

Aug. 30, 1932.

E. J. KAUFFMAN
SUPPORT FOR HOT TOPS

1,874,304

Filed April 11, 1930

2 Sheets-Sheet 1

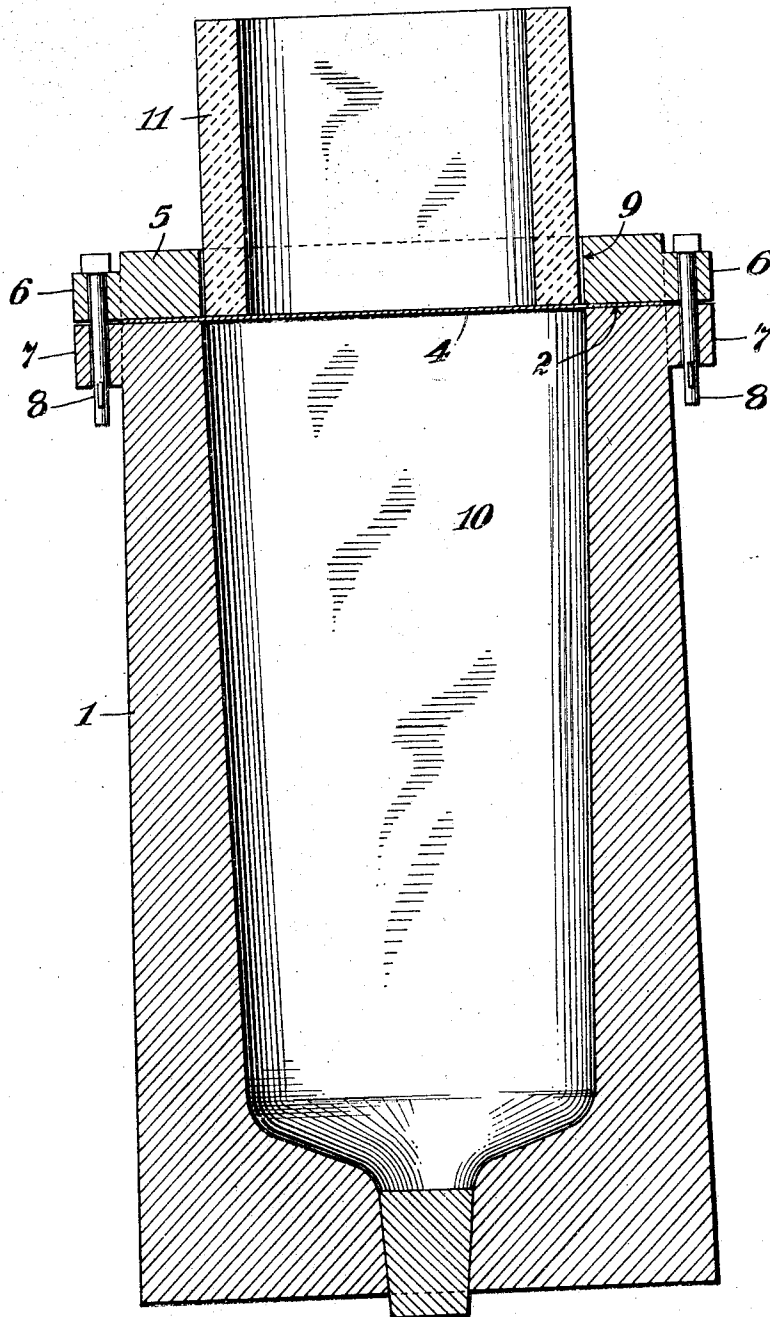


Fig. 1.

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2 Sheets-Sheet 2

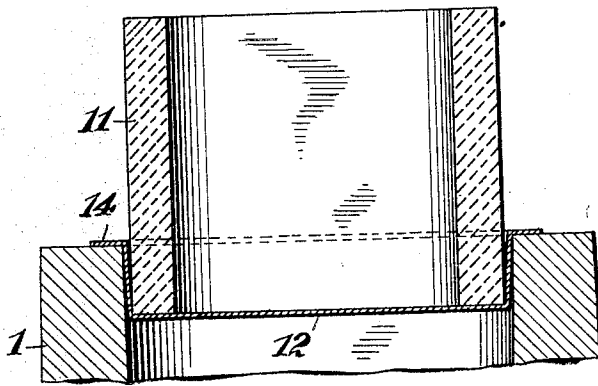


Fig. 2.

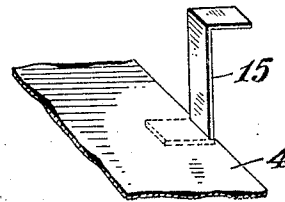


Fig. 4.

