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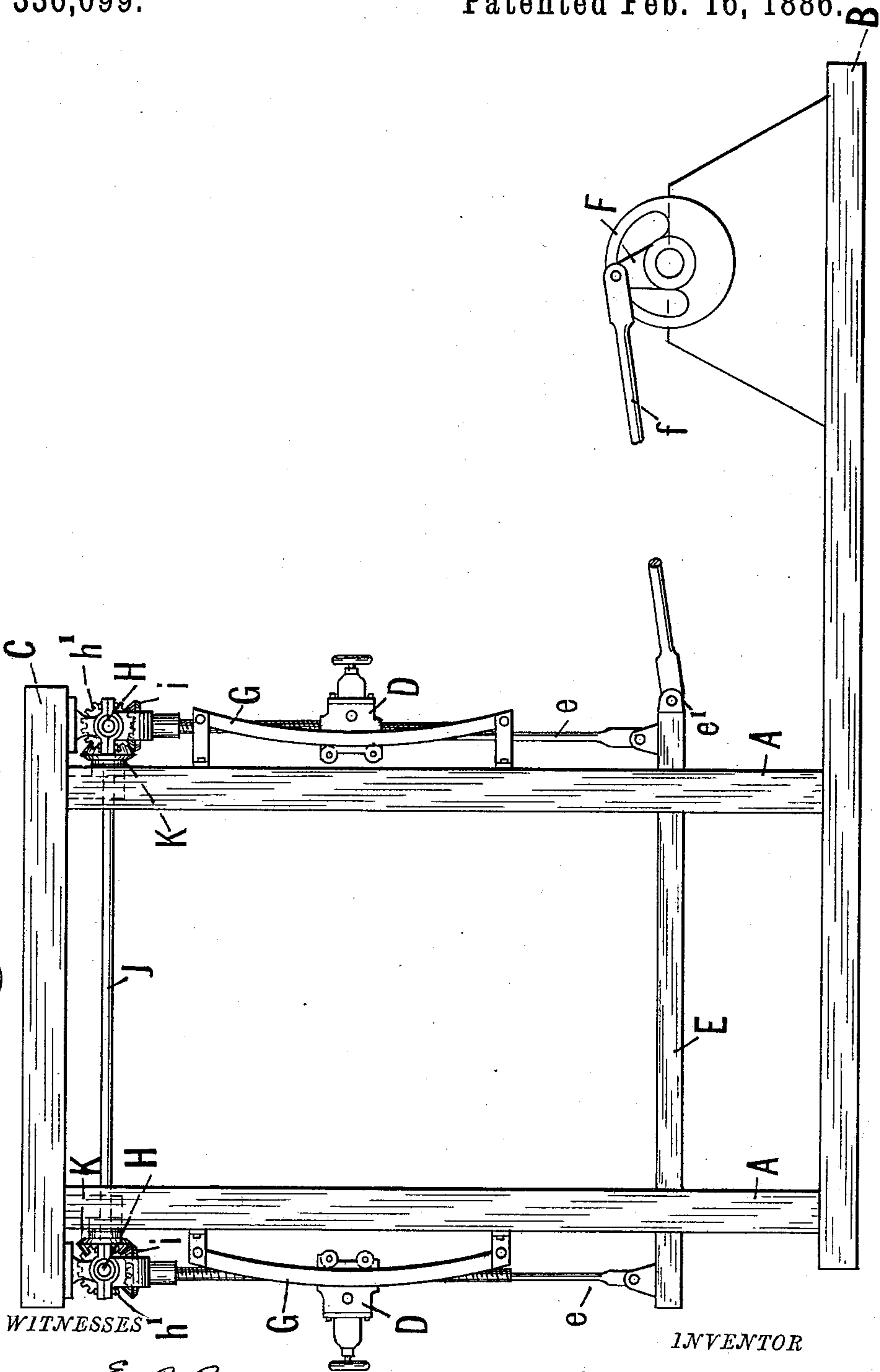
3 Sheets—Sheet 1.

J. H. FRENIER.

STONE SAWING MACHINE.

No. 336,099.

Patented Feb. 16, 1886.



E. P. Rider

Thos M. Talbot

INVENTOR

John H. Tremmer by
H. W. Beadle & Co
Attorneys

(No Model.)

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Fig. 2.

