2 Sheets-Sheet 1.

A. Bee,

Recijnrocating Saw Mill.

No. 63,780. Patented Apr. 16, 1867.

Witnesses
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2 Sheets-Sheet 2.

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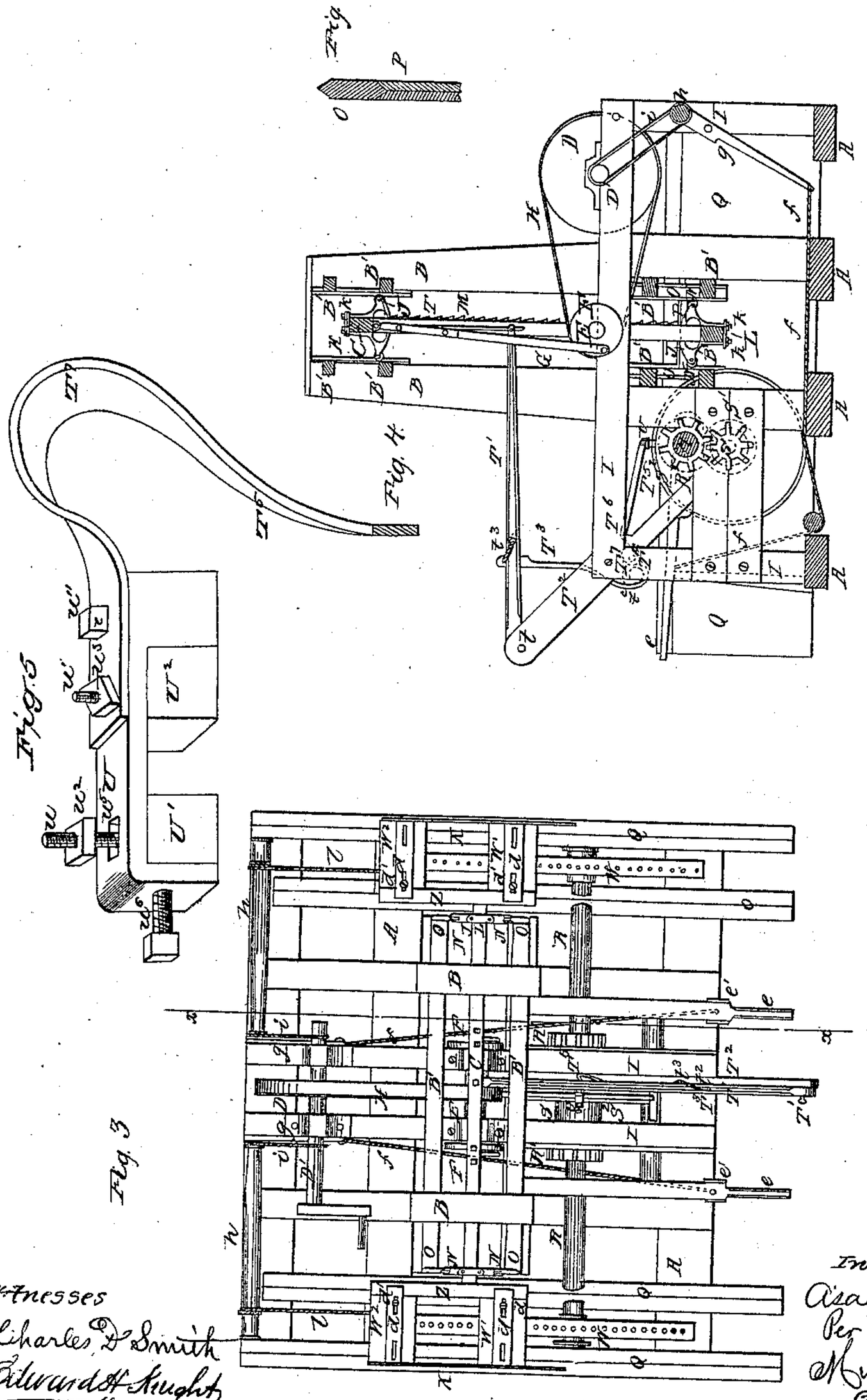

United States Patent Office

ASA BEE, OF WHITE OAK, WEST VIRGINIA.

