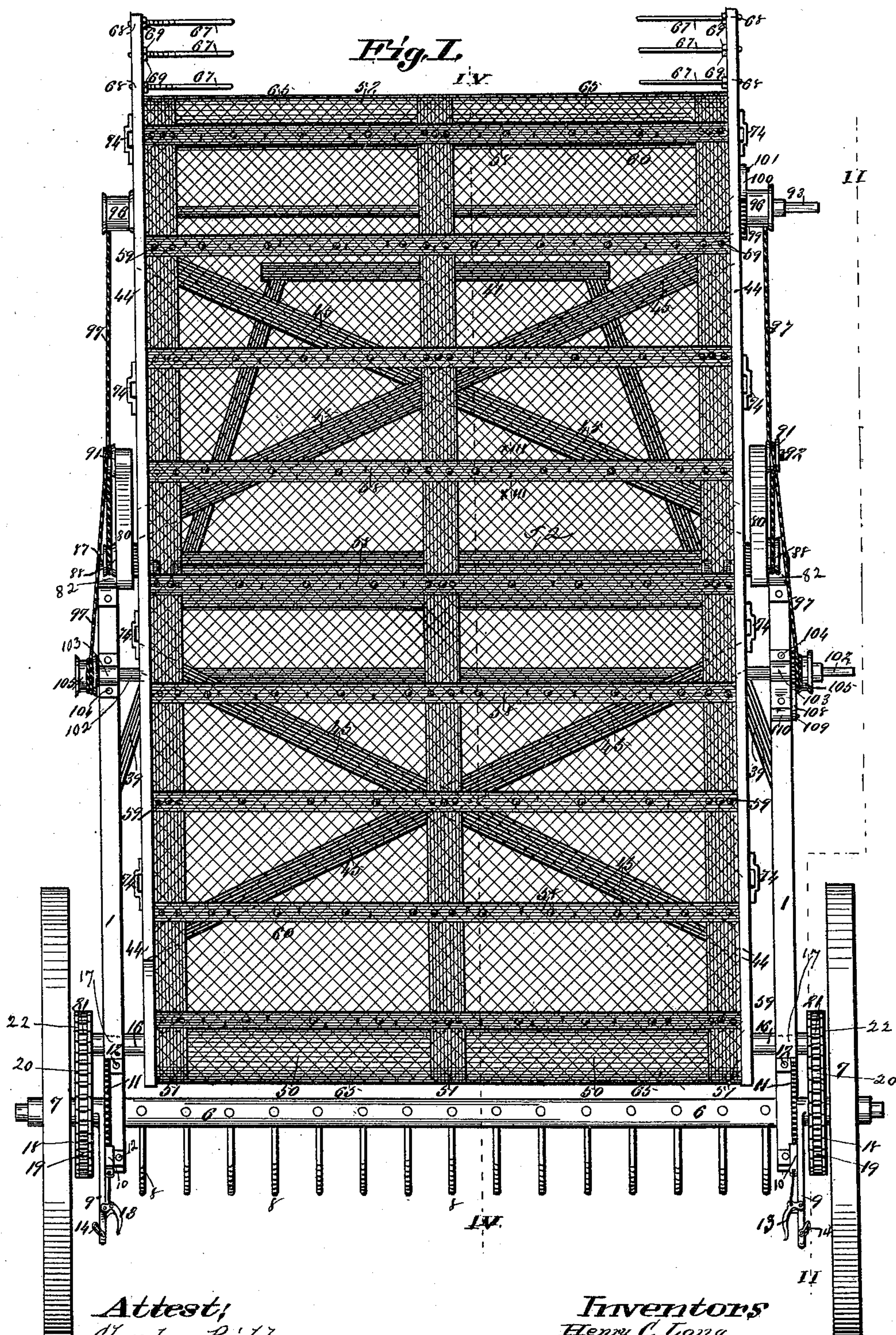


3 Sheets—Sheet 1.

No. 408,494.

Patented Aug. 6, 1889.



*Attest;*  
*Charles Pickles,*  
*E. Arthur.*

*Inventors*  
*Henry C. Long*  
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*By Knight Bros.*  
*Attys*



(No Model.)

