(Model.) 3 Sheets—Sheet 1.

F. MOSSBERG.

TWIST DRILL GRINDING ATTACHMENT.

No. 388,784. Patented Aug. 28, 1888.

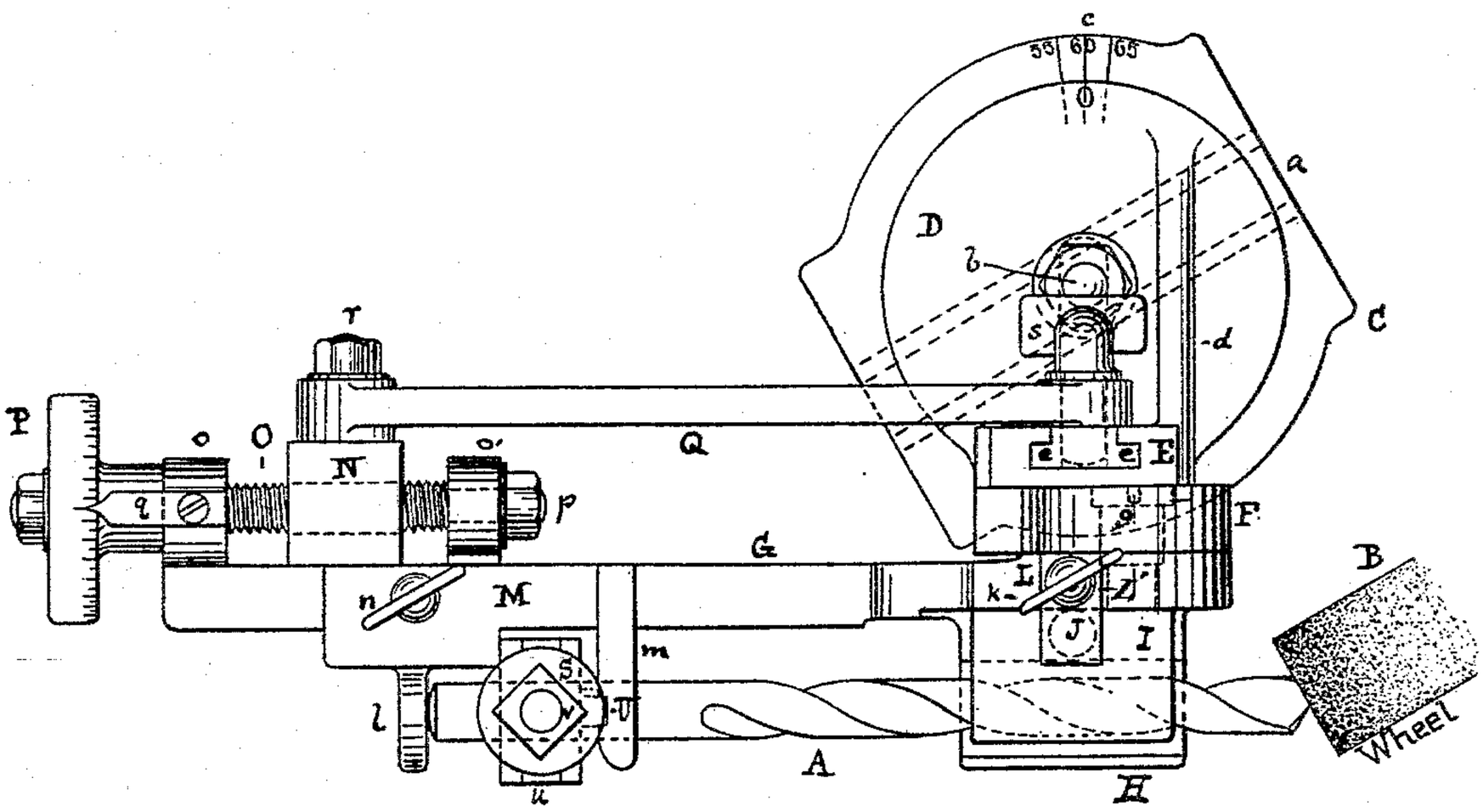

Fig. 1.