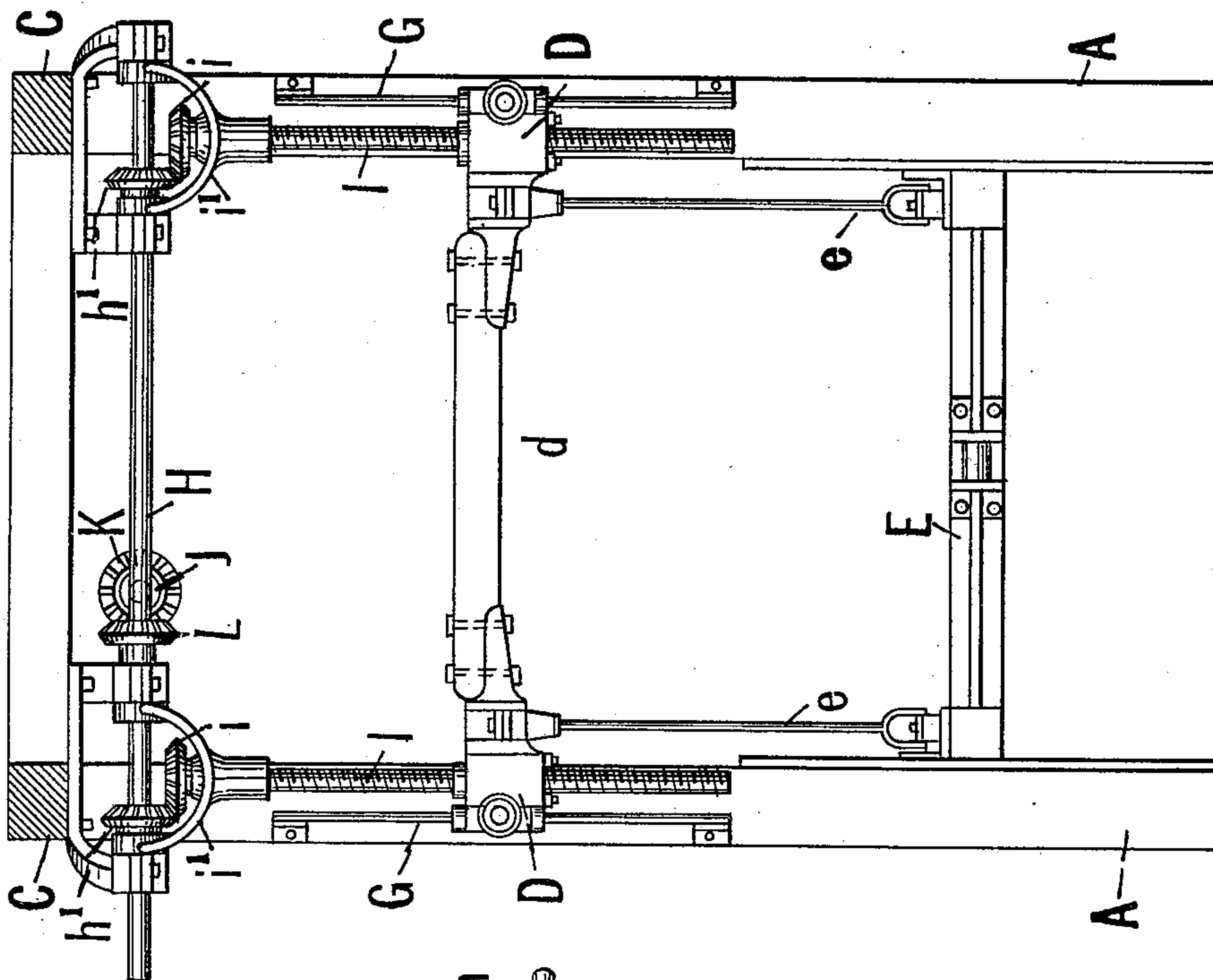


Fig. 4.