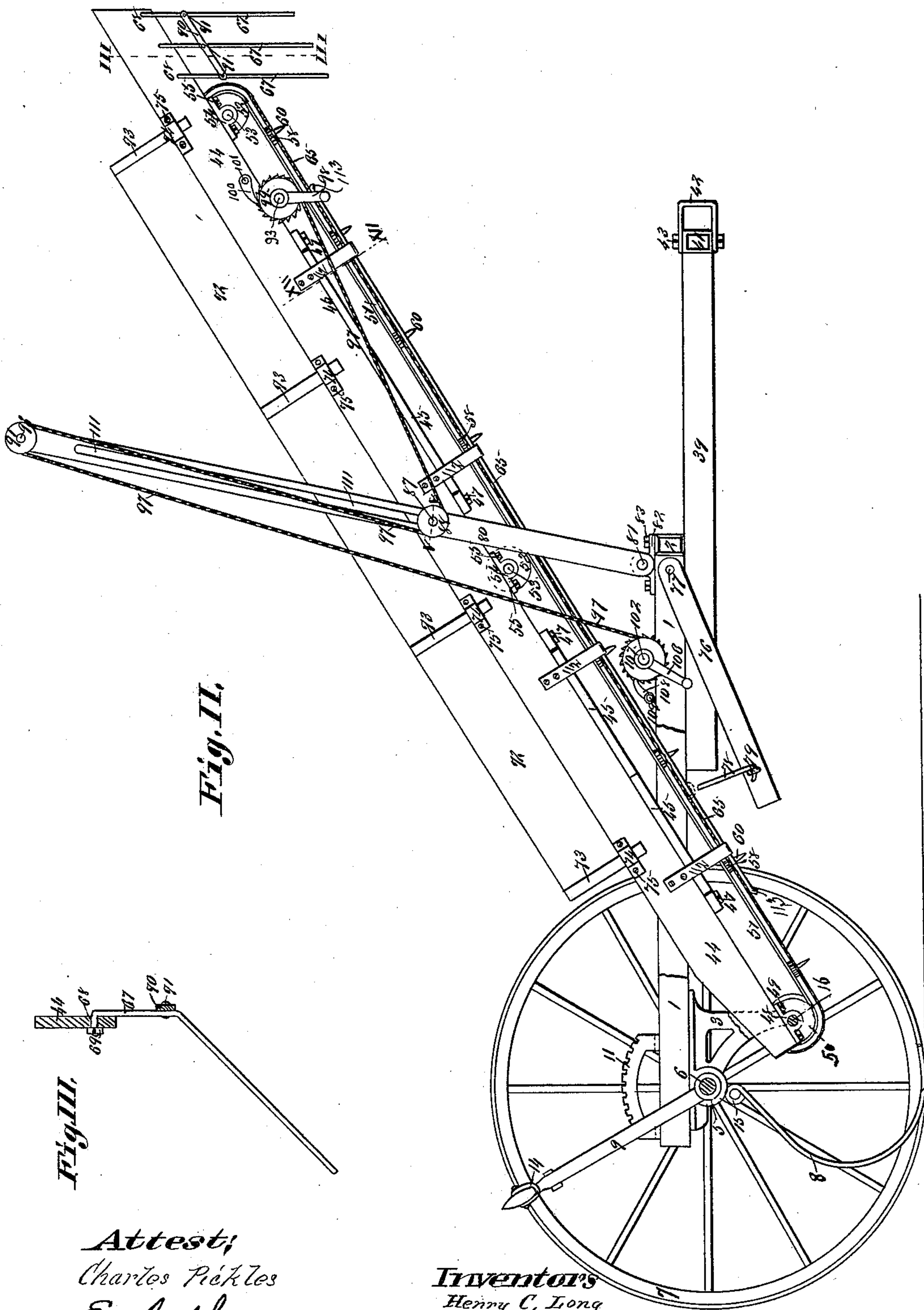
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COMBINED HAY RAKE AND LOADER.

