No. 749,585. PATENTED JAN. 12, 1904.

W. N. SHOTWELL & J. DREISTADT.

DRILL.

APPLICATION FILED MAY 9, 1903.

NO MODEL. 3 SHEETS—SHEET 1.

Fig. 1.

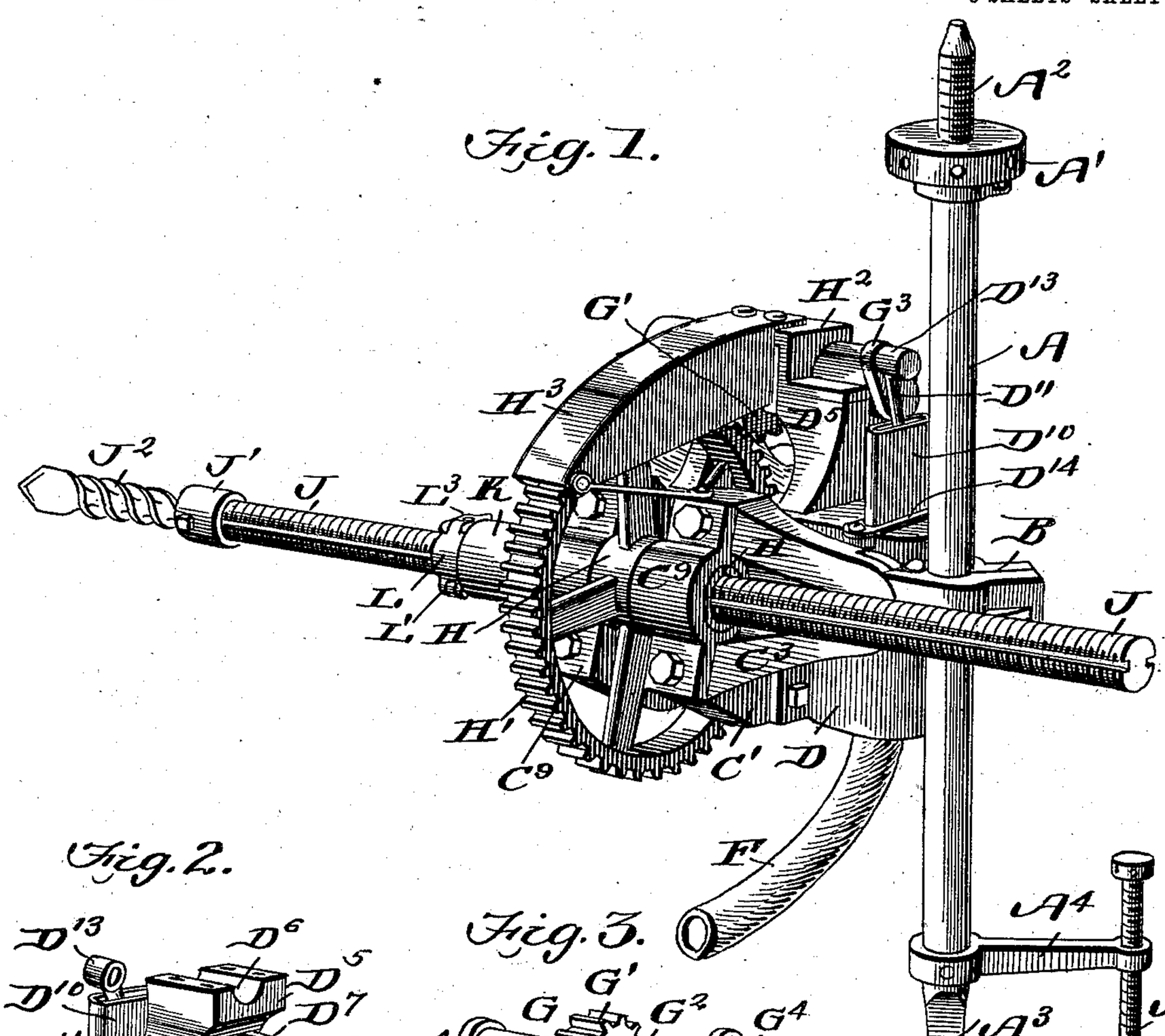


Fig. 2.

