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H. YOUNG.

Stone-Sawing Machine.

No. 200,593. Patented Feb. 19, 1878.

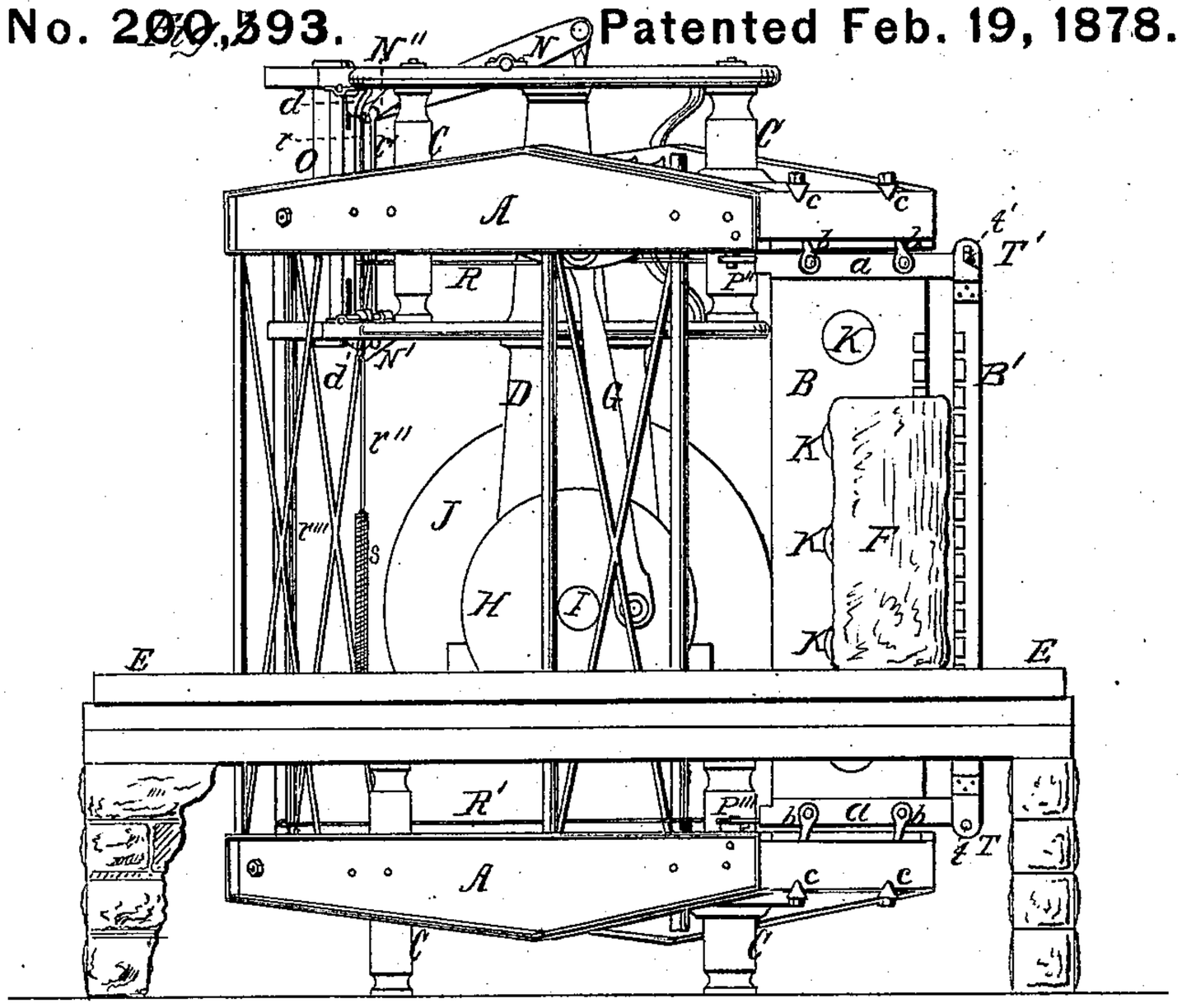

Fig. 2.