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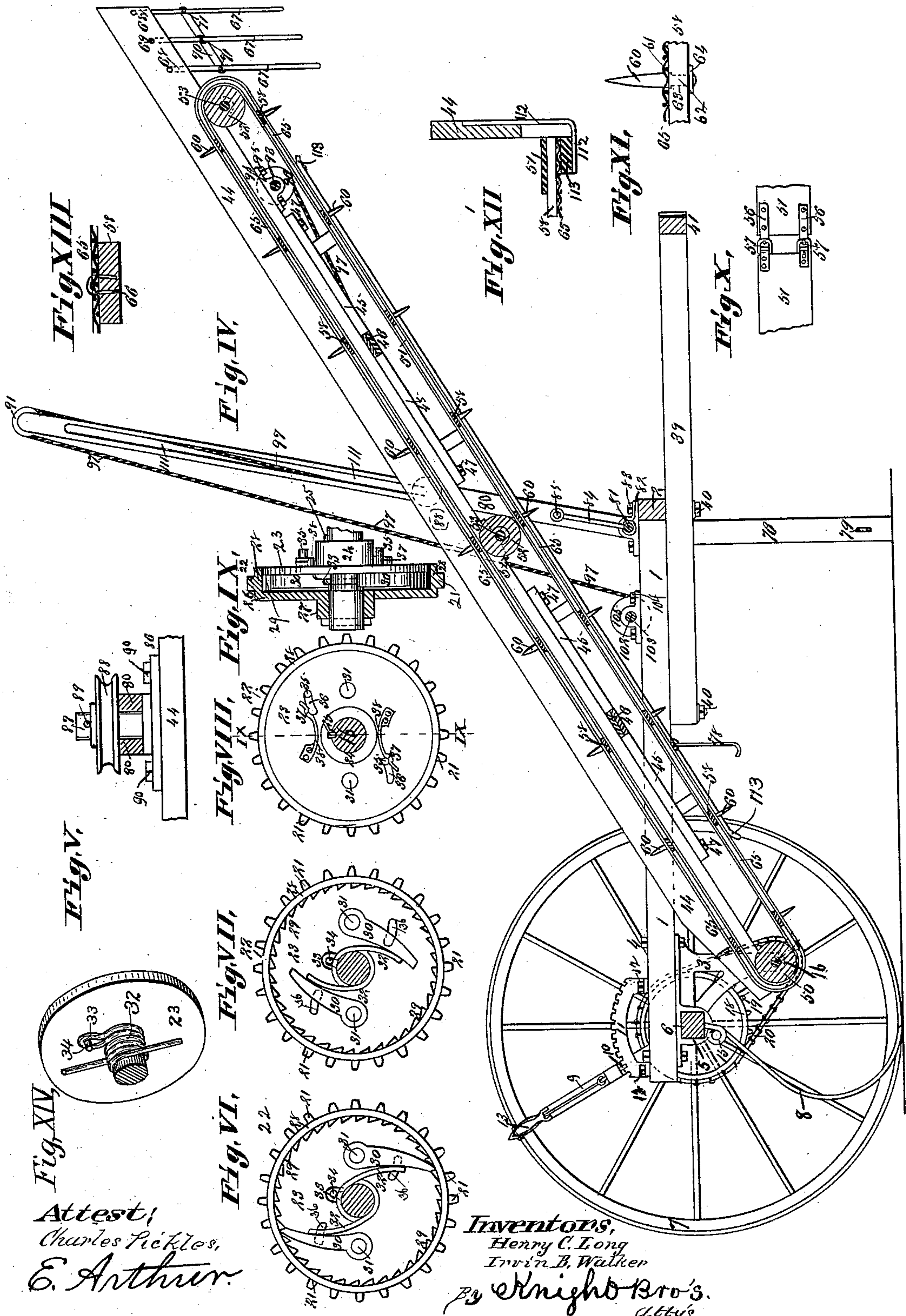
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# UNITED STATES PATENT OFFICE.

HENRY C. LONG AND IRVIN B. WALKER, OF SALEM, MISSOURI.

## COMBINED HAY RAKE AND LOADER.

SPECIFICATION forming part of Letters Patent No. 408,494, dated August 6, 1889.