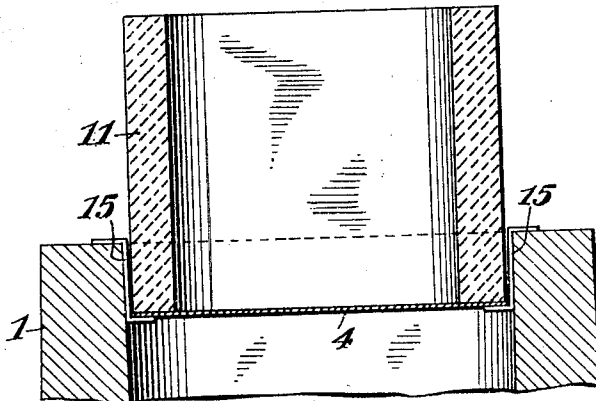


Fig. 3.

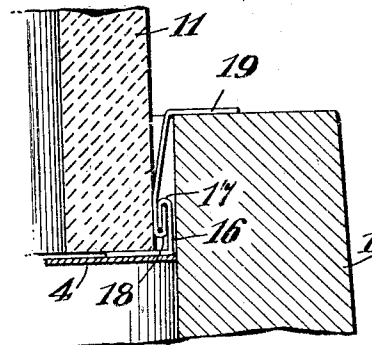


Fig. 5.

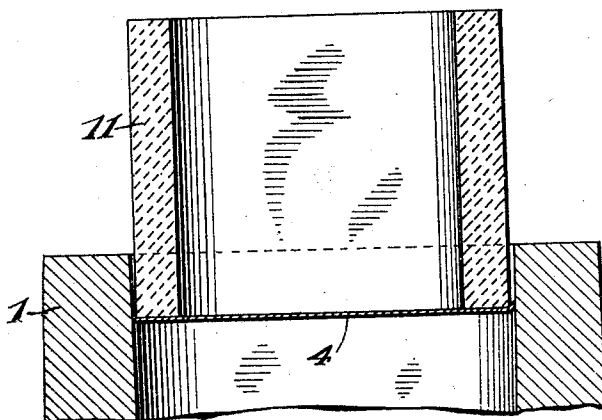


Fig. 7.

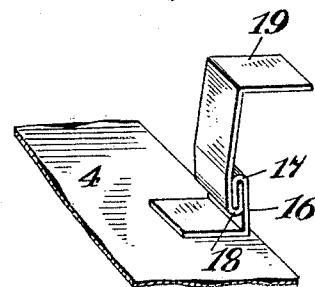


Fig. 6.

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SUPPORT FOR HOT TOPS

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The present invention relates broadly to metallurgy and more especially to a support for hot tops used in the manufacture of steel ingots.

Heretofore in the art, it has been customary to support hot tops by setting the same on the top end of the mold or by mounting the same in the mold with suitable side supports. In prior art structures, the hot top has been left open so that any foreign substances, such as pieces of material falling from the hot top or other substances dropping into the hot top, could drop into the bottom of the mold. This was particularly true where the mold set-up was made some little time prior to casting the ingot. Foreign substances dropping into the mold contaminate the ingot because the stream of molten steel poured into the mold would often submerge such foreign particles and cause them to be trapped in the freezing metal. The present invention overcomes the prior art by providing a protecting sheet as a support for the hot top. This sheet may comprise a thin sheet of metal such as mild steel or heavy paper or other suitable materials. The supporting sheet preferably is continuous so as to completely seal the upper end of the mold set-up. This sheet will catch and hold any foreign substance which otherwise would fall to the bottom of the mold. When the stream of molten steel strikes the continuous sheet it substantially instantaneously burns a hole through the sheet and the stream of molten steel enters the mold through such opening. However, where desired, a small opening may be made in the sheet, and the molten steel poured through this opening.

The hot top in accordance with the present invention preferably is of the floating hot top type which is adapted to be freely movable in the upper end of the mold when the ingot is completely poured. This freely floating hot top arrangement becomes effective when the molten steel rises against the supporting sheet. The molten steel either melts the thin metal sheet or burns the paper or similar sheet so that when the steel rises beneath the hot top sufficiently to float the same, the positive rigid support for the hot top is de-

stroyed. This leaves the hot top free to follow the contraction of the ingot lengthwise and thereby obviate hanger cracks in the side skin of the ingot, which usually occur when the ingot is stuck to and hanging from a rigidly supported hot top.

It is realized that the present invention may be practiced by constructions other than those specifically herein illustrated and therefore the disclosure is to be understood as illustrative and not in the limiting sense.

