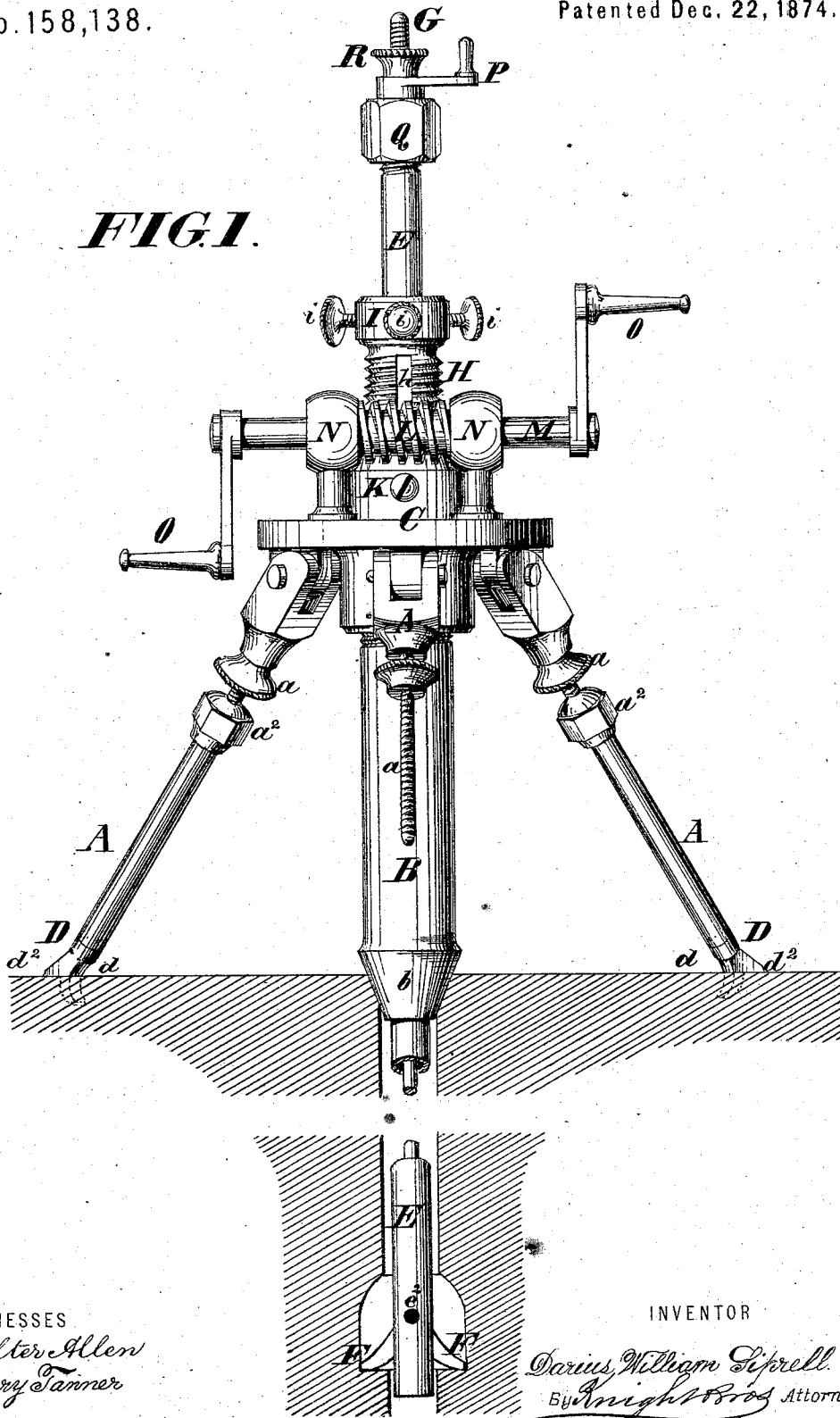


D. W. SIPRELL.
Reaming-Apparatus.

No. 158,138.

Patented Dec. 22, 1874.

FIG. 1.