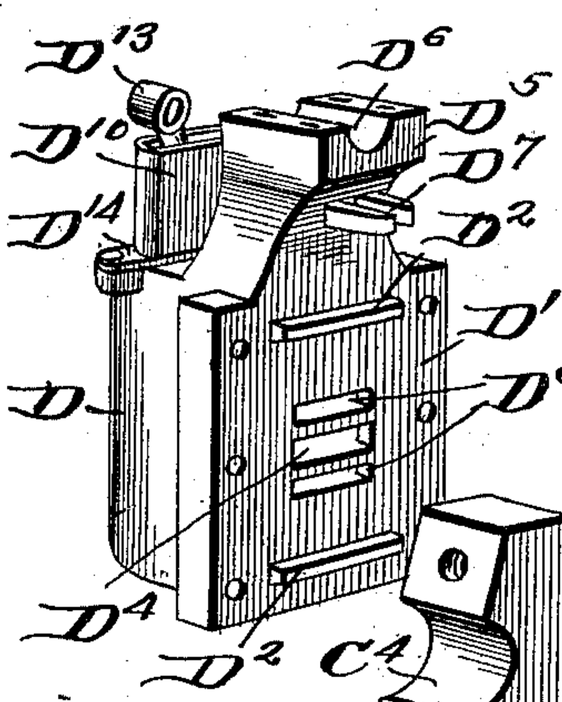


Fig. 3.

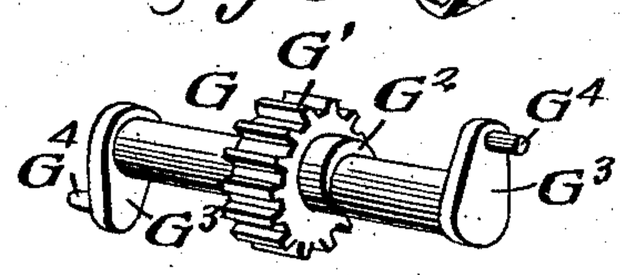


Fig. 4.

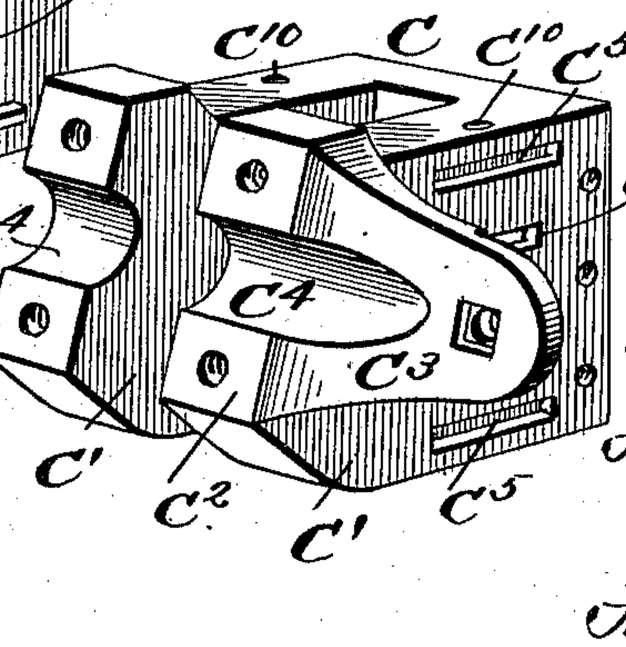


Fig. 5

Fig. 7

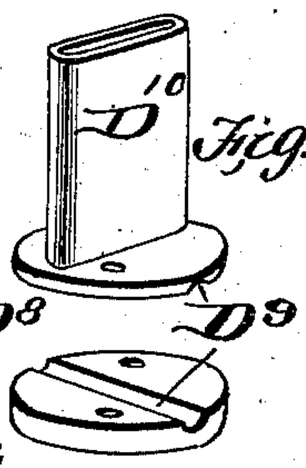
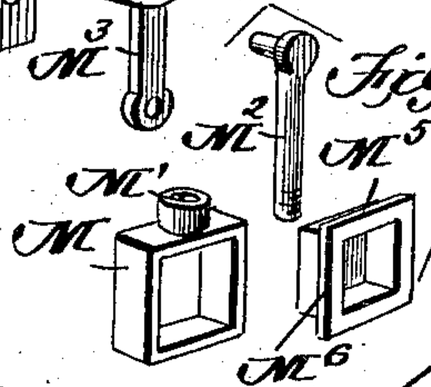


Fig. 8.

