A. FREY.

FEED MECHANISM FOR BORING MACHINES.

APPLICATION FILED FEB. 12, 1908.

936,110.

Patented Oct. 5, 1909.

2 SHEETS—SHEET 1.

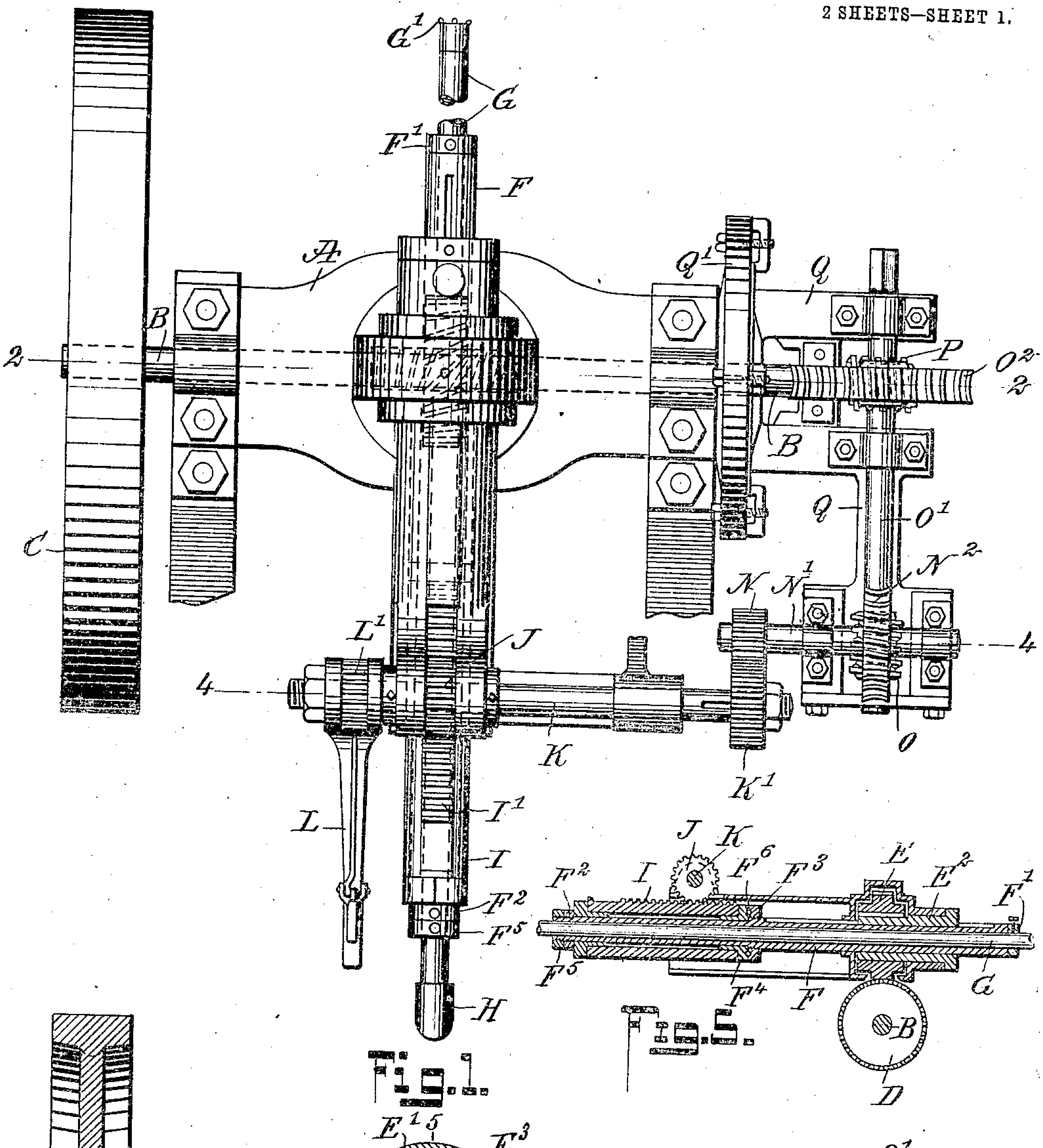

Fig. 1.

Fig. 5.

