(No Model.)

G. W. HARRINGTON.

MANUFACTURE OF LEAD LINED IRON PIPE.

No. 456,927. Patented July 28, 1891.

Fig 1

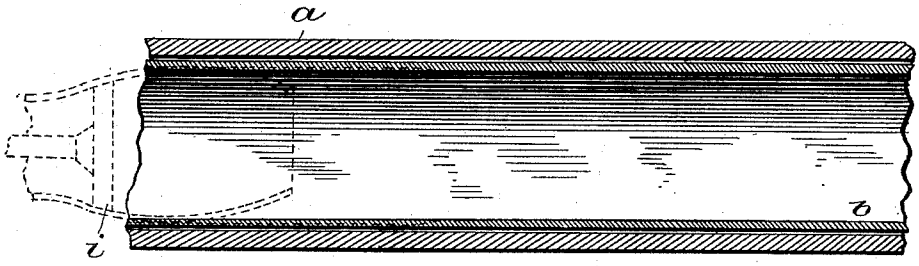


Fig 2

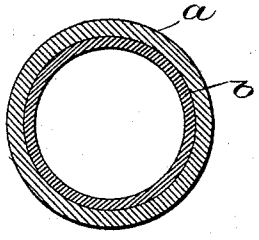


Fig 3

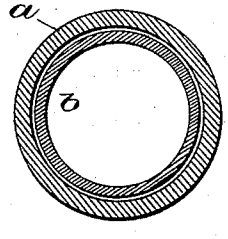


Fig 4

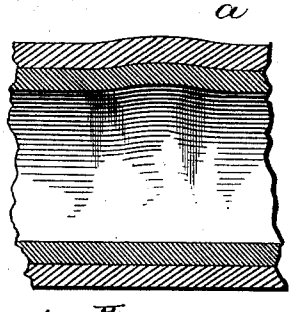
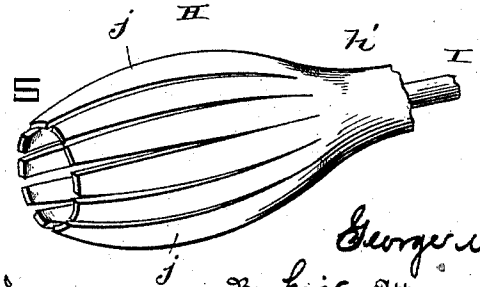


Fig 5



Witnesses

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UNITED STATES PATENT OFFICE.

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MANUFACTURE OF LEAD-LINED IRON PIPE.

SPECIFICATION forming part of Letters Patent No. 456,927, dated July 28, 1891.

Application filed March 23, 1891. Serial No. 386,102. (No model.)

To all whom it may concern:

Be it known that I, GEORGE W. HARRINGTON, a citizen of the United States, residing at Wakefield, in the county of Middlesex and State of Massachusetts, have invented Improvements in the Manufacture of Lead-Lined Iron Pipe; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to the manufacture of lead-lined iron pipes or conduits for conducting water and for other purposes, whereby I produce an iron pipe having a lining of cold-pressed and commercially-pure lead intimately associated with the internal face portion thereof and of a uniform density throughout.

In the accompanying drawings, forming part of this specification, Figure 1 is a longitudinal sectional view showing the position of the expanding-head with relation to the lead tube and pipe previous to the operation of expanding and densifying the lead, the dotted lines in said figure illustrating the comparative position of the several parts during the expanding operation of the head. Figs. 2 and 3 are cross-sectional views of lead-lined pipe designed to convey an idea of the dense and intimate cold-pressed lead lining, Fig. 2, over the comparative open fiber and loose fit of a cast-lead lining, Fig. 3. Fig. 4 is a longitudinal sectional view of a piece of my improved lead-lined pipe, the irregularities in the latter being exaggerated in order to show the uniform density and thickness of the cold-pressed lead lining; and Fig. 5 is a detail perspective view of the expanding-head.

At the outset it is important to bear in mind that a pipe of a sufficient density to possess the requisite strength and wearing capacity, readily produced in any desired length and presenting a non-corrosive internal surface for conveying water, is the desideratum. In most localities, where the water is free from any element that would chemically act disadvantageously on the lead, a pipe made of the latter-named metal fulfills all the important requisites stated; but its general employment is precluded on account of its expense.

Iron pipe used for water service has internally many fine irregularities due both to the operation of making the same and to many other causes. For instance, the iron pipe is turned out in comparatively long lengths, and during transportation several of these are combined in a bundle, at which time each pipe frequently becomes bent, kinked, or otherwise rendered irregular. By reason of the conditions set forth, and the facts hereinafter detailed, iron pipe has not, prior to my invention, been satisfactorily and cheaply lined, nor has it been possible to provide an iron pipe with a lining of cold-pressed and commercially-pure lead of uniform density and thickness and intimately associated with the internal face metal of the iron throughout. By my invention an article is produced that has all these qualities and presents all the advantages of a solid lead pipe at about one-half of the expense.

