(No Model.) 4 Sheets—Sheet 1.

J. W. MALOY.

STONE SAWING MACHINE.

No. 364,833. Patented June 14, 1887.

Fig. 1.

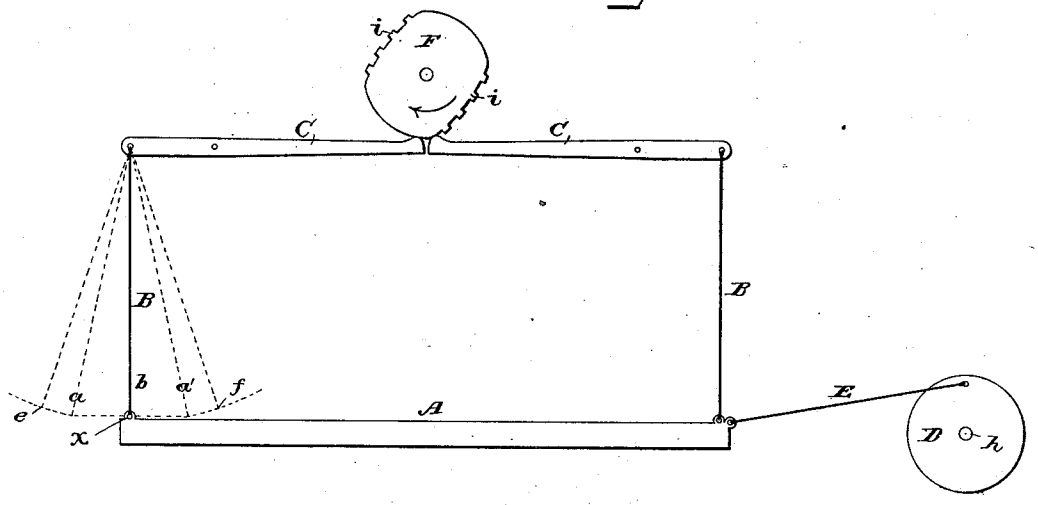

Fig. 2.

