Aug. 11, 1931. W. H. HAWS 1,818,477

HOT TOP FOR INGOT MOLDS

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Fig. 1

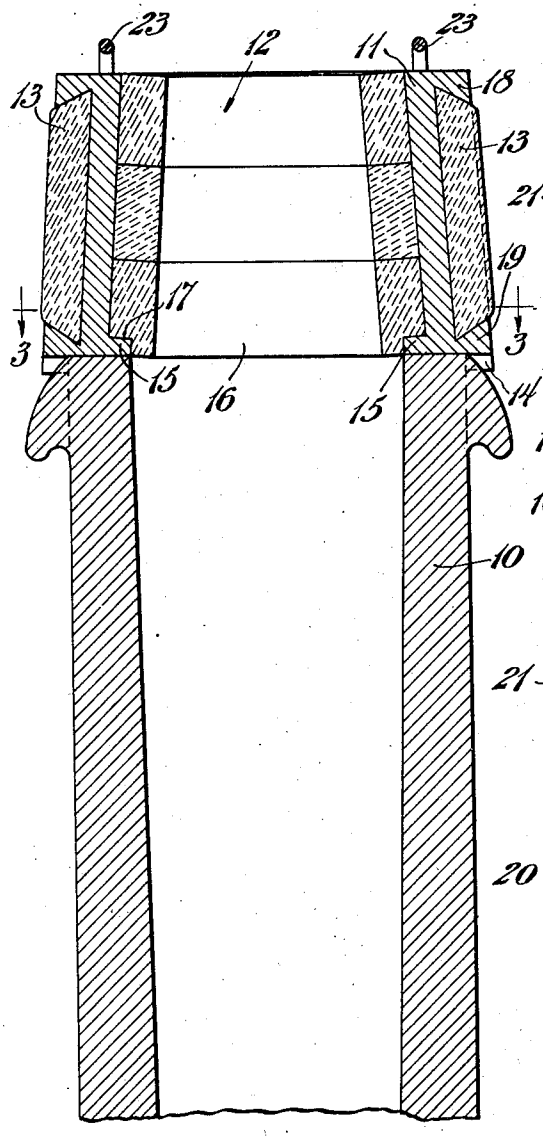

Fig. 2

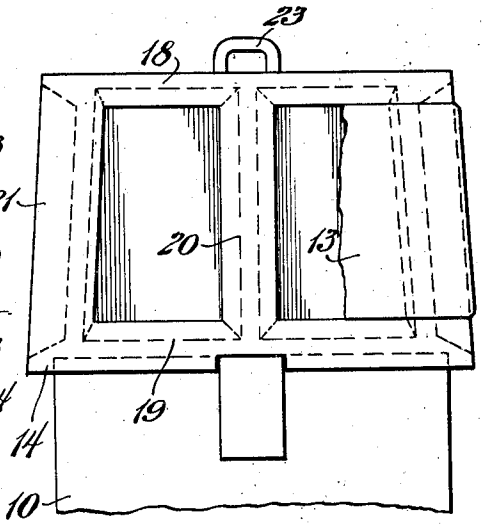

Fig. 3

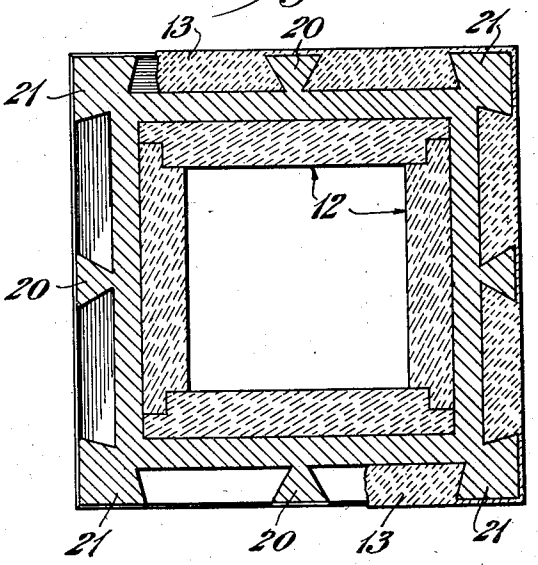

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Fig. 4

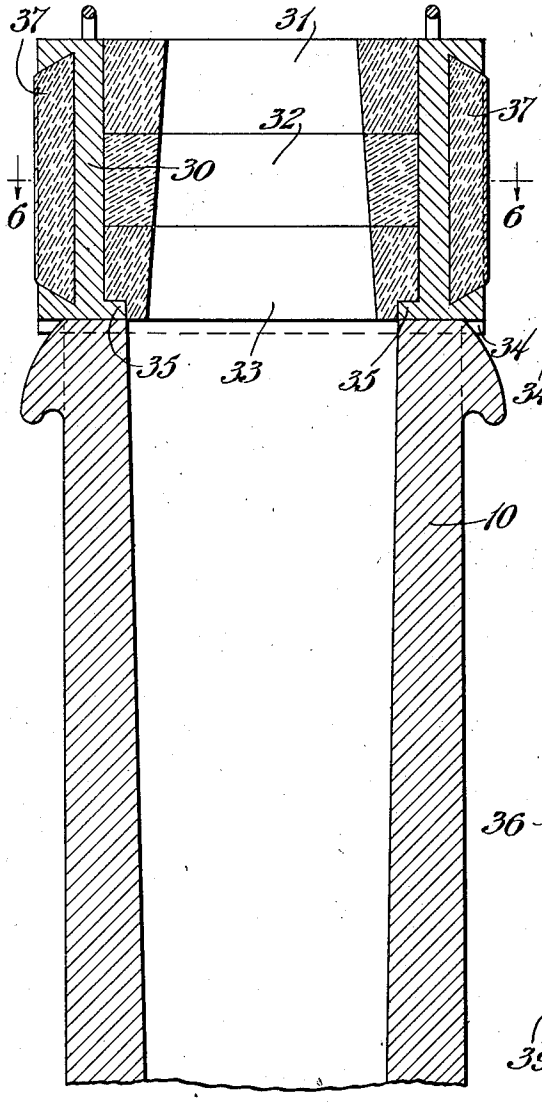


Fig. 5

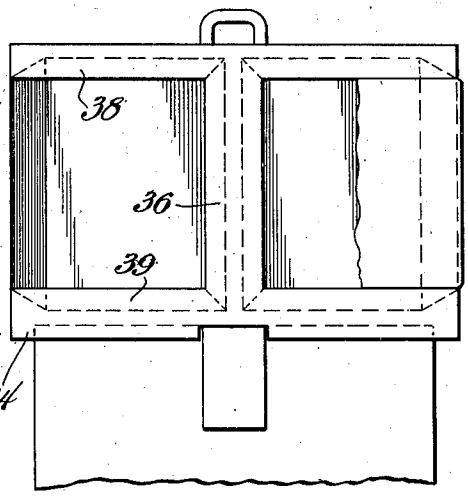
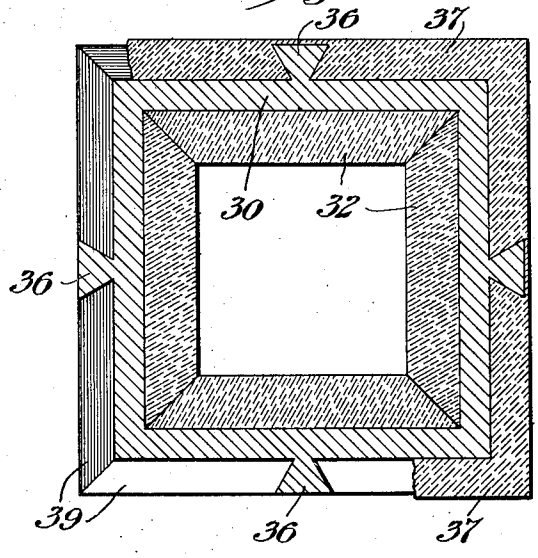


Fig. 6



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UNITED STATES PATENT OFFICE

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HOT TOP FOR INGOT MOLDS

Application filed October 2, 1930. Serial No. 485,979.

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 without renewal of any of its parts.

In the accompanying drawings showing two embodiments of the invention,

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

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

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

Fig. 4 is a view like Fig. 1, but showing another form of hot top;

Fig. 5 is a view like Fig. 2, showing the form of Fig. 4; and

Fig. 6 is a cross section on the line 6—6 of Fig. 4.

