

No. 724,422.

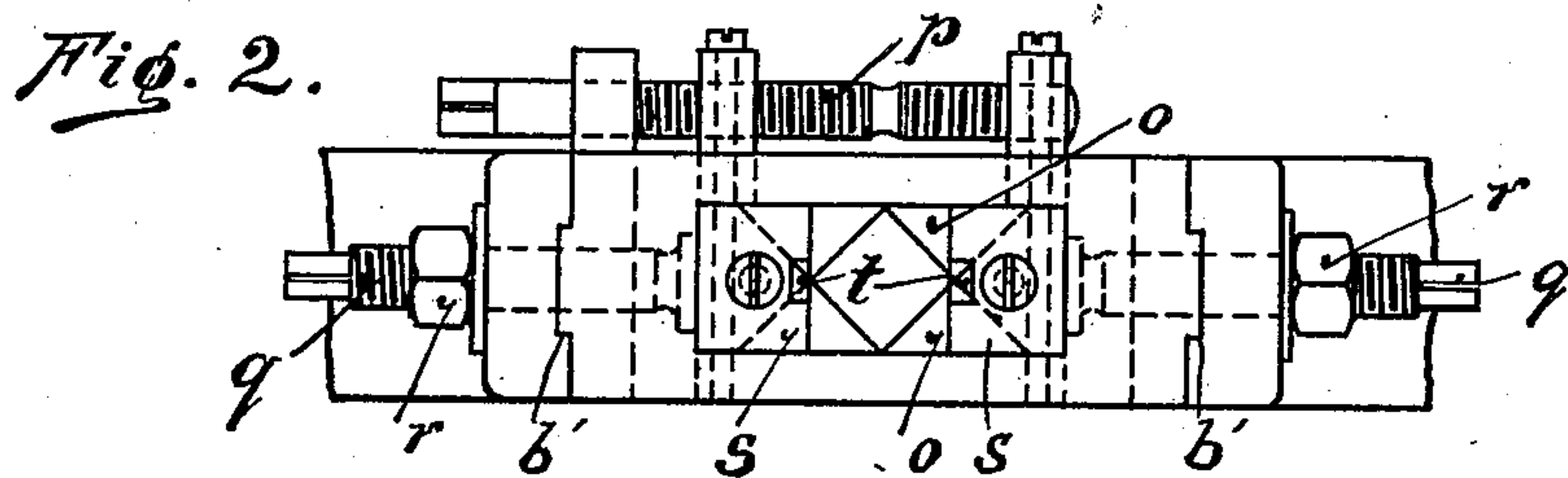
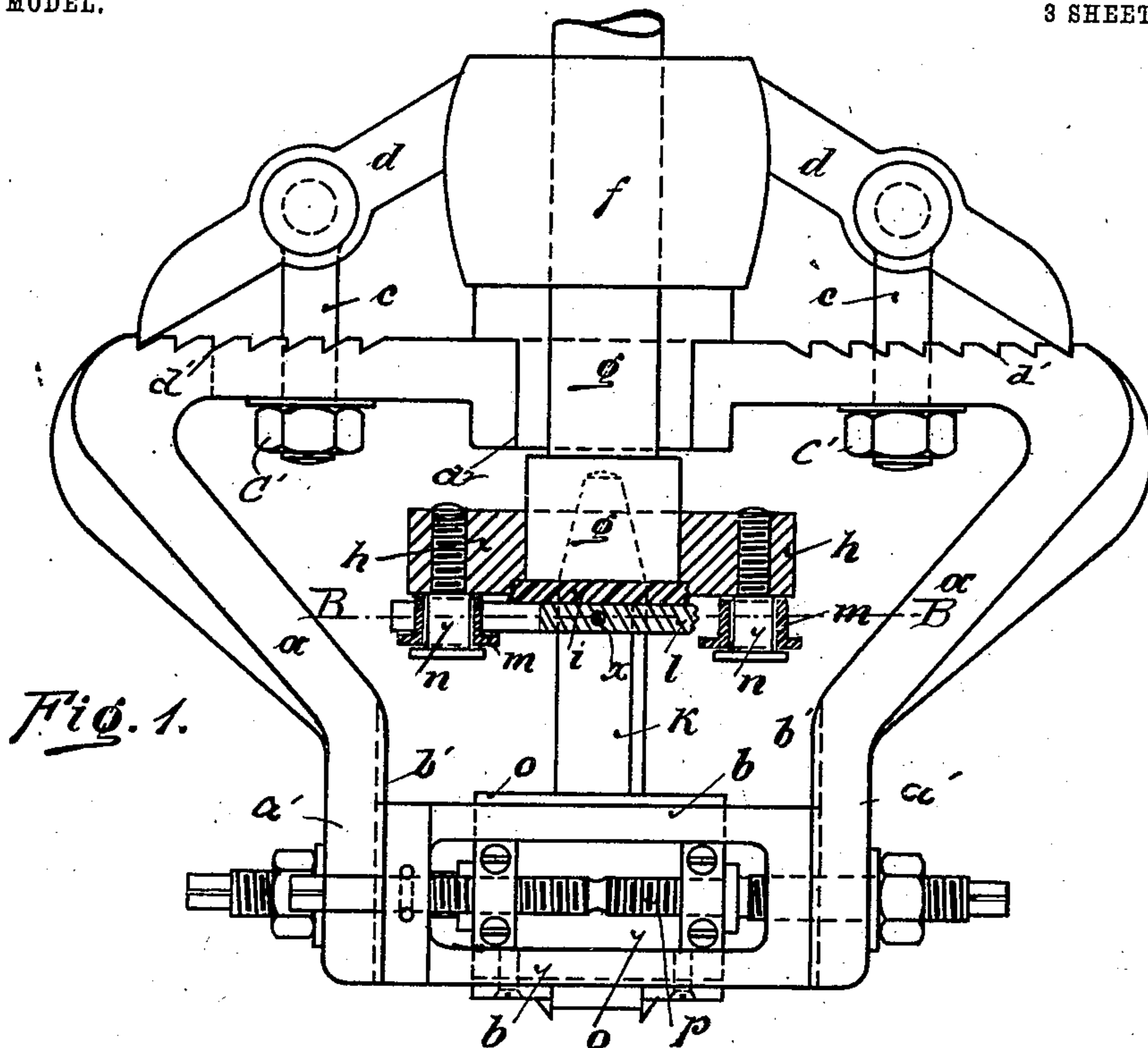
PATENTED APR. 7, 1903.

