

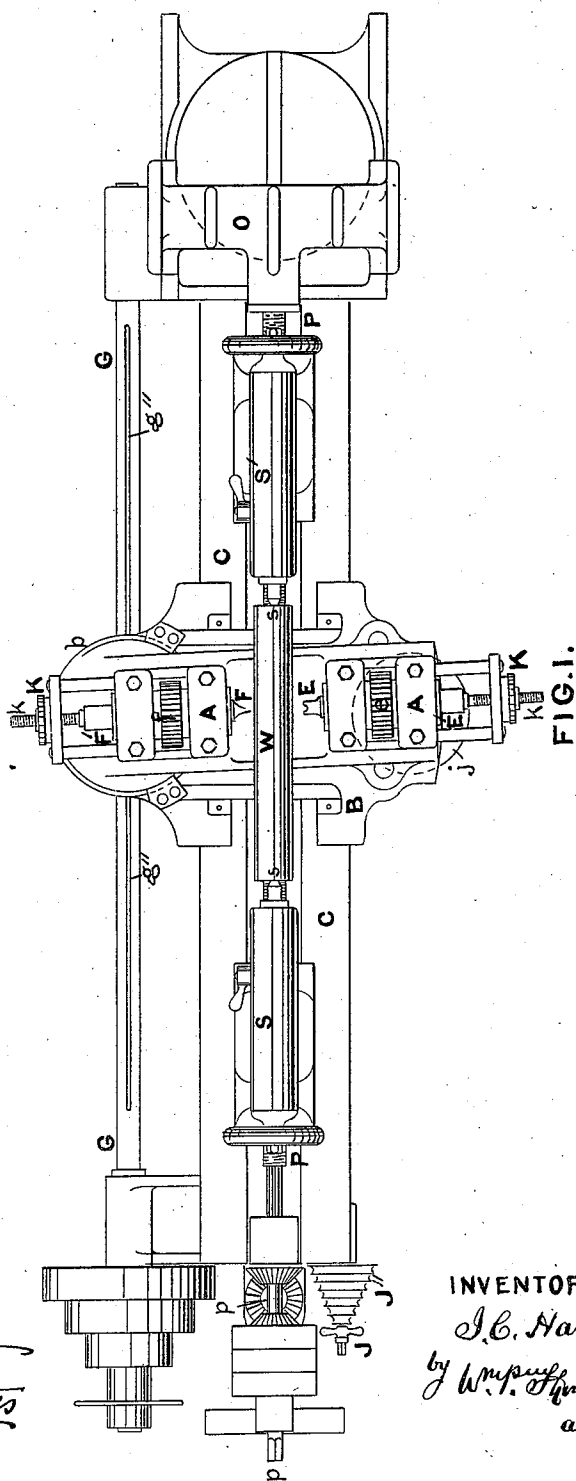
(No Model.)

7 Sheets—Sheet 1.

J. C. HARRISON.
SLOT DRILLING MACHINE.

No. 570,091.

Patented Oct. 27, 1896.



WITNESSES.

Charles Wendell
Joseph Bates

INVENTOR.

J. C. Harrison
by Wm. F. Thompson
attys

(No Model.)