Referring particularly to Figs. 1–3, there is shown an ingot mold 10 of standard construction, on which is placed a hot top consisting generally of a metal frame 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 frame 11 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, thus holding the hot top in position. The frame 11 is also provided with an inner marginal shoulder 15 at the bottom thereof for supporting several courses of fire brick together forming the inner lining 12, the bricks in the lower course 16 each being provided with an outer shoulder 17 fitting over the shoulder 15, as shown in Fig. 1. Each of the fire bricks forming the lining 12 has an interlocking engagement with the other fire bricks at its opposite ends, preferably by means of rabbet joints, shown in Fig. 3. Preferably, the fire bricks are of substantially uniform thickness, except where the shoulder 17 is provided, and form a tapering passageway through which the molten steel is poured, the frame 11 tapering toward its upper end for this purpose.

The outer lining 13 is initially plastic and is laid on by trowels or other implements, being held in position by means of undercut shoulders provided by horizontal ribs 18, 19 at the top and bottom of the hot top, by vertical ribs 20 intermediate the corners of the hot top, and by corner ribs 21. The ribs 20 and 21 are preferably generally dove-tailed in cross section, as shown in Fig. 3. The refractory material 13 is packed into the spaces between the ribs, as clearly shown, and is securely held when hardened. Preferably, but not necessarily, the refractory material 13 may be plastered over the outside surfaces of the ribs 20 and 21, as shown in Figs. 2 and 3. When the hot top is to be removed, it is lifted off the ingot mold by means of lugs 23 secured to the top of the frame 11.

In the form of Figs. 4, 5 and 6, the hot top frame 30 does not have a taper and in order to give the opening in the hot top a taper, the fire bricks 31, 32 and 33 have their inside faces tapered, as shown in Fig. 4. The fire bricks have mitered ends, as shown in Fig. 6, and are thus held in position within the frame 30. The frame 30 has a marginal shoulder 34 corresponding to the shoulder 14, and also an inner fire-brick-supporting shoulder 35 corresponding to the shoulder 15. Dove-tailed ribs 36 intermediate the corners of the hot top are provided to hold the outer lining of refractory material 37 and upper and lower ribs 38 and 39, undercut like ribs 18 and 19, assist in holding the outer lining in position.

Both forms of the invention may be used for several heats, the inner lining of refractory material absorbing sufficient heat from the molten steel to become very hot, thus heating up the metal frame 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. After several heats, some or all of the bricks may be replaced without any difficulty and the outside refractory lining may be easily removed and a new one plastered on.

Obviously the present invention is not re-

stricted to the two embodiments herein described and shown.

What I claim is:—

1. A hot top for ingot molds comprising, in combination, a metal frame having means for supporting inner and outer linings; an inner lining of refractory material; and an outer lining of refractory material.

2. A hot top for ingot molds comprising, in combination, a metal frame having means for supporting inner and outer linings; an inner lining of refractory material; an outer lining of initially plastic refractory material; said frame having undercut shoulders providing spaces into which said initially plastic refractory material is packed so that the outer lining is held upon the frame.

3. A hot top for ingot molds comprising, in combination, a metal frame having means for supporting inner and outer linings; an inner lining of refractory material; an outer lining of initially plastic refractory material; said frame having spaced vertical ribs which are generally dove-tailed in cross-section and upper and lower shoulders undercut on the under and upper faces respectively, and the initially plastic refractory material being spread between the ribs and shoulders and interlocked therewith.

4. A hot top for ingot molds comprising, in combination, a rectangular metal frame having vertical ribs at the corners and intermediate the corners undercut on each side so as to be generally dove-tailed in cross-section, and also having upper and lower shoulders undercut on the under and upper faces respectively; a mass of initially plastic refractory material spread between the ribs and shoulders and interlocked therewith; and an inner lining of refractory material also supported by the frame.

5. A hot top for ingot molds comprising, in combination, a metal frame having means for supporting inner and outer linings; an inner lining of fire bricks laid in a plurality of courses, one above the other, and having tapered inner faces so that there is a passageway tapering toward the upper end, and interlocking with each other at their ends so as to be held within the frame; and a lining of refractory material supported on the outside of the metal frame and providing a heat-retaining layer for the hot top.

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

WILLIAM H. HAWS.