Application filed March 29, 1888. Serial No. 268,784. (No model.)

*To all whom it may concern:*

Be it known that we, HENRY C. LONG and IRVIN B. WALKER, both of Salem, in the county of Dent and State of Missouri, have  
5 invented a certain new and useful Improvement in Combined Hay Rakes and Loaders, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this  
10 specification, and in which—

Figure I is a top view of our machine set up in working order, and shows its elevator, the rollers with the endless belts they carry, the transverse toothed slats that surmount the  
15 belts, the woven-wire netting that surmounts the slats, and the elevating-tackle. Fig. II is a longitudinal vertical section taken on line II II, Fig. I, and shows the derrick and its tackle, with its accompanying devices, for adjusting the position of the elevator and its  
20 means of attachment to the wagon that it loads, with part of the side beam of the bed-frame broken away to provide an unbroken view of said elevator. Fig. III is an enlarged  
25 section taken on line III III, Fig. II, and shows one of the guide-teeth (at the upper end of the elevator) that conducts the outskirts of the hay from the discharge of said elevator to the load. Fig. IV is a vertical longitudinal  
30 section taken on line IV IV, Fig. I, and shows the several operative parts of the elevator and the spring-pawl locking lever and rack for the adjustment of the rake-teeth. Fig. V is a section taken on line V V, Fig. II, and shows one  
35 of the lower elevator-pulleys, its means of attachment to the elevator, and free movement in the elongated slot of the derrick-boom. Fig. VI is an enlarged vertical section of the double-disk sectional sprocket-wheels  
40 for setting the elevator in and out of gear, showing the fast rimless disk and the overlapping flanged and sprocket-gear rim of the loose disk. It shows, also, the spring-pawls pivoted to the tight disk and in engagement  
45 with the interperipheral ratchet within the flanged rim of the loose disk to couple said disks and set the elevator in gear. Fig. VII is a like view showing the pawls out of engagement when the elevator is out of gear.  
50 Fig. VIII is an enlarged outside view of the tight-keyed rimless disk and the overlapping flanged sprocket-teeth rim of the lower disk.

It shows, also, the operative pins that are integral with and project from the dog-pawls through slots in the tight section-disk and the  
55 latch-springs that hold said pins and the pawls they command when out of gear. Fig. IX is a vertical section taken on line IX IX, Fig. VIII, part in elevation, showing the coadjutant parts of the sectional sprocket-wheel. Fig.  
60 X is an enlarged detail of the endless belt, showing its buckle attachment. Fig. XI is an enlarged detail view of one of the slats, the woven-wire netting, and one of the carrier-teeth. Fig. XII is an enlarged section taken  
65 on line XII XII, Fig. II, showing the side bar of the elevator-frame, the angle-strap, and the supporting-strip, which forms a trackway for the endless belts on their return trip. Fig. XIII is an enlarged cross-section taken on  
70 line XIII XIII, Fig. I, showing one of the slats, the wire-netting that surmounts it, and their connection by the staples that pass through the netting and into the slat. Fig. XIV is a detail perspective view of the winged spring.  
75

This invention relates to devices for simultaneously raking and loading hay; and the invention consists in features of novelty, hereinafter fully described, and pointed out in the  
80 claims.

Referring to the drawings, in which like figures of reference indicate similar parts in all the views, 1 represents the side beams of the main frame or bed, and 2 is the front cross-beam.  
85

3 represents metal hangers, which may be cast of malleable iron, steel, or common cast or wrought iron, and are secured pendent to the rear ends of the side beams by screw-bolts  
90 4. These hangers carry the bearings 5 for the main axle 6 of the ground-wheel 7. The axle also carries the rake-teeth 8, which are elevated, when it is intended they shall be inoperative, by the levers 9. The said levers also hold the teeth to any desired elevation and  
95 depression, and in the latter case can be held to either a heavy or light raking; also, when adjusted in either operative or inoperative position, can be held to their adjustment by the spring-pawls 10 on said levers, which en-  
100 gage between the teeth of the racks 11, that are secured to the rear end of the side pieces of the bed-frame by the screw-bolts 12.

