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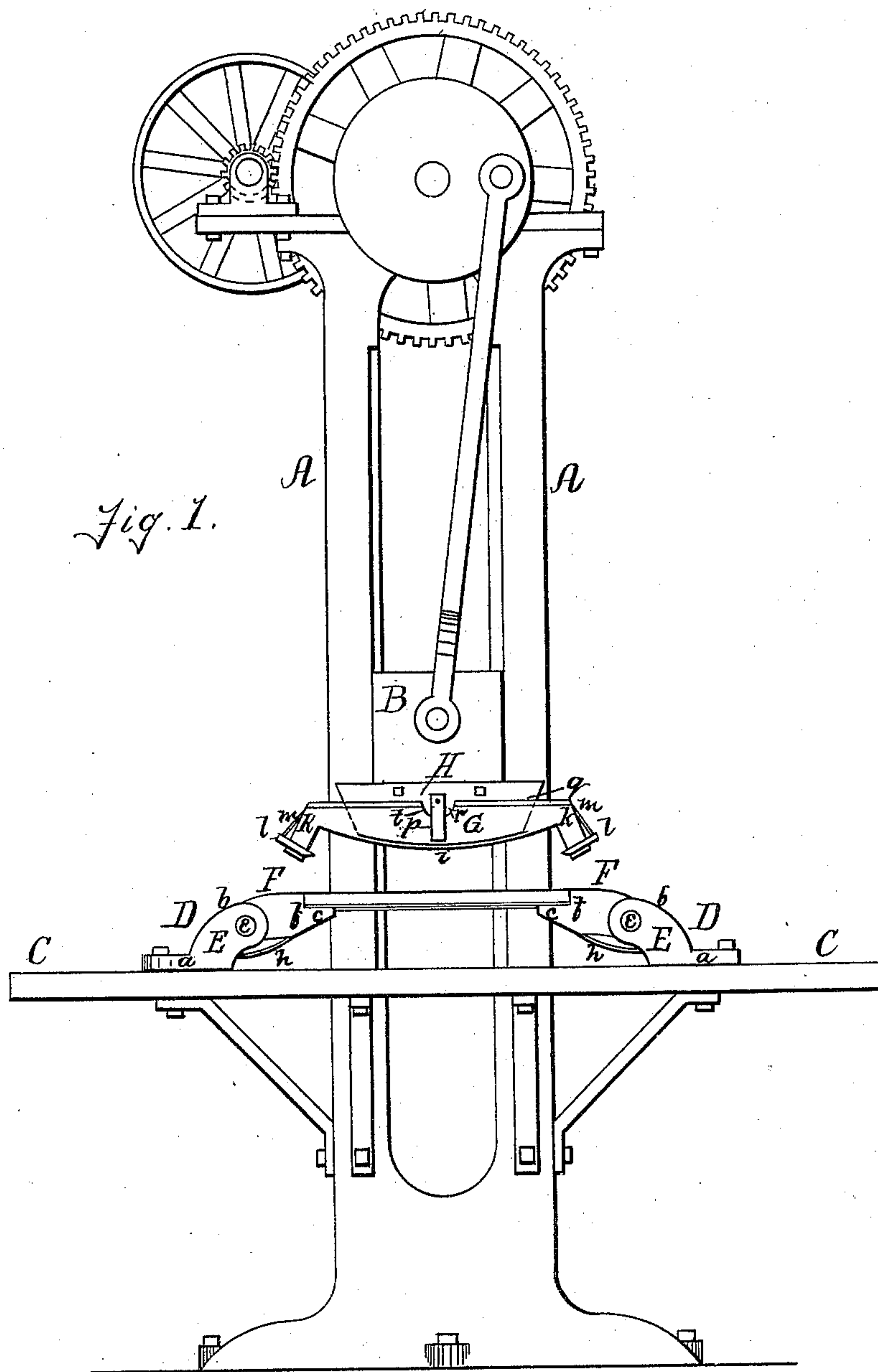
2 Sheets—Sheet 1.

A. HIRSHHEIMER & C. M. MUELLER.

MACHINE FOR BENDING STAVES.

No. 391,794..

Patented Oct. 30, 1888.



Witnesses,

S. G. Roberts.
Geo B. Evans.

Inventors,

Albert Hirschheimer.
Charles M. Mueller,

By *their* Attorneys

Lam. Warrick.

(No Model.)

