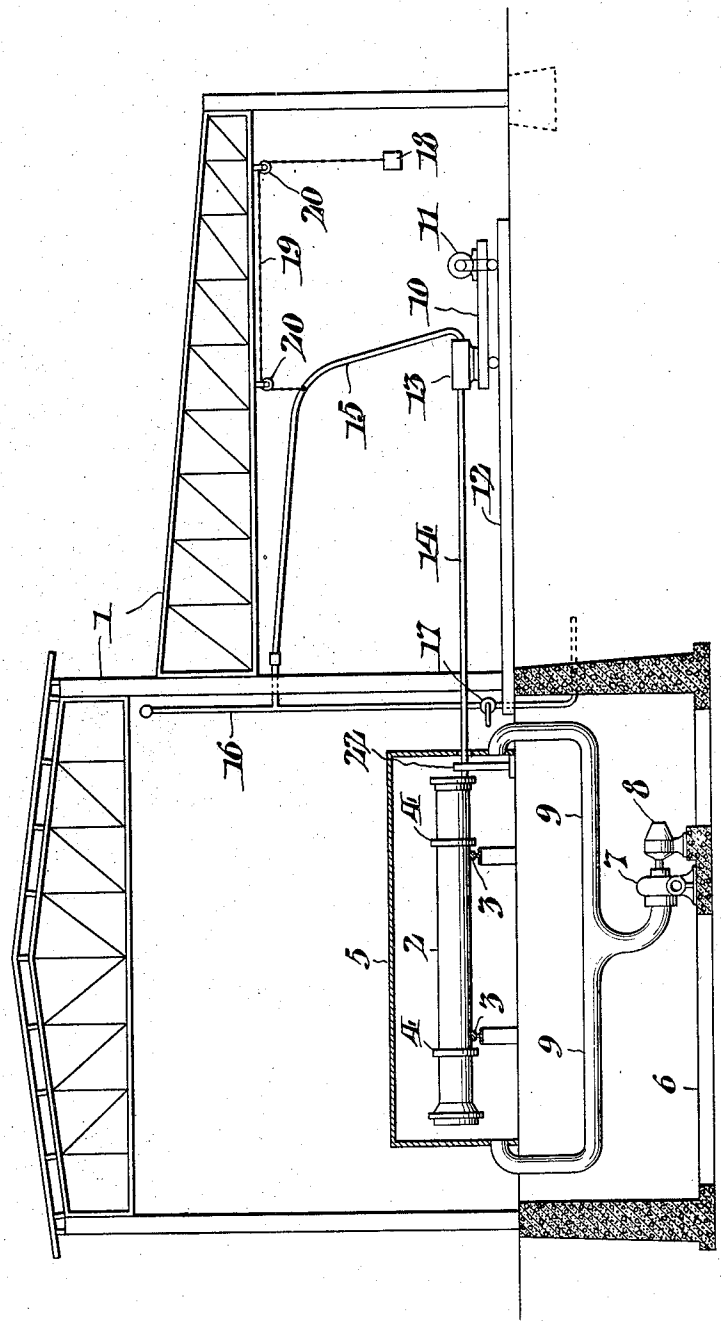
Aug. 26, 1930. L. A. CAMEROTA 1,774,082

METHOD OF FREEING AND EXTRACTING CASTINGS FROM MOLDS

Filed Sept. 7, 1929 2 Sheets-Sheet 1

FIG. I.



WITNESSES

Thomas W. Kerr, Jr.

John A. Weidler

INVENTOR:

Louis A. Camerota,

BY Fraser & Paul

ATTORNEYS.

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FIG. III.

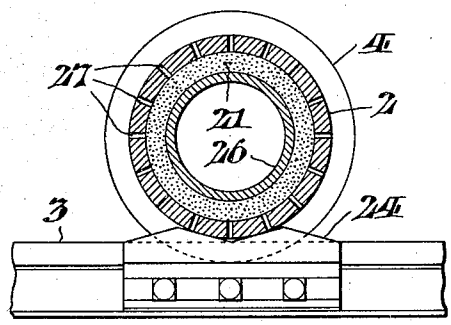


FIG. IV.