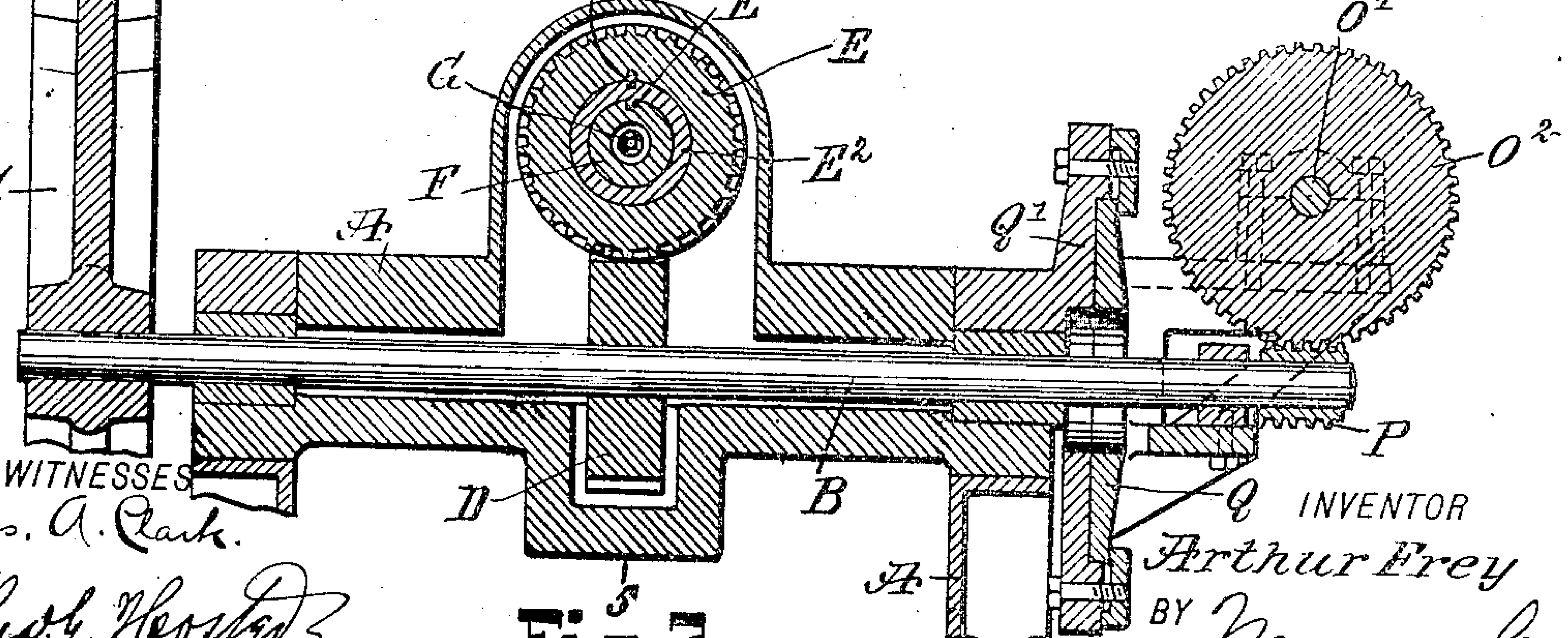

Fig. 2.

