W. A. Shaw,

Manuf. of Tin Lined Lead and Lead Pipes.

No 74.611 Patented Feb. 18. 1868.

Fig. 4.

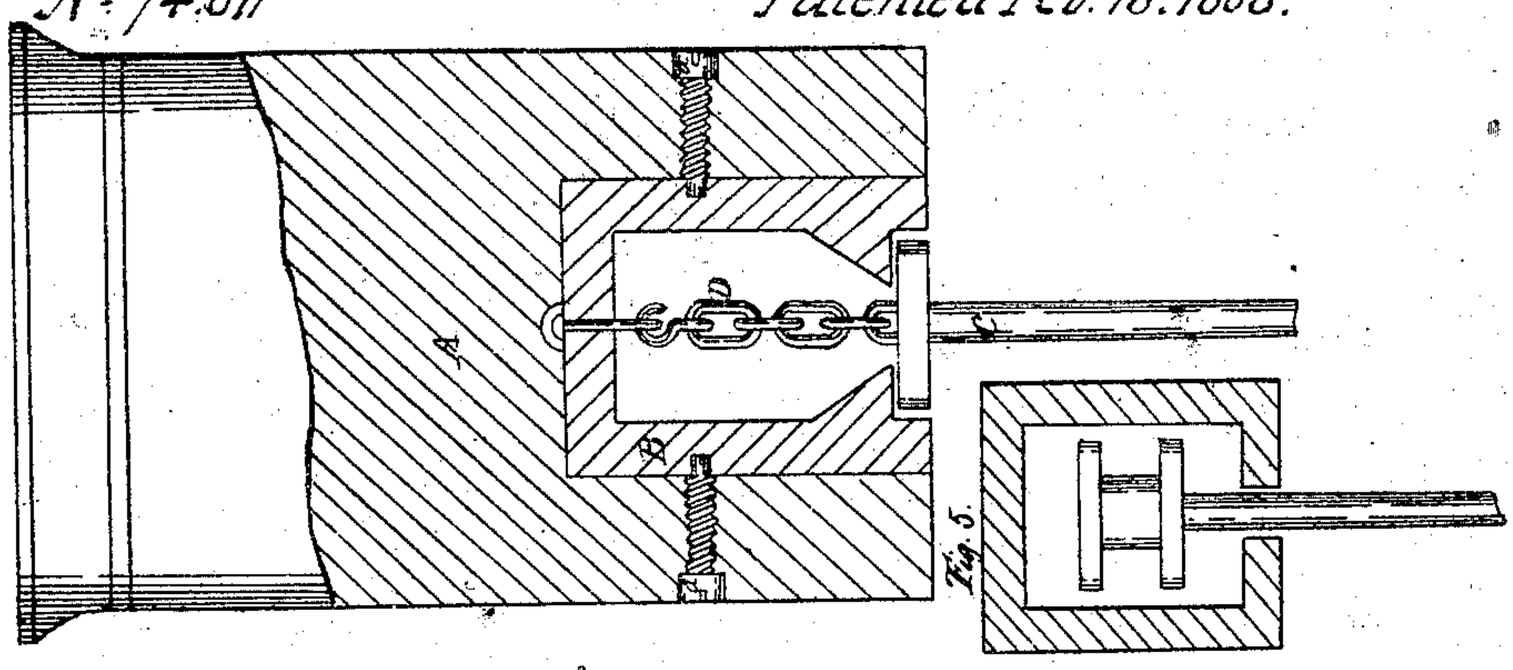


Fig. 5.

Fig. 2.