Fig. 6



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NO MODEL. 3 SHEETS—SHEET 2.

Fig. 9.

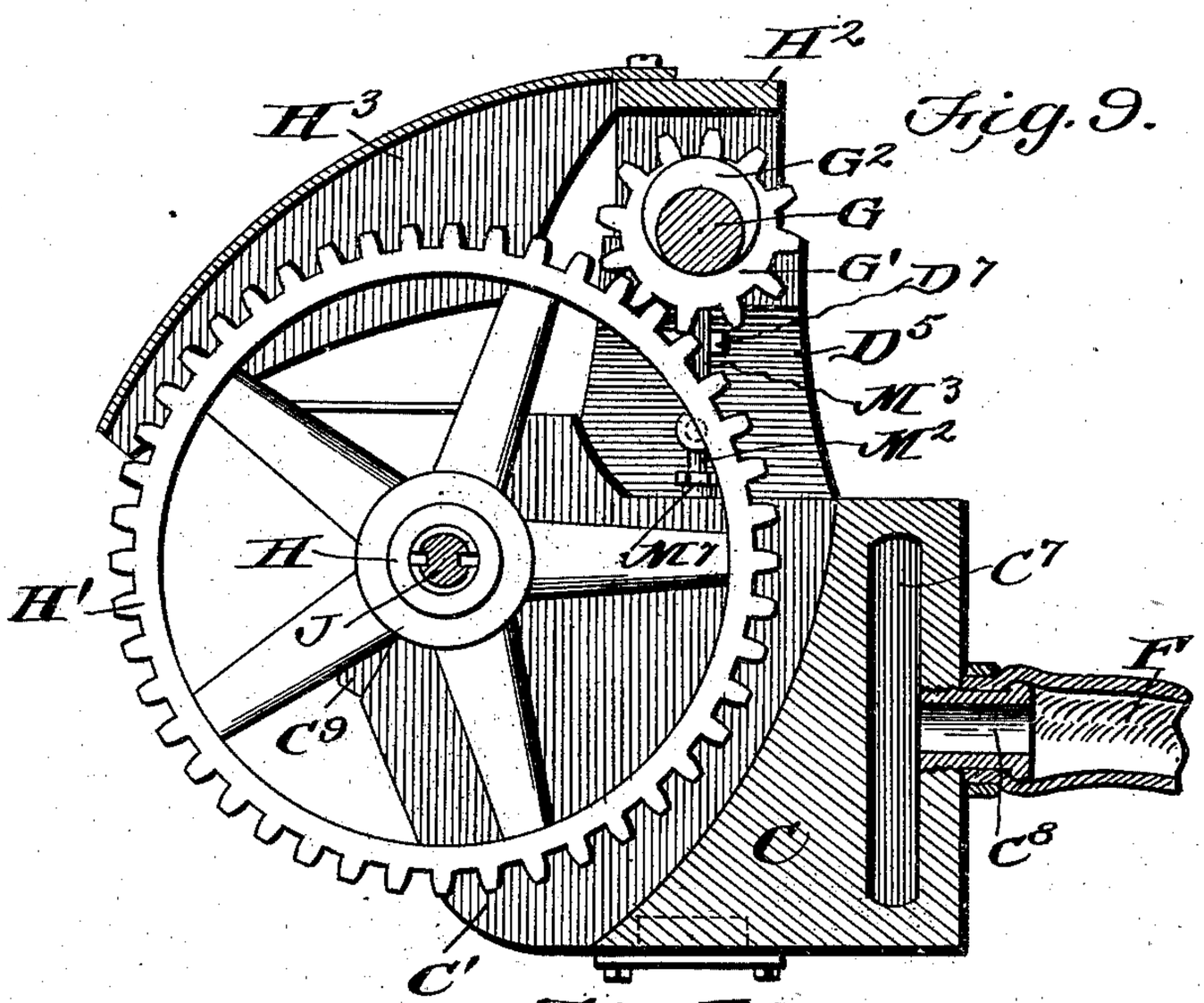

Fig. 10.

