(No Model.)

2 Sheets—Sheet 1.

B. ATHA.

MOLD FOR ARMOR PLATE.

No. 375,666. Patented Dec. 27, 1887.

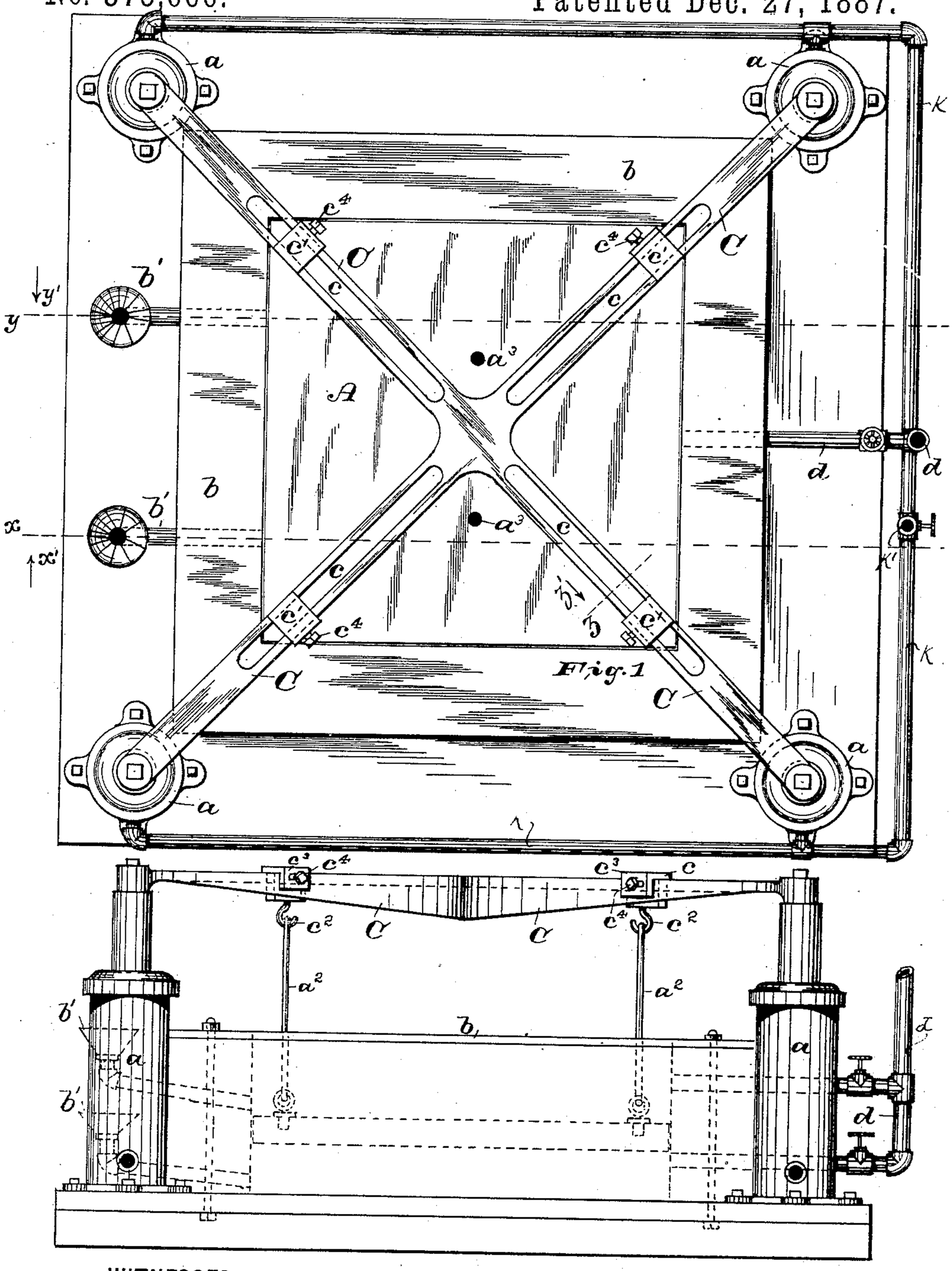

Fig. 2

WITNESSES:

J. H. Bartine
L. S. Cook.

INVENTOR:

Benjamin Atha

BY Campbell & Co. ATTYS.

