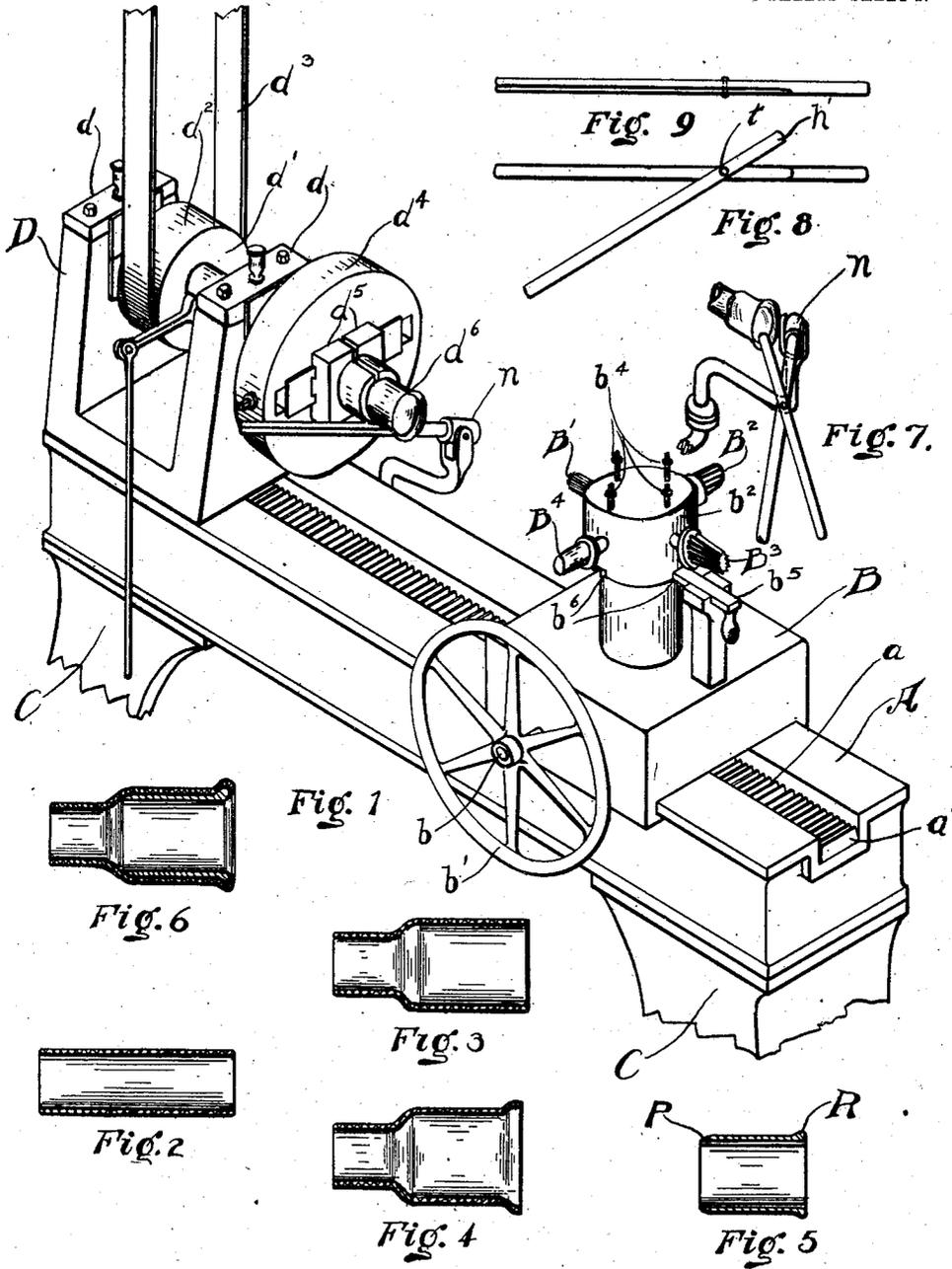


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 PROCESS FOR MAKING PLUMBERS' FERRULES.  
 APPLICATION FILED SEPT. 22, 1909.

