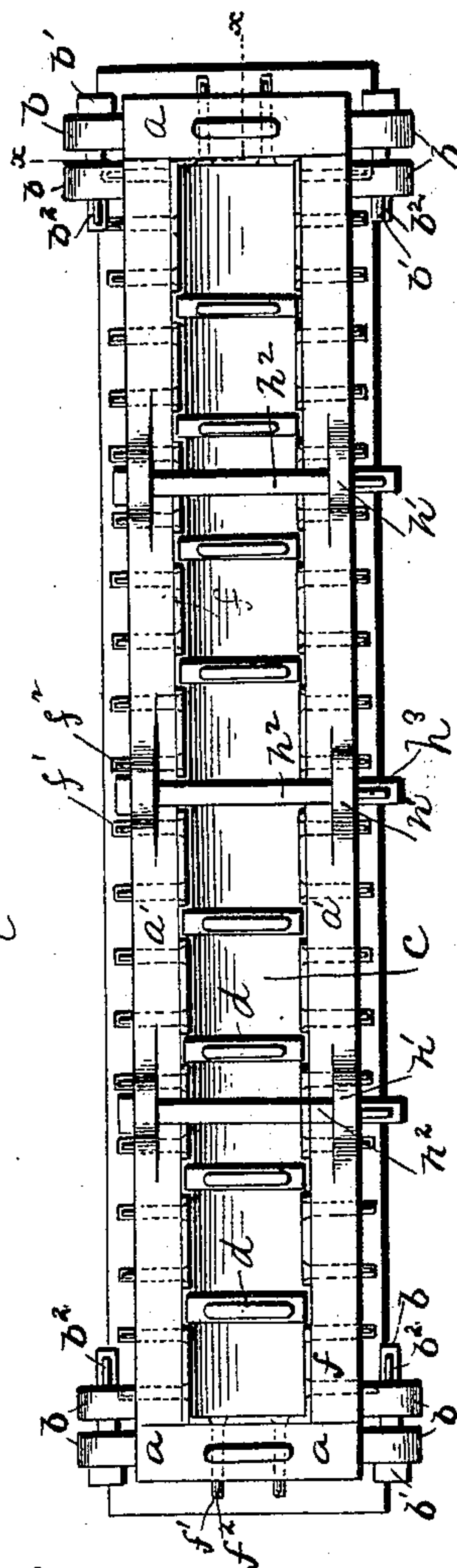
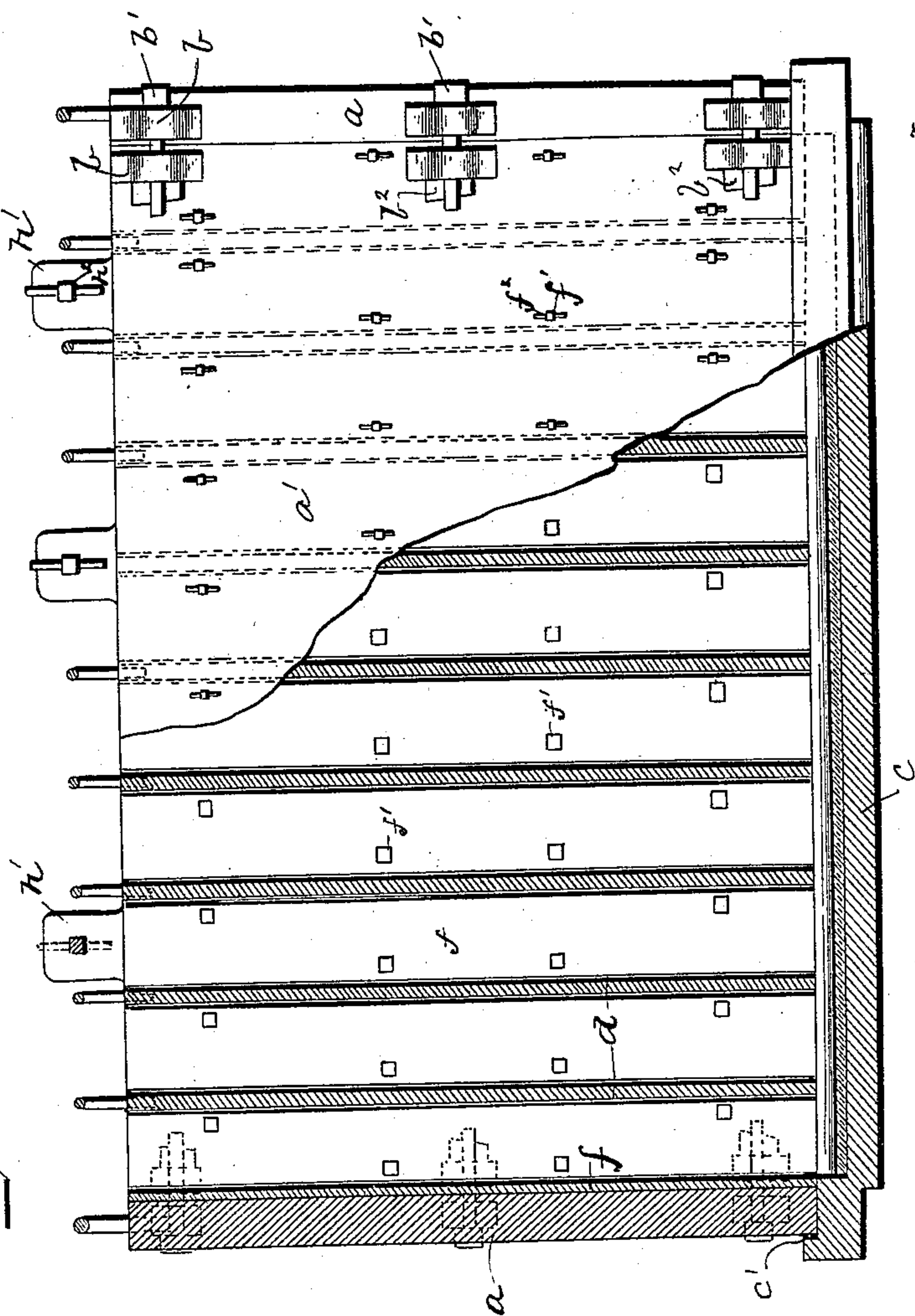
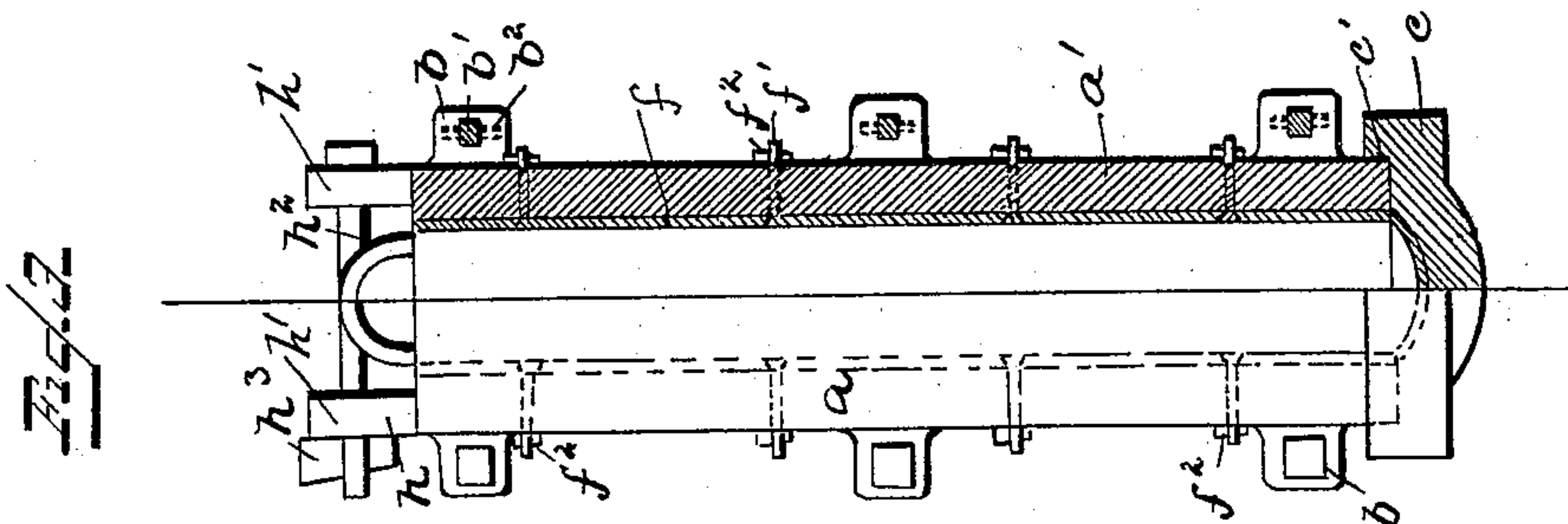


