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W. M. CHARMAN

1,804,205

LINING FOR HOT TOPS

Filed Dec. 21, 1929

Fig. 1.

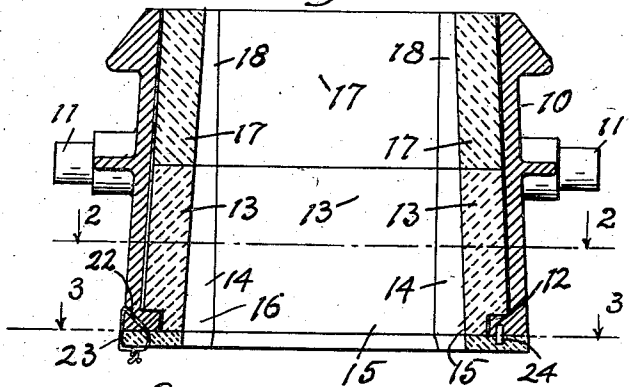


Fig. 3.

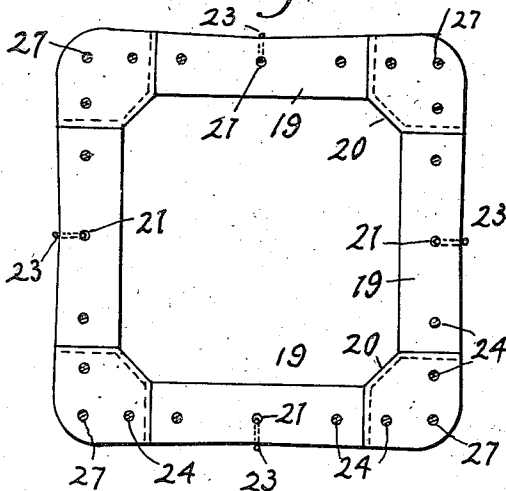


Fig. 2.

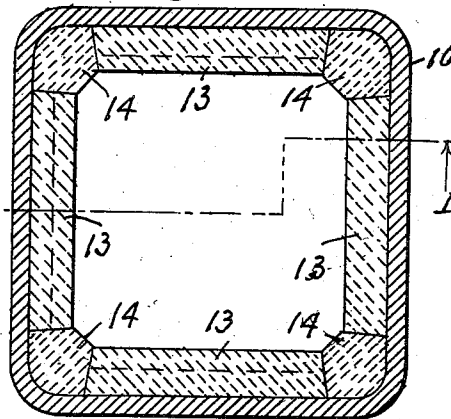


Fig. 5.

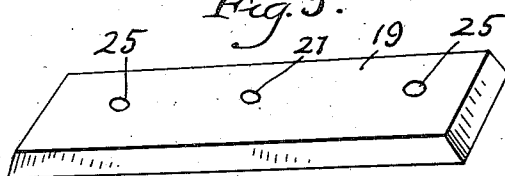


Fig. 6.

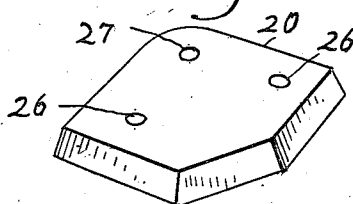
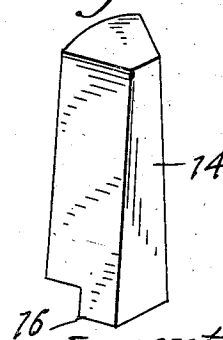


Fig. 4.



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UNITED STATES PATENT OFFICE

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LINING FOR HOT TOPS

Application filed December 21, 1929. Serial No. 415,646.

This invention relates to improvements in lining for hot tops, particularly hot tops of the character of that disclosed in application for patent Serial No. 329,486, filed by Harry J. Darlington and myself jointly, December 31, 1928.

One of the objects of the present invention is the provision of simple and inexpensive lining elements for protecting the lower end of the metal casing, and means for suitably supporting said elements and holding them against lateral movement.

Other objects and features of novelty will appear as I proceed with the description of that embodiment of the invention which, for the purposes of the present application, I have illustrated in the accompanying drawing, in which

Figure 1 is a vertical sectional view through a hot top embodying the invention, the view being taken substantially on line 1—1 of Fig. 2.

Fig. 2 is a horizontal sectional view taken substantially on the line 2—2 of Fig. 1.

Fig. 3 is a plan view of the lower lining course, this view being taken substantially on the section line 3—3 of Fig. 1.

Fig. 4 is a perspective view of one of the corner elements of the semi-permanent upper lining.