973,802.

Patented Oct. 25, 1910.

3 SHEETS—SHEET 1.



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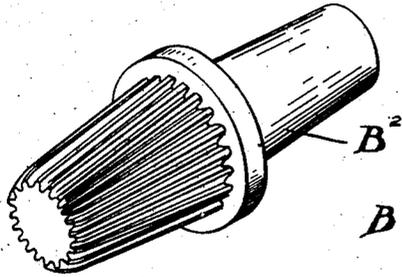


Fig. 10

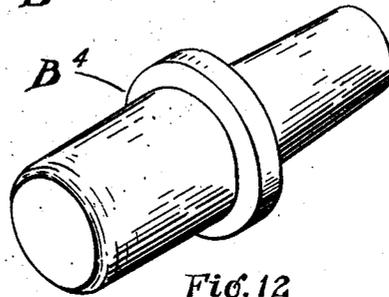


Fig. 12

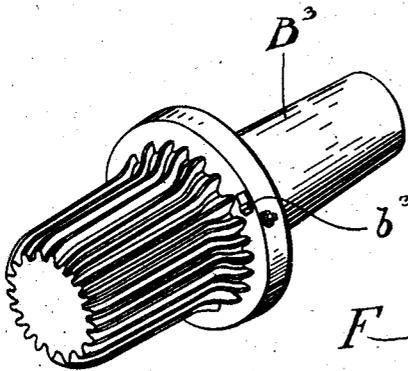


Fig. 11

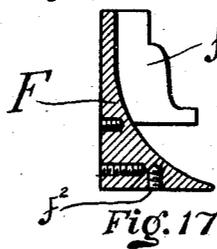


Fig. 17

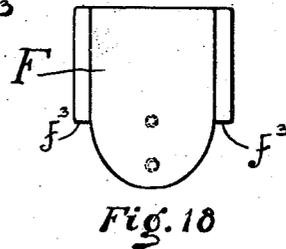


Fig. 18

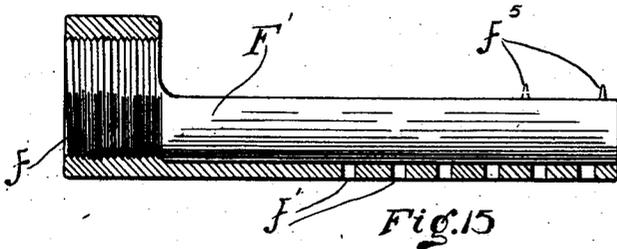
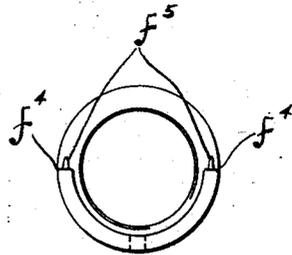


