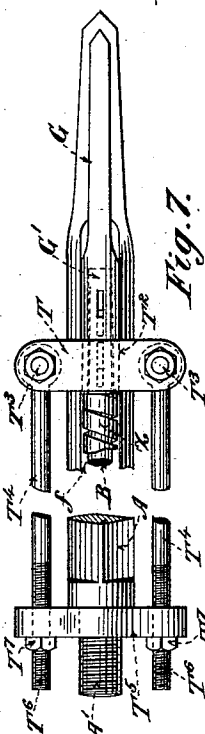
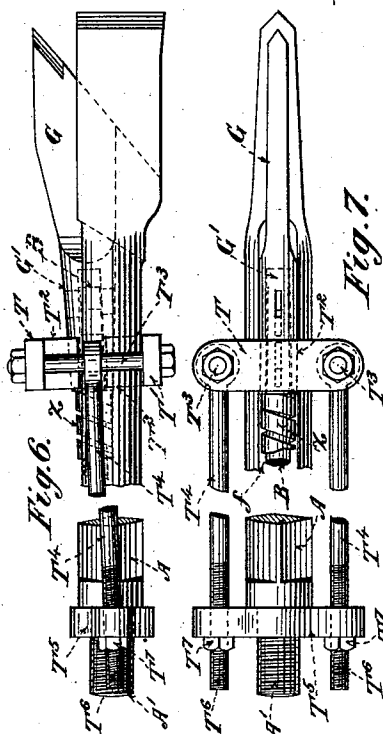
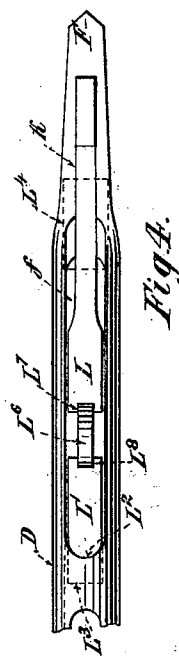
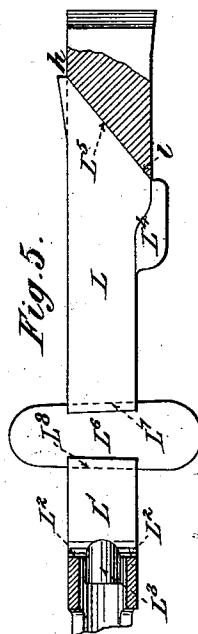
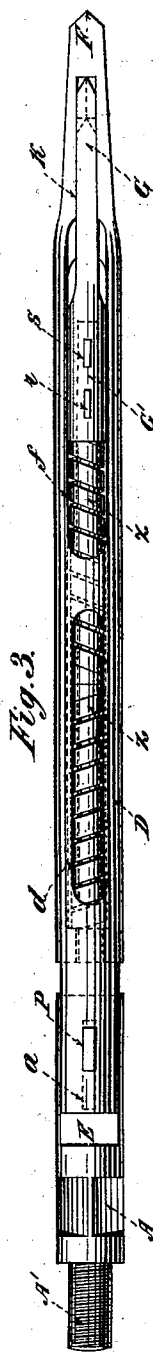
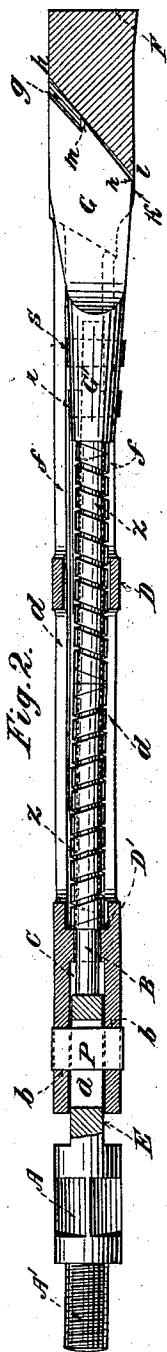
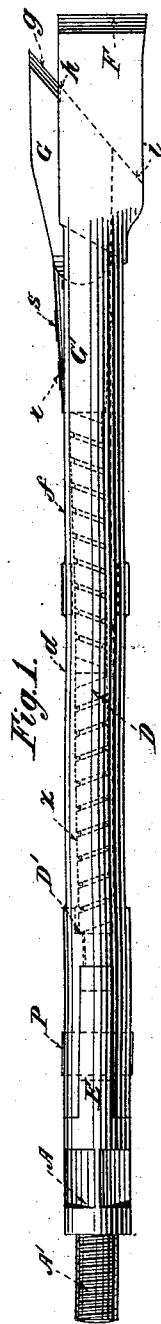


(No Model.)

