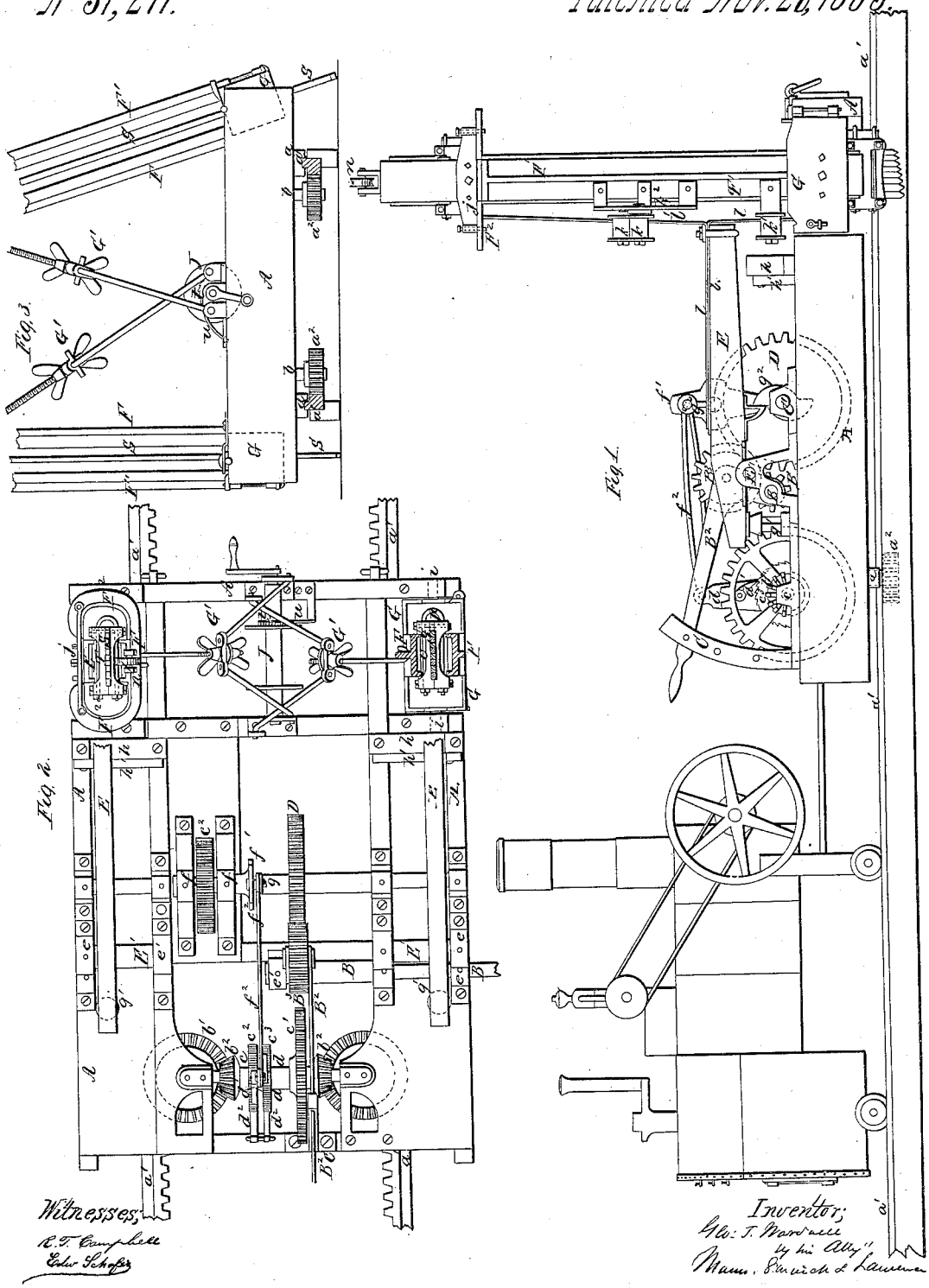
2 Sheets, Sheet 1.

G. J. Wardwell,

Stone-Channeling Machine.

No. 51,271. Patented Nov. 28, 1865.



