No. 865,175. PATENTED SEPT. 3, 1907.

E. W. EVANS.

ROCK DRILL.

APPLICATION FILED JAN. 13, 1906.

2 SHEETS—SHEET 1.

Fig. 1.

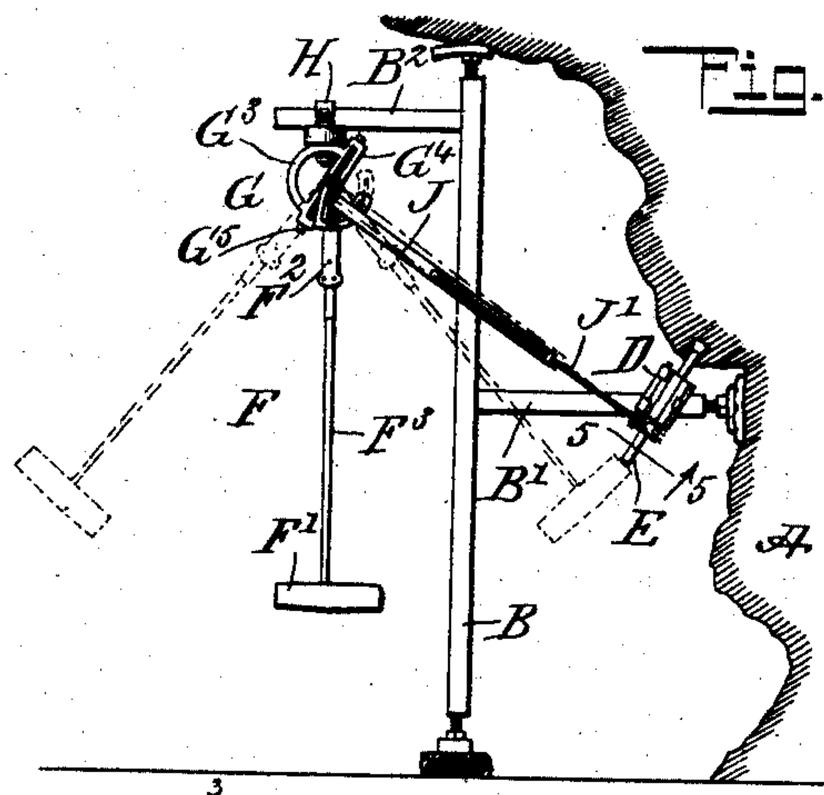


Fig. 2.

