No. 868,607. PATENTED OCT. 15, 1907.

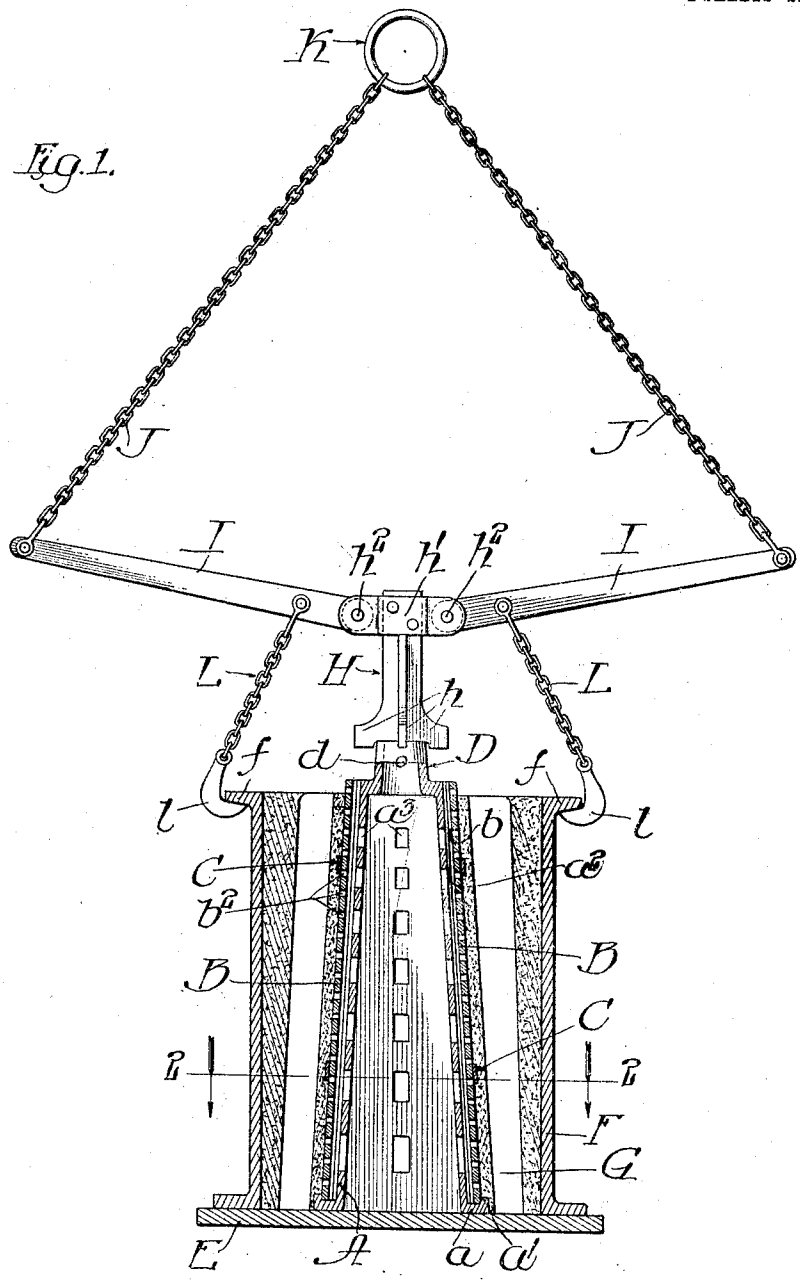
F. X. LEUTHNER.

MOLDING APPARATUS.

APPLICATION FILED JAN. 12, 1907.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses:
P. A. Alfredo
S. D. Hinckel.

Inventor
Frank X. Leuthner
by Poole & Brown
his Attys.

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2 SHEETS—SHEET 2.

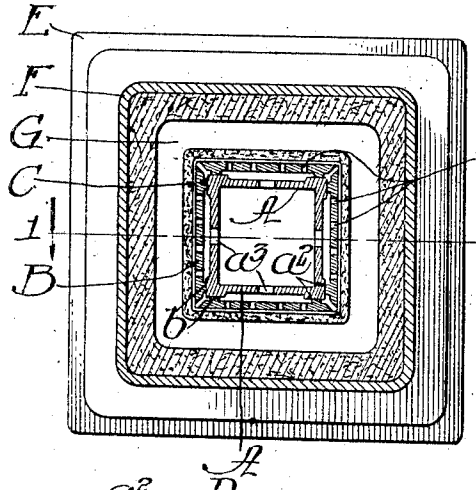

Fig. 2.