Although, as stated, the rake-teeth can be



held to an adjusted position to the ground by the engagement of the spring-pawl in the rack, yet this is not imperative, for, especially when the ground is rough, it is sometimes preferred, 5 when the teeth are operative, not to lock their ground-tension by the spring-pawls, which are then unseated from the rack by pressure on the trip-triggers 13 on the levers, and the triggers are confined in said locked position by 10 the pivoted loops 14, which are secured to the handles of the levers and are made to engage over the hooked ends of said triggers, so that until the triggers are again released the rake-teeth will then be left free, save only for the 15 ground-tension consequent on their own gravity, so that on meeting obstructions they readily spring and rise over said obstructions, and thus prevent the racking of the teeth. The coils 15, near the upper ends of the steel teeth, 20 also provide additional flexibility to the teeth. When the operator desires to readjust the teeth and lock them to their adjustment, he locks the spring-pawl on one side of the machinery, so that it will not obstruct the move- 25 ment of the levers, and then, by the movement of the lever at the other side, he secures either an inoperative position for the teeth or, relatively, a stiff or light ground-tension or gravity-tension only, as he may desire, and 30 locks the adjustment with the spring-pawls or not, as the case may require.

16 represents a rotary shaft that extends across the frame of the machine a little in front of and below the level of the axle and has its 35 bearings 17 in the lower arm of the aforesaid hanger 3, that carries the main axle.

18 represents the drive sprocket-wheels, which are made fast to the ground-wheels by having their hubs made integral with the in- 40 ner hubs of said ground-wheels or otherwise secured thereto by any suitable means, so that the drive sprocket-wheels always rotate with the ground-wheels. The sprocket-teeth 19 on said drive-wheels engage with and carry 45 the endless drive-chains 20, that also engage with the teeth 21 of the sectional sprocket-wheels 22, that have their bearings on the projecting ends of the rotary shaft 16. The said sectional sprocket-wheels are constituted 50 of the rimless disks 23, whose hubs 24 are secured to the rotary shaft 16 by keys 25, and of the flanged disks 26, whose hubs 27 have loose bearing on the said rotary shaft. The wide flanges 28 of the loose disks also inclose the 55 periphery of the rimless disks, and carry within them a circuit of interperipheral ratchet-teeth 29. On the reverse or inner side of each of the tight-bearing rimless disks 23 of said double-disk sectional wheels, and so 60 boxed in between the tight and loose disks, are two pawls 30, that are pivotally secured to the inside of the rimless disks by pins or rivets 31 with loose bearings.

32 represents springs made of one piece of 65 wire wound around the rotary shaft in double parallel coils, each end of the wire running in the same direction. The wire is first bent

to form a loop 33, which is placed over pin or key 34, whereby the wire is securely attached 70 to the rimless disk and rotary shaft. One end goes off at a tangent about half the circumference of the rotary shaft ahead of the other end. The wings of said spring enforce the engagement of the pawls 30 with the inter- 75 peripheral ratchet-teeth 29 when said pawls are in their normal position, and thus, when the pawls are engaged the two sections of the sprocket-wheel are co-operative, and the drive-wheel and drive-chain actuate the sectional sprocket-wheel to drive the elevator, 80 whose further action will be hereinafter described.

The pawls 30 are provided with operating-pins 35, that are cast or made integral with said pawls, and the pins project through curvi- 85 linear slots 36 in the rimless disks 23 and provide means for putting the elevator out of gear when it is not required to run. As stated, the normal position of the pawls under the enforced pressure of the springs is in 90 engagement with the circumferential ratchet; but when it is desired to disconnect and thus ungear, the operator simply has to press against said pins until they are forced from the geared position shown in Fig. VI to the 95 ungeared position shown in Fig. VII, in which position they are locked by the catches 37 in the latch-springs 38, (see the position of the latch-springs in Fig. VIII,) the lower one holding the pawl, through its pin, captive, 100 and the upper one having released its hold, the pawl has slipped out from engagement therewith and into gear by springing into engagement with the ratchet-teeth under the pressure of the spring 32, which latter posi- 105 tion the pawls always maintain when operative, and consequently enforce the operation of the elevator.

