(No Model.) 3 Sheets—Sheet 1.

G. N. WILLIAMS, Jr.

STONE SAWING MACHINE.

No. 429,874. Patented June 10, 1890.

Fig. 2.

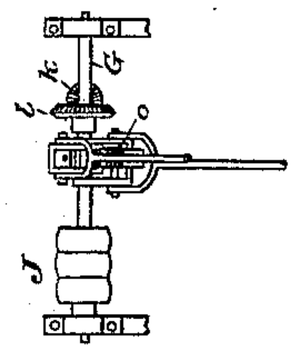

Fig. 1.

WITNESSES:

E. B. Bolton

W. Baptinger.

INVENTOR:

George N. Williams Jr.

By his Attorney,

Henry Connett

(No Model.)

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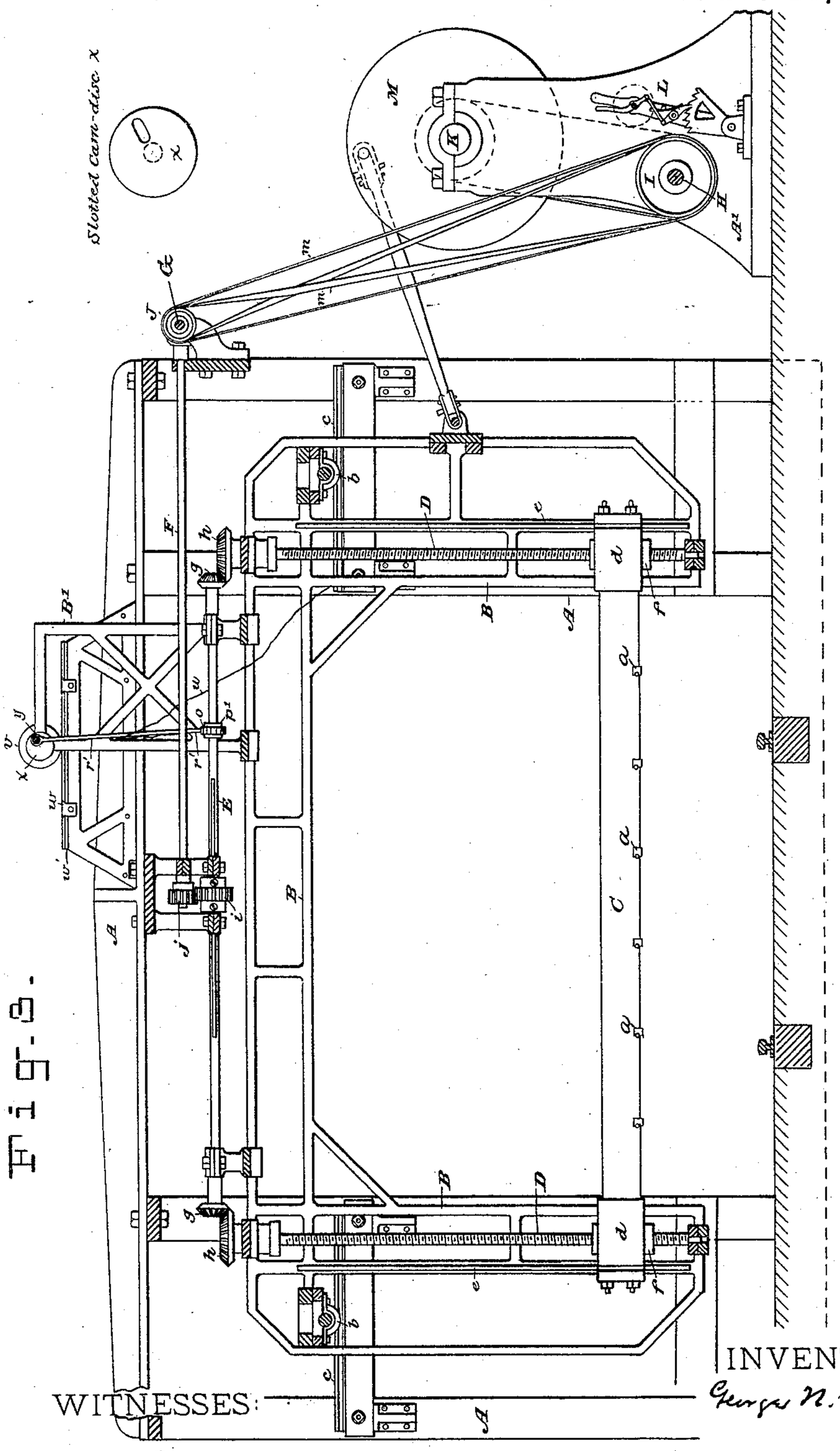

