

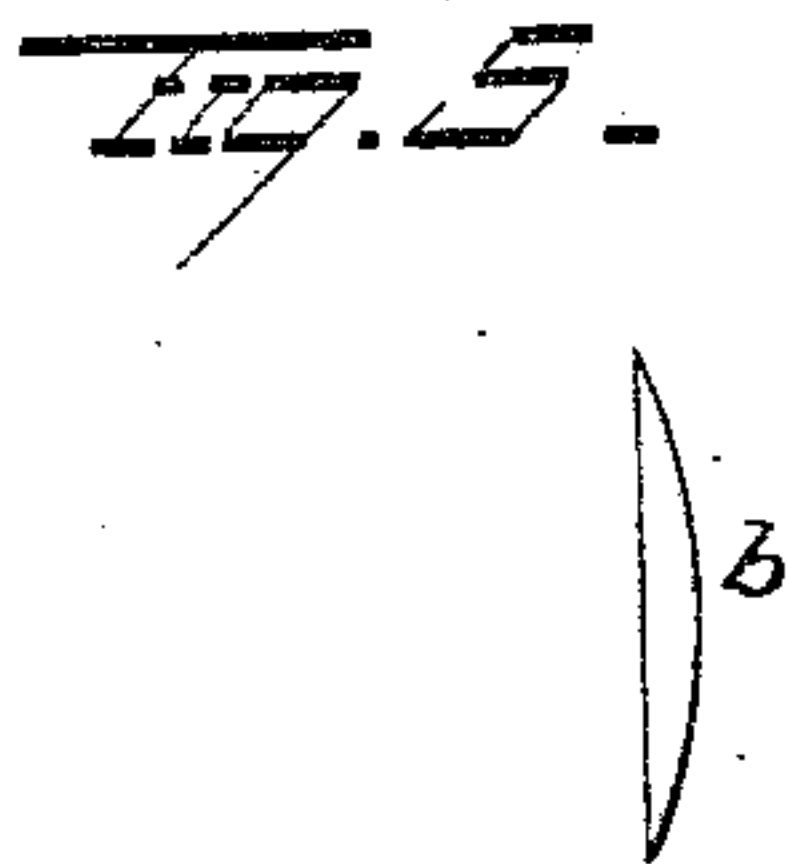