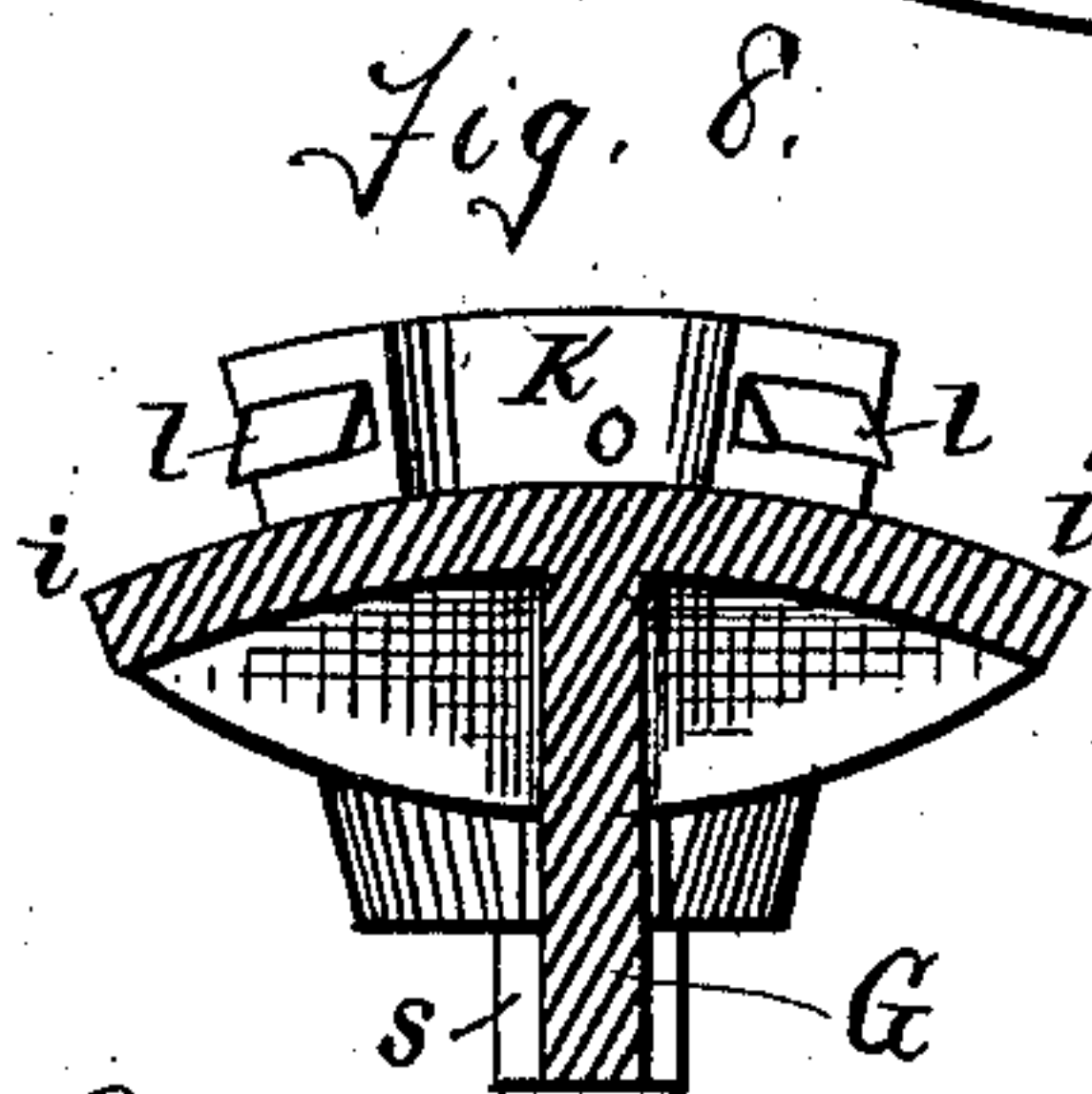
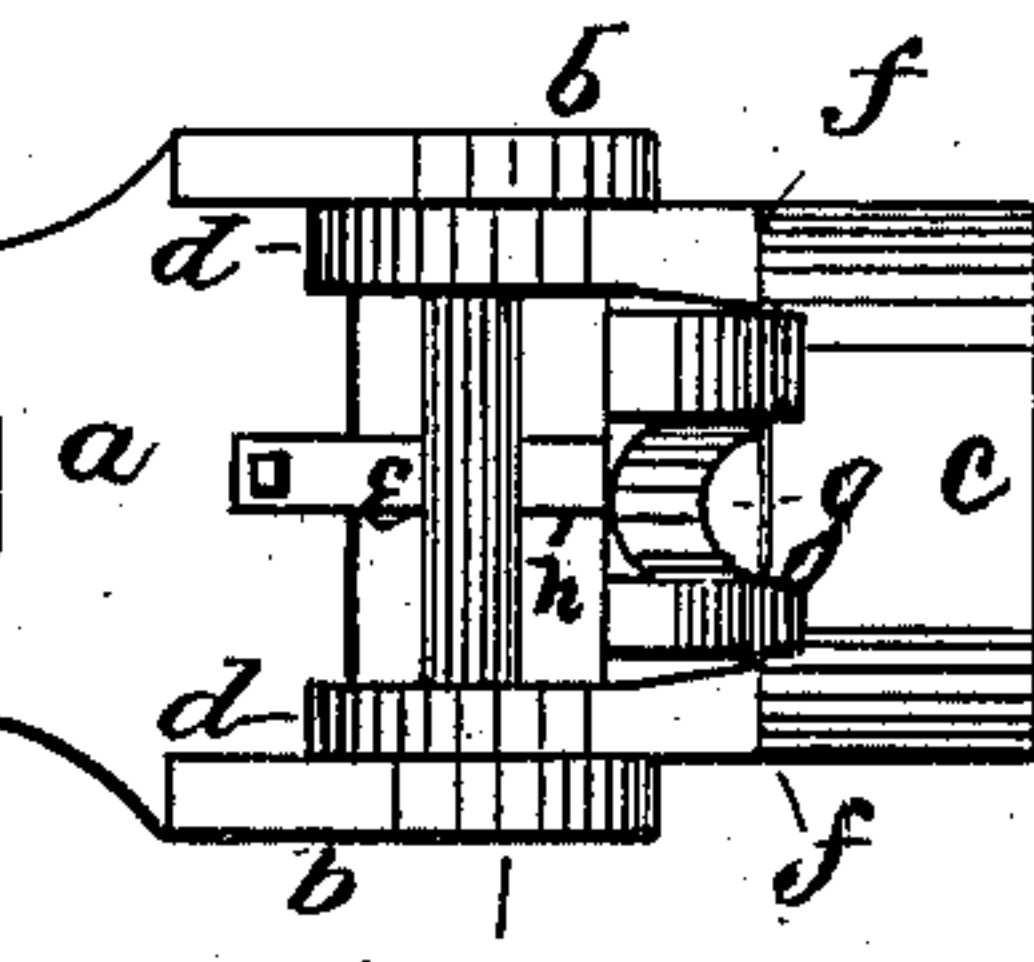
