

(No Model.)

5 Sheets—Sheet 1.

W. S. SHAKEL.

SHOCK FORMING ATTACHMENT FOR HARVESTERS AND BINDERS.

No. 559,819.

Patented May 12, 1896.

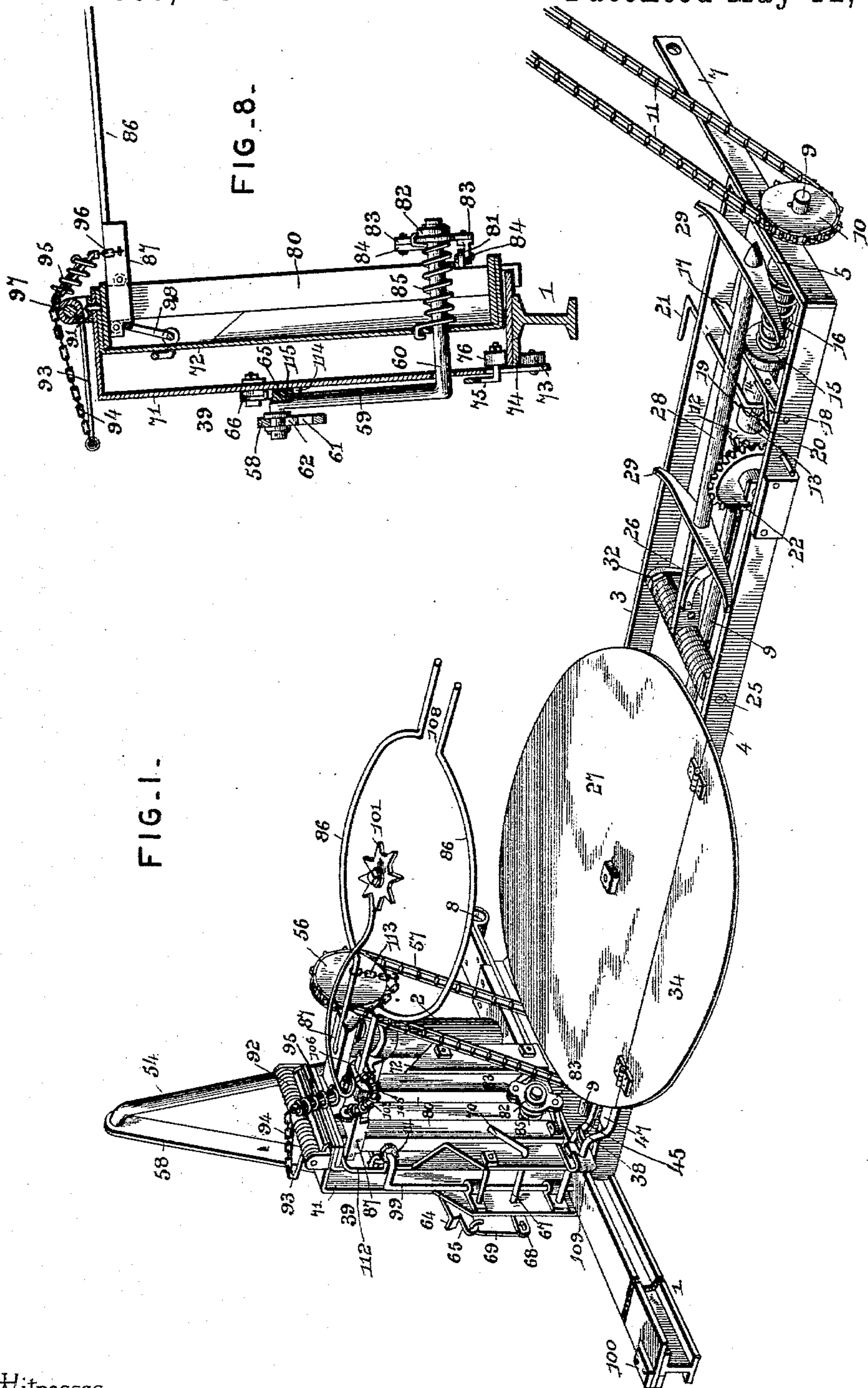


FIG. 1.

FIG. 8.

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FIG. 3.

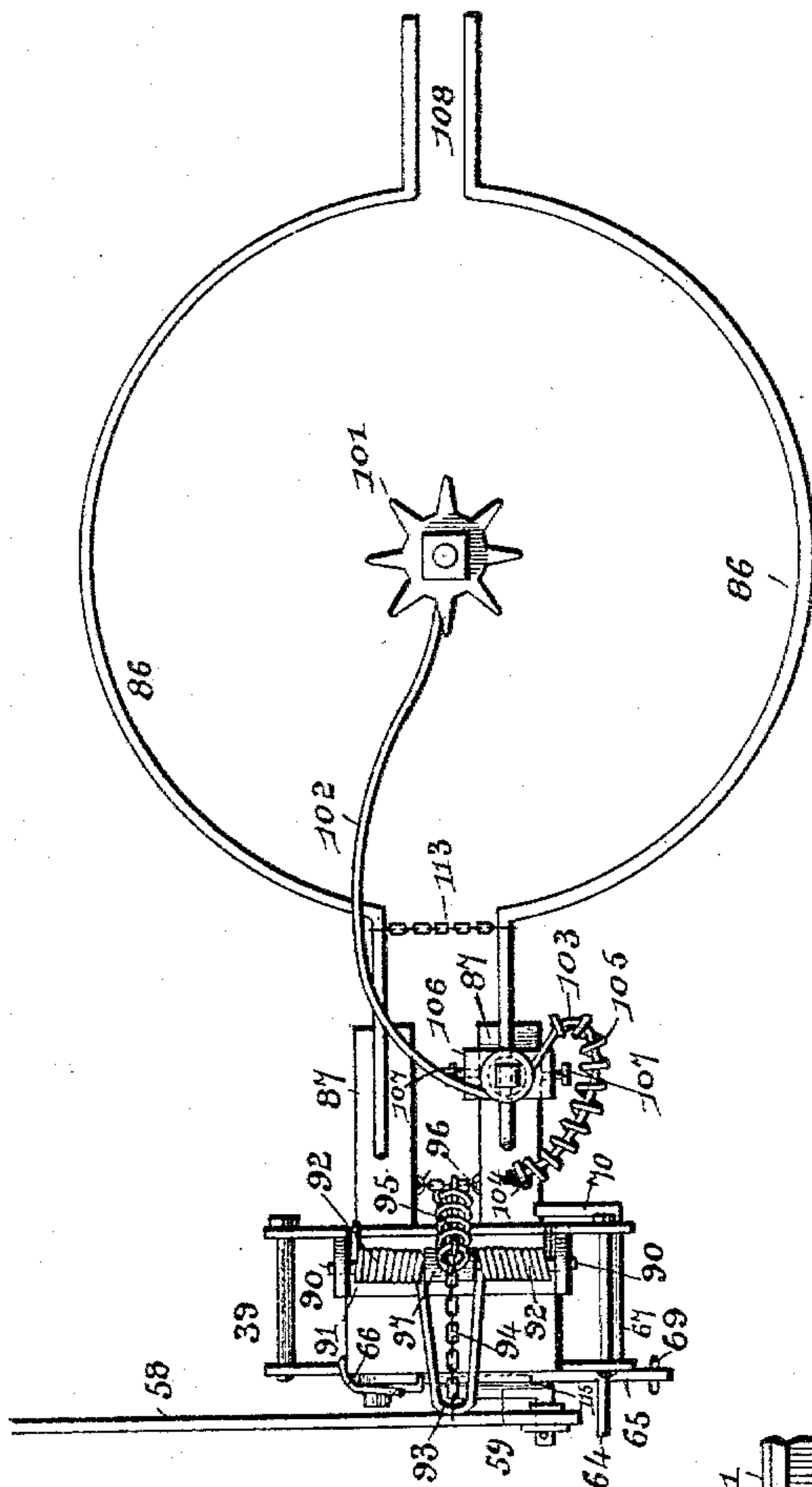


FIG. 4.