Fig. 12.

Fig. 11.

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APPLICATION FILED MAY 9, 1903.

NO MODEL. 3 SHEETS—SHEET 3.

Fig. 73.

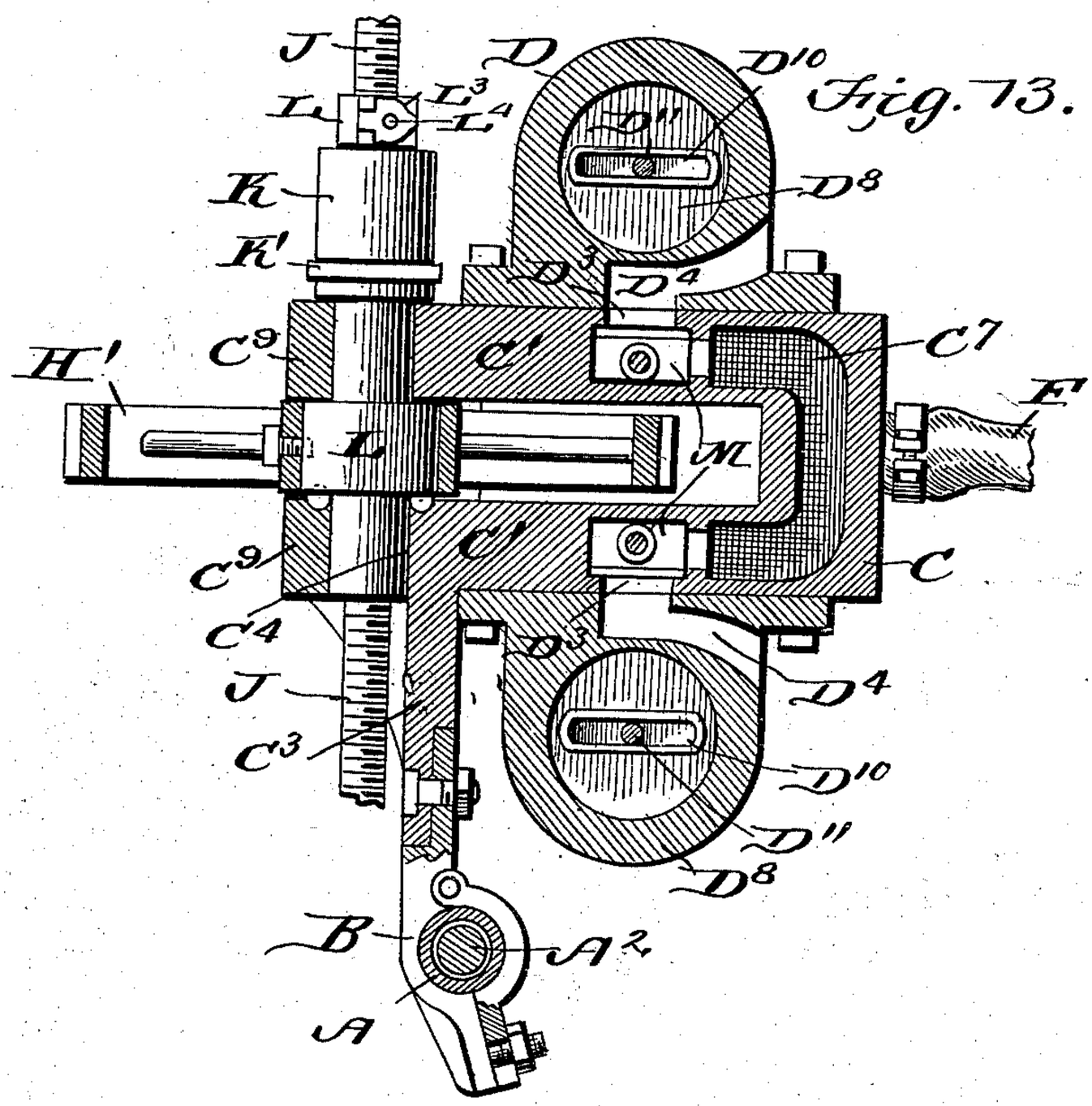


Fig. 74.

