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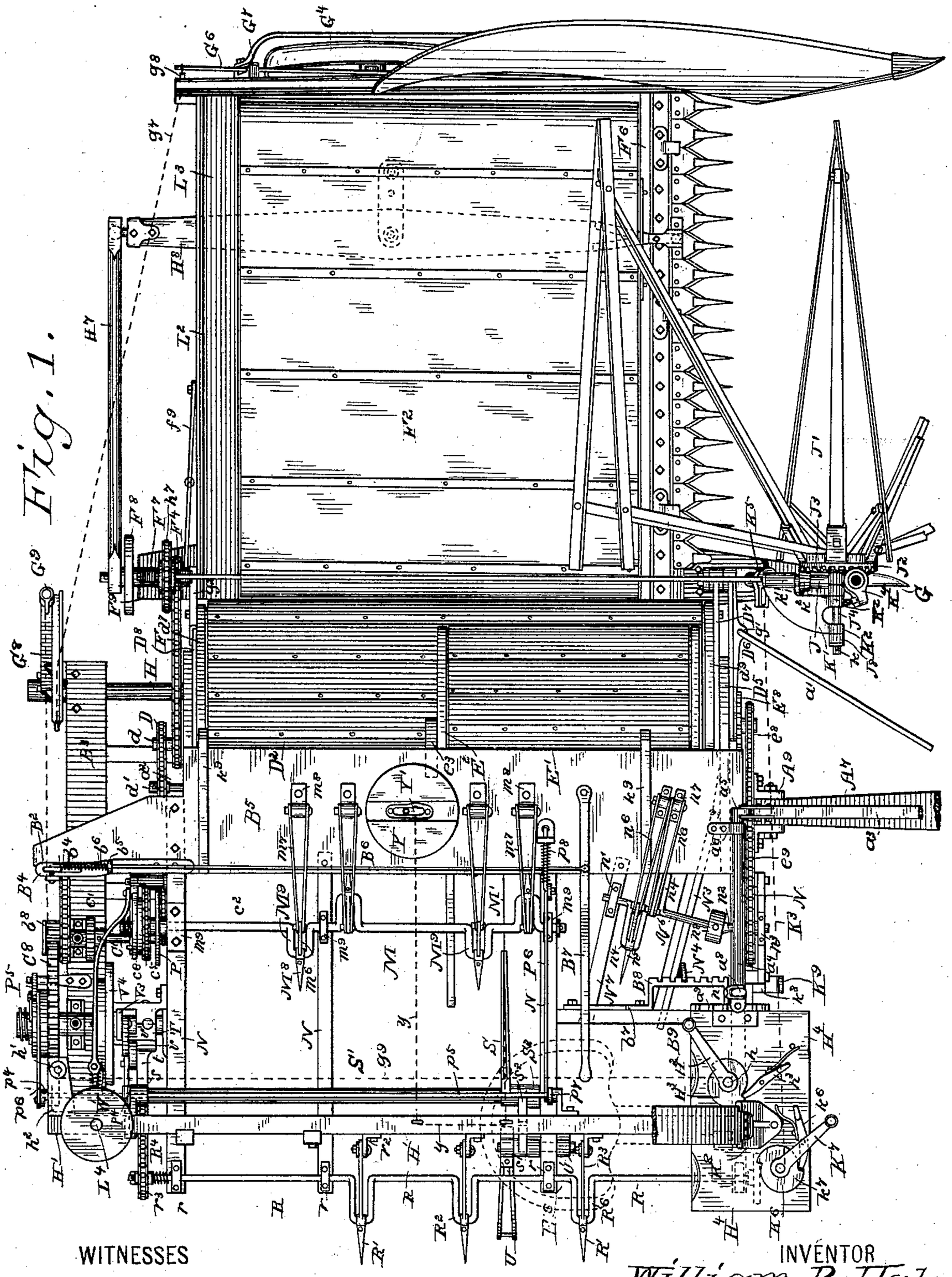
GRAIN BINDING HARVESTER.

No. 372,067. Patented Oct. 25, 1887.

Fig. 1.



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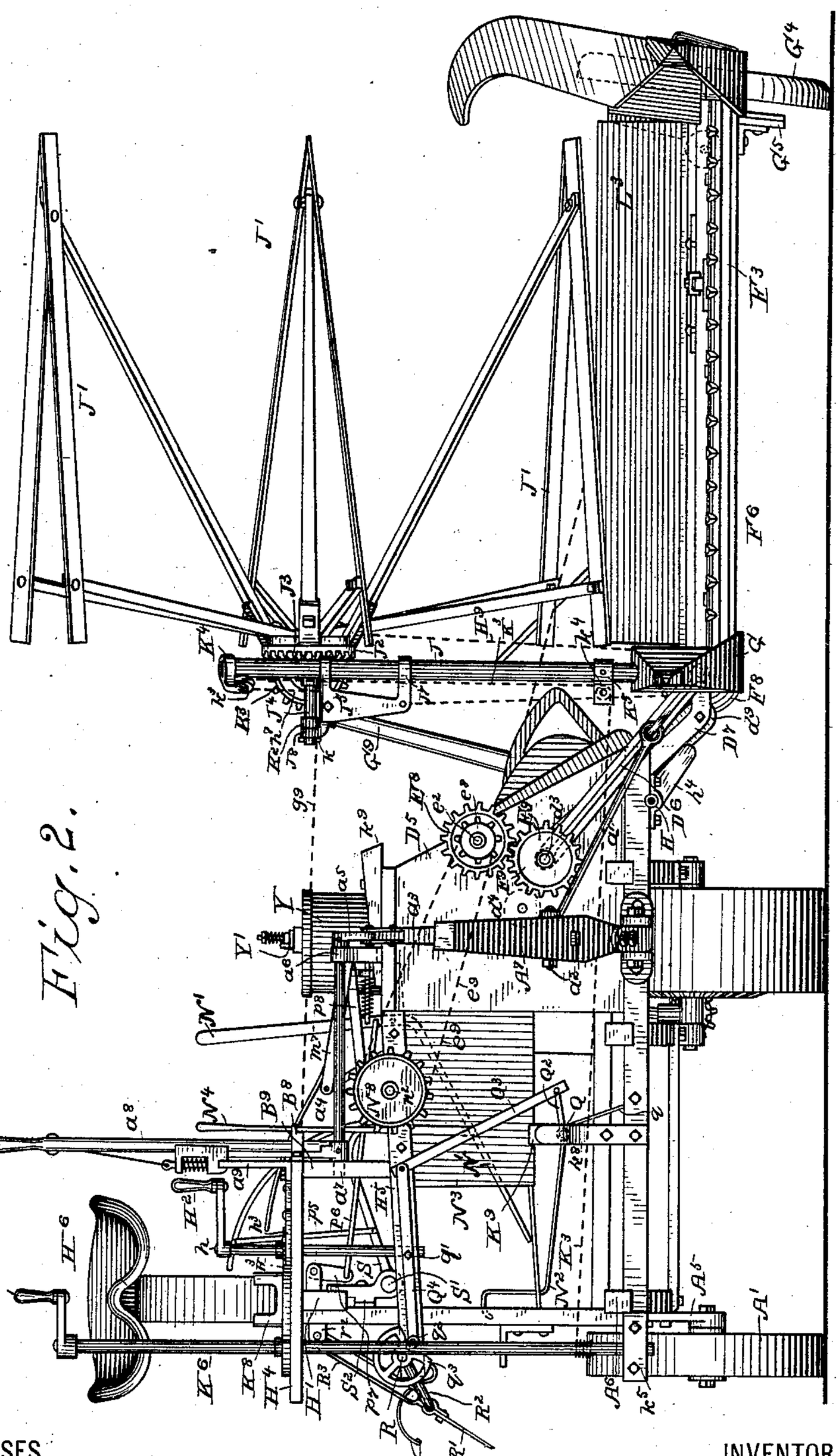

Fig. 2.

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Fig. 3.

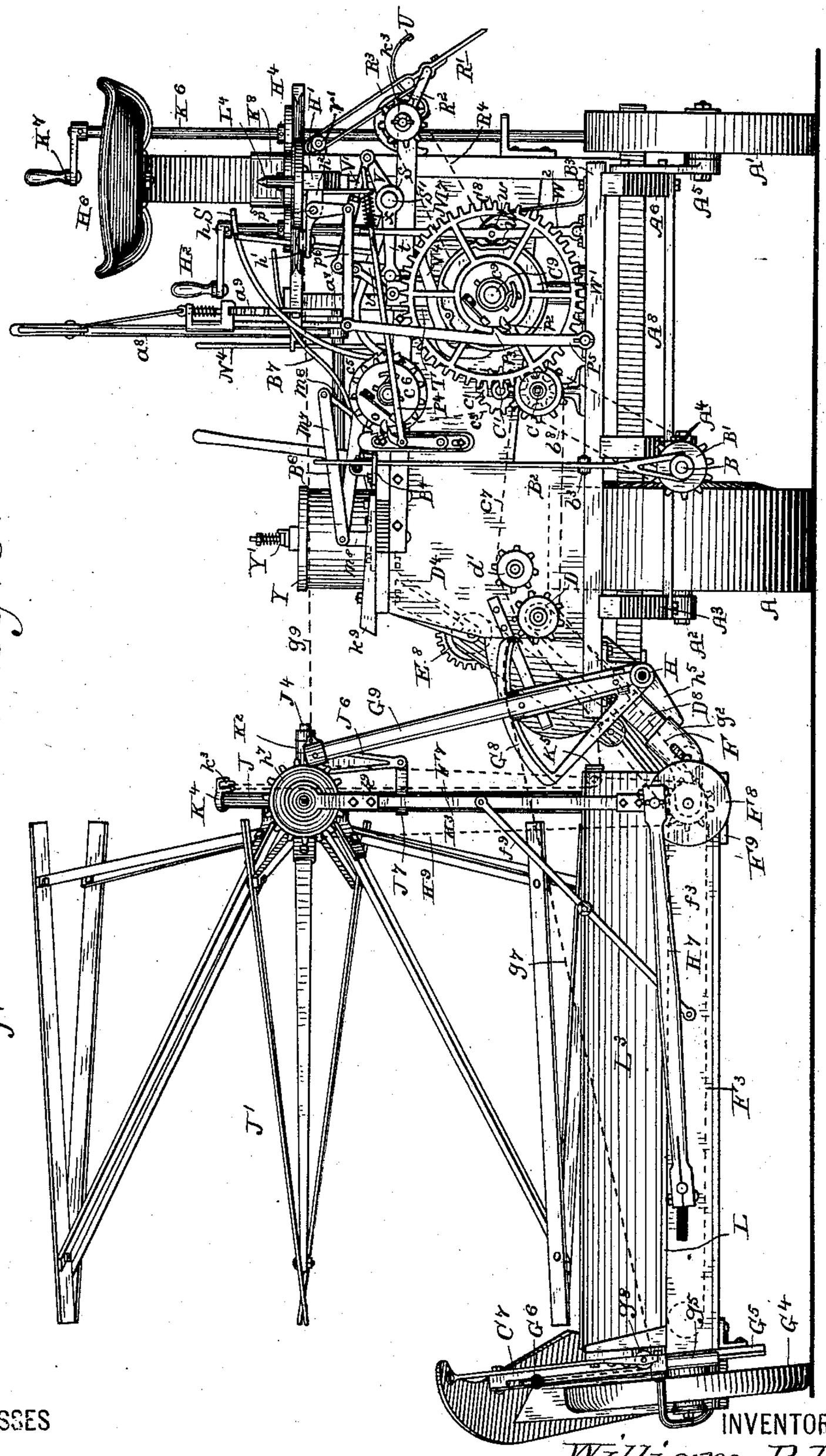

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Fig. 4.

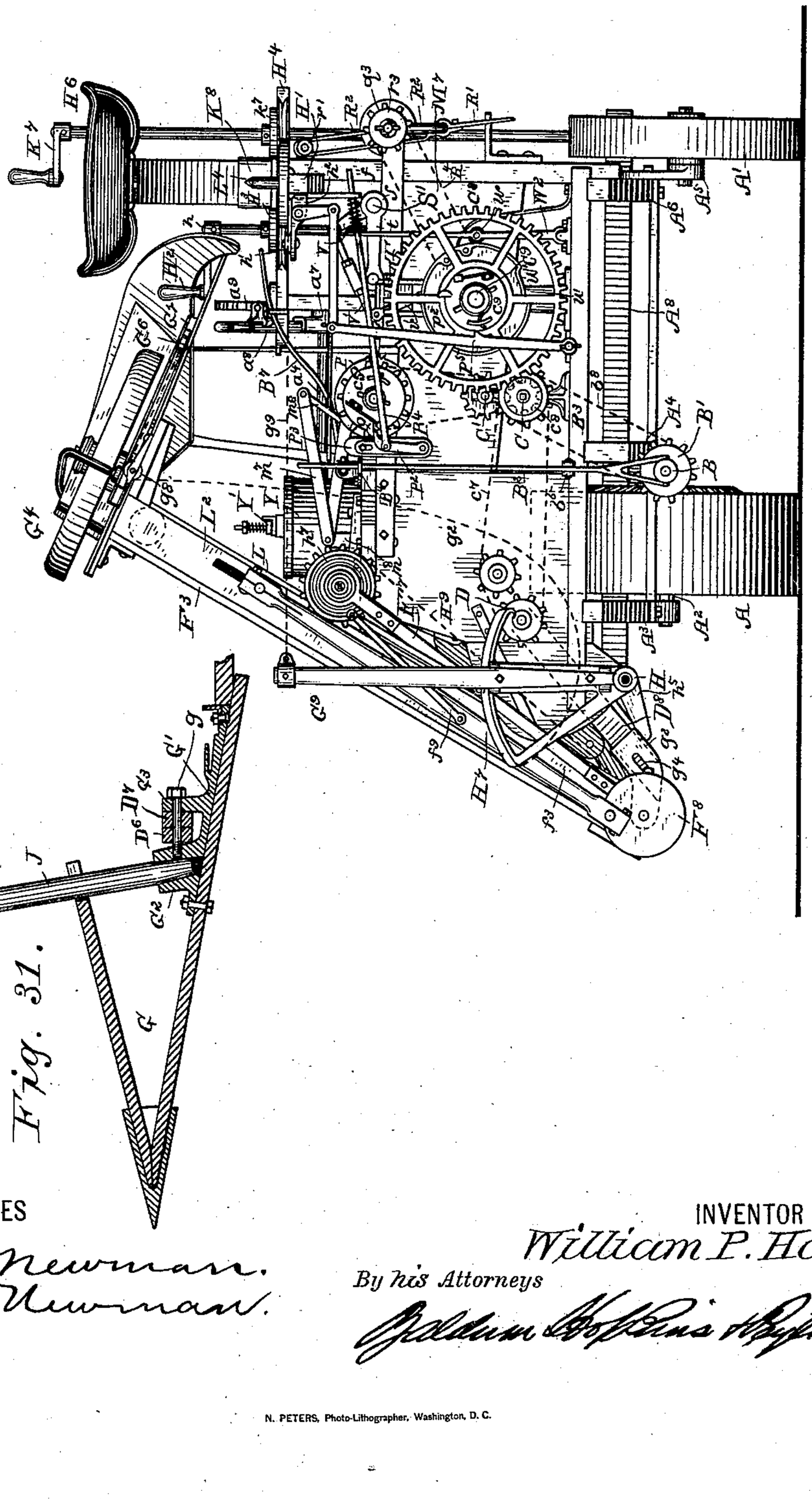

Fig. 37.

