A. E. DE KONING.

SAWING MACHINE.

APPLICATION FILED MAY 28, 1918.

1,364,356.

Patented Jan. 4, 1921.

3 SHEETS—SHEET 1.

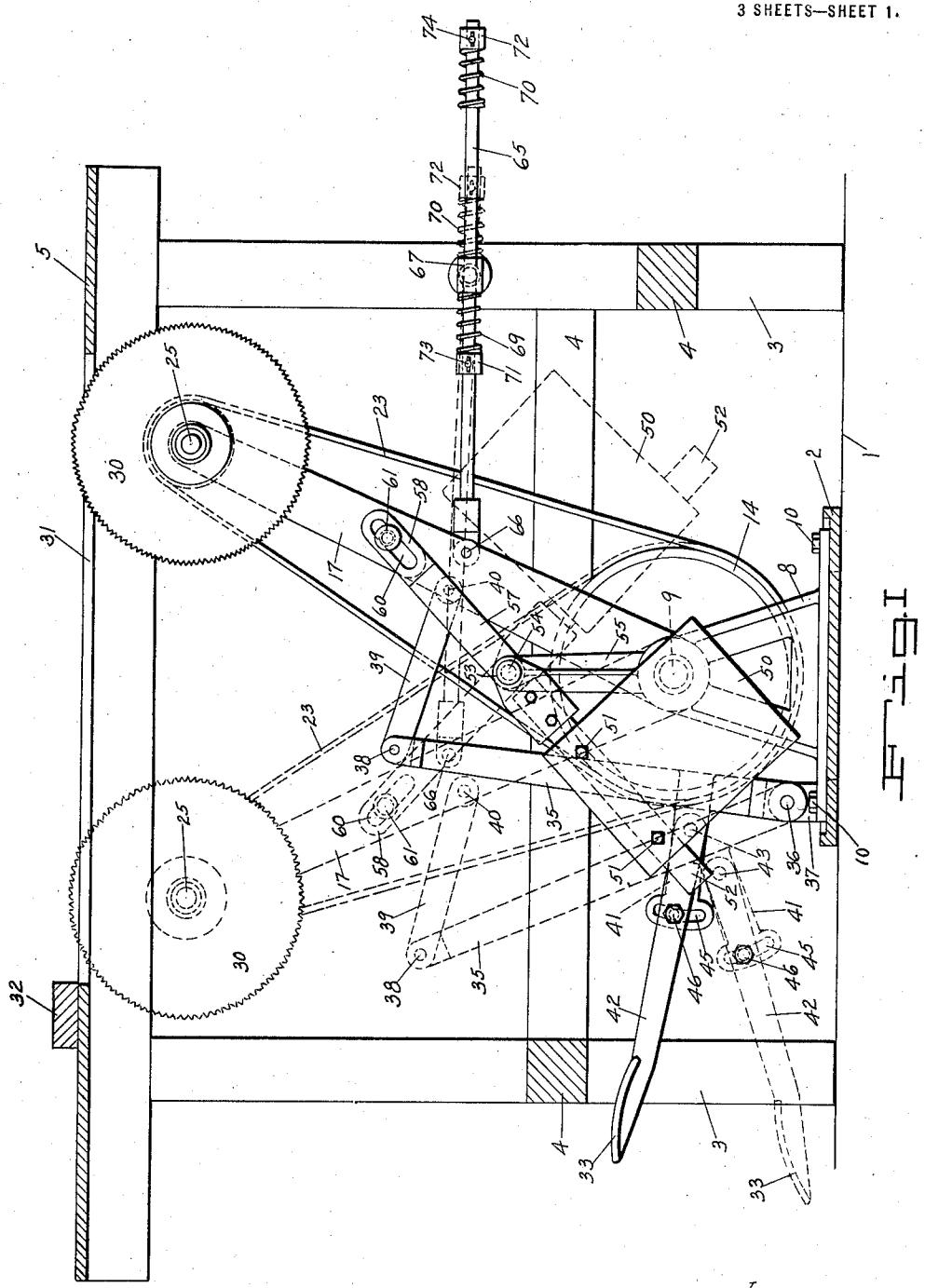


Fig. 1.