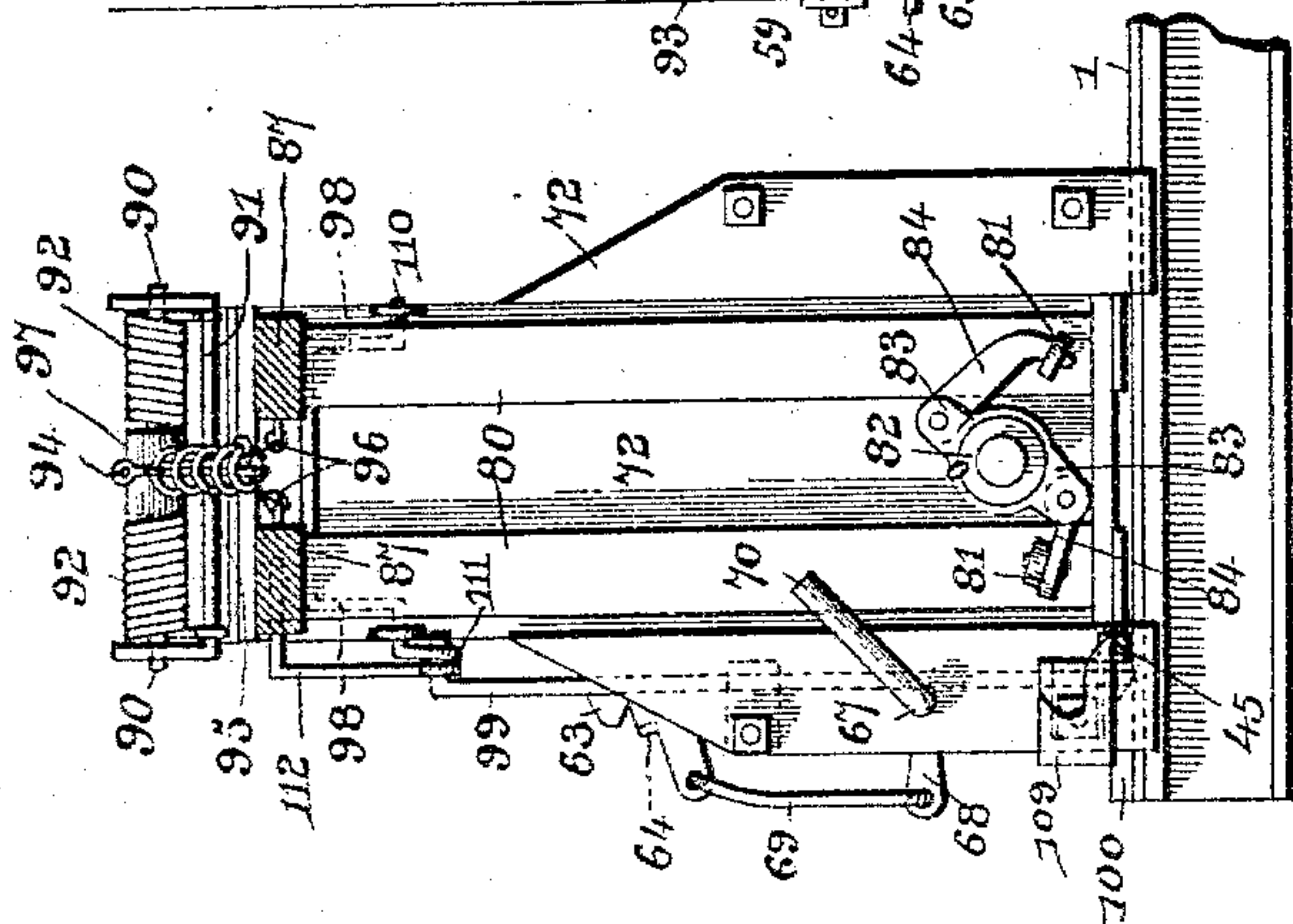
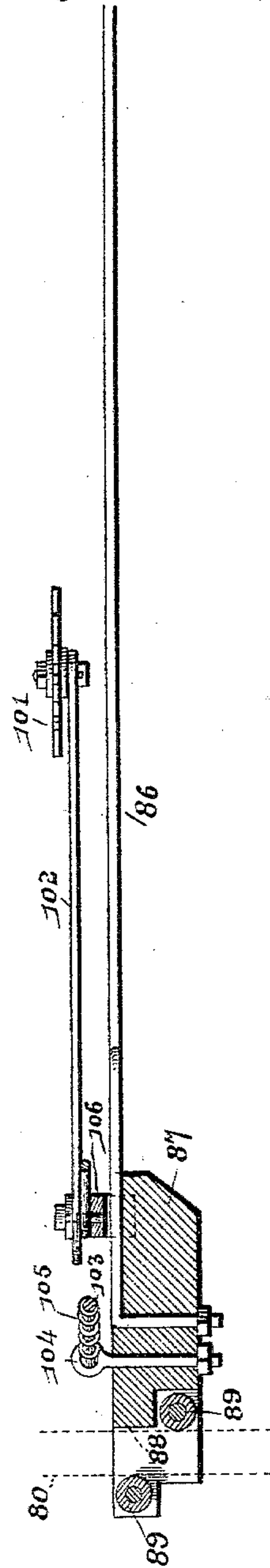


FIG. 9.



(No Model.)

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FIG. 5.