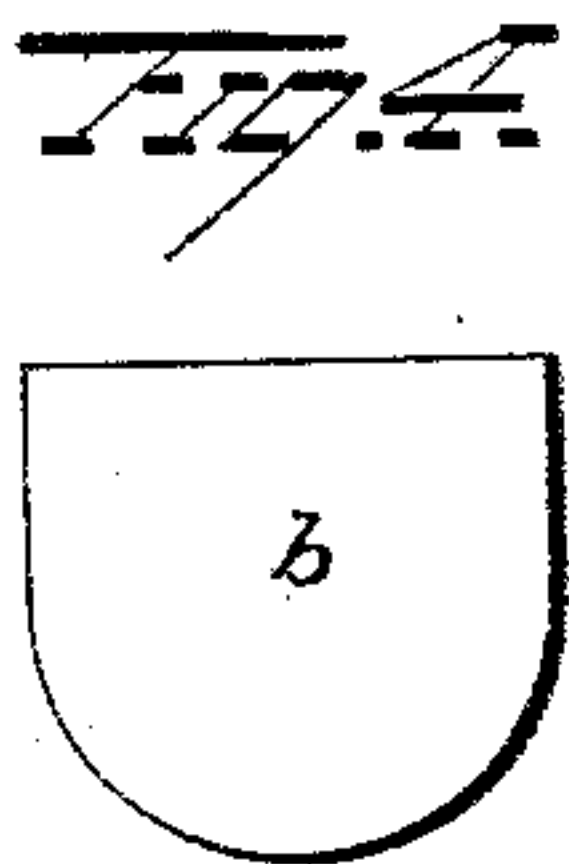
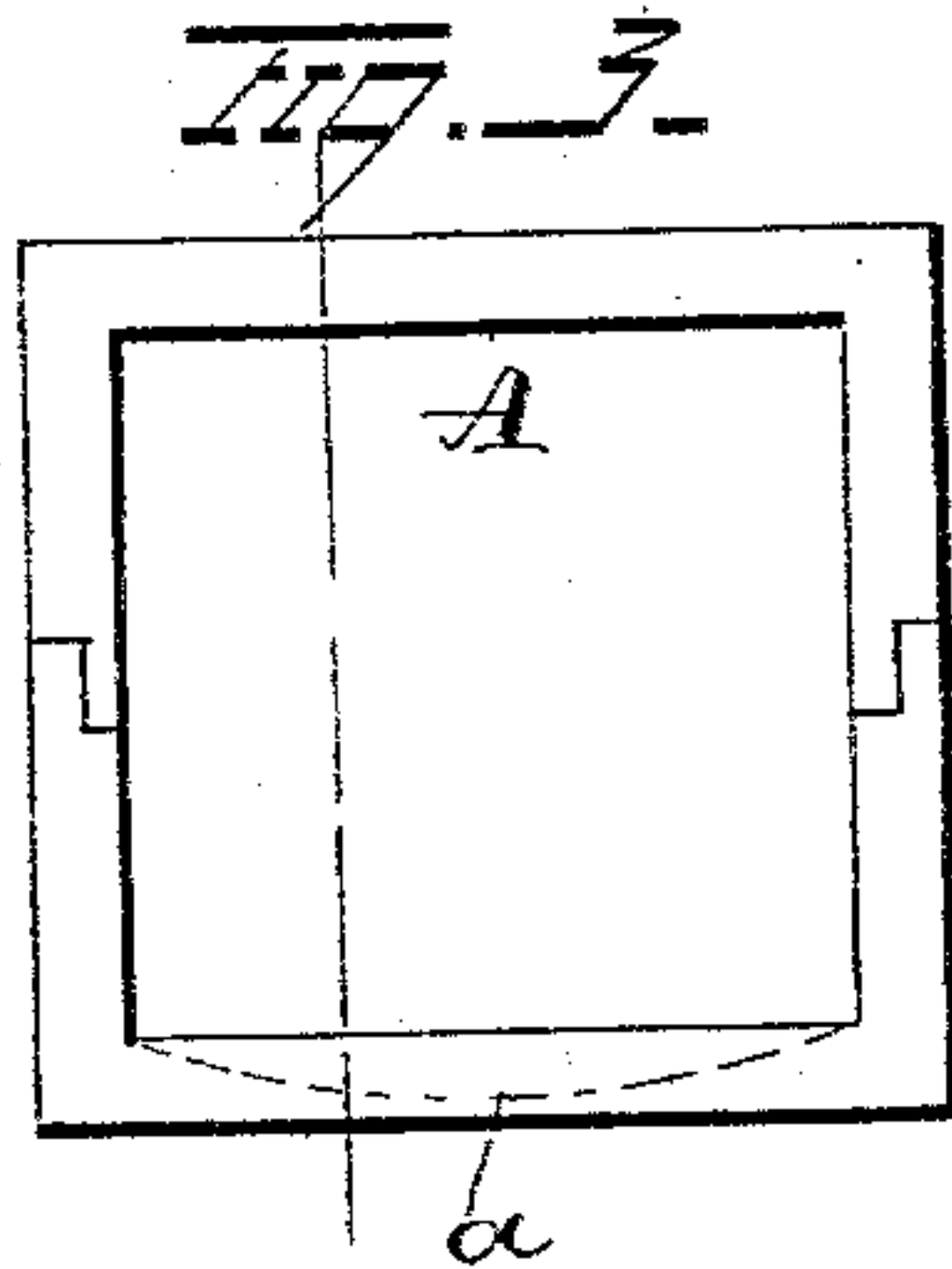
