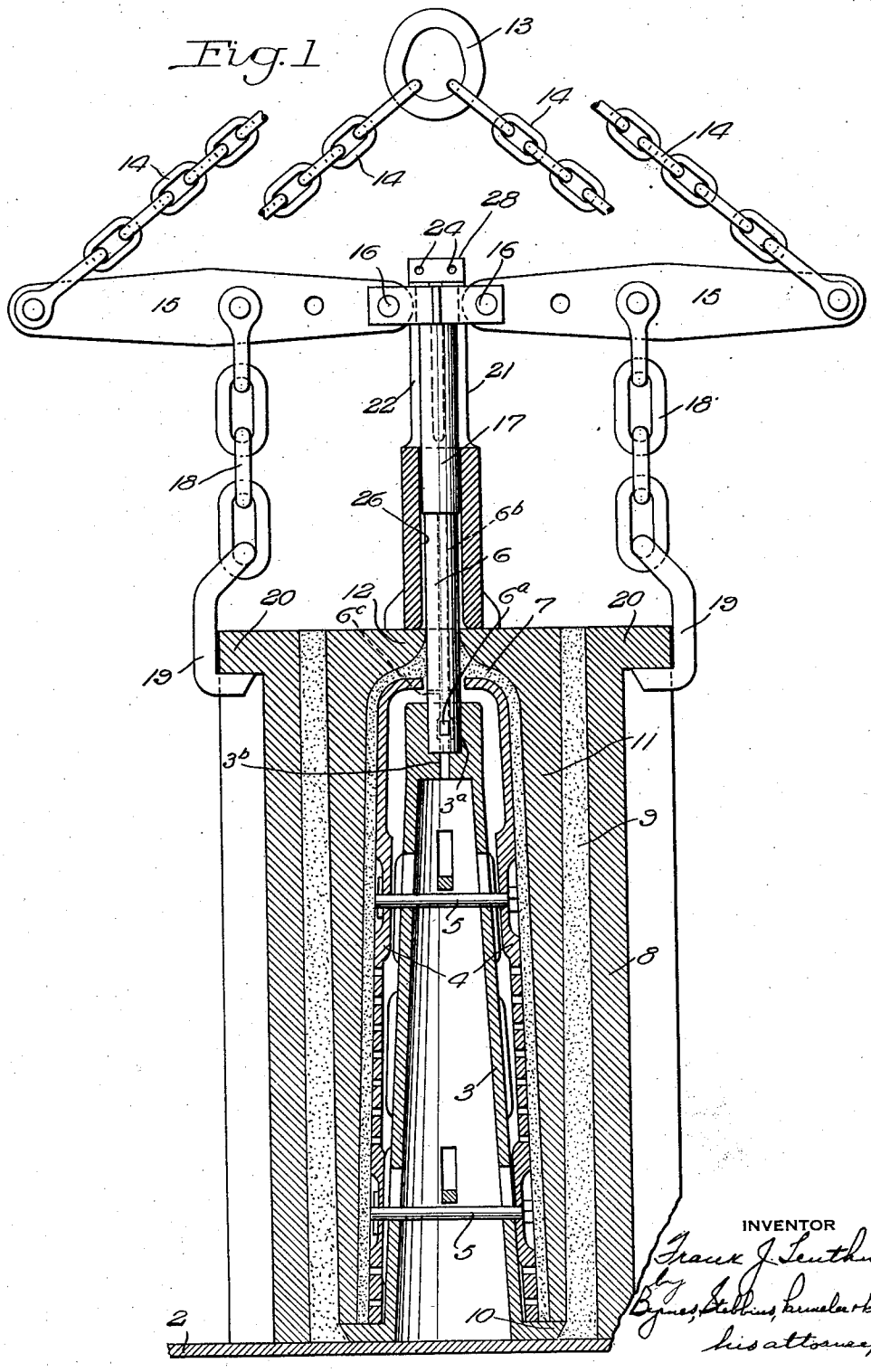
Dec. 2, 1930. F. J. LEUTHNER 1,783,805

MOLDING APPARATUS

Filed Aug. 2, 1929 2 Sheets-Sheet 1

Fig. 1



INVENTOR

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Dec. 2, 1930. F. J. LEUTHNER 1,783,805

MOLDING APPARATUS

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Fig. 2.