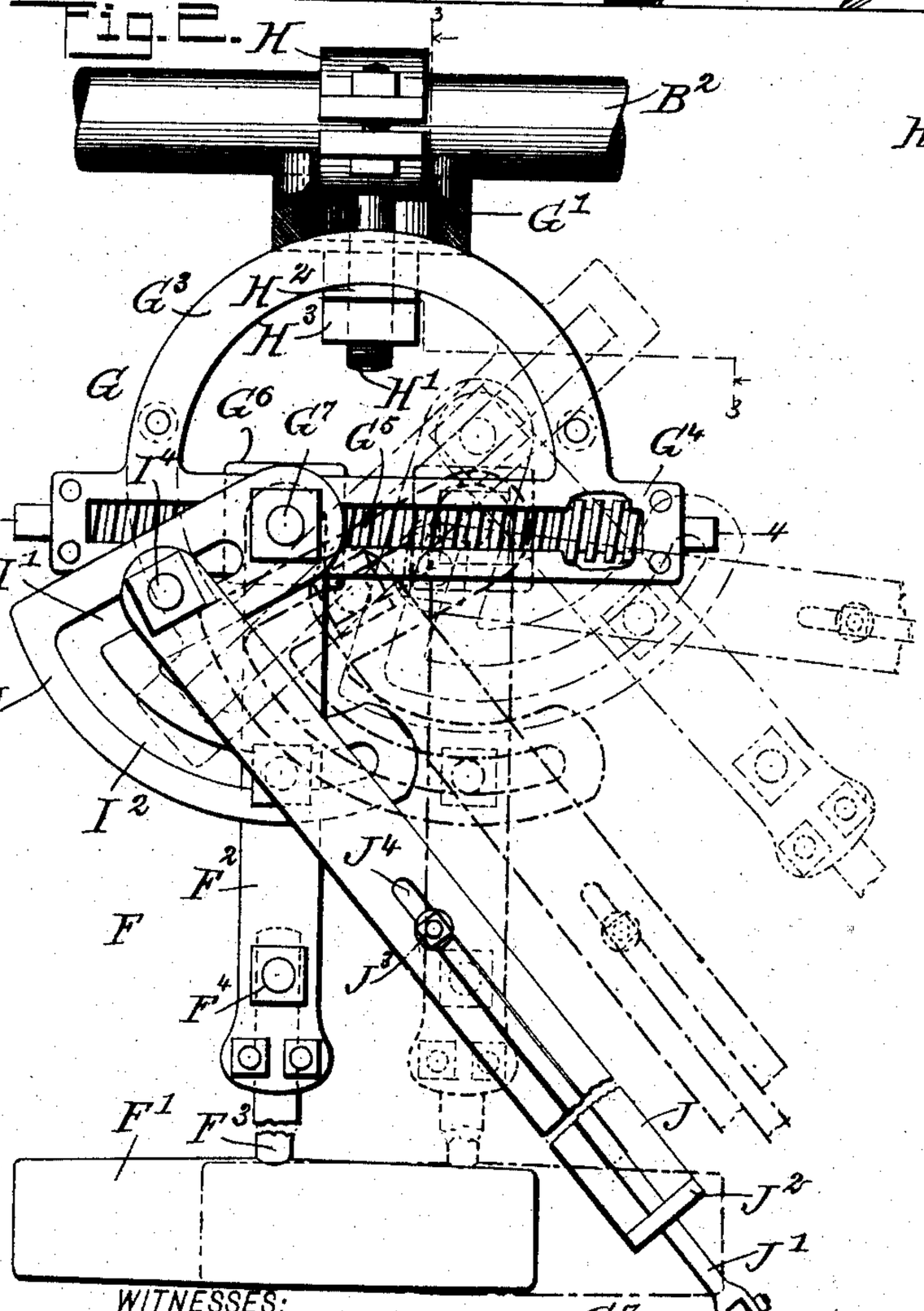


Fig. 3.

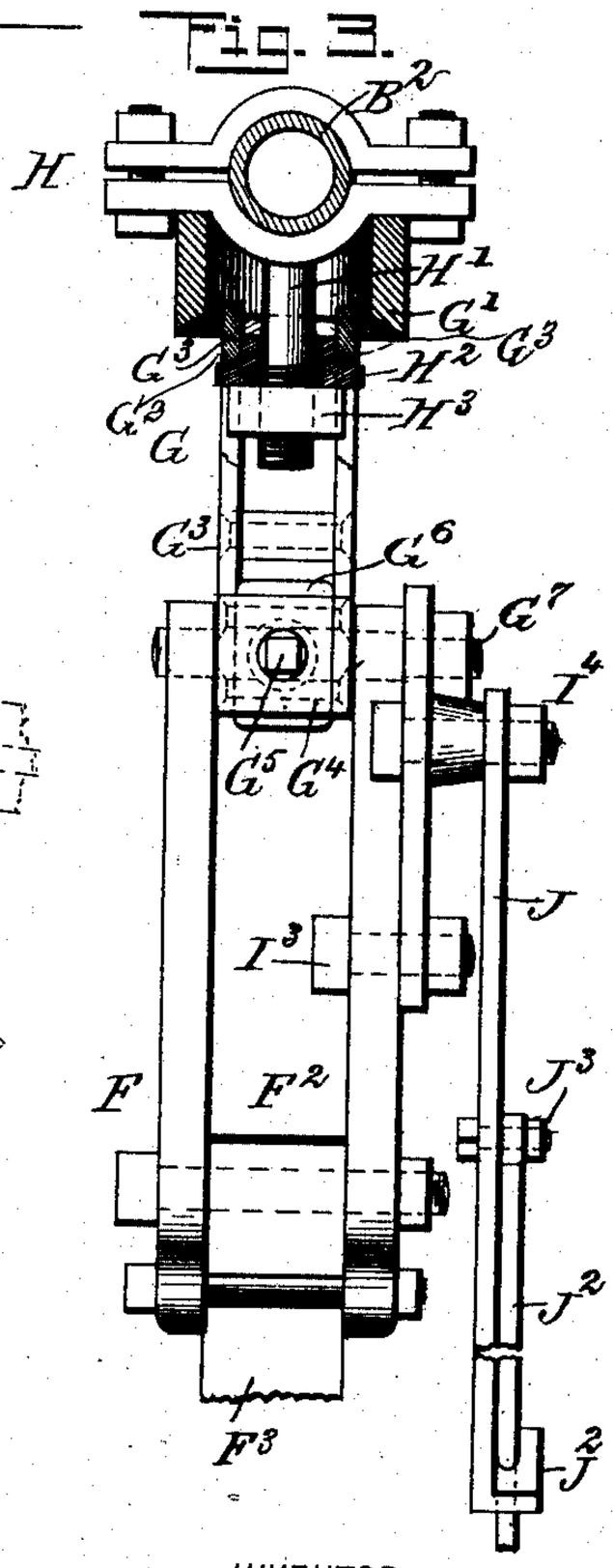
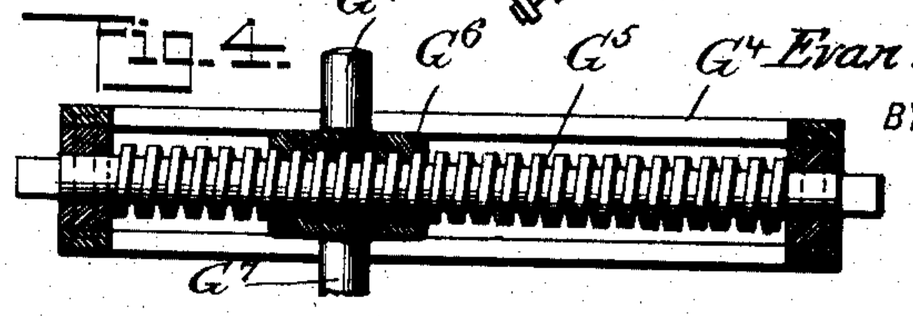