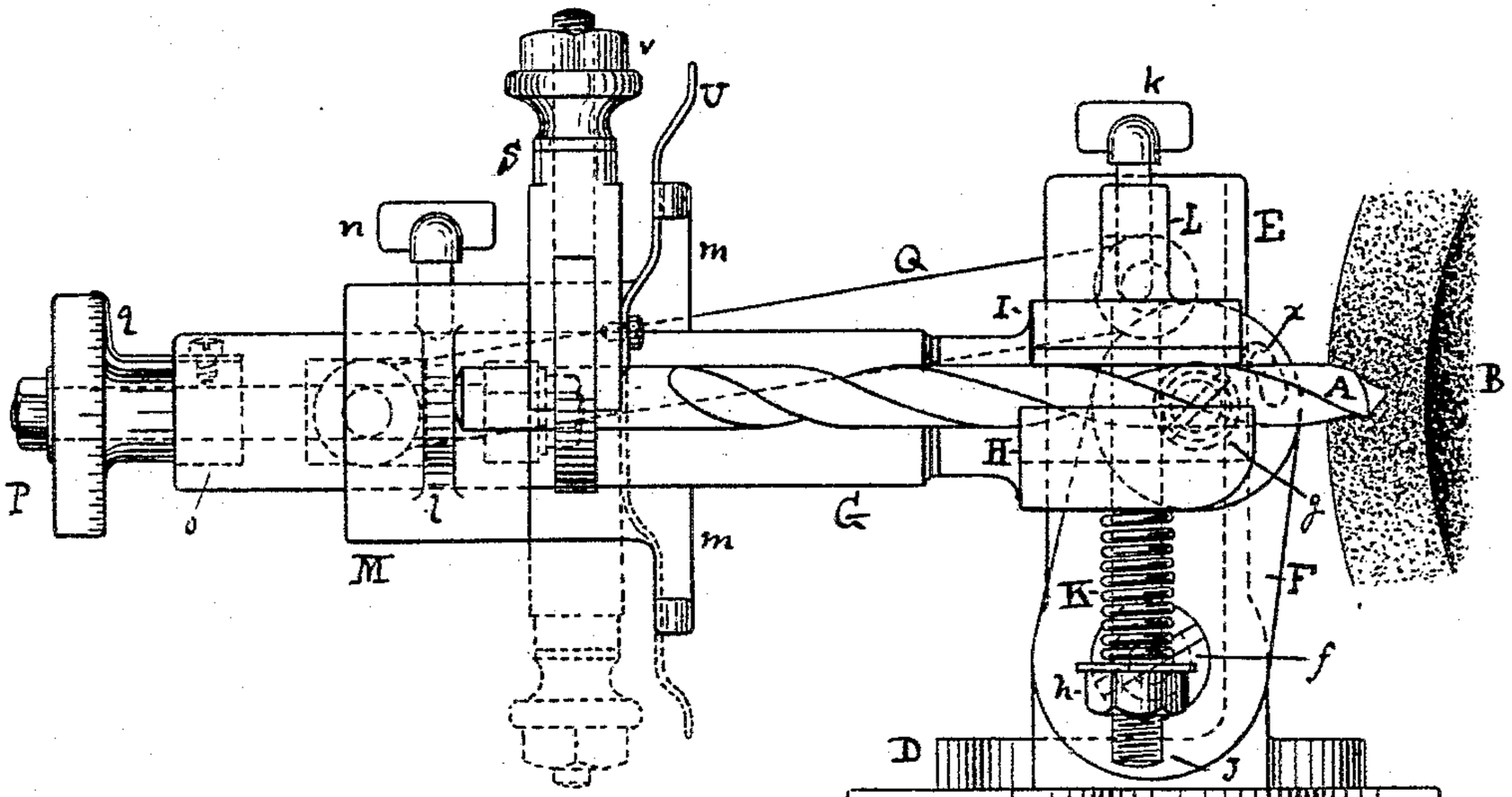

Fig. 2.

