No. 3,475. PATENTED MAR. 9, 1844.

C. & G. E. SELLERS.

MACHINERY FOR THE MANUFACTURE OF LEAD PIPES.

2 SHEETS—SHEET 1.

Fig. 1.

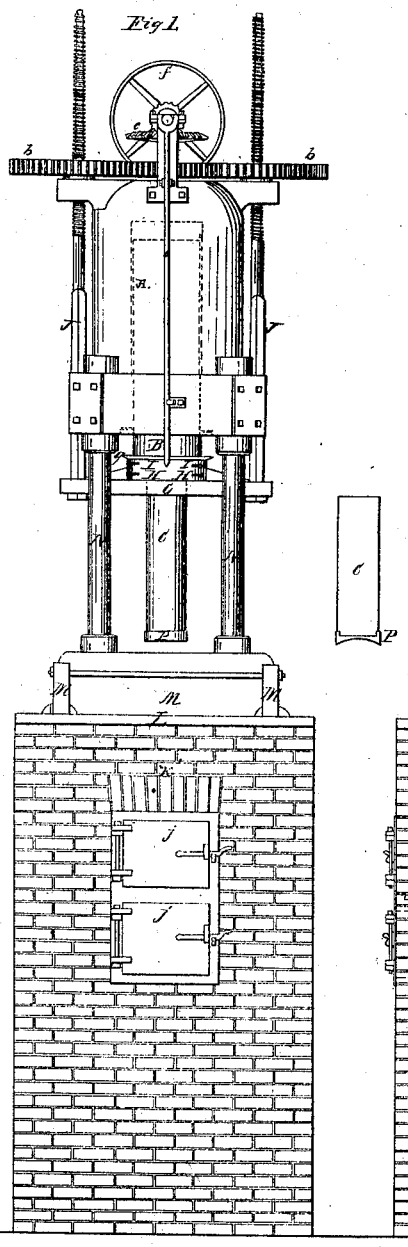
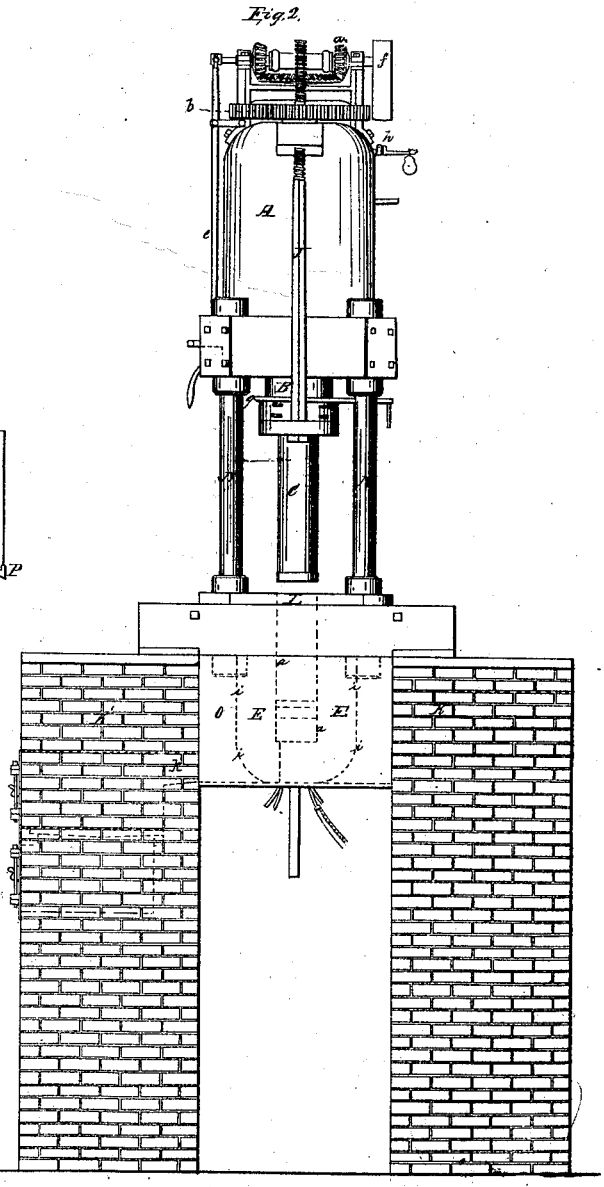


Fig. 2.



