(No Model.) 17 Sheets—Sheet 1.

J. J. DEWEY.

SELF BINDING HARVESTER.

No. 422,335. Patented Feb. 25, 1890.

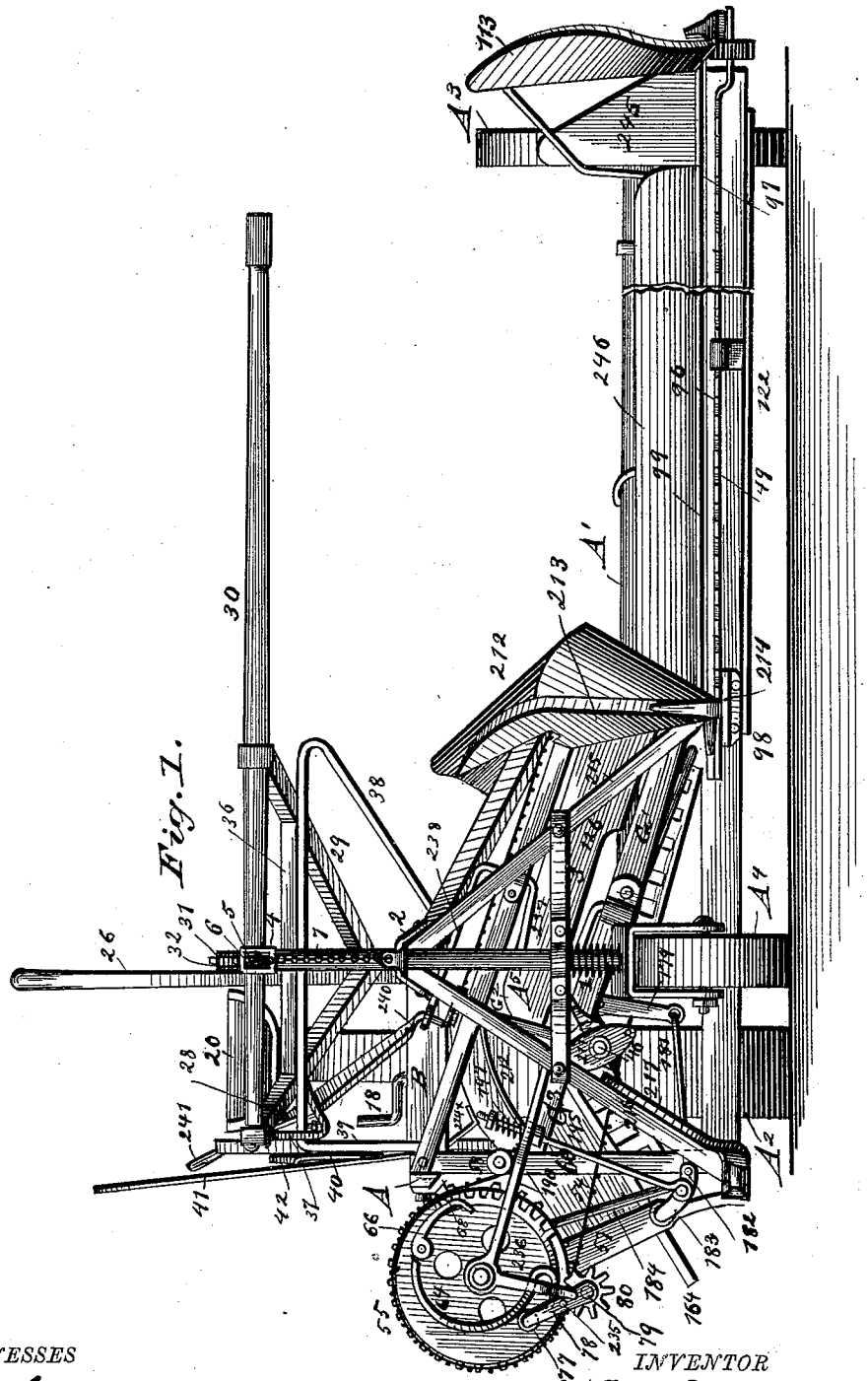

Fig. 1.

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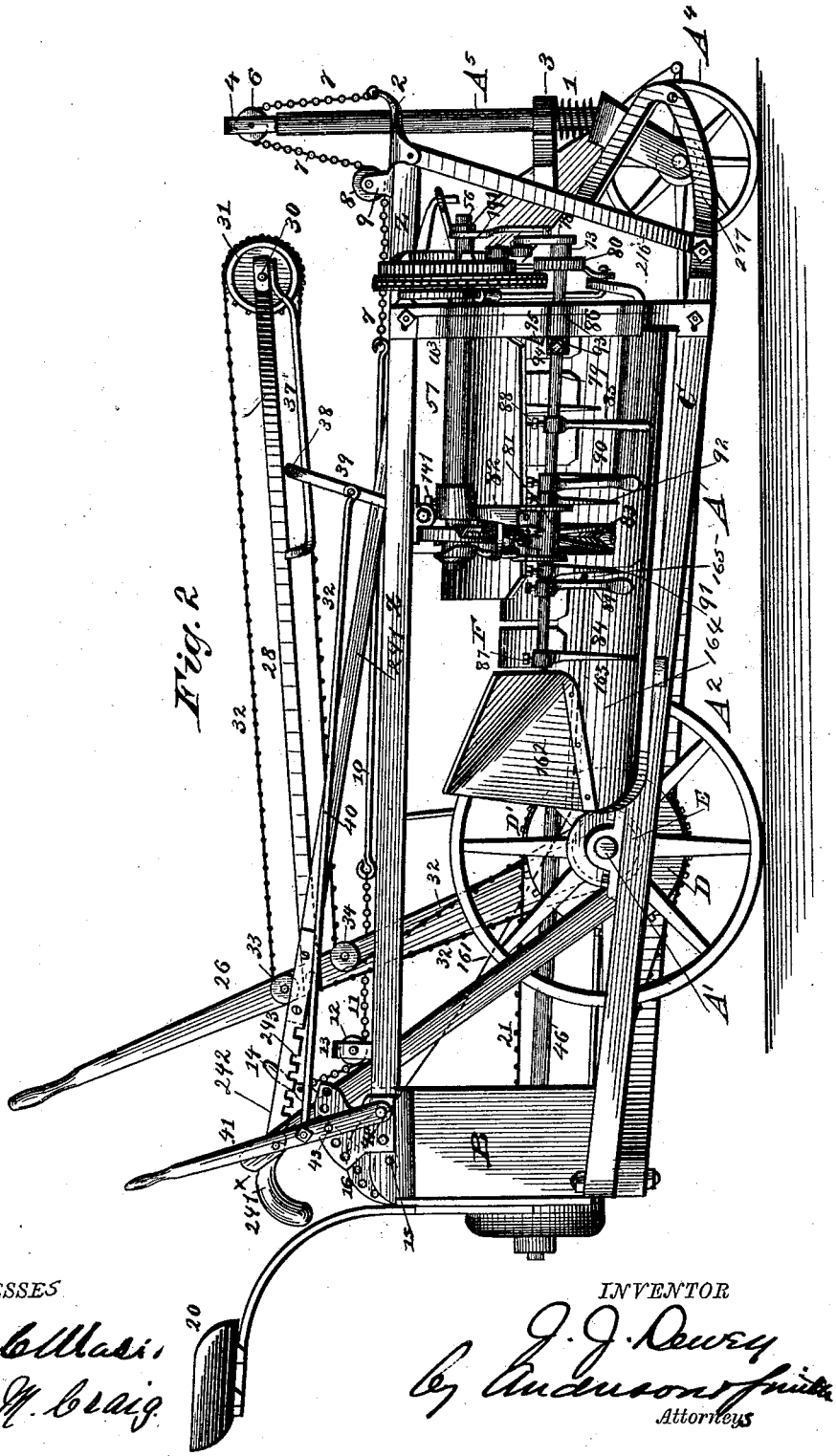

Fig. 2.

WITNESSES

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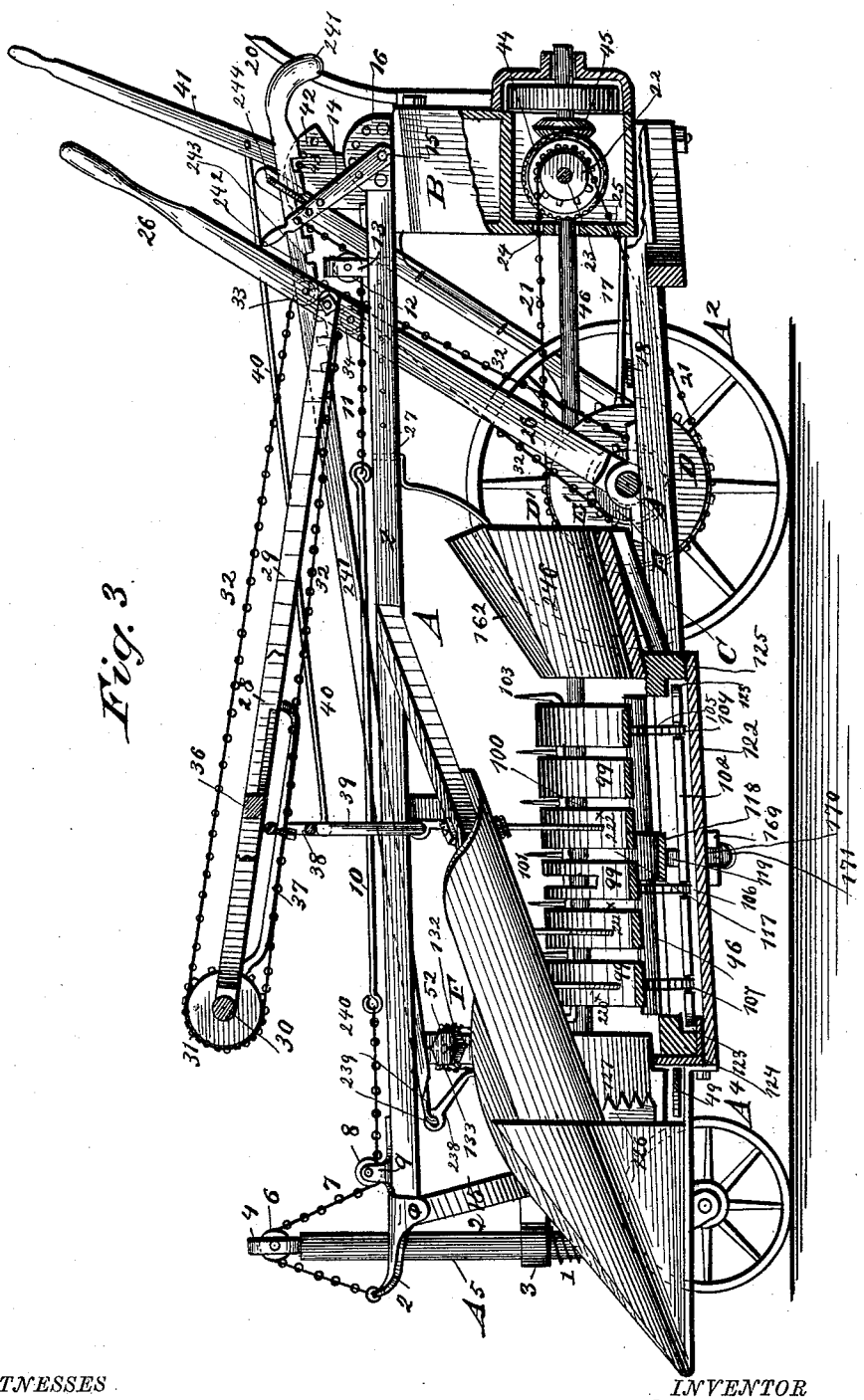

Fig. 3.

WITNESSES

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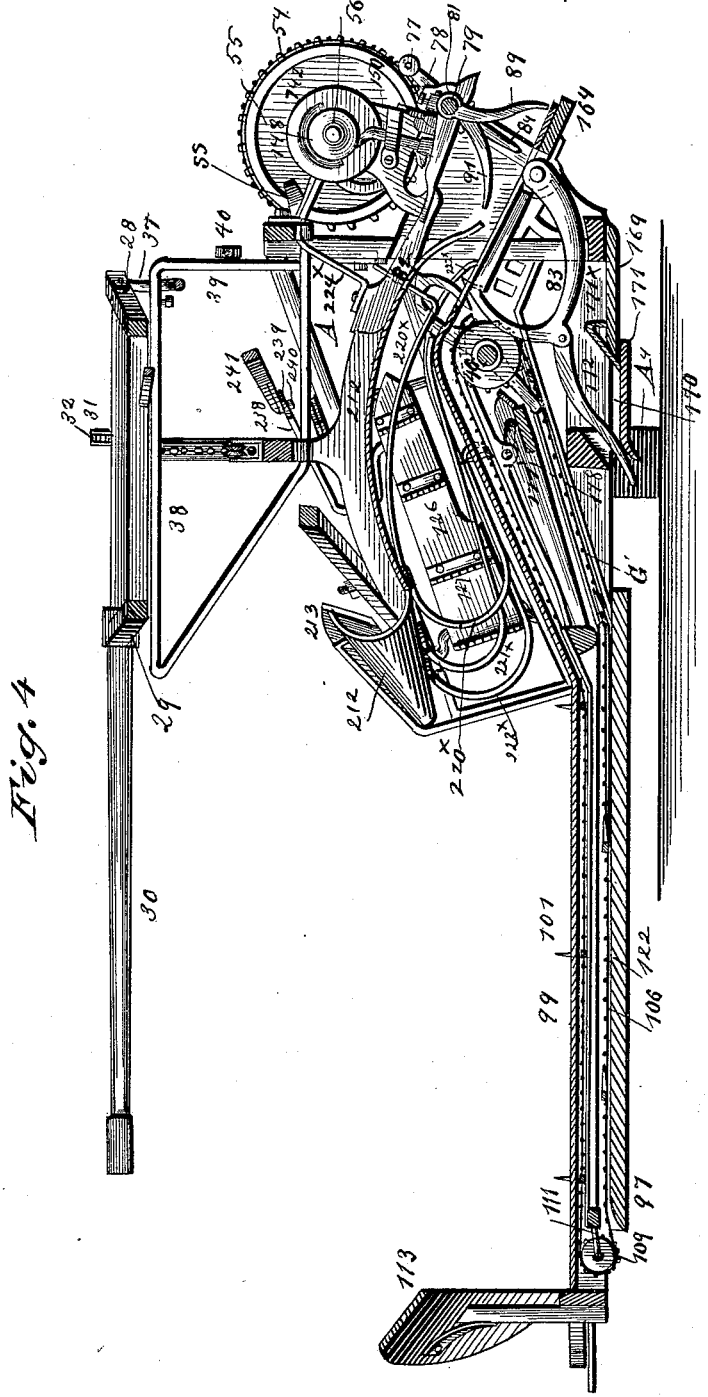