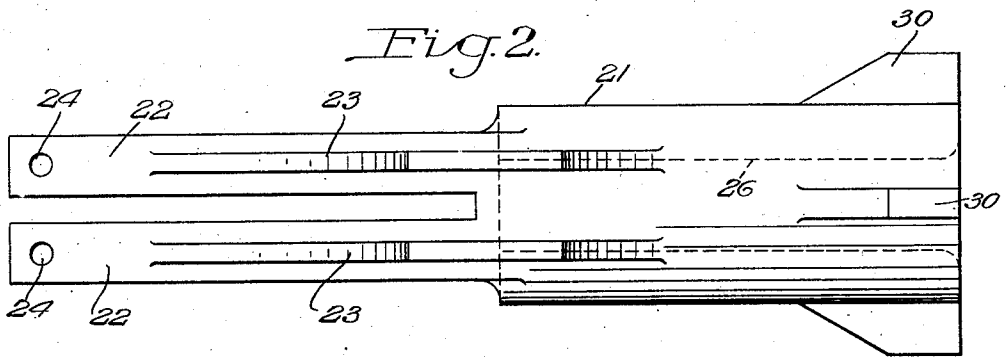


Fig. 3.

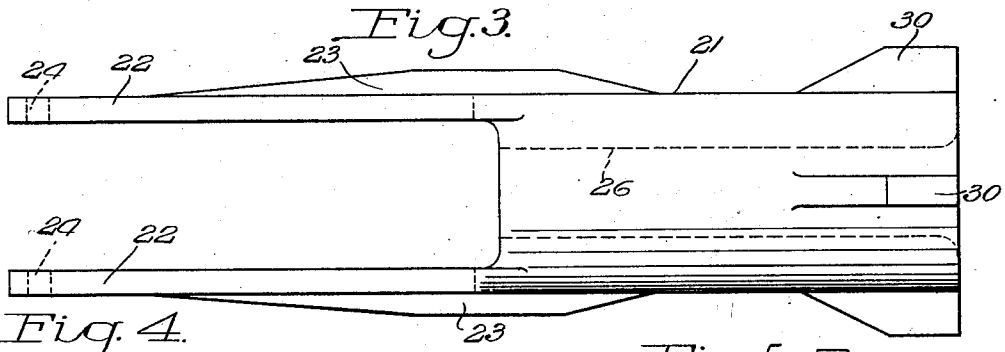


Fig. 4.

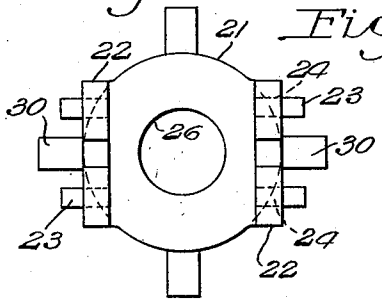


Fig. 6.

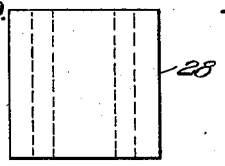


Fig. 7.

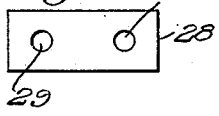


Fig. 5.

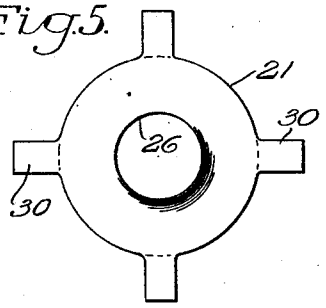
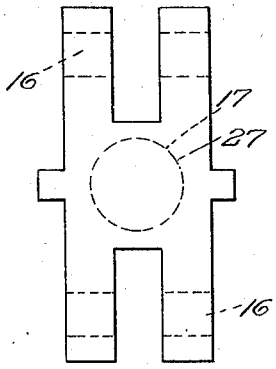


Fig. 8.



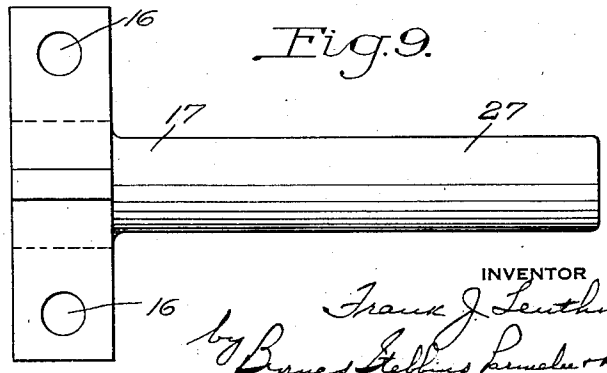


Fig. 9.