7 Sheets—Sheet 2.

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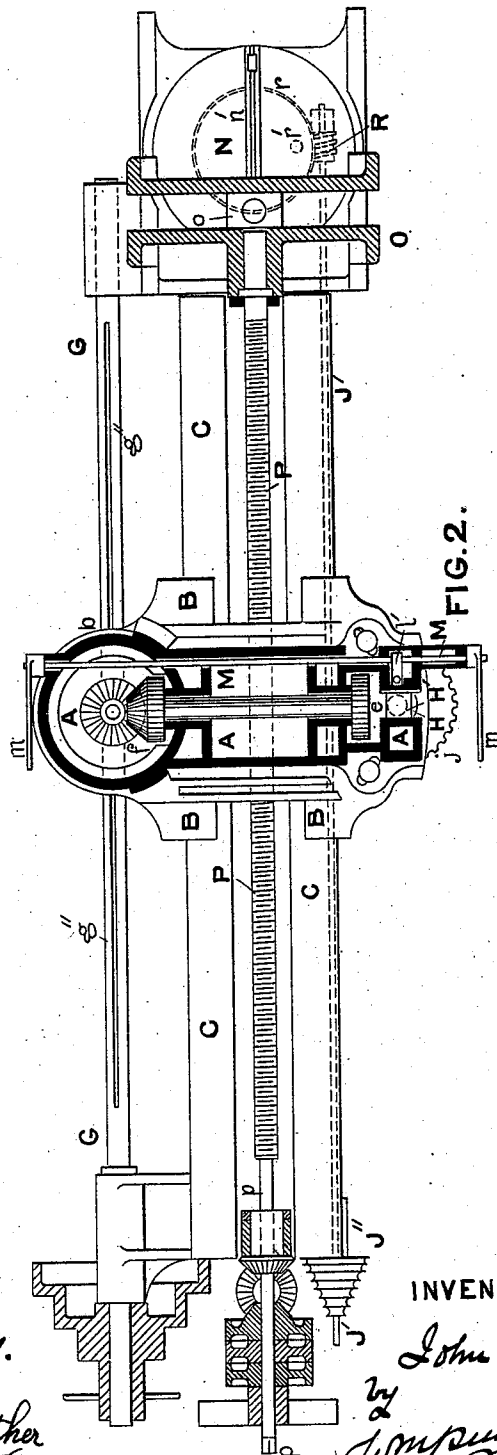


FIG. 2.

WITNESSES.

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(No Model.)

7 Sheets—Sheet 3.

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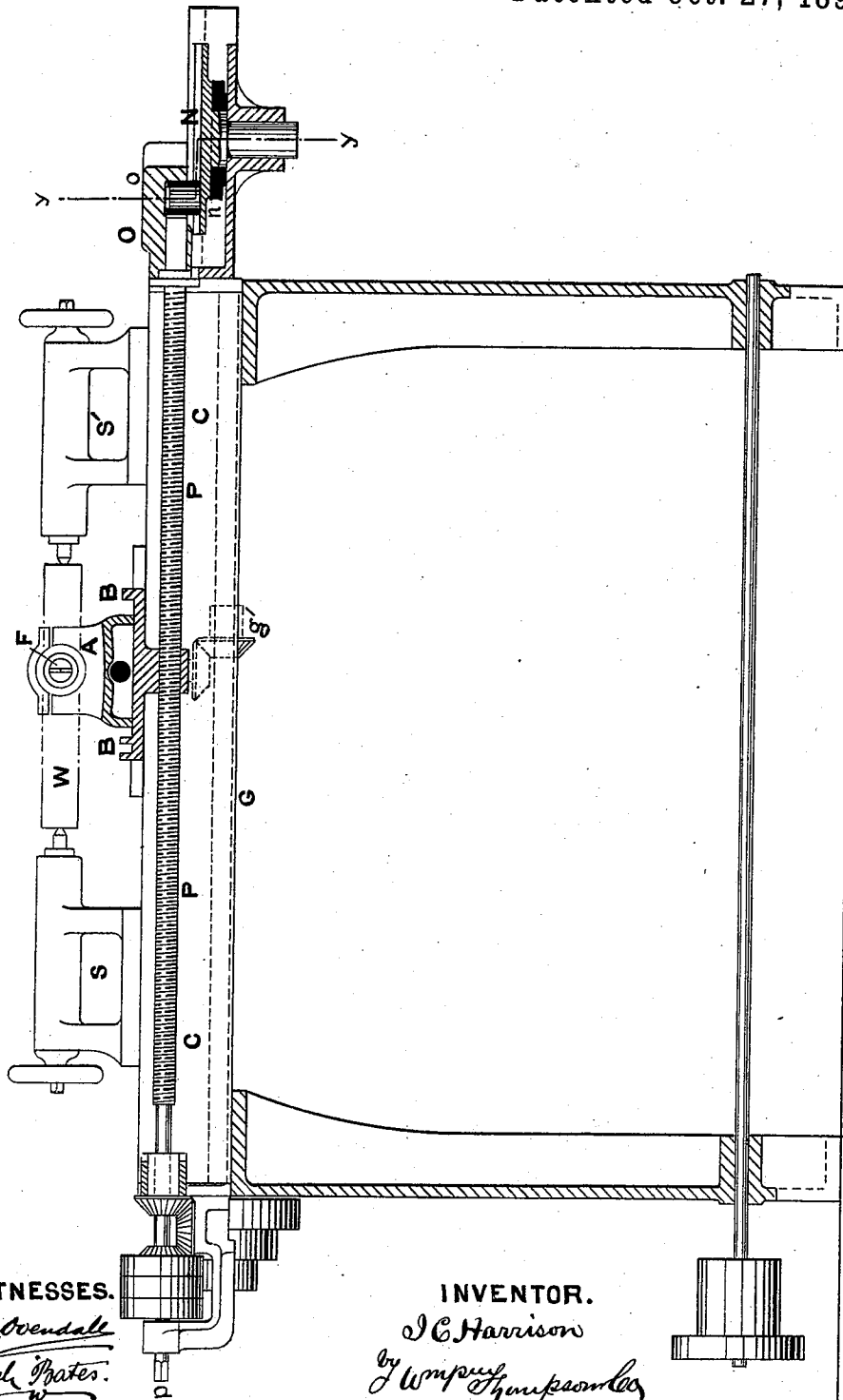