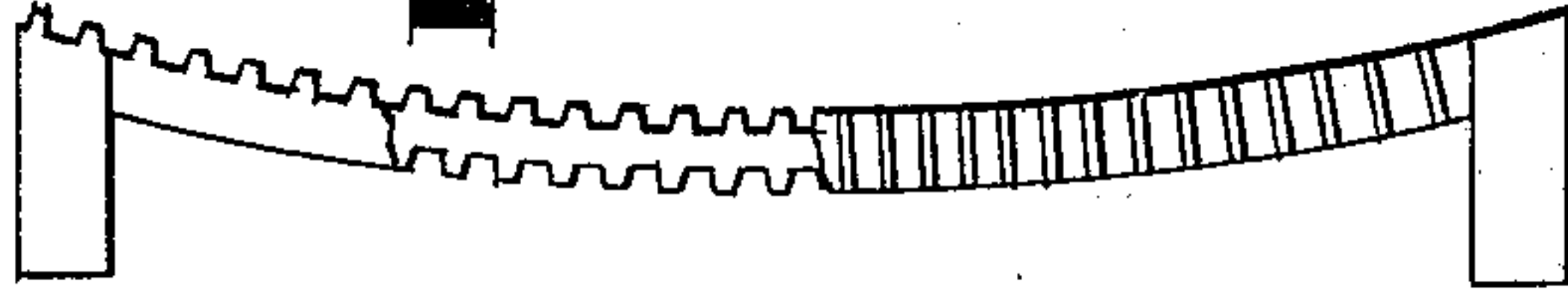
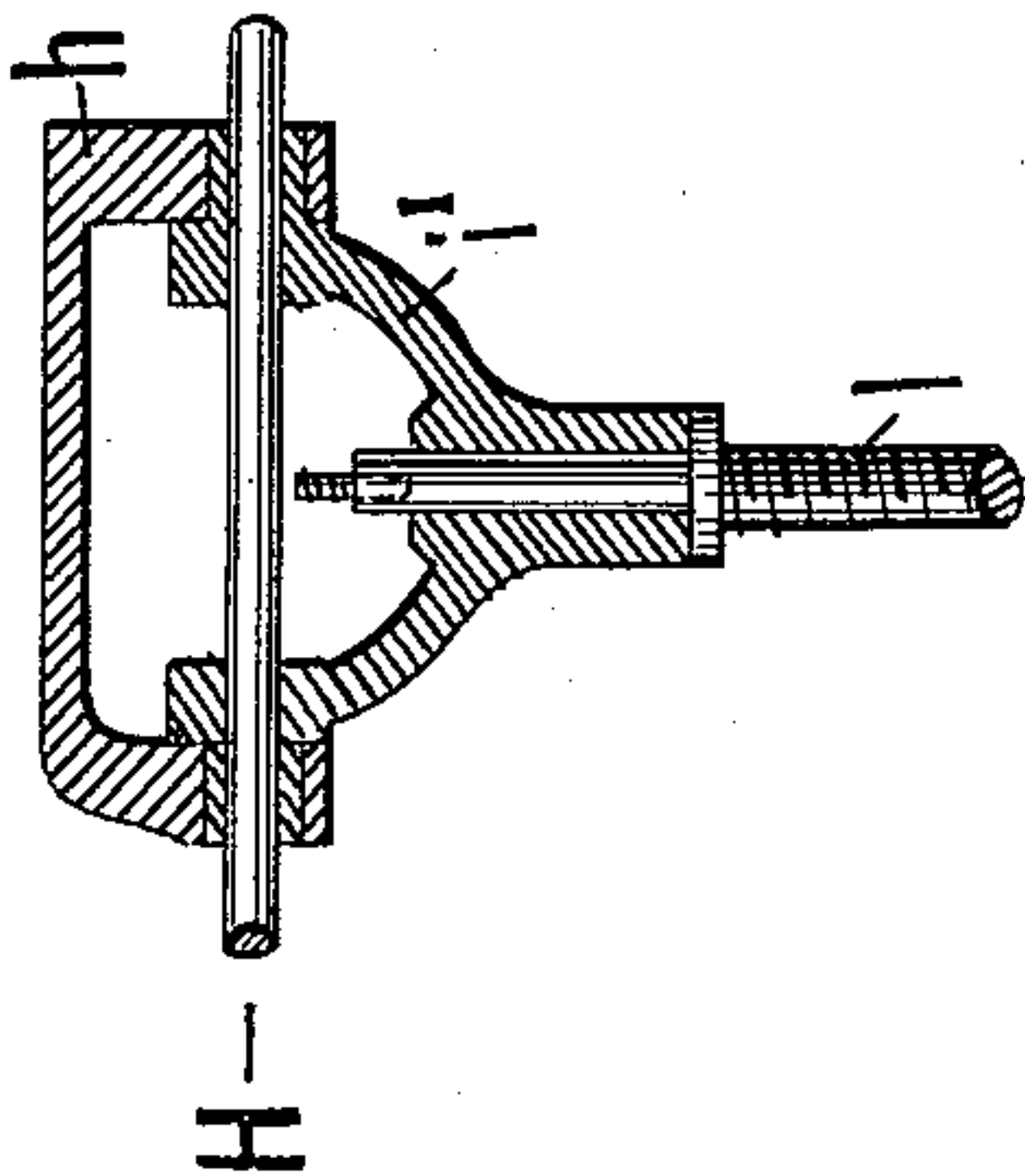


Fig. 5.