Fig. 4.



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2 SHEETS—SHEET 2.

Fig. 5.

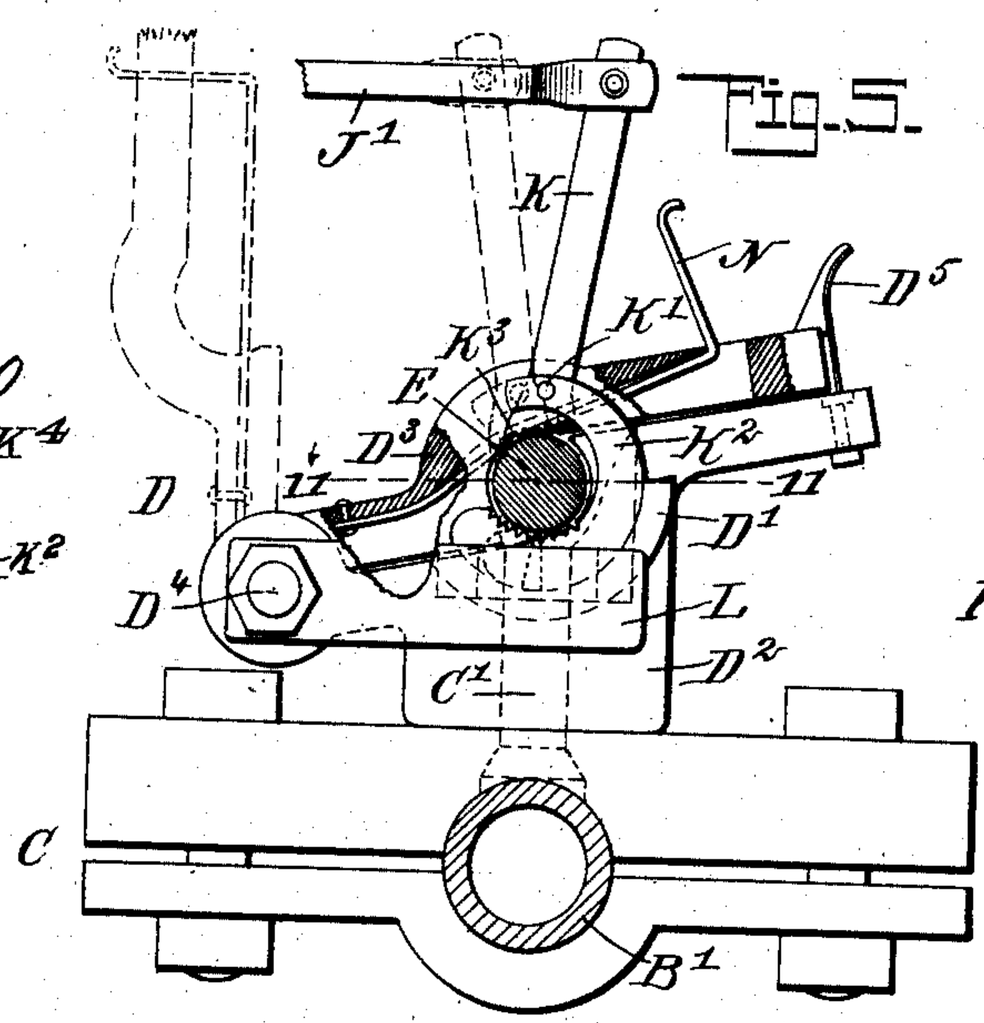

Fig. 10.

