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Y. YAMANOUCHI

ROCK DRILL

Filed June 1, 1923

2 Sheets-Sheet 1

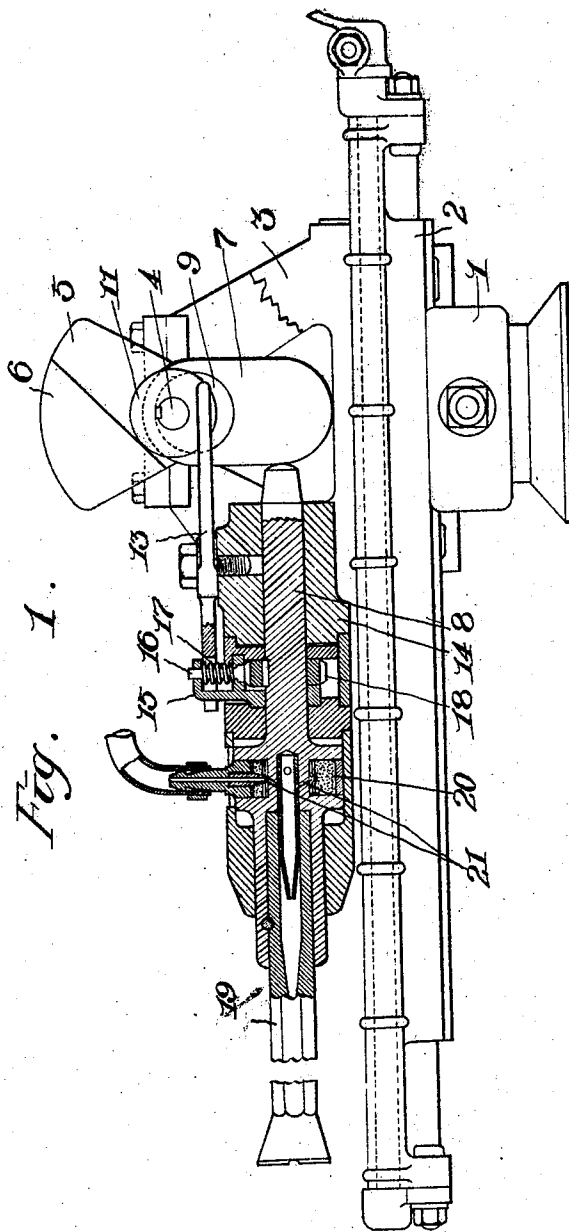


Fig. 1.

