

(No Model.)

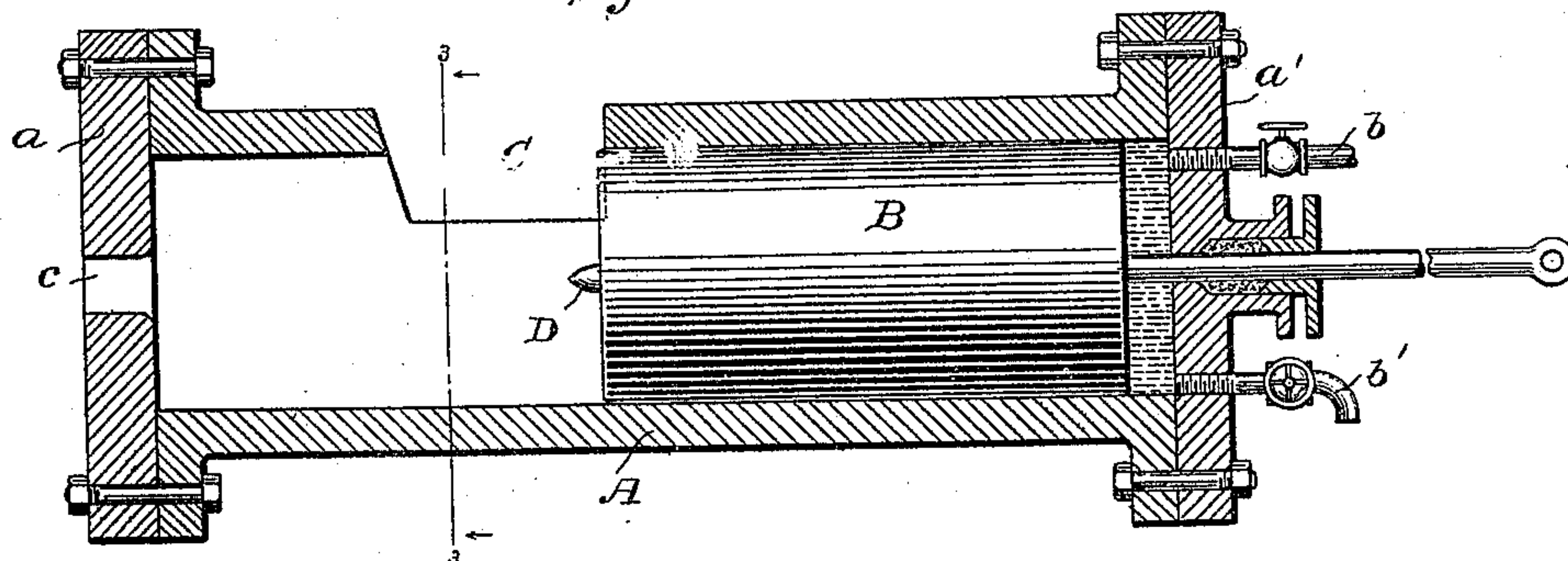
E. M. THOMPSON.

MECHANISM FOR MAKING METAL PIPES.

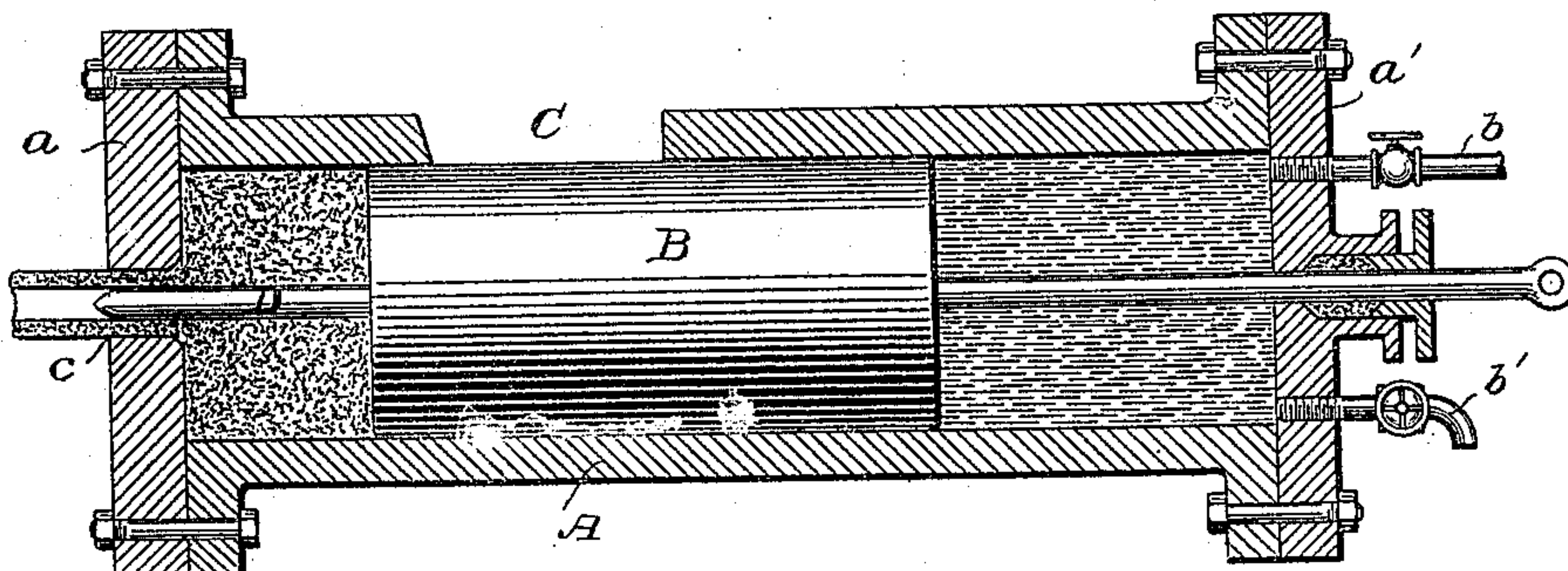
No. 349,015.

