No. 654,635. Patented July 31, 1900.

W. HINDLEY & J. W. HARDING.

WOOD CUTTING MACHINE.

(Application filed Nov. 12, 1897.)

(No Model.) 2 Sheets—Sheet 1.

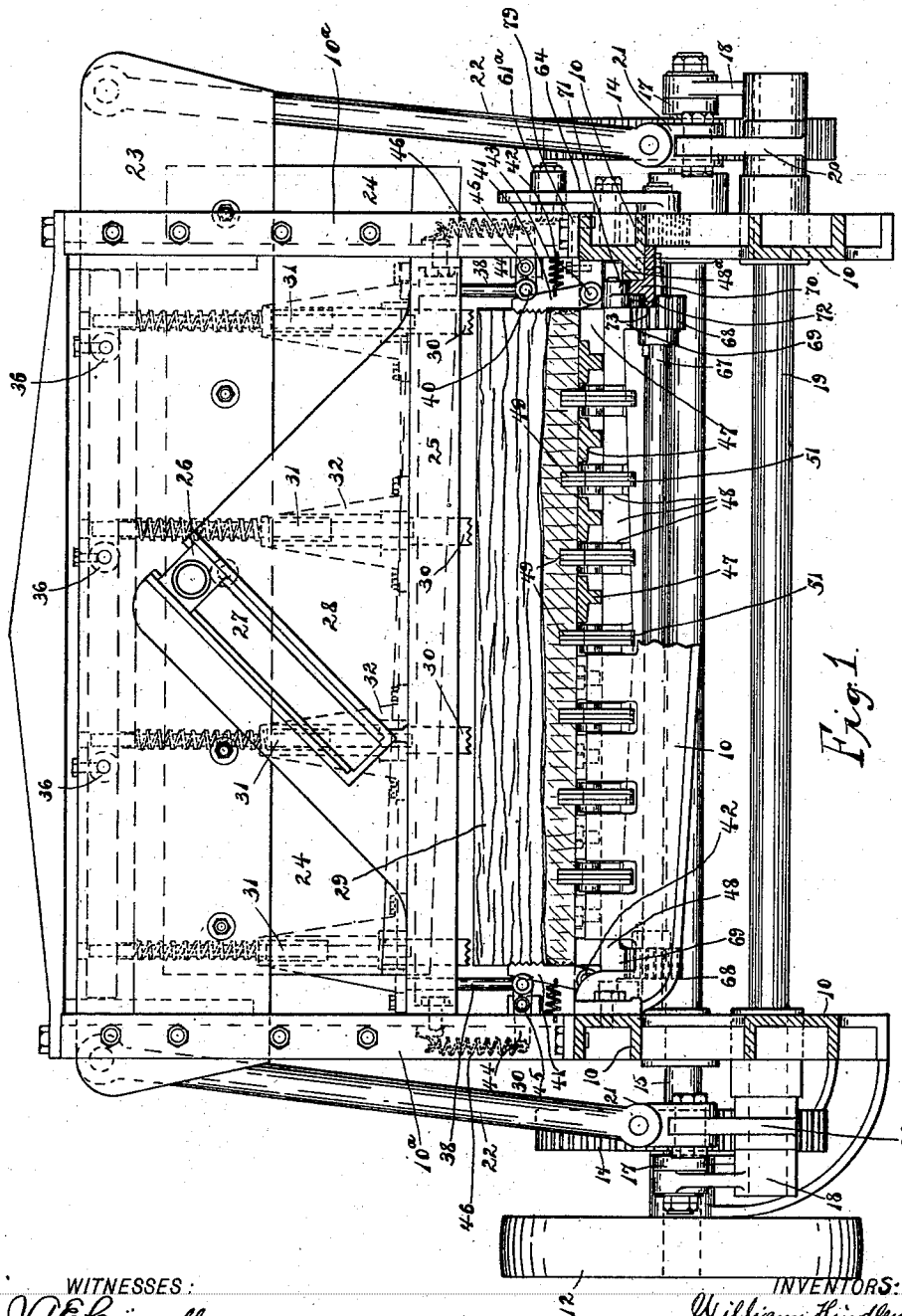

Fig. 1.

