No. 5,466. PATENTED MAR. 8, 1848.

I. ADAMS.
MAKING PIPES.

5 SHEETS—SHEET 1

Drawing No. 1.

Fig. 4.

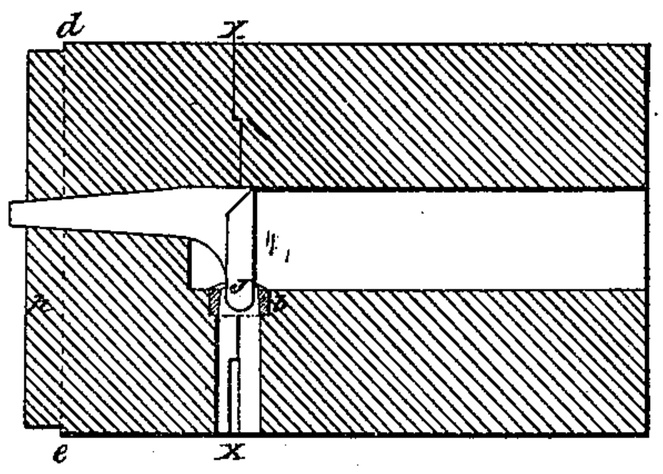


Fig. 3.

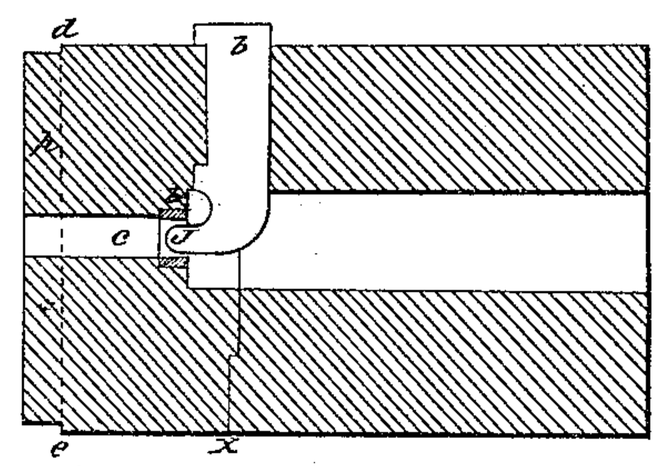
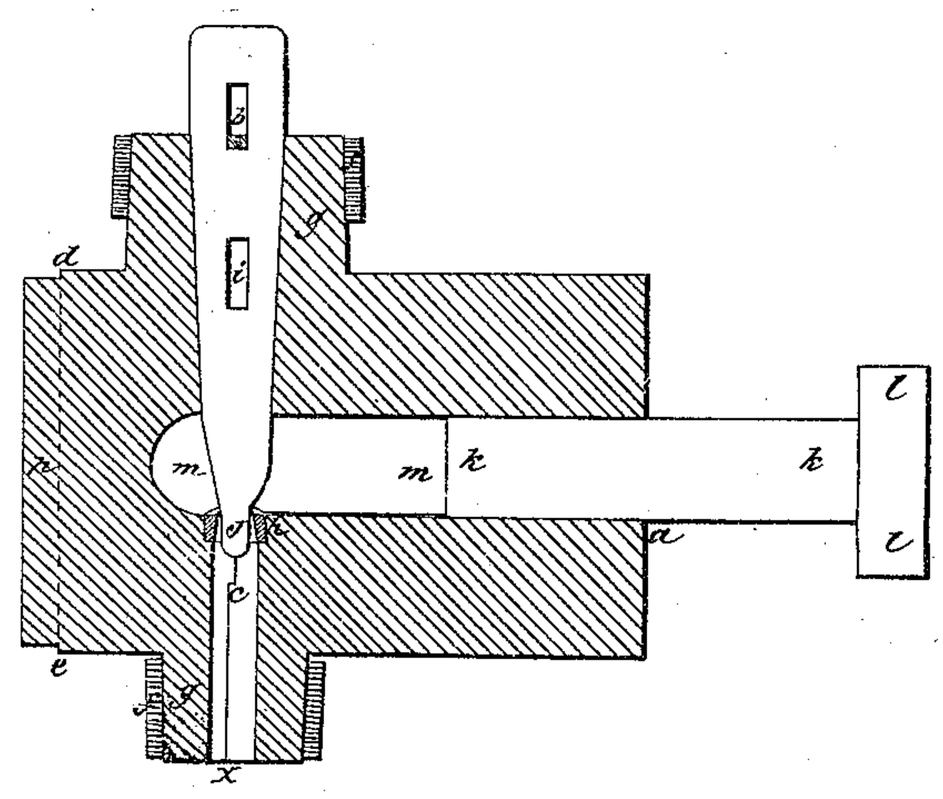


Fig. 1.