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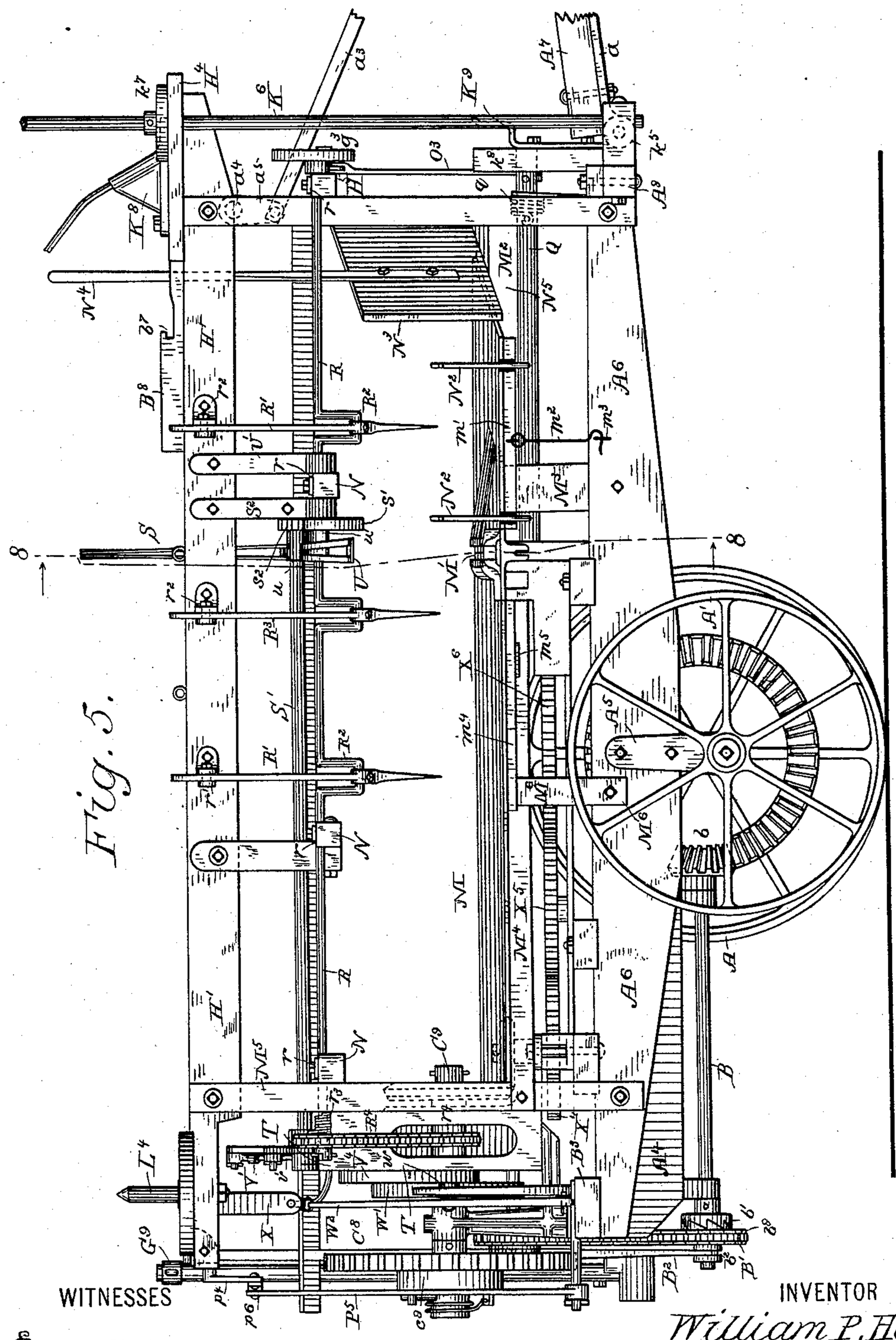

Fig. 5.

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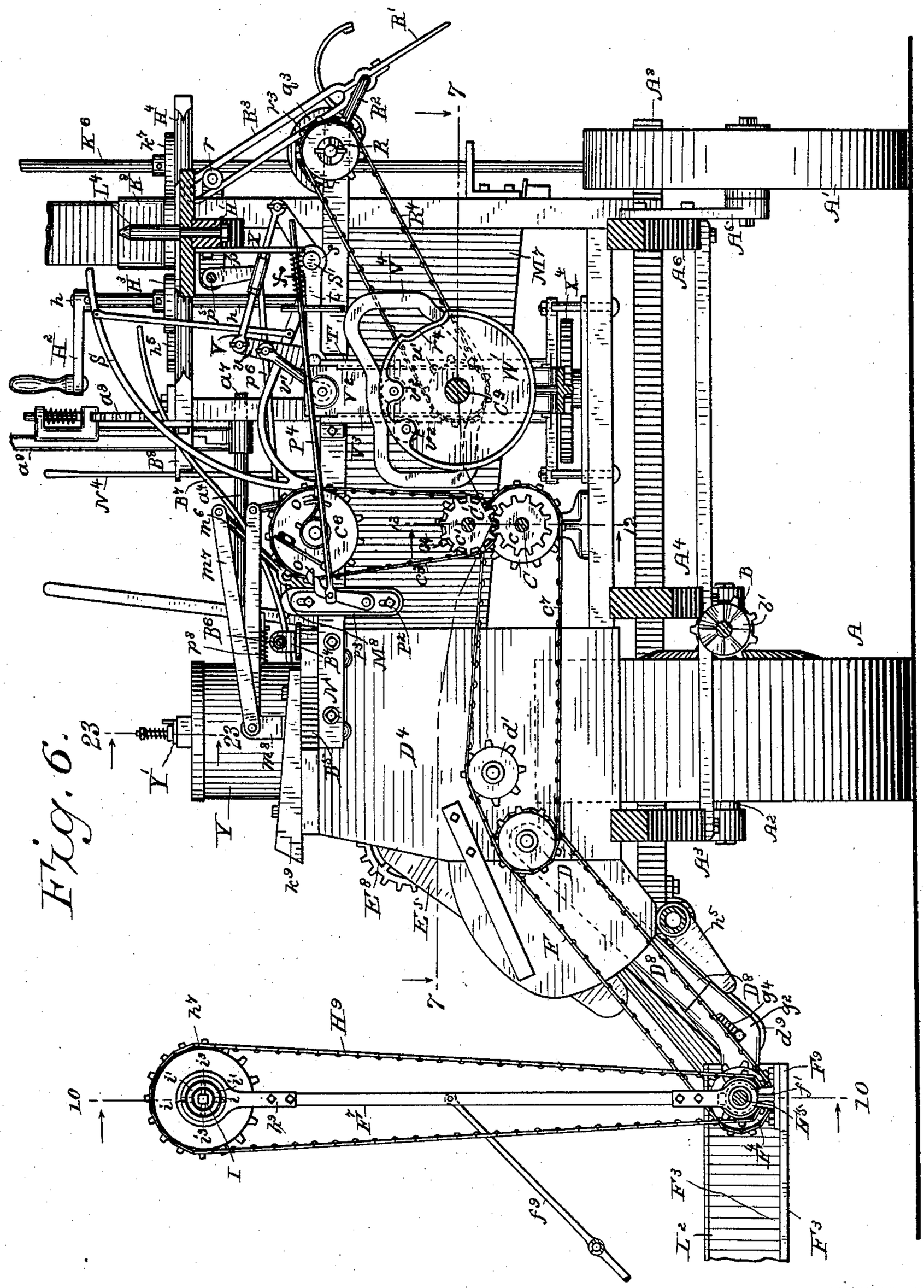

Fig. 6.

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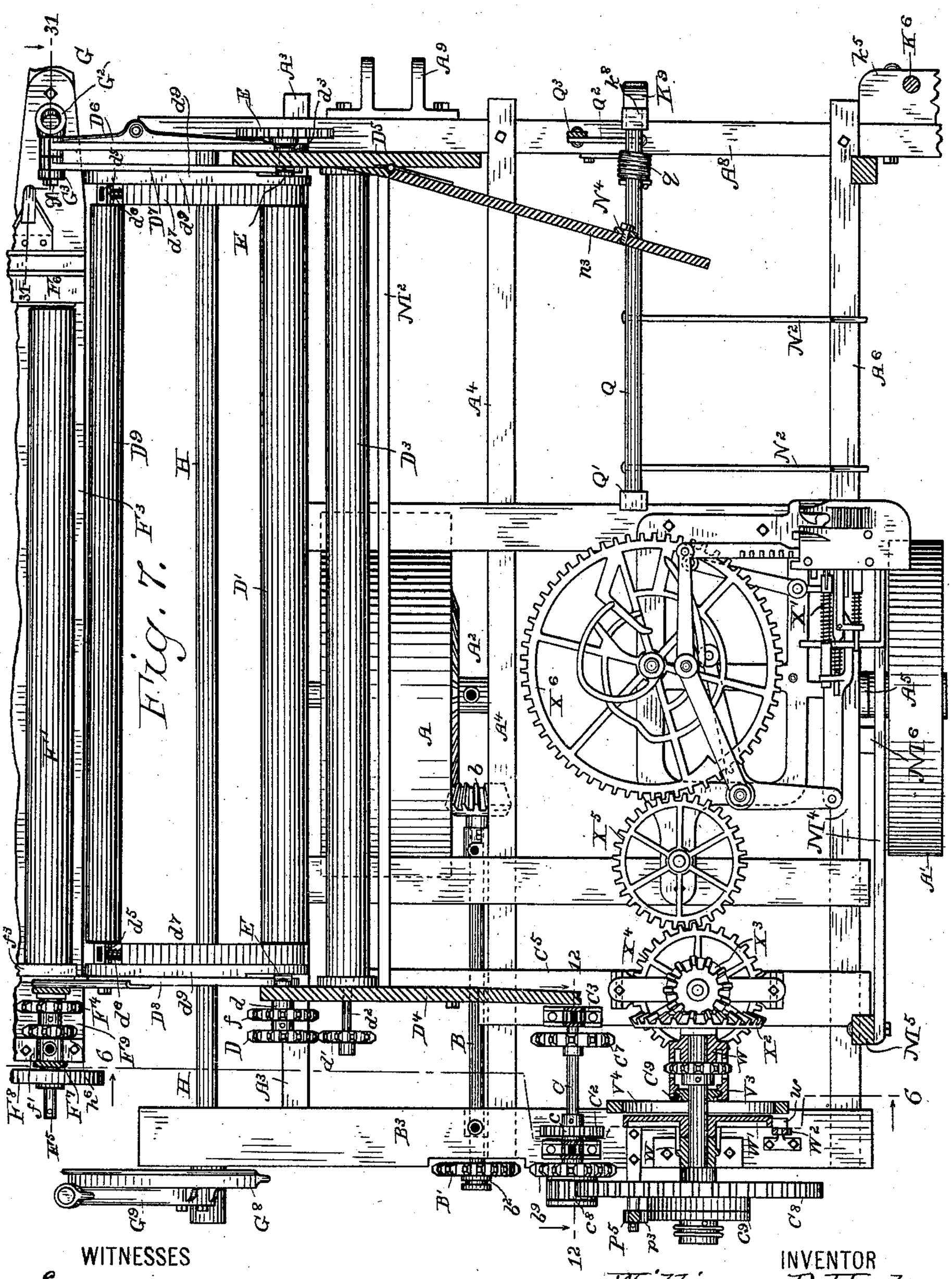

Fig. 7.

