Feb. 9, 1926. 1,572,706

F. H. CHAPIN

MOLD FOR MAKING SHRINK HEAD CASINGS

Filed Sept. 16, 1925 2 Sheets-Sheet 1

Fig. 2.

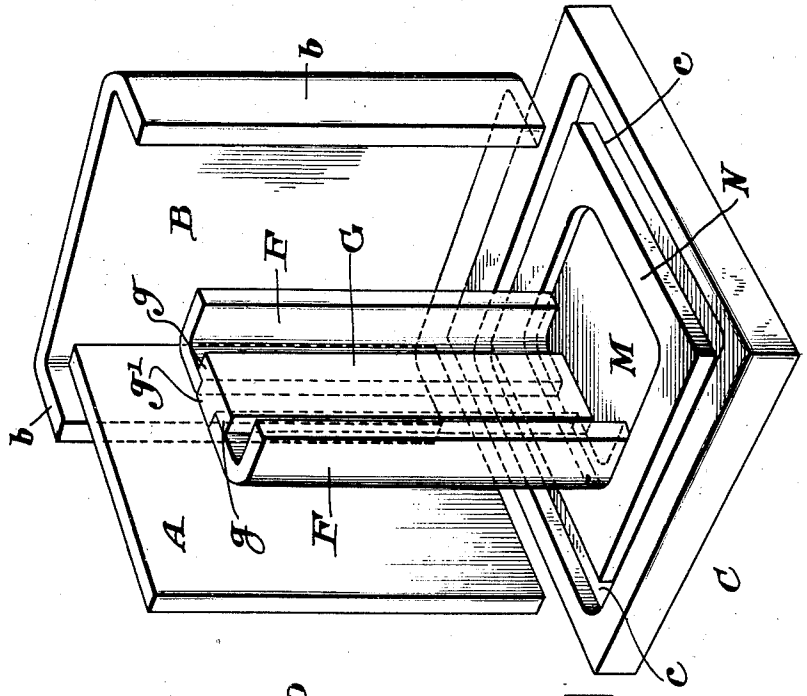
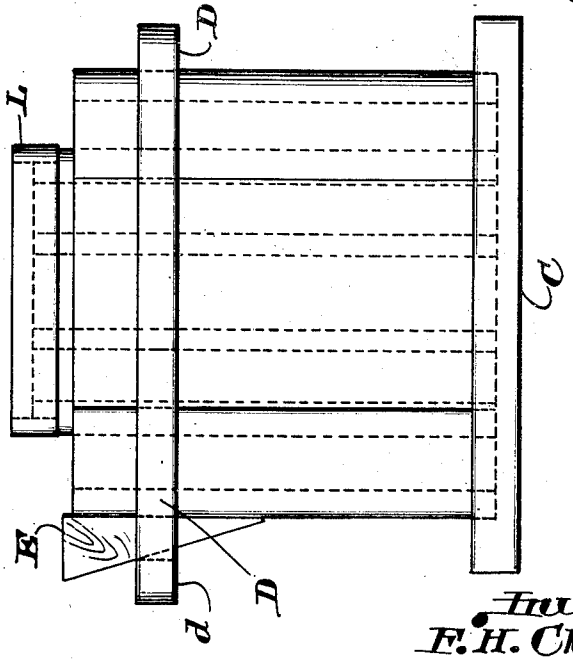


Fig. 1.