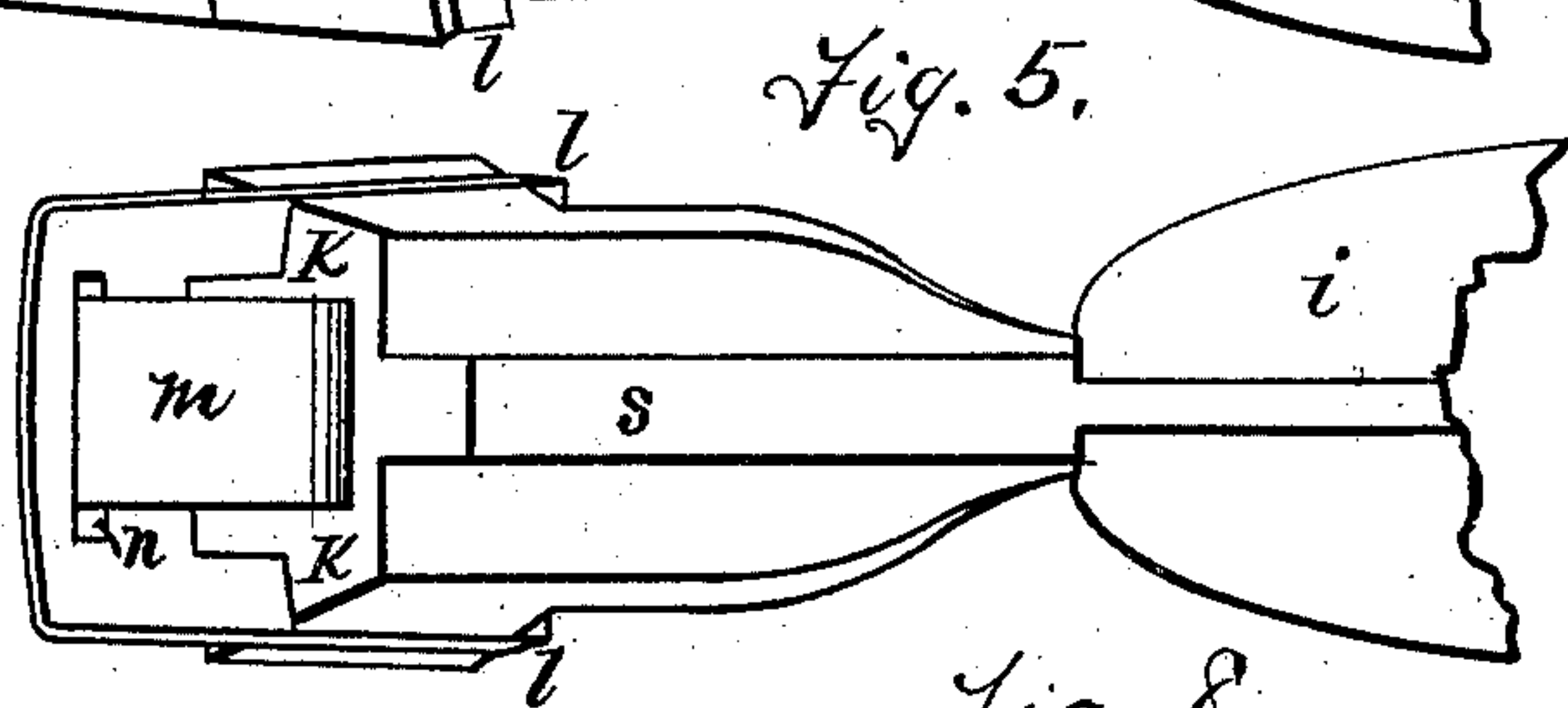
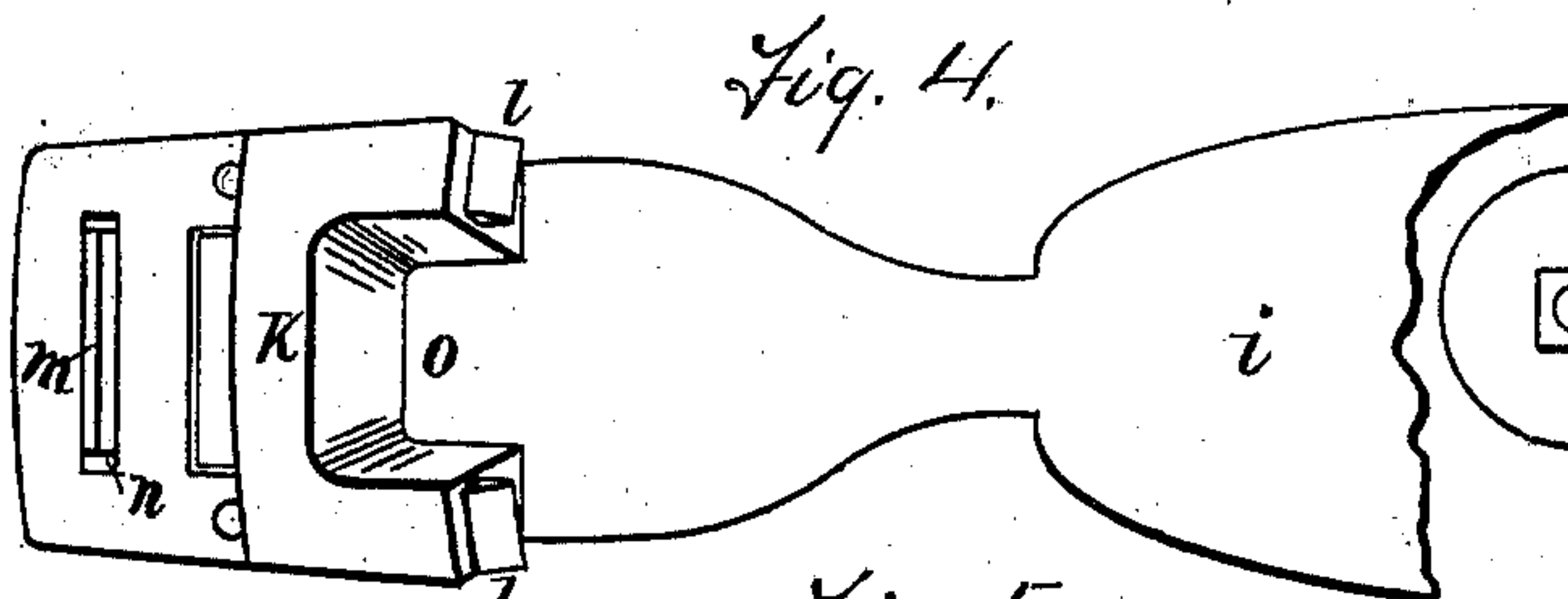