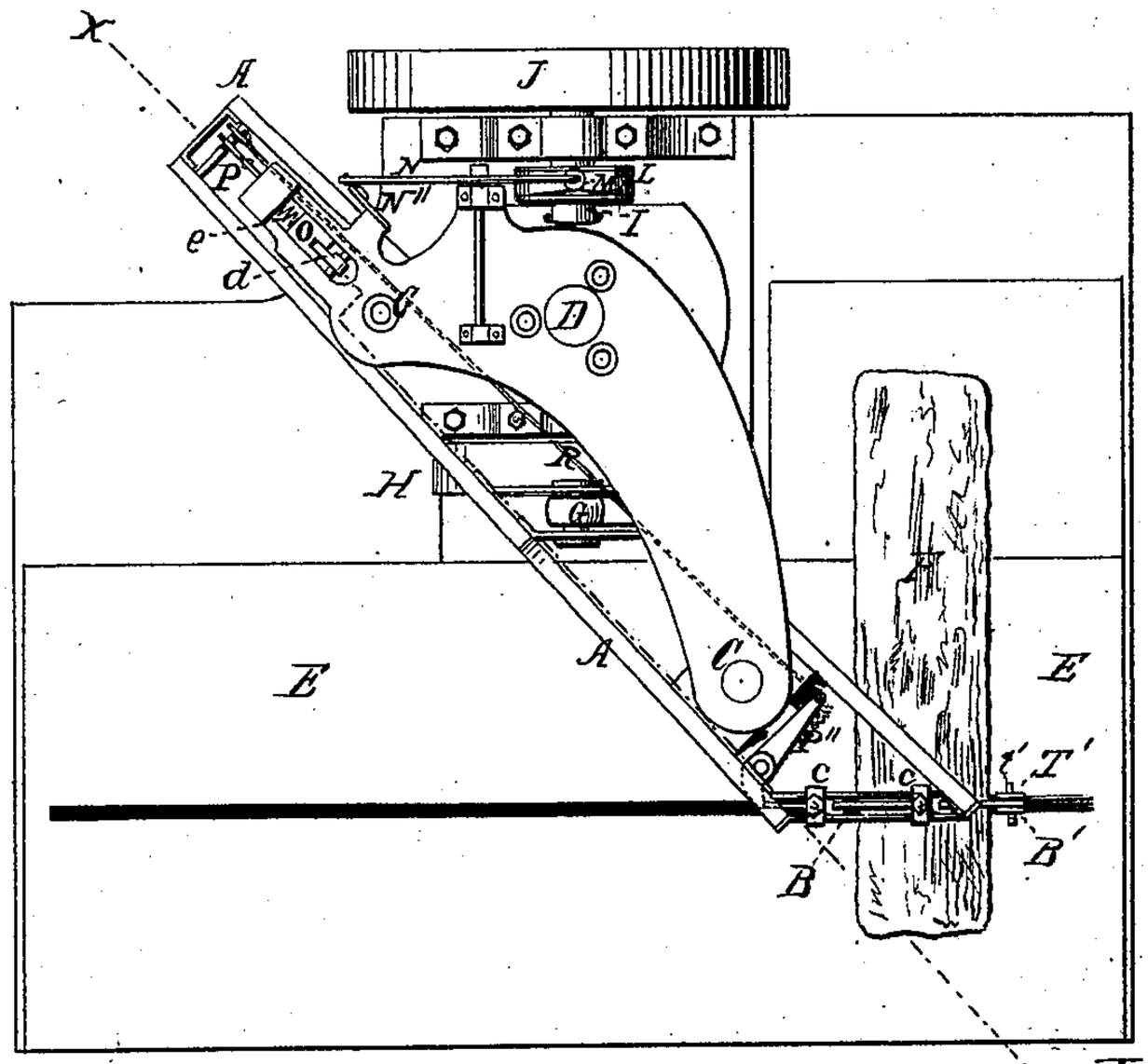

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Fig. 3

