(No Model.)

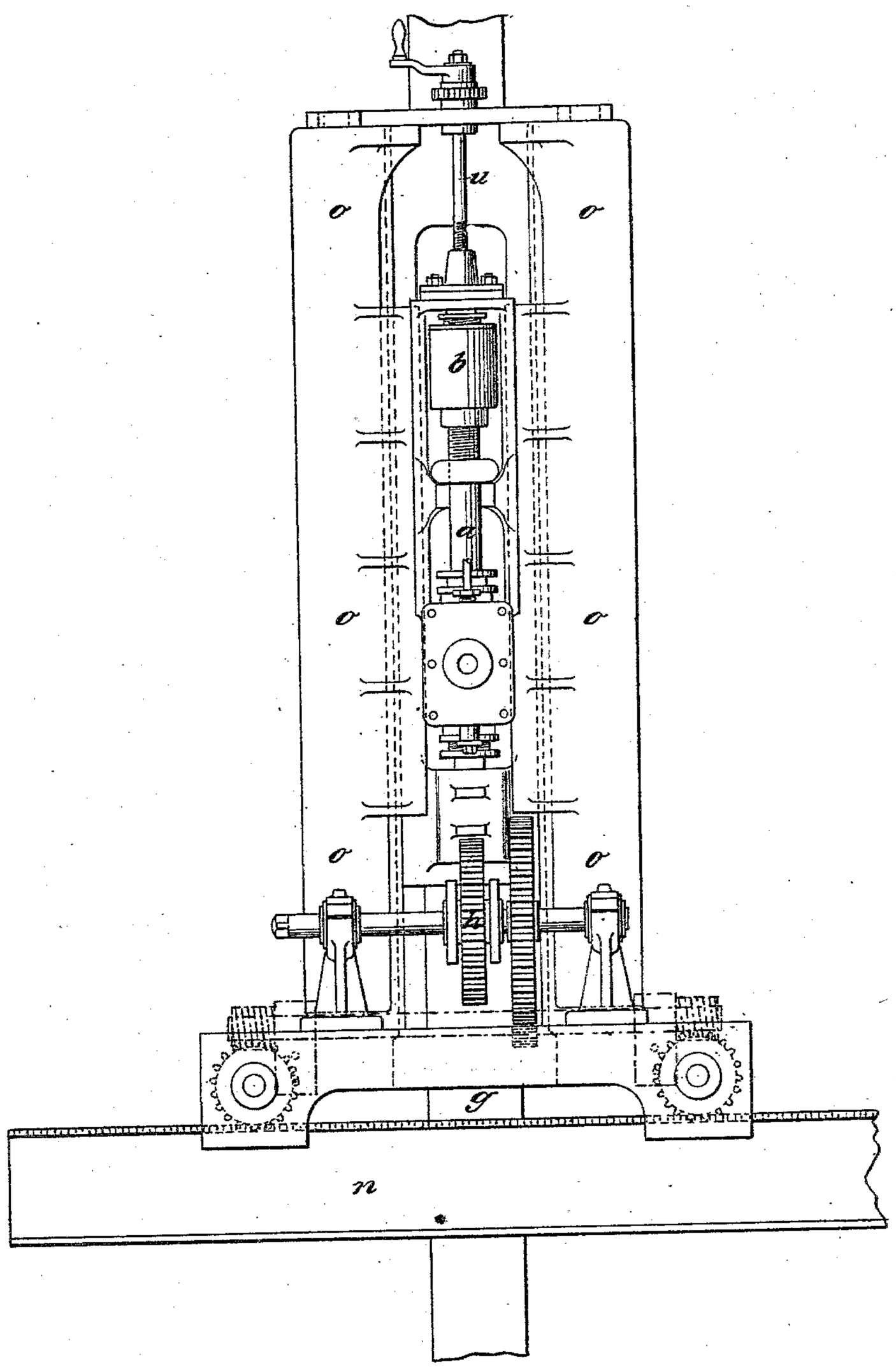
3 Sheets—Sheet 1.

A. H. RAPP.

STONE CHANNELING MACHINE.

No. 281,135. Patented July 10, 1883.

Fig. 1.



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STONE CHANNELING MACHINE.

