(No Model.)

W. L. SAUNDERS.

STONE CUTTING MACHINE.

No. 299,093. Patented May 20, 1884.

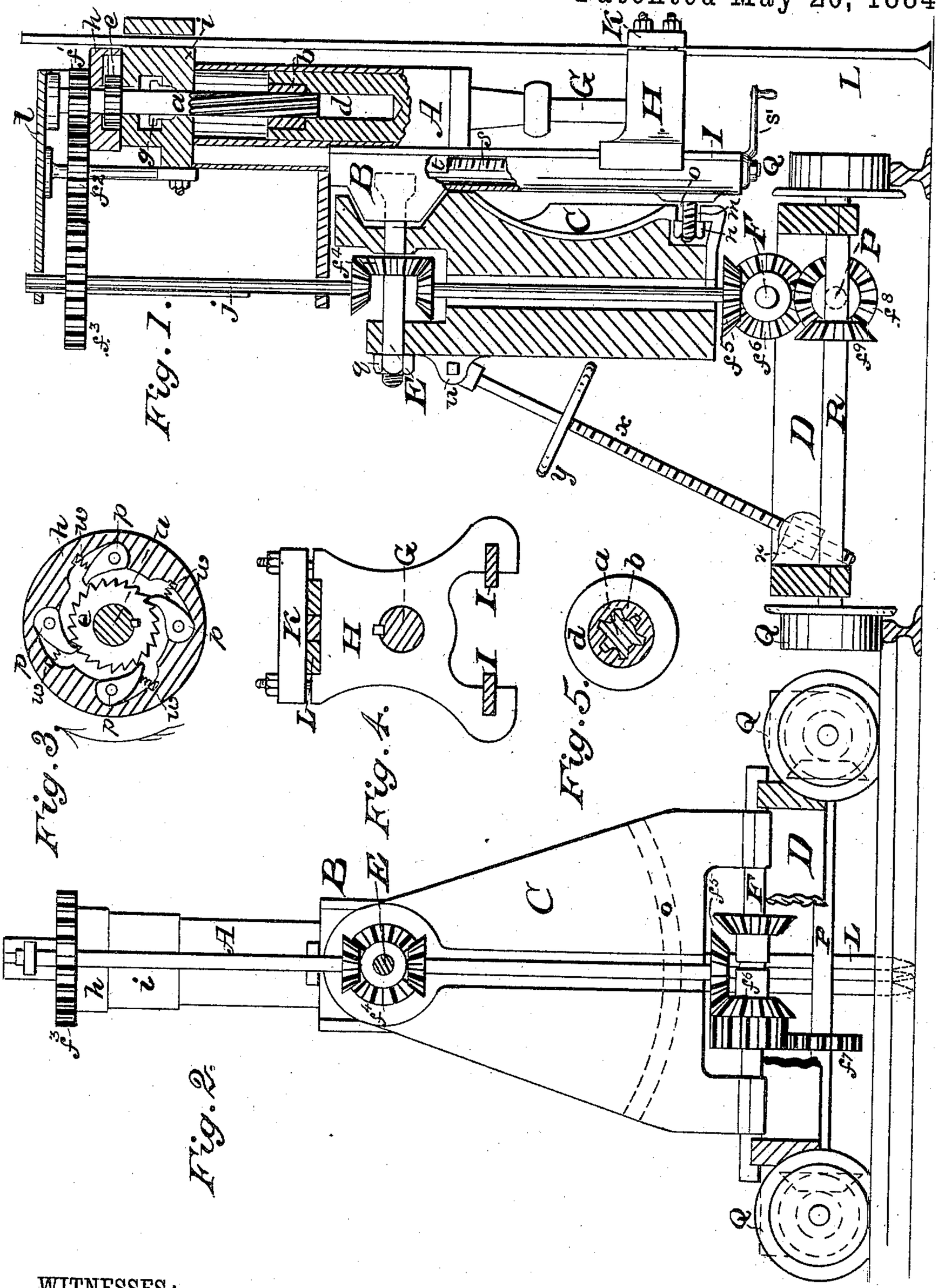

Fig. 1.