Fig. 4

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Fig. 5

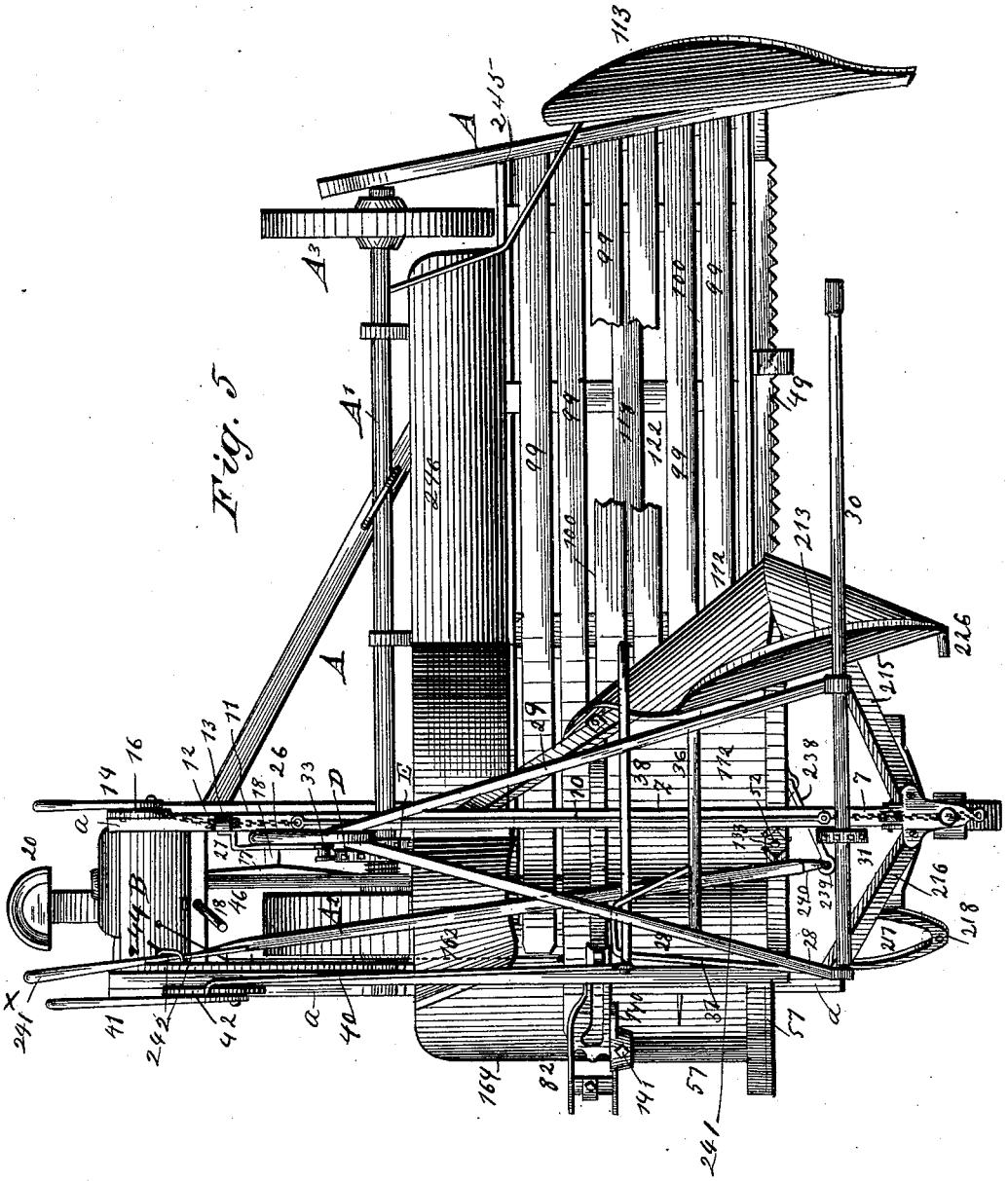

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Fig. 6.

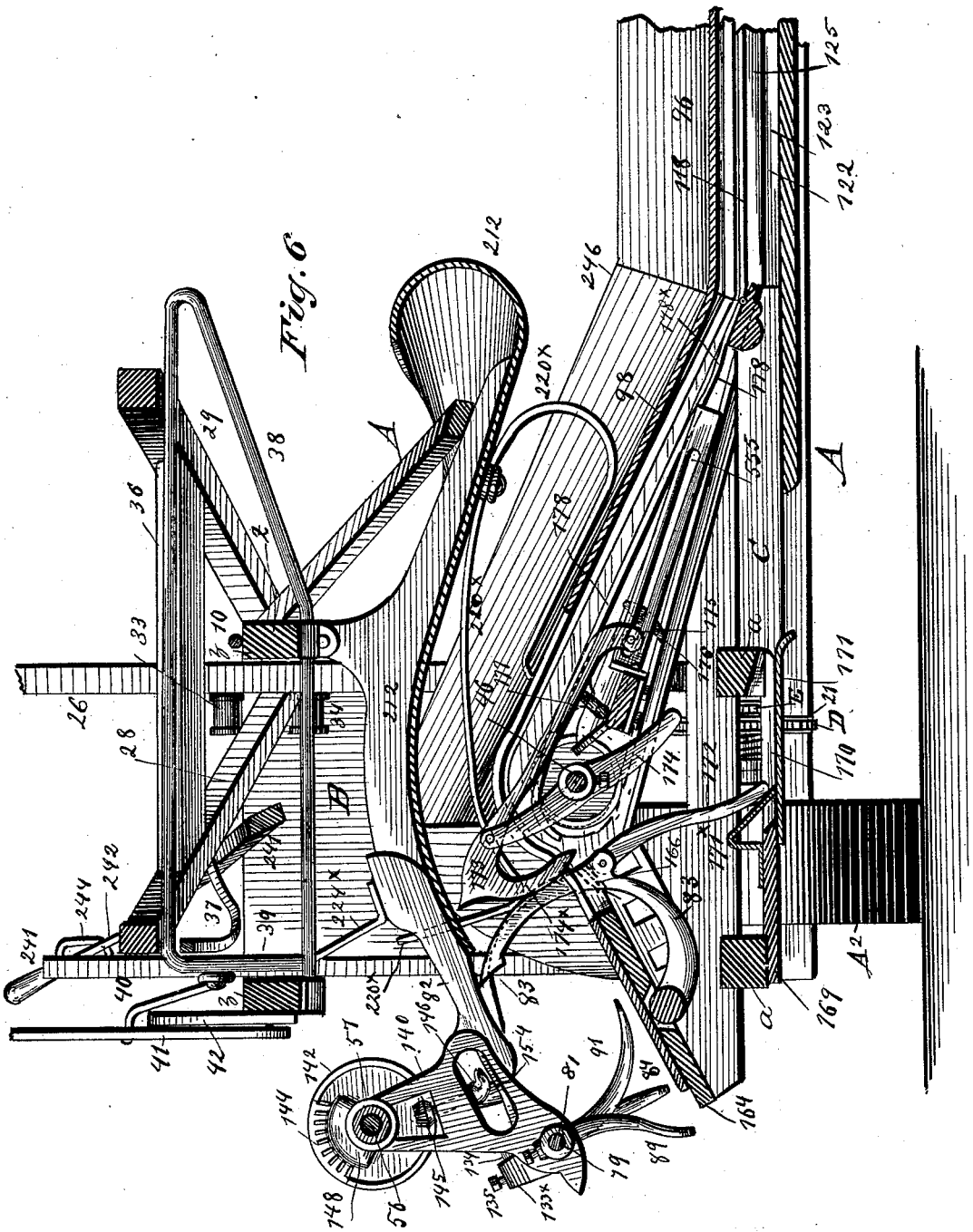

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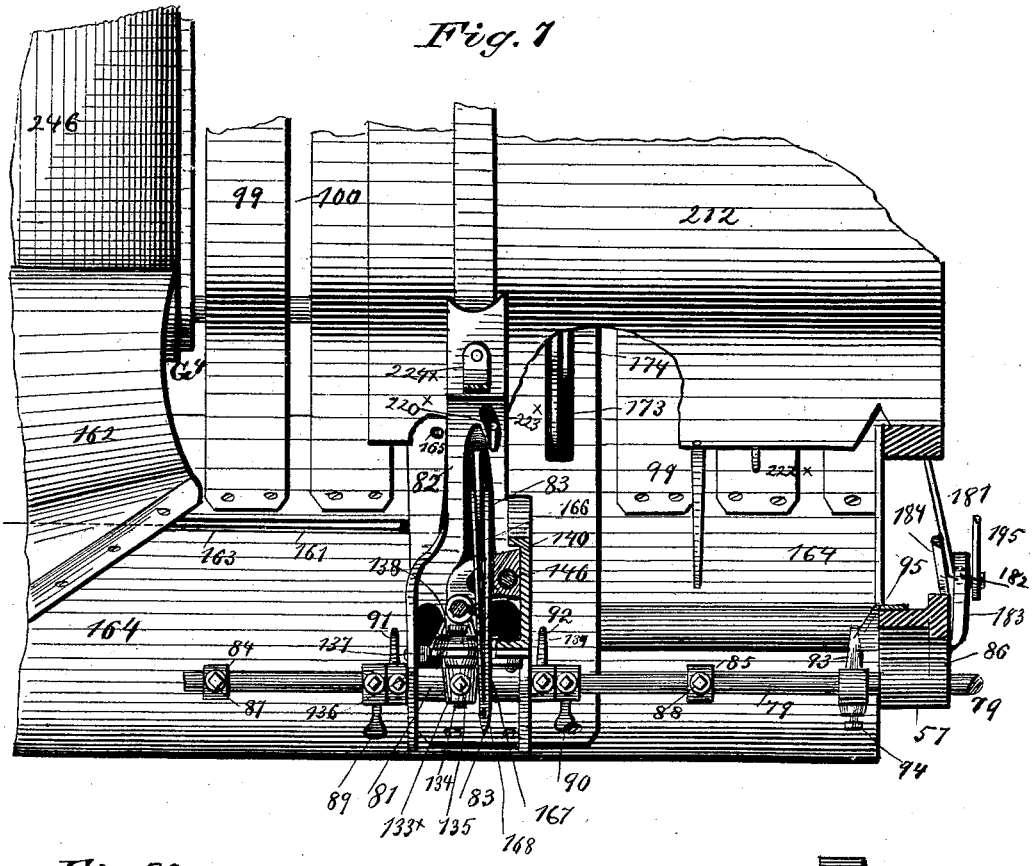
Fig. 1



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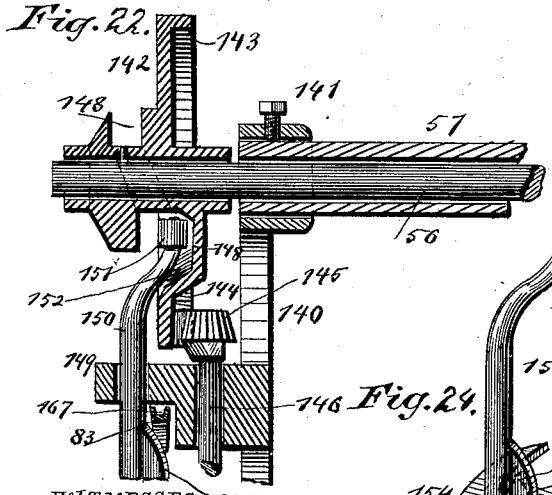

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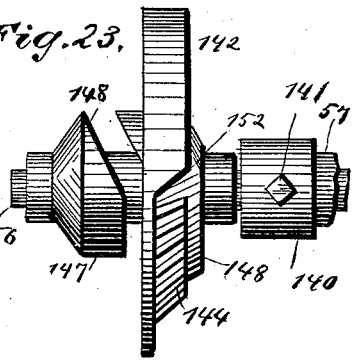

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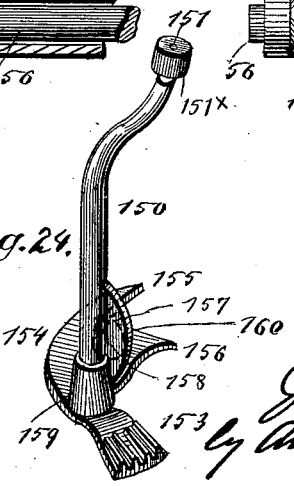