WITNESSES.

Jacob W. Stinchcomb.

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(Model.)

3 Sheets—Sheet 2.

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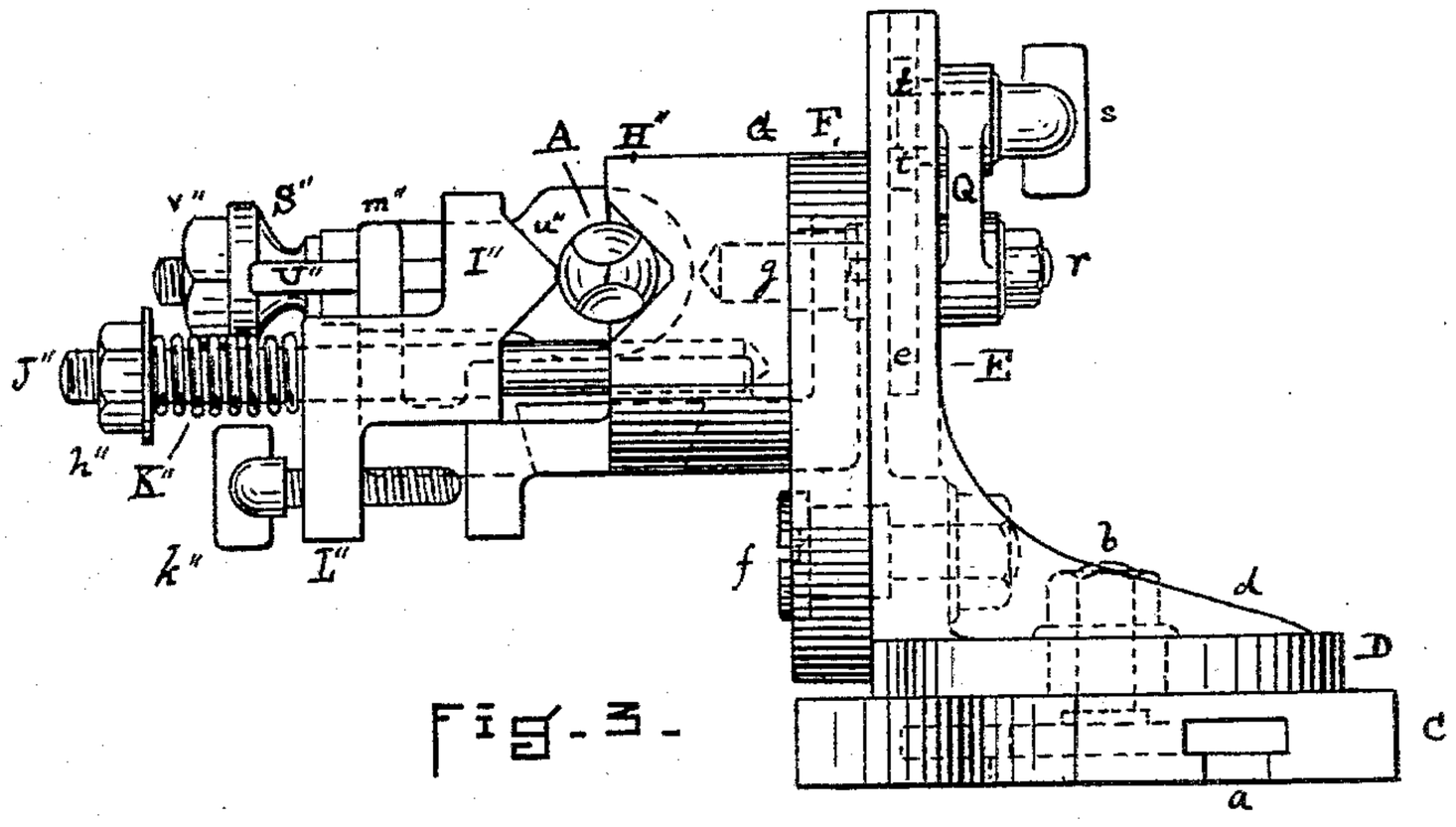

Fig. 3.