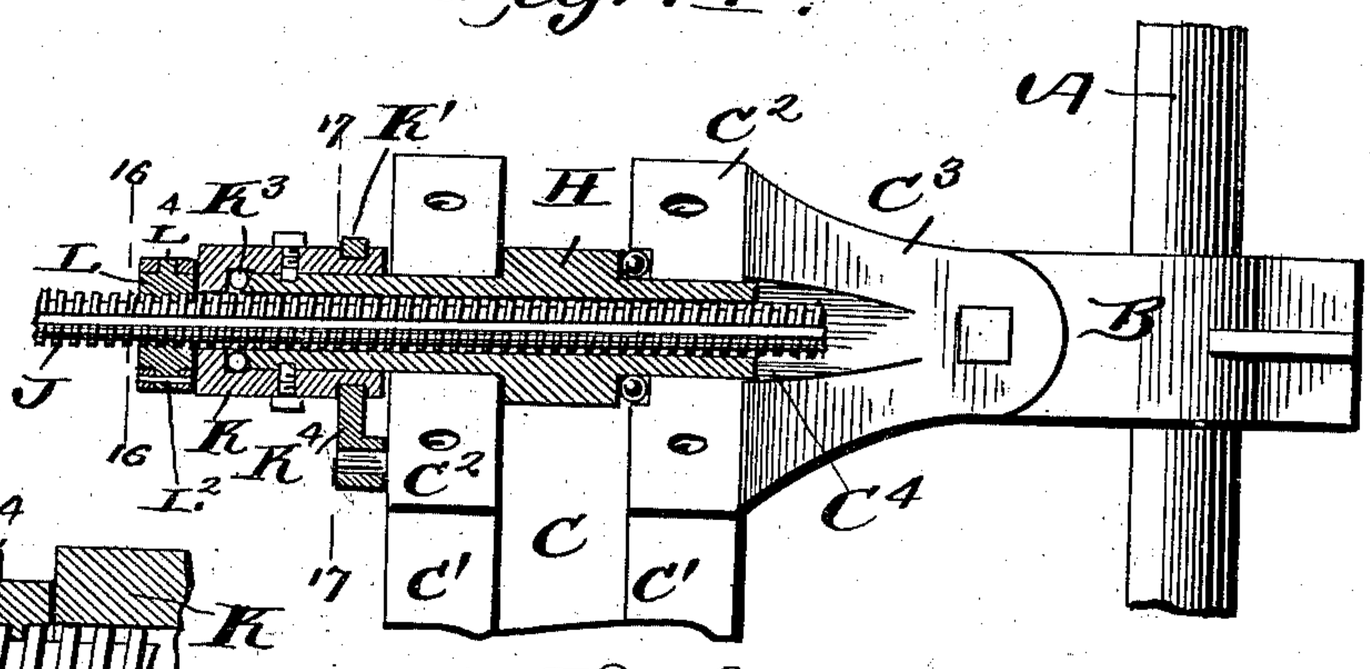


Fig. 76

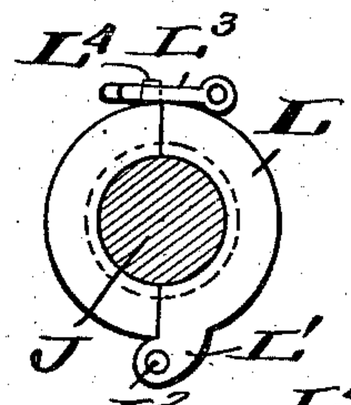


Fig. 15

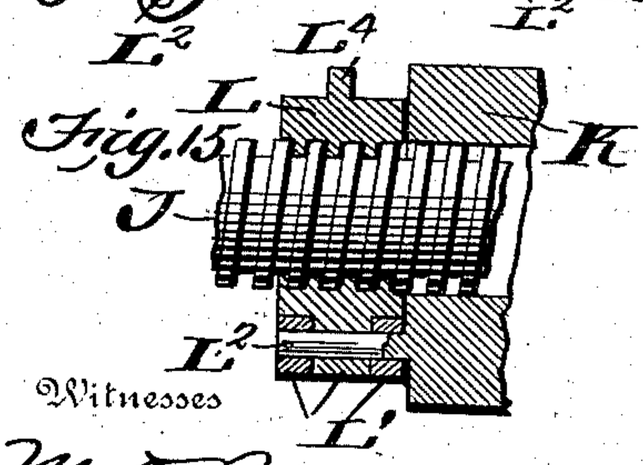
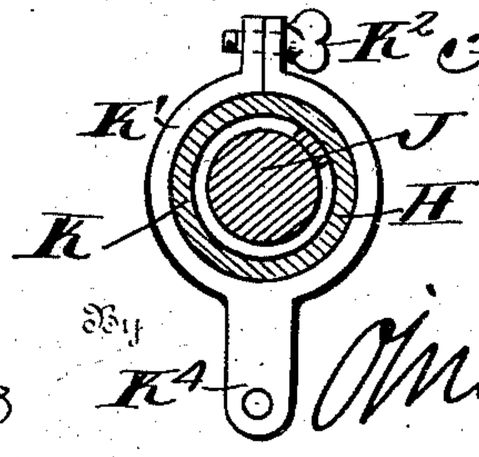


Fig. 17.



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UNITED STATES PATENT OFFICE.

WILLIAM N. SHOTWELL AND JOHN DREISTADT, OF OLDFORGE, PENNSYLVANIA.

DRILL.

SPECIFICATION forming part of Letters Patent No. 749,585, dated January 12, 1904.

Application filed May 9, 1903. Serial No. 156,482. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM N. SHOTWELL and JOHN DREISTADT, citizens of the United States, residing at Oldforge, in the county of Lackawanna and State of Pennsylvania, have invented a new and useful Drill, of which the following is a specification.

Our invention is a pneumatic drill; and our object is to produce a portable drill of this nature which can be readily placed in position, and also to provide a compact mechanism for driving the drill at a high speed. While this drilling mechanism can be used to drive a drill in work of any nature, yet the entire apparatus has been constructed with especial view to mining work and to drilling in beds of coal, rock-salt, and the like.

Our invention consists in the novel features of construction and combination of various parts hereinafter fully described, and pointed out in the claims.

