A. H. HAMON.

MACHINE FOR FORMING TIN LINED LEAD PIPE.

No. 84,114. Patented Nov. 17, 1868.

Fig. 8

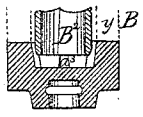


Fig. 1.

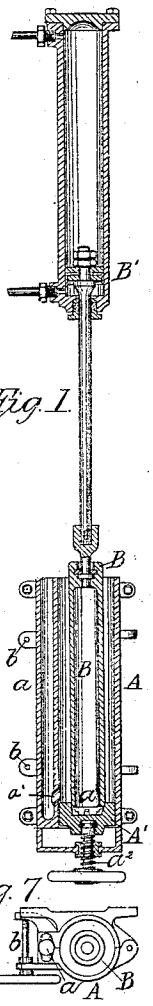


Fig. 7.

Fig. 2.

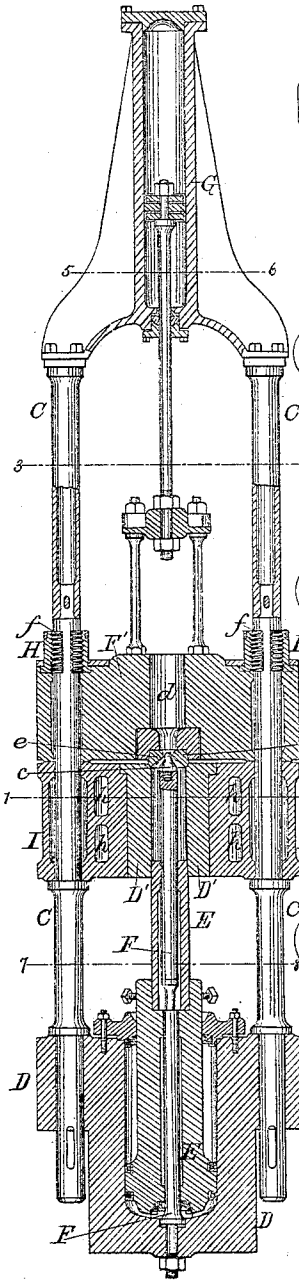


Fig. 5.

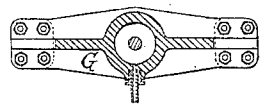


Fig. 4.

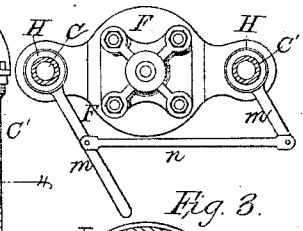


Fig. 3.

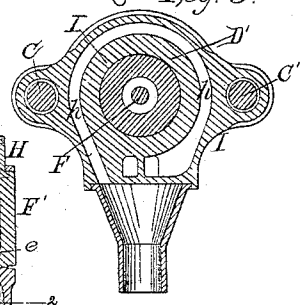
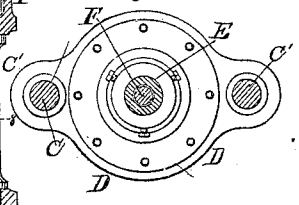


Fig. 6.



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Letters Patent No. 84,114, *dated November* 17, 1868.

IMPROVEMENT IN MACHINES FOR FORMING TIN-LINED LEAD PIPE.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, A. HAMON, of Paris, Empire of France, have invented an Improved Apparatus for Drawing Tin-Lined Lead Pipe; and I do hereby declare the following to be a full, clear, and exact description of the same.

My invention consists of certain apparatus, fully described hereafter, for forcing or drawing tin-lined lead pipe.

In order to enable others skilled in the art to make and use my invention, I will now proceed to describe its construction and operation.

On reference to the accompanying drawing, which forms a part of this specification—

Figure 1 is a sectional elevation of that part of the apparatus employed in casting the ingots;

Figure 2, a sectional elevation of that part of the apparatus employed in forming pipe from the ingots;

Figure 3, a sectional plan on the line 1–2, fig. 2;

Figure 4, a sectional plan on the line 3–4, fig. 2;

Figure 5, a sectional plan on the line 5–6, fig. 2;

Figure 6, a sectional plan on the line 7–8, fig. 2;

Figure 7, a plan view of fig. 1; and

Figure 8, a detached sectional view of part of the apparatus, drawn to an enlarged scale.

A, fig. 1, is a hollow metal cylinder, consisting of two sections, hinged together, and secured by screws *b b*, the cylinder being open at both ends, and having at one side a vertical channel, *a*, which communicates, through an opening, a^1, with the cylinder A, near the lower end of the latter.

