J. Hamilton,

Reciprocating Saw Mill,

No. 3,342, Patented Nov. 21, 1843.

Fig. 5.

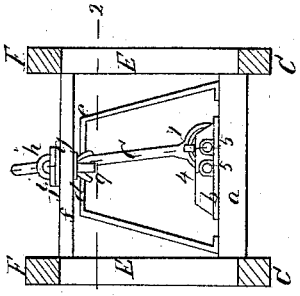


Fig. 3.

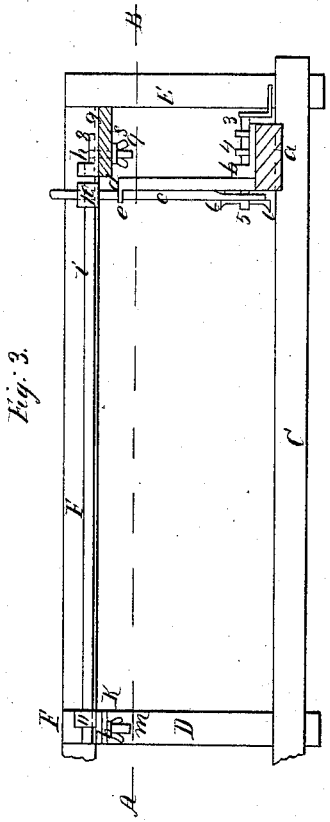


Fig. 1.

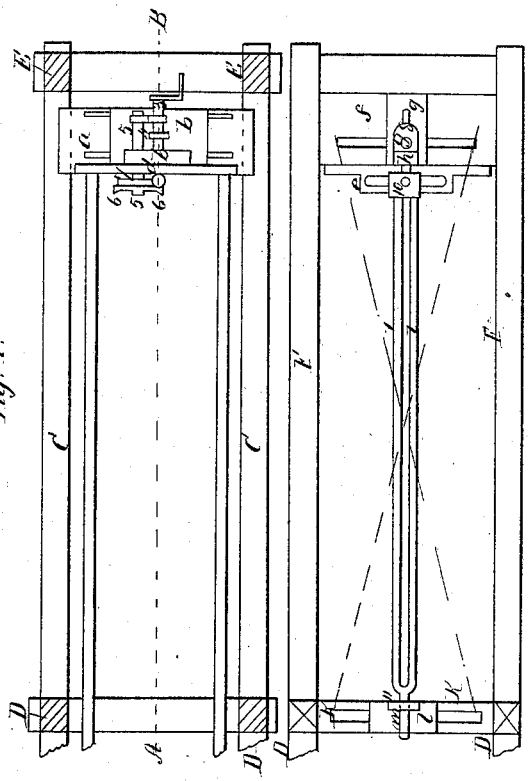
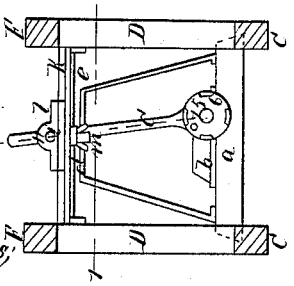


Fig. 4.



Witnesses,
A. J. Hamilton
"

Inventor,
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UNITED STATES PATENT OFFICE.

JAMES HAMILTON, OF NEW YORK, N. Y.

SAWMILL FOR SAWING TIMBER WITH A DIRECT OR COMPOUND BEVEL.

Specification of Letters Patent No. 3,342, dated November 21, 1843.

To all whom it may concern:

Be it known that I, JAMES HAMILTON, of the city, county, and State of New York, engineer, have invented and made and applied to use certain new and useful improvements in the construction and equipments of sawmill gates and frames and sawmill head-blocks and holding-dogs, such improvements being combined and connected in use for the especial purpose of attaining mechanical means by which timber may be sawed with a direct or indirect straight cut or with a common or compound curved line, or in either case with the addition of a common straight or curved bevel or compound of bevels to the face or side of the timber, or what is technically termed "a winding cut," for any required purpose, but more particularly for sawing timber into the various forms required for ship-building, for which improvements I seek Letters Patent of the United States, and that the said improvements and the mode of constructing and using the same and the ends attained thereby are fully and substantially set forth and shown in the following description and in the drawings annexed to and making part of this specification, wherein—

Figure 1 is a general plan. Fig. 2 is a side elevation seen from the side A on Fig. 1. Fig. 3 is an end elevation seen from the end B on Fig. 1. Fig. 4 is a vertical cross section as if cut through at the position of the saw, these figures represent the general arrangement of a sawmill with my improvements fitted and in use, the other figures are separately referred to, and the same letters and numbers, as marks of reference apply to the same parts in all the several figures.

