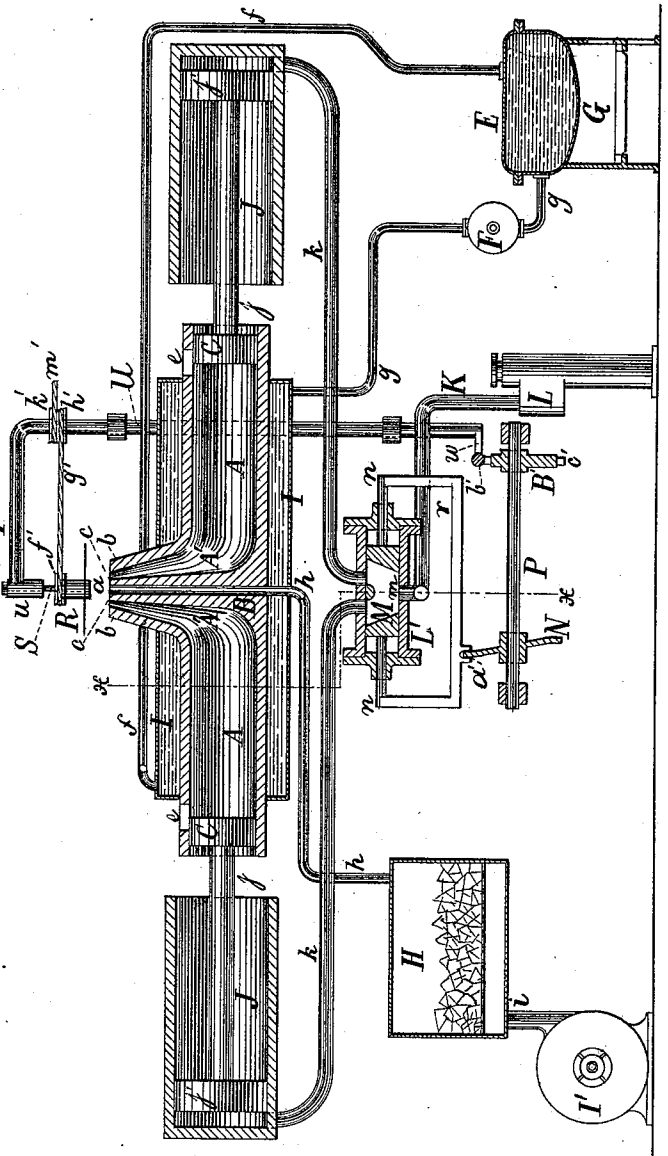
(No Model.) 3 Sheets—Sheet 1.

J. A. WHITNEY.

APPARATUS FOR MAKING PLUMBERS' TRAPS.

No. 335,407. Patented Feb. 2, 1886.

Fig 1



Witnesses
Rudolph A. Reilman
Thomas E. Crossman

Inventor
James A. Whitney

N. PETERS. Photo-Lithographer. Washington, D. C.

(No Model.) 3 Sheets—Sheet 2.

J. A. WHITNEY.

APPARATUS FOR MAKING PLUMBERS' TRAPS.

No. 335,407. Patented Feb. 2, 1886.

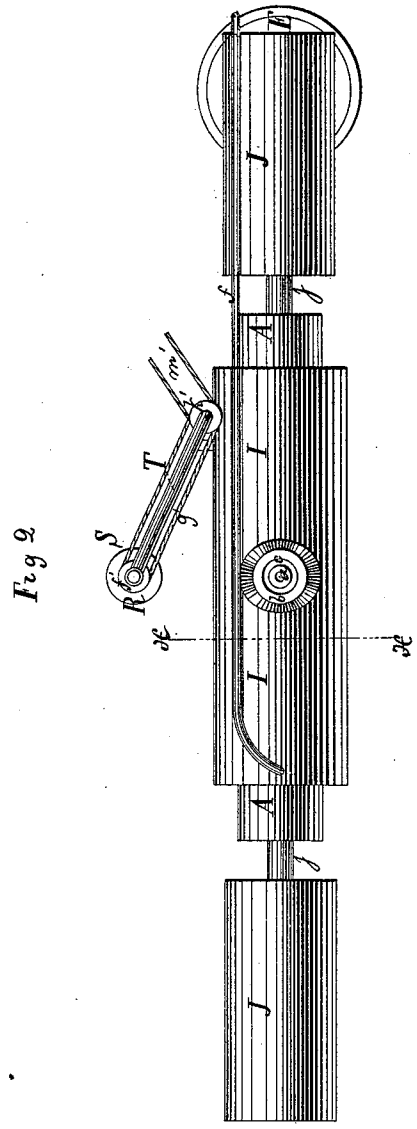


Fig 2

Witnesses

Rudolf. H. Kellman

Thomas E. Crossman

Inventor

James A. Whitney

N. PETERS. Photo-Lithographer. Washington, D. C.

(No Model.) 3 Sheets—Sheet 3.