WITNESSES

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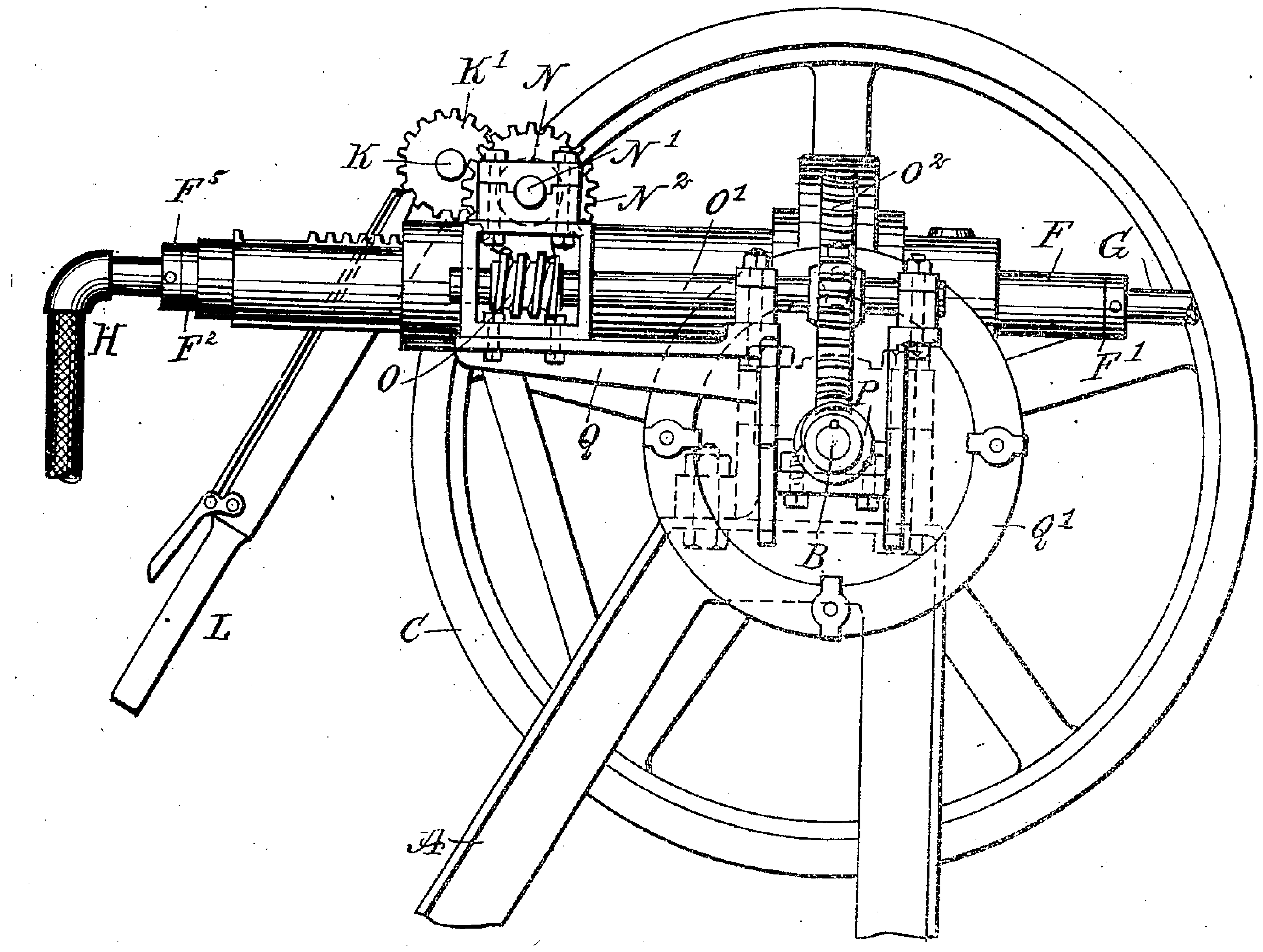

Fig. 3.

