

No. 619,123.

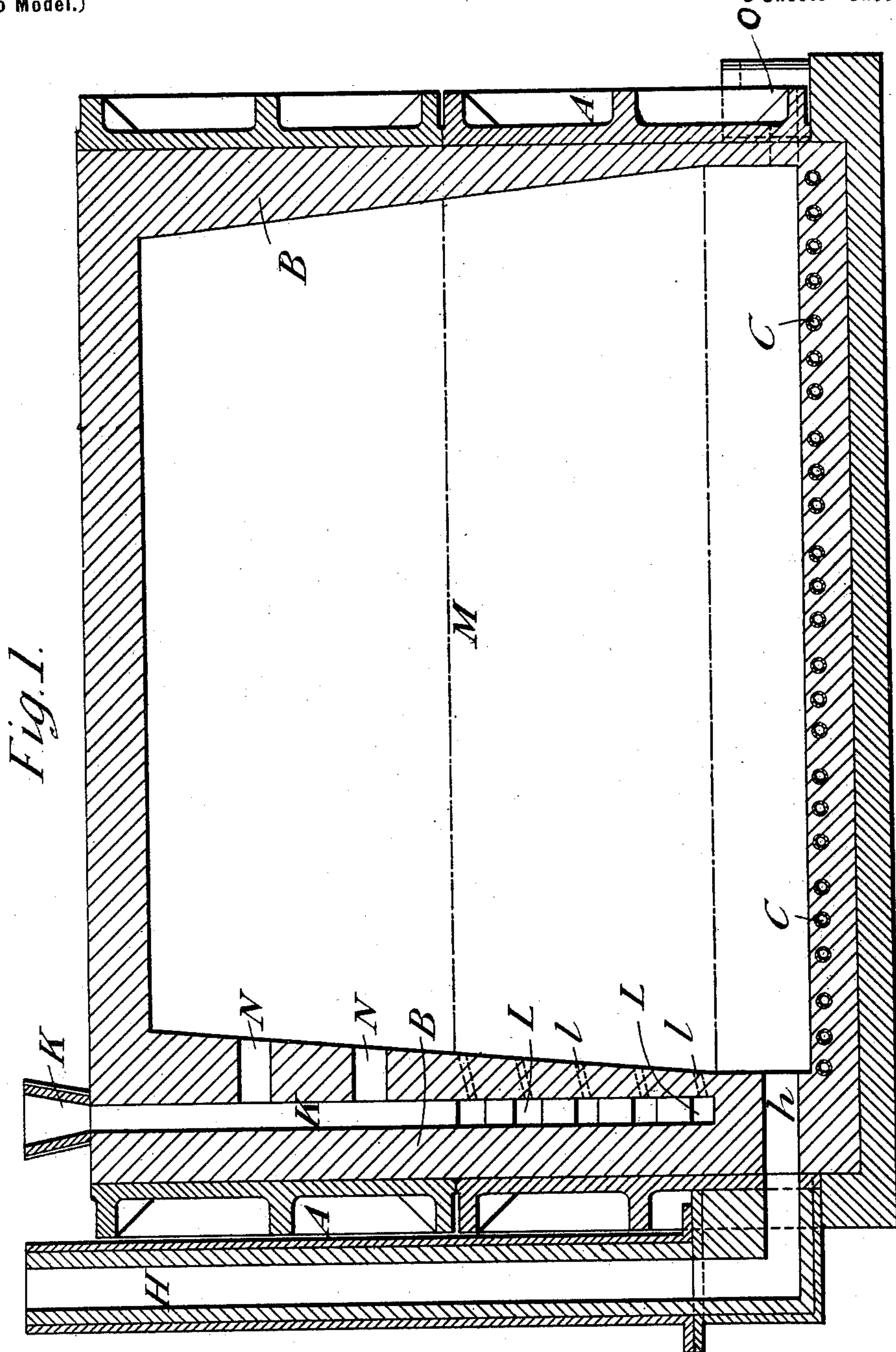
Patented Feb. 7, 1899.

W. BEARDMORE & H. V. HOLDEN.
CASTING ARMOR PLATE AND MOLD THEREFOR.

(Application filed July 31, 1897.)

(No Model.)