J. A. WHITNEY.

APPARATUS FOR MAKING PLUMBERS' TRAPS.

No. 335,407. Patented Feb. 2, 1886.

Fig 5

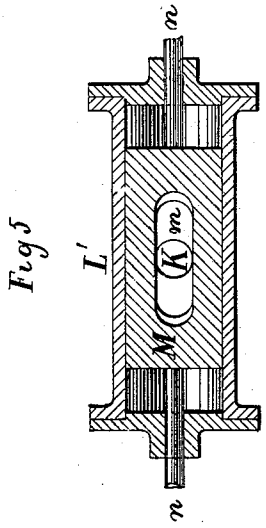


Fig 4

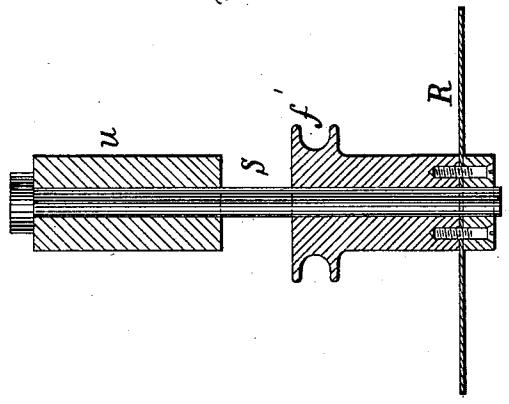
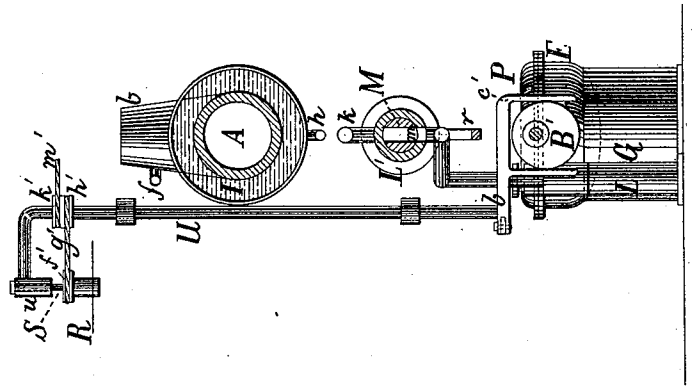


Fig 3



Witnesses

Rudolph A. Pillman

Thomas E. Roseman

Inventor

James A. Whitney

N. PETERS. Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

JAMES A. WHITNEY, OF BROOKLYN, NEW YORK.

APPARATUS FOR MAKING PLUMBERS' TRAPS.

SPECIFICATION forming part of Letters Patent No. 335,407, dated February 2, 1886.

Application filed December 23, 1882. Serial No. 80,016. (No model.)

To all whom it may concern:

Be it known that I, JAMES A. WHITNEY, late of Dobb's Ferry, in the county of Westchester and State of New York, but now of the city of Brooklyn, in the county of Kings and State of New York, have invented certain Improvements in the Manufacture of Curved or Bent Pipes, Plumbers' Traps, &c., of which the following is a specification.

This invention relates more particularly to the manufacture of plumbers' traps of wrought lead—that is to say, lead forced or drawn through a die, as distinguished from lead cast in molds; but the said invention may also be applied in the manufacture of curved or bent wrought or drawn soft-metal tubes or pipes for other purposes.

The object of the invention is to provide means whereby such articles may be manufactured with less outlay for labor, and less expense for machinery and repairs than has hitherto been practicable.

The invention comprises certain novel processes and combinations of parts, whereby said objects are effectually secured.

Figure 1 is a vertical longitudinal sectional view of an apparatus constructed according to my said invention. Fig. 2 is a plan view of the same. Fig. 3 is a vertical transverse sectional view taken in the line *x x* of Figs. 1 and 2, and Figs. 4 and 5 are detail views on a larger scale of some of the parts included in said apparatus.

