

(No Model.)

4 Sheets—Sheet 1.

J. W. MALOY.

STONE SAWING MACHINE.

No. 364,833.

Patented June 14, 1887.

Fig. 1.

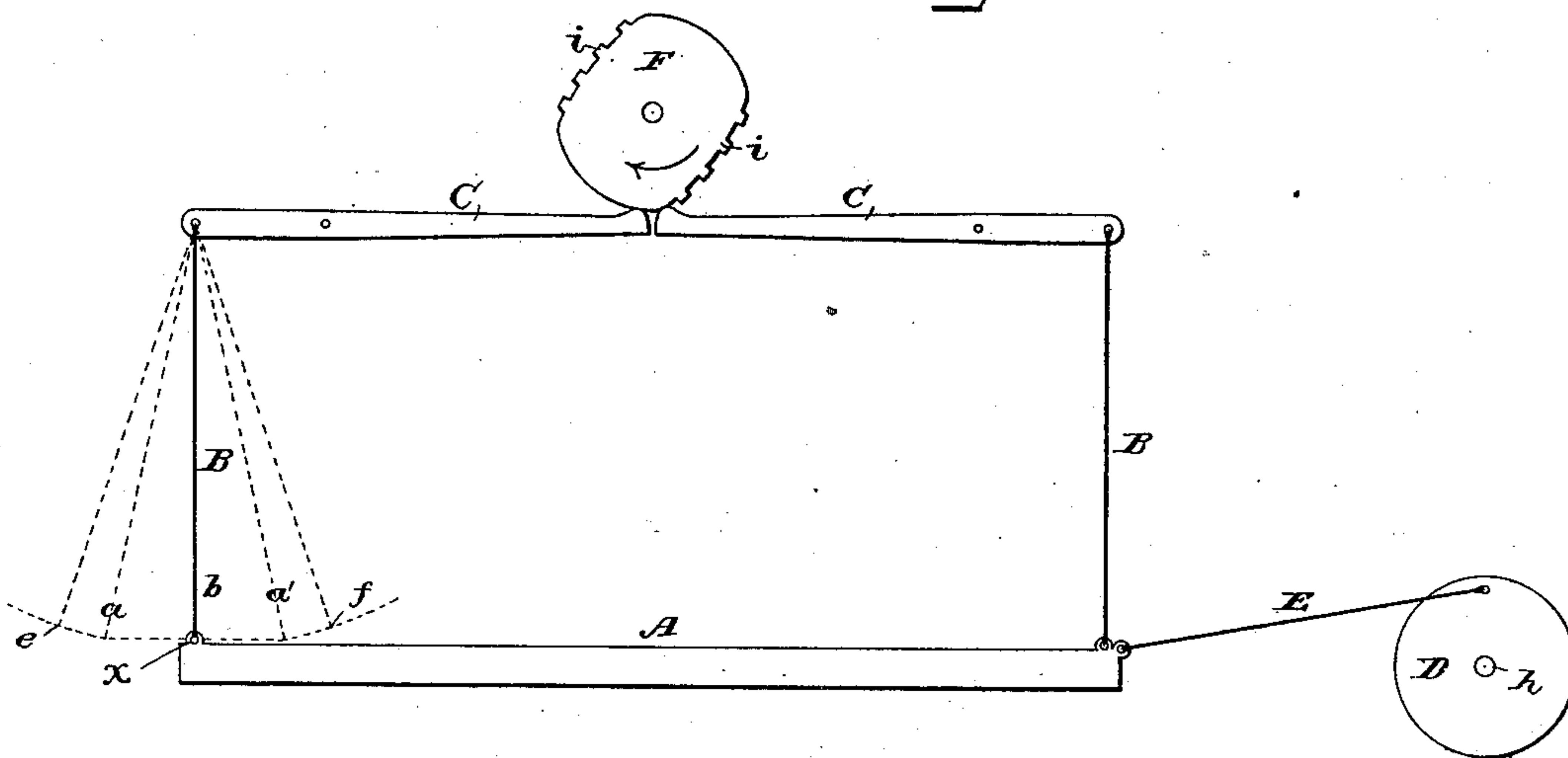
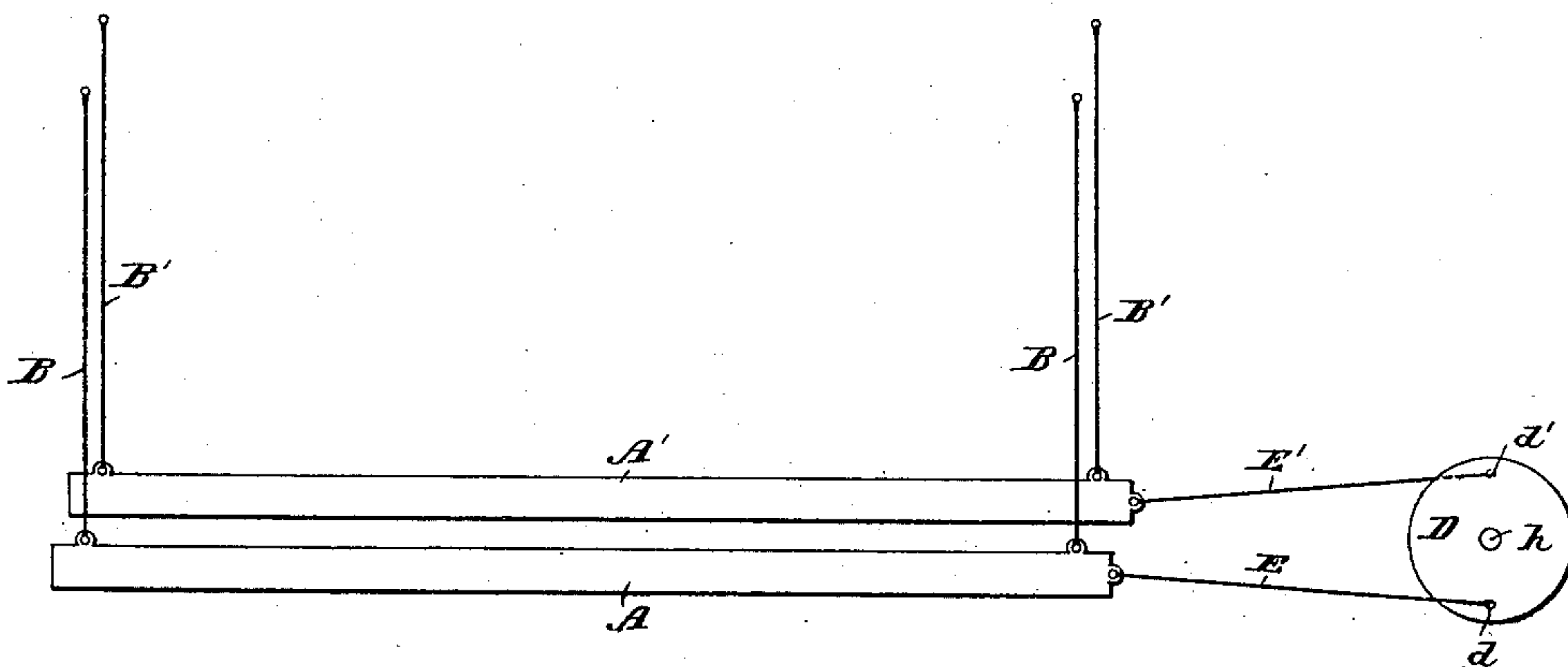


