Jan. 1, 1929.

1,696,986

M. R. TREMBOUR

HOT TOP FOR MOLDS

Filed Jan. 19, 1926

3 Sheets-Sheet 1

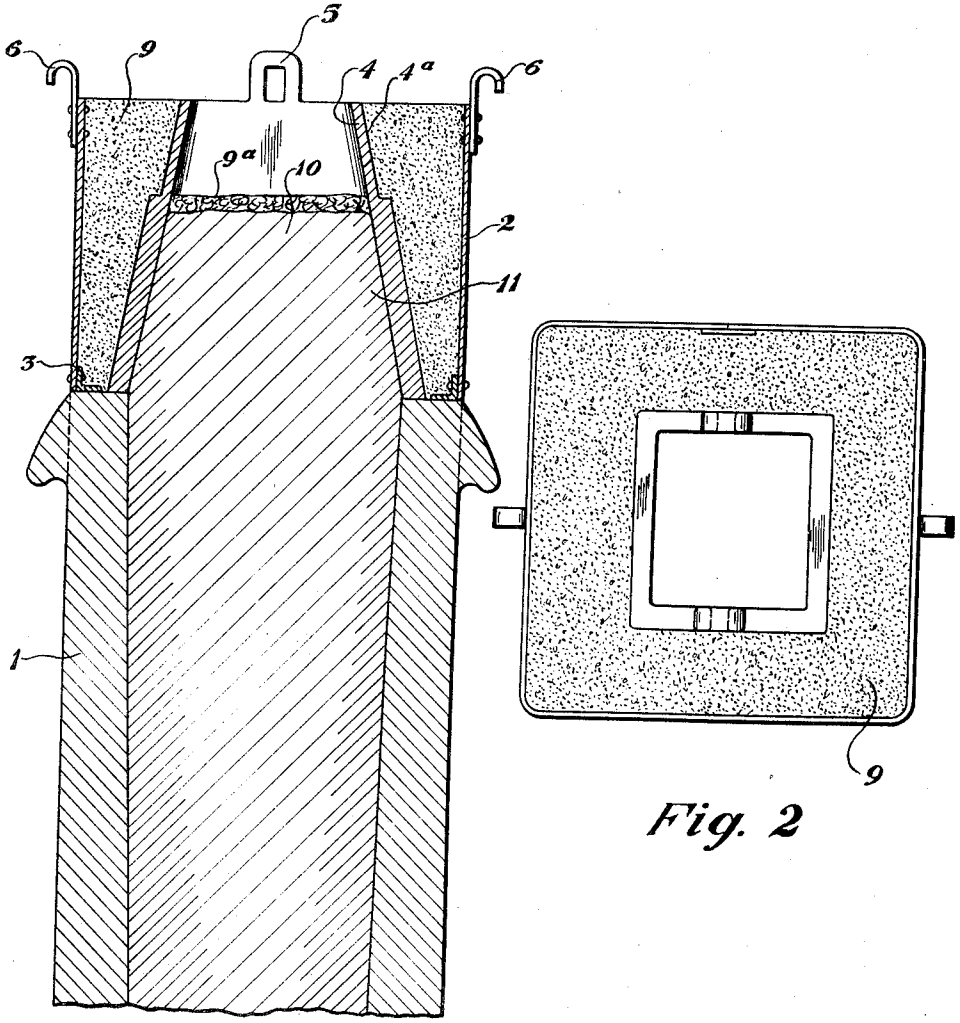


Fig. 1

Fig. 2

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3 Sheets-Sheet 2

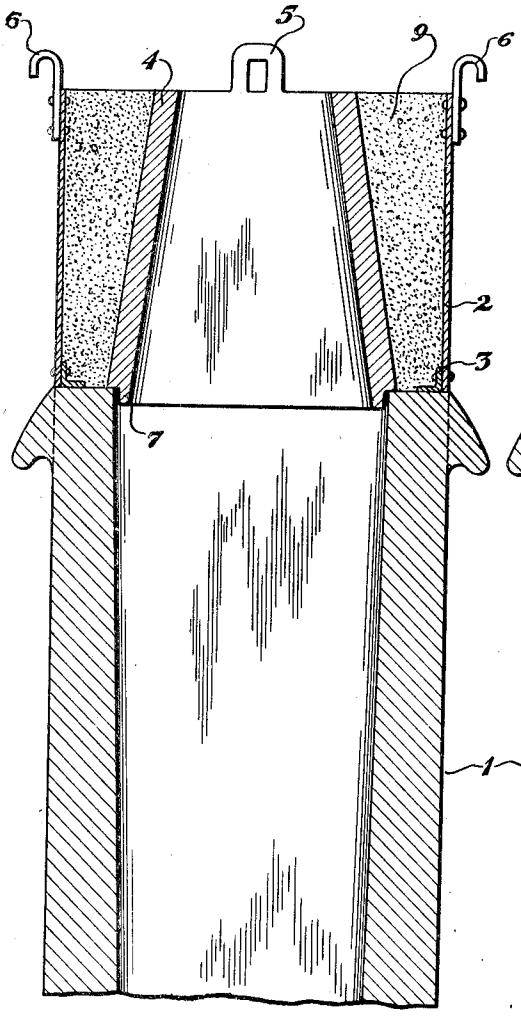


Fig. 4

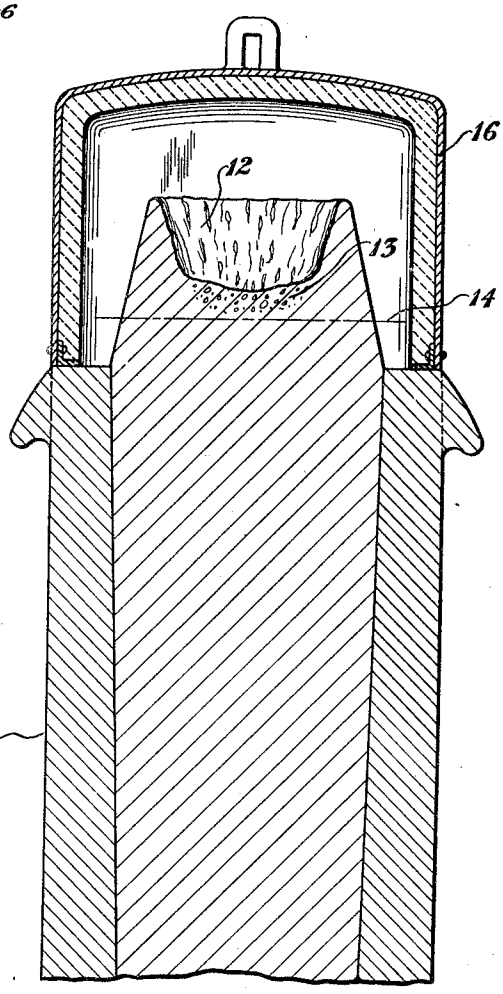


Fig. 3

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3 Sheets-Sheet 3

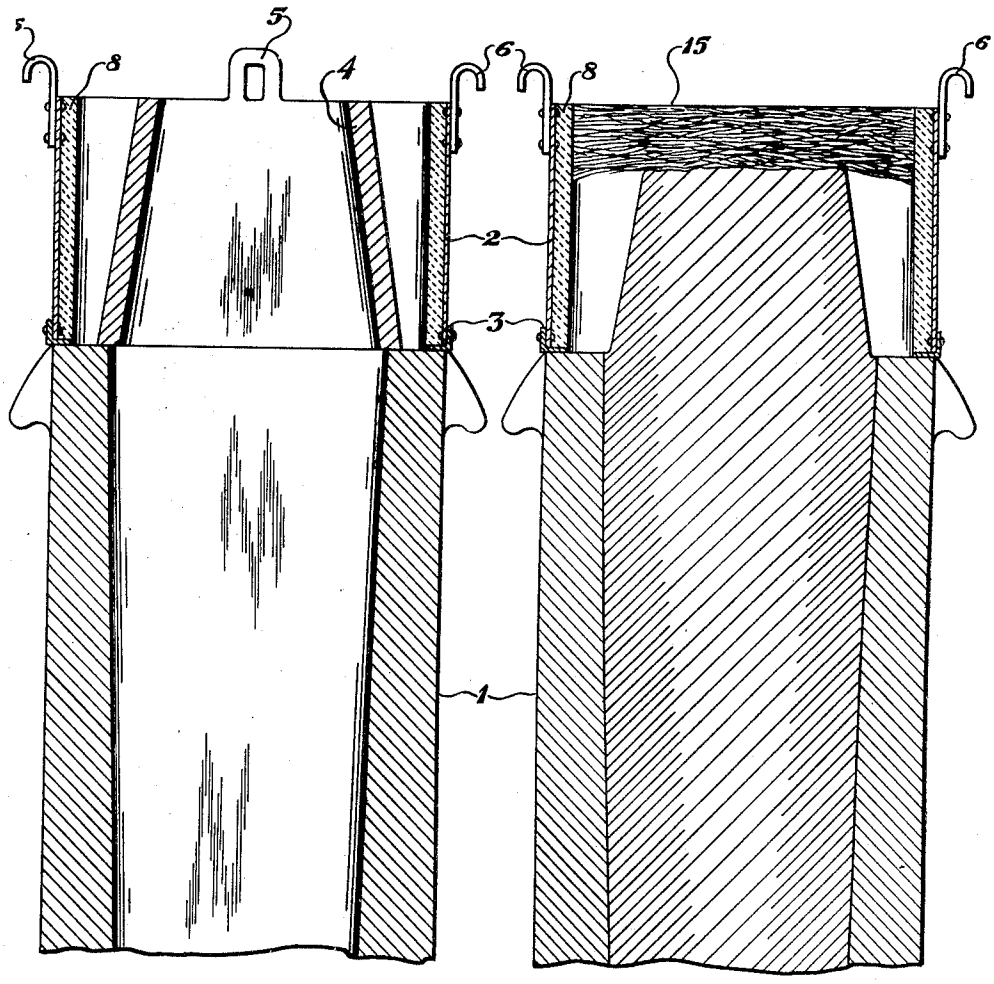


Fig. 5

Fig. 6

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UNITED STATES PATENT OFFICE.

MAX R. TREMBOUR, OF CANTON, OHIO.

HOT TOP FOR MOLDS.

Application filed January 19, 1926. Serial No. 82,208.

The invention relates to sink heads or feeders for use in connection with ingot molds and the object of the improvement is to provide means for retaining the heat in the head or "hot top" of the ingot until the entire body portion of the ingot has solidified for the purpose of reducing the pipe and confining the shrinkage cavity in the ingot to the upper part of the head or "hot top".

It is common practice to use a feeder or sink head of refractory material in an attempt to retain the heat in the head or "hot top" of the ingot but such devices are not entirely successful as an inverted conical pipe