

(No Model.)

3 Sheets—Sheet 1.

E. HANSON.

MACHINE FOR BENDING WIRE.

No. 396,930.

Patented Jan. 29, 1889.

Fig. 1

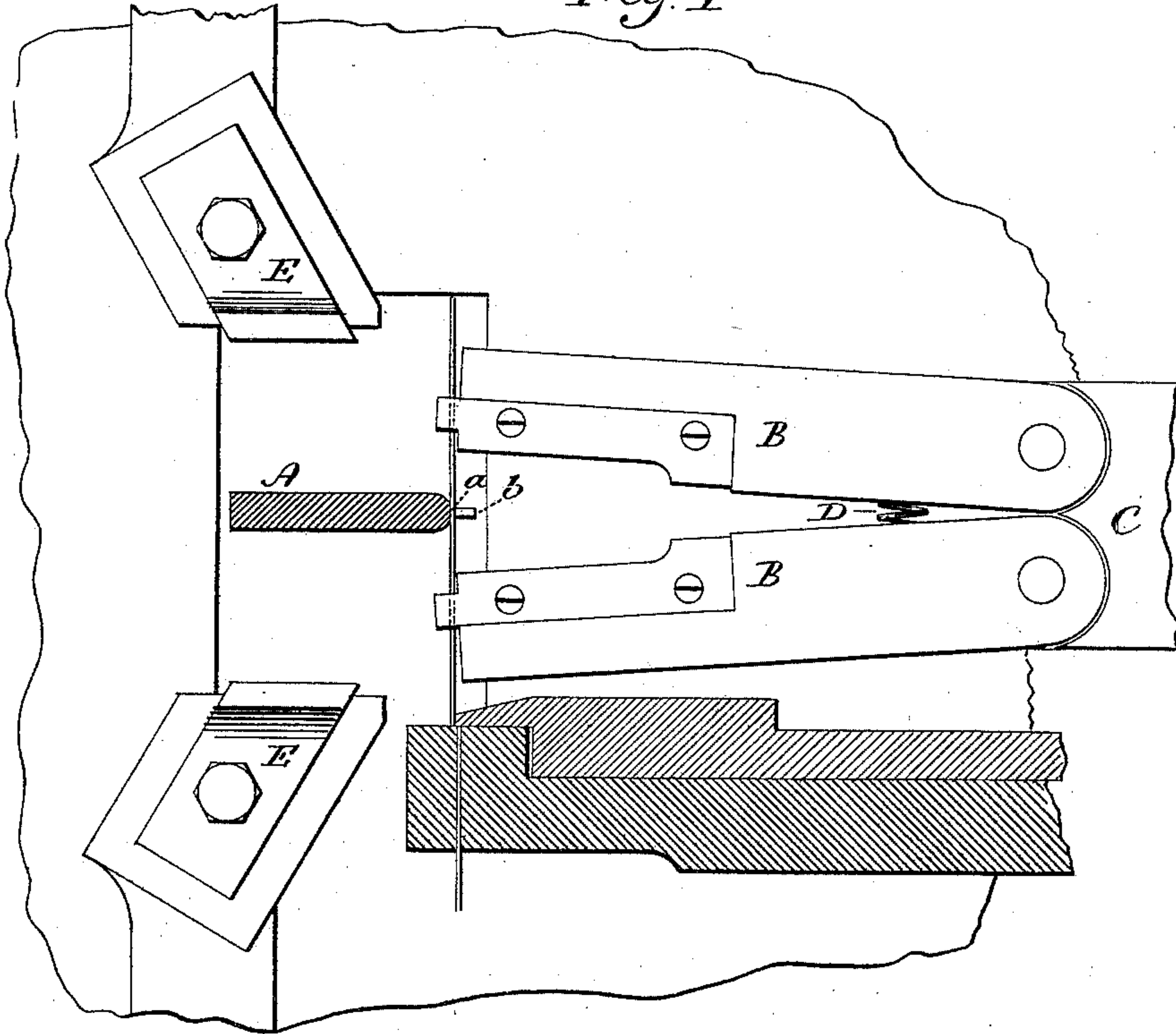
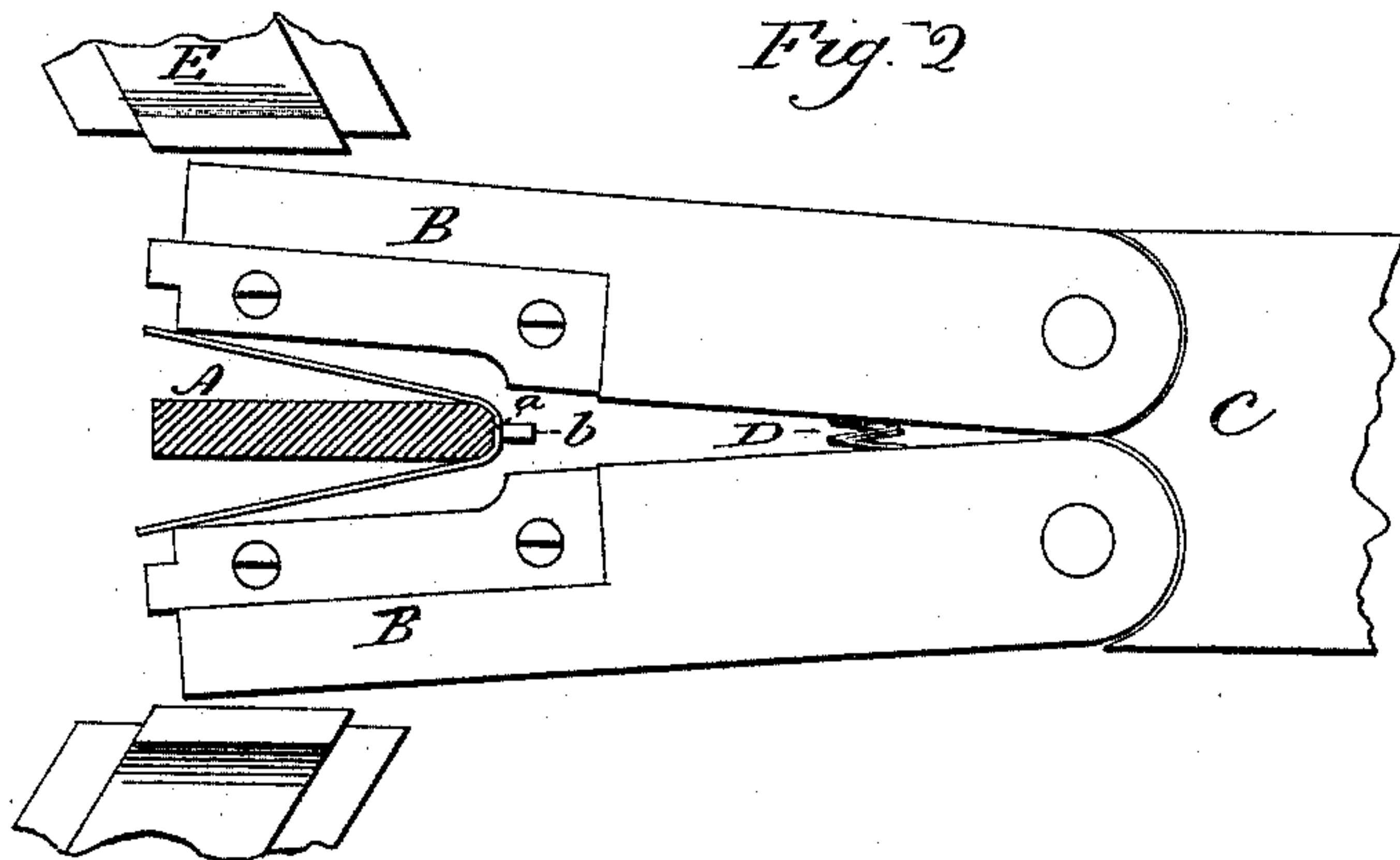