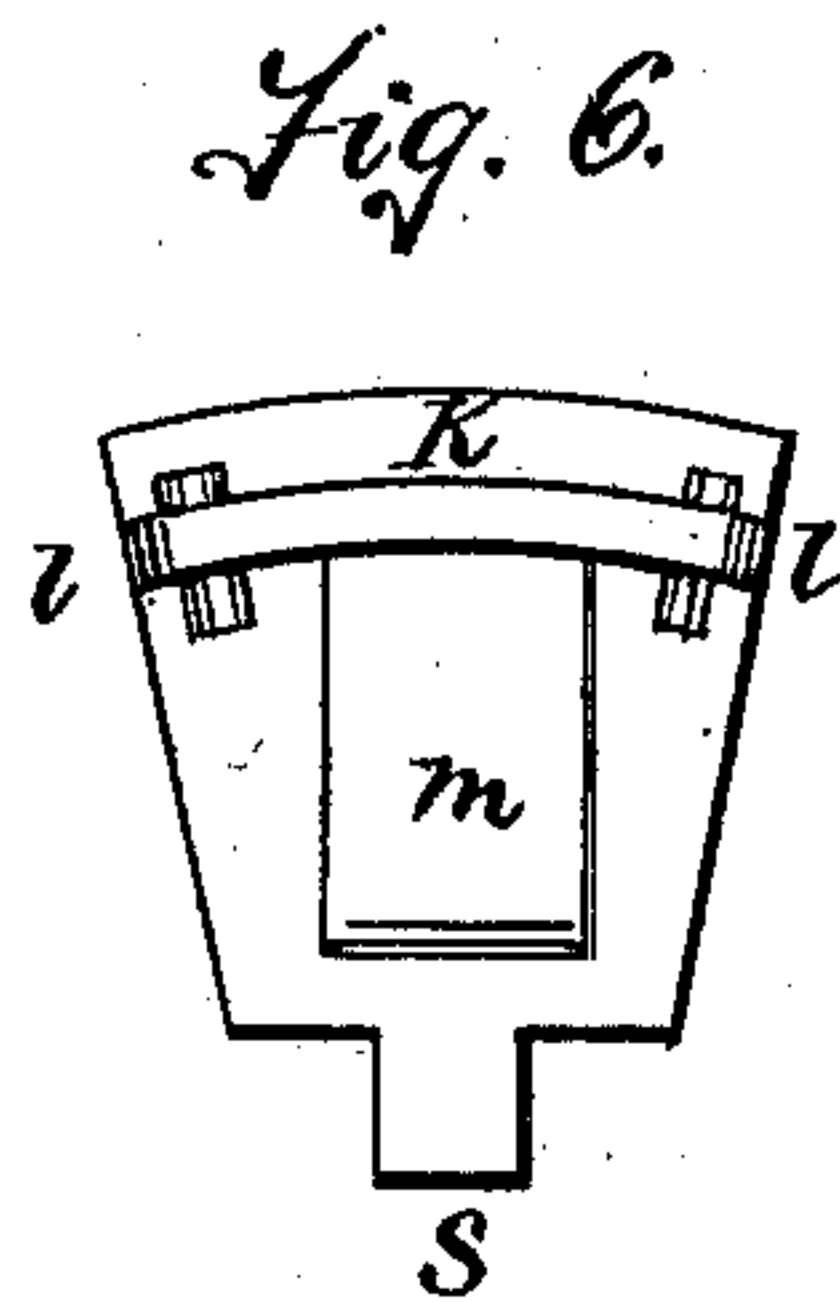
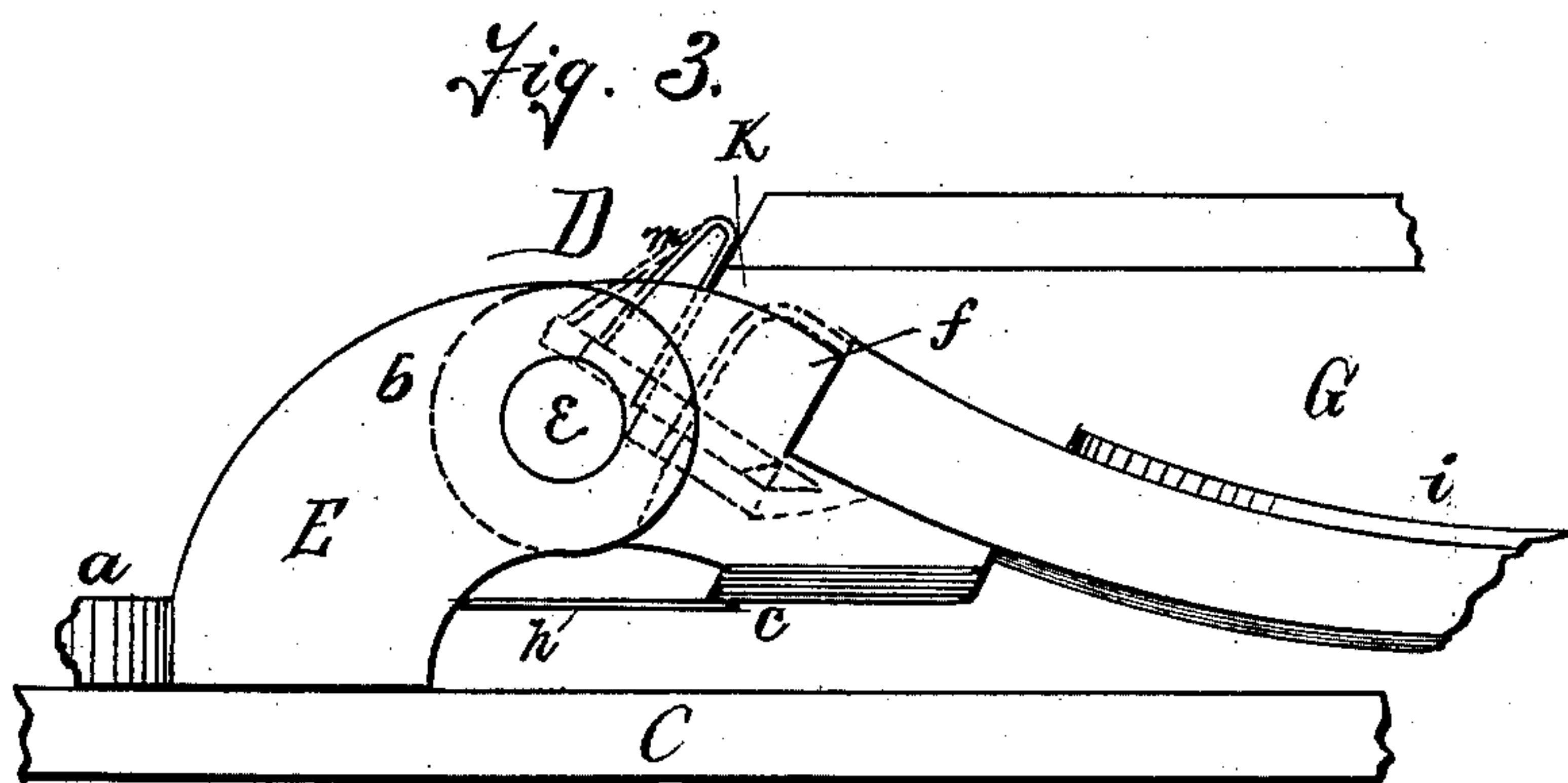