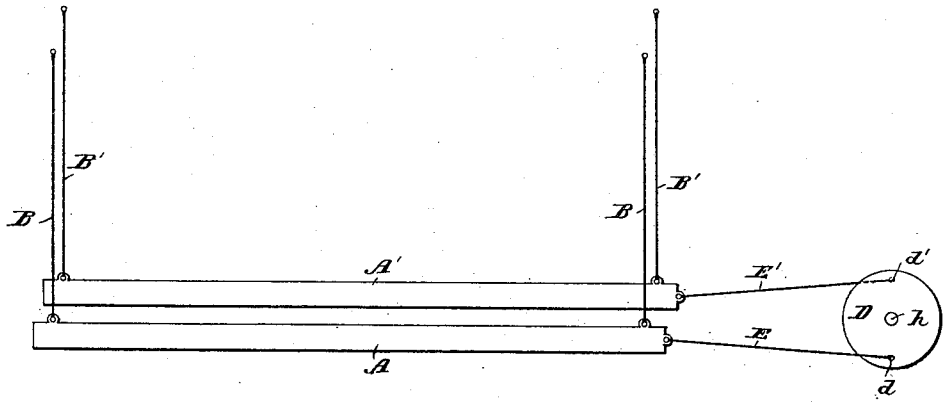

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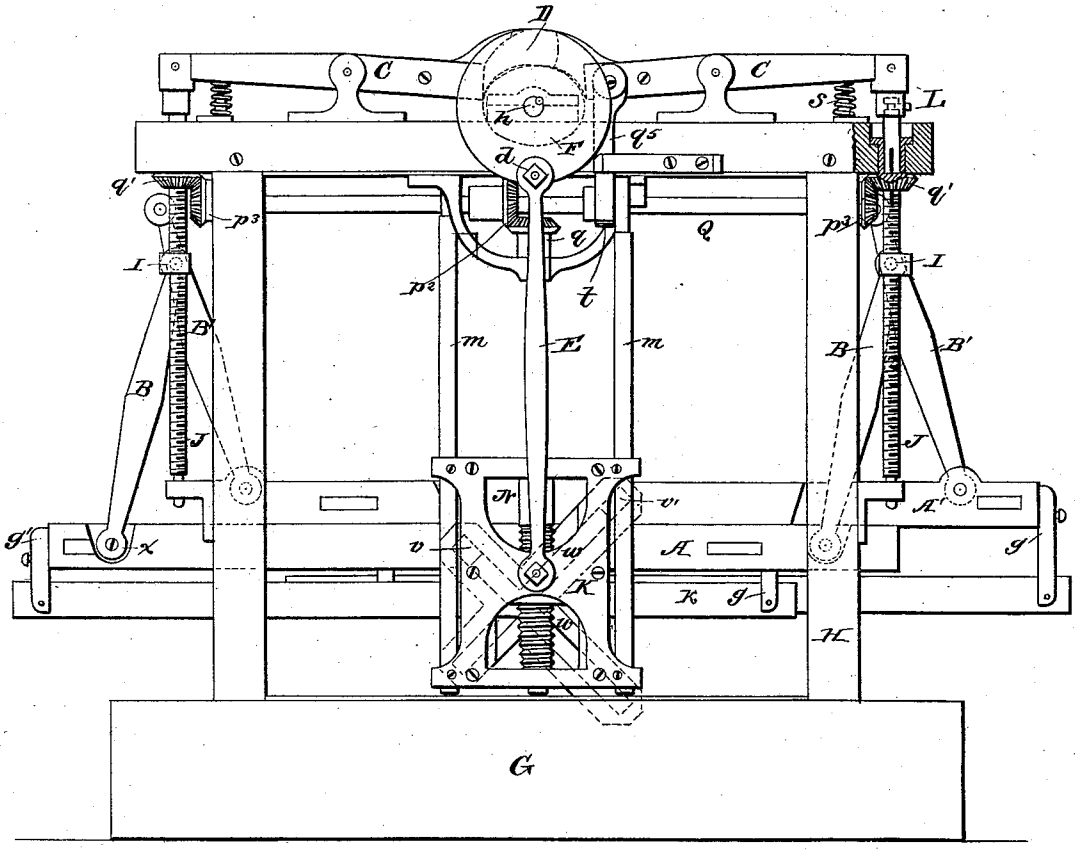
Fig 3.



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(No Model.) 4 Sheets—Sheet 3.

J. W. MALOY.

STONE SAWING MACHINE.

No. 364,833. Patented June 14, 1887.

Fig 5.