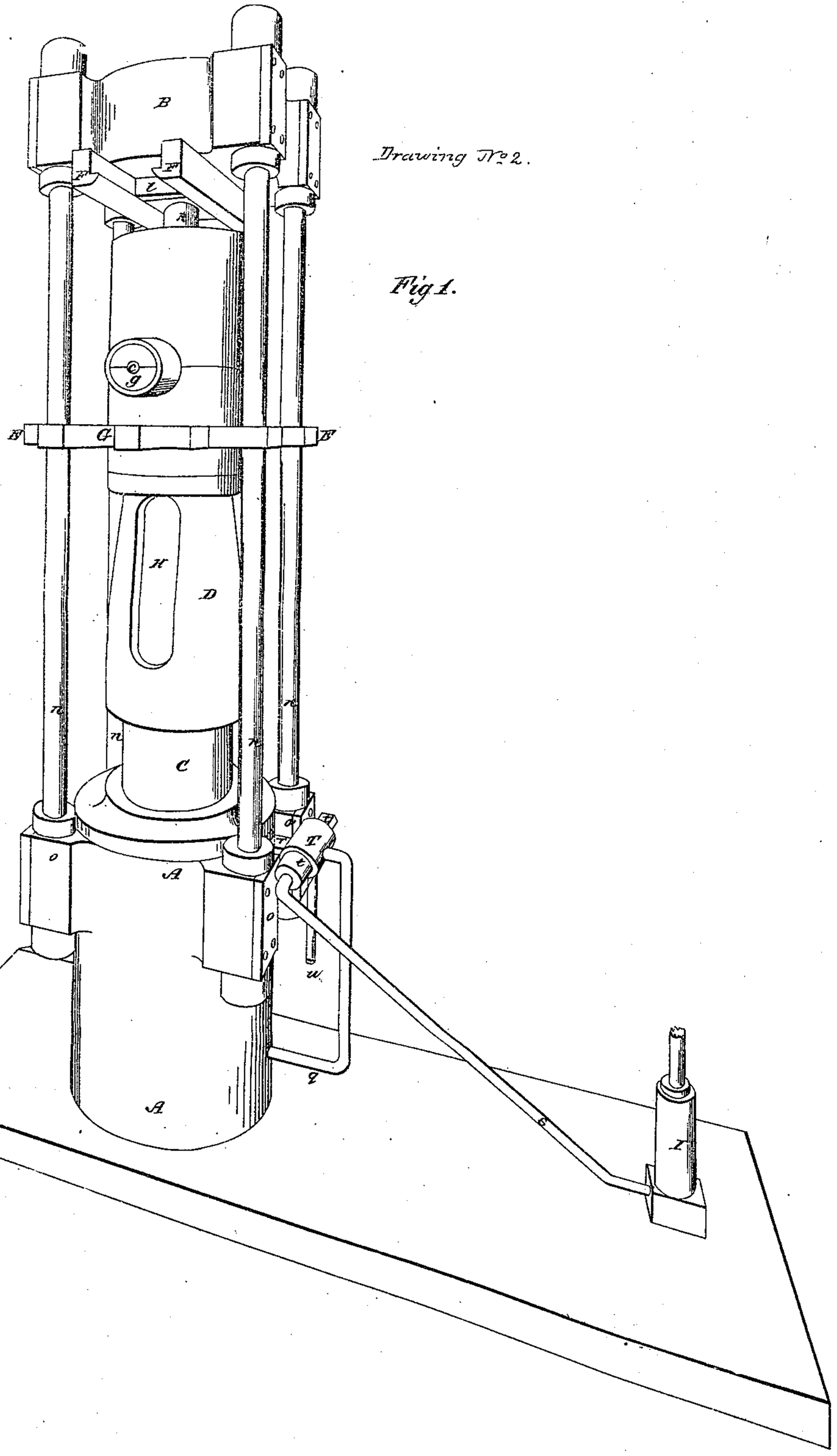
No. 5,466. PATENTED MAR. 8, 1848.