Witnesses,
Chas. Brown
Chas. A. Smith

Inventors.
Charles Sellers
Geo. Escol Sellers

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2 SHEETS—SHEET 2.

Fig. 4.

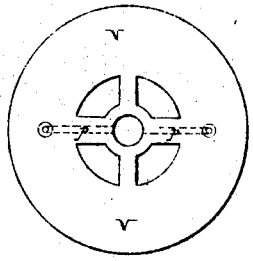


Fig. 3.

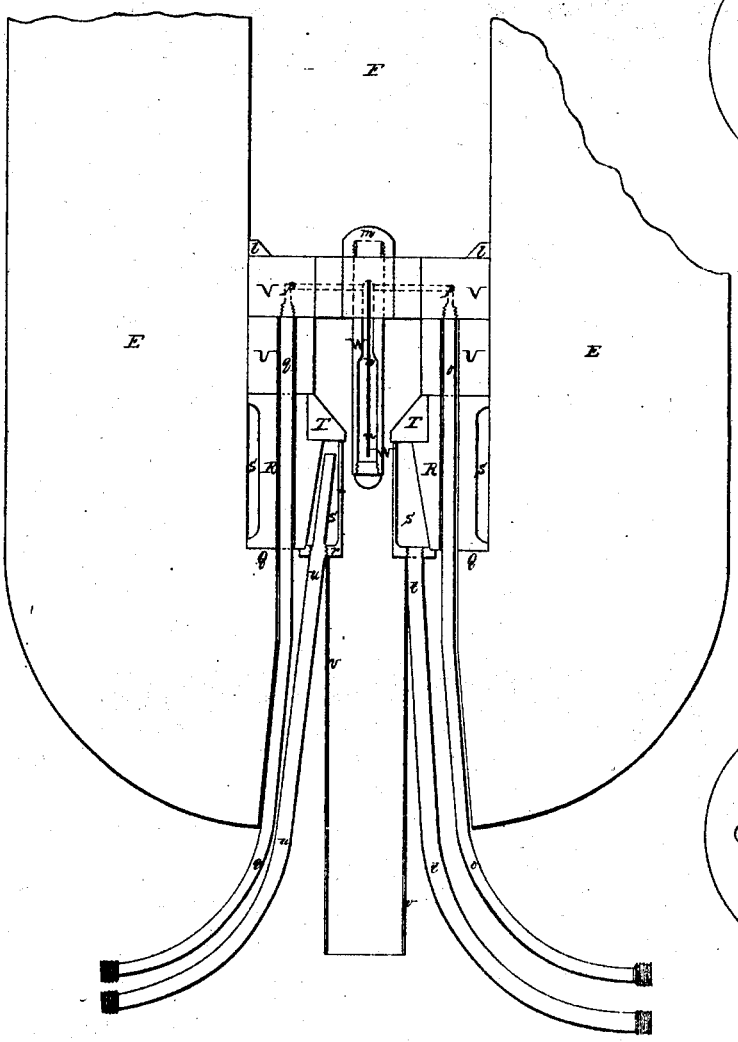


Fig. 5.

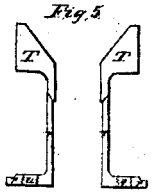
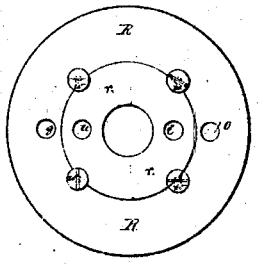


Fig. 6.



Witnesses.
Chas Wonsall
Chas A Smith

Inventors.
Charles Sellers
Geo Escol Sellers

UNITED STATES PATENT OFFICE.

CHARLES SELLERS AND GEORGE ESCOL SELLERS, OF CINCINNATI, OHIO.

MACHINERY FOR THE MANUFACTURE OF LEAD PIPES.

Specification of Letters Patent No. 3,475, dated March 9, 1844.

