V. P. KESSEL.

ROCK DRILL.

APPLICATION FILED DEC. 29, 1913.

1,132,276.

Patented Mar. 16, 1915.

2 SHEETS—SHEET 1.

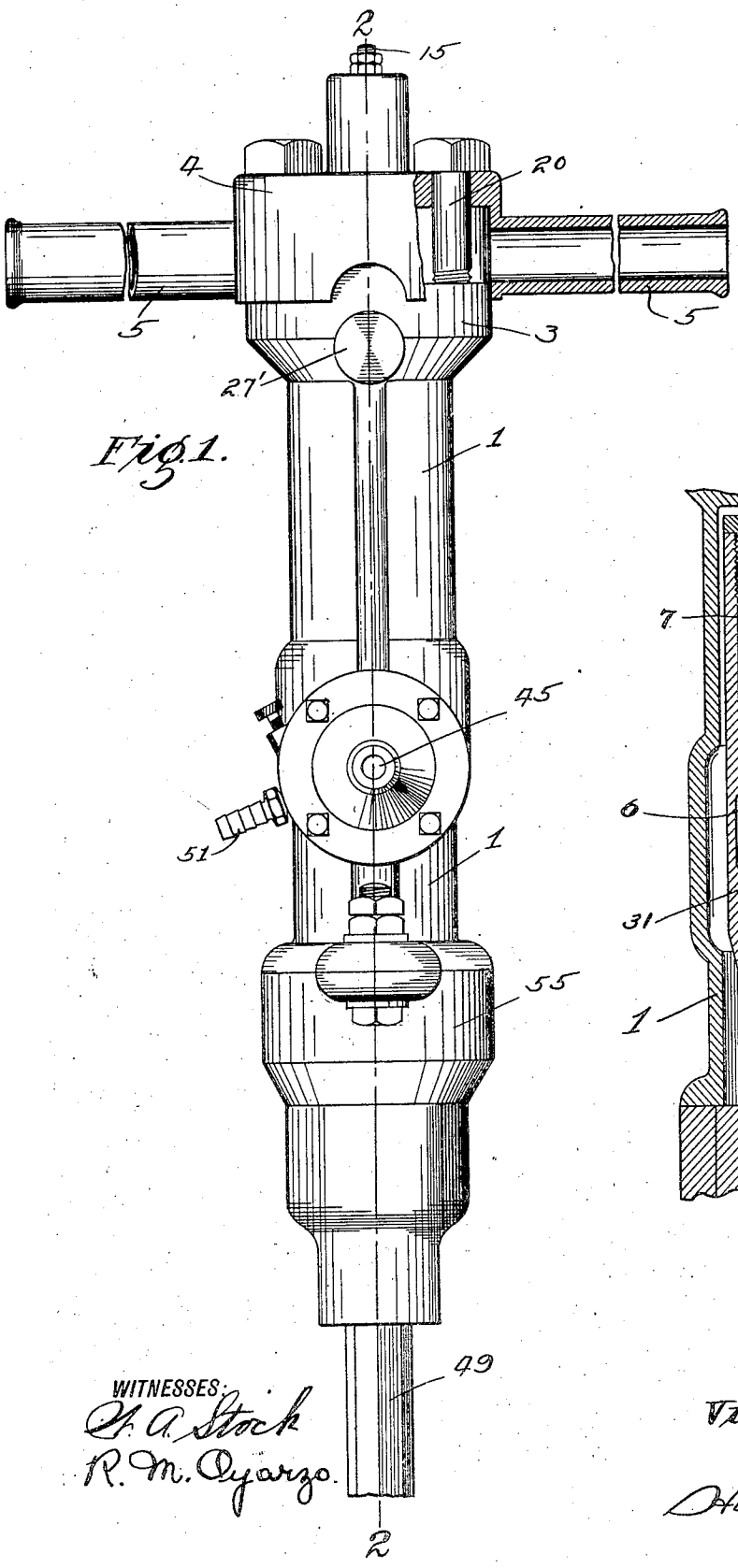
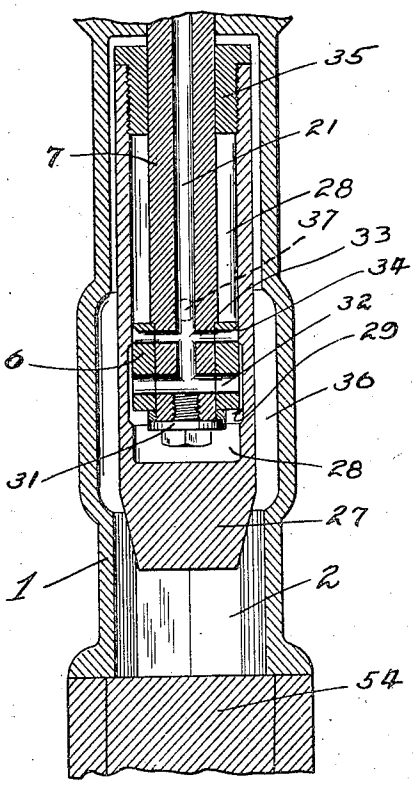


