Aug. 4, 1936. E. J. TURNER ET AL 2,049,981

HOT TOP

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Fig. 1.

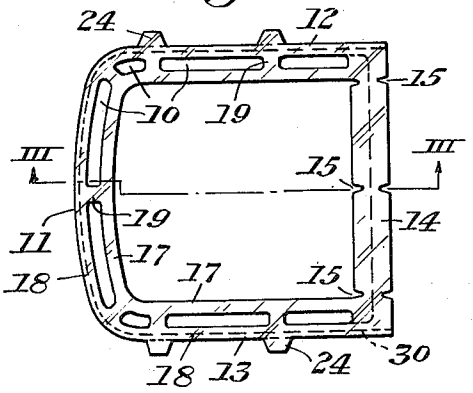


Fig. 2.

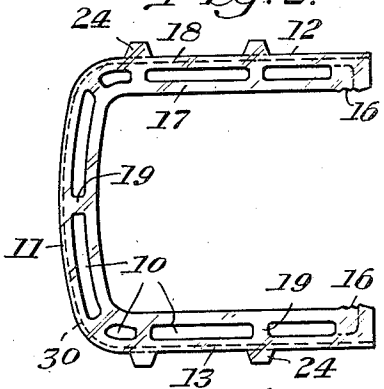


Fig. 3.

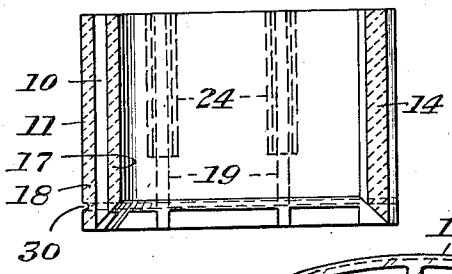


Fig. 4.

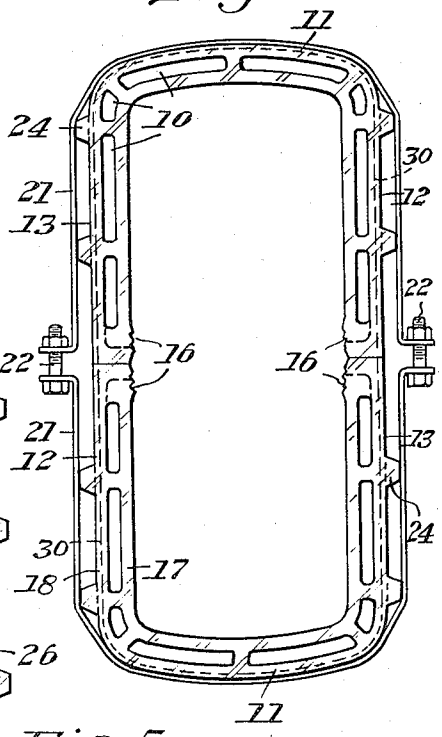


Fig. 6.

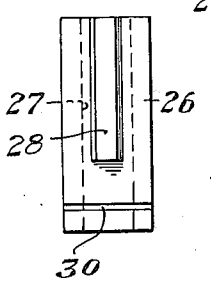
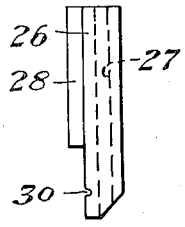


Fig. 7.



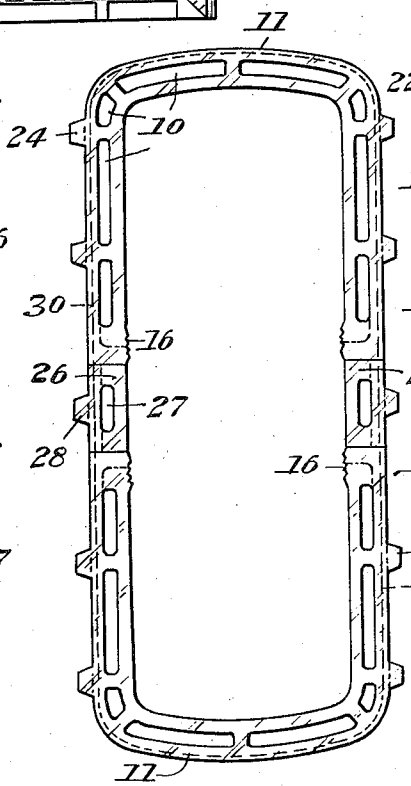


Fig. 5.

