

(No Model.)

3 Sheets—Sheet 1.

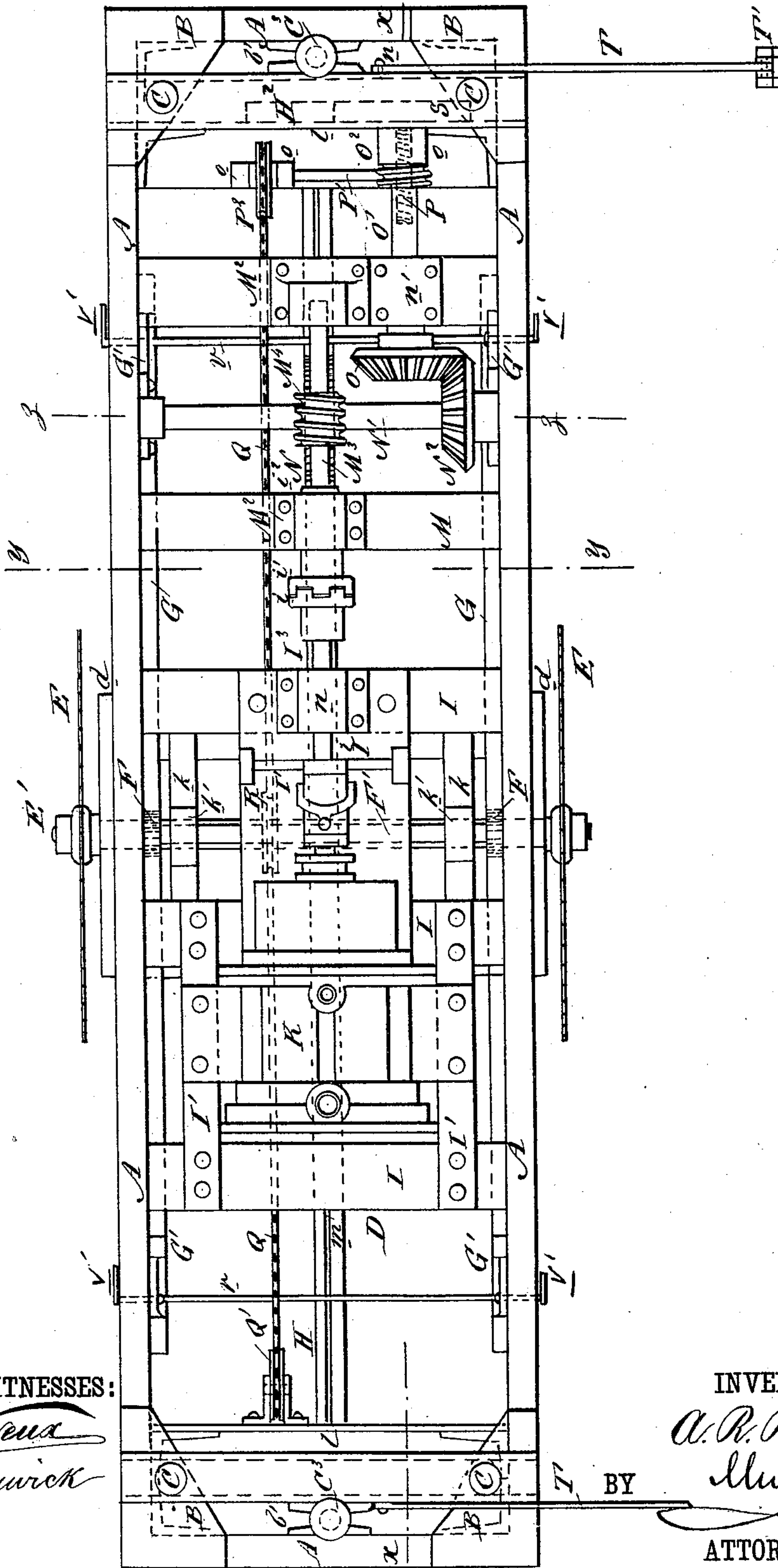
A. R. REESE.

MACHINE FOR QUARRYING SLATE AND OTHER ROCK.

No. 247,109.

Patented Sept. 13, 1881.