C, C, are the bed frames; D, D, the standard posts and string pieces. E, is a gallows frame. F, is a metal frame either attached to the fender posts and string pieces or suspended from a traveling frame above when the saw is made to travel horizontally, in the mode described and represented in my patent dated the 27 June 1840. These parts carry the working portions of the machinery as follows:

a, is a driving drum, connected by a belt to any competent motive power, and mounted on a shaft *b*, whose journals are in bearings *c*, *c*, on the top of the gallows frame E.

d, *d*, are two fly wheels, on the shaft *b*, each having a crank pin *e*, *e*, to each of which is connected a sling *f*, *f*. These slings are jointed to the upper ends of the pitmen or connecting rods *g*, *g*, working on guide slides on the frame E, the lower ends being connected to the metal bar *h* that forms the head piece of the sawgate, which is completed by the side pieces *i*, *i*, and metal foot piece *k*.

l, *l*, are the side pieces, *l'*, the top piece, and *l²*, the bottom piece of an interior saw frame, which has on the top and bottom pieces four metal gromets, *m*, *m*, *m*, *m* through which the head piece *h*, and foot piece *k* of the sawgate support the saw frame so that it can be made to slide laterally on the bars *h* and *k* by means hereafter described.

n n, Fig. 2 are the upper guide slides on the frame F, to the upper pads on the sawgate, and *o*, *o*, Figs. 2, 3, and 4, the lower guide slides to the lower pads to prevent any lateral or swaying motion of the sawgate. This mode of mounting the saw frame in the sawgate is shown on section in the detached Fig. 9, and in Figs. 3 and 4 the gromets *m*, *m*, are shown with set screws to secure them from sliding laterally when the saw is to be employed in sawing straight cuts.

On the shaft *b*, is a cam *q*, see Figs. 3 and 4 above which is one end of the lever *p*, having its fulcrum at 1, attached to any convenient support, and having jointed to it the upper end of the vertical rod *r*, the lower end of which is connected to the inner end of a cross lever *r'* on a fulcrum joint 2, the outer end of the lever *r¹*, is jointed to the upper end of a vertical rod *r²*, the lower end of this works in a guide slide *r³*, and has the feeding pawls *s*, see Fig. 2, connected on it by a hinge joint, with a spring behind to keep the pawl into the teeth of the feeding ratchet wheel *r⁶* next this is the vertical lever *r⁴* having a fulcrum 3, on the bed frame C, and jointed to this is a horizontal slide *t* going behind the slide *r³*, with a pin on it to draw back the pawl *s*. Next above this a second slide piece *r⁵*, is connected to the lever *r⁴* and going behind and past the ratchet wheel *r⁶*, finishes with two inclined planes or ratchet teeth, 4 and 5, next these the adjustables carriage 8, on the frame C, carries the two holding pawls 6 and 7, which each have a side pin see Fig. 1 to overlie the inclined planes or teeth 4, and 5, so that by moving the lever *r⁴*, in the direction of the arrow on it, see Fig. 2, the driving pawl *s*, and holding pawls 6, and 7, are all disen-

gaged from the ratchet wheel r^6, and leave the motive power at liberty to run the log carriage back by a belt on the drum r^7 outside the ratchet wheel r^6, these two are mounted on the feed shaft r^8 see Figs. 3, and 4. This has two pinions v, v gearing into teeth racks u, u, on the underside of the log carriage frames r^9, in the usual manner. In fitting this lever r^4, and slides t, and r^5, the slide t may in some cases be dispensed with and a pin, or an arm and pin, or lip be placed upon the slide r^5, to draw back the pawl s, at the same time that the holding pawls 6, and 7 are lifted by the inclined planes 4, and 5.