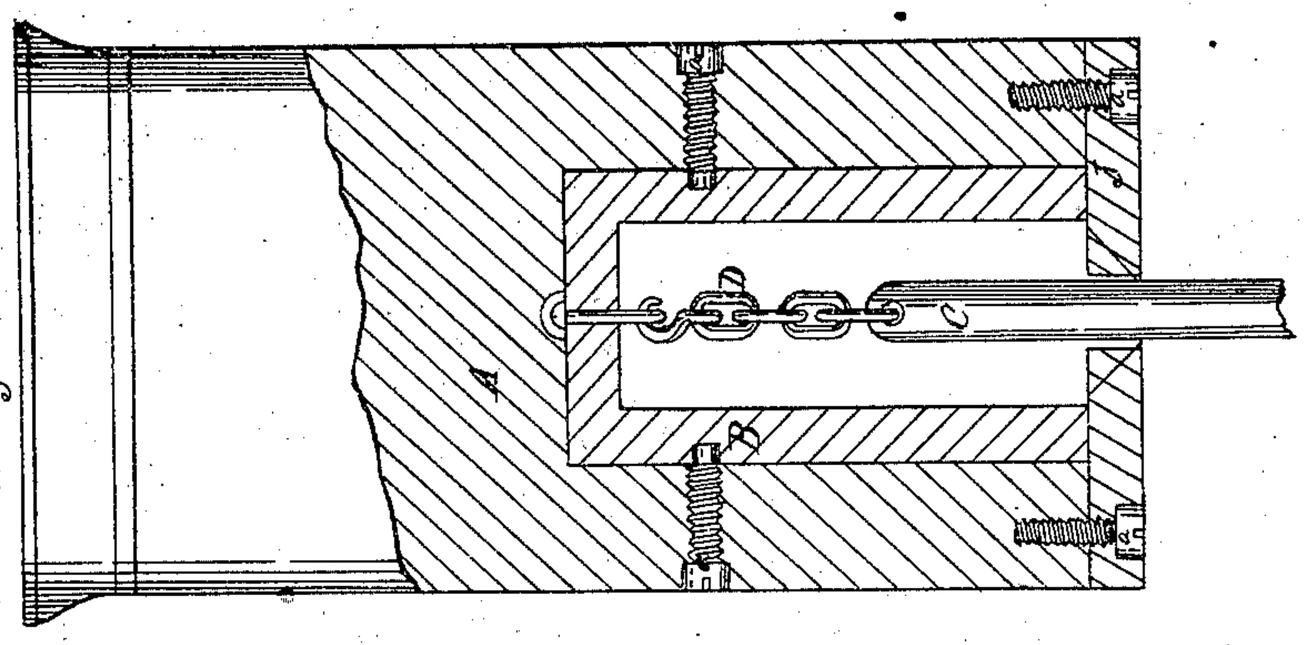


Fig. 1.

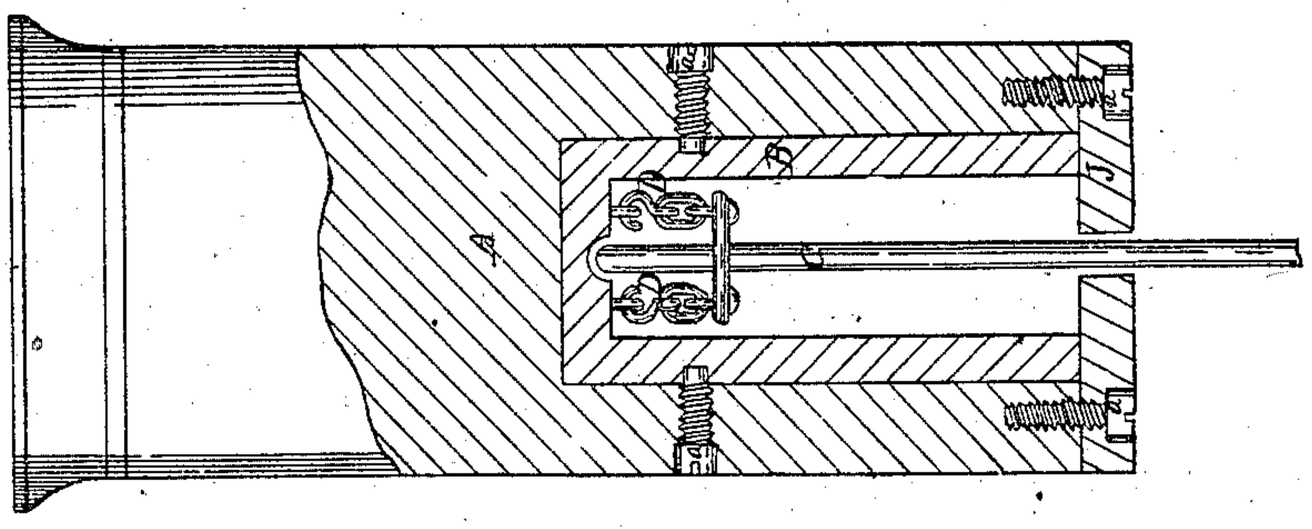
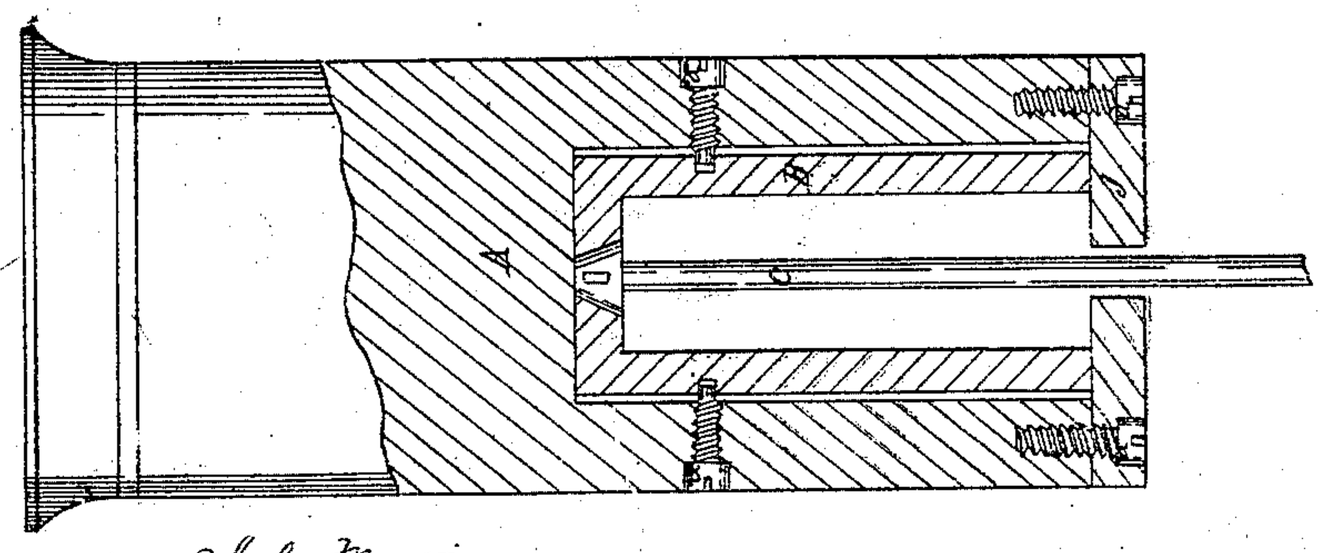