Fig. 1



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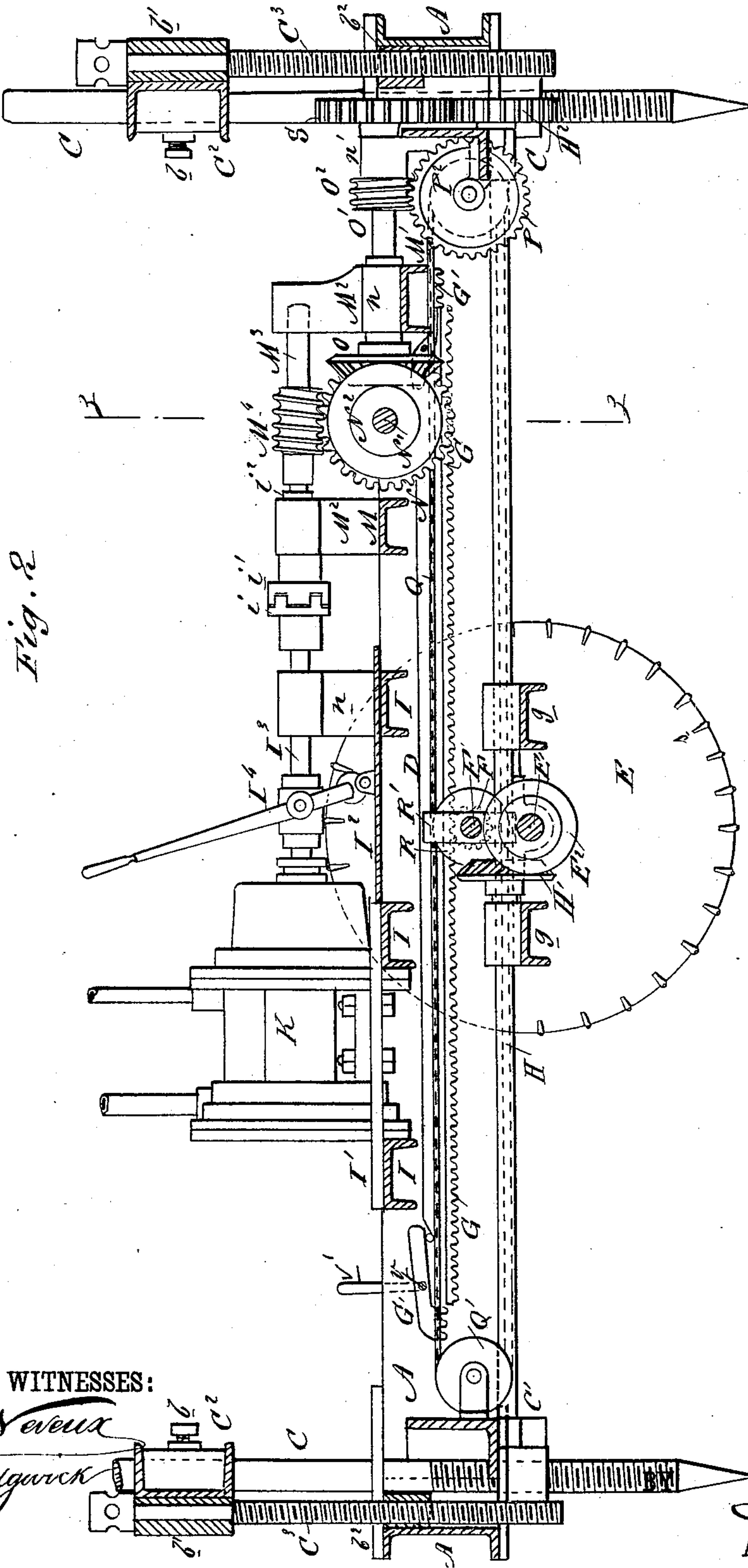
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