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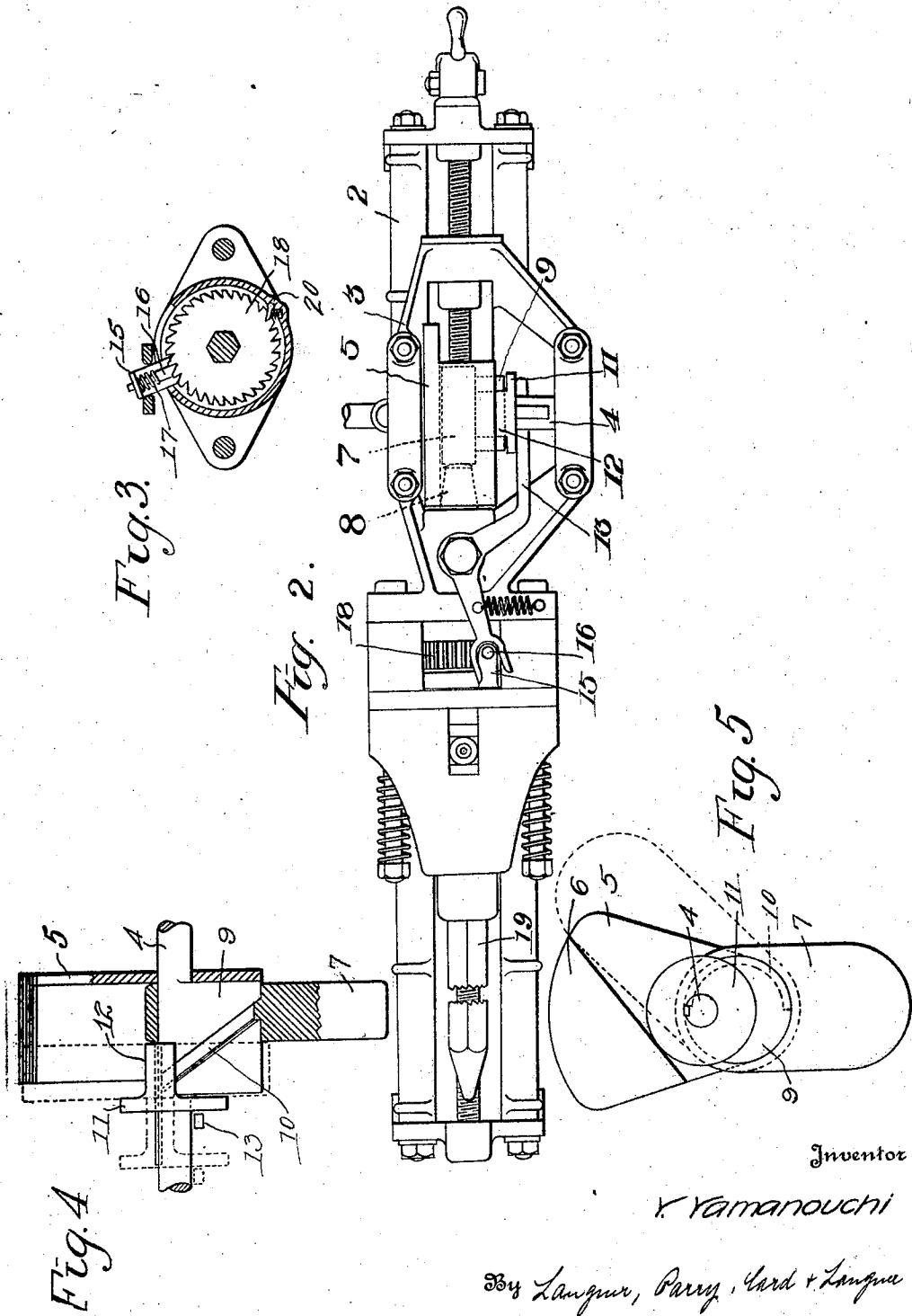
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE.

YUJI YAMANOUCI, OF KYOTO, JAPAN.

ROCK DRILL.

Application filed June 1, 1923. Serial No. 642,849.

To all whom it may concern:

Be it known that I, YUJI YAMANOUCI, a subject of the Emperor of Japan, and a resident of No. 164, 4-chome, Kiyomizu, Shimo-Kyoku, Kyoto, Empire of Japan, have invented a new and useful Improvement in Rock Drills, of which the following is a specification.

This invention relates to a rock drill in which the reaction on a revolving hammer produced by striking thereof against an anvil head is utilized to operate a lever which oscillates a pawl engaging in a ratchet wheel fixed on the anvil, the latter thus being revolved.

The object of this invention is to obtain an exact rotation of the drill bit so that the operation is done in a safe and easy manner.

This invention will be readily understood by reference to the accompanying drawings in which:

Fig. 1 is a general sectional side view,

Fig. 2 is a plan view,

Fig. 3 shows a connection of a pawl and a ratchet,

Fig. 4 is a side elevation of a connection of a hammer and a lever, partly being in section, and

Fig. 5 is an end view thereof.

Like numerals refer to like parts in these drawings.

Referring to the drawings, 1 designates a base on which a carriage 2 is slidably fitted. The carriage is provided with a raised frame 3 on which a shaft 4 is transversely mounted to be revolved by a flexible shaft from any suitable prime mover. 5 designates a hammer bearer formed segmentally which is bent and longitudinally extended at its outer edge to form the shape of an L turned upside down in cross section as shown in Figs. 1, 4 and 5. The hammer bearer is also provided with an inclined hammer seat 6 having increasing thickness from one end to another by which a hammer 7 is prevented from reversal because the reaction on the hammer produced by striking thereof against an anvil head is arrested by said seat as shown in Fig. 5. This invention is to utilize the reaction to rotate a ratchet wheel fixed on an anvil 8 so that a drill bit is regularly turned in consequence of the regular reacting action on the hammer. The hammer 7 is bored at one end in which an eccentric plate