FIG. 3.

WITNESSES.

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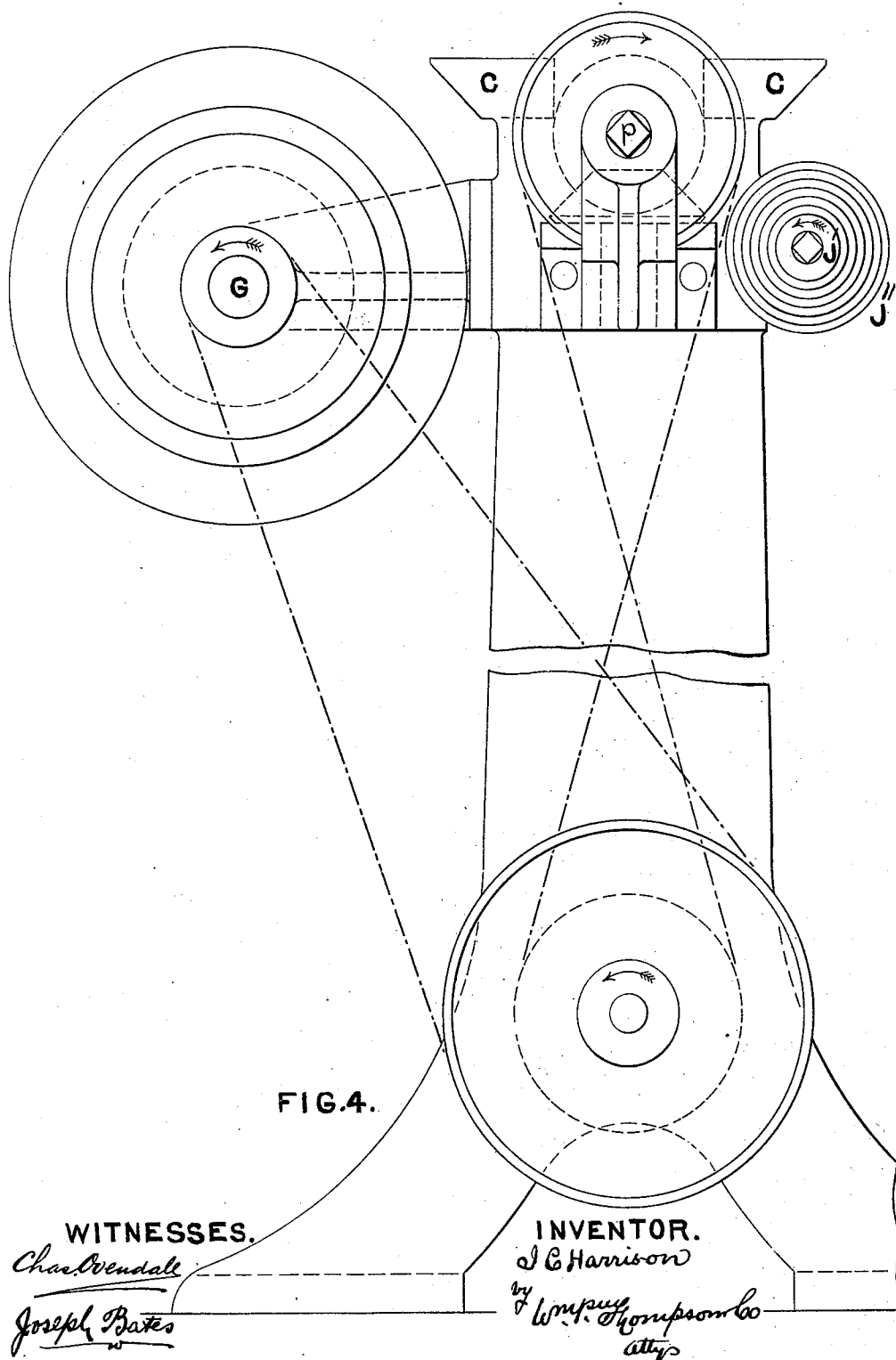
