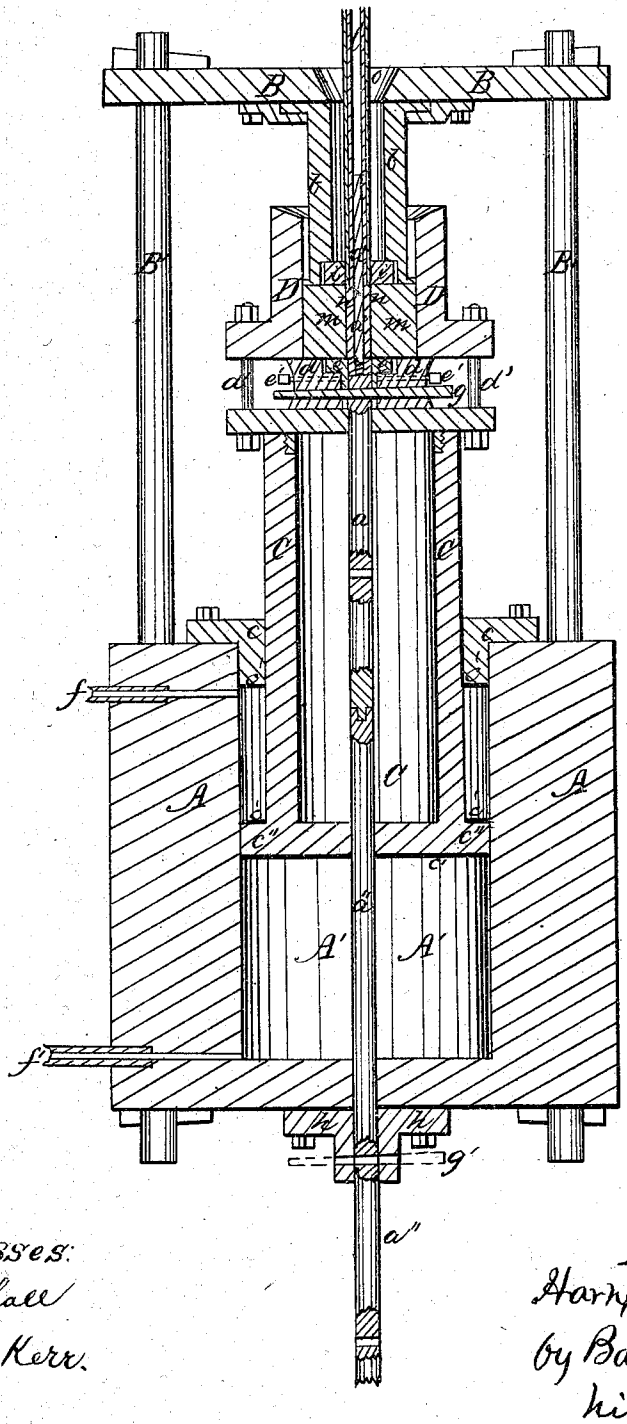
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MACHINE FOR MAKING TIN LINED LEAD PIPE.

No. 91,815. Patented June 29, 1869.




Witnesses:
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# UNITED STATES PATENT OFFICE.

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## IMPROVED MACHINE FOR MAKING TIN-LINED LEAD PIPE.

Specification forming part of Letters Patent No. **91,815**, dated June 29, 1869.

*To all whom it may concern:*

Be it known that I, HARRY J. BAILEY, of the city of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Machines for Making Tin-Lined Lead Pipe; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawing, making a part of this specification, which is a vertical section of my improved machine as formed by a plane passing through its axis or central line of motion, the particular position of the devices shown being that which they occupy when the compound lead and tin ingot is about half pressed out.

My invention relates to that class of machines for making tin-lined lead pipe in which a double core is used for making the compound lead and tin ingot, one core being an extension of the other; and the nature of it consists in so combining such double core with a single hydraulic press as that, in connection with an ingot-cylinder, plunger, and dies, such combination will perform the functions heretofore performed by the use of a double hydraulic press.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and mode of operation.