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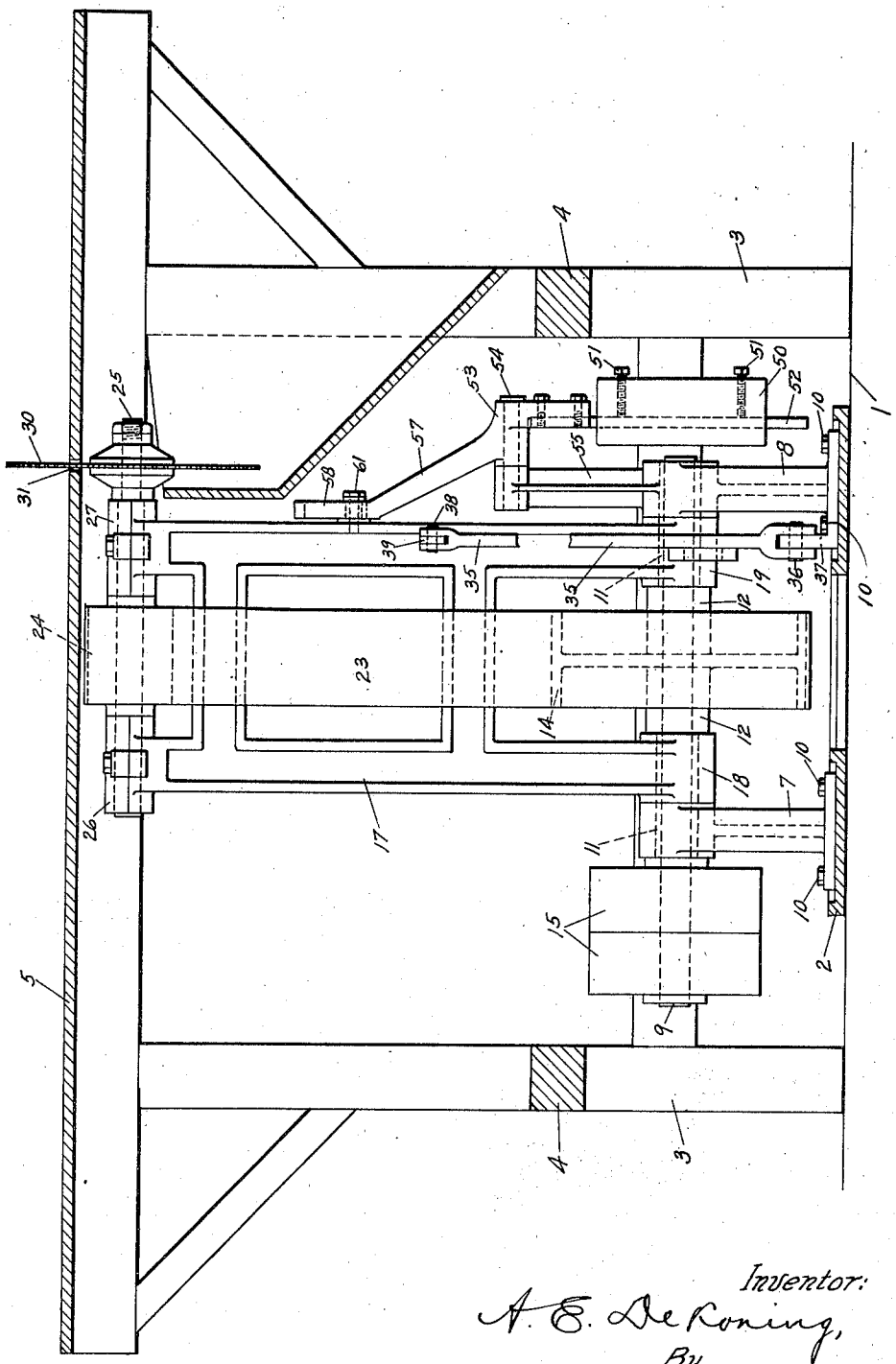


Fig. 2.

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3 SHEETS—SHEET 3.