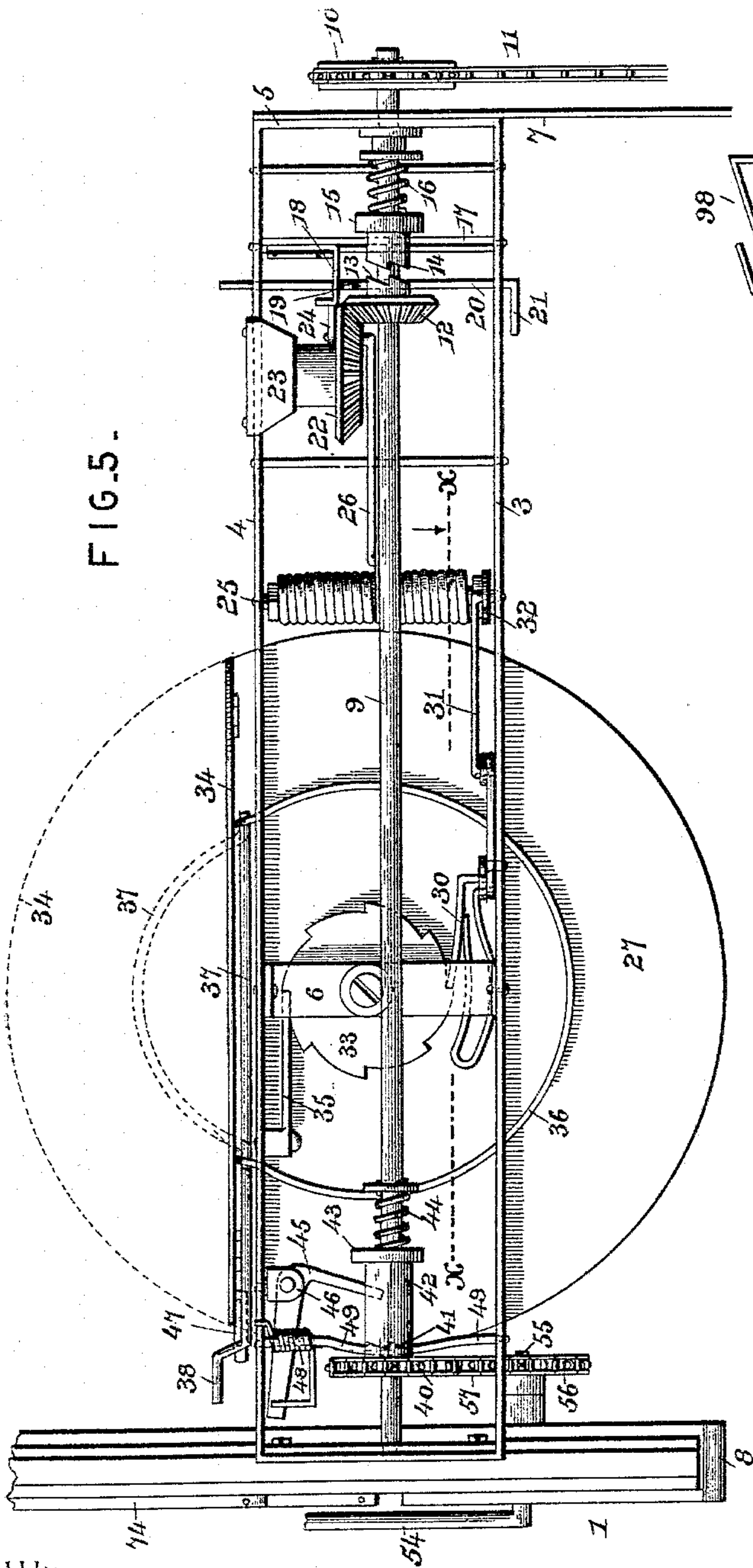


FIG. 6.

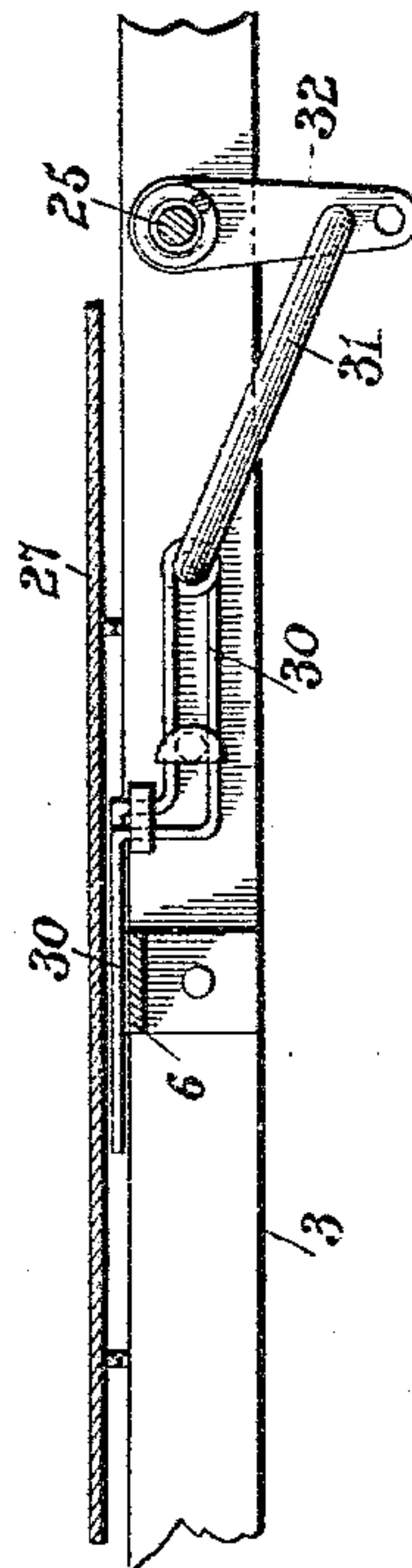
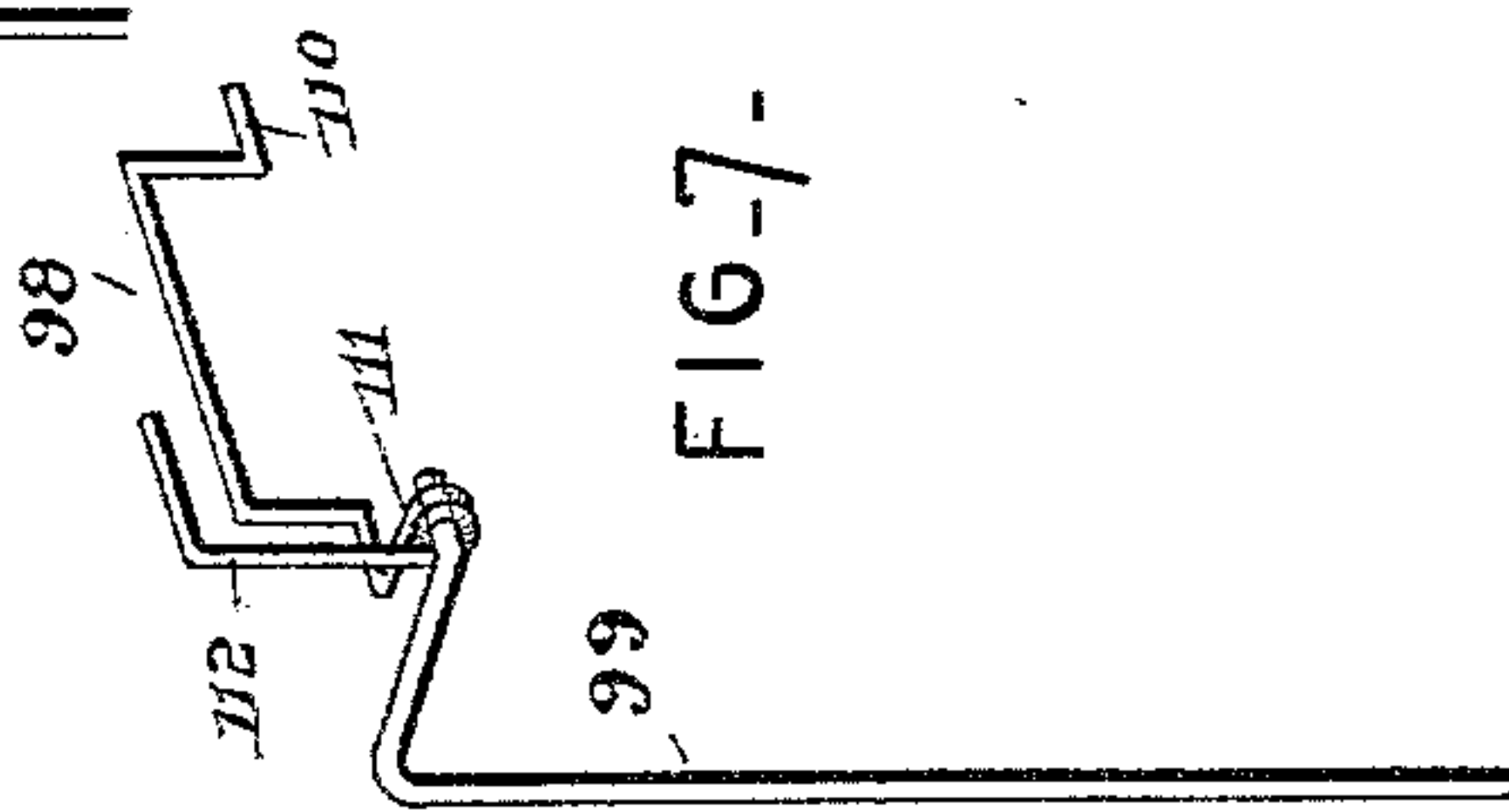