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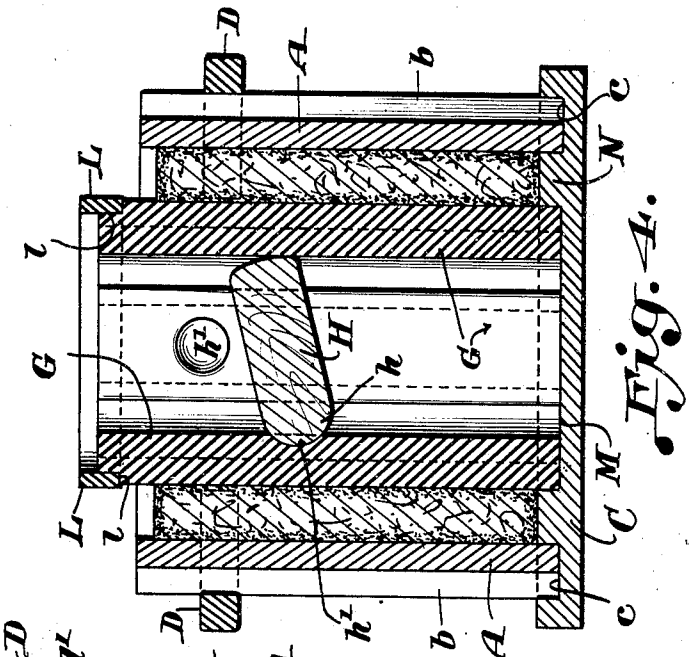


Fig. 4.

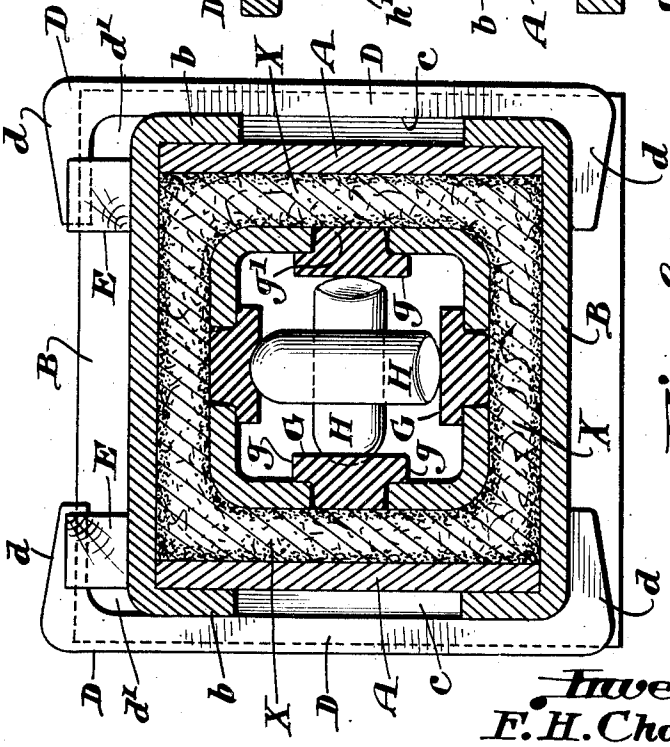


Fig. 3.

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UNITED STATES PATENT OFFICE.

FRED H. CHAPIN, OF CLEVELAND, OHIO, ASSIGNOR TO THE BOURNE-FULLER COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

MOLD FOR MAKING SHRINK-HEAD CASINGS.

Application filed September 16, 1925. Serial No. 56,754.

To all whom it may concern:

Be it known that I, FRED H. CHAPIN, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Molds for Making Shrink-Head Casings, of which the following is a specification.

This invention relates to molds for making shrink head casings for ingot molds.

In casting steel ingots, it is customary to pour the molten metal into the mold through what is called a feeder, hot top or shrink head casing into which the molten metal rises during the latter part of the pouring operation and within which a pool of molten metal is maintained long enough to feed the molten metal to the pipe or cavity naturally forming in the solidifying metal so that whatever pipe or cavity remains in the ingot will be confined within the casing or mold top, thus largely reducing the amount of metal cropped from the ingot before it is rolled into blooms or during the rolling process.

Usually shrink head casings of this kind have been made of fire clay. I have found however, that the cost of such casings is very largely reduced by making them of blast furnace slag treated in a new way.