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Fig. 8

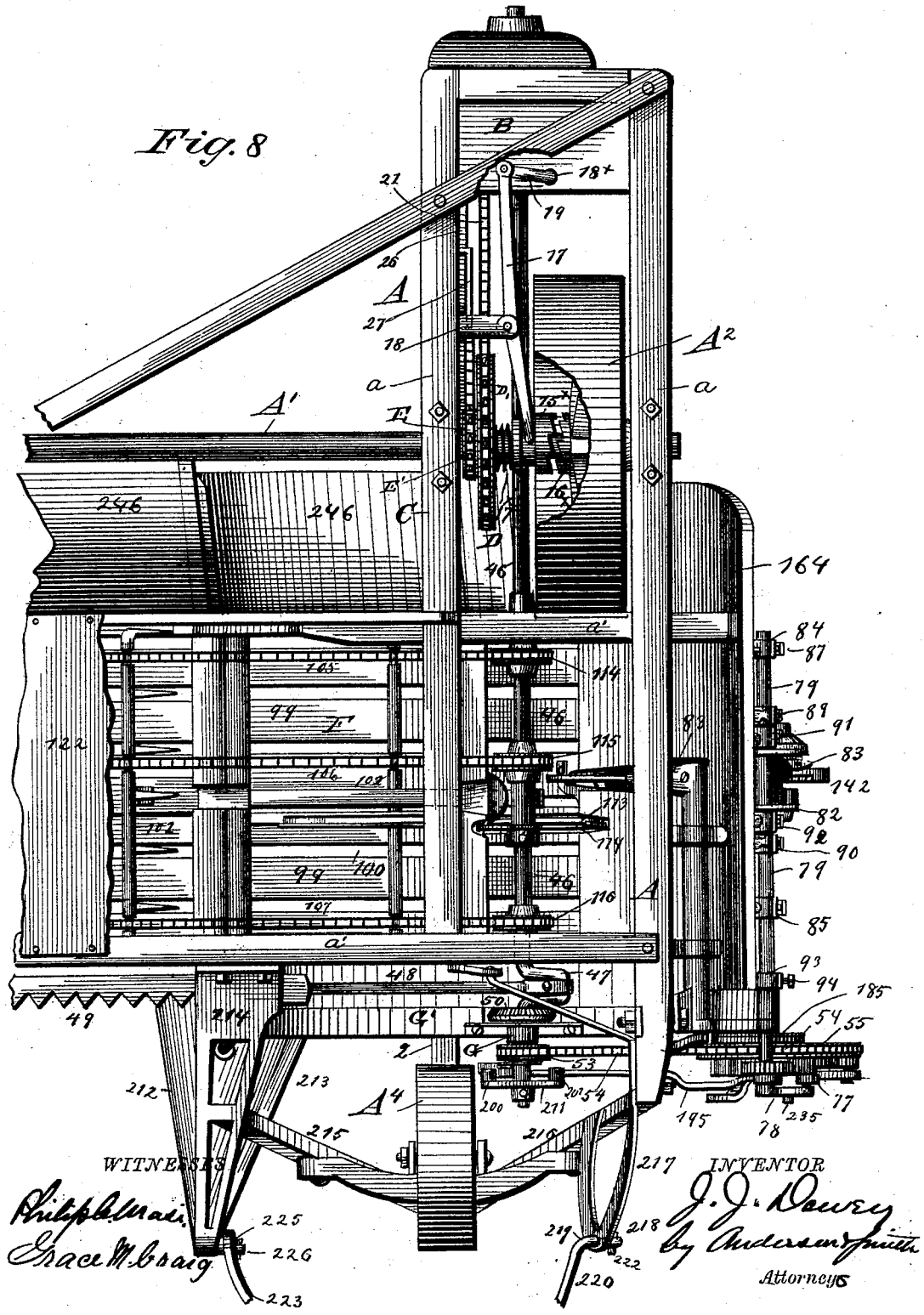

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Fig. 9.

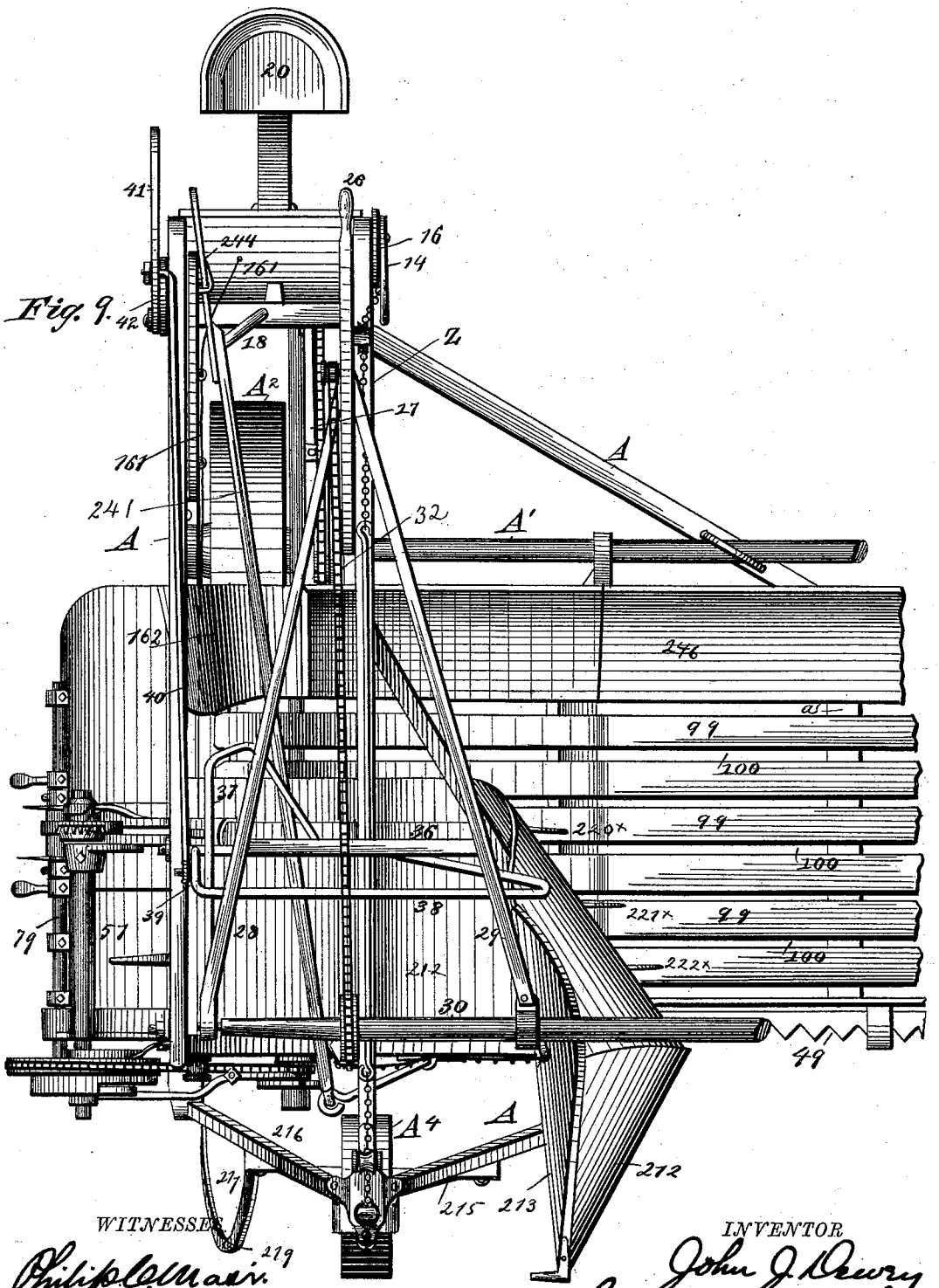

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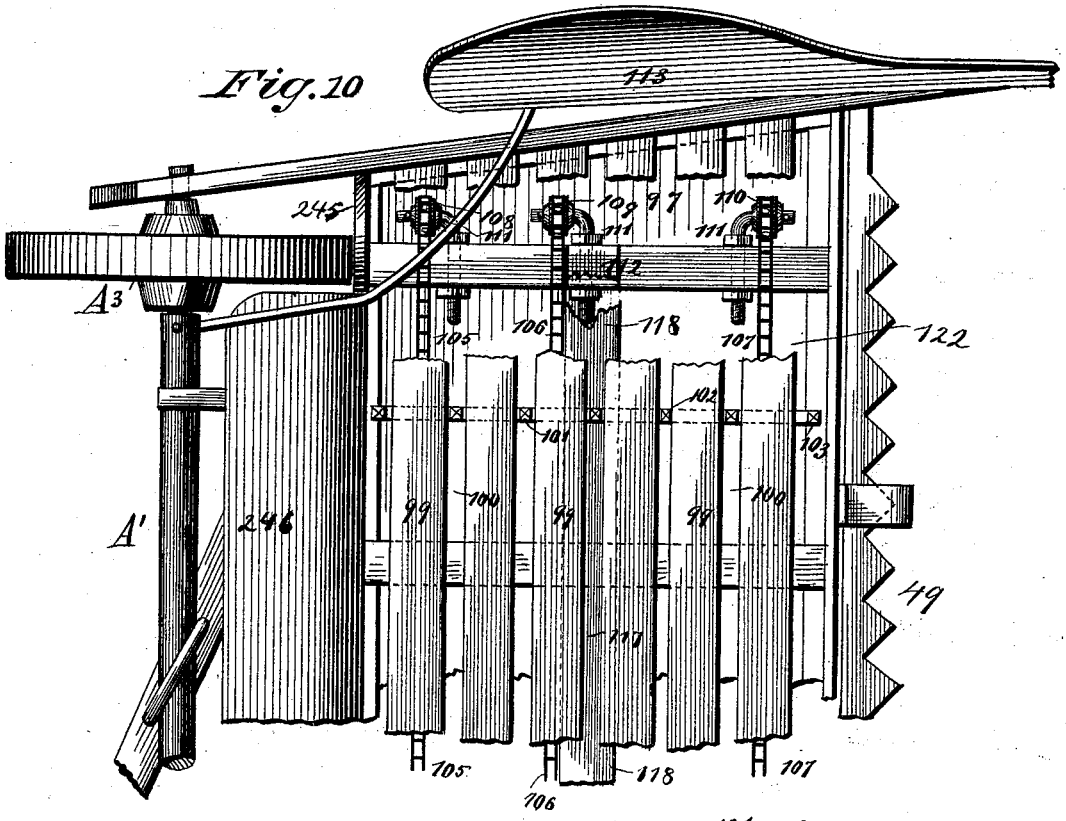
Fig. 10



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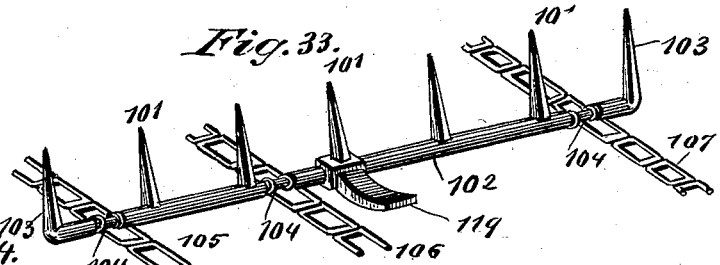
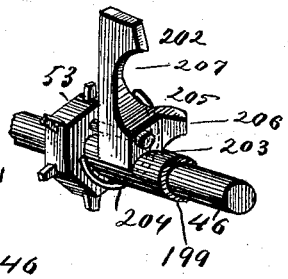


Fig. 34.

Fig. 36.



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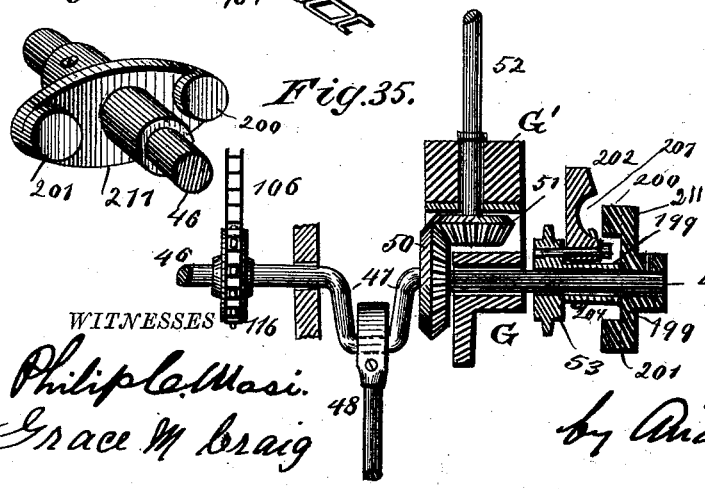

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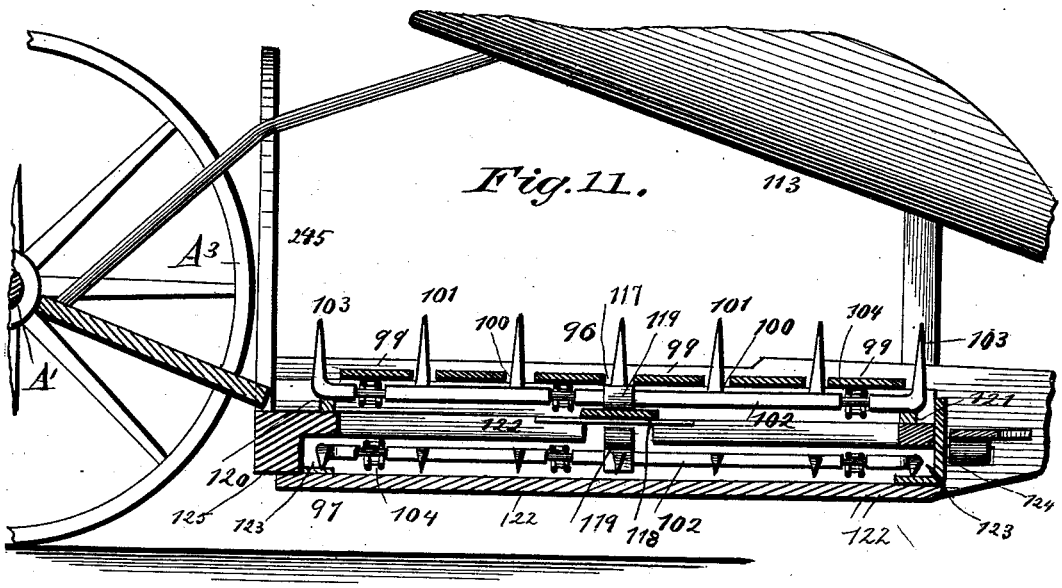
Fig. 11.



