No. 894,213.

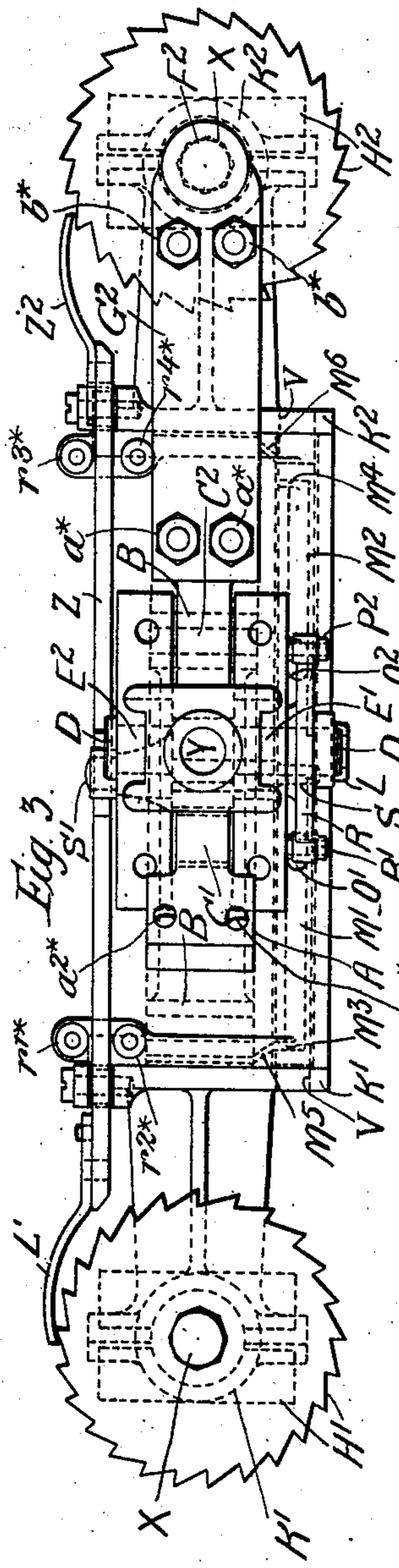
PATENTED JULY 28, 1908.

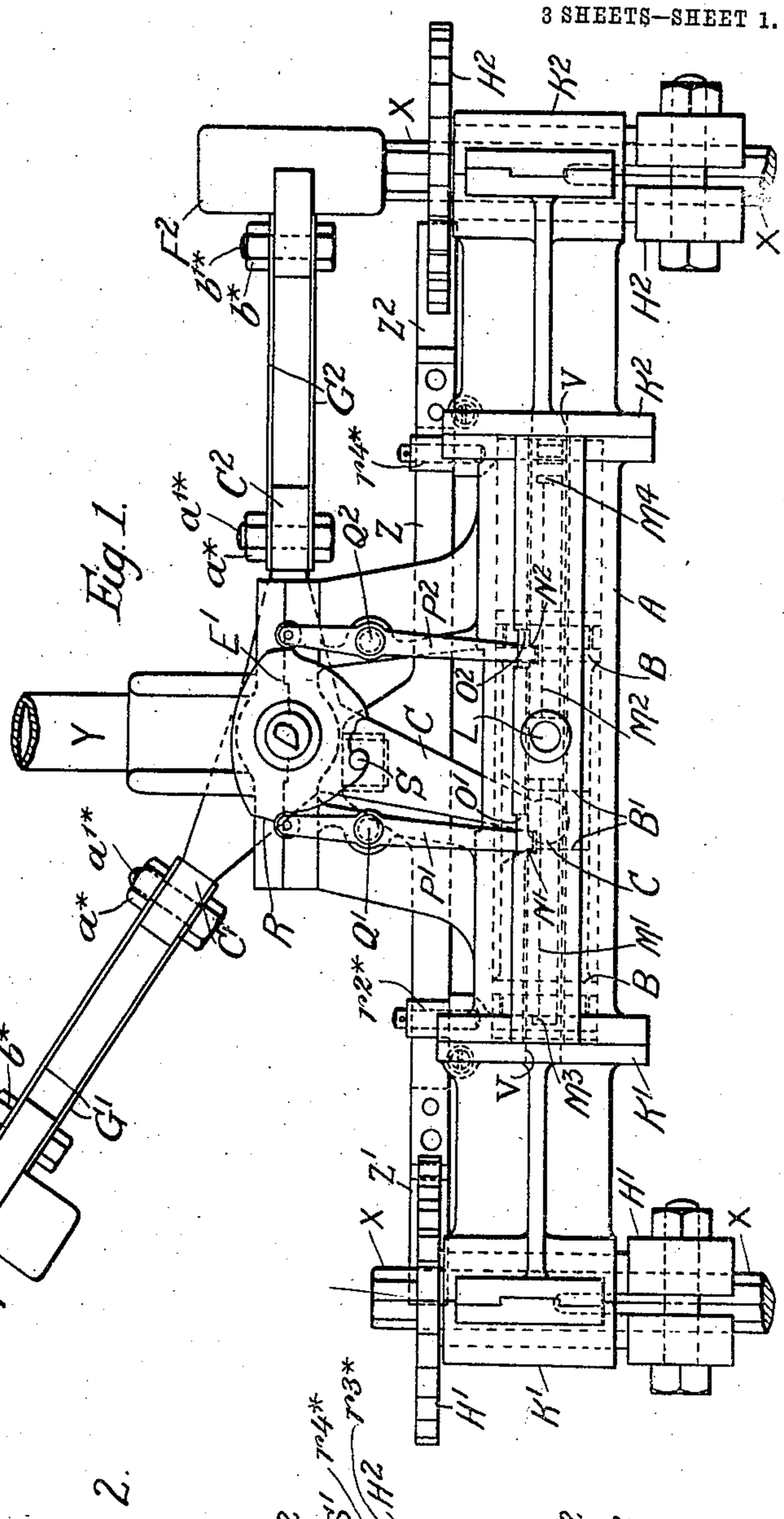
H. J. C. KEYMER.