FIG. 7.



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5 Sheets—Sheet 5.

W. S. SHAKEL.

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FIG. 10.

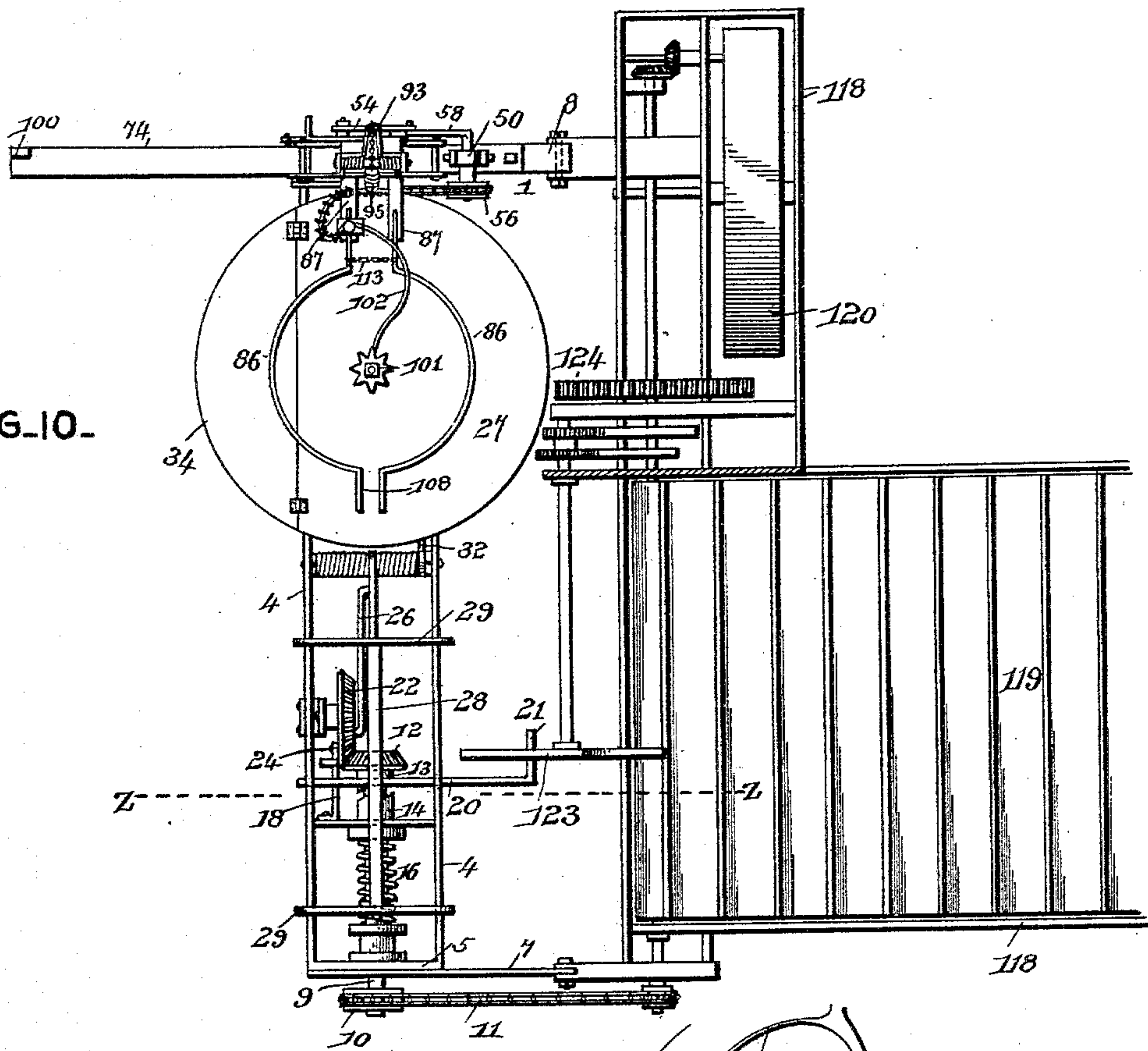
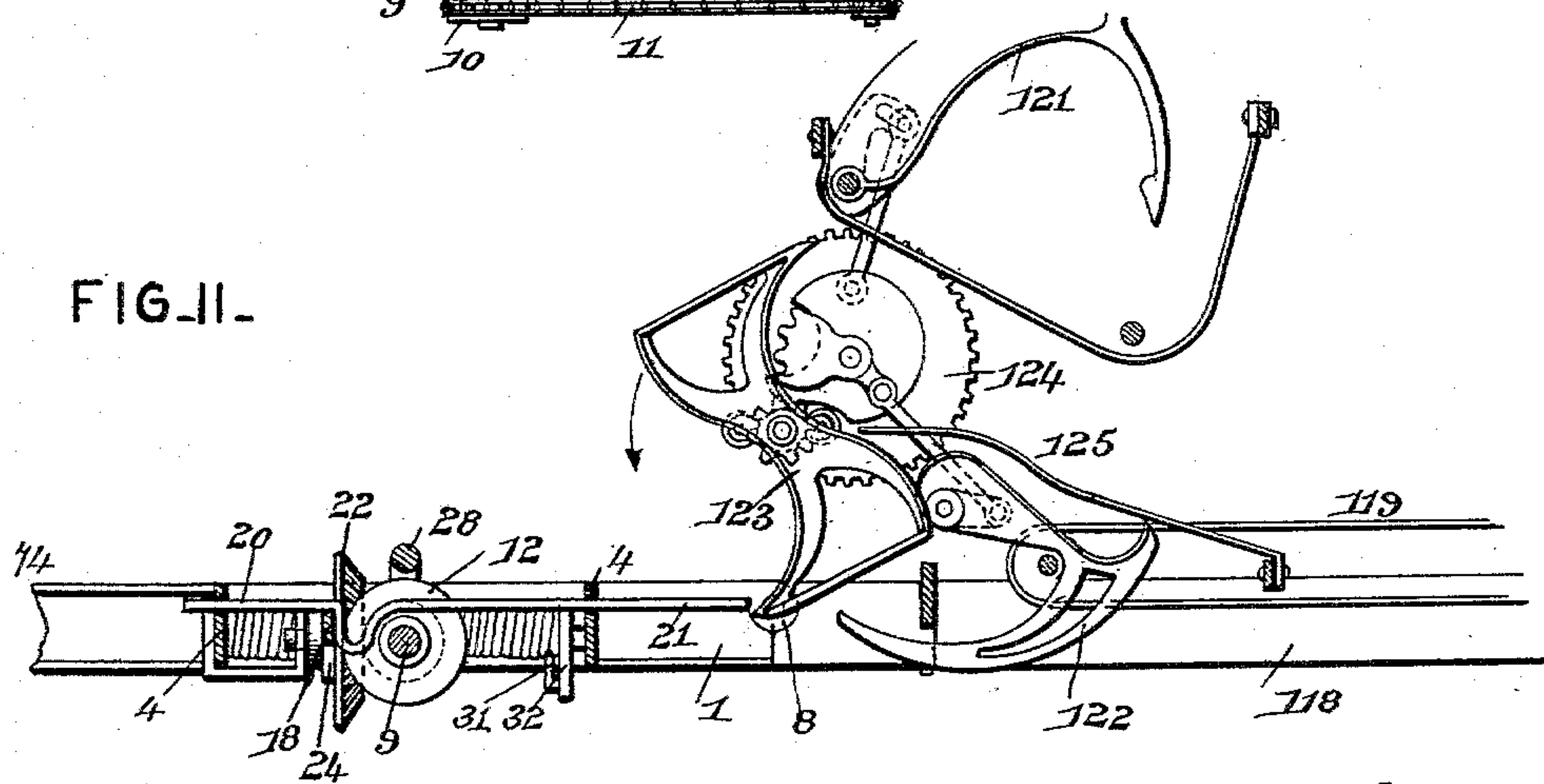