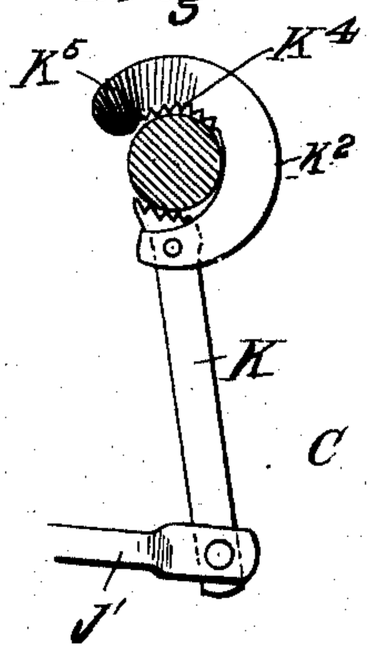

Fig. 11.

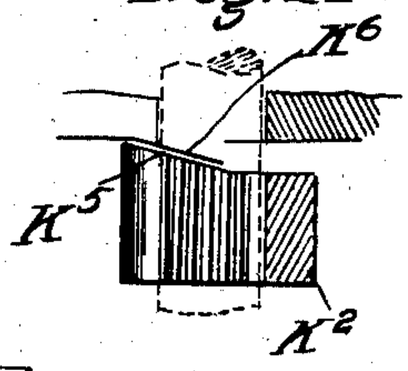

Fig. 6.