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HOT TOP

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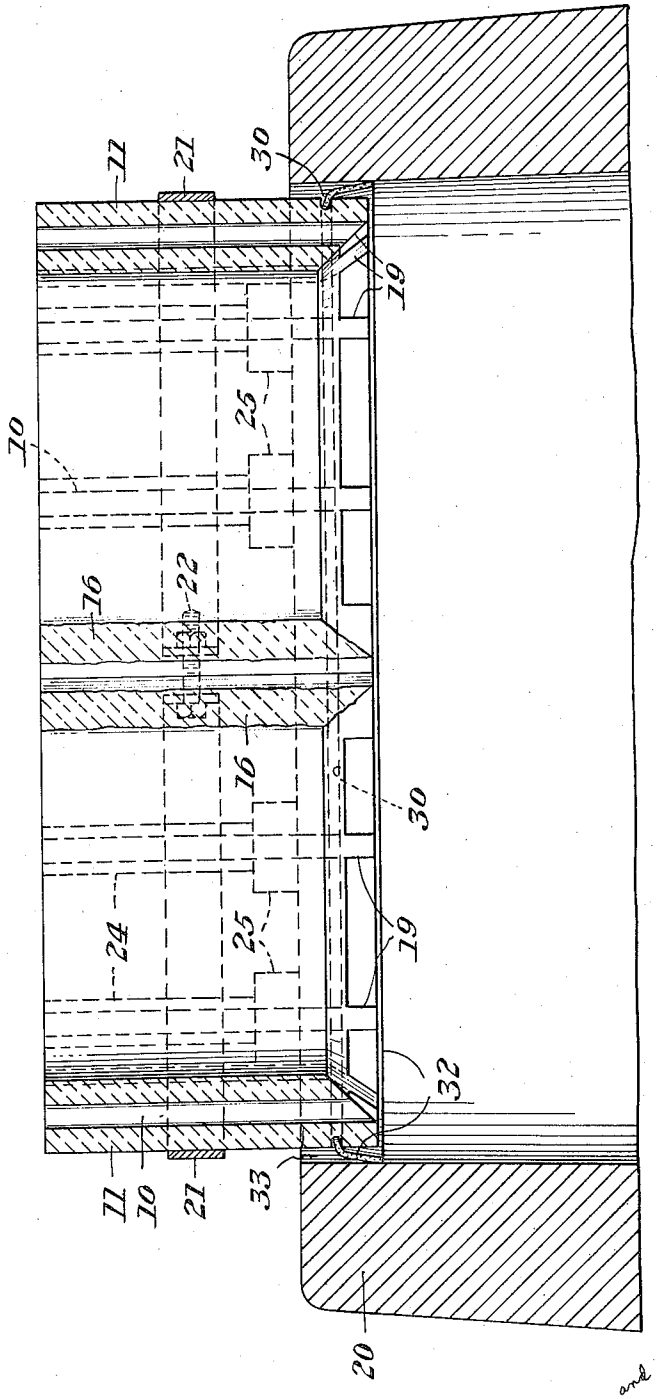


Fig. 8.

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2,049,981

HOT TOP

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Application April 3, 1934, Serial No. 718,795

2 Claims. (Cl. 22—147)

The present invention relates to a sectionally constructed hot top; and more particularly to an improvement in the type of hot tops shown in the patent to Turner, No. 1,666,759.

As set forth in said patent, it is customary in the art to which the present invention relates to utilize hot tops or feeders with ingot molds for the purpose of maintaining a pool of molten metal available for feeding the shrinkage, and thereby decrease segregation and piping. Hot tops are ordinarily constructed of refractory material; and there is a limit to the size of hot top which can be economically constructed and shipped in one piece. In the patent above referred to is disclosed a procedure for making a hot top in sections which are convenient and economical for production and shipping, the complete hot top being brought together in the steel plant by the assembly of sections in the top of the ingot mold.