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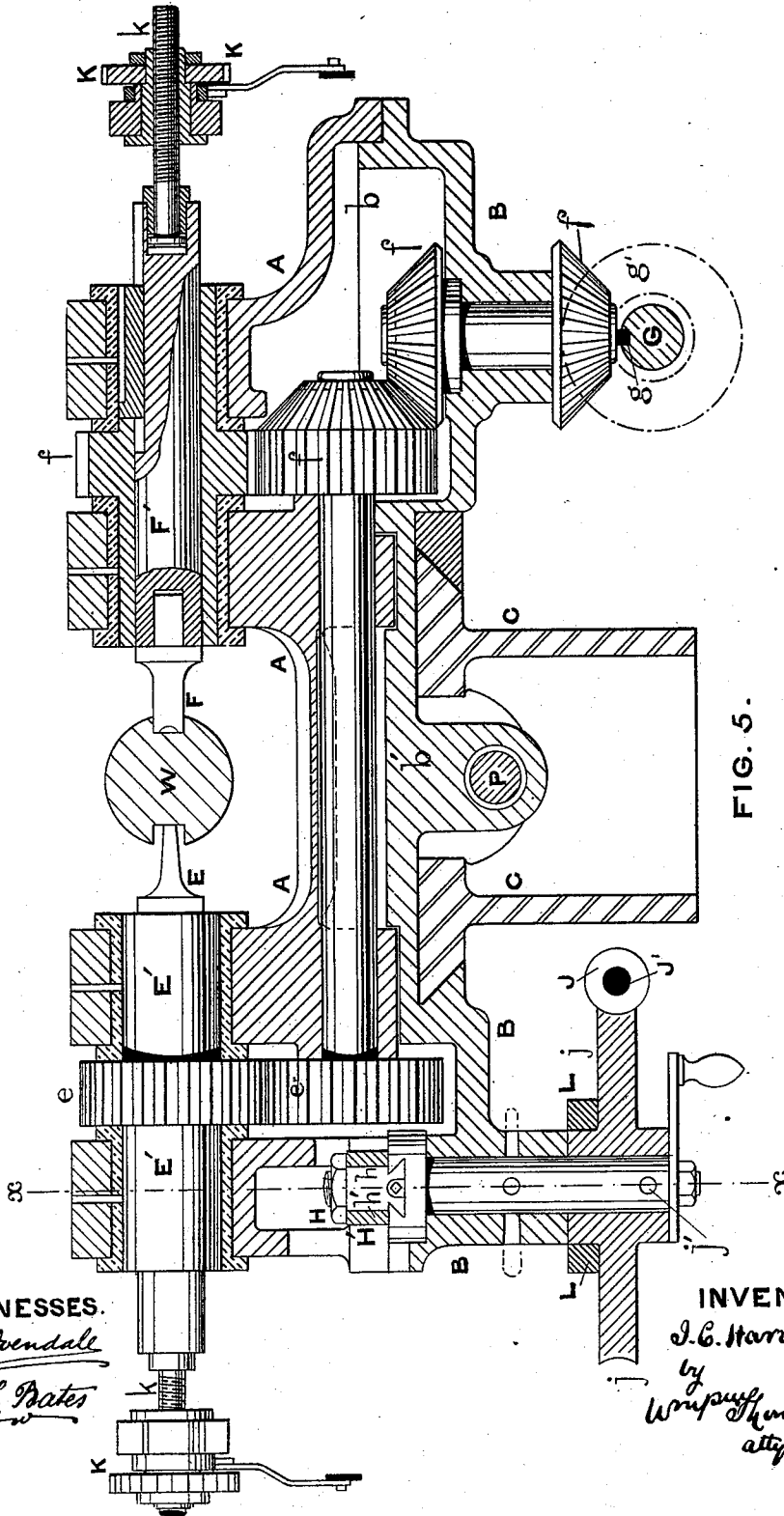


