

(No Model.)

3 Sheets—Sheet 1.

L. G. MERRITT.
KNIFE AND CUTTER HEAD FOR LATHES.

No. 573,098.

Patented Dec. 15, 1896.

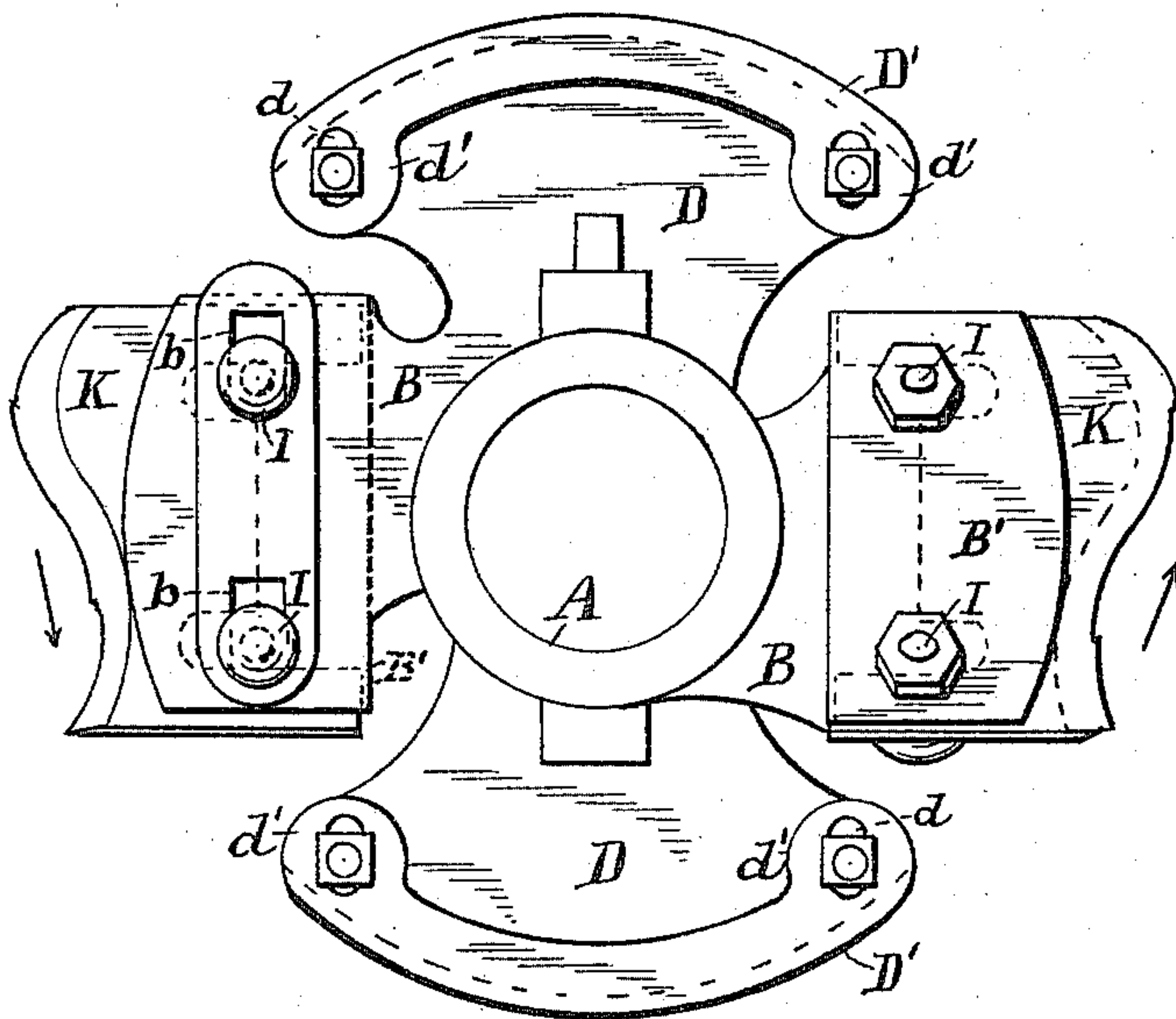


Fig. 1.