Letters Patent No. 63,780, *dated April* 16, 1867.

IMPROVEMENT IN SAW-MILLS.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, ASA BEE, of White Oak, in the county of Ritchie, and State of West Virginia, have invented certain new and useful Improvements in Sawing Machines; and I do hereby declare the following to be a full, clear, and exact description of the nature, construction, and operation of the same, reference being had to the accompanying drawings, which are made a part of this specification, and in which—

Figure 1 is a rear end elevation of a portable sawing machine, illustrating my invention.

Figure 2 is a side elevation of the same.

Figure 3 is a plan.

Figure 4 is a vertical longitudinal section of the machine, in the plane indicated by the line *x x*, fig. 3.

Figure 5 is a detached perspective view of the grip iron which gives motion to the rag-wheel.

Figure 6 is a detached view of the saw-sash, saws, and the devices which impart motion thereto.

Figure 7 is a detached view of one of the stirrups, with its guide rollers, which will be hereinafter referred to.

Figure 8 is a detached view of one of the scrapers and guide bars, hereinafter referred to.

Similar letters of reference indicate corresponding parts in the several figures.

This invention relates to a portable sawing machine, in which two reciprocating saws, carried by a single sash, are employed in connection with two independent carriages, which feed simultaneously or alternately as may be desired.

The present improvements have reference to the arrangement of the driving mechanism relatively to the saw-sash, the construction of the feeding mechanism, the means for guiding the sash and saws in the gallows frame, and the construction of the carriages.

In order that others skilled in the art to which my invention appertains may be enabled to fully understand and use the same, I will proceed to describe it in detail.

In the accompanying drawings, A A may represent the base or foundation frame, and B the vertical gallows frame in which works the saw-sash C C^1 C^2 C^3. D is the main drum or pulley, which is keyed to the shaft D′, and which is rotated by steam, horse, or any other power. E is a shaft, which carries at its opposite ends the crank-wheels F F, to which are attached by wrist-pins the pitmen G G, which give a vertical reciprocating motion to the saw-sash. The shaft E is rotated by the main pulley D, through the belt H, which works upon a pulley, E′, keyed centrally to the shaft E; and said shaft E has its bearings in the upper horizontal timbers of the frame I I, which upper timbers extend through the gallows frame B B, as well as through the saw-sash C C^1, etc.

By referring to fig. 6, the ensuing explanation relative to the arrangement of the driving mechanism (E E′ F F, G G) and the advantages resulting therefrom, will be readily understood. It will be observed from inspection of fig. 6 that the said driving mechanism, which is all directly concerned in giving motion to the saw, is situated within the square of the sash, and occupies a position about equidistant from the cap C and sill C^1, thus allowing the sash to have its full vertical motion. Under the ordinary construction of sawing machines of this kind, it is the practice to place the shaft E and the wheels E′ F F′ below the sash, hence the latter, together with the saws, has to be elevated to such a height above the driving mechanism as to afford room for the vertical reciprocation of the sash; consequently the logs have to be raised some distance in order to place them in position to be acted upon by the saws. By constructing the machine upon my plan, that is to say with the saw-driving mechanism situated within the sash C C^1 C^2 C^3, the sash and the saws need not be mounted at such a height, but may be arranged to operate in closer proximity to the ground. Thus I facilitate the work by avoiding the necessity of raising the logs to such a height as to render it difficult to place them upon the carriage.

J J (see fig. 7) are stirrups applied to either end of the cap and stile of the sash. The usual function of these stirrups is tc strain or apply the requisite tensional force to the saws to cause them to pass through the wood without bending or yielding laterally, the stirrups being adjusted or regulated by screw-bolts and nuts or keys. Stirrups have heretofore been applied to the ends of the sash and connected directly to the saws when the latter have been situated outside of the stiles, but the stirrups have never, to my knowledge, been combined with the guides of the sash, as I shall now proceed to describe.

