A. G. WEBSTER.

Rock-Channeling Machine.

No. 207,374 Patented Aug. 27, 1878.

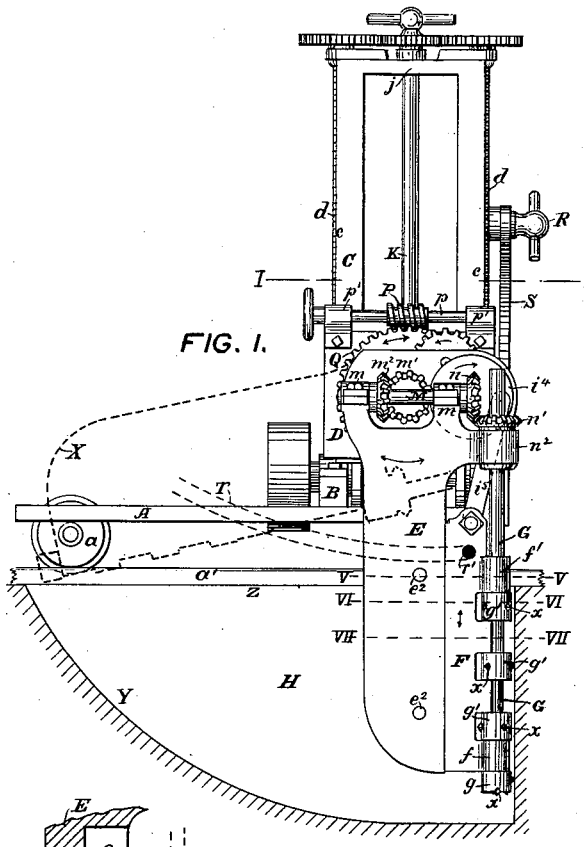

FIG. 1.

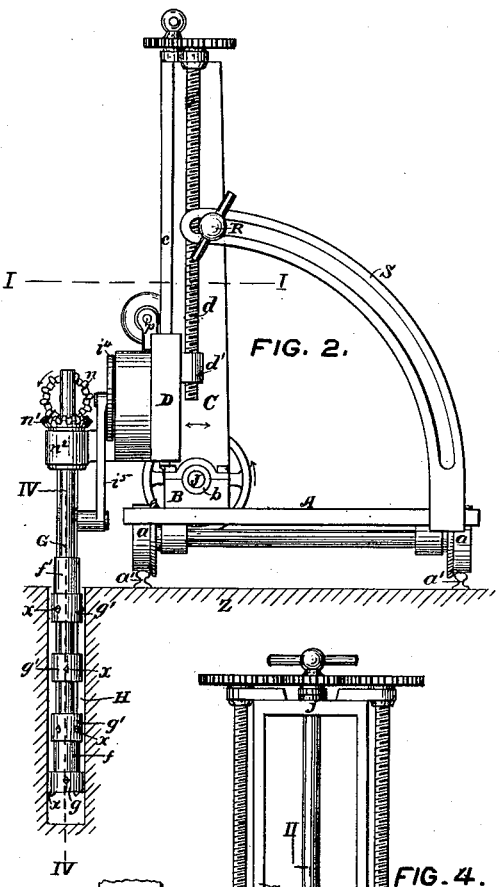

FIG. 2.

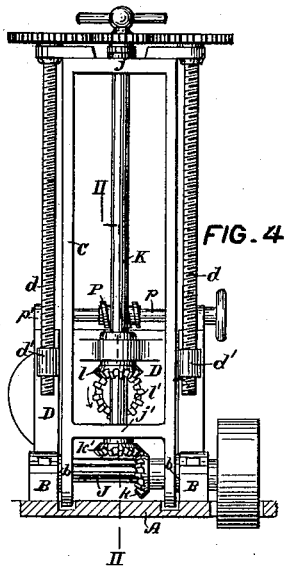

FIG. 4.

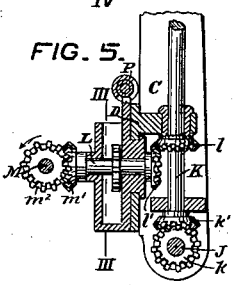

FIG. 5.

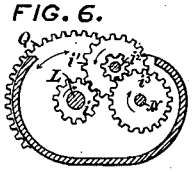

FIG. 6.

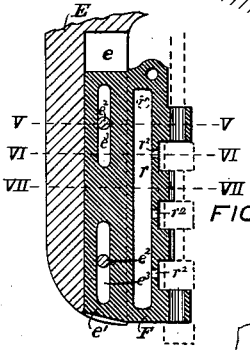

FIG. 7.

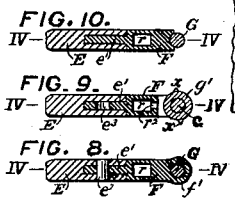

FIG. 10.