Fig. 2.



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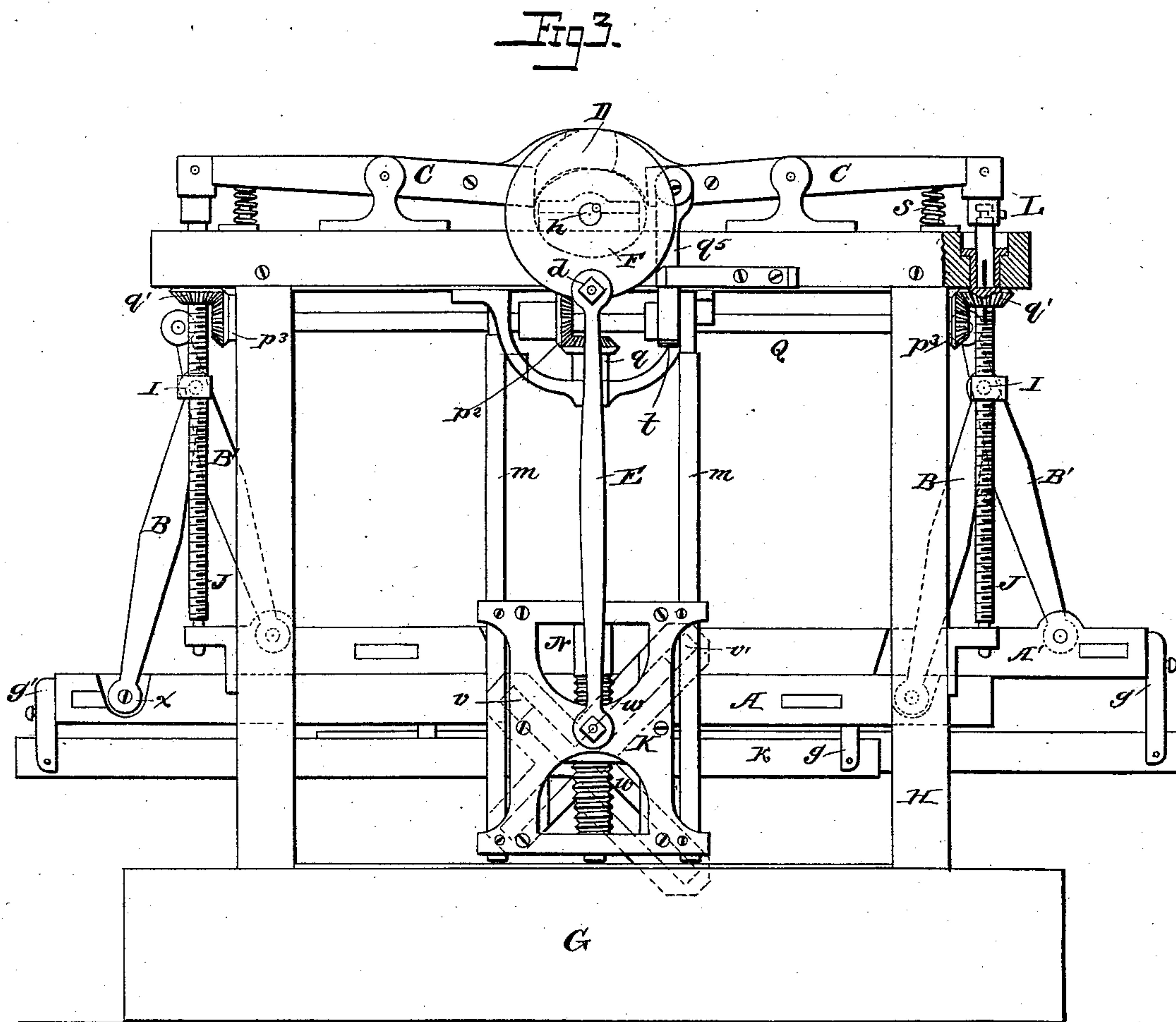
4 Sheets—Sheet 2.

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4 Sheets—Sheet 3.

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Fig. 5.