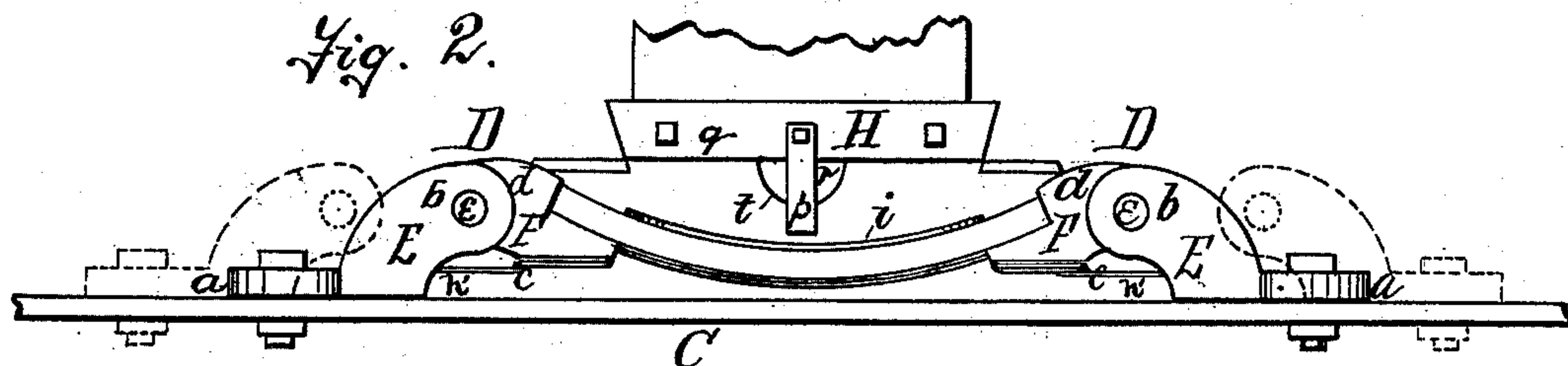
2 Sheets—Sheet 2.

