F. A. GILL.

DRILL.

APPLICATION FILED JAN. 21, 1911.

1,098,795. Patented June 2, 1914.

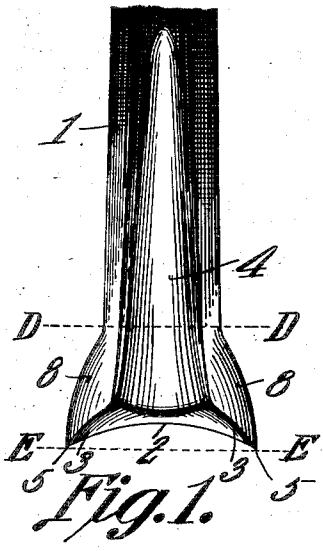


Fig. 1.

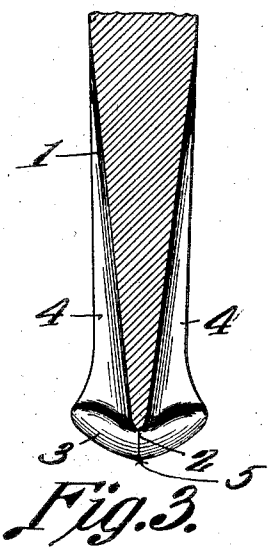


Fig. 3.

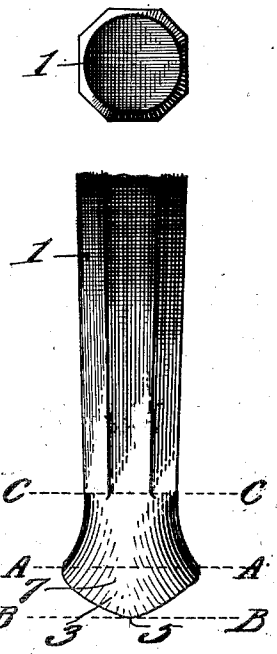


Fig. 4.

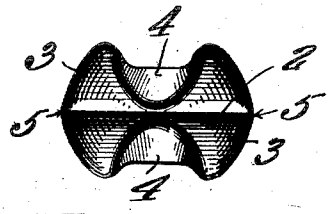


Fig. 2.

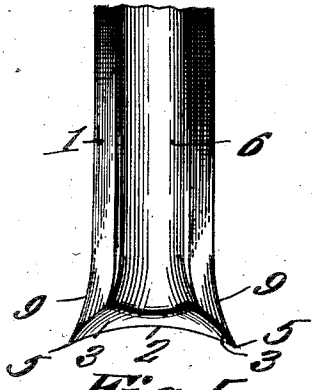


Fig. 5.

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UNITED STATES PATENT OFFICE.

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DRILL.

1,098,795. Specification of Letters Patent. Patented June 2, 1914.

Application filed January 21, 1911. Serial No. 603,960.

To all whom it may concern:

Be it known that I, FRED A. GILL, a citizen of the United States, residing at Bradford, in the county of McKean and State of Pennsylvania, have invented a new and useful Drill, of which the following is a specification.

This invention relates to rock drills.

The object of the invention is to provide an implement of this character that shall have pronounced advantages as to rapidity of operation, durability in use, wear-resisting qualities, and readiness and facility of repairs when necessary, and which in operation shall positively overcome any tendency to wedging, or of lateral deflection from the desired course, the latter incident being a source of both annoyance and expense to drillers, as it frequently happens, after a drill has penetrated a considerable distance, that it encounters a lateral drift, and should the drill point enter this, there is a liability that it will become jammed therein so firmly as to prevent removal, the result being that both the hole and drill have to be abandoned.

A further object is to overcome any tendency of retrograde movement of the drill should one cutting edge encounter a harder surface of rock than the other, thereby to prevent uneven wear of the cutting bits or wings and the retarding effect of such drill action.

With the above and other objects in view, as will appear as the nature of the invention is better understood, the same consists in the novel construction and combination of parts of a drill, as will be hereinafter fully described and claimed.

In the accompanying drawing forming a part of this specification, and in which like characters of reference indicate corresponding parts:—Figure 1 is a view in side elevation of a drill constructed in accordance with the present invention. Fig. 2 is an end view of the entering point. Fig. 3 is a longitudinal sectional view taken through the center of Fig. 1. Fig. 4 is an edge view of the drill. Fig. 5 is a view in side elevation of a slightly modified form of the invention.