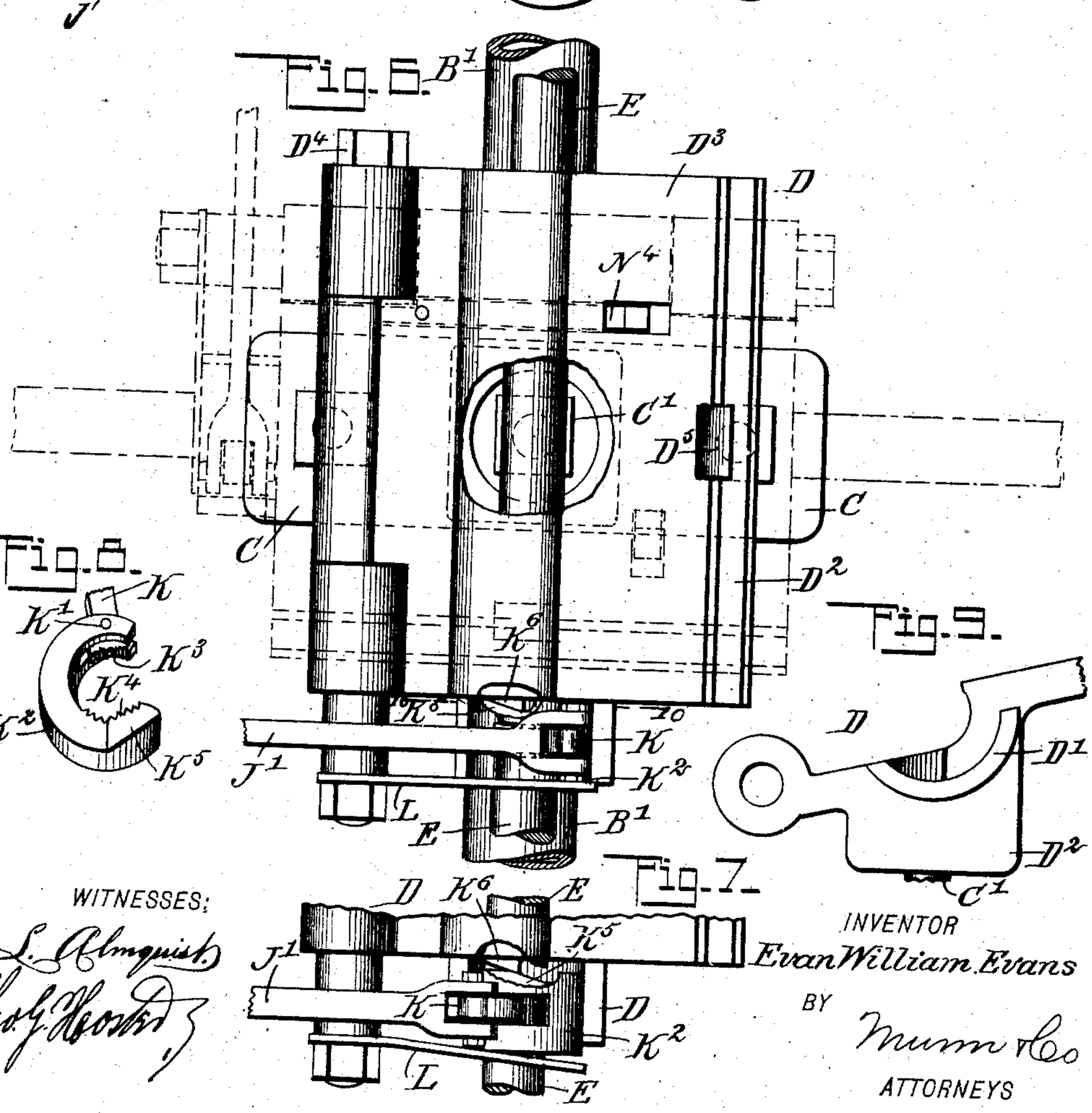

Fig. 8.

Fig. 9.

Fig. 7.

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EVAN WILLIAM EVANS, OF MARYSVILLE, BRITISH COLUMBIA, CANADA, ASSIGNOR OF ONE-HALF TO CHARLES GEORGE EVANS, OF MARYSVILLE, CANADA.

ROCK-DRILL.

No. 865,175. Specification of Letters Patent. Patented Sept. 3, 1907.

Application filed January 13, 1906. Serial No. 295,878.

To all whom it may concern:

Be it known that I, EVAN WILLIAM EVANS, a subject of the King of Great Britain, and a resident of Marysville, in the Province of British Columbia and Dominion of Canada, have invented a new and Improved Rock-Drill, of which the following is a full, clear, and exact description.

The invention relates to boring and drilling, and its object is to provide a new and improved hand-operated rock-drill, more especially designed for drilling lifter and upper holes, and arranged to enable the operator to readily set the drilling tool into the desired position and to actuate the drilling tool without requiring much physical exertion on the part of the operator.

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 this 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 side elevation of the improvement as set up in the mine; Fig. 2 is an enlarged side elevation of the hammer and its pendulum suspension, part being broken out; Fig. 3 is a transverse section of the same, on the line 3—3 of Fig. 2; Fig. 4 is a sectional plan view of the same, on the line 4—4 of Fig. 2; Fig. 5 is an end elevation of the drill holder and the means for turning the drilling tool, parts being in section; Fig. 6 is a face view of the same, parts being broken out; Fig. 7 is a like view of the same, showing the means for turning the drilling tool in a different position; Fig. 8 is a perspective view of the means for turning the drilling tool; Fig. 9 is an end elevation of part of the drilling tool holder; Fig. 10 is a sectional plan view on the line 10—10 of Fig. 6, looking downward in the direction of the arrows, and showing the jaw for turning the drilling tool with the cam surface on the face of the jaw; and Fig. 11 is a sectional view on the line 11—11 of Fig. 5, showing the cam surfaces for partly withdrawing the drilling tool.

On the walls of the mine A is secured, in the usual manner, a column B for carrying the rock-drill, the said column being provided with angular arms B′, B², of which the angular arm B′ is engaged by an adjustable clamp C carrying a drilling tool holder D, in which is mounted to turn and to slide a drilling tool E for drilling lifter and upper holes into the wall of the mine. The drilling tool E receives hammer blows by means of the head F′ of a hammer F, having a pendulum suspension G, held on a clamp H adjustably secured to the arm B² of the column B, as plainly illustrated in Figs. 1, 2 and 3.