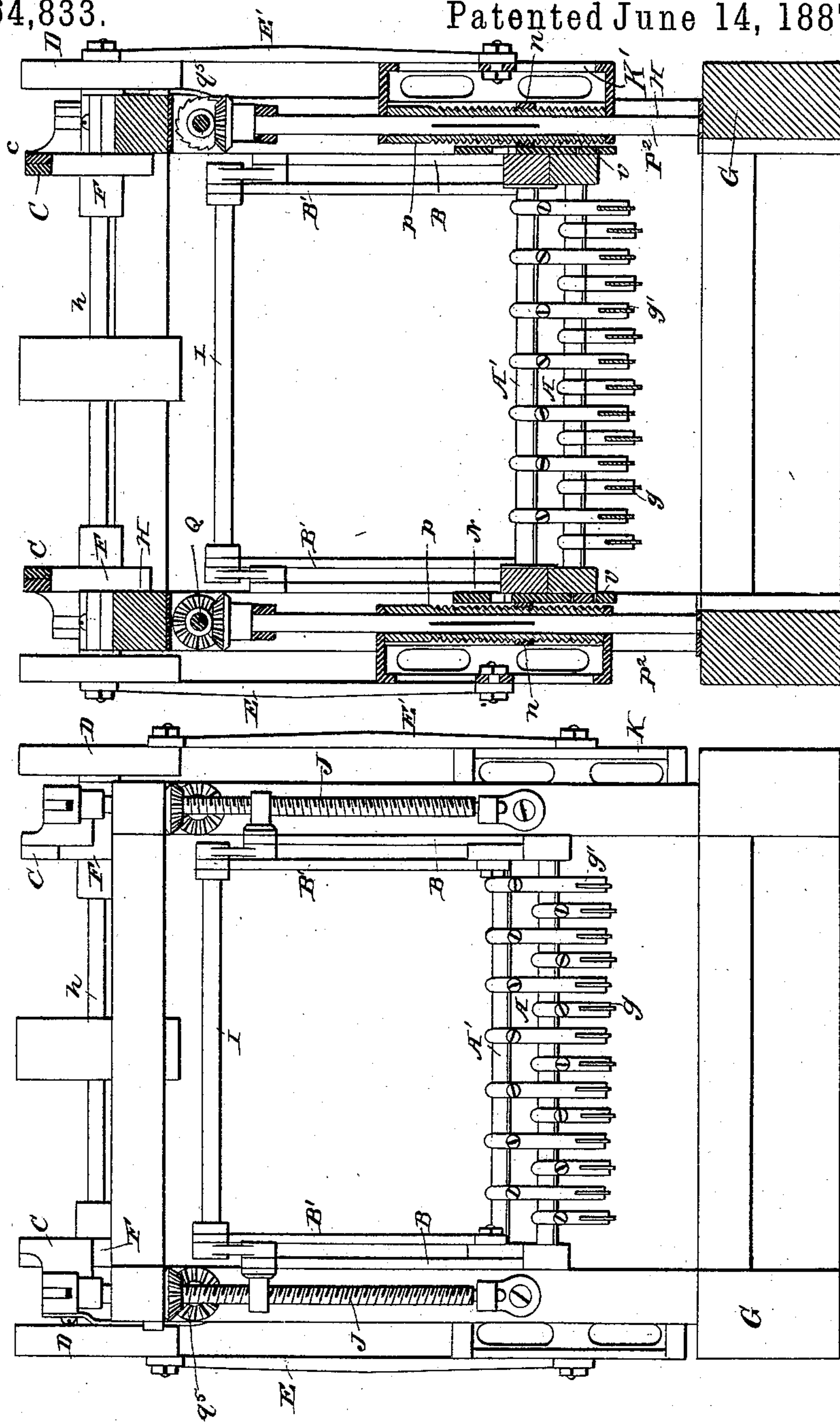


Fig. 4.