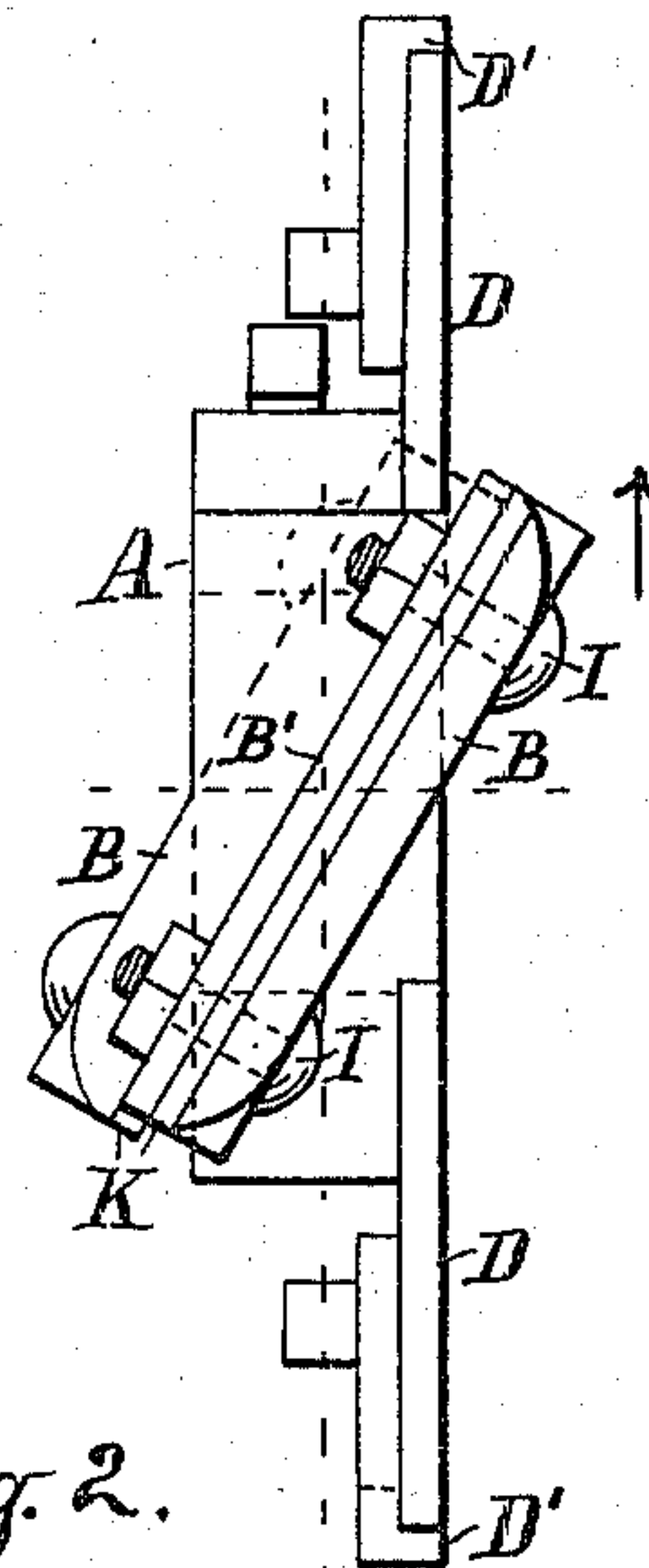


Fig. 2.

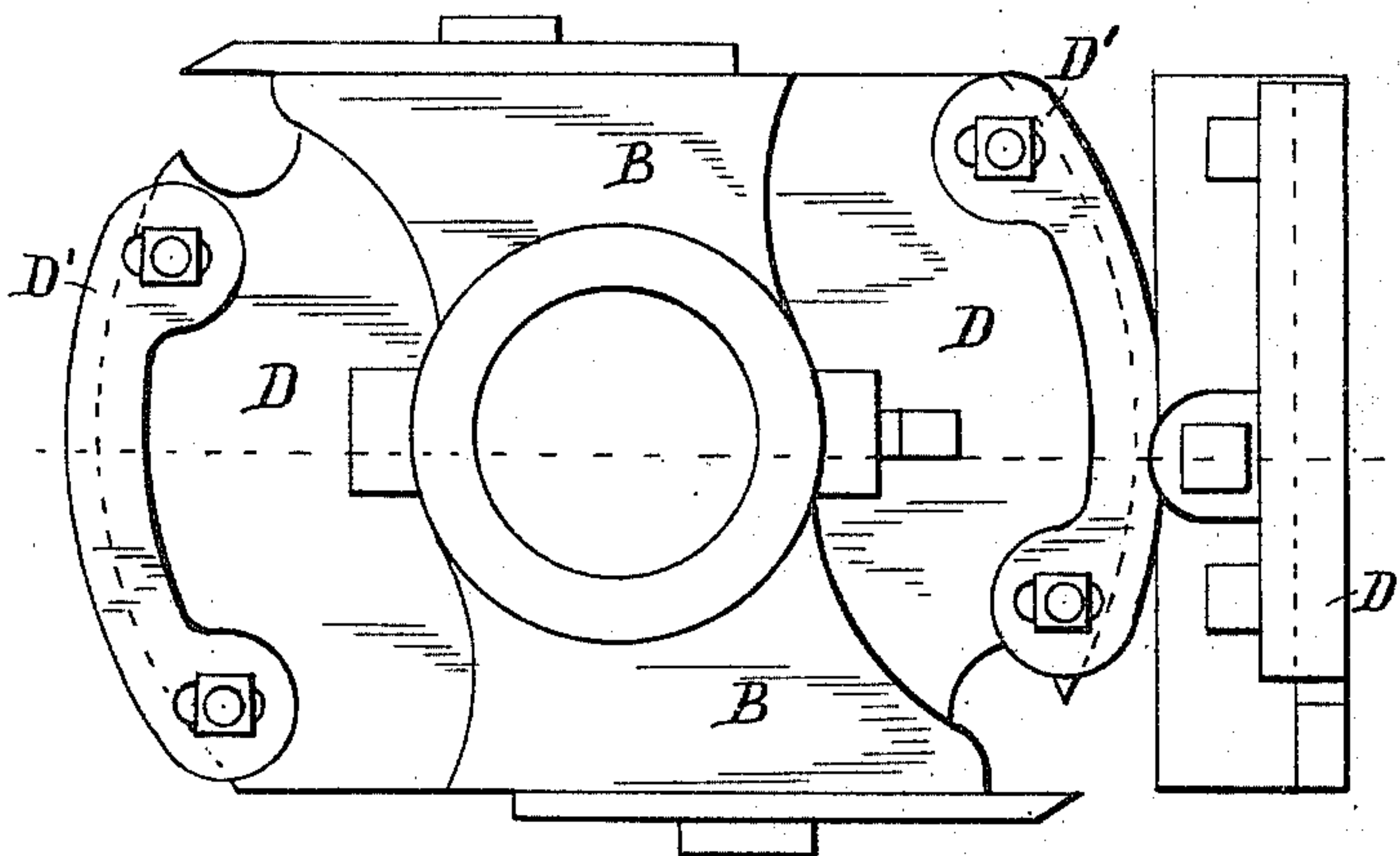


Fig. 4.