(No Model.) 2 Sheets—Sheet 2.

B. ATHA.

MOLD FOR ARMOR PLATE.

No. 375,666. Patented Dec. 27, 1887.

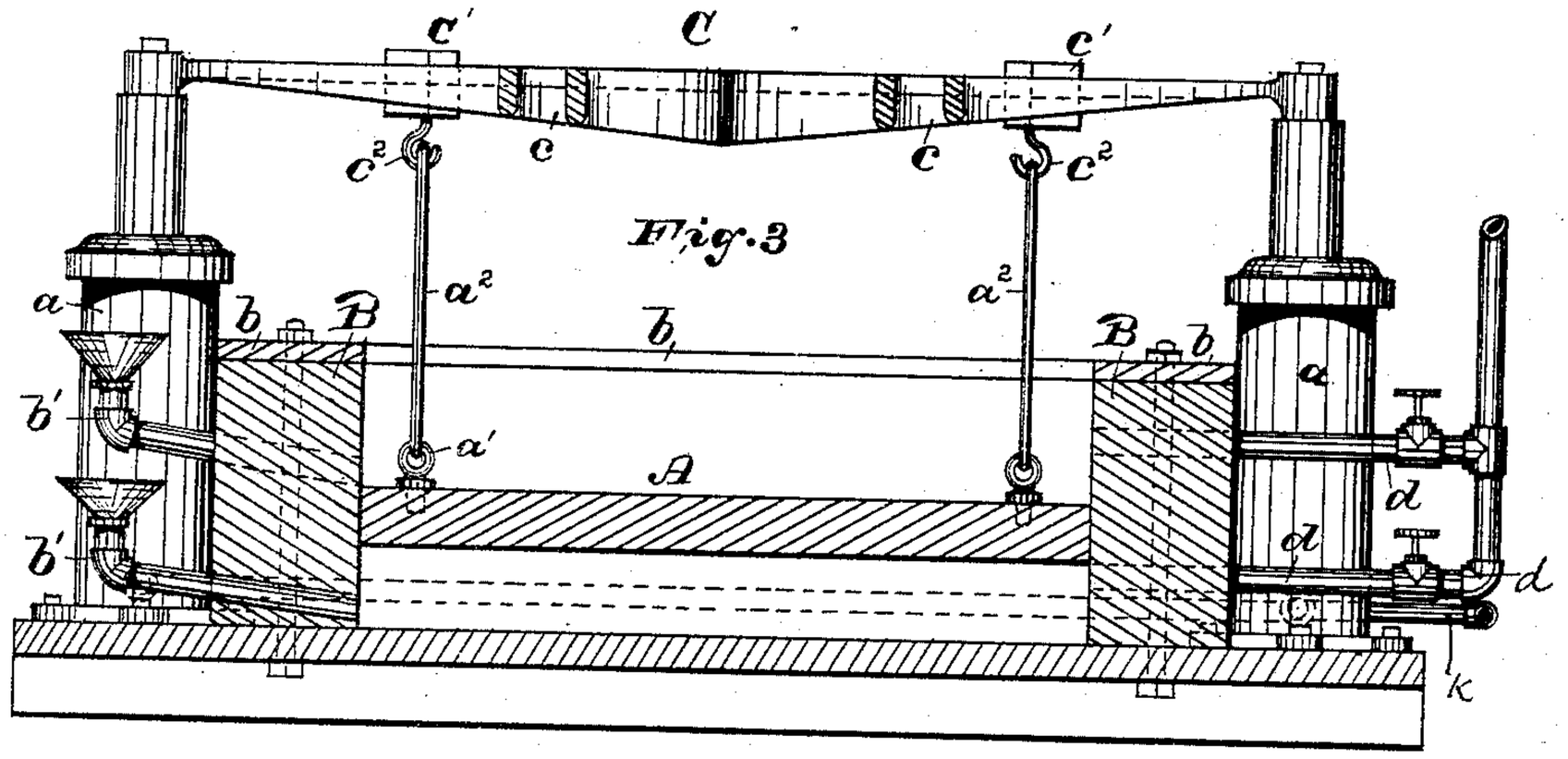

Fig. 3