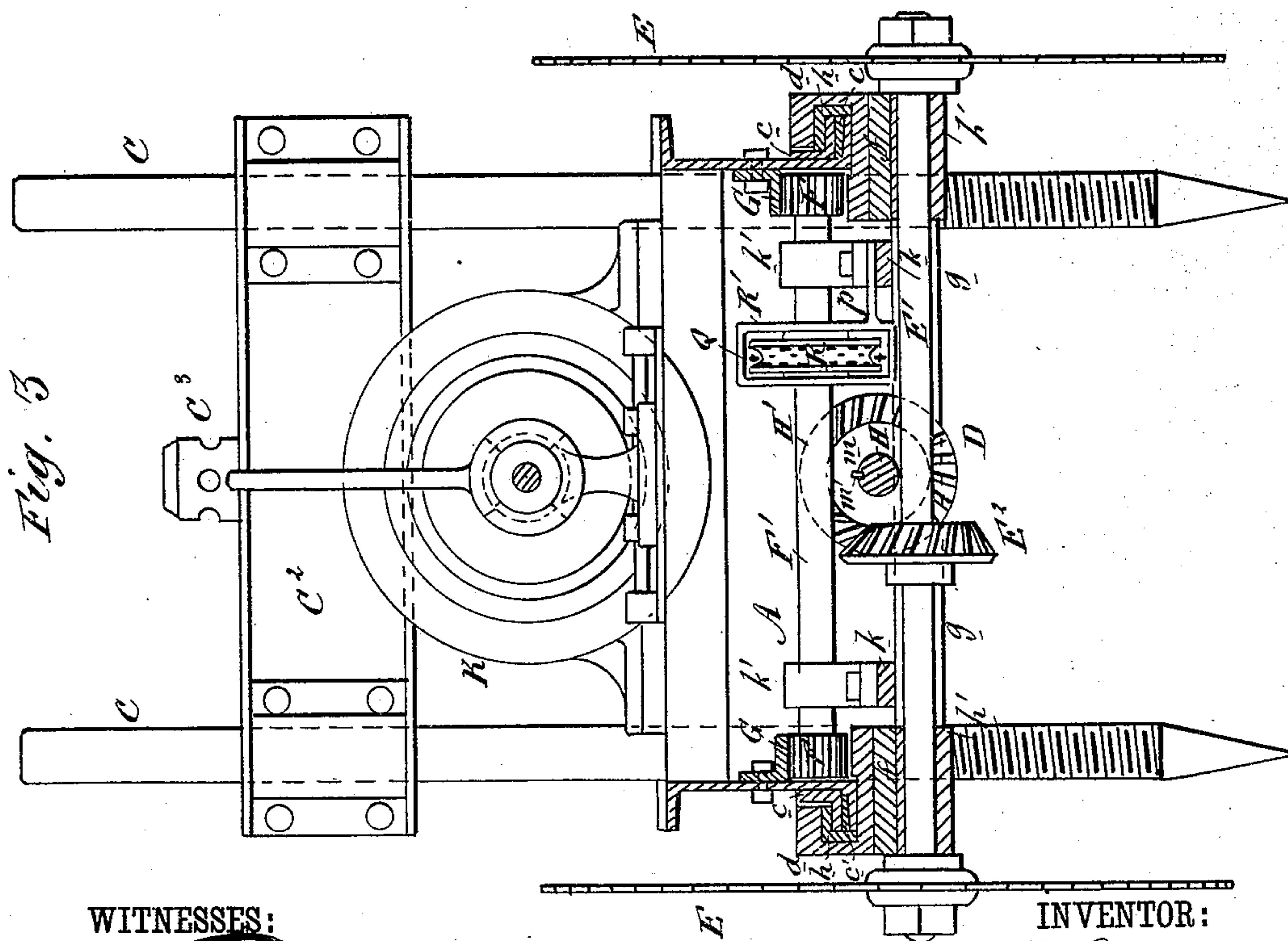
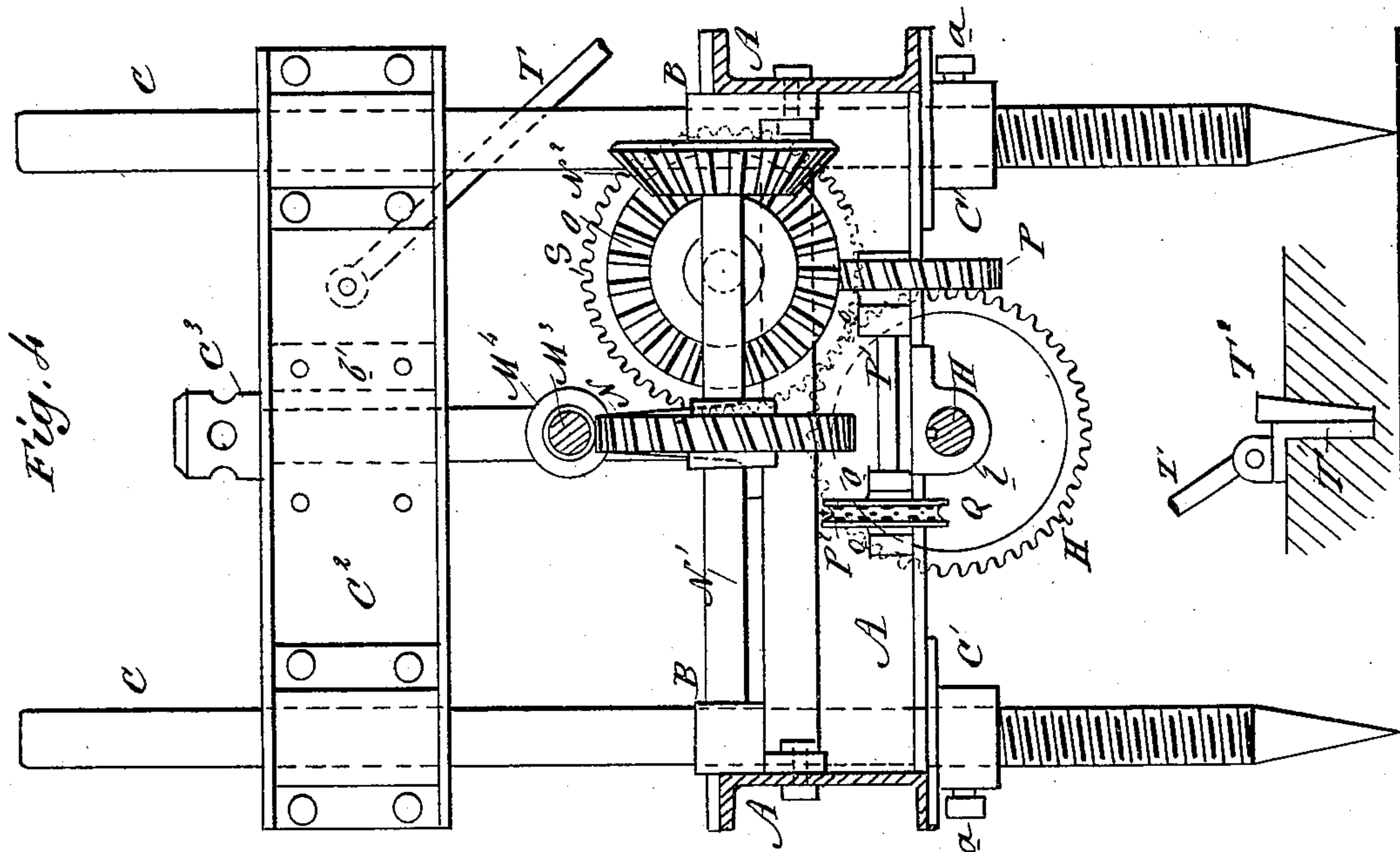
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# UNITED STATES PATENT OFFICE.

