

No. 720,374.

PATENTED FEB. 10, 1903.

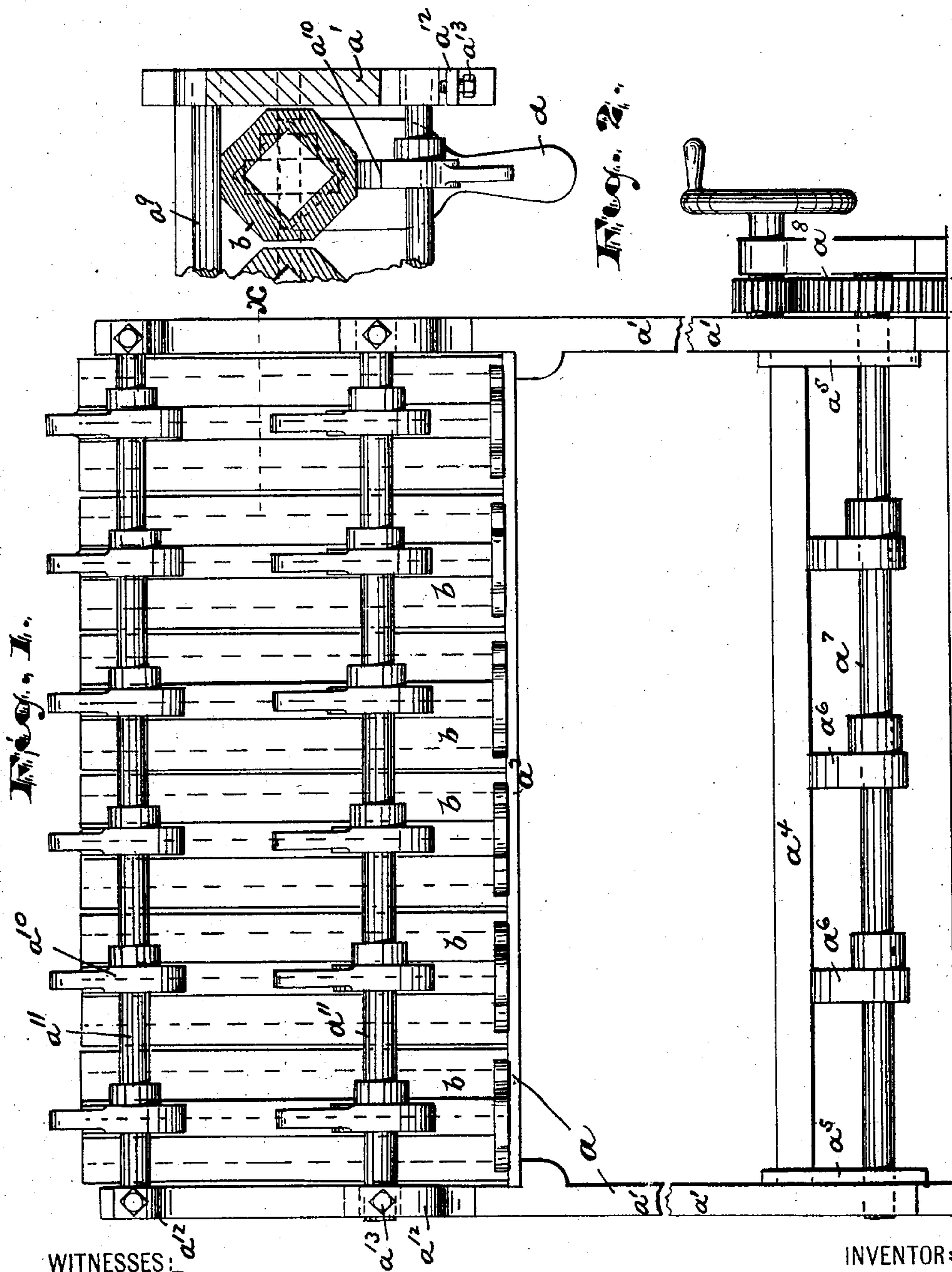
J. F. McGRATH.

PROCESS OF CASTING CRUCIBLE STEEL INGOTS.

APPLICATION FILED MAY 23, 1902.

NO MODEL.