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UNITED STATES PATENT OFFICE

FRANK J. LEUTHNER, OF SHARPSVILLE, PENNSYLVANIA

MOLDING APPARATUS

Application filed August 2, 1929. Serial No. 382,941.

This invention relates to molding apparatus, and more particularly to an improved core and extractor construction for use with molds for hollow castings. The invention still more particularly relates to an improved collapsible core and extractor particularly adapted for ingot mold casting. The extracting means is claimed in my copending application, Serial No. 482,170, filed Sept. 16, 1930 which application is a division of this application.

As is well known in the art, an ingot mold is cast in a mold having an outer flask or chill and a central core member for providing the ingot cavity. It has long been the practice to cast ingot molds whose walls are substantially straight from end to end by the use of a collapsible core. The known type of collapsible core and the straight sided ingot molds which could be cast by the use thereof are shown, for example, in United States Patents Nos. 868,607 and 1,018,668, issued to Frank X. Leuthner, and No. 1,018,669, issued to said Leuthner and Frank Tickner. Such collapsible cores comprise a central body or core bar surrounded by plates which are spaced apart at their edges and supported on the central core bar, the bar being tapered so that upon substantially axial movement in the direction of its larger end, the plates are allowed to collapse inwardly, thereby facilitating the removal of the core from the casting.

In the casting of ingot molds whose walls are substantially straight from end to end, it has been customary to use such collapsible core bars which have their upper portions extending a considerable distance above the side plates and above the tops of the castings. As will be seen from the patents above referred to, collapsible core bars of this nature are adapted only for use in casting such straight sided molds. The size of the upper portions thereof projecting above the top of the casting precludes their use with a casting whose shape at the top is other than substantially straight.

Modern practice is tending toward the use of ingot molds whose walls neck in at the top, considering the molds in the position they assume while they are being cast. Such a mold is inverted when used for pouring ingots so that the necked-in portion serves as the bottom of the mold cavity and assists in shaping the ingot and in reducing the amount of poured metal which comes in contact with the bottom of the mold. A mold of this type cannot be cast about a collapsible core of the type above mentioned because of the fact that the size of such core precludes the formation of the necked-in top as the metal is poured. It has therefore become the common practice in casting necked-in molds to use solid cores which do not have a large upper extremity extending above the top of the casting.

The problems involved in the removal of a solid core from a cast ingot mold have been well known for years. It is necessary to lay the flask, casting and core on their sides and to ram the core and flask apart. This operation is very detrimental to the flasks and cores and is also time wasting and therefore expensive. In fact, no fully satisfactory core has heretofore been provided for the casting of necked-in molds.

Furthermore, when necked-in molds are cast using solid cores, the gases which form during the casting operation are confined within the molds, producing bubbles and holes which are, to say the least, detrimental, and which in many instances entirely spoil the cast molds. This is particularly true of bubbles and holes formed in the ingot cavity, which should be substantially smooth and uniform.

I provide molding apparatus adapted to obviate the disadvantages in the present practice above noted, and to provide for the use of a collapsible core in the casting of necked-in ingot molds. I also provide an improved core extracting means adapted for use with an improved collapsible core whereby to greatly facilitate, quicken and cheapen the removal of cores from cast necked-in ingot molds.

I provide molding apparatus comprising a collapsible core having inner and outer core members, the inner core member having a pin of relatively small diameter as compared with the size of such inner core member connected with the top thereof and extending

vertically therefrom. I further provide molding apparatus comprising an extractor having means for engaging a flask and means for engaging a core for removal of the core from the flask, and a centering sleeve slidably connected with the extractor. I still further provide molding apparatus comprising a core and an upwardly extending member connected with the top thereof, such member having means for leading off gases formed about the core.

Other objects and advantages of the invention will become apparent as the following description of a present preferred embodiment thereof proceeds.

In the accompanying drawings I have shown a present preferred embodiment of the invention wherein

Figure 1 is a central vertical cross-section through molding apparatus having an ingot mold cast therein;

Figures 2 and 3 are side views to enlarged scale of a centering sleeve;

Figure 4 is a top view of the centering sleeve;

Figure 5 is a bottom view of the centering sleeve;

Figure 6 is a top view of a retaining block for the centering sleeve;

Figure 7 is an end view of the retaining block;

Figure 8 is a top view of the extractor pin; and

Figure 9 is a side view of the extractor pin.