FIG. 5.

WITNESSES.

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(No Model.)

7 Sheets—Sheet 6.

J. C. HARRISON.
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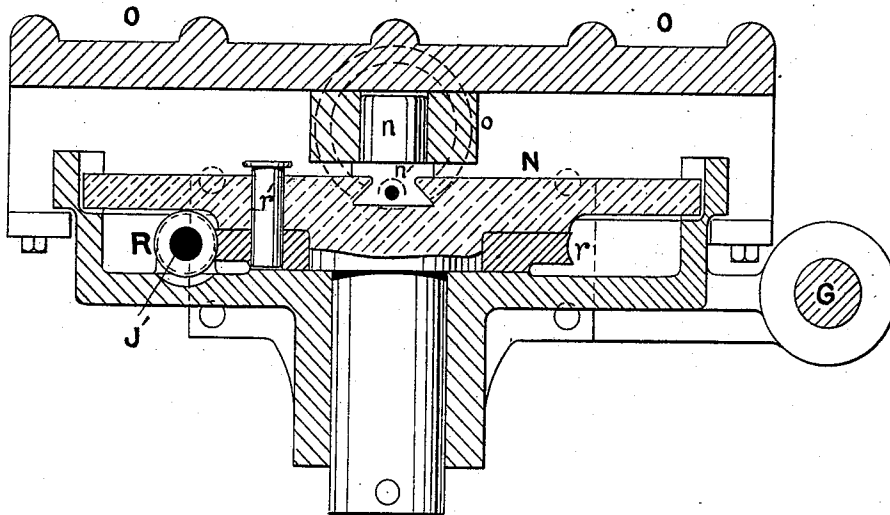


FIG. 6.

WITNESSES.