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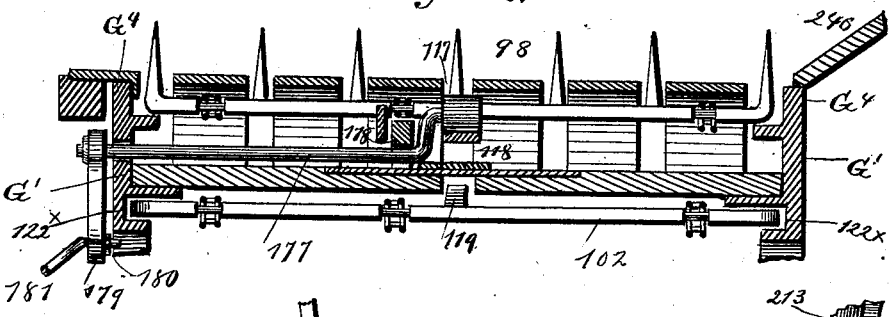

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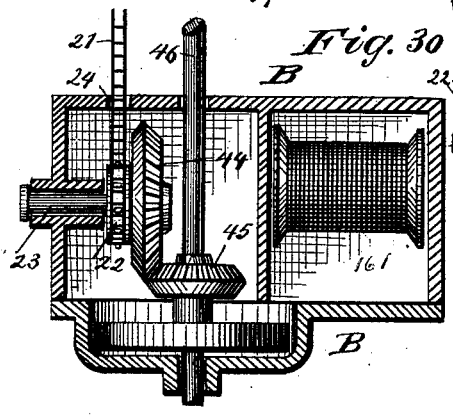

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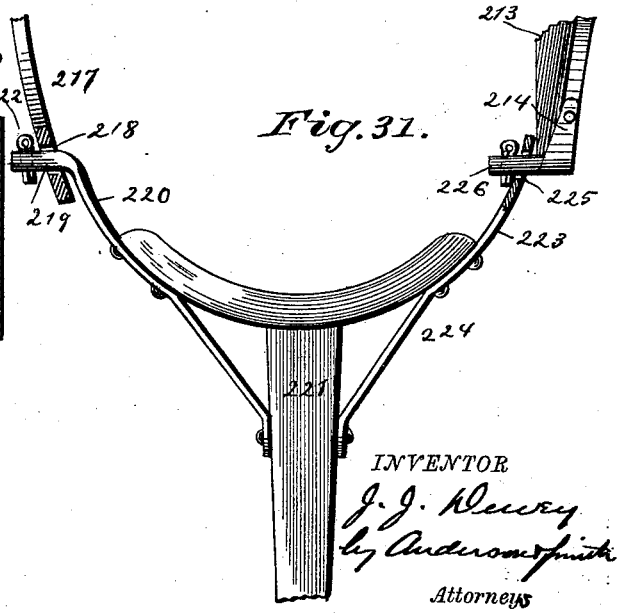

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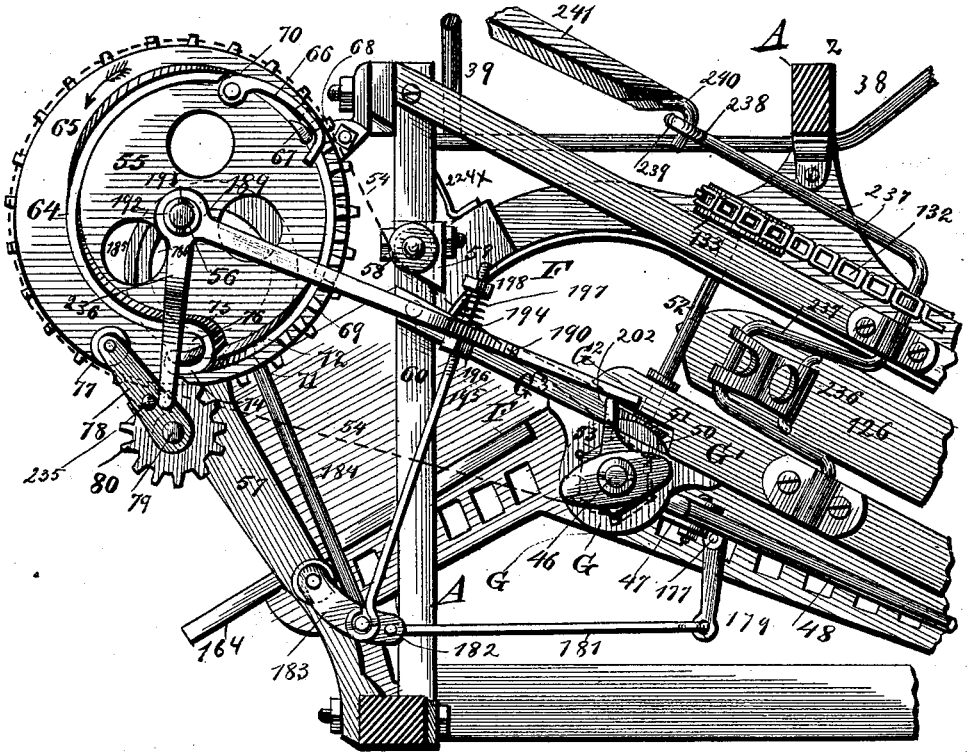
Fig. 13.



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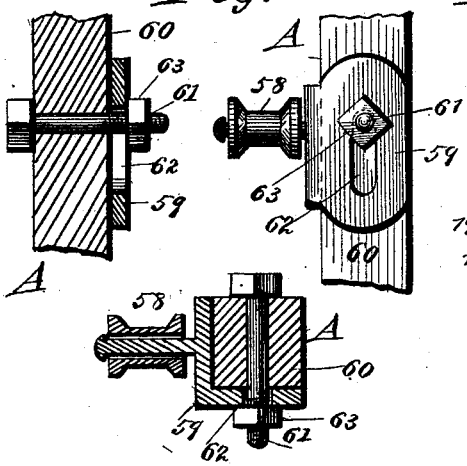

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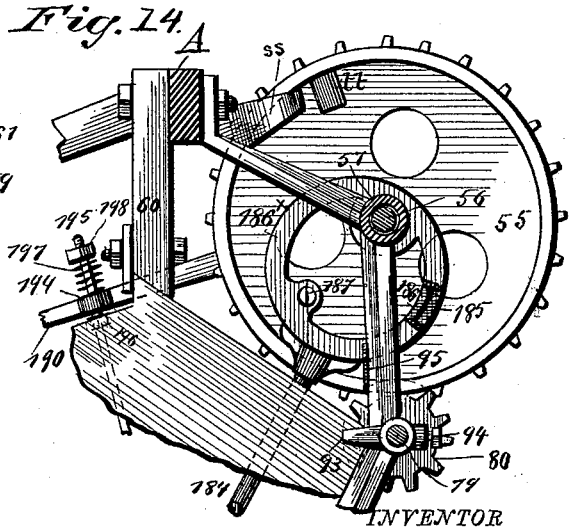

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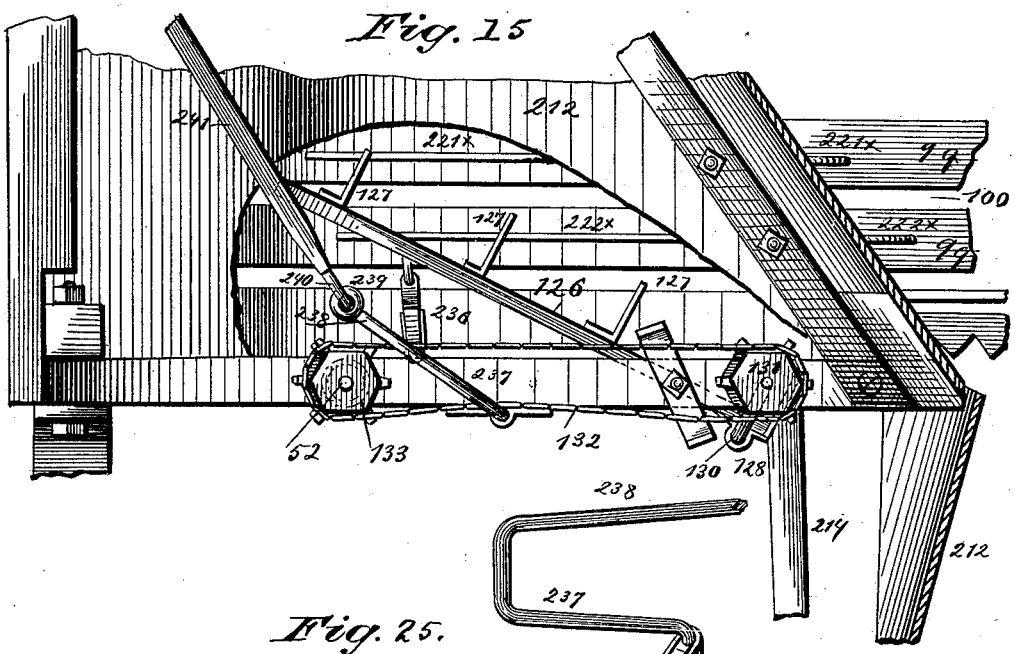
Fig. 15



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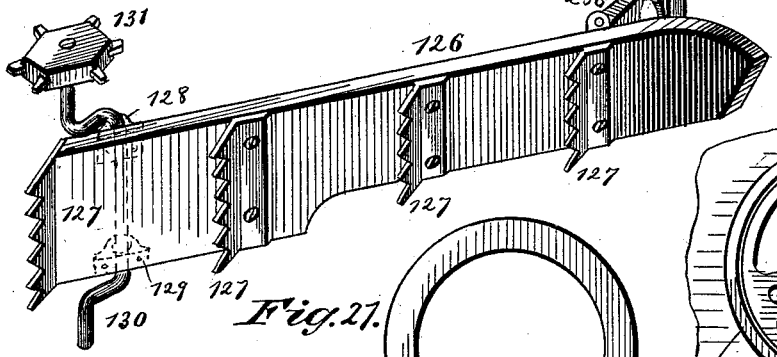

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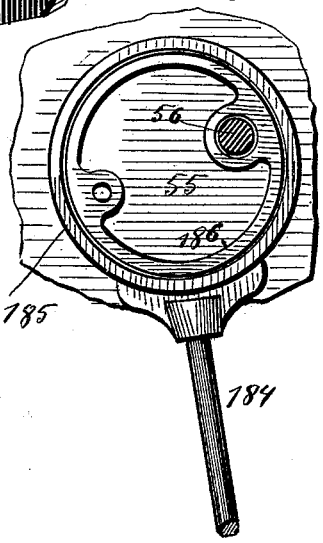
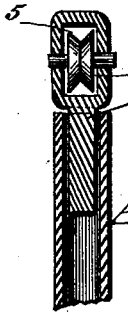


Fig. 27.

Fig. 28.



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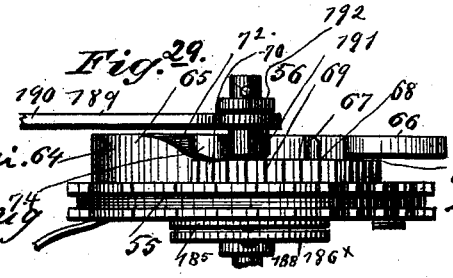

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Fig. 16.

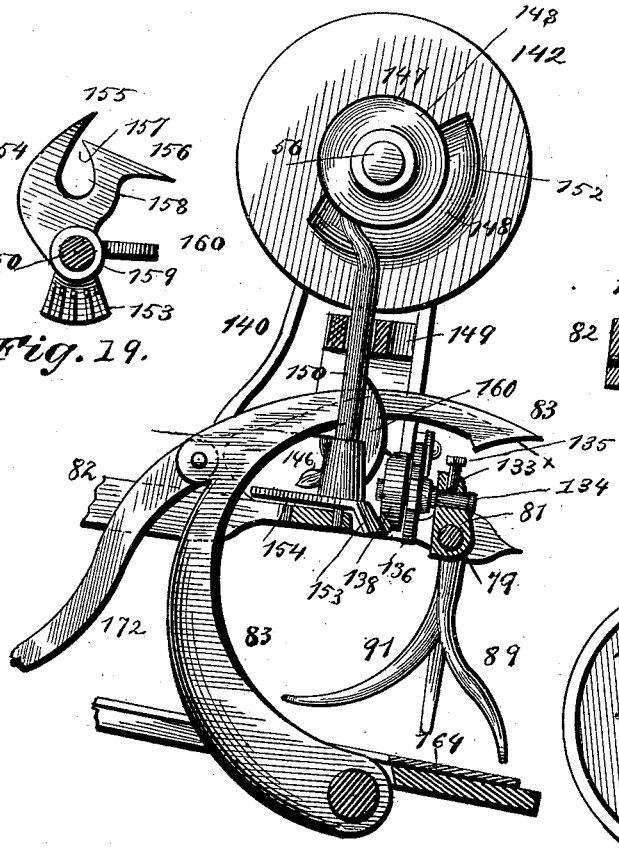
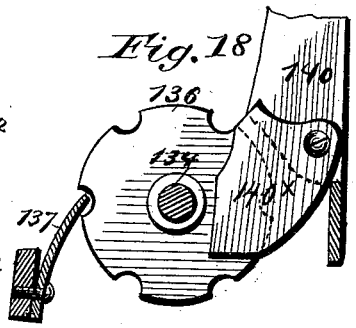


Fig. 19.

Fig. 18.



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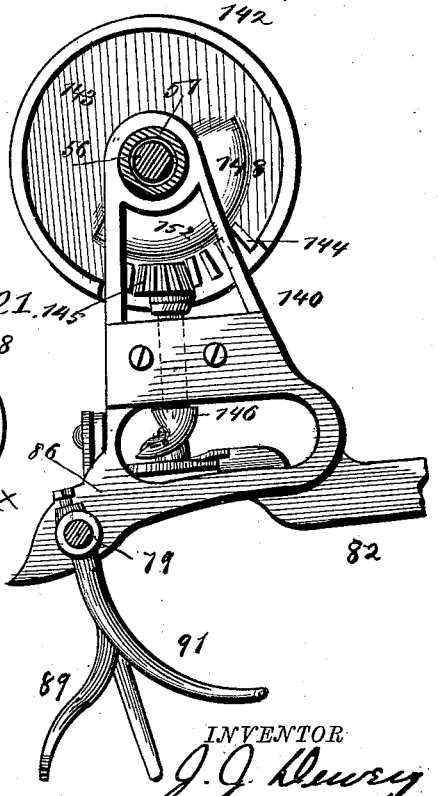

Fig. 21.