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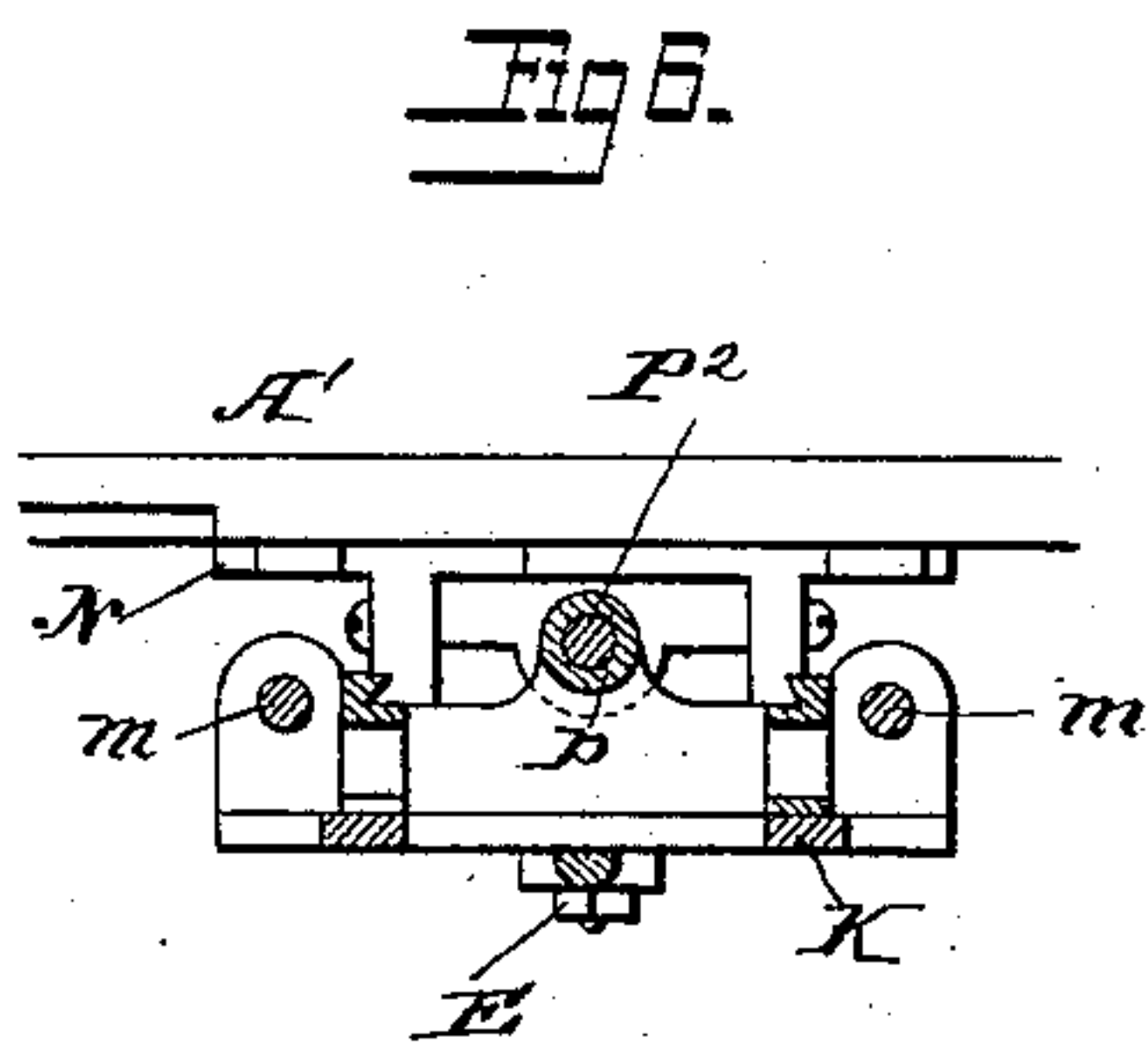