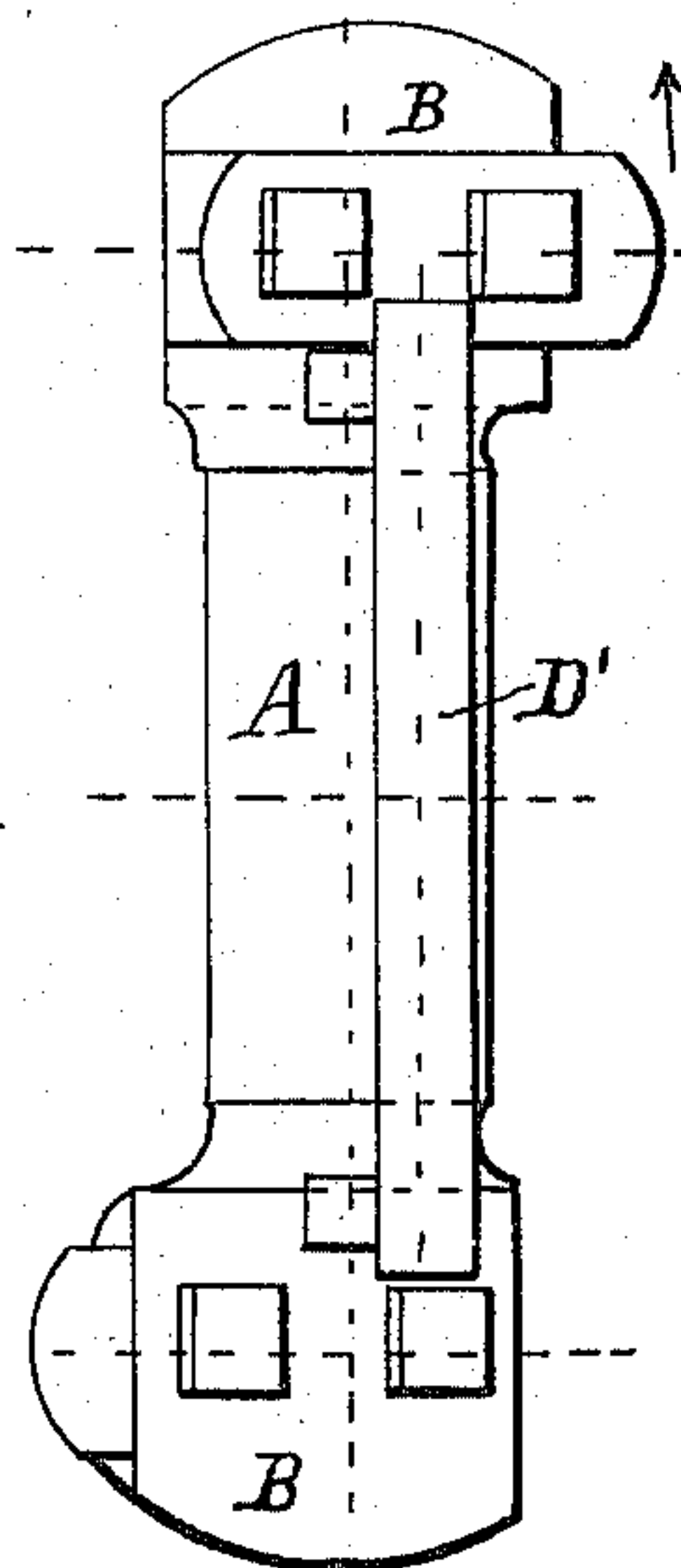


Fig. 3.

Witnesses:

Mark W. Dewey
A. S. Dewey.

Inventor.

Louis G. Merritt
By C. H. Duell
his Attorney.

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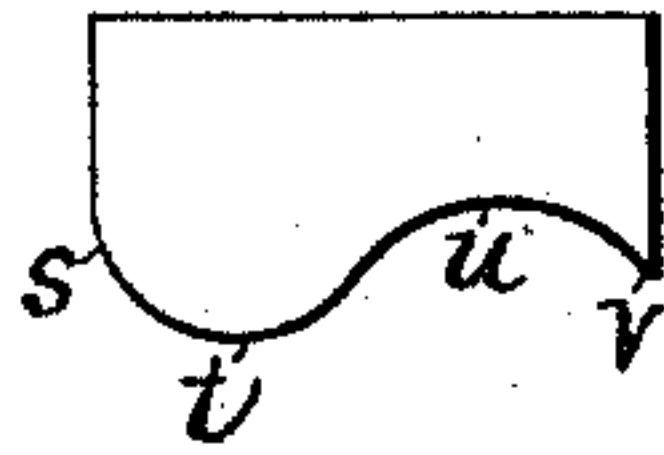


Fig. 5.