R. BARTHOLOMÄUS.
APPARATUS FOR BORING OR DRILLING ANGULAR HOLES.

APPLICATION FILED JUNE 26, 1902.

NO MODEL.

3 SHEETS—SHEET 1.



Witnesses:

Ludwig Fleissner
& Hansch.

Inventor:

Rudolf Bartholomäus

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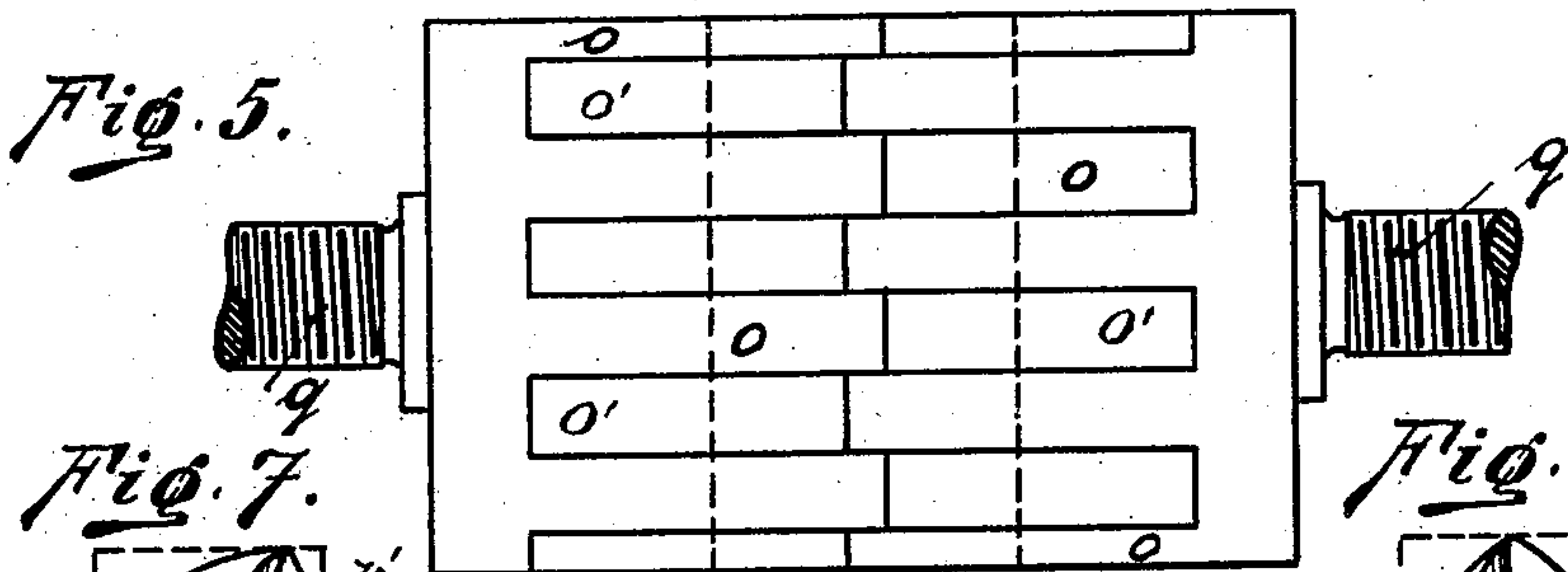
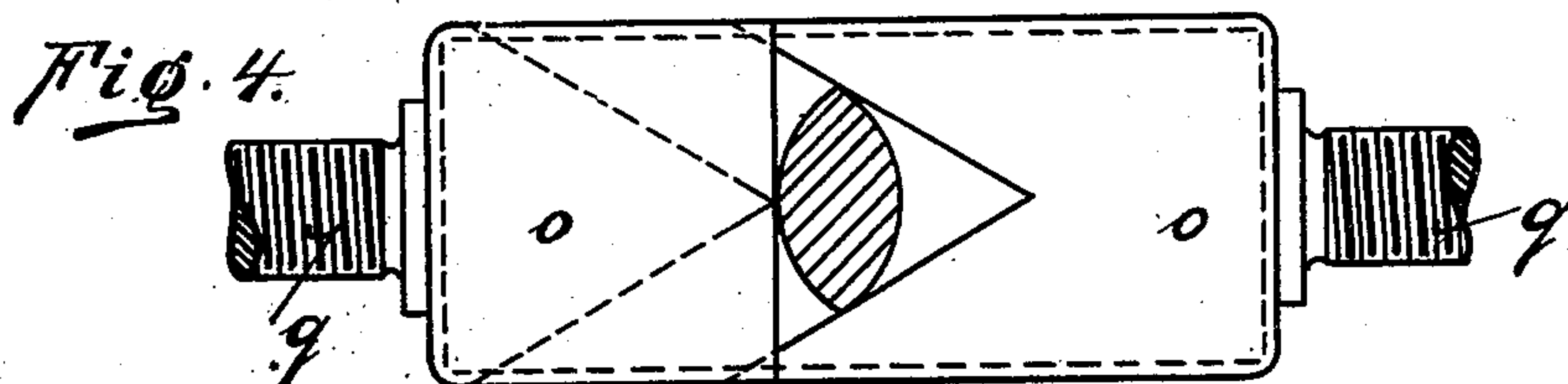
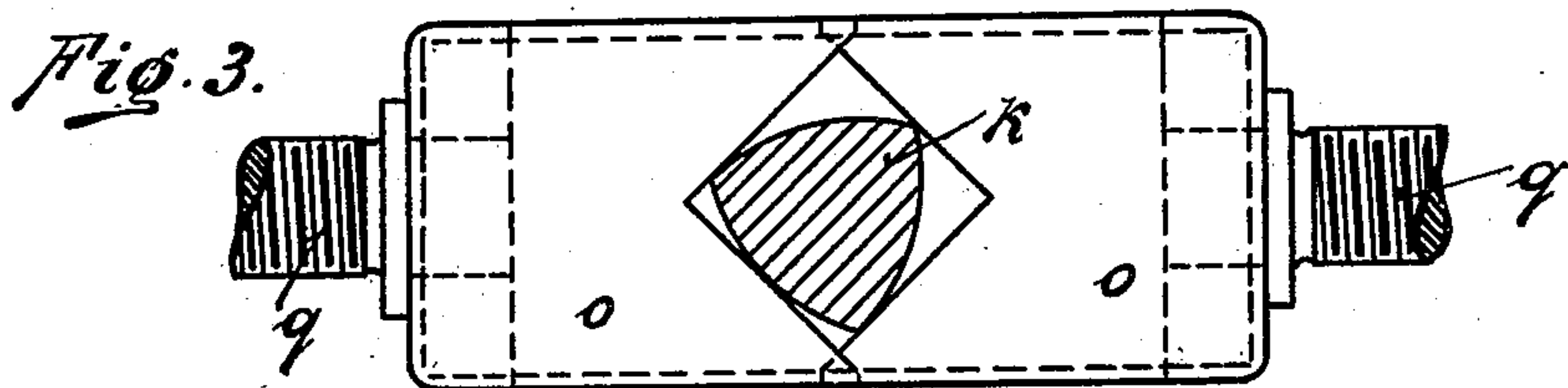


