T. A. SONE.

MACHINE ROCK DRILL.

APPLICATION FILED SEPT. 10, 1913.

1,118,692. Patented Nov. 24, 1914.

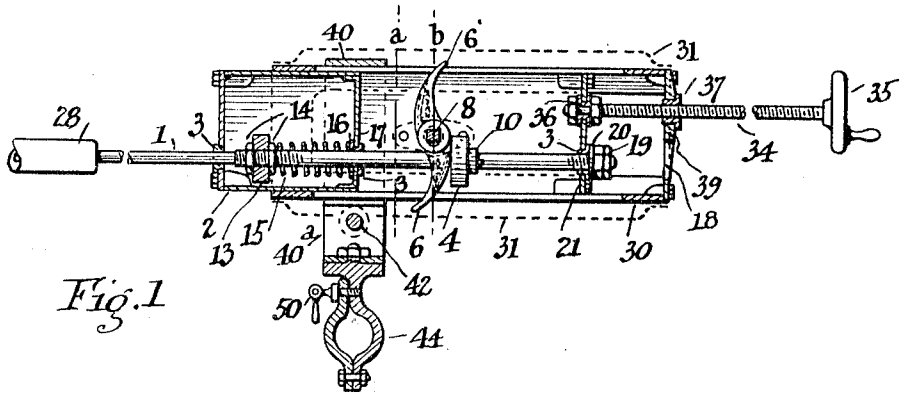


Fig. 1

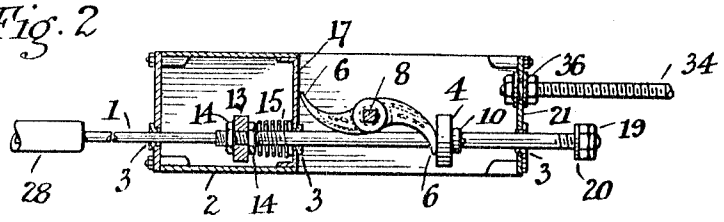


Fig. 2

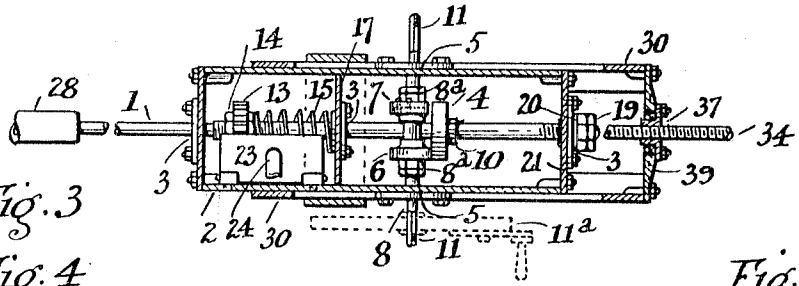
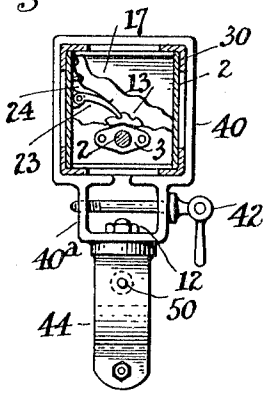


Fig. 3

Fig. 4



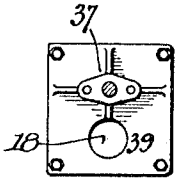


Fig. 5

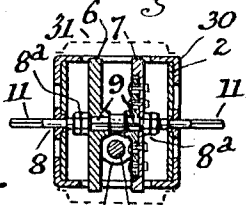


Fig. 6

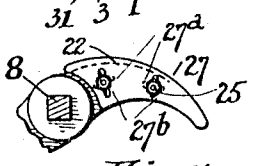


Fig. 7.

Witnesses

Thurs Matthews.

L. W. Helmuth.

Inventor

Thomas Albert Sone

by Wilkinson, Quinlan & Pickering

his Attorneys

# UNITED STATES PATENT OFFICE.

THOMAS ALBERT SONE, OF PRESTON, VICTORIA, AUSTRALIA.

## MACHINE ROCK-DRILL.

1,118,692. Specification of Letters Patent. Patented Nov. 24, 1914.

Application filed September 10, 1913. Serial No. 789,118.

