PUBLISHED MAY 25, 1943. BY A. P. C.

A. MEUTSCH

PERCUSSION DRILL FOR DRILLING HARD ROCK

Filed March 22, 1941

Serial No. 384,737

2 Sheets-Sheet 1

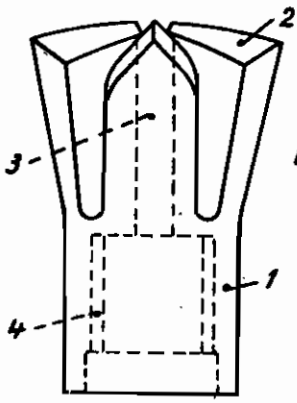

Fig.1

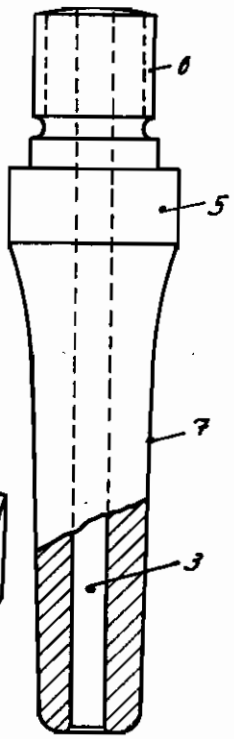

Fig.2

Fig.5

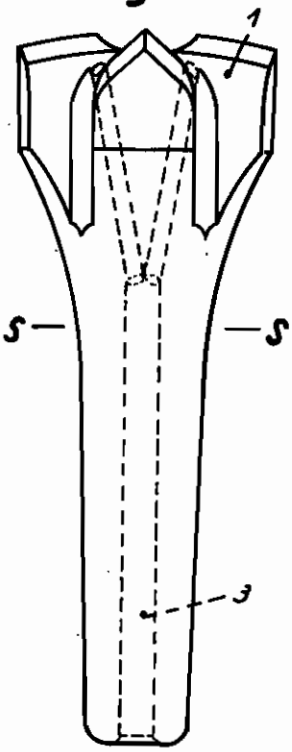

Fig.4

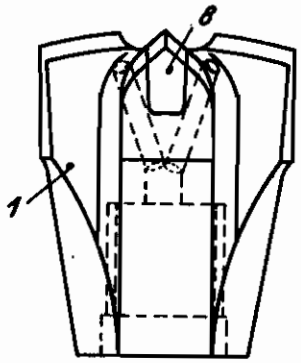

Fig.3

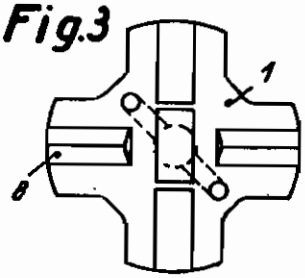

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Fig.6

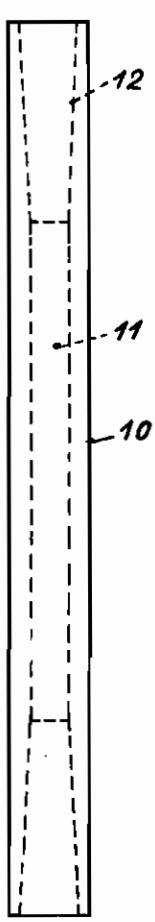


Fig.7

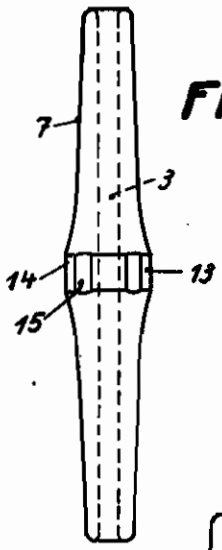


Fig.8

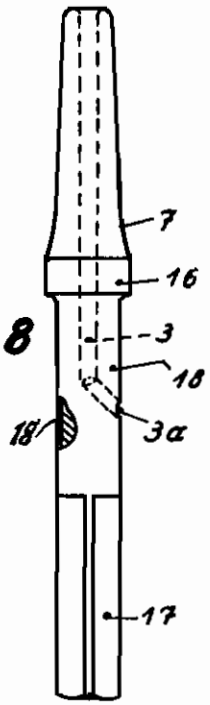
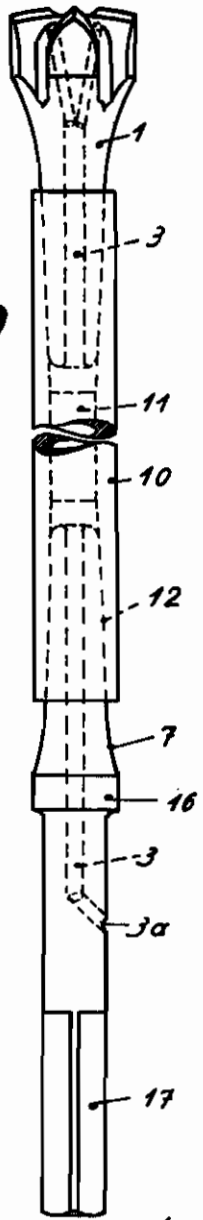


Fig.9



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ALIEN PROPERTY CUSTODIAN

PERCUSSION DRILL FOR DRILLING HARD ROCK

Adolf Meutsch, Essen, Germany; vested in the Alien Property Custodian

Application filed March 22, 1941

The invention relates to a percussion drill for drilling hard rocks by means of pneumatic or electric drilling hammers. The difficulties which occur at the drilling of hard rocks are numerous, especially so-called permanent fractures occur on the drill-rods at those points at which changes of cross-section exist, because at these points the oscillations caused by the percussion effect of the drill hammer combine to so-called oscillation knots. The strong lateral wear of the cutting edges effects clamping of the drills already after a short drilling time. The cutting-edges become blunt very rapidly, wrong hardening, especially overheating at the hardening causes premature fracture of the cutting edges or premature getting blunt.

Rock percussion drills have already become known, in which for preventing fractures due to oscillation the longitudinal bore of the drill tube is widened between the end to be inserted and the drilling crown beyond the measure necessary for the flushing. These drills possess, however, the inconvenience that the transition points from the drill tube to the insertion end and to the drill break very easily whereby the whole drill becomes unfit for use.