WITNESSES:

E. B. Bolton

H. Haslinger

INVENTOR

George N. Williams Jr

By his Attorney,

Henry Connett

(No Model.) 3 Sheets—Sheet 3.

G. N. WILLIAMS, Jr.

STONE SAWING MACHINE.

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Fig. 4.

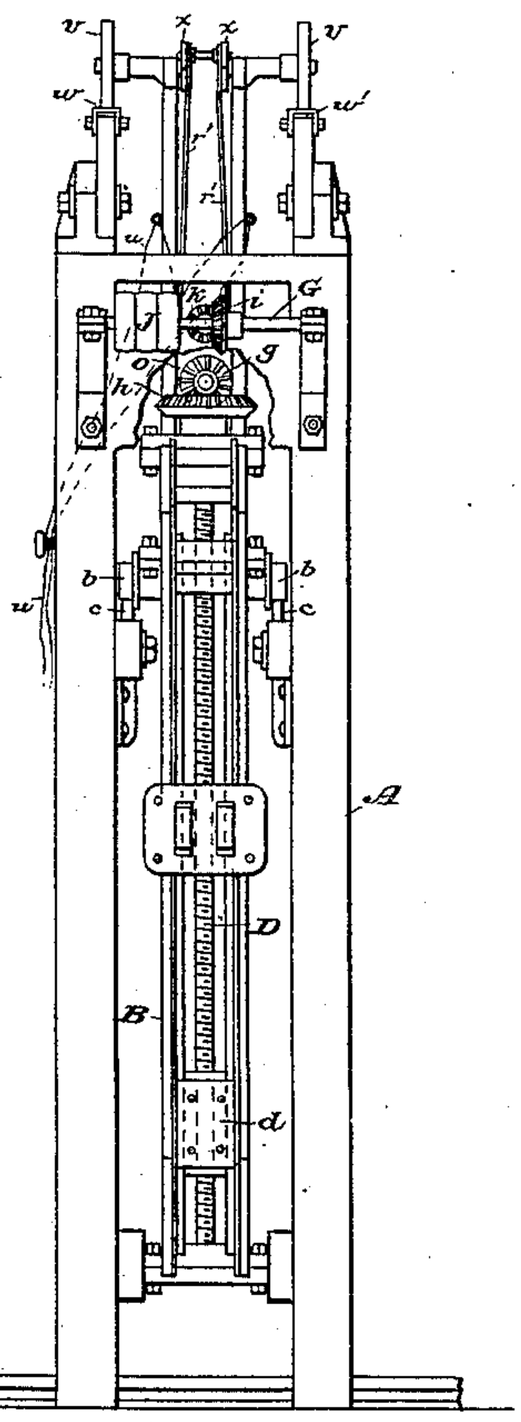
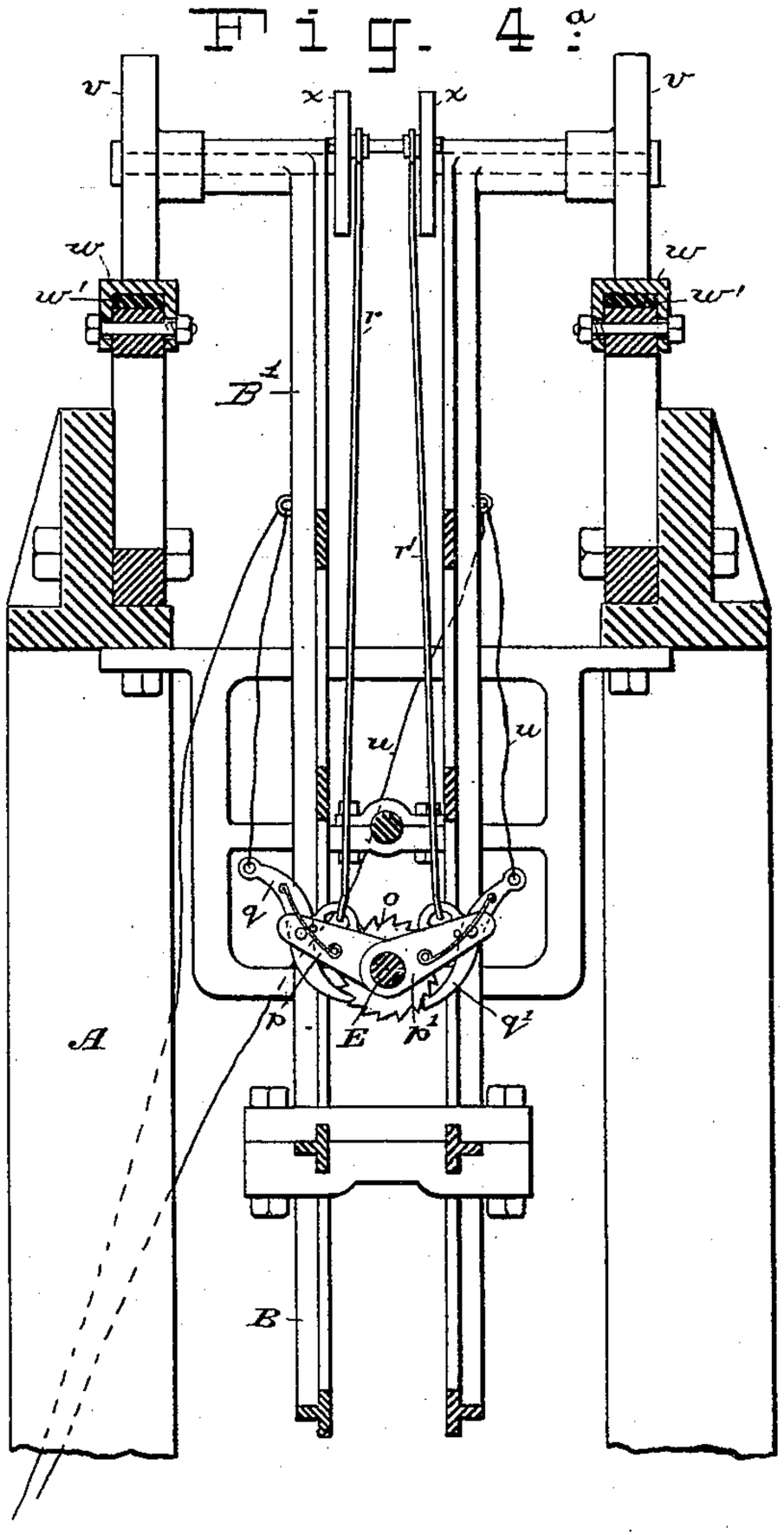


Fig. 4a.



WITNESSES:

E B Bolton

W Boasinger

INVENTOR:

George N. Williams Jr.

By Henry Connett

Attorney.

UNITED STATES PATENT OFFICE.