WITNESSES

E. P. Rider

Thos W Lull

INVENTOR

John H. Frenier by

H. W. Beadle & Co

Attorneys

(No Model.)

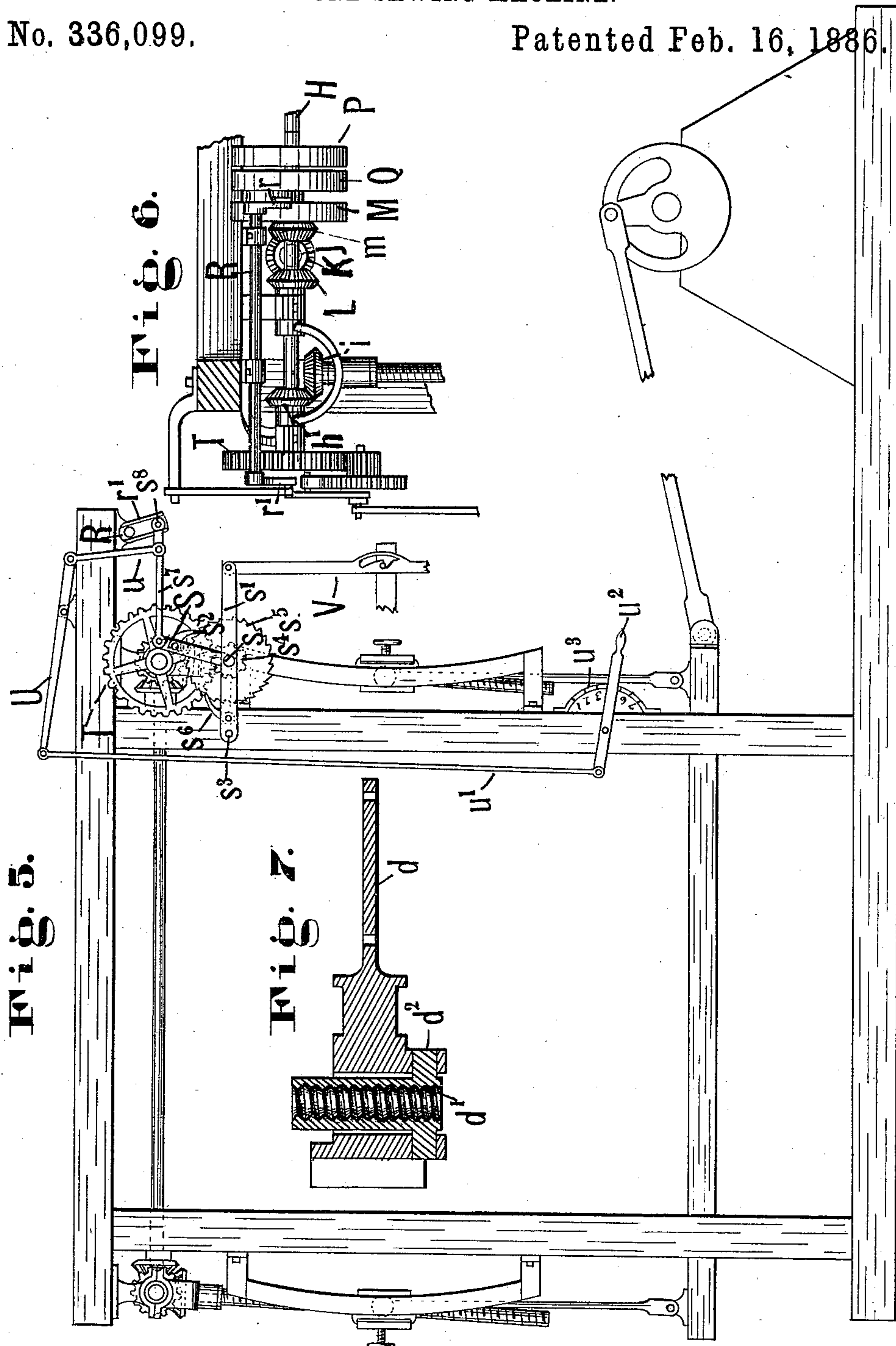
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UNITED STATES PATENT OFFICE.

JOHN HENRY FRENIER, OF RUTLAND, VERMONT.