A movable block, A′, fits snugly, but so as to slide freely in the lower end of the cylinder A, and to this block is connected a screw, a^2, which turns in a yoke secured to the cylinder.

In the upper face of the block A′ is a tapering recess, a^3, in which fits the lower end of a hollow cylindrical mandrel, B, the latter being secured to the piston-rod of a hydraulic engine, B^1.

C C′ are two upright columns, the lower ends of which are firmly secured to lugs on the cylinder of a hydraulic press, D.

Upon shoulders on the columns above the press rests a metal cross-piece, I, and in the latter is secured a detachable cylinder or mould, D′, having a cylindrical opening for the reception of the cylindrical end of the piston E of the press.

Through the piston E extends a stationary bar, F, which is secured at the lower end to the bottom of the cylinder D, and at the upper end of which is a detachable steel mandrel or former, *c*, the latter projecting into a circular orifice in a die, *e*, secured to a cross-piece, F′, sliding on the columns C C′. In the cross-piece F′, above the die *c*, is an opening, *d*, and to the cross-piece is connected the piston-rod of a hydraulic engine, G, bolted to the upper ends of the columns.

Upon each column, C C′, is cut a short screw-thread, *f*, corresponding to a similar thread in a nut, H, and vertical recesses are cut, at regular intervals, in the threads of the screws on the columns and of the nuts, so that, after turning the latter but a small portion of a revolution, they may be raised vertically on the columns.

From each nut projects an arm, *m*, fig. 4, one of which is longer than the other, and both arms are jointed to a cross-piece, *n*.

In the cross-piece I are channels or flues, *h h*, which extend round, or nearly round, the mould D′, and communicate at one end with the flue of a blast-furnace, and at the other with a suitable discharge-pipe.

Mode of Forming the Ingot.

The sections of the cylinder A are secured together. The block A and hollow mandrel B are arranged as shown in the drawing, and melted lead is poured into the channel *a*, from which it flows, through the opening a^1, into the mould, and fills the annular space round the mandrel B.

After the lead has hardened, the engine B^1 is operated, so as to draw the mandrel B out of the leaden cylinder, and another mandrel, B^2, fig. 8, smaller in diameter than the mandrel B, is secured to the piston-rod, and lowered into the cylinder, the tapering sides of the recess a^3 guiding the mandrel to a position central with the cylinder, so that there will be a uniform annular space, *y*, fig. 8, between the inner side of the leaden cylinder and the outer side of the mandrel.

The space *y* is now filled with molten tin, and, after the latter hardens, the mandrel B^2 is withdrawn, the cylinder or mould A is opened, and the hollow cylindrical ingot of lead, lined with tin, is removed, and placed in the mould D′, which it fits nicely.

Mode of Forming the Pipe.

After the introduction of the ingot into the mould D′, the parts of the apparatus are brought to the position shown in fig. 2, and a hot blast is passed through the flues *h*, so as to heat the mould and ingot, but not to such an extent as to melt the tin. The press D is then operated, so as to raise the piston-rod E, and the latter, as it passes into the interior of the mould D′, forces the soft metal from the same, between the contiguous faces of the mandrel C and die *e*, and (in the form of a continuous tube of lead lined with tin) out of the opening *d*.

The tube is wound upon a suitable reel or drum, operated automatically, so as to wind up the tube as fast as it is produced, and to this drum may be secured a suitable register, for measuring the length of the pipe as it is received.

After the soft metal has been entirely forced from the mould D′, the nuts H H are turned simultaneously, by means of their arms and connecting-rods, until the threads in the nuts are opposite the spaces *f*, in the

screw-threads on the columns. The engine G is then put in operation, so as to raise the cross-head P sufficiently to allow another ingot to be introduced into the mould D′, when the above-described operations are repeated.

Superheated steam may, if desired, be substituted for a hot blast, for heating the mould D′ and its contents.

Although I have described an apparatus for casting the combined tin and lead ingot, I, in this application, make no claim to the same, as it will form the subject of another application for a patent; but

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

1. The combination and arrangement of the sliding cross-head F′, vertically-slotted nuts and screws *f* H, or their equivalents, and pillars C C′, for the purpose of adjusting the die *e* to the mouth of the mould, in the manner described.

2. The combination and arrangement of the lifting-apparatus, consisting of a cylinder, G, and the parts thereto attached, with the slotted nuts and screws H *f*, or their equivalents, and pillars C C′, for the purpose of confining, releasing, and moving the cross-head F′, at the times specified and for the purposes set forth.

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

A. HAMON.

Witnesses:
E. RICHARD,
JAMES HAND.