A A are two cylinders, which, as represented in the drawings, constitute a reservoir for the soft metal of which the traps are made, and are placed axially in line with each other, but which may be placed in any other suitable position. Between the said two cylinders is a partition, B, at the upper end of which is a core, *a*, around and concentric with which are the outer walls, *b*, of an annular die, which, for convenience, I designate by the reference-letter *c*, said annular die being the annular space between the core *a* and the parts *b*. The annular die *c* connects at each side with the inner end of the adjacent cylinder A by means of a passage, A'. In each of the cylinders A is a plunger, C.

The cylinders A constitute reservoirs, which are filled with soft metal. In other words, both the cylinders A have placed in them any suitable or requisite quantity of lead or other soft metal. When the plungers C are forced inward, the said soft metal is forced out of the die *c* in the form of a pipe. When the plungers move in an equal ratio, so that the metal issues with a uniform velocity at all parts of the die *c*, the pipe is straight as it issues from the said die. When one of the plungers is operated to force out the metal faster than does the other, the pipe or tube issuing from the die *c* is curved or bent, so that by varying the movements of the plungers C any desired curve in either direction may be given to the pipe during the operation of forming the same, while by maintaining the flow at a uniform velocity at all parts of the die *c* the pipe may be made straight, as hereinbefore explained. Openings *e* are provided at the outer ends of the cylinders A. By withdrawing the plungers C to the requisite extent, these openings *e* are made to communicate with the interior of the cylinders, so that the latter may be filled with the soft metal in a molten condition, the metal being allowed to solidify before commencing the operation of forming the pipe or tube, as hereinafter explained.

I is a chamber surrounding the cylinders A, which may be formed of sheet metal, wood, or other suitable material. One end of this chamber I communicates by a pipe, *f*, with the upper part of a closed caldron or vessel, E, the lower part of which connects by a pipe, *g*, with the opposite end of the chamber I. A rotary or other suitable pump, F, is so arranged as to draw the liquid contents of the caldron through the pipe *g*, thence to and through the chamber I, and thence through the pipe *f* back to the caldron. The liquid in the latter may be composed of a saturated solution of common salt or of water more or less charged with glycerine, or may comprise any other suitable liquid.

The furnace or equivalent heating apparatus G of the caldron should be so constructed and controlled as to heat the liquid to a point approximating, but still below, the melting-point of the soft metal. Thus, for example, when the pipes, traps, or the like are to be made of lead, the temperature of the liquid may be, say, 600° Fahrenheit. This circula-

tion of the heated liquid around the cylinders A maintains the lead in a condition which, while still solid, is extremely soft and plastic, so that it may be forced to and through the die, as hereinbefore explained, with a comparatively slight expenditure of power. Inasmuch as the tube of soft metal at this relatively high temperature is extremely weak and plastic, it is necessary that it be rapidly cooled, in order that it may not become misshapen or deformed by its own weight as the metal issues from the die *c*. In order to thus rapidly cool the metal as it issues from said die, the core *a* is made tubular, its internal passage extending through the lower part of the partition B and thence connecting by a pipe, *h*, with a refrigerating box or chest, H, filled with broken ice, over which is preferably sifted a small quantity of common salt. This refrigerator H connects by a suitable pipe or passage, *i*, with a fan-blower, I′, so arranged as to force air from the external atmosphere through the refrigerator H, thence through the pipe *h* and tubular interior of the core *a* to the upper end or outlet of the latter, so that the cold air issuing from the said core and expanding within the tube or trap as the latter issues from the die rapidly cools and stiffens the same to the requisite degree.

The plungers C are provided with suitable piston-rods, *j*, connected with pistons *j′*, which work in hydraulic cylinders J, which, being of the usual or any suitable construction, need no particular description here. These hydraulic cylinders J communicate by pipes *k* with a pipe, K, common to both, which in its turn communicates with a pump, L, such, for example, as is ordinarily used as part of hydraulic presses from which the water is forced to the cylinders J, to operate the pistons therein, in substantially the same manner as is done in an ordinary hydraulic press.

The pump L, being of the usual construction, requires no specific description here. The pipes *k k* and K branch from and are united by a valve-chamber, L′, which latter is more fully represented in Fig. 5. In the valve-chamber L′ is placed a slide-valve, M, controlling the port *m*, leading to the pipes *k k*, so that when the valve is moved to one position the water supplied through the pipe *k* will be allowed to pass equally to the cylinders J through the pipes *k k*, in order that their plungers C may be actuated by an equal pressure to force the metal equally from opposite sides of the die, thereby forming a straight tube; but when the valve is moved one way or the other to supply a greater proportion of the water to one or the other of the cylinders J as the case may be, the plungers C, being thereby unequally operated, force an unequal proportion of metal from opposite sides of the die which impart a curvature to the pipe or tray as the latter issues from the die *c*, as hereinbefore explained. Thus by moving this valve one way or the other the curves of the pipe or trap may be formed alternately in opposite directions as the same issues from the die *c*, and the straight portions of the tray or other tube may be formed by properly placing for the time being, as hereinbefore explained, the valve M with reference to the inlets of the two pipes *k*.