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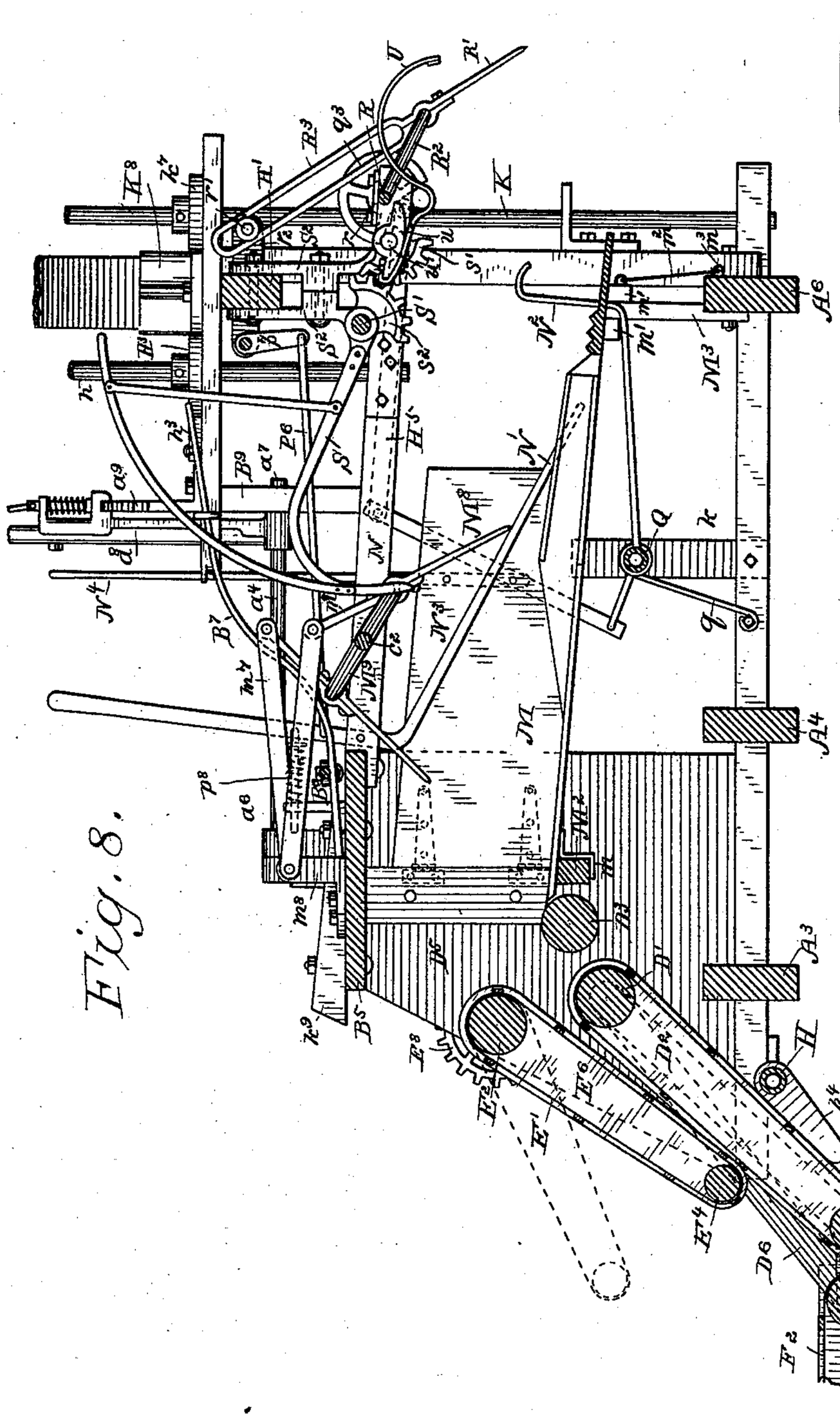

Fig. 8.

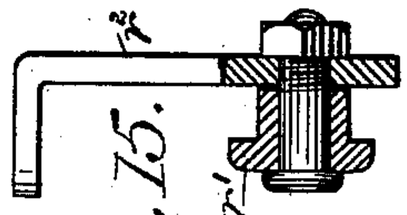

Fig. 15.

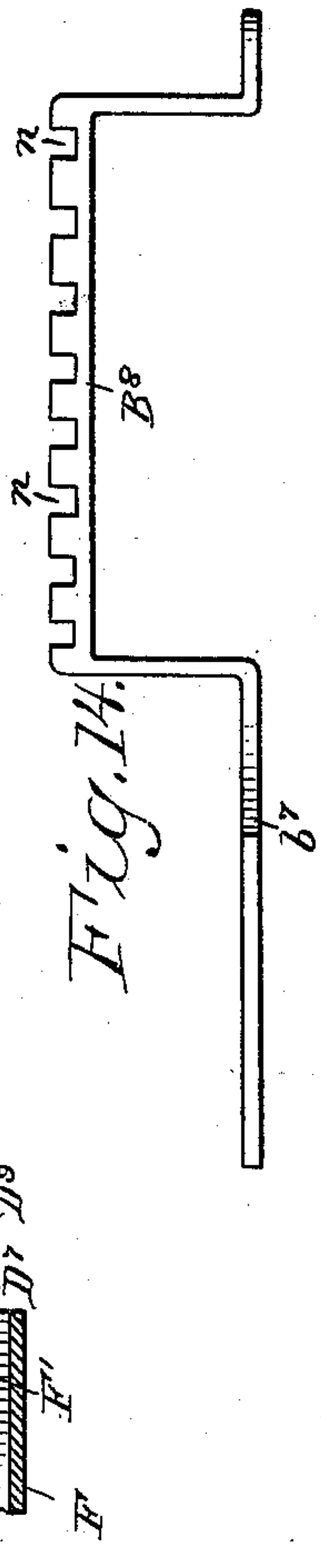

Fig. 14.

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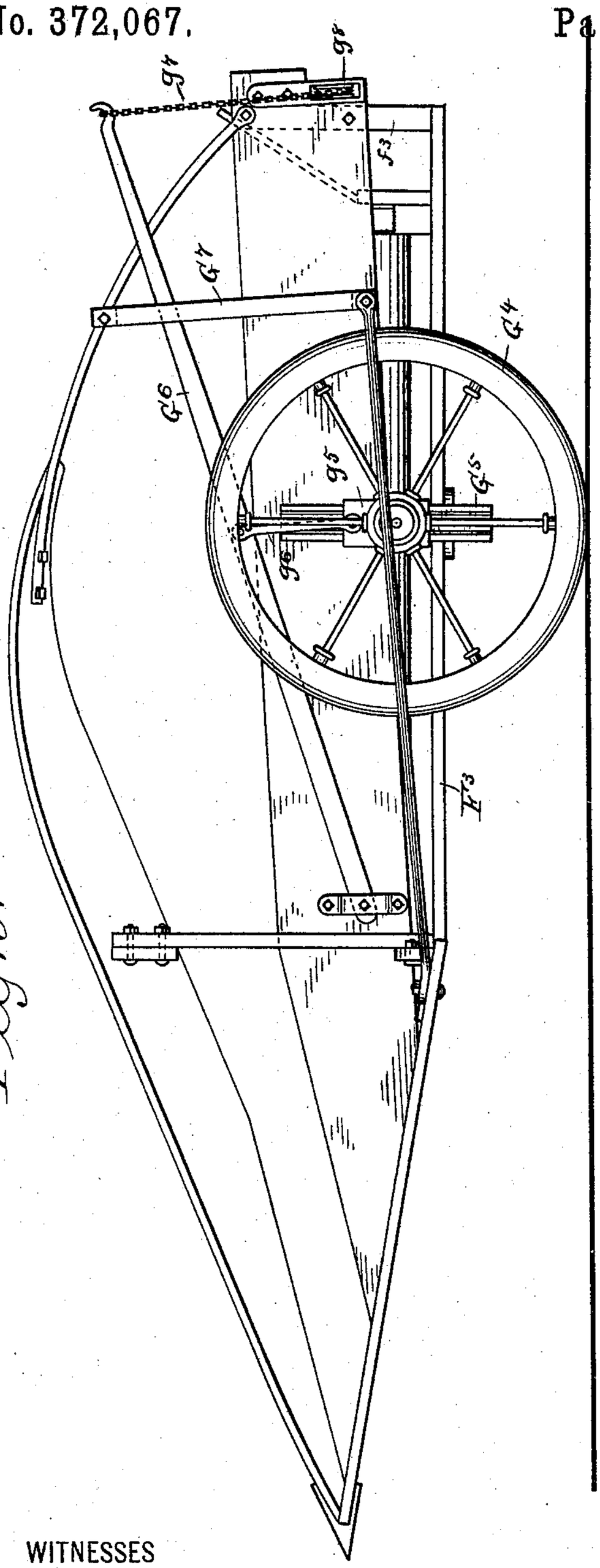

Fig. 9.

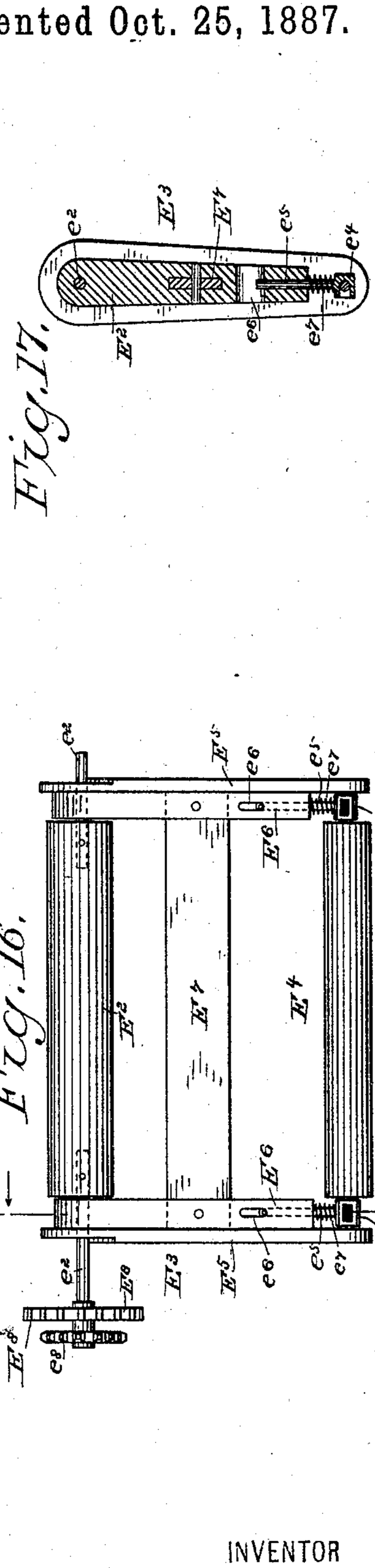

Fig. 11.

Fig. 10.

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Fig. 13.

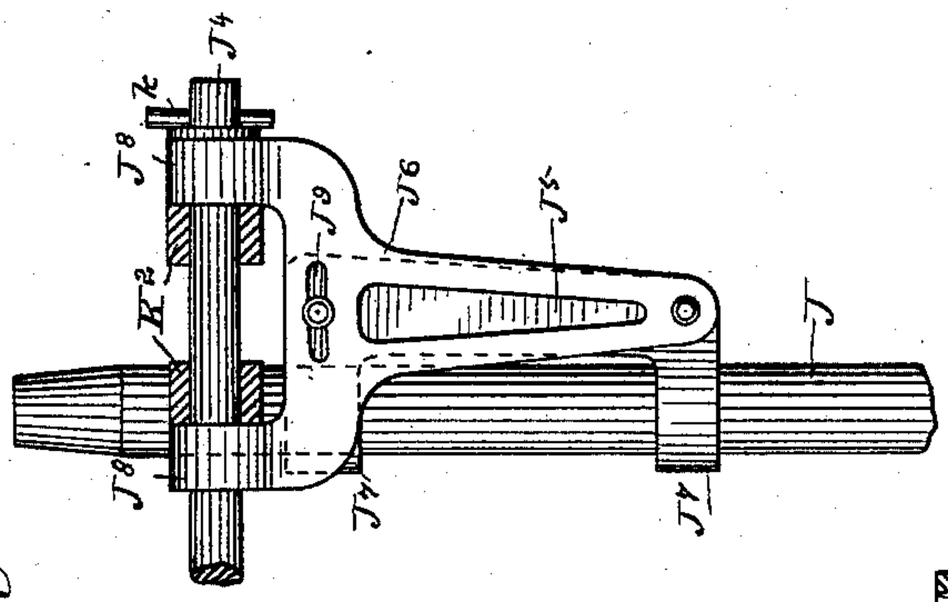


Fig. 11.

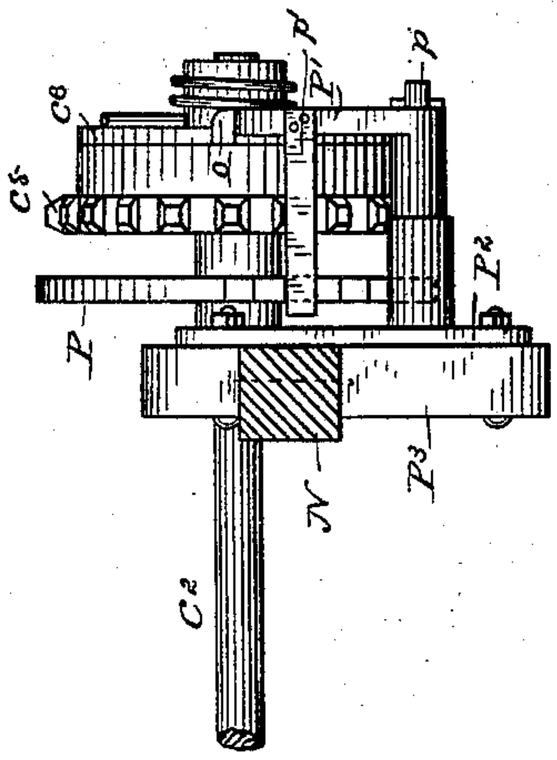


Fig. 12.