Fig. 20

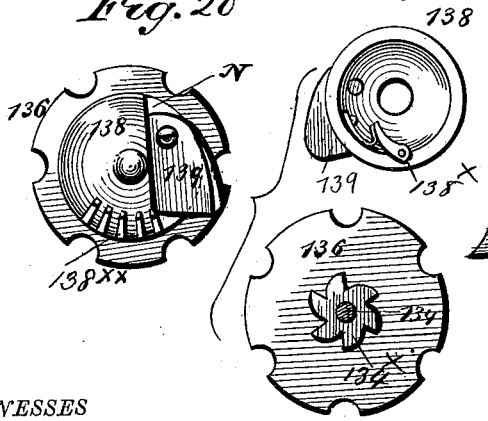

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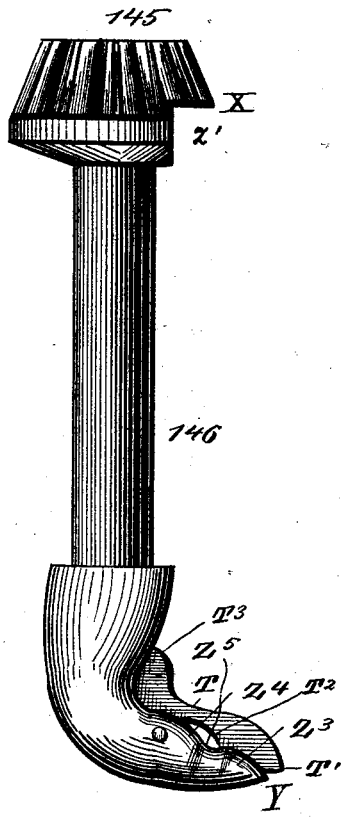
Fig. 37.



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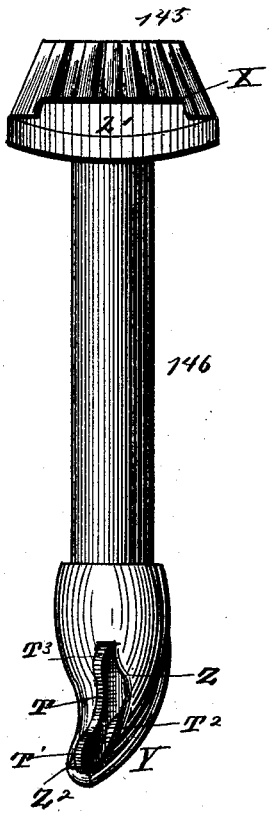

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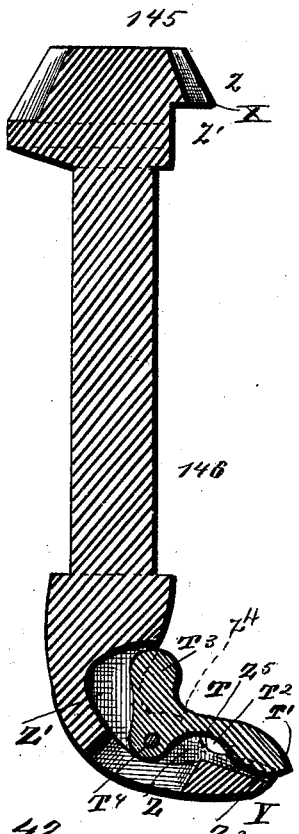

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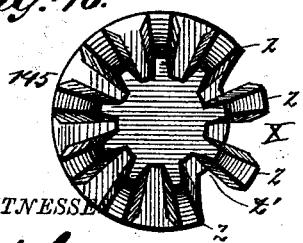

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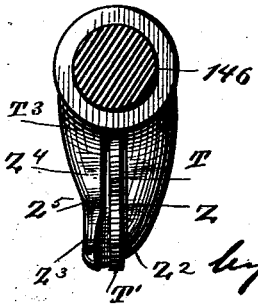

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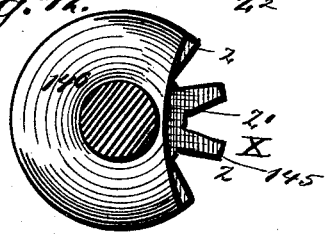

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SELF BINDING HARVESTER.

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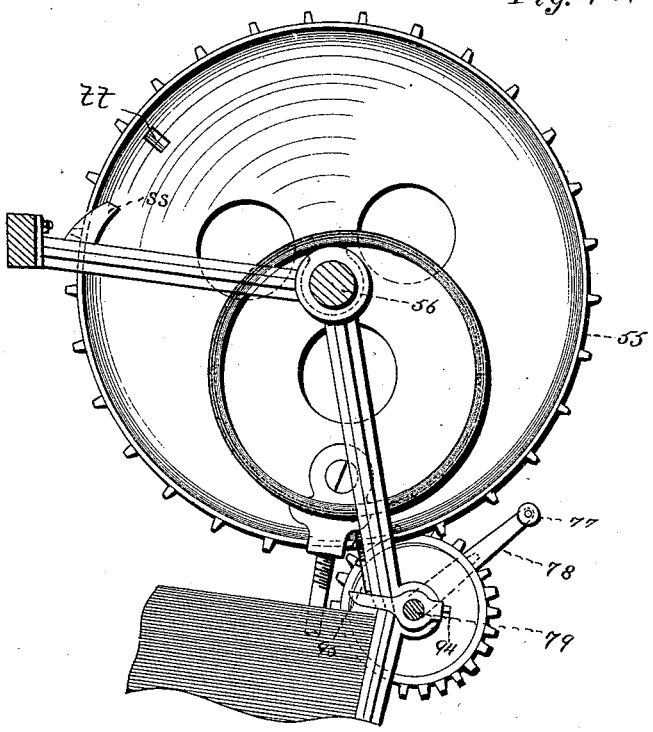
Fig. 43.



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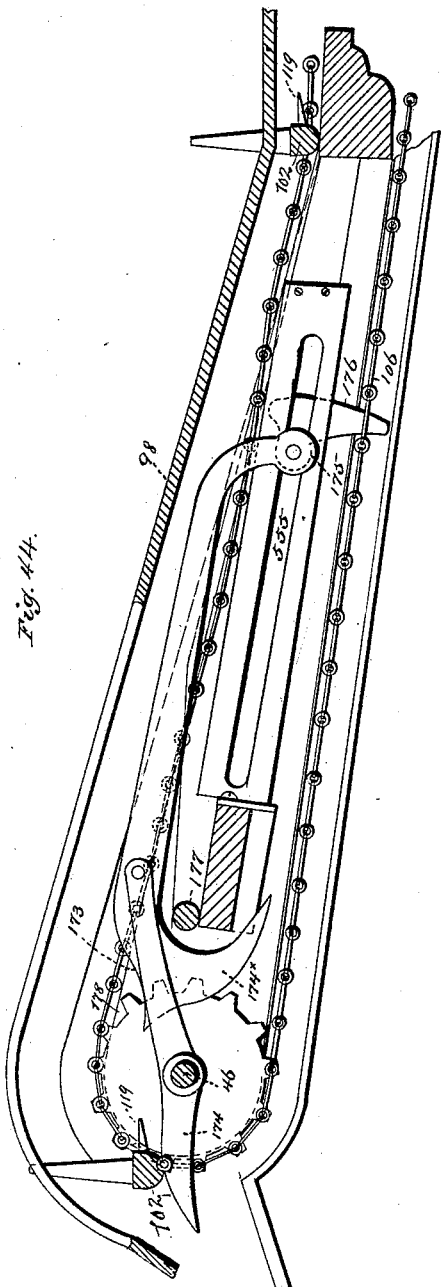
J. J. DEWEY.

SELF BINDING HARVESTER.

No. 422,335. Patented Feb. 25, 1890.

Fig. 44.



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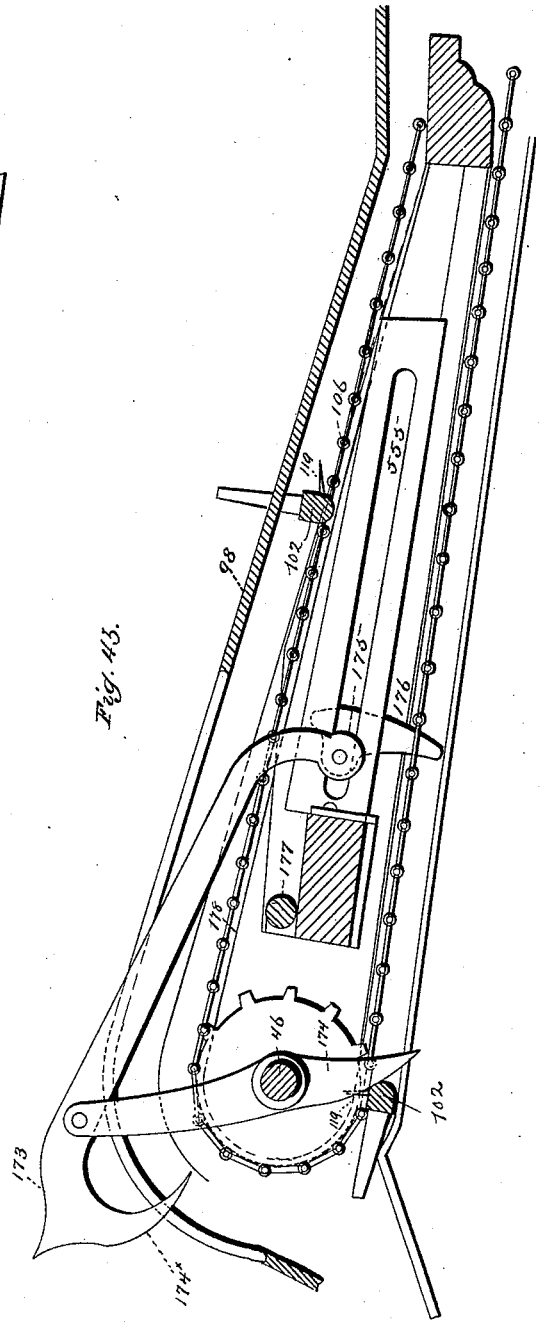

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his Attorneys

N. PETERS, Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

JOHN J. DEWEY, OF ST. PAUL, MINNESOTA, ASSIGNOR TO THE HARVESTER AND BINDER PATENT COMPANY, OF SAME PLACE.

SELF-BINDING HARVESTER.

SPECIFICATION forming part of Letters Patent No. 422,335, dated February 25, 1890.

Application filed September 7, 1886. Serial No. 212,928. (No model.)

To all whom it may concern:

Be it known that I, JOHN J. DEWEY, a citizen of the United States, and a resident of St. Paul, in the county of Ramsey and State of Minnesota, have invented certain new and useful Improvements in Self-Binding Harvesters; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

Figure 1 is a front elevation of a binder harvester embodying my improvements. Fig. 2 is a side elevation of the same. Fig. 3 is an end elevation taken partly in section. Fig. 4 is a central transverse section. Fig. 5 is a plan view of the frame with the operating mechanism removed. Fig. 6 is an enlarged sectional view of a portion of the binder, showing more clearly the packer and feeder mechanism. Fig. 7 is an enlarged detail plan view showing the binder-deck and the construction of the supporting-arm. Fig. 8 is an enlarged bottom view, a portion of the binder with the flooring removed. Fig. 9 is an enlarged plan view of a portion of the binder. Fig. 10 is an enlarged plan view of the grain end of the grain-platform. Fig. 11 is a transverse section of the same. Fig. 12 is a similar view showing the rake-heads in the inclined ways. Fig. 13 is an enlarged view of the binder, showing more clearly the construction of the cam-wheel 55. Fig. 14 is a reverse view of the same. Fig. 15 is a plan view of a portion of the machine, showing the location of the butt-board. Fig. 16 is a detail view of the knotting mechanism and cam-wheel 142. Fig. 17 is a reverse view of the same. Figs. 18, 19, 20, and 21 are detail views of the knotting mechanism. Fig. 22 is an enlarged sectional view of the cam-wheel 142. Fig. 23 is a side elevation of the same. Fig. 24 is a detail view of the rock-shaft 150. Fig. 25 is a detached view of the butter-board. Figs. 26 and 27 are detail views of the eccentric-ring 185. Fig. 28 is a detail sectional view of the hollow vertical shaft A^5 and its connections. Fig. 29 is a detached plan view of the cam-wheel 55. Fig. 30 is a horizontal section of the tool-box B, showing the interior gearing. Fig. 31 is a plan view of the tongue-connection. Fig. 32 is a detail view of the tightening-pulley 58 and its connections. Fig. 33 is a detached view of one of the rake-heads and its attachments. Fig. 34 is a detached view of the cross-head 211. Fig. 35 is a detail sectional view showing the crank 47 and its attachments. Fig. 36 is a detached view of the dog 202 and its connections. Fig. 37 is a detached side view of the tying-bill. Fig. 38 is a front view of the same. Fig. 39 is a vertical section of the same. Figs. 40, 41, and 42 are detail views of the same. Fig. 43 is a detail view showing a transverse section of the main binder and compressor shafts. Fig. 44 is a detail view of the packer mechanism, the arms being down. Fig. 45 shows the same with the arms up.

This invention has for its object the production of an efficient low-down self-binding harvester; and it consists in the construction of devices and novel combination of parts, as set forth.

I have designed in this invention to provide an efficient low-down self-binding harvester, and to this end have designed devices and combinations of parts, which together compose a practical and well-balanced mechanism capable of extended use in harvesters of other general form. Therefore I do not desire to confine the invention to the exact devices herein shown, when equivalent devices will serve in the combinations devised, yet it is preferred in the manufacture of my harvesters to follow the construction illustrated in the accompanying drawings.

In order to arrange the binder in the desired low position, and at the same time to provide for the machine a drive-wheel of sufficient diameter, a right-angle frame is constructed, carrying the drive-wheel to the rear of the line of the grain-platform, the latter extending between said drive-wheel and the draft attachment. In this manner a low rise or elevation of the grain-platform is provided for, the grain in passing to the binder being carried in front of the drive-wheel, and not over it, as in many self-binding harvesters now in use; and as the grain-platform is in front of

the axis of the drive-wheel it requires to be supported and counterbalanced, and to this end a caster or other wheel-support is provided at the front of the frame, said wheel being located nearly in the line with the drive-wheel. A counterbalance-spring is usually employed on said wheel-support, and a counterbalancing-weight is provided on the rear extension of the frame. For convenience this weight is preferably made in the form of a box-casting to incase the connecting drive-gear and to hold tools and other articles. The inclination of the machine-frame is by simple mechanism made adjustable on the axis of the drive-wheel to raise or lower the cutters and steady the same, and this adjustment is obtained and held by connection with the front wheel-support, and the machine is balanced laterally or upon the drive-wheel line by placing the binder mechanism on that portion of the grain-platform which is outside the line of the track of said drive-wheel, and by constructing the binding mechanism low down or nearly all below the level of the top of the main drive-wheel, this construction being easily attained because of the position of the grain-platform relative to that of the main drive-wheel. The weight of the driving mechanism, the binding mechanism, and the machinery designed to actuate the carrier, butter-sickle, and reel is massed near the line of the main drive-wheel, and to this line the main drive-shaft is extended parallel to the side of the main drive-wheel and under the rise of the carrier-platform, this rise affording room below for nearly all the actuating mechanism except the binder.