Witnesses,
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Edw. Schaefer

Inventor;
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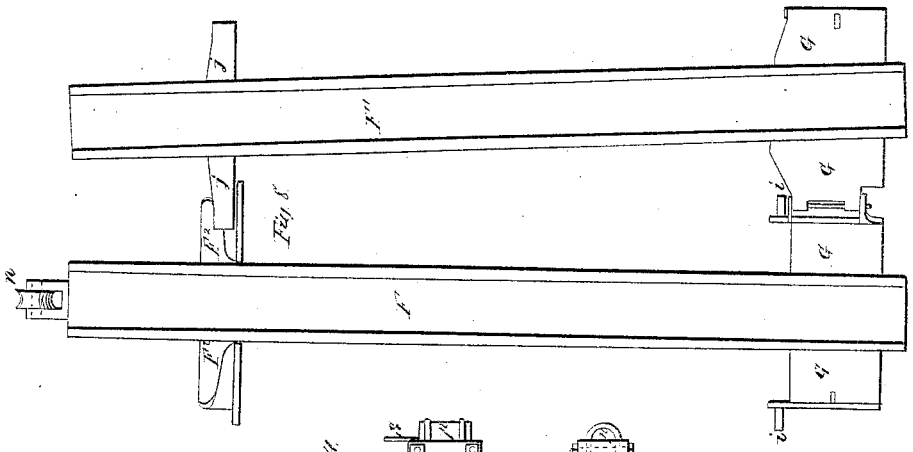
by his Atty's
Munn, Emrich & Lawrence

2 Sheets, Sheet 2.

G. J. Wardrell,

Stone-Channeling Machine.

No. 51,271. Patented Nov. 28, 1865.



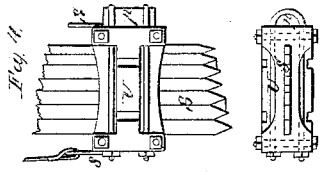


Fig. 4.

Fig. 5.

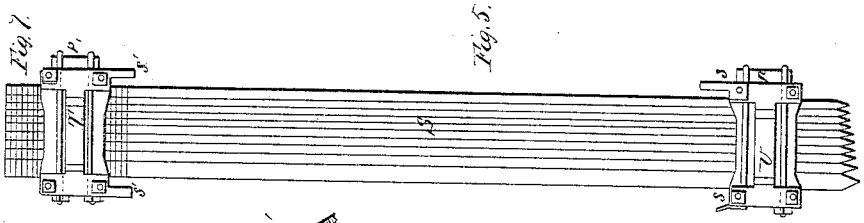


Fig. 7.

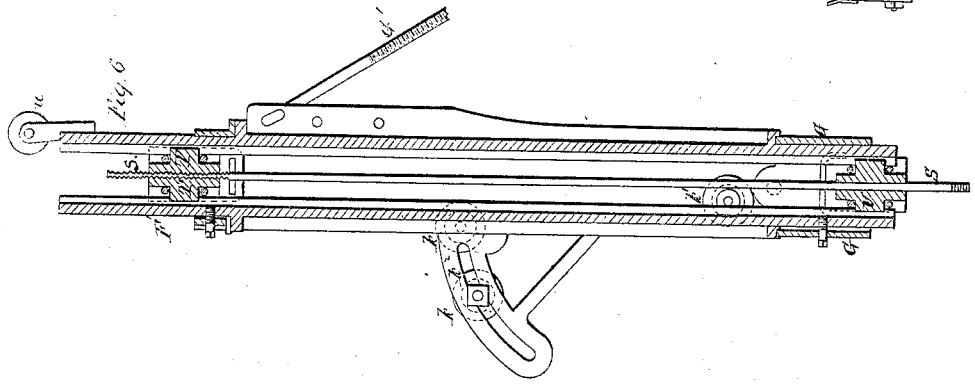


Fig. 6.

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UNITED STATES PATENT OFFICE.

GEORGE J. WARDWELL, OF RUTLAND, VERMONT, ASSIGNOR TO THE STEAM STONE CUTTER COMPANY, OF NEW YORK, N. Y.

IMPROVEMENT IN STONE-CUTTING MACHINERY.

Specification forming part of Letters Patent No. **51,271**, dated November 28, 1865.

To all whom it may concern:

Be it known that I, GEORGE J. WARDWELL, of Rutland, in the county of Rutland and State of Vermont, have invented a new and Improved Machine for Cutting Stone; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is an elevation of one side of the stone-cutting machine and an engine for driving the same mounted upon a track. Fig. 2 is a plan view of the stone-cutting machine. Fig. 3 is an elevation of one end of the machine, showing the manner of supporting the cutter-standards so that they can be inclined at any desired angle. Figs. 4 and 5 show the construction of the foot-clamps, which are used for securing the cutters together in gangs. Fig. 6, Sheet 2, is a vertical sectional view of one pair of cutter-standards with a gang of cutters arranged therein. Fig. 7 is a front view of a gang of cutters with the head and foot clamps applied. Fig. 8 shows the manner of constructing the standards to receive the cutters.

