

(No Model.)

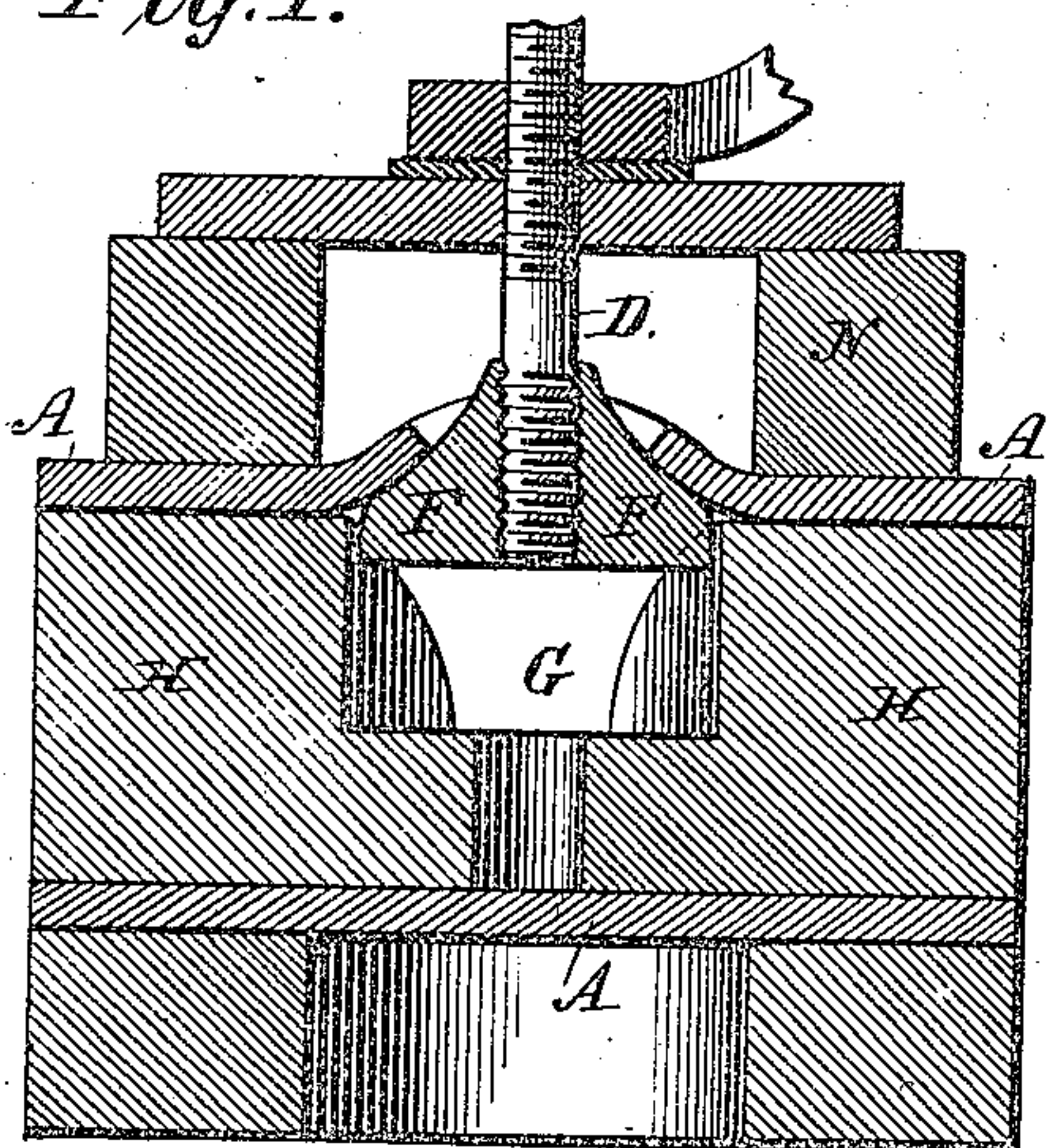
F. E. YOUNGS.

MANUFACTURE OF PIPE FITTINGS.