Fig. 15



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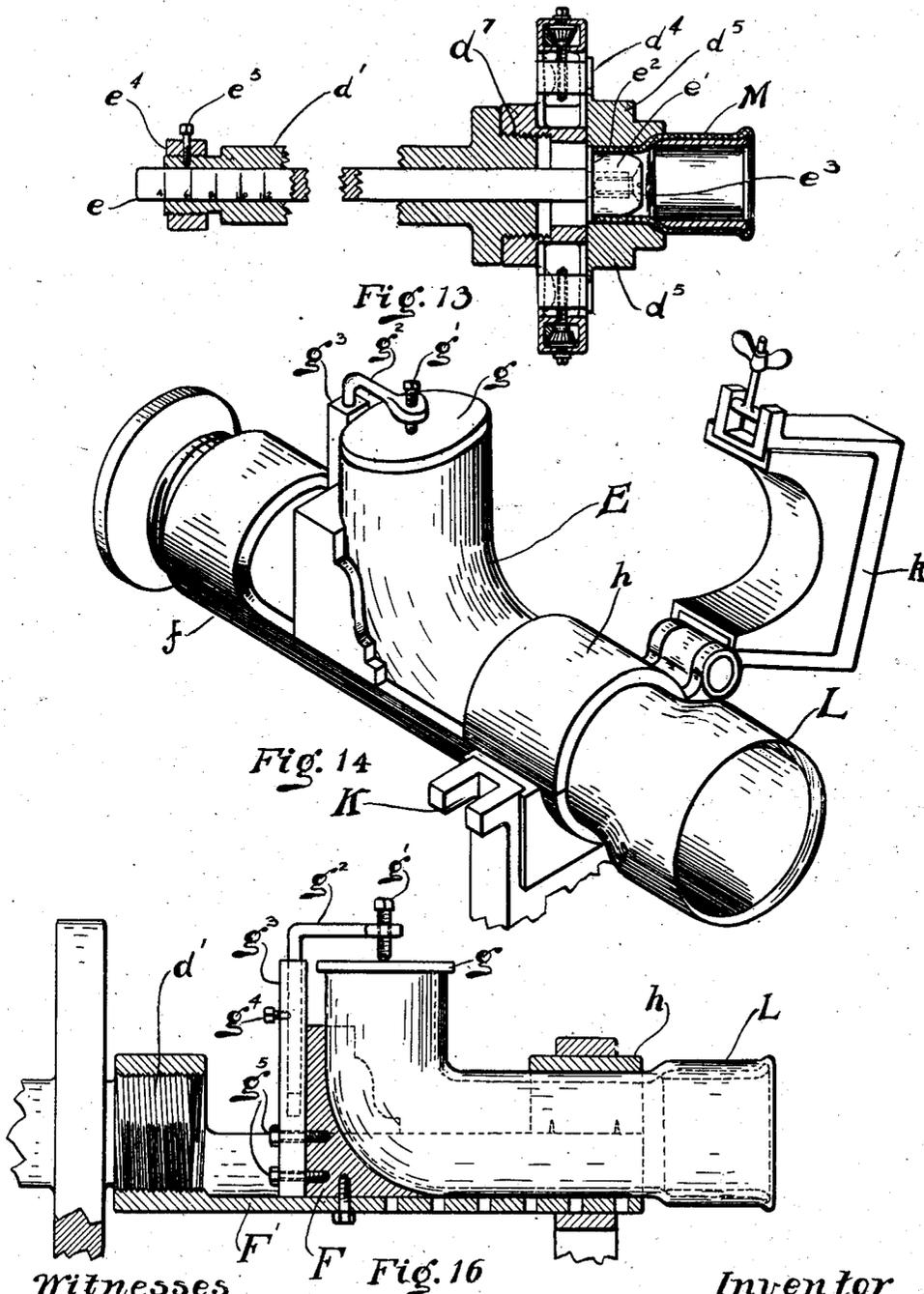
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3 SHEETS—SHEET 3.



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# UNITED STATES PATENT OFFICE.

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## PROCESS FOR MAKING PLUMBERS' FERRULES.

973,802.

Specification of Letters Patent. Patented Oct. 25, 1910.

Application filed September 22, 1909. Serial No. 519,111.

*To all whom it may concern:*

Be it known that I, ROBERT A. MERRILL, a citizen of the United States of America, and resident of Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Processes for Making Plumbers' Ferrules, of which the following is a specification.

The object of my invention is a process of forming plumbers' ferrules, which may be performed rapidly and without injury to the lead.

In carrying out my process, I use a section of lead pipe and an iron ferrule to form the plumber's ferrule.

In the accompanying drawings, I have illustrated the steps of my process, and a machine as a means by which the process may be carried out.