Fig. 7.

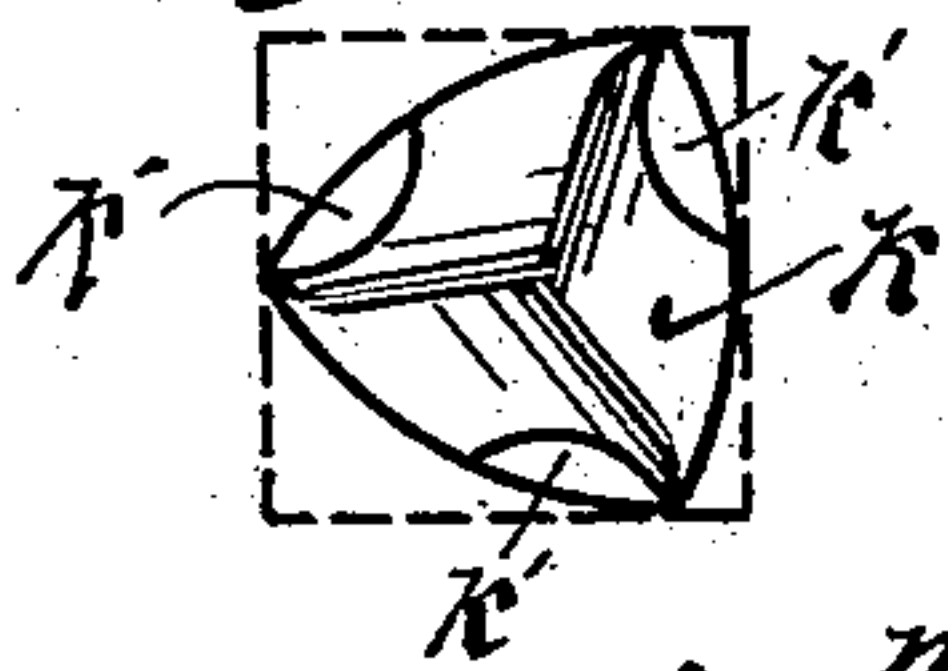
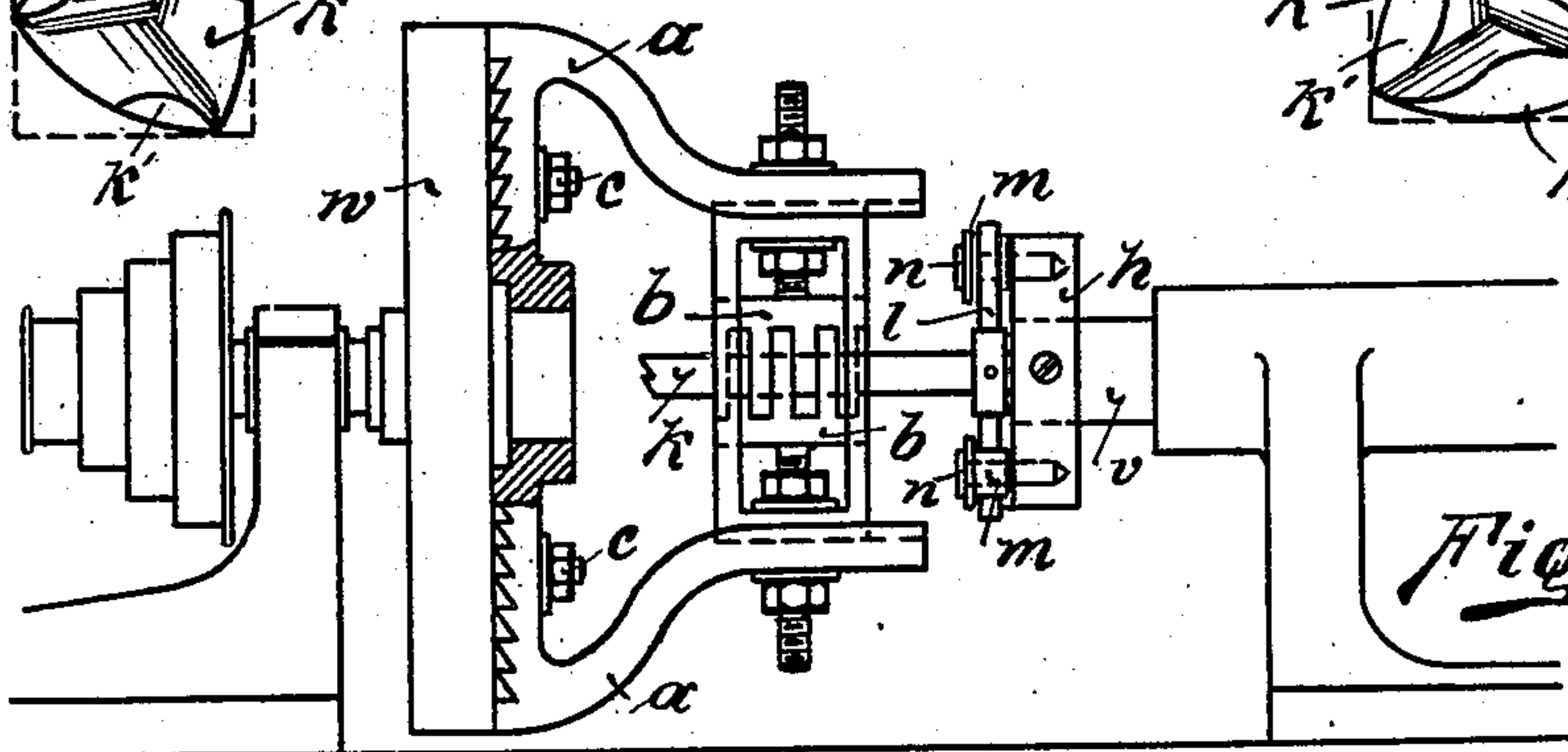