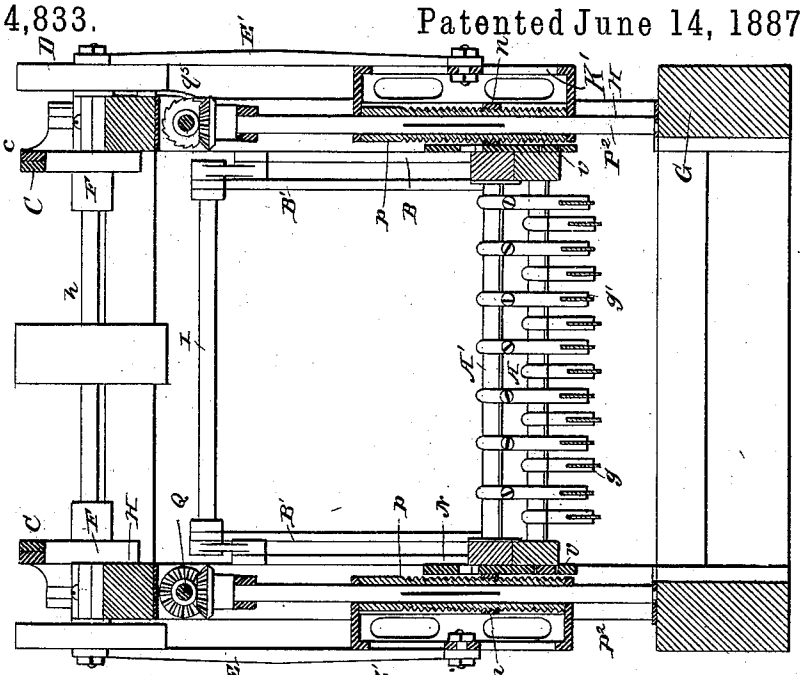
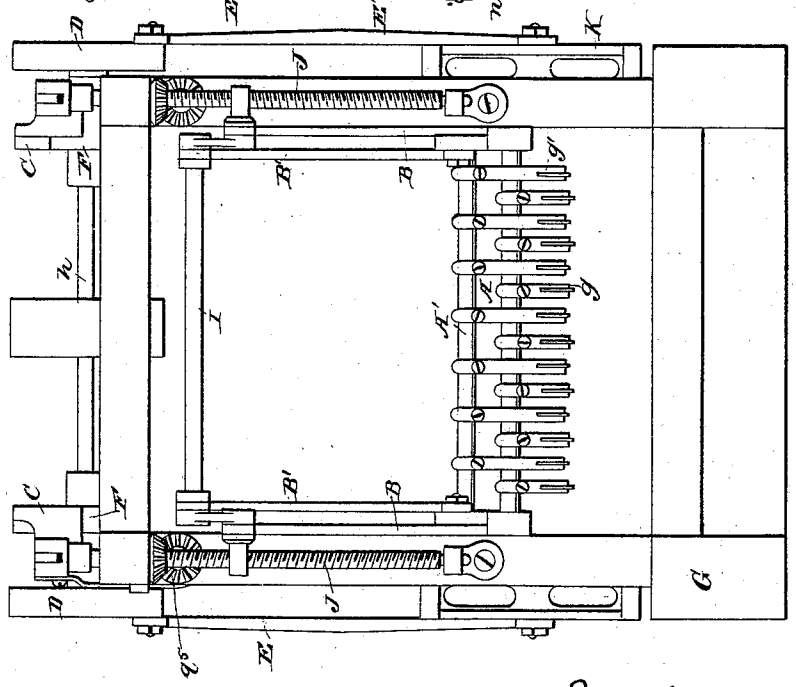


Fig 4.



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(No Model.) 4 Sheets—Sheet 4

J. W. MALOY.

STONE SAWING MACHINE.

No. 364,833. Patented June 14, 1887.

Fig. 7.

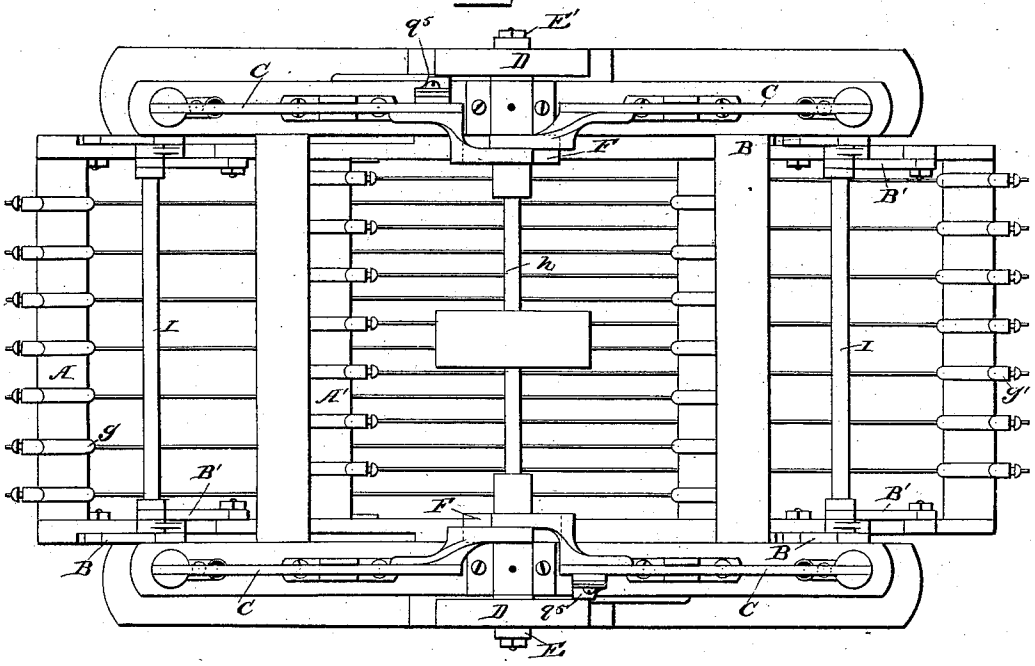
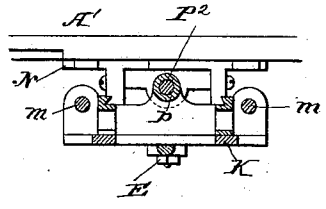