Fig. 1.

Fig. 3.



WITNESSES:

H. A. Stock

R. M. Ojarzo.

INVENTOR

Vilhelm P. Kessel

BY

Harry C. Schroeder

ATTORNEY

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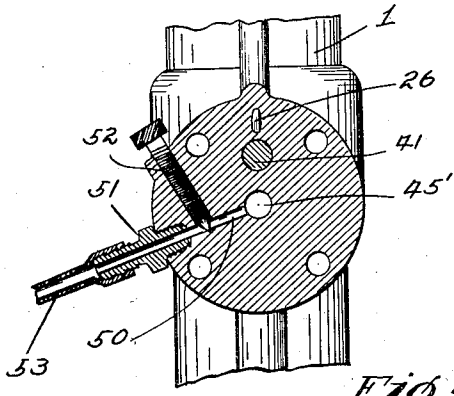


Fig. 4.

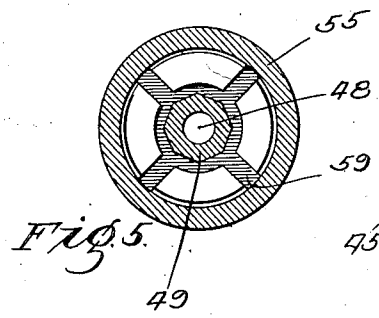


Fig. 5.

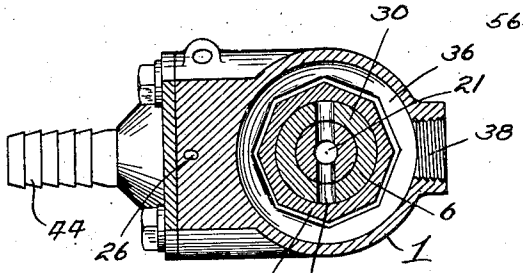


Fig. 6.

