J. B. WALKER.

PROCESS FOR THE MANUFACTURE OF INGOT MOLDS.

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1,262,718.

Patented Apr. 16, 1918.

Fig. 1.

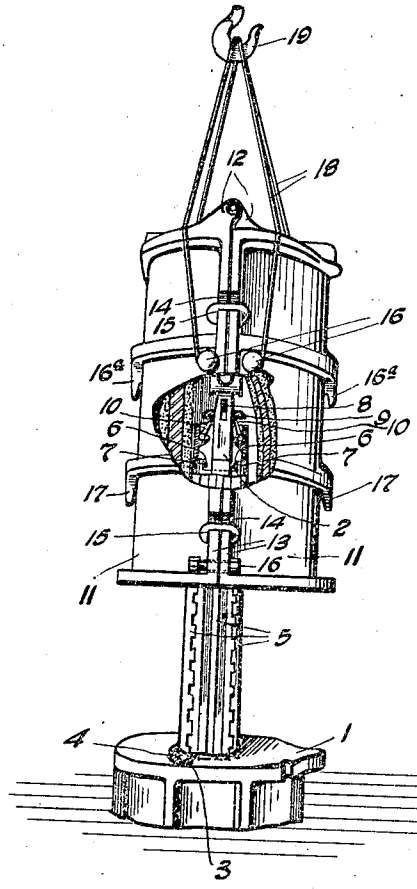
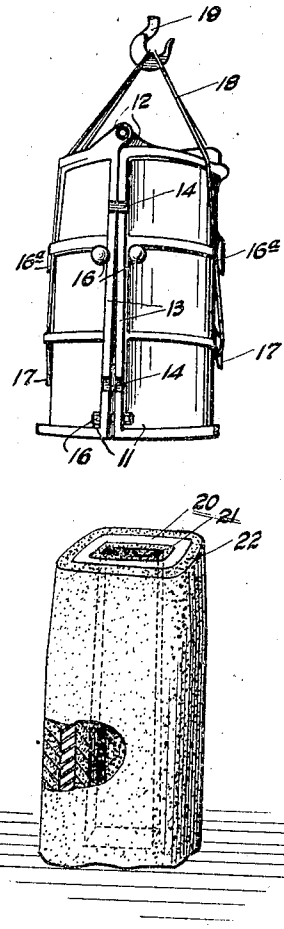


Fig. 2.



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PROCESS FOR THE MANUFACTURE OF INGOT-MOLDS.

1,262,718. Specification of Letters Patent. Patented Apr. 16, 1918.

Original application filed March 12, 1917, Serial No. 154,402. Divided and this application filed August 4, 1917. Serial No. 184,467.

To all whom it may concern:

Be it known that I, JOHN B. WALKER, a citizen of the United States of America, residing at Birmingham, in the county of Jefferson and State of Alabama, have invented certain new and useful Improvements in Processes for the Manufacture of Ingot-Molds, of which the following is a specification.

My present invention relates to the manufacture of ingot molds and like large hollow castings and is directed more particularly to a novel process for annealing the casting and reducing to a minimum the cost of cleaning the sand from the casting.

I am of course aware that castings of various shapes have been annealed in annealing ovens, but in order to obtain the advantages to be derived from the gradual and uniform cooling of such large heavy castings as ingot molds, the cost of such ovens and their maintenance and operation is so very expensive that such castings have not heretofore been annealed though their duty is such as to especially demand that the casting be free from strains and stresses that result from uneven cooling.

My present invention concerns itself more particularly with a novel and extremely simple and inexpensive process for annealing ingot mold castings and like hollow tubular bodies, my object being to obtain the advantages of an annealed casting without any increase in its cost of production.

My present process contemplates casting the ingot mold (which term I use generically for like tubular bodies) in a sand mold comprising a core formed on a collapsible arbor, and a cheek formed in a flask which is preferably divided into vertical sections that are so connected that the flask may be expanded to permit it to strip freely from the cheek, as is more fully described in Letters Patent of the United States No. 1,221,117, issued to me on the 3rd day of April, 1917.

Having cast the ingot molds in the sand mold in the manner well understood in the art, I propose to strip the casting from the flask and core arbor so that both the core and cheek sand is left adhering to the casting and forming a protecting cover or sand envelop in which the casting is set aside to cool slowly and uniformly so that the finished product is in effect annealed.

A further advantage of my process arises from the fact that when the cheek and core sand is left adhering to the casting, the latter when it becomes cold will release the sand so that it has no tendency to adhere thereto and will fall freely from the casting. To those skilled in the art, it will be apparent that I thus avoid the labor and expense required for stripping and shaking out the castings, which represent a substantial part of the molding cost of ingot molds and like large castings.

In illustrating an apparatus for utilizing my process, I show a collapsible core arbor and an expansible flask which respectively form the subject-matter of United States Letters Patents Nos. 1,221,117 and 1,221,116, granted to me on the 3rd day of April, 1917, and which are also described in my pending application, Serial No. 154,402, from which the subject matter of this application has been divided.