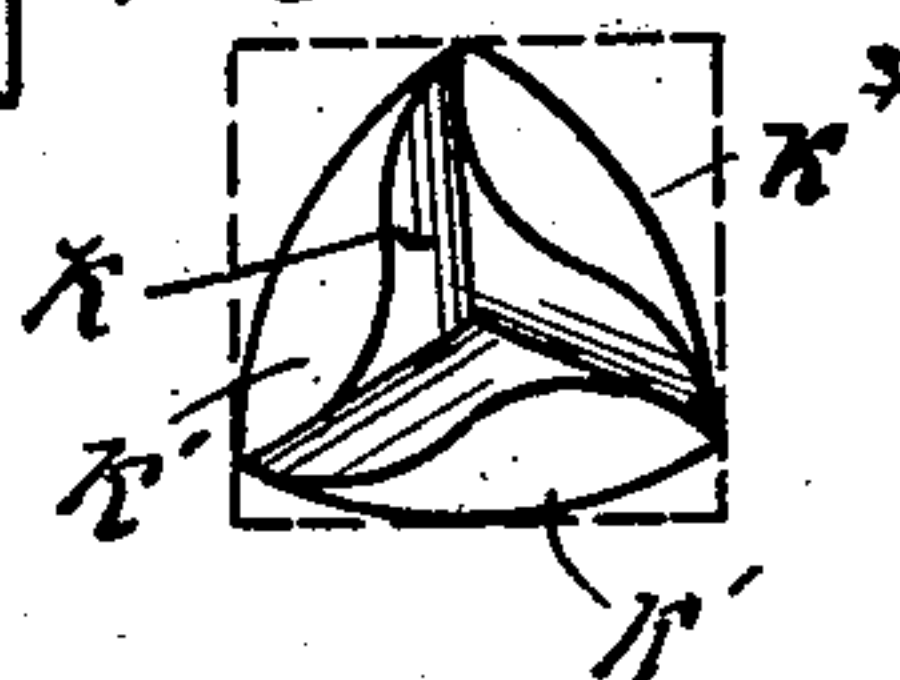


Fig. 8.