Fig. 3.



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UNITED STATES PATENT OFFICE.

WILLIAM ANTHONY SHAW, OF NEW YORK, N. Y.

IMPROVEMENT IN THE MANUFACTURE OF TIN-LINED LEAD PIPE.

Specification forming part of Letters Patent No. **74,611**, dated February 18, 1868; antedated February 6, 1868.

To all whom it may concern:

Be it known that I, WILLIAM ANTHONY SHAW, of the city, county, and State of New York, have invented a certain new and useful Improvement in the Manufacture of Lead Pipe or Tin-Lined Lead Pipe; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the annexed drawing, making part of this specification, in which—

Figures 1, 2, 3, and 4 are longitudinal sections through the ram of a hydraulic pipe-press, and illustrate four different modifications of my inventions.

This invention consists of a novel method of making and attaching or connecting the core or mandrel to or in the ram of a hydraulic pipe-press.

Hitherto the core or mandrel of the pipe-press has been rigidly connected or fixed in the end of the ram, so that the latter, when the charge is pressed out of the cylinder, brings the shank of the mandrel close down to the die, which makes it necessary for the ram to fit the cylinder with great accuracy, and the mandrel to be adjusted in the center of the ram precisely over the center of the die. So long as this accuracy in construction and adjustment is maintained the press will work well, and will produce a very good quality of pipe; but in the course of a very short time it is found that the cylinder has stretched enough to make the ram fit it loosely, making it impossible to keep, with any certainty, the axis of the mandrel over the center of the die. The mandrel, when the press is in motion, will be forced nearer to one side of the die than the other, thus making one side of the pipe thicker than the other, and frequently breaking the mandrel in working off the last part of the charge. This is owing to the axis of the mandrel being out of line with the center of the die, which, however, in the beginning of the stroke, does not much affect the working of the press, because the mandrel is then drawn nearly its full length out of the die, and can spring or yield a little to compensate for the inaccuracy of the press; but, as the ram moves down and brings the shank of the mandrel near the die, and the pressure grows stronger upon the charge, the strain on the mandrel from this inaccuracy is very great, and is augmented by the tendency of the issuing metal to press it directly in the center of the die. The tendency of the issuing metal to press the mandrel in the center of the die shows that the mandrel would adjust itself in its proper position if left free to do so, and, if left free to adjust itself, it would be relieved from the strain above alluded to, and its liability to break would be avoided.

The object to be accomplished, then, is to so construct the mandrel and attach it to the ram that it may yield to the tendency of the metal, and take its place directly in the center of the die, notwithstanding any little inaccuracy of adjustment and construction in the press.