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 2.

WITNESSES:

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STONE-CUTTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 299,093, dated May 20, 1884.

Application filed December 20, 1883. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM L. SAUNDERS, a citizen of the United States, residing in Jersey City, county of Hudson, and State of New Jersey, have invented a new and useful Improvement in Stone-Cutting Machines, of which the following is a specification.

My invention relates to improvements in stone-cutting machines where a continuous channel is made in stone through the intermittent blows of a gang of drills operated by an engine mounted upon a car, and the whole fed in a direction parallel with the channel.

The object of my invention is, first, to construct a direct-acting stone-cutting machine, provided with mechanism by which the intermittent motion of the engine, with cutting-tools attached, is converted into a rotary motion for the propulsion of the car upon which said engine and cutting-tool are mounted; and, second, to so mount the engine and cutting-tools upon the car that they will be capable of varied angular adjustment without interfering with the feeding mechanism.

Figure 1 is a side elevation of the entire machine, partly in section. Fig. 2 is a rear elevation of the entire machine. Fig. 3 is a sectional view showing the rotating mechanism on the back head of the cylinder. Fig. 4 is a sectional view of the cross-head, showing the method of guiding it in the shell of the engine. Fig. 5 is a sectional view of the piston, showing the rifled nut and bar for the feed mechanism.

Similar letters refer to similar parts throughout the several views.

A represents the engine; B, the shell which supports the engine and through which it is guided; C, the bracket or frame on which the shell B is pivoted, and D the car which supports the whole.

The engine A is provided with a reciprocating piston, *d*, which in its upward stroke is made to impart a rotary motion to the rifled bar *a*, and thence to the gears f' f^2 f^3 f^4 f^5 f^6 f^7 f^8 f^9, and thence to the axle R and the wheels Q Q, whereby the car is propelled through traction upon the rails.

To the end of the rod G of the piston *d* is fixed the cross-head H. To the face of this cross-head is affixed a cap, K, which serves to clamp the cutting-tool L. The rear end of the cross-head H is provided with grooves which fit the guides I I of the shell B. Thus the cross-head H, the cutting-tool L, and the piston *d* are movable only in a direction parallel with the line of the stroke of the engine.

In the upper part of the piston *d* is inserted a nut, *b*, which is fixed to the piston. The inner surface of this nut *b* is rifled with grooves corresponding to grooves made on the surface of the bar *a*, which passes through the nut *b* and into the piston. This bar *a* passes through the upper cylinder-head, *i*, and is provided with a stuffing-box, *g*, to prevent the escape of steam. Immediately above the head-piece *i* the ratchet *e* is keyed to the bar *a*. This ratchet is provided with pawls *p p p p*, Fig. 3. which are pivoted to the revolving head-piece *h*, and are held against the ratchet-teeth by means of the springs *w w w w*. To the upper part of the revolving head-piece *h*, and concentric with it, is bolted the spur-gear f'. The rifled bar *a* passes through the revolving head-piece *h* and the upper gear f', being free to turn within them, and terminates against the bracket *l*.

The operation of the mechanism is as follows: The piston *d*, being raised by the elastic fluid underneath, causes the nut *b* to act torsionally upon the rifled bar *a*, imparting a rotary motion thereto. This bar *a* is so rifled that its tendency to turn will be in the direction of the arrow, as shown in Fig. 3. It is thus resisted by the pawls *p p p p*, and hence the entire head-piece *h* is made to revolve. This rotary movement is imparted to the spur-gear f', thence to the intermediate gear f^2, to the gear f^3, thence through the shaft *j* to the intermediate gear f^4, thence to the bevel-gear f^5, to the bevel and spur gears f^6, Fig. 2, thence to the spur-gear f^7, thence through the shaft P to the bevel-gear f^8, thence to the bevel-gear f^9, which is keyed to the axle R, and by which the motion is imparted to the wheels Q of the car D. On completing the upper stroke, the motion of the piston is reversed, and the rifled bar *a* is turned in the opposite direction; and as the ratchet *e* is free to travel over the pawls *p p p p*, it is merely returned to its former position, while the revolving head-piece *h* and the gears connected therewith remain stationary. Thus an

intermittent rotation is given the axle, and the car is carried a definite and constant distance over the track at every stroke of the piston.