A. G. P. CREED.
DRILL BIT AND REAMER FOR EARTH BORING.

No. 513,987.

Patented Feb. 6, 1894.



Witnesses:
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UNITED STATES PATENT OFFICE.

ALEX GEORGE PERCY CREED, OF SYDNEY, NEW SOUTH WALES.

DRILL BIT AND REAMER FOR EARTH-BORING.

SPECIFICATION forming part of Letters Patent No. 513,987, dated February 6, 1894.

Application filed November 2, 1893. Serial No. 489,807. (No model.) Patented in New South Wales June 16, 1893, No. 4,461.

To all whom it may concern:

Be it known that I, ALEX GEORGE PERCY CREED, Artesian-well driller and mechanical engineer, a subject of the Queen of Great Britain, residing at Sydney, in the British Colony of New South Wales, have invented a new and useful Combined Drill Bit and Reamer, to be used as an improved combined drill bit and reamer for earth-boring and tube-well sinking, (for which I have obtained Letters Patent in New South Wales, No. 4,461, dated June 16, 1893,) of which the following is a specification.

This invention relates to an improved combined expanding drill bit or reamer useful in most kinds of earth boring and specially in that kind known as the "Canadian system of tube well boring" either by pole or cable tools now common for drilling in search of Artesian water.

Heretofore tube wells were usually first drilled with a "bit" the size of the inside diameter of the tube or casing and afterward enlarged or reamed out to the size (or larger than the size) of the outside diameter of said casing which was then lowered into place. Now by this present invention a string of tubing or casing may be put down or sunk and a hole drilled underneath its lower end as large or larger than its outside diameter thereby effecting a great saving in time and trouble. In certain ground (for example in blue shale or clay which caves in freely though interlaid with streaks of rocks and boulders) my improved bit and reamer will drill underneath a string of casing a hole sufficiently large to allow the casing to lower into place without resort to subsequent enlargement or reaming of the bore hole.

In order that my invention may be clearly understood reference will now be made to the drawings herewith.

Figure 1 is a side view of my improved combined drill bit and reamer with the reamer expanded. Fig. 2 is a sectional side view of the same with the reamer incased. Fig. 3 is a plan view of Fig. 2. Figs. 4 and 5 are plan view and edge view of an anvil piece to facilitate the "setting" of the cutting edge of the shell of the drill with the said anvil piece within such shell as during the "setting." Figs. 6 and 7 are side views on crosswise di-

ameters of a drawing up clamp for use in connecting the reamer bit to the central pin or lifting rod of the drill.

The sinker bar of the drill rig screws onto boss A' of the enlarged end A of lifting rod B which also has a smaller flat enlargement E which fits into slot C of the shell or drill stock D and is held there by pin or cotter P passing through slot *a* and held or riveted in holes or slots *b* in the fork of shell or drill stock D. On the lower end of rod B is secured the movable piece or expanding chisel point G having boss or socket G' through which and through rod B pass securing pins or cotters *r* and *s*. As the rod B is passed into or inserted through the shell or drill stock D it is also inserted in two spiral springs Z which were previously placed in position through slot *f* in the shell D. Another slot *a* is made in the shell or drill stock to facilitate the escape from said shell of debris, drillings, &c., particularly on the compression of the spring. The two springs Z form a continuous spring exerting its expanding force between the heads of boss G' and the shoulder D' of the central bore of the shell or drill stock D and keeps the combined bit and reamer normally ready for work as in the position shown in Fig. 1. The chisel point G is compressed to enter the bit into and during its passage through the tube or casing when the combined tool takes the form shown in Figs. 2 and 3 with the head or enlargement A thrust away from shell or drill stock D. (the slot *a* allowing the necessary movement to cotter P.) The slot *f* at bottom of shell or drill stock D is extended into slot K to take the movable piece or expanding chisel point G. On the cutting side of said point G the slot K extends to near the bottom while on the other side of the shell is presented an inclined surface *h. i* or tapered end which makes say an angle of about forty-five degrees (45°) with the main cutting edge F of the tool on which surface *h. i* the angle face *m n* of the expanding point G slides up and down and in and out. A clearance piece L may be fixed on the main cutting edge by dove-tail countersunk screws so as to be easily replaced when worn for this side of the tool will wear away the fastest.