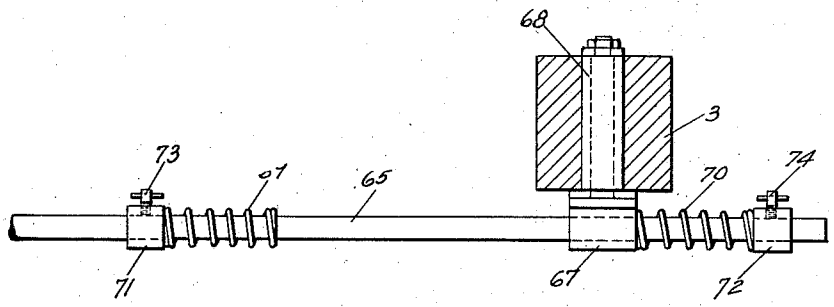


Fig. III

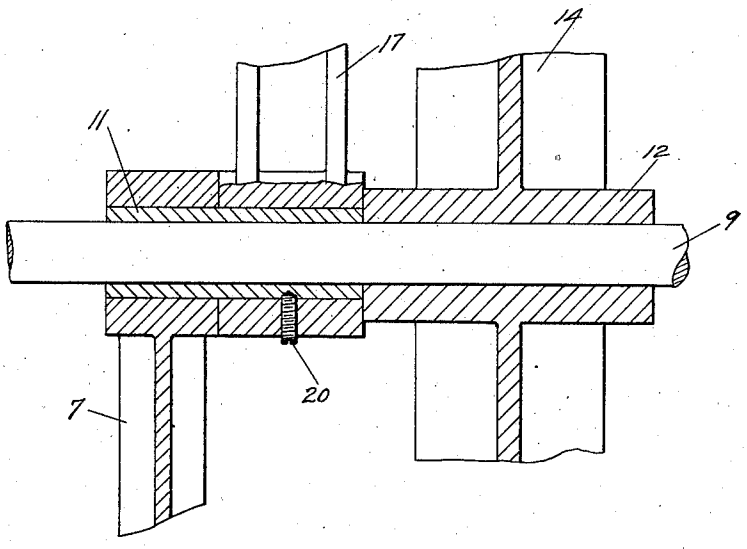


Fig. IV

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UNITED STATES PATENT OFFICE.

ARTHUR E. DE KONING, OF PORTLAND, OREGON.

SAWING-MACHINE.

1,364,356. Specification of Letters Patent. Patented Jan. 4, 1921.

Application filed May 28, 1918. Serial No. 237,163.

To all whom it may concern:

Be it known that I, ARTHUR E. DE KONING, a citizen of the United States of America, residing in the city of Portland, in the county of Multnomah, in the State of Oregon, have invented certain new and useful Improvements in Sawing-Machines, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to that class of machines for sawing wood in which a circular saw is mounted on a swinging frame whose swinging motion is subject to the control of an operator, preferably a foot-control.

My machine is adapted to be used for different kinds of work, but since the various uses to which it is applicable will be apparent to one skilled in the art, and since all its functions are exercised in its operation as a cut off sawing-machine, it appears to be unnecessary, herein, to specify it in reference to any other operation.

An important object of my invention is to provide in a machine of the class described means for facilitating the operation of the machine and rendering it true, accurate, prompt, and responsive to the will of the operator, whereby the capacity of the machine is greatly increased, the quality of its work improved, and the ease of operation augmented.

The above and other objects of my invention are explained in the following specification, wherein what constitutes my invention is first described in detail and afterward succinctly set forth in the appended claims.

In the accompanying drawings,

Figure I is a side elevation partially in section of my invention in present preferred form of embodiment, showing, in full lines, the machine at rest, and, in dotted lines, the position of the various parts of the machine at the moment when a full stroke of the saw-carrying frame is accomplished.

Fig. II is a front elevation partially in section of the subject matter of Fig. I.

Fig. III is a detached detail view illustrative of the adjustable spring cushions for the quick return mechanism of the saw-carrying frame.

Fig. IV is a side elevation of a portion of the main driving shaft, showing in section the saw-carrying-frame sleeve thereon, and portions of the elements next adjacent thereto.

Referring to the numerals on the drawings, 1 indicates a horizontal base upon which is fixed a base-plate 2, and uprights 3 of a frame that preferably comprises also cross pieces 4 and a table top 5. The base 1 may be the floor of a building, for example, or it may be a part of a structure that includes both it and the uprights 3, and thereby lends the convenience of portability to the machine into which it enters.

The base-plate 2 should be of suitable weight, shape, and dimensions to accommodate pillow-blocks 7 and 8 within which, on suitable bearings, is mounted a main driving shaft 9. Bolts 10 serve to secure the pillow-blocks and base-plate 2 together and to fasten them to the base 1. The shaft 9 is carried by sleeves 11 (see Fig. IV) between which abuts the hub 12 of a pulley 14. Pulleys 15 on one end of the shaft 9 represent, by way of example only, one means of communicating driving power to the shaft 9.

