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METHOD OF LINING THE WORKING CHAMBERS OF INTERNALLY IRREGULARLY SHAPED CASINGS.

APPLICATION FILED JAN. 21, 1910.

1,012,920.

Patented Dec. 26, 1911.

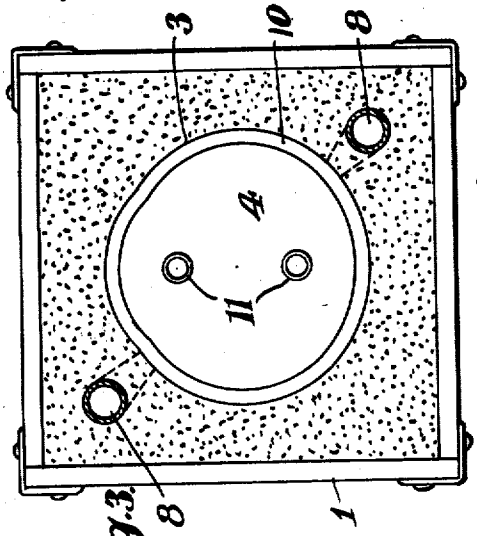

Fig. 3.

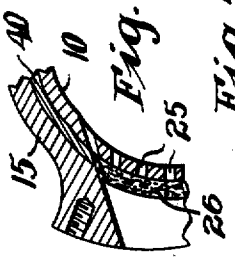

Fig. 6.

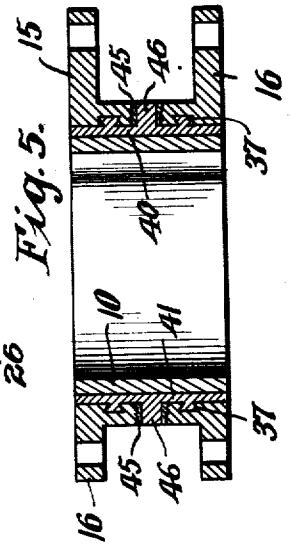

Fig. 5.

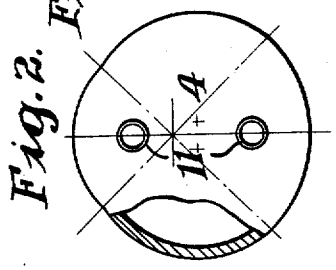

Fig. 2.

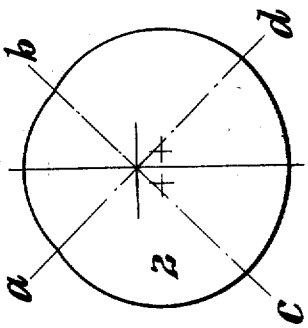

Fig. 4.

Fig. 1.

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METHOD OF LINING THE WORKING CHAMBERS OF INTERNALLY-IRREGULARLY-SHAPED CASINGS.

1,012,920. Specification of Letters Patent. Patented Dec. 26, 1911.

Application filed January 21, 1910. Serial No. 539,348.

To all whom it may concern:

Be it known that I, JOHN ROWBOTHAM, a citizen of the United States, residing in Montgomery county, State of Pennsylvania, have invented certain new and useful Improvements in Methods of Lining the Working Chambers of Internally-Irregularly-Shaped Casings, of which the following is a specification.

My invention has especial relation to motor pumps such as are shown in my co-pending application filed January 21, 1910, Serial No. 539,349; water meters having chambered bodies such as are shown in Letters Patent of the United States No. 325,361 and No. 325,362 granted to me September 1, 1885, in which the interior of the chamber is not of cylindrical form; or other casings having internally irregularly shaped chambers requiring a smooth working surface. In the said patents and in my present application, I show constructions in which are formed working chambers having two opposite concentric and two intermediate eccentric surfaces.

Heretofore in the manufacture of a chambered casing such as is shown in this application or in my co-pending application aforesaid, a casing having a chamber of substantially the shape and contour desired has been cast and thereafter in order to secure the smooth, true working surface desired, it has been necessary to true up or finish the interior working surface by the expensive manual operations of boring and turning or by other kindred fitting and dressing operations for the reason that it has been impossible to cast the chamber so true that such finishing has not been necessary and essential.

Broadly considered it is the object of my invention to obviate these laborious and expensive operations.

In further stating the object of my invention, it may be said to be to provide an improvement in the method of producing and securing a lining or bushing upon the interior of the working chamber of a casing such as that illustrated in the accompanying drawings.

Other objects and advantages will appear either obviously or by being pointed out hereinafter.

In order that my invention may be more fully understood and be made more comprehensible to others skilled in the arts relating thereto, reference is to be had to the accompanying drawings which illustrate the means of practicing and carrying out the method constituting my invention and in which is also illustrated a completed pump in which the casing has been constructed by following my method of construction.