Referring now to the drawings, Fig. 1 illustrates a vertical cross-section through an ingot mold set-up comprising a supporting ring for holding the hot top supporting sheet in place.

Fig. 2 illustrates in section a sheet material support for the hot top being in the form of a cup, with the flanges thereof resting on the end of the mold.

Fig. 3 is a sectional view illustrating a supporting sheet beneath the hot top and sustained in the mold by strap hangers.

Fig. 4 is a detail view illustrating the strap shown in Fig. 3.

Fig. 5 is a detail view illustrating a modification of the strap hanger shown in Fig. 3.

Fig. 6 is a detail of the strap shown in Fig. 5.

Fig. 7 illustrates a sheet hot top support held by frictional engagement with the side walls of the mold.

Referring to the drawings and more especially to Fig. 1, the mold 1 is provided with a substantially plane top 2 upon which a supporting sheet 4 rests. Preferably, a clamp ring 5 bears upon the supporting sheet 4 to hold the same securely in place. This clamp ring may, when desired, be provided with lugs 6 corresponding to lugs 7 on the mold and through which positioning pins 8 may pass in order to accurately center the opening 9 in the clamp ring 5 directly over the matrix 10 of the mold. A hot top 11 sets in the opening 9 in the clamp ring 5. Preferably, the hot top is of destructible material so that the hot top is used but for a single pour. The hot top may comprise a built-up composite body of suitable materials or it may comprise a tile or other well known hot top material.

The supporting sheet 4 preferably is a continuous sheet entirely covering the matrix part of the mold, but where desired a small opening may be left through which the steel stream may be poured without necessity of the stream cutting a hole through the sheet. The sheet may comprise any suitable material but preferably is formed of a thin sheet of mild steel or iron.

Fig. 2 shows the hot top 11 being supported in the mold by a cup shaped supporting member 12 of sheet material having a flange 14 resting on the end of the mold. In this type of construction, the hot top sets down in the mouth of the mold. If desired, the flange may be raised slightly above the end of the mold by wood or other blocks which may be removed when the ingot is poured. This permits the hot top to rest directly on the molten steel and obviates any possibility of the hot top hanging in the mold in such manner as may result in hanger cracks in the upper end of the ingot.

Fig. 3 illustrates a construction similar to Fig. 2 except the continuous supporting sheet 4 instead of being supported by a skirt and flanges is supported by individual Z shaped straps 15 which may, if desired, be attached to the sheet by spot welding, riveting or the like or these straps may be separate members on which the sheet rests.

Fig. 5 illustrates a construction similar to that shown in Figs. 3 and 4 with the exception that a lug 16 is attached to the supporting sheet 4 by spot welding or riveting and is provided with a hook end 17, which is adapted to interlock with the hook end 18 on a supporting strap 19. The supporting straps 19 may be of different lengths so that the operator may adjust the depth to which the hot top extends in the mold to suit his convenience or operating conditions. In practice, the hooks 17 and 18 are sufficiently small in thickness so that the distance between the side wall of the hot top and the inside of the mold is a small space.

Fig. 7 illustrates the supporting sheet 4 being constructed slightly larger than the matrix 1 at the mouth of the mold, so that when the supporting sheet is forced into the matrix, the sides of the supporting sheet frictionally engage the matrix side walls so as to sustain the hot top 11 directly on the sheet without other supporting means.

Where the word "iron" is used in the claim, it is intended to cover mild steel or other forms of sheet iron in which iron forms the major portion of the composition of the sheet.

It will be observed from the foregoing that in each case the hot top is supported by a protective sheet member which is adapted to be destroyed when the ingot mold is filled with molten steel. This supporting sheet catches any foreign substance that may tend to fall

into the mold and holds the same until the molten steel rises into the hot top when the foreign substances are floated upon the molten steel or if they should become trapped in the molten steel, the trapping occurs in that part of the ingot mold which is cropped off when the ingot is being fabricated by the billets, or other fabricated shapes. The edges of the supporting sheet also act to chill any small fin of molten steel that might tend to rise between the hot top and the side wall of the mold. Such fins, if not prevented, may tend to lock the hot top to the mold and cause hanger cracks in the ingot.

Having described my invention, I claim:

In a mold set-up for casting steel ingots, the combination of an ingot mold having a substantially vertical matrix therein, a hot top telescoped into the upper end of said matrix, means to support said hot top, said means comprising a flanged cup of thin sheet iron adapted to melt on contact with molten steel and with the flange of the cup resting on the top of the mold and the bottom of the cup comprising the sole support for the said hot top.

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