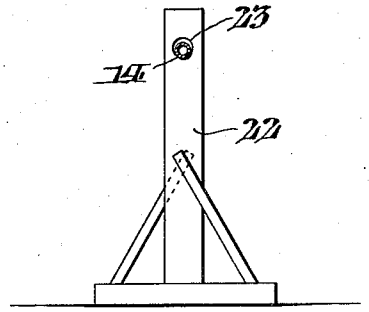
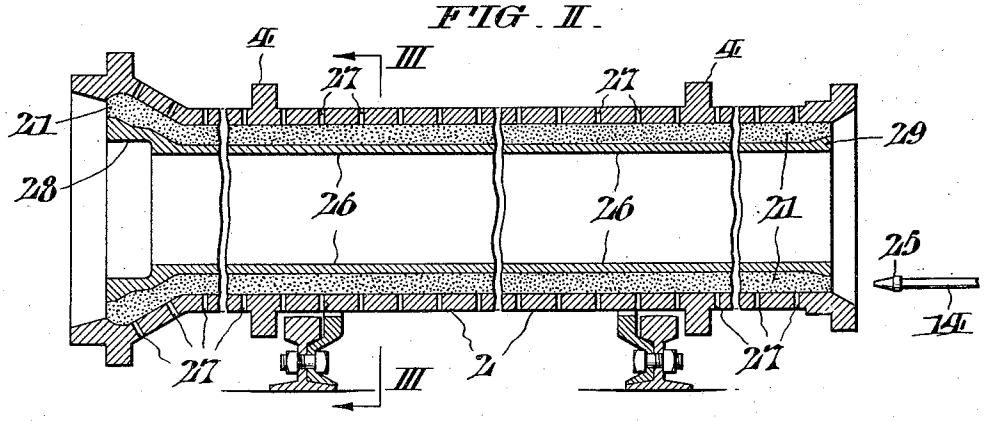


FIG. II.



WITNESSES
Thomas W. Kerr, Jr.
John A. Weidler

INVENTOR:
Louis A. Camerota,
BY Fraley & Paul
ATTORNEYS.

Patented Aug. 26, 1930 1,774,082

UNITED STATES PATENT OFFICE

LOUIS A. CAMEROTA, OF BURLINGTON, NEW JERSEY, ASSIGNOR TO WALTER WOOD, OF PHILADELPHIA, PENNSYLVANIA

METHOD OF FREEING AND EXTRACTING CASTINGS FROM MOLDS

Application filed September 7, 1929. Serial No. 390,986.

My invention relates to the art of freeing and extracting a casting from a flask lined with a refractory mold, and has particular reference to a method of thus freeing and extracting hollow metal bodies, such as pipes which have been cast centrifugally, from sand lined flasks of the unitary closed type.

Iron pipes are frequently cast with a bell shaped flange at one end and a bead at the other end. When cast by the centrifugal process in a closed flask, such a pipe cannot be freed from its mold by mechanical appliances exerting a pull or push upon the pipe and tending to move it relative to the flask without the danger of damaging either flask or casting. This is so because, as the bell end is drawn from the flask, the bead compresses the mold ahead of it so that the pipe becomes jammed in the mold. Even with plain cylindrical castings on which there is no bead, an attempt to force the casting through the flask results in further compressing the mold, the pressure increasing as the casting is progressed. Heretofore several methods have been proposed by which the sand lining may be disintegrated to make possible the removal of the pipe casting from its flask. One such method is to shake out the molded sand lining from its flask by subjecting the flask to a succession of violent jars on a vibrating machine. While it is possible in this manner to free a casting from its mold, the time expended in the operation, the labor in handling the flask, and the danger of damaging the flasks are such that a quicker, more efficient and more economical method is desirable. Means have also been devised for cutting out the sand mold by mechanical cutters, and while apparatus of this type possesses advantages over the jarring process, where there are scabs projecting from the casting into the sand mold, these scabs prevent the proper operation of the mechanical cutters and render it extremely difficult to remove the casting. In extracting pipe castings from closed flasks by the above methods, and, so far as I am aware, by all other methods now practiced, the sand lining is disintegrated by the removal of successive annular increments until substantially the entire lining has been displaced.

In order to accomplish the removal of a centrifugal casting from its flask by a more economical process and to obviate the difficulties attending the above described methods, I have invented a method for disintegrating a portion of the mold or lining by boring the same to effect a longitudinal slot substantially throughout its length at one or more points to free the casting to such an extent that pressure thereafter applied to the casting can force it through the flask without its jamming in the mold. My invention is particularly applicable to freeing pipe castings which are extremely difficult to remove by other methods and is adapted to be used as a preliminary operation preparatory to a mechanical stripping of a casting from its flask.

