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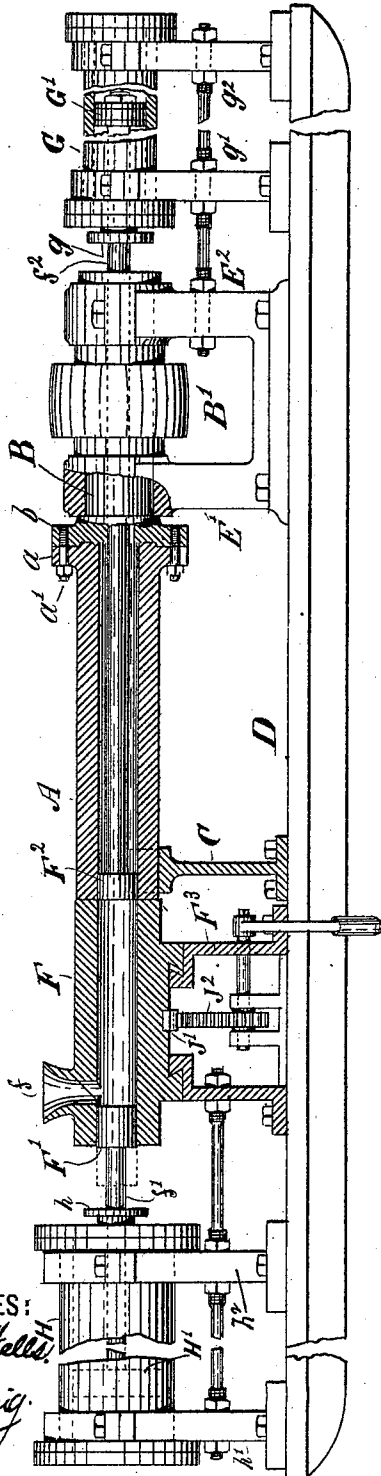
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F. DEMING.
CASTING METAL TUBES.

No. 581,272.

Patented Apr. 27, 1897.

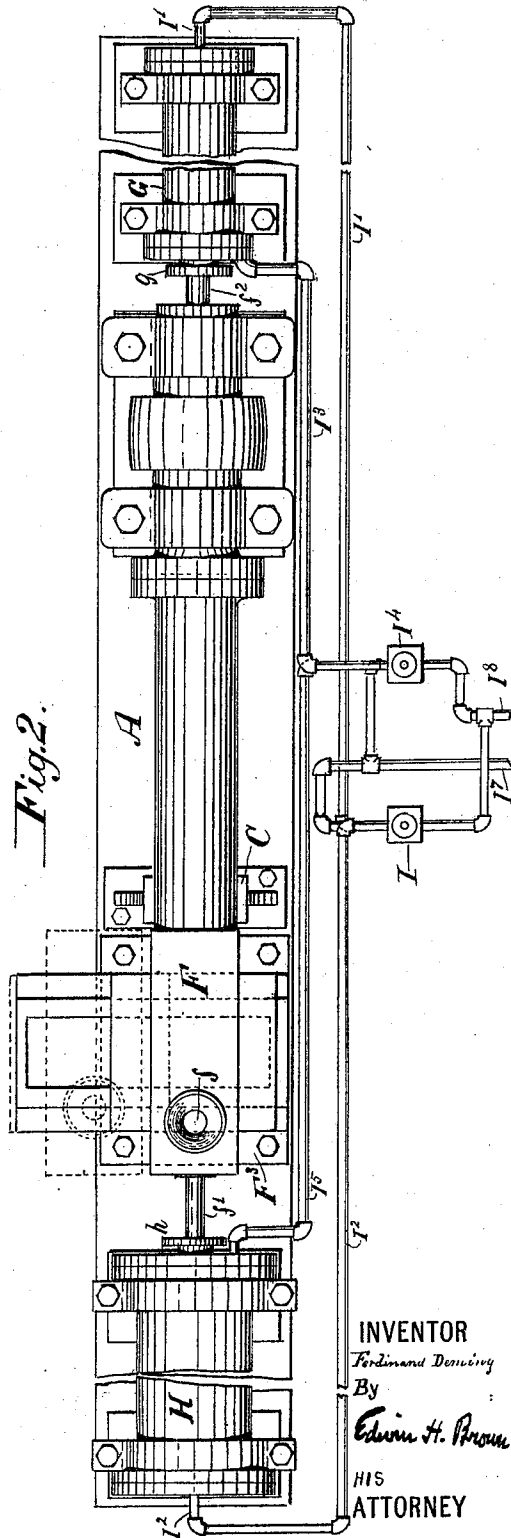
Fig. 1.



WITNESSES:

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Fig. 2.



INVENTOR

Ferdinand Deming

By

Edwin H. Brown

HIS

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(No Model.)