Fig. 2



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J. M. C. Miley.

(No Model.)

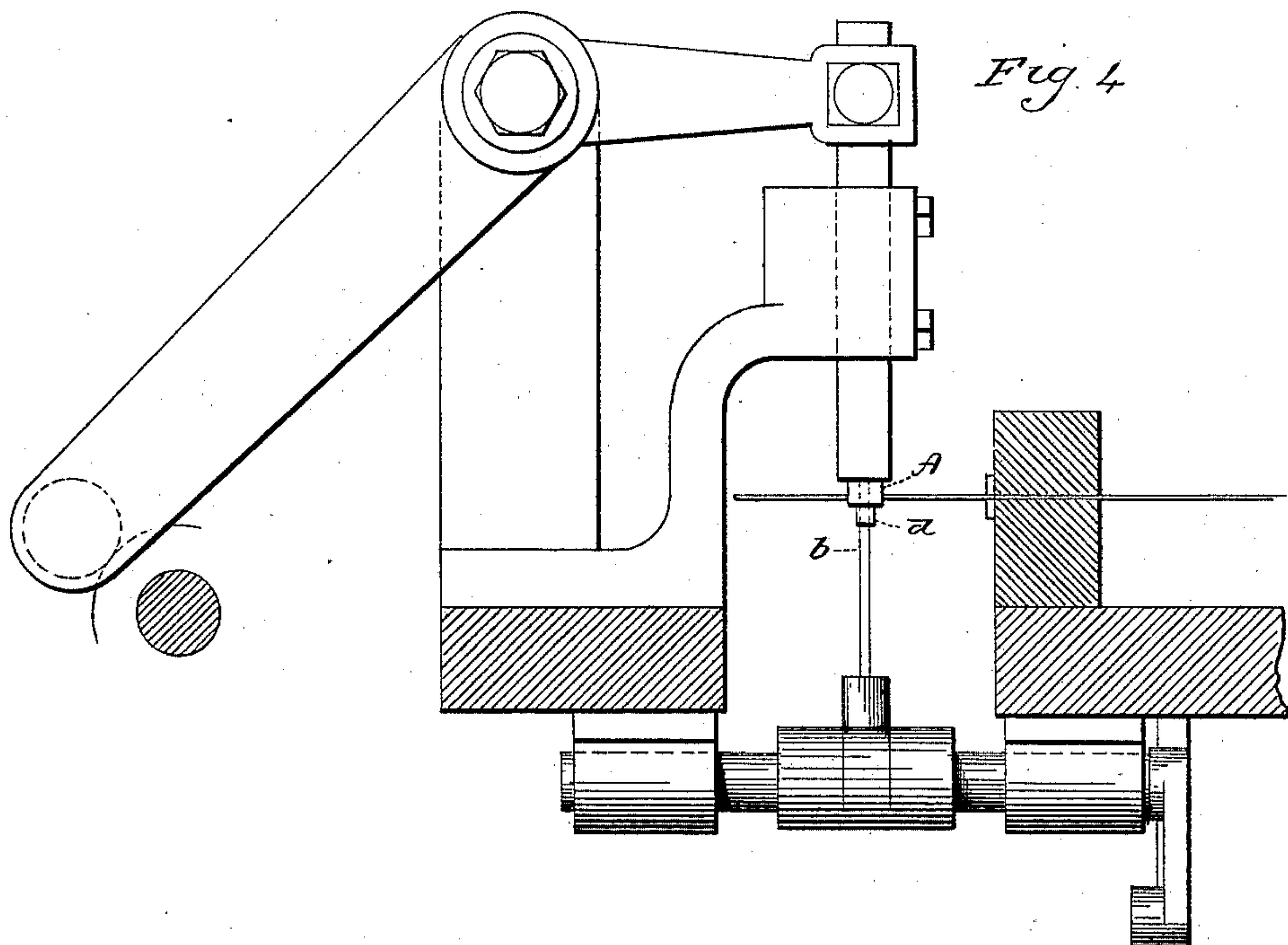
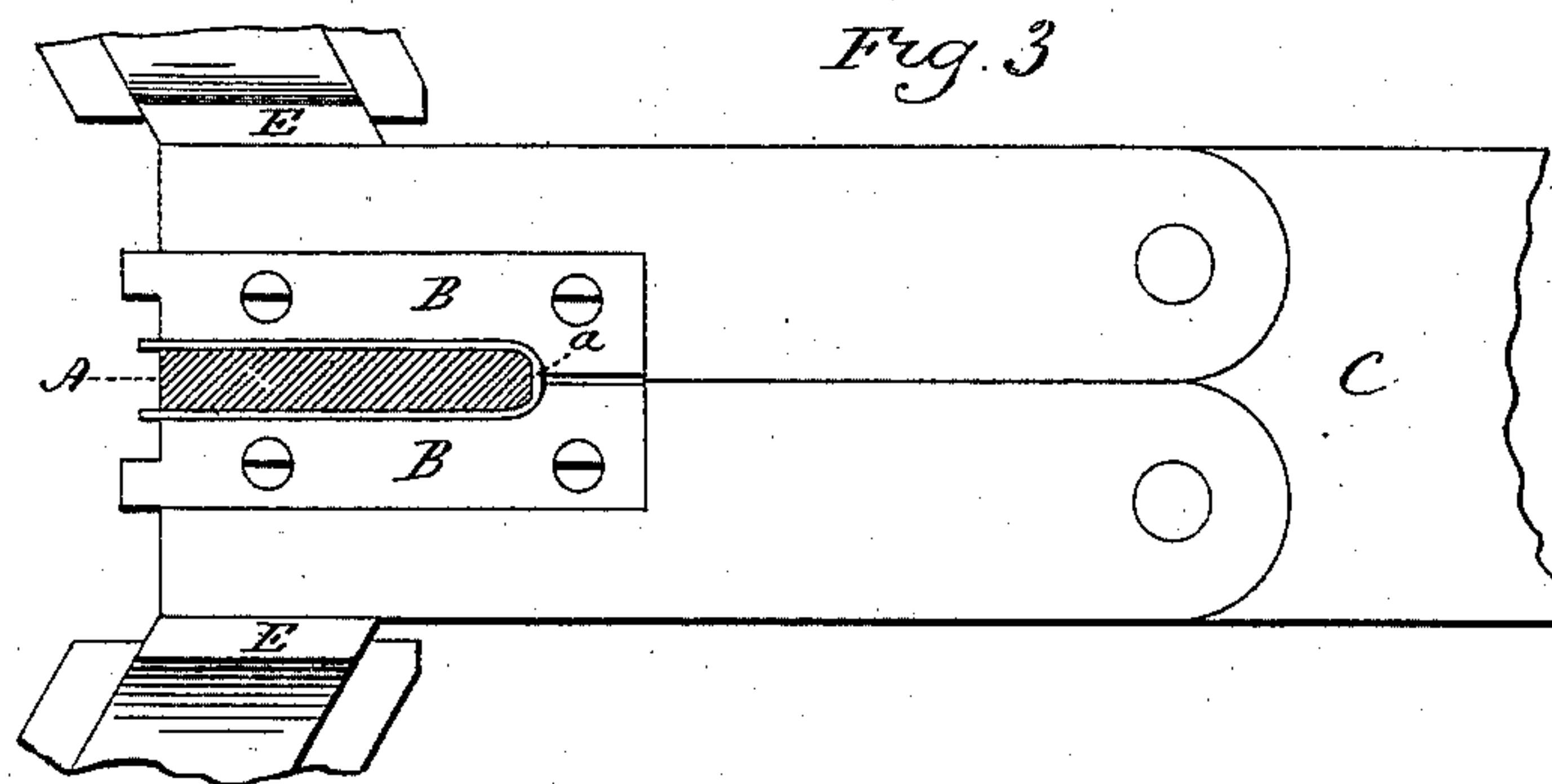
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(No Model.)