In order to avoid carrying the grain to the binder when the latter is in operation, the carrier is provided with an automatically-dropping hinged guide-track which drops when the binder starts, so as to permit the rakes to fall below the binder-table, and when the binder stops the track again rises, so that the grain is then carried forward over the rise to the binder. This is effected without stoppage of the carrier, which is designed to be in constant action when the machine is in operation. The cut grain is therefore being constantly carried toward the binder; but when the latter is in operation the grain is only carried to the foot of the rise of the grain-platform, where it is massed until the binder ceases its action, when the carrier again comes into action on said rise, carrying the grain up and over the same. The grain-platform, which is in rear of the cutter and finger-bars, is made as thin as practicable. The sprocket-wheels for the chain-carrier at the grain end of the machine are journaled in adjustable bearings, whereby the rake-chains may be tightened or loosened when necessary. The chain-rakes have extensions forward of the swivel connection with the carrying-chains terminating in teeth adjacent to the sickle-bar; and because of the low binding mechanism the needle-guard is jointed, and as the needle is retracted said needle-guard is shoved to the rear in horizontal or nearly horizontal position by suitable guiding devices. The needle-arm itself is formed with a recess in the front of its compressing portion or shank, said recess affording play for the binding-cord in its movement between the needle-arm and the bundle while the latter is being compressed and bound.

The binding mechanism is simple and is almost directly connected with the main binder-operating shaft 56, the latter being provided with an eccentric-bearing which engages a pitman in connection with a cranked needle-shaft. The needle-shaft, the compressor-arms, and the discharging mechanism are combined with a main binder-wheel having the eccentric-bearing on one side and on the other a cam-track and cog-segment; and a single shaft carrying the compressing and discharging arms is combined with a trip-arm pivoted on the main binder-shaft. In this manner a single shaft carrying both compressing and discharging arms may be employed in connection with a binder-wheel having devices for moving said shaft to put in operative action, first, the compressing-arms, and, secondly, the discharging-arms. The knotter or tying-bill is formed with a tapering channeled curved beak having a lateral rise at its forward end, and provided with a pivoted shouldered tongue extending beyond said beak, and having an elongated notch in its lower edge beveled at its outer end opposite the first portion of said rise, whereby the tongue will be automatically opened and closed and will hold the tying-cord automatically until the knot is fully formed, when it will automatically release the cord to allow the knot to be drawn tight.

The reel-shaft is made vertically adjustable from a pivotal axis, so that it can be raised or lowered to accommodate it to the height of the grain. It is also made adjustable forward and backward, both of these adjustments being governed by levers within easy reach of the driver on his seat, which is arranged on the rear or counterbalancing extension of the frame, in order that the weight of the driver may be utilized. It is preferred to run the reel by chains and sprocket-wheels, and as the reel is made with a double adjustment, the frame being pivoted to a lever, the chains are passed over guide pulleys or bearings at the angle of the levers, so that whatever be the adjustment of the reel the chains will not be thrown out of driving connection.

The butt-board is preferably made vibratory and adjustable, its upper end being connected to an upright crank-shaft having an arm and connecting-rod extending to the driver's seat, and its lower end being connected to a rotating crank-shaft operated by devices driven by the main shaft.

Other features of the machine will be apparent upon reading the subjoined description.

Referring by letter to the accompanying drawings, which illustrate a harvester embodying my invention, A designates the main frame, which consists of longitudinal timbers *a*, which constitute the drive-wheel end of the frame, and the cross-bars *a' a'*, forming the platform-frame, and which, as shown in this machine, is L-shaped, the main arm of said L standing under and supporting the grain-platform, and the lesser arm running rearward therefrom and having bearings for the drive-wheel, the binding and knotting mechanism being supported at the junction of the two arms, and it is supported in rear on the axle A' of the main drive-wheel A^2 and the grain-wheel A^3, the diameters of said wheels A^2 and A^3 being such that the main frame will be quite low or near to the ground. The front end of the main frame A is preferably mounted on a caster-wheel A^4, which is nearly in line with the main drive-wheel A^2 of the machine. The vertical bearing-shaft A^5 of the caster-wheel A^4 is provided at its lower end with a spring L under bearing-lug 3, to prevent the transmission of concussions to the machine in event of the contact of the wheel A with obstructions, and slides in bearings 2 and 3, projecting from the front end of the frame of the machine.

The vertical bearing-shaft A^5 may be hollow or provided with a bearing at its upper end for a slotted swivel 4, in the slot 5 of which is journaled a grooved pulley 6, over which a chain 7, connected to the bearing 2 at the front end of the main frame, runs and passes down and under a pulley 8, journaled to the front end of the top bar Z of the frame of the machine. At its rear end the chain 7 is connected to the front end of a rearwardly-extending horizontal rod 10, the rear end of said rod 10 being connected to the front end of a chain 11, which chain 11 runs under a pulley 12, journaled in bearings 13, secured to and rising from the top bar Z, a short distance in front of the rear end of the latter, the rear end of the said top bar Z being connected to the inner end face of the gear-box, located at the rear end of the main frame of the machine. The rear end of the chain 11 is secured to a lever 14, the latter being fulcrumed on a bolt 15, which passes through a semicircular perforated rack-plate 16 and secures the latter firmly against the outer face of the top bar Z at the rear end of the latter, so that the lever 14 may be moved forward and back to lower or raise the front end of the machine when desirable or necessary. The front end of the top bar Z is supported by the two inclined brace-pieces 215 and 216, while its rear end is connected to one side of the cord-bar B and is supported thereby.

The axle A' has secured upon it a double sprocket-wheel D E, consisting of a larger portion D, provided with the teeth D', and a smaller portion E, having the teeth E'. $15^\times$ is a clutch-section splined upon the said axle and caused to engage with the clutch-section $16^\times$ by the coiled spring $17^\times$, Fig. 8, which bears against the adjacent side of the said double sprocket-wheel. The section $16^\times$ is secured to the wheel A^2, which turns loosely on the axle A', upon which the wheel A^3 also turns loosely. The section $15^\times$ can be disengaged from the section $16^\times$, thereby stopping the rotation of the axle by means of the lever 17, the front arm of which is engaged in the circumferential groove of the former section. The said lever is pivoted upon the arm 18, secured to the main frame A, and has its rear arm connected to the lower crank 19 of the vertical double-cranked lever $18^\times$, which is journaled on the bottom and top of the cord-box B, and has its upper crank or handle within easy reach of the driver's seat, so that the clutch can be readily operated therefrom.

The large wheel D of the double sprocket-wheel D E, Fig. 3, is connected by a sprocket-chain 21 with a sprocket-wheel 22, journaled on a shaft 23, mounted in the end wall of the gear-box B, said sprocket-chain 21 passing through openings 24 and 25 in the front wall of said box.

A hand-lever 26, Figs. 3 and 5, is fulcrumed at its lower end upon the axle A', alongside the sprocket-wheel D E, and extends up between the top rail Z and a guard 27, which limits its forward and backward movements to within easy reach of the driver while in his seat, said hand-lever 26 being retained at its point of adjustment by suitable locking device.

The side rails 28 and 29 of the reel-frame are connected at their rear ends to the sides of the hand-lever 26, and the reel-shaft 30 is journaled in bearings at the forward ends of said side rails and projects laterally over the cutter-bar at the front of the grain-platform.

Between the side rails of the reel-frame the reel-shaft 30 is provided with a sprocket-wheel 31, over which a chain 32 runs, said chain passing over two friction-pulleys 33 and 34, arranged one above the other on the face of the hand-lever 26, and thence down around the sprocket-wheel E on the axle.

Near its front end the reel-frame is provided with a cross-bar 36, and to this cross-bar 36 and the side rail 28 of the reel-frame a guard or guard-brace 37 is secured, a pivoted metal supporting-frame 38 being journaled to the upper rails of the main frame and having its upper horizontal portion passing between the reel-frame and the guard-brace 37. The vertical arm 39 of the pivoted supporting-frame 38 is connected by a horizontal rod 40 to a hand-lever 41, pivoted to the outer face of a perforated plate 42, secured to the outer face of a top rail of the frame of the machine near the rear end of the said rail, a detent-pin 43 in said lever 41 being employed to engage either of the holes in said plate 42 to hold the reel-frame at the desired elevation. The reel-frame is raised and lowered by elevating or depressing the reel-supporting frame 38, which is done by moving

the lever 41 forward or backward, as may be necessary.

The shaft 23, Fig. 3, on which the sprocket-wheel 22 is secured, is provided with a miter gear-wheel 44 at its inner end, which miter-gear engages the miter-gear 45 on the main longitudinal shaft 46, near the rear end of said shaft 46. This shaft 46 has bearings in the front and rear walls of the box B, also in the end pieces of the carrier and packer-frame F, and in a box G on the under face of the lower inclined piece G′ at the front end of the machine, Fig. 8. The shaft 46 is also provided near its front end with a crank 47, to which the pitman-rod 48 is connected at one end, the other end of the pitman-rod being connected to the cutter-bar 49.

Outside of the crank 47 the shaft 46 is provided with a miter-gear 50, which is keyed to said shaft 46 and revolves therewith. This miter-gear 50 engages a miter-gear 51 on the lower end of a shaft 52, Figs. 13 and 35, the purpose of which will be hereinafter explained.

Outside of the box G the shaft 46 has loosely mounted thereon a small loose sprocket-wheel 53, which is connected by an endless chain 54 with the large sprocket and cam wheel 55 near the front end of the binder-shaft 56, said binder-shaft 56 being supported in an elongated sleeve-bearing 57 at the side of the machine and near the front of the same. On its rear face the wheel 55 is provided with a friction-roll *t t*, Fig. 14, which is engaged by a spring *s s*, Fig. 14, which is secured at one end to the frame of the machine and which prevents backward motion of said cam-wheel 55 while the bundle is being compressed by the compressor-arms on the shaft 79. A tightening-pulley 58 is supported in adjustable bearings 59, secured to the upright piece 60, near the front end of the frame of the machine, by a bolt 61, passed through said upright 60 and through a slot 62 in the casting 59, said casting being held to its adjustments by a nut 63, secured upon the bolt 61. This tightening-pulley 58, Figs. 13 and 32, bears upon the endless sprocket-chain 54 and takes up the slack in said chain.

The combined sprocket and cam wheel 55 has teeth extending entirely around its periphery, and on its outer or front face said wheel 55 is provided with a scroll-cam 64, having a wide plain portion 65, at one end of which is pivoted a curved gate 66, which when closed bears against a projecting lug 67 at the base of the second tooth 68 on the toothed portion 69 of the scroll-cam 64, and forms an extension of the wider part 65 of the scroll-cam 64. The portion 69 of the scroll-cam 64 is plain or free of teeth for a short distance near each end, or at the points 70 and 71, where it merges into the wider plain portion 65 of said scroll-cam. The portion 72 of the scroll-cam 64 is provided with a projection 74 and a nearly-radial slightly-curved web 75, which joins the points of the scroll-cam farthest from and nearest to the center of the wheel 55. The weight-gavel, as will be hereinafter apparent, forces the friction-roller 77 on the end of the arm 78, secured to the outer end of the compressor and discharger shaft 79, against the outer surface of said cam-scroll, when it rolls over and past the projection 74, so that it closely hugs said scroll. This shaft 79 is journaled in a bearing or sleeve 81 on the outer end of the slotted curved supporting-arm or breast-plate 82. The shaft 79 is journaled also in a bearing 86 at the front end of the frame. Just inside the arm 78 and fixed upon the compressor and discharger shaft 79 is a pinion 80, the teeth of which engage the teeth on the toothed portion 69 of the scroll-cam 64. The compressor and discharger shaft 79 is provided with two compressor and discharger arms 84 and 85, one 84 keyed upon the shaft 79, near or at its rear end, and the other 85 keyed thereon about midway between the breast-plate 82 and the bearing 86 in the frame, said arms 84 and 85 being adjustable on said shaft 79, and set-screws being provided in order to secure the adjustment. Intermediate of the straight arms 84 and 85 two outwardly and downwardly curved discharge-arms 89 and 90 are fastened upon the shaft 79, and immediately inside of these two discharge-arms 89 and 90 are two inwardly and downwardly curved compressor-arms 91 and 92, which are also fastened to the shaft 79 and are adjustable on said shaft 79, the object of making the arms 84, 85, 89, 90, 91, and 92 adjustable being to adapt these portions of the machine to grain of different lengths and to make different-sized bundles. The shaft 79 is provided just alongside the bearing 86 in the frame with a short finger 93, which is fastened to said shaft by a set-screw 94, and is adapted to strike against a projecting stop-spring 95, which prevents reverse rotation of the compressor and discharge shaft 79. The grain-platform 96, Figs. 1, 3, 5, 6, and 11, has a bottom 122, which extends from near the grain-wheel side at 97 to a point a little beyond the foot of the elevation 98 of said platform. The metal slats 99, which form parts of the grain-platform, have intervals 100 between them for the passage of the rake-teeth 101, which are connected to the pivoted rake-heads 102, the latter being provided with end teeth 103 and connected by hinge-connections 104 at the ends and midway of their ends to endless sprocket-chains 105, 106, and 107, which run over sprocket-wheels 108, 109, and 110, journaled on bearings 111, secured to a cross-piece 112 below the metal slats 99 a short distance from the inner face of the grain-board 113. The bearings 111 for the sprocket-wheels 108, 109, and 110, Fig. 10, are adjustable bearings, which are provided with threaded arms, on which jam-nuts are provided, said jam-nuts bearing against the vertical faces of the cross-piece 112, so that said bearings may be adjusted to take up the

slack in the chains 105, 106, and 107, when necessary. These endless sprocket-chains 105, 106, and 107 also engage and are actuated by three sprocket-wheels 114, 115, and 116, keyed upon the main shaft 46 in line with the sprocket-wheels 108, 109, and 110 on the cross-piece 112, so that when the main shaft 46 is rotated in the proper direction the endless sprocket-chains 105, 106, and 107 will move and carry the rakes toward the binder mechanism. Beneath the two slats 99, nearest the middle space 117, between the slats of the grain-platform, is located a metal way or flat track 118, secured to cross-bars connecting with the longitudinal side pieces or bars of the grain-platform frame, upon which the dogs or arms 119, made integral with and extending rearwardly from the rake-heads 102, bear and travel when the rakes are on the upper side of said track 118, these dogs or arms 119 being designed to hold the rake-heads during this part of their trip in an upright position to cause the rake-teeth to engage the grain lying on the platform. The ends of the rake-heads 102 travel on ways 120 and 121, Fig. 11, at the front and rear of the casing or frame 122 of the grain-platform until the rakes reach the inclined pieces G′ G′, at which time the ends of the rake-heads travel upon said end pieces G′ G′. The rake-teeth remain in the upright position until they have reached the crown of the elevation 98, which is immediately over the main shaft 46 and below the level of the top of the drive-wheel, at which time they reach the arc-shaped upper ends G^2 of the end pieces G′ G′ and begin to turn downwardly on the arc of a circle, and the rake-teeth move in said arc for a distance of about ninety degrees, when the ends of the rake-head engage grooves $122^{\times}$ along the lower sides of the inner faces of the end pieces G′ G′, and travel back therein until they reach the lower ends of said end pieces, when the rake-heads drop out of said grooves $122^{\times}$ and fall upon the ways 123 along the lower edges of the front and rear pieces 124 and 125 of the platform-frame.

