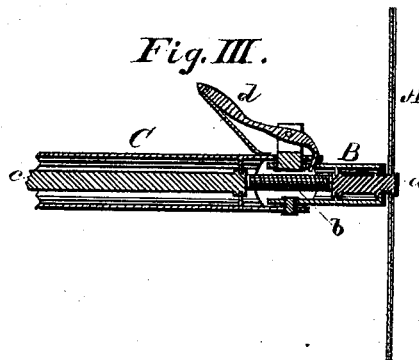
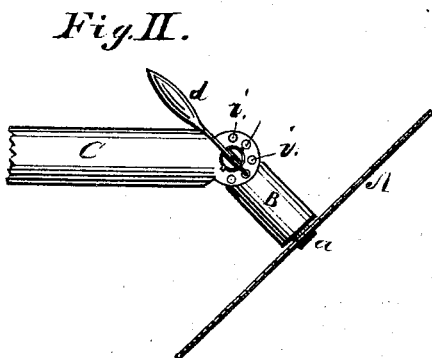
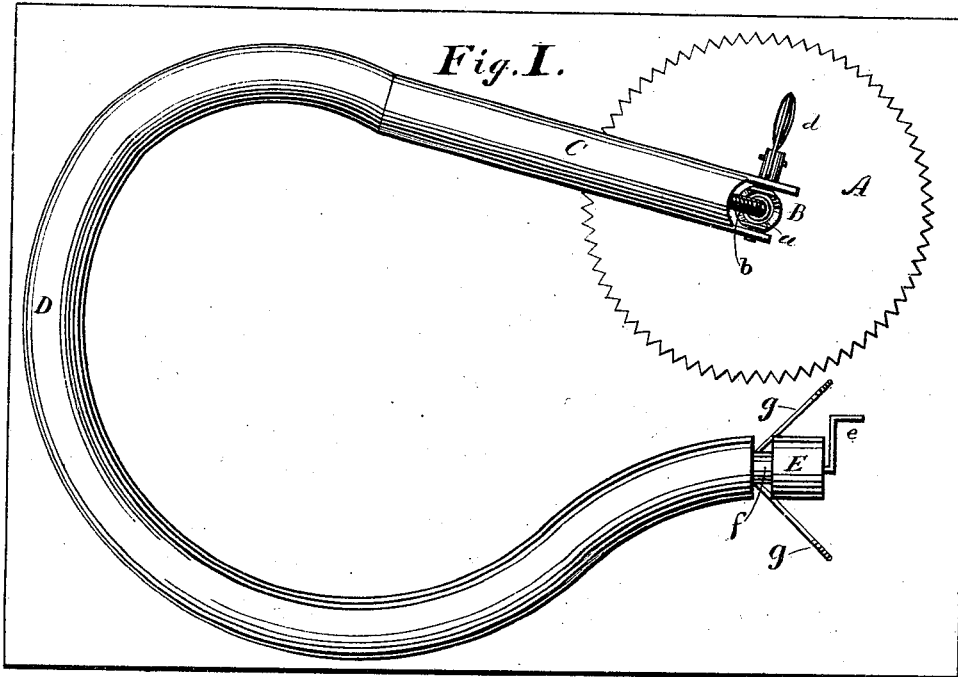


F. HAMILTON.
Hanging Circular Saw.

No. 196,893.

Patented Nov. 6, 1877.



WITNESSES.

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FRANK HAMILTON, OF WASHINGTON, DISTRICT OF COLUMBIA.

IMPROVEMENT IN HANGING CIRCULAR SAWS.

Specification forming part of Letters Patent No. **196,893**, dated November 6, 1877; application filed August 9, 1877.

To all whom it may concern:

Be it known that I, FRANK HAMILTON, of the city of Washington, in the District of Columbia, have invented a new and useful Improvement in Sawing-Machines, which improvement is fully set forth in the following specification and accompanying drawing, in which—

Figure I is a plan view of my sawing-machine when cutting horizontally. Fig. II is a plan view of the connecting-joint, hereinafter mentioned, when the saw-blade is vertical and cutting at an angle of forty-five degrees to the direction of the handling-sleeve. Fig. III is a sectional view of the connecting-joint when in the same position as in Fig. I, except that the saw-blade is at a right angle to the handling-sleeve.

The object of my invention is to furnish a universal saw which may be readily operated in any direction and distance from the driving-power, which will cut horizontally, vertically, or at any intermediate angle, and also parallel to, or at any angle from, the direction of the handling-sleeve, and be readily changeable at the will of the operator from any of these directions to any other while in motion, and which will be powerful, portable, and easily managed.

In the drawings, A is the saw-blade; *a*, a short rigid shaft fastened to it and resting on bearings in the short sleeve B; *b*, a short flexible shaft joined at one end to shaft *a*, and at the other to a longer rigid shaft, *c*, which rests upon bearings in the handling-sleeve C, to which the short sleeve B is hinged, being held in position, as hereinafter described, by means of the lever *d*. The shaft *c* is connected to the driving-power by means of a flexible shaft, made of a coil or coils of wire, revolving within the flexible covering D, this flexible shaft being directly attached to the driving-pulley E. The coils of this shaft may be wound upon each other in opposite directions, the thickness of wire increasing with the number of coils, which is graded to suit the amount of power required. The ends of all the coils are then brazed together, forming a single shaft.

The hand-crank *e* merely illustrates a mode of causing the shaft to revolve; but in general practice the pulley would be employed as a

means of imparting greater velocity to the saw.

The pulley-shaft may revolve in a bearing, *f*, supported on legs *g*, or in any other convenient manner.