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MACHINE FOR BENDING STAVES.

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Witnesses.

Geo. B. Evans.

J. B. Hartwick

Inventors.

Albert Hirshheimer and
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By their Attorneys

Lawrence

UNITED STATES PATENT OFFICE.

ALBERT HIRSHHEIMER AND CHARLES M. MUELLER, OF LA CROSSE,
WISCONSIN.

MACHINE FOR BENDING STAVES.

SPECIFICATION forming part of Letters Patent No. 391,794, dated October 30, 1888.

Application filed December 1, 1887. Serial No. 256,626. (No model.)

To all whom it may concern:

Be it known that we, ALBERT HIRSHHEIMER and CHARLES M. MUELLER, citizens of the United States, residing at La Crosse, in the county of La Crosse and State of Wisconsin, have invented certain new and useful Improvements in Machines for Bending Staves; and we 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 and figures of reference marked thereon, which form a part of this specification.

This invention relates to mechanism for bending staves and other similar work, and its object is, primarily, to apply the power in such a manner and at such points that the fibers of the wood shall be compressed longitudinally at the same time and to the same extent that pressure is exerted in a lateral direction.

Another and important feature of the invention is in the construction of the former upon which the stave is bent, by means of which the stave is automatically locked upon the same and securely held until it has been passed through a jointing-machine, by which arrangement the stave is jointed while rigidly held in the exact position it will occupy in the finished barrel.

The invention consists in the construction and arrangement of the brackets upon which the stave is held during the process of bending, and in the former upon which it is retained after bending, as will be hereinafter more particularly set forth and described.