In the drawings it is to be noted that like numerals refer to corresponding parts throughout all of the figures, of which:

Figure 1 is a top plan view of a pattern of wood; Fig. 2 is a top plan view of a hollow core (which may be of cast iron) a portion of which is broken away; Fig. 3 is a top plan view of a drag with the hollow core being shown in position with a ring extending around the same; Fig. 4 is a transverse section of a casing showing the lining or bushing secured in position according to my invention; Fig. 5 is a transverse section of the casing after the casting operations have been completed and after the opposite sides of the said casing have been planed off; and Fig. 6 is a transverse section of a portion of the casing showing a detail of the method.

Referring to the drawings: 1 designates a drag of known construction and 2 designates a wooden pattern provided with an irregular exterior surface having oppositely disposed concentric portions, one of which portions is located between the dotted lines *a* and *b* and the other of which is located between the dotted lines *c* and *d*, and also oppositely disposed eccentric portions intermediate the said concentric portions.

The wooden pattern 2 is placed in the drag 1 and the casting sand is packed around the same so as to produce or form a mold 3 therein having an interior surface corresponding exactly to the exterior surface of the wooden pattern.

After the casting sand has been firmly packed around the wooden pattern 2 the latter is withdrawn. Thereafter a hollow metallic core 4, the external surface of which is of the same contour or shape as that of the wooden pattern 2, is placed in the mold 3. The diameters of the metallic core 4 through the concentric and eccentric portions thereof are less than the corresponding diameters of the wooden pattern 2 in con-

sequence of which a space is provided between the said hollow core 4 and the internal irregularly shaped surface of the mold 3. After the core 4 has been placed in position and the drag and its cope (not shown) are properly arranged and prepared, the fused metal to form the ring is poured in through the gates 8 which communicate with the space inside of the mold 3 and outside of the core 4 and forms the ring 10 which subsequently may be used as a lining or bushing for an internal chamber.

In order that the internal surface of the ring may be perfectly smooth and even and free from flaws, I heat the core 4 before pouring the metal through the gates 8 to form the ring 10. The core 4 is hollow and its heating is accomplished by filling it with molten metal, such as lead. The heat of this lead is transmitted to the walls of the hollow core in consequence of which as the molten metal is poured into the mold to form the ring 10 it flows freely and readily in the space between the core 4 and the interior of the said mold without flaws or other defects being formed. The molten lead is poured into the hollow mold 4 through one of the tubes 11, the other of the said tubes acting as a vent to permit the escape of air and other gases from the said mold.

In order to facilitate the removal of the ring 10 from the core 4, the exterior surface of the latter is covered with graphite or other suitable material. After the core 4 with the ring 10 which has been cast around the same has been removed from the mold, the lead may be removed from the said core by again heating it and pouring the lead therefrom and the core thereafter again used. Obviously the core may be used over and over an indefinite number of times.

It will be understood that the sizes of the wooden pattern 2 and of the metallic core 4 may be changed in order to produce rings of varying diameters and widths.

After the ring has been produced as above described and it is desired to place the same in a casing to form the lining or bushing of a working chamber therein, the said ring is again placed upon a hollow core of the same size, shape and construction as that on which it was previously cast or formed and the said core and ring are then placed inside a casing 15 of cast iron or other suitable material. The said casing 15 may be cast in any known manner and is formed with an interior chamber which is of substantially the same shape or outline as the external surface of the lining or bushing. The casing is provided with flanges 16, as shown, to which face plates or cover plates 17 and 18 are adapted to be secured. Preferably the face plate 17 is secured in position by means of bolts and nuts 19 before the core 4 and its surrounding ring 10 are placed in position. The ring 10 is placed in position within the casing 15 with its concentric and eccentric portions located in the same positions as the corresponding portions of the said casing 15. After the said core 4 and the ring 10 have been placed in position inside the casing upon the face plate 17, the face plate 18 which is provided with holes 20 through which the tubes 11 are adapted to extend is placed in position and secured to the flange 16 by means of bolts and nuts 21. Previous to the placing of the ring 10 in position in the casing 15, its exterior surface is tinned or otherwise prepared for a purpose to be stated. The eccentric portions of the said ring are also provided with perforations 25, as is indicated in Fig. 6 of the drawings. In order that these perforations may not be closed during a subsequent portion of the operation, the eccentric perforated portions of the said ring are covered with clay 26 or other suitable luting. After the core 4 and the ring have been placed in position within the chamber of the casing 15 and the face plates 17 and 18 secured in position, as shown in Fig. 4 of the drawings, molten metal, as for instance lead, is poured into the hollow core 4 through one of the pipes 11, the other of the said pipes, as previously stated, acting as a vent to permit the escape of gases, as, for instance, air. The molten metal which is poured into the hollow core 4 transmits its heat to the core 4 and thence to the ring 10 which is to constitute the lining or bushing of the working chamber within the casing 15. After the perforations 25 have been closed by means of clay or other suitable luting as above described and after the pouring of the molten metal into the hollow core 4 as above described, molten metal, preferably one which has a minimum of expansion and contraction due to the variations of temperature, such as type metal, is poured into the spaces 30 and 31 through pipes 32 and 33 which have communication through the casing with the said spaces, as indicated in Fig. 4 of the drawings.