FIG. 9.

FIG. 8.

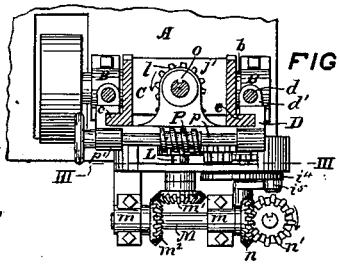

FIG. 3.

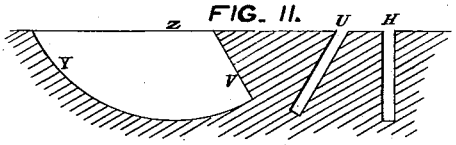

FIG. 11.

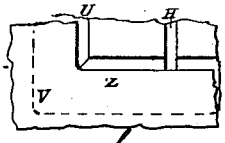

FIG. 12.

WITNESSES:

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UNITED STATES PATENT OFFICE.

ALBERT G. WEBSTER, OF BRANDON, ASSIGNOR OF ONE-HALF HIS RIGHT TO JOHN M. GOODNOUGH, OF PITTSFORD, VERMONT.

IMPROVEMENT IN ROCK-CHANNELING MACHINES.

Specification forming part of Letters Patent No. **207,374**, dated August 27, 1878; application filed January 29, 1878.

To all whom it may concern:

Be it known that I, ALBERT G. WEBSTER, of the town of Brandon, in the county of Rutland and State of Vermont, have invented certain Improvements in Rock-Channeling Machines, of which the following is a description, reference being had to the accompanying drawing, in which—

Figure 1 is a side elevation of a rock-channeling machine embodying my invention, shown as in operation. Fig. 2 is a forward-end elevation of the same. Fig. 3 is a plan view of a portion of Figs. 1 and 2, as shown below the line I. Fig. 4 is a rear elevation of a portion as shown above the truck A in Figs. 1 and 2. Fig. 5 is a central vertical section taken on the line II, Fig. 4. Fig. 6 is a sectional elevation of a part of the mechanism back of the line III, Figs. 3 and 5. Fig. 7 is a central vertical section of a part of my invention, taken on the line IV in Figs. 2, 8, 9, and 10. Figs. 8, 9, and 10 are horizontal sections taken, respectively, at the lines V, VI, and VII in Figs. 1 and 7. Fig. 11 is a sectional, and Fig. 12 a plan view, of portions of rock, showing channels therein as cut by my hereinafter-described invention.

The arrows in the various figures indicate directions of motion of the parts to which they are attached or contiguous.

Like characters refer to corresponding parts in the different figures.

In the above-mentioned drawing, A is a truck, mounted on wheels *a*, so as to traverse on the tracks a^1. B are pillow-blocks, secured on the platform of the truck A, in such a manner as to receive the journals *b* of the frame C. The frame C is provided with ways *c*, so constructed as to receive the carriage D, and to allow of such carriage being moved up and down thereon by means of the screws *d* and box-nuts *d'*, or any equivalent device therefor.

The carriage D supports an arm, E, in such a manner as to permit of this arm being moved back and forth radially about the shaft L. In the front edge of the blade-like arm E is f rmed a d groove, *e*, to receive the tongue e^1 of the spindle-carrier F, and which carrier F is held in its place upon the arm E by means of the pins e^2 passing through the sides of the groove *e* and the slots e^3, or by any equivalent device therefor, in such a manner as to permit the carrier F to be moved to and fro longitudinally with the arm E.

G is a spindle, supported in the eyes or journal-bearings *f* and *f'*, formed on the carrier F, in such a manner as to freely turn therein, and is provided with a boss or cutter-holder, *g*, below and projecting downward from journal-bearing *f*; and between the bearings *f* and *f'* is arranged another boss or bosses, *g'*. These bosses *g* and *g'* are provided with carbons *x*, such as are usually employed in quarrying marble or other stone, or with cutters of any other suitable material, in such a manner as to admit of their employment in cutting a channel in rock, substantially as shown in Figs. 1 and 2.

A further description and the operation of my invention are as follows: The track *a'* being laid on the bed Z of the quarry in the direction in which it is desired to cut the channel, and having thereon the truck A, upon which is mounted my herein-described invention, the depth of the channel to be cut being regulated by the position of the carriage D upon the ways *c* of the frame C, and the radial arm E, with the carrier F and spindle G, being in the position as indicated by the dotted lines X in Fig. 1, rotary motion is communicated to the shaft J, supported by bearings in the axis *b* of the frame C; thence, by means of the gears *k k'*, to the shaft K, supported in bearings *j j'* in the top and bottom cross-pieces of the frame C; thence, by means of the gears *l l'*, to the shaft L, passing through the axis of the radial arm E; thence, by the gears m^1 m^2, to the shaft M, arranged so as to revolve in bearings *m* at top of the arm E transversely to the axis thereof; and thence transmitting its motion thus received to the cutter-spindle G by means of the gears *n* n^1. The shaft L also transmits a considerably slower motion to the shaft N by means of the gears *i* i^1 i^2 i^3, or by means of a device equivalent thereto, which, by means of the crank or eccentric i^4 and pitman i^5, gives to the carrier F and cutter-spindle supported thereby a gradual endwise-reciprocating motion. At the same time the spindle G is being rapidly revolved, the upper portion of such

