

No. 638,261.

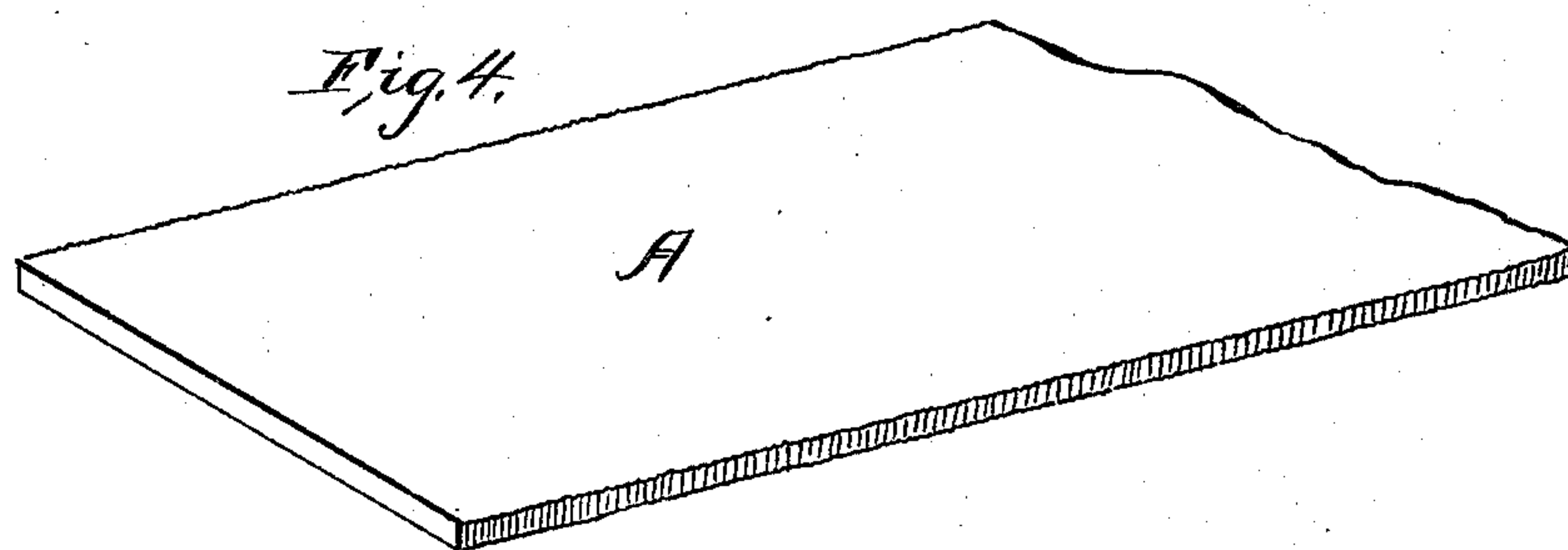