For convenience of description only, the broader surfaces of the drill will be referred to as the sides and the narrow portions as the edges, and this distinction will be observed in describing both forms of the invention.

The shank 1 of the drill is preferably octagonal in cross section, and may be of any desired length and size. One end of the shank is provided with the entering point forming the subject matter of this invention, and which, owing to the peculiar construction of its parts, necessitates the use of terms not ordinarily employed in describing a mechanical structure, but which will be found apt, and are in fact the only ones that could be used in setting forth the different curves and relations of the parts.

The entering point, as a whole, is anticlastic, that is to say it is curved longitudinally in one direction and transversely in opposite directions, as the surface of a saddle. The end of the point is provided with a transverse web 2, which is inwardly curved, as clearly shown in Figs. 1 and 3, the metal of the point at each side of the drill being transversely broadened to provide two cutting wings or bits 3, which incline in opposite directions from the web, as shown in Fig. 2, forming in conjunction therewith a double anticlinal throat that operates to force the pulverized rock, mixed with water, to waterways 4 formed in the sides of the drill, so that the cutting edges 5 of the bits will be prevented from being forced through a mass of the pulverized material, which would result in rapid dulling, but on the contrary, leaves these edges free to contact with the walls of the holes being drilled, thus to render them self-sharpening. As shown in Figs. 1 and 2, the waterways gradually decrease in depth from the point of the drill upward, and at any desired point in the length of the shank, merge thereinto, while in the form of the invention shown in Fig. 5, it is designed that the waterways 6 shall extend throughout the entire length of the shank.

The entering point, as shown in Fig. 2, is of panduriform contour, the obovate portions 7 of which are laterally deflected to provide the cutting edges and also a clearance, and the concavities of which constitute the waterways. As seen in Fig. 4, the wings included between the lines A—A and B—B are of conoidal shape while those included between the lines A—A and C—C are anticlinal, and as seen in Fig. 1, the portions of the point included between the lines E—E and D—D are anticlinal, and the exterior surfaces 8 are convex curvilinear, so that no obstructing surfaces will be presented to the wall of the rock which would interfere with

the easy operation of the drill. The curvilinear surfaces 8 will be employed where the drill is used for working very hard rock which necessitates that the wings shall be exceptionally strong; but for softer rock the surfaces 9 may be concave curvilinear as shown in Fig. 5, making the bit more of a skeleton form. This latter construction of the surfaces 9 will render the cutting capacity of the bit greater owing to the fact that the worn part of the bit that comes in contact with the wall of the hole will be less, thus causing a smaller amount of friction.

In operating the drill, the active surfaces of the wings or bits present a cutting surface of more than one half of the circumference of the hole being drilled, and by this arrangement, the drill is prevented from penetrating far enough to permit it to stick or jam, while the web of the bit operates to direct the drillings together with the water to the waterways, and thus prevent friction on the cutting edge.

The drill of the present invention is exceedingly simple in construction and will be found thoroughly effective in use, and as it only deteriorates in diameter transversely by frictional contact with the walls of the holes being drilled, when it has become too small, it is only necessary to remove the drill, heat it to the proper temperature, and upon blows being imparted to the face of the bit beginning at its center, the cutting edges will be swaged out to the desired gage, after which the drill may be tempered and again made ready for use.

It will be noted that the essentially important features of this drill are as follows: In considering its opposite sides or faces as those in which waterways or channels 4 are formed, said sides are identical in shape, and, therefore, the bit can be formed between opposed die members, and said members can be manipulated on an anvil by means of a machine to spread and restore the bit to its normal gage, after having been worn exteriorly by use, and yet said die members can be freely withdrawn from the bit, the operation of spreading to restore the tool being accomplished in one operation, thereby distinguishing this article from those in which three or more similar cutting elements are employed, or which must be formed on cutting or chiseling machines instead of forging dies.

The bit is flared or enlarged in diameter conically toward its cutting edges, and said cutting edges, by reason of lateral wings at the extremities of the bit blades, are of greater extent, measured in a plane at right angles to the axis of the bit, than any other portion of the tool. Hence, the friction due to the withdrawal or retraction of the bit is reduced to the minimum.

All of the exterior friction upon the bit is applied to the portion of greatest diameter, which is at the cutting edge, and the wearing effect on the exterior of the bit, therefore, can be compensated for when necessary by a simple spreading of the cutting edges, thereby eliminating the necessity of sharpening.

