Nov. 4, 1958 W. E. HOFFMAN 2,858,588

HOT TOP CONSTRUCTION

Filed June 14, 1957 2 Sheets-Sheet 1

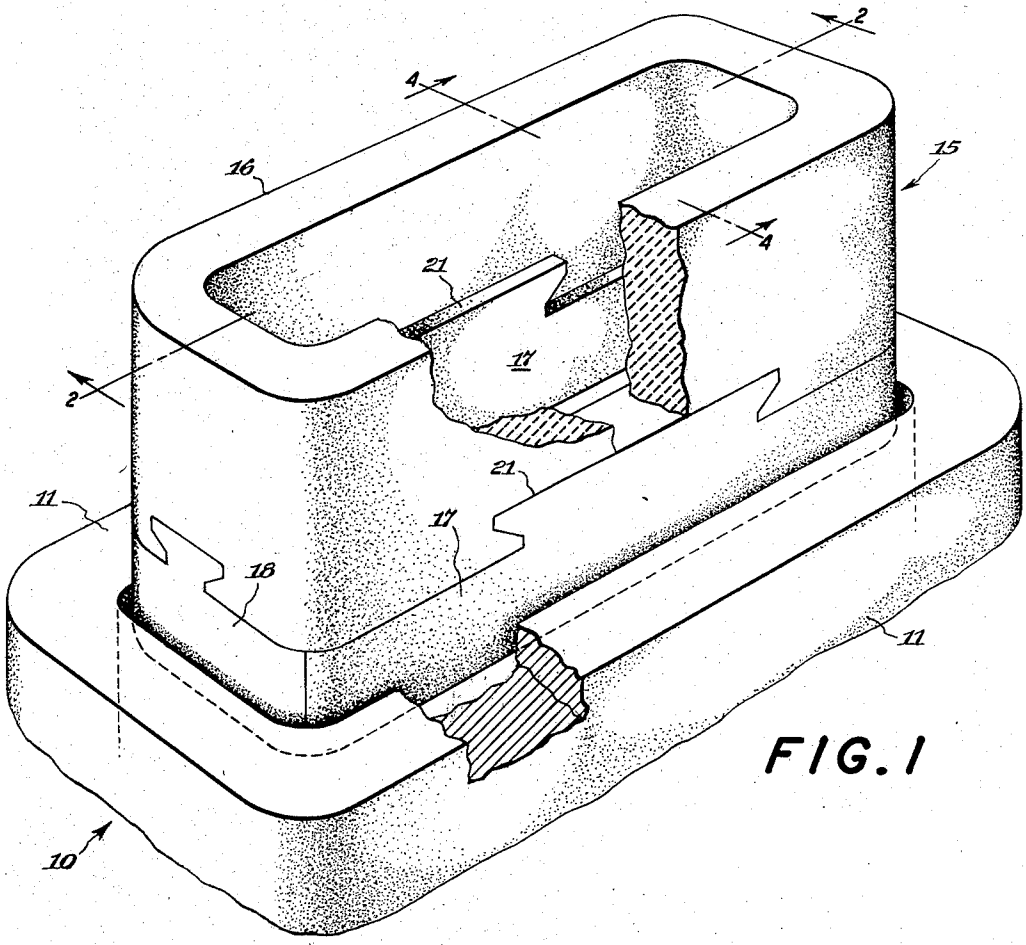


FIG. 1

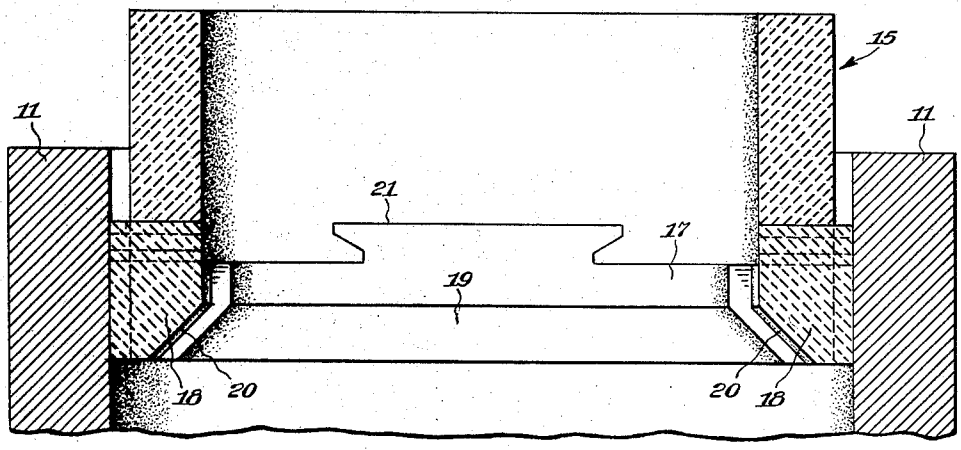