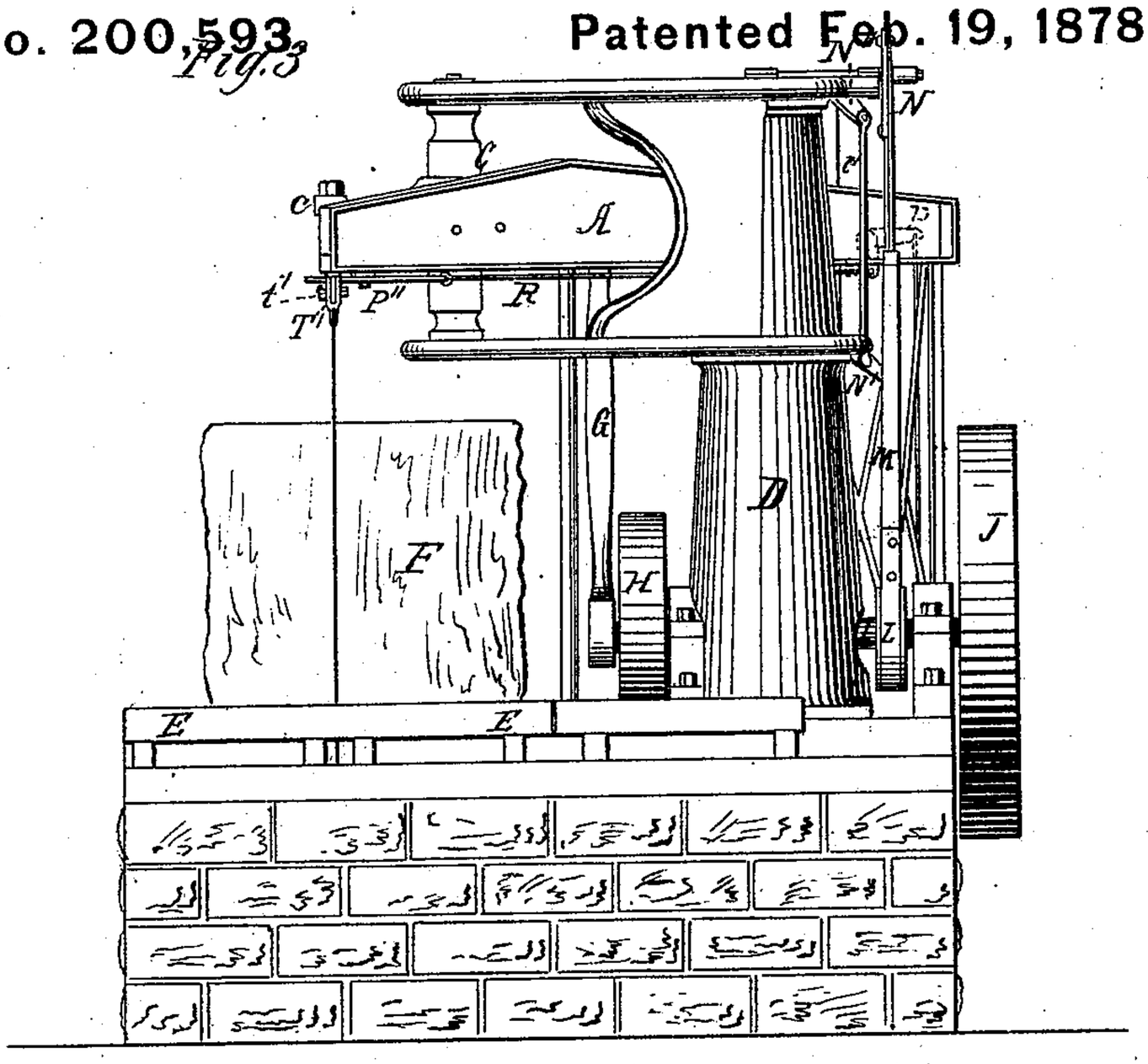

Fig. 4

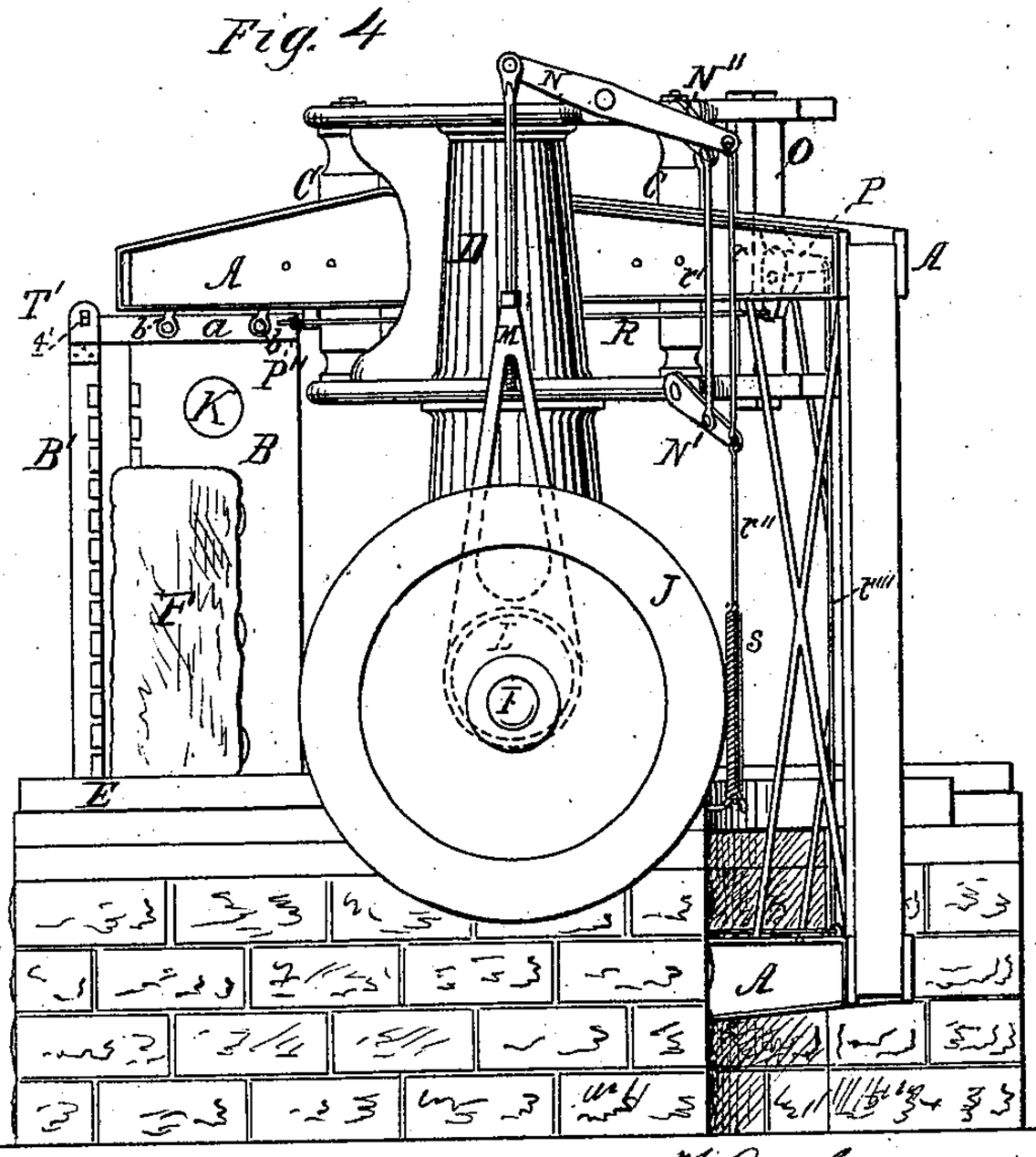