2 SHEETS—SHEET 1.



WITNESSES:

*Henry Krug*

*Russell M. Everett*

INVENTOR:

*James F. McGrath*

BY

*Drake & Co.*

ATTORNEYS

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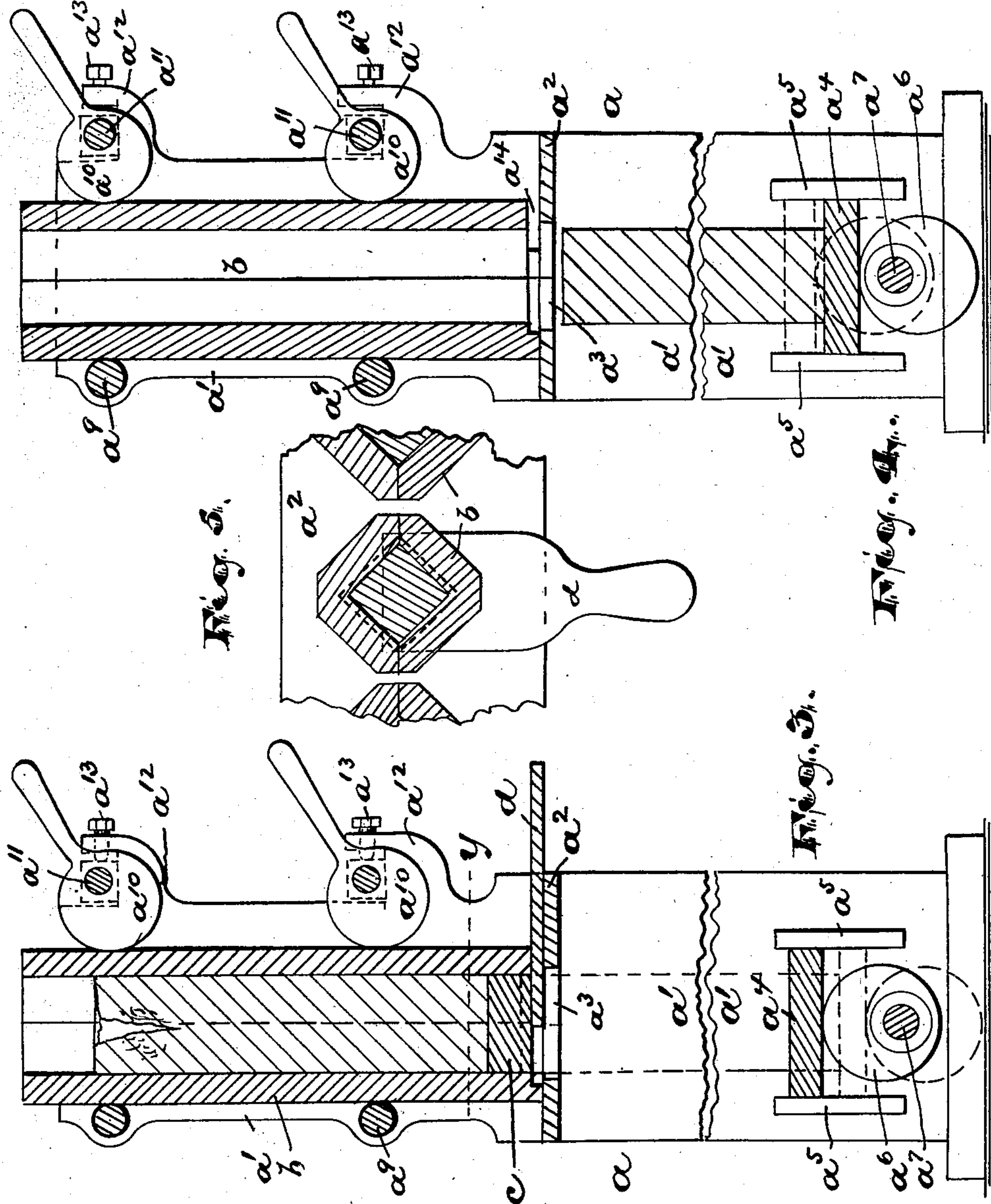
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# UNITED STATES PATENT OFFICE.

JAMES F. McGRATH, OF NEWARK, NEW JERSEY.

## PROCESS OF CASTING CRUCIBLE-STEEL INGOTS.

SPECIFICATION forming part of Letters Patent No. 720,374, dated February 10, 1903.

Application filed May 23, 1902. Serial No. 108,664. (No specimens.)

*To all whom it may concern:*

Be it known that I, JAMES F. McGRATH, 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 Processes of Casting Crucible-Steel Ingots; 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.

The object of this invention is to obtain in a crucible-steel ingot greater uniformity of hardness or temper and freedom from piping throughout its length; and it consists in the process of producing crucible-steel ingots, all substantially as will be hereinafter set forth and finally embraced in the clauses of the claim.