Referring to the drawings:

Figure 1 shows the apparatus during the first step of the process in which the flask and contained casting are lifted to strip the casting with the core sand adhering thereto from the collapsed core arbor, the view being partly broken away to indicate the casting in its sand jacket.

Fig. 2 illustrates the second step of the process in which the flask is stripped from the casting, leaving the cheek sand adhering to its outer surface.

Similar reference numerals refer to similar parts throughout the drawings.

In brief, my present process contemplates stripping the casting, as soon as it has sufficiently solidified, from the molding apparatus in such manner as to leave the core and cheek sand adhering to the casting to form a sand coating or jacket in which the casting is left at any convenient point to cool and anneal before the sand is stripped therefrom. It will be obvious that this process does not involve any increase in equipment, as the mold parts are released as soon as the casting is ready to be taken out, and no annealing oven or apparatus is required. Moreover, the annealing of the castings is accomplished without extra cost because it is not necessary to handle the casting or the sand otherwise than is necessary in the present practice, and the sand jacket, in which the casting is annealed, is produced as a part of the normal molding process.

As illustrative of an apparatus for carrying my process into effect, I prefer to utilize the stool and collapsible core arbor which are described in my Letters Patent No. 1,221,116, and which may be briefly described as comprising a stool drag 1 having an arbor column 2 connected thereto and provided with sockets 3 in which the rounded bases 4 of the four collapsible arbor staves 5 are seated and adapted to rock, the upper ends of these staves being provided with lugs 6 which engage stop arms 7 on the column to limit the outward or expanding movement of the staves. A wedge key 8, driven through the top of the arbor, depresses a plate 9 which, by means of downwardly and outwardly inclined pawls 10, serves to force the staves outwardly against the stop arms 7 and hold them rigidly in their expanded position. To permit the arbor to collapse it is only necessary to loosen the wedge key 8, whereupon the pressure on the pawls is relaxed and the staves at their upper ends are free to fall inwardly toward the column. It will be understood that this is my preferred type of collapsible core arbor but that other types may be used with more or less success in conducting my present process.

The flask is formed in half sections 11 by being divided in a vertical plane, the sections having top lugs 12, which are hingedly connected, and abutting side flanges 13 which are provided with notched clamp seats 14 which receive wedge clamps 15 and bolts 16 which limit the opening or expanding movement of the sections. The flask sections carry lifting lugs 16^a and 17 adapted to be engaged by a sling 18 which hangs from the crane hook 19. When the clamps 15 are knocked loose the flask sections are free to swing apart to the limit allowed by the bolts 16, the expanding of the flask being accomplished by the pull on the sling 18 when lifting the flask by its lugs 17.

In operation, after the casting has been poured, the flask arbor and stool drag, suitably connected together, are transported by the crane to the point at which the casting will be annealed. The wedge key 8 is knocked loose so as to permit the arbor to collapse and the flask is disconnected from the stool drag. The crane sling is then applied to the flask lugs 16^a, and the flask, cheek, casting and core sand are stripped together from the core arbor and stool drag, as indicated in Fig. 1. The flask is then seated on the ground, the clamps 15 knocked loose, and the sling 18 transferred to the lugs 17, as seen in Fig. 2. As soon as the weight of the flask comes on the sling its bottom automatically opens out sufficiently to permit it to strip freely from the cheek, leaving the ingot mold casting 20 embedded in the core sand 21 forming an inside sand coating and the cheek sand 22 forming an outside sand coating. These two coatings of sand form an envelop or jacket in which the casting remains until it has cooled and they serve to effect so gradual and uniform a cooling of the casting that it is annealed.

After the casting has cooled I have found that the sand coatings are so free of adherence thereto that they will fall freely from the casting when it is ready to be shaken out, and I find moreover that a much smoother and more highly finished casting is produced than has been heretofore possible when it was attempted to shake out the casting as soon as it was removed from the mold.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. The hereindescribed process for annealing ingot molds and like hollow castings, which consists in stripping the mold from the casting so as to leave the cheek and core sand adhering to the casting, and leaving the casting to cool in its sand jacket formed by the cheek and core sand in which it was cast.

2. The hereindescribed process for annealing ingot molds and like tubular castings, which consists in casting the article in a sand mold over a collapsible core arbor, contracting the arbor as soon as the casting has solidified sufficiently to be handled, stripping the arbor so as to leave the core sand adhering to the inner surface of the casting, and stripping the flask so as to leave the cheek sand adhering to the outer surface of the casting, and leaving the casting to cool slowly and anneal in the sand jacket formed by the cheek and core sand adhering thereto.

3. The hereindescribed process for the production of annealed ingot molds and like tubular castings, which consists in casting the article in a sand mold about a collapsible core arbor and within an expansible flask, collapsing the arbor when the casting has solidified sufficiently to be handled, stripping the flask with contained casting and core sand from the core arbor, expanding the flask and stripping it from the cheek, and leaving the casting with the cheek and core sand adhering thereto to cool slowly and anneal, substantially as described.

In testimony whereof I affix my signature.

JOHN B. WALKER.

Witness:
NOMIE WELSH.