The above-described sectional sprocket-wheel, with its devices for transmitting and 110 shutting off the drive-gear from the elevator, may be placed either side to bring the face of the rimless disk, which carries the adjustable operative devices, to the side that is most convenient for the operator. 115

The actuating-pawls, which are pivoted, as stated, to the rimless disk, work under the impingement of their double wing-springs within the wide projecting flanged rims 28, which are integral with and peripherally 120 seated around the corresponding disks 26, that have loose bearings on the shaft 16. The flanged rims also loosely inclose the periphery of the rimless disks 23, that are keyed to and so have tight bearings on the same shaft 125 that the other sections have loose bearings on, and box in the circumferential ratchet, the pawls that engage therein, and the springs that enforce said engagement.

39 represents the side pieces of the draft- 130 frame, that are firmly secured to and beneath the side and front pieces of the main or bed frame by the screw-bolts 40, and 41 is the front piece of said draft-frame, which may be tenon



and mortise jointed to the side pieces or secured by any other efficient means. A draft-clevis 42 is secured by the draft-bolts 43 to the said front piece of the draft-frame, and provides the means for attachment of the machine to the wagon or its rack, on which the hay is loaded.

44 represents the side pieces of the elevator-frame, which are coupled by two sets of cross brace-bars 45, that are halved together at their cross-junction, as shown in section at 46 in Fig. IV, and are secured to and beneath the side pieces by screw-bolts 47. This elevator-frame has pivotal bearings on the rotary shaft 16 by means of the pendent brackets 48, that are secured beneath the lower ends of the side pieces of said elevator by the screw-bolts 49.

50 represents the drive-roller, which has tight bearings on the rotary shaft 16, and when placed in gear drives the three endless belts 51 that it carries around the lower end of the elevator. The said belts are also carried halfway up by the coadjutant rollers 52 on the rotary shafts 53, which have their bearings in the pendent brackets 54, that are secured to the middle and upper end of the side pieces of the elevator by screw-bolts 55.

The end belts are preferably constructed of two or three sections (which number may be increased or diminished, as desired) to facilitate its handling in attachment and detachment and to facilitate its tension adjustment. The sections of said belts are secured together and their tension length adjusted by straps 56 and buckles 57 on the adjoining ends of the sections that engage together.

58 represents the cross-slats, which are secured to the endless belts by bolts or rivets 59. The carrier-teeth 60 are constructed, as shown in the enlarged Fig. XI, with shoulders 61, that fit down on the slats and brace the teeth to withstand the side pressure from the weight of hay they carry. The teeth have shanks 62, reduced in diameter from that of the shoulders, which shanks are seated in the holes 63 in the slats and pass through washers 64, against which they are riveted.

65 represents an endless apron, that is preferably of copper wire-netting, but may be of any other suitable wire-netting or material. This netting is stretched over the slats that carry the elevated teeth, and, preferably at the union of the ends, overlaps the space between two adjoining slats to strengthen the attachment. The netting is securely attached to the slats by staples 66. This wire-netting allows the dirt and dust that of a necessity are more or less raked up with the hay to escape therefrom on its passage up the elevator; also the contact of the hard wire of the netting on the soft hay it carries forms a traction-surface that greatly facilitates the carriage of the hay.

While we prefer wire-netting in the construction of the endless apron, cord-netting or other suitable material may be used. The

belts 51 and the wire-netting constitute, practically, a single endless belt or apron.

The upper ends of the side pieces 44 of the elevator-frame extend beyond the upper carrying-roller, around which the endless belts and apron move, and said extensions of the side pieces are each provided with a series of crooked bars or rods 67, that are loosely seated in perforations 68 in the side boards and held in their seats by screw-nuts 69. The rods or bars hanging pendent from their seats in the side boards at first hang downward in a nearly vertical position, and are held parallel to each other by connecting-straps 70, to which they are attached by clips 71. Beneath said cross connecting-strap the rods or bars or prongs turn inward in about the form of the prongs of drag-forks, the points from each series turning inward toward the other and so guiding the marginal scatterings or outskirts of the hay, toward the middle of the load on which it is constantly discharging. By this guide attachment the scattering hay that would otherwise roll off the load on delivery is safely landed thereon. The bars or rods are made to fit loosely in their seats in the side pieces, so that when the ground-wheels of the machine are passing over uneven ground and consequently the sides of the elevator-frame vary from the perpendicular the gravity of the teeth tends to correct the divergence in guiding the delivery of the hay on the load.