In the drawings, forming a part of this specification, Figure 1 is a perspective view of our device complete. Fig. 2 is a detail perspective view of one of the cylinders detached. Fig. 3 is a perspective view of the driving-shaft and gear. Fig. 4 is a detail perspective view of the hollow forked casting, the front end plates being removed. Fig. 5 is a detail perspective view of the valve-operating means, the two sections being separated. Fig. 6 is a perspective view of one of the slide-valves and stem, the parts being shown detached. Fig. 7 is a detail perspective view of the piston-rod. Fig. 8 is a detail perspective view of the piston and cross-head, the lower section of the piston being shown detached. Fig. 9 is a vertical section taken centrally through the driving mechanism and at right angles to the drill. Fig. 10 is a vertical section, parts being shown in elevation and taken through the cylinders and casting at right angles to Fig. 9. Fig. 11 is a detail vertical section taken through one of the pistons and cross-heads, the piston-rod being shown in elevation. Fig. 12 is a detail perspective view of a stuffing-box. Fig. 13 is a horizontal section taken through the cylinders and casting. Fig. 14 is a longitudinal section through the drill-holding shaft, the casting and drill being shown in elevation. Fig. 15 is an enlarged detail view of part of Fig. 14. Fig. 16 is an enlarged sectional view on the line 16 16 of Fig. 14. Fig. 17 is an enlarged sectional view about on the line 17 17 of Fig. 14.