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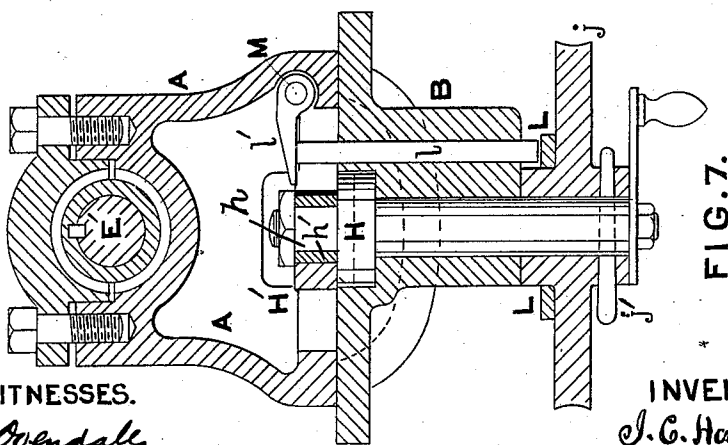
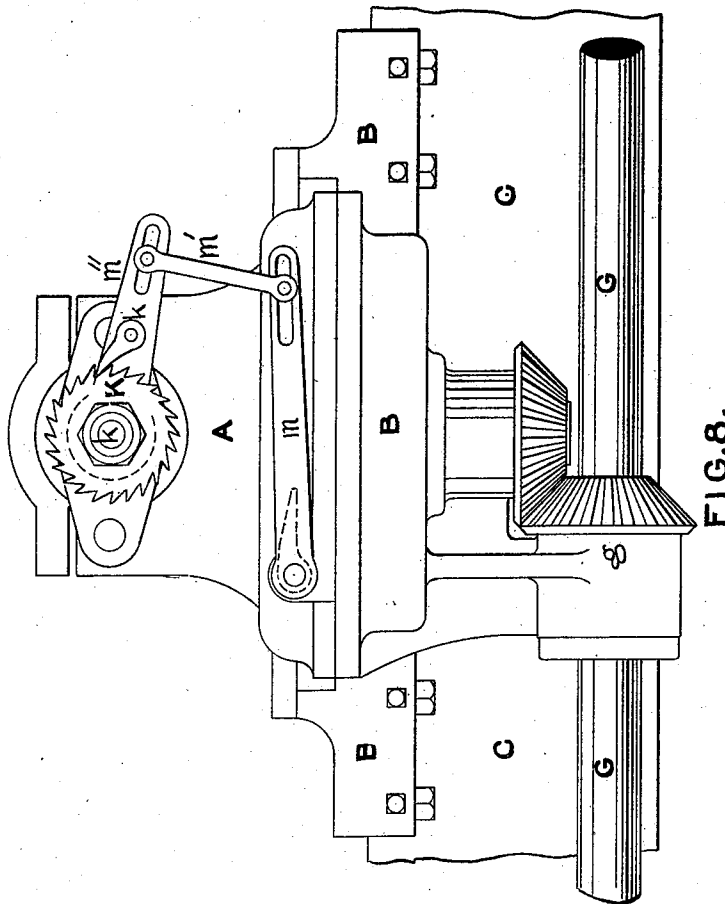
(No Model.)

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SLOT DRILLING MACHINE.

No. 570,091.

Patented Oct. 27, 1896.



WITNESSES.

Chas. Owendale
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UNITED STATES PATENT OFFICE.

JOHN C. HARRISON, OF BOWNESS, ENGLAND.

SLOT-DRILLING MACHINE.

SPECIFICATION forming part of Letters Patent No. 570,091, dated October 27, 1896.

Application filed February 4, 1896. Serial No. 578,036. (No model.)

To all whom it may concern:

Be it known that I, JOHN COLLINSON HARRISON, a subject of the Queen of Great Britain, residing at Bowness-on-Windermere, in the county of Westmoreland, England, have invented certain new and useful Improvements in Slot-Drilling Machines, of which the following is a specification.

This invention relates to that class of machines in which key-seats, feather-ways, cotter-holes, cutter-holes, and similar slots in shafts are cut by rotating drills traveling to and fro from end to end of the slot, and is designed to provide a machine in which the work is held centrally and can be done more expeditiously, and by which the holes or slots can be cut at any desired angle.

It consists, essentially, in constructing the machine with a drilling-head mounted upon a traversing saddle provided with two rotating spindles placed opposite to each other, so that they may operate at different sides of the work, and pivoted upon a trunnion at one end of the saddle, upon which it is oscillated by a crank to give the desired inclination to the slot, the saddle and drilling-head being moved to and fro to traverse the work by crank or crank-pin with an adjustable stroke working in a cross-head connected thereto by a screw or otherwise, and the work being held stationary by centers carried in head-stocks or brackets affixed to the bed.

The invention will be fully described with reference to the accompanying drawings.