The pendulum suspension G is arranged as follows: From the clamp H depends a bolt H′ extending through a bearing G′ abutting against the lower member of the clamp H and also against the under side of the arm B² (see Figs. 1, 2 and 3) and the underside of the circular or ring-shaped bearing G′ is beveled to form a guideway G² onto which fit segments G³ adapted to be turned on the said guideways to assume any desired angular position, the segments G³ being secured in position after the desired adjustment is made by a washer H² fitting the inner edges of the segments G³ and engaged by the nut H³ of the bolt H′. On loosening the nut H³, the segments G³ can be turned in the guideways G² until the desired position is reached, and then the nut H³ is screwed up, to securely clamp the segments G³ in position in the guideways G² of the bearing G′. The lower ends of the segments G³ support a carrier G⁴ carrying a screw-rod G⁵ the ends of which are mounted to turn in bearings at the ends of the carrier. The screw-rod G⁵ screws in a cross-head G⁶ mounted to slide lengthwise on the carrier G⁴, and on the cross-head G⁶ is arranged a transversely-extending pivot G⁷ extending through longitudinal slots in the sides of the carrier G⁴ and on which is fulcrumed the end F² of the hammer handle F³ carrying the hammer head F′ of the hammer F. The handle F³ is preferably removably connected with the end F² by bolts F⁴, so that in case the handle F³ breaks, a new one may be readily substituted and connected with the head F′ and the fulcrum end F². Now, by the operator turning the screw-rod G⁵ by the use of a suitable wrench or like tool, the cross-head G⁶ can be moved forward or backward, to bring the hammer F in proper relation to the drilling tool E, so that when a swinging motion is given to the hammer F, its head F′ strikes the outer end of the drilling tool E.

In order to turn the drilling tool E after each blow of the hammer F, the following device is provided, controlled from the hammer F: On the pivot G⁷ is held an L-shaped arm I, provided with a radial slot I′ and a segmental slot I², of which the latter is engaged by a bolt I³ for securing the arm I to the end F² of the hammer F. In the radial slot I′ is adjustably secured a bolt I⁴, on which is fulcrumed a link J having an extension-rod J′ passing through a bearing J² on the link J and fastened by a bolt J³ to the link in a slot J⁴, so as to permit of adjusting the extension-rod J′ on the link J. The outer end of the extension-rod J′ is pivotally connected with a jaw lever K, fulcrumed at K′ on a segmental jaw K², mounted to rock in a bearing D′ formed on the base D² of the holder D, as plainly illustrated in Figs. 5, 6, 7 and 9. The inner end of the jaw lever K is provided with teeth K³, adapted to engage the periph-

eral face of the drilling tool E, and the segmental jaw K^2 is provided, at its inner face, with teeth K^4, also engaging the drilling tool E at a point diametrically opposite the teeth K^3. When a forward swinging motion is given to the hammer F, then the link J and extension-rod J′ impart a swinging motion from the left to the right to the jaw lever K, so that the latter swings open; that is, its teeth K^3 move out of engagement with the drilling tool E, and consequently the latter is disengaged by the turning device; and when the hammer head F′ now strikes the drilling tool E, the latter is caused to slide lengthwise in the holder D and against the material in the bottom of the drill hole. When the hammer F is on the return swinging motion, then the link J and its extension-rod J′ impart a rocking to the jaw lever K from the right to the left, so that the teeth K^3 engage and grip the drilling tool E, thus turning the same.

In order to insure an easy turning of the drilling tool E in the drill hole by the turning device above described, it is necessary to partly withdraw the drilling tool, to disengage the bit thereof from the material in the bottom of the drill hole. For the purpose mentioned, the inner face of the jaw K^2 is provided with a cam surface K^5 engaging a cam surface K^6 arranged on the holder D, so that when the jaw lever K turns the drilling tool E, and with it the jaw K^2, then the cam surface K^5, in riding over the cam surface K^6, causes a bodily movement of the turning device, and consequently of the drilling tool E, to disengage the bit from the material in the bottom of the drill hole during the turning of the drilling tool. A spring L secured on the base D^2 of the holder D engages the outer face of the jaw K^2, so as to hold the latter against displacement in its bearing D′, at the same time allowing the bodily movement of the jaw, as above described.

On the base D^2 of the holder D is fulcrumed, at D^1, a cover D^3 adapted to be locked to the base by a suitable spring catch D^5, which, when opened, permits the swinging of the cover D^3 into an open position, to allow convenient insertion or removal of the drilling tool. A spring N is secured to the under surface of the cover D^3, to engage the drilling tool E, with a view to hold the latter against falling out of the holder D, but allowing the drilling tool to slide in the holder when the latter receives the blows from the hammer F. The base D^2 of the holder D is mounted to turn on the clamp C, to bring the drilling tool E into the desired position, and for the purpose mentioned the base D^2 is mounted to turn on a pivot C′ attached to the upper member of the clamp C.