Fig 6.



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UNITED STATES PATENT OFFICE.

JAMES W. MALOY, OF SOMERVILLE, MASSACHUSETTS.

STONE-SAWING MACHINE.

SPECIFICATION forming part of Letters Patent No. 364,833, dated June 14, 1887.

Application filed October 16, 1885. Serial No. 180,082. (No model.)

To all whom it may concern:

Be it known that I, JAMES W. MALOY, a citizen of the United States, and a resident of Somerville, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Stone-Sawing Machines, of which the following is a specification.

In stone-sawing machines of ordinary construction the saw-blades are generally secured to frames swinging from links or chains, so as to travel in curved paths, thereby securing but a limited action of the blades on the stone.

My invention consists of means, fully described hereinafter, whereby to support each frame so as to reciprocate longitudinally in straight lines, but lift it at the end of each movement to permit the sand to flow down beneath the cutting-edge, and whereby to operate the frames and feed them as required.

In the drawings, Figure 1 is a diagrammatic view illustrating the operation of the saws in a machine embodying my improvements. Fig. 2 is a diagrammatic view illustrating the saw-driving mechanism. Fig. 3 is a side elevation of a complete machine; Fig. 4, an end elevation; Fig. 5, a transverse sectional elevation; Fig. 6, a section on the line 1 2, Fig. 3; Fig. 7, a plan view.

Different appliances may be used for securing the desired movement of the blades—for instance, modifications of any of the usual parallel motions; but I prefer the construction illustrated by the diagram, Fig. 1, in which A represents the said frame, B B the suspension-links, and C C levers, from the outer ends of which the links are suspended. With these I combine a crank-wheel, D, and pitman E, or other appliances, for imparting reciprocation to the frame, and a cam, F, or other device which will depress the inner ends of the levers as the links swing from the position *a* or *a'* to the position *b* and lift said ends as the links swing back from *b* to *a* or *a'*, thereby causing the connection-pivots *x* to travel on the horizontal lines *a a'*. The cam is constructed to arrest the motions of the levers after the pivot *x* passes points *a* or *b*, when it will travel in a curve to the positions *e* or *f*, and the frame will be lifted or depressed. By this arrangement the blades starting from an elevated position move forward and downward until the pivots *x* are at *a* or *a'*, when the edges of the blades are against the stone. The blades then move horizontally in contact with the stone and cut the same, and then rise as the pivot passes from *a* or *a'* to *e* or *f*, thereby permitting the sand to fall into the kerf prior to the back-action of the blade, in which like movements take place. I thus cause the blades to traverse horizontally during the entire cutting action on the stone.

In many instances the complete movement of the blades from *a* to *a'* is necessary to wholly crush the sand admitted to the kerf by the lifting of the blade; but there are instances where the sand is crushed by a shorter motion. In such cases the blades should be lifted momentarily at intervals while they are traveling in their horizontal course, thus permitting a fresh supply of sand to pass beneath the blades at each lift. Thus, if the distance from *a* to *a'* is five feet, and a travel of one foot is sufficient to crush the sand admitted by the lifting of the blades, the cam F is provided on each side with four narrow projections, *i*, which, after the blades have traveled one foot horizontally, lift them suddenly and let them fall, to permit a fresh supply of sand to fall into the kerf, repeating this after each foot of motion until the blades are lifted at the termination of the stroke.