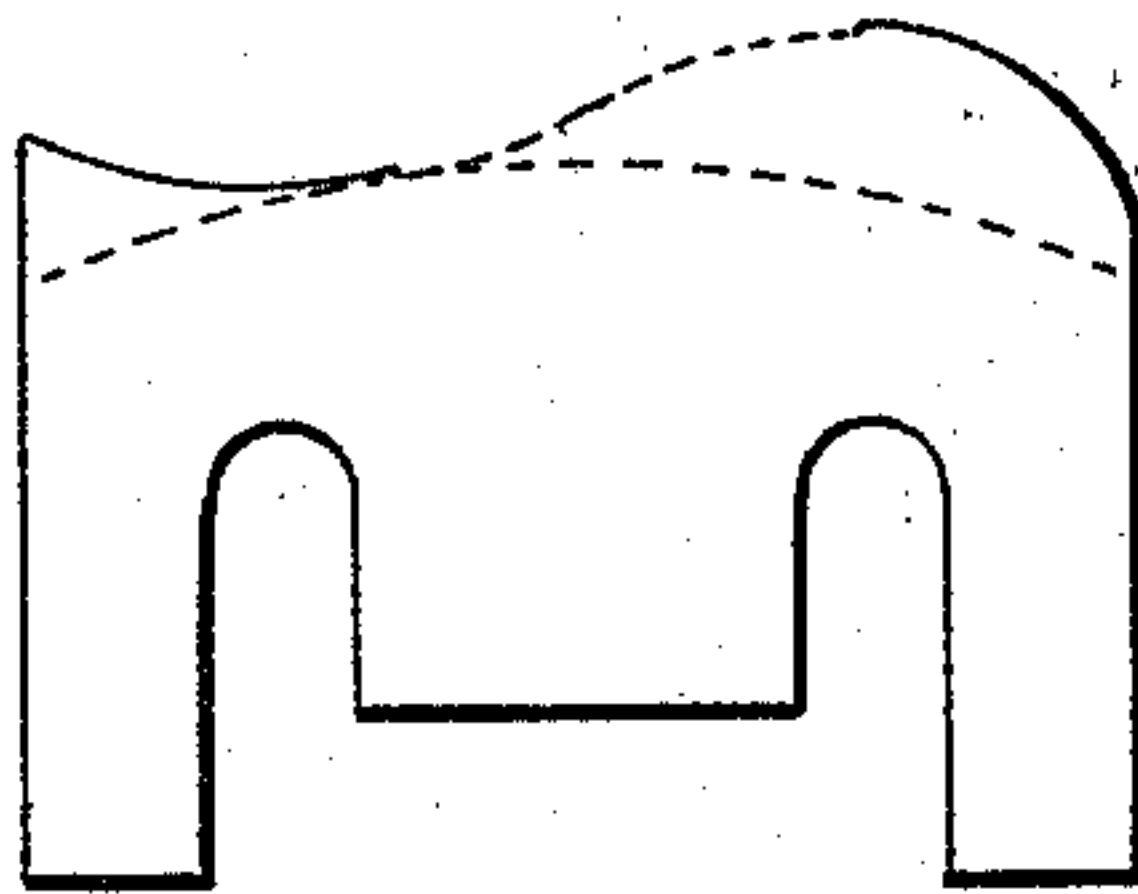


Fig. 6.

