Aug. 7, 1956 S. E. RYD 2,757,906

MEANS FOR DRILLING IN ROCK OR THE LIKE

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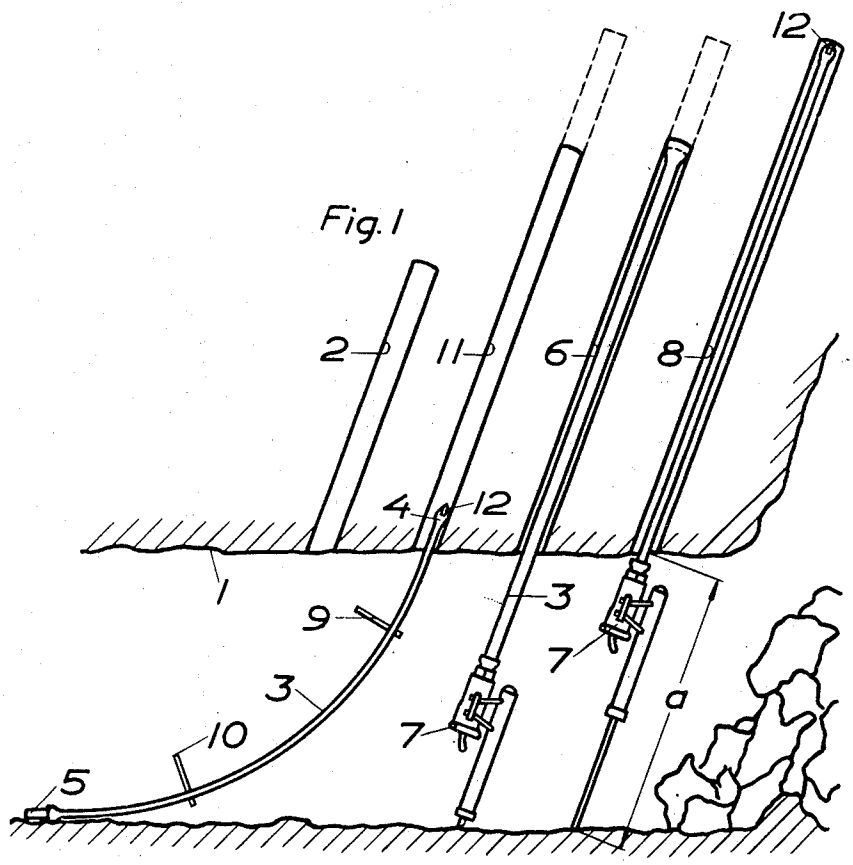


Fig. 1

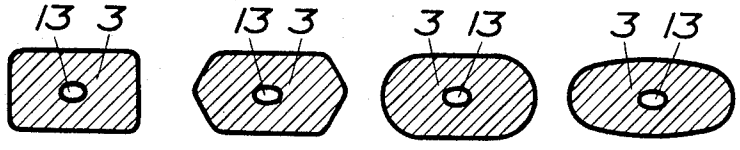


Fig. 2 Fig. 3 Fig. 4 Fig. 5

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MEANS FOR DRILLING IN ROCK OR THE LIKE

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3 Claims. (Cl. 255—64)

This invention relates to drilling of holes in rock or the like and to drill steels for drilling such holes. Drilling of holes in rock or the like of a length which materially exceeds the clear distance in the longitudinal direction of a hole from the mouth of said hole to an opposed wall or the like, for instance in a mine, has heretofore not been accomplished as expeditiously as has been possible in the drilling of long holes in places where the available space permits the used of conventional long drill steels. One object of the invention is to improve drilling in such close quarters as above mentioned and to maintain a high drilling speed and a high drilling economy. According to the invention a drill hole of the above type is drilled at least partly with semi-flexible drill steels having a flattened cross section and a greater length than the clear distance in the longitudinal direction of a hole from the mouth of said hole to an opposed wall or the like and provided with hard metal inserts in the cutting end, said drill steels being inserted in the hole by being bent without stressing the material of the steel above the elastic limit. There is thus provided a drill steel and method of operation which makes possible the economical drilling of such holes since by using the above mentioned inserts the life of the drill steel and the life of the cutting end may be made substantially the same and a high drilling speed maintained. Such a drill steel may have at least a portion with a flattened cross section with less dimension in one direction than in any other direction and a cutting end provided with a hard metal insert. Furthermore, a drill steel according to the invention may have a flattened cross section and a flushing duct extending longitudinally of the drill steel having a cross section flattened in the same direction as the cross section of the drill steel. Preferably, a drill embodying the invention is made as an integral one-piece structure, thus eliminating any joints in which drilling energy is lost.

In the accompanying drawing the method according to the invention and drill steels for use in said method are illustrated by way of example. Fig. 1 is a section of a drift in a mine from which inclined holes are drilled in the roof of the drift. Figs. 2–5 illustrate four different cross sections of drill steels according to the invention.