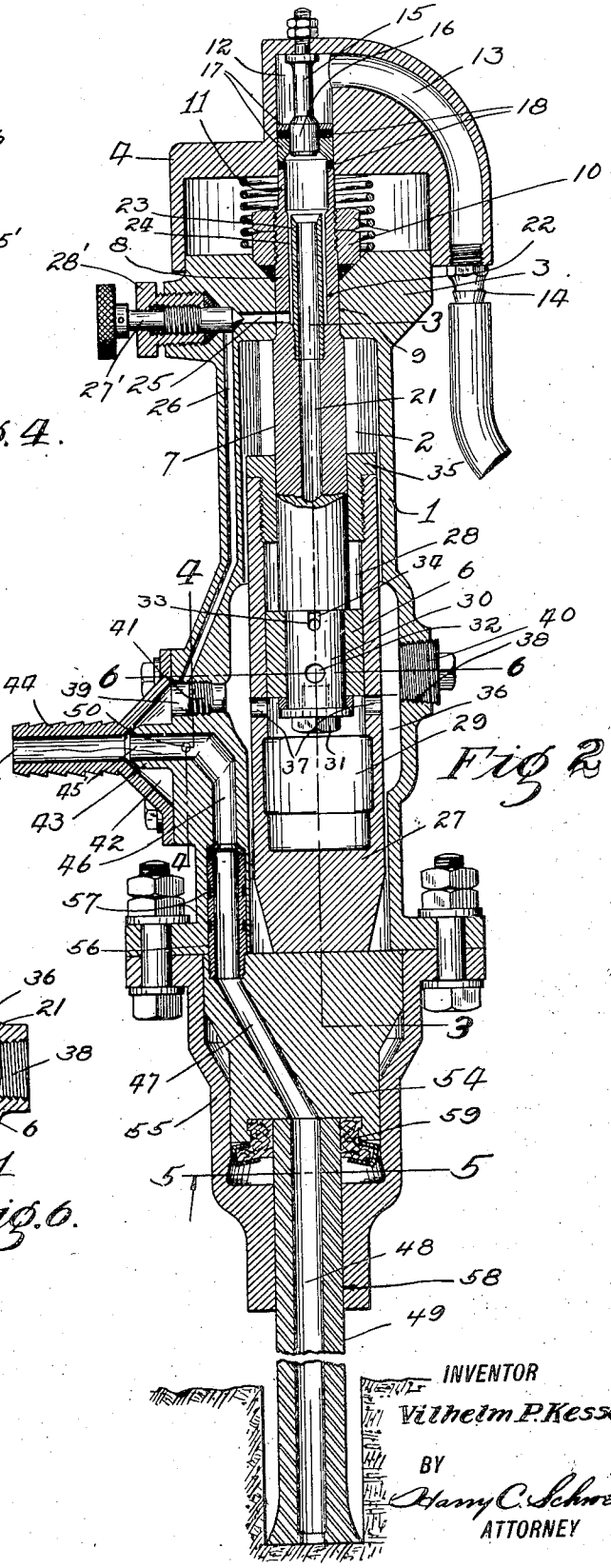


Fig. 2.

WITNESSES:

H. A. Stock

R. M. Ayarzo.

INVENTOR

Vilhelm P. Kessel

BY

Harry C. Schroeder

ATTORNEY

UNITED STATES PATENT OFFICE.

VILHELM P. KESSEL, OF SAN FRANCISCO, CALIFORNIA.

ROCK-DRILL.

1,132,276. Specification of Letters Patent. Patented Mar. 16, 1915.

Application filed December 29, 1913. Serial No. 809,144.

To all whom it may concern:

Be it known that I, VILHELM P. KESSEL, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Rock-Drills, of which the following is a specification.

This invention relates to improvements in pneumatic rock drills, and has as its principal object the construction of such a drill, which will clear the hole in the rock and prevent the dust formed thereby from floating into the air where it is breathed by the operator with very injurious results.

In my improved drill I remove the dust formed by the drilling operation by means of suction and provide two ways of accomplishing this result. Where the dust is light and in small particles the exhaust air from the hammer is sufficient to remove the same, but where the dust is heavy and in large quantity, as in drilling soft rock, I find it advantageous to use live air. The dust thus sucked from the hole is disposed by blowing it through a hose to a point removed from the drill, but if the distance to which it must be thus carried is too great I intermingle it with water forming a slush which may be deposited nearby.

Other objects of my invention are to provide an improved and simplified valve arrangement for the hammer action and admission valve for the compressed air.

With these and other objects in view my invention consists in the new and novel arrangement and construction of parts as herein described and illustrated in the drawings forming a part thereof and as more particularly pointed out in the claims hereto appended.

Referring to the drawings: Figure 1 is a view in elevation of the improved drill with a portion in section to show the manner of attaching the head thereto. Fig. 2 is a central vertical sectional view on 2—2 Fig. 1. Fig. 3 is a view in section on 3—3 Fig. 2 with the hammer in its raised position. Fig. 4 is a view on 4—4 Fig. 2 showing the water inlet. Fig. 5 is a view on 5—5 showing method of holding the packing around the drill. Fig. 6 is a view in section on 6—6 Fig. 2.