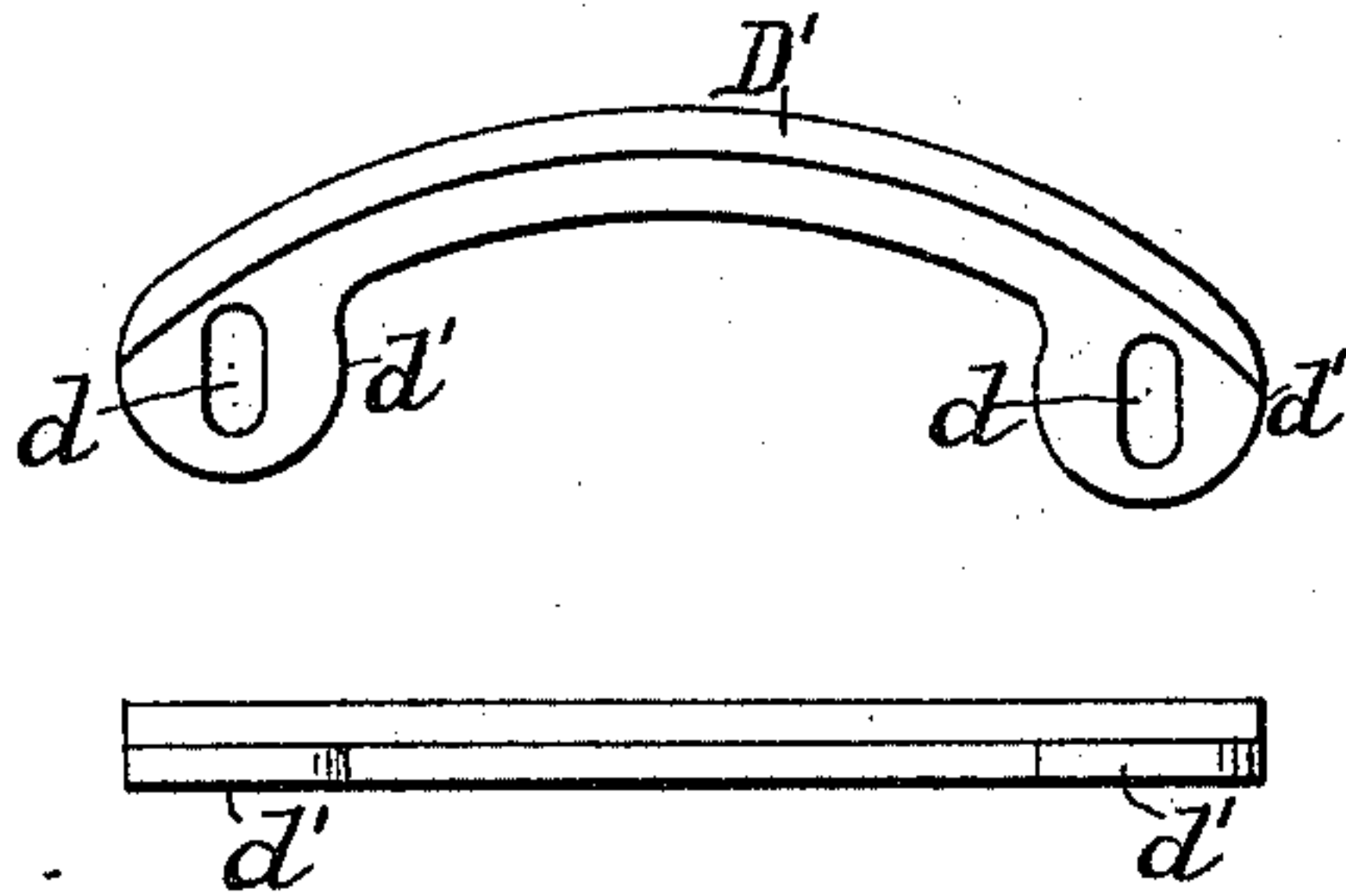
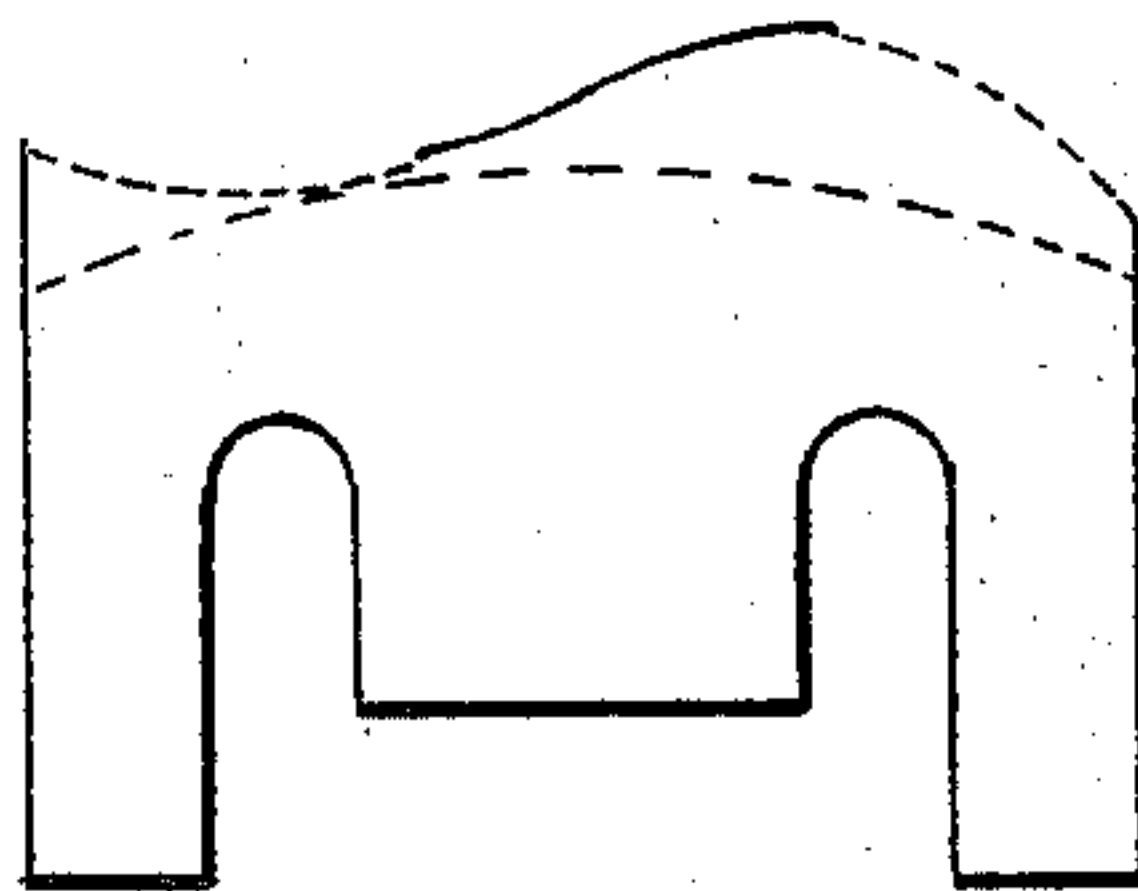
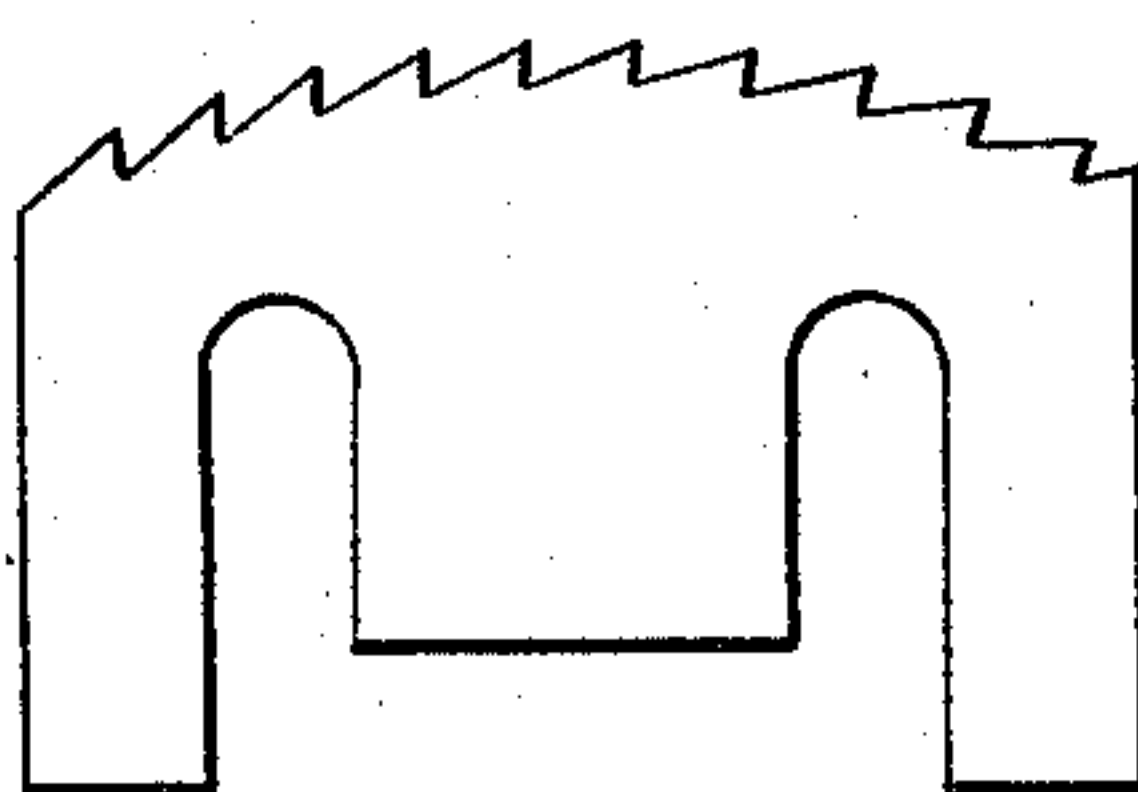