STONE-SAWING MACHINE.

SPECIFICATION forming part of Letters Patent No. 336,099, dated February 16, 1886.

Application filed November 21, 1883. Serial No. 112,320. (No model.)

To all whom it may concern:

Be it known that I, JOHN HENRY FRENIER, a subject of the Queen of Great Britain, a resident of Rutland, county of Rutland, and State of Vermont, have invented certain new and useful Improvements in Stone-Sawing Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

This invention relates to that class of stone-sawing machines the members of which are each provided with a reciprocating saw-frame actuated by a crank and pitman, vertically adjustable cross-heads moving in fixed guides upon the frame, and pivoted suspension-rods uniting the cross-heads to the saw-frame to support the same properly in its swinging movement.

This invention has for its principal object the longitudinal adjustment or movement relative to a normal vertical line, of the cross-head suspension-bearings of the saw-frame in harmony or coincidence with the longitudinal adjustment or movement of the saw-frame itself as the latter changes its vertical position relatively to the crank and pitman. For convenience, the parts are said to be in their normal positions when the saw-frame is in the middle of its travel, and the suspension-rods and the suspension bearing-points of the saw-frame lie in the same vertical plane. The special longitudinal movement of the saw-frame above referred to results from the necessary travel of the end of the pitman attached to the saw-frame in the arc of a circle, when these parts, by the vertical movement of the cross-heads, are moved above or below the normal horizontal line. By causing the longitudinal movement of the suspension or supporting bearings of the frame coincidently with the longitudinal movement of the frame itself, the bearing-points are always held in line over the center of the arc of the frame's vibration, and hence all its movements are equal and uniform.

This invention has for its principal novelty, first, the combination, broadly, of the following elements: A reciprocating saw-frame having a varying longitudinal position relatively to a normal vertical line according to its vertical position relatively to the crank and pit-

man, vertically-adjustable cross-heads having suspension bearings and rods for supporting the saw-frame, and curved guides upon the main frame, substantially as described, adapted in the vertical movement of the cross-head suspension bearings, and the frame to give to the bearings a longitudinal movement coincident with the longitudinal movement of the frame; and, second, certain other combinations and details of construction relating to this feature of the invention.

This invention has for its subordinate novelty certain mechanisms for feeding the frame and saws to the stone, and also for quickly adjusting the frame vertically into any desired position.

In the drawings, Figure 1 represents a side view of my improved machine; Fig. 2, an end view of the same; Fig. 3, an enlarged view of one of the bearings, *h*, employed in connection with the vertical screw-shaft *I*; Fig. 4, a modified form of guide-bar; Fig. 5, a side view of a machine having the improved form of mechanism applied thereto; Fig. 6, a sectional end view of the main frame with the feeding mechanism attached thereto, and Fig. 7 a sectional view of one of the cross-heads enlarged.

To enable others skilled in the art to make my improved machine, I will proceed to describe fully its construction and the manner of its operation.

For convenience and clearness, the description relating to the construction will be divided into two parts, as follows: first, that relating to the main feature of the invention--that is, the mechanism for causing the coincident longitudinal movement of the suspension-bearings of the saw-frame and the frame itself when the vertical position of the parts is changed; and, second, that relating to the mechanism for feeding the frame and saws to the stone, and the quick adjustment of the saws in any desired position.

First, the mechanism for causing the coincident longitudinal movement of the suspension-bearings of the saw-frame and the frame itself when the vertical position of the parts is changed. *A A*, Figs. 1 and 2, represent vertical posts; *B*, Fig. 1, the foundation-plate or bed, and *C C* upper beams constituting a frame-work of proper solidity and strength. *D D*, Figs. 1, 2, and 7, represent cross-heads