3 Sheets—Sheet 3.

E. HANSON.

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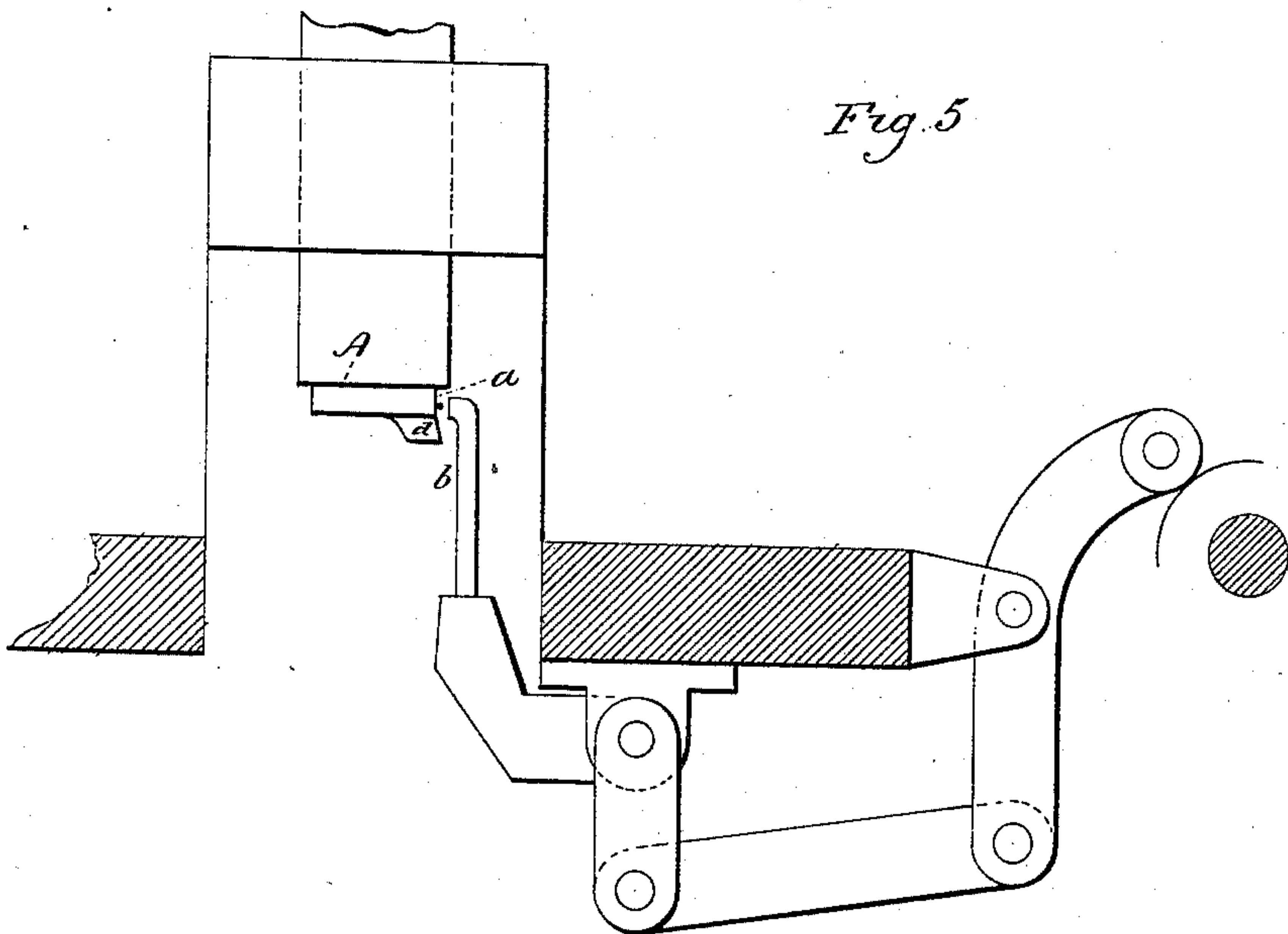