ADAM R. REESE, OF PHILLIPSBURG, NEW JERSEY.

## MACHINE FOR QUARRYING SLATE AND OTHER ROCK.

SPECIFICATION forming part of Letters Patent No. 247,109, dated September 13, 1881.

Application filed June 17, 1881. (No model.)

To all whom it may concern:

Be it known that I, ADAM R. REESE, of Phillipsburg, in the county of Warren and State of New Jersey, have invented a new and Improved Machine for Quarrying Slate and other Rock, of which the following is a full, clear, and exact description.

The ordinary methods of quarrying are very wasteful of the rock, and involve great labor and expense.

The object of this invention is to avoid this excessive waste, labor, and expense by the use of an improved machine for sawing or cutting the rock *in situ*.

The invention consists of a reciprocating traveling carriage provided with rotary saws or cutters, supported on a frame having adjustable legs for securing the machine in suitable position, which frame also supports the novel mechanism through which motion and power are transmitted to the cutters, it being designed that the steam, compressed air, or other motive power used shall be furnished from a source independent of the machine, all of which will be hereinafter set forth.

Figure 1 is a plan of the machine. Fig. 2 is a partly-sectional longitudinal elevation of the same, on line *xx*, Fig. 1. Fig. 3 is an enlarged partly-sectional end elevation of the same on line *yy*, Fig. 1. Fig. 4 is an enlarged sectional end elevation of the same on line *zz*, Figs. 1 and 2.

Similar letters of reference indicate corresponding parts.