FIG. 2

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HOT TOP CONSTRUCTION

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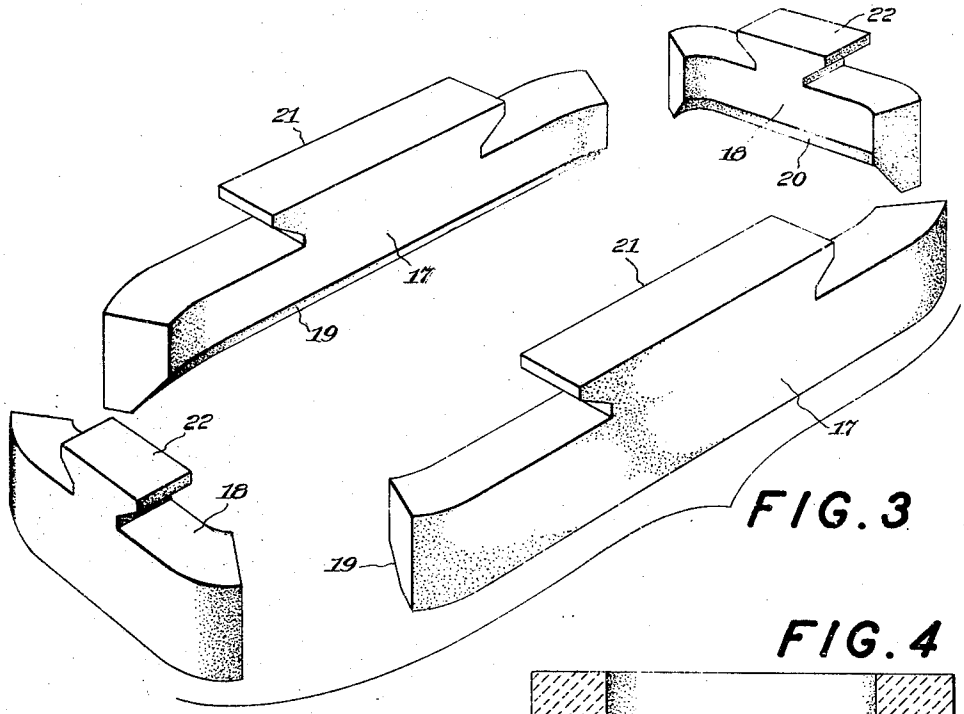