The vertical lever x has its fulcrum on one of the cross pieces of the gallows frame and the top end is fitted with an inclined plane y, see Figs. 2 and 4, that comes beneath a pad w, which is to be made adjustable by a slot and screws going through holes in the descending feed rod r, and by allowing the pad w, and rod r, to descend so much that the moving end of the lever p, is in contact with the cam q during each whole rotation, a large feed of the log will be given to the saw below, while by placing the pad w, lower on the rod r, the cam q, will only come in contact with the moving end of the lever p, when the longer axis of the cam is near the vertical line, and thus give a very small feed to the saw, or the pad may have any intermediate position, and when in work by moving the lever x in the direction of the arrow see Fig. 2, the feed can be decreased by the upper part of the inclined plane y, lessening the vertical motion of the pad w and rod r, or the feed may be increased by moving the lever x in the opposite direction as the rise of the cam q, operates by the lever p, rod r, cross lever r^1, and rod r^2, to send the pawl s down and give the ratchet wheel r^6 an intermittent motion in the same direction, the amount of which motion is regulated by the position of the pad w, and lever x with its inclined plane y.

The saw c^8, is to be mounted in the frame in the mode shown sectionally in larger size in the detached Fig. 10 where the top stretcher l' of the frame is shown with a saw sling c^5 on it, a center pin c^6 is put upward through the lower bight of the sling, and kept in place by a collar and pin, the lower part of the center pin c^6 finishes with the holding chops c^7, to which the saw c^8 is to be secured in any convenient manner, the lower end of the saw is to be secured in the same manner to the lower stretcher l^2, of the saw frame, the parts being reversed and fitted with the addition of a tightening screw in the lower part of the sling as shown on the lower part of the detached Fig. 9 or a tightening screw may be applied at either or both ends of the saw frame.

Inside each of the uprights of the frame F is a pad c, slotted vertically, these carry between and on them a cross bar c^2, with a long slot through it, and on the upper edge a set of upright pins * * * *. The detached Fig. 6 is a plan and side form of a saw guide lever c^3, made with a fork in one end. With this the workman is to guide the saw c^8, by placing the lever through the slot in the bar c^2, and directing the saw by the fork so as that the saw shall follow the curve of any line on the log by giving the saw a limited rotary motion on the center pins c^6. A small keeper piece z with a fork is so secured by a slot and screw on the sling c^5, with the fork above the saw chops c^7, that by sliding the fork z down so as to ride the chops the saw will be kept in a straight course when needful to do so. In Fig. 7, c^4 is a small lever to lie between the pins * * * *, on the bar c^2 and enable the workmen to relieve the saw frame if it should not slide freely by the gromets m on the saw gate. When in work the bar c^2 is to be adjusted on the pads c', close above the log to sustain the lever c^3 near the cut.

The detached Fig. 5 is an elevation of a head block fitted with my improvements by which the machine is made to effect a cut with a compound bevel or winding fall. In this a' is the head block secured on the carriage frames r^9, a^2, are slide ways across the machine to guide a cross slide forming a dog carriage a^3, which has a return flanch behind, the lip of which passes beneath a slide piece at the back part of the head block to prevent any lifting of the back of the dog carriage a^3 see Figs. 1 and 2, a rack 9 is secured to the under side of the carriage a^3 and a pinion 10, on a shaft 11, within the head block gears into the rack 9 so as to allow of the carriage a^3 being moved by hand by a small crank handle these parts are necessarily shown partially by dotted lines in Figs. 1, 3, and 5. The rack 9 may be set in the head block and the shaft 11 and pinion 10 on the under side of the carriage a^3 if found most convenient.