In the drawings, A represents the long rectangular frame of the machine, preferably constructed of angle and channel iron, and having stout corner blocks or posts, B B, through which pass the vertical screw-threaded and sharp-pointed legs C C, on which the said frame A is adjusted at suitable inclinations or levels, said frame A being raised or lowered at one or all of its corners, as may be desired, and held in such position by the collars C' C', that encircle the legs C C below the frame A, and are secured in place by set-screws *aa*, said collars C' C' being screwed up or down on the legs C C at will. The upper ends of these legs C C are held by set-screws *bb* in the cross-timbers or beams C<sup>2</sup> C<sup>2</sup>, that are above and parallel with the ends of the frame A. This frame A

is designed to be about twelve feet long and wide enough for the cutting of channels in the rock about four feet apart; but it may be constructed of any desired dimensions. Stout screw-threaded rods C<sup>3</sup> C<sup>3</sup> are passed vertically down through boxes *b' b'*, fixed centrally on the outside of each beam C<sup>2</sup>, and also through boxes *b<sup>2</sup> b<sup>2</sup>*, that are secured on the outer ends of the frame A, so that by turning said screw-rods C<sup>3</sup> the frame A and its supported sliding carriage D can be adjusted at any desired elevation, for shallow or deep cutting, by the saws or cutters E E.

In the drawings the frame A is strengthened by angle-irons *c* and flat bars or strips *c'*, extending the whole length along its sides, as shown; but the said sides may be made sufficiently strong without these auxiliaries.

The sliding carriage D is composed of the channeled end pieces, *dd*, that clasp or fit upon the frame A in such a manner that the carriage D may hang therefrom; of the strengthening-strips *ff*, secured on and covering the under faces of the end strips, *dd*; of the parallel cross-bars *gg*, extending from one end piece, *d*, to the other, and of two bars, *kk*, parallel with the ends *dd*, and secured across and upon the upper faces of the bars *gg*, all these parts being firmly fastened together. Anti-friction or wearing strips *h*, of brass or other suitable metal, are introduced between the ends *dd* of the carriage D, being secured thereto and the sides of the frame A.

In boxes *h'*, secured on the under side of the carriage D, is journaled the transverse shaft E', which extends beyond the sides of the carriage D and frame A, and has rigidly secured on its ends the rotary saws or cutters E E.

On the tops of the bars *kk* are secured journal-boxes *k' k'*, in which is journaled the transverse shaft F', carrying on its ends the pinions F F, which gear in the racks G G, that are bolted to and extend parallel with the sides of the frame A, and nearly the whole length thereof, whereby said carriage D is made to move back and forth.

On the shaft E' is rigidly secured a bevel-gear wheel, E<sup>2</sup>, that gears with a corresponding gear-wheel, H', which is loosely secured on a shaft, H, that is extended centrally and longitudinally along the frame A, and is jour-



naled at each end in suitable bearings, *l l*. Said shaft *H* has a spline or feather, *m*, extending nearly throughout its entire length, which spline *m* fits into a corresponding key-way in the bevel-gear wheel *H'*, thereby preventing the latter from rotating independently of the shaft *H*, but permitting it to slide thereon.

The saws or cutters *E E* are operated by power transmitted through the shaft *H* and gear-wheel *H'*, the gear-wheel *E<sup>2</sup>*, the said saws *E E* being fed down with the frame *A* by means of the screw-rods *C<sup>3</sup>* as the depth of the channel cut in the rock increases.

*I I* represent channel-iron cross-braces extending from one side to the other of the frame *A*, and rigidly secured thereto, and on these braces *I I*, on a level with the top of the frame *A*, and on the braces *I' I'*, crossing said braces *I I*, is secured the engine *K*, that drives the machine. In this instance said engine *K* is a rotary disk engine; but I do not confine myself to this construction of engine. A pillow-block, *n*, secured on the engine bed-plate *I<sup>2</sup>*, supports the engine revolving shaft *I<sup>3</sup>*, on one end of which is a clutch, *i*. The reversing-gear of said engine *K* is indicated at *I<sup>4</sup>*.

On cross-braces *M M'*, extending at different levels from one side to the other of the frame *A*, are secured pillow-blocks *M<sup>2</sup> M<sup>2</sup>*, in which is journaled a worm-shaft, *M<sup>3</sup>*, extending parallel with the frame *A*, carrying a worm, *M<sup>4</sup>*. On one end of this shaft *M<sup>3</sup>* is a clutch, *i'*, always engaged with the clutch *i*, but having an endwise play therewith to prevent any longitudinal strain upon the engine revolving shaft *I<sup>3</sup>*. A collar, *i<sup>2</sup>*, on the shaft *M<sup>3</sup>* bears against the inner pillow-block, *M<sup>2</sup>*, and prevents the longitudinal movement of the said shaft *M<sup>3</sup>* in that direction, and the outer pillow-block, *M<sup>2</sup>*, in which the outer end of the shaft *M<sup>3</sup>* is journaled, prevents the longitudinal movement of said shaft *M<sup>3</sup>* in that direction.