At the front of the machine and in rear of the caster-wheel is located the hinged butting-board 126, Figs. 13 and 25, which is provided with a number of serrated or toothed angle-plates 127, secured to its inner face at proper intervals for the purpose of engaging the butts of the cut grain as the latter is carried up the incline or elevation leading up from the grain-platform by the rakes. The lower end of the butting-board 126 is connected by ears 128 and 129 to a vertical double crank-shaft 130, said crank-shaft 130 being provided on its upper end with a sprocket-wheel 131, which is connected by a sprocket-chain 132, Figs. 13 and 15, with a sprocket-wheel 133 on the upper end of the shaft 52, hereinbefore mentioned, said shaft 52 being connected by the miter-gear 51 on its lower end to the miter-gear 50 on the driving-shaft 46, so that the butting-board will be reciprocated from the main shaft 46 when the machine is drawn forward, and will straighten the grain as the latter is carried upon the incline of the platform by the rakes, the serrated angle-plates 127 engaging the butts of the grain and moving them forward, then leaving them and engaging the butts of the grain below the portions already straightened, and bringing up or straightening the latter, operating in this manner as long as the cut grain is being carried up the incline by the rakes.

The bearing-sleeve 81 on the end of the slotted and curved breast-plate 82 is provided nearly midway of its length with a bearing-lug $133^{\times}$, which extends upward from the bearing-sleeve 81 and forms the seat for the fixed shaft 134, which is secured in place by a set-screw 135. On this shaft 134 is journaled a notched disk 136, having six teeth, a spring 137, secured to the inner face of the rear side of the plate 82, bearing normally against the edge of the disk 136 and entering the notches thereof to prevent the disk from reversing its rotation.

138 is a concavo-convex disk journaled on the shaft 134 to the inner side of the notched disk 136, and having secured to its concave surface a spring-controlled pawl $138^{\times}$, which engages the ratchet $134^{\times}$, secured to the inner face of the notched disk, so as to rotate the said disk in one direction only when the concavo-convex disk turns. This disk 138 is provided with the cord-cutting knife or blade 139, which is secured in a recess N in the rear face of the said disk, said blade 139 projecting beyond the periphery of the disk 138. The disk has a convex-faced segment $138^{\times\times}$, which has a number of teeth which engage with the toothed segment 153, referred to hereinafter. Rising from the breast-plate is a short knotter-frame 140, which is secured to the rear end of the elongated sleeve-bearing 57, said sleeve-bearing being secured in its seat in said knotter-frame 140 by a set-screw 141, Fig. 22. The frame 140 has applied to it a shoe $140^{\times}$, which co-operates with disk 136 to hold the cord.

On its rear end the binder-shaft 56 is provided with a cam-wheel 142. On its front face this cam-wheel 142 is provided with a delay-surface 143 and a segmental section 144 of teeth which engage the miter-teeth 145 on the upper end of the tying-bill 146. The miter-teeth 145 are nine in number, four of them—viz., Z Z Z Z—having portions cut away at the base of the gear-pinion, as at X. The lower end of the tying-bill 146 has a curved tapering jaw Y, which has a vertical slot Z made through it, which slot communicates with a groove or recess Z′ in the point of the jaw Y, said groove Z′ being slightly curved in a lateral direction and made wide or flaring at its outer end. The point of the toe Z^3 of the stationary jaw Y is slightly curved or rounded, and at the longer side of the flaring portion Z^2 said point Z^3 is provided with a rounded or convex rise or pro-

jection Z^4, outward from which is a curved depression or groove Z^5. Within the slot Z is pivoted the tongue T, which is provided with a point or toe T′, which extends slightly beyond the toe of the tying-bill and is provided with a concave notch T^2 in its under edge, which notch comes alongside the curved depression Z^5 when the tongue T is closed down by the binding-cord. The heel T^3 of the tongue T is rounded on its edge and extends normally upward from the pivotal point T^4 in its slotted seat, and is adapted to enter an opening Z′, forming an extension of the slot of the jaw Y.

On its rear face the cam-wheel 142 is provided with a hub 147, Figs. 16, 22, and 23, through which a pin is inserted into the binder-shaft 56, to secure said cam-wheel in place on the binder-shaft. This hub 147 is provided with a peripheral cam-groove 148, which dips into the rear face of the cam-wheel 142, and after traveling nearly halfway round the face of said cam-wheel 142 said cam-groove 148 returns into the hub 147.

Immediately below the cam-wheel 142 the short knotter-frame 140 is provided with a laterally-projecting bearing-arm 149, in the outer end of which is formed the bearing for the vertically-disposed rock-shaft 150, the upper end of which is curved or bent away from the axial line of the straight portion of said rock-shaft, and is provided with an upwardly-projecting vertical stud 151, having a roller $151^\times$ thereon, which enters the cam-groove 148 in the hub 147 of the cam-wheel 142, and travels in said cam-groove 148 when said cam-wheel 142 is revolved by the binder-shaft 56, the rock-shaft 150 remaining stationary in its initial position as long as the roller $151^\times$ remains in the arc 152 of the cam-groove 148 of the cam-wheel 142. When, however, the cam-wheel 142 has been caused to revolve one-half a revolution, the upper end of the rock-shaft 150 will leave the arc portion 152 of the cam-groove and will enter the cam portion of the groove 148, which is at that time nearest, and will travel in said cam portion, which will cause the rock-shaft 150 to turn the toothed segment 153 at the lower end of the sleeve of the cord-tucker and stripper 154, said part 154 being provided with two flat curved arms 155 and 156, the former being the longer of the two arms. The points of these arms approach each other and nearly meet, leaving only a space 157 for the cord to enter to the elongated opening 158 in said tucker and stripper. The latter is keyed through its sleeve 159 to the rock-shaft 150, near the lower end thereof, and is provided at one side nearest the shorter arm 156 with a vertically-disposed cord-guide 160, which serves to press the cord toward the tying-bill just at the time that the knife is bearing against the cord in the opposite direction to cut it, and also to keep the cord in proper position on the knotter and prevent its slipping off. The cord or twine 161, Figs. 2, 6, and 7, is placed in the cord-box at the rear end of the machine and is run out through a small hole in the lid of the box, passing under the shield 162 and along a groove 163 in the upper face of the downwardly-inclined grain or binder deck 164, thence through an inclined guide-hole 165 in said binder-deck, and up through a slot 166 in the needle or cord arm 83, and along a groove 167 in the upper edge of the curved needle-arm and down through an eye 168 in the point of said needle or cord arm 83. To the under side of the two lower parallel rails of the main frame is secured a slotted directing-board 169, the slot extending from about the middle of said board back to the rear end of the same. The slot 170 in this directing-board is closed by a metal plate 171, secured upon the lower face of said directing-board, the outer end of said slot being left open beneath the inner lower parallel rail of the main frame. At the forward end of the slot 170 is provided a triangular projection $171^\times$, over or upon which the hinged downwardly and rearwardly extending arm or needle-guard 172 of the needle-arm 83 moves to and fro, and is turned upward on its pivot as the needle-arm recedes from the bundle. The object of providing this movement is to prevent the arm or needle-guard 172 from running into the ground, which it would otherwise do in a low-down binder.

173 is a packer-bar, having at its upper and outer end the downwardly-extending arm $174^\times$ and at its inner end the downwardly-extending short arm 175, pivoted in the longitudinal slot of the plate 555, suitably bolted upon the bridge portion of the frame A. 176 is a plate secured to the pivot of the arm 175 on the inner side of said slotted plate.

174 is a double-armed lever journaled about centrally on the shaft 46 and having the end of its upper arm pivoted upon the packer-bar near the origin of the arm $174^\times$.

When the transverse rakes move up the incline 98, the arm 175 of the bar 173 being then in the lower end of the slot of the plate 555, they pass easily over the top of the packer-bar, which is then retracted below the metal slats or strips forming the grain-platform. When, however, a rake has passed over the top of the incline 98 and begins to descend, it strikes against the lower arm of the lever 174, which arm is then projected outward, and by moving said arm inward causes the top of the packer-bar to rise between the slats of the grain-platform and descend on the outer side of the incline 98, packing or forcing down the grain brought up by the rake to form the gavel.

As the rake passes back to the grain-platform it strikes against the pivoted plate 176 and draws or pulls the packer-bar inward and retracts it again below the grain-platform slats in position for the following rake to pass over.

A short distance below the shaft 46 is a shorter shaft 177, which has its rear bearing in the upper end of the inclined portion 178

of the flat track 118 and its front bearing in the upper portion of the front inclined metal portion of the carrier and packer frame. Upon the front end of this transverse shaft 177 is keyed a short depending arm 179, and in the lower end of this depending arm 179 is loosely secured by a key the inner crank end of a slightly-curved rod 181, the outer end of said rod 181 being provided with a forwardly-extending crank, which projects through an eye 182 in the inner end of a crank-arm 183, made integral with the shaft of the needle-arm. This crank-arm 183 is connected to the lower end of the pitman-rod 184, the upper end of said rod being provided with a ring 185, Figs. 13 and 14, which fits over the eccentric ring-flange 186 on the rear face of the sprocket and cam wheel 55.

186[×] is a ring that is held over the eccentric and ring 185 by a screw 187, and also by a collar 188, Figs. 27 and 29, on the shaft 56.

When the binding mechanism begins to operate, the crank-arm at the inner end of the shaft 177, which arm has its bearing on the inclined part 178 of the track 118, is turned downward, depressing said inclined portion 178 of track 118 by means of the depending arm 179, the link-rod 181, the crank-arm 183, the pitman 184, and the eccentric on the rear face of the sprocket-wheel. Consequently the teeth of the rakes, which operate continuously, are depressed below the slats of the inclined portion of the grain-platform, and fail to carry the grain up said incline, but allow it to accumulate at the foot thereof. This action is rendered possible from the fact that the rake-chains are somewhat loose, and will fall when the inclined portion 178 of the track is depressed, as described. The lower part of the inclined portion 178 of the track 118 is curved downward slightly at 178[×], as shown in the drawings, so that the rake-teeth will pass below the slats near the lower end of the incline. When the said inclined portion of track is again raised, the grain accumulated at the foot of the incline will be carried thereover to form part of the succeeding gavel.

Loosely mounted upon the front end of the shaft 56 is an angle-lever 189, the longer arm 190 of which is slightly curved between its fulcrum and its inner end. This angle-lever 189 is rigidly secured to a sleeve 191, which sleeve is slipped upon the shaft 56, a washer 192 being placed upon the front end of the shaft 56. The longer arm 190 of the angle-lever 189 is provided with a seat 194, through which the upper threaded end of a rod 195 passes and projects, a bearing-nut below said longer arm 190 limiting its downward adjustment. A coil tension-spring 197 encircles the projecting threaded upper end of the rod 195, a nut 198 being screwed upon said rod 195 above the spring 197 to regulate the tension of said spring 197, which controls the compression necessary to trip the binder into gear, and thus regulates the size of the bundle. The shorter arm of lever 189 is struck by pin 235 in arm 78, and the binder is thus thrown into gear.

The small loose sprocket-wheel 53, which is connected by the sprocket-chain 54 to the large sprocket and cam wheel 55, is provided on its front or outer face with an integral hub or sleeve 199, upon which sleeve 199 is pivoted a dog 202, having an arc 203 cut in its base to fit the arc of the hub or sleeve 199, upon which it bears. A curved wire spring 204 has one of its ends secured in a seat in the front or outer face of the small sprocket-wheel 53, the other end of said curved spring being bent outwardly at a right angle and secured in a seat 205 in a projection 206 on the larger or base portion of the pivoted dog or stop 202. The upper end of the stop or dog 202 is flat and extends forward a distance a little greater than the thickness of the base of said dog 202, so that an interval 207, bounded by a concave line, is left for the passage at certain times of the rearwardly-extending projections 200 and 201 near the ends of the arms of the cross-head 211, the latter being keyed to the front end of the shaft 46. The rearwardly-extending projections 200 and 201 pass the dog or stop 202 only when the latter is engaged by the inner end of the longer arm 190 of the angle-lever 189, at which time the binder mechanism is in operation; but the rake mechanism is operative and is at this time carrying the cut grain to the compressors. As soon as a sufficient quantity of cut grain has been carried up the incline of the platform and deposited against the compressor-arms the weight of the grain will become operative to overcome the tension of the coil-spring 197 on the rod 195 by pressing the compressor-arms back to lift arm 190 to disengage it from the dog, and thus start the binder. The tension of this coil-spring arm 197 may be regulated to meet the requirements of heavy or light grain by turning the upper nut on the threaded upper end of the rod 195.