For a better understanding of the invention, its objects and specific advantages obtained with its use, reference should be had to the accompanying drawings and descriptive matter, in which I have illustrated and described one embodiment of the invention.

Of the drawings:

Fig. I shows a side elevation of apparatus employed for freeing a pipe casting from a closed flask according to the manner of my invention.

Fig. II shows a longitudinal cross-section of a flask and pipe casting in position for the first step of the stripping apparatus.

Fig. III shows a transverse section of the same taken along the lines III—III of Fig. II; and

Fig. IV is a detailed view of a standard for guiding an air nozzle into the mold of a flask.

For convenience I have illustrated in Fig. I a shed 1 constituting a station to which flasks 2 are brought from a centrifugal casting machine by rolling them along rails 3. At this station the flasks are momentarily halted for the application of the first step of a stripping operation. The flasks 2 are of the customary unitary type used in making pipe castings by the centrifugal process and are provided with perforations 27 which

permit the escape of foundry gases during the casting operations. The flasks 2 have annular flanges 4 which guide them with respect to the rails 3, and accordingly assist in their proper positioning for the application of the first step of the stripping operation.

A hood 5 serving as a dust collecting enclosure is shown surrounding the flask 2. To admit the flask within the hood, horizontal hinged doors may be provided in an obvious manner at the points where the rails 3 enter and leave the enclosure. Preferably located in a pit 6 beneath the hood 5 there is provided an exhaust fan or blower 7 operated by a motor 8 and having one or more exhaust trunks 9 leading from the hood 5 to the blower 7. However, the dust collecting enclosure and the means for exhausting it are not essentially a part of the invention, but are merely illustrated as a convenient method of reducing flying dust and fine sand incident to the operation of the apparatus.

At one side of the flask station I provide a movable platform or car 10 preferably equipped with its own motor and speed reducer diagrammatically shown at 11 and adapted to travel back and forth on tracks 12 which parallel the longitudinal axis of the flash 2. Mounted on the forward end of the car 10 is a support 13 for rigidly holding a blow pipe 14 and having therein a connection joining a flexible air hose 15 with the blow pipe 14. The flexible air hose 15 is in turn connected with a compressed air line 16 equipped with a valve 17 at a convenient point. To keep the flexible air hose 15 off the floor of the shed 1 while the car is moving, I prefer to use a weight 18 with a cord 19 attached to the hose and suspended by pulleys 20 from the roof of the shed.

The blow pipe 14 and its nozzle 25 are guided toward the sand mold 21 of the flask 2 by means of a standard 22 adjacent the end of the flask 2. The standard 22 is provided with an opening 23 permitting the passage therethrough of the blow pipe 14 and directing it into the mold at the proper level. To maintain the flask 2 in alignment with the blow pipe 14, I may use any well-known mechanical appliance acting as a stop in the path of the flasks along the rails 3. For this purpose, there are shown (see Fig. III) notched centering plates 24 bolted to the rails 3, the top edges of these plates being slightly higher than the rails. The flasks can be easily rolled onto the centering plates and thus positioned in alignment with the blow pipe 14.

With particular reference to Fig. II it will be seen that the pipe casting 26 is of a standard type having a bell flange 28 at one end and a bead 29 at the other end. The nozzle 25 is directed into the mold 21 at the bead end of the casting.

The operation of the apparatus is as follows: When the flask 2 is positioned the car 10 is moved slightly forward so that the nozzle 25 barely penetrates the mold 21 midway between the inner surface of the flask 2 and the outer surface of the casting 26. The air valve is then opened, and a jet of air under considerable pressure is directed into the mold 21. The car 10 is then moved forward so that the blow pipe 14 is forced through the mold to a point adjacent the bell of the casting, blowing out the loosened sand at the end of the flask 2 corresponding to the bead end of the pipe casting and through the minute perforations 27. When the blow pipe has reached the limit of its travel, the block of sand between the nozzle 25 and the bell end of the casting is blown out and the bore is completed. It is found that by thus boring the mold, there is a sufficient disintegration and removal of sand to free the casting so that it can thereafter be readily removed by mechanical means. As long as the mold is intact, its cementitious property and the presence of the bead on the end of the pipe casting prevent the extraction of the casting without danger of injury to flask or casting. However, after boring the mold in the manner described, enough sand is removed from the annular space between flask and casting, and the disintegration of the mold is sufficiently initiated, so that the later application of mechanical pressure tending to move the casting with respect to its flask will complete the disintegration of the mold and permit the ready removal of the casting.