I. ADAMS.
MAKING PIPES.

5 SHEETS—SHEET 2.

Drawing Nº 2.

Fig 1.



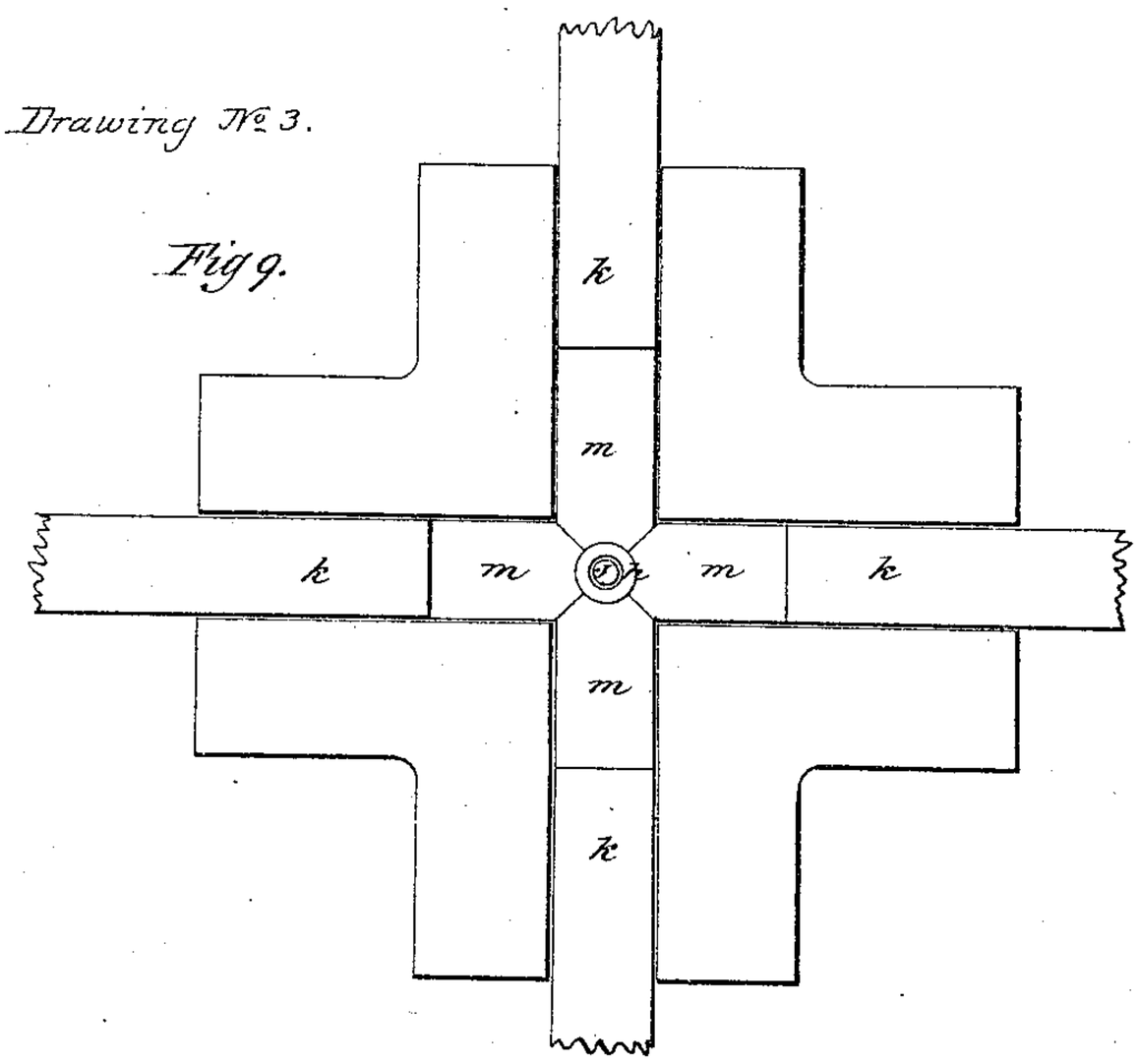
No. 5,466. PATENTED MAR. 8, 1848.

I. ADAMS.
MAKING PIPES.

5 SHEETS—SHEET 3

Drawing № 3.

Fig 9.



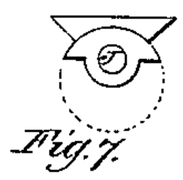


Fig. 7.