ROCK DRILL.

APPLICATION FILED JAN. 8, 1907.

3 SHEETS—SHEET 1.





WITNESSES:

H. H. Berrigan.

F. B. Hogan

INVENTOR,

HENRY JOHN CUBITT KEYMER,

BY Hyde & Odell

Attorney.

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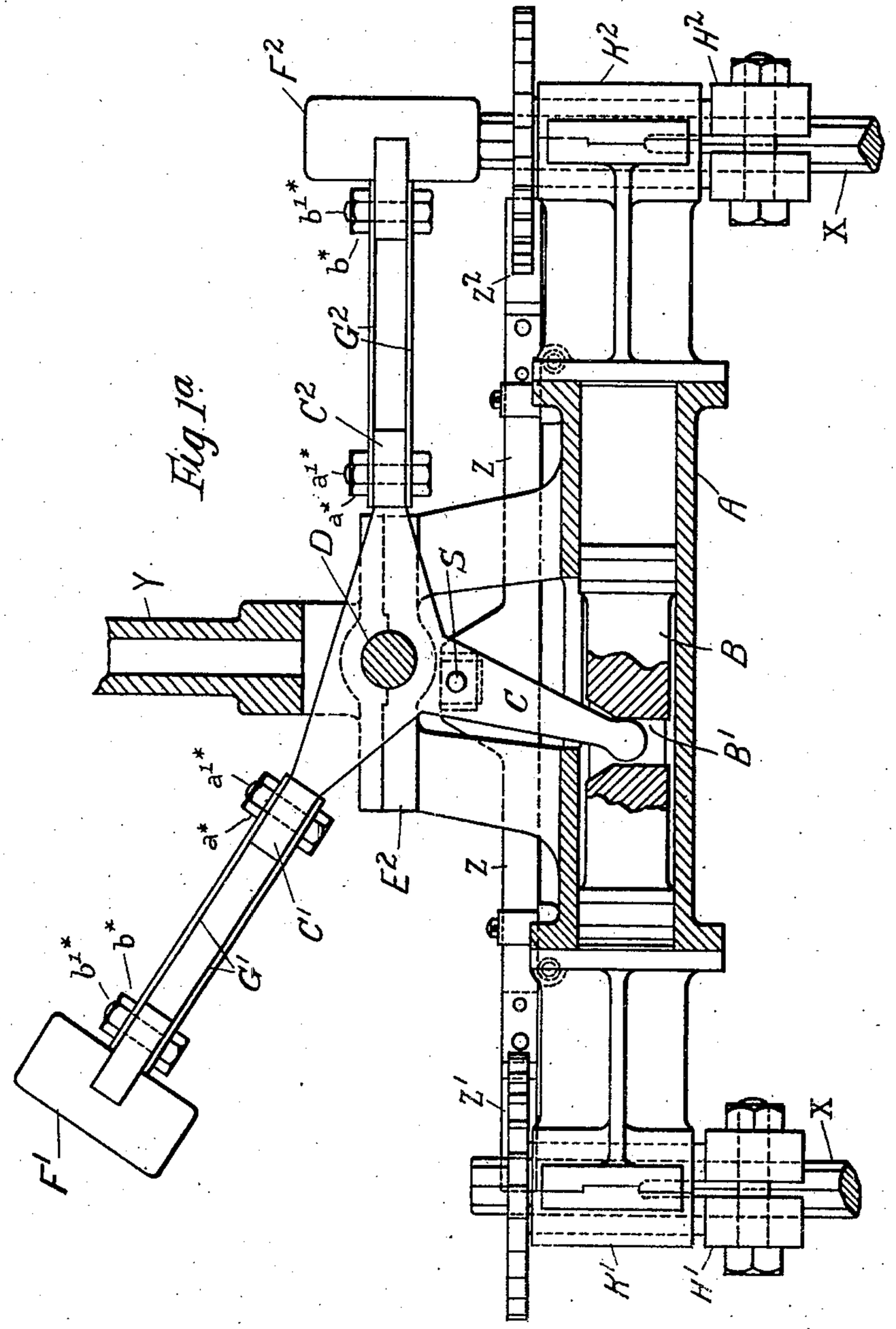
3 SHEETS—SHEET 2.