FIG. 11.



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# UNITED STATES PATENT OFFICE.

WILLIAM S. SHAKEL, OF METAMORA, INDIANA.

SHOCK-FORMING ATTACHMENT FOR HARVESTERS AND BINDERS.

SPECIFICATION forming part of Letters Patent No. 559,819, dated May 12, 1896.

Application filed April 19, 1895. Serial No. 546,387. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM S. SHAKEL, a citizen of the United States, residing at Metamora, in the county of Franklin and State of Indiana, have invented a new and useful Shock-Forming Attachment for Harvester-Binders, of which the following is a specification.

The purpose of the present invention is to equip grain-binders with a mechanism for automatically forming the sheaves or bunches into shocks and depositing the latter squarely upon the ground.

A further purpose of the invention is to provide an attachment that can be readily applied to the various styles of harvester-binders and which will be compact in its structural arrangement and perform the desired work in an efficient and satisfactory manner and which in its organization will comprise a rotatable shock-forming table upon which the sheaves or gavels are placed in an upright position, one at a time, until a sufficient number are in position to form a shock, when the latter is automatically grasped by arms, lifted from the table, and carried to a point at the side of the machine and deposited on the ground.

With these and such other objects in view as belong to the nature of the invention the latter consists of the novel features and the peculiar construction and combination of the parts, which hereinafter will be more fully described and claimed and which are shown in the accompanying drawings, in which—

Figure 1 is a perspective view of the shock-forming attachment. Fig. 2 is an end view, looking from the front, having the carrier, the latter being shown about to return from the limit of its outward movement. Fig. 3 is a top plan view of the carrier. Fig. 4 is a side elevation of the carrier as seen from the remote side of Fig. 2. Fig. 5 is a bottom plan view of the invention, a portion of the crank-arm and the track being broken away. Fig. 6 is a section on the line X X of Fig. 5, looking in the direction of the arrow, showing the mechanism for actuating the shock-forming table. Fig. 7 is a detail view of the catches for supporting the gripping-arms and the means for releasing the same to permit the descent of the shock upon the ground.

Fig. 8 is a section on the line Y Y of Fig. 2, looking in the direction of the arrow. Fig. 9 is a side elevation of a gripping-arm, showing its supporting-head in longitudinal section. Fig. 10 is a plan view showing the shock-forming attachment applied to the frame of a low-down binder. Fig. 11 is a detail section on the line Z Z of Fig. 10 on a larger scale, some of the parts being broken away and others omitted.

The framework of the machine comprises a track 1, having a post or standard 2 near its front end, parallel bars 3 and 4, an end bar 5, a cross-bar 6, and a bar 7, secured to the end bar 5 and adapted to be pivotally connected at its side with the framework of the harvester to which the attachment is to be applied. A clip 8, located at the inner end of the track 1, is designed to form pivotal connection between the track 1 and the said framework of the harvesting-machine having the attachment applied thereto. A shaft 9 extends parallel with the bars 3 and 4 and is journaled near its ends in suitable bearings provided on the end bars connecting the extremities of the parallel bars 3 and 4. A sprocket-wheel 10 is mounted upon the end of the shaft 9 and receives motion from a convenient part of the harvester-actuating mechanism by means of a sprocket-chain 11. A bevel gear-wheel 12 is mounted on the shaft 9, having the sprocket-wheel 10 in such a manner as to turn loosely on the said shaft, and is provided on one side with a half-clutch 13, which is adapted to engage with a corresponding half-clutch 14 on the opposing end of a sleeve 15, having movement on the shaft 9 to and from the bevel gear-wheel 12, so as to cause the half-clutches 13 and 14 to gear and ungear according as it desired to cause the bevel gear-wheel 12 and shaft 9 to revolve together or admit of the shaft 9 revolving alone. This sleeve 15, while free to move on the shaft 9, is keyed thereto, so that the shaft and sleeve will revolve together. A spring 16 is disposed upon the shaft 9 and exerts a pressure whose normal tendency is to advance the sleeve toward the bevel gear-wheel 12 and bring the half-clutches 13 and 14 into engagement. A cross-bar 17 is eccentrically journaled at its ends in the parallel bars 3 and 4, and its middle portion engages with an



annular shoulder of the sleeve 15. A spring-arm 18 projects about at right angles from the cross-bar 17 and is engaged by a crank portion 19 of a rod 20, journaled in the bars 3 and 4, parallel with the cross-bar 17. The inner end of the rod 20 may be of any shape, and, as shown, is bent at approximately right angles to form an arm 21, which is adapted to be engaged by the ejector of the harvester-binder and move the rod 20 longitudinally when it is required to gear the bevel gear-wheel 12 to the shaft 9. This arm 21 is not essential and may be dispensed with, and is provided only as a convenient means for the ejector to engage with. A bevel gear-wheel 22 is journaled to a bracket 23 on the bar 4, and is in mesh with the bevel gear-wheel 12 and receives motion therefrom. A trip 24 is provided on the side of the bevel gear-wheel 22, and is adapted to engage with the arm 18 and turn the cross-bar 17 in its bearings and move the sleeve 15, so as to throw the half-clutches 13 and 14 out of gear and permit the rotation of the shaft 9 without imparting a corresponding movement to the bevel gear-wheel 12. A bundle-elevator 25 is journaled at one end in the bars 3 and 4 and is connected by means of a pitman 26 with the bevel gear-wheel 22, so that in the operation of the latter the said bundle-elevator will be raised and lowered to deposit the bundles or sheaves in a standing position upon the shock-forming platform or table 27. This bundle-elevator comprises a central support 28 and cross-arms 29, the latter curving or being slightly depressed between their ends on the upper edges, so as to retain the bundles or sheaves in place when the bundle-elevator is depositing them in a standing position upon the shock-forming table 27. A sliding pawl 30 is connected by a link 31 to an arm 32 on the journaled end of the bundle-elevator 25 and is adapted to engage with a ratchet-wheel on the under side of the shock-forming table 27. The parts are so disposed that when the bundle-elevator 25 is rising the pawl 30 is returning to a position to engage with a tooth of the ratchet-wheel 33, and when the bundle-elevator is lowering the pawl 30 is advancing and moving the ratchet-wheel a distance of one tooth, so as to bring an unobstructed portion of the shock-forming table opposite the bundle-elevator to receive the next sheaf to be deposited thereon.