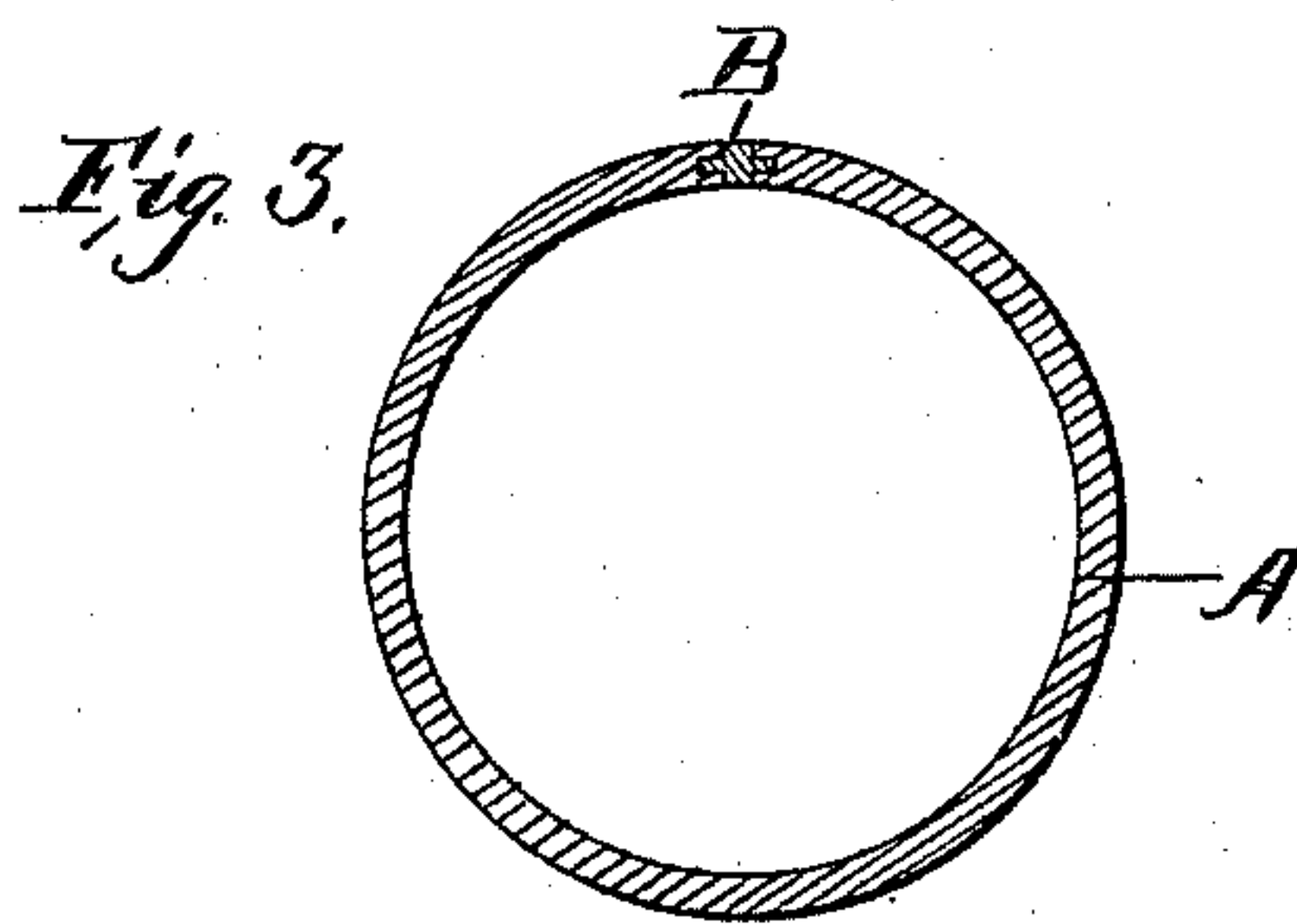
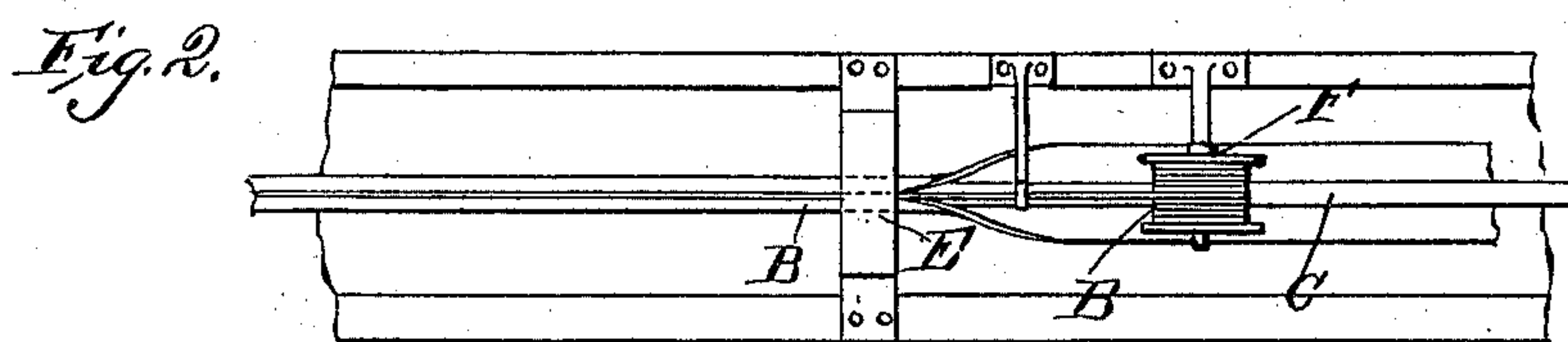
