March 15, 1932. W. H. HAWS 1,850,060

HOT TOP FOR INGOT MOLDS

Filed Dec. 30, 1930

Fig. 1

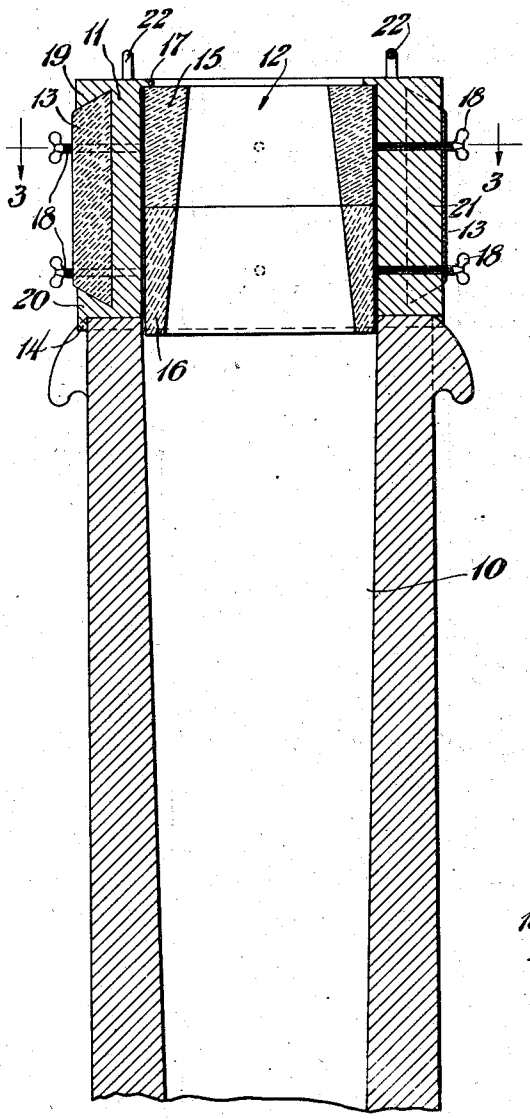


Fig. 2

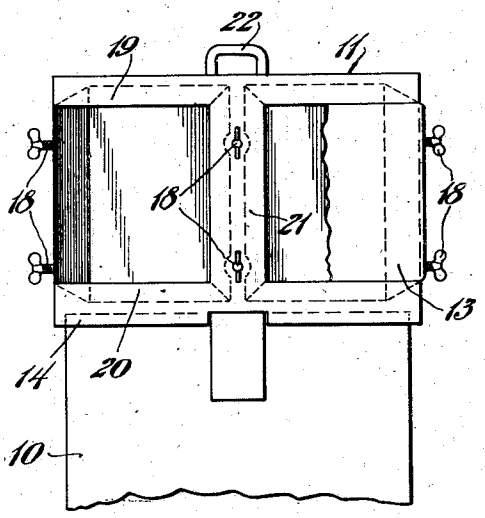
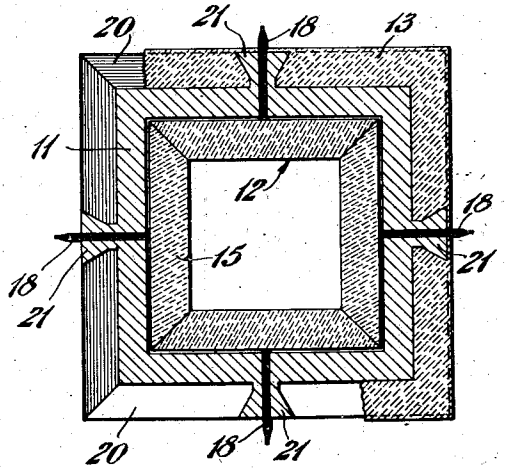


Fig. 3



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UNITED STATES PATENT OFFICE

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HOT TOP FOR INGOT MOLDS

Application filed December 30, 1930. Serial No. 505,635.

This invention relates to hot tops for ingot molds and, among other objects, aims to provide a removable hot top which may be used for a number of heats.

In the accompanying drawings showing the preferred embodiment of the invention:

Fig. 1 is a vertical section through the upper part of an ingot mold showing a hot top in position thereon;

Fig. 2 is a side elevation of the hot top, showing only the upper part of the mold; and

Fig. 3 is a cross section on the line 3—3 of Fig. 1;

Heretofore, it has been proposed to use hot tops for ingot molds in which an inner lining of fire brick is secured within the hot top casing. However, it has been found in practice that the molten metal will freeze to the lower portion of the brick and when the metal shrinks, this tends to draw the lining downwardly; but as the lining is held against such movement, the lining will either crack or crumble, or if the lining fails to give, fractures will be caused in the ingot. The present invention provides a hot top casing having a lining of fire brick which is so arranged that it may be released from the casing and follow the metal downwardly as its shrinks.