To all whom it may concern:

Be it known that we, CHARLES SELLERS and GEORGE ESCOL SELLERS, of the city of Cincinnati, in the county of Hamilton and State of Ohio, have made certain Improvements in Machinery for the Manufacturing of Lead Pipe; and we do hereby declare that the following is a full and exact description thereof.

In the manufacturing of lead pipe by our process the metal from which it is to be formed is fused and poured into a receiver of cast-iron, or other metal of great strength, which receiver is heated by means of a suitable furnace, so as to preserve the metal in a fluid state. The lower part of the receiver contains a die having an opening through it of such size as to adapt it to the forming of the outside of the pipe, and a core or mandrel, to determine its size, or caliber, within. It also incloses the apparatus which we employ for the purpose of cooling the pipe as it leaves the core, and also of keeping the temperature of the core below that of melted lead, by which means we effectually prevent the combining of the lead with the surface of the core, which takes place when lead is in a fused state, and is subjected to heavy pressure, and which has not been prevented by any of the means heretofore adopted. The fused lead is to be forced out by means of a ram, or plunger, made to fit the cylindrical cavity containing the lead, said plunger being brought down by means of an hydrostatic press.

In the accompanying drawings, we have represented all such parts of the apparatus as are necessary to a clear and full description of our improvements. The figures on sheet No. 1, are drawn to a scale of one inch to the foot, and those on No. 2, to a scale of six inches to the foot, having been made from a machine that we have in actual and successful use; but it may, of course, be varied in size.

In each of the figures where like parts are represented, they are designated by the same letters of reference.

A, A, is the cylinder of the hydrostatic press, which we use in an inverted position, the ram being made to descend instead of to rise; the pumps are not represented, as neither these nor the press, in their general construction, differ from such as are in general use.

B, is the ram, or plunger, of the press, and C, a second ram or plunger, attached to the lower end of the former, for the purpose of forcing the lead out of the receiver; which receiver is furnished with a cylindrical cavity, bored perfectly true, so that the plunger C, may fit it accurately.

The receiver is represented at E, E, Figure 2, and its cylindrical cavity by dotted lines *a*, *a*. Its lower part is shown in section on an enlarged scale in Fig. 3, F, being the cylindrical cavity shown by dotted lines *a*, *a*, in Fig. 2. The plunger C, is made to rise out of the receiver to such height as is necessary to allow of the pouring in of a fresh supply of lead, and to admit, also, of the cleaning of its surface; by this provision, we are enabled to make pipe of any length, even of the larger sizes, as the fresh supply of melted lead commingles perfectly with that already in the receiver, without any intervening scoria, or film of oxid, which when pipe is made from metal that has set, or solidified, previously to its being forced out of the machine, cannot be effected.

The plunger, C, is attached to B, in such manner as to coincide accurately with the bore of the cylindrical receiver. The plate G, G, we denominate the lifting platen, which may be attached to the ram or plunger, B, by screws, as at H, H. The ram C, is attached to the under side of B, but in such manner as that it can be accurately adjusted by the set screws I, I. The screw rods J, J, serve to raise and lower the platen and rams. These rods are square at their lower ends, and slide freely through squared holes in the platen; the square part of the rods is of sufficient length to allow them to descend through it to a distance equal to that of the whole descent of the plungers. The screw at their upper ends is also cut to an equal length.

The apparatus for lifting the platen and its appendages is shown above the cylinder A. The two cog-wheels *b*, *b*, have screws cut through their hubs so as to constitute nuts adapted to the screws on J, J. An intermediate pinion on the shaft of the bevel wheel *c*, serves to turn the wheels *b*, *b*, and the direction in which they are to revolve is determined by the two bevel pinions, *d*, *d*, which are furnished with a clutch by which they may both be thrown out of gear, or either of them thrown in gear at pleasure.

e is a lever by which the attendant moves the clutch; we make the shaft of the pinions

d, *d*, hollow, so that a rod passing into it, and upon which the lever *e*, operates shall move the clutch. A band wheel, *f*, serves to give motion to the pinions, *d*, *d*, when clutched, but when not so they turn freely on their shaft.

