

UNITED STATES PATENT OFFICE.

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IMPROVED DRILL.

Specification forming part of Letters Patent No. 49,129, dated August 1, 1865.

To all whom it may concern:

Be it known that I, JOHN M. MAY, of Rock county, and State of Wisconsin, have invented a new and useful Improvement in a Rock-Drill and a Sand-Pump, to be worked or operated together or at the same time, forming a built tool that I call a "pump-drill;" and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

The nature of my invention consists, first, in constructing the bit or cutting-edge of a drill with a bevel all or chiefly on one side, to cause the drill to revolve somewhat in the path of a horizontal circle at each descending stroke or blow of the drill, that it may descend and cut in a new place at each blow; second, in constructing and operating a pump-drill to take or pump up the broken and crushed rock, sand, and roily water and muddy substance as the process of drilling goes on; third, in introducing or supplying at each blow water from the outside of the pump-drill, at the bottom of the drilled hole, to supply the place of the crushed rock, sand, &c., taken up into the pump, and to keep the bottom of the drilled hole clean, whereby the drilling process is more rapidly advanced; fourth, in connecting a pump-drill or a drill to a rope or rod used to operate a pump-drill or a drill by means of a swivel so constructed that a single or a double blow may be given at each descending stroke of the drill and allow the drill to revolve; fifth, operating a pump-drill by means of a pipe or tube through which broken and pulverized rock, sand, muddy and roily water is forced to the surface of the ground and discharged as the process of drilling progresses; sixth, a spring-guide through which a pipe or rod used to operate a drill passes to prevent friction of the pipe or rod against the sides of the drilled rock, and to keep the pipe or rod central in the drilled hole as the drill rises and falls; seventh, in so forming a spring-guide as to catch pieces of rock and other substances that may drop into the drilled hole and prevent their getting between the rock and drill; and, eighth, a screen or strainer to keep the unpulverized pieces of rock and coarse substances from entering and clogging the pump.

In the accompanying drawings the same letter in each figure represents the same part.

Figure 1 is a vertical section through the center of the pump-drill and swivel. Fig. 2 is a view of a pump-drill and pipe for operating the same, the pipe also serving to conduct the contents of the pump to the surface of the ground to be discharged, a spring-guide being used to keep the pipe central in the drilled hole. The pump-drill and pipe in this figure are represented as being inside a drilled hole or drilled well, the well part of this figure being a vertical section through its center. Fig. 3 is a similar view to Fig. 2, a rod and rope, instead of a pipe, being represented with which to operate the pump-drill. Fig. 4 is a horizontal cross-section from *a* to *b* in Fig. 1. Fig. 5 is a horizontal section, showing a circular cutting-edge of a drill from *e* to *f*, and the diameter of the drill from *g* to *h* in Fig. 6. Fig. 6 shows the lower end of a pump-drill put together, with a portion broken away, showing its interior. Fig. 7 shows a screen or sieve to protect the valve and pump from being obstructed, it being a horizontal view. Fig. 8 is a horizontal cross-section from *l* to *m* in Fig. 1; and Fig. 9 is the top of a pump-drill connected directly with a drilling-rod without a swivel.

A is the circular member of a pump-drill. To this member is fastened a central member, B or B', and cylinder D of the pump, and at the upper end of the cylinder is center piece or bracket, E. The parts A, B, D, and E are screwed together or attached to each other in any substantial manner. Central member, B, has any desired number of wings extending from its center, and each wing has its cutting-edge or bit beveled on one side, similar to a carpenter's chisel, (shown in Figs. 1 and 2,) for the purpose of giving a drill or a pump-drill a slightly rotating motion at each descending stroke or blow, causing also each succeeding blow to strike in a new place without the necessity of rotating the drill at the surface of the ground, as is now the method. The swivel, formed of bracket E and rod F, allows a drill or pump-drill to revolve, as described. The cutting-edges, beveled all on one side, or chiefly on one side, also facilitate the rapidity of cutting and chipping the rock to be drilled. The bit or cutting-edge of wings B' are beveled on

both sides, and the drill or pump-drill requires to be rotated from the top of the well in the usual manner, and the swivel, as such, dispensed with, and the hole through bracket E to receive rod F made square, and the rod made square between shoulders G and K for the purpose of rotating a drill or a pump-drill from the top of the well and giving a double blow, as hereinafter described.

Rod F of the swivel, bracket E, and collar G constitute a means of giving a double blow at each descent of a drill and rod, or at each descent of a pump-drill and rod, first, by the weight of a drill or pump-drill, and, second, by the weight of the rod, which continues to descend until collar G comes in contact with shoulder H. The force of the second blow depends on the greater distance from G to K than from H to J, which distance may be graduated by moving and fastening the collar G at any desired point on the rod. On the upward motion the shoulder K, striking shoulder J, causes a concussion, useful in keeping the drill free from becoming fast at the bottom of the drilled hole.

The circular member A has holes near its bottom or cutting edge, which holes are angular, as at *c*, or horizontal, as at *d*, in Figs. 1 and 2, and are of any desired size and shape, and are for the purpose of allowing the water between the wall of drilled rock and outside of the pump-drill to enter the drilled hole to take the place of the pulverized rock, sand, and mud, and roily water received into the pump at the descending blow, and also prevents a tendency to form a vacuum below the drill-pump by the close fitting of the cutting and trimming edge of circular member A to the wall of the drilled hole as the pump-drill rises.