Referring particularly to the drawings, there is shown an ingot mold 10 of standard construction, on which is placed a hot top consisting generally of a metal casing 11 having an inner lining 12 of refractory material, such as fire brick, and having an outer lining 13 of initially plastic refractory material, such as fire clay, or a mixture of fire clay and ground slag, or other suitable material. The casing 11, in the precent instance, is generally rectangular, as shown in Fig. 3, and has a depending marginal shoulder 14 fitting outside of the upper end of the ingot mold 10, as shown, to center the casing with respect to the mold and thus hold the hot top in position. The inner contour of the casing is the same shape and size as the inner contour of the top of the mold, and the inner faces of the casing walls are substantially perpendicular.

The fire brick lining within the casing is preferably made in two courses 15 and 16, each course being composed of four bricks having mitered ends as shown in Fig. 3. The fire bricks have their inner faces tapered so that the lining is thickest at the top, to withstand the abrasion of the molten metal when it is poured in the opening. The lower ends of the lower course of bricks 16 extend slightly below the bottom of the casing so as to project down into the top of the mold. The fire brick lining is slightly smaller than the inside of the mold so that the bricks forming the lining may readily be inserted in or removed from the casing. The bricks are inserted in the casing from the bottom and the upper ends of the bricks in the top course 15 abut against an inner marginal flange 17 at the upper end of the casing.

It is obvious that the bricks would fall out of the casing unless some means were provided to suspend them in the casing. To this end, a plurality of set screws 18 are provided, being threaded through openings in the side walls of the casing, there preferably being two screws in each wall, one above the other, so that at least one screw bears against the back of each brick. The screws preferably have coarse threads so that only a small amount of turning is required to hold or release the bricks.

The outer lining 13 is initially plastic and is laid on by trowels or other implements, being held in positon by means of undercut shoulders provided by horizontal ribs 19, 20 at the top and bottom of the hot top, and by vertical ribs 21 intermediate the corners of the hot top. The ribs 21 are preferably generally dove-tailed in cross section, as shown in Fig. 3, and the threaded openings for the screws may extend through these ribs 21. The refractory material 13 is packed into the spaces between the ribs, as clearly shown, and is securely held, when hardened, by the undercut shoulders and ribs. Preferably, but not necessarily, the refractory material 13 may be plastered over the outside surfaces of the ribs 21, as shown in Fig. 3. When the hot top is to be removed, it is lifted off the ingot mold by means of lugs 22 secured to the top of the frame 11.

When the molten metal is poured into the mold through the hot top opening, the inner lining of refractory material absorbs sufficient heat from the molten steel to become very hot, thus heating up the metal casing and the outer refractory lining. The latter acts as an insulator, radiating its heat relatively slowly, and greatly aiding in prolonging the period of time during which the upper end of the ingot is prevented from freezing.

When a heat is to be poured, the hot top is prepared, and the set screws are adjusted to hold the lining in place. The hot top is then placed in position on the mold and the molten metal poured through the tapered opening. The inner marginal flange 17, extending as it does partially over the top bricks, prevents the metal from entering the space between the bricks and the casing. When the metal freezes sufficiently, the lower set screws 18 are loosened and the lower bricks float on the top of the congealing mass of metal. They are then free to follow the metal downwardly as it shrinks. When the mold is to be stripped from the ingot, the hot top is raised from the mold, carrying the upper bricks 15 with it and leaving the lower bricks 16 adhering to the upper end of the ingot. These bricks are broken loose from the ingot and of course are destroyed. The hot top is ready for use as soon as a new lower course of bricks is secured in the casing. After the hot top has been used for a number of heats, it may be found that the upper bricks are becoming impaired, and if so, they may be easily replaced by loosening the upper set screws. It will be seen that by reusing the upper course of brick, very worth while economies are realized as fewer bricks are needed, handling charges on the reduced number of bricks are less, and both labor and time are materially reduced.

The present invention is an improvement on the invention described and claimed in my copending application Ser. No. 485,979, filed October 2, 1930.

Obviously, the present invention is not restricted to the particular embodiment thereof herein shown and described.

What is claimed is:

1. A hot top for molds comprising, in combination, a metal casing having lower and upper open ends; an inner lining of fire brick in two courses, one above the other; releasable means on the casing to hold the bricks in the casing whereby the lower or both courses may be released to follow the metal downwardly in the mold as it shrinks.

2. A hot top for ingot molds comprising, in combination, a hollow metal casing having an inner contour of the same shape and size as the top of the mold; a refractory lining for the casing, said lining being formed of courses of fire brick, each course being made in sections having mitered ends; set screws threaded through the walls of the casing and bearing against the back of the sections to hold the ends of the sections against each other to hold the lining suspended in the casing.

3. A hot top for molds comprising, in combination, a hollow rectangular metal casing; an outer lining of refractory material; an inner lining of fire brick in courses one above the other, the outer contour of the inner lining being slightly smaller than the inner contour of the casing; an inner marginal flange at the upper end of the casing against which the upper course abuts; and releasable means on the casing to hold each course independently in the casing.

4. A hot top for ingot molds comprising, in combination, a metal casing; an inner refractory lining within the casing and removable through the lower end thereof; and means mounted on the casing and engageable with said lining to hold the lining against dropping out of the casing; said means being readily movable by an operator to permit the lining to follow the metal downwardly in the mold as it shrinks.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature.

WILLIAM H. HAWS.