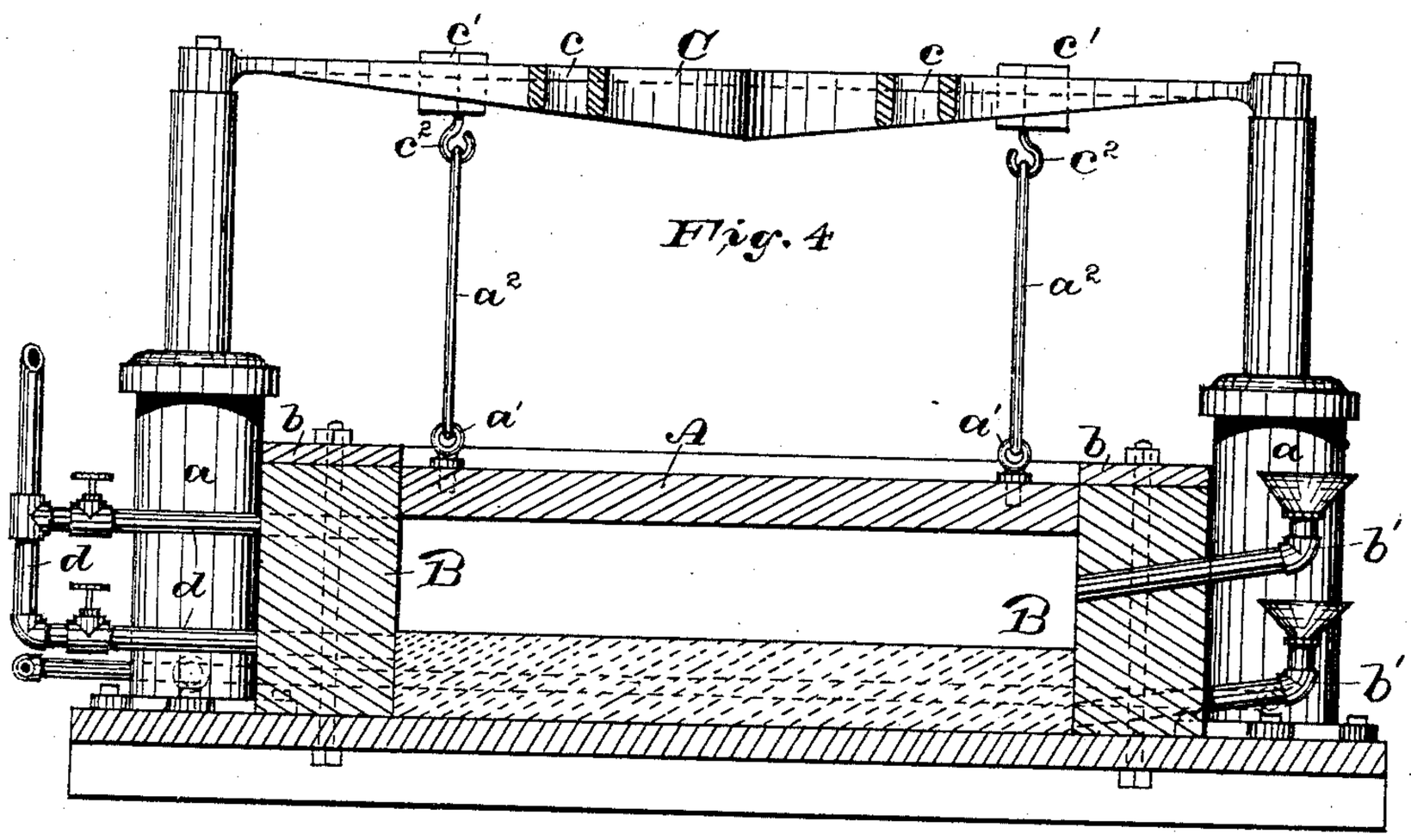

Fig. 4

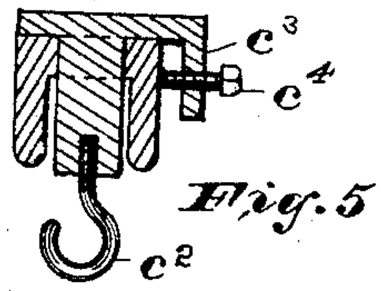

Fig. 5

WITNESSES:

L. L. Partine

L. L. Cook.

INVENTOR:

Benjamin Atha

BY Campbell & Co. ATTYS.