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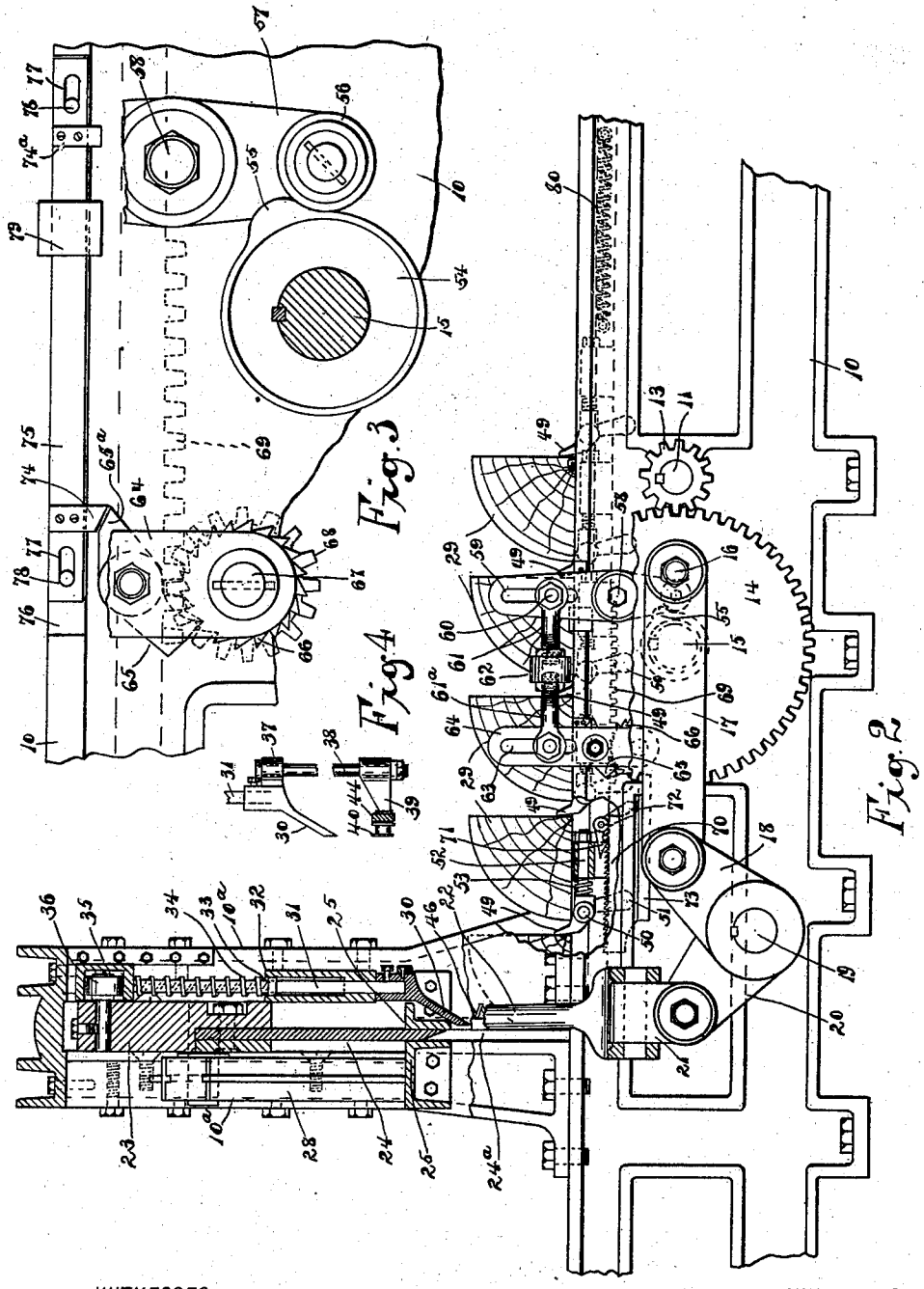

Fig. 3

Fig. 4

Fig. 2

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UNITED STATES PATENT OFFICE.