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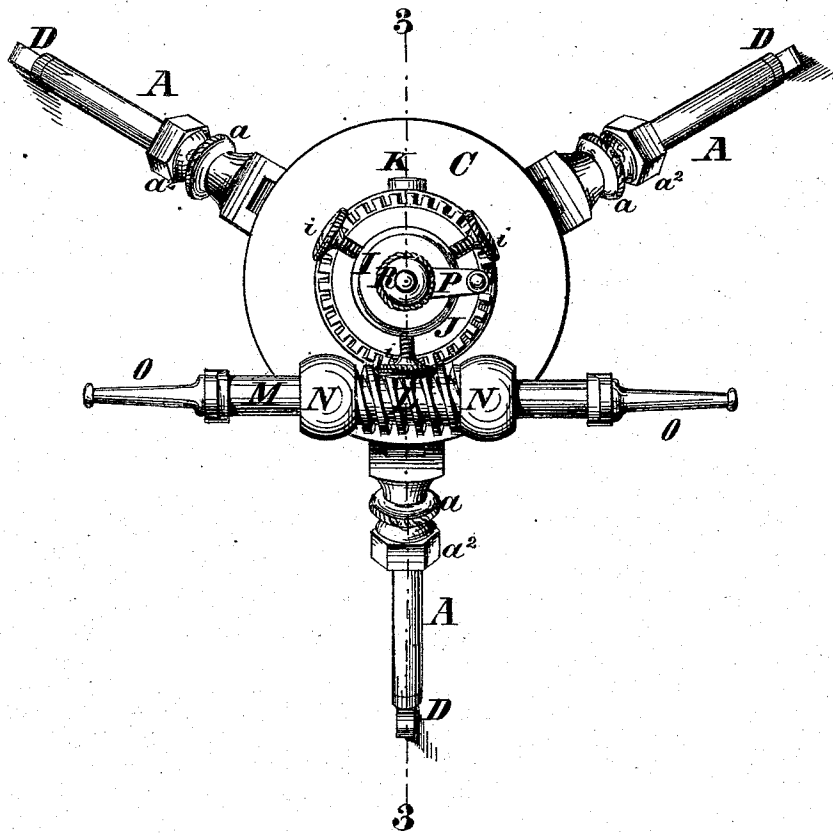
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FIG. 2.



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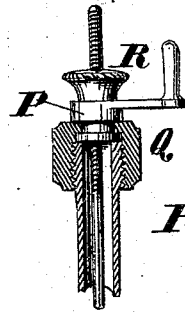
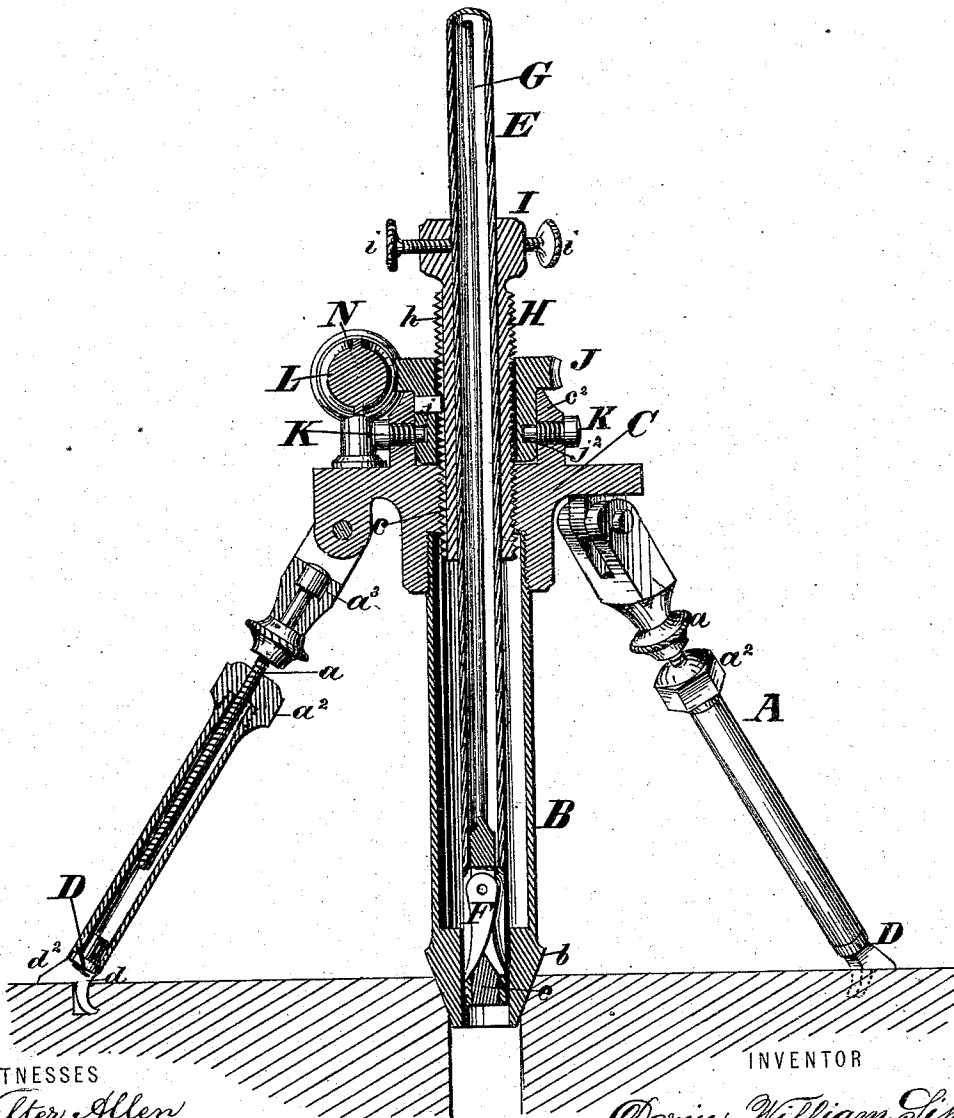