The cutting edges coöperating with the concave curvature of the face of the bit provide a clearance or cause a deflection of the cuttings or chips inwardly and toward the channels, thus producing a scouring effect on the face, which, as the operation of the bit progresses, serves to sharpen said cutting edges and reduces the friction or wear on the gage, adding to the possible extent of use before redressing and increasing the durability or life of the bit, and experience has shown that the bit is actually sharper after prolonged use than at first, and the above mentioned spreading to restore the bit to gage after it has been worn exteriorly serves to render the bit equally as effective as in the first stages of its use. The triangular wings or extensions of the cutting blades, in addition to increasing the extent of the cutting edges, and thereby the efficiency of the tool, act to increase the inward deflecting tendency upon the cuttings or chips to enhance the interior scouring effect upon the bit channels or faces, the amount of lateral extension of these wings being limited in practice only by the necessity of leaving unobstructed the channels and concave side faces of the bit, so that the forming dies may have free ingress and egress.

The face of the head is anti-clinal, the web connecting the cutting blades extending from one cutting edge to the other, between the inlets of the channels, and intersecting and merging into both cutting edges at their centers, and this web coöperates, by reason of its reduced edge, with said cutting edges, in acting upon the rock, and with the concaved surfaces which merge thereinto in deflecting the cuttings or chips and directing them into the channels, and also in adding to the scouring effect upon the face of the head to increase the sharpness and cutting capacity of the tool. This web, at its forward or cutting edge, is concaved or recedes from its terminals toward its center to avoid any choking or packing effect and increase the tendency to deflect the cuttings or chips toward the outlet channels. The anti-clinal contour of the face of the drill head is thus bounded by diametrically opposite curved or circumferential cutting edges separated terminally by the interposed channels which have their inlet ends in the face, these channels being preferably convergent, so far as their floors or bottoms are concerned, to approach a meeting point in the face of the head and are at the face separated only by the web which defines

or lies in the anti-clinal axis, the centers of the cutting edges being located at the terminals of the anti-clinal axis, and from these centers of the cutting edges the face of the bit recedes in all directions on concave lines toward the inlet ends of the channels to insure a uniform and efficient clearance, supplemented by a scouring action on all parts of the face of the head, to neutralize, or at least in part counteract, the dulling tendency, due to the impact of the cutting edges on the rock.

I claim:—

1. A drill head having an anti-clinal face forming a cutting edge and bounded by diametrically opposite curved cutting edges, separated terminally by interposed channels having inlet ends in the face, the centers of the cutting edges being located at the terminals of the anti-clinal axis, from which points the face of the bit recedes in all directions toward the inlet ends of said channels.

2. A drill having an enlarged conical head comprising diametrically opposite exteriorly convexed and interiorly concaved blades having forwardly convexed cutting edges, said blades being separated by longitudinal diametrically opposite channels, deepened toward and terminating in the face of the head, and said face being anticlinal and having a diametrical web forming a cutting edge and occupying the anticlinal axis with its terminals intersecting said cutting edges and extending between the channels, whereby the face recedes continuously on concave lines from said axis and all portions of the cutting edges toward, and merges into, said channels.

3. A drill having an enlarged conical head comprising diametrically opposite exteriorly convexed and interiorly concaved blades having forwardly convexed cutting edges, said blades being separated by longitudinal diametrically opposite channels, deepened toward and terminating in the face of the head, and said face being anticlinal and having a diametrical web occupying the anti-clinal axis and provided with a centrally receding edge with its terminals intersecting said cutting edges and extending between the channels, whereby the face recedes continuously on concave lines from all portions of the cutting edges toward, and merges into, said channels.

4. A drill having a head comprising diametrically opposite interiorly concaved blades having forwardly convexed cutting edges, said blades being separated by longitudinal diametrically opposite channels, deepened toward and terminating in the face of the head, and said face being anticlinal and having a diametrical web forming a cutting edge and occupying the anticlinal axis with its terminals intersecting said cutting edges and extending between the channels, whereby the face recedes continuously on concave lines from said axis and all portions of the cutting edges toward, and merges into, said channels.

5. A drill having a head comprising diametrically opposite interiorly concaved blades having circumferentially curved cutting edges separated by longitudinal diametrically opposite channels terminating in the face of the head, said face being anticlinal and having a diametrical web forming a cutting edge and occupying the anticlinal axis with its terminals intersecting said cutting edges, whereby the face recedes continuously on concave lines from all portions of the cutting edges toward, and merges into, said channels.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

FRED A. GILL.

Witnesses:

F. B. OCHSENREITER,

C. E. DOYLE.