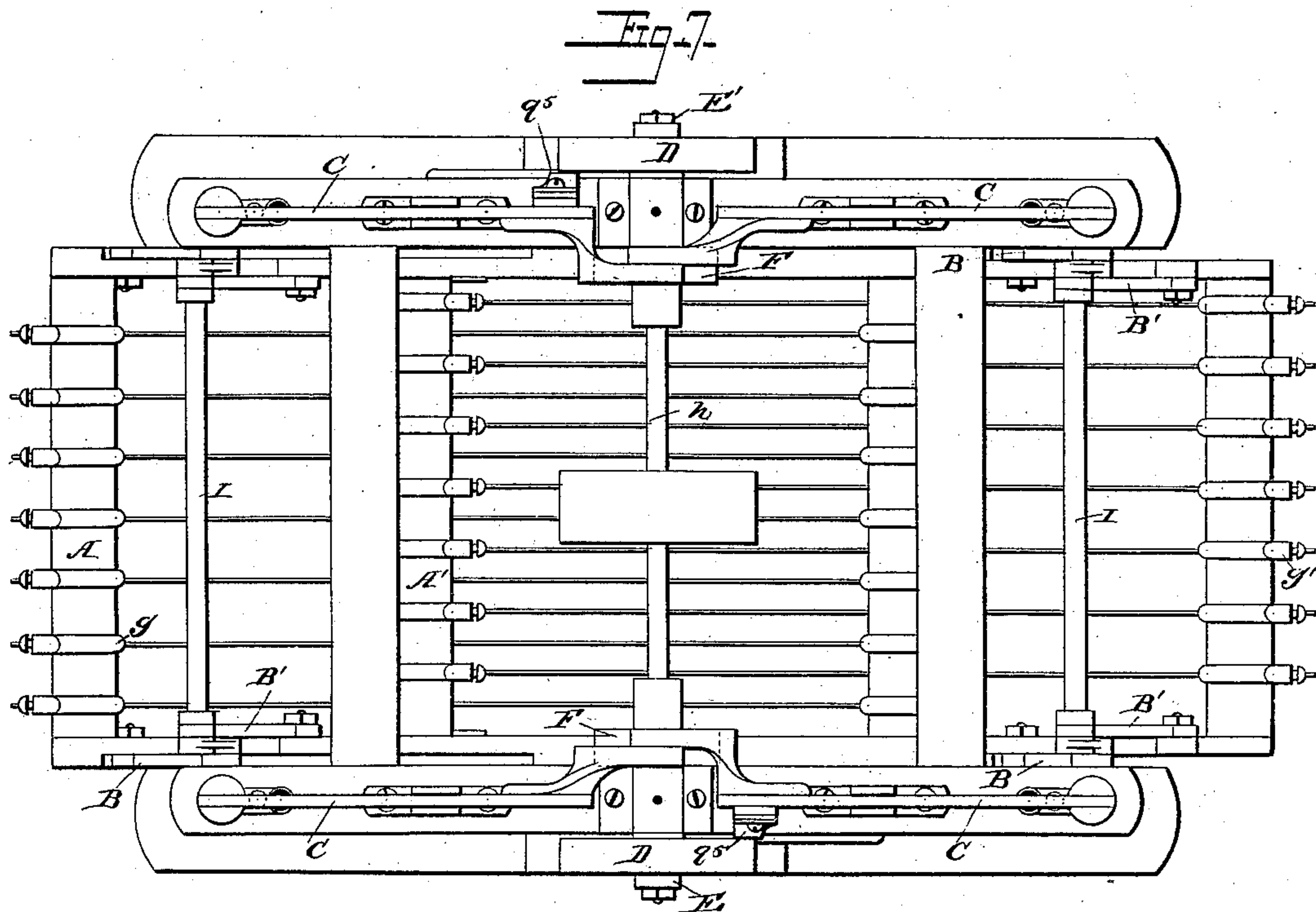
(No Model.)

