No. 741,460. PATENTED OCT. 13, 1903.

A. B. CHANTRAINE.

CASTING SMALL STEEL INGOTS.

APPLICATION FILED NOV. 22, 1902.

NO MODEL.

Fig. 1

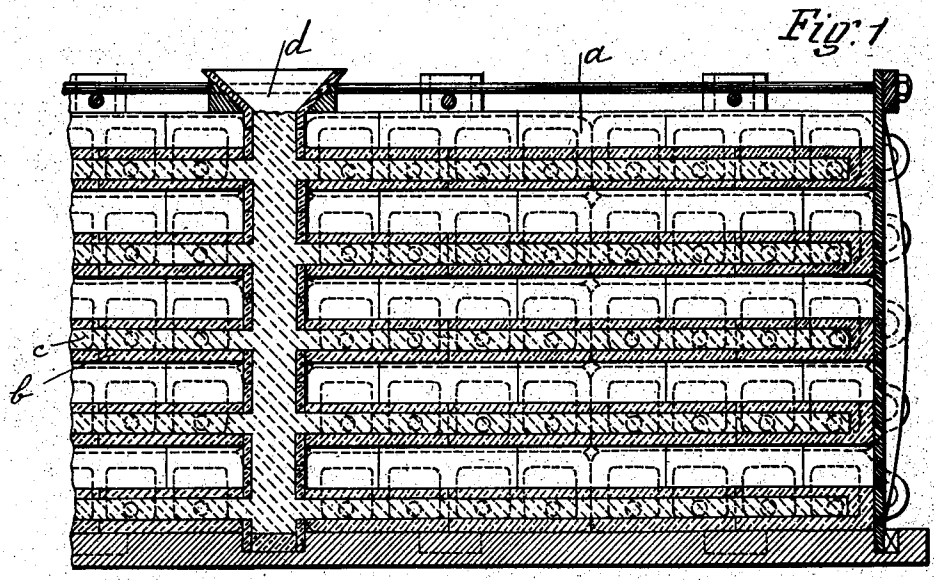
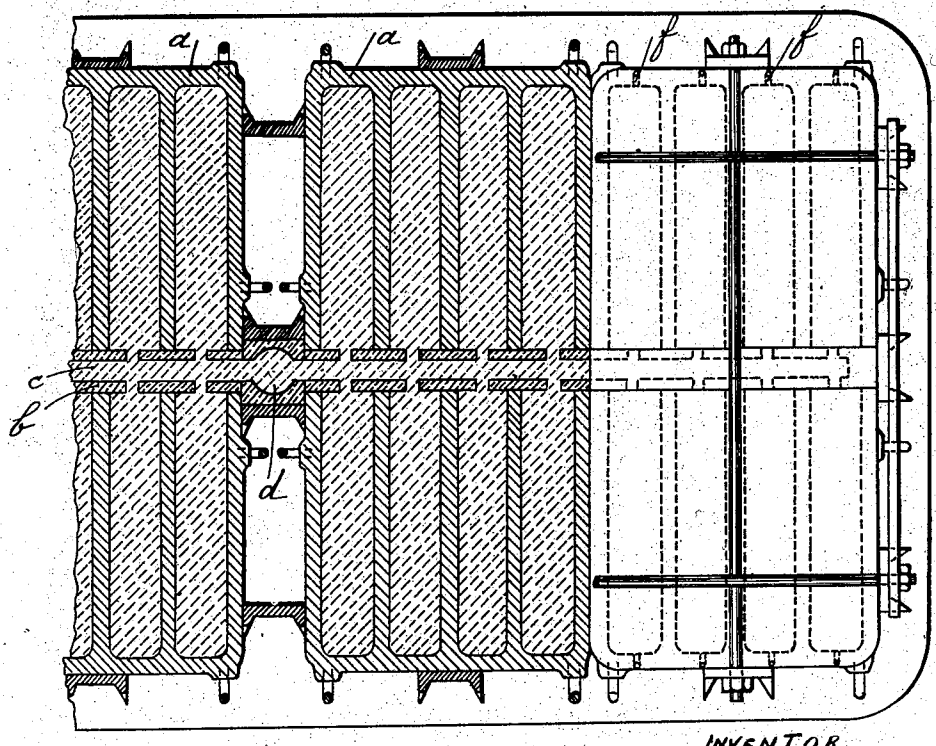


Fig. 2



WITNESSES:
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HIS ATTORNEYS

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No. 741,460. Patented October 13, 1903.

UNITED STATES PATENT OFFICE.

ALPHONSE BAUDOUIN CHANTRAINE, OF MAUBEUGE, FRANCE.

CASTING SMALL STEEL INGOTS.

SPECIFICATION forming part of Letters Patent No. 741,460, dated October 13, 1903.