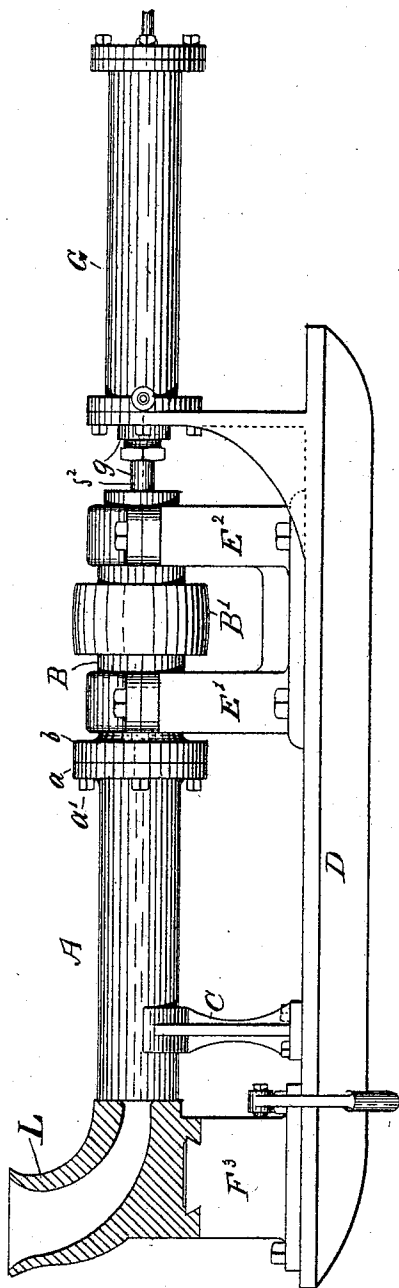
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Fig. 3.



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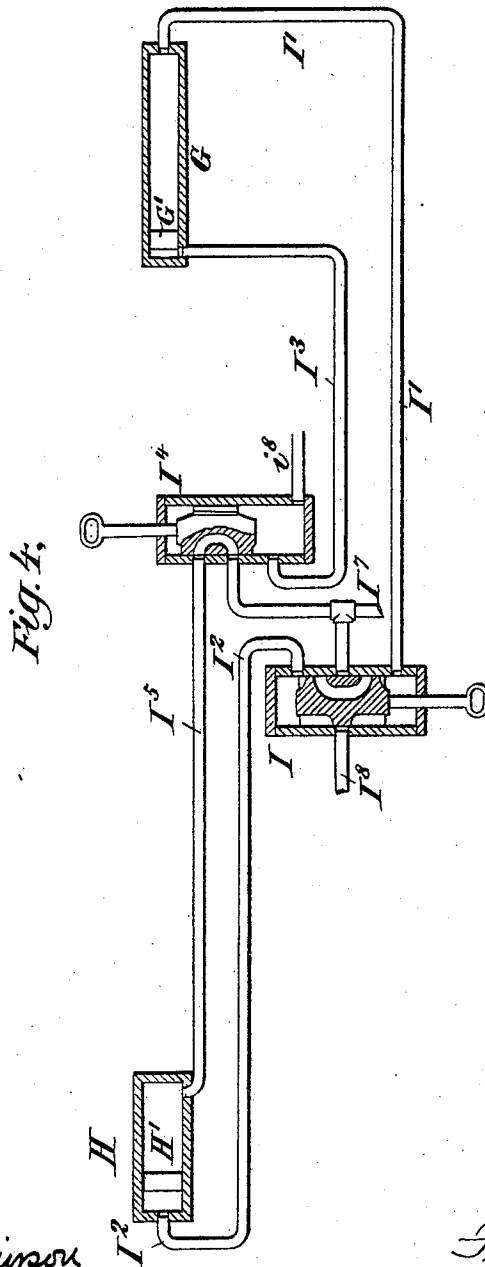
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UNITED STATES PATENT OFFICE.

FERDINAND DEMING, OF WATERBURY, CONNECTICUT, ASSIGNOR, BY
MESNE ASSIGNMENTS, TO GEORGE H. CLOWES, OF SAME PLACE.

CASTING METAL TUBES.

SPECIFICATION forming part of Letters Patent No. 581,272, dated April 27, 1897.

Application filed April 26, 1895. Serial No. 547,283. (No model.)

To all whom it may concern:

Be it known that I, FERDINAND DEMING, of Waterbury, in the county of New Haven and State of Connecticut, have invented a certain new and useful Improvement in Casting Metal Tubes, of which the following is a specification.

It is desirable for certain purposes to cast metal in tubular form. This is notably so for producing tubular or hollow ingots, such as are commonly used where tubes are to be produced by drawing.

