N. F. ENGLISH & C. M. WILLARD.
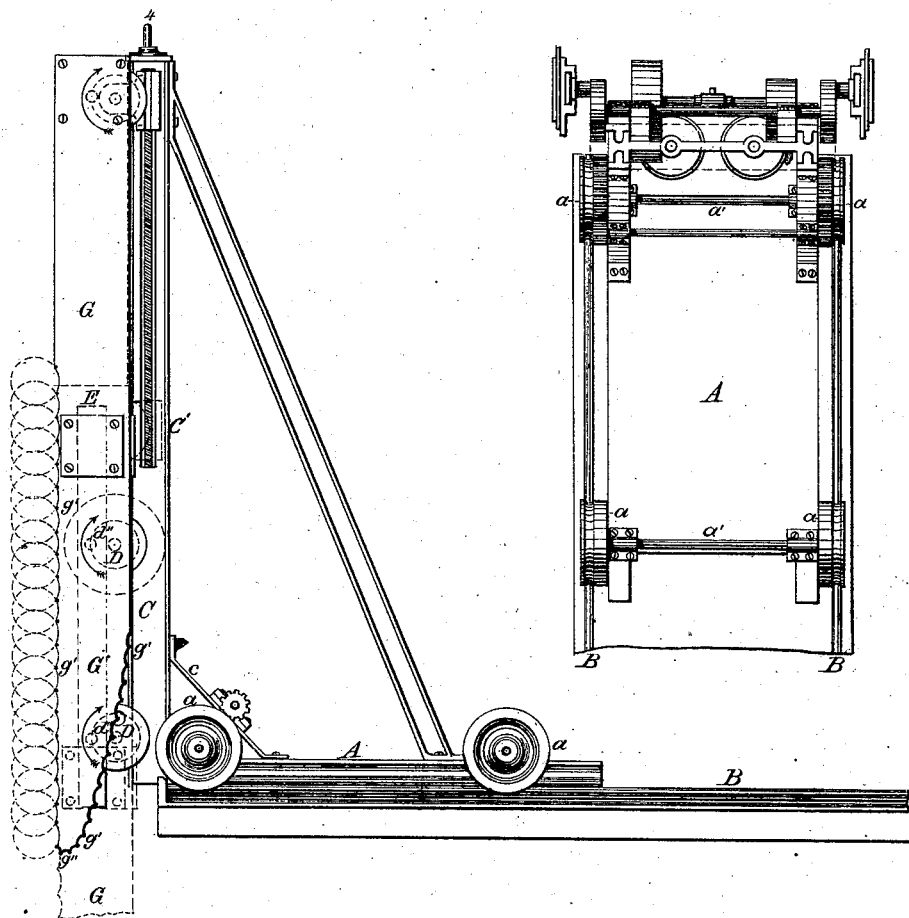## Machine for Channelling and Sawing Stone.

No. 160,888. Patented March 16, 1875.

Fig. 2. Fig. 1.

Attest:

Inventor:

Nathan F. English,
Cyrenius M. Willard
By N. Crawford atty.

N. F. ENGLISH & C. M. WILLARD.
Machine for Channelling and Sawing Stone.

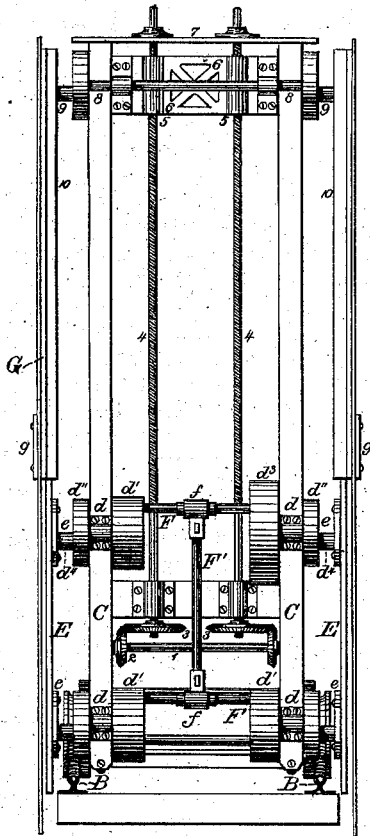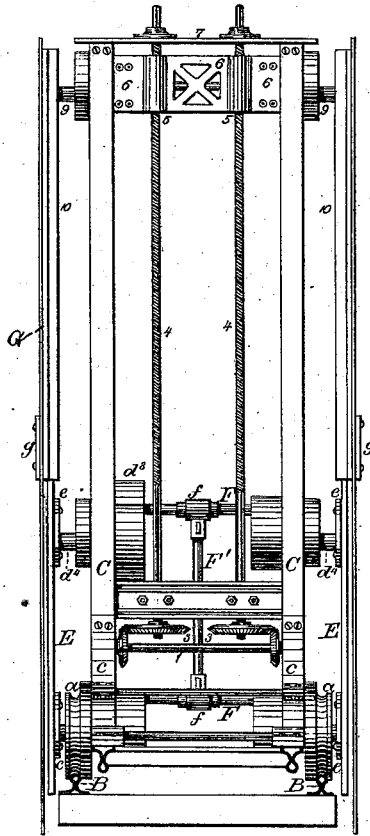No. 160,888.   Patented March 16, 1875.