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WOOD-CUTTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 654,635, dated July 31, 1900.

Application filed November 12, 1897. Serial No. 658,257. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM HINDLEY, of Hoboken, in the county of Hudson and State of New Jersey, and JOSEPH W. HARDING, of New York, (Brooklyn,) in the county of Kings and State of New York, have invented certain new and useful Improvements in Wood-Cutting Machines, of which the following is a full, clear, and exact description.

Our invention relates to improvements in wood-cutting machines; and the object of our invention is to produce a comparatively simple, compact, and powerful machine which has a reciprocating knife moving also with a lateral movement, so as to have a drawing cut; which has means for automatically feeding stock beneath the knife; which is adapted to automatically return the feeding mechanism, so as to receive a new supply of stock, and which is adapted to cut the wood very rapidly and to a desired thickness.

The invention is primarily intended to cut longitudinally logs or large sticks of wood, so that the cut pieces can be bound at intervals and then crosscut between the bindings, so as to form bundles of commercial kindling-wood; but we do not limit our invention to such use as this, but claim, broadly, for any purpose, a cutting-machine in which the parts are organized and arranged in substantially the manner hereinafter described.

With these ends in view our invention consists of certain features of construction and combinations of parts, which will be hereinafter fully described and claimed.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar figures of reference indicate corresponding parts in all the views.

Figure 1 is a broken end elevation, partly in vertical cross-section, of our improved cutting-machine. Fig. 2 is a broken side elevation with the knife mechanism and adjacent parts in section. Fig. 3 is an enlarged detail view of the mechanism for feeding the stock forward and for tripping and releasing the feed mechanism to permit its return to first position, and Fig. 4 is a broken detail sectional view of one of the clamping-dogs and the connection therewith for operating one of the clamping-jaws.

The machine has a substantial frame 10, of any approved design, journaled transversely, on which is a driving-shaft 11, which, as illustrated, is driven by a pulley 12; but can be driven by any usual means. This shaft is provided near the ends and on opposite sides of the frame 10 with cog-wheels or pinions 13, meshing with gear-wheels 14 on a counter-shaft 15, which is also journaled transversely on the main frame, and to the cranks 16 of the gear-wheels 14 are connected pitmen 17, which also connect with the cranks 18 of the shaft 19, this shaft also carrying cranks 20, which connect pivotally by means of links 21 with the connecting-rods 22, which extend upward in a substantially-vertical direction on opposite sides of the machine and are pivoted at their upper ends to the transverse cross-head 23, which carries the knife 24.

The cross-head 23 slides in the bracket 10^a, which is erected on the frame 10 and may form an integral part thereof, and the knife 24, which is firmly bolted to the cross-head, slides in a slot 24^a (see Fig. 2) of the bracket and also between the transverse guides 25, these latter stiffening the knife and causing it to move rigidly downward through the stock beneath. It is desirable to have the knife move downward and laterally, so as to have a drawing cut on the stock, and to this end the cross-head 23 has pivoted to it, near the center, a slide-block 26, which moves diagonally up and down in the slot 27 of the bracket 28, which is firmly supported on the bracket 10^a. It will be seen, therefore, that when the cross-head moves downward the cam action of the walls of the slot 27 on the slide-block 26 will cause the knife to also move laterally, and therefore the knife will cut easily through the stock 29. The stock, which is usually logs of wood, most generally cord-wood, is placed transversely on the frame 10 and held in a manner to be hereinafter described and is also fed forward step by step beneath the reciprocating knife 24, the details of this feeding mechanism being described below.