The operation is as follows: In setting up the device, it is necessary that the screw-rod G^5 be arranged parallel to the drilling tool E, and the cross-head G^6 is moved on the carrier G^4 so as to bring the head F′ in proper striking position relative to the outer end of the drilling tool E. Now, by the operator taking hold of the handle F^3 of the hammer F, a swinging motion can be readily given to the hammer, so that the hammer head F′, on the forward stroke, strikes the drilling tool E, thus driving the same into the material; and when the hammer F is on the return stroke, the drilling tool E is partly withdrawn and also turned by the action of the link J, the jaw lever K and the jaw K^2, as above explained. Thus, on the next stroke given to the hammer F, the drilling tool E is again sent into the hole, but with the bit in a different position to the previous one, so that a proper drilling of the hole takes place on the successive actions of the hammer F on the drilling tool E. By mounting the cross head G^6 on the carrier G^4 supported by the segments G^3, any desired adjustment can be made, as the segments G^3 are adjustably secured on the bearing G′, and the cross head G^6 is adjustable on the carrier G^4, and hence the hammer F can be always brought into proper striking position relative to the drilling tool E. By connecting the link J with the arm I attached to the end F^2 of the hammer F, it is evident that the link J receives its motion from the hammer and can be adjusted thereon, to bring the link in the proper position relative to the turning device

It is understood that in drilling horizontal holes, the hammer F is given a swing of about one-eighth of an entire revolution; but in drilling angular or vertical holes in the roof of the mine, then about one-quarter swing is given to the hammer F; but in either case the normally vertically-disposed hammer can be readily actuated by the operator without undue physical exertion, and consequently a large amount of work can be done by the arrangement described.

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

1. A rock drill comprising a hammer for striking the drilling tool, a cross head on which the handle of the hammer is fulcrumed, the said hammer normally hanging vertically, a screw rod screwing in the said cross head, a carrier in which the screw rod is mounted to turn, a segment connected with the said carrier, and a support having a guideway in which the said segment is adjustable.

2. In a rock drill, a support, a carrier adjustably held in said support, a screw rod mounted to turn in said carrier, a cross head carried by the screw rod, and provided with a transversely extending pivot, the said carrier having longitudinal slots in its sides through which the ends of the said pivot extend, and a hammer fulcrumed on the said pivot and normally vertically disposed.

3. In a rock drill, a supporting bar, a clamp adjustably secured to said bar, a bearing abutting against the lower member of the clamp, guideways formed in the under side of said bearing, segments fitting said guideways and adapted to be turned therein, means for adjustably securing the segments in position in said guideways, a carrier supported by the lower ends of the segments, a screw rod carried by said carrier and having its ends mounted to turn in the ends of the carrier, a cross head mounted to slide lengthwise on the carrier, and in which the said screw rod screws, and a hammer pivoted on the cross head and normally vertically disposed.

4. In a rock drill, a support, a clamp secured to said support, a bearing engaging the lower member of the clamp and the under side of said support, guideways formed in the under side of said bearing, segments engaging said guideways and adapted to be turned therein, means for adjustably securing the segments in position in said guideways, a carrier supported by the ends of said segments and having longitudinal slots in its sides, a cross head carried by said carrier and provided with a transversely extending pivot extending at its ends through the slots in the sides of the carrier, a screw rod screwing in said cross head and mounted to turn in the ends of said carrier, and a hammer having the end of its handle fulcrumed on the said pivot.

5. In a rock drill, a support, a clamp adjustably secured to said support, a ring-shaped bearing abutting against the under side of said support, guideways formed in the under side of said bearing, segments engaging said guideways and adapted to be turned therein, a bolt depending from the clamp and extending through said bearing, a

washer on the bolt for engaging the inner edge of the segments, a nut engaging said washer to clamp the segments in adjusted position in said guideways, a carrier supported by the segments, a cross head adjustably carried by said carrier, a hammer pivoted on the cross head, and a holder for the drilling tool arranged for the hammer to strike said tool on imparting a swinging motion to the hammer.

6. A rock drill comprising an adjustable cross head, a support for the same, the cross head being provided with a pivot, a hammer mounted to swing on said pivot, an L-shaped arm held on said pivot and provided with a radial slot and a segmental slot, a bolt extending through the segmental slot and securing said arm to the hammer handle, a bolt adjustably secured in the radial slot of said arm, a link fulcrumed on said bolt, a holder for the drilling tool to turn and to slide in, means for intermittently turning said drilling tool, and a connection between said means and the said link.