A sheet-metal hood 212 is secured to the inner grain-board 213 of the machine, said grain-board being supported at its forward end upon an open metallic arm 214, secured to the front of the grain-platform and extending forward therefrom and turned up and back and secured upon the nose of the inner grain-board 213. The front end of the frame of the machine is provided with two inclined brace-pieces 215 and 216, which are secured at their lower ends, one to the upper face of the metallic arm 214 and the other to the front end of the outer lower rail of the main frame. The braces 215 and 216 are secured at their upper ends to the bracket on the front end of the bar Z, as shown in Figs. 1 and 2. The inclined brace-piece 216 is provided with a forwardly-projecting arm 217, which has a bearing 218, into which a journal 219 on the outer end of the arm 220 of the tongue, Fig. 8, is sprung and held in place by a key 222, passed through an eye in said jour-

nal. The other spring-arm 223 of the iron 224 of the tongue is provided with an eye 225, which springs over a short journal 226, projecting toward the caster-wheel from the front end of the open metallic arm 214, and this end of the spring-arm of the tongue-iron is held in place by a split key passed through an eye near the point of said journal 226. By this or other pivotal connection the tongue is pivoted and permits the front of the machine to have vertical play, the weight of the front end of the machine coming upon the caster-wheel and not upon the necks of the team.

To the under face of the sheet-metal hood 212 at its lower rear end are secured three downwardly-curved wire compressor-arms $220^{\times}$, $221^{\times}$, and $222^{\times}$, Figs. 4 and 6, two of which extend up over the ridge of the inclined portion of the platform, the intermediate one $221^{\times}$ extending just to the ridge of the platform. The rear compressor-arm $220^{\times}$ is secured to the hood at its center and has one part bent down and upward, so as to rest on the incline leading up to the binding-table, and the opposite portion extends entirely over the ridge of the platform and its end is bent to extend up through a recess near the upper end of the breast-plate 82.

The butting-board 126 is connected near its upper end by a hinged arm 236 to a double-crank rod 237, having bearings in boxes, Fig. 13, secured to the upper and lower inclined frame-pieces at the front of the platform. The double-crank rod 237 is provided at its upper end with a long crank-arm 238, which is provided with an eye 239 at its end, into which eye a curved pin 240 at the forward end of an adjusting-lever 241 projects. The rear end of said lever projects back to within convenient reach from the driver's seat, and is provided with a handle $241^{\times}$, made integral with a plate 242, Fig. 2, secured to the lever 241, and provided in its lower edge with notches 243, which engage upon a detent-staple 244, Fig. 5, through which the handle projects and within which it may be lifted and moved backward or forward to adjust the butting-board to suit longer or shorter cut grain, the object of the adjustment being to move the grain rearwardly when necessary to bring the middle part of the gavel at the proper place to receive the cord from the binder-arm.

The grain-platform is provided in front of the grain-wheel with a vertical guard-board 245, to prevent the grain from coming in contact with said wheel. At the rear end of the platform is an inclined grain-board 246, which extends along the horizontal portion of the platform, and also extends up the incline to the ridge thereof, where it is connected by a metal shield 162, which extends over the front part of the driving-wheel to the upper face of the binder-deck at or near the end of said deck, so that the driving-wheel, over the forward portion of which the grain is carried, will not interfere with the grain on the binder-deck while the same is passing thereto or being bound thereon.

The operation of the machine is as follows: The grain cut by the co-operation of the reel and cutter-bar falls upon the platform and is carried by the rakes over the incline of the said platform, the reciprocating butt-board causing the butts of the stalks to be set evenly when passing thereover. The compressor-fingers $220^{\times}$, $221^{\times}$, and $222^{\times}$, connected to the under surface of the hood, hold the grain down, so that the rakes and packer-bar 173 can easily carry it forward and then downward against the compressor-arms on the shaft 79, the rakes in the meanwhile descending and returning to the grain end of the machine. The weight of the grain against said arms is sufficient to press them outward, and by partially rotating the shaft 79 elevates the arm 78, rocking the lever 189 and throwing the binder into gear, and also bringing the anti-friction roller 77 against the eccentric cam-track 64 65, &c., so that as the wheel 55 rotates and the binder-arm rises the said cam-track turns the arm 78 outward and the compressor-arms inward, compressing the gavel before tying between said arms and the binder-arm. A curved door 66 can fall freely outward from the center of the wheel 55 until its outer side brings up against the adjoining shoulder of the cam-track, when it stands rather more than radially outward. When it falls inward, its hooked end, Fig. 13, catches against the lug-stop 67, which holds the outer surface of the door nearly in the same curved and eccentric line as that in which the outer surface of the cam-track 64 65 lies. The wheel 55 rotates in the direction shown by the arrow in Fig. 13, and when the door 66 reaches the roller 77, which occurs at the same time that the gavel is completely tied, the said roller pushes the door inward until the latter is engaged against the lug-stop 67 and rolls over its outer surface, which has the outer edge flush with and forms a continuation of the cam-track. The door passes beyond the roller just as the curved concentric rack 69 and the pinion 80 engage. The roller 77 then being released from the door, which at the moment falls downward from the pinion 80, is rotated by the rack 69, and the shaft 79 is consequently rotated, and the discharge-arms on said shaft are caused to throw the completed bundle out of the machine. When the door falls back, it permits the arm 78 to rotate with the shaft 79, the roller 77 passing between the stop-lug 67 and the open door 66. During the tying and discharging of the bundle the inclined portion 178 of the track 118 is depressed, so that no grain may be brought over the incline of the platform to interfere with the operation; but when the pinion 80 has completed its rotation the pitman 184 and arm 183, by means of the link-rod 195, cause the arm 190 of the lever 189 to impinge against the stop 202, stopping the rotation of the

wheel 55. The inclined track 178 is at this time raised, and the rakes carry over the grain, as also described, until the weight thereof is sufficient to turn outward the compressor-arms, and by rotating the shaft 79 raise the arm 78, a pin 235 on which, striking against the depending arm 236 of the lever 189, raises the arm 190 of said lever out of engagement with the arm 202, and again allows the wheel 55 to rotate and act as before. The needle-arm or binder-arm and binder-arm shaft are operated at the proper time by means of the arm 183, the pitman 184, and the eccentric on the wheel 55. The parts are arranged so that the butting-board is operated by means of the crank-shaft 130 from the driving-shaft 46. The disk 142 is rotated by the shaft 56, and when the rack 144 meshes with the pinion 145 the tying-bill 146 or knotter is caused to make one complete rotation. The flange 143 of the disk 142 is cut away adjacent to the teeth of the rack 144, and the base of the pinion 145 is cut away on one side below the teeth for a suitable distance. When the pinion is opposite the flange 143, this cut-away portion of the base is adjacent to the flange, so that the latter can pass through said cut-away portion and the rotation of the wheel 142 will not be interfered with. After the rack 144 meshes with the pinion and turns it one complete rotation the cut-away portion of the latter is in position for the opposite end of the flange to enter therein. The binder-arm passes the cord up and through one of the notches in the wheel 136. The rock-shaft 150 is then partially rotated by the cam-groove 148, as described, and by means of the rack 153 and the teeth on the concavo-convex disk 138 turns said disk, while by means of the pawl $138^{\times}$ and the ratchet $134^{\times}$ it turns the wheel 136 and binds the cord in the said notch against a suitable holding-shoe on the breast-plate. The reverse motion of the disk 138 causes the knife 139 to cut the loop previously formed and surrounding the gavel from the spool portion running to the needle. As the binder-arm is retracted, the cord, directed by the plate 160 and the edge of the projection 156, is laid over the jaws of the knotter, the ends of which jaws are oppositely rounded to allow the cord to pass. The cord below the knotter is then pressed downward toward the compressor-arms by the grain descending to form the gavel, and is lifted on the inner side of the gavel by the binder-arm again rising. In the meantime the descending cord has been slipped into the notch 157, and when the binder-arm rises the ascending cord also passes through said notch and over the jaws of the knotter. The knotter is then rotated, as described, and the two cords wound thereon and the crossed ends forced between the jaws of the knotter. The bound bundle which is now being forced out draws the loop around the jaws tight, the cord is cut, and the ejector-arms in forcing the bundle out draw the loop from the knotter-jaws and complete the knot.

I claim—

1. The combination of the main driving-shaft, the cross-head thereon, the wheel on the binder-shaft having an eccentric-bearing on one side and the cam-track on its opposite side, the angle-lever having the curved long arm secured to the sleeve on the binder-shaft engaging against a clutch-dog at the end of each rotation of the said wheel, the needle-arm shaft having the crank on the end thereof, the pitman connecting said crank and the eccentric-bearing on the wheel on the binder-shaft, the link-rod connected loosely at its lower end to the said crank and passing through an opening in the horizontal arm of the angle-lever, the coiled spring, the nut on said rod above the spring to regulate the tension of said spring, and the bearing-nut below the arm 190 to limit its downward adjustment, substantially as specified.

2. A harvester-frame having its grain-platform extending laterally between the main drive-wheel below the level of its top and the shaft-connections, and counterbalanced in rear of said main drive-wheel by a rear extension of said frame carrying a metallic boxing for the gearing of the main drive-shaft, substantially as specified.

3. An L-shaped harvester-frame having its transverse axial line of support in rear of and parallel to a grain-platform below the level of the top of the driving-wheel, a counterbalancing extension in rear of the main drive-wheel, and a supporting-wheel forward of the platform, substantially as specified.

4. The combination of the grain-platform composed of the longitudinal slats from the grain end to the binder-table and rising over the main driving-shaft to connect with the binder-table, the endless carrier extending under the entire length of the grain-platform and provided with rakes consisting of transverse oscillating bars having teeth secured thereon, the carrier-guide having a hinged rising portion under the rising portion of the platform, which hinged portion adjacent to the hinge is curved downward slightly, and mechanism, as described, whereby the said hinged portion is lowered when the binding mechanism is in operation and when the said mechanism comes to rest, substantially as specified.

5. The combination, with the grain-platform having the upwardly-inclined portion adjoining the binder-table, the carrier-guide having a hinged inclined portion under the inclined portion of the binder-table, and the endless chain-carrier extending under the entire platform, and provided with the rakes composed of angular teeth and transverse oscillating bars, of the sliding packer-arm 173, the part 175, pivoted thereto and having the downwardly-projecting arm or finger 176 and the centrally-pivoted lever 174, having the end of its upper

arm pivoted to the packer-arm, substantially as specified.

6. The combination of the lever pivoted on the axle of the drive-wheel, the support composed of two diverging arms pivoted at their junction on the lever rising from the drive-wheel axle, the reel-shaft journaled in the outer ends of said diverging arms, the metal rod slide-bearing secured to the outer side of said support, the crank-rod 39, engaging said bearing and journaled on the frame of the machine, the lever pivoted on the main frame, and the link-rod connecting said lever and the crank-rod 39, substantially as specified.

7. The combination, with the binder-shaft and the wheel 142 thereon, provided with the segmental rack 144 on one side and on the other side with the hub provided with a circumferential cam-groove 148, which cam-groove extends into the adjacent face of the wheel 142 for nearly half of its length, of the double-jawed knotter, the pinion on the knotter-shaft to engage the segmental rack and rock-shaft 150, having an anti-friction roller on its upper end above its curved portion, the toothed segment 153 on the lower end of the rock-shaft, the cord-guide 160 on the rock-shaft 150, and the tucker and stripper 154, provided with the flat curved arms 155 and 156, as and for the purpose specified.

8. The combination, with the crank-shaft 46, the sprocket-wheel 53, provided with a sleeve on said shaft 46, the cross-head 211, provided with the similar opposite bearing-lugs, the dog 202, pivoted near its base to the sprocket-wheel and on the inner side thereof and having the concave base 203 to fit upon said sleeve, the cut-away portion 207, the upper flat end of said dog extending forward a distance a little greater than the thickness of its base, and the curved spring 204, acting on said dog, of the angle-lever provided with a sleeve pivoted on the main driving-shaft, the trip-pin 235 on the arm 78 of the shaft 79, the needle-arm crank-shaft, and the link-rod connecting the crank thereon with the longer arm of the angle-lever, substantially as specified.

9. The combination, with the main driving-shaft, the scroll cam-wheel provided with the pivoted gate, the angle-lever 189, journaled at its angle on the main driving-shaft, the shaft 79, the pinion 80, the arm 78, having an anti-friction roller at its end, and the trip-pin 235 on said arm, of the needle-arm crank-shaft, the crank-shaft 177, the movable portion of the guide-track connected to the shaft 177, the link-rod connecting the cranks of the needle-arm shaft and shaft 177, the shaft 46, the sleeved sprocket-wheel 53, the cross-head provided with the bearing-lugs, the dog pivoted on the sprocket-wheel, and the spring attached to said dog, substantially as specified.

10. The combination, with the main driving-shaft, the compressor-shaft, the compressor and discharge arms thereon, the angle-lever journaled on the main driving-shaft, the gearing connecting the main driving-shaft and compressor-shaft, and the trip-pin 235, of the needle-arm crank-shaft, the crank-shaft 177, the section 178 of guide-track moved by shaft 177, the link-rod connecting the cranks of the needle-arm shaft and shaft 177, the clutch mechanism on shaft 46, and the link-rod connecting the crank of the needle-arm shaft with the longer arm of the angle-lever 189, substantially as specified.

11. The combinatian of the shaft 46, the double-armed lever 174, journaled about centrally thereon, the packer or feeder arm 173, pivoted to the upper end of said lever near its outer end, the piece 176, secured to the inner end of arm 173, the inclined longitudinally-slotted track 555, the endless chain-carrier provided at suitable intervals with the transverse rakes, and the mechanism, constructed substantially as described, whereby said rakes are operated, as specified.

12. The combination of the grain-platform, having the inclined rise adjacent to the binder-table, the hood extending over said rise, the curved compressor $220^{\times}$, secured to the hood at its center, having one end resting on the incline and its opposite end bent to pass through an opening in the breast-plate, the compressors 221 and 222, secured to the hood, having their bend downward and inward and running upward slightly above the rise of the grain-platform, and the endless carrier provided with the transverse rakes, having teeth which carry up the grain below the said compressor-rods, said rods evening and distributing the ascending grain, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN J. DEWEY.

Witnesses:
LOUIS M. HASTINGS,
JNO. S. PRINCE, Jr.