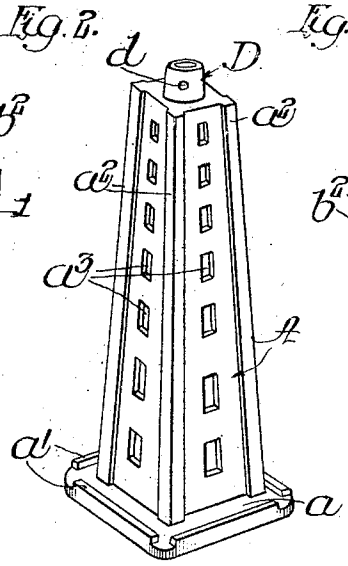

Fig. 4.

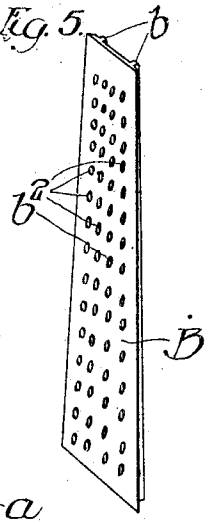

Fig. 5.

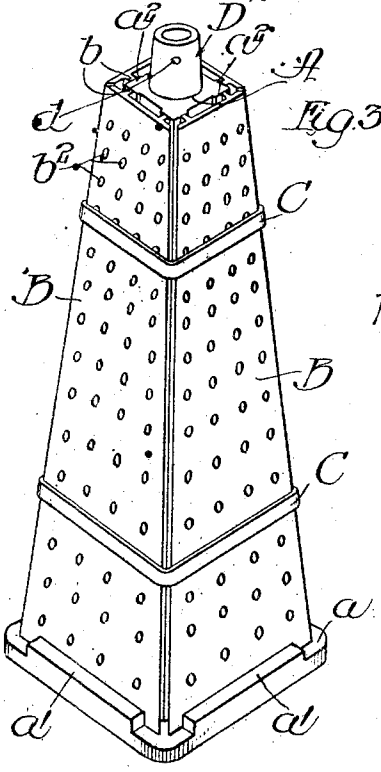

Fig. 3.

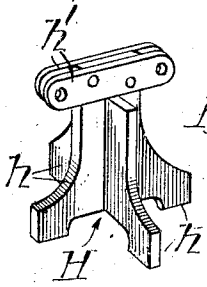

Fig. 6.

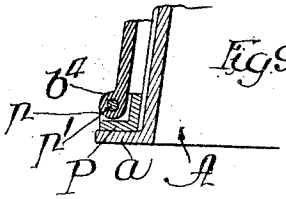

Fig. 9.

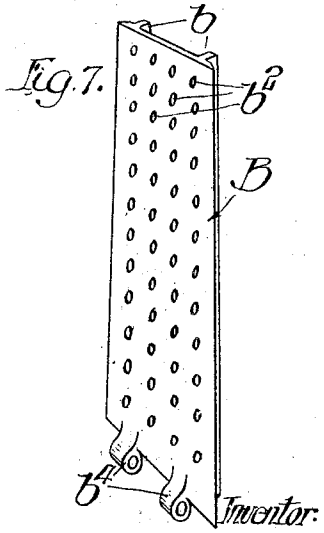

Fig. 7.

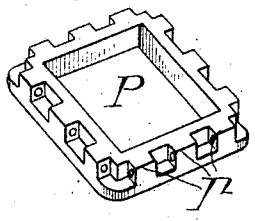

Fig. 8.

Witnesses:
F. W. Kluge
S. D. Hirsch

Inventor:
Frank X. Leuthner
by Poole & Brown
his Attys

UNITED STATES PATENT OFFICE.

FRANK X. LEUTHNER, OF BUFFALO, NEW YORK, ASSIGNOR OF ONE-HALF TO FRANK TICKNER, OF HAMBURG, NEW YORK.

MOLDING APPARATUS.

No. 868,607. Specification of Letters Patent. Patented Oct. 15, 1907.

Application filed January 12, 1907. Serial No. 351,909.

To all whom it may concern:

Be it known that I, FRANK X. LEUTHNER, a citizen of the United States, and a resident of Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Molding Apparatus; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in molding apparatus for making tubular castings, of that kind embracing a collapsible core-barrel and it consists in the matters hereinafter set forth and pointed out in the appended claims.