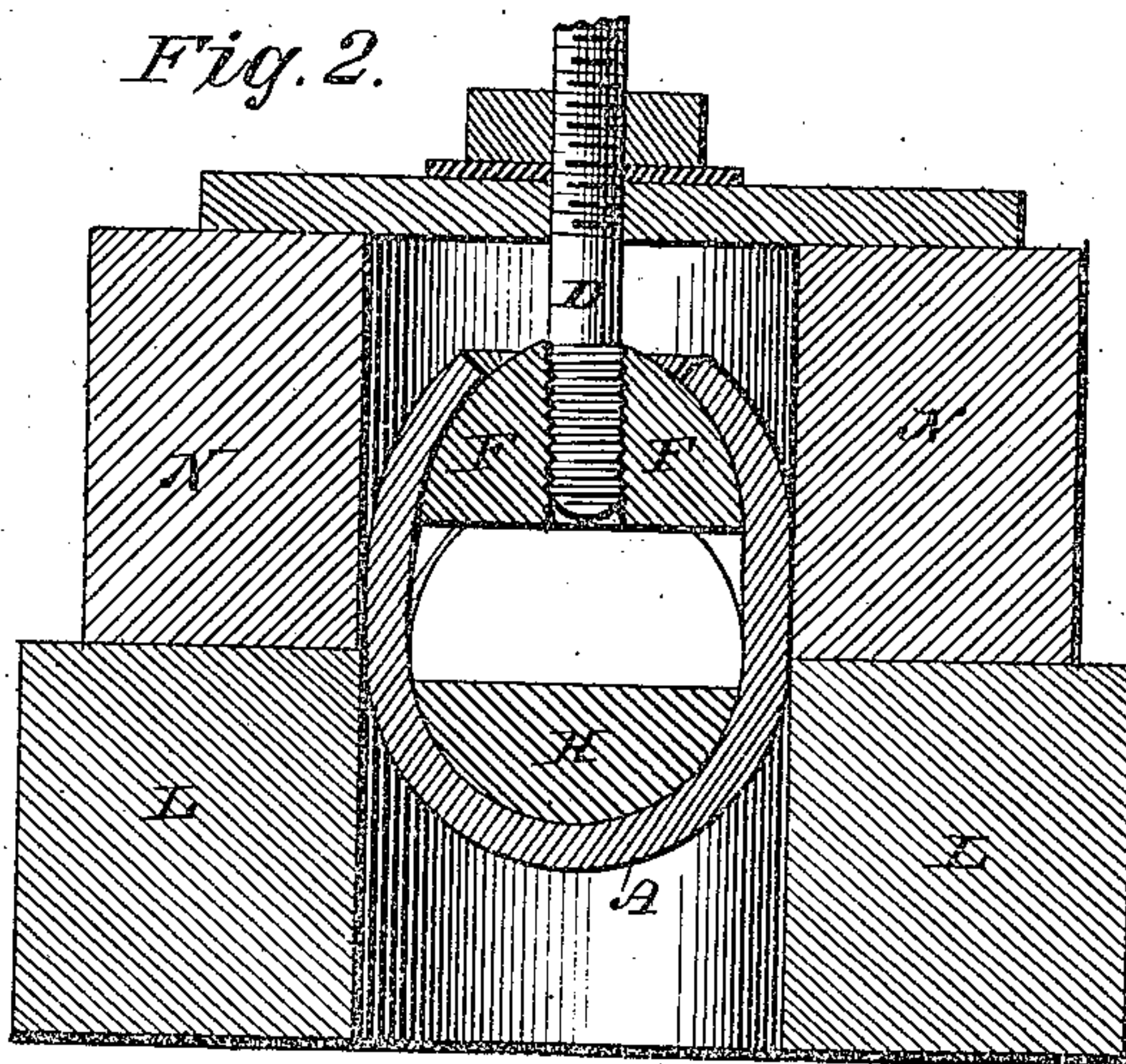
No. 354,879.

Patented Dec. 21, 1886.