It is desirable to drive gangs of saws at high rates of speed; but this has been found impossible when the saws are arranged in gangs, as usual, as the resistance at different parts of the rotation of the crank-wheel is unequal and the rapid motions result in sudden shocks and violent strains. Thus, when the frame A is moving with the blades in contact with the stone, there is a great resistance to the revolution of the crank-wheel D; but when the blades pass from the stone, and until on the return motion they again are brought upon it, this resistance is removed and the driving-shaft then acquires a rapid motion, which is suddenly retarded as the blades again encounter the stone, and if the revolution of the shaft is rapid the sudden changes in the resistance produce disastrous effects. The same

effect results if other driving means than crank-wheels are used, as cams. To avoid these results while driving the blades with great rapidity, I hang two or more saw-frames or gangs of saws in proximity and so connect them with the driving-shaft that when one gang is moving in one direction the other will be moving in a reverse direction, so that the action upon one tends to counteract that upon the other and secures a more uniform resistance to the rotation of the driving-shaft. This action is illustrated in the diagram, Fig. 2, in which the two suspended frames A A′ are connected by pitmen E E′ to crank-pins *d d′* on opposite sides of the shaft *h*.

For the sake of compactness the two gangs carried by the frames A A′ may be arranged so that the blades of one gang will alternate with those of the other, as will be understood from the description of the machine itself hereinafter.

In ordinary stone-sawing machines there must be two foundations—one for the bed of the main frame supporting the stone and saw-ing-frames and the other for the bed of the pedestal supporting the bearings of the driving-shaft—and this arrangement results in the loss of room, as the pitman is long and the pedestal must be a considerable distance from the main frame. To avoid this, I support the driving-shaft on and above the main frame, so that one foundation serves for both, while no more room is required than is occupied by the main frame.

Any suitable connections may be employed for driving the frame or frames A A′ from the upper driving-shaft—as levers, belts, &c.; but I prefer the arrangement which I will hereinafter fully describe.

In the machine shown in Figs. 3 to 7 the letters A A′ B B C C F D E E′ *h x* represent the parts heretofore referred to. G is the base plate; H H, side frames, and I I cross-bars supported at the ends by vertical screw-rods J J, which turn in bearings of the side frames, said cross-bars serving to support the links B B′, which are hung thereto, and pivoted to the two frames A A′, one arranged above the other. The frame A carries brackets *g*, that support saws *k*, and the frame A′ carries brackets *g′*, intermediate with the brackets *g*, and supporting saws *k′*, the saws of the two gangs being side by side. The two frames are reciprocated horizontally by means of two cams, N N, carried by frames K K′, sliding on guides *m m*, and to each of which is connected one of the pitmen, each cam having two cross-grooves, *w w′*, receiving, respectively, two studs, *v v′*, at the sides of the frames A A′, so that as the frames K K′ rise and fall the frames A A′ will be reciprocated horizontally in opposite directions.

In order that the actions of the two frames A A′ may be alike, the links B B′ must be of the same length, and the cross-bars I I are therefore cranked, the more elevated portion affording bearings for the links of the upper frame and the lower portion constituting bearings for the links of the lower frame. (See Figs. 4 and 5.)

The before-described lifting and lowering of the links to insure the travel of the frames A A′ in horizontal lines while the saws are cutting is effected by raising and lowering the screw-rods I I, by vibrating the levers C C by cams F and springs *s;* but as the screw-bars must be turned to feed the bars I I downward as the stone is cut, each rod J is connected to the lever C by a jointed connection, L, which permits the screw portion to be revolved without affecting its connection with the levers. As the frame-supports and frames are fed downward the cams N N that reciprocate the frames must be moved in like manner, which is effected by connecting the cams movably to the frame K. Thus each cam has a stud, *n*, through which extends a tubular screw-sleeve, *p*, carried by and turning in bearings of the frame K, and a feathered rod, P^2, extends through the sleeve and is turned at the same rate as the screw-rods J, so as to turn the screw-sleeve and feed the cams downward.