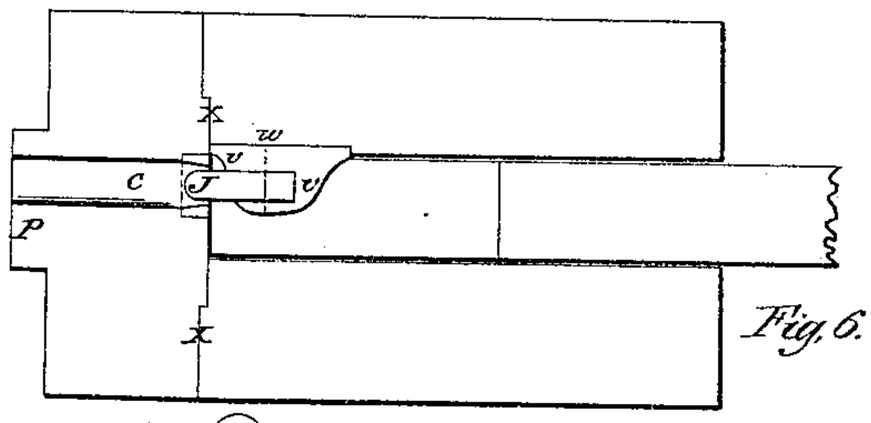


Fig. 6.

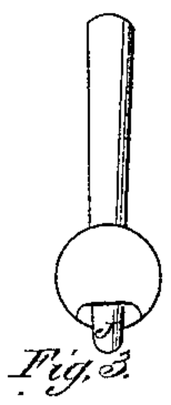


Fig. 3.

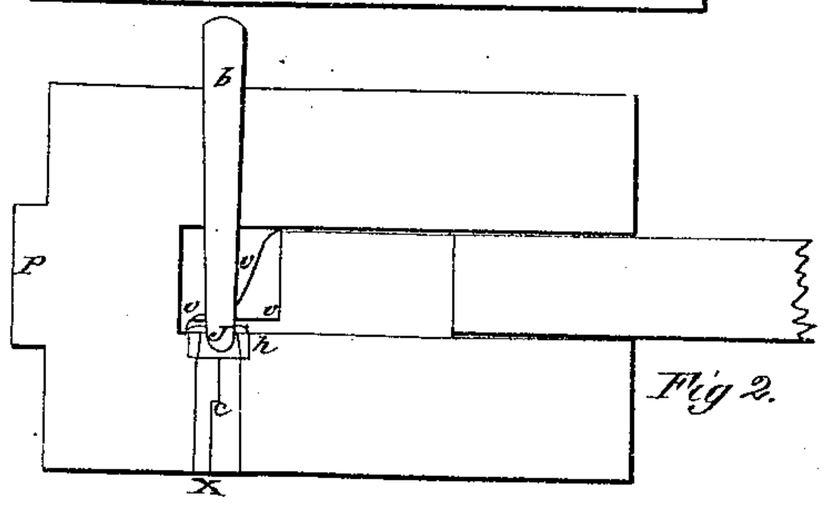


Fig 2.

No. 5,466. PATENTED MAR. 8, 1848.

I. ADAMS.

MAKING PIPES.

5 SHEETS—SHEET 4.

Drawing N° 4.