Fig. 1a.



WITNESSES:

H. H. Berrigan

J. L. Flaherty.

INVENTOR,

HENRY JOHN CUBITT KEYMER,

by

van Oldenneel & Schoenlank

Attorneys.

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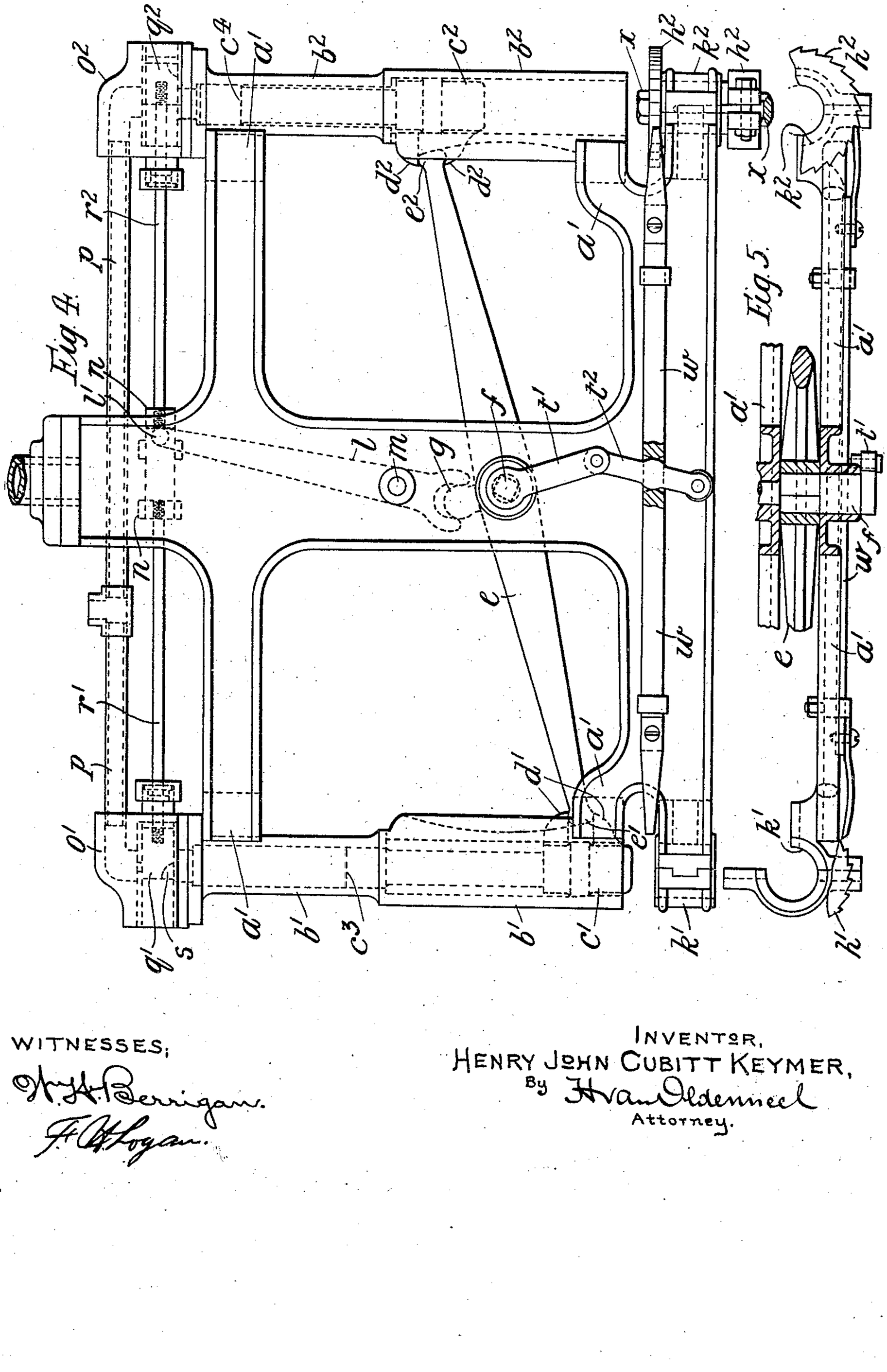
3 SHEETS—SHEET 3.