The movable piece G in Figs. 2 and 3 is shown drawn up, and thrust back along the

inclined bottom *hi* of the slot K sufficiently to allow the tool to pass up or down in a string of casing without jamming in said casing. To thus close in the tool ready to pass up a string of casing it is necessary that the outside part or shell or drill stock D of the tool should be held fast by the bottom edge of the casing in which the tool fits and into which it is required to pass it or if it is intended to pass the tool down a string of casing the outside part or shell or drill stock D is held fast by any suitable means. In either case the shell being thus held a pull is taken on the head or enlargement A with the result that said head, A lifting rod B and movable piece or expanding chisel point G (which is keyed fast to lifting rod B) are drawn say upwardly until the bottom of the slot *a* presses against the bottom edge of the key P. While the movable piece or point G is being drawn up as before explained, it is also being pressed inwardly by the side of the casing (or by other means if the tool is not being drawn into the bottom of a string of casing) until it is more or less completely inside the shell or drill stock D in the slot K or sufficiently in such slot K as to allow the tool to pass up and down the casing freely.

As shown in Figs. 1 and 2 the cutting edge *g* of the movable piece G does not extend downwardly quite as far as the main cutting edge F of the tool so that such edge *g* is not called upon to do as much work as the solid cutting edge F in fact is only required to do as little work as is consistent with gaining the desired end. The tool it will be noted expands and contracts by reason of the movable piece or chisel point G sliding down and up and in and out on the inclined bottom *hi* of the slot K.

The anvil piece is in two parts the forward end or toe L and back piece L' both of which are passed through the slot *f* to the interior of the casing D the shoulders L² of the back piece taking against the ends of said slot *f* while the boss L³ takes within the casing. The stop piece L⁴ takes against the outer part of slot K and the inclined face L⁵ takes against inclined face *hi* of said slot K and the forward end or toe L of the anvil piece is forced asunder from the back piece L' by the key L⁶ driven or forced through the slot or grooves L⁷ and L⁸ of said pieces. The inclined face L⁵ of the anvil is forced hard against the face *hi* of the slot K and is prevented by the stop piece L⁴ from advancing up inclined face *hi* of said slot K and the anvil piece is thus jammed in the casing so that the cutting edge F may be softened in the fire, hammered and otherwise treated without injury to the inclined face *hi* and the sides of slot K.

The reamer bit G is keyed to the end of the lifting rod B by compressing the springs Z and this may be easily and quickly done by means of the clamp plates T and T' which have bosses or mid extensions T² to take within the side slots *f*. These clamp plates are

bolted together upon the boss G' of the reamer bit G (so as to hold or clamp it between the mid extensions T²) by bolts T³ upon which are threaded the eye bolts T⁴ which latter extend to and through plate T⁵ terminate in screwed end T⁶ with nuts T⁷. The plate T⁵ fits over boss A' and takes against the enlarged end A of the lifting rod B so that when nuts T⁷ are screwed up the boss G' upon the end of rod B is drawn upwardly when the key S is passed through said boss and through the rod B fastening the rod B and reamer G in their relative positions. The clamps being removed the key *r* is inserted and the reamer bit is ready for work.