Fig. 5

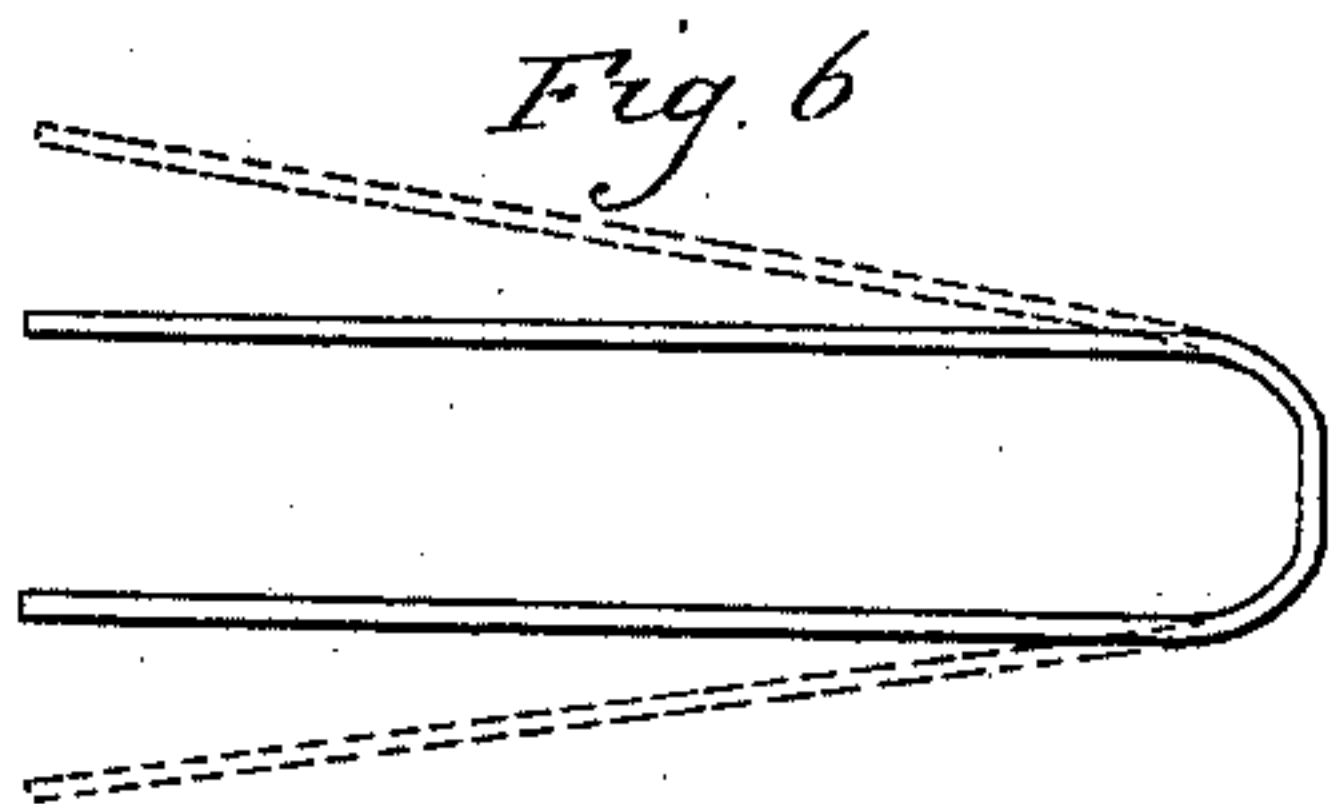


Fig. 6

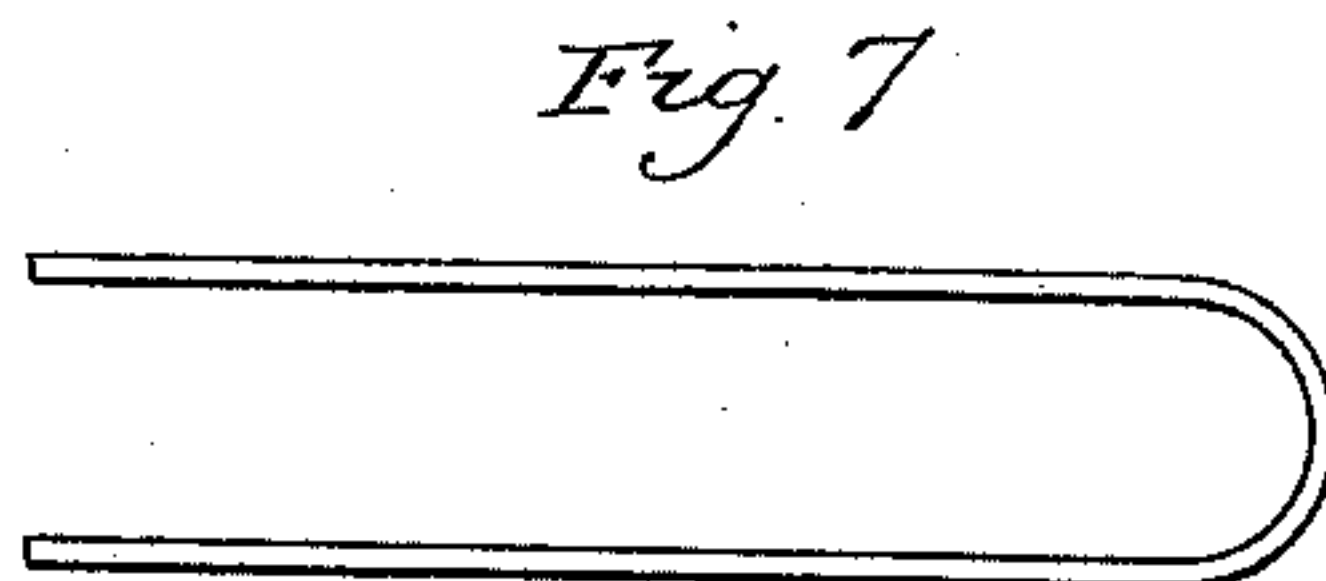


Fig. 7

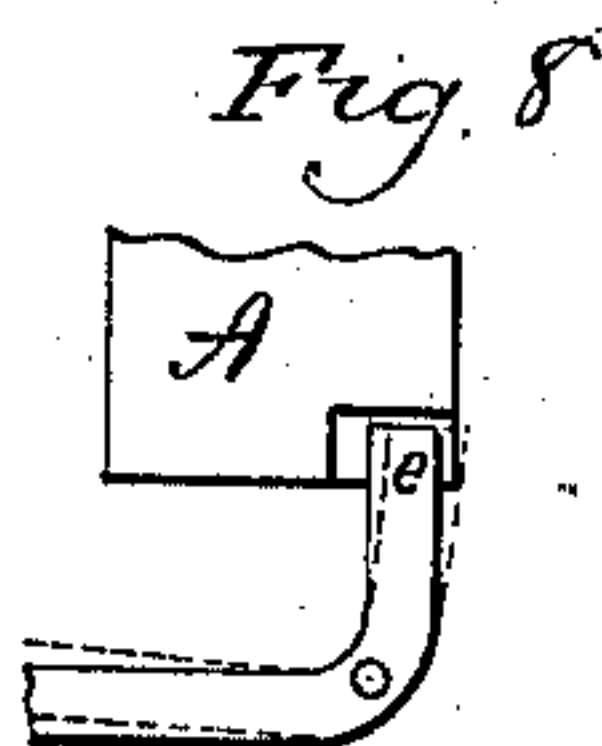


Fig. 8

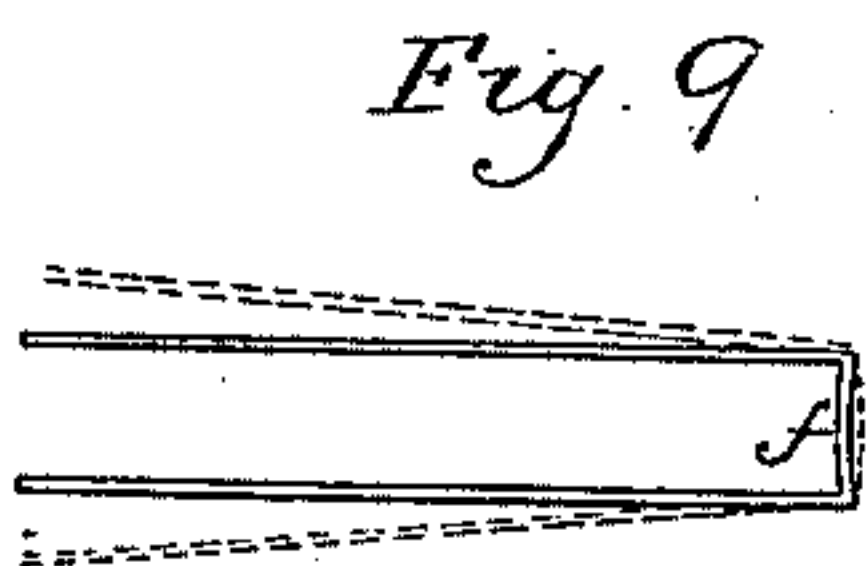


Fig. 9

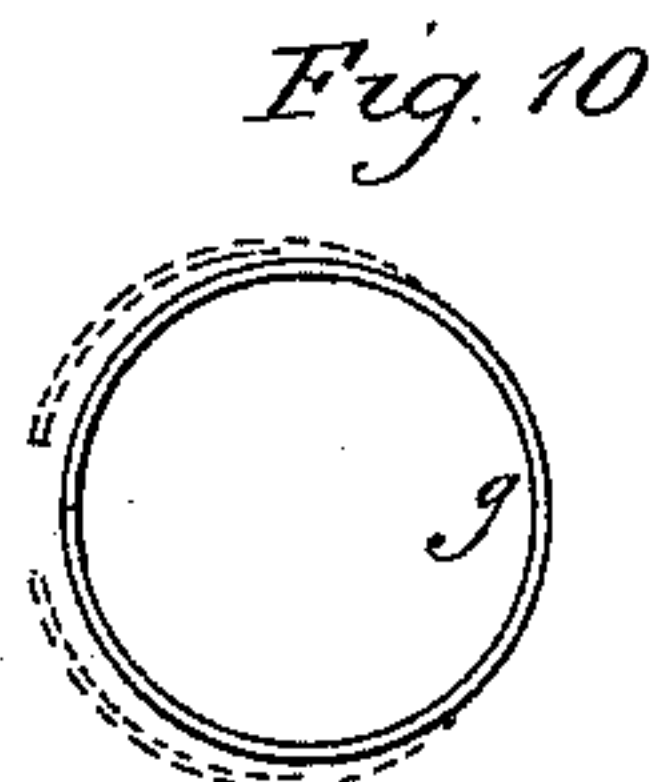


Fig. 10

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UNITED STATES PATENT OFFICE.

ELI HANSON, OF NEW YORK, N. Y., ASSIGNOR TO THE SELF RETAINING
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MACHINE FOR BENDING WIRE.

SPECIFICATION forming part of Letters Patent No. 396,930, dated January 29, 1889.

Application filed June 11, 1888. Serial No. 276,723. (No model.)

To all whom it may concern:

Be it known that I, ELI HANSON, of New York, in the county of New York and State of New York, have invented new Improve-
5 ments in Machines for Bending Wire; and I do hereby declare the following, when taken in connection with accompanying drawings and the letters of reference marked thereon, to be a full, clear, and exact description of the
10 same, and which said drawings constitute part of this specification, and represent, in—

Figure 1, a top view of an apparatus for bending hair-pins, showing the former in transverse section, the parts in the position of
15 having just received a blank wire preparatory to bending; Fig. 2, the same after the benders have advanced to double the wire upon the former; Fig. 3, the same, showing the benders as closed upon the former. Fig. 4
20 illustrates the former as arranged for vertical reciprocating movement; Fig. 5, a side view of the former, showing the projection for giving the supplemental bend to the wire. Fig. 6 represents the wire after the principal bend,