The shock-forming table 27 is circular in outline and is rotatably mounted upon the cross-bar 6 and has a drop portion 34, which is attached to the body of the table by a hinge connection in any desired manner. The ratchet-wheel 33 is secured centrally to the under side of the shock-forming table, and its teeth are spaced a sufficient distance apart to make room for a sheaf in the rotation of the table, so that after each sheaf or bundle has been deposited upon the table the latter will move forward the proper distance to bring an unobstructed portion in position to

receive the next bundle. A detent-pawl 35 is pivoted at one end to the bar 4 and engages with the teeth of the ratchet-wheel 33 and prevents the table from turning back after it has been advanced by the action of the pawl 30. A supporting-ring 36 is placed upon the bars 3 and 4 and gives stability to the shock-forming table. A segment of the ring, as 37, is adapted to drop at the proper time and permit the drop portion 34 of the shock-forming table to lower, so as to provide ample clearance-space for the depositing of the shock upon the ground. This drop-segment 37 is journaled in the intercepted end of the ring 36, and one end portion is projected toward the track 1 and is bent to form a crank-arm 38, which is engaged by a suitable portion of the carrier 39, so as to hold the part or segment 37 in a horizontal position until the carrier starts upon its sideward travel upon the track 1, when the said segment 37 lowers and permits the drop portion 34 of the shock-forming table to lower, so as to prevent interference of the shock-forming table with the free dropping or depositing of the shock upon the ground. By providing the drop portion 34 the track 1 is enabled to be made shorter a distance corresponding to the width of the said drop portion 34. If this drop portion 34 were not provided, the track 1 would necessarily be longer in order to admit of the shock clearing its table when being deposited upon the ground.

On that end of the shaft 9 contiguous to the track 1 is arranged a sprocket-wheel 40, having a half-clutch 41 on one side to engage with a corresponding half-clutch 42 on the opposing end of a sleeve 43, mounted upon the shaft 9, so as to revolve therewith, but free to move to and from the sprocket-wheel 40 to gear and ungear the half-clutches 41 and 42 to cause the sprocket-wheel 40 and the shaft 9 to revolve together when the shock is sufficiently formed to be deposited upon the ground. A spring 44 is placed upon the shaft 9 and exerts a pressure on the sleeve 43, so as to bring the half-clutches 41 and 42 into engagement when the said sleeve 43 is released from the restraining influence of the bell-crank lever 45, which is pivoted at the elbow to a clip 46, having pivotal connection with the bar 4. By this mounting of the bell-crank lever 45 the latter is adapted to have a twofold movement, the one on its pivotal connection with the clip 46 and the other with the clip 46, so as to disengage its forwardly-extending arm from an annular shoulder on the sleeve 43. The end portion of the bell-crank lever 45 extending parallel with the bar 4 projects within the path of a trip 47, attached to the shock-forming table 27, to be engaged thereby when the shock-forming table has completed a revolution, so as to disengage the bell-crank lever 45 from the sleeve 43 and admit of the half-clutches 41 and 42 coming into engagement, so as to cause the shaft 9 and the sprocket-wheel 40 to revolve



as a unit. A spring 48 is mounted upon a cross-rod 49 and has one end in engagement with the frame of the attachment and its other end constructed to press upwardly on the laterally-extending member of the bell-crank lever 45, so as to hold the other member in engagement with the sleeve 43 until released therefrom by means of the trip 47 in the manner just described.

A bearing 50 is journaled upon the inner ends of set-screws 51, which pass laterally through the bifurcated ends 52 of a bar or rod 53, adjustably supported within the post or standard 2. A long crank-lever 54 has its end portion 55 journaled in the bearing 50, and a sprocket-wheel 56 is mounted upon the end portion 55 and receives a sprocket-chain 57, which passes around the sprocket-wheel 40, so as to transmit motion from the latter to the sprocket-wheel 56, by means of which the crank-lever 54 is actuated, so as to move the carrier 39 upon the track 1. A pitman 58 connects the opposite end of the crank-lever 54 with a crank-arm 59, which has its shaft portion 60 journaled in the side pieces of the carrier 39, and which is adapted through suitable mechanism to operate the shock-gripping arms and cause them to embrace the shock. The outer end of the pitman 58 has a longitudinal slot 61, which communicates with a lateral or branch slot 62, which slots unitedly form an L-shaped slot in which operates the connecting portion of the crank-arm 59. A projection 63 extends outwardly from the end of the pitman 58 and is adapted to be engaged by a corresponding projection 64 of a lever 65, pivoted at one end to the side of the carrier 39. A spring 66 is constructed to exert a downward pressure upon the lever 65, so as to hold its projection 64 out of engagement with the projection 63. A shaft 67 is journaled in the side pieces of the carrier, and one bent end 68 is connected by means of a link 69 with the lever 65, and its opposite bent end 70 projects within the path of one of the shock-gripping arms, so as to be engaged thereby when the shock is settling and cause an upward movement of the lever 65 through the link 69 and bring the projection 64 in engagement with the projection 63 and lift the pitman 58 a sufficient distance to disengage the lateral slot 62 from operative engagement with the crank-arm 59, which latter will move in the longitudinal slot 61 and permit the shock-gripping arms to spring apart and release the shock.

The carrier 39 comprises side pieces 71 and 72, which are secured together and braced laterally in any convenient manner. The lower ends of the side pieces are adapted to engage with and embrace the edge portions of the track 1, so as to hold the carrier in place upon the said track. Rollers 73 are provided on the lower portion of the side piece 71 and are adapted to relieve frictional contact in the operation and travel of the carrier upon the track 1. The front edge portion of the track

is thickened or provided with a strip 74, which is engaged by the rollers 73 when the carrier starts upon its outward travel upon the track, so as to cause a slight tipping of the carrier from the perpendicular in a direction away from the shock-forming table, whereby the shock is slightly elevated from its supporting-table, so as not to drag thereon when moving thereover to be discharged at the side of the machine. A lever 75 is pivoted midway of its ends to the lower portion of the side 71, and its ends are bent in opposite directions, the lower end having mounted thereon a roller 76, which is adapted to engage with a stop 77, by means of which the carrier is held upon the track 1 directly opposite the shock-forming table 27, and its upper end is bent outward across the path of the crank-arm 59 to be engaged by the latter at the proper time, so as to disengage the roller 76 from the stop 77 on the track 1 to admit of the outward movement of the carrier on the track to deposit the shock upon the ground. A spring 79 is provided and serves to hold the roller 76 in engagement with the stop 77 until its force is overcome by the movement of the crank-arm 59.