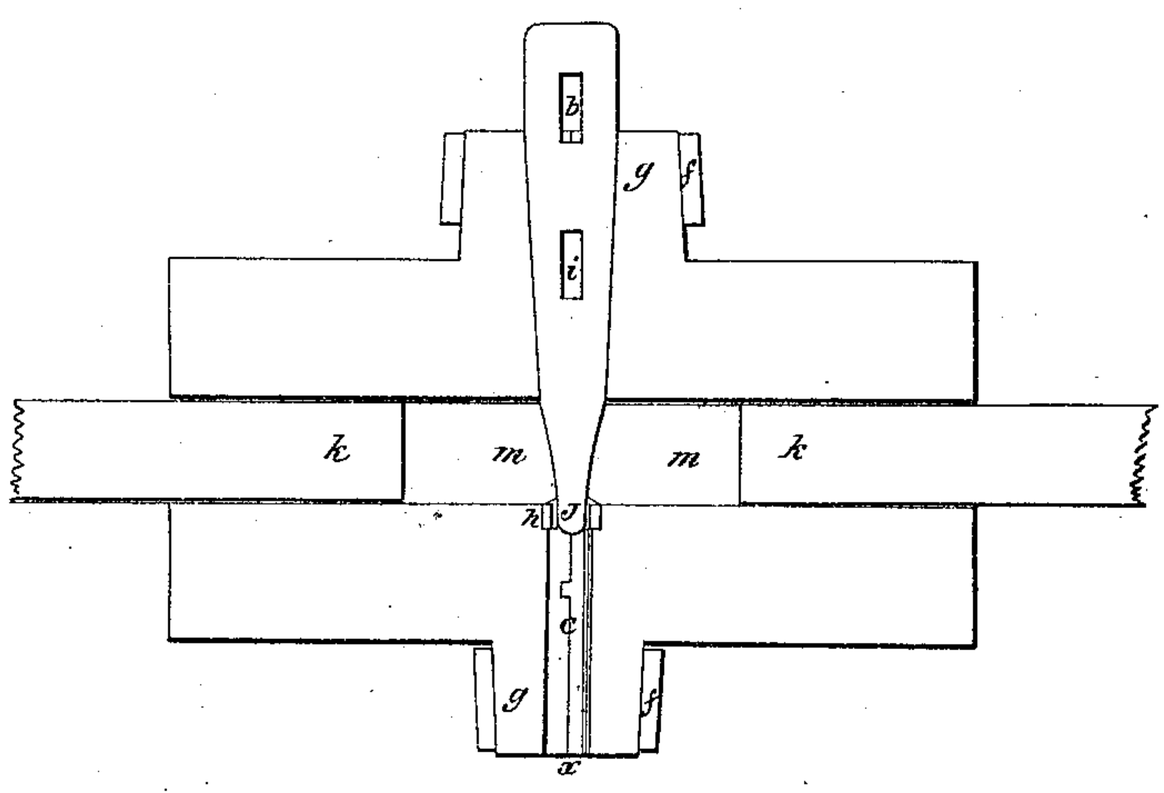


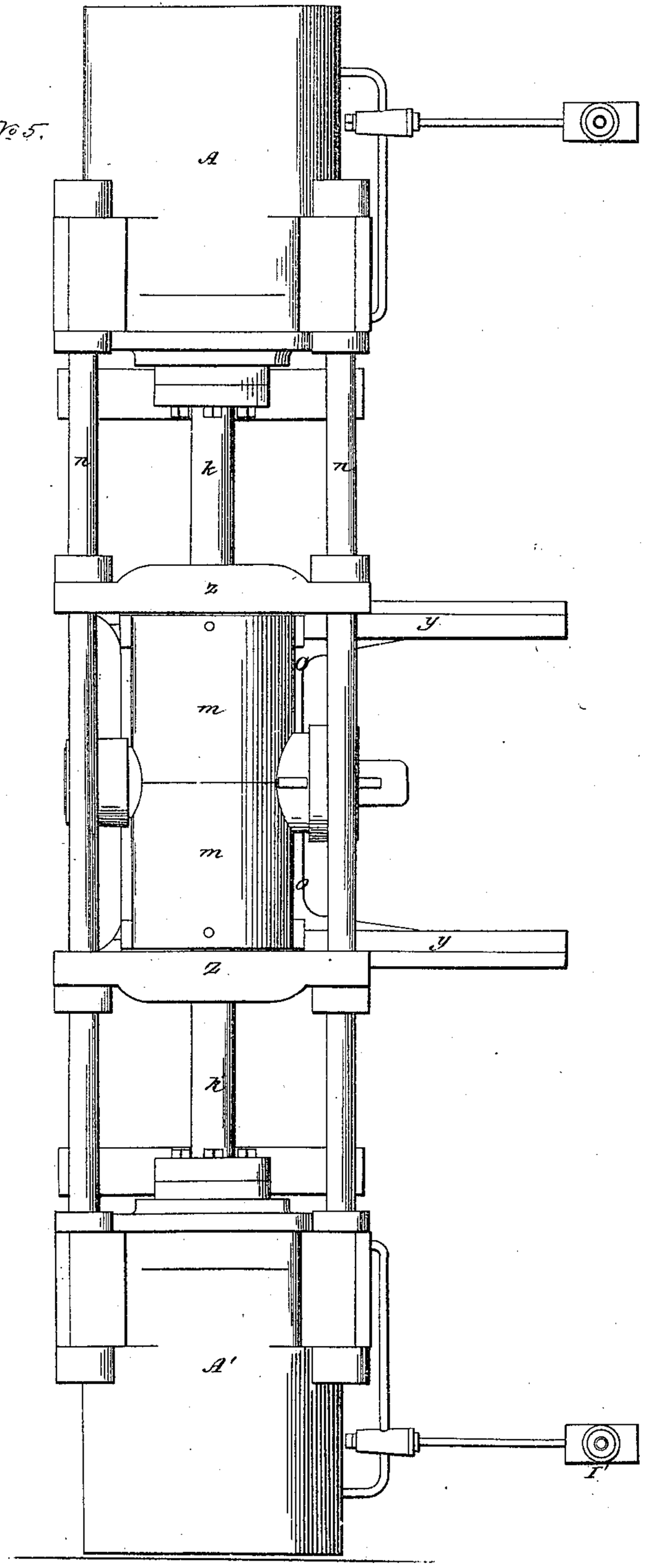
Fig. 8.