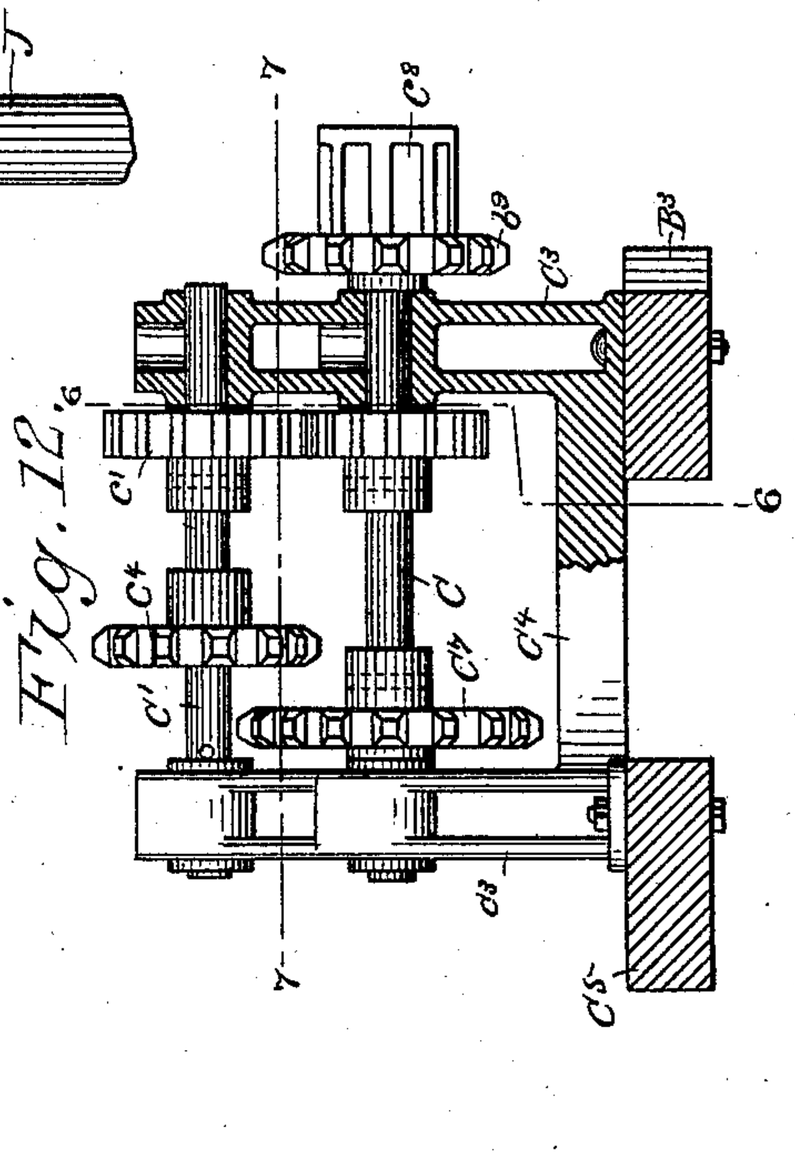
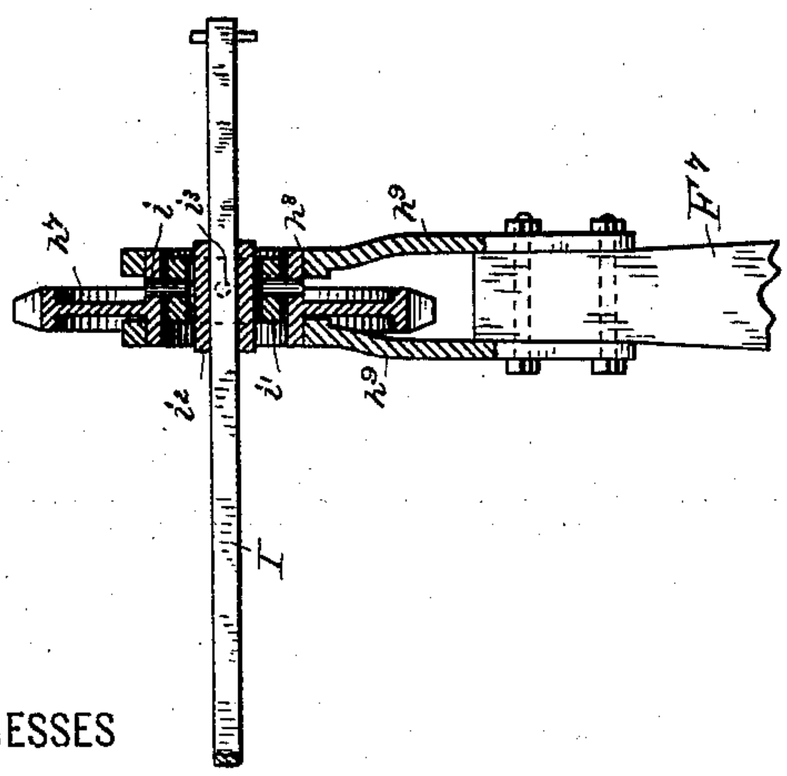


Fig. 10.



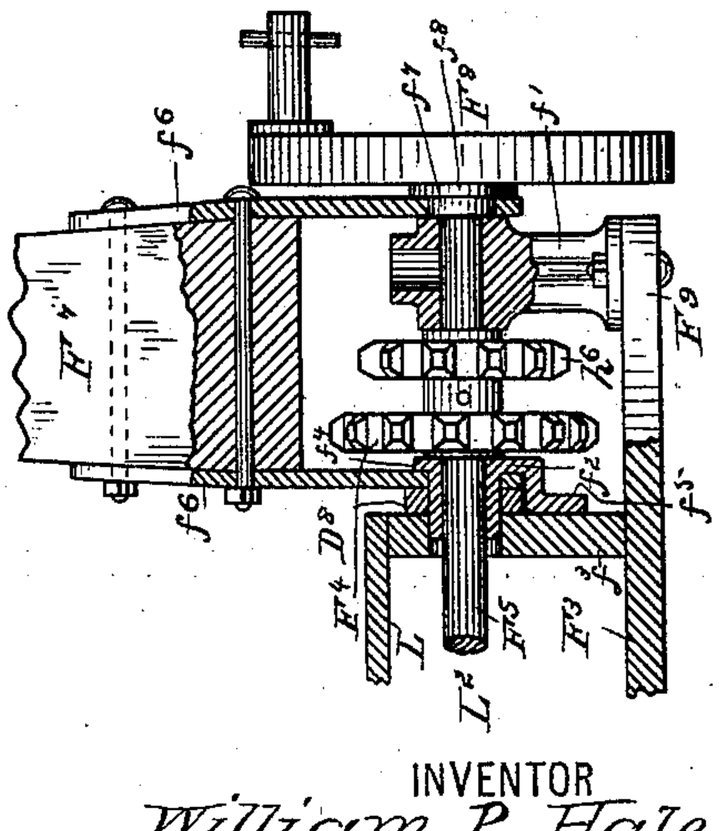


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Fig. 22.

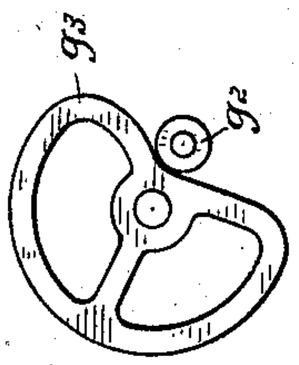


Fig. 23.

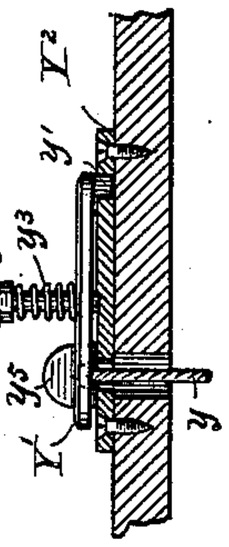


Fig. 24.

Fig. 25.

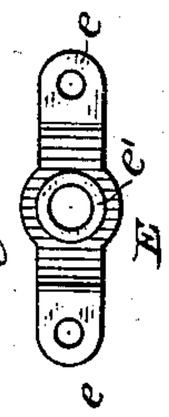


Fig. 21.

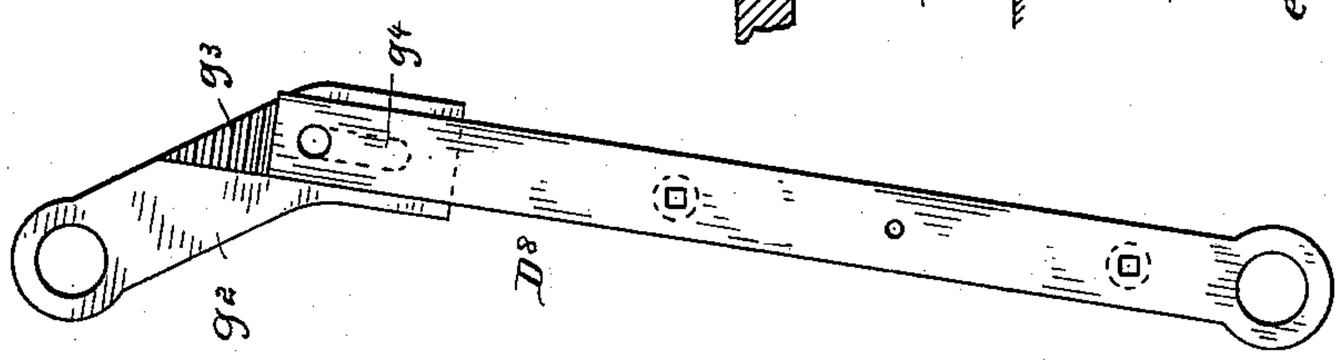


Fig. 20.

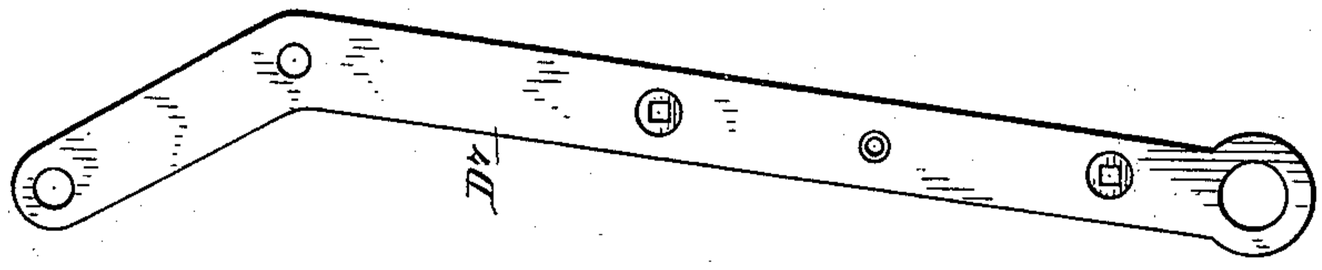


Fig. 19.

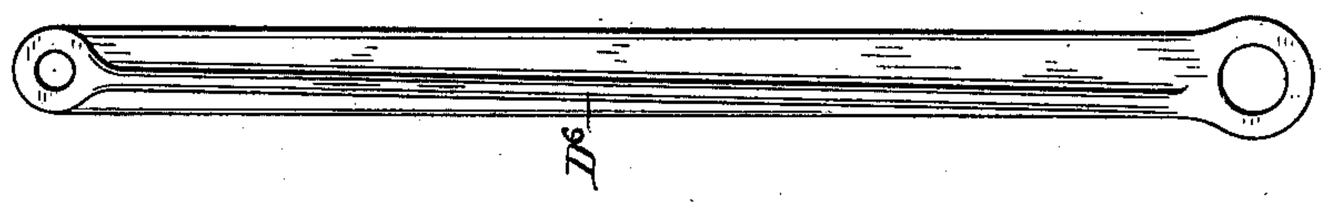
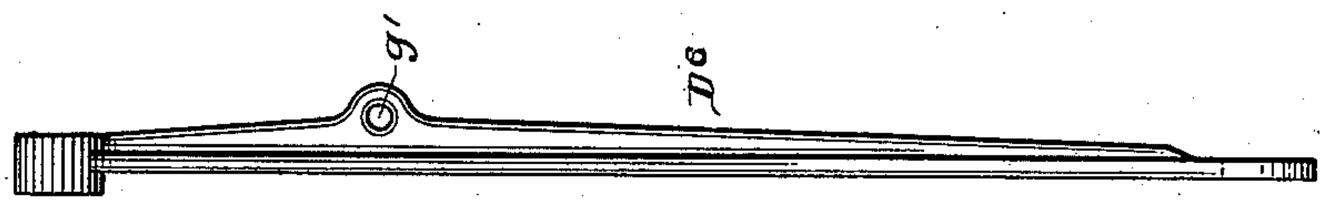


Fig. 18.



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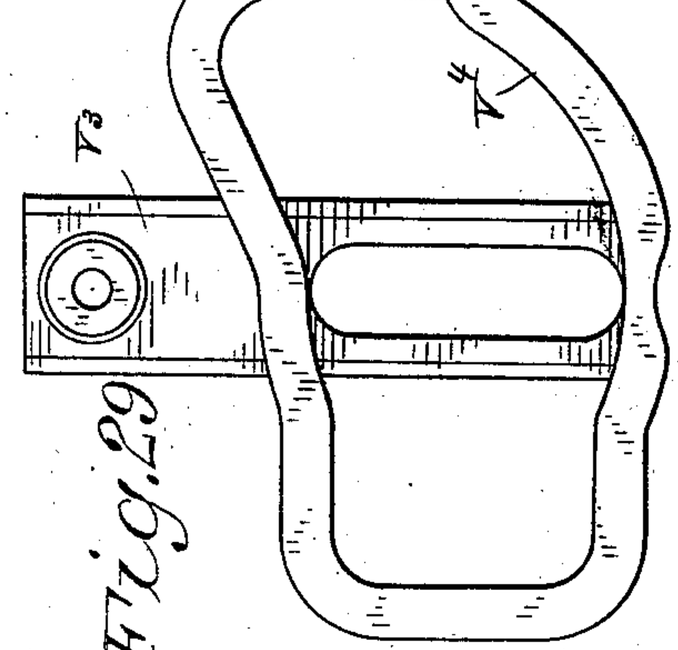

Fig. 29.