In Figs. 3 and 6, where the cutting-bits B' are beveled on both sides and the revolving of the pump-drill is done at the top of the well, are channels or grooves *iii*, as in Fig. 3, made longitudinally with the outsideline of the pump and drill through the bit and cutting-edge of member A, which expands outwardly, as shown, through which channels water finds its way under the drill as it rises.

The channels may be made of any size or shape or number that will best accomplish the desired object and not impair the efficiency of the drill. A view of these channels is also seen at *iii* in the horizontal cross-section, Fig. 5, in which the greatest diameter of the cutting-edge of member A is from *e* to *f*, and the greatest diameter of the pump-drill above the tapering portion of the bit is from *g* to *h*, these diameters being also shown by corresponding letters in Fig. 6.

Either holes or channels may be used through which to supply water from the space *n* between the pump-drill and drilled rock *g*, as shown in Figs. 2 and 3, to take the place of pulverized rock, sand, and other substances taken into the pump as the pump-drill is operated, whereby the drill has less obstruction in

reaching the rock to be drilled, and a cleaner surface when reached, both of which are important advantages.

A ball-valve, C, in Fig. 1, I deem the best for a sand-pump combined with a drill, though any suitable kind of valve may be used.

To prevent chips of rock or other obstructing substance from ascending and clogging the valve, I use a screen or sieve, *j*, in Figs. 1 and 7, of any suitable material and texture. A coarse sieve of brass wire I deem suitable.

I do not confine myself to any particular angle or degree of expansion of the bit or lower end of circular member A of the pump-drill. That which will be effectual and durable and yet allow it to rise and fall freely will best serve the purpose.

When the water in the drilled hole comes sufficiently near the top of the well, and pipe N in Fig. 2 is used as a hollow pumping and drilling rod, I also use it to convey the contents of the pump-drill to or above the top of the well to be discharged. Thus the drilling and pumping is carried on at one and the same operation; also, I use a pumping-rod and suitable valves inside the pipe N, at a proper distance below the surface of the water in the well, to make an auxiliary pump, when the interior diameter of pipe N is suitable for that purpose. This auxiliary pump I operate by attaching the upper end of this pumping-rod firmly over the top of pipe N to a stationary beam or other suitable fixture, and the process of pumping the contents out of pipe N as they ascend from the pump-drill is accomplished as the pipe descends at each blow of the drill; or I operate this auxiliary pump independently by a lever or other suitable means, yet as an auxiliary to the pump-drill at the bottom of the drilled hole, and greatly aids the process of sinking a well by boring or drilling rock, but cannot be used unless there is a suitable abundance of water.

When the pump-drill is operated by means of rod P and rope R in Fig. 3, and cylinder D, which may be of any suitable length and capacity, is filled with sand and pulverized rock, the pump-drill is withdrawn and the contents discharged, requiring much less time than when a sand-pump and drill are used separately.

In Figs. 2 and 3 is a spring-guide, in which Q is a collar, rounded inside to allow a rod or pipe to pass freely, and has attached to it springs *ssssssss*, curved substantially as shown, so that they will pass obstructions, and are sufficiently strong to sustain their own weight and that of the collar by a gentle pressure against the wall of the drilled rock, and serve to guide the rod or pipe and to keep it central in the well, whereby greater efficiency is added to the drill, and the breaking the edge and corners of the drill by not being kept perpendicular and in line avoided. Sockets Q, in Figs. 2 and 3, that connect joints of pipe N and joints of rod P, one above and one below the spring-guide, move the spring-guide up and

down in the well, and as many as may be necessary to keep the pipe or rod in line should be used; also, any suitable additional number of springs *s* may be added to each collar to form a receptacle opening upward to catch fragments of rock, tools, or other articles that may fall into the well, and thus prevent their getting wedged in between the drill and wall of the drilled rock, whereby loss of time, or of a drill, or both, may be saved.

The hollow or curved recess *k* in the center of the upper part of the wings *B* or *B'* is for the purpose of making a suitably large space for broken rock, sand, &c., to pass freely through to reach throat *I*, through which they pass to reach valve *C*, and thence into the cylinder *D*, as the pump-drill is worked, the coarse screen *f* being the only obstacle encountered, the bars *L* across the cylinder regulating the height the ball-valve can rise.

In Letters Patent granted to me on the 23d day of August, 1859, for a spring - guide for keeping a pump-pipe in the center of a drilled well, I now apply and combine a spring-guide with a rock-drill, as herein described.

I am aware that a perforated drill, valve, and flexible nose have been used in combination, and I do not claim such combination, nor any combination including a flexible pipe or hose.

I do not confine myself to any particular form or style of making a pump-drill, whether the

circular cutting-edge of the bottom of the drill and pump - cylinder are made of one piece of material and the cross-cutting edges and valve firmly placed inside, or as shown in the drawings and described, or in any other firm and substantial manner whereby the chief characteristic qualities of a drill and a pump are retained and united in one built tool or pump-drill.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. Beveling the bit or cutting-edge of a drill all on one side, or chiefly on one side, to give the drill a slightly rotating motion in a horizontal direction at each blow of the drill, substantially as described.

2. A swivel formed of parts *E*, *F*, and *G*, when used, to allow a drill or a pump-drill to revolve in the path of a horizontal direction, substantially as described.

3. Using a spring - guide to catch pieces of rock and other substances that fall into a drilled well and obstruct the operation of a drill, substantially as and for the purposes described.

4. Screen or strainer *j*, when used in a pump-drill, substantially as and for the purposes described.

JOHN M. MAY.

Witnesses:

S. L. LORD,
S. D. LOCKE.