No. 5,466. PATENTED MAR. 8, 1848.

I. ADAMS.
MAKING PIPES.

5 SHEETS—SHEET 5.

Drawing No. 5.



UNITED STATES PATENT OFFICE.

ISAAC ADAMS, OF BOSTON, MASSACHUSETTS.

LEAD-PIPE MACHINERY.

Specification of Letters Patent No. 5,466, dated March 8, 1848.

To all whom it may concern:

Be it known that I, ISAAC ADAMS, of Boston, in the county of Suffolk and State of Massachusetts, have invented a certain new and useful improvement for making pipes from solid or partially-fused lead or other soft or malleable materials, whereby certain imperfections sometimes found in pipes which are made by forcing solid or partially-fused metal from a cylinder through dies are avoided and less power required for forcing the metal through the die than in many machines heretofore used.

By my said improvement the mandrel, which forms the inside of the pipe is kept central with certainty without the employment of objectionable features known under the names of a bridge and construction chamber. Besides the uneven thickness produced in pipe by unavoidable inaccuracies in the hollow ram and the core holder used in some machines is avoided and the mandrel is made far more convenient to be taken out for lubrication, or any other purpose, than in other machines for a like purpose.

To enable others skilled in the art to make and use my invention the following description and drawings are furnished.

When my invention, or improvement, is constructed so as to force the lead from one direction only, a cylinder is to be made consisting of two parts, as represented in the central longitudinal section Figure No. 1, Drawing No. 1, to wit, the part from the mouth (*a*) of the cylinder to the center (*b*, *c*,) of the mandrel and aperture constitutes one, and the principal, part of the cylinder; and that part from *b*, *c*, to *d*, *e*, constitutes the other piece of the cylinder and forms its bottom. These two pieces are secured together by means of hoops, (*f*, *f*,) which are driven firmly over two projections (*g*, *g*,) on the two opposite sides of the cylinder which are somewhat like trunnions on the sides of cannon, only much larger, one half of each of them proceeding from each piece of the cylinder. The die is of the approved construction heretofore in use, and is inserted in the side of the cylinder, as seen at *h*, so as to coincide with the aperture (*c*,) for the emission of the pipe. The mandrel *b*, J, is inserted in a tapering hole formed through the side of the cylinder opposite to the die; and in order to give it a long bearing and conveniently secure it in its place so as to render it as firm as possible, it is put through one of the projections (*g*,) used to hold the cylinder together. This mandrel is held in its place by driving a key, or wedge through the hole *i*, and corresponding passages made through the cylinder. It may be started out, by driving a wedge through the hole *b*, made through it. The end or core of it (J,) which enters the die and governs the diameter and form of the inside of the pipe is made of the size to correspond with the caliber of the pipe to be manufactured. From the dies it is gradually enlarged until we come to the side of the cylinder from which it emerges, where it must be of a size to give it the requisite stiffness to prevent its end (J,) from being forced out of a central position in the die either by the pressure of the lead, or other material against it. That side of the mandrel toward the ram, or piston *k*, *k*, should be formed into the shape of a dull knife edge or an approximation thereto. This will facilitate the parting of the lead over the mandrel as it is forced down toward the die.

k, *k*, represents the ram, or piston, which is of the form now in use for the purpose, and its office is to force the lead or other material down toward the die through which it is thus caused to issue perfectly made into pipe. *l*, *l*, is the head by which the piston or ram is suspended in the press.

m, *m*, is the cavity, or chamber which receives the material to be operated upon.