All these inconveniences are obviated according to the invention and an unimpeded drilling in the hardest rock parties is ensured. With this object in view, the rock drill is according to the invention composed of several parts which may be detachably connected to form a tool, so that rapid exchanging of the individual parts is possible without longer interruption of work. The drill is composed of a bit or head with cutting edges, a drill tube the widened longitudinal bore of which extends over its whole length or of several drill tubes, and of one or several detachable connecting elements connected with the drill tube and having a bore of reduced diameter. In such a drill the individual parts, according to the stress to which they are submitted, can be adapted to the object for which they are to be employed as regards kind of steel, heat treatment such as hardening and refining.

For the connection of the individual parts sleeves, cones or screw-threads may serve. Conical connections have proved to be especially practical, and in the interior of each drill tube conical widenings are preferably provided at the ends, destined to receive the corresponding end cones of the detachable connecting elements. The drill tubes can be produced in longer sections by rolling or drawing and then cut off to the actually required lengths, whereby the keeping in store is simplified. By the insertion of the intermediate pieces it is possible to drill a bore hole to any depth. Practically only one single rock drill head is required, which is practically equipped with plate-shaped inserts of high quality special steel or hard metal, as a drilling tube which is not sufficiently long can be lengthened by a second tube and, if desired by more tubes. The intermediate pieces can be produced with an external diameter which is greater than the diameter of the drill tube, so that at the same time a straight and good gulding of the tube in the bore hole is ensured.

Several embodiments of the invention are illustrated by way of example in the accompanying drawings, in which:—

Fig. 1 shows in side elevation a rock drill head of steel,

Fig. 2 in side elevation an intermediate piece or drill nipple for connecting a rock drill head with the drill tube,

Fig. 3 in top plan view a rock drill head with inserted carriers for the cutting edges made of hard metal,

Fig. 4 a side elevation of Fig. 3,

Fig. 5 in side elevation a rock drill head with a conical connecting pin,

Fig. 6 a drill tube,

Fig. 7 a connecting nipple as intermediate piece for the connection of several drill tubes,

Fig. 8 a hammer nipple as connecting piece between drill tube and drill hammer, and

Fig. 9 a complete rock percussion drill.