FIG. 3.



WITNESSES

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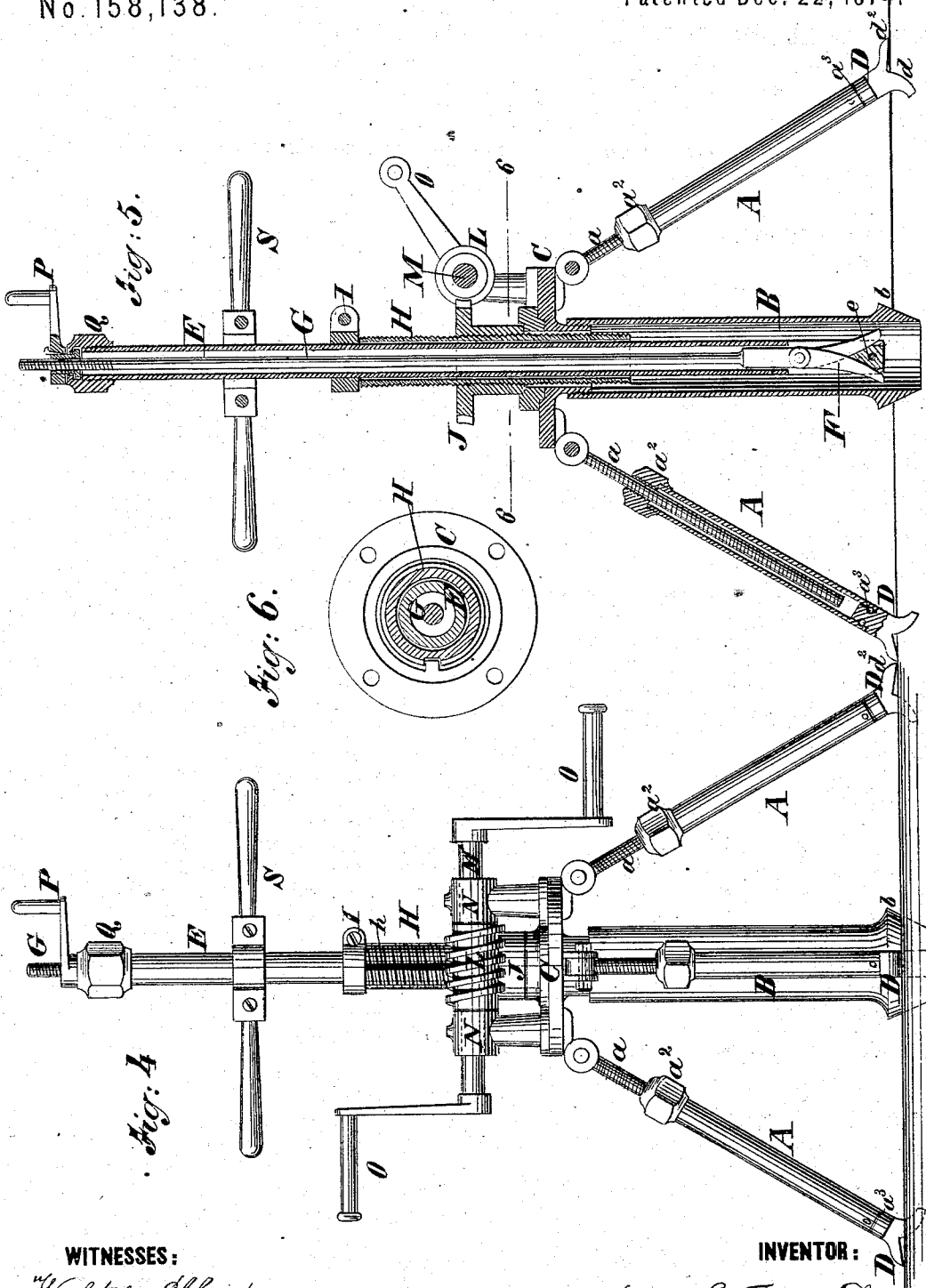
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UNITED STATES PATENT OFFICE.

