Oct. 23, 1951 R. E. DALEY 2,572,452

SECTIONAL TAPERED BOTTOM RING FOR HOT TOPS

Filed Feb. 23, 1949

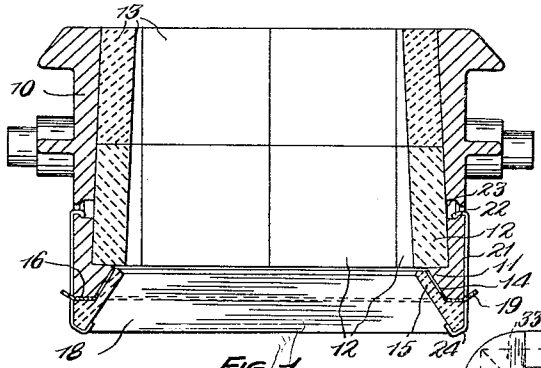


FIG. 1

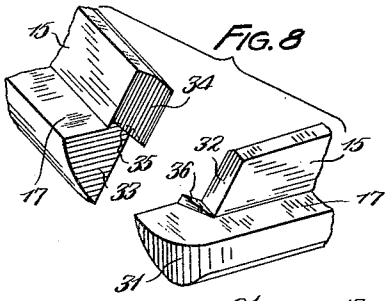


FIG. 8

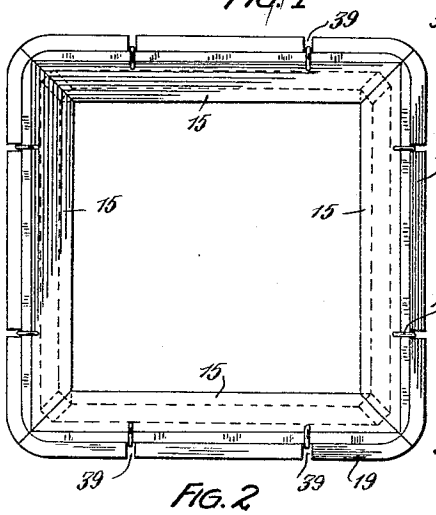


FIG. 2

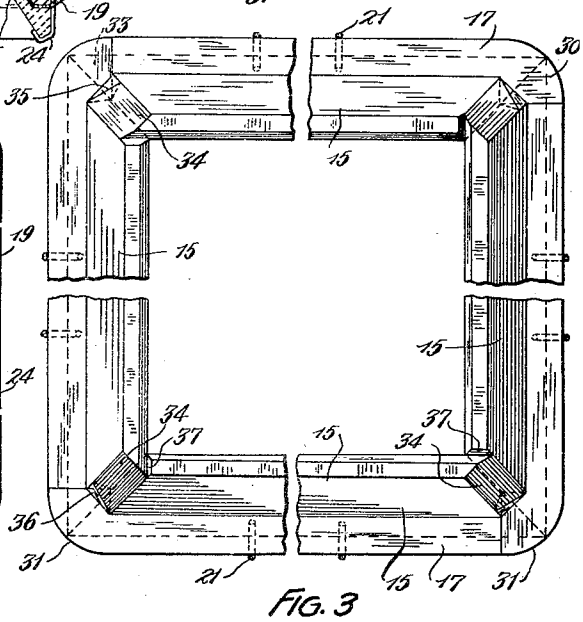


FIG. 3

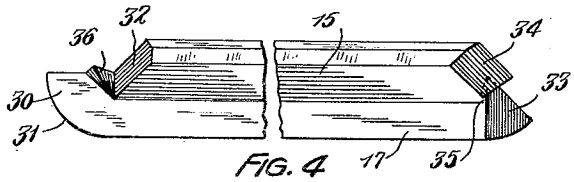


FIG. 4

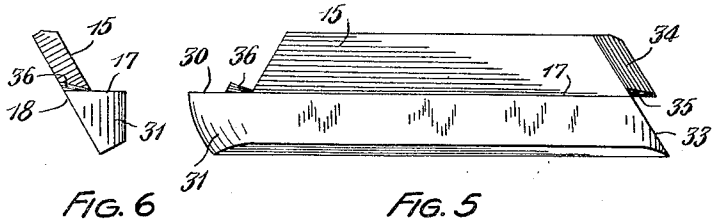


FIG. 6

FIG. 5

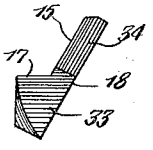


FIG. 7

INVENTOR.