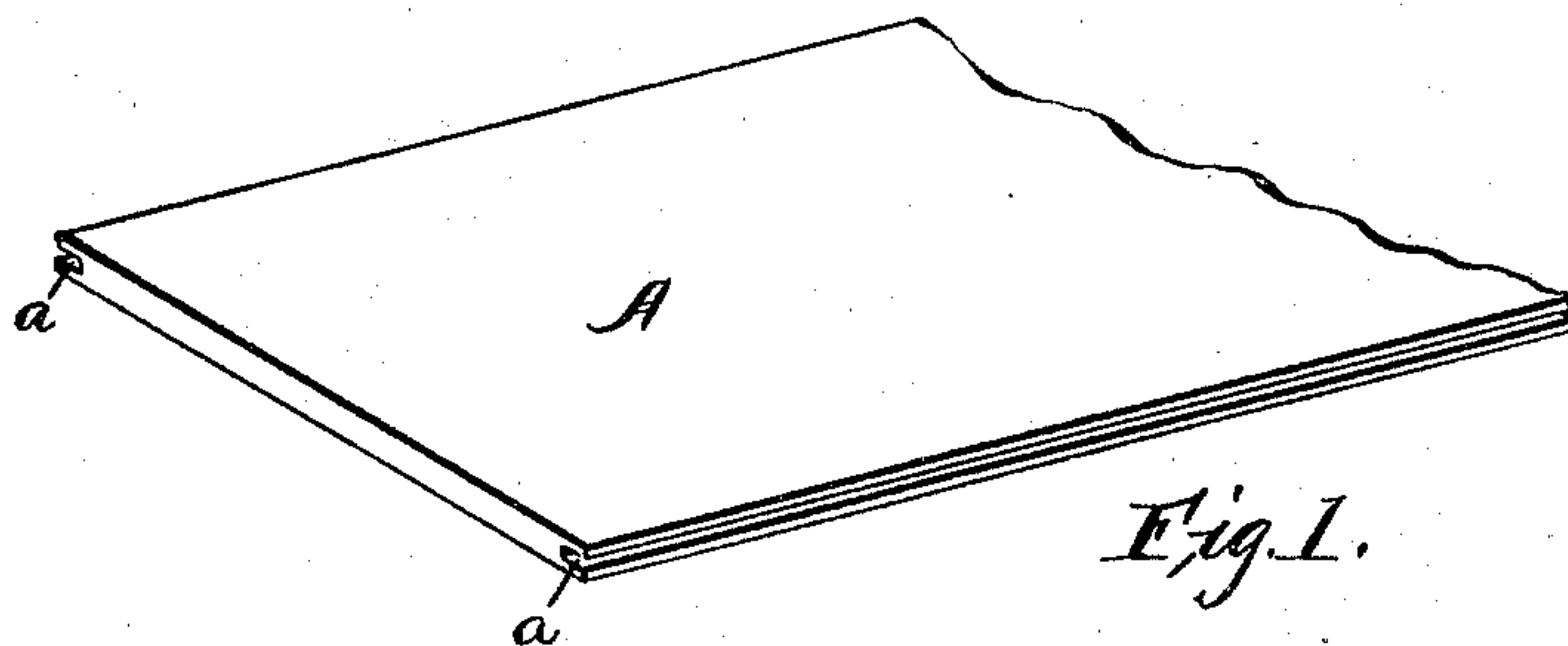
Patented Dec. 5, 1899.