GEORGE N. WILLIAMS, JR., OF MOUNT VERNON, ASSIGNOR TO B. A. & G. N. WILLIAMS, JR., OF NEW YORK, N. Y.

STONE-SAWING MACHINE.

SPECIFICATION forming part of Letters Patent No. 429,874, dated June 10, 1890.

Application filed November 29, 1886. Serial No. 220,148. (No model.)

To all whom it may concern:

Be it known that I, GEORGE N. WILLIAMS, Jr., a citizen of the United States, residing at Mount Vernon, in the county of Westchester and State of New York, have invented certain Improvements in Diamond Stone-Sawing Machines and in Methods of Operating the Same, of which the following is a specification.

My invention relates to a method of and means for operating the sash and saw-blade of a diamond stone-sawing machine.

Diamond stone-sawing machines are too well-known to require more than a brief description herein. In the kind more generally used the saw moves in a horizontal path and the blade is fed down upon the stone. My improvements relate to this class of machines. I have ascertained that the power required to run one of these saws is mainly absorbed in imparting a reciprocating movement to the saw-sash, which usually weighs from two to three tons, and that but a small part thereof is required to cut the stone. In order, therefore, to double the "duty" of the plant without materially increasing the amount of power required to operate the saw, I feed the saw to the stone during both its strokes in a positive and regulated manner, so that it cuts when moving in either direction, whereby I am enabled to cut twice the amount of stone that could be cut formerly with one saw, and with a very slight increase of power over that formerly employed. I prefer to so arrange the feed that the saw-blade will be fed to the stone in a degree proportionate to the speed at which the saw is moving during both strokes. In this class of machines the saw-sash is moved in a straight line to and fro by means of a crank and connecting-rod, and necessarily, with this driving mechanism, the saw will move at its maximum speed at the middle of the stroke, and at its minimum speed at the ends of the stroke. I prefer to so arrange the feed that it will be at its maximum at the middle of the stroke and at its minimum at the ends thereof. Thus in my machine the feed is at the maximum when the saw-blade is moving most rapidly, and when the most advantage is being derived from the momentum of the heavy sash.

In the drawings, which serve to illustrate my invention, I have shown how my method of operating and feeding the saw-blade may be applied to the sawing-machines now in use—notably what are known in the trade as "Young's diamond saws"—and how I prefer to effect this mode of feeding and operating the saw-blade in newly-constructed machines.

Figure 1 is a sectional side elevation of a sawing-machine similar to those now in use, but provided with means for feeding the saw-blade according to my invention; and Fig. 2 is a detached view of the ratchet feeding mechanism as seen from the right-hand end of the machine. Fig. 3 is a sectional side elevation of a stone-sawing machine, illustrating the construction I prefer to employ in building new machines, to which my improved feed is to be applied. Fig. 4 is an end elevation of the same, and Fig. 4ª a transverse vertical section on a larger scale than Fig. 3.

Referring first to Figs. 1 and 2, I will briefly describe the general structure of this class of stone-sawing machines, premising that this is not new with me, and need not be rigidly adhered to in carrying out my invention.

A represents a strong fixed frame, usually of cast-iron, and B is the reciprocating sash, in which is mounted the saw-blade C, provided with diamonds *a a* on its lower or cutting edge. This sash B is mounted to reciprocate in the frame A, being provided with carriage-wheels or track-rollers *b b*, which roll on tracks *c c* on the frame A. The ends of the saw-blade C are secured in blocks *d d*, that play in guides *e e* in the sash B, and these blocks carry nuts or female screws *f f*, through which pass screws D D, mounted rotatively in the sash *b*. By the rotation of these screws simultaneously the saw-blade may be raised or lowered. On the sash is mounted in bearings a shaft E, carrying on its ends bevel-pinions *g g*, which mesh with bevel-wheels *h h* on the upper ends of screws D. Splined on the shaft E and arranged between keepers or bearings pendent from frame A is a pinion *i*, which is in mesh with a similar wheel *j* on a shaft F, rotatively mounted on frame A. On the end of shaft F is fixed a bevel-wheel *k*, (see Fig. 2,) which meshes with a similar wheel *l* on a cross-shaft G, mounted in the end of frame A.