The press in which this cylinder is placed to be operated is a hydraulic press of the construction of those already in use for the manufacture of lead pipe by forcing solid or partially fused, lead from a cylinder through a die. A press of such kind and having the pipe cylinder in it, is represented in the perspective drawing No. 2. In this drawing A, A, is the hydraulic cylinder, and *o*, *o*, *o*, *o*, are strong projections from it made to receive the bolts *n*, *n*, *n*, *n*, which pass through the head beam (B,) of the press and serve to counteract the pressure produced in the machine.

C, is the piston of the press. This piston has a head on the end which works in the hydraulic cylinder similar to the piston of a steam cylinder.

D, is a hollow pillar which stands on, and is secured to, the top end of the piston C,

and supports the plate (E,) upon which the lead pipe cylinder (Fig. 1,) is placed and secured, by screws or otherwise.

k, is the ram of the pipe cylinder, and *l*, is the head by which the ram is suspended on the railways F, F, which are secured to the head beam and serve to slide the piston in and out of the press.

g, is one of the projections (hereinbefore described) used to hold the pipe cylinder together, and *c*, is the aperture for the emission of the pipe. There is an opening or passage (G,) in the plate E, into which a projection (P,) from the bottom side of the cylinder fits; this is to keep the cylinder in place and to guide it when it is slid upon the plate in and out of the press.

H, is an opening into the hollow pillar calculated for the pipe to pass through when the pipe cylinder is constructed with the aperture for the emission of the pipe down through its bottom instead of through the side as above described.

Q, is a pipe through which the water is forced into the hydraulic cylinder, for the purpose of elevating the piston.

r, is the pipe through which the water is forced in upon the top side of the head of the piston to depress it and the pipe cylinder.

I, is the hydraulic pump, and S, is the pipe through which the water is forced into the press.

T, is a cock so constructed that when the plug *t*, *t*, stands in one position the water passes through it and the pipe *q*, into the bottom of the cylinder, while at the same time the water from the upper end of the cylinder passes out and down through the discharge pipe *u*. And when it is turned to another position the water passes into the top of the cylinder above the piston head, and the water from the bottom of the cylinder passes up the pipe *q*, and out through the pipe *u*.

The manner of working with this apparatus for the manufacture of pipe is very similar if not the same as that by which it is made by other lead pipe machines already in public use. The pipe cylinder is first warmed in an oven, or otherwise, and the material which is to be converted into pipe, being first melted, is poured into the cavity, or chamber *m*, *m*, of the pipe cylinder, and so as to fill the chamber nearly to the top of the cylinder. The cylinder is then slid into its place in the press and there fastened. The ram being placed centrally, the hydraulic press is next put in motion so as to cause the pipe cylinder to rise up and receive the ram into its cavity, or chamber and to act or press on the lead, or other material therein with such power as to cause it to issue through the die (*h*,) and about the mandrel (J,) in the form of pipe. When the ram has been thus forced into the chamber of the pipe cylinder to its full extent, the cock should be turned in such manner as to cause the water from the pump to pass into the top of the hydraulic cylinder. This will cause the piston to descend so as to draw the lead chamber away from its ram, and in such manner that it may again be filled with pipe material as before.

Instead of relying upon the large size, and stiffness, of the mandrel to keep it central, it may be supported from the bottom of the chamber as represented in the central longitudinal section Fig. No. 2, Drawing No. 3. This is done by a block V, V, V, which fills the diameter of the chamber and rests upon its bottom, its top being so shaped and sloped, from its periphery down to the die, as to allow the lead, or other material, to slip easily over it. Fig. 3, is a top view of this block with the mandrel in it. Or the mandrel may be secured and supported in the bottom of the cylinder by giving to it a bent shape so that while one end of the mandrel which finishes the inside of the pipe enter the die that forms the outside of the pipe, the other end is caused to turn down on, or into and through the bottom of the chamber as shown in the central longitudinal section Fig. No. 4, Drawing No. 1. In this drawing J, is a section of the mandrel. Or the aperture for the emission of the pipe may be made through the bottom of the cylinder, and the mandrel may be put into the side of the cylinder and secured, its end being bent down so as to enter the die in the bottom of the chamber as shown in the central longitudinal section Fig. No. 5, Drawing No. 1. In this figure J, *b*, is a section of the mandrel. Or there may be a piece dovetailed or otherwise properly fastened in the side of the lead chamber and made to project into it sufficiently to receive the mandrel which may extend downward from it and through the die in the bottom of the chamber as shown in the central longitudinal section Fig. No. 6, Drawing No. 3.