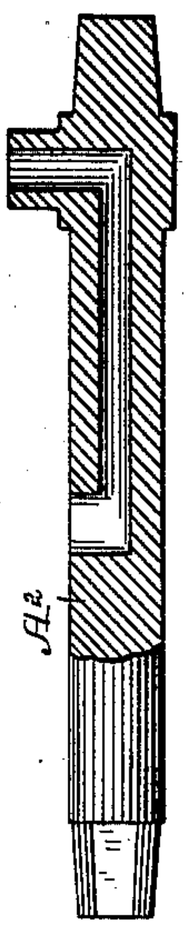

Fig. 30.

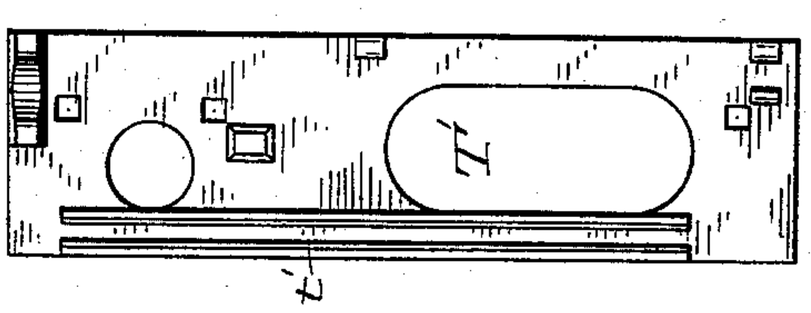

Fig. 28.

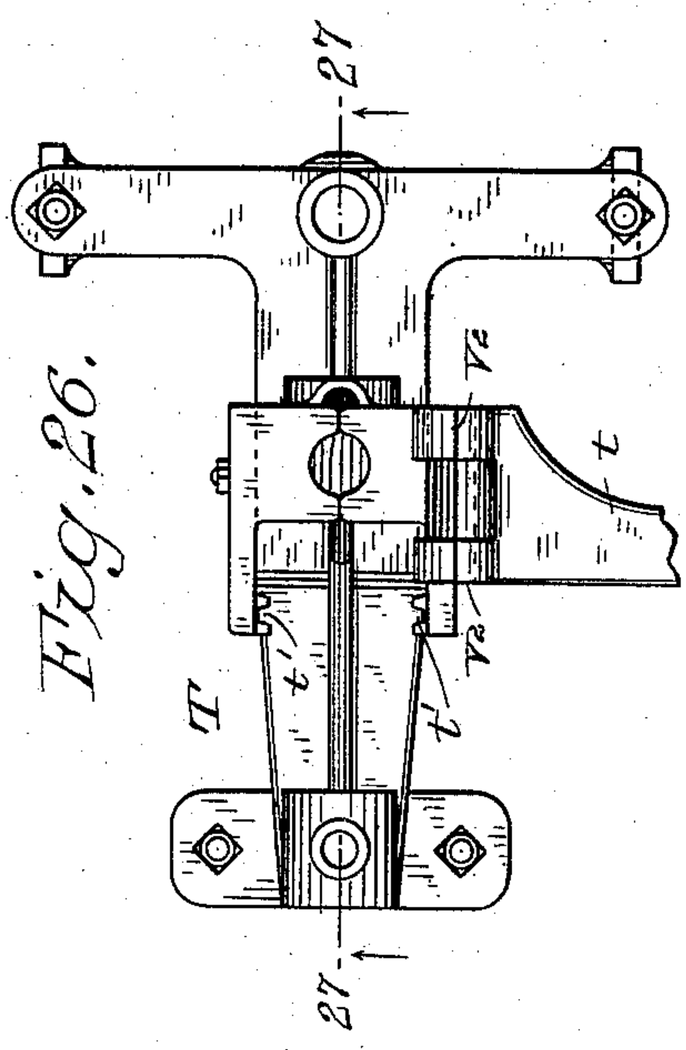

Fig. 26.

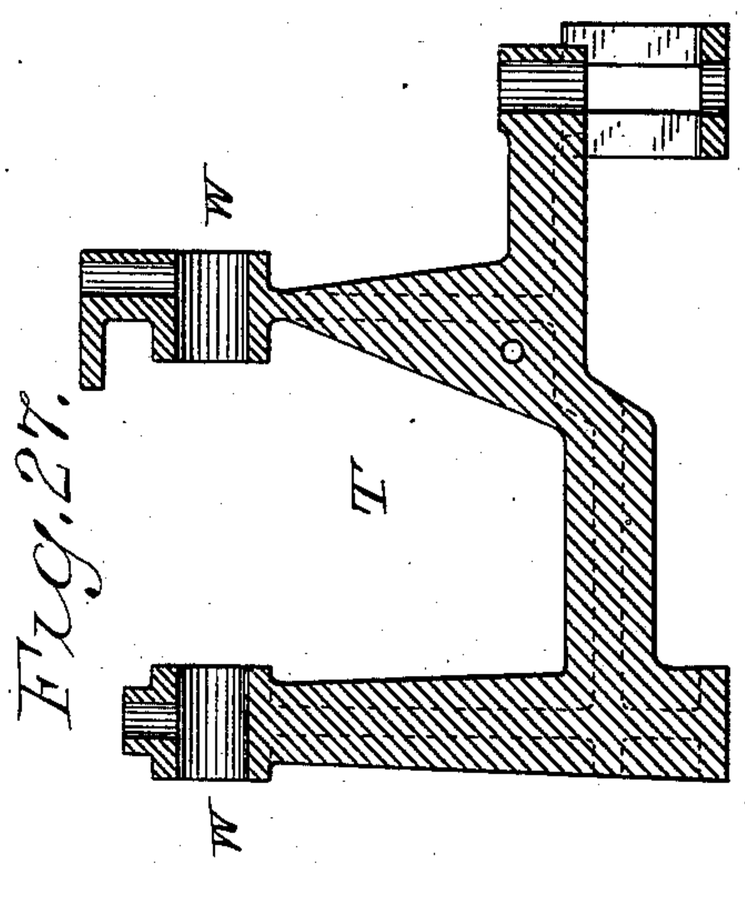

Fig. 27.

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UNITED STATES PATENT OFFICE.

WILLIAM P. HALE, OF BROCKPORT, NEW YORK.

GRAIN-BINDING HARVESTER.

SPECIFICATION forming part of Letters Patent No. 372,067, dated October 25, 1887.

Application filed May 17, 1886. Serial No. 202,385. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM P. HALE, of Brockport, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Grain-Binding Harvesters, of which the following is a specification.

My invention relates to improvements hereinafter distinctly claimed, applicable to harvesters of the class in which a main frame is carried by two supporting-wheels, a grain-platform and cutting apparatus have jointed connection with the main frame, and the grain to be bound is carried over the inner supporting or driving wheel.

In many respects devices shown in connection with my present invention are the same as or generally similar to features shown and described, or to which reference is made, in Letters Patent of the United States No. 343,709, granted to me June 15, 1886.

The accompanying drawings show my invention in connection with those parts of an appropriate harvester and its binding mechanism illustration of which is needed to convey a proper understanding of a suitable application of all of my improvements. Some of these improvements may, however, be used without the others, or in connection with equivalents of omitted parts, and in machines differing in some respects from that shown and hereinafter described.

Figure 1 is a plan view with parts broken away. Fig. 2 is a front elevation. Fig. 3 is a rear elevation. Fig. 4 is a rear elevation with the reel detached and the platform folded up against the main frame. Fig. 5 is an elevation as seen from the outer or stubble side of the machine. Fig. 6 is a view, partly in rear elevation and partly in section, on the lines 6 of Figs. 7 and 12. Fig. 7 is a view, partly in plan and partly in section, on the lines 7 of Figs. 6 and 12, some parts being omitted. Fig. 8 is a view, partly in rear elevation and partly in section, on the line 8 of Fig. 5. Fig. 9 is an elevation as seen from the inner or grain side, showing the grain-wheel and adjacent parts. Fig. 10 is a view, partly in side elevation and partly in section, on the line 10 of Fig. 6, with parts broken away, showing portions of the mechanism by way of which the cutters, the reel, and the endless carrier of the platform are actuated. Fig. 11 is a side elevation showing a portion of the packer-shaft and the clutch and detent mechanism thereof, with one of the frame-bars in section. Fig. 12 is a view, partly in side elevation and partly in section, on the line 12 of Fig. 7, showing the main actuating-shaft, the counter-shaft driven thereby, the gearing of these shafts, and the manner of mounting them. Fig. 13 is a view, partly in rear elevation and partly in section, showing details of mechanism for supporting and raising and lowering the reel-shaft. Fig. 14 is a top view of a detent-bar for the levers for controlling the butter and the clutch of the primary driving-shaft. Fig. 15 is a view, partly in plan and partly in section, of a bracket and a roller carried thereby to engage with the slotted shank of a discharger-arm. Fig. 16 shows detached and in elevation the swinging frame, rollers, &c., of the upper or outer elevating-apron; and Fig. 17 is a section on the line 17 of Fig. 16. Figs. 18 and 19 are views at right angles to each other of the front coupling-link of a pair of coupling-links by way of which the platform at front has hinged connection with the main frame, and Fig. 20 shows the other link of the pair. Fig. 21 is a view of a coupling-link by way of which the rear of the platform has hinged connection with the main frame. Fig. 22 is a view showing, detached and in front elevation, a cam of the discharger-shaft and the roller acted on by the cam to control the operation of grain-retaining fingers against which the gavels are accumulated. Fig. 23 is a view, partly in side elevation and partly in section, on the line 23 of Fig. 6, showing details of the tension devices. Figs. 24 and 25 show, detached, one of the bearings for the upper roller of the inner or under elevating-apron. Fig. 26 is a plan view of a sectional bracket-frame for supporting mechanism for actuating the binding mechanism. Fig. 27 is a vertical section on the line 27 of Fig. 26. Fig. 28 is an elevation of one of the side plates of the sectional bracket-frame detached. Fig. 29 is a rear elevation of a vertically-reciprocating cam for actuating the binder-arm; Fig. 30, a longitudinal view, partly in section, of the axle of the driving-wheel. Fig. 31 is a view, partly in elevation and partly in section, on the line 31 of Fig. 7, showing the inner

divider or shoe, the casting secured thereto, and the lower end of the reel-post.

A suitably-constructed rocking main frame is carried upon two supporting-wheels, one being the driving-wheel A and the other a smaller or supplemental wheel, A′. The axle A^2 of the loosely-mounted driving-wheel is secured at its ends, so as not to turn beneath the inner bars, A^3 A^4, of the main frame, and the stud-axle of the supplemental wheel is carried by a hanger, A^5, bolted to the outer bar, A^6, of the main frame. The frame-bars A^3 A^4 A^6 are parallel to each other, and the axles of the wheels A A′ are in the same vertical plane, to admit of the rocking of the main frame, which at its front has jointed connection with the heel of the tongue A^7. The tongue-heel is shown as jointed to the front cross bar, A^8, of the main frame by means of the bracket A^9, between the perforated lugs of which is pivoted the elongated eye or short bearing-sleeve of a plate, *a*, secured to the under side of the tongue-heel. The tongue is braced against outward lateral movement by a rod, *a*′, secured at its front end to the tongue in advance of its heel by the pivot-bolt a^2, and extending inwardly and rearwardly and secured at its rear end, as farther on to be explained. The bearing sleeve of the heel-plate *a* is of a length somewhat less than the distance between the lugs of the bracket A^9, so that there may be slight lateral movement of the heel-plate, and the pivot-bolt which passes through the lugs of the bracket and through the bearing sleeve of the heel-plate is somewhat loosely embraced by this sleeve, in order to provide for slight lateral vibration of the tongue, so that the main frame may be rocked freely, although the inner end of the brace *a*′ may be above or below its usual level, as farther on will be fully understood.

An inclined connecting-rod, a^3, has suitable jointed connection at its front end with the tongue near the brace-securing bolt a^2, and extends upwardly and rearwardly to the crank a^5 of a rock-shaft, a^4, the rear end of the connecting-rod being jointed to this crank. The cranked rock-shaft is mounted in a bearing-bracket, a^6, and a bearing in the frame upright a^7, and is controlled by an upwardly-projecting lever, a^8, provided with suitable detent devices, shown as formed by the segmental rack a^9 and the usually-employed spring-actuated detent for engaging therewith. By moving the controlling-lever backward the front end of the main frame is raised, and by a forward movement of the lever the front end of the frame is lowered, as will be obvious.