To catch, and conduct off, the drippings of the press, we place a dish, or trough, of sheet metal *g*, *g*, around the ram B. This ram is packed in the ordinary manner, but we employ a double packing operating in contrary directions; the second packing is intended to prevent the entrance of air which, from the position of the ram, might otherwise take place while the press was descending, before the pumps are put in operation; this not being done until the lower ram is brought into contact with the lead in the receiver. The two packings above named may be near to each other; *h*, is a safety valve to allow of the discharge of air from the cylinder.

The ram, or plunger, C, terminates at its lower end, in a wrought-iron bottom piece, P, which is somewhat larger in diameter than the plunger, and is made to fit the receiver very accurately; this part we make concave on its under side, by which its terminating edge is rendered thin. As wrought expands something more than cast iron, this property, coöperating with the mechanical forcing out of the thin edge of the piece, P, in the operation of pressing, will cause the ram to fit the receiver so closely as effectually to prevent the escape of lead.

The press and its appendages rest upon the double stacks of masonry K, K; these stacks are capped by strong bed plates L, L; and upon these rest the frame work of cast-iron M, M, which, on the sides, extends from one stack to the other. The frame work and bed plates sustain the receiver, which is contained within a heated chamber to be presently described. The outline of the receiver is shown by the dotted lines *i*, *i*, Fig. 2. Upon the frame M, M, also, rests the press A, which is supported by the pillars N, N. The stack K′, contains a fire-chamber, or furnace, the fire and ash-pit doors of which are seen at *j*, *j*, its interior being shown by the dotted lines in Fig. 2. The heat from this furnace is carried through a flue at *k*, into a space inclosed by three plates of metal, forming the bottom and two sides of a chamber which must be heated to such degree as to insure the keeping of the lead within the receiver in a state of fusion. One of the side plates of this heat-chamber is shown at O. Its lower, or bottom, plate has a circular opening in the middle, immediately under the receiver, and is nearly equal to it in diameter. Its interior we line with fire brick.

We will now proceed to describe the manner in which we combine and arrange the parts concerned in the formation of the lead pipe, which parts are distinctly shown in drawing No. 2, in which Fig. 3, represents the lower end of the receiver, E, E; the cylindrical cavity for the plunger being shown at F; this cylindrical part extends down to Q, Q, where there is a ledge, or shoulder, upon which the apparatus by which the pipe is to be formed is sustained.

R, R, is a bed piece which rests upon the ledge Q, and is hollowed out at its periphery, as shown at S, S. This is done to prevent the bed-piece, which is itself to be kept as cool as possible, from unnecessarily robbing the receiver of heat. Upon the bed piece, R, R, rests the die T, T, by which the diameter of the outside of the pipe is determined, and which, as well as the core, may be changed at pleasure.

U, U, is a ring of iron resting also on the bed piece R; this ring is closely fitted to the cylinder and supports the bridge V, V; raising said bridge to such height as may be requisite to give to the core its proper length. A top view of this bridge piece is given in Fig. 4. The bridge piece is perforated, to allow the molten lead to pass through it, and above it we generally insert a wrought-iron ring, in the form shown at *l*, *l*, which fits the cylinder closely, and will, from its form, be pressed against it as the ram C, is brought down. This ring may, however, be dispensed with.

W, W, is the core, or mandrel, which determines the bore of the pipe. This is made of cast-steel, and is attached to the center of the bridge by a nut, as shown at *m*. The distinguishing feature of this mandrel is the device by which we preserve it at a temperature below that of melted lead, and thereby prevent the combining of the heated lead with it. For this purpose, we make it tubular, closing it at its lower end, and dividing it along the greater part of its length into two parts, by a metallic plate, or partition, seen at *n*, *n*, extending down nearly to its lower end. Either hot water, air, or steam, is made to pass down on one side of this partition, and up on the other. Steam, however, is the most manageable, and is perfectly effective; and in all our late experiments this has been used, as it does not endanger the cooling of the core so as to solidify the lead surrounding it. We sometimes twist the partition piece, *n*, *n*, so as to cause the steam, water, or air, to pass in a spiral direction in its passage through the mandrel; we have sometimes left the mandrel open at its lower end, and allowed the air, or steam, to pass through it, and into the pipe, but we prefer the modification above described. A tube, *o*, *o*, made of iron, is connected with a boiler so as to cause steam to pass into it; the bed piece R, and the ring U, are perforated to admit this

tube, which screws into the bridge piece, and through this there are perforations shown by the dotted lines *p*, *p*, that lead to and from the interior of the mandrel. A corresponding tube, *q*, *q*, serves to conduct the steam off.