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TO HIMSELF, ALEXANDER MAURICE DE LISLE, OF MONTREAL, AND
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IMPROVEMENT IN REAMING APPARATUS.

Specification forming part of Letters Patent No. **158,138**, dated December 22, 1874; application filed
December 18, 1874.

To all whom it may concern:

Be it known that I, DARIUS WILLIAM SIPRELL, of Riviere du Loup, (*en bas*), in the county of Temiscouata and Province of Quebec, in the Dominion of Canada, have invented a new and useful Improvement in Reamers, of which the following is a specification:

This invention relates primarily to reaming apparatus for use in the operations of well-boring, blasting, &c., in rock and earth. It is applicable also in part to other reaming apparatus.

The first part of the present invention consists in a peculiar tripod-frame for supporting a reamer-rod axially within a well or other vertical bore. The legs of this frame are constructed with swivels and adjusting-screws to adapt them to be readily and forcibly extended or shortened, and have feet of a suitable shape to engage with recesses in the surface of the rock or of the ground, or in a bed-frame, as the case may be, so as to attach the structure firmly thereto. The central member of the frame consists of a large vertical tube, with a tapering or conical lower end to engage with the upper end of the hole, and to center itself and become firmly wedged therein. The second part of the invention consists in peculiar combination of an endless screw, a swiveled worm-wheel, and other devices, for raising and lowering the cutters, and for raising or lowering and simultaneously rotating the same, as hereinafter set forth. The third part of the invention consists in a hand-nut, swiveled to the upper end of a tubular reamer-rod, in combination with a central rod, for projecting and retracting pivoted cutters attached to the latter, with or without a jam-nut for locking the cutters more securely in their different positions.

This improved reamer may be operated by hand or steam power, and is adapted to work in a previously drilled or bored hole of any given length and size, in any matter or substance susceptible of being perforated. The reamer is designed and adapted to cut a chamber at any given place in the bore or hole in which it is used without enlarging the orifice of the hole. It is also capable of mak-

ing more than one chamber in the same hole without interfering with or enlarging its orifice, and such chambers may be made of different sizes, if required; and it may be modified to cut a single extended chamber by means of two or more pairs of cutters, or to cut two or more chambers simultaneously.

In the accompanying drawings, Figure 1 is an elevation of this improved reamer in a preferred form, represented as at work. Fig. 2 is a plan view of the same. Fig. 3 is a vertical section on the line 3 3, Fig. 2, representing the reamer-rod as elevated out of the hole. Fig. 4 is an elevation of a reamer illustrating a modification of this invention. Fig. 5 is an axial section of the same. Fig. 6 is a partial horizontal section on the line 6 6, Fig. 5.