A rotary shaft a^4 is fitted into gromet journals on the dog carriage a^3, so that it has on it the eye of the gage bar a^7 behind the four claw holding dog a^5 a stop piece a^6 is fitted to enter between any two claws or prongs of the dog a^5, and by a connecting screw through a segment slot the stop piece a^6 connects the dog a^5 and gage bar a^7, so that the dog can only move around, with its shaft, as it is controlled by the gage bar; this is made with holes through which a bolt and nut connect it through a long slot to the index arm a^8, the upper end of which has a short slot through which a bolt secures it to the apex of the quadrant frame a^9 the legs of this are secured on or in the head block a^1 and the lower end of the index arm a^2 is connected at b^8 by a nut to a screw

shaft b^2, which extends across the head block in journals beneath it and carries also a pinion b^3 which gears into a tooth rack b^4 on the bed piece inside the frame c. The mounting of the index arm a^8 may be varied by making the upper end with a pin to move in a slot in the apex of the quadrant frame instead of a pin in the frame and a slot through the arm. And a pivot may be made in a movable clamp secured by screws on the back of the index arm a^8, with the pivot through the slot taking into a slot in the gage bar a^7 instead of a bolt or pin through holes in the gage bar, or any similar means of connecting these parts may be used which shall have the same practical effect when in operation.

Fig. 11 represents a leading and movable head block d, fitted with a lip d^2 to take the weight of the outer end of the log, and with a kerf d^3 cut from the front of the lip d^2 into the head block to pass the saw in and allow the lip d^2 to project between the sides of the saw gate and frame and before the saw where it is to receive that end of the log for the dog to enter; this head block may be fitted with the cross slides a^2 carriage a^3 rotary shaft and gromet journals a^4 and four claw holding dog a^5 and with the rack 9, pinion 10, and shaft 11, as in the first or follower headblock, or the rotary shaft and dog may be fixed on the headblock d, as shown in Figs. 3 and 4.

The detached Fig. 8 represents a means of sustaining the bight of a crooked log when placed between the rotary holding dogs so as to relieve the strain with which the tendency of the bight of the crooked log to turn downward by its own weight will operate on the dogs and rotary gear. In this b^6, is a fulcrum on the carriage frame r^9, sustaining a hook pointed lever b^5 with a balance weight b^7, hung on a slide eye taking into notches on the lever and operating like the pea of a steelyard, the hookpoint of the lever is shown as sustaining the bight of a crooked log b^8, shown sectionally as it would appear in use with the log in the dogs, so that by moving the weight the power to support the log may be effectively regulated.

When the machine is thus prepared and the log to be sawed is in place between the dogs and the lines or curves marked by which the saw is to cut the linear shape, the attending workman is to guide the saw when in motion with the forked lever c^3 Fig. 6, by placing it through the slot in the bar c^2 and giving the saw such a limited rotary motion on the center pins c^6 as will follow the curves marked on the log, and where these are very abrupt a narrow saw with a wide set of teeth will be needful. The saw with its frame and gromets will slide laterally on the upper and lower stretchers of the sawgate as the workman directs the saw in the curve of the cut, and any slight check to this motion may be removed, by the workman using the lever c^4 see Fig. 7 between the pins $x\ x\ x\ x$, and against one side of the saw frame.

The length of the log and the amount of the required bevel or progressively increasing bevel being known, the index arm a^8 and gage bar a^7 are to be so set and connected together, that the number of turns made by the pinion b^3 and screw shaft b^2 in the length of the log by the pinion moving in the rack b^4 shall carry the index arm a^8 by the nut b^1 such a distance as to move the gage bar a^7 from the commencing position gradually to the position which will give the amount of bevel required at the finish of the cut and the tie or connection made between the gage bar a^7 and rotary dog a^5 by the slotted stop piece a^6 compels the dog and log to rotate with the motion of the gage bar and the saw will form the face of the wood with a clean beveled or winding cut as required. In other words the number of turns made by the pinion b^3, and screw shaft b^2, in any given length of log and rack b^4 being known, the extent of motion of the nut b^1 will also be known, and from this the extent of motion at any part of the index arm a^8 will be known. Then if the gage bar a^7 be jointed at that part the extent of rotary motion of the gage bar will be the same, and the dog and log will rotate to the same extent so that the saw will form a winding face on the log arithmetically and certainly the same in the difference between the commencement and finish of the cut. By these means timber may be converted into any required form for any given purpose, cheaply, expeditiously, and certainly in many cases with a considerable saving of material in the shape of valuable timber.