ROBERT E. DALEY

BY Hudson, Boughton,

Williams, David & Hoffmann.

ATTORNEYS

Patented Oct. 23, 1951

2,572,452

UNITED STATES PATENT OFFICE

2,572,452

SECTIONAL TAPERED BOTTOM RING FOR HOT TOPS

Robert E. Daley, Willoughby, Ohio, assignor to The Eerro Engineering Company, Cleveland, Ohio, a corporation of Ohio

Application February 23, 1949, Serial No. 77,778

3 Claims. (Cl. 22—147)

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This invention relates to improvements in sectional tapered bottom rings for hot tops, that is to say an insulating refractory ring adapted to be connected to and to protect the lower end of the casing of a composite hot top, and having inclined inner walls to provide bevel surfaces on the ingot at the junction substantially of the ingot proper and the sinkhead. Bottom rings, as is well understood in the art, are intended for single use only. The advantages of bevel shoulders on an ingot in respect to the molding of the ingot are known and appreciated in the art. A single piece ring with a tapered inner surface could not be molded economically, but by constructing the ring in a number of sections equal to the number of sides of the hot top, four in a rectangular hot top and six in a hexagonal one, I am enabled to employ the inclined side of each ring section as the strike-off face in the molding operation, the other surfaces of the ring section including the end surfaces being so designed as to be readily moldable.

Heretofore refractory bottom rings have been formed with a flat undersurface, as for example in Charman et al. Patent 1,949,292, or Urmetz Patent 2,046,043, which served as the strike-off face in the molding of the ring. The upper side of the ring necessarily includes an upwardly projecting rim to cover the inner edge of the casing ledge and to substantially meet the lower inner edges of the upper lining blocks. The upper side of such a ring therefore cannot constitute the strike-off face. The lower side cannot be used as the strike-off face because the angle between it and the inclined face would be greater than 90°. Hence the production of a bottom ring with such an upwardly projecting rim and with an inner tapered surface has heretofore been impossible of accomplishment.

In accordance with the present invention this difficulty has been overcome by molding the ring in sections equal to the number of faces of the hot top and using the inclined face of each section as the strike-off face.

One of the objects of the invention therefore is the construction of a hot top bottom ring in sections having inclined surfaces designed to be utilized for forming bevel shoulders on the ingot, the said sections being molded with their inclined surfaces flush with the strike-off surfaces of a mold used for producing them.

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

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Fig. 1 is a vertical sectional view of a rectangular composite hot top embodying the invention.

Fig. 2 is a top plan view of the assembled bottom ring with wiper strips in place thereon.

Fig. 3 is a bottom plan view of the same on a larger scale and without the wiper strips.

Fig. 4 is a top plan view of one section of the ring.

Fig. 5 is a side view of the same.

Figs. 6 and 7 are elevational views looking at the two ends respectively of Fig. 5, and

Fig. 8 is a fragmental perspective view of adjacent ends of two ring sections, indicating how they mutually overlap when the ring is assembled.

Referring first to Fig. 1 of the drawing, 10 refers to a metal casing. At its lower end it is provided with an inwardly extending ledge 11, on which there are supported refractory blocks 12 constituting the lower course of a semi-permanent insulation lining. Blocks 13 resting on blocks 12 complete the semi-permanent lining for the casing. Blocks 12 overhang the ledge somewhat, as illustrated in Fig. 1. The foregoing elements of the construction are conventional in the art.

In the present instance the inner surface 14 of the ledge is inclined inwardly and upwardly to take an inclined surface 15 on each section of the bottom ring. The bottom surface 16 of the casing may be substantially perpendicular to the outer wall thereof. It is engaged by a flat surface 17 of each section of the bottom ring. The inner surface of each section of the ring is a single planar surface 18 which may be parallel to the surface 15 and in any event is adapted to produce a bevel shoulder upon the casting at the junction of the ingot proper and the sinkhead. Sheet metal wiper strips, commonly employed on composite hot tops, may be used in this construction and may be interposed between the surface 16 at the bottom of the casing and the surface 17 on each ring section. These strips, which project outwardly beyond the casing for contact with the mold wall, are marked 19 in the drawing. They are suitably slotted as indicated at 39 to clear wire clips 21 that are provided at their upper ends with hooks 22 for engagement with recesses 23 in the casing 10 and at their lower ends with further hooks 24 which embrace the lower edges of the ring sections so as to hold the latter in position during the handling of the completed hot top and the pouring of the molten metal therethrough.