A is the hydraulic cylinder, having a cylindrical cavity, A′. By the upright B′ or other suitable frame-work this is connected with the top or cross plate, B. In the cavity A′ is operated a close-fitting piston, C, the joints between the two being closed by a collar, *c*, secured to the cylinder A, and any suitable packing, *c*′. The vertical depth of the cavity A′ and the length of the piston C are such as to permit of the motions hereinafter to be described.

Through holes of the proper size in the cylinder A and piston C (such holes being in the central line of motion of the latter) I pass the double core *a a*′ or a core-stem, *a*″, with a main or large core, *a*, screwed into its upper end, and a smaller core, *a*′, into the upper end of that, and all in the same axial line.

To the upper end of the piston C is attached by bolts *d*′ an ingot-cylinder, D, an annular collar-block, *d*, being interposed between the two as a carrier for the annular removable collar *e*, such collar being adjusted and held in place by set-screws *e*′. The collar-block *d* and collar *e* form the bottom of the ingot-cylinder D.

To the top plate, B′, is attached in any suitable way the cylindrical hollow die-holder *b*, so made and arranged that its lower end shall work closely in the cavity of the ingot-cylinder D. There is an aperture, *o*, in the top plate, B′, right over the cavity of the die-holder *b*. In the lower mouth of the cavity of the die-holder *b* is set and adjusted by set-screws a removable annular die, *i*, which die forms the outer face of the pipe and should be of the diameter required for that purpose. The inside diameter of the collar *e* is the same as the outside diameter of the core *a*, which plays through it. The double core *a a*′, ingot-cylinder D, and die-holder *b* are arranged with a common axial line, and so that they may play into each other, in the manner presently to be described.

To force water into the cavity A′ so as to operate the piston, I use pipes leading from a force-pump, the one, *f*, above the head *c*″ of the piston C and the other below, so as by forcing water in to raise or lower the piston C at pleasure. By keys *g* and *g*′, which pass through key-holes in the core *a a*″, I hold it to any desired point of adjustment.

To the bottom of the cylinder A, I attach a hollow core-block, *h*, and in such position that the core-stem *a*″, passing through the bottom of the cylinder, shall also play closely through the hollow cavity of this core-block *h*. A mortise is made through this core-block *h* to admit of the insertion of a key, *g*′, which also passes through a key-hole in the core-stem *a*″ or the extended core *a*, the object being to key or fasten at certain times during the operation of the machine the cores to the cylinder, so as to raise or lower the piston without moving the cores. In like manner the collar-block *d* is mortised so as to admit a key, *g*, which also passes through a key-hole in the core *a*, the object being to key the cores to the piston so that the two may be raised or lowered together.

The operation of my machine is as follows: The piston-head *c*″ being near the bottom of the cavity A′, the cores *a a*′ are to be adjusted till the larger core *a* occupies the axial line of the ingot-cylinder D to its top, and is keyed there by the key *g* passing through it and through the collar-block *d*. The upper end of the ingot cylinder D will then be opened. Into it I pour a charge of molten lead, filling the cavity of the cylinder D around the core *a*. A part of this lead ingot not yet pressed out is