Such sectionally constructed hot tops are particularly subject to rapid congealing of the metal confined within the hot tops. A hot top is not completely effective once it maintains a body of molten metal available for feeding downwardly by gravity so long as voids or cavities are possible in the body of the ingot due to congealing of the molten metal poured into the ingot mold. It is one purpose of the present invention to perfect the type of hot top shown in the above-mentioned patent, so as to overcome this difficulty with too rapid cooling of the body of molten metal confined within the hot top.

A further object of the construction we have perfected is to pack the joint between the hot top and the ingot mold so as to prevent fins forming at the upper rim of the ingot, and also to avoid hanging of the ingot in the upper end of the ingot mold.

In the drawings which illustrate our invention,

Fig. 1 is a plan view of a hot top section formed as a hollow bay with a bracing wall or web connecting the lateral portions thereof;

Fig. 2 is a similar plan view of such a hot top section with the bracing wall or web broken out;

Fig. 3 is a vertical sectional view on the line III—III of Fig. 1;

Fig. 4 is a plan view of two hot top sections such as shown in Fig. 2, assembled in the top of an ingot mold;

Fig. 5 is a similar view of an assembly of hot top sections adapted to be used with a larger ingot mold than the mold with which the hot top of Fig. 4 cooperates;

Fig. 6 is a view in side elevation of the intermediate section used for lengthening the hot top shown in Fig. 5;

Fig. 7 is an end elevation of the intermediate section shown in Fig. 6; and

Fig. 8 is a vertical sectional view lengthwise of the upper portion of an elongated ingot mold, showing a hot top embodying our invention positioned therein.

In carrying out the present invention, hot top sections are constructed in such configuration and dimensions as to conform to the contour of the upper portion of the ingot mold for which the hot top is required. In constructing a sectional hot top for an ingot mold such as shown in Fig. 8, two end-bay sections are formed which, when assembled in mating relation as illustrated in Figs. 4 and 8, combine to form the desired hot top. Each of these sections is formed with a plurality of suitably arranged air spaces 10, the sections being produced by molding, extrusion or the like, as is customarily practiced for example in the manufacture of hollow tiles. Each end-bay section has a portion 11 which forms the end of the hot top when assembled on the ingot mold. The bay section further includes lateral portions 12 and 13 extending along opposite sides of the ingot mold. The extent of these lateral portions is such that they would be easily damaged in shipment; and as taught in the above-mentioned patent, a bracing wall or web 14 extends between the lateral portions 12 and 13 of the bay section. The bracing wall or web is scored, as indicated at 15, to provide such cleavage lines as will facilitate breaking out the wall 14, as illustrated at 16 in Figs. 2 and 8.

The portions 11, 12 and 13 are extruded or formed in other suitable fashion as compound walls comprising an inner shell 17 and an outer shell 18 connected by relatively narrow ribs or webs 19. The air spaces 10 thus provided in the compound wall increase the insulation of the contents of the hot top against heat loss. Such a hot top as assembled in the top of an ingot mold 20 is illustrated in Fig. 8. A pair of end-bay sections is illustrated in this figure and Fig. 4 as held assembled by surrounding means, with the ends of the lateral portions 12 and 13 abutting to prevent the escape of molten metal. The surrounding means provided for clamping the sections together herein takes the form of one or more straps 21 drawn tight by a bolt or bolts 22 passed through the outturned ends of the strap metal. For large hot tops the sections can be drawn together more snugly if there are two

breaks in the strap metal, one on each side of the hot top, as shown in Fig. 4. The surrounding means thus provided is effective for preventing spreading apart of the end-bay sections by the hydrostatic pressure when the metal is poured so as to rise within the hot top. The portions 11, 12 and 13 of each section may be provided with suitable means 24, such as ribs, cut-outs, shoulders, projections or the like adapted to cooperate with blocks 25 or the upper end of the ingot mold 20 to limit the extent of projection of the hot top into the mold.