Patented Sept. 14, 1886.

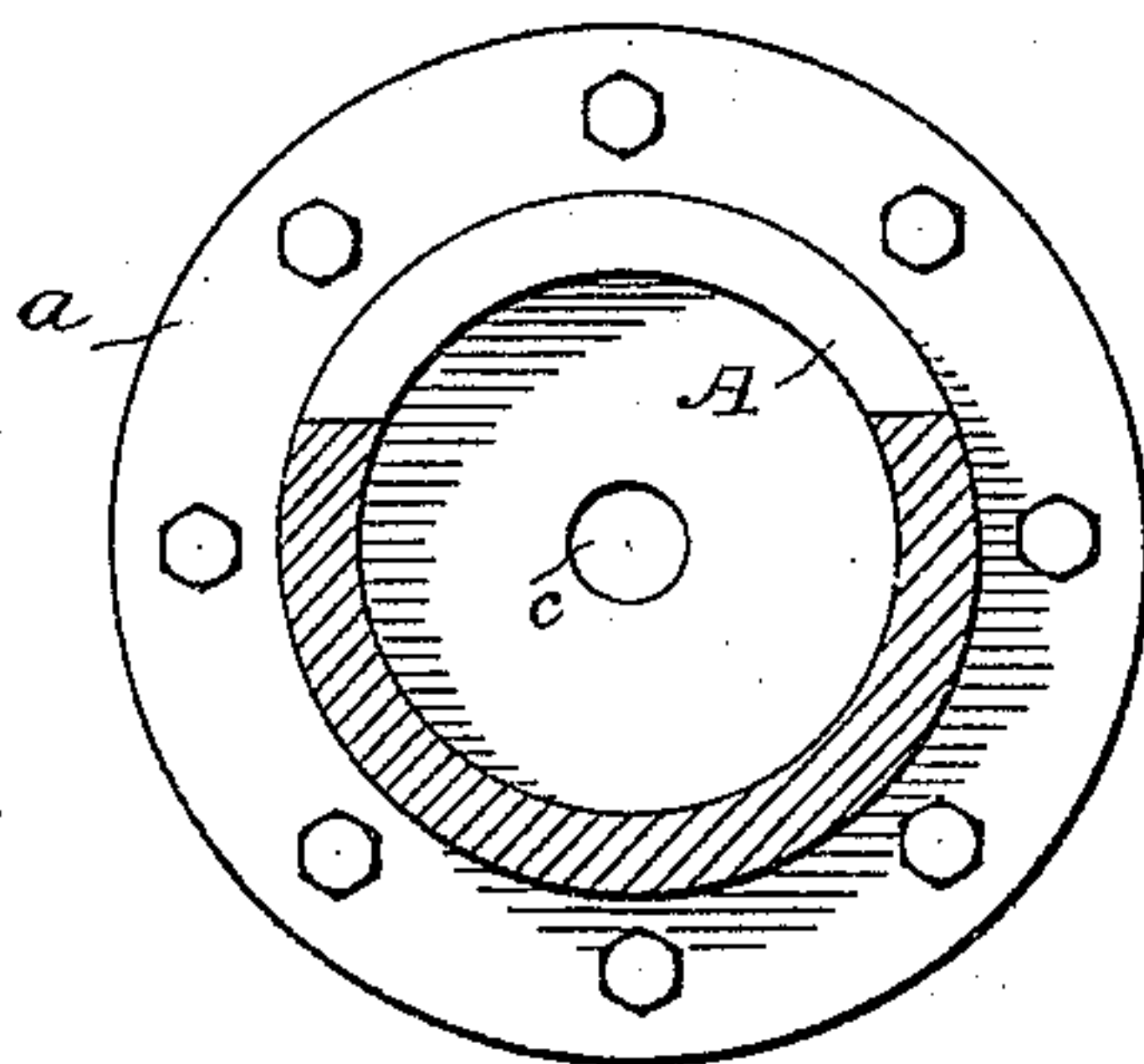
*Fig. 1.*



*Fig. 2.*



*Fig. 3.*



Witnesses

Wm A. Skunkle  
Henry A. Lamb.

Inventor

Evert M. Thompson

By his Attorneys

Parkinson & Parkinson



# UNITED STATES PATENT OFFICE.

EVERT M. THOMPSON, OF EVANSVILLE, INDIANA.

## MECHANISM FOR MAKING METAL PIPES.

SPECIFICATION forming part of Letters Patent No. 349,015, dated September 14, 1886.

Application filed February 5, 1886. Serial No. 190,948. (No model.)

*To all whom it may concern:*

Be it known that I, EVERT M. THOMPSON, a citizen of the United States, residing at Evansville, in the county of Vanderburg and State of Indiana, have invented certain new and useful Improvements in Mechanism for Making Metal Pipes, of which the following is a specification.

The object of my invention is to supply a machine that will manufacture seamless, solid, drawn pipe from blooms of steel, iron, and other metals heretofore used for tubing.

Lead pipe has long been manufactured by forcing it through a bore of suitable size within which was centered a mandrel. This mandrel was supported by braces from the walls of the compressing-chamber, and the ingot or bloom of lead was forced by means of a plunger against the braces, which of course severed it; but, as is well known, freshly-cut heated lead will unite again integrally under great pressure, therefore the material issued from the tube or bore as a seamless pipe. Such construction is, however, impractical when it is desired to make a pipe or tube from a bloom of steel or iron, because then to insure a perfect union of the metal in the pipe either of these must be heated to a greater degree than such mechanism would stand, and even if it withstood the heat the force necessarily applied would break away the braces. Moreover, the chilled residue of metal left in the die and about the braces at the end of an operation could scarcely be