W. P. TATHAM.

Making Lead Pipe.

No. 7,624. Patented Sept. 3, 1850.

Fig. 4

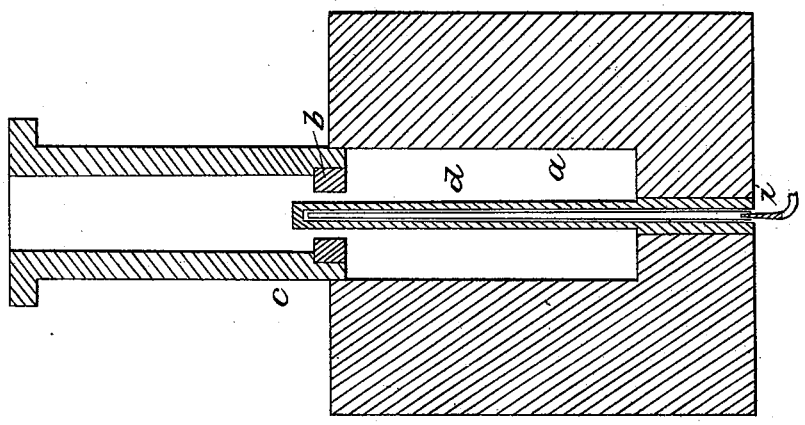


Fig. 3

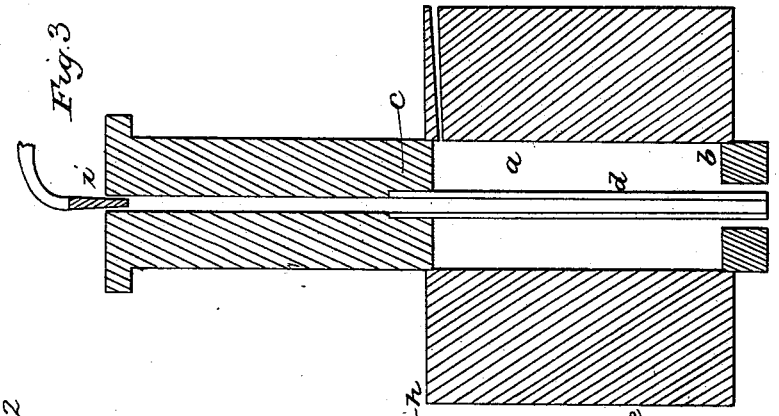


Fig. 2

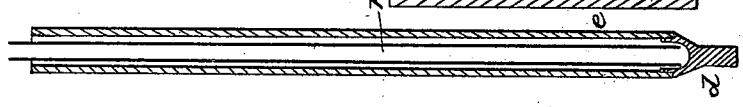
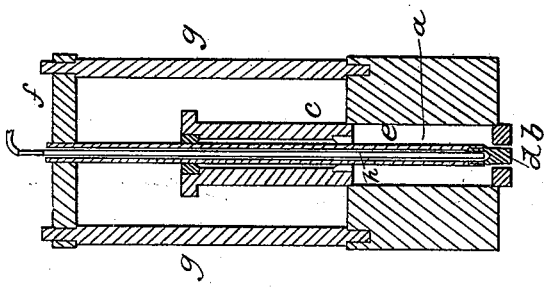


Fig. 1



UNITED STATES PATENT OFFICE.

WILLIAM P. TATHAM, OF PHILADELPHIA, PENNSYLVANIA.

MANUFACTURE OF LEAD PIPE.

Specification of Letters Patent No. 7,624, dated September 3, 1850.

To all whom it may concern:

Be it known that I, WM. P. TATHAM, of the city and county of Philadelphia, in the State of Pennsylvania, have invented a certain new and useful Improvement in Machines for Manufacturing Lead Pipe by Pressure, and that the following is a full, clear, and exact description of the principle or character which distinguishes my invention from all other things before known and of the manner of making, constructing, and using the same, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a vertical section of a machine on my improved plan; Fig. 2, a vertical section of the core and core-holder on a larger scale, the better to exhibit the internal arrangement; Figs. 3 and 4, vertical sections of my improvement as applied to machines differing in some particulars from the one represented at Fig. 1.

The same letters indicate like parts in the above figures.

My improvement is applicable to the machinery for the manufacture of pipes of lead or other metal or alloy, described in the patent granted to Thomas Burr, of Shrewsbury, in England, dated the 11th day of April, 1820, and recited in the first volume of the first series of the *London Journal of Arts and Sciences* and to any modification of the same machinery combining, first, a cylinder or receiver to contain the melted metal and in which the metal is permitted to set or solidify; second, a piston or ram traversing the cylinder by which the metal is expelled therefrom when set but not cold; third, a core or core-holder passing through the middle of the cylinder from end to end in the direction of the axis and determining the inner diameter or bore of the pipe at the part where the metal is released from pressure; fourth, a die, by which the external circumference of the pipe is formed and determined at the corresponding part, besides the details not here necessary to be described being well known to practical men.