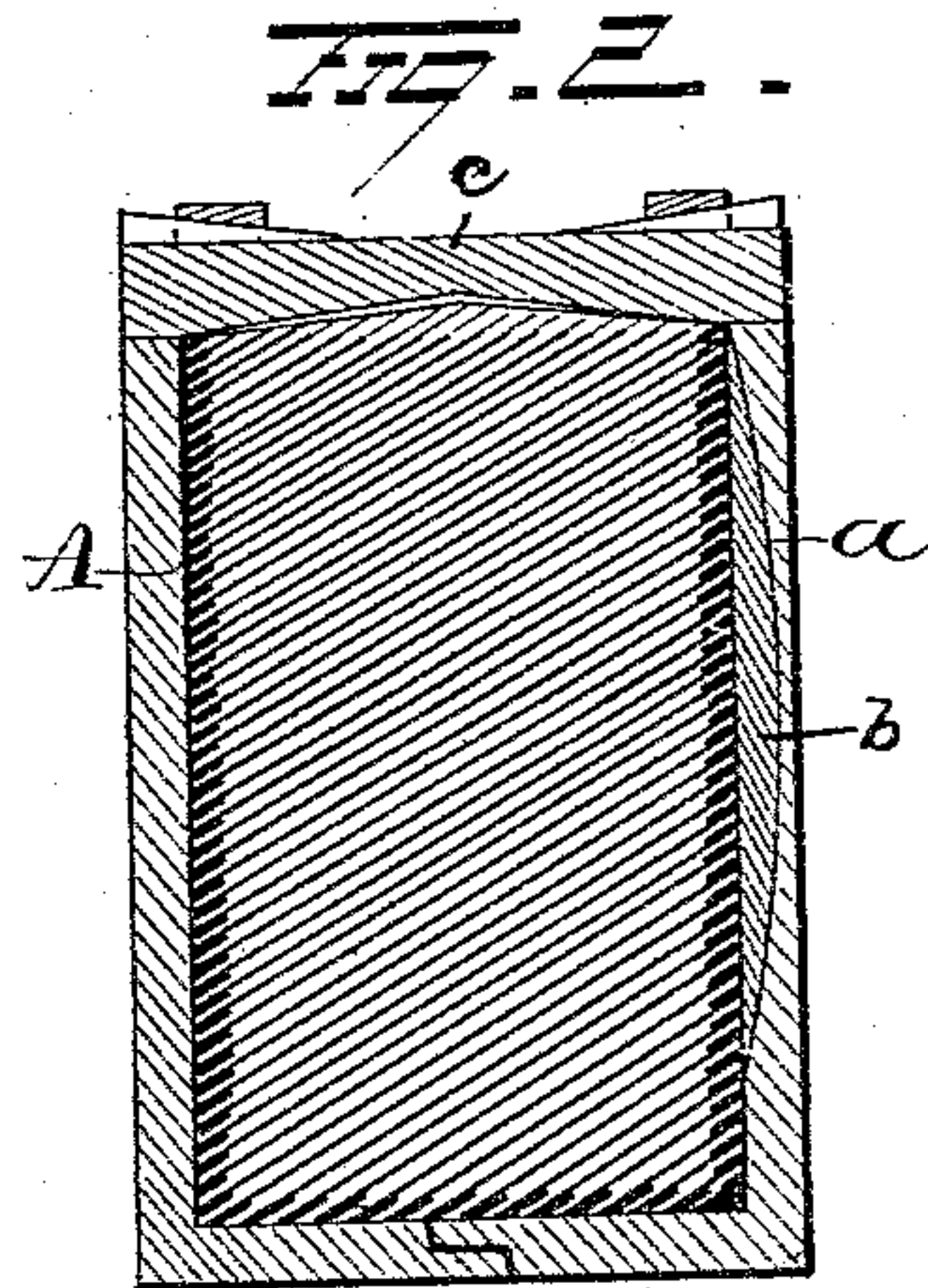