I construct the stirrup in two parts, *j j*, the extremities of which embrace the vertical sides of the stile or cap, and are clamped by smaller screw-bolts to the square or flat ends of the screw-bolts K K, whose opposite threaded ends are connected by a plate or flat bar, L, and upon the threaded extremities of the screw-bolts K K, work the nuts *k k*. By setting the nuts *k k* of the two stirrups employed at each side of the sash, the stirrups at the bottom and top of the saws may be drawn in opposite directions, and being attached to the saws M by screw-bolts *m*, the stirrups J apply the desired strain. In like manner the nuts *k k* enable the stirrups to be slacked to relieve the strain upon the saws and sash when the operation of the machine is suspended. Each stirrup projects in front of and behind the saw sufficiently to afford a bearing for the rollers N N, which may be journalled in the opposite sides of the stirrups and held between the two parts *j j* thereof, so as to have no lateral movement. These rollers are formed with V-shaped grooves in their peripheries, and operate, in connection with vertical ways O formed with V-shaped edges, for the purpose of guiding the sash as it plays up and down in the gallows frame B. The guide-bars O are fastened to the cross-bars B^1 of the gallows frame by bolts *b*, fig. 2, and the apertures in the guide-bars O, through which said bolts *b* pass, are elongated horizontally to enable said guide-bars to be adjusted toward the saws to compensate for wear. Blocks B^2, which are made adjustable toward or from the stirrups by means of the bolts which attach them to the cross-bars B^1, may be employed to stay the guide-bars O, and also serve to steady the guide-bars when their bolts *b* are being tightened. It will be seen that by attaching the guide-bars O to the ends of the cross-bars of the gallows frame the attaching bolts *b* may be inserted in and parallel with the longitudinal centre of said bars; hence the pos tion of the bolts *b* will remain unchanged under variations in the bulk of the cross-bars, and the guide-bars will always maintain a true position. Therefore my arrangement of the guide-bars effects a positive advantage over machines as heretofore constructed, in which the guide is attached to the side of the post of the gallows frame, and is thereby liable to change its position on account of the swelling or contracting of the post by moisture or variations of temperature. This advantage will not be so fully experienced in saw-mills under cover, but it is all-important in portable mills, which have to be set up in various localities, and which are exposed to all kinds of weather. The advantage in combining the guide-rollers N N with the stirrups J is that the rollers serve to prevent the lateral displacement of the stirrups when they are being adjusted upon the sash by the nuts *k k*. At night, when the operation of the machine is suspended, it is customary to slack the stirrups to relax the strain on the saws and sash, and when the stirrups are tightened in the morning to put the machine in condition for operation, the stirrups have a tendency to turn, and thus throw the saws out of their true line of motion. In my machine the guide-rollers N N, being held against horizontal motion by the fixed guide-bars O O, prevent the stirrups from obeying their tendency to turn, and thus preserve the saws in their true working position. The bolts which connect together the two parts of the stirrups J, and form journals for the rollers N N, enable said parts to be drawn together so as to cause them to bear snugly against the sides of the guide-rollers N N, which is a necessary adaptability, in order that the rollers may be properly confined or retained as their sides are worn away by continued friction. If preferred, the rollers N may be clamped firmly between the two jaws of the stirrup, so as to be held against rotation, in which case different parts of their peripheries may be brought into requisition, and thus afford new guides as often as the acting parts of their peripheries become worn. In like manner I propose to clamp straight-grooved guides between the jaws of the stirrups instead of the rollers.