In the accompanying drawings (Figs. 1 and 2,) (*a*) represents the cylinder which receives the molten lead in the usual way with a die (*b*) at one end which determines the outer diameter of the pipe. To the cylinder is fitted a ram (*c*) by which the lead is forced out of the cylinder, the power for this purpose being applied by means of a hydrostatic engine in the usual way. The inner diameter of the pipe to be made is determined by a core (*d*) placed centrally within the die leaving the required annular space between the two, and this core is attached to, or forms the lower end of what is denominated a core-holder (*e*) which is a cylindrical rod that passes through the bore of the ram. It extends up above the ram and is at its outer end firmly secured to a cross-head (*f*,) connected with the cylinder by means of two bars (*g g*) by which it is held at all times in the same position relatively to the die in the end of the cylinder. The core holder is hollow as represented from the upper end to within a short distance of the lower end, and within it there is a tube (*h*) of less diameter so as to leave an annular space between the two for the free circulation of water which descends from an appropriate reservoir down the tube (*h*) and up the space between the tube and the core-holder and escaping over the upper end thereof. But instead of this the water may be caused to descend through the space between the core holder and central tube and then up through the central tube and out at the upper end thereof; or the core holder and core may be hollow all the way through; the cooling fluid passing in at one end and discharging at the other.

Instead of the above described arrangement the principle of my invention may be applied as represented at Fig. 3 in which the core (*d*) is of the same diameter from end to end and is attached to and moves with the ram (*c*) in the manner of the well-known Burr machine above referred to. In this arrangement the core is hollow, the bore thereof passing entirely through it and the ram, so that the cooling fluid introduced into the outer end passes through it and is discharged at the lower end; but instead of passing through, the fluid may be made to circulate therein as represented in Fig. 1. In this arrangement either the cylinder may be made to move on the ram, or the ram in the cylinder, for forming and forcing out the pipe, and when the latter plan is adopted, the pipe or nozzle (*i*) by which the fluid is introduced should be connected with a reservoir by means of a hose or jointed pipe that the nuzzle may move up and down with the ram.

Fig. 4 represents my improvement applied to another modification of machinery which differs from the others in having the

die (*b*) in the end of the ram (*c*) and the long-hollow core (*d*) for the passage of the cooling fluid attached to the head of the cylinder.

The principle of my invention may however be applied to any other modification of machinery for making lead pipe by pressure from set or solid lead in which a long core or core holder is used, such as the modification of the Hanson's machine in which the long core is guided by, and passes through a perforated bridge separated from the die by what is termed a chamber of construction.

Whatever may be the modification of machinery to which the principle of my invention is applied, or whatever the position in which it is worked, the long hollow core or core-holder must extend from end to end of the cylinder, and it must be hollow throughout the whole or nearly the whole of its length, for the circulation or passage of the cooling fluid, as the object is to set the inside of the mass of lead within the cylinder as near as may be at the same time with the outer part, to reduce the length of time required for the setting of the lead before the pressure can be applied, and that the core or core-holder may be the better sustained by the mass of set lead surrounding it, instead of being in that part of the mass which is nearest the fluid state. The passage of the cooling fluid has the additional effect of keeping the long core or core holder cooler and therefore more rigid than in any other arrangement before known, and therefore less liable to be bent or warped out of its true central position, by any unequal lateral pressure or the action of the heat.

The method of using these machines is as follows: The parts being duly arranged and the cylinder properly heated, the melted metal is placed in it. After waiting for the metal to become set or solid, the piston is forced into the cylinder expelling the warm soft metal and causing it to issue in the form of pipe through the annular opening between the core and the die.

The difficulties I seek to remedy by my improvement, as above referred to are as follows: It is found by experiment that melted metal in a cylinder hardens first at the outside, the middle portion being last fluid and always the hottest part of the mass. This unequal cooling of the metal causes loss of time, because the heat of the interior must escape through the other portion into the iron of the cylinder, and loss of power, because the outside will be unnecessarily hard by the time the interior is fit to work. The core or core holder being in the middle and hottest portion is subjected to a high degree of heat and rendered liable to soften and lose its stiffness, to bend or to warp from various causes. To remedy these difficulties, I employ a long hollow core or core-holder extending through the length of the cylinder, into or through which water, air or other cooling fluid is passed (the same being of a lower temperature than melted lead, and the lower the better) the object and result of which is to facilitate and promote the uniform cooling and setting of the mass of metal contained in the cylinder in a very short time, and also to cool the core or core holder, preserving it stiff and straight.

This invention is distinguished from that of Charles and George Driscoll Sellars as it appears in their patent dated March 9th 1844, in the following particulars: First, the length and locality of their core, their core being much shorter and not extending through the length of the cylinder proper as mine does, but placed outside of it in the chamber of construction between the bridge and the die. Second, in the character of the fluid circulating through the core. I prefer the coldest. They use hot water or steam, preferring the latter. Third, in the immediate result desired to be effected by the circulation through the core in the two cases, I desire to make all the metal in the cylinder uniformly solid before I move it mechanically. They desired merely to prevent the adhesion or amalgamation of the melted metal surrounding the core with it, and were careful to use a hot application so "that the effect on the core should not endanger the cooling of the core so as to solidify the lead surrounding it until it arrived at the die." Fourth, in the ultimate result of the machinery and arrangement. The pipe made by my machine is a wrought lead pipe pressed out in the solid form. The pipe made as described by Sellars's machine is made by a method of continuous casting.

I do not therefore claim broadly the use of a hollow core through which a fluid is passed in the manufacture of lead pipe, but

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

The method substantially as herein described of setting or cooling the inside of the mass of metal within and throughout the length of the cylinder and before or preparatory to pressing out the pipe by passing a cooling fluid into or through a long core or core-holder extending through the length of the cylinder as herein described the said method having the effect at the same time to keep the said core or core-holder cool and stiff as described.

WM. P. TATHAM.

Witnesses:
THOMAS INGRAM,
GEORGE N. TATHAM.