In my U. S. Patent No. 1,547,787 of July 28, 1925, I have shown and described a very efficient shrink head casing made of blast furnace slag and a binder such as cement treated with a substance which prevents the deleterious action of the gas-producing constituents of the mixture. I have found that while such casings are being molded they contract to a considerable extent and if the inner and outer walls of the mold in which such a casing is formed are rigidly held until the material is fully set, hardened or solidified, internal strains are produced which cause the casing to crack or break in various places. To prevent the formation of these strains or stresses and consequent cracking or breaking of the casing, I have devised a mold in which the material is molded or given shape between inner and outer walls provided with means for rigidly holding them in position until an initial shape is given to the material but which can be released from the casing at different periods during the molding operation. In practice, the inner walls are released as soon as the material has partially set, hardened or solidified or as soon as a skin has been formed on the surface of the material sufficiently strong to support the softer material within the skin. After this the partially solidified casing is allowed to remain within the outer mold walls until it has hardened to the desired extent when the outer mold walls are released and the casing removed and given further treatment when required.

While the mold constructed in accordance with my invention is especially designed to make shrink head casings of the kind shown, described and claimed in my U. S. patent above mentioned, I have found that it is serviceable in molding casings made of properly treated liquid furnace slag and various other materials.

The novel features of the mold construction are herein claimed, while the novel method of producing the casings in such molds is claimed in my copending application filed September 16, 1925, Serial No. 56,753.

In the accompanying drawings I have illustrated the best way now known to me of embodying my invention.

Figure 1 is a front elevation of a mold constructed in accordance with my invention for making shrink head casings of the general shape or form shown in my U. S. patent of July 28, 1925.

Figure 2 is a perspective view of parts of the mold showing how the mold members are assembled.

Figure 3 shows a horizontal section of the mold in active position for the initial part of the molding operation.

Figure 4 shows a vertical section of the mold with the mold members in the same position as that shown in Figure 3.

Both the inner and outer walls of the mold are composed of a plurality of sections.

In the preferred construction, the outer walls comprise two similar members A and two similar members B. The members A are of a general rectangular shape being of the same width and height. The members B are of the same size and shape and each of these members B has an inwardly projecting flange *b* at each end. The lower

ends of the members A and B are seated in a bottom member C provided with a recess *c* extending continuously around the inner side of the bottom member. The lower ends of the members A and B closely fit within the recess *c* in such manner that they cannot be moved laterally in either direction. These recesses are wide enough to accommodate not only the lower ends of the members B including the flanges *b*, but also the lower ends of the members A. This construction is clearly shown in the drawings. In order to hold the outer walls of the mold firmly in place, I employ locking bars D which have at opposite ends arms *d*, which overlap the end portions of the members A. The distance between the two arms of each locking bar is such as to provide a space *d'* to receive a wedge E. When the wall members A are placed in proper position and the locking bars D are applied, the wedges may be driven home in such manner as to securely lock the members A in operative position. The inner walls of the mold are preferably made of eight separate pieces. There are four corner members F, all of the same size and shape and four intermediate members G all of the same size and shape. The members G are T-shaped, having portions *g* which overlap the inner ends of the corner members F and a central portion *g'* which is adapted to enter between the extreme inner ends of two corner members. When the intermediate members G engage the corner members, the inner wall of the mold as a whole is rigidly held but when the intermediate members are withdrawn, the inner wall of the mold is released from the material being molded. In order to securely lock the inner wall members in place, I employ locking blocks H of the kind shown in Figure 3; two such blocks may be used. They are somewhat longer than the distance between two intermediate members when these members are in locked position. One end of each block H may be curved or rounded as indicated at *h* and seated in a recess *h'* in one of the members G. The opposite end of the block H may abut against an opposite intermediate member G. It will be understood that only two locking blocks H are necessary, one being employed between each two intermediate members G. A locking ring L is adapted to be seated in rabbets or recesses *l* formed in the upper ends of the members F and G. The lower ends of the members F and G project into a recess M in the middle portion of the bottom member C and when the ring L is applied and the blocks H are forced into active position, the outer portions of the lower ends of the members F and G are pressed against the inner sides of a rib or flange N surrounding the recess M. The ring L and the flange N limit the outward movement of the members F and G when the bracing blocks H are put under strain.