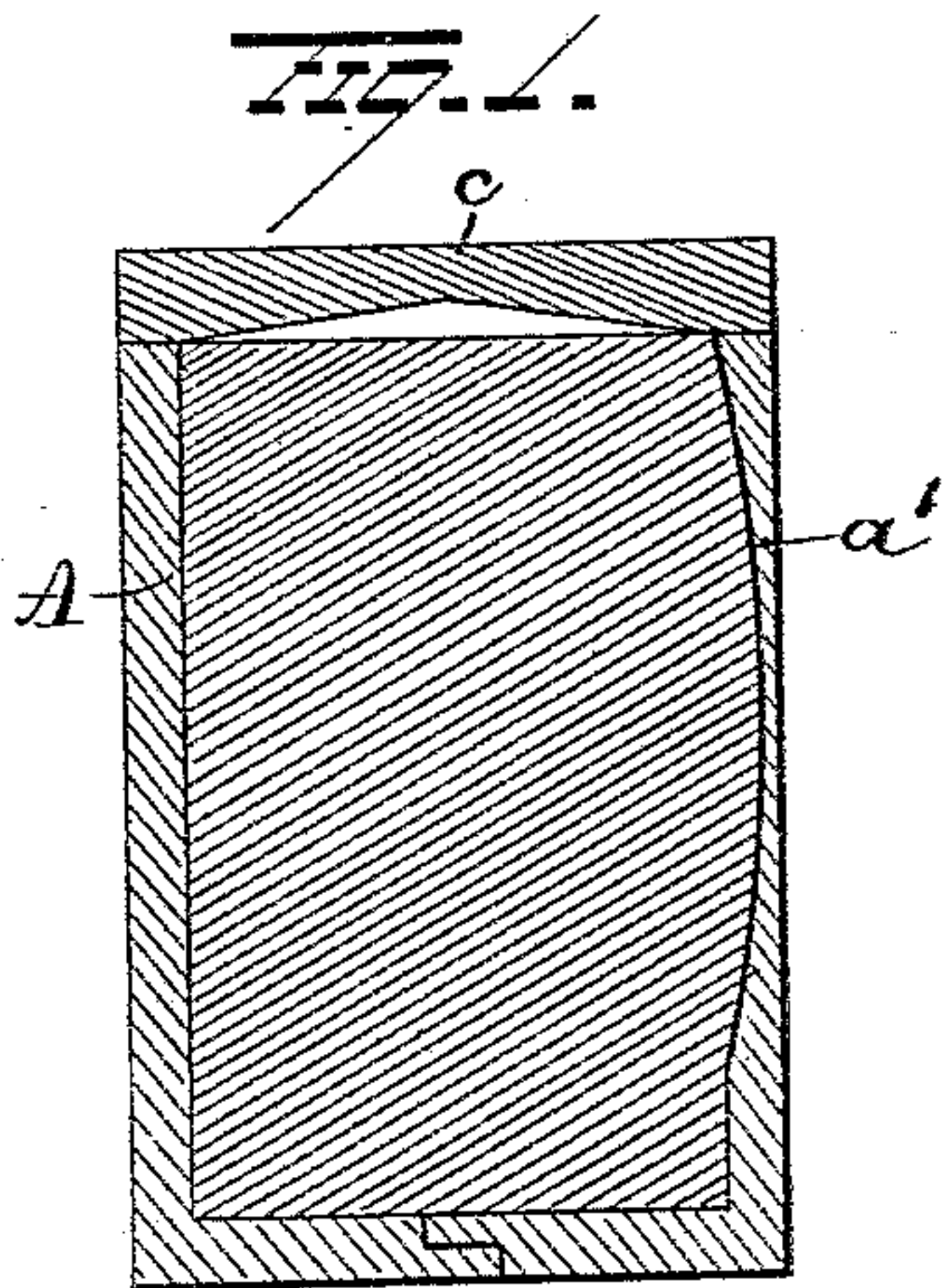
(No Model.)

