Oct. 18, 1932. A. B. KINZEL 1,883,382

INGOT MOLD

Filed Oct. 27, 1930

Fig. 1.

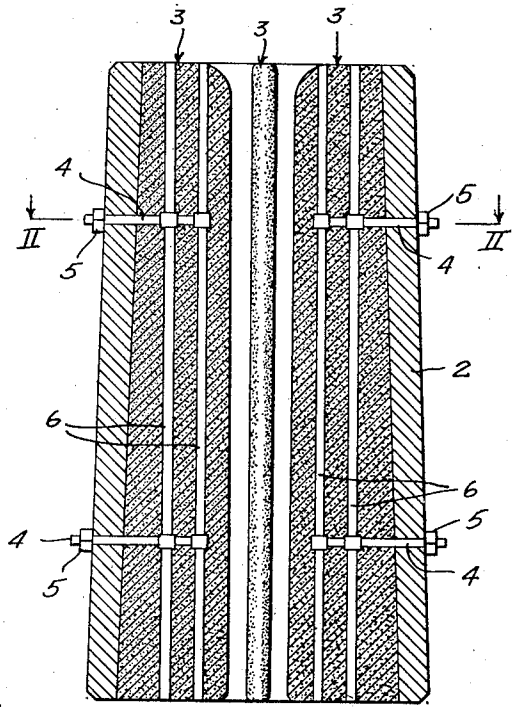
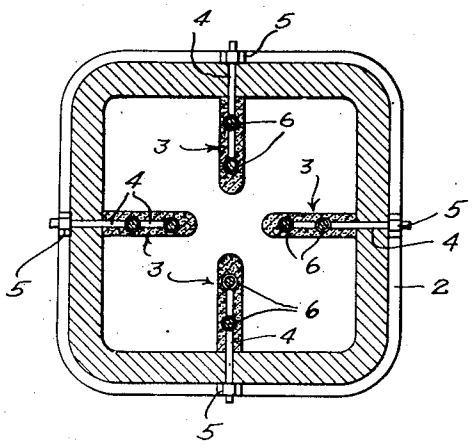


Fig. 2.



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UNITED STATES PATENT OFFICE

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INGOT MOLD

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This invention relates to molds for casting ingots, and has application to a particular type of improved ingot mold especially adapted for casting so-called "piping" steels.

Due to the natural shrinkage of molten metal while cooling in a mold, many difficulties are encountered in attempting to form sound steel ingots. Among the most common defects is that caused by piping. This consists in the formation of cavities or fissures within the interior of the ingot. The surfaces of these cavities usually become oxidized, and if the ingot is worked without removing them, defects will appear in the finished steel. With the usual form of ingot mold it is impossible to control the particular point within the ingot where the pipe may occur although it is usually found in the upper portion. It is therefore customary to cut off and discard that section of the ingot containing any pipe, before subsequently working it. In most instances this results in a waste of a considerable portion of the ingot.

An object of my invention is to provide an improved ingot mold having means therein for confining or concentrating the shrinkage cavities to a comparatively small portion of the ingot, which portion is so defined as to permit its easy removal and produce a greater yield of sound workable metal.

The advantages of my mold will be evident from a description of the accompanying drawing illustrating one form of a suitable ingot mold embodying the invention.

Fig. 1 is a vertical cross section through the center of the mold.

Fig. 2 is a section on the line II—II of Fig. 1.

In the modification shown the outer wall 2 of the mold is substantially square in cross section and tapered toward the top. This wall resembles in shape the common form of ingot mold, and is preferably made of cast iron. The four vertical dividing walls 3 extend the entire length of the ingot. Each side of the outer wall carries one inner vertical wall which is centrally disposed thereon and extends toward the center of the mold. The inner walls are detachably mounted to the outer walls by means of the rods 4 and the nuts 5, the rods 4 being connected with the reinforcing members 6. The material of the walls 3 should have less heat conducting capacity than the outer cast iron walls. I prefer for this purpose so-called hard sand such as that used for making cores in the usual steel foundry. This sand differs from molding sand, in that it is higher in silica and lower in clay. The reinforcing members may suitably be of steel, and the walls are made up outside the mold and inserted as replacements are necessary.

It will be noted that there is a free and unobstructed central opening running throughout the entire length of the mold. The molten metal is introduced into the mold with the dividing walls in the position shown, and, as the metal cools, the shrinkage cavities are confined to the open central portion of the ingot mold. After the metal has solidified the central section of the ingot is so defined that it may be easily separated from the rest of the ingot by breaking or cutting off the outer portions to provide four sound blocks of steel. Thus the amount of steel wasted through discarding this comparatively small center portion is much less than when large portions of the entire end of the ingot are removed, as is customary in normal practice for obtaining sound steel.

As previously stated the inner vertical walls are constructed of a material which is a poor conductor of heat. They, therefore, conduct very little heat away from the metal in the center of the mold, but rather act to cause that portion of the metal to remain molten longer than the rest. Since the pipe usually forms in that part of the metal which is the last to freeze, these inner walls act to confine the pipe formation in the open central portion of the ingot. In the particular position shown they also provide four sound blocks of steel, substantially square in cross section and of suitable shape for rolling.

Materials other than the one mentioned may be used for forming the inner vertical walls, and various other modifications may also be made, especially with regard to the outer shape of the mold and the particular positioning of the inner walls, without de-

parting from the spirit of my invention.

I claim:

1. A mold for casting ingots comprising an outer wall and a plurality of vertical dividing walls of low heat conducting material extending inward from said outer walls toward the center of the mold.

2. A mold for casting ingots comprising an outer substantially rectangular wall, and a plurality of vertical dividing walls of low heat conducting material on said outer wall extending inwardly toward the center of the mold, but spaced therefrom to form an unobstructed central section throughout the entire length of the mold.

3. A mold for casting ingots comprising an outer wall substantially square in cross section, having a vertical dividing wall of low heat conducting material centrally disposed and detachably mounted on each side of said outer wall, said dividing walls extending inwardly toward the center of the mold but terminating short thereof.

4. A mold for casting steel ingots comprising an outer cast iron wall substantially square in cross section, having a vertical dividing wall of low heat conducting refractory material centrally disposed and detachably mounted on each side of said outer wall, said dividing walls extending inwardly toward the center of the mold but terminating short thereof to provide an unobstructed central section throughout the entire length of the mold whereby shrinkage cavities within the ingot are confined to that portion within said unobstructed central section of the mold.

In testimony whereof, I affix my signature.

AUGUSTUS B. KINZEL.