The mechanism by which this invention is operated may be of any construction suitable to the purpose. We, however, make use of it in connection with the main portion of the mechanism illustrated in Letters Patent No. 325,542—machine for inserting harrow-teeth—granted to us September 1, 1885, which consists of an upright frame-work, at the top of which is mounted a shaft carrying suitable driving-gear and having pitman-connection with a presser block or die adapted to move vertically up and down in ways attached to

the main frame. It is therefore illustrated in such connection in the accompanying drawings, in which—

Figure 1 is a front elevation of the invention, showing the parts in position for the bending of the stave. Fig. 2 is a similar view showing the position of the various parts after the operation of bending has taken place. Fig. 3 is a partial side view of the former and one of the supporting-brackets, showing the manner in which the stave is compressed longitudinally and locked upon the former. Fig. 4 is a detail view of the under side of the former; Fig. 5, a top view of the same; Fig. 6, an end view of the former, Fig. 7 is a detail view of one of the supporting-brackets, and Fig. 8 a vertical transverse section of the former.

Like letters designate corresponding parts in all of the figures.

A is the main frame, in which reciprocates vertically the presser-block B, actuated by pitman-connection with suitable driving-gear located at the top of the frame. Upon the front of the frame is a horizontal table, C, to which are secured, at suitable distances from the presser-block, the two stave-supporting brackets D D. These brackets are adjustable longitudinally of the table C, in order to adapt them to support different lengths of staves and in such a manner that the presser-block shall be over the middle of the stave when resting upon the brackets. The brackets are formed by casting and are constructed in two parts, the one part, E, composed of a bed-plate, *a*, adapted to be bolted or otherwise secured to the table C and having two upwardly-extending arms or ears, *b b*, of substantially the form shown in the drawings. The other or movable portion of the bracket F is composed of a plate, *c*, from which extend downwardly and backwardly two arms or ears, *d d*, similar to those upon the other portion of the bracket. The corresponding arms or ears of the bracket are connected by a pivot or rod, *e*, forming a hinge-joint of such a nature that the part E, being firmly secured to the table C, a downward pressure upon the part F will cause it to tilt downward and forward toward the middle of the table. The plate *c* of the tilting portion

of the bracket is concave in cross section to conform to the outer surface of a stave, which has previously been shaped. The ears *dd* extend somewhat above the surface of the plate *c*, and are cut down perpendicularly thereto, so as to form a shoulder, *f*, at the rear of the plate, against which the end of the stave may rest, and, in addition to the shoulders formed by the two ears at each edge of the plate, there is also an upright projection or abutment, *g*, in the middle of the rear edge of the plate for the same purpose. The tilting portion of each bracket is held normally in the position shown in Fig. 1 by means of a spring, *h*, underneath the same.

When the stave is laid upon the brackets in the position shown in Fig. 1, its outer surface resting upon the plate *c* of the tilting bracket and the ends of the stave abutting against the shoulders *ff* and *g*, it is obvious that any downward pressure upon the middle of the stave will cause the tilting brackets to upset sufficiently to keep the shoulders *ff* and *g* constantly in contact with the ends of the stave. As the pressure is increased, the longitudinal distance between the abutting shoulders of the opposite brackets is constantly diminished, and a powerful pressure in the direction of the length of the stave is consequently exerted upon the ends of the stave, which not only assists in bending it properly, but also prevents any parting of the fibers from the strain.

In connection with the tilting mechanism above described we make use of a former of peculiar construction, as shown in Figs. 1 and 2, but more in detail in Figs. 3 to 6, inclusive. This is also preferably formed by casting, and consists of a flat main or body portion, *G*, of somewhat greater length than the proposed length of the stave to be bent upon it, and preferably only of such thickness as to give the requisite strength. Its lower middle portion terminates in a broad curved surface, *i*, convex both laterally and longitudinally on its under surface to conform as nearly as possible with the inner surface of a finished stave. This is the forming or molding surface. The ends *kk* of the former *G* extend downwardly at an angle with the straight upper edge of the former, so as to form an abutment at each end of the stave when properly bent in a plane perpendicular to the surface of the stave. Upon the arms *kk* are mounted double jaws or dogs *ll*, which are normally held projecting inwardly from the arms, upon which they are mounted by means of springs *mm* upon the outside of the arms *kk* and connected with the jaws or dogs by passing through a slot, *n*, in the arm connecting the two jaws on the same arm.

The operation of this part of the mechanism is as follows: The stave being placed upon the tilting brackets, as shown in Fig. 1, the former is caused to descend by the downward movement of the presser-block. The forming surface *i* comes in contact with the middle of the stave, and by the continued downward press-

ure of the former and the upsetting action of the brackets the stave is bent to conform to the shape of the surface *i* and the ends of the stave are brought within and made to abut against the inside of the arms *kk*. The slanting under surface of the dogs *ll* causes them, upon contact with the end of the stave, to retreat flush with the inner surface of the arms *kk*, or sufficiently so as to allow the end of the stave to pass by them. When the stave is sufficiently bent so that its ends have passed inside the dogs *ll*, the springs *mm* force the latter back to their normal position, thus automatically and securely locking the stave upon the former, where it remains until its fibers are set in the required shape.