While there may be occasions when it is desirable to bore the mold in more than one place, I have found that ordinarily one application of the air jet suffices, care being taken, however, to see that the mold is bored substantially throughout its length. By an obvious modification additional nozzles may be provided so that a multiplicity of bores may be effected at the same time, and such is within the contemplation of my invention. For ordinary purposes, however, I have found that a single application of an air jet will carry the disintegration of the mold to such an extent as to permit the casting to be readily removed by the second step of the stripping operation.

The second step of the stripping operation preferably consists of subjecting the casting by mechanical appliances to a force tending to move it in the direction of its length while holding the flask stationary. For this purpose various forms of apparatus may be used, as for example, a hydraulic ram, or a stripping apparatus comprising internal and external chucks applied to the casting and flask respectively and means for drawing the chucks apart. Such an apparatus is shown in United States Letters Patent No. 1,758,883, granted to me on May 13, 1930.

The physical means employed for extracting the casting do not, however, form a part of this invention.

From the above description it will be noted that the method used in the practice of my invention is characterized by the boring of the sand lining along one or more parallel lines to provide a longitudinal slot so that, when a force is subsequently applied tending to move the pipe casting through the flask, the internal pressure normally caused by the bead tending to further compress the sand lining is relieved, there being a space into which the sand particles may be forced permitting the distortion of the shape of the sand lining as the bead passes therethrough. Accordingly, the preliminary boring operation makes it possible for a comparatively moderate force to progress the casting through the flask without imposing undue strain upon flask or casting, and the power required to accomplish the disintegration of a sector of the sand lining and the extraction of the pipe is considerably less than that required to disintegrate the whole sand lining by successive annular increments. Furthermore, the apparatus herein described can obviously be employed for pipe castings of varying diameters and lengths without necessitating any change, and the equipment required for the practice of my invention is inexpensive and of simple construction.

It will be apparent that while I have referred to compressed air as the preferred medium for the preliminary disintegration of the sand lining, other means for effecting a longitudinal bore to slot the sand lining throughout its length may be used in a similar manner to accomplish the same result and the use of such other means is within the contemplation of this invention.

Having thus described my invention, I claim:

1. The method of extracting a casting from a cylindrical flask lined with a refractory mold which consists in slotting the mold longitudinally, and then separating the casting from its flask.

2. The method of extracting a casting from a cylindrical flack with an annular refractory lining which consists in disintegrating a sector of the annular lining by a pressure jet directed to effect a longitudinal bore within said lining, and then separating the casting from its flask.

3. The method of extracting a casting from a closed cylindrical flask lined with a refractory annulus which consists in directing a pressure jet into the end of the annular lining, forcing the pressure jet through said lining while guiding the same in a parallel relation with the axis of the flask, and then separating the casting from its flask.

4. The method of extracting a pipe casting from a closed cylindrical flask with an annular sand lining which consists in directing a blow pipe into the end of the sand lining, forcing the blow pipe through said sand lining while guiding the same in a parallel relation with the axis of the flask whereby the sand lining is slotted substantially throughout its length, and then separating the pipe casting from its flask.

5. The method of extracting a pipe casting from a cylindrical flask with an annular refractory lining which consists in slotting the refractory lining longitudinally by means of a pressure jet with removal of a sufficient quantity of the refractory material to permit the pipe casting to be later progressed through the lining without further compressing the same, and then separating the casting from its flask.

6. The method of extracting a pipe casting having a bead at one end and a bell at the other end from a cylindrical flask lined with a refractory mold which consists in directing means for delivering a pressure jet into the refractory lining at the bead end of the casting, forcing said means longitudinally through the refractory lining to a point adjacent the bell of the pipe casting whereby the lining is bored throughout its length, and then separating the casting from its flask.

7. The method of extracting a pipe casting having a bead at one end and a bell at the other end from a cylindrical flask lined with a refractory mold which consists in directing a blow pipe into the refractory mold at the bead end of the pipe casting, said blow pipe delivering a pressure jet, forcing said blow pipe through said mold whereby the mold is longitudinally bored to a point adjacent the bell of the pipe casting and a block of refractory material at the bell blown out at said end of the flask, and then separating the casting from its flask.

In testimony whereof, I have hereunto signed my name at Burlington, New Jersey, this 5th day of September, 1929.

LOUIS A. CAMEROTA.