Fig. 7.

Fig. 8.



Witnesses:

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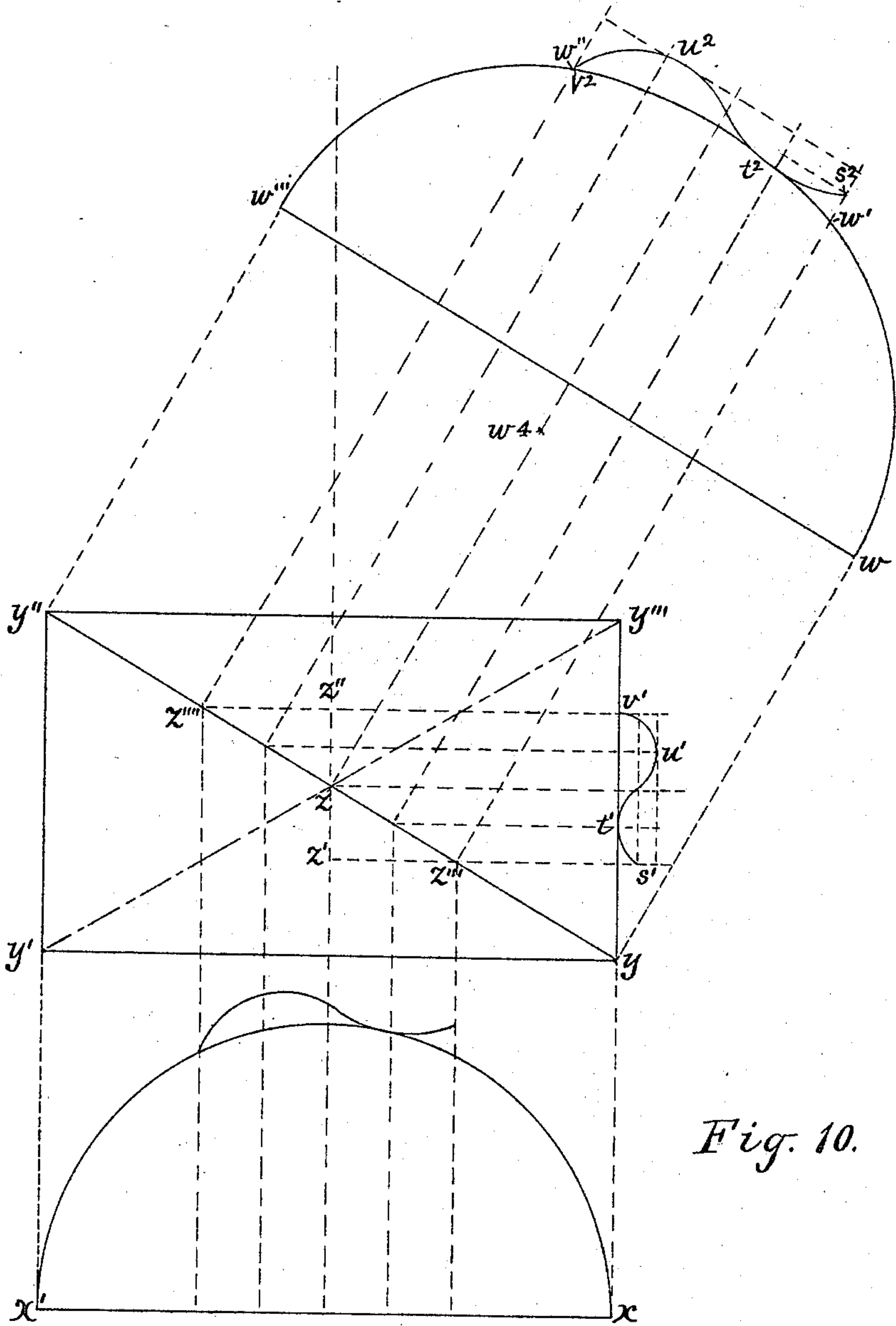