The inner portion of the arms *kk* between the dogs is hollowed out, as shown at *o*, Fig. 4, to admit the entrance of the projecting abutment *g* on the tilting bracket, and the bracket is correspondingly hollowed out on each side of the abutment *g* to allow for the passage of the dogs on the former in order that the former and the bracket may be completely interlocked without hinderance to the complete bending of the stave. The shoulder *g* forms a support or abutment against the middle of the end of the stave-blank, and the difficulty that might be occasioned by the splintering of the corners of the blank at the points of contact with the shoulders *ff* when pressure is exerted upon the blank by means of the presser-die is thereby avoided. It also serves to retain the end of the blank, even when the same is very narrow, in such a position as to direct it within the arms *kk* of the former, and, entering within the recess *o* upon each of said arms, retains the blank securely in place until the endwise pressure thereupon is transferred to the arms *kk* of the former.

To attach the former to the presser-block, where it is held until the operation of bending is accomplished, a holding-block, *H*, is provided. This is secured permanently to the presser-block, and consists of a plate with its lower edge curved to conform to the upper surface of the curved plate *i* of the former, and is provided with a spring-clutch, *p*, upon one side. The upper flat portion of the former is slipped underneath the spring and retained in place by the pressure of the same against the holding-block. Upon the upper edge of the holding-block *H* a shoulder is formed, against which the upper edge of the former abuts, and by means of which the downward pressure is communicated to the former by the downward movement of the presser-block.

To retain the former in position against displacement in a longitudinal direction, a lug, *r*, extends downward from the middle of the shoulder *q*, which fits into a corresponding notch, *t*, cut in the upper portion of the former. The middle of the former is thus made to descend upon the middle of the stave in every instance, thus insuring the perfect shape of the stave.

Aside from that already described, the

former has another important function, being used as a carriage for jointing the stave or upon which the stave is run through a jointing-machine in connection with our improved machine for jointing staves, shown and described in our application for Letters Patent of even date herewith. For this purpose the upper edge of the former terminates in a lip or flange, *s*, as shown in Fig. 6, which fits in a groove upon the jointing-table, thereby constituting a carriage upon which the stave is immovably held in the exact position which it will occupy in the finished barrel, thus making a perfect joint. By this method we obviate the inaccuracy in jointing which takes place in the use of other methods by reason of the springing of the stave when released from the former.

By the means above described we are able to make a more perfect stave than by any of the machines hitherto in use.

As many formers are used as may be necessary in order to allow the fibers of the stave to set after bending, and they are made of different sizes to correspond with the different sizes of staves. After the stave is bent and locked upon the former, it is run through the jointing-machine, the former serving as a carriage for the stave. No adjustment of the stave is therefore necessary in order that it may be properly jointed.

This mechanism is equally well adapted for bending other articles besides staves, and formers of any desired forming-surface can be used, though it has been described with especial reference to that class of work.

We claim as our invention—

1. In a machine for bending wood, the pivoted bracket-section *F*, having shoulders *ff* and *g*, adapted to abut against the end of the wood to be bent, substantially as and for the purpose herein described.

2. In a machine for bending staves, the pivoted bracket-section *F*, having the concave stave-supporting plate and abutments *ff* and *g*, forming a shoulder at the rear of the same, and the downwardly and rearwardly extending arms *d d*, and the pivot *e*, passing through the same and similar arms, *b b*, on the other section of the bracket, substantially as speci-

fied, whereby a downward movement of the supporting-plate causes a forward movement of the abutments.

3. In a bending-machine, the presser-block *B*, means for actuating the same in a vertical direction, the holding-block *H*, having spring-clutch *p*, a removable former carried by said holding-block, the table *C* underneath said presser-block, and pivoted brackets *F F*, adjustably located thereon at equal distances from the presser-block, substantially as and for the purpose herein specified.

4. In a bending-machine, the presser-die, the holding-block *H*, permanently attached thereto, having shoulder *q*, lug *r*, extending downwardly therefrom, and spring-clutch *p*, in combination with a former having its upper edge shaped to conform to the shoulder *q* and lug *r* on the holding-block, substantially as and for the purpose herein specified.

5. In a machine for bending wood, the tilting brackets *F F*, having abutments *g g*, in combination with the former *G*, having the downwardly-extending arms *k k*, the said arms having their inner central portion hollowed out to receive the abutments *g g*, substantially as and for the purpose herein specified.

6. In a machine for bending wood, the former *G*, having convex surface *i* of the form to which the wood is to be bent, arms *k k*, substantially perpendicular to the forming-surface, carrying the spring-actuated locking-dogs *l l*, substantially as and for the purpose herein specified.

7. The former *G*, having forming-surface *i*, arms *k k*, substantially perpendicular thereto, provided with automatically locking and retaining dogs *l l*, and the upper edge of the former terminating in a flange, substantially as described, whereby the former may be used as a carriage upon which to joint the bent article.

In testimony whereof we affix our signatures in presence of two witnesses.

ALBERT HIRSHHEIMER.
CHARLES M. MUELLER.

Witnesses:

SARA L. FOX,
HARRY MARSH.