The apparatus embodying my invention which is illustrated in the accompanying drawings, embraces as its main feature a mold embracing external and internal mold members. The external mold member consists of an open ended tubular part or flask which rests on a horizontal supporting surface or drag and to the inner surface of which is applied the layer of sand which constitutes with the flask the outer part of the mold when the same is in readiness for use. The internal mold member consists of a collapsible hollow metal core-barrel, which also rests on the said horizontal surface or drag and to which is applied the layer of sand to form the inner part of the completed mold. Said core-barrel embraces a hollow or tubular tapered body or core, and a plurality of separate, perforated, longitudinally arranged plates which surround the said body or core, the said body or core being adapted for endwise sliding movement relatively to the plates, so that the said plates may be allowed to move inwardly and the core-barrel thereby collapsed to permit its extraction from the finished casting. In connection with the parts above referred to, a device is shown in said drawings for moving the body or core of the core-barrel in a direction to effect the collapse of the external plates thereof, embracing levers adapted to act on the flask and the said body of the core barrel in a manner to lift the flask from the drag and at the same time to press downwardly on the said body of the core barrel so that the said core or tapered body of the core-barrel is thrust downward within the exterior plates thereof and the core-barrel is thereby collapsed at the same time that the flask is lifted; said levers being operated by suitably applied hoisting or lifting means, such as a crane.

My invention may be more readily understood by reference to the accompanying drawings in which,—

Figure 1 is a view showing the mold in vertical section, taken on line 1—1 of Fig. 2, and in elevation, an extractor for use in connection with the core-barrel. Fig. 2 is a horizontal section of the mold, taken on line 2—2 of Fig. 1. Fig. 3 is a view in perspective showing my improved core-barrel assembled. Fig. 4 is a view in perspective showing the tubular body of said core-barrel. Fig. 5 is a perspective view of one of the detachable side plates thereof. Fig. 6 is a perspective view of the head of said extractor. Fig. 7 is a perspective view of one of the side plates of said core-barrel, showing a modified form thereof. Fig. 8 is a perspective view of an annular frame for use in connection with side plates of such modified form. Fig. 9 is a detail section showing the pivotal connection of the side plate illustrated in Fig. 7 with the annular frame shown in Fig. 8.

As shown in said drawings, A indicates the tubular core or body of the core-barrel, which is of tapered form, tapering upwardly from the bottom to the top thereof, Said body A is preferably made of cast-metal, and may be either rectangular, round or of any other suitable shape in cross-section. As herein illustrated, said body is square in cross-section. At its bottom said body has an outwardly projecting flange a, as most clearly shown in Figs. 1, 3 and 4. On the outer margins of said flange are elevated ribs or flanges a^1 a^1 extending at their ends to within a short distance of the corners of said flange.

B B indicate side plates which surround the body A and, when the said body has a plurality of flat faces, are flat and severally applied to the said flat faces. The flange a is adapted to engage the lower edges of the side plates B, which are held in place upon said flange by the ribs a^1 a^1. Said plates B conform to the general contour of the exterior lateral surfaces of the body A, but they are of such width that when placed in position upon said body, the plates are separated a small distance from each other at their adjacent margins. Upon the inside faces of each plate B are two longitudinal ribs b b arranged respectively parallel with and near the oblique side edges of said plate. Said ribs are adapted to engage similar ribs a^2 a^2 formed flat upon the faces of the body A near the side edges of said faces. The said ribs b b and a^2 a^2 serve to hold the side plates at a distance from the body so as to leave an air space therebetween. When in place, the side plates are held firmly in place upon the body by means of encircling metal bands or hoops C. At the top of the body is formed a neck D, which projects above the upper ends of the side plates B when the latter are in position on the body. Said neck is shown as made integral with the said body A and of tubular and cylindric form. This neck constitutes part of the means for extracting the core-barrel from the mold, as will be explained hereinafter, and also furnishes means for connecting a hoisting device therewith in handling the body, for which purpose it is provided with a horizontal hole d adapted

to receive a transversely inserted lifting-rod. The body A, moreover, is formed with a number of vent-holes or openings a^2 through its side faces opening into its hollow interior, and the hollow interior is open at the top and at the bottom of the body. Each side plate B is likewise provided with a number of vent-holes b^2 extending therethrough.