Witnesses:

Ludwig Flum
O. Hancock

Inventor

R. Bartholomäus

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3 SHEETS—SHEET 3.

Fig. 9.

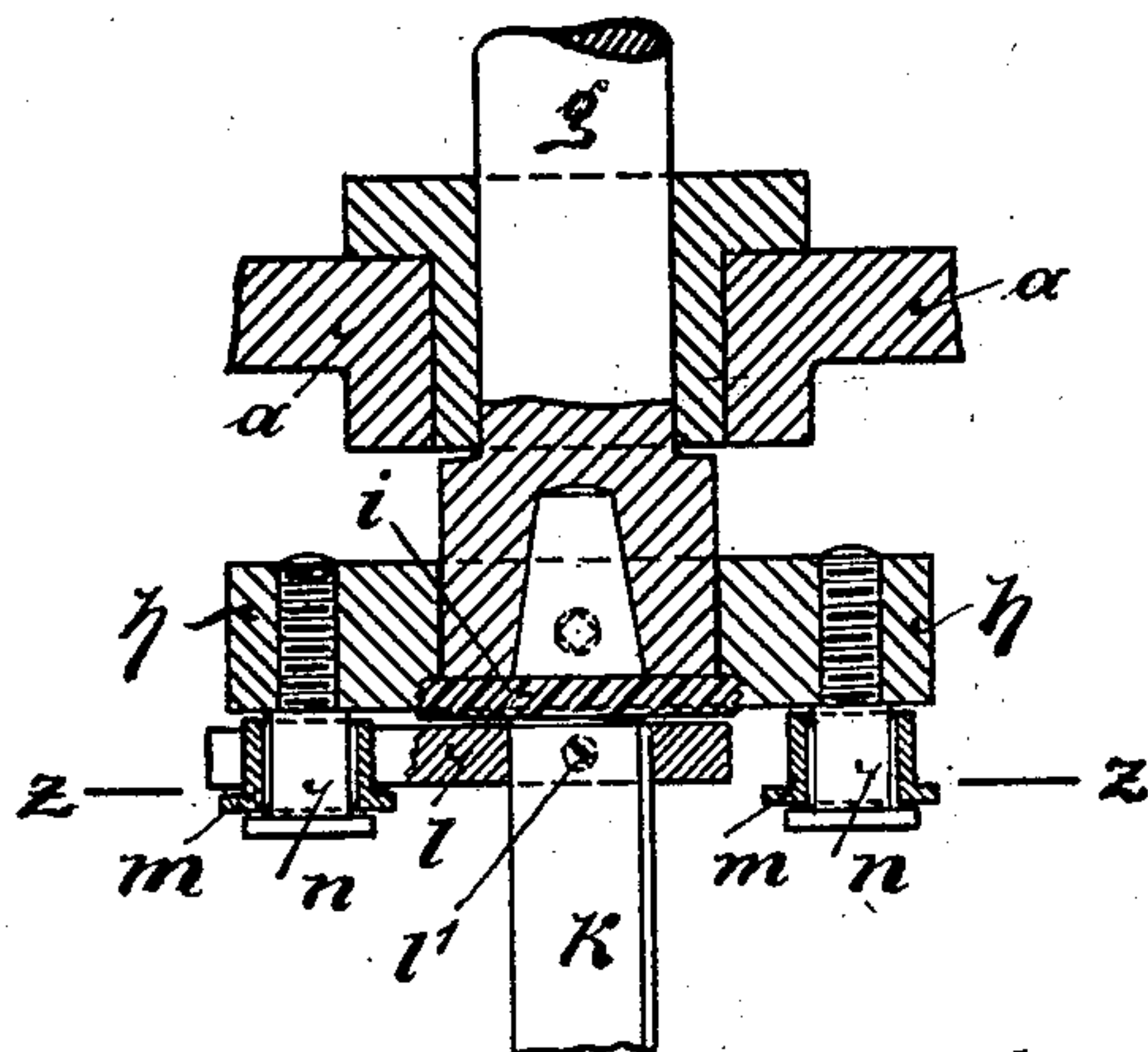


Fig. 10.