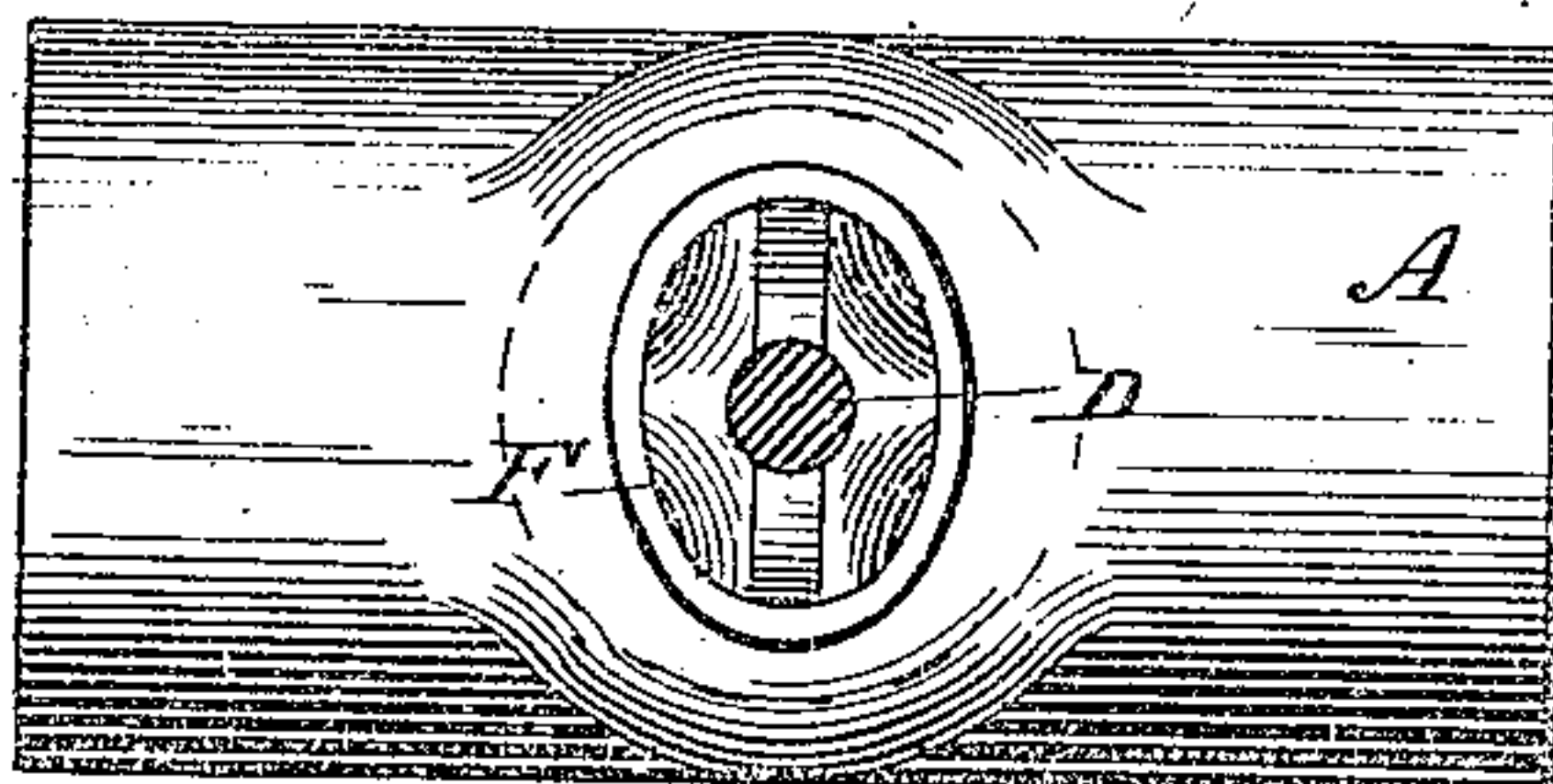
*Fig. 1.*



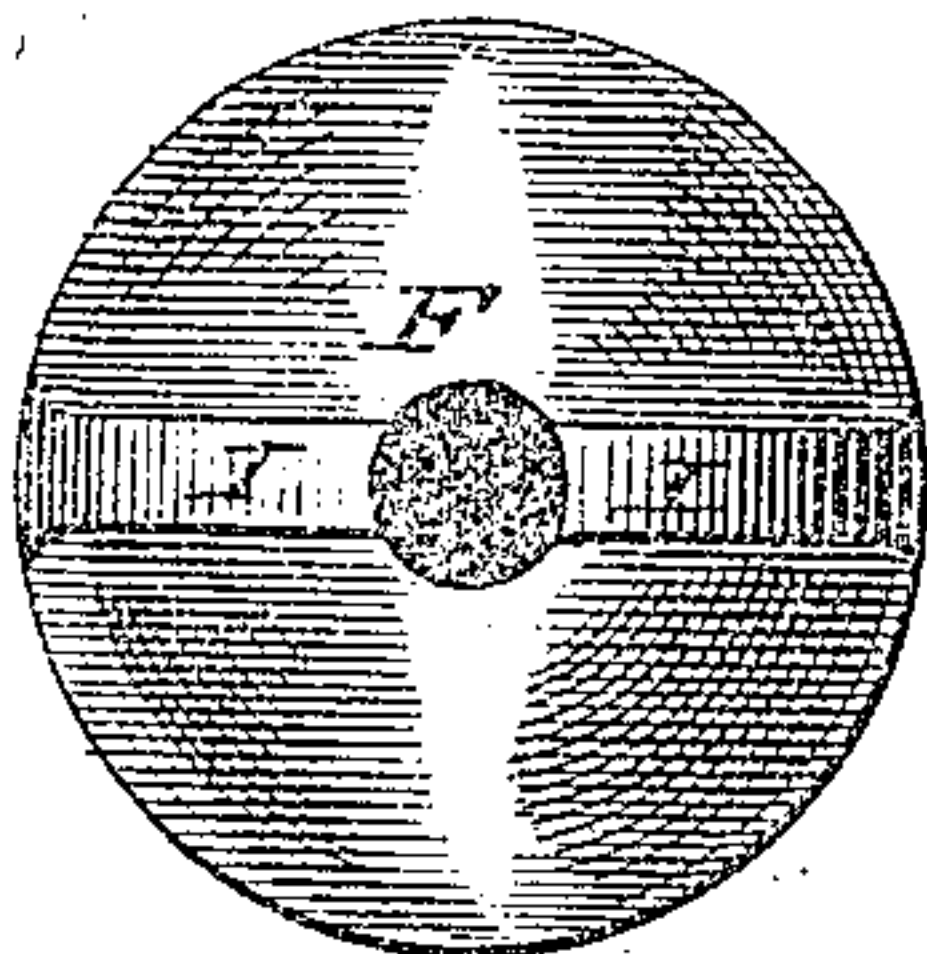
*Fig. 2.*



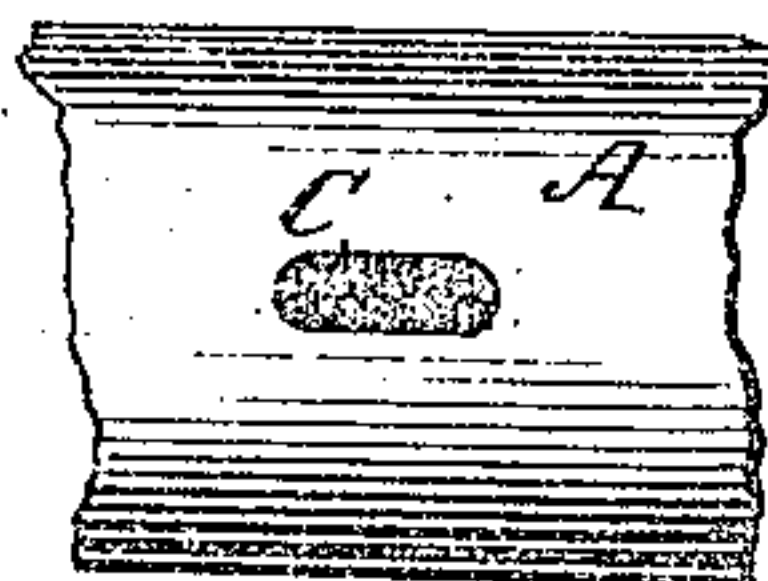
*Fig. 3.*



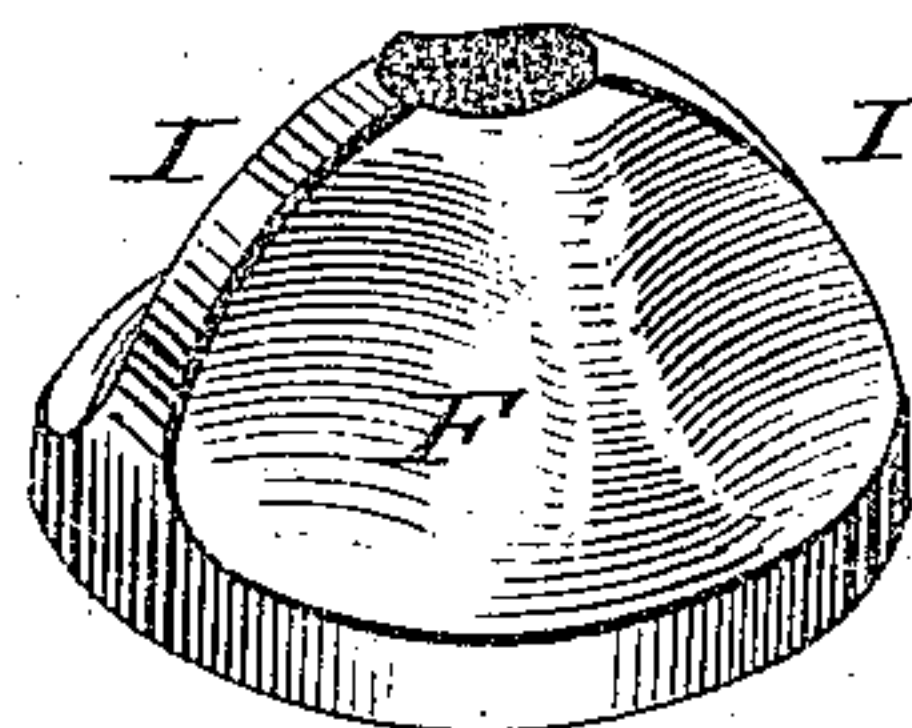
*Fig. 4.*



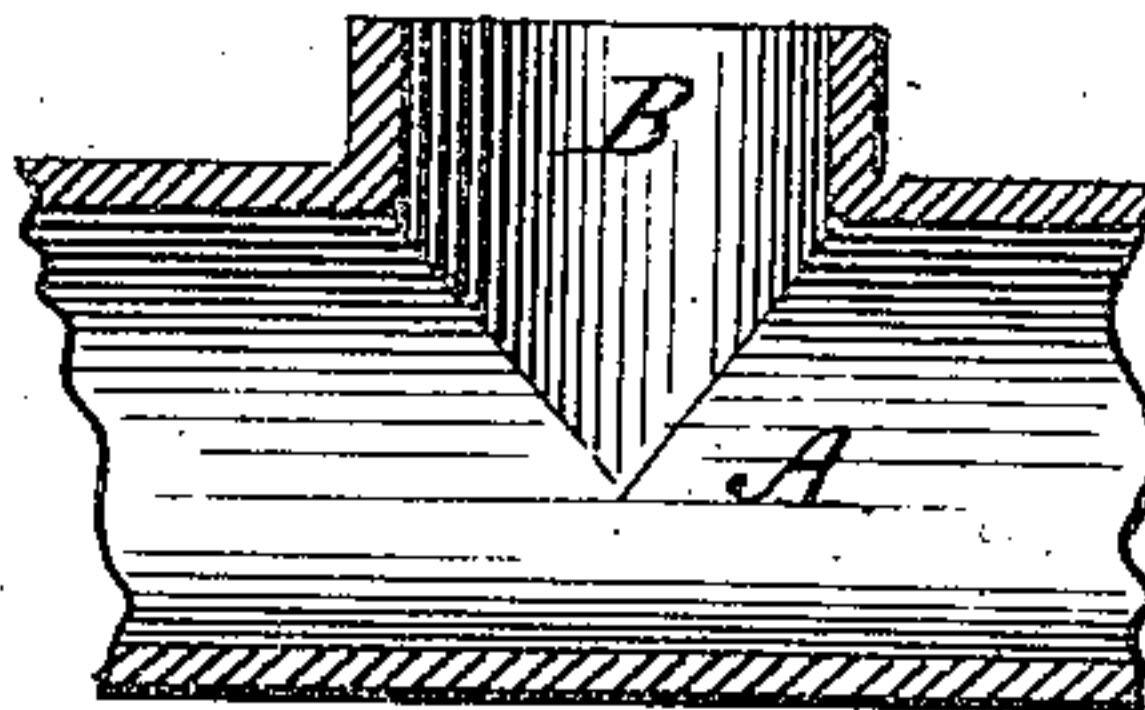
*Fig. 6.*



*Fig. 5.*



*Fig. 7.*



WITNESSES

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# UNITED STATES PATENT OFFICE.

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## MANUFACTURE OF PIPE-FITTINGS.

SPECIFICATION forming part of Letters Patent No. 354,879, dated December 21, 1886.

Application filed April 10, 1886. Serial No. 198,429. (No model.)

*To all whom it may concern:*

Be it known that I, FRED E. YOUNGS, of Allegheny, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in the Manufacture of Pipe-Fittings; and I do hereby 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 pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to an improvement in the manufacture of pipe-fittings; and it consists, first, in an apparatus for forming openings or T's in pipes, a cone provided with a ridge and flattened sides, in combination with the rod connected thereto, and a means for drawing the cone through the side of the