Fig. 10.

Witnesses:

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C. D. Dewey

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UNITED STATES PATENT OFFICE.

LOUIS G. MERRITT, OF LOCKPORT, NEW YORK.

KNIFE AND CUTTER-HEAD FOR LATHES.

SPECIFICATION forming part of Letters Patent No. 573,098, dated December 15, 1896.

Application filed July 5, 1894. Serial No. 516,572. (No model.)

To all whom it may concern:

Be it known that I, LOUIS G. MERRITT, of Lockport, in the county of Niagara, in the State of New York, have invented new and useful Improvements in Knives and Cutter-Heads for Lathes, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

My invention relates to certain improvements in knives and cutter-heads for lathes, &c., designed to cut irregular forms in wood; and the object is to cut smoothly and without splitting the beads.

My invention consists in the combination, in a cutter-head, of a hub provided with wings extending in parallel planes on diametrically opposite sides thereof and each extending equally on opposite sides of the shorter diameter of the ellipse formed by the plane of said wings cutting the cylinder of rotation, cutting-blades secured to the wings and so arranged that each cutting edge will also occupy equal spaces on opposite sides of the shorter diameter of the ellipse, whereby the center of the cutting edge engages the work perpendicularly thereto and the adjacent portions thereof approximately so; and my invention consists in certain other combinations of parts hereinafter described, and specifically set forth in the claims.

My improved knives are designed for cutting beads and other shapes involving side cuts and is capable of cutting across the grain of the wood without splitting the beads. This is accomplished by so shaping and setting the knives that the highest portion will be cut first. Otherwise, the ends of the grain being first cut off by the part of the knife making the deeper cuts, the top of the head left unprotected would be unable to stand the strain of the knife. In order also to make smooth work, this knife has a shear cut starting at the top of the bead and finishing at the bottom. This I accomplish by mounting the knife at an angle with the axis, as hereinafter explained.

In the drawings hereto annexed, Figure 1 is an end view of a cutter-head embodying my invention. Fig. 2 is a side or edge view of the same. Fig. 3 is another side or edge

view. Fig. 4 shows end and edge views of an ordinary cutter-head provided with my improved adjustable rails. Fig. 5 represents an ogee cut in a body by my improved knives. Fig. 6 represents the pair of knives used to make this cut. Fig. 7 shows two views of the adjustable rails removed from the cutter-head, and Fig. 8 is a modified form of knife that may be used for some purposes with my cutter-head.

Referring to the several views of the drawings, particularly to Figs. 1, 2, 3, and 4, the letter A indicates the hub of a revoluble cutter-head, and projecting from said hub are two wings B B, each of which is set at a great angle in the same parallel plane across the periphery of the hub, and by "great angle" is meant an angle greater than forty-five degrees. Said wings upon opposite faces thereof are provided with seats *b* for the reception of cutting-knives K K, which are adjustably set in the same parallel plane with the flanges, that is to say, at a slight inclination or angle to a line drawn in the direction of movement of the cutter-head. The knives K K (see Fig. 6) are made of thin steel and are secured to the wings by means of bolts I I, having square shoulders, which pass through rectangular slots made in said wings and are firmly held in the desired operative position by means of fish-plates B' B' and securing-nuts, as shown in Figs. 1 to 4, inclusive. Instead of placing the knives behind the wings, which form seats for said knives, the arrangement of the wings is such as to give to the knives a firm backing, thereby relieving the bolt-heads of all strain. In other words, the knives are secured to the front of the wings instead of the rear side. This brings the bevel of the cutting blade or knife against the seat and the cutting edge in front of it to the extent of the thickness of the knife. The cutting edges of the two knives are in the same plane—the plane of intersection with the cylinder of rotation—and the seats of the wings lie in two parallel planes a short distance apart, corresponding to the combined thickness of the two knives, as shown in Fig. 2 of the drawings. As thus arranged and secured the knives set at a slight

inclination or angle to the line of rotation of the cutter-head.