*To all whom it may concern:*

Be it known that I, THOMAS ALBERT SONE, a subject of the King of Great Britain and Ireland, &c., residing at Preston, in the State of Victoria, Commonwealth of Australia, have invented certain new and useful Improvements in Machine Rock-Drills; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in machine rock drills, especially for drilling holes for the purpose of blasting, and is of strong but light construction.

My improvements can be operated by one man or can be fitted with gearing to be actuated by a motor. With the hand wheel drive the cam spindle would be rotated at about fifty revolutions or less per minute, while in the case of the motor actuated drill the frequency of blows should be arranged so as not to exceed one hundred blows a minute or a rate suited to the cams used.

Reference will be had to the accompanying drawings in which like reference characters designate like parts throughout the several views.

Figure 1 represents a sectional elevation of my invention with parts broken away, and a diagrammatic showing of the outer casing, with the striking rod fully extended. Fig. 2 is a sectional elevation with parts broken away of the internal slide case with the striking rod at the beginning of the outward stroke. Fig. 3 is a sectional plan view with parts broken away showing a portion of the concussion spring, and a hand wheel diagrammatically. Fig. 4 is a cross section on the line *a* in Fig. 1 with parts broken away. Fig. 5 is an elevation of the feed end of the casing showing the feed screw in cross section. Fig. 6 is a cross section along the line *b* in Fig. 1, with a diagrammatic showing of the outer case, and Fig. 7 shows a supplementary cam adjustable shoe fitted in place on the supplementary cam arm.

The drill striking rod 1 is mounted to work in part within a frame 2 which is slidably adjustable in an outer skeleton casing 30. This skeleton casing is square at its ends and is inclosed at a suitable portion of its length by a square frame 40, which is made to pinch or grip said casing by means, hereinafter more fully described. The rod 1 reciprocates through a number of bushings 3 set in the casing in rectilinear alinement.

A wiping collar 4 is mounted on rod 1 and is provided with a boss 10 which is keyed or otherwise held in the desired adjustment.

The rod 1 is given an intermittent reciprocating motion, by means of the repeated lifting and liberating action of the respective oppositely set cams on the collar 8. These cams are secured to and rotated by a shaft (see Fig. 3) having squared or angular ends 9. The shaft is also provided with locknuts $8^a$ or other suitable means for securing in position the carrying sleeve for the main cam arms 6. On the same shaft is another carrying sleeve for the supplementary arms 7 (shown in detail in Fig. 7), the outer ends of which have short cam surfaces, and act on the collar 4 simultaneously and equally with the cams 6, having longer cam surfaces. In the construction of the supplemental cams 7 a hollow shoe 27, provided with transverse slots $27^a$ is adjustably set upon a skeleton frame arm 22, provided with longitudinal slots $27^b$, by means of bolts and nuts 25. In this way the action of the supplementary cam can be regulated by adjusting the shoe to contact more or less with the collar 4.

Shaft 8 is provided with angular shanks 11 having slots for locking pins, or other means to hold on either end a hand wheel $11^a$, (shown dotted in Fig. 3) or a gear wheel or pulley, for other driving means. The shaft 8 rotates in suitable bearings 5 located in the sides of the casing 2, these bearings being provided with means for longitudinal adjustment on the casing to secure satisfactory working of the cams.

A spiral spring 15 incloses a portion of the rod 1, one end of which bears against a washer 16 backed by an abutment partition 17 secured to the casing 2. The other end is adjustably held by a ratchet wheel 13 provided on either side with lock nuts 14. These lock-nuts are adjustable longitudinally of the rod so as to produce, as required, the desired tension in the spring 15. There are also lock nuts 19 threaded on the end of the rod 1 which can be adjusted to

vary the length of the drill stroke. Between said nuts and the top 21 of the casing 2 is provided an elastic buffer or cushioning member 20 (shown reduced in size in drawings) for the purpose of reducing the jar caused by concussion in the top of the casing.

An elongated check pawl 23 (see Figs. 3 and 4) is provided to continuously engage the ratchet wheel 13, a leaf spring 24 being provided to bear against the said pawl to prevent backward movement of the said ratchet wheel. This pawl 23 is necessarily long because of the reciprocation longitudinally of the rod 1 upon which the disk is mounted.

The casing 2 and its outer guide casing 30 are protected from dust by removable shield plates 31, (shown dotted in Figs. 1 and 6), which also allow the cams to move freely within.