25 by which a portion of the bend is left flat; Fig. 7, the same wire after the supplemental bend; Fig. 8, a modification in the supplemental benders; Figs. 9 and 10, different applications of the invention.

30 This invention relates to an improvement in machines for making articles from wire, in which the wire is bent into the requisite shape.

It is well known in the manufacture of arti-
35 cles from wire that after a bend has been made in the wire the natural elasticity of the wire causes it to react after bending, so that if, for illustration, the wire be bent upon a curve of a certain radius the reaction of the wire will
40 prevent it from retaining the curve thus given to it, and will cause the wire to expand, so that the curve of the wire delivered from the machine, after the bending, will be of a radius greater than that of the curve upon which it
45 was bent. Consequently it is necessary, where a given curve is required in wire, to first bend the wire upon a curve of a radius less than the required radius to allow for the reaction of the wire after bending. I have discovered
50 that if, in bending such a curve, a small por-

tion of the surface of the former upon which the wire is bent be left flat, or substantially so, and the wire be held against that flat portion during the bending operation, so that in bending the wire to the required curve the
55 portion of the wire corresponding to this flat surface will be straight, and then after bending this straight portion be thrown outward by an independent stroke, as it were, into the proper curve, the reaction of the wire will be
60 prevented; or, in other words, if the reaction be permitted after the bending operation, and a stroke or blow be then applied to this straight portion to bend it outward into the proper curve, it will draw the expanded por-
65 tions each side this bend toward each other, so as to bring them to the required curve—that is, the curve of the former upon which they are bent; and I have also discovered that this supplemental bending may be effected
70 while the wire is yet on the former, and in substantially a continuous operation.

The object of my invention is the construction of a machine in which this supplemental bending may be performed in direct connec-
75 tion with the principal or preliminary bending; and my invention consists in the combination of a former, bending devices adapted to bend the wire around the former, and a mechanism arranged to operate from the in-
80 side of the former outward, which will impart to the wire a supplemental outward bend after it has been closed by the former in the preliminary or principal bend, as more fully hereinafter described. 85

For convenience in describing my invention, I first illustrate it as applied to the manufacture of hair-pins.

A represents a former, the surface of which is of a shape corresponding to the inside of
90 the pin to be bent, the pin being a common U-shaped pin. The head edge of the former is rounded, corresponding to the curve required for the head end of the pin, and at one point of that curve—the center, for illustra-
95 tion—a flat portion, *a*, is formed, as if, after the curve had been fully formed, a slight portion of the curved surface had been removed or recessed to make that portion flat.