Like letters of reference indicate corresponding parts in the several figures.

A tripod-frame provides for supporting and adjusting the working parts of this apparatus, and is composed of adjustable legs A, a central vertical tube, B, which is, by preference adapted to constitute an axial guide, and a head or table, C, to which these are attached. The legs are hinged to the table so as to fold close to the guide-tube B in transportation, and to be expanded so as to afford the necessary extended lateral support in use. They terminate in feet D, having, as in the illustrations, suitably-bent hooks *d*, to engage in seats picked for them in the surface of the rock or of a bed-frame, and heels *d*² to rest on the surface, or provision for engaging with a surface of soil. These feet serve to attach the apparatus firmly to the surface, in addition to their function of preventing any accidental displacement of the respective legs. The legs are adjustable as to length by means of longitudinal screws *a*, in combination with nuts *a*² and swivels *a*³, to permit the screwing motion. In that form of the apparatus illustrated in Figs. 1 to 3 the screws are rotary, and furnished with hand-wheels or heads, and are swiveled to the hinge ends of the legs, engaging with the nuts *a*², which are fixed at the upper ends of the lower members of the legs. The central tube B of the frame terminates at bottom in a conical or tapering point, *b*, adapted to cen-

ter the apparatus relatively to the hole with which it engages, and to become wedged in the latter, so as to assist in affording lateral support. A tubular reamer-rod, E, is employed in combination with pivoted cutters F of suitable shape, as regards their cutting capacity, for the material in which they are to work. These project through slots in the tubular reamer-rod, and a wedge, *e*, is introduced in the tube at the lower extremity of its slots, and at right angles thereto, to forcibly project the cutters when they are lowered within the tube. The latter action is accomplished by an axial rod, G, to the lower end of which the cutters are attached, preferably, by means of a pivotal screw or bolt, so as to be quickly removable, an orifice, *e*², being provided in the side of the tube to give access to the screw or bolt for removing and replacing the same. Provision is thus made for readily renewing the cutters as they become worn by use. For raising and lowering, and simultaneously rotating, the cutters after they are projected for work, the head or table C is constructed with a fixed nut or internal screw, *c*, of large diameter, extending upward from the orifice of the guide-tube B; and a screw-sleeve, H, terminating at top in a clamp-ring, I, is fitted to this nut *c*, so as to work therein. The clamp-ring I is provided with radial set-screws *i*, by tightening which the screw-sleeve H is attached to the reamer-rod E. Preliminary to lowering the cutters by hand, or by suitable tackle, to the working-point, and elevating them at the conclusion of the operation, the reamer-rod E is simply released, so as to permit it to slide through the screw-sleeve H. A horizontal worm-wheel, J, with a large hub and bore surrounds the screw-sleeve H, and is connected thereto by a spline or internal projection, *j*, in the hub of the worm-wheel, engaging with a longitudinal groove, *h*, in the periphery of the screw-sleeve. The worm-wheel J is attached to the head or table C by a swivel, composed of a vertical flange, *c*², on the latter, a horizontal groove, *j*², in the hub or neck of the worm-wheel, and a pair of screws, K, with smooth points projecting through the flange *c*², into the groove *j*². An endless screw or worm, L, on a horizontal shaft, M, engages with the worm-wheel J. Its shaft is supported in bearings N on the head or table C, and terminates, in the illustrations, in a pair of hand-cranks, O. By these means a steady rotary motion with great power is imparted to the horizontal worm-wheel J, and this is converted by the screw-sleeve H and fixed nut or internal screw *c* into a vertical movement of the said sleeve, and the reamer-rod clamped therein, which movement is upward or downward, according to the direction in which the shaft is turned. Said motion is also transmitted, without conversion, to the screw-sleeve, and there-through to the reamer-rod, by means of the spline or projection *j* engaging with the walls of the vertical groove *h* in the screw-sleeve. Pro-

vision is thus made for raising or lowering and simultaneously rotating the cutters. In order to apply steam or other power the shaft M would simply be provided with a pulley or pinion in lieu of one or both of the hand-cranks O. The cutters are projected and retracted through the mediums already described, by means of a hand-nut, P, which is swiveled to the upper end of the tubular reamer-rod E by means of a sleeve, Q. The rotary hand-nut engages with a screw-thread on the upper end of the cutter-rod G, and a jam-nut, R, on the same thread engaging with the upper surface of the hand-nut P, provides for securely locking the cutters in their different positions.