Motion is imparted to the primary driving-shaft B from the driving and main supporting wheel A by an internal bevel-gear of the wheel meshing with the bevel-pinion *b*, fast on the front end of the shaft. This primary driving-shaft is mounted in suitable main-frame bearings, shown as secured to the frame-bar A^4, and at its rear end is provided with a sprocket-pulley, B′. This pulley is loose upon and has clutch-connection with the shaft. The clutch *b*′ (see Fig. 5) is of simple well-known form, being made of one section fast on the shaft and another section loose and adapted to slide, this sliding section being formed with or rigidly secured to the sprocket-pulley. The clutch is actuated by the shifter B^2, the forked lower end of which engages the annular groove b^2 in the hub of the sprocket-pulley and sliding section of the clutch. The clutch-shifter is pivoted at b^3, near the lower end, to the rear cross-bar, B^3, of the main frame, and near its upper end is provided with a guideway, shown as formed by the plate B^4, having the slot b^4, through which the upper end of the shifter passes. This guideway-plate is secured to the rear end of the inner upper bar, B^5, of the main frame. A link-rod, B^6, has jointed connection at its front end with a clutch-controlling lever, B^7, and at its rear end with the clutch-shifter above its guideway. The clutch-controlling lever is pivoted upon the frame-bar B^5. The link-rod passes through a perforated guide-lug, b^5, of the guideway-plate, and a coiled spring, b^6, encircling the link-rod, bears at one end against this lug and at the other against the clutch-shifter. This spring, it will be seen, acts with a tendency to move backward the upper end of the shifter and keep the sprocket-pulley B′ clutched with its shaft. The clutch-controlling lever is provided with a detent, shown as formed by the notch b^7 of the detent-bar B^8, Figs. 1, 5, and 14, which is secured to the frame-bar B^9. When the clutch-controlling lever is engaged with its detent in obvious way, the sliding clutch section is disengaged from the fixed clutch-section, and the sprocket-pulley B′ is consequently thrown out of engagement with the primary driving-shaft.

A main actuating driven shaft, C, by connections with which the various parts of the mechanism are actuated, has motion imparted to it from the primary driving-shaft B by a chain, b^8, passing around the sprocket-pulleys B′ and b^9, the latter fast on the main actuating-shaft. A counter-shaft, C′, over the main actuating-shaft is geared therewith by the pinions *c* *c*′, fast on the respective shafts. These two shafts are mounted in suitable bearings in the posts C^2 C^3 of a bearing-frame, C^4, securely fastened by its base upon the parallel rear cross-bars, C^5 B^3, of the main frame.

Motion is imparted to an intermittingly-actuated rotary packer-shaft, c^2, by a chain, c^3, passing around sprocket-pulleys c^4 and c^5 on the counter-shaft C′ and packer-shaft, respectively. The pulley c^5 is connected with the packer-shaft by a clutch, c^6, and this shaft is thrown into and out of action at proper times, as farther on to be explained. A sprocket-pulley, C^7, on the main actuating-shaft imparts motion to a driving-chain, c^7, by way of which to actuate a reel, the cutters, the endless carrier of the platform, the grain-elevating apparatus, a clearing-roller, and butt-hastening apparatus, as in turn to be described. A pin-

ion, c^8, on the main actuating-shaft imparts motion to a main actuating-gear, C^8, serving by connecting mechanism to operate the binding mechanism, and a clutch, c^9, provides for engaging and disengaging this main actuating-gear and its intermittingly-operating binder-actuating shaft C^9, as will farther on be explained. The chain c^7, driven by the main actuating-shaft, passes around a sprocket-pulley, D, fast on the projecting rear journal, d, of the driving-roller (the upper roller) D′ of the inner or under grain-elevating apron, D^2, and around another sprocket-pulley, d', fast on the projecting rear journal, d^2, of a clearing and directing roller, D^3. The journals d d^2 of the elevating-apron roller and clearing-roller, respectively, are mounted in suitable bearings in a strong rear upright, D^4, of the main frame, and the front journals, d^3 d^4, of these rollers have their bearings in a strong upright, D^5, of the main frame.

Coupling-links D^6 D^7 D^8 have pivotal supporting-connection with the main frame at their upper ends, so as to vibrate about the axis of the apron-driving roller D′, and have jointed connection at their lower ends with the grain-platform, as farther on in detail to be explained, and in this way the grain-platform and cutting apparatus have hinged connection with the main frame at its front and rear, inside the driving-wheel. As in this instance represented, two of the coupling-links, D^6 D^7, are employed in making connection between the grain-platform and main frame in front, and the other coupling link, D^8, in making the connection between the grain-platform and the main frame at the rear, these links being pivoted about the bearings of the driving-roller of the inner elevating-apron. As shown, the bearing E, Figs. 7, 24, and 25, for the rear journal, d, of the driving-roller is so formed that when it is bolted to the frame-upright D^4 by its securing-flanges e e its boss e' serves as the pivot for the upper end of the coupling-link D^8, and two of these bearings are provided for the front journal, d^3, of the driving-roller D′, one at the front and the other at the back of the frame-upright D^5, the bearing-bosses serving as pivots for the upper ends of the front coupling-links, D^6 D^7, which are on opposite sides of the frame-upright.

By slight modification the front coupling-link, D^6, might be omitted and two coupling-links only be used; but three are preferable.

The driven roller (the lower roller) D^9 of the inner elevating-apron is mounted by its journals in suitable front and rear bearings d^5 d^5, respectively connected with the rear-most one, D^7, of the two front coupling-links and the rear coupling-link, D^8. As shown, these bearings have supporting-rods d^6 d^6, which are adapted to move endwise in guide-ways formed by holes in the lower ends of bars d^7 d^7, firmly fastened in suitable way to the coupling-links D^7 D^8, respectively. The outward or downward movements of the rods d^6 d^6 are limited by suitable means, such as will be explained by reference to Figs. 16 and 17, and the description of the outer or upper elevating-apron to be given farther on. Springs d^8 d^8 act on the bearings with a tendency to move them downward and keep the elevating-apron taut. Between the bars d^7 d^7 and the coupling-links to which they are respectively secured are pieces d^9 d^9, which serve as guides to keep the apron from moving endwise of its rollers. These guide-pieces project above the surface of the apron, and the edges of the apron move against or close to them.

As the bearings for the driven roller of the elevating-apron D^2 are carried by the coupling-links D^7 D^8, by means of their above-described supporting-connection therewith, the driven roller vibrates with these links about the axis of the driving-roller D′, and therefore the movements of the platform do not affect the working of the elevating-apron.

The outer elevating-apron, E′, as shown, is of less width than the inner elevating-apron, the outer apron extending from the front backward to about midway the width of the inner apron. In this way, while the butts of the stalks of grain which come between the outer apron and the front portion of the inner apron are acted upon by both aprons, the heads, unless the stalks are unusually short, are acted upon by the inner apron only, and thus I avoid the shattering and waste of grain occasioned by pressure and friction upon the heads between the ordinarily-employed elevating apparatus, the inner and outer aprons of which are of corresponding width.

The driving-roller E^2 of the outer elevating-apron is mounted by its front and rear journals e^2 e^2 in suitable bearings in the front frame upright, D^5, and a bracket, e^3, secured to the frame-bar B^5. An apron-frame, E^3, supported by and vibrating about the journals of the driving-roller E^2, carries the driven roller E^4 at the outer end of the apron. The vibrating frame is shown as formed by the guide-pieces E^5 E^5, which prevent movement of the apron endwise of the rollers, the side bars, E^6 E^6, secured at the inner sides of the guide-pieces, and the cross-bar E^7, firmly connected at its ends with the side bars. The bearings e^4 e^4 for the journals of the driven roller, like those for the driven roller of the inner elevating-apron, are provided with supporting-rods e^5 e^5, movable endwise in guideway-holes in the lower ends of the side bars. Cross-pins inserted in the inner or upper ends of the supporting-rods, by way of the slots e^6 e^6 in the side bars, limit the outward movement of the supporting-rods and bearings, and springs e^7 e^7 act upon the bearings with a tendency to move them outward to keep the apron taut under ordinary circumstances.

The driving-roller E^2 of the outer elevating-apron has motion imparted to it by means of a pinion, E^8, fast on its projecting front journal, e^2, and a driving-pinion, E^9, fast on the projecting front journal, d^3, of the driving-roller of the inner elevating-apron. A sprocket-pulley, e^8, fast on the journal e^2 in front of the pinion

thereon, actuates a chain, e^9, for driving butt-hastening apparatus, as farther on to be explained.

A sprocket-pulley, *f*, on the rear journal, *d*, of the driving roller D′ of the inner elevating-apron imparts motion to a chain, F, for actuating the driving-roller F′ of the endless carrier F^2 of the grain-platform F^3. The driving-chain F engages a sprocket-pulley, F^4, on the rear journal, F^5, of the driving-roller of the platform carrier. This driving-roller in this instance has a suitable bearing at its front end in a front beam, F^6, of the grain-platform.

The grain-platform at rear has jointed connection with the coupling-link D^8 by way of the journal F^5 of the driving-roller F′ of the platform-carrier, and by way of this coupling-link the platform has hinged connection with the main frame at rear, as before fully explained. As in this instance shown, a reel is driven from the journal F^5, the journal supports a post, F^7, is provided with a crank-wheel, F^8, for actuating the cutters, and is mounted and connected with the rear coupling-link, as follows: The journal has bearing in a post, *f*′, secured at its base to a rearward extension, F^9, of the grain-platform and in a sleeve, f^2, fitting in an opening in the rear beam, f^3, of the grain-platform. This bearing-sleeve is formed at its outer end with a surrounding flange, f^4, provided with an inwardly and downwardly projecting portion, f^5, for attaching the sleeve to the platform-beam f^3 in suitable way, as by screws. The post F^7 is forked at the lower end, the body or main part of the post being made of wood, and the two metallic bars f^6 f^6, bolted to the lower end of the post, constituting the arms of the fork. The rear arm of the fork is provided with a bearing-opening at its lower end, through which and the hub of the crank-wheel F^8 the journal F^5 passes.

The crank-wheel is secured to the rear end of the journal, and its projecting hub is made of two diameters, the reduced inner end, f^7, of the hub being interposed between the journal and the rear arm of the fork of the post. The annular shoulder f^8, formed by the larger portion of crank-wheel hub, prevents rearward movement of the fork-arm, and its forward movement is prevented by the bearing-post *f*′. The front arm of the post-fork has a bearing-opening at its lower end and has supporting-connection with the journal by way of the bearing-sleeve f^2, and the coupling-link D^8, by a bearing-opening at its lower end, has similar connection with this journal. The coupling-link embraces the bearing-sleeve between the platform-beam f^3 and the front fork-arm, and this arm is prevented from moving lengthwise of the journal by the coupling-link and the flange of the bearing-sleeve.

It will be seen that while provision is made for vibrating or turning the post F^7 about its supporting-journal no movement of vibration lengthwise of this journal is permitted. Ordinarily turning movement of the post is prevented by a toggle-like brace, f^9, connecting it with the rear beam of the platform, the two links comprising this brace being jointed together by what is commonly termed a "stump-joint" or "rule joint," so that by an upward pull upon the brace the joint is forced to give, to thus admit of the folding up of the platform, &c., as farther on to be explained. A sprocket-pulley fast on the journal F^5 imparts motion to a chain of the reel-driving mechanism, farther on to be described.

The jointed connection between the front coupling-links, D^6 D^7, and the grain-platform as in this instance shown is as follows: A hollow shoe or inner divider, G, strongly bolted to the platform, is provided with a casting, G′, firmly secured to the upper surface of its bottom and having two lugs or short posts, G^2 G^3. The front lug, G^2, is made hollow to form a tapering socket for stepping a reel-post, and has a screw-threaded opening at its rear side about midway its height. A headed bolt, *g*, threaded at its end, is passed through an opening in the rear lug, G^3, in line with the threaded opening in the socket-lug, and through bearing-openings at the lower ends of the coupling-links D^6 D^7, and screws into the threaded opening. This bolt is in the axial line of the driving-roller of the platform-carrier, and serves as a pivot for the lower ends of the front coupling-links.

The front coupling-link, D^6, is provided with an eye, *g*′, and the hooked rear end of the tongue-brace *a*′ is jointed to the link by engagement with this eye.

In order that the driven roller of the inner elevating apron and the driving-roller of the platform-carrier may occupy their proper relative positions, the coupling-links D^7 and D^8 are made of angular form, their lower ends extending horizontally, or nearly so, from the axial line of the roller D^9 to the pivot-bolt *g* and the journal F^5 of the roller F′. The foremost one of the front coupling-links may also be bent to give it the angular form of the other links; but, as it is not necessary that it be so formed, it is shown as made straight. To facilitate the fitting of the parts, the rear coupling-link is formed in two sections and made adjustable in length. As shown, the lower or bent section, g^2, is formed with a guideway for the upper or straight section, the guideway having a serrated surface, g^3, and elongated slot g^4. The lower end of the upper section is provided with serrations (not shown) to engage with the serrations of the guideway, and has a bolt-hole, through which and the slot g^4 a securing-bolt passes, the bolt being provided with a nut, and the parts are thus adapted to be locked as adjusted, as will readily be understood.

Mechanism, such as next to be described, is provided for adjustably supporting the outer end of the grain-platform and for raising and lowering the platform and cutting apparatus to adjust the height of cut, clear obstructions, &c., without interfering with their self-

adjusting movements about the jointed connection of the platform with the lower ends of the coupling-links to conform to inequalities of the ground over which the grain-wheel G^4 passes. As shown, the platform is rendered capable of vertical adjustment relatively to this wheel by having the stud about which the wheel revolves carried by a block, g^5, sliding up and down in a guideway of a bracket, G^5, strongly secured to the divider and bottom of the outer end of the platform in well-known way. The sliding block g^5 is connected by a stiff thrust-link, g^6, with an adjusting-lever, G^6, between its ends. This lever is pivoted at its front end to the grain-fence of the platform and works near its rear end in a guideway, G^7.

A chain, g^7, is connected at its opposite ends to the rear end of the adjusting-lever and to a segment sheave, G^8, fast on the rear end of a rock-shaft, H, supported by the main frame by being mounted in bearings secured to the under sides of the front cross-bar, A^8, and rear cross-bar, B^3. The chain passes downward from the adjusting-lever beneath a sheave, g^8, supported at the rear end of the grain-fence.