Beneath the worm-shaft *M<sup>3</sup>*, and at right angles thereto, a shaft, *N'*, is journaled in the sides of the frame *A*, and has keyed on it a wheel, *N*, in which the worm *M<sup>4</sup>* engages, the worm *M<sup>4</sup>* being designed to make about four hundred and fifty revolutions a minute and the wheel *N* about twelve revolutions a minute. On one end of this shaft *N'* is keyed a bevel-gear wheel, *N<sup>2</sup>*, that engages with a corresponding bevel-gear wheel, *O*, which is keyed on a shaft, *O'*, that is on a lower level than the shaft *M<sup>3</sup>*, and extends parallel with the sides of the frame *A*, and is journaled in boxes *n n'*. On this shaft *O'* is also secured a worm, *O<sup>2</sup>*, which engages with a wheel, *P*, that is keyed on a cross-shaft, *P'*, which is on a lower level than the shaft *O'* and is journaled in boxes *o o*.

On the shaft *C'* is also secured a peripheral-grooved wheel or sprocket-wheel, *P<sup>2</sup>*, over which passes the endless rope or chain *Q*, whose bight passes over a grooved guide-pulley, *Q'*, secured on the opposite end of the frame *A*; and extending thus from one end to the other of the frame *A*, the chain *Q* is held in engage-

ment with the sprocket-wheel *R*, that is keyed on the shaft *F'*, by a guiding-frame, *R'*, which is held in position by the insertion of its arm *p* between a bar, *k*, and a journaled box, *k'*, or in any other convenient manner, so that the carriage *D* shall be moved by motion transmitted through the chain *Q*.

On the extreme outer end of the shaft *O'* is keyed a cog-wheel, *S*, which meshes with a cog-wheel, *H<sup>2</sup>*, on the shaft *H*, whereby said shaft *H* is revolved and power thereby transmitted to the saws or cutters *E E*.

The engine *K* being set in motion, power is transmitted, through the engine revolving shaft *I<sup>3</sup>*, shaft and worm *M<sup>3</sup> M<sup>4</sup>*, wheel *N*, shaft and wheel *N' N<sup>2</sup>*, wheel, shaft, and worm *O O' O<sup>2</sup>*, wheels and shaft *P P' P<sup>2</sup>*, to the chain *Q*, for moving the carriage *D* back and forth longitudinally in the frame *A*, and at the same time power is transmitted, through the cog-wheels *S H<sup>2</sup>*, shaft *H*, and gear-wheel *H'*, to the gear-wheel *E<sup>2</sup>* and shaft *E'*, whereby the saws or cutters *E E* are revolved. These saws or cutters *E E* are provided with steel cutting-teeth *s*, as shown, or they may be provided with diamonds for cutting, as may be most suitable for the character of the work to be done and the kind of rock operated upon. If steel teeth are used, the saws *E* will be run at about twelve revolutions a minute. If diamonds are used, the saws *E* should revolve about eight hundred or nine hundred revolutions per minute.

In operating this machine, when the carriage *D* has reached the end of its run in one direction, the pinions *F F* run off the ends of the racks *G G*, and hence the said carriage *D* ceases to move, though the pinions *F F* may continue to revolve. When, then, it is desired to run the carriage *D* back again, the engine *K* is reversed and the pivoted movable rack-sections *G' G'*, which are pivoted on the transverse rods *V*, that extend across the frame *A*, near each end, and are journaled in the sides thereof, are thrown down at that end of the machine which the carriage *D* has reached by the operator taking hold of the rod-handles *V'*, so that they (the said rack-sections *G' G'*) shall engage with the pinions *F F*; then the latter, having a fresh hold afforded them, immediately engage with the said rack-sections *G' G'*, and thence with the rack *G G*, and the carriage *D* is thereby run back. This operation is constantly repeated at each end of the frame *A*, the rack-sections *G' G'* being so balanced on the rods *V* that they will lift up out of gear or connection with the racks *G G* when the operator removes his hand from the handles or levers *V'*.