Denoting corresponding parts by the same numerals of reference, 1 is the body which is in the nature of an elongated casing having the octagonal interior cavity 2 wherein the hammer reciprocates. The upper end of this casing is enlarged as at 3 and slidably mounted thereon is the head 4 provided with handles 5. Within the cavity 2 is a stationary piston 6 mounted upon the stem 7, which has a reduced end 8 passing through an opening 9 in the end 3 and on the outside thereof is provided with nuts 10, which clamp it firmly in position. The rod is further reduced as at 11 and the head 4 is provided with a cylindrical bore 12, into which this reduced end slides. The bore 12 communicates by a curved passage 13 to a hose connection 14 and thus to a source of compressed air. Mounted central of the bore 12 is a valve stem 15 having an enlarged head 16, which is surrounded by the annular packing rings 17 and 18 of metal and leather respectively. These rings are not fastened in any manner, the air pressure within bore 12 being sufficient to hold them in place and compress the leather so as to make tight joints around the head 15 and the periphery of bore 12. The air pressure within bore 12 and the action of spring 19 tend to raise the head 4, which movement is limited by bolts 20 passing through the head and having their ends threaded into the end 3. Valve stem 7 is provided with a central tubular passage 21, the upper end thereof of which is countersunk as at 22. Within the latter is a tube 23 of somewhat smaller diameter than the counterbore and in threaded engagement with the bottom thereof. By this construction an annular air passage 24 is provided which communicates adjacent the bottom of the counterbore with a lateral passage 25, which in turn connects with a vertical passage 26 formed in the outer wall of casing 1. The amount of opening between passages 25 and 26 may be regulated by means of the valve 27′ in threaded engagement with the packing gland 28′ and is provided with a conical point, which seats in a corresponding depression in the end of passage 25. This arrangement providing an effective and simple arrangement for regulating the flow of air to passage 26.

The hammer 27 is of elongated shape and has a hexagonal outside periphery which fits loosely within the hexagonal cavity 2 and is thus prevented from turning. The piston is provided with a cylindrical chamber 28 in which the piston 6 closely fits, the

lower part of the chamber being enlarged as at 29. For convenience in making repairs the piston is in the form of a collar held on the reduced end 30 of the piston rod, by means of a screw 31. From passage 21 there are provided two lateral passages through the piston denoted by 32 and 33, the latter having upwardly inclined ends 34 to provide a leakage path into the chamber 28 above the piston, the upper end of said chamber being closed by a nut 35 in threaded engagement with the interior of said chamber.

Adjacent the center of casing 1 is provided an annular space 36, which is at certain periods of the hammer stroke in communication with the cavity 28 below the piston through openings 37. From this annular cavity are provided openings 38 and 39 provided with threaded plugs 40 and 41 respectively and when in use one or the other of these plugs is removed according to whether exhaust or live air is to be used for ejecting the dust. The removal of plug 40 provides a free passage for the exhaust to the atmosphere, while if 41 is removed the exhaust enters the conical chamber 42 surrounding the ejection nozzle 43.

From chamber 42 a passage 45 is provided through the hose connection 44 and in alinement therewith is a passage 45′ extending through the nozzle, continuing in a downward direction in passage 46 which is in communication with an angular passage 47 through the hammer tappet 54 which in turn communicates with a central passage 48 in the drill stock 49. It will also be observed that the passage 26 communicates with the chamber 42 through the hole 39 so that when valve 27′ is opened live air is admitted to the chamber 42.

Referring to Fig. 4 it will be seen that a small passage 50 extends from passage 45′ to the outside of the casing and is there provided with a hose connection 51. A valve 52 is arranged to close the passage 50 and a hose 53 leads to a supply of water which through suction is drawn through this passage into passage 45′ where it mingles with the dust for the drill point.

The hammer tappet 54 is slidably mounted in the end casing 55, which is bolted to the main casing 1. A tube 56 is threaded into the passage 47 adjacent the top thereof and extends upward into a counterbore in the lower end of passage 46, and is provided with packing rings 57 around the outside thereof. The drill rod 49 extends through an opening 58 in the end of casing 55, the joint between the tappet and drill being made tight by a gasket 59.

The operation of this device is as follows:—Passage 13 is connected to a source of compressed air through a suitable flexible hose and the pressure within cavity 12 will hold the head 4 in its uppermost position. Now when this head is depressed on the piston rod extension 11 it will be evident that the gasket 17 will move downward until an opening is formed therebetween and the bottom of head 16. This admits air to the counterbored end of stem 7 where it passes down through the bore 21 thereof to the lateral passage 33. From this passage it leaks past the thin edge formed between the inclined passage 34 and the top of the piston, into the chamber 28. As this chamber becomes filled the hammer will be carried upward, by the pressure against the underside of nut 35, until the holes 37 are above the piston 6 as shown in Fig. 3, when the pressure therein escapes into the cavity 36. At the same time the air pressure through 21 flows through the lower lateral passage 32 along the counter bore 29 into the chamber 28 below the piston and thus starts the hammer on its down stroke which continues until the holes 37 are exposed below the piston when this chamber exhausts into cavity 36.

