# UNITED STATES PATENT OFFICE.

GEORGE H. GILMAN, OF CLAREMONT, NEW HAMPSHIRE, ASSIGNOR TO SULLIVAN MACHINERY COMPANY, OF CLAREMONT, NEW HAMPSHIRE, A CORPORATION OF MASSACHUSETTS.

## METHOD OF DRILLING HOLES.

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*To all whom it may concern:*

Be it known that I, GEORGE H. GILMAN, a citizen of the United States, and a resident of Claremont, county of Sullivan, and State of New Hampshire, have invented an Improvement in Methods of Drilling Holes, of which the following description is a specification.

My invention pertains to methods of drilling holes in minerals, and more particularly, though not exclusively, to methods of operating percussive drilling engines of the hammer type.

In drilling holes of any considerable depth, it is ordinarily necessary and desirable to use a series of drill steels or bits of varying length, longer and longer drills being used as the depth of the hole is increased. The feed mechanism of the ordinary hammer drill, whether of the pressure fluid fed or mechanically fed type, usually provides for about two feet advance of the drilling engine toward the hole to be drilled. Hence the second drill is usually about two feet longer than the first, the third, two feet longer than the second, and so forth.

The usual method of operation comprises the discontinuation of the drilling operation during the change of drill steels. I have found that by carrying two or more holes along jointly, and by operating the drill on one hole while the steel is being changed in another, a great saving of drilling time is effected.

I have found this method particularly useful when applied to hammer drills of the self feeding type, especially pressure fluid fed drills, for these drills require practically no attention from the operator, when once started in operation, until the substitution of a larger drill steel is necessary. Thus the operator, or his helper, if he has one, has an abundance of time to change the drill steel in the hole not being drilled, while the drill is advancing the drill bit to drill deeper the alternate hole.

The method preferably is practised in connection with a mounting for the drilling engine and feeding apparatus providing locating and positioning means, which may be positive positioning means, as lugs or stops to insure absolute alinement of the drill with the positions in which it was adjusted during previous drilling operations on the same holes.

I may, if desired, practise my method in connection with locating and positioning means which merely insures the alinement in one plane of the drilling engine, as by swinging devices, the axis of which may be parallel with the axis of the drilling engine or at any desired angle relative thereto.

I prefer, however, to practise my method in connection with a mounting which provides for a bodily movement of the drill cylinder out of alinement with each hole when another hole is to be drilled. Thus the hole in which the drill steel is to be changed is entirely clear of the drill operating on another hole, so that the drill steel in the first hole may be manipulated without regard to the drilling engine. This obviates the necessity of any springing of the drill steels during insertion into or withdrawal from a hole, and also renders it safe for the operator to manipulate the steels without regard to the drill operating on another hole.

During the interval the operator may, if desired, scrape the cuttings from the hole in which the steels are to be changed, in case the air or water cleansing apparatus, which is preferably used in connection with the drilling engine, has not entirely cleaned the cuttings from the hole.

I preferably practise my method in connection with a drilling apparatus providing power retraction of the drill steel as well as power feeding thereof. In this connection it is desirable that drill steel engaging means be provided to insure the retraction of the drill steel when the drilling engine is retracted.

In case the drill steel is stuck, the fastest method of operation is usually to operate the percussive instrumentalities during the retractive operation. If desired, I may partially retract the drill steel, then disengage the drill steel engaging means, and then complete the withdrawal of the drilling engine, thereby freeing the drilling engine of the drill steel.

I have found it of marked advantage to frictionally control the feeding and retraction mechanism if pressure fluid feeding means is used.

The hammer drill is preferably of the self rotating type, preferably rotating intermittently between, but not during, the blows of the percussive means. If such mechanism

is used, the frictional means is of use not only to regulate the rate of feed but also to prevent excessive pressure on the point of the drill steel, which excessive pressure might prevent the proper functioning of the rotating means and, where the latter is actuated by the reciprocation of the percussive reciprocating element, might even interfere with the proper functioning of the percussive means.

While I have herein described for illustrative purposes my improvements in methods of drilling, it is to be understood that the invention is not limited to the specific operations, nor sequences of operations, nor to the combinations of operations herein described, but that extensive deviations from the description may be made, without departing from the principles thereof.

The scope of my invention is more particularly pointed out in the appended claims.

Having thus described my invention, what I claim and desire by Letters Patent to procure is:—

1. That method of drilling holes with a drilling engine and a series of drill steels of different lengths, which comprises drilling an initial hole with a relatively short drill steel held in operative relation to said drilling engine, transferring said drilling engine to start a second hole, inserting a longer drill steel in the initial hole during the drilling operation on the second hole, transferring said drilling engine to operative relation with said longer drill in said initial hole, and during the latter drilling operation inserting in the second hole a drill steel longer than the drill steel previously used in said second hole.

2. That method of drilling holes which comprises alternately operating a percussive drill on two holes and utilizing the time of drilling each hole to insert in the other hole a drill steel longer than the drill steel previously used in such hole.

3. That method of drilling holes which comprises alternately operating a percussive drill on two holes and utilizing the time of drilling each hole to substitute in the other hole a drill steel longer than the drill steel previously used in such hole.

4. The method of drilling holes which comprises drilling one hole while meantime placing another drill steel in operative relation with a second hole, and transferring the drilling operation to the second hole while placing another drill in operative relation to the first hole during the drilling operation on the second hole.

5. The method of drilling holes with a percussive drilling engine and a series of drill steel of varying lengths which comprises erecting said drilling engine in operative relation to a relatively short drill bit and drilling an initial hole therewith, transferring said drilling engine entirely out of alinement with said initial hole and drilling a second hole therewith, meantime placing a longer drill steel in the initial hole, transferring said drilling engine again into alinement with said initial hole and in operative relation to said longer drill steel, operating said drilling engine to continue said initial hole, and meantime placing a longer drill steel in operative relation with said second hole.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

GEORGE H. GILMAN.

Witnesses:
W. ALEX. RICE,
MARY A. GAFFNEY.

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