The bottom ring extends inwardly beyond the ledge 11 substantially as far as the overhanging portions of the lining blocks 12, any clearance

between the bottom ring and the latter blocks being filled with a heat resisting slurry.

The invention is illustrated as applied to a square hot top. For a hot top of that shape I construct the bottom ring in four identical sections. In the case of rectangular hot tops other than square ones the ring is built in two sets of sections the sections of each set being identical. In all cases the two ends of each section are of different form and are so designed that they interfit with the ends of adjacent sections and are moldable.

At one end the lower and thicker half of the ring section projects endwise beyond the upper half as indicated at **30**. This end portion may have a curved exterior **31** to conform with the corner radius generally provided on the inner surface of an ingot mold. At the upper and thinner half of the ring the end surface **32** is parallel to the inner surface **18** of the adjacent ring section, by which it is overlapped.

At the opposite end of the section the lower or thicker half has an undersurface **33** which is inclined in a plane parallel to the inner surface **18** of the next adjacent section, by which it is overlapped. At this end of the section the upper or thinner half is provided with an end surface **34** which is disposed at 45° to the surfaces **15** of both sections. It is designed to fit within a corner surface of the ledge **11**.

In order to provide the necessary draft for molding the ring section a portion of the end at the bottom of the inclined wall **34** is cut away as indicated at **35**, and in order to fill the cavity thus left when the ring is assembled the other end of the ring is provided with a corresponding projection **36**. When the ring sections are assembled upon a casing small pockets **37** are left at the corners, but these are filled with slurry and thus exclude hot metal.

The individual sections of the rings are molded of suitable refractory material without metal reinforcement and are dried or baked. When completed they are strong and rigid. In the molding of a ring section the flat surface **18** is made the strike-off face. The other surfaces are so designed and arranged as to meet surface **18** at angles less than 90° in order to provide the necessary draft for molding purposes.

When a hot top embodying the invention is prepared for a casting operation the casing **10** with the lining blocks **12** and **13** assembled therein is inverted. The bottom ring sections are then mounted on the casing, slurry being run into the joints to fill any cracks or crevices resulting from slightly imperfect fits. The four wiper strips are then slid into position between the bottom surface of the casing and the surfaces **17** of the ring sections. All of the latter are then secured to the casing by means of the wire clips **21**.

In the manner stated I have accomplished the object of providing a hot top bottom ring with tapered inner surfaces for producing inclined shoulders on a cast ingot, while overcoming the difficulty heretofore existing of molding such a ring by simple molding procedures. In other words by molding each side of the ring separately and using its inclined surface as the strike-off face I am able to provide such a ring at low cost. Also by providing the double overlap at each corner, as heretofore described, relative movement between the sections, when they are supported by the clips **21**, is negligible.

One of the advantages of the invention arises from the making of the ring of four refractory parts instead of one which permits smaller molding equipment, simpler mechanized handling, smaller storage facilities and less bulk in shipment.

Another advantage is that the separate sections of my ring when left behind on the ingot by the stripping of the hot top therefrom, break away from the ingot in the first one or two rolling passes, whereas a one-piece ring of conventional form provided with metallic reinforcements adheres to the ingot longer.

Having thus described my invention, I claim:

1. A sectional bottom ring for composite hot tops having inclined inner walls for imparting bevel shoulders to ingots at the junction of the ingot proper with the sinkhead, comprising a plurality of ring sections equal to the number of hot top faces, means for attaching each section individually to the casing of the hot top, each of said sections having a flat face for forming the said bevel shoulder on one side of the casting and its other surfaces forming angles with said flat face not greater than 90°, whereby the separate sections of the ring are readily moldable, each section at a corner of the hot top having a portion overlapping the adjacent section and another portion overlapped by the adjacent section.

2. A sectional bottom ring for hot tops as defined in claim 1, wherein the overlapping surfaces in each case are continuations of the said flat faces of the respective sections.

3. A bottom ring for composite hot tops having inclined inner walls for imparting bevel shoulders to ingots at the junction of the ingot proper with the sinkhead, comprising a series of sections adapted to be individually attached to the casing of the hot top, each of said sections having a flat face for forming the said bevel shoulder on one side of the ingot and having a face angularly disposed with respect to said flat face for engagement with the bottom surface of the casing, each section at one end having a lower end surface adapted to engage the flat inner surface of the adjacent section, and at the other end having an upper end surface adapted to engage the flat inner surface of the section adjacent to that end.

ROBERT E. DALEY.

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