FIG. 3

FIG. 4

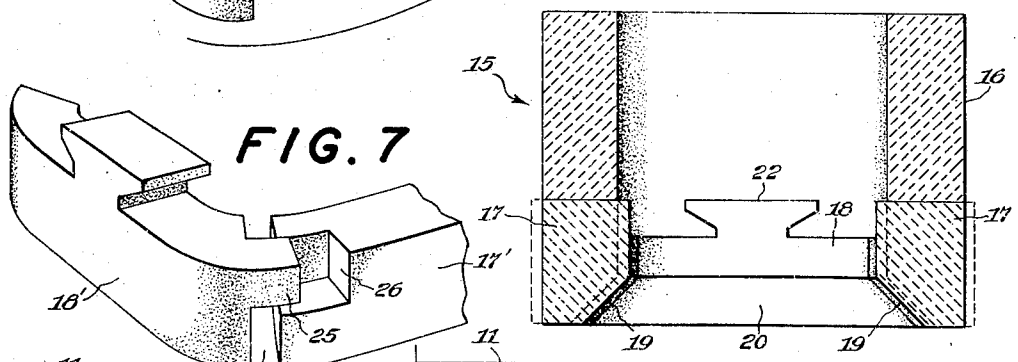


FIG. 7

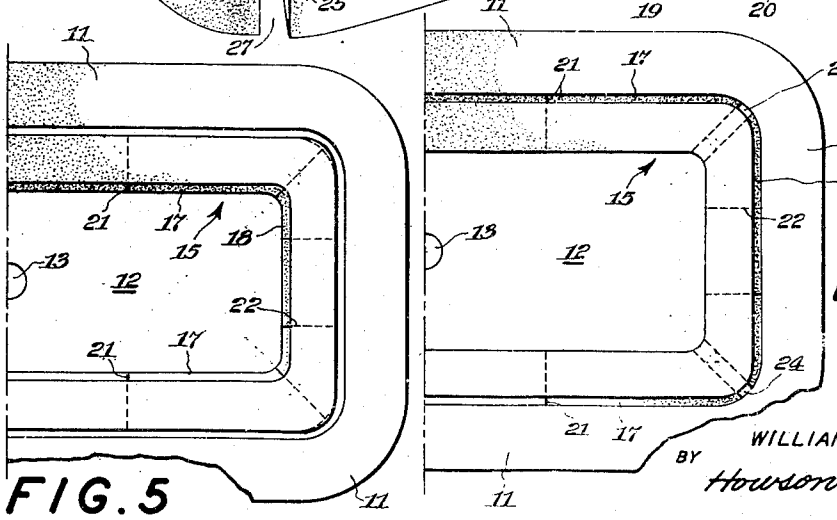


FIG. 6

FIG. 5

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HOT TOP CONSTRUCTION

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9 Claims. (Cl. 22—147)

This invention relates to a hot top structure for use in the casting of ingots.

In the prior art, it has been common to insert hot tops within molds to produce an insulation to keep the metal hot, and feed the ingot, to get a better yield of good metal. The hot tops employed have been formed ot a member designed to fit within the opening of the mold and to extend upwardly and usually out of the opening. Hot tops are made of some refractory material which will withstand the heat of molten metals, although they are normally used only once and destroyed after an ingot is cast.

Using hot tops of the prior art, it has been necessary to do a great deal of hand work preparing the hot top and the mold for receiving the metal to be cast. The primary problem has been to fill the region between the hot top and mold with refractory caulking material. Failure to carefully caulk between the mold and the hot top will permit molten metal to rise upward between the hot top and the mold in a thin collar or "fin" which tends to bind in such a way that resulting forces may crack the ingot upon cooling, due to the compressive forces involved, tending to damage or crack the ingot itself. Manually caulking the space between the hot top and the mold has required reaching downwardly through the hot top and filling the required space mostly by feel, and this process proved to be less than satisfactory. In many cases, insufficient caulking or small omitted areas have resulted in permanent damage to the ingot because of the difficulty in seeing the work that is being done. Moreover, it is a time-consuming, tedious job which not only is costly but also generally delays the work on the casting floor.

The present invention eliminates the necessity for caulking the large regions which have heretofore been caulked, and necessitates caulking only a very small region which can be done quickly and usually quite accurately without difficulty. The present invention provides a simple modification of conventional hot tops which can be readily adapted to the techniques in their manufacture. The hot tops produced are easily used even by one with a minimum of skill.

More specifically, the hot top of the present invention provides slides in the annular body of the hot top which are adapted to move outwardly and engage the side walls of the opening of the mold. Since the slides can be caused to move into intimate contact with the side walls of the mold opening, metal is unable to flow between the slide portions and the mold walls, and only small areas between the adjacent slides need be caulked. Caulking in these areas is easily accomplished in a short time because the areas between the slides may be made small. It is possible to feel whether the few small areas are completely caulked or not.

The slides are placed at the extreme lower edge of the mold and are adapted to be moved outwardly to engage the side walls of the opening by use of a light mallet which is used from inside the hot top and moves the

slides in response to a light tap. The slides are advantageously keyed by a dovetail member, or similar guide.

For a better understanding of the present invention, reference is made to the following drawings in which:

Fig. 1 is a perspective view, partially broken away, which shows a hot top partially inserted in the opening of a mold;

Fig. 2 is a sectional view taken along line 2—2 of Fig. 1;

Fig. 3 is an exploded perspective view showing the arrangement of the slide members with the annular body portion of the hot top removed;

Fig. 4 is a sectional view taken along line 4—4 of Fig. 1;

Fig. 5 is a plan view from above showing the hot top inserted in the mold with the slides in unexpanded position;

Fig. 6 is a plan view similar to Fig. 5 showing the slide members moved outwardly against the side walls of the opening of the mold; and

Fig. 7 is a detailed view showing a modified form of the slide member.

Referring to Fig. 1, it will be seen that the mold **10** here employed is an ingot mold having generally vertical side walls **11** and a bottom **12** (see Figs. 5 and 6). The ingot mold may be filled either from top or from bottom. If the latter, the bottom is provided with a central opening **13** through which molten metal is fed from a central standpipe used to feed a number of molds at a time through a manifold distributing system to the various molds in accordance with common ingot practice. As the molten metal rises in the mold, it carries impurities to its top surface by flotation since they tend to be lighter than the pure metal. Thus the impurities rise up into the hot top generally designated **15** which is suspended within the opening of the mold. The hot top thus serves to keep the molten metal hot to feed the ingot, i. e., to fill voids which would otherwise occur in the ingot upon cooling.