(No Model.)

E. L. CLARK.
INGOT MOLD.

No. 404,381.

Patented June 4, 1889.



WITNESSES.
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UNITED STATES PATENT OFFICE.

EDWARD L. CLARK, OF PITTSBURG, PENNSYLVANIA.

INGOT-MOLD.

SPECIFICATION forming part of Letters Patent No. 404,381, dated June 4, 1889.

Application filed November 5, 1888. Serial No. 290,027. (No model.)

To all whom it may concern:

Be it known that I, EDWARD L. CLARK, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Ingot-Molds; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to improvements in ingot-molds, whereby it is possible to cast small ingots of steel or other metals without material loss of the metal in the form of scrap, and at the same time without the injury to the molds heretofore experienced; and it consists in a mold subdivided into compartments by upright removable partition-walls arranged at near intervals, and having a runner-trough at the bottom of the mold, the runner-trough being formed by the bottom of the mold itself, so that the runners which connect the several ingots shall form parts of the ingots, which can be rolled or otherwise worked with them. Heretofore the runners connecting the ingots have been so arranged that the metal which chills in the runners cannot be used with the ingots, but must be broken off and remelted with the scrap. The waste of metal thus occasioned is very considerable, and its expense has detracted largely from the benefits which are derived from the system of casting a number of connected small ingots by bottom casting. It is presumed that the advantages of forming small ingots by the process of bottom casting, as well as the former difficulties in their casting, are well understood by those skilled in the art.