shown at *m*. As soon as this lead is fairly hardened or "set" I remove the key *g*, pass it through a key-hole in the stem-block *h* and the lower end of the stem *a''*, as at *g'*, in such way as to prevent the cores from being raised when the piston C goes up. By forcing water through the pipe *f'*, I then raise the piston C, and along with it the ingot-cylinder D and the lead part *m* of the ingot, until the cores *a a'* come to the position shown in the drawing, the upper end of the larger core being even with the upper face of the collar-block *d*, and the smaller core *a'* being in the axial line of the cavity thus left in the lead part *m* of the ingot. A charge of molten tin is then poured into the cavity between the smaller core *a'* and the lead *m*, which solidifies and forms the tin part of the compound ingot, as shown at *n*. The smaller core *a'*, it will be observed, should be of the size desired for the inside of the pipe to be made. The key *g'* is then removed and replaced, as at *g*, as shown in the drawing. Water is again forced in under the piston C, and the upper end of the compound ingot *m n* is brought against the lower end of the die-holder *b*, the cores moving upward along with the piston C. The pressure being continued, the lead and tin *m n* are forced out at the same time through an annular cavity between the smaller core *a'* and the die *i*. The two metals are united by the pressure, so as to form a tin-lined lead pipe, *l*, which passes off over the top of the core *a'* through the aperture *o* and is coiled in proper condition for market. When the charge has all or nearly all been pressed out I reverse the motion of the piston C, mold D, and cores *a a'*, by which the core *a'* is stripped clear of the pipe and fragment of the charge above, and I lower away by forcing water into the cavity A' above the piston-head *c''* until the upper end of the ingot-mold D is clear of the lower end of the die-holder *b*. I then remove the key from *g* to *g'*, so as to hold the cores fixedly in position, and lower the piston a distance about equal to the vertical depth of the cavity of the mold D till the larger part *a* of the core occupies the axial line of the cavity of the mold. I then turn into the ingot-mold D a new charge of lead. As soon as it is set I elevate the piston C till the small core *a'* comes in the axis of the cavity inside the lead part of the ingot. The charge of molten tin is then poured in as before. Again shifting the keys, I force the compound ingot so cast up against the fragment of the old ingot which remains attached to the die-holder *b* and apply sufficient pressure to continue the exudation of the combined metals, whereby also a perfect union is effected between the successive ingots and a continuous pipe, *l*, is produced.

By using a core-stem, *a''*, I am enabled to use cores *a a'* of different absolute as well as different relative sizes, so as to make pipe of different sizes, and also pipe of lead and tin of different relative thickness. The larger the small core *a'* is made the greater will be the inside diameter of the pipe *l*, and the greater the difference in diameter between the two cores *a a'* the thicker will be the tin part *n* of the compound ingot, and vice versa. It will also be observed that the collar is removable, so that a collar may be substituted having an aperture corresponding in size to the larger core *a*, which plays through it. Also, the die *i* is removable, so that any other sized die may be inserted in order to make the pipe *l* of any required outside diameter.

I do not limit myself to the use of keys *g g'* for securing the cores, as set-screws or other equivalent mechanical device may be substituted therefor; nor is it material to what part of the devices described the cores are keyed or otherwise fastened, provided that when they are to move with the piston up or down they be attached to the piston or to some part that moves with it, and also provided that when they are to be stationary during the time the piston moves they be fastened to some fixed part or otherwise held from moving. The order of the motions in lowering after one ingot is pressed out into a pipe and until another is ready to be pressed need not be rigidly adhered to, provided only that when the casting or pouring of the metals is done the cores and ingot-mold be in the proper relative positions. Also, in bringing the larger core *a* into the cavity of the mold D it is better to have it so adjusted that the key-holes in the core *a* shall, when the casting is being done, be above or below the mold D. This I effect by making the distance between the key-holes greater than the length of the mold D. Then when the core is up the upper key-hole will be above the upper end of the mold D, and when down both will be below.

The advantages I claim over similar machines heretofore constructed are cheapness, simplicity, and ease of operation.

I am aware that it is not new to make tin-lined lead pipe by causing the two metals to exude through a die and over a core; also, that hydraulic cylinders and piston or plunger have been used in such process; also, that a double core, the smaller being an extension of the larger, in connection with a double hydraulic press, is not new; but

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

1. An adjustable double core, *a a'*, with or without a stem, *a''*, arranged in and along the axial line of the machine, substantially as and for the uses set forth.

2. The cylinder A, piston C, ingot-mold D, and double core *a a'*, with or without a stem, *a''*, in combination with keys *g g'*, or the mechanical equivalents thereof, all arranged and operated substantially in the manner and for the purposes set forth.

In testimony whereof I, the said HARRY J. BAILEY, have hereunto set my hand.

HARRY J. BAILEY.

Witnesses:

JOHN GLENN,

G. H. CHRISTY.