Figure 1 is a perspective view of the entire machine by means of which the process embodying my invention may be performed. Figs. 2, 3 and 4 are sectional views through the lead pipe as it is put through the different operations. Fig. 5 is a sectional view of the iron ferrule. Fig. 6 is a sectional view of the completed ferrule. Fig. 7 is a perspective view of the tools for spinning the lead over and around the end of the iron ferrule. Fig. 8 is a detail view of the tool used in spinning the lead around the iron ferrule. Fig. 9 is a view of the same tool in a closed position. Fig. 10 is a perspective view of the tool used in the first operation. Fig. 11 is a perspective view of the tool used in the third operation. Fig. 12 is the tool upon which the iron is placed when it is inserted in the expanded lead casing. Fig. 13 is a longitudinal sectional view of the spindle the chuck and the finished ferrule secured in the jaws of the chuck, the graduated rod located in the spindle being shown in elevation. Fig. 14 is a perspective view of a modification used in making elbow ferrules on the same machine. Fig. 15 is a sectional view of the mandrel shown in Fig. 14. Fig. 16 is a view in section of the mandrel and in elevation of the ferrule. Fig. 17 is a detail sectional view of the piece which forms the back or support to the lead elbow. Fig. 18 is a front elevation of the same.

Referring to the parts: in Fig. 1 the bed (A) is similar in design to that of the ordinary lathe and is supported by legs (C C). In the center of the bed (A) is a channel in

which is fastened a toothed rack (a). The purpose of this rack is to aid in the movement of the tail stock (B). This movement is performed by a pinion revolving under the body of the tail stock and meshing with the teeth of the rack (a). This pinion is fixed upon the shaft (b) which is suitably journaled in the tail stock (B). At the end of the shaft (b) is a hand wheel b' which hand wheel is used to cause the tail stock (B) to move back and forth along the length of the bed (A). Upon the body of the tail stock (B) is mounted the revolving cylindrical tool holder (b<sup>2</sup>) which contains tapered holes into which suitable tools (B', B<sup>2</sup>, B<sup>3</sup>, B<sup>4</sup>) are driven and secured by set screws (b<sup>4</sup>). The revolving cylinder (b<sup>2</sup>) is kept from revolving, when in the proper position, by the key (b<sup>5</sup>) being forced into the slots (b<sup>6</sup>).

At the extreme left hand end of the lathe is placed the head stock (D) which is similar to the head stock of an ordinary lathe. This head stock contains bearings d in which is journaled the hollow spindle d'. Upon this spindle is fastened the pulley d<sup>2</sup> which is driven from the belt d<sup>3</sup>. Upon the inner threaded end d' (Fig. 13) of the hollow spindle is screwed the chuck d<sup>4</sup> which contains movable jaws d<sup>5</sup>. These jaws clasp the section of lead pipe M and hold the same rigidly while the several operations are being performed thereon. The spindle d' has a square hole through its length and in this square hole is placed in sliding fit, the graduated square rod e. (See Fig. 13.) One end of this rod is turned down and a center stop e' with a collar e<sup>2</sup> turned thereon is fastened to the rod with a screw e<sup>3</sup>. This rod is adjustable and is fastened by a lock nut e<sup>4</sup> and set screw e<sup>5</sup>. This adjustment is used to regulate the machine for different lengths of sections of lead pipe for different sizes of ferrules.

I will now describe the tools used in the different operations.

(Fig. 10), is a perspective view of the tool used in the first operation. This tool is grooved and has all sharp edges removed from it. It is slightly tapered as shown, in order to enter the lead pipe easily. The tool used in the second operation is similar. It is larger and is nearly straight. The tool (Fig. 11) used in the third operation is still larger and is enlarged near the base. It is

also provided with a cutter  $b^3$  which trims the edge of the lead pipe. (Fig. 12) shows the tool used in placing the iron ferrule in position in the lead casing. It is not provided with teeth or cutters and is straight. All of these tools are provided with shanks, which enter the holes in the revolving tool holder  $b^2$  (Fig. 1) and are then fastened by set screws  $b^4$ .