Rotation of shaft G in one direction runs the saw-blade up and rotation of said shaft in the opposite direction runs the saw-blade down. H is the main shaft, from which shaft G is driven by means of tight and loose pulleys I, on the main shaft, tight and loose pulleys J on the cross-shaft G, and two belts *m m*, one crossed and one straight. This belt-and-pulley mechanism is one in common use for driving a shaft in either direction or stopping it by merely shifting the belts on the pulleys, and it will require no minute description.

Main shaft II drives the crank-shaft K through a belt *n* and suitable pulleys, a belt tightener L being usually employed for starting or stopping the crank-shaft. The sash B is given a reciprocating motion through the medium of a crank M on the crank-shaft, and a pitman or connecting rod which couples said sash and crank.

So far as above described the machine is the same as that ordinarily employed, except that these machines usually employ some means of lifting the saw-blade, either during the whole or at some part of the stroke, usually at the termination of the stroke.

I will now describe the mechanism I employ for imparting the proper feeding movement to the reciprocating saw during both its forward and backward strokes. On shaft G is fixed a ratchet-wheel *o*, and pivoted to an arm *p*, (or pair of arms,) mounted to swing radially on said shaft G, is a spring push-pawl *q*. On the opposite side of ratchet-wheel *o* is pivoted a spring pull-pawl *q'*, pivoted to a radial arm *p'*. These pawls engage the said ratchet-wheel on opposite sides. Fulcrumed on some fixed part, as the frame A', which supports the main shaft, for example, is a rock-lever O, to one end of which are coupled two operating-rods *r r'*, the former of which is coupled at its other end to the radial pawl-arm *p*, and the latter of which is coupled at its other end to the pawl-arm *p'*. The other extremity of rock-lever O is coupled by a connecting-rod *s* to a crank-pin *t* on the end of the crank-shaft K. Thus rotation of the crank-shaft, while it imparts a reciprocating motion to the saw-blade C, at the same time feeds the saw up to its work through the medium of the pawl-and-ratchet mechanism last described. Both pawls being actuated from the same end of lever O, they will move forward and backward together; but one being a push-pawl and the other a pull-pawl, the push-pawl will impart a rotary motion to the wheel *o* on the forward stroke and the other a rotary motion thereto on the back-stroke. The cranks M and *t* on the shaft K are so set relatively that when the saw-blade is moving with the maximum speed (at about mid-stroke) the pawls will move the ratchet-wheel *o* at its maximum speed One pawl feeds the saw up to its work on the back-stroke and the other pawl feeds it on the forward stroke. By means of cords *u u*, connected to the pawls, these latter may be drawn out of engagement, and so held while the saw-blade is being run up or down in setting the stone and adjusting the saw thereto. This shifting or running of the saw-blade up and down is effected by means of the pulleys I and J and belts *m m*. Such or similar mechanism is now in use on machines for sawing stone, and I make no claim to it specifically herein. I will only say that while the pawls are disengaged the saw-blade is raised or run up, the stone moved in place, and the saw-blade moved down to or nearly to the upper surface of the stone. The pawls are then put into engagement, and the regulated feed begins as soon as the crank-shaft is set in motion.

I will now describe the construction illustrated in Figs. 3, 4, and 4ª. In these views the only part that differs from the machine as shown in Figs. 1 and 2 is the feeding mechanism, and this I will now describe, premising that the feed of the saw-blade up to its work is in this case effected through the rolling of a carriage carried by the sash B along a track.