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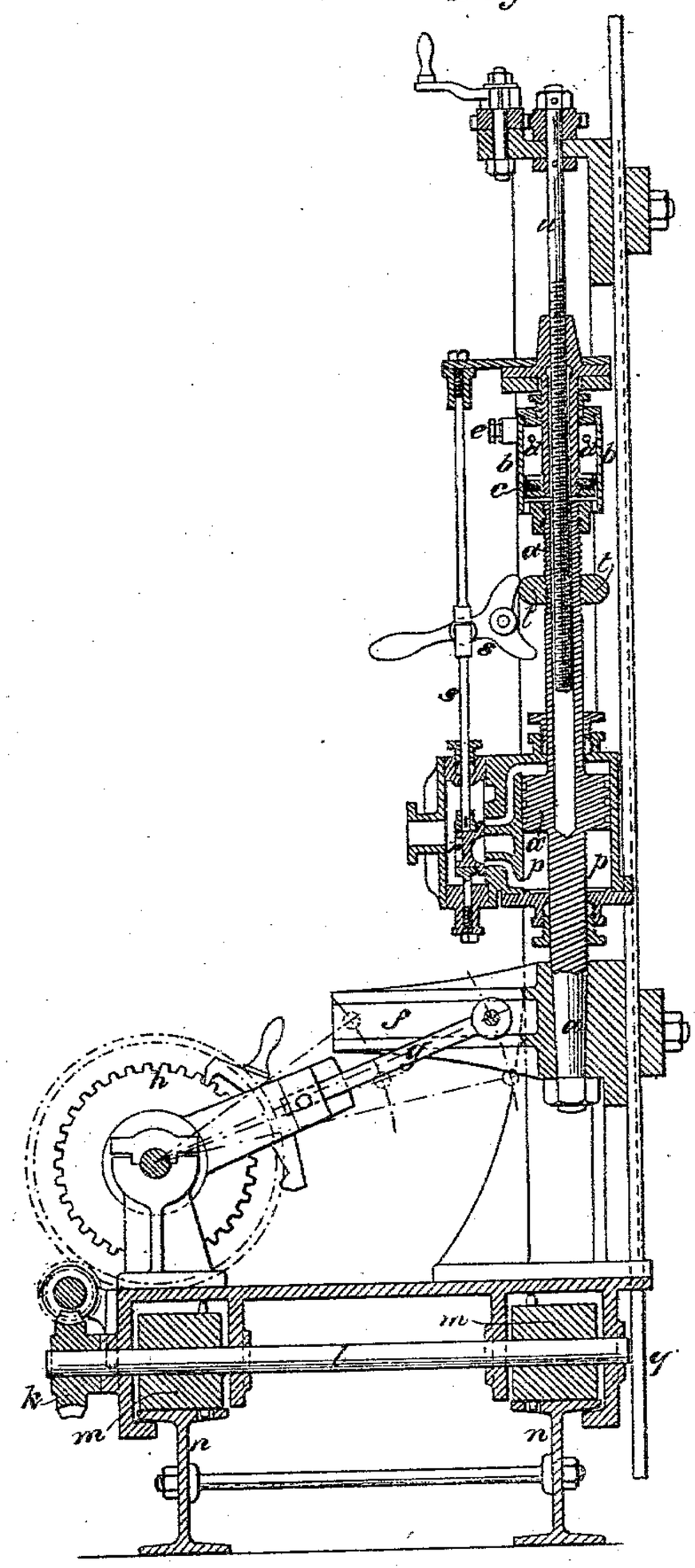
Fig. 2.



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(No Model.) 3 Sheets—Sheet 3.

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STONE CHANNELING MACHINE.

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Fig. 3.