removed; hence when it has been desired to form a pipe of iron or steel it has always been necessary to resort either to casting or to welding, neither of which processes gives the perfect character that might be obtained from a pipe drawn from the bloom. In my invention I dispense with such braces and employ a cylinder of great strength, closed for a distance from both ends toward the center, but open about half its diameter at some point along its length, to permit the introduction of the bloom. At one head or end this cylinder is bored centrally to form a die, which determines the exterior diameter of the pipe to be made. At the other end it receives a plunger, which, by means of a hydraulic or other force, is reciprocated therein, and through the plunger is

passed a mandrel, pointed at its inner end and of a diameter less than the die to determine the internal diameter of the pipe. This enables me to place an ingot or bloom of any metal from which it is desired to form the pipe within the compression chamber or cylinder, then first compress it by means of the plunger, next pierce it with the mandrel, which is driven sufficiently far to pass into and partly or entirely through the bore or die in the cylinder-head, and then, by further actuating the plunger, to cause the bloom to emerge from the cylinder through the die in the condition of a solid, seamless, drawn pipe.

In the drawings, Figure 1 is a side elevation of a machine embodying my invention with the compressing chamber or cylinder in longitudinal section and empty, and the parts in readiness for the reception of a bloom; Fig. 2, a like side elevation with the cylinder in longitudinal section, a bloom introduced and compressed by the advance of the plunger, and the mandrel driven forward until its end has pierced the metal and rests within the die; and Fig. 3, a cross-section on the correspondingly-numbered line of the first figure.