Figs. 5 and 6 are perspective views of the side and corner elements respectively of the lower temporary lining course.

In the drawing I have illustrated at 10 a metal casing which may be formed as a single casting or which may be made in a plurality of parts secured together by suitable means. It is provided with trunnions 11 for convenience in handling. Along the bottom of the casing there is an inturned flange 12 which extends entirely around the casing. Above this flange there is supported a semi-permanent lining made up of one or more courses of refractory or other suitable material, each course consisting of a series of elements of different size and shape inter-fitting with as little clearance as the nature of the material and the expansion of the same due to heat will permit. This expansion may be kept within low limits by employing

a so-called sawdust brick mix, wherein the sawdust or like material is burned out in the baking, leaving a porous material which tends to absorb the expansion within its own walls.

In the drawing we have shown two courses of lining elements above the flange 12. The lower course comprises side elements 13 and corner elements 14. Each of the elements 13 has parallel side edges that are beveled as shown in Fig. 2. For a square hot top, like that shown herein, these elements are identical in size. When a rectangular top of a form other than square is used, the elements 13 for two opposite sides will of course be wider than those for the remaining sides. Along its lower outer edge each element 13 is rabbeted to fit over the flange 12, so that a depending portion 15 remains to cover the inner side of the flange. The corner elements 14 are all alike, whether or not the hot top be square. They taper toward their upper ends, and are beveled on their sides to engage with the bevels on the side edges of the elements 13, whereby movement of any of the elements of the course inwardly is prevented. The elements 14 are recessed on their lower outer corners to provide depending portions 16 similar to the depending portions 15. Since the side edges of the elements 13 are parallel, any one of these elements may be withdrawn upwardly, after which all of the remaining elements of the course may be readily removed. In assembling the reverse procedure is followed, that is to say the entire course with the exception of one element 13 is mounted in place on the ledge or flange 12, after which they are all locked together by sliding said element 13 downwardly into position.

The upper course of semi-permanent lining material comprises side elements 17 and corner elements 18. The side elements 17 are of the same width as the elements 13, but are flat on the bottom to engage the flat upper surfaces of the elements 13. The side edges are parallel and beveled in the same manner as in the case of the elements 13. The elements 18 at the bottom are of the same dimensions as the tops of the elements 14, and they

taper off toward their upper ends with the same degree of taper as in the case of elements 14. This upper course is assembled or disassembled in precisely the same manner as is the lower course. When the entire lining above the flange 12 is assembled I prefer to cement the blocks or elements together and to coat their inner surfaces with any suitable preparation calculated to protect the surface of the refractory material and at the same time to form a parting plane between the lining and the ingot. This coating should be renewed after each casting operation.

In order to protect the bottom surface of the casing and the flange 12, and in order to provide a good parting between the ingot and the bottom of the hot top, I employ a lower lining course comprising side and corner elements 19 and 20. These elements are flat on top for engagement with the flat lower surfaces of the casing and flange 12 and the depending portions 15 and 16 of the semi-permanent lining. This lower course is detachably connected to the casing, and is intended to remain upon the ingot when the hot top is stripped therefrom. For thus detachably connecting it to the casing I provide the side elements 19 with holes 21, extending through the same and adapted to register with inclined openings 22 in the casing, so that a soft wire 23 may be threaded through these registering openings and its ends then twisted together, as indicated at the left in Fig. 1. Each of the side elements 19 is beveled at its end across the upper sides thereof, and the corner elements 20 are reversely beveled, so that when the parts are assembled the bevels on the side elements underlie the bevels on the corner elements. Hence the corner elements are supported by the side elements. However, in order to prevent the corner elements from being dislodged laterally, there must be some provision to hold them against lateral movement. Furthermore, where a single fastening only is employed on each side element, it is advisable to prevent that element from turning about its fastening. To this end I mount in the casing a series of depending dowel pins 24 which take into holes or sockets 25 in the elements 19 and into holes or sockets 26 in the elements 20. For the fastenings 23 I employ relatively weak wire, it being necessary to use wire strong enough only to support the weight of the lower lining course.

I prefer to provide the elements 20 with holes 27 which are adapted to register with inclined passages (not shown) in the lower corners of the casing 10, in order that fastenings similar to the fastenings 23 may be used upon the corner elements 20 if desired by the operator. However, I find that such additional fastenings are not essential, and I recommend that they be dispensed with, except

where no means for supporting the corner elements from the side elements is provided.