It will be obvious that different means may be used to effect the revolution of the screw-rods I and *p*. I have shown shafts Q provided with bevel-gears p^2 p^3, engaging with similar gears, *q q′*, the gears *q* secured to the rods P^2, and the rods J passing through the gears *q′* and having feathers adapted to said gears, so that the rods can slide in and be turned by the gears which revolve in bearings of the frame. The shafts Q are turned by any suitable means—as by pawls q^5, hung to the levers C and engaging with ratchets *t* on the shafts Q.

The saw-frames may be weighted to secure any desired pressure.

It will be evident that most of the devices above described may be used with a single frame and one gang of saws, if desired.

I do not limit myself to the means shown for effecting the movements of the saws described, nor for feeding the said frames and cams, nor to the use of cams for driving the frames, as these and other details may be changed without departing from the main features of my invention.

I claim—

1. The combination, with the reciprocating saw-frame, of suspension-links for said frame, levers, and connections between the same and said links, and cams arranged to engage said levers, as set forth, whereby the frame is lifted at the termination of the movement in each direction, substantially as set forth.

2. The combination, with the reciprocating saw-frame, of suspension-links for said frame, levers connected each at one end to said links, and cams engaging with the other or free ends of said levers for lifting the frame at the termination of each longitudinal movement, substantially as described.

3. The combination of the reciprocating saw-frame, links suspending the same, adjustable bearings for said links, levers con-

nected each at one end to said bearings, and cams engaging with the other or free ends of said levers and moving the latter to maintain the frame in the same horizontal plane except at the termination of each longitudinal movement, substantially as described.

4. The combination of the reciprocating frame, links suspending said frame, cross-bars to which the links are connected, levers connected each at one end to said bars, and cams engaging with the other or free ends of the levers for raising and lowering the cross-bars, substantially as described.

5. The combination, with the suspended reciprocating frame, levers connected each at one end to support said frame, and cams engaging the other end of said levers to raise and lower the frame during its reciprocation, of feed devices whereby the frame is fed gradually downward, substantially as described.

6. The combination, in a stone-sawing machine, of two or more gangs of saws, with the saw-frames one above the other and with the edges of the saws in substantially the same plane, a driving-shaft, and connections from the drive-shaft to the gangs, whereby one gang is driven in one direction while the other is driven in a reverse direction, substantially as described.

7. The combination of a reciprocating frame, A, carrying a gang of parallel saw-blades, a reciprocating frame, A′, arranged adjacent to the frame A, and carrying a second gang of blades alternating with the first, with the edges in substantially the same plane, and appliances for reciprocating the frames simultaneously in opposite directions, substantially as described.

8. The combination, with the horizontally-reciprocating saw-frame and feed devices, substantially as described, connected to said frame, of vertically-reciprocating cams engaging with said frame, whereby the said frame is reciprocated, and feed devices, substantially as described, connected to said cams for feeding them downward, substantially as described.

9. The combination of a horizontally-reciprocating saw-frame provided with suitable feed devices, vertically-reciprocating frames carrying adjustable cams engaging said saw-frames, and appliances connected to said cams for feeding them downward on their supporting-frames, substantially as described.

10. The combination of the saw-frame, vertically-reciprocating frames K, cams N, carried by said frames K, feed-sleeves *p*, carried by the frames, shafts P^2, and means whereby the said shafts are rotated, substantially as described.

11. The combination, with the vibrating saw-frame and cam-frames, of the feed-rods J P^2, and cams N, and shafts Q, gearing with both the rods to turn them simultaneously to raise and lower said frame, substantially as described.

12. The combination of the saw-frame supported by links hung to a cross-bar, screw-rods passing through said cross-bar and feeding the same as they are turned, vibrating levers to which said screws are connected, and cams or equivalent means for operating the levers to direct the frame in straight lines, substantially as described.

13. The combination of the two reciprocating saw-frames A A′, supporting-links of equal length and cross-bars with bearings at different heights for the upper ends of the links, and means for supporting said cross-bars, substantially as described.

14. The frames A A′, arranged one above the other, with brackets intermediately arranged supporting two gangs of saws arranged intermediately side by side, and means for reciprocating said frames, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JAMES W. MALOY.

Witnesses:
GEO. H. WOODMAN,
F. L. FREEMAN.