The tool as herein described and illustrated will pull into the bottom of a string of casing it is made to fit, without damaging or straining the bottom of the said casing or the tool itself and the instant the expanding part of the bit is out of the casing the spiral springs draw or thrust the movable piece G down into its place ready for work.

My improved combined expanding bit-and-reamer will not satisfactorily drill hard solid rock nor in most cases drill a clean hole; but in earth or rock not exceedingly hard it would prove a most effective reamer. With my improved combined bit and reamer the casing might at once sink on to the bottom of the bore hole but this must not be allowed: as it must be kept the stroke of the walking beam clear of the bottom of the hole, so that on the upstroke of the sinker bar the expanding part of the bit will not come into contact with the bottom of the casing.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. Means for enlarging a bore hole comprising a tubular stock provided with a longitudinal slot, a rod having both endwise and lateral motion therein, and a reaming tool rigidly secured to the outer end of said rod adapted to be withdrawn into or projected through the aforesaid slot by the endwise and lateral motion of its rod in the proper direction, for the purpose set forth.

2. Means for enlarging a bore hole comprising a tubular stock provided with a longitudinal slot, a rod having both endwise and lateral motion therein, a reaming tool rigidly secured to the outer end of said rod adapted to be withdrawn into or projected laterally from said stock by endwise and lateral movement of the rod in the proper direction, and actuating devices for automatically imparting endwise and lateral motion to the reamer rod in one direction.

3. A combined drill and reamer comprising a tubular stock provided with a longitudinal slot, and with a drilling or boring tool at its outer end, a rod having both endwise and lateral motion in the stock, and a reaming tool rigidly secured to the outer end of the rod and adapted to be projected through the slot in

the stock by endwise and lateral motion of the rod in the proper direction, for the purpose set forth.

4. A combined drill and reamer comprising
5 a hollow stock provided at its outer end with a drilling or boring tool, a lifting rod having both endwise and lateral motion in said stock, and a reaming tool adapted to be projected laterally from or withdrawn into said stock
10 by endwise and lateral motion of the rod in a proper direction, for the purposes set forth.

5. A combined drill and reamer comprising a hollow stock provided at its outer end with a drilling or boring tool, a lifting rod having
15 both endwise and lateral motion in said stock, a reaming tool adapted to be projected laterally from or withdrawn into said stock by endwise and lateral motion of the rod in a proper direction, and a spring adapted to impart endwise motion to said rod in one direction,
20 for the purposes set forth.

6. In a combined drill and reamer, the combination with the drill or boring tool provided with a laterally inclined upper face, and its
25 hollow stock provided with a longitudinal slot extending upwardly from said inclined face, of a lifting rod having both endwise and lateral motion in said stock, and a reaming tool keyed to the lower end of said rod opposite the slot in the stock, said reaming tool provided with an inclined face having bearing
30 on the corresponding face of the drill or boring tool, for the purpose set forth.

7. In a combined drill and reamer, the combination with a longitudinally slotted drill
35 stock, of a lifting rod adapted to be connected

with the sinker bar of a well rig, said rod having both endwise and lateral motion in said stock, a reaming tool connected with the outer end of the rod in proximity to the slot in the stock, means for limiting the endwise motion
40 of said rod, and a spring exerting its power against pressure exerted on the rod, for the purpose set forth.

8. In a combined drill bit and reamer of the class set forth the combination with a shell
45 D bored out to freely take therein a central pin or lifting bar B with spring Z thereon and having slots *f d* and K of flat enlargement E slot *a* slot C cotter P and riveted orifices or
50 fastenings *b* substantially as herein described and explained.

9. The combination with the drill stock D slotted transversely at *d* and *f*, the lifting rod B, reamer G, and springs *z z* on said rod, of
55 means for compressing said springs for connecting and disconnecting the reamer to or from said rod, consisting of the compressing device T, T', adapted to engage the end of the lowermost spring, and a shoulder on the rod,
60 respectively, and connecting rods T⁴ connected with plate T and extending through plate T', said rods screw-threaded at their outer end, and nuts fitting said threaded ends, said parts constructed and operating substan-
65 tially as described.

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Witnesses:

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