In order to give the requisite movement to the slide-valve M, the latter, as shown in the drawings, is provided at its opposite ends with laterally-projecting arms *n*, to which is attached a yoke, *r*, which extends outside of the chamber L′ and has formed in it a notch, *a′*, which receives the edge of a cam-wheel, N. This yoke may be provided with suitable guides to insure its retention in position. Such guides may be of any usual or appropriate construction, and need not differ materially from those which are used for insuring rectilinear movements in ordinary mechanical structures. This cam-wheel has its edge of such contour that when it (the said cam-wheel) is rotated by means of its shaft P, the curves or cam portions upon its edge or circumferential surface will move the yoke *r*, and consequently the slide-valve M, one way or the other, in order to regulate the flow of water to one or the other of the two hydraulic cylinders J. In due course the straight portions—that is to say, the portions more distinctly in a plane at right angles to the shaft P of the said cam-wheel—hold the valve stationary at any desired point, so that the cam-wheel, being made with a proper configuration, regulates by its rotation the movement of the valve M, and thus by regulating the relative supply of water to the hydraulic cylinders J regulates the flow of the metal through the die *c*, and therefore determines the shape and contour of the pipe, tube, or trap, as the case may be, as the same issues from the said die.

In order that the pipe, tube, or trap, as the case may be, may be severed at a suitable distance from the die *c*, there is provided a cutting apparatus arranged to sever the desired portion from that more immediately adjacent to and issuing from the die, as aforesaid. As represented in the drawings, this apparatus comprises a circular saw, R, arranged in a horizontal position upon the lower end of a vertical mandrel, S, which revolves in a vertical bearing, *u*, at the outer or free end of a horizontal arm, T, on the upper end of a vertical shaft, U, which rotates in suitable fixed bearings, and which has at its lower extremity a short lateral arm, *w*. This arm *w*, by means of a rod, *b′*, connects with a yoke, *c′*, which is passed over the circumference of a cam, B′, on the shaft P, the parts being so proportioned that when one revolution of the cam N has determined the formation of a specific length of pipe or tube—as, for example, of a plumber's trap—the cam B′, acting through the rod *b′*, draws upon the arm *w*, and turning the shaft U around its own axis swings the arm T inward, thereby bringing the saw R against and through the pipe or tube and severing the same from the metal below. The

saw R has a pulley, f', upon its boss, which connects by a band, g', with a pulley, h', which is loose on the shaft U, and which has attached to it another pulley, k', also loose upon the shaft U, and which is rotated by a belt, m', from any suitable driving-pulley, so that the saw is caused to rotate continuously. Inasmuch as the upward movement of the metal issuing from the die c will tend to lift the saw, the mandrel S is capable of a vertical sliding movement in the bearing u, so that the saw yields in an upward direction simultaneously with its passage through the metal. As the length or piece of pipe or tube—as, for example, the trap, formed as hereinbefore explained—is severed by the action of the saw R from the metal below it is grasped by the hand of the attendant or operator, protected by a suitable cloth, thick gloves, or the like.

Inasmuch as my invention provides for automatically regulating the movement of the plungers C, I am enabled to dispense with the labor of a skilled attendant for such purpose; and inasmuch as the movement of the valve M is regulated by the action of a mechanical device, which may be made of any shape required to meet the conditions under which the plungers C are required to act upon the metal, it follows that such device may be so formed as to throw the preponderance of the liquid from one to the other of the hydraulic cylinders in such proportions and by such gradual change as to avoid interference with the inertia of the metal, which, if too suddenly resisted or changed in direction, would tend to rupture the reservoir or cylinders in which it is contained; and inasmuch as my said invention provides for automatically severing the length of tube or pipe—as, for example, a plumber's trap when formed from the metal more immediately issuing from the die c—it follows that the labor of the attendant is proportionally lessened; and inasmuch as my said invention provides for the vertical movement of the severing device simultaneously with the severing action thereof, it follows that the pipe or tube is cut straight across, thereby avoiding the waste of material which occurs when the metal is sawed off by hand, and therefore necessarily more or less obliquely and irregularly. Further, inasmuch as my said invention provides for maintaining the soft metal in the reservoir—in other words, in the cylinders A—uniformly at a temperature approximating but below the melting or fusing point of the metal, it follows that the metal is maintained in the most plastic condition possible, and that in which it may be forced through the die with the least expenditure of power and the least strain upon the mechanism, so that the latter may require less material in its construction, will last longer, and require less frequent repair.