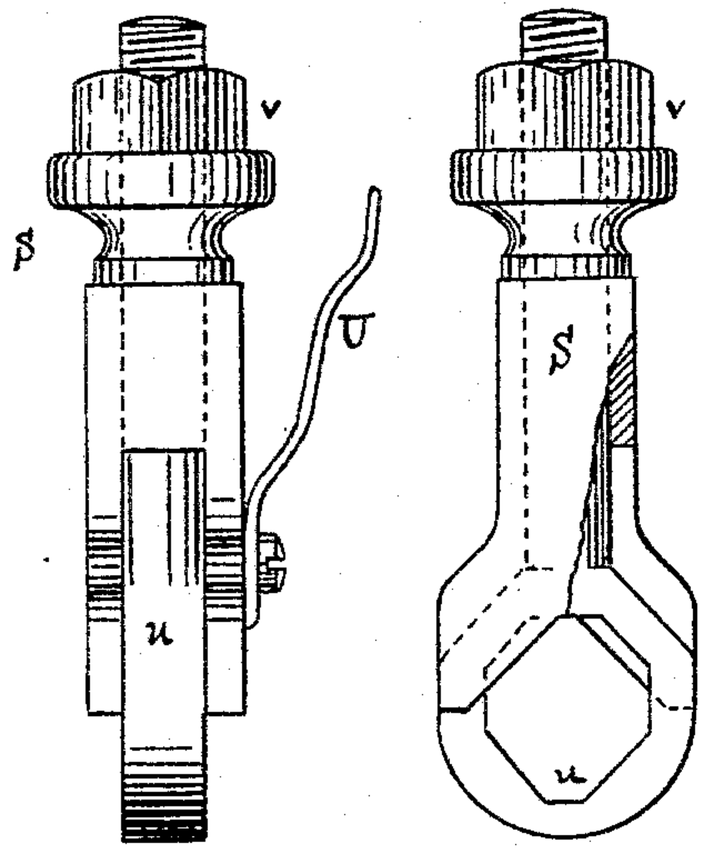

Fig. 4.

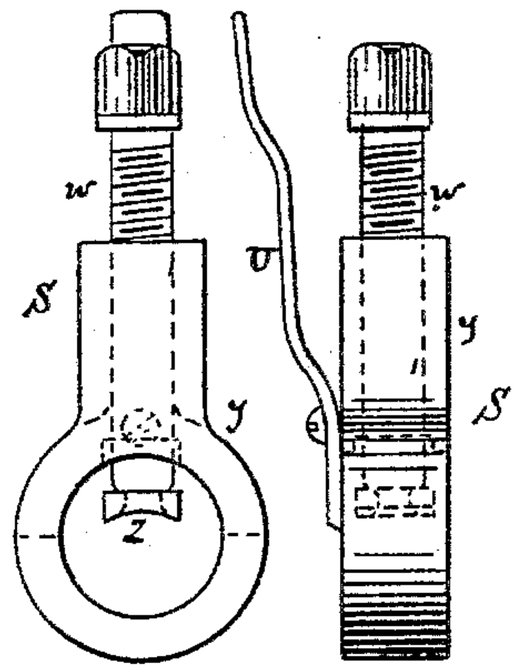

Fig. 5.

WITNESSES.

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(Model.) 3 Sheets—Sheet 3.