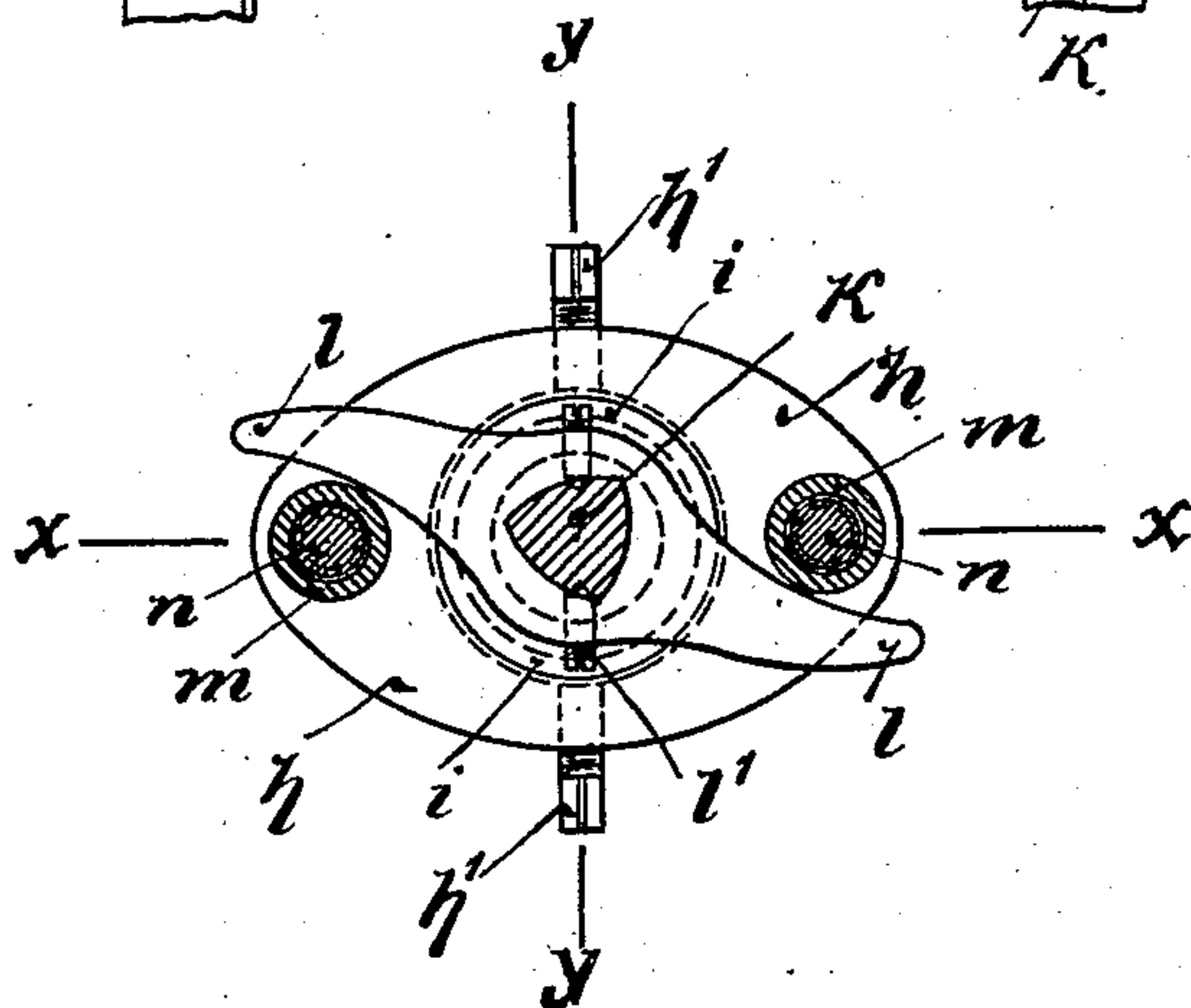
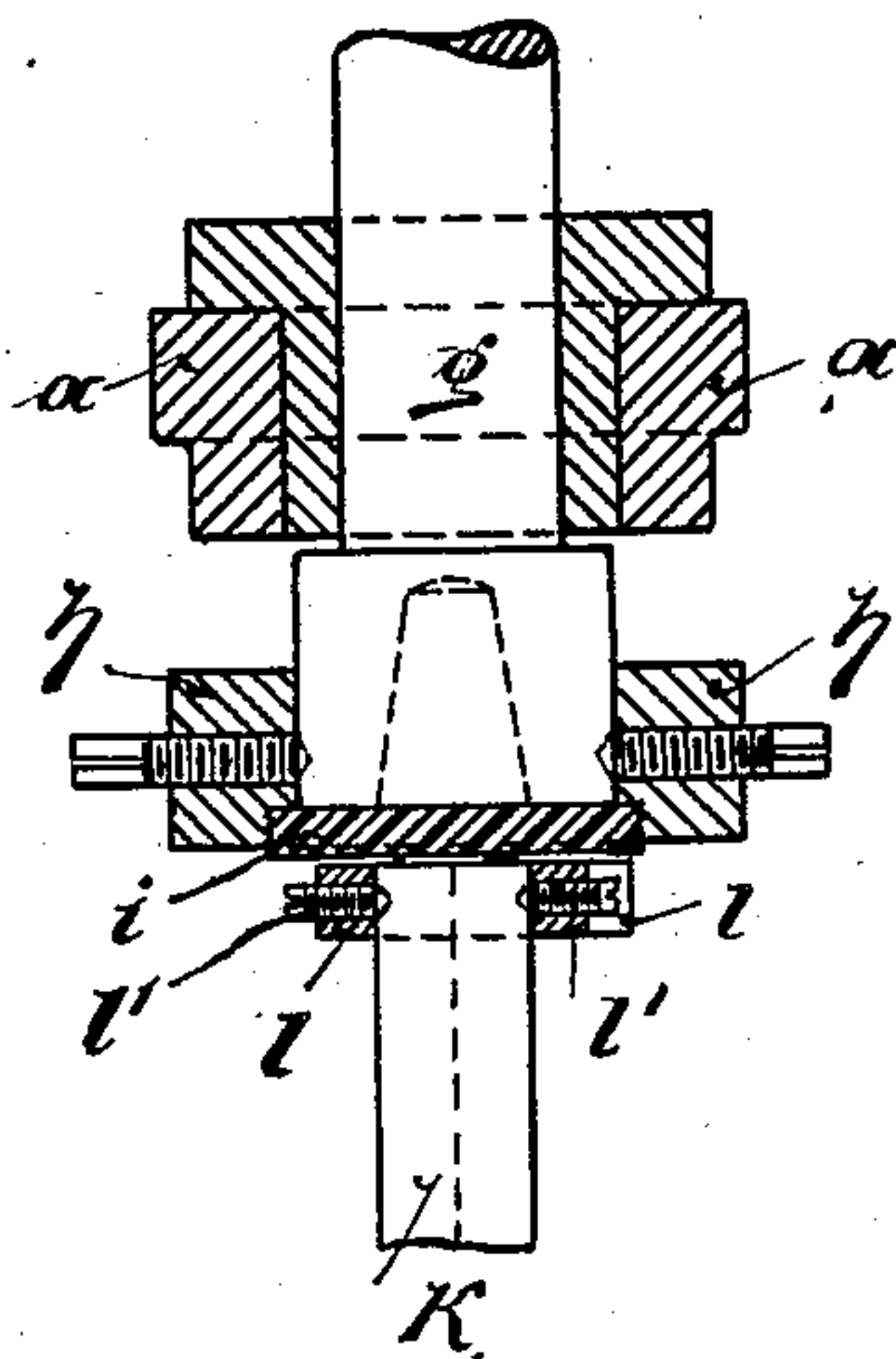