spindle, which passes through the sleeve of the bevel-gear n^1, (supported so as to turn freely in the bearing n^2 projecting from the arm E,) being slotted to receive a feather in such sleeve, as indicated at *o* in Fig. 3, thus permitting the shaft G to move back and forth endwise in the axis of the gear n^1 while in motion.

P is a worm, secured on the shaft *p*, turning in bearings *p'*, secured to the carriage D, and working in the segmental rack Q, connected to the head of the radial arm E and concentric with the axis thereof, by which means, or by a device equivalent thereto, the outer extremity of the arm E is lowered and fed forward from the position as indicated at X, Fig. 1, in the arc of a circle, while the spindle G is in motion, as above described, and the cutters *x* thereon cut away the rock in their path, thereby forming a channel with a curved bottom, as indicated at Y, Figs. 1 and 12, to the depth at which it is desired to cut such channel. When the arm E has arrived at or near the position as shown in Fig. 1 the radial motion ceases, and the continued forward movement of the cutting device in making a channel of uniform depth is produced by feeding forward the truck A upon the tracks *a'* as the cutting of such channel progresses.

The frame C is supported by journals *b* resting in bearings in the pillow-blocks B, in such a manner as to permit such frame being inclined backward at any desired angle about the axis formed thereby, and is secured at such angle by means of the quadrant *s* having its foot secured to the truck A and the clamping-bolt R, or by any device equivalent thereto. By means of this arrangement of the frame C and parts supported thereby with the truck A, the device for channeling rock above described is enabled to cut a channel at any desired angle beneath a horizontal plane or in the face of a vertical wall.

The frame C and parts supported thereby are shown in the drawings in a position for cutting a vertical channel, as shown at H, in Figs. 1, 2, 11, and 12; but in cutting a channel denominated as "tunnel-cutting," as shown at U in Figs. 11 and 12, the frame C is inclined backward at an angle corresponding to the angle of such channel.

In tunnel-cutting, along the side walls of a quarry the stone in the angles of the quarry has heretofore had to be removed, at a considerable expense of time and labor and waste of material, by hand. To obviate this difficulty, when the channel H or U is cut forward vertically a sufficient distance, or as far as the truck A can be propelled, the feeding mechanism of the truck is stopped and the mechanism for moving the radial arm E about its axis is employed in feeding the arm E still farther forward about its axis, thus cutting the forward end of the channel under obliquely, substantially as shown at V, Figs. 11 and 12.

In order to obviate the overheating and consequent destruction of the cutters *x* while cutting the channel, it is necessary that a constant supply of water should come in contact therewith, which may be introduced to the cutters at the mouth of the channel, near or in front of the cutter-spindle; or, if it should be preferred to introduce the water more directly to the cutters, I form the spindle-carrier F with a chamber, *r*, therein, to which water is supplied through the inlet-orifice r' by means of a pipe, as indicated by dotted lines T, and from which chamber the water is discharged through orifices r^2 directly to or near the cutters *x* while in operation. The outer surface of arm E is corrugated, to admit of the passage of the cuttings and water to rear.

What I claim as my invention is—

1. A rock-channeling machine provided with a shaft, G, furnished with cutters *x*, in combination with mechanism for giving such shaft or spindle a continuous rapid rotary and, at the same time, a gradual endwise-reciprocating motion, substantially as shown and described.

2. A rock-channeling machine provided with a radially-projecting arm for supporting a device for cutting a continuous channel, in combination with mechanism for turning such arm about an axis in the arc of a circle, substantially as shown and set forth.

3. A rock-channeling machine having a frame provided with ways *c* and mechanism for raising or lowering therein the mechanism for cutting a continuous channel, so as to regulate the depth of such channel, substantially as set forth.

4. A rock-channeling machine provided with a frame, *c*, for supporting the mechanism for cutting a continuous channel, so constructed and arranged in combination with the platform of the truck A as to permit such frame being radially inclined and secured at various angles from an axis at or near its lower end, substantially as shown and described.

5. The combination of the revolving cutter-spindle G and carrier F, provided with the water-chamber *r*, having inlet and outlet orifices r^1 and r^2, substantially as shown and set forth.

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Witnesses:

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E. O. HAMILTON,

LEWIS GOODNOUGH.