What I claim as my invention is—

1. A machine for making plumbers' traps, curved pipes, tubes, &c., comprising the following elements in combination, viz: an annular die, devices for forcing the material in variable quantities from opposite sides of said die, and mechanism for automatically controlling the said devices, all substantially as and for the purpose herein set forth.

2. The method of making soft-metal traps, tubes, &c., which consists in forcing the metal, softened by a surrounding temperature slightly below its fusing-point, from and through a tubular die, and subjecting the same as it issues from the die to a cooling medium to stiffen and set the formed tube, said cooling medium being supplied through the body of the die around and from which the tube issues, substantially as described.

3. The combination of the annular die c, passages A', cylinders A, plungers C, hydraulic apparatus J, valve M, and means, substantially as described, for automatically actuating said valve, substantially as and for the purpose herein set forth.

4. The combination, with the annular die c, of means, substantially as described, for directing a blast or forcibly impelled current of air upon or against the surface of the hot metal immediately after it issues from the die in the direction of movement of the forming-tube, substantially as and for the purpose herein set forth.

5. The combination of the annular die c, having a tubular core, means, substantially as described, for directing a blast or current of air through said core away from the mouth of the die, and means, substantially as described, for cooling the air, all substantially as and for the purpose herein set forth.

6. The combination, with the annular die c, having a tubular core, of a blower for forcing air in due relation thereto and a refrigerator for cooling the air, substantially as and for the purpose herein set forth.

7. The combination, with a machine for forming soft metal substantially as described, of a cutting device arranged to sever the pipe into lengths during the process of its formation and its movement from the die.

8. The combination, with a reservoir having an annular pipe-forming die and a surrounding chamber for receiving a heated circulating liquid, of a pump for impelling said liquid to and through said chamber and pistons for impelling soft metal from said reservoir through the said pipe-forming die, substantially as described, for the purpose specified.

9. The combination, with the annular pipe-forming die, of a cutting implement arranged and supported to be moved to and from the metal issuing from said die to sever said pipe during its projection from said die, substantially as described, for the purpose specified.

10. The combination, with the pipe-forming die and the pistons for forcing the metal from said die, of a circular saw for severing the pipe during the process of its formation, having a rotary motion and a sliding movement in the direction of the moving pipe, whereby

the saw yields in a direction with the moving pipe simultaneously with its passage through the same.

11. The combination, with a seamless-pipe-forming die substantially such as described, of a pipe-cutting implement having a rotary motion, a movement in the direction of the length of the pipe being severed, and a movement to and from the pipe, a reservoir containing the soft metal, and piston for forcing it therefrom through said die, substantially as described.

12. The combination of the annular die *c*, partition B, cylinders A, plungers C, hydraulic apparatus J, and means, substantially as described, for automatically varying the action of the hydraulic apparatus to give a variable movement to the plungers, all substantially as and for the purpose herein set forth.

13. The combination of the annular die *c*, passages A′, cylinders A, plungers C, hydraulic apparatus J, and the valve M, arranged to control the hydraulic apparatus in its action upon the plungers, substantially as and for the purpose herein set forth.

14. The combination, with the annular die *c*, in a machine for making soft-metal pipes, traps, &c., of a saw arranged to sever the pipe in a plane substantially parallel with the face of the said die, substantially as and for the purpose herein set forth.

15. In an apparatus for making curved pipes, traps, &c., the combination of the following elements, to wit: an annular die, *c*, a saw for severing the pipe or tube as the same issues from the die, means for varying the flow of metal at opposite sides of the die, and means for automatically feeding the saw at intervals to sever the pipe or tube, all substantially as and for the purpose herein set forth.

16. In a machine for making plumbers' traps, curved pipes, tubes, &c., from soft metal, the combination of the following elements, viz: a cylinder or reservoir for containing the soft metal, an annular die through which the metal from the reservoir may be forced, devices for causing a variable flow of the material at opposite sides of said die, a hydraulic press for actuating said devices, and mechanism, substantially as described, for automatically controlling the hydraulic pressure to automatically regulate the variable flow of the material through the die, substantially as and for the purpose herein set forth.

JAMES A. WHITNEY.

Witnesses:

THOMAS E. CROSSMAN,

RUDOLF H. RJELLMAN.