B' is a frame mounted on the sash B, in which are rotatively mounted shafts bearing track-wheels *v v*, which roll on tracks *w w*, mounted on the main frame A. On the inner ends of the shafts of these wheels *v v* are fixed radially-slotted crank-disks *x x*, which are connected by a cross-rod *y*, the ends of which are mounted adjustably in the slots in said crank-disks. This rod serves to form two crank wrists or pins, to which are coupled two pawl-operating rods *r r'*, which extend down and are coupled, respectively, at their lower ends to two pawl-arms *p p'*, carrying pawls *q q'*, which engage opposite sides of a ratchet-wheel *o*, mounted on shaft E. The pawl *q* is a push-pawl, and the pawl *q'* is a pull-pawl, as in the device seen in Figs. 1 and 2. Cords *u*, as in the former case, serve to disengage the pawls when it is desired to adjust the saw-blade at starting. The rolling of the wheels *v* on their tracks *w* imparts a reciprocating movement to these pawls, and in order that the wheels *v* may press on the tracks firmly and elastically at all times, so as to insure their proper rotation, I prefer to mount the track-rails *w* on strips of rubber *w'*, (see Fig. 4ª,) or springs of any kind may be placed under the same. The object in slotting the crank-wheels *x* to receive the ends of the cross-rod *y*, forming the wrist, is to enable the stroke of the cranks to be properly adjusted or regulated. The mechanism will of course be so proportioned, primarily, as to give the desired amount of feed to the saw; but this adjustment of the crank-throw may be needed to effect the proper degree of accuracy. The wheels *v* might be toothed wheels and the track-rails *w* racks, in order to insure positive movement of the wheels.

I have shown a belt-tightener L for starting

and stopping the crank-shaft K, and this is the ordinary device employed for the purpose; but I may as well employ a clutch, either positive or frictional, for this purpose.

I may use but one wheel *v* and track *w*.

Having thus described my invention, I claim—

1. The herein-described method of feeding the reciprocating saw-blade of a stone-sawing machine, which consists in imparting to said saw-blade during its forward and backward movements a forward or feeding movement during both its backward and forward strokes, said feeding movement corresponding in extent to the speed at which the saw-blade is moving forward or back at all times, substantially as set forth.

2. In a stone-sawing machine, the combination, with the diamond-toothed saw-blade and its sash, of means for imparting to said sash a reciprocating movement in a straight line throughout its entire stroke, a screw mechanism for positively feeding the saw-blade up to its work, and means for actuating said feeding-screws during both the forward and backward strokes of the saw, whereby the saw-blade is fed up to its work intermittently during both its reciprocating movements.

3. In a stone-sawing machine, the combination, with the saw-blade and its sash, of means for imparting to said sash a reciprocating movement in a straight line throughout its entire stroke, a ratchet mechanism operating means for feeding the saw-blade up to its work during its forward stroke, and a ratchet mechanism operating means for feeding said blade up to its work during its backward stroke, substantially as set forth.

4. The combination, with the main frame, the saw-blade and its sash, and mechanism for imparting longitudinal reciprocation to said saw-blade, of a wheel or wheels *v*, carried by said sash, a track or tracks on the main frame under said wheels, cranks *x* on the shaft with wheels *v*, pawls *q q'*, connected with cranks *x*, a ratchet-wheel on shaft E, engaged by said pawls, said shaft E mounted rotatively on the sash, and mechanism whereby rotation of said shaft may impart a feeding movement to the saw-blade, substantially as set forth.

5. The combination, with the frame A and sash B, of the wheels *v*, rotatively mounted in bearings on the sash, the track-rails *w*, mounted on springs on the frame A under said wheels *v*, the cranks *x* on the same axis with wheels *v*, the shaft E, rotatively mounted on the sash, the pawls *q q'* and their carrying-arms, the ratchet-wheel on shaft E, engaged by said pawls, and the rods *r r'*, connecting said pawls with the cranks *x*, substantially as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

GEORGE N. WILLIAMS, JR.

Witnesses:

HENRY CONNETT,

J. D. CAPLINGER.