In the above-described drawings, A represents a standard of any desired length, having at its upper end a revoluble disk A′, carrying a screw A^2. The standard is sharpened at its lower end and carries a laterally-extending bracket A^4, which holds a screw A^5. By these means the standard may be rigidly held in the roof, floor, or sides of a mine shaft or tunnel. A clamping member B, formed in two sections, is adjustably held on the standard.

In the construction of our improved drill-actuating mechanism we employ a hollow forked casting C, having the parallel forks C′. The forward ends of these forks are formed with upwardly and rearwardly inclined faces C^2, and the fork member adjacent the standard has a laterally-extending projection or arm C^3, which is bolted to and supported by the clamping member B. A horizontal groove C^4 is formed in the faces C^2, extending into the arm C^3, and forms a bearing for the drill-shaft. The hollow forks not only serve as supports for the driving mechanism, but also serve as valve-chambers, and on the outer side of each member C′ are recesses C^5, inlet-passages C^6, and exhaust-passage C^{11} between the inlet-passages, (see Fig. 10,) and extending through the top of the fork members are apertures C^{10}, through which the valve-stems slide. The rear connecting end member of the casting is also hollow, the air-chamber C^7 extending through this end piece into each fork, as shown in Figs. 9 and 10. An opening is formed in the end member, in which is inserted a perforated plug C^8, to which is attached one end of a flexible air-pipe F.

The cylinders D are bolted to each side of the casting C and for this purpose are formed with a flat flanged face D′, having lugs D^2 formed thereon which fit into the recesses C^5. In the face D′ of each cylinder are formed inlet-passages D, which aline with and are continuations of the passages C^6 of the casting.

These passages D^3 open in the interior of the cylinder adjacent its ends and are shown in full in Fig. 10. Between them is the exhaust-passage D^4, which registers with the opening C^{11}, as also shown in Fig. 10, and which is shown in full in Fig. 13. Extending above each cylinder integral therewith and overhanging the casting are brackets D^5, grooved at D^6 and forming bearings for a driving-shaft.

A piston D^8 is formed in two sections adapted to be bolted together, each section being grooved, as shown at D^9 in Fig. 8, the grooves forming a cylindrical passage when the sections are joined together. Mounted on the upper section is a flat elongated sleeve or cross-head D^{10}, having a V-shaped bore, the apex intersecting the passage formed by the grooves D^9. The piston-rod D^{11} has at its inner end a cross-piece D^{12}, which rests on the grooves D^9, the rod extending upward through the bore of the cross-head and being practically pivoted to the piston. The outer end of the piston carries a socket D^{13}, arranged at a right angle to the piston-rod. One of these pistons and rods is arranged in each of the cylinders.

Extending inwardly from the side of each bracket D^5 are guide-arms D^7, the object of which will appear hereinafter. Set into the top of each cylinder is a stuffing-box D^{14}, through which the cross-head D^{10} works. A removable end plate E is threaded into the lower end of each of the cylinders. A driving-shaft G is journaled adjacent each end in the bearings formed by the grooves D^6. This shaft carries a gear-wheel G', secured centrally and rigidly thereto, and on each side of the gear is an oppositely-formed cam G^2, integral with the shaft. Oppositely-extending crank-arms G^3 are carried at the ends of the shaft, and the arms have crank-pins G^4, which fit into the sockets D^{13}.

A shaft H is journaled in the bearings formed by the groove C^4, and rigidly mounted thereon is a gear-wheel H', meshing with the gear-wheel G'. End plates C^9 fit over the inclined faces C^2 and the shaft H and complete the bearing in which the shaft is journaled. A top plate H^2, having a central elevated portion, extends from one bracket D^5 to the other and forms a covering for the shaft G and gear-wheel G'. A curved flanged shield H^3 is secured at its rear end to the plate H^2 and extends forwardly and downwardly over the upper portion of the gear-wheel H' and is braced by suitable brace-rods. This shield prevents rock and dirt from catching in the gear-teeth. The threaded drill-shank J passes through the shaft H and is splined thereto. At one end this shank carries a bit J', in which is secured the drill J^2.