The hot top is formed of an annular body **16** which has the same general shape as the shape of the opening formed by the side walls **11** of the mold. The hot top, however, is generally smaller in its dimensions than the opening so that it slides easily within the opening as shown in Fig. 1.

At the bottom edge of the annular hot top body are provided four slide members which may be of the form shown in Fig. 3. In a rectangular hot top, such as that shown, there are two long slides **17** along the sides and two short slides **18** along the ends of the hot top. As can be seen in Fig. 2, the slides are provided with beveled surfaces **19** and **20** which eliminate the sharp corner which would otherwise exist between the neck and body of the cast ingot. The slides are also provided with dovetail flanges **21** and **22** which are engaged by track-like channels of similar form cut in the bottom side walls of the annular housing. Interlocking keys in grooves, of course, can be made of other shapes. Alternatively, the keys can be made in the annular body and the grooves in the slide. Alternatively, the slides might be made to be wholly enclosed by the annular body side walls **11** so that keys and grooves of the type described may not be employed.

The grooves are directed toward the side walls **11** nearest adjacent the portions of the annular body **16** to which the slides are fixed. The slides, as may be seen in Figs. 1, 2 and 4, may be made thicker than the side walls and sufficiently thick so that when in extended position in contact with the side walls of the mold opening their inside surfaces will present an area essentially flush with the inside surface of the annular walls.

In the use of the hot top, the hot top is moved into

place with the aid of a crane or hoist and when lowered to the proper level within the opening a mallet is used to tap outwardly from inside the annular body each of the slides until the various slides lie in snug contact with the mold opening side walls. The movement is from the position shown in Fig. 5 to that shown in Fig. 6 and it will be observed that this movement results in the formation of an opening **24** between the slides **17** and **18** in their extended position. This opening, however, is extremely small and can be caulked with refractory material in the same manner that the space between the hot top and the mold can be caulked, with the difference, however, that the small area involved can be given more concentrated attention with the results that a better joint is completed.

Contact between the slides and the side walls **11** of the mold opening must be close in order to avoid the flow of metal upwardly between the hot top and the mold which would result in finning. Therefore, the mold slides are designed to contact the mold snugly in their extended position.

A modified form of the slides is shown in Fig. 7 in which the slides **17'** and **18'** are provided with an interlocking tongue and groove **25** and **26**, respectively. The member **18'** carrying the tongue must be moved outwardly first and then the other member can be subsequently moved outwardly. The tongue may be made of a thickness to minimize the caulking in the groove region **27** and the tongue could even extend the full width of the slide, if desired. It will be obvious that the tongue and groove constructions could be interchanged.

Modifications in the form of the present invention within the scope of the claims are intended to include all possible shapes, sizes and configurations including additional slides. The material used for the hot top in the experimental stage has been a composition of Portland cement but other refractory materials may be employed as readily. The molds in most cases are composed of iron. When ingots are removed from the molds, the molds are intended to be used again whereas the hot tops in accordance with the prior art practice are not re-used but are broken away from the ingot.

I claim:

1. A hot top for use with a mold having an opening into which the hot top is inserted, comprising an annular body of the same general peripheral configuration as the opening in the mold and of such dimensions to be inserted within the mold with clearance between its side walls and those of the mold opening, and slide members outwardly movable relative to the side walls of the annular body and adapted to engage the opening of the mold, said slides being effective to close the space between the annular body and the side walls of the opening.

2. The hot top of claim 1 in which the slide members are arranged at the lower portion of the annular body so they will be among the first portions of the hot top to be inserted in the mold opening.

3. The structure of claim 2 in which the slide members are located at the lowermost portion of the annular body and form the bottom edge thereof in their regions of the annular body.

4. The hot top of claim 3 in which the slides are supported relative to the annular body by dovetail sliding joint between the annular body and each slide.

5. The hot top of claim 4 in which the dovetails are on the slides and grooves in the annular body.

6. The structure of claim 4 in which the slide members are four in number and adapted to move in generally opposite directions along lines of movement at right angles to one another.

7. The hot top of claim 6 in which the annular body is generally rectangular in form and has slides along its sides and at its ends.

8. The hot top of claim 6 in which the adjacent slides have overlapping portions which minimize the caulking required between slides when the hot top is in place in a mold.

9. The hot top of claim 6 in which the slide members are contoured to fit the surfaces which they strike.

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