P P (see fig. 4) are strips of wood or other suitable material, which are clamped between the jaws or two parts of the lower stirrups J J, and occupy a position above the guide-rollers N N. The ends of these strips are bevelled to correspond with the angular face of the guide-bars O, and two strips, P, are attached to each stirrup, so as to move in contact with the opposite sides of the angular face of each guide-bar O. These strips P cover the rollers N N at the lower ends of the saws, and serve to prevent the saw-dust from falling into the grooves of said rollers; and they also act as scrapers to remove from the guide-bars the saw-dust which clings thereto when the machine is in operation. They may be made adjustable by means of the bolts which hold them in the stirrup, so as to be made to constantly press against the guide-bars. Each guide-bar O is formed with the V-shaped guide-ways on both its edges, so that when one edge becomes worn away to such an extent as to become unserviceable as a guide the bar is reversed, thus presenting a new and perfect guide-way for the rollers.

The foregoing paragraph completes the description of the saw-driving and guiding mechanism, and I shall now describe the feeding mechanism.

Q Q are the guide-ways for the log-carriages, which work alongside of their respective saws in customary manner. It is the intention to cap the ways Q Q with cast-iron V-shaped rails for the accommodation of the wheels of the log-carriages. R R represent a pair of shafts, the inner ends of which are provided with cog-wheels, R′, which receive a rotary motion from the cog-wheels S^1 S^1, on the opposite ends of the rag-shaft S. S^2 is the rag-wheel, which, instead of being a ratchet, consists of a smooth rim of iron fixed upon the edge of a disk of wood or other suitable material. The rag-wheel and its shafts and cogs are rotated by means of the grip-iron, U, which derives its motion from the saw-sash C C^1, etc., through the medium of the springs T T^3 T^5 T^6, lever T^1, and elbow T^4, (see fig. 4.) The spring T is attached at its upper extremity to the cap of the saw-sash, and at its lower extremity to the vertically vibrating lever T^1, which at its opposite end is connected by a fulcrum pin, *t*, to the stationary brace T^2, which is fastened by screw-bolts to one side of the frame I, with its lower end resting upon the foundation frame A. The upper extremity of the spring T^3 is held within a slot, t^3, cut vertically in the lever, T^1, and the lower end of said spring is formed with an elastic elbow, t^4, connected with a fulcrum piece, T^4, which communicates motion to the spring-arm T^5, of the grip-iron U, through the medium of the spring T^6. T' represents a brace bearing against the spring T^3, and having a slight elasticity in its attachment to the fulcrum piece T^4. The function of this brace is to distribute and equalize the flexure

of the elastic elbow t^4, and protect it from danger of breaking under a heavy strain. The above-described connections, although elastic, still have sufficient rigidity to vibrate the grip-iron, turn the rag-wheel, and thus propel the log-carriages when the machine is operating free of impediment or obstruction; but in case either of the carriages has its path or motion obstructed by a slaf, crowbar, or any other obstacle, so as to be incapable of further progress until such obstacle is removed, then the force which is applied to the spring connections, through the sash, is resisted by the rag-wheel S^2, which, in refusing to turn, causes the springs to alternately bend and spring back to their normal positions without subjecting the feeding devices to undue strain. By this means it will be seen that I divert the force (when it cannot subserve its appropriate purpose of propelling the log-carriages) in such a manner that the machinery is saved from the damage which results from undue strain upon strictly rigid or inelastic connections. It will be further observed that in my machine the motion of the saw need not be suspended during the time in which the operation of the feeding mechanism is arrested, hence when the obstruction is removed the work proceeds without having experienced the same interruption which occurs in ordinary mills because of the necessity for stopping the entire machinery to enable the removal of the obstacle. The spring connections, as above described are also useful in regulating the feed motion, as, with a large log upon the carriage, the springs are subjected to a proportionate increase of pressure, and hence yield or bend, and therefore give less motion to the rag-shaft and saw-carriages than the same would receive if the log were lighter and the springs allowed to undergo their full reciprocating motion. "The larger the log the lighter the feed" is an expression well understood by mill-tenders, who will fully appreciate the benefits to be derived from a mechanical arrangement (such as I have described) which shall be capable of changing the feed according to the requirements of the work without any attention or manipulation. Moreover, the use of springs avoids the necessity of making loose or flexible joints between the several parts through which motion is communicated to the rag-shaft. In my machine these parts, save the lever T^1, and elbow T^4, are connected or attached by stiff joints, and the flexibility of the springs serves the purpose of flexible joints or pivotal connections, which involve an amount of wear which increases with the number of such flexible joints and the friction to which they are subjected.