of any proper construction, which are united by the transverse bar *d*, Fig. 2, to form practically a single structure, as shown. These cross-heads are supported from the upper part of the frame-work by any proper means in such manner as to be capable of vertical adjustment when desired. *E* represents the saw-frame, and *ee* pivoted suspension-rods uniting the cross-heads to the saw-frame in such manner as to support the same properly in its swinging movement. *e'*, Fig. 1, represents the bearings of the saw-frame, to which the pitman is attached. *F*, Fig. 1, represents the crank, and *f* the pitman or connecting rod uniting the crank to the arm-bearing *e'* of the saw-frame, as shown. *G G* represent curved plates, bars, or frame-pieces of any proper construction fixed upon the frame-work in such manner as to cause the cross-head suspension-points to move in the arc of a circle when they are raised or lowered by the actuating mechanism. The radius of this arc equals the length of the pitman-rod, and it consequently coincides with the arc of the circle described by the end of the pitman-rod attached to the saw-frame, but is located above the same a certain distance, so that the center of the arc coincides horizontally with the middle of the vertical travel of the cross-heads. The operation of these parts is substantially as follows: When the parts are in their normal positions—that is, when the saw-frame is in the middle of its travel and the suspension-rods and suspension bearing-points are in the same vertical plane—the saw-frame, when actuated, swings in the arc of a circle, and the lower ends of the suspension-rods have an equal vibration upon each side of the center of the arc in which it moves. By this action the saws are lifted from the stone at the end of the swing, in the manner well understood, and consequently the sand and water necessary for the proper performance of the sawing action is readily introduced. This uniform swing of the saw-frame, which naturally results when the parts are in their normal positions, must also be secured to obtain the proper results when the frame is above or below the normal horizontal line. When, therefore, the saw-frame by the movement of the cross-heads is raised, for example, above the normal horizontal line, the bearing-arm *e'* and the attached end of the pitman *f* are swung in the arc of a circle, in the manner well understood. By this swinging movement the saw-frame in addition to its vertical movement is carried in a longitudinal direction relatively to a normal vertical line. By means of the curved guides, however, the suspension bearing-points of the saw-frame are moved coincidently with it in a longitudinal direction; and hence the vertical line through the suspension bearing-points and the suspension bearing-rods remains unchanged. The uniformity of the swing of the saw-frame is thus maintained in all its vertical positions. Any suitable means may be employed to give the cross-heads their proper

vertical movement. If desired, the guides may be provided with teeth, as shown in Fig. 4, and the cross-heads be moved thereon by means of any proper gearing located on the cross-heads. A preferred form of mechanism, however, shown in Figs. 1, 2, and 3, will now be described. *H H*, Figs. 1, 2, and 3, represent transverse shafts supported near their ends by any proper bearings *h*, Fig. 3, bolted to the frame-work, as shown in Fig. 2. *h' h'* represent bevel gear-wheels rigidly secured to each shaft near the end of the same, as shown. *I I* represent vertical shafts or screws, two at each end of the machine, or only one at each end, as may be required, each of which is provided at its upper end with a bevel gear-wheel, *i*, as shown. *i' i'*, Figs. 2 and 3, represent bifurcated or forked pieces, having trunnion-bearings on the shaft *H*, as shown. The upper ends of the vertical screws or shafts *I* are secured in these bearings in such manner as to be capable of revolution. The bevel-gears *h* and *i'* engage with each other in the manner well understood. The vertical shafts *I* having proper screw-threads extending through proper threaded openings in the cross-heads *D D*, as shown, a nut, *d'*, Fig. 7, is preferably employed in each opening, and this nut is adapted to swing or rock in the cross-head by means of a ball-and-socket joint or trunnion-bearing, *d''*, as shown. The vertical movement of the cross-heads upon the curved guides imparts a swinging movement to the nuts *d'* and the screws *I I*, the movement of the latter being permitted by the trunnion-bearings on the shaft *H*. The lower ends of the screws are at their extreme swing one way when the cross-heads are at the middle of the curved guides, and at the extreme the other way when the cross-heads are at either end of the curved guides. *J*, Figs. 1 and 2, represents a longitudinal shaft having bevel-gear *K*, engaging with the bevel-gear *L* on shafts *H*, to cause all the shafts to move in harmony. The operation is substantially as follows: Proper movement having been communicated in any suitable way to the system of horizontal shafts, the vertical shafts are thereby caused to revolve, and actuate, by means of the screw-threads, the cross-heads, and consequently raise and lower the saw-frame in the manner well understood.

Second, the mechanism for quickly moving the saw-frame into any desired vertical position, and the mechanism for feeding the frame and saws to the stone. For convenience and clearness these mechanisms, although intimately connected, will be described separately.