In Fig. 1 the rock drill bit or head 1 is made of cast steel or of a special steel and has cutting edges 2. A bore 3 in the head extends up to the cutting edges and serves for the passage of the flushing liquid. In the lower part of the head an internally threaded bore 4 is provided, by means of which the drill head can be screwed onto an intermediate piece 5, shown in Fig. 2. The intermediate piece 5 has, with this object in view, at one end an externally threaded extension 6 of shorter diameter, on which the head 1 is to be screwed by means of the bore 4 until its lower edge comes to bear against the projecting face of the intermediate piece 5. The lower end 7 of the intermediate piece 5 is conical and adapted to engage into a corresponding conical widening of the drill tube. A longitudinal bore 3 in the nipple serves as passage for the flushing liquid.

The rock drill head shown in Figs. 3 and 4 corresponds substantially to the drill head shown in Fig. 1, but in this instance special hard metal or

hard steel cutting edges 8 are provided for the bursting work. These cutting edges are embedded in the drill body 1 so that they are enclosed on all sides by this body and only the cutting edge remains free. The inserts 8 of hard material are hardly soldered or welded with the head 1.

In the embodiment illustrated in Fig. 5, the drill head 1 has a conical extension made in one piece with the drill head, the flushing bore 3 extending also over the whole length of the drill head. The diameter of the bore 3 is selected so that the flushing liquid is accelerated at the discharging. As fractures from oscillation occur frequently at the point designated by the line S—S, an intermediate piece as shown in Fig. 2 is preferably used in expensive hard metal percussion drills.

Fig. 6 shows a drill tube 10 open at both ends, the inner longitudinal bores 11 of this tube being wider than the dimension of 7 mm diameter required for the flushing, i. e. up to about 20 mm. At the ends of the drill tube 10, the bore 11 merges into conical widenings 12, which are destined to receive the detachable parts, such as drill head, drill nipple and hammer nipple. The widened longitudinal bore imparts to the drill tube 10 an increased resistance moment against oscillations at stresses due to shocks and therewith also a greater resisting capability against fractures due to oscillation. The inner bore 11 can be produced absolutely smooth by a drawing proceeding at the production of the drill tube 10, so that no projections or notches and similar unevennesses exist as according to the known rolling method and which might give cause for rusting influences by the flushing water. By the provision of the widenings 12 at both ends of the drill tube, any drill tube can also be used upside down.

For the connection of several drill tubes 10 the one with the other connecting nipples 13 as shown in Fig. 7 may be used which have corresponding outer cones 7 one at each end and also a continuous flushing bore 3. The diameter of the collar 14 of the nipple 13 located between the conical ends is preferably so great that it serves at the same time for guiding the drill tube on the wall of the bore hole. It is, however, advisable in this instance to provide longitudinal grooves 15 in the outer wall of the collar 14 through which grooves the bore dust can pass.

The still free end of the drill tube can be closed, as shown in Fig. 8, by a hammer nipple 16, which has at one end also a conical pin 7, whereas on its other end a square or hexagon head 17 is provided adapted to be inserted into the drill hammer. The hammer nipple has further a cylindrical shank 18, on which the flushing head is pushed, by means of which the flushing liquid is conducted into the drill tube through the lateral bore 3a extending at an angle from the flushing bore 3.

Fig. 9 shows a complete rock drill according to the invention. This drill ensures an economical drilling in the hardest rock, the individual parts being detachable and adapted to be exchanged when worn or damaged. For regrinding the cutting edges it is only necessary to remove the rock drilling heads, whereas the other elements remain on the working places, this being a serious advantage especially in depths up to 2000 m practically occurring in some mines.

In certain cases it is advisable, to provide on parts of the drilling arrangement a protecting layer, especially on the outer end face of the seat of the flushing head, which must have a sliding face for the flushing head which is as rust-proof as possible. Any suitable protecting coatings may be employed herefor, which are adapted to withstand the rust formation, such as for instance coatings which are produced by galvanizing, further by burning-in of a metal or by enameling. Such a part coated with a protecting layer 18 is shown in Fig. 8. By the coating of this part, the rubber rings in the flushing head are exposed to very little wear so that in service they last often for months.

ADOLF MEUTSCH.