Controlling mechanism, to be operated by the driver of the machine when in his seat, for actuating the rock-shaft and segment-sheave is provided, as follows: An upwardly-projecting controlling-lever, G^9, is strongly secured to the rock-shaft by way of the segment-sheave in suitable way. A chain, g^9, is connected at one end with the upper end of the controlling-lever and at its opposite end with a vertical controlling-shaft, h. The controlling-chain passes about a sheave, h', supported by a bracket, h^2, secured to the outer top bar, H', of the main frame. The controlling-chain is wound about or unwinds from the controlling-shaft, according to whether the crank H^2 of the shaft is turned to the right or to the left. A spring-pawl, h^3, and a detent-disk, H^3, to be engaged thereby and fast on the controlling-shaft, provide for securing this shaft as adjusted. The controlling-shaft is mounted in suitable bearings—the upper one in the footboard H^4 of the main frame and the lower one secured to the upper front cross-bar, H^5, thereof. The crank H^2 is thus located within easy reach of the driver in the seat H^6.

It will readily be understood that by winding the chain g^9 about the controlling-shaft the outer end of the platform will be raised, and that it will be lowered by allowing the chain to unwind from the shaft. In order that while the platform is being thus adjusted it may be simultaneously and correspondingly adjusted at its inner end, instead of vibrating about its jointed connection with the coupling-links, the rock-shaft H is cranked, so as to act upon the coupling-links D^7 D^8. The front and rear cranks, h^4 h^5, bear upward against the coupling-links D^7 and D^8, respectively, and support their lower ends. It will therefore be obvious that as the controlling-lever G^9 is actuated to adjust the outer end of the platform it at the same time adjusts the inner end thereof, either by moving the coupling-links upward about their jointed connection with the main frame or allowing of their downward movement to the desired extent.

Motion is imparted to the cutters from the crank-wheel F^8 on the rear journal of the driving-roller of the platform-carrier F^2 by way of the usual pitman, H^7, and sway-bar H^8, and the sprocket-pulley h^6 on this journal drives the chain H^9 for imparting motion to a sprocket-pulley, h^7, having universal-joint connection with a reel-driving shaft, I.

The reel-driving shaft I is supported at or near its rear end and by way of its sprocket-pulley h^7 in a bearing, h^8, for this pulley at the upper end of the post F^7. This bearing receives the hub of the pulley and is divided, being formed by the two metal arms h^9 h^9, constituting a fork at the upper end of the post. The universal joint, Fig. 10, connecting the reel-driving shaft and sprocket-pulley, is of suitable ordinary construction. In this instance the hub of the pulley is connected by two diametrically-opposite pins, i, with a ring, i', which is similarly connected with a sleeve, i^2, which receives the reel-driving shaft. The pins i^3 (one of them is dotted in place) are at right angles with the pins i, and spaces are left between the pulley-hub and ring and between the ring and sleeve to allow all needed movement, as will be understood. The reel-driving shaft is allowed endwise sliding movement in its sleeve, while compelled to turn with it, the shaft being square in cross-section and the opening for it in the sleeve of corresponding shape.

A reel-post, J, is detachably supported by the shoe or inner divider, G, by way of the socket of the lug G^2 of the casting G', attached to the shoe. The foot of the reel-post is tapered to correspond with and fit firmly in the socket. A vertically-adjustable reel, J', which may be of any suitable construction, is supported by the reel-post, as in this instance shown, in the following way: The reel head or carrier J^2 is formed with teeth to constitute a bevel-gear, J^3, and is loosely and removably mounted by its hub on a short reel-shaft, J^4. This reel-shaft is supported on the reel-post by a sectional carrying-bracket, J^5 J^6. The section J^5 is formed with two bearings-arms, J^7 J^7, one above the other, embracing and adapted to slide upon the reel-post, and the section J^6 is bifurcated at its top and formed with two bearing-arms, J^8 J^8, through which the inwardly-projecting reel-shaft passes.

At its lower end the reel-shaft-supporting section J^6 is pivoted to the post-engaging section J^5 of the carrying-bracket, and a slot, J^9, in its upper portion, together with a set-bolt and nut, serves in obvious ways for adjusting the reel-shaft-supporting section relatively to the reel-post-engaging section to cause the reel-shaft to occupy a position such as to insure that the reel-beaters in their revolution

shall pass at the proper distance above the cutting apparatus and platform throughout their length. Securing-pins *k* are provided at the opposite ends of the reel-shaft.

The front end of the reel-driving shaft I turns in a long or sleeve bearing, *k'*, at the rear end of a curved bracket, K', which at its front end is bifurcated and forms two bearing-arms, K^2 K^2, through which the reel shaft, projecting inwardly from the reel-post, passes. This bearing-bracket K' is made strong enough to resist the twisting strains brought upon it in holding up the front end of the reel-driving shaft. A bevel-pinion, k^2, on this shaft engages and imparts motion to the bevel-gear of the reel-head.

It will be seen that the long bearing presented by the forked front end of the curved bracket K' for engaging the reel-shaft between the arms J^8 J^8 of the carrying-bracket effectually prevents lateral twist or rocking movement of the curved bracket.

It will further be seen that as the bearing for the reel-driving shaft at the rear end of the curved bracket is at a right angle with the front or reel-shaft-engaging bearing, and of sufficient length to guard against rocking movement of the bracket on the reel-driving shaft about an axis transverse to this shaft, a steady support sustained by and adjustable with the reel-shaft is provided for the front end of the reel-driving shaft.

The reel is raised and lowered by controlling mechanism operated by the driver, as follows: A chain, K^3, secured at one end to the part J^5 of the sectional carrying-bracket, passes upward and about a pulley, k^3, supported at the top of the reel-post by a bracket, K^4, then downward about a pulley, k^4, supported by the reel-post, by way of the lower bracket, K^5, thereof, and then to a vertical controlling-shaft, K^6, mounted in suitable bearings, shown as provided the one in the foot-board H^4 and the other in a block, k^5, bolted to the cross-bar A^8 of the main frame. The chain is attached to this controlling-shaft, and is wound about it or unwound from it, according to whether it is desired to raise or to lower the reel, by sliding the carrying-bracket up or down the reel-post.

A crank, K^7, is provided at the upper end of the controlling-shaft for turning it, and a spring-pawl, k^6, and detent-disk k^7 serve to lock the controlling-shaft when the reel is adjusted. When it is desired to fold the platform up to the main frame to facilitate transportation of the machine and enable it to pass readily between the posts of gates of ordinary width, the reel-head is detached from the reel-shaft, the reel-post lifted from its socket, the brace which connects the platform and the post for supporting the reel-driving shaft is flexed, the driver's seat is removed by lifting its supporting-spring from the socket K^8, with which it interlocks in suitable and well-known way, and the platform and cutting apparatus are turned about their jointed connection with the coupling-links and folded against the main frame. The lower end of the reel-post is held by resting in a support formed by a hook, K^9, secured to the short upright k^8 of the main frame. When the driver's seat is restored to its position, it serves as a check to the upward movement of the outer divider, which rests beneath it, thus preventing injurious movement of the platform by the jolting of the machine. The platform rests, when folded up, against the two supports k^9 k^9, secured to the main-frame bar B^5. The front beam, F^6, of the platform rests against one of these supports, and the top board, L, of the box-like rear extension, L^2, of the platform rests against the other support. Before the platform is folded the hinged guard-board L^3 above the rear extension of the platform is folded over upon the endless carrier of the platform, in order that the top board, L, may come against the rear-platform support k^9. The reel when detached is carried by the machine by fitting the hub of the reel-head about the stud L^4 at the outer rear corner of the main frame.

As the driving mechanism of the various parts of the machine is not at all disarranged by folding up the platform, it will be seen that the machine may quickly be placed in working condition again. It will also be seen that free vertical adjustment of the reel without cramping of parts is allowed by the universally-jointed sliding connection of the reel driving-shaft and its sprocket-pulley.

The grain carried up by the elevating apparatus is cleared therefrom and directed to a receiving-platform, M, by the clearing roller D^3. This grain-receiving platform is slightly inclined and is divided at M', Figs. 1 and 5, into front and rear sections, which are detachably secured in place in suitable way. As will be seen by reference to Figs. 5, 7, and 8, the front section of the receiving-platform is supported at its inner side, close to the clearing-roller, upon the frame-bar M^2, which is attached at its opposite ends to the frame-uprights D^4 D^5, and a hook, *m*, fixed to this front section engages the frame bar. Two parallel strips, *m* *m'*, are secured, at slight distance apart, to the under surface of the front section of the receiving-platform, near its outer or lower side, which is supported by the frame-stud M^3, secured to the frame-bar A^6. The upper end of this stud enters the space between the strips, and a swinging hook, m^2, and staple m^3 serve to hold the platform-section down upon the supporting-stud. The rear section of the receiving-platform is supported at its inner or upper side upon the frame-bar M^2, and has a hook for engaging this bar similar to the hook *m*, and at its outer side this section is provided with parallel strips m^4 m^4, (one only of these strips is shown,) one on either side of its supporting-bar M^4. This supporting-bar for the outer side of the rear section of the receiving-platform is secured to the outer rear upright, M^5, of the frame and to the frame-stud M^6. An ordinary turn-button at m^5, piv-

oted to the outer strip, m^4, engages with a slot in the supporting-bar M^4 to hold the rear section of the receiving-platform down upon this bar; or a swinging hook, such as m^2, and staple, such as m^3, may be used instead of the turn-button. A fence, M^7, to check backward movement of the grain, is provided at the rear of the receiving-platform. The grain delivered to the receiving-platform by the elevating apparatus and clearing-roller is acted upon by packer-arms M^8, pivotally attached to cranks M^9 of the packer-shaft c^2. As shown, there are four cranks for a similar number of packer-arms, and these arms are arranged in pairs, the arms of a pair being jointed to oppositely-projecting cranks. Two of the cranks—one of the cranks of each pair of packer-arms—project in the opposite direction to that in which the other two cranks—one of each pair—project. It will be seen that the result of this arrangement is that during rotation of the packer-shaft one packer-arm of each pair will act upon the grain simultaneously and alternately with the other arms—one of each pair.

Each packer arm is jointed by its heel extension or shank m^6 to a vibrating controlling-link, m^7, shown as formed of two metal bars pivoted at their opposite ends, respectively, to the shank of the packer-arm and to the upwardly-projecting lug of a bracket, m^8, secured upon the frame-beam B^5. The packer-shaft is mounted in suitable bearings, m^9, secured to the upper cross-bars, N, of the frame.

The operation of the packer-arms so as to force the grain downwardly or outward along the receiving-platform beneath a starting-lever, N′, and toward and against vibrating grain-retaining arms N^2, in turn to be described, will readily be understood.

An adjustable butter, N^3, having hinged connection with the frame-upright D^5, is controlled by a lever, N^4, within reach of the driver in his seat, and is held in the desired position by engagement of this lever between teeth n of the detent-bar B^8. The butter, instead of working over or upon the grain-receiving platform, works in the space N^5, Fig. 5, in advance of its cut-away front end, the lower edge of the butter extending below the level of the platform.

To prevent the butts of the stalks of grain being retarded in their travel down the receiving-platform by friction against the butter and to urge them along in proper condition for binding, butt-hastening apparatus is provided, as follows: A diagonally-arranged rotating-shaft, N^6, Fig. 1, having its inwardly-inclining rear end supported in a bearing, n', on the short cross-bar N^7 of the frame, has universal-joint connection at its front end with the rear end of a short shaft, n^2, mounted in a bearing, n^3, having suitable supporting connection with the front cross-bar, H^5, of the frame. The shaft n^2 extends at a right angle to this cross-bar, instead of diagonally thereto, as the shaft N^6 does. A sprocket-pulley, N^8, fast on the shaft n^2, is driven continuously during operation of the machine by the driving-chain e^9, which, as before explained, is actuated by the driving-roller of the upper elevating apron. The shaft N^6 is doubly cranked, the cranks n^4 n^4 projecting in opposite directions and having pivoted to them a pair of packer-arms, n^5 n^5, controlled by links n^6 n^6, pivoted to their shanks and to lugs of brackets n^7 n^7, in the manner as before explained with reference to the intermittingly-actuated packer-arms. The universal joint n^8, connecting the shaft-sections N^6 n^2, is of any suitable well known construction—such, for instance, as that before described for connecting the reel-driving shaft and its sprocket-pulley.

It will be seen that the butt-hastening packer arms effectually prevent the butts of the grain from being held back by contact with the butter, and that as these arms are constantly in action during operation of the machine they operate to advance and adjust the butts of the stalks of grain during the intermissions in the operations of the packer arms of the shaft c^2.

As the clutch c^6, by way of which the packer-shaft is brought to rest and started in motion, is provided with the two diametrically-opposite tripper-engaging lugs o o, and is in other respects constructed precisely as fully set forth in my before-referred to Patent No. 343,709, detailed description of it is not needed herein. The packer shaft is provided, as before, with a ratchet-wheel, P; but instead of the pendent clutch-tripping arm and pawl carried by the rock-shaft of the arm for engaging the ratchet-wheel, as before, I now provide the following devices: The clutch-tripper P′, Fig. 11, is pivoted at its lower end upon a stud, p, carried by a plate, P^2, attached to a block, P^3, rabbeted to the rear top cross-bar, N, of the frame. The clutch-tripper has jointed to it the bent end of an endwise moving connecting-rod, P^4, by way of which it is actuated. A forwardly-projecting pawl-arm, p', secured to the tripper, engages the ratchet-wheel when the packer-shaft is thrown out of action to prevent rebound or backward movement of this shaft.