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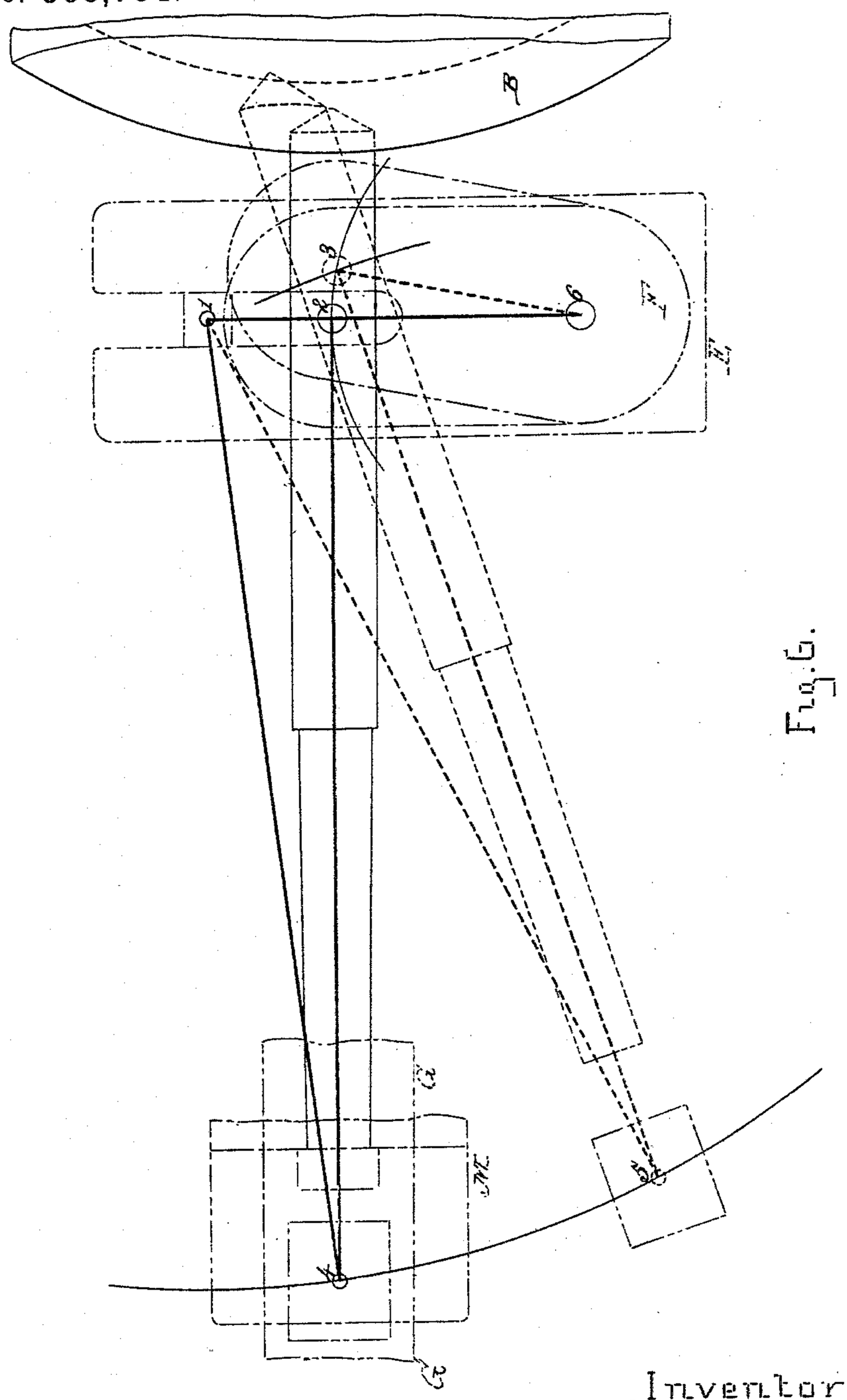

Fig. 6.

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UNITED STATES PATENT OFFICE.

FRANK MOSSBERG, OF PAWTUCKET, RHODE ISLAND.

TWIST-DRILL-GRINDING ATTACHMENT.

SPECIFICATION forming part of Letters Patent No. 388,784, dated August 28, 1888.

Application filed October 6, 1886. Serial No. 215,503. (Model.)

To all whom it may concern:

Be it known that I, FRANK MOSSBERG, of Pawtucket, in the county of Providence, in the State of Rhode Island, have invented a certain new and useful Improvement in Twist-Drill-Grinding Attachments; and I declare the following to be a specification thereof, reference being had to the accompanying drawings.