The sleeves 11 are provided in order to afford upon the shaft 9, without interfering with its rotative motion, accommodation with rocking motion for a saw-carrying frame 17. Hubs 18 and 19 that fill the respective spaces about the shaft 9 between the pillow-blocks 7 and 8 and the intermediate hub 12 are provided upon the frame 17 whereby it is secured, as by set screws 20, one for each hub 18 and 19, to the sleeves 11. The presence of the said sleeves is not only made to accommodate the rotative motion of the shaft to an independent rocking motion of the frame 17 upon it, but also, by the contrivance that the rotation of the shaft 9 and the forward rocking motion of the frame 17 shall be in same direction, is made to cause the rotation of the shaft 9 to assist the forward rocking motion thereon of the frame 17. The sleeves also contribute firmness of support to the frame 17 and prevent its lateral motion. Toward the same result and for like reason a tight fitting belt 23, passing around the pulley 14 and a pulley 24 on a mandrel 25, also contributes, the mandrel being mounted in bearings 26 and 27 provided for it in the free end of the frame 17. 30 indicates a circular saw carried by the mandrel and working with each

vibration of the frame 17 through a slot 31 in the table top 5 back and forth toward a gage 32.

Vibration or rocking motion of the frame 17 is imparted by an operator at will, preferably through a treadle 33 projecting, in effect, forwardly from an upright lever 35 whose short arm is hinged as indicated at 36 to a stud 37 preferably incorporated as a part with the pillow-block 8. The long arm of the lever 35 is hinged as indicated at 38 with a link 39 hinged, as indicated at 40 to the frame 17. In order to accommodate the treadle 33 to the swing of the frame 17 through arcs of different lengths, I prefer to provide between the treadle and the lever 35, a two part shank comprising a fixed arm 41 extending from the lever 35 and a movable arm 42 hinged, as indicated at 43, to the arm 41 and adjustably securable thereto as by aid of an arcuate slot 45 and through a bolt 46. By the contrivance last described maximum availability for the leverage of the treadle 33 is provided under all conditions and irrespective of the length of the arc through which the frame 17 is made to swing.

The mechanism already described constitutes, within a certain sense, an incomplete operative assemblage of elements. To explain, if the shaft 9 be rotated at a proper rate of speed, the saw 30 may be made to cut material against which it is presented by pressure upon the treadle 33; but no provision is made in the machine so far as it has been described hitherto for interrupting the cutting operation or for restoring the saw to a starting position thereafter.

The necessity for some such mechanism is obvious. Heretofore in the art, a spring return has been used. By my invention, in addition to a special spring return mechanism which for its quick action I employ only as auxiliary means, I provide for the function indicated what may be termed a compensator. As I use it the term compensator denotes retroactive mechanism which includes a pendulous weight that resists by gravity the swing of the frame 17 in either direction away from a normal position, with a force that increases with the length of the arc through which the free end of the frame moves.

The effect of my compensator, therefore, is both to restore the frame 17 to its normal position each time after it completes a certain operation, which, by definite preadjustment, it is appointed to perform and also to equalize, throughout the swing of the arm 17, the force necessary to actuate it. The equalizing effect of the compensator is due to the shifting of its center of gravity during its backward and forward swing.

The practical result is that while the machine is in operation the frame 17, after determinate adjustment, continues to operate with a rhythmic stroke of definite length, one stroke following another with a motion that appears to be yielding but is not. It is a motion that is at once positive but unaccompanied by shock or jar.

My compensator comprises as an essential element a weight 50 and also means for applying it as a counterbalance to the frame 17. To the end last named I prefer to secure the weight 50 adjustably, as by means of set screws 51 to an arm 52 forming part of a crank 53 that is journaled upon an axle 54 having a fixed connection with the base-plate 2. A standard 55 extending, from the top of the pillow-block 8, affords a suitable and convenient support for the axle 54, from which the weight is, in effect, pendulously hung.

The longitudinal axis of the aperture provided in the weight 50 for the accommodation of the arm 52 is preferably disposed closely adjacent and parallel to one corner of the parallelepiped composing the weight, where two of its sides meet. The effect, as will appear upon due consideration of Fig. I, is to unequally distribute the weight and throw its preponderance against the working motion of the frame 17. Also, when the frame 17 is at rest, the center of gravity of the weight 50 gives to the arm 52 inclination from the vertical and fixes accordingly the position which the frame 17 then assumes.