Adjacent to the knife and held normally

just below its cutting edge are a series of dogs 30, which move downward with the knife and engage the stock 29, so as to hold the latter firmly while being cut, and in order that the dogs may yield after firmly holding the stock and so prevent any excessive strain on the machine or any mangling of the wood the dogs are each provided with shanks 31, which extend upward through suitable guides 32, each of which has a collar 33, backed by a spring 34, the latter engaging the cross-bar 35, which is pressed downward on the springs, and so as the cross-bar descends the springs yield after the requisite pressure has been put on the dogs 29, this pressure being determined by the strength of the springs. The cross-bar 35 is preferably hollow, and in it run rollers 36, which are journaled on the cross-head 23. The cross-bar is also pierced, as shown by dotted lines in Fig. 1, so that as it descends the shanks 31 may project through it. It will be seen that when the cross-head 23 descends the cross-bar 35 will be pushed down by the rollers 36 and, pressing on the springs 34, will move down the shanks 31 and dogs 30, so that the latter firmly engage the stock or wood 29.

The outer dogs 30—that is, the dogs nearest the sides of the machine—have bosses 37, (see Fig. 4,) in which are journaled rods 38, and these at their lower ends have loosely thereon offsets 39, on which are journaled rollers 40, which are adapted to engage the jaws 41 (see Fig. 1) and force the latter inward against the stock or wood 29. This is to provide against any endwise movement of the wood, and it also causes the wood to be held, in connection with the dogs 30, against movement of any kind. The jaws 41 are pivoted at their lower ends, so as to swing in and out in relation to the stock, as shown at 42 in Fig. 1, and they are normally pulled open slightly by springs 43. The jaws are inclined on their outer sides, being thickest at the bottom, so that as the rollers 40 move down on them they are forced firmly inward against the wood. When the cross-bar 35 moves upward with the cross-head 23, the dogs 30 and rods 38 are also lifted by means of springs 46, which are secured to the frame 10 and to the arms 44. The rollers 40 are forced downward against the jaws by means of the levers or arms 44, which are pivoted to the offsets 39 and which are pivoted near the center, as shown at 45, the outer ends of the arms being connected to springs 46, which normally tip down the inner ends of the arms and so force the rollers 40 firmly against the jaws, and as the latter are inclined, being thickest at the base, the aforesaid movement of the rollers holds them securely in place. When the cross-head 23 descends, the dogs 30 clamp the wood or stock 29 on top and hold it securely, and the wood is held endwise by the jaws 41 just described. On the upstroke of the cross-head 23 and the knife 24 the dogs 30 move upward with the cross-head, and as the cross-head nears the limit of its upstroke the bosses 37 (see Fig. 4) strike the tops of the rods 38 and so lift the rods, and the latter tilt the arms 44 against the tension of the springs 46 and release the jaws 41. On the return stroke of the knife the dogs 30 reëngage the wood, as before, and the jaws 41 can move inward; but both dogs and jaws clamp the wood in new spots, as the wood has been fed forward during this interval by the mechanism which will be hereinafter described.

The bed of the machine is made up of parallel rigid bars 47, (see Fig. 1,) on which the wood rests transversely, and beneath the bars and in close proximity thereto is a carriage or frame 48, which moves backward and forward and which carries a series of dogs 49, which project upward above the frame, so as to engage the stock or wood 29, and each dog is pivoted, as shown at 50 in Fig. 2, and has a weighted lower end 51, which keeps the upper part in position to engage the stock, but permits the dog to be tilted whenever necessary. Each dog has a shank 52 held in a suitable socket, and between the dog and the socket is a spring 53, (see Fig. 2,) so that each dog is yieldingly mounted, and if the wood is thrown on and fails to engage one dog it will be engaged by the next dog behind, and if it happens to lie over a dog the latter can tilt up, so as to be out of the way and not interfere with the operation of the machine. The carriage is fed forward by the below-described mechanism.