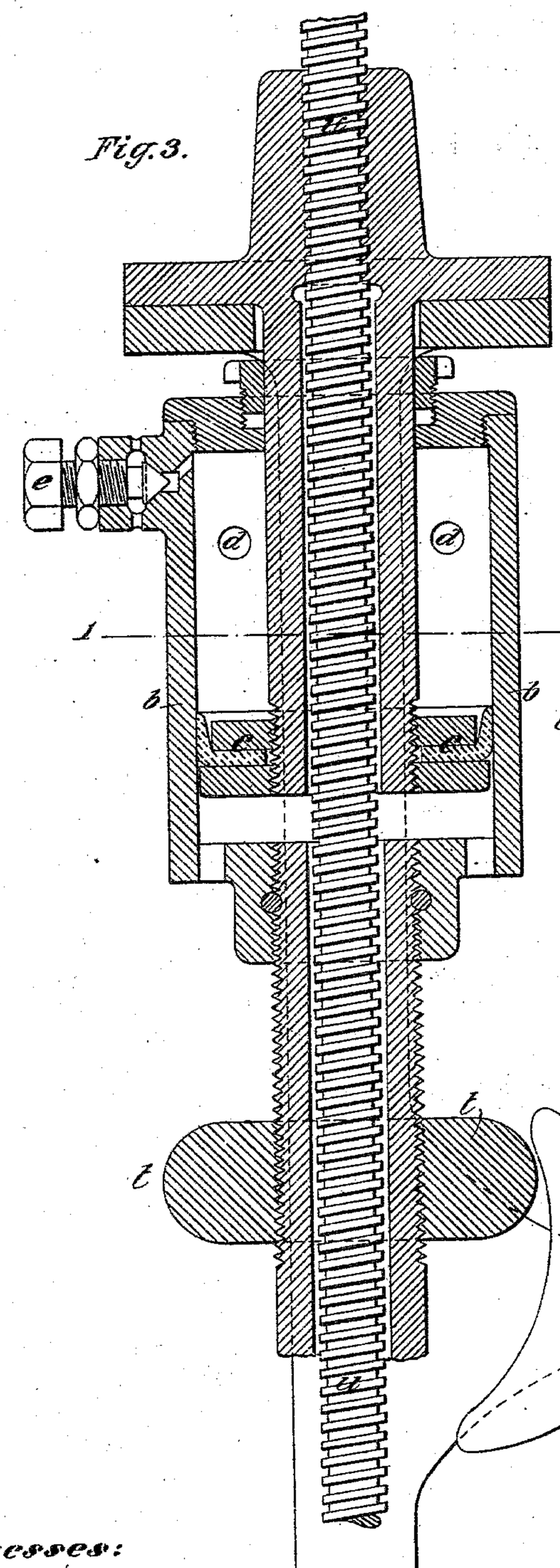
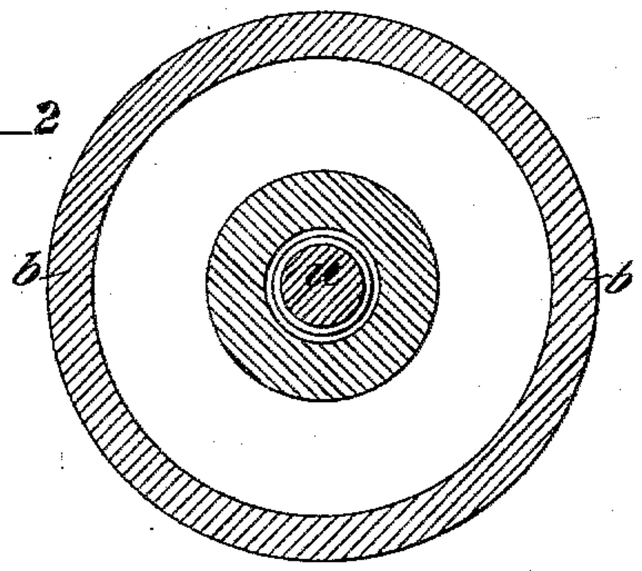


Fig. 4.



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UNITED STATES PATENT OFFICE.

ALMIRE H. RAPP, OF PARIS, FRANCE, ASSIGNOR TO ALLSTON GERRY, OF NEW YORK, N. Y., INDIVIDUALLY AND AS TRUSTEE.

STONE-CHANNELING MACHINE.

SPECIFICATION forming part of Letters Patent No. 281,135, dated July 10, 1883.

Application filed November 27, 1882. (No model.) Patented in France November 23, 1880, No. 139,813.

To all whom it may concern:

Be it known that I, ALMIRE HENRY RAPP, a citizen of the United States, at present residing at Paris, in the Republic of France, have invented certain new and useful Improvements in Stone-Channeling Machines, for which I have obtained a French Brevet d'Invention No. 139,813, dated November 23, 1880, and of which the following is a description, reference being had to the accompanying drawings.

This invention relates more particularly to machines for channeling stone in its natural bed or in the quarry. In order the better to make its essential characteristics understood, I will commence to explain what are the difficulties generally encountered in the employment of machines in the cutting up of stone. If the rock to be channeled were always homogeneous—that is to say, without faults or breaks in its continuity, and if it were always of equal hardness—the work would be easy, for then it would suffice to have a tool guided by a piston moved by steam, compressed air, or water, and having a determined stroke, or even a tool lifted to a certain height by means of cams acting against a spring which assists the weight of the tool in its descent; but experience has demonstrated that the work is not so easy. When soft spots, flaws, or breaks of continuity of the stone are encountered, if the machine is one with a direct-action piston, of the steam-hammer kind, for example, the tool, no longer encountering sufficient resistance, falls beyond the desired distance and staves out the lower head of the steam-cylinder or destroys some other part of the machine. If the machine is one having a tool with independent fall, the band, chain, or cable which serves to lift the tool after each fall breaks or produces damage of another kind. The same thing occurs when the degree of hardness, and consequently the resistance of the stone, diminishes suddenly. It results, then, that it is necessary to remove the machine and work by hand until a quality of stone suitable for machine-channeling is arrived at. Another defect of machinery heretofore employed is that the advance of the machine is determined by the degree of penetration of the channeling-tool into the stone. This is a great disadvantage, as it is frequently desirable to have the machine advance slowly or quickly, according to the nature of the stone being operated upon and irrespective of the degree of penetration of the channeling-tool.