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

This invention relates to certain novel improvements on the stone-channeling machine for which Letters Patent were granted to me on the 10th day of November, 1863. In said machine but one gang of cutters was used, and consequently but one channel could be made in the stone at a time. All the strain and concussions were upon one side of the frame of the machine, and the machine was moved backward and forward by a single pinion-wheel applied to one of the rails of the track. There was no provision for cutting close to a bank, and that portion of the quarry-bed which was between the cutters and the rear end of the machine in starting the machine could not be channeled. There was no provision for making inclined channels, as the cutter-standards were permanently fixed to the frame of the machine in a plane perpendicular to this frame. No provision was made for removing the cutters from the channel in the stone when the machine was stationary, and supporting them when they were detached from the working-beam for repair or sharpening. These and many other objections attended the use of said machine.

The main object of this invention is to remedy the above-named objections by providing for the use of a gang of cutters upon each side of the frame of the machine, outside of the track upon which the machine is moved, and so applying these cutters that they can be inclined at any desired angle from a vertical line and made to work as well when inclined as when erect.

Another object of my invention is to provide for feeding the machine up to its work at any desired degree of speed, which can be regulated with reference to the up and down strokes of the cutters, as circumstances may require; also, for stopping the machine and again starting it forward or backward at pleasure; also, for moving the machine backward or forward without operating the cutters.

Another object of my invention is to provide for elevating and supporting the gangs of cutters when they are detached from their working-beams, as will be hereinafter described.

To enable others skilled in the art to understand my invention, I will describe its construction and operation.

In the accompanying drawings, A represents a horizontal frame or carriage, which is suitably braced and adapted for receiving the cutters and the mechanism for operating them and moving the machine. This frame is provided on its bottom with shoes *a*, (shown in Figs. 1 and 3,) which receive the supporting-rails *a'* *a'* of the track upon which the machine is moved. The shoes *a* prevent the frame from having any lateral movement, and they serve as guides for it. The rails *a'* *a'* have teeth formed on their inside surfaces, as shown in Fig. 2, to receive spur-wheels a^2 a^2 on the lower ends of vertical shafts *b* *b*. These shafts *b* are located near the rear end of the frame A, and have their bearings therein. They carry on their upper ends bevel-spur wheels *b'* *b'*, which engage with the teeth of and are driven by the pinion-wheels b^2 b^2 on a horizontal transverse shaft, *c*. This shaft *c* has a large spur-wheel, *c'*, keyed on it, and also two ratchet-wheels, c^2 c^3, between which latter an arm, *d*, vibrates loosely. The arm *d* has a pawl, *d'*, on each side of it, which can be engaged with or detached from their respect-

ive ratchet-wheels at pleasure. The ratchet-teeth of these wheels are pitched in opposite directions, and their respective pawls are adapted to engage with them and to give the shaft *c* and shafts *b b* a forward or backward movement whichever direction it is intended to move the frame A.

Two stay-dogs, d^2 d^2, are pivoted on top of the rear beam of frame A, for the purpose of preventing backlash. These dogs can be engaged or disengaged with their respective ratchet-wheels at pleasure.

The main driving-shaft B is supported in bearings *e e e*, and carries on one end, outside of the frame A, a large belt-wheel, which is not shown in the drawings, for receiving motion from a belt-wheel on an engine that may be arranged behind the machine, to move upon the rails or track with it. The opposite end of the shaft B carries a pinion spur wheel, B′, and a vibrating lever, B^2, which latter supports a spur-wheel, B^3, that is constantly in gear with the teeth of the pinion B′. Lever B^2 extends backward and passes through or between an upright segment-guide, *c*, that is secured upon the rear beam of frame A, to which guide the lever is affixed by means of a transverse pin in an elevated or depressed position, according to the movement it is required of the machine. When said lever is depressed so as to engage the spur-wheels B^3 C′ the machine can be moved backward or forward rapidly without actuating the cutting-tools, provided both of the ratchet-wheels c^2 c^3 are released from their pawls.