S. T. WILLIAMS.

METHOD OF CASTING STEEL INGOTS.

No. 331,856.

Patented Dec. 8, 1885.



WITNESSES
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UNITED STATES PATENT OFFICE.

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METHOD OF CASTING STEEL INGOTS.

SPECIFICATION forming part of Letters Patent No. 331,856, dated December 8, 1885.

Application filed September 11, 1885. Serial No. 176,831. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL T. WILLIAMS, of Tacony, in the county of Philadelphia and State of Pennsylvania, have invented certain
5 new and useful Improvements in Methods of Casting 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
10 to make and use the same.

My invention relates to an improvement in the method of casting steel ingots. The object is to prevent what is commonly called
15 "piping"—viz., the forming of a cavity or cavities in the ingot, which tend to materially diminish its value for manufacturing purposes.

With this end in view my invention consists in the method of preventing pipes or cavities in casting metal, consisting, essentially, in passing the liquefied metal from the
20 central portion of the ingot upwardly into a hot space or chamber, and allowing the same to feed back gradually into the central portion of the ingot as the latter cools.

My invention further consists in certain steps and details of procedure, as will be hereinafter explained, and set forth in the claims.

In the accompanying drawings, Figure 1
30 represents a vertical sectional view showing the mold containing metal and having the plug or cover thereon. Fig. 2 is a similar view showing the mold, metal cover, and pressure-plate or wedge. Fig. 3 is a top plan view of
35 the mold, showing the cavity for the pressure-plate. Fig. 4 is an edge view of the pressure-plate, and Fig. 5 a front view thereof.

In Fig. 1, A represents the mold, the dotted line *a* in the plan view representing the hol-
40 lowed-out shape which the mold is made to assume to form a belly on one side of the casting.

The curved line *a'* in Fig. 1 represents the same hollowed-out portion of the mold in ver-
45 tical section.

Into a mold of the above character the melted metal is poured, and as quickly as possible thereafter a hot cover or plug, *c*, is placed on the top of it. The plug or cover may be made

of any suitable material; but a refractory ma- 50
terial is the best. The cover or plug is either put on in such a position as to leave a small space between it and the metal in the central portion of the top of the casting, or the bot-
55 tom of said plug or cover may be hollowed or dishd out to form said cavity, as may be deemed best in practice. As soon as the metal in the mold has set sufficiently to hold the molecules together, the mold is opened on the side or sides next to the belly or bellies, (for
60 the mold may be hollowed out on both sides, instead of one only,) and the pressure-plate *b*, Fig. 2, is inserted with its flat side against the said belly and its convex side opposite the
65 hollowed-out portion of the mold, and the hollowed-out portion of the mold put in plane and pressure applied. The metal composing the belly portion of the ingot is thus forced
70 inwardly, and the more movable portion of the ingot located at its central part is thereby forced upwardly or outwardly into the space
75 or chamber beneath the hot cover or plug, filling the same, and thus forming a head of metal kept in a soft or liquid form by the heated cover or plug, and ready to feed into any pipe
80 or cavity which may form in the ingot as it cools. After sufficient pressure has been applied to fill the head-cavity, the pressure is more gently continued for some minutes, to hold the metal well together, in order to pre-
85 vent the pipe or cavity which is being fed from the head from becoming any larger than can be avoided.

The pressure-plate, it will be observed, is constructed with one side convex and the other
85 plane. The convex side is preferably of such shape and size as to just fill the hollowed-out portion of the mold, and the ingot, when cooled, will thus have a plane face on the side where it originally bulged out; or, if it is not
90 necessary that the ingot should have a plane surface, an ordinary plane-faced mold can be advantageously employed, and the pressure-plate inserted with its convex side toward the ingot. The head for supplying the pipe or
95 cavity is kept hot by the hot cover, and remains in a liquid state sufficiently long to feed the pipe or cavity until the metal ingot has

become cooled and set to the very top. It is the better plan to put a slight pressure on the top of said cover or plug to hold it in place; but this is not necessary if the pressure on the pressure - plate be applied very evenly and gently.

The pressure may be applied by removing the ingot from the mold and then applying it as before described; but I prefer to do it while yet in the mold, as it saves labor.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The method of preventing pipes or cavities in casting metal, consisting, essentially, in pressing the liquefied metal from the central portion of the ingot upwardly into a hot space or chamber and allowing the same to feed back gradually into the central portion of the ingot as the latter cools, substantially as set forth.

2. The method of preventing the formation of cavities while casting metal, consisting, essentially, in applying pressure to one or more sides of the ingot after the latter is sufficiently cooled to cause the outside molecules to cohere, and forcing the molten metal from the central portion of the ingot upwardly, and allowing the same to feed back gradually into the central portion of the ingot as the latter cools, substantially as set forth.

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

SAMUEL T. WILLIAMS.

Witnesses:

W. E. WILLIAMS,
J. S. RIDDELL.