Like letters indicate like parts.

Figure 1 is a top plan of my invention. Fig. 2 is a side elevation of the same. Fig. 3 is an end view showing the clamping device in a modified form. Figs. 4 and 5 are detail views of the drill-holder used in turning the drill. Fig. 6 is a diagram illustrating the operation of giving the lips of the drill a suitable clearance.

My invention is a device for holding and properly moving a twist-drill for the purpose of grinding it upon an emery-wheel, so as to sharpen the cutting-edges of such drill and give to the lips a suitable clearance and angle. It consists of clamps and a sliding block mounted upon the main bar and capable of adjustment for the proper support of the drill while being ground, a drill-holding device to turn the drill as desired, a main bar oscillating upon a pivot of a link, a swinging link connected to said main bar and to the head-piece of the machine, and a connecting-rod vertically adjustable at one end upon the head-piece and connected at its opposite end to the main bar, as hereinafter more particularly described and claimed.

In the drawings, A represents the drill, which is to be ground on the wheel B. The machine is supported by two base-plates. The base-plate C has a T-shaped slot upon its bottom side, as seen at *a*, and by means of said slot it is attached to the table of the grinding-machine by a screw-bolt whose head engages in the slot. My grinding attachment is thus capable of adjustment in the direction of such slot. The upper plate, D, is integral with the head-piece E, and has a horizontal rotary motion upon the plate C by turning on the screw-pivot *b*. The plate D has a central hole, through which the screw-pivot *b* passes, and consequently it is capable of adjustment, so as to bring the drill into position laterally upon any part of the periphery of the wheel B. By means of an index upon the plates C D, as shown at *c*, the plate D may be turned to any required point upon the plate C, and by this means the angle of the lip of the drill may be varied as desired, as such slight rotation of the plate D carries the entire operative parts of the machine and determines the angle at which the drill A is presented to the wheel B.

In Figs. 1 and 3, *d* denotes a rib to strengthen the connection of the plate D with the head-piece E. The head-piece E has a vertical T-shaped slot, as seen at *e*. On the side of the head-piece E which is opposite to the slot *e* a link, F, is pivoted at its base by the screw *f*. This screw *f* is a fixed center for the oscillation of said link. At the upper end the link F is pivoted by a screw-bolt, *g*, to the forward end of the main bar G, and a pin-and-slot arrangement, as shown at *x* in Fig. 2, limits the movement of the bar and link on each other. The main bar G carries at its forward end the clamping device, which consists of a fixed jaw, H, integral with the bar G and furnished with a longitudinal V-shaped groove or channel. The upper jaw, I, is movable vertically and is provided with a V-shaped lip or flange. A bolt, J, is fixed to the jaw I and passes down through the lower jaw, H. Said bolt J has a screw-thread at its outer or lower end, upon which a nut, *h*, is engaged. A spiral spring, K, surrounds the bolt, and has its bearings at the lower end against the nut *h* and its upper bearing against the under surface of the fixed jaw H. The pressure of the spring K is regulated by the nut *h*. From the top of the jaw I a post, L, projects upward, having an arm, L′, extending therefrom at a right angle, through which arm is a set thumb-screw, *k*, whose lower end bears on the top of the bar G. A sliding block, M, slides on said bar lengthwise, and for its proper connection the bar G and the block M should be beveled. The block M has a vertical projection, *l*, on its outer side and two horns, *m*, bent in a direction at a right angle to the bar G and extending parallel to each other, the one at the top and the other at the bottom. Each of these horns *m* has a transverse recess near its end. A thumb-screw, *n*, extends through the top flange of the block M and bears on the top of the bar G. On the rear surface of the bar

G are two fixed lugs, *o o'*. A feed-screw, O, passes through the lugs *o o'* and the block N, which is tapped and screw-threaded and which travels along the thread of the screw O. The screw O has at its inner end a nut, *p*, and at its outer end a fixed wheel, P, on whose rim is an index, as shown in Figs. 1 and 2. A pointer or finger, *q*, is fastened to the lug *o* by a screw and its end is bent to lie close over the rim of the wheel P, as shown. A connecting-rod, Q, is mounted upon the end of the block N by the screw-pivot *r*. At its opposite end is a thumb-screw, *s*, which passes through it into a flanged nut, *t*, which slides along the T-shaped slot *e* in the head-piece E. The nut is clamped in any desired position within the slot by means of the thumb-screw *s*.