W. A. McCool.
CONDUIT TUBING.

(Application filed Sept. 12, 1896.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses
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Arthur L. Bugard

Inventor
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By H. H. Bliss
Att.

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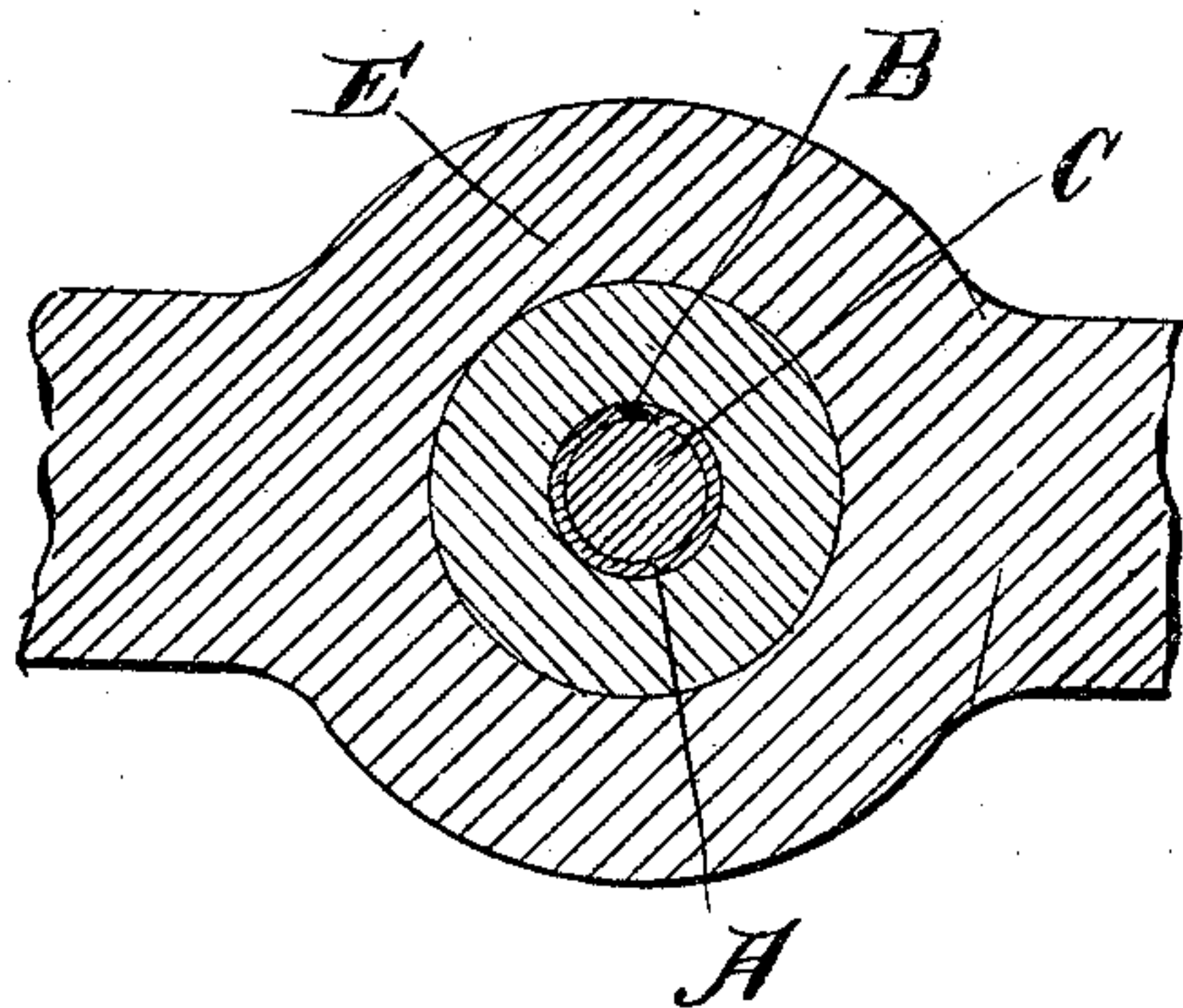
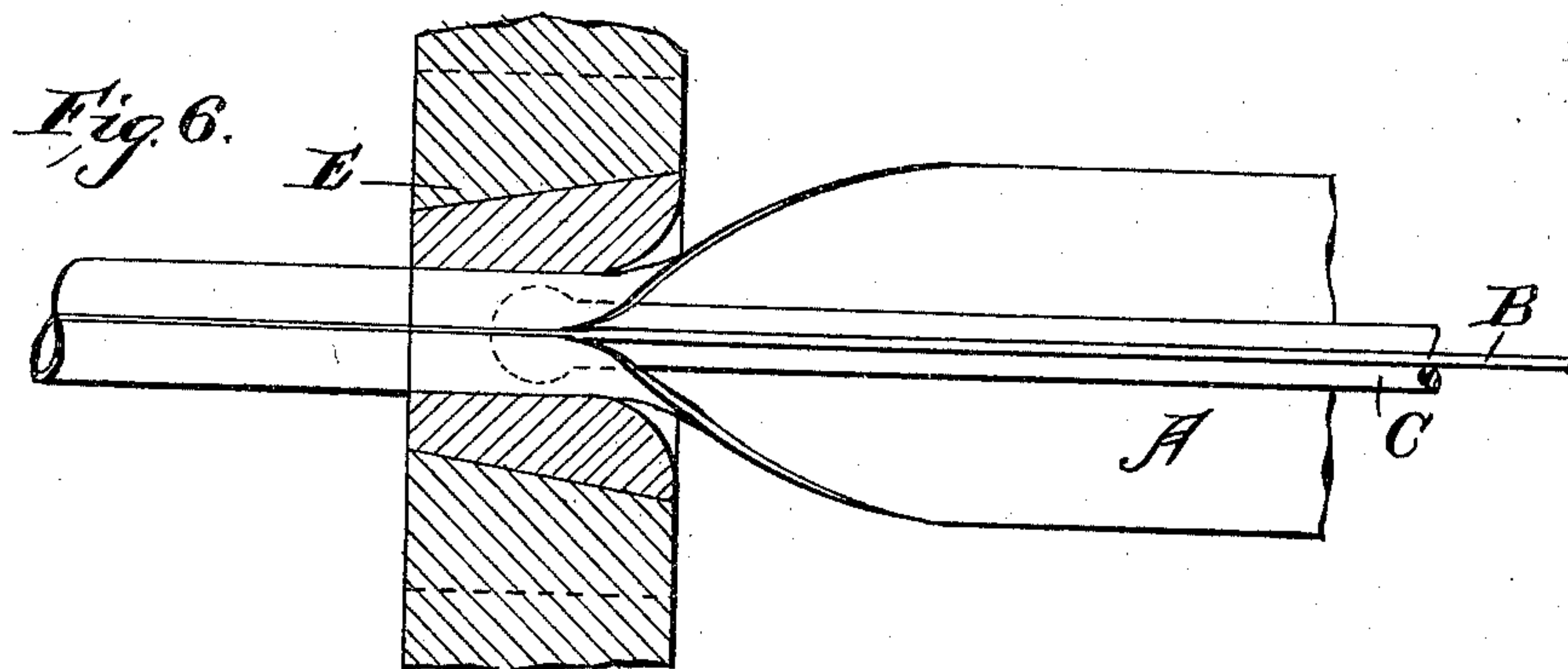
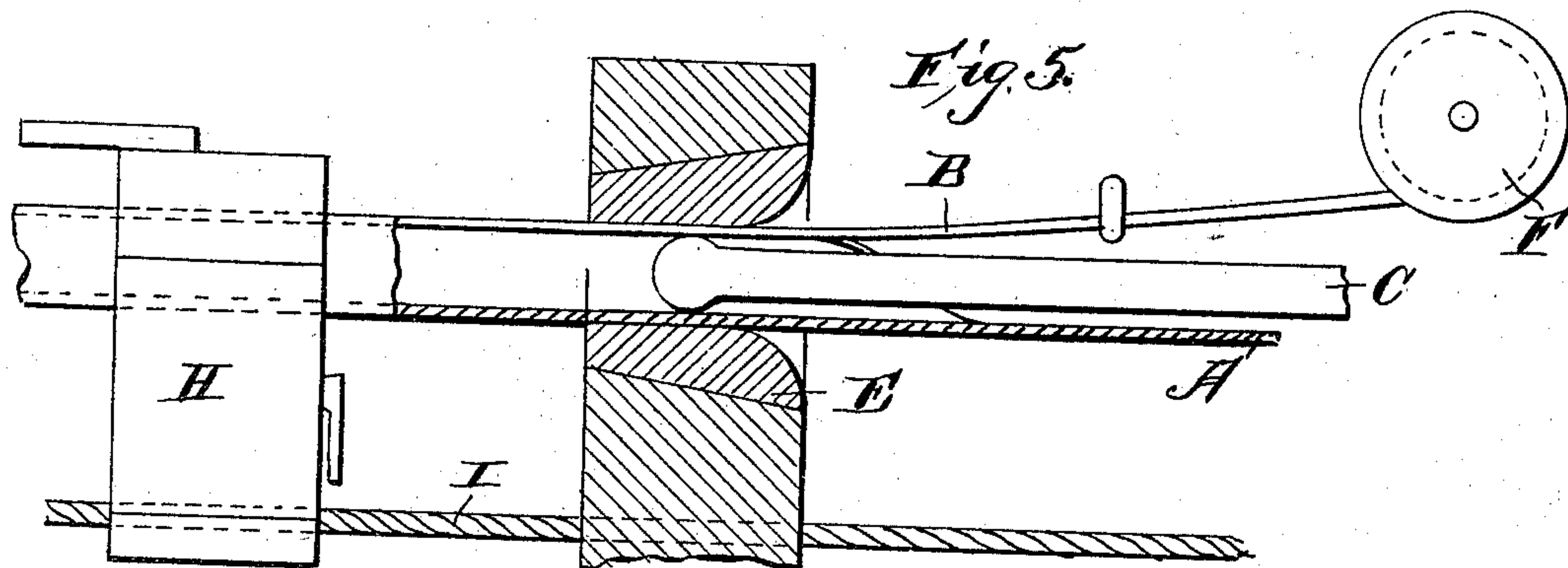
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CONDUIT TUBING.