4 Sheets—Sheet 4

J. W. MALOY.
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Patented June 14, 1887.



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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 5 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 10 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 15 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 20 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- 25 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 30 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.

40 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 45 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 , 50 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 55 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 60 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 65 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.) 70

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 75 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 with- 80 out 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 85 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 90 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 95 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 100 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 105 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 110 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 115 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 120 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 125 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, sub- 130 stantially as described.

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

5 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 move-
ment, substantially as described.

10 4. The combination of the reciprocating
frame, linkssuspending said frame, cross-bars
to which the links are connected, levers con-
nected 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.

15 5. The combination, with the suspended re-
ciprocating frame, levers connected each at
one end to support said frame, and cams en-
gaging the other end of said levers to raise
and lower the frame during its reciprocation,
of feed devices whereby the frame is fed gradu-
ally downward, substantially as described.

20 6. The combination, in a stone-sawing ma-
chine, 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.

30 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 de-
scribed.

40 8. The combination, with the horizontally-
reciprocating saw-frame and feed devices,
substantially as described, connected to said
frame, of vertically-reciprocating cams engag-
ing with said frame, whereby the said frame
is reciprocated, and feed devices, substan-
tially as described, connected to said cams for
feeding them downward, substantially as de-
scribed.

9. The combination of a horizontally-recip-
rocating saw-frame provided with suitable
feed devices, vertically-reciprocating frames 50
carrying adjustable cams engaging said saw-
frames, and appliances connected to said cams
for feeding them downward on their support-
ing-frames, substantially as described.

10. The combination of the saw-frame, ver- 55
tically-reciprocating frames K, cams N, car-
ried by said frames K, feed-sleeves *p*, carried
by the frames, shafts P², and means whereby
the said shafts are rotated, substantially as de-
scribed. 60

11. The combination, with the vibrating
saw-frame and cam-frames, of the feed-rods J
P², and cams N, and shafts Q, gearing with
both the rods to turn them simultaneously to
raise and lower said frame, substantially as 65
described.

12. The combination of the saw-frame sup-
ported by links hung to a cross-bar, screw-
rods passing through said cross-bar and feed-
ing the same as they are turned, vibrating 70
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 75
saw-frames A A', supporting-links of equal
length and cross-bars with bearings at differ-
ent heights for the upper ends of the links,
and means for supporting said cross-bars, sub-
stantially as described. 80

14. The frames A A', arranged one above
the other, with brackets intermediately ar-
ranged supporting two gangs of saws ar-
ranged intermediately side by side, and means
for reciprocating said frames, substantially as 85
described.

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

JAMES W. MALOY.

Witnesses:

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