In the manufacture of such a sectional hot top, it is of considerable advantage to adopt one or a limited number of standard end-bay sections for making up hot tops for ingot molds of various lengths. An assortment of intermediate sections 26 may be cheaply produced for cooperating with standard end-bay sections, as shown in Fig. 5, to make up hot tops of the desired lengths. As these intermediate sections 26 are quite simple to manufacture, and as they can be made in a variety of different widths, it is possible to fit a large number of sizes of molds with a relatively small number of standard end-bay sections. These intermediate sections 26 are preferably provided with air spaces 27 so as to further decrease the rate of heat flow from the metal within the hot top to the exterior surface of the hot top. Ribs or lugs 28 are formed on the exterior side to position the intermediate members relative to the ingot mold. Surrounding means for clamping the sectional hot top together will be used with this embodiment of the invention similarly as with the first embodiment.

The sections of the hot top may, if desired, be formed with an external groove 30 adjacent the lower extremities thereof. When the sections are assembled, a packing strip 32 may be mounted on the hot top so as to surround the lower portion thereof, one edge of the strip 32 being engaged in the groove 30 to position the strip. This strip may be a steel band or it may be a strip of asbestos or a heavy grade of cardboard. The strip 32 acts as packing to prevent the poured metal rising in the joint 33 between the lower extremity of the hot top and the top of the mold 20. The function of the strip 32 is merely to momentarily stop the rise of the molten metal into this joint 33; as the chilling effect at the opening to the joint 33 almost immediately freezes the metal. Successful results have been obtained with heavy cardboard, even though the latter is quickly carbonized.

The packing strip 32 has the important advantage that it prevents the formation of upstanding fins around the upper rim of the ingot. Such fins are objectionable in rolling the ingot. Should metal rise sufficiently in the joint 33, the freezing of this flange of metal against the wall of the ingot mold 20 may cause the ingot to hang. That is to say, the solidified metal in the joint 33 may adhere to the mold 20; and as the ingot shrinks downwardly due to congealing of the metal, hanging cracks develop which may be as deep as one-quarter of an inch. It is thus apparent that a strip positioned on the hot top in accordance with our invention has the advantage of improving the smoothness of the upper end of the ingot.

We have found the features illustrated and described herein to be of particular advantage in connection with sectional hot tops. There is an unusually difficult problem involved in maintaining a pool of molten metal for the desired length of time in feeding relation to the ingot where the latter is of unusual length with relation to its width. In accordance with our invention, we make it possible to keep the metal in the molten state for a greater length of time, even though the hot top is relatively narrow as compared with its length. Moreover, by our invention we overcome the tendency towards injuring the uniformity and smoothness of the upper end of the ingot which rises out of the joint between the sectional hot top and the walls of the ingot mold. Moreover, hot tops constructed in accordance with our invention can be economically produced so as to conform to the contour of the ingot mold.

While we have illustrated and described certain preferred embodiments of our invention, it will be understood that numerous changes as will readily suggest themselves to those skilled in the art can be made in the construction and arrangement of the parts within the scope of our invention as set forth in the accompanying claims.

We claim:

1. In combination, a hot top having adjacent its lower extremity an external groove and a flexible packing strip positioned on the periphery of the lower extremity of the hot top by having an edge portion of said strip entered in said groove, said strip extending outwardly from the lower extremity of the hot top when in unflexed condition, and being adapted to flex into outwardly pressing engagement with the wall of an ingot mold.

2. In combination, a sectionally constructed hot top comprising wall sections assembled in edge-abutting relation to confine a pool of molten metal, the lower portion of said wall sections being formed with an external groove, and a flexible packing strip surrounding the lower extremities of said sections and positioned thereon by having an edge portion of said strip entered in said grooves, said strip extending outwardly from the lower extremity of said sections when in unflexed condition, and being adapted to flex into outwardly pressing engagement with the wall of an ingot mold.

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