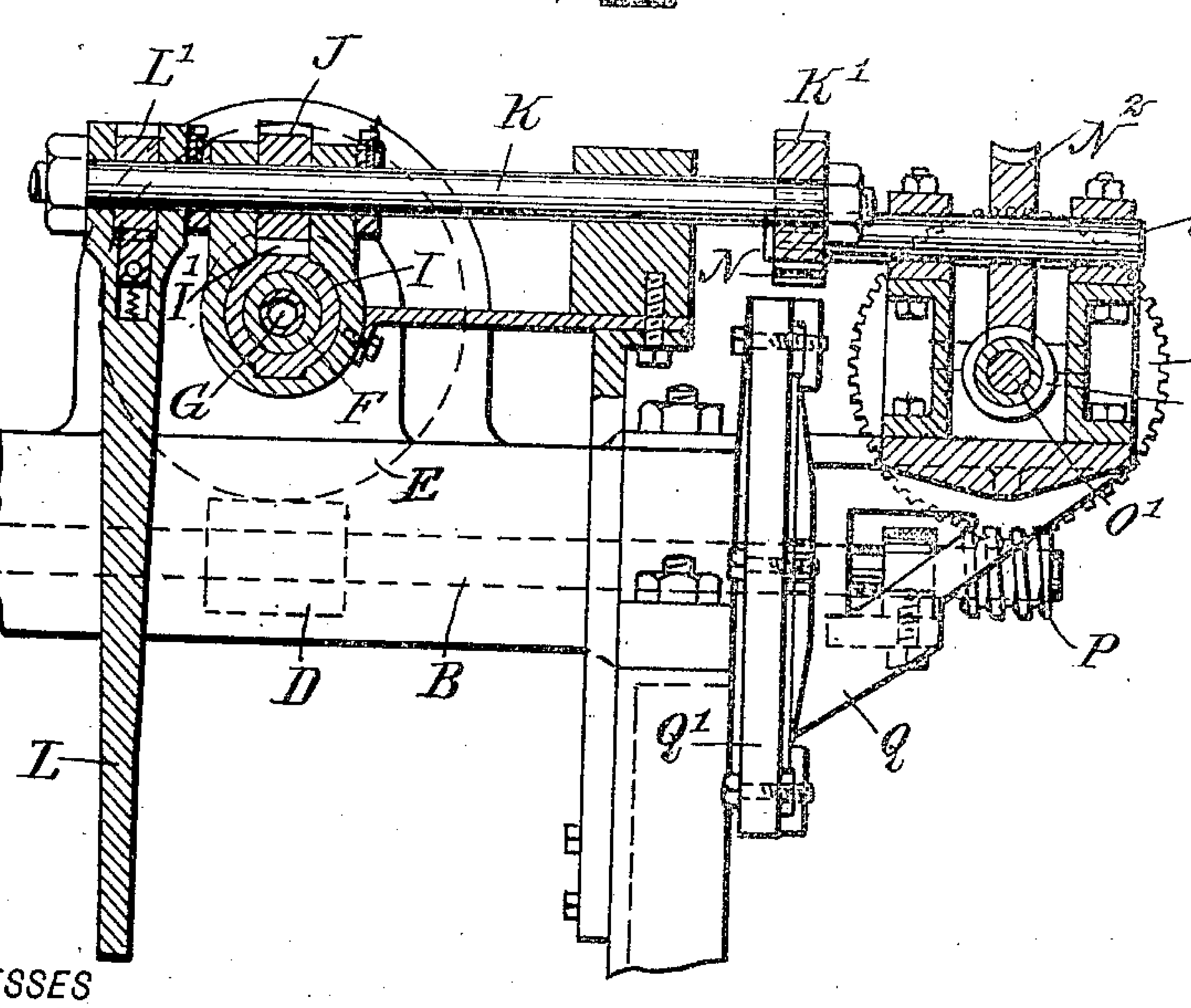

Fig. 4.

WITNESSES

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FEED MECHANISM FOR BORING-MACHINES.

936,110. Specification of Letters Patent. Patented Oct. 5, 1909.

Application filed February 12, 1908. Serial No. 415,494.

To all whom it may concern:

Be it known that I, ARTHUR FREY, of Schöftland, Canton of Aargau, Switzerland, a citizen of Switzerland, and temporarily residing at Ojuela, Mapimi, State of Durango, Mexico, have invented a new and Improved Feed Mechanism for Boring-Machines, of which the following is a full, clear, and exact description.

The invention relates to rock-boring machines using a tubular boring tool through which water is passed into the bore hole.

The object of the invention is to provide a new and improved feed mechanism for boring machines, capable of being quickly changed for use as a hand feed or an automatic feed, and arranged to permit convenient changing of the gearing so that the feed mechanism for feeding the boring tool may be run at any desired speed according to the nature of the rock to be bored.

The invention consists of novel features and parts and combinations of the same, which will be more fully described hereinafter and then pointed out in the claims.

A practical embodiment of the invention is represented in the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a plan view of the improvement; Fig. 2 is a cross section of the same on the line 2—2 of Fig. 1; Fig. 3 is a side elevation of the same; Fig. 4 is a cross section of the same on the line 4—4 of Fig. 1, and Fig. 5 is a longitudinal sectional elevation of the improvement on the line 5—5 of Fig. 2.

On a suitably constructed stand A is journaled a transversely extending driven shaft B, provided at one outer end with a wheel C adapted to be turned by hand or by power, to rotate the shaft B. On the driven shaft B is secured a spiral gear wheel D (see Fig. 2), in mesh with a corresponding spiral gear wheel E fastened by a key E′ to a bushing E^2 journaled on the stand A and having a key E^3 engaging a longitudinal key-way in a sleeve F provided at its front end with a collar F′ engaging the tubular boring tool G by means of a set screw *f*, so that when the shaft B is rotated a rotary motion is transmitted by the said spiral gear wheels D and E to the bushing E^2 and the sleeve F, which latter in turn rotates the boring tool G and when the sleeve is moved in the direction of its length, it carries the boring tool G along and feeds it into the rock or other material to be drilled.