Referring more particularly to the drawings, reference numeral 2 designates a mold base upon which is set a tapered core bar 3 which forms the inner member of a collapsible core. Cooperating with the bar 3 are side plates 4 supported in the position shown in Figure 1 by the bar 3 and held inwardly by bolts 5. Upon downward movement of the bar 3 the side plates 4 of the core collapse inwardly, whereby to facilitate removal of the core from the casting. So much of the construction as is described above is well known in the art.

The core bar 3 has a top opening 3*a* from the bottom of which to the interior of the core bar leads a duct 3*b*. Fitting into the opening 3*a* is a pin 6 which is preferably of steel. The pin 6 is positively connected with the core bar 3 by a key 6*a* which passes through the core bar and the pin to maintain the latter in place. Instead of being keyed to the core bar, however, the pin 6 may be connected therewith by being cast integral with the core bar, by driven fit or by any other suitable means.

Extending longitudinally through the pin 6 is a duct 6*b*. This duct communicates with the duct 3*b* at its bottom and also has lateral branches 6*c* leading out through the pin 6 above the point of connection of the pin with the core bar. The ducts are for the purpose of leading off gases formed about the core during the casting operation. Unless such gases are led off, they form imperfections in the casting as above mentioned. The ducts provide a means not provided by a solid core for leading off the gases. When a solid core is used, whatever gases do not find their way out by leakage remain within the casting and are an endless source of trouble.

The pin 6 is of small diameter as compared with the size of the inner core member and is of substantially the same diameter as the hole to be provided in the top of the cast ingot mold (which will be in the bottom of the mold when used for casting ingots). A sand mold wall 7 is formed about the core by the use of a suitable pattern, as well known in the art. A flask 8 also rests upon the base 2 and is centered with respect to the core. A sand cheek 9 is formed within the flask 8 also with the use of a pattern. The bottom of the core bar 3 is provided with a lateral extension 10 which joins the sand cheek and upon which the sand core wall 7 rests. The extension 10 therefore serves as the bottom of the mold cavity for casting the ingot mold. The sand walls 7 and 9 serve respectively as the inner and outer mold surfaces, the metal 11 being poured in to form an ingot mold having a necked-in upper extremity 12. As shown in Figure 1, the metal at the top of the casting substantially abuts the pin 6 so that the hole through the top of the casting is only slightly greater in diameter than the diameter of the pin.

In order to collapse the core it is necessary to exert a downward pressure on the top of the pin 6 whereby the core bar 3 moves downwardly and the side plates 4 collapse inwardly, the entire core then falling out. I provide novel extracting means adapted for use with the improved core to effect extraction thereof. The extracting means comprises a ring 13 adapted to be connected with a crane hook, such ring having connected therewith a pair of oppositely disposed chains 14. Pivoted to the extremity of each chain 14 is a lever 15. Pivoted to the inner ends of the respective levers 15, as at 16, 16, is an extractor pin 17 (see Figures 8 and 9. Pivoted intermediate the ends of the respective levers 15 are chains 18 to the end of each of which is connected a hook 19 adapted to underlie and engage with a flange 20 on the flask 8.

Slidably carried over the extractor pin 17 is a centering sleeve 21 (see Figures 2, 3, 4 and 5) which sleeve has four upward extensions 22 each having a strengthening rib 23 and each being provided at its upper extremity with a hole 24. The extensions 22 merge into the sleeve 21, which has a substantially cylindrical inner surface 26 whose diameter is slightly greater than the diameter of the shank 27 of the extractor pin 17. The

sleeve is slidably connected with the pin 17, as shown in Figure 1, a retaining block 28 having holes 29 being inserted between the extensions 22 and pins fitted through the holes 24 and 29 to prevent the sleeve from becoming disengaged with the pin. The lower part of the sleeve has strengthening flanges 30, as shown in Figures 2 and 3.

The internal diameter of the centering sleeve is somewhat greater than the external diameter of the steel pin 6 in the core and is adapted to embrace the upper part of the pin 6 to center the extractor pin 17 with respect thereto.

