

J. G. LEYNER.
 ROCK DRILLING ENGINE.
 APPLICATION FILED JULY 5, 1910.

Patented Apr. 8, 1913.

2 SHEETS—SHEET 1.

1,058,072.

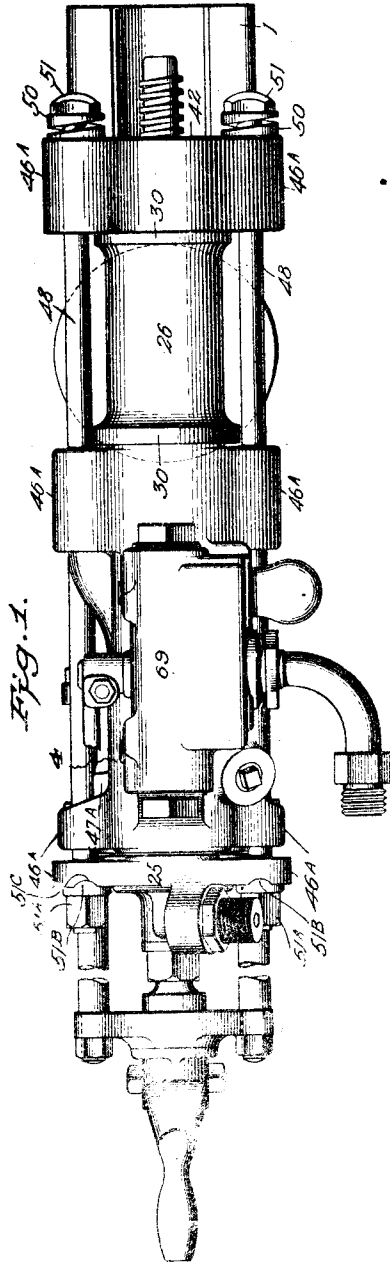


Fig. 1.

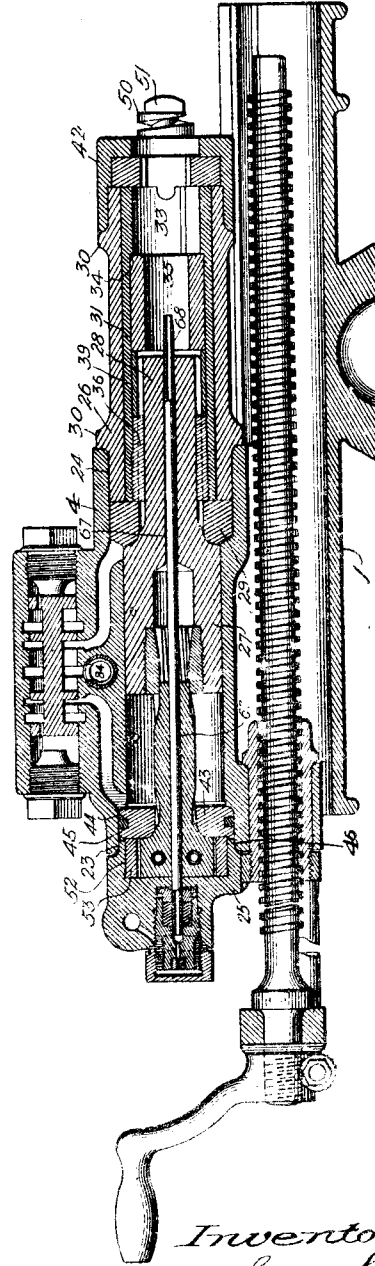


Fig. 2.

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3 SHEETS—SHEET 2.

This diagram shows a cross-sectional view of a second embodiment of the device. It features a central rectangular cavity (49A) surrounded by a thick, shaded material (49). The top and bottom surfaces of the central cavity are labeled 47, and the side surfaces are labeled 48.

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UNITED STATES PATENT OFFICE.

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ROCK-DRILLING ENGINE.

1,058,072.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JOHN GEORGE LEYNER, a citizen of the United States of America, residing in the city and county of Denver and State of Colorado, have invented a new and useful Rock-Drilling Engine, of which the following is a specification.