In the modification illustrated in Figs. 4, 5, and 6 the legs A are swiveled in a different manner from those of the machine above described, the screws *a* constituting the upper members of the legs, while the swivels *a*³ are applied or formed between the feet D and the lower ends of the legs proper, as shown in Fig. 5. The nuts *a*² in this case are rotary with the lower members of the legs for adjusting the apparatus. The fixed nut *c*, Fig. 3, is dispensed with, and a screw-thread is formed within the worm-wheel J and its hub to mesh directly with the thread of the screw-sleeve H. The spline or projection *j*, displaced within the worm-wheel J, is located beneath the same in the orifice of the head or table A, engaging with the groove *h* in the screw-sleeve, in this case, to prevent the rotation of the latter. In other words the internal screw and spline are transposed in the modification. The clamp-collar I is not formed on or attached to the screw-sleeve H in this modification, but rests loosely on the upper end of the same, and is made of a different form, consisting of an open ring furnished with external lugs, and a tightening-bolt applied thereto. The rotation of the endless screw or worm L serves in this case simply to move the reamer-rod vertically, leaving its rotation to be accomplished by other means, which may consist, as in the illustration, of a T-handle, S, clamped thereto at convenient height. The mechanical details of construction may vary greatly, and constitute no essential part of the present invention, except as herein specified. In either form of the apparatus above described, the inner rod G may be adapted to carry cutters at more than one point, if this be desired, by extending its fork to any length required, and the employment of two or more pairs of cutters in some cases is proposed. Two pairs of cutters ten inches apart will make a cut of twenty inches in length by moving the reamer-rod vertically ten inches; three pairs will cut thirty inches for a movement of the reamer-rod of one-third this extent, and so on. The capacity of the apparatus as regards length of cut may thus be varied to any desired extent by simply adding more cutters or removing those which are not required. Two or more pairs of cutters may also be employed to form two

or more chambers of a given length simultaneously. With a single pair of cutters, or with a gang of cutters, as above described, two or more chambers of any desired size may be formed at different points by shifting the reamer-rod relatively to the screw-sleeve, by means of the clamp-ring I, and in all cases the reaming action is accomplished without any enlargement of the upper end of the preliminary or main bore or hole. The apparatus is peculiarly adapted to be made of any desired size and capacity. With a reamer rod or tube of five or six inches in diameter, and five or six pairs of cutters, for example, a chamber of two feet in diameter and several feet in length could readily be formed. The apparatus may also be used to advantage for other purposes than forming chambers, as, for example, the turning off or removal of any projections which may be left by the drills in a well-bore designed to receive driven pipe.

The following is claimed as new in this invention, namely:

1. The tripod-frame composed of the swiveled and adjustable legs A, the central vertical tube B, having a centering and wedging point, *b*, the head or table C, to which these are attached, and feet D for attaching the structure to the surface, substantially as herein shown and described.

2. The combination of the endless screw or worm L, the swiveled worm-wheel J, and the screw-sleeve H, with a nut, *c*, and a clamping-collar, I, for attaching the screw-sleeve to the reamer-rod, substantially as herein shown and described, as means for raising and lowering the cutters during the reaming operation.

3. The combination of the endless screw or worm L, the horizontal worm-wheel J carrying a spline, *j*, the screw-sleeve H, having a longitudinal groove, *h*, the fixed nut *c*, and the clamp-collar I, formed on or attached to the upper end of the screw-sleeve, for raising, lowering, and simultaneously rotating, the cutters, in the manner herein set forth.

4. The swiveled hand-nut P, in combination with the threaded axial rod G, and the pivoted cutters T attached thereto, for projecting and retracting the latter with a positive movement, in the manner herein set forth.

5. The combination of the threaded cutter-rod G, the swiveled hand-nut P, and the jam-nut R, applied above the latter on the same thread, for projecting, retracting, and securely holding the cutters, substantially as herein specified.

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