72 represents raves that are riveted or otherwise secured to slats or battens 73, the lower ends of which project beyond said raves and are seated within brackets 74, that are secured to the side of the side pieces of the elevator by screws 75. These raves are for use in windy weather, or when an unusually heavy crop of hay is being raked and elevated, to prevent its waste over the sides of the elevator.

Supporting-legs 76, pivoted to the main frame by bolts 77, serve, when in a vertical position, to sustain the front end of the bed-frame of the machine when detached from the wagon. When the machine, on the other hand, is attached to the wagon that it loads, the said legs are turned backward on their pivots and the hooks 78 are made to engage in the staples 79, and thus hold the foot of the post out of interference with the ground over which it travels.

We will now describe our device for adjusting the elevator-frame to its desired point of delivery.

80 represents the derricks or jib-booms, which are pivoted at their feet to the rock-shaft 81, that has its bearings in the journal-boxes 82, which are secured to the bed-frame by screw-bolts 83. Longitudinal iron straps 84 also have pivotal bearings on the said rock-shaft alongside the foot of the booms, to which their upper ends are secured by the screw-



bolts 85. The booms are thus longitudinally re-enforced from withdrawal from their clutch on the rock-shaft, and the cross-section of the timber beneath their pivot-bearings is re-enforced from splitting out.

86 represents washer-plates, from which project the sheave-bearing pins 87, on which the sheaves 88 have their bearings and on which they are keyed by the linchpins 89. The said plates 86, with sheaves they carry, are secured to the outside of each side piece of the elevator-frame, near the middle longitudinally, by screw-bolts 90. The said pins, on which the sheaves have their bearings, pass through elongated slots 111 in the booms, and so, by means hereinafter described, as the tackle lifts or lowers the elevator-frame, the bearing-pins of the sheaves, while stationary to the side pieces of the elevator, move freely up or down said elongated slots in the booms to correspond with the change of elevation in the elevator. Angle-irons 112, secured to the side pieces of elevator, support strips 113, that form return-tracks for the support of the belt and netting. Secondary sheaves 91 run on their bearer-pins 92, that project outwardly from the side of the booms near their upper ends. A rotary cross-shaft 93 near the upper end of the elevator has its bearings in journal-boxes 94, that are secured beneath each side piece of the elevator by screw-bolts 95, and flanged drum-rollers 96 have tight bearings on the projected ends of said shafts 93, and thus form the upper drums, to which the upper ends of the tackle-ropes 97 are attached. On one side of the frame the shaft 93 extends beyond said drum, and may be either made square to seat the hand-crank, or said hand-crank 98 keyed on it. A circular ratchet-plate 99 also has a tight bearing on said shaft, and the follower-pawl 100 is pivoted to the side piece of the elevator by the pin 101.

A rotary cross-shaft 102 has bearings in the journal-boxes 103, that are secured on the top of the side pieces of the bed-frame by screw-bolts 104. This shaft carries the flanged drum-rollers 105 on its ends, that project beyond the journal-boxes, and to these drums are the lower ends of the rope tackle secured. The shaft 102 extends beyond the drum-roller at one end, and may be either made square, to seat the hand-crank 106 thereon, or said hand-crank may be keyed thereto. A circular ratchet-plate 107 also has a tight bearing on said shaft, and the follower-pawl 108 is pivoted by the pin 109, which is seated in the loop 110 at the end of one of the journal-boxes 103. The said pawl, and as does the one in engagement with the rotary ratchet at the other end of the tackle, hold their respective ends of the tackle and drums, to which they are relatively attached, in the position effected by the turning of the hand-crank.