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(No Model.)

2 Sheets—Sheet 2.



Witnesses
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UNITED STATES PATENT OFFICE.

WILLIAM A. MCCOOL, OF BEAVER FALLS, PENNSYLVANIA.

CONDUIT-TUBING.

SPECIFICATION forming part of Letters Patent No. 638,261, dated December 5, 1899.

Application filed September 12, 1896. Serial No. 605,655. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM A. MCCOOL, a citizen of the United States, residing at Beaver Falls, in the county of Beaver and State of Pennsylvania, have invented certain new and useful Improvements in Metallic Tubing; 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.

My present invention relates to improvements in the manufacture of light metal tubing, particularly of that class adapted to serve as conduits for electric wires and similar purposes; and the object of my improvements is to provide an improved joint or mode of connecting the edges of the blank or skelp from which the tube is formed. Tubes for such purposes are required to be extremely light and strong and also have a smooth surface which shall be capable of a high finish, as by plating or other means. Owing to the lightness of the metal employed, it has been found impracticable to unite the edges of the blanks by welding, as is done with heavier tubes; but, as above stated, it is desirable to have a close joint between such edges and to form the same in such manner as not to destroy the smooth inner or outer surfaces of the finished article.

I have illustrated in the accompanying drawings my improvements, in which—

Figure 1 is a perspective view of a blank of the character employed for the manufacture of conduit-tubing. Fig. 2 is a view of a portion of an apparatus adapted to form such a blank into a tube. Fig. 3 is a cross-sectional view through a finished tube. Fig. 4 is a detail view of a blank of slightly-different construction or form from that illustrated in Fig. 1. Figs. 5, 6, and 7 are details, on a larger scale, illustrating the method of manufacture.

To form a tube in accordance with my invention, I take a flat band-like blank of iron, steel, or other metal of the desired thickness and of the proper width to form a tube of the desired diameter. Such a blank is indicated by A in the drawings. As shown, the edges

of the blank A which abut in the finished tube are preferably provided with a longitudinal groove *a*, and in order to lock such meeting edges firmly together I provide means for forcing into such grooves *a* a wire-like strand or strip B of tougher metal than that of which the blank A is formed. I have found that a copper wire is well adapted for this purpose, and at present prefer to use such a locking means, although I am aware that other material may be satisfactorily employed for this purpose. The blank is formed into a tube by being drawn over a mandrel and through a cylindrical die of any desired or preferred construction in the manner common in the manufacture of such tubing.