Part A.—The mechanism for quickly moving the saw-frame into any desired vertical position. *M*, Fig. 6, represents a pulley loosely held on one of the cross-shafts *H*, or any other convenient shaft, and *M* a bevel gear-wheel rigidly secured thereto. *K*, Figs. 2 and 6, represents a bevel gear-wheel upon the shaft *J*, which engages with the bevel gear-wheel

m on loose pulley *M*, and also with bevel-gear *L*, rigidly secured to shaft *H*. *h'* represents the bevel gear-wheel on the shaft *H*, before referred to, and *i* the bevel gear-wheel upon the vertical shaft *I*, before referred to. By means of this construction the quick movement of the pulley *M* is communicated to the shaft *H* through the intermediate set of gear-wheels described, in such manner as to revolve the shaft in a direction opposite to that in which the pulley moves. By these revolutions the cross-heads and saw-frame are quickly moved in one direction any desired distance. *P* represents a pulley rigidly secured to the shaft *H*. By means of this pulley a quick movement is communicated to the shaft in the same direction as that in which the pulley revolves. By the action of this pulley the cross-heads and saw-frame are quickly moved any desired distance in a direction opposite to that resulting from the movement of the pulley *M*. By means then of the pulleys *M* and *P*, and the system of gearing described, a quick movement in either direction may be communicated to the cross-heads and saw-frame when it is desired to adjust the same properly in relation to the stone. When it is desired to arrest the movement of pulley *M* or *P*, the belt is shifted to pulley *Q*, which is loose on shaft *H*, and all movement consequently ceases, because pulley *Q* at this time is not acting on the feeding mechanism, the parts having been disconnected by the rod *V*, as will be hereinafter described.

Part B.—The mechanism for feeding the saw-frame and saws to the stone. *Q*, Fig. 6, represents a pulley loose upon the shaft *H*, which is provided with any proper eccentric for actuating the arm *r* of rock-shaft *R*, which is connected with the eccentric as shown, or in any other suitable manner. *r*, Figs. 5 and 6, represents a crank upon the end of the rock-shaft, which is provided with a longitudinal slot extending its entire length, as shown in Fig. 1. *S*, Fig. 6, represents a lever pivoted on the stud *s* upon the frame or bar *s'*, which lever is provided with a pawl, *s²*, as shown, pivoted thereon at any suitable point. *s¹* represents a rod attached at one end to the free end of the lever *S*, and at the other to the crank *r* by means of a crank-pin, *s³*, resting in the slot, as shown. The crank-pin *s³* may be provided with a friction-roller or any other proper means of obtaining an easy movement of the pin in the slot of the crank. *u* represents a connecting-rod, hereinafter referred to, by means of which rod and its attachments the free end of the connecting-rod *s¹* and the crank-pin *s³* are properly supported. The frame or bar *s'* is itself pivoted at the point *s³* on the main frame. *s* represents a shaft or stud held in the frame or bar *s'*, which serves as the pivot-point of the lever *S*, and upon which is located the pinion *s⁴*, fast to ratchet-wheel *s⁵*, as shown. *T* represents a gear-wheel upon the shaft *H*, which engages with the pinion *s⁴*, as shown. The pawl *s²* on the lever *S* engages with the ratchet-

wheel *s⁵* upon the shaft or stud *s*, as shown. *s⁶* represents a stop-pawl on the bar *s'*, by means of which the ratchet-wheel *s⁵* is held against return movement. *U* represents a lever pivoted upon any suitable part of the frame, which is connected at one end by the rod *u¹* to the lever-handle *u²*, as shown, and at the other to the rod *u*, before referred to. *u³* represents an index-plate of any suitable shape, having teeth or other proper means adapted to hold the lever in any position in which it may be adjusted, and also provided with figures on its face corresponding with the number of teeth, to indicate the degree of feed required for different qualities of stone. *V* represents a rod attached to the free end of the frame or bar *s'*, which is provided with a hook adapted to engage with any proper catch upon the frame or other stationary part.

The operation of the feeding mechanism is substantially as follows: Movement having been communicated to the pulley *Q*, the eccentric located thereon is caused to impart a rocking motion to the arm *r* of the rock-shaft *R*, to give to the free end of the crank *r* a reciprocating movement. By this action the free end of the rod *s¹*, with crank-pin held in the slot of the crank *r*, is also reciprocated, and with it the lever *S* and its pawl *s²*, which latter is thereby caused by the swinging action of the lever on its pivot *s* to actuate the ratchet-wheel *s⁵*. By the movement of the ratchet-wheel, the pinion *s⁴* on the same stud or shaft, by its engagement with the gear-wheel *T*, is caused to revolve the shaft *H*, and through the shaft *H* and the bevel-gears *h'* and *i*, before described, the feeding-screw shafts *I* in the manner well understood. By the movement of the lever-handle *u²*, through the intermediate lever-connections described, the crank-pin *s³* of the rod *s¹* may be adjusted vertically in the slot of the crank *r*, to obtain a longer or shorter throw, as may be desired. By increasing or diminishing the distance traveled by the crank-pin in each reciprocation, the distance moved by the pawl on the lever *S*, and the ratchet-wheel engaging therewith is also increased or diminished, and, consequently, also the distance moved by the feeding-screws and saw-frame.