B B represent benders arranged to be moved 100

in a plane at right angles to the axis of the former. Such benders are best hung to a slide, C, so as to receive a reciprocating movement therefrom. While the benders are in an open condition, being so held open by a spring, D, the wire is passed across the rounded or head edge of the former and between that edge and the ends of the benders, as represented in Fig. 1.

A finger, *b*, is arranged to grasp the blank wire against the flat surface *a* before the bending commences. This device is common in such bending apparatus, to hold the blank after it is cut or delivered and before the benders come into contact with the wire. The benders then advance, as seen in Fig. 2, and then side pressers, E, are advanced against the benders and give them a lateral movement toward each other to bring the bent wire close upon the surface of the former, as seen in Fig. 3. Then the benders are withdrawn and the bent pin will drop from the machine.

As the benders move away from the former, the natural elasticity of the wire will cause the legs to spring apart, so that the pin will assume substantially a V shape, substantially such as seen in Fig. 2, the legs of the pin diverging to a very considerable extent, while, as represented, the sides of the former are parallel. If it is desirable to make the legs parallel, or more nearly so, it has hitherto been necessary to construct the sides of the former correspondingly converging, so that after bending the reaction of the wire will bring the legs into the required shape.

In carrying out my improvement in the manufacture of hair-pins I have found a very satisfactory result in making the former A vertically movable, as illustrated in Fig. 4, the former being arranged in vertical guides, so as to move up and down or in a plane at right angles to the plane of the benders, so that the former may be drawn up from between the benders while the pin is held by the jaws. Upon the lower face of the former, at points where the flattened surface *a* is formed, I provide a projection, *d*, which may be made as a part of the former, the outer surface of which inclines rearward from the rounded surface of the former to substantially the extent of the flattened portion, as seen in Fig. 5. As the former rises, this inclined surface of the projection *d* acts upon the flat portion of the wire and gives to it an outward bend, as, for illustration, from the shape seen in Fig. 6, which represents the bent wire with the flattened portion to that seen in Fig. 7, which represents the flat portion thrown out into the same curve. In such bending the finger *b* retreats or yields, corresponding to the inclined surface of the said projection *d*.

The supplemental or final bend has the effect to draw the legs or sides together, and in the operation described the bending is sufficient to retain the legs in the proper position, and prevent the spread under the reactive force due to the elasticity of the wire.

In the apparatus I have thus far described the supplemental bend is produced by a rubbing action upon the wire; but it may be produced by a direct pressure, as seen in Fig. 8, in which a supplemental bender is arranged to normally stand with its nose *e* in a recess upon the under face of the former A, and at the head end. After the bending, as before described, the nose *e* is forced outward, as represented in broken lines, Fig. 8, to produce the outward bend. This action is substantially that of a blow or pressure, and is a sufficient modification to enable those skilled in the art to apply the invention in various ways, and this illustration of the curve of a hair-pin is sufficient to enable those skilled in the art to apply the invention to the bending of various articles of a curved form. This auxiliary bend is not to be understood as applicable to a curve only. For illustration, the article bent may be desired to present angles, as seen in Fig. 9, in which case the natural expansion of the sides after bending would be, for illustration, to the position indicated in broken lines, Fig. 9, while the required position is that of solid lines. In this case the outward or supplemental bend would be produced upon the closed end between the angles, as at *f*. In such case the better plan would be to give to that closed end an inward bend, as represented in Fig. 9, so that the supplemental bend will straighten that side, as indicated in broken lines, the bend in that figure being exaggerated for convenience of illustration. This supplemental bend will produce the same effect in this case as in that first mentioned. So, in bending a ring required to be complete, as in Fig. 10, the elasticity of the wire would naturally cause the ring to spread, say, as indicated in broken lines in that figure. In this case a portion of the wire is left straight, and then the supplemental bend is made at that point to bring the straight portion into the required curve, which will cause the wire from the point or supplemental bend to be drawn inward and brought to the complete ring shape, as indicated in Fig. 10.

From the foregoing it will be understood that I do not wish to be limited to any specific bending device or to the manufacture of any specific article.

In illustrating a machine embodying my invention I have shown only the operative parts, omitting the mechanism by which movement may be imparted to the said parts. Such apparatus, being common and well known in wire-bending machinery, does not require illustration or description to enable those skilled in the art to apply the invention.

I claim—

In an apparatus for making articles from wire, in which the wire is bent to shape, the combination of a former, corresponding in shape to the shape required for the bent wire except that a portion of the surface of the

former is recessed to permit an extra inward
bend of the wire, and an auxiliary bender
arranged to operate within the bend so made
by the principal bender and at the point
5 where the said recess in the former occurs,
substantially as described, said supplemental
bender being adapted to give to the said in-

ward bend an outward bend into the required
shape.

ELI HANSON.

Witnesses:

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JAMES F. DOYLE.