For the adjustment of the height of the elevator, the tackle-ropes are firmly secured by any suitable means to the drum-rollers

105, then passed up and around the upper sheaves 91 at the top of the jib-boom, then down and around the sheaves 88, whose bearing attachments are firmly secured to the side pieces of the elevator-frame, and whose bearing-pins move in the elongated slots 111 in the booms as the elevator-frame rises or lowers, and from said sheaves the ropes pass direct to the upper drum, to which they are firmly secured by any suitable means.

It will be seen that by this device the height of delivery of the elevator-frame is readily adjustable, either from the ground or from the load, by turning the lower or upper hand-crank, as the case may be. It is evident that when the elevator is to be lowered the pawl is required to be thrown back and the hand-crank operated to slowly let out the tackle, and when the elevator is sufficiently lowered the pawl is again thrown into engagement with the rotating rack and locks the adjustment. When, on the other hand, the elevator is being raised, (which is its invariable movement during loading,) all that is required is to turn the hand-crank, the lower one from the ground or the upper one from the load, and the follower-pawl holds at each tooth it jumps and locks the elevator to its adjustment.

This combined rake and loader is devised to be driven into a field of cured hay, which lies as left by the knife of the mower, and, without the intervention of any manual labor on the ground, gather and load it on the wagon to which the machine is attached. Even when loading, as the hay advances in height, and in consequence the upper end of the elevator has to be raised, it is easily effected by one of the men on the load by turning the hand-crank 98 without alighting from the load.

When passing from field to field, or when at any other time it is desired to suspend the operation of the loader, all that is required is to turn the pins 35, that operate the pawls 30, into engagement with the latch-springs 37 and to consequent disengagement of the interperipheral ratchet-teeth, and the elevator is immediately thrown out of gear, and again by tripping said latch-pins the elevator is set in gear again. This makes an easy and, it is believed, novel device for putting the machine in and out of gear.

We claim as our invention—

1. In a hay rake and loader, the combination of the main wheels, the sprocket-wheels 18, shaft 16, having flanged sprocket-disks 26 mounted loosely thereon, drive-chains 20, passing around sprocket-wheels 18 and flanged sprocket-disks 26, a circular series of ratchet-teeth on the inner sides of the latter, disks 23, fixed rigidly to shaft 16, pawls 30, pivoted to said disks, and springs 32, of one piece of wire, coiled around shaft 16, and having tangential ends engaging said pawls to throw them in engagement with the ratchets, substantially as set forth.



2. In a hay rake and loader, the combination of sprocket-wheels 18, shaft 16, flanged sprocket-disks 26, mounted loosely thereon, having ratchet-teeth on the inner sides of the flanges, slotted disks 23, having hubs 24, keys 25, securing disks 23 to shaft 16, pawls 30, pivoted to the slotted disks, the integral double-coil loop-attached springs 32, the two arms of said springs engaging said pawls to engage them with the ratchet-teeth, pins on said pawls projecting through the slots of disks 23, and spring-catches 38, engaging said pins when the pawls are disengaged, substantially as set forth.

3. In a hay rake and loader, an elevator-frame, rollers 50 and 52, hangers 3, in which roller 50 is mounted, endless belts 51, and an endless belt of wire-netting passing around said rollers, cross-slats 58, secured to the endless belts and having teeth projecting from them, and inwardly-projecting strips 113, supported by the sides of the elevator-frame on which the lower portion of the endless belt is

supported and has bearing, substantially as set forth.

4. In a hay rake and loader, the combination of the adjustable rake, the sprocket drive-gear, and sectional sprocket drive-wheel that transmits the movement from the ground-wheels to the elevator, the pivoted standard 80, that is provided with the elongated slot 111, the sheaves 88 on the sides of the elevator-frame, and secondary sheaves 91 at the top of the standards, the rotary shafts 93 and 102, journaled, respectively, in the elevator and main frames, the windlass-drums they carry, the hand-cranks that work them, and the ropes 97, arranged to adjust the discharge height of the elevator, substantially as and for the purpose set forth.

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In presence of—

J. M. ORCHARD,  
W. W. WALTERS.