I shall now describe my invention by reference to the accompanying drawings, which form part of this specification.

In the drawings, Figure 1 is a side view, in partial longitudinal vertical section, of my improvement. Fig. 2 is a plan view. Fig. 3 is an irregular cross-section on the line $x x$ of Fig. 2.

Like symbols of reference indicate like parts wherever they occur.

Referring to the drawings, $a a'$ represent the side and end walls of the mold, which are secured to each other by projecting lugs b , through which bolts b' pass, fastened by keys b^2 , or in any other suitable manner. The sides of the mold are also held together and braced

by lugs h' , bolts h^2 , and keys h^3 . These walls, formed of suitable castings, rest on a bottom piece, plate, or casting c , which is recessed, as at c' , for the reception of the side and end pieces. Extending vertically between the side pieces a' are cross partition-walls d , which are removably fitted in grooves in the side pieces and reach from the bottom to the top thereof, thus forming separate mold-compartments communicating with each other under said walls by a concave trough formed in the bottom piece or casting c , the partition-walls d extending down merely to the upper face of the bottom piece c .

In casting the ingots the metal is poured from the ladle into one of the compartments of the large mold, and then flows into each of the smaller compartments along the trough at the bottom and under the several partitions d . When the compartments have been properly filled and the metal has solidified therein, the ingots are uncovered by unkeying and detaching the end and side pieces of the mold and taking the ingots therefrom in succession, the thin web of metal at the base of each partition readily breaking off, so as to leave the ingots separate from each other. No metal need be wasted in this operation, because from the position of the runner-trough of the mold it is clear that the runner will form an integral part of each ingot and can be rolled or worked with it. In order to make the lower end of the ingot easier to work, I make the trough concave or curved in cross-section, so that the ingots shall have round ends, thus enabling them to be more easily rolled; but it can be shaped otherwise if desired.

The partition-walls d should be made quite thin, in order that the degree of separation between the ingots and the size of the connecting-runner may be small; and, if desired, they may be made of thin metal, though in such case they should be coated before each casting with a wash or coating of some refractory material to prevent adhesion of the cast metal thereto.

In order to protect the end walls, side walls, and bottom piece, which are all formed of castings, from the deleterious or cutting action of the molten metal, I provide their exposed

surfaces with a lining or covering f of fire-brick, clay, or other material—such as metal sheeting or castings—which is secured to the mold by bolts and keys f' and f'' , which, if
 5 injured, can readily be replaced at small cost compared with replacing any part of the body of the mold itself.

In a separate application, Serial No. 290,028, filed on November 5, 1888, I describe and
 10 claim a process executed by means of the apparatus described and shown in the foregoing specification.

I claim—

1. An improvement in apparatus for casting
 15 ing simultaneously a series of two or more laterally-separate ingots by bottom casting, which consists in a mold subdivided into two or more compartments for separate ingots by upright removable partitions having openings
 20 under their bases, thereby establishing communication between the compartments, and forming at the base of the mold an open runner trough or gutter, substantially as and for the purposes described.

2. An improvement in apparatus for casting
 25 ing simultaneously a series of two or more laterally-separate ingots by bottom casting, which consists in a mold having a bottom piece formed with a concave or gutter-shaped
 30 surface, and upright partitions which divide said mold into two or more compartments for separate ingots, the bases of said partitions being elevated above the base of the concave or gutter-shaped surface of the bottom piece,
 35 thus establishing communication between the compartments and forming at the base of the

mold an open runner trough or gutter, whereby the metal in the runners forms integral and reducible parts of the several ingots, substantially as and for the purposes described. 40

3. An improvement in apparatus for casting simultaneously a series of two or more laterally-separate individual ingots by bottom casting, which consists in a mold having
 45 separable ends and sides, partitions movably arranged in grooves in the sides and dividing the mold into a plurality of small molds for individual ingots, separate detachable linings for each of the small molds, and a base having recesses c' , into which the sides and ends
 50 are detachably fitted, provided with a continuous longitudinal runner common to and communicating with all of the small molds, substantially as described.

4. A mold for casting simultaneously a series of two or more laterally-separate individual ingots, said mold having sides and ends, transverse partitions dividing the inclosed
 55 space into a series of smaller molds, a base having a unitary inlet or runner common to all the smaller molds, and an interior sectional lining of refractory material detachably secured in place in each of the smaller
 60 molds and co-operating with the partitions, substantially as described. 65

In testimony whereof I have hereunto set my hand this 3d day of November, A. D. 1888.

EDWARD L. CLARK.

Witnesses:

W. B. CORWIN,
 W. BAKEWELL.