My invention relates to improvements in rock drilling engines, and the object of my invention is to provide a rock drilling engine in which the hammer piston cylinder and its cylinder heads are held in operative relation to each other by resiliently yielding connections. I attain this object by the mechanism illustrated in the accompanying drawings, in which:

Figure 1 is a plan view of my improved rock drilling engine. Fig. 2, is a longitudinal, central, sectional view of Fig. 1. Fig. 3 is a front view of the cap for the front cylinder head. Fig. 4 is a rear view thereof. Fig. 5 is a horizontal sectional view of the same on the line 5—5 of Fig. 3. Fig. 6 is an elevation of the rear cylinder head, the water inlet hub thereof being shown in section.

Similar letters of reference refer to similar parts throughout the several views.

Referring to the drawings, the numeral 1 designates the supporting base of my improved rock drilling engine, which I term a guide shell, it being so called because it forms a support and also a guide for feeding the drilling engine forward toward and backward from rock when in operative drilling relation thereto.

The rock drilling portion of my rock drilling engine comprises the cylindrical casing 4, in which a cylindrical bore is formed, which is adapted to receive the hammer piston. At the opposite end portions of the cylinder counterbores 23 and 24 are formed, which are adapted to receive front and rear cylinder heads 25 and 26. The hammer piston bore is preferably a straight bore of one diameter, and in it a hammer piston 27 is reciprocally mounted. This hammer piston is reciprocally mounted in the cylindrical bore of the casing, and it is provided at its front end with a hammer bar extension 28 of smaller diameter than its piston head portion, which extends reciprocally through a ring 29, which I term the front cylinder ring. The front cylinder ring is placed at the junction of the cylin-

der's hammer piston bore and of the counter bore 24 of the cylinder casing.

The front cylinder head 26 comprises a tubular-shaped casing which is provided with collar portions 30 adjacent to its opposite ends. The rear end of this front cylinder head extends into the counter bore 24 of the hammer piston cylinder. This front cylinder head is provided with a straight cylindrical bore in which a sleeve 31 is rotatably mounted. This sleeve 31 I term the chuck sleeve. This chuck sleeve 31 is provided with an axial bore of two different diameters, which are both arranged in axial alinement with the bore of the hammer piston cylinder. The larger axial bore 32 extends from the rear end of the chuck sleeve to within a short distance of its front end, where it terminates in a smaller bore 33, and a shoulder 34 is formed at the junction of these two bores. A bushing 35, which I term the chuck bushing, fits tightly in the bore 32 of the chuck sleeve and is seated against the shoulder 34. The entrance to the rear end of the chuck sleeve is threaded, and a nut 36, which I term a chuck nut, is threaded to it. This nut 36 is provided with an axial bore 37 in the wall of which straight rifle flutes 38 are formed. A ring 39, which I term the chuck ring, is placed in the bore 32, between the chuck nut and the chuck bushing 35. A cap 42 fits over the front terminal end portion of the front cylinder head against the front collar 30 formed on the cylinder head. At the rear end of the cylinder casing a ring 43, which I term the rear cylinder ring, is placed in the counter bore 23 of the casing of the cylinder against the shoulder formed at the junction of the said counter bore and the hammer piston bore. The rear cylinder ring 43 is provided with a circumferential groove 44, in which any suitable packing material 45 is placed. This packing ring is adapted to prevent the compressed air in the cylinder from leaking past it and the hub of the rear cylinder head to the atmosphere. The rear cylinder head 25 is provided with a hub portion 46 that extends a short distance into the counter bore 23 of the cylinder close to the adjacent side of the ring 43. These cylinder rings 29 and 43 act as buffers to such reciprocal strokes of the hammer piston as are not cushioned by the compressed air actuating fluid when the hammer piston is not

striking against a drill bit that is not in operative position against a rock. The cylinder and the cylinder heads and the front cap are arranged to be clamped together under a resilient clamping pressure of sufficient tension to hold them in operative alignment and position under such operative strains as the drilling engine is subjected to while drilling rock.