Fig. 3.   Fig. 4.

Attest:

Inventors
Nathan F. English
Cyrenius M. Willard
By N. Cranford
            atty.

UNITED STATES PATENT OFFICE.

NATHAN F. ENGLISH, OF HARTLAND, AND CYRENIUS M. WILLARD, OF PITTSFORD, VT.; SAID ENGLISH ASSIGNOR TO SAID WILLARD.

IMPROVEMENT IN MACHINES FOR CHANNELING AND SAWING STONE.

To all whom it may concern:

Be it known that we, NATHAN FREDERICK ENGLISH, of Hartland, in the county of Windsor, and CYRENIUS METCALF WILLARD, of Pittsford, in the county of Rutland, both in the State of Vermont, have invented certain Improvements in Machines for Channeling Stone in the Quarry, or sawing blocks of stone and other substances into smaller blocks or slabs, of which the following is a specification:

The object of this invention is to produce a machine that will cut a channel or channels into the bed-block from the surface downward to any desired depth into the rock, clearing itself from binding in its kerf or channel, and when a channel is so cut the machine can be advanced forward, cutting a channel or channels as deep as it has penetrated to any distance that the bed-rock is clear; and it consists in the construction and arrangement of the parts of the machine, the saw or instrument by which the work is performed, and the motion given to the instrument in doing its work.

In the drawings, Figure 1 represents a plan view; Fig. 2, a side view; Fig. 3, a front upright view, and Fig. 4 a rear upright view.

A represents the movable platform to support the motive power and the actuating parts of the machine. *a a a a* are wheels that support the platform A; and *a' a'* are the axles that connect each pair of wheels together, and which are attached to the platform, so that the axles and wheels may freely revolve. B B are rails upon which the wheels *a* travel, and cause the platform A to be moved in whichever direction they revolve upon the rails. C C are uprights resting upon the sills of the platform A, and support the actuating parts of the machine, and are held in upright position by the braces *c c*. *c'* is a transverse girt between the uprights C, to give lateral support to the uprights. D D are short transverse shafts revolving in boxes *d d* on uprights C, and have fast on their inner ends pulleys *d' d' d'*, and upon their outer ends crank-wheels *d'' d'' d'' d''*, having crank-pins *d⁴* projecting outward, and engaging in boxes on plates *e*, that are attached to the sides of guide-bars E. F F are transverse shafts or rods between pulleys *d'*, and are fixed therein eccentrically to their center, so as to become cranks. F' is a connecting-rod or pitman, adjustably fixed between and turning upon shafts F by the boxes *f f*. G is a saw secured to slide upon the guide-bar E by the slide *g*, and yet be carried by the bar in whatever position it assumes. The saw is in the form shown in Fig. 2 in side view. It will be seen that the forward cutting-edge of the saw is straight till near its bottom end *g''*, when it assumes the form of a segment of a small circle, thence growing wider upon a circular line till the full width of the saw-blade is obtained at about one-third of its height. The cutting-points *g'* are about three and three-fourths inches apart, and are armed with diamonds for cutters, and each of the cutting-points in cutting describes a circle, as seen in said Fig. 2. 1 is a horizontal shaft between uprights C, and revolves in proper boxes on said uprights, and has at each end a bevel-gear wheel, 2, gearing into gear-wheels 3 on upright screw-shaft 4, which screw-shafts pass through screw-nuts 5 in transverse girt 6, and upward to a bearing-plate, 7. 8 is a transverse shaft attached to and revolving in bearings on the girt 6, on the ends of which are cranks 9, that enter into grooves that are circles in a connecting-plate, 10, that is attached to the inside of the saw-plate G. The grooves in plate 10 are of the same diameter as that which the cranks *d⁴* describe in their revolution, which keeps the three points at which the cranks are connected to the guide-plate or plate 10 in the same plane of movement.