The special function of the spring T^6, (shown in dotted lines in fig. 4,) which connects the spring arm T^5 with the elbow T^4, is to exert sufficient downward pressure upon the grip-iron U to cause the latter to maintain its working position upon the rag-wheel S^2, the weight of the grip-iron itself being insufficient to overcome its tendency to fly off in an upward direction when the machine is working rapidly.

The object in placing the end of the spring T^3 in the slot t^2 is to enable the spring to be shifted at the point where it is attached to the lever, so that it may be made to receive a greater or less degree of motion from the said lever, and thus increase or diminish the feed according to the weight of the log. Thus, if the upper end of the spring T^3 be drawn and held to the forward part of the slot t^2, (which is done by the cord t^3 wound upon a pin on the lever, or otherwise hitched,) then the motion which the spring derives from the lever, and consequently the feed, will be greater than it is when the end of the spring is in the rear part of the slot, by as much as the difference of motion which is due to the distance of the forward and rear end of the slot t^2 from the axis of vibration t of lever T^1. The regulating of the feed by the system of spring connections, as previously described, and the change of feed by the adjustment of spring T^3, should be considered as distinct objects. Thus the system of springs has an invariable tendency to reduce the feed in proportion to the weight of the log, and though the diameter of the log (which determines the amount of feed motion) generally increases with the weight of the log, yet it frequently happens that a log of small diameter but unusual length weighs the same as the larger logs, but requires about as great a degree of feed motion as a log of the same diameter but less weight. Thus, with a "small" but heavy log on the carriage, the spring T^3 is adjusted to the forward part of the slot, so as to receive additional motion and thus counteract the tendency of the system of connecting springs to reduce the feed. The adjustment of the spring T^3 is sufficient to increase or diminish the feed motion to any desired extent.

The grip-iron U is constructed with two adjustable gripping-blocks, U^1 U^2, (see fig. 5.) The space between the gripping-blocks U^1 U^2 is a little wider than the thickness of the rim of the rag-wheel S^2, which is embraced between them, and the blocks are so set that their inner and opposite faces are inclined to or form an angle with the faces of the rag-wheel rim. When the grip-iron is pushed forward by the spring-arm T^5 the diagonally opposite corners of the blocks U^1 U^2 bite on to the opposite faces of the rim of the rag-wheel, and cause it to revolve a distance equal to the vibration of the grip-iron. And when the grip-iron is retracted, elasticity in that part of the spring T^5 marked T^7 causes the faces of the blocks U^1 U^2 to become more nearly parallel with the faces of the rag-wheel rim, and slide back upon them without giving motion to the rag-wheel; that part of the arm T^5 which is nearest to the grip-iron, and approaches it with a short curve, being perfectly rigid and free from elasticity. The blocks U^1 U^2 are made adjustable by the set-screws u u^1, and nuts u^2 u^3, and when they have their acting corners worn so as to fail to work, they can be turned to present new corners, and even after that they may be turned over so that the sides which were beneath shall be uppermost, each block thus affording eight working corners, which can be successively brought into use to act upon the rag-wheel. The screw-bolt u^1, and nut u^3, together with a screw-bolt u^4, serve to fasten the spring-arm T^5 to the end of the grip-iron U. As the size of the gripping-blocks U^1 U^2 diminishes from constant wear, it is necessary to adjust them toward each other. This adjustment I accomplish by making a slot u^5 in the grip-iron U for the reception of the bolt u, the latter, together with the block U^1, being thereby made movable and adjustable toward the block U^2. That part of the bolt u^1 which fits within the slot u^5 is squared to prevent the bolt from turning therein, and thus retain the block U^1 firmly in its working position. The block U^1, when the nut u^2 is unscrewed, may be set toward the block U^2 by the screw-bolt u^6, which also serves to brace the block when set or adjusted.