My invention contemplates in this respect any means by which these several parts can be resiliently clamped or secured together so that each will have a slight yielding movement independent of the others under severe strains and which will enable an operator to take the machine apart and put it together again in a few moments when necessary to repair or otherwise keep it in operative order; and, while a number of different methods of connecting these parts to effect this result might be employed, I preferably, however, carry out this feature of my invention in the following manner: The opposite sides of the opposite ends of the cylinder of the drilling engine and the opposite sides of the front cap and of the rear cylinder head are provided with laterally projecting lug portions 46^A, in which apertures 47 are formed, through which bolts 48 extend loosely. These bolt-rods extend through the apertures of the lugs from the front or cap end of the drilling engine and are each provided with a head 51 at one end and with a threaded portion at their opposite ends. The head end of each bolt-rod is adjacent to the lugs of the cap, while the threaded ends of the bolt-rods extend through and far enough beyond the back head to each receive a nut 51^A. The apertures 47 through all of the projecting side lugs are round, but the side of each of the bolt-rods at their threaded end portions are flattened along their sides that lie adjacent to the sides of the cylinder. This flattened portion extends far enough from the ends of the bolt-rods to permit flat faced lugs 47^A, which form a part of the projecting lugs 46^A at the rear end of the cylinder and also form a part of and project from the side of the rear end of the cylinder, to bear against the flattened sides of the bolt-rods and thus prevent the bolt-rods from turning in their apertures 47 of their supporting lugs. The nuts 51^A are each provided with a projecting key portion 51^B, which extends cross its squared up end. These key portions 51^B are adapted to fit into keyway recesses 51^C formed in the adjacent surface of the lugs 46^A of the back cylinder head, and they lock the nuts against accidentally unscrewing from the ends of the bolt-rods when the bolt-rods are tightly bolted in their operative positions. The lug portions of the cap are made long enough to be provided at their front side portions with apertures 49, which are of enough

larger-diameter than those through which the bolt-rods extend to receive and form housings for coiled expansive springs 50, which are mounted on the ends of the bolts, preferably adjacent to the heads 51 of the bolts, and consequently are compressed between the heads of the bolt rods and the wall 49^A at the bottom of the apertures 49 that surround the bolt-rod receiving apertures 47. The nuts 51^A are screwed onto the bolts and against the lugs of the rear cylinder head until they compress the springs 50 enough to exert sufficient resilient expansive compressive pressure on the cylinder heads and cap against the ends of the cylinder to hold these parts in operative alignment. The cylinder heads 25 and 26, with their internal cooperating parts, and the cylinder rings 29 and 43 are fitted in such relative relation to each other and to the shoulders between the counter bores 23 and 24 and the cylinder bore that these cylinder rings 29 and 43 are held tightly against these shoulders by the resilient clamping tension of the springs on the bolts 48.

I have found in practice that the tension best adapted to the operative, stationary and slipping condition of the ratchet ring should be sufficient to exert a pulling pressure on the rear cylinder head against the ratchet ring and of the ratchet ring against the rear cylinder ring such as would require the use by an operator of a wrench of about a foot in length applied to the drill-bit to turn the chuck and hammer piston and the rifle bar against the teeth of the ratchet ring in order to cause the ratchet ring to rotatively slip in its seat.

The rear cylinder head is provided with an axial recess bore 52 that extends into its hub portion a short distance, and in it a ratchet ring 53 is rotatably mounted. This ratchet ring is, however, enough thicker than the depth of the recess 52 to project a trifle beyond it and be pressed hard against the rear cylinder ring 43 with a frictional, slipping or yielding pressure by the resiliently yielding side rod bolts, as will be readily understood.

An axial aperture 63 is formed entirely through the rifle bar and an axial aperture 67 is also formed through the hammer piston. These apertures 63 and 67 are both large enough to receive loosely a water inlet tube 68, which extends from the rear cylinder head through them and into the front chuck bushing 35 of the chuck sleeve 31 of the front cylinder head 26. The cylinder is provided with a valve chest 69, which preferably is positioned centrally on top of and lengthwise of it and an air inlet valve 84 is arranged to control the admission of air to the valve chest.

In case the drill bit sticks in a seam in the rock during the operation of the machine, 130

the ratchet ring will slip rotatively between its seat in the recess of the rear cylinder head and the rear cylinder ring, due to the yielding connections provided by the present invention.

While I have illustrated and described the preferred construction and arrangement of my improved rock drilling engine, I do not wish to be limited to the construction and arrangement shown, as many changes might be made therein without departing from the spirit of my invention.