As the pipe escapes from the mandrel and die, it must, of course, be cooled so as to assume the solid form, and this we effect by injecting water into the lower part of the apparatus concerned in its formation. A flanched tube of brass, or other metal, shown at *r*, *r*, is fitted, water-tight, to the die at its upper, and to the bed piece at its lower end, and forms a water chamber *s*, *s*; into this chamber leads a supply tube *t*, *t*, and a discharge tube *u*, *u*; it will be seen that the effect of this arrangement will be to cause the metal to set as it leaves the die and mandrel, and this it has been found to do effectually; but as the lower part of the receiver is heated above that of the temperature of melted lead, the heat radiating from it will be frequently sufficient to fuse the pipe which is passing out; but this we prevent by inserting a tube of tin plate within the cavity through which the pipe has to pass, as shown at *v*, *v*.

We have sometimes varied the form of the die, and of the tube which forms the water chamber, as shown in Fig. 5. The under side of the bed piece, and of the tube and flanch, are shown in Fig. 6; *w*, *w*, being the heads of screws by which the piece *r*, *r*, may be held in place. When small pipe is being made, steam may be injected into the cooling apparatus, instead of water. The injecting and delivery tubes above named must be provided with stop cocks to regulate the admission of steam and of water. In the making of large pipe, we sometimes allow water to escape from the water chamber through small openings, so as to pass in jets on to the pipe; it is necessary, however, in this case to wipe the pipe as it passes off, or the appearance of its surface will be injured.

The respective parts of the forming apparatus which are made to fit into the cylindrical cavity of the receiver, require to be inserted therein while they are cold; and to do this, we first heat the cylinder in order to expand it, when they may be readily introduced. It, of course, requires considerable force to remove them when they are to be changed; this force we apply in the following manner. A strong iron tube, of the proper length, is introduced into the opening in the lower end of the receiver, first removing the supply and the water chamber tubes. Under this iron-tube we pass a piece of timber, or of metal, and to each end of this, and to the lifting rods J, we attach chains, or rods, so as that by the action of the lifting apparatus above the press, the requisite force may be applied.

Having thus, fully described the manner in which we construct and use our machinery for the manufacture of lead pipe, we do hereby declare that we do not claim any of the parts of the said machinery when taken separately, with the exception of those hereinafter particularly pointed out; nor do we claim the use of the hydrostatic press for applying the force required in the formation of the pipe; nor the use of conical dies for forming its exterior, or of a mandrel for forming its interior; nor the bridge by which said mandrel is sustained; these having been, long since, used, and being described in the specifications of patents obtained in England and elsewhere, and having, therefore, become public property; nor do we claim the manufacturing, or forming, of lead pipe from lead kept in a melted state while it is contained in the cylindrical cavity, which we have called the receiver, and also when it passes the bridge, and arrives at the conical die, and the part of the mandrel which said die surrounds; this having been before done by us, and by others, but—

What we do claim as of our invention and desire to secure by Letters Patent is—

1. The employment of a tubular core, or mandrel, divided, longitudinally, into chambers through which heated water, air, or steam, is to be passed, in the manner described, and for the purpose of preserving said core at a temperature somewhat below that of melted lead; by which device the lead is effectually prevented from adhering to the mandrel.

2. We claim the manner of forming the packing of the ram, C, by attaching to its end the piece of wrought-iron, P, rendered thin at its lower edge, by forming the face of said piece concave, for the purpose above set forth.

3. We claim the combination and arrangement of the parts constituting the water chamber, consisting of the tube *r*, the bed piece R, and the conical die; the supply of water thereto being given, and governed, substantially as described and represented.

CHAS. SELLERS.
GEO. ESCOL SELLERS.

Witnesses:
C. SONNTAG,
CHAS. A. SMITH.