In front of the main driving-shaft B is a horizontal transverse shaft, C′, which carries a two-throw cam on each end, as will be hereinafter more fully described. This shaft C′ has a large spur-wheel, D, keyed on it in a plane with the spur-wheels B^3 C′, so that by raising the rear end of the lever B^2 its driving-wheel B^3 will be engaged with the teeth of this large spur-wheel D, as shown in Figs. 1 and 2. The cam-shaft C′ also has another spur-wheel keyed on it for giving motion to a pinion spur-wheel, C^2, which is keyed on a short transverse shaft that is supported in bearings *f f*, shown in Fig. 2.

A slotted arm, *f′*, is secured to one end of the short shaft of wheel C^2, to which the forward end of a pitman-rod, f^2, is pivoted. The rear end of this rod is pivoted to the upper end of the vibrating pawl-arm *d′*, above-described. The slotted arm or crank *f′* projects on each side of the center of its shaft, and the pitman f^2 is pivoted to this arm by means of a stud, *g*, which passes through the slot, and which can be adjusted and fixed nearer to or farther from the axis of the shaft of the arm, according to the amount of throw which it is required to give the vibrating arm *d′*. By this arrangement the length of strokes of the vibrating pawl-arm *d′* can be adjusted to a nicety.

E E are two longitudinal beams, which extend forward of the main driving-shaft B, and which are arranged near the sides of the frame A, as shown in Figure 2. These beams are secured near their rear ends to rock-shafts E′ E′, which are supported in the bearings *e e e′ e′*, and beneath their rear ends india-rubber or metallic springs are suitably applied, as shown at *g′*, Fig. 1, the object of which is to move their forward ends downward with considerable force. These beams E E are acted upon by cams g^2 g^2 on the cam-shaft C′, which cams may be so arranged as to elevate and depress the beams simultaneously or alternately, as may be desired.

Near the forward ends of the beams E E, and arranged beneath the same upon the frame A, are stop-blocks *h h*, upon which the forward ends of these beams strike when they are allowed to fall.

Two props, *h′ h′*, may be pivoted to the rear sides of the stop-blocks *h h*, for supporting the forward ends of the beams E E in an elevated position, free from their respective cams, when desired.

Having described the mechanism for actuating the cutting-tools and moving the machine upon its track forward or backward at pleasure, I will now proceed to describe the construction of the cutting-tools and the manner of guiding them and directing them to their work.

In the machine which was secured to me by Letters Patent dated November 10, 1863, I represented but one gang of cutters, which was arranged on one side of the frame of the machine and outside of the track upon which the machine moves. The cutters which I am now about to describe are arranged outside of the track; but I now employ two gangs of cutters, which are supported and guided by means of standards arranged on both sides of the frame A, so that two channels can be made in the stone simultaneously.

As the standards F F′ on both sides of the machine are constructed and arranged precisely alike, I will describe those on one side only.

Both standards, F F, are secured at or near their lower ends to a rectangular box, G, which is supported at its forward and rear ends upon the transverse beams at the forward end of frame A by means of trunnions *i i*. The outer side (longitudinal side) of this box is hinged to the forward end, so that it can be swung open, as shown in Fig. 8, and when closed, as in Figs. 1, 2 and 6, it is secured by means of a staple and bolt, or in any other suitable manner.

The standard-guide F is secured to the inner side of the box G at an intermediate point between the ends of this box, and the standard F′ is secured to the inner side of the hinged side, as clearly shown in Figs. 6 and 8, by means of screw-bolts, and steady-pins are used to adjust this standard in a plane parallel with the standard F. The upper end of the standard F′ is similarly secured to a horizontal pivoted gate, *j′*, which is hinged to a yoke, F^2, that is secured rigidly to a standard, F, as

shown in Figs. 2, 6, and 8. By means of this yoke the two standards F F′ mutually support each other at their upper ends when they are locked together. These two standards are sustained in position by means of an inclined brace, G′, consisting of a screw-rod, which is attached to the standard F, and two rods, which are pivoted to plates on the frame A at their lower ends, and connected to a block at their upper ends, as shown in Figs. 2 and 3. The screw-rod of this brace G′ passes through the said block and receives nuts for affixing it rigidly thereto. By forking the lower end of the brace G′ it affords a good support for steadying the standards. By means of the nuts on said screw-rod, and the provision for allowing the standards to swing laterally, the latter can be adjusted and fixed rigidly at any desired angle for cutting channels obliquely into the stone.