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

1. In a rock drilling engine, the combination of a cylinder provided with a front and a rear cylinder head, a drill bit driving hammer piston reciprocally mounted in said cylinder, a drill bit holding chuck in said front cylinder head, rings in the opposite end portions of said cylinder arranged to define the reciprocal movement of said hammer piston, lugs on the opposite side portion of said cylinder and its heads, said lugs being provided with bolt-rod receiving apertures, bolt-rods extending through the apertures of said lugs and provided with heads at one of their ends positioned adjacent to the front side of the lugs of said front cylinder head, said bolts being arranged to extend loosely through said lugs from the front end of the drilling engine and to lie alongside of said cylinder, nuts threaded to the ends of said bolt rods, expansive springs mounted on said bolt rods between the head portions of said bolt rods and the front side of the lugs of said front cylinder head, said nuts being adapted to clamp said cylinder heads and said cylinder between said springs and the heads of said bolts, a flattened portion on the sides of said bolt rods adjacent to said cylinder, and a lug on each side of said cylinder arranged to project against the flattened portion of said bolt rods and adapted to prevent said bolt-rods from turning.

2. In a rock drilling engine, the combination of the cylinder provided with cylinder rings and with heads fitting its opposite ends, one of which is provided with a cap which forms an extension thereof, the side bolt rods provided with springs and with nuts on their ends, said side rods being connected to said heads and arranged to clamp them to said cylinder with an adjustable resiliently yielding pressure, and a housing on one of said heads for said springs.

3. In a rock drilling engine, the combination of a cylinder provided with cylinder heads at its opposite ends, one of which is provided with an extending cap portion that forms a part thereof, lugs on the opposite cylinder head and on the cap portion of said other cylinder head, provided with bolt

receiving apertures, bolts provided with head portions extending through the lugs of one head and through the lugs of said cylinder into and through the lugs of the cap portion of the opposite cylinder head, expansive springs on said bolts at their head portions, which are adapted to be housed in sockets formed in said cap, and to abut against the bottoms of the sockets and the heads of the bolts, and nuts threaded to the opposite ends of said bolt rods and adapted to be screwed against the adjacent cylinder head and to compress said springs to draw on said bolts to clamp said cylinder heads to said cylinder with an adjustable resilient yielding pressure, lugs projecting from the opposite sides of said cylinder and a flattened portion on said bolt-rods arranged to engage said lugs and prevent said rods from turning, a keyway slot extending across the rear face of the lugs of said rear head in diametrical alinement with the bolt apertures through said lugs and a projecting lug shaped key portion formed on each nut of said side rods arranged to seat itself into the keyway recess of said lugs.

4. In a rock drilling engine, the combination of the cylinder and the cylinder heads, one of which is provided with a cap portion, apertured lug portions on the opposite side portions of said cylinder and cylinder head and said cap, bolt rods extending through said apertured lugs each of which is provided with a head, threaded end portions and nuts on the opposite end portions of said bolt rods, expansive springs on said rods between said heads and said cap arranged to exert a resilient yielding pressure on said cylinder and its heads, housings being formed in said cap to receive said springs, and means including rings in the opposite ends of said cylinder for receiving the clamping thrust of said cylinder heads against said cylinder.

5. In a rock drilling engine, the combination of the cylinder provided with a piston bore and with a counterbore, provided with a shoulder between said cylinder's piston bore and said counterbore, and the cylinder head projecting into said counterbore, a ring seated in the shouldered counterbore of said cylinder between said rear cylinder head and said shoulder, a circumferential groove in the peripheral surface of said cylinder ring, and a packing in said groove adapted and arranged to prevent the leaking of compressed air from said cylinder's bore past said cylinder ring and said rear cylinder head to the atmosphere.

6. In a compressed air or other actuating fluid operated rock drilling engine, the combination of the supporting shell provided with guideways and a depending hub portion, a cylinder provided with cylinder heads fitting loosely into the opposite end

portions of said cylinder, and bolt rods
extending along the opposite sides of said
cylinder and its cylinder heads provided
with springs and with nuts threaded to
5 said rods arranged and adapted to clamp-
ingly bolt said cylinder and its cylinder
heads and said drill bit operating mecha-
nism in operative relation together by a
resiliently yielding clamping pressure that
10 will under normal operation resist rotative

strains and that will prevent the breakage
of said drill bit operating mechanism under
abnormal operative strains by slipping ro-
tatively.

In testimony whereof I affix my signature 15
in presence of two witnesses.

JOHN GEORGE LEYNER.

Witnesses:

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."