3 Sheets—Sheet 1.



Witnesses:
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Robert Lawson

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Fig. 2.

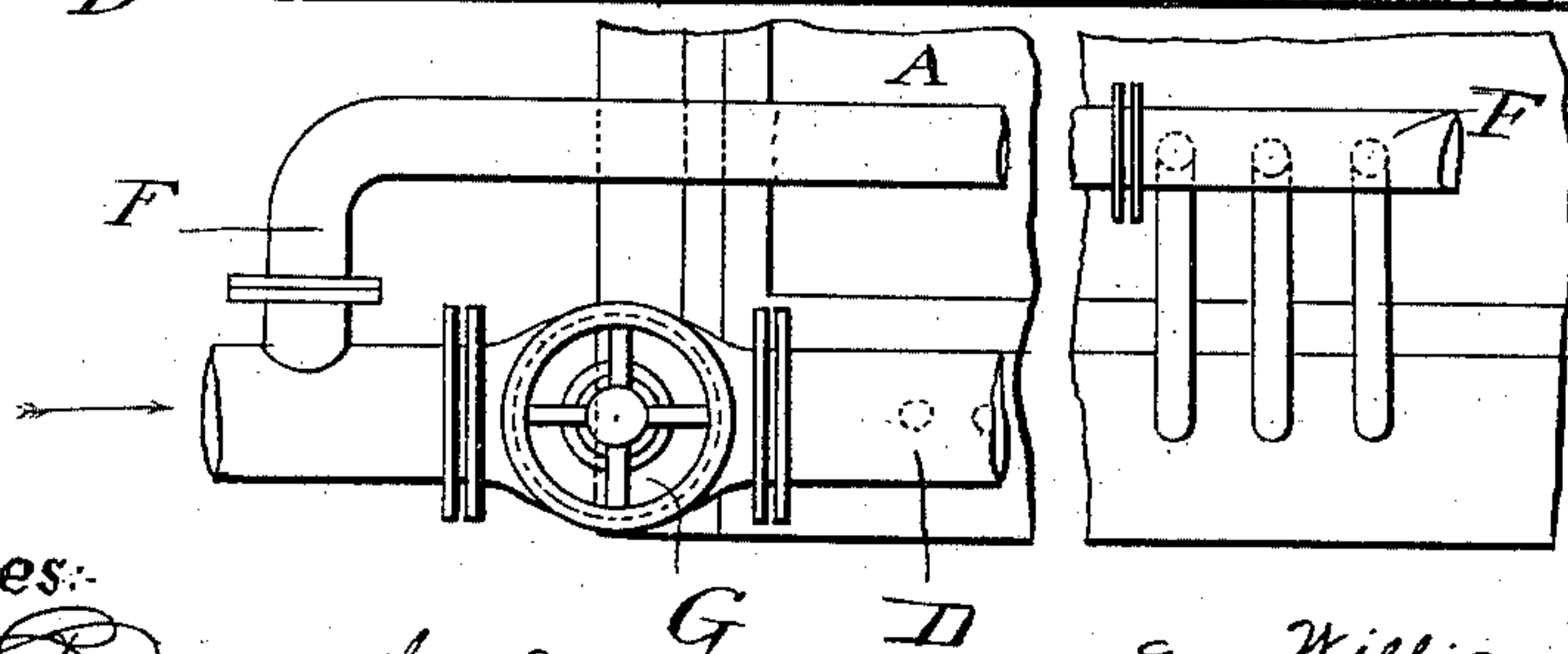
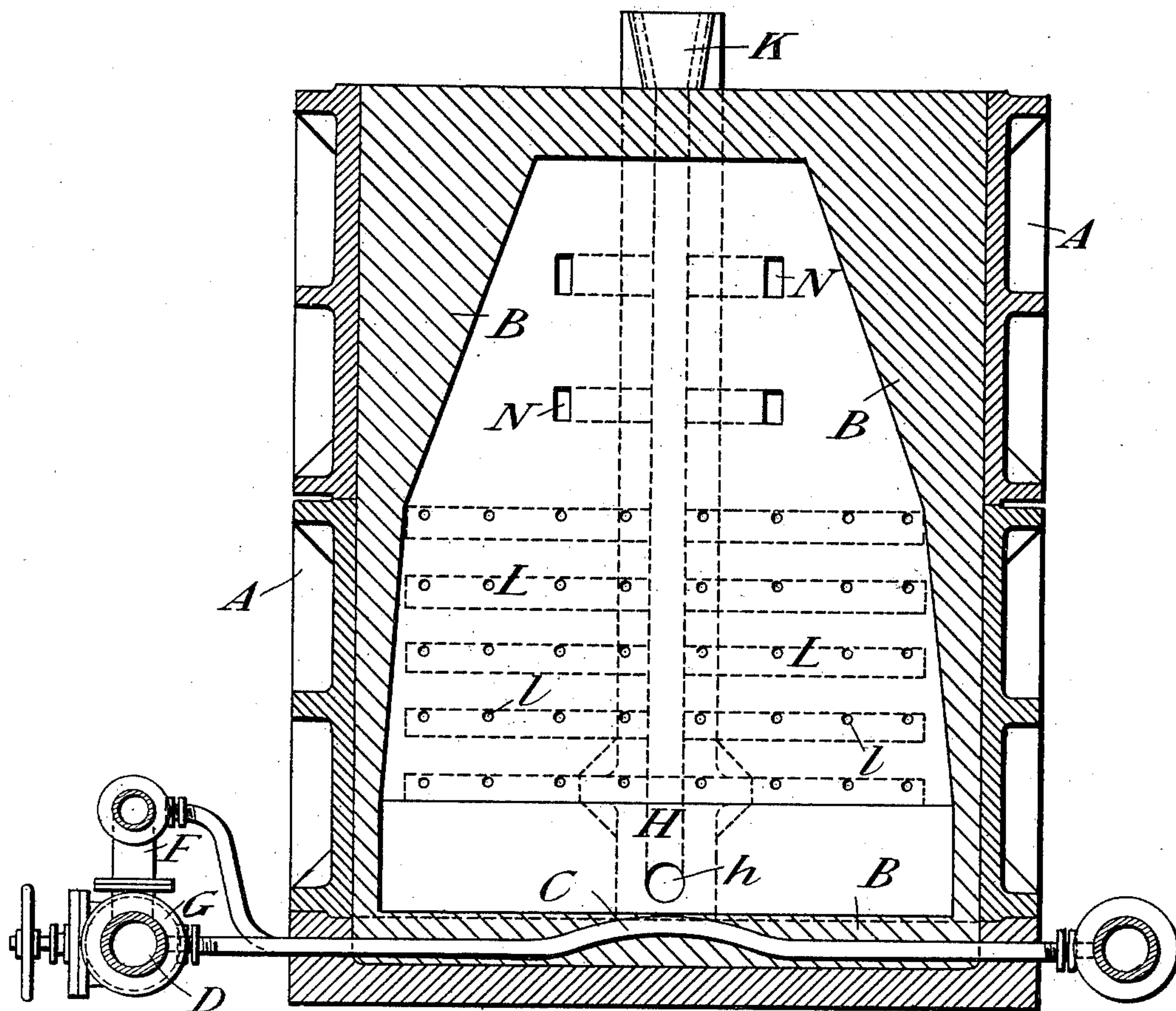