There are two ways by which this object can be accomplished. The one is by making a yielding or flexible connection between the ram and the mandrel, and the second is by making a deep cavity in the lower end of the ram and increasing the length of the mandrel above the die or lower end of the ram by the depth of the cavity, making the fixed or rigid connection between the ram and the mandrel in the top of the cavity; or the mandrel might be carried up all the way through the ram, and be connected in the top or above it. In the first of these cases, the flexibility of the connection is relied upon, and, in the second, the increased elasticity or spring of the mandrel, resulting from its increased length, is relied upon to fulfill the desired conditions.

In the drawings, Figs. 1, 2, and 4 show three modifications of the yielding or flexible connection, and many more different forms of this connection might be made, but always with the same result, and they would therefore be substantially the same thing, and fall within the scope of my invention.

Fig. 3 in the drawing shows the manner of obtaining and applying a spring or yielding mandrel rigidly connected to the ram, which connection may be made in a variety of ways, without, however, changing the result, provided always the connection is made in the ram far enough from the die to secure the necessary length of mandrel and yield the consequent spring above the die.

The drawing, in all the figures, shows the mandrel C connected to the ram A through

the agency of a cup, B, which is fitted into a cavity made in the ram to receive it, and is held in position by means of set-screws *a a a a* and the cap or plate J. In the case of the spring or yielding mandrel, with a rigid connection, as shown by Fig. 3, this cup is used to facilitate the connection between the ram and the mandrel; and, moreover, by the use of this cup, the self-adjusting quality of the connection may be augmented, for, by making the cup a little smaller than the cavity in the ram, and dispensing with the set-screws, and relying upon the plate J to hold it in its place, it is left free to move from side to side in the cavity, or the strain may be upon one side or the other of the mandrel. This cup, however, may be dispensed with, and the mandrel connected in the top of the cavity made in the ram, or it may be carried all the way through the ram and connected above; but I think the connection made with the cup the most advantageous.

In making pipe, when the press is in operation and working in line, about the only strain on the mandrel is a tensile strain in the direction of the issuing metal or pipe; but in starting the press, before the metal begins to issue, the friction of the metal on the mandrel presses it back, so that, in the case of the loose or flexible connection, it is well to have a bearing to receive the mandrel when started. Such a bearing is obtained in Fig. 1, by making the connection to a collar on the mandrel and carrying the end thereof up against the top of the cavity or cup, or nearly so, as shown in the drawing.

The same object is accomplished by the device shown in Fig. 4, which consists of a shoulder made in the cup to receive the collar or flange made on the mandrel. The drawing illustrates the arrangement so clearly that further description is unnecessary.

Fig. 2 shows the connection between the ram and mandrel by means of a simple chain or wire rope, which it is thought will answer a very good purpose. In making the connection, after the mandrel has been attached to the cup, I propose to fill the cup with lead or other soft metal or material sufficiently yielding to allow the mandrel to adjust itself, in which case the plate J on the end of the ram will serve to keep the metal in the cup from being welded to the metal in the cylinder; but should I find that the metal or material in the cup will interfere too much with the freedom of the mandrel, I propose to leave the cup empty, and exclude the metal by cutting the cap J down from the inside to an edge around the mandrel, making the mandrel fit the hole, and at the same time secure its freedom for self-adjustment, or, by adopting a plan similar to that shown in Fig. 4, the collar on the mandrel in that case being pressed up against the shoulder in the cup, so as to exclude the metal therefrom.

Where a chain or flexible connection is used the cavity or cup need not be so deep as in the case of the spring or yielding mandrel; but, in the case of the rigid connection, the deeper the cavity the better, for the farther the connecting-shank of the mandrel is removed from the die in the bottom of the retaining-cylinder the longer the mandrel will be and the easier it will yield to any lateral strain, come from whatever source it may.

My invention is, of course, applicable to all sorts of pipe-presses whereon it can be affixed with advantage, whether the pipe be made of lead or tin, in whole or in part, or of any other metal which can be forced through a die, whether one or more rams or cylinders be used.

Having now described the nature and extent of my invention, I claim and desire to secure by Letters Patent—

1. The combination of the mandrel C with the ram A, said mandrel being rigidly connected to said ram in a deep cavity, as shown and described, so as to give said mandrel capacity to spring in said cavity and adjust itself in the center of the die.

2. Connecting the mandrel to the ram by the interposition of a flexible link, substantially as described.

3. In combination with the ram A, the cup B, for the purpose of facilitating the connection between the mandrel and the ram, substantially as described.

WM. ANTHONY SHAW.

Witnesses:

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