Turn-posts 80 are disposed in vertical and parallel relation, and are journaled at their ends in laterally-extending portions of the carrier-frame. These turn-posts are of such shape in cross-section as to form positive means of engagement with the inner end portions of the shock-gripping arms to cause the latter and the said posts to move in unison when the posts are turned upon their journals. For the sake of simplicity of construction these posts are angular, and the inner end portions of the gripping-arms are of corresponding shape to fit thereon. A lug 81 has pivotal connection with the lower end of each turn-post. A hub 82 is mounted upon the projecting end of the shaft 60, and its oppositely-extending arms 83 are connected by means of links 84 with the said lugs 81, thereby forming positive means of attachment between the shaft 60 and the turn-posts 80, whereby a movement of the said shaft 60 will cause a simultaneous movement of the turn-posts and an opening or closing of the shock-gripping arms, according as the movement of the shaft 60 is to the left or to the right. A coil-spring 85 is connected at one end to the frame of the carrier and at its opposite end to the part 83, and exerts a pressure so as to hold the shock-gripping arms separated during the formation of the shock.

The shock-gripping arms 86 are of similar construction, and are formed from heavy wire or thin rod-steel and have their outer portions oppositely curved, so that when brought together they will form an approximately circular inclosure, and have their shank portions secured to heads 87, which latter are castings and have openings 88 to receive the turn-posts 80. Rollers 89 are disposed at diagonally opposite points within the openings



88, so as to prevent binding of the heads 87 upon the turn-posts 80 in the movements of the said heads 87 upon the turn-posts 80. The heads 87 are adapted to move vertically upon the turn-posts 80, and have a yielding connection with a cross-bar 90, secured at its ends in the vertical portions of a bar 91, pivoted midway of its ends to the top of the carrier-frame 39. A double spring 92 is mounted upon the cross-bar 90, and its outer end portions are bent to engage with the pivoted bar 91, while the middle portion forms an outwardly-extending arm 93, which is connected by means of a short chain 94 with a spring-coupling 95, and the latter being connected in turn with the said heads 87 by means of short chains 96. The spring-coupling 95 may be of any suitable construction to admit of the lengthening and shortening of the chains 94 and 96 when the arms 86 are lowering to deposit the shock upon the ground. The arm 93 will also yield so as to admit of the lowering of the shock, as will be readily understood. A roller 97 is provided on the cross-bar 90 and relieves friction on the chain 94 in the movement of the latter over the said cross-bar 90.

The shock-gripping arms 86 are supported at their highest position upon the turn-posts 80 by means of catches 98, which normally project across the path of the inner ends of the heads 87, so as to come beneath the latter and prevent a descent of the gripping-arms until the carrier reaches the outer end of the track 1. A rod 99 is connected at its upper end with a crank portion of the catches 98, and its lower end is adapted to be engaged by a stop 100 at the outer end of the track 1 for the purpose of withdrawing the catches 98 from beneath the heads 87 when the carrier 39 reaches the end of the track 1, thereby permitting the shock-gripping arms 86 to descend under the weight of the shock embraced thereby.

A star-wheel 101 is journaled on the outer end of an arm 102, and normally occupies a position directly over the center of the shock-forming table 27, and is designed to retain the sheaves or bundles in place during the formation of the shock. This arm 102 is slightly elastic to permit a yielding of the star-wheel from its normal position when subjected to abnormal strain, and its inner end 103 is curved and operates through a guide 104, secured in a head 87. A spring 105 is mounted upon the curved end 103 of the arm and holds the star-wheel in proper position. A slide 106 is mounted upon the head 87, carrying the guide 104, and is held in the located position by a binding-screw 107, which passes through the slide 106 and is adapted to bear against the head 87. The arm 102 is pivotally mounted upon the slide 106, and by moving the latter the tension of the spring 105 can be adjusted so as to cause the star-wheel 101 to sustain a greater or less pressure. In order to insure the passage of the sheaves between the ends

of the shock-gripping arms 86, the extremities of each or both are bent outward toward the bundle-elevator 25, as shown at 108.

As previously intimated, the attachment is designed to be secured to the framework of a harvester-binder of any desired make by pivotal connections, so that when the machine is not required for use the attachment can be folded into a compact form. The attachment must be so disposed that the sheaf or bundle after being bound is deposited upon the bundle-elevator 25 at the same time the ejector of the harvester engages with the bent end 21 of the rod 20 to move the latter and release the sleeve 15, which, under the action of the spring 16, brings the half-clutches 13 and 14 into engagement and causes the bevel gear-wheel 12 and the shaft 9 to revolve together, and by means of the mechanism hereinbefore set forth the bundle-elevator 25 is raised to a vertical position and deposits the bundle or sheaf upon the shock-forming table. During this interval the pawl 30 is returning to engage with the next tooth of the ratchet-wheel 33, so that as the bundle-elevator lowers the pawl will engage with the ratchet-wheel and move the latter so as to advance the shock-forming table a distance corresponding to the space occupied by the sheaf or bundle just placed in position and bring an unobstructed portion opposite the bundle-elevator to receive the next sheaf. This operation is repeated until the shock-forming table is filled and has made a complete revolution, when the trip 47 will engage with the projecting end of the bell-crank lever 45 and disengage the latter from the sleeve 43, when the latter will move under the action of the spring 44, so as to bring the half-clutches 41 and 42 in engagement and cause the sprocket-wheel 40 and shaft 9 to revolve together and cause a rotation of the sprocket-wheel 56 by means of the sprocket-chain 57 in the manner described. As the sprocket-wheel 56 begins to turn the crank-lever 54 will operate and move the crank-arm 59, and through the mechanism herein specified will cause the shock-gripping arms 86 to embrace the sides of the shock and grip the latter in a firm embrace. As the crank-arm 59 reaches the limit of its throw it will engage with the upper bent end of the lever 75 and disengage its lower end from the stop 77, thereby releasing the carrier, which will begin its movement upon the track 1. When the carrier begins its outward movement on the track, the rollers 73 will engage with the thickened or stripped portion 74 of the track and cause a canting of the carrier sufficient to lift the shock from its supporting-table to prevent the dragging of the shock thereover, and at the same instant a hook or stop 109, provided on the carrier, will be withdrawn from engagement with the crank-arm 38 of the segment-drop 37 and permit the latter and the portion 34 of the shock-forming table to fall to an approximately vertical position. As the carrier



reaches the limit of its rearward movement upon the track 1 the rod 99 will be engaged by the stop 100, and the catches 98 will be disengaged from the heads 87 of the shock-gripping arms, thereby permitting the latter to descend under the weight of the shock carried thereby. At or about the instant the shock reaches the ground one of the heads 87 will engage with the bent end 70 of the shaft 67, and through the connections herein referred to will cause an upward movement of the rear end of the pitman 58, thereby releasing the crank-arm 59 from the lateral slot 62, whereby the said crank-arm 59 is free to move in the longitudinal slot 61 and will permit the shock-gripping arms 86 to separate under the compression of the shock, so as to release the latter, which will drop upon the ground. The double spring 92 and the spring-coupling 95 will regain themselves and bring the shock-gripping arms back into a normal position upon the turn-posts 80. The sprocket-wheel 56 continuing to revolve will, through the action of the crank-lever 54 and pitman 58, return the carrier 39 to a normal position upon the track, and the hook or stop 109, engaging with the crank-arm 38, will return the drop portion 34 of the shock-forming table to a normal position, and at the same time will engage with the bell-crank lever 45 and throw the sprocket-wheel 40 out of gear, thereby bringing the parts into a normal position for repeating the operation just described.