Referring to the accompanying drawings, in which like letters of reference indicate corresponding parts in each of the several figures, Figure 1 is a front elevation of the improved machine. Fig. 2 is a section at line  $x$  of Fig. 1. Fig. 3 is a vertical section of the machine, taken through one of the molds, showing the relation of parts when the ingot is in one of the first stages of casting. Fig. 4 is a similar section showing the parts at a later stage, and Fig. 5 is a section at line  $y$  of Fig. 3.

In said drawings,  $a$  indicates a frame comprising suitable uprights or standards  $a'$ , an upper platform or table  $a^2$  of sufficient length to receive a series of molds  $b b b$ , said molds in practice being preferably arranged in series of sixteen, and when a plurality of series are employed I may multiply the standards in accordance therewith. Said platform or table  $a^2$  is provided with a series of perforations  $a^3$  somewhat larger in areas than the horizontal areas of the mold-chambers in which the ingots are cast, the molds being seated on said platform so that said chambers coincide with the perforations and so that the ingots when freed from the mold will gravitate through said perforations. Below said table  $a^2$  is a second table or stop-platform  $a^4$ , which is vertically movable, preferably, between slide-

ways  $a^5$  at the inner sides of the standards  $a'$ . Said second lower table or stop-platform is preferably supported by hand-operable eccentrics or levers  $a^6$ , arranged on a horizontal shaft  $a^7$ , provided with means  $a^8$  for turning said shaft and eccentrics, and thus raising or lowering the table or platform at will.

The molds  $b b$  are in sections separable one from the other and are backed by horizontal bars or stays  $a^9 a^9$  and at their fronts are engaged by eccentrics  $a^{10}$ , arranged on pivotal bars  $a^{11}$ , supported removably on arms or brackets  $a^{12}$  of the frame and held firmly in place by set-screws  $a^{13}$  or by other suitable means. The parts are so related that by turning the eccentrics the sections of the mold may be clamped together against the stay-bars  $a^9$ , closing the sections preliminary to casting. The mold-sections are bottomless and are thus adapted to receive a false bottom or plug  $c$ , Fig. 3, which is set in the mold and is free to drop from the same when the sections are opened or parted. Said false bottom is supported in the mold by a slide  $d$ , the forward mold-section at its lower end being recessed at  $a^{14}$  to receive the said slide. Preliminary to casting the mold-sections are clamped together on the perforated platform, the plugs being arranged on the slide within the mold closing the lower end to hold the molten metal in place and the lower platform  $a^4$  being raised to a point within the frame distant from the upper platform less than the length of the complete ingot.

In casting I first take, say, a hundred pounds of molten steel and cast about ninety pounds of it into the mold. After the expiration of, say, a half minute I loosen the sections of the mold and withdraw the slide and permit the ingot to drop upon the lower table or platform, which occasions a powerful impact sufficient to effect a loosening of the air-globules in the still molten center part of the first casting, so that the said center part is very materially solidified. I then pour into the mold and onto the top of the lowered casting the balance (about ten pounds) of the hot steel remaining in the pot or crucible, which molten steel enters the pipe forming or tending to form at the top of the ingot and fills the same with a steel of the same nature and hardness or temper as the body-metal first poured, so



that the body of the ingot and the top part thereof are of uniform quality or grade of steel from end to end of the ingot. After the second pouring and hardening the ingot is  
5 lowered with the lower platform or table, thus releasing said ingot from the mold, and thus enabling the said ingot to be removed.

Having thus described the invention, what I claim as new is—

10 1. The process of casting crucible-steel ingots, consisting of first casting a portion of a pot of molten steel into a mold and partially hardening the steel thus cast, then applying to the partly-hardened steel a blow or impact  
15 to solidify the still fluid core or center part thereof and then casting at the top of the partly-cast ingot the balance or remainder of the steel from the pot containing the metal first cast, substantially as set forth.

2. The process of casting crucible-steel in- 20  
got's consisting of first casting a portion of a body of steel from a crucible into a bottomless mold having means for temporarily holding the metal therein while molten allowing  
25 said steel to partly cool and set or harden then permitting the partly-hard steel to gravitate with force against a hard resisting-body and finally pouring onto said first casting, the remainder of steel from the said crucible, substantially as set forth. 30

In testimony that I claim the foregoing I have hereunto set my hand this 1st day of May, 1902.

JAMES F. McGRATH.

Witnesses:

CHARLES H. PELL,  
C. B. PITNEY.