UNITED STATES PATENT OFFICE.

BENJAMIN ATHA, OF NEWARK, NEW JERSEY.

MOLD FOR ARMOR-PLATE.

SPECIFICATION forming part of Letters Patent No. 375,666, dated December 27, 1887.

Application filed September 22, 1887. Serial No. 250,376. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN ATHA, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Molds for Armor-Plate; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

This invention is designed to provide an improved apparatus for casting armor or other plates composed of united steels of different carbon cast one upon the other with an interval of time between each casting operation in which the successive quantities of metal are protected from the surrounding air after being cast until set.

In the accompanying sheets of drawings is illustrated an embodiment of my invention, in which—

Figure 1 is a plan view of my improved apparatus. Fig. 2 is a side elevation of the same. Fig. 3 is a section taken through X, Fig. 1, looking in the direction of the arrow *x*, illustrating the relation of the parts of my apparatus during the casting of the first layer. Fig. 4 is a section taken through *y*, Fig. 1, looking in the direction of the arrow *y*, and illustrating the relation of the parts of my apparatus during the casting of the second layer of metal; and Fig. 5 is a section through one of the slotted arms and the sliding hook arranged therein.

As above indicated, this invention is designed to be used in forming armor or other plates of steels of different carbons, or steel combined with other materials—such as iron, &c.—the primary object being to protect the surfaces of the cast metal which are to unite from the oxidizing effect of the atmosphere to enable a perfect union to take place at the point of welding of the separate layers of metal.

The device shown in the above-described sheets of drawings consists of a movable plate, A, which moves vertically within the side walls, B, of the mold, into which the molten metal is poured through ducts suitably placed. The said side walls of the mold are made, preferably, from dry sand of the proper kind, and upon the top of said side walls is arranged a plate, *b*, as shown in Fig. 2. Opening into the interior of said mold at different heights, according to the thickness of the different layers of the finished plate, are the pouring-ducts or runners *b'*.

The mechanism for raising and lowering the movable plate A (shown in the drawings) consists of four hydraulic cylinders, *a*, arranged at each corner of the mold, and connecting the pistons of each of said hydraulic cylinders above the top of the mold are slotted arms C, which cross above the center of the mold and are either formed in one piece or bolted together, as may be desired. Each of these connecting-arms is provided with a slot, *c*, between the point of intersection thereof and the piston of each hydraulic cylinder, and sliding in each of said slots is a block, c', provided with a hook, c^2, on the lower side thereof, and a depending flange, c^3, through which works a set-screw, c^4, which engages with the side of the slotted bar and retains the same in any desired position.

Instead of the sliding block heretofore described I have contemplated using a threaded bolt having a head on one end and a hook similar to the hook c^2 on the lower end, provided with a nut thereon, which, when the threaded bolt is arranged in the slot, is screwed up against the under side of the slotted bar and answers the same purpose as the set-screw c^4 in the sliding block heretofore described.

As the size of the armor-plates varies to a large extent, the hydraulic cylinders are placed at such a distance apart as to take in the largest size of plate, and in the space between the cylinders there is placed the sand mold for receiving the metal, which may be formed according to the size of plate desired.

By means of the sliding blocks in the slotted arms which connect the pistons in the hydraulic cylinders adjustable mold-plates may be used of varying sizes, and the blocks adjusted to each size of adjustable plate.

On the upper surface of the adjustable mold-plate are provided hooks a', preferably four in number. The rods a^2 connect each of said hooks with each of the hooks on the sliding blocks in the intersecting arms above the mold.

The water supplied to the hydraulic cylinders is controlled by a single valve, substan-

tially as indicated in Fig. 1 at *k'*, so that all four of said cylinders simultaneously raise and lower the adjustable mold-plate within the mold. Steam is applied to the cylinders by pipes *k*.