When it is desired to disconnect the feeding mechanism to permit the quick movement of the cross-heads, the hook of rod *V* is disengaged from its top in such manner that the frame *s'* may be lowered, and the pinion *s⁴* being thereby disconnected from the gear-wheel *T*.

Some of the advantages resulting from the use of my invention are as follows: By the employment of the curved guides in connection with the vertically-moving cross-heads or saw-frame supporting mechanism in the manner described, a perfectly uniform swing is obtained in all the positions of the saw-frame. By the employment of a slotted crank and adjustable crank-pin in connection with the feeding mechanism, as described, a quick or slow feed may be readily obtained, according

to the varying degrees of hardness in the stones subjected to the sawing action. By the use of the index the degree of feed is always indicated to the operator. The shaft R may
5 be rocked by any suitable means. This special feeding mechanism is applicable to other kinds of stone-sawing machines than that herein described.

Having thus fully described my invention,
10 what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, broadly, of the following elements: a reciprocating saw-frame having a varying longitudinal position relatively
15 to a normal vertical line, according to its vertical position relatively to the crank and pitman, vertically-adjustable cross-heads having suspension bearings and rods for supporting the saw-frame, and curved guides upon
20 the main frame, substantially as described, adapted in the vertical movement of the cross-head suspension-bearings and the frame to give to the bearings a longitudinal movement coincident with the longitudinal movement of
25 the frame.

2. In combination with the curved guides, substantially as described, adapted in the vertical movement of the cross-head suspension-bearings and the frame to give the bearings a longitudinal movement coincident with
30 the longitudinal movement of the frame, the cross-heads D D, the vertical feeding shafts or screws I I, and the system of gearing for actuating the same.

3. In combination with the curved guides, substantially as described, adapted in the vertical movement of the cross-head suspension-bearings and the frame to give the bearings a longitudinal movement coincident with the longitudinal movement of the frame, the feeding
40 mechanism, substantially as and for the purpose described.

4. In combination with a slotted crank, substantially as described, a crank-pin adapted
45 for adjustment in the slot of the crank, as described.

5. In combination with the rock-shaft R, having a slotted crank, the rod s^7 and adjustable crank-pin s^8 , the lever S, with pawl s^2 ,
50 and frame s^1 , having the ratchet-wheel s^5 , and pinion s^4 , engaging with the gear-wheel T, substantially as described.

6. The combination, with a reciprocating

saw-frame suspended by rods $e e$, all set above said saw-frame and arranged to impart a rising motion at each end of the stroke, of curved
55 guides set and arranged in the main frame, substantially as described, and the means, substantially as described, connected to the cross-heads D D and connected with and operated by the shaft H, for imparting to said
60 cross-heads a positive movement up or down, and arranged to swing on shaft H when said cross-heads move up or down on the curved guides, substantially as described. 65

7. The combination of a reciprocating saw-frame having a varying longitudinal position relatively to a normal vertical line, according to its vertical position relatively the crank and pitman, of curved guides upon the main
70 frame, substantially as described, adapted to impart to the saw-frame-supporting mechanism a longitudinal movement coincident with the longitudinal movement of the saw-frame, as described. 75

8. In combination with a slotted crank, an adjustable crank-pin, a pawl-carrying lever, substantially as described, and lever mechanism, substantially as described, for adjusting
80 the crank-pin in the slot.

9. In a feed mechanism for stone-sawing machines, the combination, with a rocking slotted crank, of an adjustable crank-pin adapted to move in the slot of the crank, and a stationary index for indicating the rapidity
85 of the downward feed of the saw-frame.

10. In combination with a slotted crank, an adjustable crank-pin, and a pawl-lever and ratchet-wheel having their length of movement determined by the position of the crank-pin in the slot, substantially as described. 90

11. In combination with a slotted crank and adjustable crank-pin, a pawl-lever, and ratchet-wheel, having their length of movement determined by the position of the crank-pin in
95 the slot, and a stationary index-plate with lever-handle indicating the length of the feed-movement, substantially as described.

In testimony that I claim the foregoing I have hereunto set my hand in the presence of
100 two witnesses.

JOHN HENRY FRENIER.

Witnesses:

P. H. BRASSARD,
F. W. HUDSON.