The various operations necessary in the making of these plumbers' ferrules are as follows: First the required length of pipe is cut off and placed in the chuck  $d^1$  (Fig. 13) and fastened. Then the tool Fig. 10 is brought up to the pipe by means of the movable tail stock and is then forced into the pipe. This brings the ferrule to a shape similar to Fig. 3. The enlarged end of the pipe is slightly tapered in this operation. The next operation is to force tool  $B^2$  into the enlarged end of the pipe thus bringing it straight as in Fig. 3. The third operation is to force a tool  $B^3$  into the pipe as now shaped. This tool enlarges the end as shown in Fig. 4, and also causes the same end to be trimmed evenly by the cutter  $b^3$  fastened in the tool  $B^3$ . See (Fig. 11). Now upon tool  $B^4$  is slipped an iron ferrule or sleeve (Fig. 5) which is beveled at one end (P) and enlarged at the other end as shown at R. This tool (Fig. 12) with the iron ferrule upon it is now forced into the lead pipe (Fig. 4) and the tool is withdrawn leaving the iron ferrule in position in the lead pipe. Next, a tool (Figs. 8—9) consisting of two pieces of wood hinged together at  $t$  and rounded on the edges, is brought into position by placing it in a universal socket  $n$  (Fig. 7) and then shaping the lead around the iron ferrule as shown in (Fig. 6). This is done in the manner illustrated in (Figs. 1 and 7). The portion  $h'$  of the tool (Fig. 8) is used for spinning the lead around the iron ferrule as shown in (Fig. 7). Should a larger lead ferrule be desired, the stop  $e'$  (Fig. 13) can be removed and a larger one substituted.

In Figs. 14 and 16 is illustrated a modification used in making elbow or angle ferrules. It consists of a segment of pipe F' which is threaded at one end  $f$  and screwed onto the threaded portion of the spindle. This body Fig. 14 is semicircular from the threaded portion  $f$  to its other end. Along

the bottom are drilled several holes  $f'$  to receive a screw which is to enter a hole  $f^2$  tapped in a stop F. This piece is curved to correspond to the radius of the lead elbow and thus forms a solid receptacle for the same. The wings  $f^3$  rest on the side  $f^4$  of the segment. The elbow is held down 1st, by a plate  $g$  (Fig. 16) which is placed on the pipe and held in position by a set screw  $g'$  which works in a tapped hole in the adjustable piece  $g^2$ . This piece is adjustable in the standard  $g^3$  and is secured by the set screw  $g^4$ . The standard  $g^3$  is fastened by screws  $g^5$  to the curved piece F. The ferrule end of the elbow is held in place by a split ring  $h$  which is pinned to the segment. A steady rest consisting of a bracket K to rest upon the lathe bed, supports the ring  $h$  which is held in place by cap  $k$  which is pivoted to the bracket K. The operation for expanding the straight end of the pipe and inserting therein the iron band are similar to those hereinbefore described.

What I claim is:

1. A process of forming a plumber's ferrule from a section of lead pipe and an iron ferrule and consisting of inserting a tool within one end of the pipe, revolving the pipe and tool in relation to each other to expand said end of the pipe, and inserting an iron ferrule into the expanded end of the pipe and securing it therein.

2. A process of forming a plumber's ferrule from a section of lead pipe and an iron ferrule and consisting of inserting graded tools within one end of the pipe and revolving the pipe and the tools relatively to each other gradually to expand said end, inserting the iron ferrule into the expanded end and securing it therein.

3. A process of forming a plumber's ferrule from a section of lead pipe and an iron ferrule and consisting of clamping one end of the pipe so as to prevent the expansion of that end, expanding the opposite end of the pipe by inserting tools therein, and rotating the pipe and tools relatively to each other and inserting the iron ferrule into the expanded end.

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