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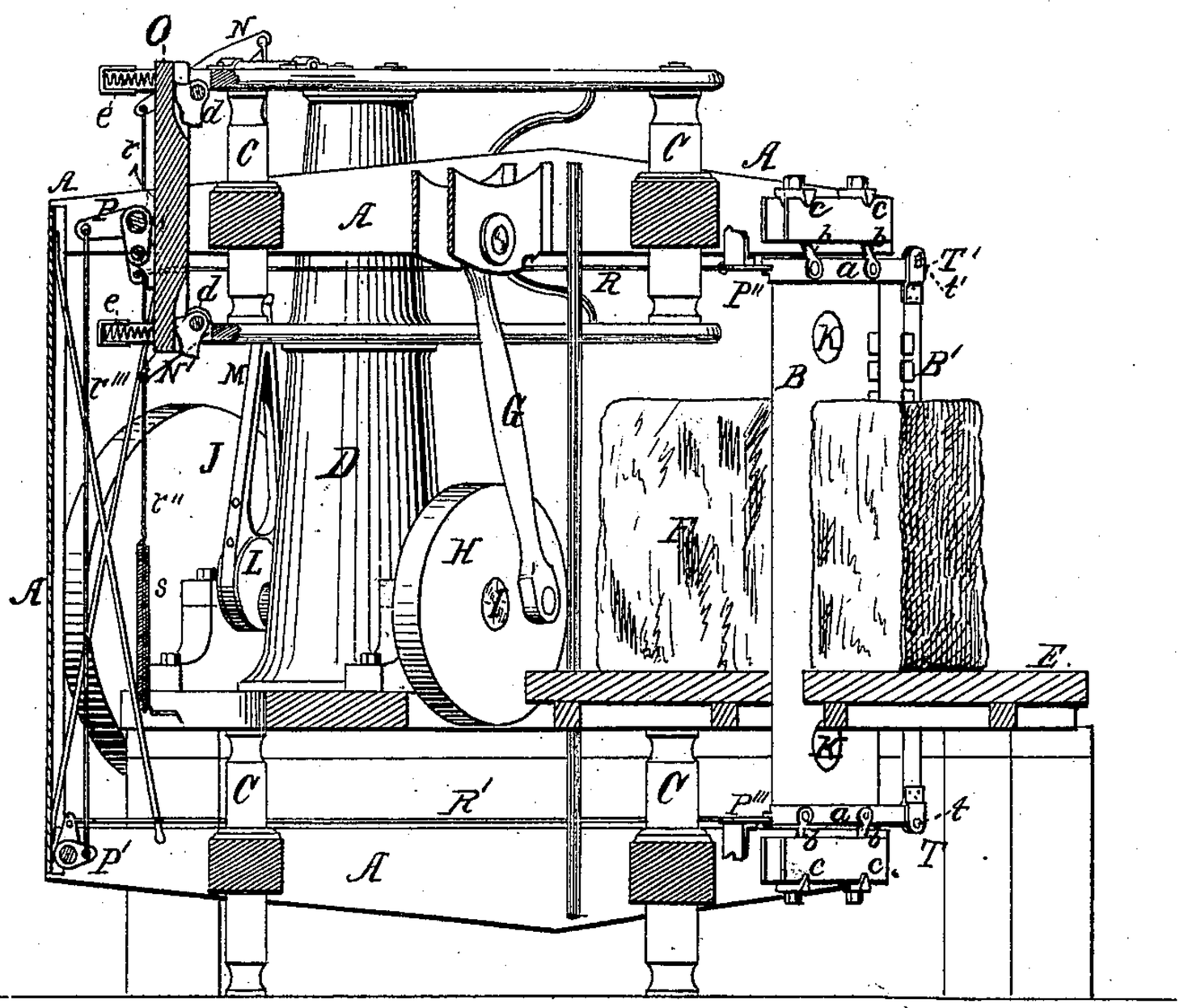
Fig. 5



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UNITED STATES PATENT OFFICE.