This machine, as shown, is designed for cutting parallel channels in slate or other rock about half an inch wide and a foot or more in depth and about twelve feet long. The machine, however, can be constructed of sufficient dimensions to make channels of any desired distance apart and of any desired depth and length.



When using this machine it is desirable to bring the top of the rock to an even surface, parallel with the natural split or lamination thereof, and then to set the machine so that the saws or cutters E E will cut channels at right angles thereto. When the saws or cutters have formed two parallel channels of sufficient depth in the rock the machine may be raised bodily by a suitable derrick and moved laterally for the cutting of other channels; and for staying the said machine in place and for making it easy of adjustment, I have pivoted to each end of the machine, or to the beams C<sup>2</sup> C<sup>2</sup>, guide-rods or stays T T, on whose ends are pivoted angle-plates T', so that, stays T being of a suitable length, the plates T' can be inserted in a channel already cut and held there by wedges T<sup>2</sup>, as shown in Fig. 4, and the said stays T be thereby made to assist in supporting the machine and in holding it at a suitable distance from and parallel with said channel, so that all the channels may be cut parallel with each other and at equal distances apart one from the other.

The saw-teeth s are designed to cut upward, so that the power applied to the cutting shall operate to hold the machine more firmly down in position.

To make cross-cuts the machine is raised by derrick or other suitable device and swung around at right angles to the channels first made.

In operating this machine I design to place the boilers furnishing steam thereto in some convenient place and to conduct the steam from boiler to engine through iron and flexible pipes or tubes.

By suitably adjusting the saws or cutters E E they can be made to cut horizontally, should it be desirable so to do.

I do not confine myself to the precise construction herein shown and described, as it is manifest that the machine may be modified or changed in many parts without departing from my invention.

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

1. A machine for quarrying slate or other rock, constructed substantially as herein shown and described, consisting of an open frame supported on adjustable legs and supporting a reciprocating saw-carriage having end pieces, d d, which clasp the said frame, and its actuating mechanism provided with revolving saws or cutters, as set forth.

2. In a machine for quarrying slate or other rock, the combination, with the open frame A, of the screw-threaded legs C C, collars C' C',

cross-beams C<sup>2</sup> C<sup>2</sup>, screw-rods C<sup>3</sup> C<sup>3</sup>, and set-screws b b, substantially as herein shown and described, whereby said frame may be adjusted with the surface of the rock, as set forth.

3. In a machine for quarrying slate and other rocks, the combination, with the frame A and beams C<sup>2</sup>, of the screw-threaded rods C<sup>3</sup>, substantially as herein shown and described, whereby said frame and its supported parts are raised or lowered, as set forth.

4. In a machine for quarrying slate or other rock, the combination, with the adjustable frame A, of the sliding carriage D, having end pieces, d d, and carrying saws E E, which have a forward and rotary movement, and are adapted to cut upward against the rock, whereby the machine shall be held more firmly to the rock and prevented from rising, substantially as herein shown and described.

5. In a machine for quarrying slate or other rock, the combination, with the frame A, of the sliding saw-carriage D, carrying rotary saws E E, and gear-wheel E<sup>2</sup> and shaft F', provided with pinions F F, and racks G G, substantially as herein shown, and for the purpose described.

6. In a machine for quarrying slate or other rock, the combination, with the frame A and sliding carriage D, carrying saws E E, shaft E', and gear-wheel E<sup>2</sup>, of the revolving shaft H, carrying sliding gear-wheel H', substantially as herein shown and described, whereby said saws are moved, as set forth.

7. In a machine for quarrying slate and other rock, the combination, with the frame A and saw-carriage D, provided with sprocket-wheel R, of the revolving shaft P', provided with sprocket-wheel P<sup>2</sup>, guide-pulley Q', and endless chain Q, substantially as herein shown and described, whereby said saw-carriage is moved reciprocally back and forth, as set forth.

8. In a machine for quarrying slate and other rock, the combination, with the frame A, having attached racks G G, and sliding saw-carriage D, provided with shaft and pinions F' F F, of the movable rack-sections G' G', substantially as and for the purpose described.

9. In a machine for quarrying slate or other rock, the combination, with the frame A and the stays T, of the angle-plates T', pivoted to said stays, and the wedges T<sup>2</sup>, substantially as herein shown and described, whereby the machine may be adjusted and stayed in position, as set forth.

ADAM R. REESE.

Witnesses:

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