In preparing the mold for use, the parts of the core-barrel are assembled with the side plates B upon the body A, held in place by the bands C, as shown in Fig. 1, and molding sand is applied to the exterior surface of the core-barrel thus assembled, in the usual manner. The holes b^2 aid in holding the sand upon the plates. The complete core is then placed upon the bottom plate or drag E and about it is placed the flask F with its sand layer or lining, leaving an annular space G (Figs. 1 and 2) between the core and the lining of said flask. Said flask is of common form and is provided with a horizontal flange around the top edge. The molten metal is poured into said annular space as in the ordinary operation of casting. When the casting is poured, the holes b^2 and a^3, the air space between the side plates B and the frame A, and the hollow interior of said frame all facilitate the escape of gases generated by the molten metal and thereby improve the quality of the casting.

For removing the tubular casting from the mold, an extractor, shown in Fig. 1, is employed. Said extractor comprises a head H consisting of four radial members joined integrally at the center of the head and extending radially from the vertical axis thereof in the form of lateral wings *h h*. The lower edges of the said wings are adapted to engage the top edge of the neck D, and said wings are notched or cut away to form at their outer ends downwardly projecting prongs which extend outside of the neck D; thereby forming in the bottom surface of the head a central recess which receives the top of the neck and holds the head centrally in position over the same. To the upper part of said head are secured two horizontally disposed flat bars h^1 h^1. To the outer ends of these bars are pivoted the inner ends of two levers I I of equal length which extend outwardly from the head H. As shown, said levers are disposed with their inner ends between the two bars *h h*. They are pivoted to the ends of said bars by means of horizontal pivot pins h^2 h^2. To the outer ends of said levers are fastened the lower ends of two chains J J of equal length, the upper ends of which are connected with a ring K. Said ring K may constitute part of any ordinary hoisting apparatus, such as a crane or the like. At points on said levers near their inner ends are secured two depending chains L L of equal length, which are provided at their lower ends with hooks *l l*.

The flask F is provided at its top with an outwardly extending, horizontal flange *f*. In the use of the extractor it is placed with its head resting upon the neck D of the core-barrel and the hooks *l l* are caught under the outwardly extending top flange *f* of the flask F or otherwise engaged with the flask. Lifting force is then applied to the outer ends of the levers I I by means of the ring K and chains J which forces the head H and the core-barrel downward and at the same time raises the flask and contained casting from the bottom plate or drag. In the upward movement of the flask the side plates B of core-barrel slide upward upon the side faces of the tapered body A and, since said body is tapered upwardly and said side plates do not meet each other along their oblique edges, they are thereby allowed to move upward so that they, with the sand covering of the core-barrel, are no longer internally supported and may become collapsed and thereby freed from the inner surface of the casting. When the body A has been lifted a distance equal to the length of the neck D, the further upward pull upon the outer ends of the levers I I and consequent downward movement of the head H brings the wings *h* into engagement with the side plates B and the frame and side plates are then pushed downwardly together and the said plates and the said covering disengaged from the casting. Thus the act of lifting the flask and casting from the bottom plate or drag operates also to extract the core-barrel from the casting and obviates the necessity of employing any other means for this purpose.

Figs. 7, 8 and 9 show a modified form of construction in the core-barrel. In this case, the side plates B, instead of resting directly upon the bottom flange *a* of the frame A, are hinged at their bottom edges to an annular frame P which rests upon said flange. Said annular frame consists of a vertical and a horizontal annular flange joined integrally along the lower edge of the former and the inner edge of the latter. Disposed upon the periphery of said frame in the angular space between said flanges are a number of horizontally pierced lugs *p p* and upon the bottom edge of each side plate are located similar lugs b^4 adapted to enter between pairs of the lugs *p p* upon said annular frame. The plates are pivotally attached to the annular frame by pivot pins p^1 p^1 inserted through the holes in the lugs *p* and b^4, and the annular frame rests upon the bottom flange *a* of the frame A, which flange in this case need not have the ribs a^1.

It will be seen that this construction possesses advantages over constructions heretofore employed in that the core-barrel can be easily and quickly extracted by a simple and inexpensive form of extractor. Furthermore, the life of the core-barrel is prolonged since no driving or hammering is necessary for extracting it, and better castings are secured, due to the vent-holes and air-spaces which insure better drying of the molding sand and also facilitate the escape of gases during the operation of casting.

I claim as my invention:—

1. A core-barrel comprising a tapered body and a plurality of plates surrounding and adapted for endwise movement relative to said body said plates being perforated and adapted to receive and hold a coating of sand.

2. A core-barrel comprising a tapered, tubular body and a plurality of plates surrounding said body and adapted for endwise movement relative thereto, said plates being supported at a distance from the outer face of said body so as to leave air spaces between the walls of said body and the plates.