In a plane diametrical to the center of the axle 54 and coincident with its axis and with that of the arm 52, an arm 57 extends in a direction opposite to the arm 52. The arm 57 is deflected, as shown in Fig. II, to bring its head 58 in parallel juxtaposition to the edge of the frame 17 to which it is loosely pivoted as by a longitudinally disposed slot 60 in the head 58 and a through bolt 61 headed and threaded into an aperture provided for it in the frame 17.

By the means described, whenever the frame 17 is tilted forwardly, which is toward the treadle 33, the weight 50 is projected rearwardly, with an increasing power as the saw 30 advances toward the front, due partly to increase of leverage obtained by rotation of the crank upon its axle and partly to the manner of disposition of the weight 50 upon the arm 52 which carries it.

It has been heretofore specified that in addition to the compensator I employ a special spring return mechanism. That mechanism preferably consists of a rod 65 hinged to the frame 17, as indicated at 66, and having its free end passed through and supported by an oscillating sleeve 67 swiveled as by a shank 68 let into an upright 3 or other member of the machine frame.

The rod 65 carries springs 69 and 70 disposed, respectively, upon opposite sides of the sleeve 67, being adjustably securable to

the rod as by set collars 71 and 72, respectively, and their respective set screws 73 and 74.

The following may be added by way of brief description of the operation of my machine to what has been previously specified.

The shaft 9 being in rotation the operator standing in front of the machine feeds the material to be cut upon the table top 5, as against the gage 32, for example.

To correspond to the position of the gage the collars 71 and 72 are properly fixed upon the rod 65, so that so much swing as may be necessary and no more may be imparted to the frame 17. By adjustment of the collar 71, the degree of vibration of the frame may be regulated and its normal position for any desired operation fixed.

Thereupon the operator lays the material to be cut upon the table top 5, and presses the treadle 33 with his foot. The effect is to cause the saw 30 to advance from its position shown in full lines in Fig. I toward that shown therein in dotted lines. A limit of advancement in that direction is imposed by impact of the spring 70 against the sleeve 67. A compression of the spring 70 follows initial impact, with the effect, of forcibly and suddenly reversing the movement of the frame 17 upon the instant that the treadle 33 is released. The effect of the spring return mechanism described in the last sentence is powerful but momentary, and must be augmented and carried forward by that of the compensator in order to secure that regularity and smoothness of action which in practice is accomplished by my invention. The operation of the weighted arm 52 is to tend normally to maintain the saw 30 and the swinging saw-carrying frame 17 in a rearward position, whose location may be varied by adjustment of the weight 50 upon the arm 52 or by adjustment of the collar 71 and the spring buffer 69. Consequently, as the saw 30 is brought forward by the swinging of the frame 17 produced by pressure on the treadle 33, said weight 50 counterbalances the weight of the saw and of the saw-carrying frame, with the effect of reducing the effort necessary to swing said frame and the saw it carries from a position in rear of the vertical to the vertical. When, however, the frame 17 passes the vertical, the weight, through change of its position effected by the swinging of said frame, tends to counterbalance the tendency of saw, due to its own weight and that of its frame 17, to swing forward or to drop from the vertical after passing the same. The weight 50 operatively connected as it is by the mechanism which supports it with the frame 17 is therefore a compensator, in that it compensates for the effect of the weight of the saw-carrying frame varying as it does on opposite sides of its vertical position, while at all times preserving the effect of a counterweight to restore the saw to its normal rearward position wherever pressure on the treadle 33 is relieved sufficiently to admit thereof. The compensator, accordingly, working as has been specified by descent of the weight 50, imparts oscillation to the frame 17 about the shaft 9 and drives it toward the limit of its backward swing. A limit thereto is fixed by adjustment of the collar 71 upon the rod 65, and from that limit return of the frame 17 under a fresh impulse from the treadle 33 is facilitated by the action of the spring 69 working with expansive effect between the said collar and the sleeve 67.

By my invention a sensitively balanced saw-carrying frame is obtained, which is nevertheless strong, firm, and rigid, in effect, and is, however delicate in action, entirely dependable and durable in service.

What I claim is:

1. The combination with a support, of a swinging saw-carrying frame on said support, a saw carried by said frame, means for swinging said frame, and means associated with said frame serving to oppose the downward and assist the upward movements of the frame, and also serving to return the frame to its normal position at one end of its swinging working stroke from any other position.