In Figs. 2, 5, and 6 I have illustrated conventionally an apparatus for forming the blank into a tube and simultaneously inserting the locking-wire B in place. In such figures, C designates the mandrel, and E the cylindrical die between which and the mandrel the blank A is passed in the ordinary manner, H and I indicating conventionally a detachable draft device. F designates a reel or rotary support mounted upon the framework of the apparatus at one side of the die E, and on said reel is wound the joining-wire B. As the end of the blank passes between the mandrel and the die the free end of the wire B is inserted in the grooves *a* and drawn, with the blank, through the die C. The pressure exerted on the blank forces the edges against the tougher locking-wire with such force as to cause a compression of said wire, with the result that the groove *a* and any inequalities in the surfaces of such edges will be filled and the parts locked firmly and securely together. The mandrel and cylindrical die also act to prevent the formation of any ridge or rib along the line of the joint. Therefore at a single operation I am enabled to provide a tube with perfectly smooth interior and exterior surfaces.

While I have above described and illustrated the abutting edges of the blank A as being grooved, I am aware that such a step or construction is not essential and that the edge of such blank will naturally have such a surface as to provide numerous cavities into which the metal of the wire B can be forced, or, if desired, instead of forming a

single longitudinally-extending groove in each edge of the blank a series of transversely-extending grooves may be formed on each edge by suitable means, or such edges may
5 be knurled or milled to any desired contour.

As above said, I prefer to make the wire B of copper; but it will be understood that any other metal or alloy which will flow under pressure and is adapted to take the form of
10 the spaces between the abutting edges of the blank may be used instead of copper.

I am aware that prior to my invention it has been proposed to unite the edges of a pipe-skelp by a separately-formed key adapted
15 to be secured to the body of the pipe by welding; but, as above pointed out, such a construction and mode of manufacture are not applicable to the making of tubes of the kind to which my improvements relate, it being
20 desirable to form such tubes of material so light as not to be capable of being welded. By my invention, also, it will be seen that the binding or locking wire-like strip may be of less thickness than the metal of the tube, as
25 it is initially placed in the grooves in the edges of the skelp, and therefore when pressure is applied it will not cause said binding-wire to overlap the edges of the skelp on either the inner or the outer surface. By
30 this arrangement of parts the walls of the completed tube adjacent to or along the line of connection between the edges of the skelp are of the same thickness as at other points, whereas if the said edges are united by welding, as by being welded to an interposed
35 strip, such strip is of sufficient thickness to project more or less beyond both the inner and outer surfaces of the skelp, and during the welding operation these projecting portions
40 are forced over the edges of the skelp and form

a rib or portion of increased thickness along the line of the weld. If the metal of the skelp is relatively thick, this increase in the thickness can be more or less overcome by
45 reducing or tapering the edges of the skelp and forming grooves in the sides of the connecting-strip, into which said tapered edges of the skelp extend, or such projecting metal can be removed by suitable cutters; but neither of these steps can be successfully
50 practiced in the manufacture of tubing of the character herein referred to in which the thinnest possible metal is employed and the interior surface of such a tube is required to be smooth and without any inward-extending
55 projections. I also avoid the necessity of heating the tube and connecting-strip, the pressure of the die and mandrel being sufficient to force the relatively small tough binding-strip into engagement with the edges of the
60 skelp and form a tight joint between said edges.

What I claim is—

The herein-described tube of substantially uniform thickness at all points in cross-section, it being formed of a skelp having its
65 edges brought adjacent to each other and each formed with opposing projections, and a relatively tough binding-strip having tongues cold-pressed into the spaces in the edges of
70 the skelp between said projections and having outer and inner surfaces coincident with the outer and inner surfaces of the tube-skelp, substantially as set forth.

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

WILLIAM A. MCCOOL.

Witnesses:

JOHN W. CULMER,
JAMES F. MERRIMAN.