HUGH YOUNG, OF NEW YORK, N. Y., ASSIGNOR TO WILLIAM RADCLIFF, OF SAME PLACE.

IMPROVEMENT IN STONE-SAWING MACHINES.

Specification forming part of Letters Patent No. **200,593,** dated February 19, 1878; application filed November 16, 1877.

To all whom it may concern:

Be it known that I, HUGH YOUNG, of the city and State of New York, have invented an Improvement in Machines for Sawing Stone; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification.

My invention has reference more particularly to machines for sawing stone, and which employ saws armed with black diamonds, borts, or other hard stones; but it is, in part, applicable to machines which cut the softer kinds of stone with toothed saws, or harder rocks with saws supplied with sand and water.

The invention is also, in some of its features, adapted not only to machines employing vertically-reciprocating saws, but to those using horizontally-reciprocating saws.

The objects of the invention are to secure greater compactness, durability, and accessibility of parts in machines of this class; to adapt them to the crosscutting and squaring of blocks in cases where the portions to be cut off, or that may be placed inside of the plane of the blade, are longer than the rectangular distance from said plane to the thrust-pieces of the sash or other obstruction; to secure, by a better mode than hitherto, the action of the saw-teeth upon the work while making the cutting-stroke, and their disengagement from the work while making the back or return stroke; to prevent slackness of the front and back margins of the saw-blade, which slackness, without my improvement, often exists, although the center of the blade is drawn tight; to secure a more effectual wetting of the stone next the cutting-edge or cutters or the saw, and, by the aid of an auxiliary saw and reversal of the feed, to make the final break within the block, and so prevent the ruining of the last arrises to be formed by the saw-cut by the breaking of the stone in advance of the saw.

Figure 1 in the accompanying drawings is a side view of a machine constructed in accordance with my invention, looking toward the crank-wheel which reciprocates the saw gate or sash. Fig. 2 is a top or plan view of the entire machine. Fig. 3 is a front view or elevation of the entire machine, that side being called the front toward which the cutting-edge of the principal saw is presented. Fig. 4 is a side view or elevation of the entire machine seen from the side on which the main driving-pulley is located. Fig. 5 is a vertical section made on the line *x x* in Fig. 2.

A represents the saw gate or sash, which carries the principal saw B and the auxiliary saw B′. The said sash A reciprocates on the parallel guides C, which are supported by suitable frame-work, the upper part of which is upheld by a pillar, D, and the whole of which rests on a suitable foundation, preferably of solid masonry. The said sash not only projects laterally or hangs laterally over and under the carriage E, upon which the stone F to be cut rests and is fed to the saws, but said sash also projects over and under the said carriage, toward the front of the machine, and in front of any of the machinery between the top of the carriage and the bottom of that part of the frame which supports the upper slides. This construction carries the cutting-edges of the saws so far in advance of all obstruction by other parts of the machine that a long stone may be laid on the said carriage crosswise to have the part inside of the plane of the blade sawed off, although such part to be sawed off, measured from the plane of the blade, is longer than the rectangular distance from said plane to the thrust-pieces of the sash or other obstruction—a great advantage, not hitherto attained in this class of machines.

The sash is reciprocated in the usual way by a pitman, G, which connects the sash with the crank-wheel H on the main shaft I, which is rotated by the fly-wheel pulley J.

The principal saw B is provided with re-enforcements *a* at each of its extremities. To the said re-enforcements are pivoted links *b*, which engage the sash A by knife-edges or V-shaped bearings *c*, and through which the said saw is put under tension.

In order to prevent slackness in the edges of the principal saw B, which must be broad to work well, I make in said saw holes K, placed in the central longitudinal axis of the

saw. This construction gives the saw less resistance to tension on and near the said axis than on the longitudinal margins of the saw. The said margins will therefore be drawn perfectly tight and straight when the saw is strained in the sash. So far as yet determined, circular holes on the central axis seem preferable; but I do not confine myself to this or any other specific shape or position for the said holes, nor to cutting them entirely through the plate. The said holes, when entirely within the kerf, also act to produce spray in the kerf when the saw is cutting and supplied with water, and thus a more efficient wetting of the cutting-edge of the saw and the part of the stone acted upon by said cutting-edge is secured.