In this drawing V, V, denotes a longitudinal section of the mandrel holder, and J, a section of the mandrel as put into it. And Fig. 7, shows a cross section of the mandrel holder as cut through the dotted line W. It is best that all these cylinders should be made in two pieces and be secured together in the manner of the cylinder first described. The lines X, X, show where they should be joined together.

In case the material is to be forced in toward the dies from more directions than one, from two directions for instance, the cylinder should be twice the usual length, the chamber to receive the material being made entirely through the cylinder, and the mandrel being put, midway, through the side of the cylinder, as shown in the central longitudinal section Fig. No. 8, Drawing No.

4; the aperture for the emission of the pipe being through the opposite side of the cylinder in a corresponding position, and the cylinder being furnished with a ram, or piston *k*, at each end. In this drawing *m*, *m*, is the chamber for receiving the material to be converted into pipe, *k*, *k*, are the two rams, J, *b*, is the mandrel, which is put into the cylinder in the same manner as that described first, and shown in Drawing No. 1, Fig. No. 1; *h*, is the die, and *c*, is the aperture for the emission of the pipe as it is formed. This cylinder may be in two parts, like the others above described, or it may be in one entire piece.

A press, provided with two hydraulic cylinders, lying horizontally, is most suitable to operate a pipe apparatus of this kind. Drawing No. 5, is a top view of a press of this description with the pipe cylinder in it. In this drawing A, A, are the two hydraulic cylinders, *n*, *n*, are two of the bolts which sustain the pressure and hold the press together. *k*, *k*, are the two rams of the pipe cylinder. They are bolted or otherwise properly secured to the pistons of the press. *m*, *m*, is the lead pipe cylinder. O, O, is a large plate of iron which rests on the lower bolts of the press and serves as a support for the lead pipe cylinder to rest upon. Y, Y, are rails for the pipe cylinder to slide upon when it is put in and taken out of the press. Z, Z, are cheeks between which the pipe cylinder lies to keep it from being forced from its place by any unequal operation of the two hydraulic cylinders. I, I, are the hydraulic pumps, which operate this double cylinder press in the same manner as the one pump operates the press first described.

The manner of using this double acting pipe apparatus is precisely the same as the manner of using that first described. For convenience of filling the chambers, with the material for pipes, holes may be made in the upper side of the cylinder near its ends. Fig. No. 9, Drawing No. 3, is a central longitudinal section of a quadruple cylinder calculated for forcing the material through the die from four different directions. This figure represents the chambers and rams as cut through longitudinally crosswise of the mandrel. *m*, *m*, *m*, *m*, are the chambers, *k*, *k*, *k*, *k*, are the rams, *h*, is the die, and J, is the end of the mandrel as cut off close down to the die. I think it best to put the mandrel in as represented in Fig. No. 8, Drawing No. 4.

As many hydraulic cylinders should be used to operate the pipe apparatus as the apparatus has rams in it. I do not confine myself to the use of two or four cylinders as it will be evident that three or even a greater number may be arranged together so as to have the common mandrel and die, screws, or other mechanical powers, may be used instead of hydraulic presses.

Similar letters and figures mark the same parts in all the drawings.

I claim—

The combination in which the core is sustained by pressures on opposite sides of it and the mandrel; the said combination being represented in Drawing No. 4, Fig. 8, and in Drawing No. 3, Fig. 9; meaning to claim the said combination whether a double cylinder and two pistons, or two or more cylinders and as many pistons are employed in it to act with respect to the mandrel core and die placed centrally between them substantially as represented, the said combination enabling me to entirely dispense with a bridge for supporting the core, and a construction chamber applied to said bridge for the purpose of uniting the metal after its separation by the said bridge and previous to its passage between the die and core. The aforesaid arrangement and combination enables me to obtain a short, substantial, and unvarying mandrel; also one general and undivided passage for the pipe material to, and through the die, the material, in my machine being at no time in the operation disconnected so as to require reuniting. It also renders unnecessary the hollow ram which is used in some machines to keep the mandrel in place.

ISAAC ADAMS.

Witnesses:
R. H. EDDY,
JOHN NOBLE.