In Fig. 1, 1 designates a drift in a mine in the roof of which holes are drilled to a length which is considerably longer than the distance *a* from the mouth of a hole in the longitudinal direction of the hole to an opposed wall of the drift. During the illustrated method of mining, holes are generally drilled in the roof of the drift at an inclination, for instance, of 20°. 2 indicates a hole which has been drilled with conventional drill steels of lengths approaching or slightly exceeding the distance *a*. When a hole has been drilled as far as possible with such drills a drill steel according to the invention is inserted in the hole, said drill steel having a flattened cross section along a portion of its length and being provided at the cutting end with a hard metal insert. The cross section of the drill steel may, for instance, along the main portion of the steel be of the shape illustrated in Figs. 2–5, said cross section being chosen so that the drill steel may be bent along a curve, as indicated in connection with the drill steel inserted in the hole 11 in Fig. 1 without permanently changing the shape of the steel. It has been found that bends in excess of 30° are entirely practical that shown in Fig. 1 being approximately 32°. The drill steel is inserted in the hole and pulled out of the hole while being bent sufficiently to clear the opposite wall of the drift. It is assumed that the hole 11 has been drilled from the depth of the hole 2 to the depth indicated in full lines in Fig. 1 by means of a semi-flexible drill steel according to the invention having a length corresponding to said last mentioned depth and it is intended to drill the hole 11 by means of a drill steel 3 according to the invention to the depth indicated in dotted lines. In the illustrated embodiment of the invention drilling of the holes to considerably greater depths than the distance *a* is carried out with integral one-piece drill steels having no joints which may develop play and thus consume power. In connection with the drill hole 6 a hammer drill 7 is illustrated as operating on a drill steel 3 inserted in a hole of the same depth as illustrated in full lines at 11 and at 8 a finished hole drilled with a drill steel 3 is indicated.

In order that the flattened drill steels will not be too weak and in order to avoid a too large maximum diameter the drill steels may preferably be made in such a way that the minimum resistance to bending of the cross section is between 40 and 90% of the resistance to bending on a perpendicular axis of the cross section. Bending of the drill steel and contact with the wall of the drill hole during drilling is thus prevented thereby avoiding an excess consumption of power. The minimum resistance to bending is preferably 70–75% of the maximum resistance to bending. If desired a drill shank for engaging the chuck of the hammer drill 7 may be forged from the end of the drill steel as indicated at 5, and the cross section thereof may be of any desired shape.

The cross section of the drill steel may be substantially rectangular, flattened hexagonal, oval or elliptical as illustrated in Figs. 2–5. The cross section may be the same along the whole length of the drill steel and from said cross section a cutting end 4 may be forged in which a hard metal plate 12 is inserted and secured so that the cutting edge formed by said insert is directed perpendicularly to the smallest dimension of the cross section of the drill steel. A duct 13 for flushing medium, such as air or water, extends longitudinally of the drill steel and has a cross section which is flattened in the same direction as the cross section of the drill steel, as obvious from Figs. 2–5. In order to facilitate bending of the drill steel during the insertion of the drill steel in the drill holes open drill steel wrenches 9 and 10 may be applied at suitable places on the drill steel, as indicated on the drill steel 3 in the hole 11 in Fig. 1. Naturally the drill steels may also be bent manually.

The method and the drill steels above described should only be considered as examples and the invention may be modified in different ways within the scope of the claims. Drill steels according to the invention may naturally be employed in any locality where the available space does not permit the introduction of conventional substantially rigid drill steels of a length corresponding to the desired depth of the drill hole. Other cross sections of the drill steels than those illustrated in the drawing may be used. The invention may also be used in connection with detachable bits with hard metal inserts.

What I claim is:

1. A drill steel for making drill holes in rock or the

like of greater length than the clear distance in the longitudinal direction of a hole from the mouth of said hole to an opposed wall or the like comprising an elongated rod-like body of semi-flexible material having a length greater than said distance, a cutting head integral with said drill steel at one end of the drill steel, an end portion integral with the drill steel at the opposite end formed to fit a drill chuck of a hammer drill and to receive percussion energy therefrom, the main portion of the drill steel between said cutting head and said end portion having a flattened cross section with less dimension in one direction than in any other direction, a hard metal plate inserted in said cutting head having its greatest extension transversely to the drill steel in a direction substantially perpendicular to the direction in which the cross section of the drill steel has its smallest dimension, and a duct for flushing medium longitudinally of the drill steel having along said main portion a cross sectional configuration flattened so that the major and minor dimensions thereof substantially coincide with the major and minor dimensions of said flattened cross section of the drill steel.

2. A drill steel comprising an elongated rod like body of semi-flexible material having a flattened cross sectional configuration along the main portion of its length and capable of being bent to arcuate form without stressing the material beyond its elastic limit, a drill head at one end of said body, a portion at the opposite end of the body being adapted to receive percussion energy from a hammer drill, and a single duct longitudinally of said body for flow of flushing medium therethrough and having along said main portion a cross scetional configuration flattened so that the major and minor dimensions thereof substantially coincide with the major and minor dimensions of said flattened cross section of the body.

3. A drill steel comprising an elongated rod-like body of semi-flexible material having a flattened cross sectional configuration along the main portion of its length and capable of being bent to arcuate form without stressing the material beyond its elastic limit so as to permit introduction of said steel in a hole with more than a 30° bend, a drill head at one end of said body provided with a hard metal insert, an end portion at the opposite end of the body being adapted to receive percussion energy from a hammer drill and a duct longitudinally of said body having along said main portion a cross sectional configuration flattened so that the major and minor dimensions thereof substantially coincide with the major and minor dimensions of said flattened cross section of said main portion of the body.

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