Fig. 11.

Witnesses:
L. Waldman
O. Carlberg

Inventor:
Rudolph Bartholomäus
by J. D. Singer atty

UNITED STATES PATENT OFFICE.

RUDOLF BARTHOLOMÄUS, OF ALTDORF, NEAR NUREMBERG, GERMANY,
ASSIGNOR TO WILHELMINE BARTHOLOMÄUS, OF ALTDORF, NEAR
NUREMBERG, GERMANY.

APPARATUS FOR BORING OR DRILLING ANGULAR HOLES.

SPECIFICATION forming part of Letters Patent No. 724,422, dated April 7, 1903.

Application filed June 26, 1902. Serial No. 113,315. (No model.)

To all whom it may concern:

Be it known that I, RUDOLF BARTHOLOMÄUS, mechanical engineer, a subject of the King of Bavaria, and a resident of No. 195
5 Untere Brauhausstrasse, Altdorf, near Nuremberg, Bavaria, Germany, have invented certain new and useful Improvements in Apparatus for Boring Angular Holes; and I do hereby declare the following to be a full,
10 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.

The present invention relates to a device for boring or drilling angular holes on the
15 known principle of the Cardan circles, which can be easily and rapidly applied to any ordinary drilling-machine, turning-lathe, or the like without special preparation. Said principle of Cardan's circle is, briefly, that if three
20 circles are struck from the apices of an equilateral triangle as centers the figure formed by their common intersection will, if turned in a rigid square of such dimensions as to circumscribe said figure, form a true guide or
25 shape for reproducing said square in the path of any one of its vertices.

In the drawings, Figure 1 is a side elevation, partly in section, of my improved device, showing it as applied to the spindle of
30 an ordinary boring or drilling machine. Fig. 2 is a detail in plan of the lower part of the apparatus shown in the preceding figure. Figs. 3 and 4 are enlarged details in plan of adjustable drill-guides for square and triangular holes, respectively, showing the appropriate drill-shanks in cross-section. Fig. 5
35 is an enlarged detail in elevation of said guides. Fig. 6 represents the apparatus in elevation as applied to a turning-lathe. Figs. 7 and 8 are enlarged details of the points of two differently-cut drills. Fig. 9 is a longitudinal section through the lower end of a drill-spindle with frame *a* mounted thereupon, showing the drill-driving mechanism.
45 Fig. 10 is an elevation and part section taken at right angles to view of Fig. 9 and showing details of the drill-driving mechanism. Fig. 11 is a bottom plan view of the drill-driving mechanism.

50 A bail-shaped frame *a*, carrying between

cheeks *a'* at its lower ends the removable drill-guide *b*, is capable of being secured to the spindle-bearing *f* of an ordinary drilling or boring machine by means of pawls *d* engaging racks *d'* on the upper straight face of said
55 frame and clamped as to their heel ends by hinged bolts *c* and nuts *c'* against said bearing, the arrangement permitting the adaptation to drilling-machines of various sizes. The spindle passes through a central core *a*²
60 in the frame.

To the spindle-head *g* a follower *h* is attached, preferably by screwing it thereon by means of the screws *h'*. Into the under side of this follower a hardened-steel plate *i* is
65 screwed to serve as a thrust-block for the borer *k*. The latter is driven by a dog *l*, secured to the borer *k* itself and actuated by the spindle cross-head through its pins *n*, depending on each side thereof, and since the
70 borer continuously changes its position with regard to the axis of the spindle rollers *m* are mounted on said pins *n* to reduce friction and permit of the necessary lateral play. Thus the drill is free to follow the kinematic
75 law while being driven, and the thrust is taken by the hardened-steel thrust-plate, while the dog is prevented from falling down by means of the flanged rollers working on
80 the depending pins.