The cover plate 18 having been previously provided with vent holes 35 and 36 the air and other gases escape from the said spaces 30 and 31. Previous to the placing of the ring 10 in position as hereinbefore set forth, undercut grooves 37 are provided in the interior surface of the said casing. The molten metal poured into the spaces 30 and 31 through the pipes 32 and 33 forms layers of metal 40 and 41 between the exterior surface of the ring 10 and the interior surface of the casing 15. By reason of the fact that the interior surface of the casing 15 is more or less roughened and also of the presence of the undercut grooves 37 therein, the layers 40 and 41 adhere and become firmly fas-

tened and secured to the said casing. The exterior surface of the ring 10 having been previously prepared as by tinning, the layers 40 and 41 also adhere firmly to the said ring. In consequence the said ring becomes firmly attached to the said casing and constitutes an inner lining or bushing for the chamber therein. The interior surface of the ring constitutes the working surface of the chamber. After the metal which has been poured in through the pipes 32 and 33 has set, the said pipes are cut off as indicated at 45 in Fig. 5 leaving short screw-threaded portions of the pipes in the casing and also short projecting portions 46 of the metal 40 and 41. These projecting portions serve as a further means to firmly secure the intermediate layers 40 and 41 to the interior of the casing 15. After the layers 40 and 41 have cooled and hardened, the face plates 17 and 18 and the core 4 are removed and thereafter the opposite side of the casing 15, the layers 40 and 41 and the ring 10 are planed off so as to make the same entirely smooth, the said parts being made wider originally than is necessary so as to permit the said planing and smoothing.

Having thus described my invention, I claim:—

1. The method of lining the working chamber of the metal casing for a machine of the character described, which consists in mounting a metallic ring upon the exterior of an incombustible core corresponding in external configuration to the internal configuration of the said chamber, the said core and ring being sufficiently smaller than the said chamber to provide spaces between the said ring and the interior of the said chamber, and placing the said core and the ring thereon within the said chamber, heating the said core and ring by pouring molten metal into said core and thereafter introducing molten metal between the said ring and the interior of the said chamber to fill the said spaces.

2. The method of lining the working chamber of a metal casing for an apparatus of the character described, which consists in the placing of a ring upon the hollow metallic core; supporting the said core and ring within the said chamber, the diameter of the said core and ring being sufficiently less than that of the chamber to provide interspaces between the external surface of the said ring and the internal surface of the said chamber; heating the said core and ring by pouring molten metal into the former; pouring molten metal into the said interspaces and thereafter removing the said core.

3. The method of lining the working chamber of a casing for an apparatus of the character described, which consists in placing a ring of suitable metal upon a hollow metal core; placing the said core and the said ring inside the said chamber and supporting it therein, the external configuration of the said core and ring corresponding to the internal configuration of the said chamber and the external diameter of the said ring being sufficiently less than the internal diameter of the said chamber to provide interspaces between the said ring and the said chamber; pouring hot molten metal into the said hollow core to heat the same and the ring surrounding it; and thereafter pouring hot molten metal, such as type metal, into the said interspaces.

4. The method of producing a lining and securing it in place within the working chamber of the metal casing of an apparatus of the character described, which consists in providing a mold having a configuration corresponding to the configuration of the said chamber, placing a hollow incombustible core in the said mold and pouring molten metal therein to heat the said core, the said core being sufficiently smaller than the said mold to provide an interspace between the said core and the internal surface of the said mold; pouring molten metal into the said interspace to produce the said ring; placing the said ring upon a hollow incombustible core; and placing the said core and ring in the working chamber of said casing, the external diameter of the said ring being sufficiently less than the diameter of the said chamber to provide interspaces between the said ring and the said chamber; securing plates to the said casing to close the said chamber and support the said core and ring therein; pouring molten metal into the said core to heat the same and the said ring; and thereafter pouring molten metal into the said interspaces between the said ring and the interior of the said chamber, the said metal adhering to the said ring and to the interior surface of the said casing to secure the said ring in position.

In testimony that I claim the foregoing as my invention, I have hereunto signed my name this 19th day of January, A. D. 1910.

JOHN ROWBOTHAM.

In the presence of—

FRED L. MOWLDS,

CARRIE E. KLEINFELDER.