The said sash and saw are represented in the drawings as making the downward or cutting stroke. Now, it has been found to be essential with reciprocating saws armed with diamonds, borts, or other hard stones, that the cutting-edge of the saw should be withdrawn from its action upon the stone on its back stroke, and brought into contact with the stone only while making its cutting-stroke, in order that the borts or other cutters shall be pressed only in one direction in the performance of their work, as pressure in one direction only does not loosen them in their settings, as always results from their cutting in both directions. This has been effected in different ways, by the advance and retreat to and from the work of the entire sash, the advance and retreat of the stone itself, and by the advance and retreat of the saw-blade only; but the methods hitherto employed have presented important defects on the one hand by requiring the movement of the slides, sash, and blade together, or the movement of the stone and carriage together, and on the other hand by requiring the production of the peculiar form of motion needed on or within the reciprocating sash, or its connection with the crank. This last method makes all the bearings of the push or lift producing apparatus inaccessible for oiling while the sash is moving to and fro, and also leads to their speedy destruction by the constantly-reversing momentum of the parts. It has consequently been found almost impossible to keep these parts in such accuracy of relation as to obtain the desired regularity and exactness in the push or lift motion of the blade.

In my present invention I have obviated these defects by the use of a separate push or lift motion slide, O, distinct from but parallel with the slides which guide the reciprocating motion of the sash, and also placed in or on that part of the machine which bears said slides for guiding said reciprocating motion of the sash. This slide O receives a movement corresponding with the push or lift motion required for the saw, and only those few and simple parts needed to transmit this movement to the blade or blades are on the reciprocating sash or its connections, and the power for producing the movement of the slide O is brought directly or indirectly from the main shaft I, or from any shaft positively connected therewith, and not from the revolving crank-pin.

Upon the said main shaft I, I attach the eccentric L, the rod M of which is pivoted to one end of the rock-lever N, which, by the connecting-rod r, is connected to the rock-lever N′, which, by a connecting-rod, r', is connected to another rock-lever, N″.

The shafts or pivots of all the said rock-levers have their bearings in the upper part of the stationary frame-work of the machine.

In order that the connecting-rods may act only by a drawing motion, and may be made lighter than if the rocking of the said rock-levers were entirely performed by the eccentric L, I attach to the end of the lever N′ a rod, r'', and spring s, by which the entire system of connected rock-levers, so far as described, are actuated in one direction, while the eccentric-rod M and eccentric L actuate them in the opposite direction.

The rock-levers N′ and N″ are keyed to their shafts, and both rock through similar and equal arcs in such manner as to actuate equally similar cams attached to the said rock-lever shafts, which shafts are parallel and have their centers in a parallel line with the guides C.

The said cams d actuate the push or lift motion slide O. The said slide O is guided in or on that part of the machine which carries the guides C, and it is pressed constantly against the cams d by springs e. Its position is therefore, both when at rest and in every part of its movement, parallel to the guides C.

From this parallel motion of the push or lift motion slide O, I derive the parallel forward and backward edgewise motion of the saw or saws, as follows: To the upper part of the saw-gate is pivoted a bell-crank lever, P, and to the opposite lower part of said saw-gate is pivoted another bell-crank lever, P′. Said bell-crank levers are connected and caused to move simultaneously by the connecting-rod r''', and the vertical arm of the upper bell-crank lever P slides over the push or lift motion slide O, an anti-friction device being preferably interposed between said lever and said slide.

Each of the bell-crank levers P P″ is connected by a rod, R or R′, (which rods respectively extend across the upper and lower parts of the sash) to one arm of a horizontally-rocking bell-crank lever, P″ or P‴, pivoted to said sash. The unconnected arms of said bell-crank levers P″ and P‴ act directly against the back of the saw B respectively at the top and bottom of said saw.