3. A core barrel comprising a tapered body provided at its larger end with an outwardly extending flange, and a plurality of perforated plates surrounding said body and bearing at their ends against said flange, said plates being adapted for endwise movement relative to the body in a direction away from said flange, and being adapted to receive and hold a coating of sand.

4. A core barrel comprising a tapered body and a plurality of perforated plates surrounding and adapted for endwise movement relative to said body, said plates being of such width that when applied to the body, longitudinal

spaces will be left between their lateral adjacent edges, permitting movement of the plates toward each other when the tapered body is removed from within the same, and being adapted to receive and hold a coating of sand.

5. A core-barrel comprising a tapered body and a plurality of plates surrounding and adapted to slide endwise on said body, said plates being provided upon their inner faces with longitudinal, inwardly extending ribs, and said body being provided with longitudinal, outwardly extending ribs forming bearing surfaces for the ribs on the plates.

6. A core barrel comprising a tapered body provided at its larger end with an outwardly extending flange and a plurality of perforated plates surrounding said body with longitudinal spaces between their side margins and bearing at their ends against said flange, and a band surrounding the plates to hold them in place on the body, said plates being adapted for endwise movement relative to said body in a direction away from said flange, and being adapted to receive and hold a coating of sand.

7. A core-barrel comprising a tapered body provided with a flange at its larger end, an annular frame adapted to surround the body in contact with said flange, and a plurality of plates which surround said body and are hinged to said annular frame.

8. A core barrel comprising a tapered body provided at its larger end with an outwardly extending flange and a plurality of perforated plates surrounding said body and bearing at their ends against said flange, said plates being adapted for endwise movement relative to the body in a direction away from said flange and being of substantially the same length as the body and said body having at its smaller end a neck which extends beyond the adjacent ends of said plates when the opposite ends thereof are in contact with said flange.

9. The combination with a collapsible core-barrel adapted to be collapsed by downward pressure on its upper end, and a flask adapted to surround said core-barrel, of an extractor comprising a head adapted to rest upon the top of the core-barrel and means connected with the head and adapted for attachment to said flask, for exerting simultaneously an upward pull on the flask and a downward pressure on the core-barrel.

10. The combination with a collapsible core-barrel, embracing a tapered body and a plurality of plates surrounding and adapted for endwise movement relatively to said body, said barrel being adapted to be collapsed by downward pressure on the said body, of a flask adapted to surround said core-barrel and an extractor embracing a head adapted to engage the top of the body, and means connected with said head and adapted for attachment to the flask, said means being constructed to exert simultaneously an upward pull on the flask and a downward pressure on the said head.

11. The combination with a collapsible core-barrel adapted to be collapsed by downward pressure on its upper end and a flask adapted to surround said core-barrel, of an extractor comprising a head, levers pivoted to said head and extending outwardly therefrom, lifting members attached to the outer ends of said levers and depending members connected with said levers near their inner ends, and adapted for attachment to said flask.

12. The combination with a collapsible core-barrel, embracing a tapered body and a plurality of plates surrounding and adapted for endwise movement relative to said body; said barrel being adapted to be collapsed by downward pressure on said body, of a flask adapted to surround said core-barrel and an extractor embracing a head adapted to engage the top of said body, levers pivoted to the said head and extending outwardly therefrom, lifting members connected with the outer ends of said levers, and depending members connected with said levers near their inner ends and adapted for connection with said flask.

13. The combination with a collapsible core-barrel, embracing a tapered body having an endwise extending neck at its smaller end, and a plurality of plates surrounding and adapted for endwise movement relative to said body, of a flask adapted to surround said core-barrel and an extractor comprising a head provided with a recess on its bottom surface to receive the top of said neck, and means connected with said head and adapted for attachment to the flask for exerting simultaneously an upward pull on the flask and a downward pressure on the head.

14. The combination with a collapsible core-barrel embracing a tapered body having an endwise extending neck at its smaller end and a plurality of plates surrounding and adapted for endwise movement relative to said body, of a flask adapted to surround said core-barrel, and an extractor comprising a head adapted to engage said neck and having outwardly extending wings adapted to engage the adjacent ends of the plates, and means connected with said head and adapted for attachment to the flask, for exerting simultaneously an upward pull on the flask and a downward pressure on the head.

In testimony, that I claim the foregoing as my invention I affix my signature in the presence of two witnesses, this 29th day of December A. D. 1906.

FRANK X. LEUTHNER.

Witnesses:
GEORGE C. SUERT,
R. S. BRENNESHOTZ.