In Fig. 5 I show an enlarged view of the drill-holder S, which consists of a collar and stem in one piece and has a screw-bolt passing through said stem. A loosely-fitting washer is placed on the inner end of said screw-bolt. A bent spring-finger, U, is fastened to one side of the holder S.

Having thus described the parts of my invention, I will now explain its operation.

To fasten my grinding attachment upon the table of the emery wheel or grinder, I insert the head of a clamping-bolt into the T-shaped slot *a* in the base-plate C and tighten it in position by a nut on the clamping-bolt. By means of the movement of said plate C by its slot-connection above described, the whole machine is adjusted relatively to the grinding-wheel. To insert and secure the twist-drill, I draw back the sliding block M, having first loosened the screw *n*. I then screw down the thumb-screw *k*. This draws the bolt J upward and compresses the spiral spring K. This movement raises the V-shaped lip of the jaw I out of the V-shaped groove of the jaw H. The drill A is then laid in said groove of the jaw H, and by unscrewing the thumb-screw *k* the spring K presses downward the bolt J and draws the lip of the jaw I forcibly upon the drill and confines the drill in the groove of the jaw H. I slip the holder S loosely upon the drill by inserting the drill through the collar of the stem *y*. The block M is then slid forward until its projection *l* bears against the end of the drill, and when in position is securely fastened in place by the screw *n*. The drill-holder S is then moved along the drill to a proper relative position, and the screw *w* is turned to bring the washer *z* into gripping contact with the drill, so that the drill can be rotated in its supports by means of said holder until the spring-finger U engages in the recess of the upper horn *m*. The recesses in the horns *m* should be made so as to coincide with the vertical plane of the axis of the drill when in position.

I will now suppose the parts of the machine are all in the position indicated in Figs. 1 and 2, the rod Q connected to the head-piece E by the screw *s*, which keeps that end of the rod Q in its elevated position in the slot *e*. Now, by bearing the hand down upon the wheel end of the bar G, the drill A is crowded forward against the grinding-wheel B, and by reason of the movement of the link F the lips of the drill are ground down into a curved edge, commonly called the "clearance," which curve is more or less parabolic in shape, as may be desired, according to the adjustment hereinafter described. When the lip in contact with the grinder has been sufficiently ground, I release the spring-finger U from the recess of the upper horn *m*, and by means of the drill-holder S, now thus relieved, I turn the drill over one hundred and eighty degrees and spring the finger U in the corresponding recess of the lower horn *m*. This movement brings the other lip into the same relation to the grinder as the first lip was, and the operation of grinding is continued, thus forming both lips with a uniform angle and clearance. The screw O causes the bar G to move to and from the wheel, and by the index upon the wheel P the length of the feed is graduated. This screw is operated to force the lip of the drill against the grinder to be ground into shape by it, and when the drill is turned by the holder S to grind the second lip, the same degree of grinding may be obtained by the feed-screw being turned to the same point on the index. The degree of clearance for the lips is regulated by sliding the nut *t* up or down in the slot *e* of the head-piece E. It will be seen that thus there are three centers of oscillation—two being fixed, to wit, by the nut *t* and the screw-pivot *f*, and one being free, to wit, the center at the pivot *g*. The main bar G may thus be swung outwardly, more or less, according to the degree allowed by the distance between the points or centers *t* and *g*. The curve described by the drill-point is a true circle when the points *t* and *g* are in the same horizontal and vertical plane, and the curve is more of a parabola the farther the point *t* is removed vertically or horizontally from the point *g*. The pin-and-slot arrangement at *x* allows this freedom of motion.