The operation of the mechanism hereinbefore described is as follows: The mold-plate A is adjusted within the mold at a height determined by the thickness of the first layer of metal, as indicated in Fig. 3, and through the lowest feeder or duct which opens into the space thus left beneath the adjustable plate the metal is poured which forms the first layer of the compound plate. When the cast is finished, the adjustable plate is raised vertically within the mold to such a height as is desired to make the second layer of metal of the required thickness, as indicated in Fig. 4. Into the space thus provided between the upper surface of the first cast and the under side of the adjustable plate the second cast is made through the duct which opens into the space thus made. In this manner the successive layers of metal are poured one upon the other, as many as may be desired, each successive pouring being made at the proper time, which is determined by the condition of the preceding cast, so as to unite or weld the two charges of metal together. In order to still further prevent the admission of any air beneath the mold-plate, I provide pipes *d*, through which any suitable non-oxidizing gas is forced into the space beneath the mold-plate before the metal is poured into the same. As the metal enters said space it gradually forces out the gas, and until the same is entirely expelled from the matrix of the mold when filled by the molten metal. The gas may be conducted into the interior of the mold through independent pipes provided with suitable cut-off valves therein, or may be introduced through a series of pipes provided with valves which communicate with a single gas-feeding pipe. These various ducts or flues for admitting the molten metal and gas into the spaces beneath the mold-plate are arranged one above the other, at a distance determined by the thickness of the successive layers of the compound plate. When the required number of casts have been made to form the desired thickness of plate, the mold-plate is lifted at a distance above the top of the mold, and the compound plate is removed.

To facilitate the removal of the cast compound plate suitable hooks or eyes may be cast in the plate, as will be understood. Suitable holes, a^3, are provided in the adjustable plate *a* to vent the gases rising from the cast metal beneath said plate. It will be understood that the valves in the gas-pipes and the position thereof may be varied from those shown in the drawings, which are shown merely for illustration.

Having thus described my invention, what I claim is—

1. In a mold for casting armor or other plate, the combination, with the inclosing sides of said mold and pouring-funnels opening into the interior thereof at different levels, of a cover or plate vertically adjustable within said sides to increase or diminish the capacity of the casting-cavity, and means for raising and lowering said adjustable plate within the mold, for the purposes set forth.

2. In a mold for casting armor or other plate, the combination of inclosing sand sides, pouring-funnels opening through said sand sides into the interior of said mold at different levels, a cover or plate arranged within said mold and vertically adjustable in the same, and means for raising and lowering said adjustable plate within the mold, for the purposes set forth.

3. In a mold for casting armor-plate, the combination of a sand mold, pouring-ducts opening into said mold at different levels, gas-induction pipes arranged and opening into the interior of said mold at the same level as the pouring-ducts, a plate or cover arranged in said mold and vertically adjustable within the same, and a lifting and lowering device for adjusting said plate within the mold, for the purposes set forth.

4. In a mold for casting compound plates, the combination of the sand mold, pouring-ducts opening into said mold at different levels, a plate or cover arranged in said mold and vertically adjustable within the same to increase or diminish the casting-cavity, hydraulic cylinders arranged around said mold, the pistons of which are connected above the mold-plate by a lifting-frame, and adjustable devices for connecting the mold-plate with said lifting-frame, for the purposes set forth.

5. In a mold for casting compound plate, the combination of the sand mold *b*, pouring-ducts arranged at different levels and opening through the walls of said sand mold into the interior thereof, a vertically-adjustable plate, A, hydraulic cylinders arranged around said mold, a water-supply pipe connecting all of said cylinders, a lifting-frame, C, connecting the pistons of said cylinders and extending above the mold-plate *a*, sliding blocks *c'*, moving in said lifting-frame, and rods a^2, connecting said sliding blocks with the mold-plate, substantially as and for the purposes set forth.

6. In a mold for casting armor-plate, the combination of a mold, pouring-ducts opening into said mold at different levels, a plate or cover arranged in said mold and vertically adjustable within the same to increase or diminish the casting-cavity, and hydraulic cylinders arranged around said mold, the pistons of which are connected with each other and the adjustable cover by a lifting-frame, for the purposes specified.

In testimony that I claim the invention set forth above I have hereunto set my hand this 15th day of September, 1887.

BENJAMIN ATHA.

Witnesses:
FREDK. C. FRAENTZEL,
FREDK. F. CAMPBELL.