Application filed November 22, 1902. Serial No. 132,423. (No specimens.)

To all whom it may concern:

Be it known that I, ALPHONSE BAUDOUIN CHANTRAINE, a subject of the King of the Belgians, residing at Maubeuge, department of Nord, in the Republic of France, have invented certain new and useful Improvements in the Casting of Small Steel Ingots or Slabs, of which the following is a specification.

The manufacture of blooms or slabs by the means hitherto in use in steel works—that is to say, by the rolling of ingots after they have been reheated—is somewhat costly, for to the cost of reheating, rolling, and shearing must be added the losses in the reheating-furnace and those arising from the cutting of the unsound ends of the ingot, the lower portion, and more especially the top part or head, which despite all the percautions taken are never of the same quality as the remainder of the ingot. On the other hand, the differences between the selling prices of ingots and those of blooms or slabs indicate sufficiently what extra cost arises from the transformation of ingots into blooms. To suppress this costly transformation of ingots into blooms and slabs, it was necessary to find a process which would permit cast ingots of small cross-section and small weight without the disadvantages inherent to all the ingots as usually cast—that is to say, without unsound top and bottom parts. Attempts have been made to overcome these disadvantages by casting ingots horizontally according to the process disclosed in the British Patent No. 9,514 of 1896 or by that disclosed in British Patent No. 23,668 of 1897; but the commercial success of these processes was not sufficient to warrant their extended application.

The object of my invention is to obtain a better and more practical result by the arrangement shown in the accompanying drawings, in which—

Figure 1 is a sectional elevation of part of the arrangement; and Fig. 2 a plan, partly in section, of the same.

Before proceeding to describe the arrangement it should be observed that horizontal casting is only applicable to the manufacture of small pieces, for the steel on entering in the fluid state into an ingot-mold must as it cools, form a skin, and the thickness and nature of this skin must be such that on rolling the ingot or slab the rolled product is round at the surface. Now in casting horizontally the steel masses must not be two considerable, so as to enable the ingot-mold to absorb through each of its faces enough heat to prevent the gases in the steel rising through the mass of steel from accummulating at the upper part of the ingot or slab.

As shown on the drawings, the ingot-molds *a* are arranged in superposed horizontal layers in close contact and on both sides of central feeding-sprue *d*, to which they are connected by channels *e*, provided in hollow bricks *b*, of refractory material. Thanks to this arrangement, all the molds are in intimate metallic contact along their longitudinal faces. The length of the rows of ingot-molds and the number of superposed tiers vary according to the cross-section and the weight of the ingots, which by this arrangement can be manufactured accurately to a given size. The casting operation is therefore effected from a central sprue, from which the metal runs successively into the horizontal tiers of ingot-molds. As the ingots are cast in a mold the bottom of which is heated before the molten metal is run in, and as the mass rises in a horizontal plane the entire upper surface of the molten metal simultaneously comes into contact with the cool wall of the mold, next above it. It thus forms a skin on the upper surface of the ingot, checking the tendency of bubbles to rise to the surface and producing a perfect cast bloom or slab with no surface defects.

The ingot-molds used in this process may be of any known kind.

In the accompanying drawings I have shown ingot-molds having a closed end cast on. These molds are movable and may be simple or multiple ingot-molds, (those shown in the drawings permitting to cast four ingots at once.) These ingot-molds are at their upper part provided with an orifice *f*, through which the air and part of the gases escape as the ingot-mold is being filled with the molten steel. If need be, the ingot-molds may be slightly inclined, so that the end on which the orifice is provided is a little higher than the other end and the gas can escape more easily.

Ingot-molds closed at the top by a cover or lid may also be used. In this case the orifice *f* can be dispensed with. This arrangement has important advantages. The quantity of metal lost in the feeding-channels and the quantity of refractory material required for a given quantity of metal are reduced to a minimum. In all the ingot-molds except those of the lowermost tier the metal on reaching the molds comes in contact with a heated bottom part and a cold top part, so that the crust formed at the upper part is practically as thick as that at the lower part, and the occluded gases are in the central portion of the slab, the quality of which is thereby advantageously improved. In practice while working under normal conditions the cast-iron base keeps sufficiently hot, so that the lowermost tier is kept in a proper working condition—that is to say, its bottom part is hot while its top part is cool.

I claim as my invention—

A mold for casting of ingots, comprising a group of straight, horizontal and parallel molds, the roof of one mold being the floor of the one above, whereby the floor of a mold is heated by the metal beneath and the roof is maintained comparatively cool until the entire upper surface of the molten mass rises to meet it, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ALPHONSE BAUDOUIN CHANTRAINE.

Witnesses:
GUST. PIERRU,
ED. PUGH.