The clutch c^9, for throwing the binder-actuating shaft C^9 into and out of action, by engaging it with and disengaging it from the continuously-rotating main actuating-gear C^8, is the same as before employed, and corresponds with the packer-clutch, except that but one tripper-engaging lug, p^2, is provided. The direction of rotation of the main actuating-gear is now reversed, as compared with the direction of rotation of the corresponding gear shown in my before-mentioned patent, and the clutch-tripping lever P^5 is arranged inside of the clutch, instead of outside of it, as before. This lever is pivoted at its lower end, so that it may be moved away from the clutch to release the clutch-lug p^2 from the lug p^3 of the lever to start the binder-actuating shaft, and toward the clutch to engage the lugs and arrest the movement of this shaft.

The downwardly-projecting rear crank, p^4, of the starting rock-shaft p^5 is connected by the link p^6 with the upper end of the clutch-tripping lever, instead of directly engaging therewith, as before, and the front crank, p^7, of this rock-shaft also projects downwardly, whereas it was shown as projecting upwardly in my aforesaid patent. A link, P^6, connects the crank p^7 with the upper arm of the elbow-shaped starting lever N′, and in this instance this upper arm is extended far enough to be within reach of the hand of the driver in his seat over the outer front corner of the machine, instead of providing the foot-lever contrivance, as before. The spring p^8 acts with a tendency to hold the starting-lever against movement by the grain, and serves to restore this lever to its position after it has been actuated, as will readily be understood, either automatically, by the pressure of the grain, or by the driver and a bundle bound and discharged.

The grain-retaining arms N^2 (there are two of these arms in this instance) are carried by a rock-shaft, Q, mounted at its opposite ends in suitable bearings in the short uprights k^8 Q′ of the frame (see Fig. 7) and extending beneath the grain-receiving platform M. The outer ends of these retaining-arms are bent upward and pass through slots in the platform M and serve to arrest the grain forced against them by the packers in the accumulation of a gavel. A torsional spring, q, acts upon the rock-shaft with a tendency to resist movement of it in a direction such as to lower the upwardly-projecting bent ends of the retaining-arms, and serves to restore these arms to position after each actuation. A crank, Q^2, of the rock-shaft is connected by a link, Q^3, with the inner end of a controlling-lever, Q^4, pivoted midway its length at q' to the frame bar H^5. At its outer end this controlling-lever has a roller, q^2, acted upon by a cam, q^3, on an intermittingly-actuated shaft, R, (in this instance the discharger-shaft,) making one revolution at each actuation. It will be seen that when this shaft is rotated its cam will act upon the lever-roller and cause the lever to pull on the link, thus depressing the grain-retaining arms to permit a bound bundle to be discharged.

The discharger-shaft R is provided with vertically-swinging endwise-reciprocating discharger-arms R′, (in this instance three of these arms being provided,) jointed to the cranks R^2 of their shaft, which is mounted in bearings r, secured to the frame cross-bars H^5 N. The slotted shanks R^3 of the discharger arms engage rollers r', carried by brackets r^2, secured to the outer top bar, H′, of the frame. A sprocket-pulley, r^3, having yielding spring-connection with the discharger-shaft, substantially in the manner and for a purpose fully set forth in my before-mentioned patent, is driven by a chain, R^4, to which motion is imparted by a sprocket-pulley, r^4, on the binder-actuating shaft. It will be seen that instead of employing gearing to connect a driven sprocket-pulley with the discharger shaft, as before, this shaft is driven directly, as it now rotates in the same direction as the binder-actuating shaft, instead of in the contrary direction, as in my said patent.

A suitable binder-arm, S, is secured to the rock-shaft S′, which at its front end is mounted in a bearing at the lower end of the inner section of a two-part pendent bracket, S^2, and at its rear end in a bearing, s, provided in the arm t of the sectional bracket-frame T, secured at its base upon the frame cross-bars C^5 C^6. A compressor, U, is secured to a lug, u, of a rock-shaft, u', mounted in a bearing formed partly at the lower end of the outer section of the pendent bracket S^2 and partly in the lower end of the pendent bracket U′, which, like the sectional bracket, is secured to the frame-bar H′. The sections of the bracket S^2 are bolted together. (See Fig. 8.) A segment-gear, s', on the compressor-shaft is engaged by a corresponding gear, s^2, on the binder-arm rock-shaft, and the compressor is operated in obvious way, and as fully set forth in my aforesaid patent.

The tension upon the binding-cord y as it passes from the cord-receptacle Y to the binder-arm is produced by a frictional clamp, Y′, Fig. 23, having a lug, y', at one end loosely fitting in a socket in a plate, Y^2, upon the top of the cord-receptacle. A pin, y^2, rigidly attached to the plate Y^2 and passing through a hole in the clamp, is provided with a coiled spring, y^3, bearing at one end on the clamp and at the other against a nut, y^4, on the threaded upper end of the pin. The pressure upon the cord may be regulated by adjusting the nut. The cord passes out through openings in the top of the receptacle and in the plate Y^2, and then through an eye in the lug y^5, as will readily be understood. The lug y prevents the clamp from turning.

The mechanism yet to be referred to is in most respects identical with and in others substantially the same as corresponding mechanism fully set forth in my aforesaid patent, and will only be alluded to in a general way.

The crank V of the binder-arm rock-shaft S′ is connected by the adjustable link V′ to the rocking arm v, mounted in the bearing V^2 of the sectional bracket-frame T, and in the bearings W W of this frame the binder-actuating shaft is mounted. The rocking arm v has jointed connection with the slide V^3 of the cam-yoke V^4 by means of the link v'. The rollers v^2 v^2 of the cam-wheel W′ on the binder-actuating shaft operate the cam-yoke to reciprocate its slide, when the binding mechanism is started in action, in obvious way by the movement of the starting-lever. The roller w of the pivoted controlling-arm W^2 of the packer-clutch normally rests in the recess w' of the wheel W′ and is actuated by the peripheral cam of this wheel. The controlling-arm engages the connecting-rod P^4 of the packer-clutch by passing at its upper end through an

eye in this rod, and a spring, *x*, between this eye and the guide-bracket X for the connecting-rod serves to hold the roller *w* against the wheel and to force it into the recess thereof when presented to the roller, thus throwing the packer-shaft into action. The actuating-wheel X^6 of the knotting mechanism at X′ is operated from the binder-actuating shaft by gearing X^2 X^3 X^4 X^5. The side plates, T′ T′, of the sectional bracket-frame have the guide-way-grooves *t′ t′* for the cam-yoke slide.

I claim as of my own invention—

1. The combination of the main frame, the driving-roller D′ of the elevating-apron, journaled in the main frame at the front and rear thereof, the coupling-links having pivotal supporting-connection at their upper ends with the main frame at the front and rear thereof and vibrating about the axis of said roller, the folding grain-platform having joint-connection with the coupling-links at their lower ends, and means for raising and lowering the grain-platform, whereby in operation the height of cut may be adjusted, and for transportation the platform be folded up to the main frame, substantially as set forth.

2. The combination of the main frame, the elevating-apron driving-roller D′, the flanged and bossed bearings for its front and rear journals, and the coupling-links pivoted to the bearing-bosses, substantially as and for the purpose set forth.

3. The combination of the main frame, the grain-platform having jointed connection therewith, the endless carrier of the grain-platform, the front and rear uprights of the main frame, the inner elevating-apron, its driving-roller journaled in said uprights, actuating mechanism operating upon said driving-roller at rear, the narrower outer elevating-apron, of a width less than the average length of grain to be elevated, the driving-roller of the outer elevating-apron, journaled at front in the front frame-upright, the bracket in which the driving-roller of the outer elevating-apron is journaled at rear, and gearing connecting the driving-rollers of the inner and outer aprons at front, substantially as and for the purpose set forth.

4. The combination of the main frame, the inner elevating-apron, its driving-roller, the sprocket-pulley on the rear journal of said roller, its driving-chain, the narrower outer elevating-apron, its driving-roller, the apron-frame vibrating about this roller, the pinion on the front journal of the driving-roller of the outer elevating-apron, the pinion on the front journal of the driving-roller of the inner elevating-apron, and the bearing-bracket for the rear journal of the driving-roller of the outer elevating-apron, substantially as and for the purpose set forth.

5. The combination of the main frame, the grain-platform having jointed connection therewith, the driving-roller of the platform-carrier, its rear journal having bearing-connection with the platform, the reel-driving sprocket-pulley on said journal, the reel-driving shaft above the grain-platform, the sprocket-pulley thereon, its driving-chain, the post having bracing-connection with the platform, pivotally supported at its lower end by the rear journal of the driving-roller of the platform-carrier and provided with a bearing at its upper end for the sprocket-pulley on the reel-driving shaft, the reel, means for supporting it, and the driving-connection between the reel and its driving-shaft, substantially as and for the purpose set forth.

6. The combination of the main frame, the coupling-links having pivotal supporting-connection with the main frame, the grain-platform having jointed connection with the coupling-links, the reel-driving shaft, the post F^7 for this shaft, having pivotal supporting-connection with the platform at rear, mechanism for actuating the reel-driving shaft, and the jointed brace connecting its post with the platform, substantially as and for the purpose set forth.

7. The combination of the main frame, the grain-platform, the inner divider, the lugged casting secured thereto, the front coupling-links having pivotal supporting-connection with the main frame inside the driving-wheel, the pivot-bolt by which these links are jointed to the lugged casting, and the rear coupling-link having pivotal supporting-connection with the main frame inside the driving-wheel and pivotally connected with the platform at rear in the axial line of the pivot-bolt by which the lugged casting is connected with the front coupling-links, substantially as and for the purpose set forth.

8. The combination of the main frame, the grain-platform, the front and rear coupling-links having jointed connection with the platform and pivotal supporting connection with the main frame, the hinged tongue, the tongue-brace jointed to the front coupling-link, and means for rocking the main frame, substantially as and for the purpose set forth.

9. The combination of the main frame, the driving-roller of the inner elevating-apron, the coupling-links of angular form having pivotal supporting-connection with the main frame and vibrating about the axis of said roller, the driven roller of the elevating-apron, mounted in bearings connected with the coupling-links at their horizontally-extending lower portions, the grain-platform, the platform-carrier, and its driving-roller, in the axial line of which the coupling-links have pivotal connection with the platform in or about in the horizontal plane of the driven roller of the elevating-apron, substantially as and for the purpose set forth.

10. The combination of the main frame, the roller D′ of the inner elevating-apron, the front coupling links or link having pivotal supporting-connection with the main frame and vibrating about the axis of said roller, the sectional adjustable rear coupling-link, also having pivotal supporting-connection

with the main frame and vibrating about the axis of said roller, the grain-platform having jointed connection with the coupling-links, the endless carrier of the platform, and the driving-roller thereof, substantially as and for the purpose set forth.

11. The combination of the main frame, the grain-platform having jointed connection therewith, the post F', having supporting-connection with the rear of the platform, the sprocket-pulley supported in a bearing at the upper end of the post, the reel-driving shaft having universally-jointed sliding connection with the sprocket-pulley, the reel-post, the reel-shaft having vertically-adjustable supporting-connection with the reel-post and with the vertical movements of which the reel-driving shaft partakes at its front end, the reel-head, and gearing connecting it with the reel-driving shaft, substantially as and for the purpose set forth.

12. The combination of the main frame, the folding grain-platform having jointed connection therewith, the post F', having pivotal supporting-connection with the rear of the platform, the reel-driving shaft having supporting-connection with said post, the detachably-supported reel-post, the reel-shaft having supporting-connection with the reel-post, the bearing-bracket for the front end of the reel-driving shaft supported by the reel-shaft, and the detachable reel-head, substantially as and for the purpose set forth.

13. The combination of the main frame, the folding grain-platform having jointed connection therewith, the detachably-supported reel-post, the support at the front of the main frame for the lower end of the reel-post when the platform is folded, the reel-shaft, its carrying-bracket on the reel-post, the reel-driving shaft, its bearing-bracket connected with the reel-shaft, and the post having pivotally-supported connection with the rear of the platform, by which the rear end of the reel-driving shaft is supported, substantially as and for the purpose set forth.

14. The combination of the reel-post, the reel-shaft, its carrying-bracket vertically adjustable on the reel-post and composed of the adjustably-connected sections, the chain connected to the carrying-bracket, the upper and lower pulleys of the reel-post, about which the chain passes, and controlling mechanism to be operated by the driver, with which the chain is connected, substantially as and for the purpose set forth.

15. The combination of the reel-post, the adjustable bracket thereon, the reel-shaft projecting inwardly from the reel-post and carried by said bracket, the reel-driving shaft, the curved bracket having at its rear end the bearing sleeve for the front end of the reel-driving shaft, and through the front end of which bracket at a right angle with said bearing-sleeve the projecting reel-shaft passes, and the post supporting the rear end of the reel-driving shaft, substantially as and for the purpose set forth.

16. The combination of the intermittingly-actuated rotary packer-shaft, its clutch, the clutch-tripper P', the rigidly-supported stud *p*, by which the clutch-tripper is pivotally supported at its lower end, the endwise-moving connecting rod actuating the clutch-tripper, the pawl-arm *p'*, secured at one end to the clutch-tripper and projecting forwardly therefrom and laterally thereto, and the ratchet-wheel on the packer-shaft acted upon by the forward end of the pawl-arm, substantially as and for the purpose set forth.

17. The combination of the receiving-platform, the discharger shaft above this platform, the vertically-swinging endwise-reciprocating discharger arms, the intermittingly-operated binder-actuating shaft, the sprocket-pulley thereon, the chain driven thereby, the sprocket-pulley on the discharger-shaft, the cam on the discharger-shaft, the grain-retaining arms projecting at their ends above the receiving-platform, their spring-actuated rock-shaft beneath said platform, and mechanism connected with the rock-shaft, by way of which it is controlled by the cam of the discharger shaft, substantially as and for the purpose set forth.

In testimony whereof I have hereunto subscribed my name.

WILLIAM P. HALE.

Witnesses:
E. TARBOX,
WM. F. ROSS.