Fig. 4.

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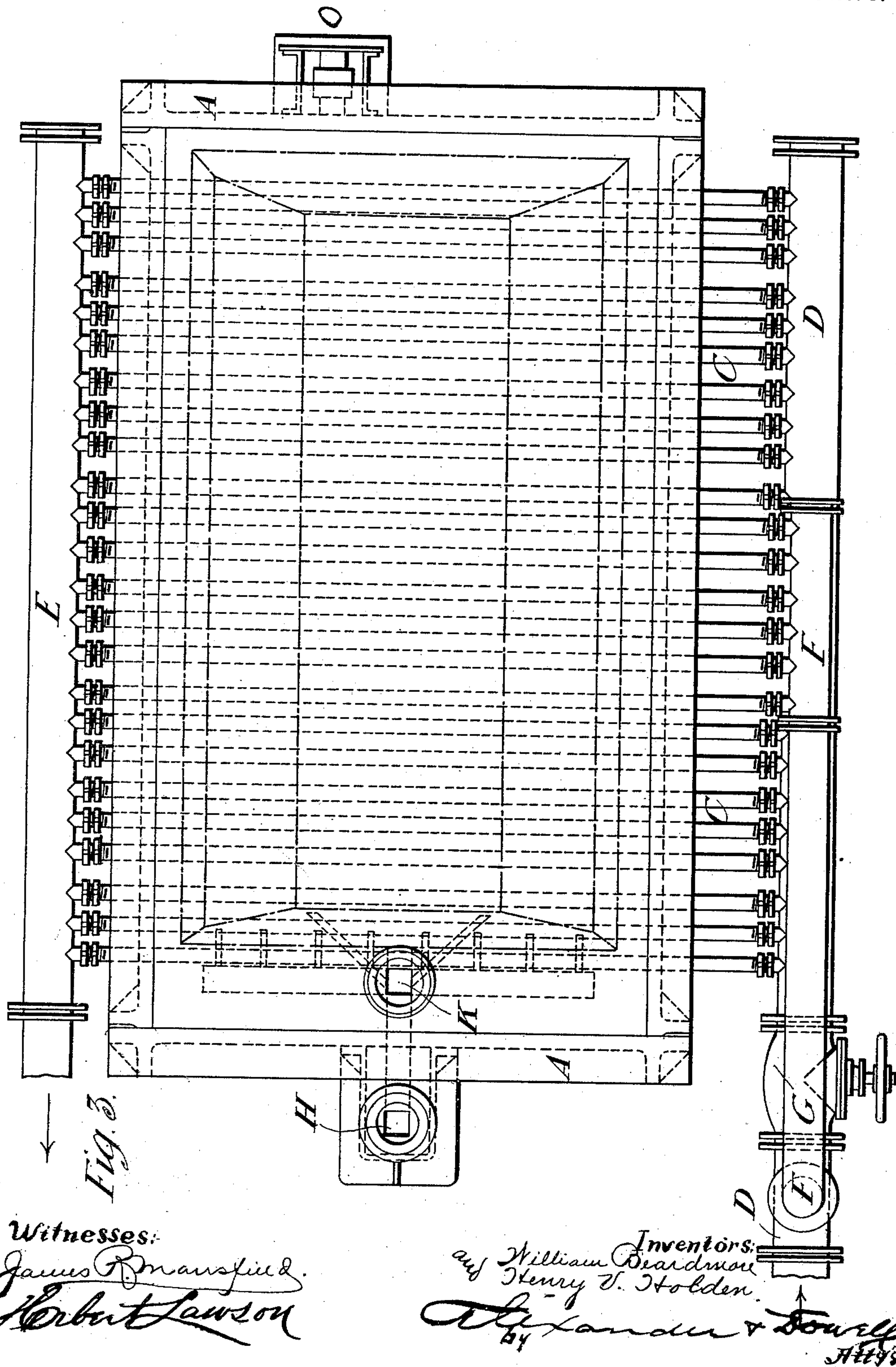
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3 Sheets—Sheet 3.



UNITED STATES PATENT OFFICE.

WILLIAM BEARDMORE, OF GLASGOW, SCOTLAND, AND HENRY V. HOLDEN,
OF LONDON, ENGLAND.

CASTING ARMOR-PLATES AND MOLD THEREFOR.

SPECIFICATION forming part of Letters Patent No. 619,123, dated February 7, 1899.

Application filed July 31, 1897. Serial No. 646,624. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM BEARDMORE, residing at Parkhead Forge, Glasgow, in the county of Lanark, Scotland, and HENRY VINCENT HOLDEN, residing at No. 24 Coleman street, in the city of London, England, citizens of England, have invented certain new and useful Improvements in Casting Armor-Plates and Molds Therefor, of which the following is a specification.

Our invention relates to the casting of armor-plates in two or more layers of metal of different qualities in respect of hardness and toughness. For this purpose we provide a mold-box, as we shall describe, referring to the accompanying drawings.

Figure 1 is a longitudinal section, Fig. 2 is a transverse section, and Fig. 3 is a plan, of a mold-box according to our invention. Fig. 4 is a detail view of the main D, branch F, and valve G.