7. A rock drill comprising an adjustable cross head, means for supporting the same, the said cross head being provided with a pivot, a hammer mounted to swing on said pivot, an L-shaped arm held on said pivot, and provided with a radial slot and a segmental slot, a bolt extending through the segmental slot, and securing said arm to the hammer handle, a bolt adjustably secured in the radial slot, a link fulcrumed on said bolt and provided with a longitudinal slot, an extension rod adjustably connected with said link, a holder for the drilling tool, and means connected with said extension rod for turning the drilling tool.

8. A rock drill comprising an adjustable cross head, a support for the same, a hammer pivoted on the cross head, an arm mounted on the pivot of the hammer, means for adjustably securing said arm to the hammer handle, a holder for the drilling tool to turn and to slide in, means for intermittently turning the said drilling tool and provided with a cam for engaging a cam surface on the holder, and partly withdrawing the drilling tool, and an adjustable connection between the said means and the said arm.

9. A rock-drill provided with a hammer for striking the drilling tool, a cross head on which the said hammer is fulcrumed, a screw-rod screwing in the said cross head, a carrier in which the screw rod is mounted to turn a segment connected at its ends with the said carrier, a support having guideways on its under side for the said segment to turn in, and means for securing the said segment to the said support.

10. A rock-drill provided with a hammer for striking the drilling tool, a cross head on which the said hammer is fulcrumed, a screw-rod screwing in the said cross head, a carrier having bearings at its ends in which the screw rod is mounted to turn, segments supporting the said carrier, a support having guideways on its under side for the said segments to turn in, a clamping device adjustably secured to a supporting bar, a bolt depending from the clamping device and extending through the said support in which the segments turn, and means on said bolt for clamping the segments in position in said guideways.

11. A rock-drill provided with a tool holder having a bearing for the drilling tool to slide and to turn in, a spring on the said holder for engaging the drilling tool, a clamping device mounted to rock on the said holder and engaging the drilling tool for turning the same on rocking the clamping device in one direction, and means for imparting a rocking motion to the said clamping device.

12. A rock-drill provided with a tool holder having a bearing for the drilling tool to slide and to turn in, a cover on said holder and a spring secured to the under surface of the cover for engaging the drilling tool, a clamping device mounted to rock on the said holder and engaging the drilling tool for turning the same on rocking the clamping device in one direction, means for imparting a rocking motion to the said clamping device, and a spring on the said holder for engaging the said clamping device to hold the latter in position on the said holder.

13. A rock-drill provided with a tool holder having a bearing for the drilling tool to slide and to turn in, a spring on the said holder for engaging the drilling tool, a clamping device mounted to rock on the said holder and engaging the drilling tool for turning the same on rocking the clamping device in one direction, the said clamping device having a cam for engaging the said holder to partly withdraw the drilling tool in the drill hole, and means for imparting a rocking motion to the said clamping device.

14. A rock-drill provided with a tool holder having a bearing for the drilling tool to slide and to turn in, a spring on the said holder for engaging the drilling tool, a clamping device mounted to rock on the said holder and engaging the drilling tool for turning the same on rocking the clamping device in one direction, the said clamping device comprising a jaw and a jaw lever fulcrumed on the said jaw, the said jaw having a cam face for engaging a cam surface on the said holder to partly withdraw the drilling tool, and means connected with the said jaw lever for rocking the clamping device to turn the drilling tool on rocking the clamping device in one direction.

15. In a rock drill an adjustable cross head, means for supporting the same, the cross head being provided with a pivot, a hammer mounted to swing on said pivot, an L-shaped arm held on said pivot and provided with a segmental slot a bolt extending through the segmental slot and securing said arm to the hammer handle, a holder for the drilling tool, and means for turning the drilling tool and connected with the said arm.

16. A rock drill comprising a holder for the drilling tool to turn and to slide in, a cross head provided with a transversely extending pivot, a screw rod screwing in the said cross head, a carrier having bearings at its ends in which the screw rod is mounted to turn, the said carrier having longitudinal slots in its sides through which the ends of the pivot of the cross head extend, a support in which the said carrier is adjustably held to allow of setting the carrier to a desired angle to bring the screw rod parallel to the said drilling tool, and a hammer having the upper end of its handle fulcrumed on the said pivot, the said hammer normally hanging vertically and adapted to strike the drilling tool, on imparting a swinging motion to the hammer.

17. In a rock drill, a support having guideways on its under side, a carrier, segments connected at their ends with said carrier and mounted to turn in said guideways, means for holding the segments in adjusted position, a cross head adjustable on the carrier, and a hammer for striking the drilling tool, the hammer being pivoted on the cross head.

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

EVAN WILLIAM EVANS.

Witnesses:

RICHARD PEARSON,

DAVID R. WOOD.