DD indicate two flanges, which extend outward from the hub A at right angles to the axis thereof and serve to prevent the knives drawing the work into the head, as will be hereinafter more fully explained. Each of the flanges is provided with an adjustable segment D', which is provided with ears d', having slots d for the reception of screws, by means of which said segment is adjustably secured to said flange. As the tendency of a revolving knife is to always draw the work toward the center of the cutter-head these segments, which form a part of a circle, are provided to serve as a stop, beyond which the work cannot be drawn. As the knife is set to give different depths of cut the segment is also set out to give the knife a constant lead or thickness of shaving. Segments of different thicknesses are employed to correspond with the displacement of the knife, each segment being slotted to allow it to be adjusted, but as the curvature of the circle changes on setting out the segment this adjustment can only be used within narrow limits. Two knives being used and carried by the revolving cutter-head, one is used to make a shear cut from right to left and the other from left to right, with portions of each knife relieved where the cut would not begin on the tops of the bead and finish at the base.

In order to find the shape of the knives to cut any desired pattern, I draw a circle xx' , one half of which is shown in Fig. 10 of the drawings, representing the base of the cylinder of revolution of the cutting edge of the knife. I then draw the rectangular figure $yy'y''y'''$, representing the diametrical section of the cylinder, and through the center of this section pass the plane yy'' , making an angle of, say, sixty degrees with the axis and representing the position of the knife with reference to the axis of revolution. The mate to this knife would make the supplement of this angle with the axis to lie in the plane $y'y'''$. It is only necessary to make the construction for one knife on the plane yy'' . On the axis of the cylinder lay off $z'z''z'''$, $z'z''$ being the length the knife will cut on the stick. Project z' to z''' and z'' to z'''' on the plane yy'' , giving $z'''z''''$ the actual length of the knife to cut $z'z''$. To find the shape of the edge of the knife to cut a straight line on the stick, the problem becomes to find the figure of intersection of the plane yy'' and the cylinder $yy'y''y'''$. This figure is found to be the ellipse $ww'w''w'''$. Of this ellipse the part $w'w''$ belongs to the edge of the knife, which is approximately the arc of a circle struck from a center w^1 .

Let Fig. 5 represent an ogee $stuv$, which it is desired to cut instead of a straight line. If the section of the cylinder in Fig. 10 be turned, as at $s't'u'v'$, to the reverse of this

shape, the desired pattern might then be ground into the wood. The problem then becomes one of finding the intersection of a plane $y'y''$. The construction is the same as before, and the knife is found to have an outline, as at $s^2t^2u^2v^2$.

Fig. 6 shows the knives made with edges ground, as determined in Fig. 10. In the upper knife in Fig. 6 the cut is from right to left and in the lower knife from left to right. The part of each knife shown in dotted lines is the part cut away, as it is seen that in these places the cut would start at the bottom of the bead and would end at the top, which must be avoided. The part which one knife leaves uncut is cut by the opposite knife, which has a shear in the other direction. It will be noticed that this knife occupies the part of the intersecting plane lying equally on opposite sides of the minor axis of the ellipse and that such a knife is not intended for straight cuts on account of a scraping action, but is adapted only for side cuts. The portion of the plane from w'' to w''' is that usually employed for shear-cutting knives, but for side cuts such a knife when set at a considerable angle is lacking in strength on account of the necessity of getting side clearance by grinding back of the edge; yet in deep cuts and in making bends this knife has to make a large angle with the axis in order to secure the desired shear cut from top to bottom of the head.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination in a cutter-head, of a hub provided with wings extending in parallel planes on diametrically opposite sides thereof, and each extending equally on opposite sides of the shorter diameter of the ellipse formed by the plane of said wings cutting the cylinder of rotation, cutting-blades secured to the wings and so arranged that each cutting edge will also occupy equal spaces on opposite sides of the shorter diameter of the ellipse, whereby the center of the cutting edge engages the work perpendicularly thereto and the adjacent portions thereof approximately so, substantially as and for the purpose specified.

2. The combination in a molding cutter-head for turning-machines, of a hub provided on opposite sides with wings set at a great angle to the axis of the said wings lying in the same plane of rotation and extending equally on opposite sides of a plane passing through the middle of the cutter-head at right angles thereto, the wings being provided with knives the edges of which are interrupted so that only the downward portions of each can engage the work, substantially as specified.

3. The combination in a cutter-head for turning-machines, of a hub having two oppositely-extending wings set at a great angle to

the axis of the shaft, each wing provided with
an oppositely-faced seat a cutter-knife there-
on, the cutting edges each being interrupted
and occupying equal spaces on opposite sides
5 of the shorter diameter of the ellipse formed
by the plane of said wings cutting the cylin-
der of rotation and the oppositely-extending
flanges provided with adjustable segments

to prevent the work from being drawn into
the cutter-head substantially as specified. 10

In testimony whereof I have hereunto
signed my name.

LOUIS G. MERRITT. [L. S.]

Witnesses:

ISAAC E. MERRITT,
FRED D. MAYER.