It is understood that by the arrangement described the sleeve F is free to slide in the bushing E^2, but turns with the latter, and the bushing E^2 is rotated from the shaft B by the spiral gear wheels D and E.

The forward end of the boring tool G is provided with the usual cutters G′ and the rear end of the said boring tool is connected with a water supply pipe H for supplying water to the bore hole at the point of contact of the cutters G′ with the rock or other material.

In order to feed the boring tool G and its sleeve F in a longitudinal direction, the following arrangement is made: On the sleeve F screw the spaced nuts F^2, F^3, and against the nut F^3 abuts a head F^4 having a reduced portion supporting the forward end of the tubular rack I, held at its rear end on a reduced portion of the nut F^2 (see Fig. 5), the nut being engaged by a lock nut F^5 to hold it from turning. A ball bearing F^6 is preferably interposed between the head F^4 and the nut F^3, to reduce the friction between the said parts to a minimum. The tubular rack I is provided on top with longitudinally-extending rack teeth I′ in mesh with a pinion J secured on a transversely-extending shaft K, mounted to turn in suitable bearings carried on the stand A. The shaft K is adapted to be rotated either by hand by the use of a ratchet lever L and a ratchet wheel L′, or the said shaft K is driven slowly from the driven shaft B by a reducing gear presently to be described in detail. A gear wheel K′ is mounted to slide on and to turn with the shaft K (see Fig. 1), and this gear wheel K′ is in mesh with a pinion N secured on a worm wheel shaft N′ extending transversely, and carrying a worm wheel N^2 in mesh with a worm O connected with a longitudinally-extending worm shaft O′ carrying a worm wheel O^2 in mesh with a worm P secured on the driven shaft B. Now when the latter is rotated, a rotary motion is transmitted by the worm P to the worm wheel O^2, to rotate the worm shaft O′, which by the worm O and the worm wheel N^2 rotates the shaft N′, and the latter by the pinion N meshing with the gear wheel K′ rotates the shaft K. Now when the shaft K is rotated the pinion J is turned, and as the

latter is in mesh with the rack teeth I′, the rack I is moved forward in the direction of its length, thus carrying the sleeve F along and the boring tool G rotated from the shaft B, as previously described. When it is desired to feed by hand, the gear wheel K′ is slipped to one side out of mesh with the pinion N, and then the operator operates the ratchet wheel L′ so as to rotate the shaft K by hand, thus feeding the boring tool G forward, as desired.

It is understood that the shaft K is rotated slowly from the driven shaft B by the gearing described, and in order to vary the feed of the shaft K when boring rock of different degrees of hardness, the pinion N is interchanged for a larger or a smaller pinion. Now in order to do this, the shafts O′ and N′ are journaled on a bracket Q mounted to swing in a circular bearing Q′ arranged on the stand A, the said circular bearing Q′ being concentric with the driven shaft B. Now by adjusting the bracket Q, larger or smaller pinions N can be placed on the shaft N′, to mesh with the gear wheel K′, so that the speed of the shaft K is correspondingly increased or decreased, presuming that the shaft B is rotated at a uniform rate of speed. The rack teeth I′ terminate a distance from the rear end of the rack I, as plainly indicated in Figs. 1 and 3, so that the forward feeding of the boring tool G comes to a standstill whenever the pinion J reaches the last tooth I′ on the rack bar I. The sleeve F is then returned, so as to bring the rack teeth I′ back to the starting point to allow feeding again of the boring tool G in a forward direction.

From the foregoing it will be seen that the boring tool G is rotated at a high rate of speed from the driven shaft B, and is fed forward slowly corresponding to the nature of the rock or other material bored by the tool G, the feeding being controlled either by hand, as above described, or from the driven shaft B at the desired rate of speed.

When the machine is running and a hole has been bored corresponding to the feed bar length, then the pinion J is at the end tooth I′, thus stopping all forward feed of the boring tool G and allowing the water forced into the boring tool G to thoroughly wash the bore hole and clear the bits or cutters G′. In case the boring tool G encounters a cave, then the water naturally disappears from the bore hole as it passes into the cave. Now when this takes place the automatic feed can be immediately stopped and use made of the hand feed, so as to rapidly feed the boring tool G through the cave to the other side thereof, after which the automatic feed may be thrown into gear again by shifting the gear wheel K′ correspondingly.