My hot top is adapted to be inserted within the top of the mold and to float upon the ingot after it has been poured and starts to cool, solidify and shrink. The metal of course rises into the interior of the hot top, and is kept molten by the insulating qualities of the lining until after the metal in the mold proper is solidified. The lower lining course tends to stick to the metal in the mold. Consequently when the hot top is stripped from the ingot the fastenings 23 or their equivalent, being too weak to overcome this tendency, break or fail and a parting takes place between the lower lining course and the bottom of the casing. The rest of the hot top remains sufficiently intact that it may be used repeatedly. Before each heat however, the hot top is mounted by its trunnions 11 in a suitable holder and turned over, after which new elements 20 are placed at the corners with their sockets or holes 26 receiving the corresponding dowels 24 of the casing. Then the four side elements 19 are placed in position with their sockets or holes 25 receiving the corresponding pins 24, after which fastenings 23 are threaded through the four holes 21 and corresponding holes 22 in the casing and twisted together to complete the securing of the lower lining course to the hot top. A new coating of facing material being applied to the upper lining courses, a tight joint being effected between the upper and lower courses and the holes, if any, in the lower elements plugged by the application of proper facing material, the hot top is then ready for further use.

While in the foregoing description and in the accompanying drawing, I have described and illustrated one embodiment of the invention more or less in detail, I desire it to be understood that such detail disclosure has been resorted to primarily for the purpose of fully illustrating the invention, and is not to be construed as amounting to a limitation upon the scope thereof.

Having thus described my invention, I claim:

1. In a hot top, a metal casing having a flat lower surface, a lining for said surface, means for detachably securing said lining to said casing, and projection and socket connections between the lining and the casing for holding the lining against lateral movement.

2. In a hot top, a metal casing having a flat lower surface, a lining for said surface, means for detachably securing said lining to said casing, said lining comprising a plurality of elements, and pin and socket connections between each element and the casing for holding the elements against lateral movement.

3. In a hot top, a metal casing having an intumed bottom flange, lining material supported upon said flange having a depending

portion covering the inner side of the flange, and a lining course detachably secured to the bottom of said casing.

4. In a hot top, a metal casing having an
5 intumed bottom flange, lining material supported upon said flange having a depending portion covering the inner side of the flange, a lining course detachably secured to the bottom of said casing, and pin and socket connections for holding the bottom lining course
10 against lateral movement.

5. In a hot top, a metal casing having an intumed bottom flange, lining material supported upon said flange having a depending
15 portion covering the inner side of the flange, a lining course secured to the bottom of said casing, said course comprising a plurality of elements, and pin and socket connections between each element and the casing for holding
20 the elements against lateral movement.

6. In a hot top, a metal casing having a flat bottom surface, a lining for said surface comprising a plurality of elements, and means for
25 securing every other one of said elements to said casing, the end surfaces of said secured elements being beveled across the top and the end surfaces of the intermediate elements being beveled across the bottom for engagement with the first named bevels, whereby
30 the intermediate elements are supported by the secured elements.

7. In a hot top, a metal casing having a flat bottom surface, a lining for said surface comprising a plurality of elements, means for
35 securing every other one of said elements to said casing, the end surfaces of said secured elements being beveled across the top and the end surfaces of the intermediate elements being beveled across the bottom for engagement
40 with the first named bevels, and means for preventing lateral movement of said intermediate elements.

8. In a hot top, a metal casing having a flat bottom surface, a lining for said surface comprising a plurality of elements, means for
45 securing every other one of said elements to said casing, the end surfaces of said secured elements being beveled across the top and the end surfaces of the intermediate elements being beveled across the bottom for engagement
50 with the first named bevels, and pin and socket connections between said casing and said intermediate elements for preventing lateral movement of the intermediate elements.
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9. In a hot top, a metal casing having an intumed bottom flange, lining material supported upon said flange having a depending
60 portion covering the inner side of the flange and terminating flush with the bottom surface of the casing, a lining course detachably secured to the bottom of said casing and extending beneath said depending portion, and means for preventing lateral movement of
65 said lining.

10. In a hot top, a casing having an internal ledge at the lower end thereof, a lining overhanging said ledge and covering its inner surface, a temporary lining covering the lower surface of said ledge, and means for releasably attaching said last named lining to said casing, said attaching means being adapted to fail when the hot top is stripped from the ingot.
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11. In a hot top, a casing having an internal ledge at the lower end thereof, a lining overhanging said ledge, a temporary lining covering the lower surface of said ledge and the lower end of said first named lining, and means for releasably attaching said last
80 named lining to said casing, said attaching means being adapted to fail when the hot top is stripped from the ingot.

In testimony whereof, I hereunto affix my signature.
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WALTER M. CHARMAN.

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