9 fixed on or extended from the shaft is fitted. Upon revolution of the shaft 4, the hammer may rotate with the shaft, having centrifugal force. However, as soon as the hammer strikes the head of the anvil, it partly is returned by reaction till engaging in the hammer seat. Thus, the hammer engaging in said seat passes over the head of the anvil. The eccentric plate is provided with an oblique guide slot 10 circumferentially about one half of its whole periphery. In case of the normal revolution, the hammer 7 is positioned on one side of the eccentric plate and is made by the guide piece engaging in the slot 10 to remain on one end of the slot as shown in Fig. 4. But, in reversal, the hammer is forwardly shifted to the opposite side of the eccentric plate 7 by means of the guide piece guided in the guide slot. 11 designates an operating plate fitted on the shaft slidable lengthwise, say, by means of a feather key. Said operating plate is provided with an extension or an arm 12 which is adapted for engagement against a side of the hammer. Then it will be clear that the operating plate is laterally moved by the lateral motion of the hammer. 13 is a lever pivoted at its middle on an anvil holder 14 of the carriage. The lever is adapted to contact with the end surface of the operating plate 11 at one end and is formed a fork at another end. The fork end embraces an upper portion of a pawl frame 15 which is loosely fitted on the anvil 8 and projected up through the anvil holder. From the pawl frame, a pawl 16 is hung radially around which a spiral spring 17 is wound for obtaining proper engagement of the pawl with a ratchet wheel 18. By reversal of the hammer, the pawl is driven circumferentially to cause the ratchet wheel to turn. In other words, by reversal of the hammer due to reaction, the hammer is shifted laterally by the slot 10, and consequently the operating plate is cooperatively moved laterally and the lever is swung so that the ratchet wheel, the anvil and a drill bit 19 are turned in turn. To prevent opposite revolution of the ratchet wheel another pawl 16' is provided as shown in Fig. 3. Further, a feed water apparatus is necessary to supply cold water to the end of the drill bit. It will be done in any suitable manner. In the present case the anvil is provided with a water chamber

20 at any suitable portion thereof. Cold water is inducted therefrom through a duct 21 to the end of the drill bit.

This invention is characterized by this 5 that the revolution of the anvil is produced by utilization of the reaction on the hammer. Therefore, the drill is turned only after striking of the hammer so that it is most adapted for safe operation. Further the 10 reverse movement of the hammer caused by the reaction is limited so that the feed of the drill results at a constant rate.

Having now described and ascertained the nature of this invention in what manner 15 the same is to be performed, I declare that what I claim is:

1. A rock drill comprising, a base, an anvil mounted on the base, a hammer mounted on the base for striking the anvil, and connecting means between the anvil and the 20 hammer, the hammer acting directly on the connecting means to cause a partial rotation of the anvil after each working stroke, said connecting means comprising, a ratchet 25 wheel keyed to said anvil, a lever pivoted to the base, one end of the lever operatively connecting with the ratchet wheel, and a reciprocating plate positioned between said hammer and the other end of the lever, rib 30 means cooperating with said hammer, whereby to give the hammer a lateral movement on rebounding from striking the anvil, the lateral movement of the hammer, acting

through said reciprocating plate, causing a partial rotation of the anvil, after each 35 working stroke of the hammer.

2. A rock drill comprising, a base, an anvil mounted on the base, a hammer mounted on the base for striking the anvil, and connecting means between the anvil and the 40 hammer, the hammer acting directly on the connecting means to cause a partial rotation of the anvil after each working stroke, said hammer being loosely mounted on an eccentric, and the eccentric being keyed to a drive 45 shaft on said base, said connecting means comprising, a ratchet wheel keyed to said anvil, a lever pivoted to the base, one end of the lever operatively connecting with the 50 ratchet wheel, and a reciprocating plate positioned between said hammer and the other end of the lever, rib means cooperating with said hammer, whereby to give the hammer a lateral movement on rebounding from 55 striking the anvil, the lateral movement of the hammer, acting through said reciprocating plate causing a partial rotation of the anvil, after each working stroke of the hammer.

In testimony whereof I affix my signature 60 in presence of two witnesses.

YUJI YAMANOUCHI.

Witnesses:

W. EBIHORAK,
ICHIRO LUZUKI.