2. The combination with a support, of a swinging saw-carrying frame on said support, a saw carried by said frame, means for swinging said frame, and a weight associated with said frame serving to oppose the upward and assist the downward movements of the frame, and also gravitationally acting to return the frame to its normal position at one end of its swinging working stroke from any other positoin.

3. The combination with a support, of a swinging saw frame pivotally mounted upon said support, a saw carried by said frame above the axis of the frame, and a weight associated with said frame serving always to assist the upward and oppose the downward movements of the frame, and also gravitationally acting to return the frame to its normal position at one end of its swinging stroke from any other position.

4. The combination with a support, of an oscillatable saw-carrying frame pivotally mounted upon said support, a saw carried by said frame, a lever pivoted independently of said frame but having a loose pivotal connection therewith, an arm on said lever and a weight on said arm positioned so as to serve always to assist the upward movement and retard the downward movement of said frame, and also to return the frame to a normal position at one end of its oscillatory path in said support from any other position.

5. The combination with a support, of an oscillatable saw-carrying frame pivotally mounted upon said support, a saw carried by said frame above the axis of the frame, a lever pivoted independently of said frame but having a loose pivotal connection therewith, an arm on said lever and a weight on said arm positioned so as to serve always to assist the upward movement and retard the downward movement of said frame, and also to return the frame to a normal position at one end of its oscillatory path in said support from any other position.

6. The combination with a support, of an oscillatable saw-carrying frame pivotally mounted upon said support, a saw carried by said frame, a lever pivoted independently of said frame but having a loose pivotal connection therewith, an arm on said lever and a weight on said arm positioned so as to serve always to assist the upward movement and retard the downward movement of said frame, and having its center of gravity to one side of the longitudinal axis of said arm toward the normal or rearward position of the saw-carrying frame at one end of its oscillatory path, thereby serving to return the frame to this position from any other position.

7. The combination with a support, of an oscillatable saw-carrying frame pivotally mounted upon said support, a saw carried by said frame above the axis of the frame, a lever pivoted independently of said frame but having a loose pivotal connection therewith, an arm on said lever and a weight on said arm positioned so as to serve always to assist the upward movement and retard the downward movement of said frame, and having its center of gravity to one side of the longitudinal axis of said arm toward the normal or rearward position of the saw-carrying frame at one end of its oscillatory path thereby serving to return the frame to this position from any other position.

8. The combination with a support, of an oscillatable saw-carrying frame pivotally mounted upon said support, a saw carried by said frame, a lever pivoted independently of said frame but having a loose pivotal connection therewith, an arm on said lever and a weight secured to said arm on the opposite side of the lever fulcrum from its connection to said frame positioned so as to serve always to assist the upward movement and retard the downward movement of said frame, and also to return the frame to a normal position at one end of its oscillatory path in said support from any other position.

9. The combination with a support, of an oscillatable saw-carrying frame pivotally mounted upon said support, a saw carried by said frame above the axis of the frame, a lever pivoted independently of said frame but having a loose pivotal connection therewith, an arm on said lever and a weight secured to said arm on the opposite side of the lever fulcrum from its connection to said frame positioned so as to serve always to assist the upward movement and retard the downward movement of said frame and also to return the frame to a normal position at one end of its oscillatory path in said support from any other position.

10. In a machine of the kind described, the combination with a support and a frame mounted to swing thereon, of a saw mandrel operatively mounted on the free end of said frame, means for swinging the frame at will, a crank pivotally supported in operative relationship to said frame and having one arm depending therefrom and an oppositely extending arm loosely pivoted to said frame, and a weight carried by the said depending arm and adjustable lengthwise thereof, said weight being a parallelepiped and having connection with said arm in lines closely adjacent and parallel to a corner thereof where two of its sides meet.

11. The combination with a support, a saw-carrying frame swinging upon said support, and a saw carried by said frame above said support, of a lever pivoted independently of said frame, but having a loose pivotal connection therewith and having a depending arm, and upon said arm a weight whose center of gravity is to one side of the longitudinal axis of said arm toward the normal or rearward position of the saw-carrying frame.

In testimony whereof, I have hereunto set my hand in the presence of two subscribing witnesses.

ARTHUR E. DE KONING.

Witnesses:
JOSEPH L. ATKINS,
JOHN B. CLELAND.