WITNESSES;

H. H. Berrigan.

F. A. Logan.

INVENTOR,

HENRY JOHN CUBITT KEYMER,

By Hvan Oldenneel

Attorney.

UNITED STATES PATENT OFFICE.

HENRY JOHN CUBITT KEYMER, OF GORLESTON, GREAT YARMOUTH, ENGLAND.

ROCK-DRILL.

No. 894,213. Specification of Letters Patent. Patented July 28, 1908.

Application filed January 8, 1907. Serial No. 351,341.

To all whom it may concern:

Be it known that I, HENRY JOHN CUBITT KEYMER, a subject of the King of the United Kingdom of Great Britain and Ireland, and resident of Gorleston-on-Sea, Great Yarmouth, England, have invented a certain new and useful Improvement in Rock-Drills, of which the following is a specification.

This invention relates to improvements in drills and more especially to pneumatically operated rock drills of the kind in which the boring tool or bit receives a rotary movement from suitable mechanism and is also subjected to intermittent blows from a hammer or the like.

My improvement consists primarily in an improved construction of drill wherein a pair of tools are actuated (hammered and rotated) alternatively.

An important part of the invention is an improved mechanism for transmitting the movement of the piston to the tool actuating means.

Further improvements are referred to in the following description and indicated in the accompanying drawings.

In said drawings Figure 1 is a side elevation: Fig. 1[a] is a part vertical section and part elevation of the construction shown in Fig. 1. Fig. 2 an end elevation (with the hammers and helves removed), and Fig. 3 a plan (with one hammer and helve removed), showing the preferred construction with a pair of bits intermittently rotated by ratchet mechanism with which coöperate a pair of pivoted hammers serving to drive the tools into the rock. It will be seen that the ratchet devices receive their movements from the same devices as actuate the hammer mechanism. Fig. 4 is a side elevation and Fig. 5 a part plan showing a modified construction in which the power is applied directly to the hammers and movement transmitted therefrom to the ratchet mechanism.

Referring to the construction shown in Figs. 1 to 3 the improved drill comprises a cylinder A within which reciprocates the piston B which is provided with a slot B^1 located midway between its ends. The said slot is engaged by the rounded end of a lever C pivoted on a pin D working in bearings E^1 and E^2 projecting from the cylinder casting. The lever C is provided with two wings or arms C^1 and C^2, for operating hammers, F^1 and F^2, carried at the ends of spring handles or helves G^1 and G^2. Each hammer is connected by bolts b^{1*} and nuts b^* fitted thereto, with one of each of the upper and lower springs, and the other ends of each pair (G^1 or G^2) of springs are connected, by bolts a^{1*} (which pass through openings a^{2*}) and nuts a^*, with the arms C^1 and C^2. The drills X are held by ratchet-headed sockets H^1 and H^2 which revolve within the cylinder cover arms or bearings K^1 and K^2.