For the purpose of lowering the drill to strike new rock or other material, there is provided a feed screw 34 provided with a hand wheel 35. This screw is controlled by a fixed nut 37 mounted in the end 39 of the outer casing 30 and rotates in a bushing 36 in the top 21 of the casing 2. An aperture 18 is provided in the lower half of the end 39 through which the end 19 of the rod 1 reciprocates.

The clamping frame 40 is provided with a screw 42 (Fig. 4) passing through to cheeks 40[a] of the frame, for the purpose of allowing the same to be tightened or made loose on the casing 2 at will. The frame is pivoted at 12 to a clamp 44 so that the drill can be turned in any direction desired. The clamp has cheeks adapted to be pinched together for securing this clamp to a pillar support by means of a locking screw 50. The connecting means 28 between the rod 1 and the drill may be of any suitable kind.

The operation of this device will be clear from the foregoing, but it may be summarized as follows:—When the shaft 8 is caused to rotate the long surfaces of the cams 6 wipe the collar 4, causing the drill to reciprocate and also to rotate. The latter part of the rotating action is intermittently stopped by the action of the cams 7, the surfaces of which are so arranged as to bear against the collar less continuously than the cams 6. This action can be regulated by employing the supplementary cams, provided with adjustable shoes, hereinbefore described. It is obvious that when a main cam and a supplementary cam are each bearing evenly on the collar then there will be no rotation of the latter. During the upward movement of the rod 1 the spring 15 is compressed and the ratchet disk 13 is rotated, the pawl 23, holding the same from backward movement. When the collar 4 is free from the cams the spring 15 is allowed to expand, the ratchet disk sliding along the pawl, and the rod is forced outwardly. The opposite cam arm then catches the collar and starts the arm again on its upward stroke. The pawl 23 acts as a check against any tendency of the spring 15 to cause the intermittent rotation of the rod 1 to become irregular. It is obvious that should any such irregularity occur, the drill would lose a great deal of its efficiency as the blows would not be delivered in the best positions. When the drill end no longer finds new rock or other material to strike at the outer end of its stroke, adjustment of the casing 2 is necessary. This is accomplished by turning the hand wheel 35, and operating the feed screw 34 thus lowering the drilling apparatus as desired.

It is obvious that those skilled in the art may vary the details of construction and arrangement of parts, without departing from the spirit of my invention, and therefore I do not wish to be limited to such features except as may be required by the claims.

I claim:—

1. In a drill, the combination with a casing, of a drill mounted in said casing adapted to be reciprocated and intermittently rotated, a transverse shaft mounted in said casing adapted to be rotated, a collar adjustably mounted on said drill rod, two pairs of oppositely disposed cam arms mounted on said transverse shaft, and to either side of said drill rod adapted to wipe said collar, one pair of said cam arms being provided with longitudinal slots, shoes mounted on said second named pair of cam arms provided with transverse slots registering with said slots in said cam arms, and adjustable means securing said cam arms to said shoes through said slots, providing longitudinal and transverse adjustment of said shoes to regulate the wiping surface of said second named pairs of cam arms, substantially as described.

2. In a drill, the combination with a casing of a drill rod mounted in said casing adapted to be reciprocated and intermittently rotated, a transverse shaft mounted in said shaft adapted to be rotated, a collar adjustably mounted on said drill rod, two pairs of oppositely disposed cam arms mounted on said transverse shaft and to either side of said drill rod adapted to wipe said collar, one pair of said cam arms being provided with longitudinal slots, shoes mounted on said second named pair of cam arms provided with transverse slots registering with said slots in said cam arms, and adjustable means securing said shoes to said arms through said slots, providing for longitudinal and transverse adjustment of said shoes, to regulate the wiping surface of said second-named pair of cam arms, an adjustable ratchet wheel mounted on said drill rod, an

abutting plate mounted in said casing provided with an aperture, through which said drill rod reciprocates, a spring mounted on said drill rod between said adjustable ratchet wheel and said abutting plate, an elongated hinged pawl adapted to engage along its upper edge the teeth of said ratchet wheel to hold said ratchet wheel against backward movement, and a spring mounted in said casing and engaging said pawl to hold the same in engagement with said ratchet wheel, substantially as described.

In witness whereof I have hereunto set my in the presence of two witnesses.

THOMAS ALBERT SONE.

Witnesses:
EDNA TURRI,
WILLIAM L. BEATTIE.

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