Whenever the worm P is slipped off the shaft B, then the secondary shaft O′ can be turned by hand, preferably by applying a hand crank on the said shaft at either end. By this arrangement the shaft K can be turned to feed the rack I forward, and without requiring turning of the shaft K by the ratchet lever mechanism L, L′.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. A rock-boring machine having a sleeve on the boring tool, a driven shaft geared with the said sleeve for rotating the boring tool, and a feed mechanism driven from the said shaft and connected directly with the said sleeve for positively feeding the latter and the boring tool on rotating the said driven shaft.

2. A rock-boring machine having a sleeve on the boring tool for rotating and feeding the latter, a driven shaft geared with the said sleeve for rotating the latter, a tubular rack on the said sleeve for moving the latter in the direction of its length, and a gearing for actuating the said rack from the said driven shaft.

3. A rock-boring machine having a sleeve on the boring tool for rotating and feeding the latter, a driven shaft geared with the said sleeve for rotating the latter, a tubular rack on the said sleeve for moving the latter in the direction of its length, a transverse shaft carrying a pinion in mesh with the said rack, means for turning the said transverse shaft by hand, and a gearing connecting the said driven shaft with the said transverse shaft for driving the latter from the driven shaft.

4. A rock-boring machine having a sleeve on the boring tool for rotating and feeding the latter, a driven shaft geared with the said sleeve for rotating the latter, a tubular rack on the said sleeve for moving the latter in the direction of its length, a transverse shaft carrying a pinion in mesh with the said rack, means for turning the said transverse shaft by hand, and a gearing connecting the said driven shaft with the said transverse shaft for driving the latter from the driven shaft, the said gearing having interchangeable gear wheels for varying the feed.

5. A rock-boring machine having a sleeve on the boring tool for rotating and feeding the latter, a driven shaft geared with the said sleeve for rotating the latter, a tubular rack on the said sleeve for moving the latter in the direction of its length, a transverse shaft carrying a pinion in mesh with the said rack, a shiftable gear wheel on the said transverse shaft, and a gearing driven from the said driven shaft and adapted to mesh with the said shiftable gear wheel.

6. A rock-boring machine having a sleeve on the boring tool for rotating and feeding the latter, a driven shaft geared with the

said sleeve for rotating the latter, a tubular rack on the said sleeve for moving the latter in the direction of its length, a transverse shaft carrying a pinion in mesh with the said rack, a shiftable gear wheel on the said transverse shaft, a pinion adapted to mesh with the said shiftable gear wheel, a worm wheel having a shaft carrying the said pinion, a worm shaft carrying a worm in mesh with the said worm wheel, and a second worm wheel and worm, of which the worm wheel is secured on the said worm shaft and the worm is secured on the said driven shaft.

7. A rock-boring machine having a sleeve on the boring tool for rotating and feeding the latter, a driven shaft geared with the said sleeve for rotating the latter, a tubular rack on the said sleeve for moving the latter in the direction of its length, a transverse shaft carrying a pinion in mesh with the said rack, a shiftable gear wheel on the said transverse shaft, a pinion adapted to mesh with the said shiftable gear wheel, a worm wheel having a shaft carrying the said pinion, a worm shaft carrying a worm in mesh with the said worm wheel, a second worm wheel and worm, of which the worm wheel is secured on the said worm shaft and the worm is secured on the said driven shaft, and an adjustable bracket in which the said worm shaft is mounted to turn.

8. A rock-boring machine having a sleeve on the boring tool for rotating and feeding the latter, a driven shaft geared with the said sleeve for rotating the latter, a tubular rack on the said sleeve for moving the latter in the direction of its length, a transverse shaft carrying a pinion in mesh with the said rack, a shiftable gear wheel on the said transverse shaft, a pinion adapted to mesh with the said shiftable gear wheel, a worm wheel having a shaft carrying the said pinion, a worm shaft carrying a worm in mesh with the said worm wheel, a second worm wheel and worm, of which the worm wheel is secured on the said worm shaft and the worm is secured on the said driven shaft, and an adjustable bracket in which the said worm shaft is mounted to turn, the said bracket having a circular bearing concentric with the said driven shaft.

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

ARTHUR FREY.

Witnesses:
O. R. WHITAKER,
C. Q. SCHLERETH.