A is a strong cylinder of metal with its ends closed by heads *a a'*, suitably secured thereto. At one end of the cylinder is a plunger, B, closely fitting therein, and suitably packed when hydraulic pressure is to be used, and, for the purposes of the present description, I shall proceed to thus describe it, as it will be sufficiently evident therefrom how other motive forces may be employed. The head which closes the end of the cylinder behind the plunger is perforated to receive an induction-pipe, *b*, connected with a hydraulic pump, and also to receive an eduction or discharge pipe, *b'*, both of said pipes being provided with suitable cut-off cocks. The compressing-cylinder is cut away for a short distance at a point, C, just at the forward end of the plunger, to about one-half its circumference, for the introduction of the ingot or bloom, and the head opposite the advancing end of the plunger has a bore, *c*, axially of the cylinder to determine the exterior diameter of the pipe or tube to be formed from such bloom. The opposite head and the plunger are also bored on the same axis, but to a lesser diameter, for the recep-



tion of a punch or mandrel, D, sharpened to a point at its forward end, and at its rear or outer end suitably formed for connection with an appropriate forcing or driving mechanism, or to receive the impact of a hammer. Where the mandrel passes through the head, a suitable stuffing-box should be attached to the latter, to prevent the escape of water under the hydraulic force, and packing may also be employed at the point where it enters the plunger. This mandrel is intended to determine the internal diameter of the pipe or tube formed from the bloom.

In operation the bloom is inserted through the aperture in the side of the cylinder, while the plunger and punch are both drawn back and the water shut off. This bloom, if of steel or iron or other similar refractory metal, is heated to a point which will allow it to draw, but not necessarily, with this construction, to a welding heat. If of lead, it may be fluid and allowed to set after introduction, or simply heated to the usual degree in forming lead piping. Water is then fed on from the hydraulic pump, and the plunger forced forward until the bloom is compressed within the farther closed end of the cylinder, and against the head thereof. As soon as the bloom is suitably compressed, or while this compression is taking place, the punch, supported and centered by the long bore through the plunger, is driven forward, in the one case the plunger momentarily ceasing its action and in the other the punch moving more rapidly than the plunger, so as to pierce the metal and enter the die at the forming end of the cylinder, where it acts as a mandrel. The plunger, now continuing its movement, forces the metal to issue through the die and over the mandrel as a solid, seamless tube, and this action lasts until the bloom has been nearly exhausted and what remains has become cold, when the formed pipe is severed. The hydraulic pump is then reversed, and the plunger forced back by atmospheric pressure, while the punch is also withdrawn. The residuum or waste part of the bloom will now have so far shrunk from chilling that it will either follow the punch as it is withdrawn or will be easily driven back by the introduction of a drift-bolt into the die, when it can be taken out from the aperture in the cylinder and a fresh heated bloom introduced.

When large tubes are to be made for use in boilers, the aperture in the side of the compressing-cylinder should be closed by a gate or sectional piece, conforming internally to its cylindrical outline as soon as the bloom has been introduced and before the plunger begins to act.

In order to keep the plunger cool, and also to cool that part of the punch passing through it, the body of the plunger may be chambered, or in a sense "honey-combed," to con-

nect with the hydraulic chamber and receive water therefrom. When this is done, considerable steam will be generated within the plunger and chamber, which will increase the force; but a safety-valve should be applied to avoid bursting.

I have described the plunger as being withdrawn to its position of rest by reversing the hydraulic pump and allowing the atmospheric pressure to take effect. It may, however, be withdrawn by the punch, as that is forcibly retracted, suitable provision for this purpose being made.

By the employment of this machine I am enabled to form seamless tubes of steel and iron having all the qualities of drawn metal, and far stronger than obtained by any process heretofore practiced of which I am aware.

I claim as my invention—

1. The combination of a compressing chamber or cylinder, a die formed axially through one of its heads or ends, a plunger moving from the other end, a punch of smaller diameter than the die passing axially through said plunger, and mechanism whereby said plunger is advanced along the compressing-chamber and the punch forced through the metal and into the die to act as a mandrel as the plunger continues its compressing movement.

2. The combination, substantially as hereinbefore set forth, of the compression chamber or cylinder apertured at a point along its length to permit the introduction of a bloom, and bored axially at one end to form a die for the exterior of the tube to be formed, the plunger fitted within said chamber to reciprocate therein, the hydraulic induction-pipe passing through the head or end of the chamber opposite the die, and the punch, of smaller diameter than the die, passing axially through said end and through the plunger, and actuated by suitable mechanism to pierce the bloom introduced within said chamber and enter the die to form a mandrel for the interior of the pipe drawn from said bloom.

3. The combination, substantially as hereinbefore set forth, of the cylinder A, having an aperture along its length for the introduction of a bloom, the head *a*, having a bore axially of said cylinder to provide a die for the exterior of the tube to be formed from the bloom, the head *a'*, the hydraulic induction-pipe, the discharge-pipe and its cut-off cock, the plunger B, and the punch D, of lesser diameter than the die, passing axially through said plunger and through the adjacent head.

EVERT M. THOMPSON.

Witnesses:

CHARLES M. WETZEL,  
JONATHAN KEITH.