The engine or motive power by which the saw or channeling device is driven is placed upon the platform A, and from which, by any mechanical means, power and motion is communicated to any of the pulleys *d'*, and if the motion from the motive power is positive and fixed the pulleys are made larger or smaller, as desired, as can be seen in the case of pulley *d³*, which is larger than its fellow on the same shaft. The pulleys *d'*, being in revolution, give revolution to the cranks *d⁴*, which puts guide-bar E in motion at each end by carrying the point at which it is connected to the cranks along with the cranks, and describing the same circle that the cranks do.

The saw G, being attached to the guide-bar E, is given the same motion that the cranks give the bar E, and any point in the saw describes a full circle of the same diameter as that described by the cranks. Hence, each of the cutting-points g' describes the same circle. Motion being communicated to the transverse shaft 1 from the motive power, the screw-shafts 4 are revolved, and the effect is that as they revolve in their screw-nuts 5 the transverse girt 6 is drawn down at every revolution of the screw-shaft, and the cranks 9, bearing in the grooves on plate 10, will depress the saw G by sliding it down, and advancing it as far as the gain of the screw-thread on shaft 4 is at each revolution. The machine, being placed upon the rock in which channels are to be made, is put in motion, and, by the action of the cranks acting upon the guide-bar, the saw is forced downward. The screw, turning, forces the saw still lower at every revolution, when the points in the narrow and rounded lower end strike into the rock and describe a segment of a circle in its cut as it is advanced forward and upward, when the cutting-points on the front of the saw will take into the rock, and clear its way as it cuts upward. This is continued until the saw is forced down into the bed-rock the required depth, which may be six feet or more, when the feeding of the saw downward is suspended, and then the entire machine is advanced forward by any known mechanical device being applied thereto.

Having the saw cut upward in its front cut gives it an improved advantage in starting to channel down, or in advancing the cut forward. Another advantage this machine has is, the saw can be operated close to the perpendicular wall of a quarry, however deep it may be down, and can be made to cut up to a perpendicular wall in any direction, and can be turned to cut channels at right or other angles to suit the shape of block desired to be taken from the quarry.

Without departing from the principles of construction, the machine can be made to have the saw penetrate horizontally into an upright face of the ledge, and, when at the depth or distance desired, can be made to rise upward and cut perpendicular channels, or to cut horizontal ones.

Two saws, one at each side, are generally used, but one only may be used; or gangs of two or more saws, operating in the manner described, may be used for cutting blocks after being quarried into slabs of any dimension.

Having thus described our invention, what we claim is—

1. The combination, in a machine for channeling or sawing stone, of the revolving cranks d^4, connecting-rod F', guide-bar E, and saw G, whereby each cutting-point is caused to cut upon the line of a given circle exclusively its own, substantially as described.

2. The saw G, constructed as described, in combination with the revolving cranks d^4 and their operating devices, as and for the purposes described.

3. In a machine for channeling in stone, the saw G, having its penetrating end g'' narrow in width, circular in form, and armed with diamonds or other hard substance for cutters, in combination with the revolving cranks d^4, as and for the purposes described.

4. In a machine for channeling in stone, the combination of the saw G, having the motion as set forth, with a mechanical device, whereby the saw is fed down to cut a channel into the rock, substantially as described.

5. The mode of channeling or sawing of stone by the saw G, in which each of the cutting-points in cutting describes a circle that is independent of that cut by any other point in the saw, substantially as described.

NATHAN FREDERICK ENGLISH.
CYRENIUS METCALF WILLARD.

Witnesses:
  EMMA WILLARD,
  WILLIE WILLARD.