When the parts are in the condition shown in Figure 3, the material X to be molded may be poured in between the inner and outer walls of the mold and allowed to partially set, harden or solidify. In practice, it is found that a skin such as indicated at *x* is formed along the material if the material is allowed to stand for a few minutes, say ten to fifteen minutes. This skin is sufficiently strong to support the softer material within the skin.

When the parts are in the condition shown in Figure 3, the material in a liquid, plastic or semi-fluid condition, is poured into the space between the inner and outer mold walls in the manner indicated in Figure 3 and the material is allowed to partially set, harden or solidify in the manner before described. After this, the bracing blocks H are knocked out of operative position and the inner walls of the mold collapse, in other words, they are withdrawn from contact with the casing being formed so that the casing is allowed to freely contract as it naturally does during solidification. In this way, I prevent the presence of interior strains or stresses in the casing which would occur if freedom of contraction was not provided for. The mold walls or sections are of non-resilient or rigid material as shown in the drawings and in the use of the mold the sections are rigidly connected with each other by the fastening devices shown and the mold walls can neither expand nor contract until the fastening devices are released.

In the condition shown in Figure 4, the mold is allowed to stand until the material has set, hardened or solidified to the desired extent throughout the casing and then the locking bars D are removed and allowed to drop away from the casing. The casing is now completely molded. It may in some cases be used in this condition or it may be further treated in the manner described in my patent before mentioned or in other ways.

I claim as my invention:

1. A mold for making shrink head casings for ingot molds comprising non-resilient outer walls composed of two sections of approximately the same size and shape and two sections of substantially the same size and shape having flanges at opposite edges which overlap the adjacent edges of the first mentioned sections, means for locking the sections in molding position, non-resilient inner walls composed of separable sections, and means independent of the first mentioned locking means for holding the inner walls in locked position.

2. A mold for making shrink head casings for ingot molds comprising a recessed bot-

tom member, non-resilient outer mold walls composed of two sections of approximately the same size and shape, and two sections of substantially the same size and shape having flanges at opposite ends which overlap the adjacent edges of the first mentioned sections, and the lower ends of which four sections are seated in said recesses in the bottom member, means for locking the outer walls in molding position, non-resilient inner walls composed of separable sections having their lower ends seated in said recesses in the bottom member, and means for holding the inner walls in locked position.

3. A mold for molding shrink head casings for ingot molds comprising a recessed bottom member, outer walls composed of separable sections having their lower ends seated in said recesses, locking bars and wedges for holding the outer wall members in position, non-resilient inner walls composed of separable sections having their lower ends seated in said recesses in the bottom member, a locking ring applied to the upper ends of the inner wall members and bracing blocks engaging the members of the inner wall.

4. A mold for forming shrink head casings for ingot molds comprising non-resilient outer wall members flanged at their opposite ends, rectangular non-resilient wall members interlocking with the first mentioned members, a bottom mold member in which the lower ends of the outer wall members are supported, locking bars and wedges engaging the upper portions of the outer wall members, and non-resilient inner wall members comprising corner sections and intermediate sections supported on the bottom member of the mold, a retaining ring engaging the upper ends of the inner wall members and bracing blocks engaging the members of the inner walls for locking them in molding position.

5. A mold for making shrink head casings for ingot molds comprising non-resilient outer walls composed of separable sections, means for locking them in molding position, and a core for the mold comprising four corner members and four spacing members interposed between the four corner members and devices for holding said intermediate members in position to thus hold the corner members in place.

In testimony whereof, I have hereunto subscribed my name.

FRED H. CHAPIN.