The counter-shaft 15 has thereon a rotary cam 54, with a projection 55, which engages the roller 56 on the lower end of a vertical lever or walking-beam 57, which is pivoted on the main frame 10, as shown at 58 in Figs. 2 and 3, and this lever has a slotted upper end 59 to permit of the vertical adjustment of the bolt 60, by which is fastened to the lever the screw-rod 61, which engages, by means of the turnbuckle or nut 62, with a similar screw-rod 61^a, the two rods 61 and 61^a, with the turnbuckle, forming an adjustable connecting-rod by which the lever 57 is connected with a second lever 64, parallel with the first lever and slotted likewise, as shown at 63, to permit of the vertical adjustment of the rod 61^a. The lever 64 is pivoted at its lower end and carries a pawl 65, which engages a ratchet-wheel 66 on the cross-shaft 67, which shaft has at its ends pinions 68, engaging the toothed racks 69 on the under side and outer edges of the carriage 48, and so the oscillation of the levers 57 and 64 causes the pawl 65 to turn the ratchet-wheel 66 step by step, and thus movement is imparted to the shaft 67, pinions 68, and carriage 48. The parts are timed so that this forward movement takes place during the upstroke of the knife 24, and when the knife descends new stock comes beneath it. The carriage is prevented from sliding back by reason of the ratchet-bar 70 (see Figs. 1 and 2) and the pawl 71, which is pivoted on the carriage and engages the ratchet-bar, the pawl having a weighted

lower end 72, which rides on a flange 73. (Best shown in Fig. 2.) When, however, the last of the stock 29 has been fed beneath the knife, the weighted end 72 of the pawl 71 falls over the end of the flange 73, thus raising the pawl, releasing the carriage, and permitting it to be pulled back, as presently described. When the carriage is released to permit of its return to normal position, it is of course necessary to release the pawl 65 from the ratchet-wheel 66, and to this end the pawl has an upper and rearward inclined end 65^a, which is adapted to engage a correspondingly-inclined trip 74 on the slide-plate 75, which moves in a horizontal recess 76 in the frame 10 (see Fig. 3) and which is slotted longitudinally, as at 77, to receive the guide-pins 78 on the frame, by which pins the plate is held in place and its movement limited. Near the rear end of the slide-plate 75 is a stop 74^a, the stop 74^a and trip 74 being alternately engaged by the stirrup 79, which is secured to the carriage 48, and the parts are adjusted so that when the carriage is advanced to bring the last of the stock beneath the knife and the pawl 71 has been released by the weighted end 72 falling over the end of the flange 73 the stirrup 79 strikes the trip 74 and the latter, engaging the inclined end 65^a of the pawl 65, releases the pawl from the ratchet-wheel 66, and the carriage is then pulled back by means of the spring 80, which is secured to one end thereof and to the main frame (see Fig. 2) and against the tension of which the carriage has been advanced. It will be noticed that this automatic feed mechanism is adapted to move the stock step by step beneath the knife 24; that the movement of the pawl 65 can be regulated by means of the connecting-rod 61 61^a and the levers 57 64; also, that a convenient means is shown for automatically releasing and returning the feed mechanism, which includes the carriage 48 and dogs 49 and connections; but we do not, nevertheless, confine our invention to this precise feed mechanism, as other devices can be substituted for feeding the stock without departing from the spirit of the invention, and it is obvious that the knife will cut nicely without regard to the manner in which the stock is brought beneath it. Further, we do not confine our invention to the precise means shown for operating the knife, as it can be reciprocated in other ways, if desired, without affecting the principle of the invention.