A sleeve K is carried at one end of the shaft by set-screws. The sleeve, which has inwardly-turned flanges at its outer end, carries between said flanges and the end of the shaft antifriction-balls K^3. Adjacent its inner end the sleeve has an annular groove formed around it, in which fits a split collar K', the free ends of the collar being held by a set-screw K^2, and a downwardly-projecting arm K^4 being secured by a pin or any suitable means to the casting.

A threaded box L, having a threaded bore through which the shank K works, is formed in two sections, having downwardly-projecting ears L' hinged on a pintle L^2, formed integral with and projecting from the sleeve K. A catch L^3, hinged to the upper part of one section, locks over a pin L^4, carried by the other section, holding the two together. By lifting the lock and swinging the sections apart the threaded drill-shank can slide in the bore of the shaft H.

In each of the chambers C^7 in the forks of the casting are arranged valves constructed as follows: An open rectangular frame M is provided, having on its upper side a socket M'. Threaded into this socket is a valve-stem M^2, carrying a pin at its upper end. A strap M^4, divided into two sections and bolted together, surrounds each cam G^2 and has a depending arm M^3, which is pivotally secured by the pin to the stem M^2. A box M^5, open on one side and having a flange M^6 extending laterally around said open side, fits into the frame M, the flange M^6 resting against the frame. This flange also slides against the wall of the chamber and the box M^5 opens toward the inlet and exhaust passages, the exhaust being always covered by the box. The stems work through suitable stuffing-boxes M^7.

The operation of our device is as follows: The drill being adjusted on the standard in the proper position for the work at hand, compressed air is fed into the chamber C^7 from any desired source and passes into the interior of the forks C'. The cams being oppositely arranged, one of the valve-boxes will cover the exhaust and upper inlet passages into the cylinder and the other valve will cover the exhaust and lower inlet passage. The compressed air will therefore pass through the uncovered passages into the cylinders, driving the pistons in opposite directions, and the air in front of the moving pistons will pass through the covered passages into the valve-boxes and from there into the exhaust-ports. The cams G^2 being parallel with the cranks G^3 and extending from the shaft in the same direction each valve will move with its respective piston. The movement of the pistons imparts rotation to the shaft G, gear G^2, gear H', shaft H, shank J, and the drill J^2. The cross-heads slide through the stuffing-boxes D^{14}, and the piston-stems D^{11} swing in the bores of the cross-heads from side to side, as shown by the dotted lines in Fig. 11.

Any desired means may be adopted for controlling the admission of air into the casting or through the pipe F.

Having thus fully described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a drill of the kind described, the combination with a casting having hollow forks and a plurality of air-passages arranged in one side of each fork, of a cylinder having a flat outer face, and having a plurality of air-passages formed therein, supported by each fork, the air-passages of the cylinders registering with those of the forks, a drill supported by said forks, drill-driving mechanism carried by the casting and valves arranged in the casting adapted to control the supply of air to the cylinders.

2. A drill of the kind described comprising a hollow forked casting, the end faces of said forks being rearwardly and upwardly inclined and horizontally grooved, a laterally-projecting arm extending from one of said forks, a standard, means for adjustably clamping said arm to said standard, a drill-carrying shaft journaled in the groove of the forks, drill-driving mechanism carried by the casting, means for admitting compressed air into said casting, and valves arranged in the forks and adapted to regulate the feeding of said air to the driving mechanism.

3. The combination with a forked casting, of a drill-shaft journaled on said casting, cylinders arranged on the outer sides of each fork of the casting and having ports communicating with the interior of the forks, pistons arranged in the cylinders, brackets arranged on the casting, a shaft journaled in said brackets, means for connecting the pistons with said shaft, valves arranged in the forks of the casting adapted to close the ports leading to the cylinders, means for connecting said valves to the shaft adapting them to move in unison with the piston in the adjacent cylinder, and means for transmitting rotation of the shaft carried by the brackets to the drive-shaft.

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