The engine A is guided within the shell B, and may be raised or lowered by the screw *s*, operated by means of the crank-head S′, which passes through the nut *t*, which is fixed to the cylinder.

The shell B is pivoted to the frame C by the bolt E, which serves as an axis for the intermediate gear f^4. On loosening the nut *q* of the bolt E, the shell, with the engine, may be swung to the right or left. The frame C has an axial bearing on the shaft F, which serves as an axis for the intermediate gears f^6. The frame C may thus be pressed forward or drawn backward, and the cutting-tool given an incline. The back screw, *x*, which is pivoted to the car D and to the support C at the points *r* and *u*, serves to raise or lower the engine.

I do not confine myself to the propulsion of the car by the upward stroke of the piston only, as it is evident that by reversing the ratchet and pawls in the rotating head-piece the feed may be imparted while the piston is on the downstroke.

I am aware that stone-cutting machines have been used where an engine mounted on a car has been made to operate a gang of drills and to impart a longitudinal feed to the car through the intervention of a crank-shaft.

I am also aware that machines have been designed where an engine, with cutting-tools attached to its piston, is mounted upon a car, and capable of varied angular adjustment therewith, the whole being fed longitudinally by means of an independent engine or mechanism not dependent upon or regulated by the action of the piston which drives the cutting-tool.

I am further aware that percussion rock-drills are in use where a rifled bar and nut is used to impart a rotary motion to the piston during the drilling of holes.

Having, on the 20th day of December, 1883, filed an application for patent for improvements in stone-channeling machines, being Serial No. 115,232, in which I have shown and claimed a cutting-tool fixed to a reciprocating engine, and means for causing the tool to travel along a fixed bar attached to the machine; and having, on the 28th day of December, 1883, filed an application for patent for improvements in carriages for rock-drills, being Serial No. 115,880, wherein I have shown and claimed a drill and engine fixed to a saddle and mounted upon a standard with means for raising or lowering the said standard in a vertical plane, I do not herein claim what is shown and claimed in either of said applications; but

What I claim as new and of my invention is—

1. In a stone-cutting machine, the combination, with a gang of drills, of a piston to which said gang is attached, mechanism for giving a reciprocating motion thereto, a spirally-formed or rifled bar and corresponding nut, said nut being fixed to the piston, and said rifled bar being provided at its outer end with connections for actuating a train of gearing and arranged to slide through said nut and within the piston when the latter is operated, whereby the to-and-fro motion of the piston and gang is converted into rotary motion of the train of gearing and connecting-rods extending to and connected with the shaft of the carriage which supports the machine.

2. The combination, with the shell B and cylinder A and means for moving said cylinder vertically within its shell, of the supporting-piece C, a horizontally-moving carriage to which the support C is attached, and a bolt or shaft E, extending between and serving to detachably connect the shell and its support, said bolt being provided with and forming the axis for an idle wheel or gear, f^4, for completing a train of gearing extending from the cutting-tool to the wheels of the carriage.

3. In a stone-cutting machine where the cutting-tool is attached to the piston-rod, the combination of the rifled bar *a*, operated by the piston, and carrying ratchet *e* and pawl *p*, the head-piece *h*, revolved by said ratchet and pawls, the gears *f*, axle R, and the wheels Q, by which mechanism the reciprocating motion of the piston causes the propulsion of the said engine and cutting-tool in the direction of and parallel with the cut.

In testimony whereof I have hereunto subscribed my name this 18th day of December, A. D. 1883.

WILLIAM L. SAUNDERS.

Witnesses:

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