V, fig. 1, is a weighted retaining grip, held to the rim of the rag-wheel by a spring, V^1, and employed to

prevent any backward motion of the rag-wheel consequent upon the frictional impingement of the grip-iron U in making its backward motion.

The shafts R R, receiving motion from the rag-shaft S, as above described, impart motion to the log-carriages through the medium of the cogs or sprockets, *r r*, and rack shafts W W, the latter being attached to the under side of the carriages and moving parallel with and between the ways Q Q. Each of the log-carriages consists of a head-block, W^1, and tail-block W^2, (see fig. 1,) and each block is mounted upon four wheels, *w*—two at each side—as represented in fig. 2. The blocks W^1 W^2 are connected together at one side, so as to stand any distance asunder to suit logs of different length, by means of the arm X, which may consist of a flat board permanently attached to the tail-block W^2, and held to the head-block W^1 at any point of its length by the adjustable clamp Y, which is bolted to the head-block. At the opposite side the blocks W^1 W^2 are connected by the log itself, which is designated by Z in figs. 1 and 3, and which is firmly held with its ends resting upon the blocks, by means of the adjustable block-clamps *d d*, (or their equivalents,) which are secured to the blocks W^1 W^2 by set-screws d^1 d^1. The saw-carriages being thus constructed, each of two blocks set away from each other, or held nearer together by the arm X, (which is of light material,) and having recesses cut in them to confine the wheels within the compass of the blocks, contributes to the portability of the machine, which is designed to be transported in sections and put up wherever it may be required for use.

When the log-carriages have completed their forward movement the shafts R R are thrown out of gear with the rag-shaft S by means of the shipping-levers *e e*, which are fulcrumed upon opposite uprights of the gallows frame B B, and which have openings cut in them to form bearings for the inner ends of the shafts R R. The shipping-levers *e e* are sustained, when raised to throw the feed shafts out of gear, by the pivoted legs *e'*, which are notched at their lower ends so as to rest upon the edge of the rear bar of the foundation frame.

f f are cords or ropes, which are connected to the lower ends of levers *g g*, the upper ends of which afford bearings for the windlasses *h h*, which when in gear receive motion through the bands *i i*, from the main shaft D, and wind up the cords *l l*, so as to give the gig back-motion to the log-carriages. The cords *f* may, by attachment with the shipping-levers *e e*, be made to vibrate the levers *g* so as to throw the windlasses *h* into and out of gear with the shaft D', or said cords *f* may extend back to the levers *e* in the manner represented, and carried up over a pulley on the gallows frame, and terminate at a point where they can be conveniently reached and managed by the engineer; or said cords *f* may be hitched and unhitched at any convenient part of the framing of the machine.

Having thus described my invention, the following is what I claim as new, and desire to secure by Letters Patent:

1. I claim the application of the guide-rollers N or their equivalent, to the stirrups J, substantially as and for the purpose specified.

2. I claim the V-shaped adjustable and reversible guide-bars O when constructed and applied substantially as and for the purposes set forth.

3. I claim the clearers P, when constructed and applied in the manner and for the purpose explained.

4. I claim the combination of the springs T T^3 T^5, and lever T^1, when constructed and operating as described to communicate motion from the saw-sash to the grip-iron.

5. I claim the spring T^3 when constructed and made adjustable in the slotted lever T^1, in the manner specified, for the purpose of changing the feed, as described.

6. I claim a grip-iron when constructed with adjustable gripping-blocks U^1 U^2, substantially as and for the purpose specified.

7. I claim the adjustment of the blocks W^1 W^2 by means of the arm X and clamp Y, as and for the purpose described.

ASA BEE.

Witnesses:

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VICTOR HAGMANN.