Fig. 6, which is a diagram, shows the skeleton of the machine partly in dotted lines, and illustrates the mode of operation in obtaining clearance by moving the drill-carrier through a sufficient angle up and down. In order to illustrate the operation clearly, the eccentricity or distance between centers 1 and 2 is shown exaggerated. It is on account of this eccentricity that the drill is gradually carried on toward the emery-wheel; but at the same time that it is given this linear motion it is also given a revolving motion round the center 2, the position of which after the downstroke is completed is represented by center 3. Center 3 is obtained in the following manner: Point 4 of the arm 4 2 is moved down to 5 in the circumference of a circle struck by the arm 4 1 as a radius and with 1 as center. This center, which is stationary during the operation of

grinding, can be changed in regard to the distance from center 2, and this is determined by the amount of clearance required. Center 2, which is an oscillating one, has during the operation moved from 2 to some point on the circumference of a circle struck with 2 6 as a radius and 6 as a fixed center permanent in regard to location. The point or center 3 is found by striking a circle with 5 as a center and the constant length of the arm 4 2 as a radius. The projection of the distance between 2 and 3 on a horizontal line is the approximate clearance on the drill. The combined linear and oscillating motion causes the lips of the drill to move in a curve very similar to that of a parabola, the nature of which provides for the necessary clearance.

I have shown in the drawings modified forms of my invention.

In Fig. 3 the clamping device is horizontal in its movement instead of vertical. The parts are substantially the same as in Figs. 1 and 2, and those in the modified form are indicated by the same letters having the additional mark ″. The advantage of this modified form is that, whatever the diameter of the drill may be, its center, when held in the machine, is always in the same horizontal plane, while if the perpendicular arrangement of the clamp is used drills of different diameters will have their centers lie in different horizontal planes.

In Fig. 4 I show an enlarged view of a modified form of the drill-holder S, which consists of a collar, *u*, having an angular opening and a stem in one piece therewith, which is screw-threaded at its top or end. The holder S is bifurcated, and embraces said stem and the plane sides of the collar. The bent spring-finger U is fastened on one side of the holder S.

I claim as a novel and useful invention and desire to secure by Letters Patent—

1. In a drill-grinding attachment, the clamping device herein shown, consisting of the fixed grooved jaw H and the movable jaw I, which has the post and arm L, and the thumb-screw *k* and the bolt J, secured to said jaw I and passing freely through an opening in the jaw H, and provided with a nut, *h*, and spring K, substantially as described.

2. The combination of the jaws H I and the bolt J, having the nut *h* and spring K, arranged and operating substantially as specified.

3. The combination of the link F, the pivot *f*, the head-piece E, and the main bar G, provided with drill-clamping mechanism and mounted on the link F by the pivot *g*, substantially as described.

4. The combination of the head-piece E, having the slot *e*, the sliding nut *t*, and screw *s*, the rod Q, pivot *r*, and block N, connected to the bar G, the link F, pivoted at *f* to said head-piece, and the bar G, pivoted at *g* to said link F and provided with a drill-clamping device, substantially as shown.

5. The combination of the head-piece E, having the slot *e*, the nut *t*, the screw *s*, the rod Q, the pivot *r*, the block N, the link F, the bar G, having the lugs *o o'*, the pivots *f g*, and the feed-screw O, substantially as specified.

6. In a drill-grinding device, the combination of a head-piece, a main bar provided with drill-clamping, drill-feeding, and drill-turning mechanism, a link oscillating on a fixed pivot of the head-piece and having at its traveling end a pivot by which it connects with the main bar and gives to said main bar a reciprocating motion longitudinally, and a connecting-rod pivoted at one end in the plane of the main bar and vertically adjustable at its opposite end upon said head-piece, all arranged and operating for the purpose of forming an angle and a curved clearance upon the lip of a drill, substantially as specified.

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