. In a mechanism of the character described, the combination with a pulley shell, of means for engaging and exerting a pressure longitudinally thereof for compressing the same, a removable core movably mounted with respect to said compressing means, and means for actuating said core independently thereof for permitting the same to compensate for variations in compressibility of said shell.

7. In a mechanism of the character de-

scribed, the combination with a pulley shell, of means for engaging and exerting a pressure longitudinally thereof for compressing the same, a removable core movably mounted with respect to said compressing means, and a rack and pinion for actuating said core independently thereof.

8. In a mechanism of the character described, the combination with a pulley shell, of means for engaging and exerting a pressure longitudinally thereof for compressing the same, a removable core movably mounted with respect to said compressing means, a lever actuated means for moving said core, and a stop on said mechanism for engaging said lever upon said compressing means being withdrawn for jerking said core loose from the metal surrounding the same.

9. In a mechanism of the character described, the combination with a pulley shell, of a pair of members for engaging said shell and compressing the same, a core associated with one of said members adapted to extend into said shell, means for discharging die-casting metal thru one of said members so as to surround said core, and means for retracting said core from said shell after the metal has been discharged therein and before said members are released from their compressing engagement.

10. In a mechanism of the character described, the combination with a pulley shell, of a pair of members for engaging said shell and compressing the same, a core associated with one of said members adapted to extend into said shell, means for discharging die-casting metal thru one of said members so as to surround said core, and means for retracting said core from the shell independently of the member with which it is associated.

11. In a mechanism of the character described, the combination with a plurality of pulley shells assembled in alignment with each other, a spacing plate interposed therebetween, end plates adapted to engage the extreme ends of said shells for exerting a pressure thereagainst and compressing them with respect to each other and said spacing plate, said spacing plate and end plates being provided with molding recesses on their respective shell-engaging surfaces and perforated to permit a die-casting metal to be forced therethru, a core adapted to extend thru the bore of said shells, and means for discharging said metal thru one of said end plates and said spacing plate for causing the same to surround said core and engage the inner surfaces of each of said shells.

In witness whereof, I have hereunto affixed my signature.

WILLIAM D. HAMERSTADT.