Figure 1 is a plan; Fig. 2, sectional plan; Fig. 3, longitudinal sectional elevation; Fig. 4, end elevation, (enlarged scale;) Fig. 5, transverse section through tool-holder and saddle, (enlarged scale;) Fig. 6, transverse section through the cross-head on line *y y*, Fig. 3; Fig. 7, sectional elevation through tool-holder and saddle on line *x x*, Fig. 5; Fig. 8, end elevation of tool-holder and saddle from the back.

The drilling-head A and sliding or movable saddle B are carried by or mounted on a bed C, upon which they are traversed backward and forward by a crank N and screw P, with adjustable stroke, the bed C being supported by suitable framework. (Not shown in the drawings.)

The sliding saddle B, which rests upon and

moves to and fro over the bed C, has pivoted upon its upper surface the drilling-head A. The drilling-head is pivoted on the trunnion *b*, placed at one end, and is capable of oscillating to one side or the other. The drilling-head is provided with two drills E and F, placed in the same plane at opposite sides of the center, so that a cotter or cutter hole may be drilled with two drills simultaneously from opposite sides. The drill-spindles E' and F' are mounted in journals and are driven by suitable miter and spur gear *e* and *f* from the belt-driven shaft G, which runs along one side of the bed C, the traverse of the saddle being accommodated by a sliding key *g* in the wheel *g'* and slot *g''* in the shaft. The drill E is a right-hand drill and the drill F a left-hand one, and they are preferably set with their respective cutting edges at right angles to each other, so that they may overlap each other without fouling when joining the hole. When not requiring to drill a hole right through or a keyway on either side of the shaft, either drill may be removed from its spindle and the other used without it.

The radial oscillation or movement of the drilling-head A is transmitted to it by the crank H, the pin *h* of which is adjustable to vary the throw of the crank and the consequent movement of drill-head. The crank-block *h'* works between the two planed faces of the slot H'. The crank is driven by the worm J on the shaft J' engaging with the worm-wheel *j* on the end of the crank-spindle. The worm-wheel is secured to the spindle by a tapered pin *j'* passing through it, which can be removed when it is not desired to rotate the crank and passed through a hole in the casting into the crank-spindle. This is done when it is required to work the drilling-head without oscillation for ordinary keyways, the oscillating movement being required to cut tapered holes or slots. The amount of oscillation or movement given to the drill-head is regulated according to the amount of taper required in the slot or hole.

When the apparatus is working, the drills E and F are each fed forward automatically by a ratchet-wheel K, which is rotated about a screw *k*, connected to the end of the drill-spindle. Motion is transmitted from a projection or cam L on the face of the worm-

wheel *j* by means of an upright pin or rod *l*, which is moved up and down in a hole in the saddle-casting, and the upper end of which engages with a lever or tappet *l'* on a tappet-shaft M. The tappet-shaft M passes right
5 through the lower side of the drill-head A, projecting at either end. On the ends of the tappet-shaft M are placed the levers *m*, which, through the connecting-rods *m'*, actuate the
10 pawls *k'*, pivoted to the oscillating levers *m''*.

The reciprocating traverse movement is imparted to the drill-head A and saddle B by the adjustable crank N at one end of the bed. The crank-pin *n* is adjustably attached to the
15 disk which carries it by a screw *n'*, so that the throw of the crank can be readily either lengthened or shortened to correspond with the length of slot to be cut. The crank-block
O works in a slot in the cross-head O.

The crank is actuated by the worm R on the shaft J' gearing with the worm-wheel *r*, the crank being connected to the worm-wheel by the pin *r'*, which can be removed when it is desired to throw the crank out of gear.
20 The worm R and the worm J being on the same shaft, the movements of the two cranks H and N are made to correspond, so that the oscillation of the drill-head in one direction or the other corresponds with the traverse of
30 the saddle. The shaft J' is driven by a strap or cord on a stepped pulley J'', placed on the end, from a corresponding stepped pulley placed on any adjacent driving-shaft.