The flask is picked up through the agency of the extractor, and the core is extracted at the same time. A crane hook is lowered over the assembled flask and core having the casting formed therein. The hooks 19 are engaged with the flange 20 of the flask, the ring 13 is engaged with the crane hook and the sleeve 21 is placed over the upper extremity of the pin 6. The crane hook is then raised upwardly, bodily lifting the flask, and by so doing a downward pressure is exerted through the levers 15 and the extractor pin 17 against the steel pin 6 in the core, whereby the core is collapsed and as the flask is raised upwardly by the crane, the core drops out.

The extracting operation, when an improved collapsible core and an improved extractor, such as herein disclosed, are used, is greatly simplified over the previous method wherein the flask, core and casting were laid on their sides and the core and flask rammed apart with the attendant damage, delay and expense, as above mentioned. The pin 6 serves not only to define the opening in the casting, but also to impart the force exerted by the extractor pin 17 to the core bar, whereby the collapsible core may be extracted from within the casting. The centering sleeve may be easily lowered over the upper extremity of the pin 6 and serves to positively center and position the extractor pin with respect to the core pin so that the downward force exerted by the extractor upon raising the crane hook is axial not only through the extractor pin, but also through the steel core pin. This prevents damage to the extractor or the core and effectively provides for ready extraction.

When the construction above described is used, so little pressure need be brought to bear upon the pin 6 in order to extract the core that the full cross section of the pin is not needed for the extracting operation and consequently the ducts 6*b* and 6*c*, above described, may be formed in the pin without impairing its usefulness. Also, as above described, the ducts serve as a means for carrying off the gases which would otherwise remain within the casting and cause undesirable imperfections therein.

While no claim is made to a collapsible core per se, or to an extractor per se, both of these devices being admittedly old, I am, so far as I am aware, the first to make available for use in casting necked-in ingot molds a collapsible core and collapsible core extractor. The extracting operation is thus facilitated and cheapened and the amount of time and labor incident thereto is greatly reduced.

While I have shown and described a present preferred embodiment of the invention, it is to be distinctly understood that the same is not limited thereto, but may be otherwise variously embodied within the scope of the following claims.

I claim:

1. Molding apparatus, comprising a collapsible core having inner and outer core members, the inner core member having a hole in its top receiving an upstanding pin, and communicating ducts in the top of the inner core member below the hole and in the pin.

2. Molding apparatus, comprising a collapsible core having inner and outer core members, the inner core member having a pin joined integrally with its top and extending therefrom and a sand mold wall covering the sides and the top of the outer core member to the sides of the pin.

3. Apparatus for forming sand molds, comprising a collapsible core having inner and outer core members, the inner core member having a pin of relatively small diameter as compared with the size of such inner core member connected with the top thereof and extending vertically therefrom, and molded sand covering the sides and top of the outer core member to the side walls of said pin.

4. A collapsible core against which sand is adapted to be molded, comprising inner and outer core members, the inner core member having an upward extension of reduced size extending above the outer core member, and molded sand lying generally upon its upper surface and against the extension of the inner core member.

5. Molding apparatus, comprising a collapsible core having inner and outer core members, the inner core member having a socket for receiving an upstanding pin, the outer core member having its upper portion turned inwardly above the socket in the inner core member, and a pin in the socket of the inner core member and extending above the outer core member.

6. Molding apparatus, comprising a collapsible core having inner and outer core members, the inner core member having a socket for receiving an upstanding pin, the outer core member having its upper portion turned inwardly above the socket in the in-

ner core member, and a pin in the socket of the inner core member and extending above the outer core member, the inner core member and pin having communicating ducts.

7. Molding apparatus, comprising a collapsible core having inner and outer core members, the inner core member having a socket for receiving an upstanding pin, the outer core member having its upper portion turned inwardly above the socket in the inner core member, and a pin in the socket of the inner core member and extending above the outer core member, the inner core member having a duct leading from its interior and terminating in the socket, and the pin having a duct communicating with the duct in the inner core member.

8. Molding apparatus for casting ingot molds, comprising a flask, a collapsible core therein having inner and outer members, the upper end of the outer member being below the upper edge of the flask, a pin extending upwardly from the inner member, and a sand wall on the face of the outer member on the sides and top to the side of the pin, there being space for the reception of molten metal above the sand wall and below the upper edge of the flask to form necked in walls of the molds.

In testimony whereof I have hereunto set my hand.

FRANK J. LEUTHNER.