pipe; second, in the combination of a mandrel, which is placed in the pipe and provided with a recess to receive the cone, with the cone and the rod connected thereto; third, in the process of heating the pipe around the hole made therein and then chilling portions previous to drawing the cone through the opening, all of which will be more fully described hereinafter.

The object of my invention is to provide an apparatus for making side openings, T's, crosses, &c., in metal pipes, and in which the pressure of the cone is first brought to bear at right angles to the length of the pipe in contradistinction to bringing the pressure to bear at all points alike, as is done where a round cone is used in making openings through flat surfaces.

Figures 1 and 2 are vertical sections of an apparatus embodying my invention, taken at right angles to each other, and showing the pipe as it appears while the cone is being drawn up through its side. Fig. 3 is a plan view of the pipe being operated upon by the cone, and showing the shape the opening assumes before the sides of the cone are brought into operation. Figs. 4 and 5 are detail views of the cone by itself. Fig. 6 shows approximately the shape of the opening which is made through the side of the pipe in the first instance. Fig. 7 shows a section of a pipe having a side opening or T after it is finished.

A represents a metal pipe of suitable length and diameter, and through the side or sides

of which any suitable number of openings or T's B are to be made. At those points where the T's or openings B are to be made are elliptical openings C, as shown in Fig. 6, and through which the rod D is to be passed in order to make the connection with the cone F. This cone F is placed in a recess, G, which is formed in the side of a suitable mandrel, H, which is placed inside of the pipe for the purpose of supporting the metal of the pipe while it is being acted upon by the cone F for the purpose of forming a T. This mandrel must fit snugly the bore of the pipe, so when the strain of the cone is brought to bear upon the metal it cannot buckle, bend, or get out of shape in any manner, as it is liable to do if no mandrel were used. The mandrel carrying the cone F is inserted into the pipe until the opening in the cone comes just opposite the opening C in the pipe, when the rod D is inserted through the pipe into the cone and is connected thereto in any suitable manner. As this cone is intended to be used only in a certain relation to the pipe, the cone is held in the mandrel H so that it cannot turn around in the opening and thus get out of position.

Where circular openings are to be made through flat surfaces, as in boiler-heads, a circular cone is necessary, and a round hole is made through the flat surface, so that the cone will act equally upon all parts of the metal at once. If a round cone is used in connection with a pipe for the purpose of forming a T, the sides of the cone come in contact with the sides of the opening in the pipe and chill that portion of the metal which is in a line at right angles to the pipe to such an extent that it will stretch much less than those portions of the metal which are at the ends of the opening C and in a line with the length of the pipe, and where the strain upon the metal is naturally the greatest. The consequence is that those portions of the metal which are at the ends of the opening C, being much hotter than those portions at the sides of the opening, and being naturally subjected to a greater strain, become drawn out so thin as to be either practically worthless or liable to crack or break.