The cross-head O is connected to the saddle B by a screw P passing through a nut or screwed bracket *b'* on the under side of the saddle. The end of the screw P is connected to the cross-head O, so as to allow it to rotate independently of the reciprocating movement
40 of the cross-head. At the other end of the screw P it is connected to a strap-driven shaft *p*, which projects up into the interior of the screw to allow of the traverse of the screw by the crank N, the end of the screw being
45 provided with a parallel hole and keyway extending into it for some distance. When it is desired to make a slot longer than the movement of the crank, it is thrown out of gear by removing the pin *r'*, and the saddle B and drill-head A can be traversed
50 nearly the full length of the bed C by the screw P. The shaft *p* is fitted with three strap-pulleys and suitable gearing to give a reversing and stopping motion. A handle is
55 provided to turn the screw to bring the drill-head and saddle into any desired position along the length of the bed.

Upon the bed C of the machine are placed two movable head-stocks or brackets SS', provided with centers *s s'*, between which the work W is held. The head-stocks or brackets may be clamped to the bed C in any desired position.

What I claim as my invention, and desire
65 to protect by Letters Patent, is—

1. In a slot-drilling machine the combina-

tion with a horizontal bed of a sliding saddle B resting thereon an oscillating drill-head pivoted to the sliding saddle, two drill-spindles E' and F' carried in journals in the drill-head and two drills E and F set opposite each other and operating on different sides of the work, substantially as described.

2. A drill-head for a slot-drilling machine comprising a sliding saddle B capable of moving to and fro on a horizontal bed and an oscillating head A carrying two drill-spindles placed opposite to each other and operating upon different sides of the work substantially as described.

3. In a slot-drilling machine the oscillating drilling-head A pivoted upon a sliding saddle and provided with two drill-spindles E' and F' the sliding saddle B upon which the drilling-head is pivoted and capable of sliding to and fro on a horizontal bed in combination with the longitudinal driving-shaft G and gear-wheels *g' e*, and *f* by which the drills are operated and the longitudinal shaft J' worm J worm-wheel *j* crank-shaft and crank
90 H by which the oscillating motion is imparted to the drilling-head A substantially as described.

4. In a slot-drilling machine the combination with the drilling-head A and the sliding saddle B of the connecting-screw P by which they are moved to and fro on the bed C the cross-head O attached to the end of the screw the rotating disk N and the crank-pin *n* which traverses a slot in the cross-head and gives a reciprocating movement thereto substantially as described.

5. In a slot-drilling machine the combination with the drilling-head A the two drill-spindles E' and F' rotating therein provided with drills E and F of the cam L on the crank-shaft H the vertical reciprocating rod *l* moving up and down in a hole in the casting the tappet *l'* on the tappet-shaft M with which the upper end of the rod *l* engages the tappet-shaft M projecting through both ends of the drill-head the levers *m* on the ends of the tappet-shaft the connecting-rods *m'* levers *m''* and pawls *k'* which actuate the ratchet-wheels K on the ends of the screws *k* and the right and left hand screws *k* connected to the drill-spindles E' and F' substantially as described.

6. In a slot-drilling machine the combination with the drilling-head A sliding saddle B and connecting-screw P of the cross-head O attached to one end of the screw the crank-disk N an adjustable crank-pin *n* traversing a slot in the cross-head the shaft J' the worm R thereon the worm-wheel *r* connected to the crank and the removable pin *r'* passing through the disk of the crank and the worm-wheel *r* substantially as described.

7. In a slot-drilling machine the combination with the drilling-head A the reciprocating saddle B and the connecting-screw P of the strap-driven shaft *p* projecting into the interior of the screw strap-pulleys thereon and

bevel-gearing by which the screw may be rotated in either direction substantially as described.

5 8. In a slot-drilling machine the combination with the drilling-head A of the connecting-screw P the cross-head O attached to one end of the screw the crank-disk N and crank-pin *n* traversing a slot in the cross-head and
10 shaft *p* over the end of which the screw slides

whereby a short or long traverse may be given to the drill-head substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

J. C. HARRISON.

Witnesses:

JAMES W. PRESTON,
R. W. HIGGINSON.