The connecting-joint, by which the sleeve B is attached to the sleeve C, and held firmly in any desired position, is made as follows: The adjacent ends of the sleeves B and C are partially cut away, as shown in Fig. I, to allow room for the flexible shaft *b* to work when at right angles, and the remaining sides of each cut-away part are flattened and pivoted or hinged to the corresponding sides of the opposite sleeve, one of the pivots being fast to sleeve B and working freely in sleeve C, and having the lever *d* pivoted to it. On one end of this lever is a pin which fits into any one of a series of holes, *i*, in sleeve C, arranged in the form of a semicircle around the pivot, and also into a hole in sleeve B directly back of the pivot. Near the other end of the lever is a spring which holds the pin in place.

Instead of the ends of the sleeves B and C being cut away to form the joint, ends properly cast or constructed may be welded or otherwise attached to the sleeves for this purpose.

The saw is revolved by means of the direct communication between the saw-blade and the driving pulley above mentioned, consisting of the flexible and straight shafts. It is supported by the shaft *a* resting on bearings in the sleeve B, and having collars each side the bearings, so as to support the saw-blade when horizontal, the sleeve B being hinged to the sleeve C, which is held in the hands of the operator. Handles are fitted to the sleeve C at convenient places, in actual practice, for its better management.

The saw is operated in any direction from the driving-power (and at any distance, dependent upon the length of the flexible shaft) by simply shifting the end of the long flexible shaft to which the saw is attached to any desired point, the driving-power remaining stationary.

The saw is made to cut horizontally, vertically, or at any intermediate angle by merely turning the sleeve C around the shaft *c*. This sleeve, even when the sleeve B is at a right an-

gle to it, can be revolved around the shaft an indefinite number of times without obstructing the working of the saw.

The relative direction of the saw-blade to the sleeve C is changed by pressing down the lever *d*, which withdraws the pin that holds the saw in position, and turning the lever till the pin is directly back of the required hole in the sleeve C, and then letting go. The lever being connected to the sleeve B, as heretofore described, it forms a lever by which the saw is turned and the straightening tendency of the flexible shaft *b* controlled. There may be two of these levers on directly-opposite sides of the sleeve C, if desired, for additional firmness. This connecting-joint may be replaced by right-angle gearing, if desired.

It is obvious that the long flexible shaft may run through the long sleeve C, and connect directly with shaft *a*, if desired, thus doing away with the shaft *c*; and also that any other flexible shaft may be used instead of coils of wire, as a series of straight shafts, connected by universal joints or short flexible shafts, or both.

There will, in practice, be a fender on two sides of the sleeve C, to prevent any accident from personal contact with the side of the saw-blade nearest the operator; also, guide-rollers each side of the saw-blade, attached to a metal frame, which frame will be attached to sleeve B if the connecting-joint above described is used, and to sleeve C, or to both sleeves, if right-angle gear is employed.

To avoid superfluous friction in the short flexible shaft *b*, when at right angles, the coils may be made of heavier wires than otherwise needed, and wider spaces be left between the turns in each coil.

By proper connections, a straight instead of a circular saw may be operated by the flexible shaft; but I reserve this for a future application.

My invention is especially applicable for felling standing trees, a small portable engine being used as the motive power; for trimming such trees before or after they are felled; converting waste slabs to kindling wood; sawing cord-wood in the pile, without the need of handling each log separately or conveying it to the saw; sawing or trimming timber in dangerous or intricate positions, and from a secure place; cutting growing trees or underbrush near the ground; clearing land; trimming trees at high elevations, while the operator is upon the ground or upon the opposite side of the tree, away from danger of the falling severed limbs; sawing bevel segments of circles, by having the sleeve C of sufficient length and resting upon a pivot or center, and the saw-blade turned to the desired inclination, and thus cutting the bevel at same time, and by the same act of cutting the arc. In short,

the uses to which it may be applied, and the novel results and advantages incident to my invention, are manifold, and will be manifest to persons experienced in flexible driving-shafts, or in the cutting and sawing of woods, &c.

It will be obvious that the devices specified and shown for operating and changing the position of the saw may be employed to operate instruments or tools other than saws.

What I claim as new, and desire to secure by Letters Patent, is—

1. A tree-feller and sawing-machine composed of a circular saw, a sleeve or handle for supporting and for changing the position of the saw, and a flexible shaft for operating the saw, substantially as set forth.

2. The combination, substantially as described, of a flexible shaft, a sleeve or handle free to revolve around said shaft; and a sleeve adapted to support a tool-holder.

3. The combination, substantially as described, of a flexible shaft, a short rigid adjustable shaft, *a*, operated thereby, and adapted to carry a saw or other instrument, and a locking device adapted to hold such rigid shaft to its adjusted position.

4. The combination, substantially as described, of a circular saw, a flexible shaft for driving the same, and a revoluble tubular handle or sleeve for shifting the position of the saw.

5. The combination, substantially as described, of a circular saw, a flexible shaft, and a sleeve having a joint for changing the position of the tool-supporting sleeve relative to the handle.

6. The combination, substantially as described, of a circular saw, a flexible shaft, a joint for changing the position of the saw-supporting sleeve, and a handle for shifting the position of the saw.

7. The combination of the shaft *a*, short flexible shaft *b*, shaft *c*, and sleeves B and C, substantially as shown.

8. The combination, with a flexible shaft, of the sleeves B and C and locking-lever *d*, substantially as described.

9. The combination, with a flexible driving-shaft, of a non-flexible shaft connected thereto, a sleeve surrounding the same, and a short flexible shaft connecting the non-flexible shaft with the tool or tool-stock, substantially as and for the purposes set forth.

10. As a means for changing the position of the tool-holder, the connecting-joint between the parts C and B, the spring-lever *d*, and the series of holes *i*, substantially as shown and described.

FRANK HAMILTON.

Witnesses:

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