All the above-mentioned defects are obviated by my invention and a machine produced which will perform the work of channeling stone in a much more expeditious and effective manner than any now in use.

In the annexed drawings, Figure 1 is a front view of a machine with my improvements. Fig. 2 is a vertical section of the same at right angles to Fig. 1. Fig. 3 is a vertical section on an enlarged scale of the air-cylinder and piston for checking the descent of the tool in case of meeting a soft place in the rock. Fig. 4 is a horizontal section of the same in the line 1 2 of Fig. 3.

Referring to the said drawings, *a'* indicates the main piston, which carries the channeling-tool, to the upper end of the rod *a* of which I attach an air-cylinder, *b*, which works upon a fixed piston, *c*, and compresses the air as soon as certain ports, *d*, in the said cylinder pass the said piston. The air thus compressed acts as an elastic cushion or spring. By means of a regulating screw-valve, *e*, (see Figs. 2 and 3,) I can determine the degree of this compression in such manner that if the channeling-tool comes to a crack or a softer place than has been calculated upon, the lower head of the steam-cylinder will not be driven out or broken.

In machines which have no stop device to arrest the tool when it comes to a pocket or a tender place in the rock, the motor-piston is liable to pass the level of the induction steam-ports in such manner that the steam cannot raise the piston and the tool remains forcibly engaged in the rock. My air-cylinder obviates this difficulty, because the motor-piston never passes those ports.

The advance or feed movement of my machine in the direction of the channel to be cut is determined by means of a lever, *g*, Fig. 2, which connects with a slide, *f*, in an arm attached to the piston-rod *a*, and which I can elongate or shorten at pleasure. The movement which is given by the arm *f* to the lever *g* is transmitted to a toothed wheel, *h*, which acts upon an endless screw, *i*, which itself transmits

its rotary movement to a worm-wheel, *k*, keyed on a shaft, *l*, to which are also keyed the wheels *m*, which run on the rails *n n* of the supporting-base of the machine.

The other parts of the machine will be easily understood by reference to the drawings, and I will briefly describe them as follows.

O is the upright frame, in which slides the tool-carrier. *p* is the motor-cylinder. *q* is the tool. *r* is the valve for induction and eduction of steam to and from the cylinder. *s* is the valve-gear, operated by a tappet, *t*, attached to the piston-rod. *u* is the regulating-screw, which permits the adjustment of the tool, causing the movement together of the motor-cylinder and its piston, the air-cylinder and its piston.

In the preceding description I have spoken of the application of an air chamber or cylinder for preventing the piston-rod and the tools which are thereto attached from descending below a determined point, which I propose to apply to all machines for cutting rocks. I can obtain the same effect by means of the introduction of counter steam at the moment of the descent of the piston in the motor-cylinder, as is done in steam-hammers, or by means of springs conveniently arranged and rebounding under the effect exercised by the sudden descent of the tool into the rock.

What I claim as my invention is—

1. The combination, in a stone-channeling machine, of a piston-rod, an air-cylinder provided with orifices, and a fixed piston, said air-cylinder having a vertical movement around said fixed piston for the purpose of compressing the air contained in said cylinder, and thus providing an elastic buffer or cushion for the piston-rod and channeling-tool, substantially as and for the purpose described.

2. The combination, with the piston-rod *a* and the stationary piston *c*, of the air-cylinder *b*, attached to the said rod, and provided with openings *d*, and an adjustable escape-valve, *e*, substantially as and for the purpose herein described.

3. The combination, with the piston-rod of a stone-channeling machine, and the mechanism for moving the said machine in the direction of the channel to be cut, of an arm attached to the piston-rod, fitted with a movable slide, *f*, and a lever, *g*, of variable length connected with said slide and with the said mechanism, for the purpose of varying the movement of said mechanism, as herein described.

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