Within a metal casing A we form a lining B of suitable refractory material. Through the bottom lining pass from side to side a number of pipes C, through which cold air is blown from the main D, the air passing away by another main E. We prefer to supply a number of the pipes C at the middle part of the mold-box from a branch F, which rises from the main D before the valve G, so that these middle pipes may have air blown through them when the valve G is more or less closed, preventing or lessening passage of air through the pipes nearer each end of the mold-box. At one end of the mold-box we provide a main geat H, leading to a lateral passage h, opening into the mold-box near its bottom, and we provide another geat K, which has lateral branches L at several levels, each having outlet-holes l, inclining a little upward.

Molten steel of a kind to receive hard temper is first poured into the mold by the geat H and passage h till it attains the desired level. This may be determined by pouring a calculated weight of metal, or there may be an outlet O, like a tapping-hole, allowing overflow when the metal has attained the desired level. The bottom of the mold being kept cool by the air passing through the pipes C, the layer of metal shortly begins to set from the bottom upward; but in order that the middle

part, which is farthest from the ends of the mold-box, may cool uniformly with the end parts the middle pipes supplied by the branch F have their full blast of air, while the pipes nearer the ends may have their supply more or less reduced by the valve G. When the first layer of metal is cooled to the proper degree, metal of a softer quality is poured in by the geat K, and this, flowing along the lateral passage L and out by the numerous holes l, flows gently over the surface of the first layer, uniting with it, but without such disturbance as would cause mixture of the two metals to any sensible depth. Other layers may in like manner be poured in by the geat K, and finally a considerable head of metal to fill up the space above the line M may be introduced by the geat K and lateral passages N, this head of metal serving to give soundness to the metal below the line M and being cut off to the line M when the ingot is set.

The casting produced as above described consists of a lower layer of metal which can take a hard temper and of softer and tougher metal above. It can be rolled or forged to the desired form and thickness to constitute a composite armor-plate, its front surface being hardened by chilling in the usual way.

Having thus described the nature of this invention and the best means we know of carrying the same into practical effect, we claim—

1. The combination with a mold for casting metal plates having their opposite sides of different degrees of hardness, of a series of cooling-pipes arranged in the bottom thereof, a common return or outlet pipe at one side of the mold with which all of said cooling-pipes communicate, a supply-pipe at the opposite side of the mold communicating with the cooling-pipes nearer the ends of the mold, a branch pipe communicating with said supply-pipe and with the central cooling-pipes, and a valve interposed between the junction of the branch pipe and the supply-pipe, whereby the volume of cooling medium supplied to or flowing through the end pipes can be decreased, substantially as and for the purpose described.

2. The combination with the mold, of the supply-pipe D and return-pipe E, a series of

cooling-pipes passing through the wall of the mold near the ends thereof and communicating with said supply and return pipes, a centrally-arranged series of pipes communicating with the return-pipe, and a branch pipe communicating with the main supply-pipe and with said central series of pipes, and a valve interposed between the junction of said branch and supply pipes and the first end series of cooling-pipes substantially as described.

3. The herein-described mold, having a series of cooling-pipes embedded in its bottom, a lateral passage *h* in one side near the bottom of the mold communicating with the main geat, and a geat *K* at one side of the mold communicating therewith above passage *h* through a series of lateral passages *l*, substantially as and for the purpose described.

4. The herein-described mold for casting armor-plate having its opposite sides of hard and soft metals respectively, having central and end series of cooling-pipes embedded in

its bottom, a lateral passage *h* in one side near the bottom of the mold communicating with a main geat, and a geat *K* at one side of the mold communicating therewith above passage *h* through a series of lateral passages *l*, and above passages *l* at different heights through other lateral passages *N*; with valved pipe connections substantially as described, whereby the full volume of air or cooling fluid may be continually supplied to the central pipe, while the volume of air passing through the end cooling-pipes can be decreased, so as to effect a uniform cooling or chilling of the cast ingot.

In testimony whereof we have signed our names to this specification, in the presence of two subscribing witnesses, this 10th day of July, A. D. 1897.

W. BEARDMORE.
H. V. HOLDEN.

Witnesses:

OLIVER IMRAY,
JNO. P. M. MILLARD.