The operation of the machine is as follows: The wood or stock 29 is placed transversely on the machine, being clamped between the jaws 41 at the ends and engaged at the back by the dogs 49. The movement of the gears 14 causes the reciprocation of the pitmen 17 and the oscillation of the cranks 18 and 20, which movement is transmitted, by means of the links 21 and connecting-rods 22, to the cross-head 23, which moves vertically and transversely over the machine-bed, the transverse movement being caused by the slide-block 26 and its slot 27, as previously described. On each descent of the knife the dogs 30 are moved downward to firmly engage the wood, as already described, and on the upstroke the dogs cause the release of the jaws 41 by the lifting of the rods 38, as already set forth. At this time the cam projection 55 strikes the roller 56 and tilts the levers 57 64, so that the pawl 65 turns the ratchet-wheel 66, and by means of the pinions 68 and racks 69 the movement is transmitted to the carriage 48 and feed-dogs 49, so that the stock is moved forward the requisite distance, when the knife again descends and the operation is repeated. At the end of the forward movement of the carriage the pawl 71 is tripped by its weighted end 72 falling over the end of the flange 73. The ratchet-wheel 66 is released by the trip 74 engaging and tilting the pawl 65, and the carriage is returned to normal position by the spring 80, at which time the stirrup 79 engages the stop 74^a and moves back the slide-plate 75, so as to bring the trip 74 out of engagement with the pawl 65. The pawl 71 is tipped back into position by its lower end striking against the end of the flange 73, thus tipping the pawl completely over, and the machine can then be reloaded and the operation all repeated as before.

In the drawings and in the description we have shown and described but one knife 24; but it will of course be understood that these knives can be arranged in series, if desired, without affecting the invention.

Having thus described our invention, we claim as new and desire to secure by Letters Patent—

1. The combination with the vertically and laterally movable knife, and the cross-head carrying the knife, of the hollow cross-bar, the rollers journaled on the cross-head and running in the cross-bar, and a series of independent spring-pressed dogs supported on the cross-bar and projecting slightly below the knife-edge to engage the stock, substantially as described.

2. The combination with the vertically and laterally moving cross-head and the knife secured thereto, of the hollow cross-bar, the rollers journaled on the cross-head and projecting into the cross-bar to support it, a series of spring-pressed rods supported vertically on the cross-bar, and independent dogs carried at the lower ends of the rods and projecting to a point adjacent to the knife-edge to engage the stock, substantially as described.

3. In a machine of the kind described the combination of the cross-head and knife vertically slidable in guideways, of means for imparting a lateral movement to the knife, and actuating means as follows, to wit; connecting-rods at opposite ends of the knife, said connecting-rods being pivoted at the top to the cross-head and at the bottom to a pair

of cranks, the pivotal connection at one end of the rods being essentially a universal joint, and means for actuating the cranks, substantially as described.

4. The combination with the reciprocating knife of the oppositely-arranged spring-opened jaws at opposite ends of the knife-path, said jaws being adapted to engage the stock, and means as the spring-pressed arms 44 and rollers 40 for closing the aforesaid jaws, substantially as described.

5. The combination with the vertically-movable knife, of oppositely-arranged jaws near the ends of the knife, said jaws being pivoted so as to swing inward to grasp the stock, spring-pressed arms to engage and normally close the jaws, and slide-rods moved in unison with the knife, said rods being slidably connected with the arms so that when near the end of the upstroke of the knife, the rods lift the arms and release the jaws, substantially as described.

6. The combination with the vertically-movable knife, the bed formed of parallel bars, and the intermittently-actuated carriage beneath the bed, of the feed-dogs mounted on the carriage, each dog having a spring-pressed shank held parallel with the bed of the machine, and a weighted tail to swing the dogs into operative position above the bed, substantially as described.

7. In a machine of the kind described, the combination with the feed-carriage having means for feeding it forward, of the ratchet-bar adjacent to the carriage, the pawl pivoted on the carriage to engage the ratchet-bar and prevent the return of the carriage, said pawl having a weight arranged to swing it normally out of engagement, and means as a ledge to engage the weight and hold the pawl in engagement with the ratchet-bar, substantially as described.

8. A machine of the kind described comprising a stationary longitudinally-slotted body, a vertically and laterally movable knife operating in a slideway above the body, a crank mechanism for operating the knife, a series of independent yielding dogs arranged to slide with the knife and projecting slightly below and adjacent to the edge thereof, jaws arranged near opposite ends of the knife-path and held normally open, means to close the jaws by the descent of the knife, said means being adapted to hold the jaws closed during a portion of the knife-stroke, a carriage movable beneath the bed, and a series of independent tilting dogs projecting upward from the carriage through the slots in the bed, substantially as described.

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