If plug 40 is removed the exhaust passes through the opening 38 into the atmosphere whereas if this plug is left in position and plug 41 removed the exhaust is ejected into chamber 42 and passing through the contracted passage around nozzle 45 creates a suction therein, which draws a current of mingled air and dust for the drill point through the passage 48 therein, and then through passage 47, tube 56, and passage 46, discharging the same through passage 45. If this dust must be carried a long distance before it can be discharged valve 52 is opened and a small quantity of water sucked through flexible hose 53, which mingling with the dust reduces it to a slush and allows it to be discharged near at hand. While this action of the exhaust is taking place the valve 27 is of course closed, and if it is desired to use live air to create the suction then plug 41 is placed in position and 40 removed. Valve 27′ is then opened allowing pressure to pass through the annular space 24, passages 25 and 26 into cavity 42 where the action is as heretofore explained.

While I have illustrated and described my drill arranged for vertical work it will be understood that by the proper modification it may be used as a horizontal or stopping drill, and it will be further understood that while I have shown the preferred embodiment thereof various changes in form and details of construction, within the scope of the claims may be made without departing from the spirit or sacrificing any of the advantages of the invention.

What I claim and wish to cover by Letters Patent is:—

1. A pneumatic drill comprising a hollow casing, a hammer movable therein, a tappet

adapted to be struck thereby, a tubular drill held by said tappet, an ejector mounted on the side of said casing, a passage from said ejector to said tubular drill rod, and means for supplying air under pressure to said ejector for the purpose of creating a suction through said tubular drill rod.

2. A pneumatic drill of the character described comprising a hollow casing, a hammer movable therein, a tappet positioned adjacent the lower end of said hammer and adapted to be struck thereby, a tubular drill rod held by said hammer tappet, a passageway through said casing and said tappet forming a continuation of the central passage in said drill rod, and means for creating a suction through said drill rod and said passageway for the purpose of removing the dust from the point of said drill.

3. A pneumatic drill of the character described comprising a hollow casing, a hammer movable therein, a tappet positioned in said casing adjacent the lower end of said hammer and adapted to be struck thereby, a tubular drill rod held by said tappet, a passage through said drill rod and said tappet communicating with a passage in the side of said casing, an ejector nozzle connected with the last mentioned passage and means for supplying a jet of air around said nozzle for the purpose of creating a suction through said passages.

4. A pneumatic drill of the character described comprising a hollow casing, a hammer movable therein, a tappet positioned in said casing adjacent the lower end thereof, a tubular drill rod held by said tappet and extending through said casing, a passage in the side of said casing, an angular passage through said tappet connecting the passage of said drill and the passage in the side of said casing, a nozzle on the end of said passage in the side of the casing, a pressure chamber surrounding said nozzle, and opening from said chamber to the hammer exhaust chamber and means for closing said opening.

5. A pneumatic drill of the character described comprising a hollow casing, a hammer movable therein, a tappet adapted to hold the drill rod, a passage supplying air under pressure to said hammer, and means for regulating said air supply, an ejector mounted on the side of said casing, the pressure chamber of said ejector communicating through a passage in the side of said casing with the said passage supplying air pressure to the hammer, the suction nozzle of said ejector communicating with a passage extending through the casing tappet and drill to the point thereof.

6. A pneumatic drill of the character described comprising a hollow casing, a hammer movable therein, a hammer tappet positioned adjacent the lower end of said casing and adapted to be struck by said hammer, a drill rod held by said tappet and extending through an opening in said casing, an axial passage through said drill rod, a passage through said tappet communicating with said drill passage, and extending in an angular direction to one side thereof, a passageway in the side of said casing communicating with said passage in said tappet through a suitable sliding connection, and terminating in an ejector nozzle, a pressure chamber surrounding said nozzle, an opening from said chamber to the exhaust from said hammer, a second opening therefrom to the high pressure, air supply and means for regulating the admission of air from either of these sources to the said pressure chamber.

In testimony whereof I affix my signature in presence of two witnesses.

VILHELM P. KESSEL.

Witnesses:
W. A. STOCK,
R. M. OYARZO.