In carrying out my invention I take a length of iron pipe *a*, made in any suitable way, and apply to the interior thereof a lining *b* of lead, preferably drawn. Said lead, in the form of a tube, is inserted in the iron pipe and uniformly expanded therein, so as to closely fit the interior of the same and intimately associated with the internal face portion thereof.

It will be seen that by my improvements an iron pipe is provided with a lining of cold-pressed lead, which effectually protects the interior of the pipe against the action of the moisture, facilitates the formation of tight joints between lengths or sections, and imparting all the advantages incident to the use of a solid lead pipe at about one-half the expense of the latter. Owing to the pressed condition of the lead within the pipe, its structural character is such that it will be intimately associated with the internal face of the iron without regard to the usual variations and irregularities of the latter. Further, the pressed condition alluded to will also insure the lining a finished or burnished internal face, so that it can present no frictional resistance to the water, and at the same time avoid projections or protuberances that might become dislodged and flow off with the water.

By my improvements lead-lined pipe can be made in any required length and severed into any number of sections without chipping, splitting, or otherwise impairing the lining.

I am aware that heretofore it has been proposed to line iron pipe with tin and also with an alloy of lead and tin. Tin is too expensive and too hard. In so far as the alloy of tin and lead is concerned this also in practice would have its disadvantages, for the reason that in such an alloy the tin is obviously employed to render the compound metal harder than lead, and therefore the lining would be more brittle, liable to break and chip off, would not unite so intimately with the iron, and could not be cut or severed without more or less injury to the lining.

I am further aware that it has also been proposed to line iron pipe with cast-lead, the latter in a molten condition being introduced under pressure around a central core adjusted in the pipe. There are, however, several important defects connected with this arrangement. In the first place the difficulty of guarding against the premature cooling of the lead before it reaches its position within the pipe necessarily confines this operation to comparatively short lengths unless the iron pipe is heated, in which event the latter would be impaired. Further, its unequal cooling will not secure a uniform density of the lead, and will invite rather than prevent the presence of pin-holes and other weak features. Last, but not least, the lead does not form a lining within that definition as applied to my invention, but, on the contrary, is practically a concentric lead tube within the iron pipe, since it is well-known that lead in a fused or even heated condition is expanded to a considerable degree, and therefore the lead tube in the arrangement alluded to would shrink through contraction to a degree precluding any intimate association between the lead and the inner face portion of the iron pipe.

A satisfactory form of expanding-head is that represented in Figs. 1 and 5, wherein it is shown as consisting of a steel cylinder H, having each of its end portions h h' gradually tapered, as shown, the end h' being horizontally extended and perforated for the passage of a shaft I, provided at its end with a cone i, (dotted lines, Fig. 1,) which occupies a recess within the head H near the end h' thereof. As will be seen, the cylinder is split to provide a series of curved members j, the connection of each of which is at the end h' of the cylinder. The normal tendency of each of these members is to spring outward to a degree sufficient to press the lead in close contact with the inner face portion of the iron pipe and intimately associate it with the same, while at the same time rendering the lead more dense. At the beginning of the operation, as soon as the forward portion of the head enters the lead tube the free ends of the spring members are compressed to a degree that causes them to rigidly clamp the cone i, so that said spring-head and cone are practically connected and one operates the other. Now if the lead should meet with a resisting portion in the iron or a recess therein, the compression or expansion of the spring members would cause the cone i to move forward or backward within the head, as may be necessary, to permit the further expansion or contraction of the spring members and enable the cone and head to work together. This operation of the spring members causes the head to equally press the cold lead lining and make it uniformly dense at all points.

A pipe provided with the cold-pressed lead lining such as I have herein described may be readily distinguished in the trade by those familiar with this line, from the fact that cold-pressed lead is in appearance more hard and solid than lead sought to be introduced while in a molten condition. Another distinguishing feature of said pipe is that the cold-pressed lead lining can be readily seen at the end of the pipe to be so associated with the internal iron face that the different metals appear to be blended or united.

I claim—

The process of making lead-lined iron pipe, the same consisting in introducing a tube of cold lead within said pipe and expanding the lead with a yielding pressure to force it into intimate contact with and associate it with the internal metal of the iron pipe, to render the lead lining uniformly dense throughout without regard to irregularities or deviations in said internal iron surface, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE W. HARRINGTON.

Witnesses:

WILLIAM PAXTON,

WM. P. YOUNG.