is usually formed in the upper part of the ingot, often extending a considerable distance down into the body portion of the ingot; and these refractory feeders are also objectionable not only because of their expense, and the fact that they can only be used once, but also because of the frequent spalling of the refractory feeder which becomes imbedded in the ingot.

Because of this inverted conical pipe or spongy formation extending down into the ingot, it is necessary in the blooming operation to crop back at least to the base of the head or "hot top", and frequently much below the same, in order to remove all of the pipe from the ingot. Because of the usual construction of sink head which forms a shoulder at the base of the "hot top" or head it is always necessary to crop back to this shoulder to prevent the formation of a fin in the rolling of the ingot.

The present invention contemplates the provision of a feeder comprising spaced independently removable inner and outer metallic sleeves or frames to be placed upon the top of an ingot mold, the inner sleeve or frame being preferably flush with the top of the mold. The outer frame may if desired be lined with refractory material, or loose refractory material such as sand, ashes or the like may be placed between the frames.

An embodiment of the invention is illustrated in the accompanying drawings, in which

Figure 1 is a vertical sectional view of the upper portion of an ingot mold with the improved feeder or sink head applied thereto, showing an ingot shortly after the same has been poured;

Fig. 2, a top plan view of the same;

Fig. 3, a vertical sectional view of the upper portion of the ingot in the mold after the sink head or feeder has been removed and the "hot top" or head of the mold covered;

Fig. 4, a vertical sectional view of the upper portion of an ingot mold showing a slightly modified form of feeder;

Fig. 5, a vertical sectional view showing another slight modification of the feeder applied to an empty mold, and

Fig. 6, a similar view after the ingot has been poured and the inner frame or "hot top" mold removed.

Similar numerals refer to similar parts throughout the drawings.

Referring now to the drawings, an ingot mold is indicated generally at 1, which as shown has its walls diverging toward the upper end to form a "big top" ingot but it will be understood that the improved feeder or sink head, to which the invention pertains, is applicable to any of the various forms of ingot molds in general use.