The mechanism is operated by admitting compressed air or the like into the chamber or chest L between two piston valves M^1 and M^2 which are actuated by the valve levers P^1 and P^2 which are pivoted upon the pins Q^1 and Q^2 and pass through slots O^1 and O^2 in the shell of the chamber or chest L. The levers P^1 and P^2 engage at one end recesses N^1 and N^2 of the piston valves M^1 and M^2 while the opposite ends of said levers P^1 and P^2 are in contact with and work upon the periphery of a trip cam or yoke R carried by the pin D. The cam R is actuated by the pin S projecting from the lever C, a curve in the cam path allowing the necessary travel of the lever C and the pin S to take place before the operation of the cam reverses the positions of the valves M^1 and M^2 so as to admit the compressed fluid to the reverse ends of the piston B. The portways of the valves M^1 and M^2 are thus alternately brought into communication with the ports M^5, M^6 to the cylinder, Figs. 1 and 3 showing the portway M^3 open to the port M^5 in the cylinder, while portway M^4 is closed to the port M^6 at the other end of the cylinder; the end of the valve M^2 is clear of the port M^6 and allows the exhaust to pass freely out of the exhaust port V in the cylinder cover K^2. The opposite end S^1 of the pin S to that operating the cam R projects clear of the cylinder casting and reciprocates a pawl bar Z which is guided between and upon rollers r^{1*}, r^{2*}, r^{3*} and r^{4*}, and operates alternately through the pawls Z^1 and Z^2 the ratchet drill sockets H^1 and H^2 and thus rotates the tools X so that their cutting edges are at a fresh angle or facet of the rock for the next blow of the hammers F^1 and F^2 alternately. The whole machine is carried and directed to its work by the stem Y which is held by a tunnel bar, tripod or other suitable support.

In the apparatus shown in Figs. 4 and 5 the power is applied directly to the hammers instead of to the double ended piston by arranging the hammers to work within two cylinders and hammer guides disposed par-

allel to one another and to coöperate with a double ended lever working upon a central axis, each end of which lever is in contact with one of the hammers so that forward movement of one hammer actuates the other hammer in the opposite direction.

The main structure comprises side frames a^1 between the ends of which are fixed the cylinders and hammer guides b^1 and b^2 directly over the drill sockets h^1 and h^2 working within the bearings k^1 and k^2.

Working within the cylinders and guides b^1 and b^2 are hammers c^1 and c^2 combined with pistons c^3 and c^4. The hammers c^1 and c^2 have projections d^1 and d^2 between which work respectively the ends e^1 and e^2 of the lever e oscillating upon the axis f between the said side frames. Thus by admitting compressed fluid to either cylinder the lever e moves the knuckle joint g forming part of the lever e and which in its turn operates the valve lever l working upon the axis m and in contact with the valve rod bridle n at the end l^1 of the said lever l.

The valve chests o^1 and o^2 are attached to the ends of the cylinders b^1 and b^2 and are connected by the pipe p for the compressed fluid supply. Within the valve chests o^1 and o^2 work the piston valves q^1 and q^2 connected by the bridle n and the rods r^1 and r^2 the movements of which rods are controlled by the end l^1 of the lever l so that one piston c^4 is open to and receives the full supply of compressed fluid while the other piston c^3 is expelling the fluid previously used in its reverse motion through the exhaust ports s of the valve chest o^1. The valves q^1 and q^2 thus change position according to the alternating application of the power and motion of the pistons c^3 and c^4. Through the medium of the axis f fixed in the lever e power is transmitted by the levers t^1 and t^2 to the pawl bar w actuating in turn the drill sockets h^1 and h^2, and thereby the drills x. Instead of compressed air I may utilize the power obtained by combustion of an explosive mixture to operate the drill.

Having now described my invention what I claim and desire to secure by Letters Patent of the United States is:—

1. In a rock drill, in combination, a pair of boring tools, means for rotating said tools intermittently, hammers for striking said tools alternately, connections adapted to operate by air under pressure for moving said hammer, valves for controlling said connections, and lever devices for controlling the operation of the valves and the operation of the tool-rotating means.

2. In a rock drill, in combination, a pair of boring tools, means for rotating said tools intermittently, hammers for striking said tools alternately, connections adapted to be operated by air under pressure, and comprising a percussion piston for moving said hammers, means for assuring that the operation of the hammers and the operation of the tools shall take place alternately, and valves for controlling the supply of air under pressure to the apparatus.

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

HENRY JOHN CUBITT KEYMER.

Witnesses:
ALFRED THOMAS BURBERY,
ALFRED NUTTING.