The reason why the metal at the ends of the opening C is stretched to a greater extent than that on the sides is because the metal on the



sides of the opening has only to be straightened out from the curve of the pipe to a vertical line tangent to the sides of the pipe, in all about forty-five degrees. The metal at the ends of the opening C must be turned up from a horizontal to a vertical position, in all about ninety degrees, or double the bend or angle that the metal on the sides of the opening is moved, and thus causing the stretch to come upon that portion of the metal which is turned at the ends of the opening. In order to prevent this unequal stretch of the metal, and to form the T perfectly at all points, the cone F has a ridge or bearing-surface, I, extending across its top from side to side, and then the sides of the cone on each side of this ridge are flattened or cut away, as shown in Figs. 1, 4, and 5, so that the metal at the ends of the opening C will not be brought in contact with the cut-away sides of the cone until the cone has been forced partially outward through the side of the pipe. When the first strain is brought to bear upon the side of the pipe, the ridge I is standing at right angles both to the length of the pipe and to the length of the opening C, as shown in Fig. 3. As the cone continues to be forced through the metal the shape of the opening C changes from an ellipse parallel with the length of the pipe to an ellipse at right angles to the length of the pipe, as shown in Fig. 3. The ridge I upon the cone serves to divide the stretch of the metal equally between its two bearing-surfaces, instead of bringing the whole stretch of the metal at the two ends of the ellipse in a line with the length of the pipe. As the cone continues to be drawn on through the side of the pipe the sides of the cone are brought in contact with the sides of the opening, and the metal is then forced equally outward at all points alike. The ridges I do not subside into the cone until the circular lower portion is reached, and hence the ridges continue to stretch the metal to a slightly greater degree at each of its ends until the round portion of the cone at its sides comes in contact with the metal, and then a perfectly round opening is produced.

At each side of the ridge I the cone is slightly hollowed out, as shown in Figs. 4 and 5, so that the stretch of the metal at those points where it would otherwise be thickest is effected, and thus the sides of the T are made of nearly uniform thickness.

In all cases the metal around the opening C is heated in any suitable manner and to any desired extent, so as to make the operation of forcing the cone through the metal as easy as possible. In those cases where the ridges I upon the cone F do not completely effect the desired result the metal around the opening C is either unequally heated, or else is equally heated, and then those portions of the metal

at the ends of the opening C previous to the operation are chilled to any desired extent, so as to make the metal tougher at these two points than upon the sides, and thus prevent such an amount of stretching at the ends as will cause the turned-up parts to be too thin for practical use.

The chilling of the metal may be effected by placing any cold piece of metal or dropping a few drops of water on those parts which are to be chilled.

The pipe while being acted upon rests in a suitable block or frame, L, and is held down in position by means of a second block or frame, N, which is made concaved so as to correspond to the shape of the pipe. The rod D, which is connected in any suitable manner to the cone F, is to be operated by any suitable mechanism which will answer for the purpose. A screw-thread is here shown; but the outer end of the rod will be connected in any well-known manner with hydraulic pressure, or other suitable power. This rod passes down through the opening in the upper frame, N, and through the side of the pipe into the cone, as shown in Figs. 1 and 2.

If desired, the above-described process may be applied to forming a T on a curved plate, and then this curved flanged plate may be applied directly to a pipe or main and fastened thereto in any suitable manner. A hole of suitable size must then be bored through the main so as to correspond to the opening in the curved plate. If the T were made upon a flat plate and then this flat plate bent, it could not be made to fit the pipe so as to form a tight joint.

Having thus described my invention, I claim—

1. In an apparatus for forming openings or T's in pipes, a cone provided with a ridge and flattened sides, in combination with the rod connected thereto, and a means for drawing the cone through the side of the pipe, substantially as described.

2. The combination of a mandrel, which is placed in the pipe and provided with a recess to receive the cone, a cone, and the rod by means of which the cone is drawn through the side of the pipe, substantially as specified.

3. The process herein described of heating the metal of the pipe around the opening which is made therein and then chilling portions previous to the operation of drawing the cone through the side of the pipe at the heated portion, substantially as set forth.

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

FRED E. YOUNGS.

Witnesses:

F. A. LEHMANN,  
A. W. BRECHT.