The feeder or sink head in which the "hot top" or head of the ingot is molded, comprises an outer metal frame or sleeve 2 which may be cast or formed of heavy sheets or plates of steel or iron preferably strengthened or reinforced as by angle irons 3, arranged to rest upon the top of the ingot mold.

The mold member of this feeder comprises an inner sleeve or frame 4, of cast iron or steel, preferably tapered toward its top and which may be flush with the upper open end of the ingot mold, as best illustrated in Figure 1. The cast metal inner sleeve 4 has cast walls thick enough that the sleeve will not fuse to the cast ingot, as might be the case if the sleeve were of thin fusible sheet metal.

This inner sleeve or mold member is spaced from the outer frame and is independently removable with respect thereto, being provided with rings 5 or the like by which it may be positioned upon the ingot mold or removed therefrom and from the cast ingot by the use of a crane or the like, and the outer frame may be provided with hooks 6 for the same purpose.

If it is desired to form a shoulder, in the ingot, at the base of the "hot top" or head, the inner sleeve or mold member 4 may be of slightly less diameter, at its lower end, than the upper open end of the ingot mold, as illustrated in Fig. 5.

As shown in Fig. 4, the inner sleeve 4 may

be provided with a depending flange 7 arranged to fit within the open upper end of the ingot mold in order to prevent the molten metal from leaking through the joint between the feeder and the ingot mold.

If desired, a permanent lining of fire brick or other suitable refractory, indicated at 8, may be provided upon the inside of the outer metal frame 2, as illustrated in Figs. 5 and 6 although as illustrated in the other figures, this permanent lining may be despensed with and the space between the outer and inner frames of the feeder may be filled with said ashes, coke breeze or other loose refractory material as shown at 9 in Figs. 1, 2 and 4.

In order to provide a sufficient chamber between the sleeves to accommodate the necessary amount of sand or the like to entirely cover the sides of the "hot top", the upper end portion of the inner sleeve 4 may be recessed as shown at 4^a.

In casting an ingot, as illustrated in Figure 1, the molten metal, shown at 10, may be poured within the ingot mold and feeder to a point spaced from the top of the feeder and straw or the like shown at 9^a may be then placed upon the top of the molten ingot.

The inner metal frame 4 may be removed, in five or six minutes, or after such time as is required for sufficient solidification of the exterior of the ingot and head thereof, as illustrated at 11.

When this inner sleeve is removed the sand or other loose refractory material will be caused to cover the entire side surfaces of the ingot head or "hot top", retaining the heat therein and permitting the ingot to slowly solidify from the bottom upward, eliminating the usual inverted conical pipe and producing a cavity as shown at 12 in the top of the ingot head or "hot top" with a slight spongy portion 13 adjacent thereto.

If the ingot is formed as shown in Figs. 1 and 3, without any shoulder at the base of the "hot top" or head, this hollow or spongy portion may be cropped at the line 14, utilizing possibly several hundred pounds of metal of the head or "hot top" itself which is ordinarily unfit for use.

Instead of covering the "hot top" or head of the ingot with sand or the like, the heat may be retained therein to produce substantially the results above described by removing the inner metal frame 4, of the feeder, and placing straw, sawdust or the like, as indicated at 15 in Fig. 6, over the "hot top" or head. The "hot top" or head of the ingot remains covered with this straw or the like until the ingot is stripped from the mold, which is at least one hour after the pouring of the ingot.

The same result may also be substantially obtained by removing the entire feeder and placing a refractory lined metal cover 16 over the head or "hot top" of the ingot to retain the heat therein until the entire body portion of the ingot has solidified.

From the above it will be obvious that the inverted cone shaped pipe in the ingot is eliminated, the pipe being controlled entirely in the "hot top" by the rate of cooling which is permitted in the same.

A considerable portion of the ingot is utilized by this process, which is otherwise unfit for use, and by providing a cast steel or iron inner mold 4, a smooth surface is produced upon the "hot top" or head of the ingot and the possibility of non-metallic spall, from the feeder, being imbedded in the surface of the ingot is avoided.

I claim:

A hot top mold for ingots comprising inner and outer spaced sleeves, the inner sleeve being composed of thick cast metal, each sleeve being adapted to rest directly upon the top of an ingot mold, and each sleeve being independently removable from the ingot mold and from the cast ingot.

In testimony that I claim the above, I have hereunto subscribed my name.

MAX R. TREMBOUR.