My invention involves the use of a mold which is rotated at a rapid speed, so that metal introduced into it will be caused to move outward by centrifugal force. When this mold is arranged horizontally, the metal may be more uniformly distributed, so as to make a tubular or hollow ingot of uniform thickness, because the centrifugal force will greatly predominate over the force of gravity, whereas if the mold were arranged in a vertical position the centrifugal force would not be so effective in counteracting the force of gravity, and hence a longitudinally-tapering tubular or hollow ingot would be produced.

My invention also involves the combination, with such a mold, of a receiving-chamber and a piston for discharging molten metal from the receiving-chamber into the mold.

The invention also involves other features, which will be described in detail, and pointed out in claims.

In the accompanying drawings, Figure 1 is partly a side elevation and partly a vertical longitudinal section of an apparatus embodying my improvement. Fig. 2 is a top view of the same. Fig. 3 is an elevation illustrating a modification. Fig. 4 is a diagrammatic view of the piping and valves comprised in the apparatus.

Similar letters of reference designate corresponding parts in all the figures.

A designates the mold. It may be made of any suitable material—as, for instance, cast iron or steel. As shown, it is made in the form of a cylindrical tube from one end to the other, but is provided with a flange *a* at one end. This flange *a* is secured by bolts *a'* or otherwise to a similar flange *b*, extending

from a tubular or hollow rotary spindle B. The unflanged end of the mold A may be supported by an underneath bearing C, erected upon the bed-plate D of the apparatus.

On the bed-plate D are erected standards E' E², furnished with bearings for supporting the spindle B. Between these bearings the spindle B is provided with a belt-pulley B', through which rotary motion may be imparted to the spindle and hence to the mold. Any other means may be employed for rotating the spindle.

F designates a receiving-chamber for molten metal. Like the mold A it is horizontally arranged, and may consist of a cylindrical tube. Internally it is of the same cross-section as the mold. It is made with both ends open. Near one end it is provided with a filling-mouth *f*, which preferably will be on the upper side. Normally the receiving-chamber is closed at the ends by two pistons F' F². Molten metal may then be introduced through the filling-mouth *f* until the entire chamber between the pistons shall have been filled. After this motion will be imparted to the two pistons, so that they will remove the charge of metal into the mold.

As the chamber F is intended to be filled with molten metal and the mold is only intended to have a lining or tube of molten metal within it the mold will be much longer than the chamber. Because of this the two pistons F' F² have different ranges of motion, the piston F² moving much greater distance than the piston F', it being intended that the piston F² shall move to the flanged end of the mold, so as to close that end, and that the piston F' shall merely be moved to that end of the receiving-chamber F which is contiguous to the mold without entering the mold.

It is intended that the mold A shall be rotated at a high rate of speed at the time of the entrance of the molten metal and until the metal has set sufficiently to form a tubular or hollow ingot, which happens almost instantly after the introduction of the metal.

The pistons may be so driven that both will reach their final positions at the same time. Of course this will necessitate a much faster movement of the piston F² than that of the piston F'.

The receiving-chamber serves the purpose of a measuring-chamber and determines exactly the amount of metal which it is desirable to form into a tubular or hollow ingot. Thus the thickness of the wall of the casting will be regulated.

It is important to introduce the molten metal into the mold in as large a body as can conveniently be done, and this is accomplished by the combination of receiving-chamber F and pistons F' F². The receiving-chamber is shown as being supported upon a block F³, affixed to the bed-plate D.

I will now describe a means which I have devised for imparting the desired movements to the pistons F' F². The piston F² is connected with a rod f², that passes through the mold A while this piston occupies its normal position in the end of the mold adjacent to the receiving-chamber F and thence through the tubular or hollow spindle B. The piston-rod f², after passing beyond the spindle, passes through a stuffing-box g into the cylinder G of a hydraulic engine, it being connected within the cylinder to a piston G'. The cylinder G is of course long enough to permit of the desired range of movement being imparted to the piston F² of the receiving-chamber and mold. The cylinder G is supported in standards g' g², erected upon the bed-plate D of the machine. These standards may be secured together by tie-bolts, and the standards g' may be thus connected with the standards E².

The piston F' is affixed to a rod f', that passes through a stuffing-box h into the cylinder H of a hydraulic engine, and within such cylinder is connected to a piston H'. The cylinder H is supported by standards h' h², erected upon the bed-plate D of the machine. Tie-bolts may unite these standards and connect the standard h² with the block F³ that supports the receiving-chamber F.