The borer *k*, shaped according to the kinematic law, slides in a suitable guide *b*, formed by two or more cheeks *o*, the sides of which are provided with projections *o'*, Fig. 5, meshing together like teeth, so that adjustment
85 for any desired thickness of borer can be easily effected. This adjustment of the guide-cheeks *o* can be effected by various auxiliary means—for instance, in the present case by means of a right and left screw-threaded spindle *p*. The guide may also be vertically movable in ways *b'* (indicated by dotted lines in
90 Fig. 1 and full lines in Fig. 2) in the cheeks *a'*, formed by the lower parallel ends of frame *a*, which are slotted for this purpose, to allow
95 screw-bolts *q*, which carry the guide-cheeks *o*, to be moved up or down and to be held in position by lock-nuts *r*, securing structure to the frame-cheeks.

To easily adjust the borer-guide for a cer- 100

tain size of hole, two plates *s* are bolted to the under side of the guide *b* and provided with points *t*, corresponding exactly with vertices of angle of guide in case of square or
 5 with side and vertex in case of triangle or other such figure. On the work to be bored marks are made corresponding to the hole to be drilled, and the points *t* are adjusted there-
 10 to by suitably moving the cheeks *o*. The drilling of the hole will then take place conforming to said marks and according to the shape of the guide.

It is obvious that not only triangular and quadrangular holes, but also polygonal holes,
 15 can be bored with the aid of this apparatus, the cross-section of the drill in the latter case being given a polygonal form and the borer-guide being altered accordingly. The exact shape of the drill-shank section can in each
 20 case be readily determined by the known application of Cardan's circles.

If the apparatus is to be applied to a turning-lathe, the follower *h* and dog *l* are held by the spindle *v* of the tail-stock and the work
 25 rotates with the frame *a* and the borer-guide *b*, which in this case are fastened to the face-plate *w*, as shown in Fig. 6. The hinged bolts *c* and pawls *d* are not used in this form of attachment and are temporarily removed,
 30 the frame being held to the face-plate by any well-known means, such as ordinary bolts used on lathes to carry work. It will be understood that this is one object in making the borer-guide readily removable from the
 35 frame *a*—to wit, in order that it may be reversed to bring the points *t* against the work when cross-heads *h* and *l* are used upon the adjusting-spindle of a lathe and frame *a* is secured to the work-holder thereof. Owing
 40 to the fact that the borer simply abuts with its blunt end against the plate *i*, the inconvenient and lengthy operation of fitting the borer-cone into the spindle-head is dispensed with.

45 Within certain limits the guides only require to be exchanged when the profile of the bore-hole is changed. With the same profile it is only necessary to insert other borers.

The borer *k* is so formed that its under side
 50 is sharpened in the manner of a cutter, while the lateral cutting-surfaces are hollowed out, as at *k'* in Figs. 7 and 8. This has the advantage that grinding can be easily and rapidly performed.

55 What I claim, and desire to secure by Letters Patent, is—

1. In an apparatus for boring or drilling

geometrically true and triangular, square or other polygonal holes the combination of a frame *a*, carrying an adjustably-arranged
 60 drill-guide *o*, on the frame a slotted straight face, ratchet-teeth *d'* on said straight face, a central bore in the said face, and removable means for securing the said face to the spindle of a drill-press. 65

2. In an apparatus for boring or drilling angular holes, the combination of a suitable frame, having a ratchet-toothed straight face; pawls engaging said ratchet, bolts pivoted to said pawls and passing through the adjacent
 70 part of the frame, and nuts engaging said bolts to draw down the heels of the pawls, whereby the frame may be secured to the bearing of a drill-spindle.

3. In an apparatus for boring or drilling
 75 angular holes the frame *a*, the adjustably and reversibly mounted polygonal drill-guide *b* carried by said frame, means for attaching the frame to a non-rotating member, the fol-
 80 lower *h* attached to the spindle-head *g*, pins *n* depending from said follower, the dog *l* driving the drill and engaged and driven by the said pins *n*.

4. In an apparatus for boring or drilling
 85 angular holes, the combination of a bail-shaped frame having parallel cheeks at its lower converging ends, a polygonal drill-guide adjustably and detachably secured between said cheeks, a spindle passing through the
 90 upper part of the frame, a detachable follower upon said spindle, a thrust-plate upon said follower, pins depending from the follower, a dog supported and driven by said pins, a drill bearing against said thrust-plate,
 95 and secured and driven by said dog, said drill having a shank shaped in cross-section after a modification of Cardan's circles and adapted to coact with the said polygonal drill-guide to reproduce the similarly-polygonal path of the
 100 cutter.

5. In an apparatus for drilling angular holes, the combination with the drill-guide and its cheeks *o*, of plates *s* upon the under
 105 side thereof, provided with points *t* and carried with said cheeks, whereby said points serve to gage the size of the hole to be cut and the consequent adjustment of the cheeks.

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

RUDOLF BARTHOLOMÄUS.

Witnesses:

ALEX. WIELE,
 MAX SCHNEIDER.