The sash acts a spring, which yields when the said saw is pressed forward edgewise, and which causes the saw to move backward edgewise when the pressure forward ceases. The saw is pressed and held forward during the cutting-stroke by the bell-crank levers P″ P‴

at every reciprocation, the said bell-crank levers being actuated by the slide O through the intermediate bell-crank levers and connecting-rods hereinbefore described; and all the bearings of the devices through which this motion of the saw is obtained are placed on that part of the machine which carries the slides guiding the sash, and hence are easily accessible for oiling and other attention, whether the saw is running or not, except the bearings of the bell-crank levers pivoted to the sash.

This feature of the invention is applicable to horizontally-reciprocating saws as well as to vertically-reciprocating saws. But I do not confine myself to the precise means of communicating motion from the main shaft I to the slide O, nor to the precise means of communicating motion from said slide to the saw, as other systems of devices may accomplish these results.

It is to be observed that the devices above described have this well-defined result, namely, that the parallel movement of the slide O is the exact counterpart of the push or lift motion required for the blade, or that it has an arithmetical relation to such required motion, according to the intermediate links of communication between said slide O and said blade.

For the purposes of my invention it is immaterial whether such specific mode of motion is effected by cams or wedges acting on the slide O, or by a cam on the main shaft, or on any intermediate shaft, or by any other mechanical equivalent or equivalents.

Heretofore, in the sawing of stone on such machines, when the saw has cut nearly through the stone, there has been very great danger of ruining the last arrises to be formed by the saw-cut by reason of the breaking out of the stone and parting of the block in advance of the saw; and such breaking, frequently occurring, causes great damage, necessitating the subsequent dressing of the stone to remove the broken-out portion—a serious waste of material and labor.

In the present invention this difficulty is wholly avoided, as follows: The re-enforcements *a* of the principal saw are constructed to project in front of the principal saw, and on the projecting ends of said re-enforcements are provided means for the ready attachment and detachment of the detachable supplementary or auxiliary saw B′. I do not limit myself to any precise means for the attachment and detachment of the said auxiliary saw; but a convenient method is shown in the drawings, to wit, plates T, riveted to the lower end of said saw in such manner as to pass one on each side of the end of the lower projecting re-enforcement *a* of the principal saw, a pin, *t*, passing through said plates and projection, and similar plates T′, riveted to the upper end of said saw, and having a gib and key, *t′*, passing through said plates and the end of the upper projecting re-enforcement *a*, the whole being so arranged as to bring the said auxiliary saw substantially in parallel relation and in the same plane with the principal saw. Neither do I limit myself to the attachment of said auxiliary saw to the re-enforcements *a a*, as special appliances for such attachment may be provided independently of said re-enforcements.

During the chief part of the sawing the said auxiliary saw is detached; but when the block has been so nearly divided as to be in danger of parting, the machine is stopped, the auxiliary saw attached, with its cutting-edge facing the cutting-edge of the principal saw, and the machine again started with the motion of the carriage E reversed. The auxiliary saw then cuts a kerf directly and accurately into the kerf of the principal saw, making perfect, clean-cut arrises, and the final break, if any, occurs within the body of the block.

I claim—

1. A saw-gate projecting over and under the carriage, both laterally and toward the front or end of the machine toward which the cutting-edge of the principal saw is presented, substantially as and for the purpose set forth.

2. The combination, in a stone-sawing machine, of a reciprocating saw gate or sash, a principal saw, and a detachable auxiliary saw, for attachment to or connection with the principal saw in the same plane and in parallel relation with the principal saw, substantially as and for the purpose specified.

3. The combination of the separate push or lift motion slide O, parallel to the guides C, which govern the reciprocating motion of the saw-gate, and having its bearings in or on that portion of the machine which supports said guides C, means for imparting motion from the main shaft I, or any shaft positively connected therewith, to said slide O, and means for imparting from said slide O a corresponding edgewise motion to the saw or saws, substantially as and for the purpose set forth.

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