From the outer end of the cylinder G extends a pipe I', and from the outer end of the cylinder H extends a pipe I². Both these pipes are connected with the chest or casing of a valve of any suitable character, as, for instance, a valve I. From the inner end of the cylinder G a pipe I³ extends to the valve chest or casing of another valve I⁴. From cylinder H a pipe I⁵ also extends to the valve chest or casing of the valve I⁴. Exhaust or waste ports are used in connection with the valves I and I⁴ and enter the waste-pipe I⁷. Pressure-pipes I⁸ i⁸ enter valve chests or casings of the valves I and I⁴.

While the mold A is rotated and the pistons F' F² are in their normal positions at the ends of the chamber F, the valves I I⁴ are set as illustrated in Fig. 4, the outer ends of the cylinders G and H being in communication through the pipes I' I², under control of valve I. While the parts are in these positions and the mold is still rotating, the molten metal is introduced into the chamber F, and the motive agent from the pipe i³, passing through

the valve chest or casing of the valve I⁴ into the pipe I³, forces the piston G' toward the right, thus producing a similar movement of the piston F². Any water or other motive agent which may have previously been left in the cylinder H now escapes through the pipe I⁵, the passage-way in the valve which has brought the pipe I⁵ into communication with the waste-pipe, and into the waste-pipe I⁷. As the cylinders H and G are in communication the piston H' will travel to the right when the piston G' travels to the right, although less rapidly than the piston G', but arriving at the end of its stroke at the same time as the piston G' terminates its stroke. Thus the metal will be distributed within the mold, comparatively speaking, in a body or mass and will be deposited around the inner wall of the mold in a thickness proportional to the amount of molten metal introduced. The valve I is now adjusted to open the pipe I² to the waste-pipe I⁷, and valve I⁴ is adjusted to put pipe I³ in communication with pipe I⁷ and pipe I⁵ in communication with pipe i⁸. Fluid under pressure is then admitted through the pipe I⁵ from pipe i⁸, forcing the piston H' to the left and thus withdrawing the piston F' from the chamber F. The chamber F is then moved to one side and the ingot is pushed out of the mold by piston F², which is moved through the mold A by piston G', actuated by fluid under pressure from the supply-pipe I⁸, through the valve chest or casing of the valve I, passing to cylinder G through pipe I'. 70 75 80 85 90 95 100

To permit of the expulsion of the ingot from the mold, the receiving-chamber is made movable upon the supporting-block F³. As here shown, it is fitted to slide transversely across the block, and it may be adjusted by a lever or by a rack and pinion J' J². 105

After the expulsion of the ingot the receiving-chamber will be adjusted to its normal position and the pistons G' H' will be operated so as to move the pistons F' F² into position to close the end portions of the receiving-chamber. 110

My invention is peculiarly adapted to the casting of ingots of copper and brass, but is applicable to other metals. If used for steel, the receiving-chamber and the mold will of course have to be suitably lined or surfaced internally. 115

In Fig. 3 the parts are substantially the same as in the first example of my improvement, but there is no receiving-chamber, and instead there is a large funnel L. Besides this the piston F' and the cylinder H and piston H' are omitted and the piston F² is never moved out of the mold. 120 125

In each example of my invention it will be seen that there is a piston which retards the flow of molten metal into the mold, so that it will enter the mold in a body, or, in other words, in a mass, as distinguished from flowing along one portion. 130

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination with a rotary mold, of two pistons and means for longitudinally moving said pistons into position to form the end walls of said mold, substantially as specified.

5 2. The combination with a rotary mold, of two pistons, means for longitudinally moving said pistons together into position to form the end walls of the mold, and means for returning said pistons independently of each other, substantially as specified.

10 3. The combination with a mold, of means for rotating the same, a chamber at one end of the mold two pistons closing the ends of the chamber and means for moving the pistons along the chamber and for moving one of them into the mold, so that molten metal will be moved from the chamber into the mold.

15 4. The combination of a rotatory mold, having a movable end wall as a piston, a receiving-chamber, a piston in said chamber and means for actuating this latter piston to move a mass of molten metal from the chamber into the mold, substantially as specified.

20 5. The combination of a rotatory mold, a piston movable lengthwise of the mold, a receiving-chamber, a piston in said chamber, and means for causing a differential movement of the pistons to move a mass of molten

metal from the chamber into the mold and to simultaneously cause an increase in the volume of the space in which the metal is held, substantially as specified. 30

6. The combination with a mold, and means for rotating the same, of a chamber located at one end of the mold from which chamber molten metal passes to the mold, and means for causing a relative transverse movement between the mold and chamber, substantially as specified. 35

7. The combination with a mold and means for rotating the same, of a chamber located at one end of the mold from which chamber molten metal passes to the mold, a piston movable lengthwise of the mold for ejecting a casting therefrom, and means for causing a relative transverse movement between the mold and the chamber, substantially as specified. 40 45

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses. 50

FERDINAND DEMING.

Witnesses:

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CYRUS G. BEACH.