The means of reversing the motion of the index arm a^8 and gage bar a^7 are to be furnished by the changeable arrangement of the pinion b^3 with the rack b^4 shown in the detached Figs. 12, 13 and 14. In these the screw shaft b^2 is shown with the pinion b^3 on it as before, but placed on so as to come one side of the rack b^4 and not gear into it. A lever d^4 is fixed with a fulcrum beneath, or within the head block, and has a forked end in which the wide pinion d^5 is mounted so that one half the width of the pinion gears into the rack b^4, below and the other half into the pinion b^3 in front, the hand end of this lever is to overlie two pins (see Fig. 13), which may be set into some near and convenient fixture in the headblock; while in this position the lever d^4 holds the pinion d^5 into gear with the pinion b^3 and rack b^4 and the pinion and screw shaft b^2 will work in the contrary direction to that which they would take if the pinion b^3 geared into the rack b^4. By placing the hand end of the

lever d^4 beneath the pins shown in Fig. 13 the pinion d^3 is lifted out of gear with the rack b^4, and left at liberty to run as the pinion b^3 may carry it. On the outer end of the shaft b^2 and outside the rack b^4 is a second pinion d^6 made to slide on the shaft b^2 by a feather key, and having a clutch on the center with the fork of the vertical lever d^7 in it. The fulcrum of this lever is to be so set on or above the headblock that by moving the lever in the direction of the arrow Fig. 14 the fork and clutch will slide the pinion d^6 on the shaft b^2 and into gear with the rack b^4 thereby reversing the motion of the shaft and screw b^2 and that of the index arm and gage bar so as to turn the dog and log in the opposite direction. By these means used successively a log may be shaped with a compound of various bevels in the face of the cut according to the requirements for use and at the discretion of the workman—and the mode of making these changes may be varied to suit the construction and convenience of different mills by using any other competent mechanical means to effect the same object.

I do not mean to confine myself to the mode herein described of mounting the saw frame by sliding gromets on the sawgate stretchers to obtain a controllable lateral motion of the sawframe and saw but to employ any other similar mechanical means that may be the same in effect though varying in the precise form, nor do I mean to confine myself to the mode described and shown of driving the saw and the connected apparatus by power communicated from above the saw and fixed framing, as the driving power can be communicated or connected from below by any common and well known mechanical means now in use, without any substantial departure from the general arrangement herein described, nor do I intend to limit myself to the precise mode of mounting and guiding the sawgate on the frame F as it may be mounted in metal or wood in various ways, nor do I confine myself to the use of the rotary guiding apparatus of the headblock at one end of the machine, but I intend to use a full set at each end when needful. I also intend to use a plurality of saws in the sawframe when the nature of the work in progress allows or requires more than one saw. I also intend to provide and attach dividing plates and indices on the rotary shaft of the dogs so as to saw logs into masts or for other purposes with any defined or required number of sides and with any required amount of taper in the length, and I do not intend to limit myself to the particular materials for constructing the machine that are described herein or shown in the drawings but I intend to use wood or metal for either the fixed or motive parts or for both as may be convenient or proper.

I do not claim to have invented any of the separate parts used in the construction of the whole machinery herein described, all of such separate parts being well known and in general use for various mechanical purposes, neither do I claim herein the mode of mounting the saw and chops c^7 in the slings by the center bolts c^6 as a means to allow the saw a rotary motion or a direction other than a straight line, this mode of mounting the saw being included in my patent dated the second of July one thousand eight hundred and forty two, but

What I do claim as new and of my own invention is as follows.

1. The mode of mounting the saw c^8 in an interior frame supported within the saw gate and enabled to slide laterally on the head piece h, and foot piece k, of the saw gate by the gromets m, m, m, m, as herein described.

2. The combination of the rotary holding dog a^5 and gage bar a^7, with the index arm a^8 for the purpose of rotating the log to cut a winding bevel, and in combination with these parts, thus combined I claim the screw shaft, for vibrating the index arm, and pinions and rack for turning the screw and reversing its motion—for the purpose and in the manner substantially as herein described.

In witness whereof I the said James Hamilton have hereunto set my hand in the city of New York this eighth day of April in the year one thousand eight hundred and forty three, and in the presence of the witnesses subscribing hereto.

JAMES HAMILTON.

Witnesses:

ARTHUR L. MCINTIRE,

W. P. N. FITZGERALD.