When the standards are arranged in inclined planes it is desirable to employ pulleys over which to pass the straps that connect the forward ends of the beams to the cutters, as shown in Figs. 1 and 6, so that some portion of said straps will always be in a vertical line, or in a plane coinciding with that in which the beam E moves. These pulleys, *k k* and *k′*, Fig. 6, are flanged, so that the straps *l l′* will not slip off of them, and one of the pulleys *k* is adjustable in a slotted sector, k^2.

In Figs. 4, 5, 6, and 7, I have represented the form of cutters which I prefer to employ, and the manner of connecting them together in gangs. These cutters S consist of long strips of steel of an equal thickness, having their lower ends brought to a chisel edge and upset, so that their cutting-edges are wider than their upper portions. These strips are secured together, as shown in Fig. 7, by means of head and foot clasps, or clamps T and U, both of which are constructed alike with the slight difference that the head-clasp T is adapted to fit corrugations which are formed on the surfaces of the chisel or cutter stems, as shown in Figs. 6 and 7.

The clasp T consists of two plates, which are bolted together by transverse bolts, and also a packing-block, *p*, which is used for drawing the cutter stems together edgewise.

The two clamps T U have grooved ribs formed on their sides, the grooves of which receive projections or tenons, which are formed on the standards F F′, and thus the cutters are held together between said standards and guided in their reciprocating movements.

The cutting-edges of the cutter-stems are stepped or arranged one below the other, so that one cutter, the largest, will operate first, then another, and so on; and as these cutting-edges wear away the clamp U is adjusted upward until the stems are too short for use, when they are removed and longer stems introduced in their stead.

The clamps T U are both provided on each end with loops S S′, which have straps connected to them that are suitably secured to the ends of the beams E E. The straps *l* are connected to the loops of the lower or foot clamps, U, of the two gangs of cutters, and the straps *l′ l′* are connected to the loops of the upper clamps, T. By this mode of connecting the cutters to the beams E E the latter act upon the former in ascending as well as in descending, and as the straps are flexible very little jar will be communicated to the feed mechanism.

It will be necessary, in moving the machine backward and forward, to reverse the cutters, so that their cutting-edges will always occupy the same relative position to the cuts in the stone, and for this reason the two outside standards, F′, are hinged, so that they can be quickly swung open and the cutters reversed.

It will, of course, be necessary in reversing the gangs of cutters to detach the straps *l l′* from their respective clamps.

One of the cutter-stems of each gang should have a hole through its upper end, as shown in Fig. 7, for the purpose of receiving a hook that is attached to a rope or chain for elevating these gangs of cutters. The rope is not shown in the drawings, but the flanged drum or windlass J upon which it is wound is shown in Figs. 2 and 3. This drum is located near the center of the forward end of the machine, and on one end is a ratchet-wheel, *t*, which is acted upon by a dog, *u*, for preventing the drum J from rotating backward when not required to do so. The shaft of said drum has a hand-crank on its forward end, by means of which a person can wind up the rope or chain.

Each one of the inner standards, F, is provided on its upper end with a pulley, *n*, over which said rope or chain passes as the cutters are elevated or lowered.

While I have described one form of cutter I do not confine myself to any particular form or mode of connecting them together in gangs, but reserve to myself the right to alter or modify them as circumstances may require.

In my patented machine of November 10, 1863, it was necessary to remove the cap or yoke which connected the cutter-standards together at their upper ends; but it will be seen from the above description that the caps which I now use are so constructed that they remain permanently attached to their respective standards and yet admit of the cutters being removed or replaced at pleasure.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. So constructing the yoke F^2 and applying it to the standard F that it will admit of the cutters being removed from the machine or again replaced at pleasure, substantially as described.

2. The combination of an open yoke, F^2, with a hinged standard-guide, F′, substantially in the manner and for the purpose described.

3. Providing for adjusting the cutters, together with their guides, and setting them at any desired angle, for the purpose and in the manner substantially as described.

4. The pivoted standard-boxes G G, arranged on the sides of the frame A, and adapted for receiving the standards F F′, and operating substantially as described.

5. Arranging two gangs of reciprocating cutters upon a frame, A, so as to work outside of the track upon which the machine is moved, substantially as described.

6. The application of a windlass, J, to a stone-cutting machine for the purpose of lifting and supporting the cutters, substantially in the manner described.

7. The combination of the feed-wheels C′ D, shifting-pinion B^3, and movable arm or lever B^2, with the vibrating beams E E, substantially as described.

GEO. J. WARDWELL.

Witnesses:

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W. G. VEAZEY.