It must be understood that the shaft 9 is continuously rotated and that the operating parts driven therefrom are thrown into gear at the proper time to attain the desired result.

In providing and adapting the attachment for the various makes of harvester-binders on the market and in use it is obvious that changes in the form, proportion, and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention.

The catches 98 are integrally formed from a single length of wire which has its end portions bent about at right angles and again outward to form journals 110, by means of which the catches are journaled in suitable bearings provided on the carrier-frame. One extremity of the wire is bent outward to form a crank-arm 111, which has attachment with the rod 99. A spring 112 has its upper end constructed to engage with the carrier-frame and its lower end attached to or forming a part of the catches, so as to hold the latter projected across the path of the inner ends of the heads 87 to come beneath the latter and support the shock-gripping arms in an elevated position. This spring 112 is preferably formed as an integral part of the wire from which the catches are formed.

When the bundles are being deposited upon the shock-forming table, the gripping-arms stand apart, and in order to prevent the possibility of a bundle coming between the shank

portions of the said arms a connection or chain 113 is attached at its ends to the respective shank portions of the arms and extends across the space occurring between them and forms practically a continuation of the curved portion of the said arms. This is indicated most clearly in Fig. 3.

After the crank-arm 59 has been actuated to cause the arms 86 to grip the shock and immediately before the carrier 39 starts on its outward journey a shoulder or stop 114 of the lever 65 engages with a corresponding shoulder 115 of the crank-arm 59 and locks the latter against any possible movement which would have a tendency to loosen the grip of the arms 86 upon the shock until the said lever 65 is actuated in the manner set forth, so as to simultaneously release the crank-arm 59 from the lever 65 and the pitman 58.

The rod 20 may have any required shape at its inner end so as to be engaged by an ejector of the harvester, by means of which it receives a longitudinal movement in the supporting-bars 3 and 4, so as to force the spring-arm 18 out of the path of the trip 24, thereby permitting the clutch-sections 13 and 14 to engage and cause a rotation of the gear-wheel 22, by means of which the bundle-carrier is operated. The spring-arm 18, regaining itself, returns the rod 20 into a normal position, so as to be engaged by the ejector when the latter throws a bundle from the harvester upon the bundle-carrier.

In the formation of the shock the bundles will crowd the arm 102 to one side in an opposite direction to the movement of the shock-forming table, thereby making provision for the formation of the shock in the manner set forth.

The spring 85, in addition to its ordinary function of normally holding the gripping-arms 86 separated, serves, when the crank-arm 59 is released, to cause the gripping-arms 86 to separate quickly, so as to permit the instant release of the shock. The spring 48 serves to hold the end of the lever 45 within the path of the trip 47 on the shock-forming table, so that the said lever 45 will be engaged by the trip 47, whereby the desired result is effected.

When the carrier 39 is at the inner end of the track, or in a normal position, the stop 109 will be in engagement with the end of the lever 45 and hold the same against the tension of the spring 44, so as to maintain the clutch-sections 41 and 42 out of engagement, and when the table has made a revolution the trip 47 will engage with the lever 45 and turn the same, with the clip 46, so as to disengage the ends of the said lever 45 from the stop 109 and the sleeve 43, when the spring 44, being released, will regain itself and cause the parts of the clutch to engage. The crank-lever 54 occupies an approximately vertical position when the carrier 39 is in a normal position and the slot 62 of the pitman 58 is



in engagement with the crank-arm 59, so that the moment the clutch-sections 41 and 42 come into engagement the crank-arm 59 will move and effect a gripping of the shock, after which the carrier 39 will begin its outward movement in the manner set forth. A stop 116 limits the outward movement of the crank-arm 59 and sustains the thrust of the pitman 58. After the shock has been deposited the carrier will move inward to its normal position by the continued rotation of the crank-lever 54, the mechanisms being so timed that when the carrier reaches its normal position the stop 109 will have engaged with the lever 45 and disconnected the clutch-sections 41 and 42, and the roller 76 of the lever 75 will have engaged with the stop 77, thereby securing the carrier in its normal position until released in the manner set forth. As soon as the crank-arm is released in the manner set forth it will move backward in the slot 61, and as the pitman makes its return stroke the said crank-arm 59 will be drawn against a stop 117 and move the carrier 39 to a normal position. The parts 54, 58, and 59 are so proportioned and related that the crank-lever 54 makes a complete revolution during an outward and a return movement of the carrier. Under normal conditions the spring-arm 18 extends within the path of the trip 24 and is engaged by the latter so as to hold the parts 13 and 14 out of engagement. The gear-wheel 22, being operatively connected with the sliding pawl 30, which is held in locked relation by means of the ratchet-wheel 33 and the detent 35, will be prevented from turning under the influence of the spring 16 when the clutch-sections 13 and 14 are separated, as will be readily understood.

The attachment is shown applied to a harvester-binder of the low-down type, and in which 118 is the framework, 119 the carrier, 120 the drive-wheel, 121 the binder-arm or needle, 122 the packer, 123 the ejector, and 124 the actuating mechanism for the operating parts. As the ejector rotates it discharges the bundles from the gavel-compartment 125 one at a time upon the bundle-carrier 25, and the advancing curved edges of the ejector-arms coming in contact with the inner end of the rod 20 or its bent end 21 move the said rod 20 and start the shock-forming mechanism, as herein fully explained.

Having thus described the invention, what is claimed as new is—

1. In a shock-forming attachment for harvester-binders, the combination with a rotatable platform, of a bundle-elevator, and mechanism for intermittently and alternately actuating the platform and the bundle-elevator, whereby the bundle or sheaf is raised from a horizontal to a vertical position and set upright upon the said platform during its periods of rest, substantially as set forth.

2. In a shock-forming attachment, the combination of a rotatable platform, a bundle-elevator pivotally supported at one end and

comprising a central support and cross-arms, actuating mechanism for moving the bundle-elevator from a horizontal into a vertical position, and intermediate connections between the bundle-elevator-actuating mechanism and the rotatable platform for moving the latter a distance corresponding to the space occupied by a bundle or sheaf at each complete forward and return movement of the bundle-elevator, substantially as set forth for the purpose described.

3. In a shock-forming attachment, the combination of a platform, a bundle-elevator, a power-driven shaft, a gear-wheel operatively connected with the said shaft and with the bundle-elevator, a clutch mechanism to throw the said gear-wheel in and out of mesh with the shaft, a trip carried by the gear-wheel and adapted to throw and hold the clutch mechanism out of gear, and a trip adapted to be actuated by means of an ejector or other part of the harvester to release the first-mentioned trip, whereby the said clutch mechanism is permitted to mesh, substantially as and for the purpose set forth.

4. In a shock-forming attachment, the combination with a rotatable platform having ratchet-teeth, of a bundle-elevator, actuating mechanism therefor, and a pawl operatively connected with the said bundle-elevator, whereby when the latter returns to a normal position the pawl will be moved and cause an advance movement of the said platform to provide for the reception of the next bundle, or sheaf, substantially as set forth.

5. In a shock-forming attachment for harvester-binders, the combination with the mechanism for assembling the bundles to form the shock, and shock gripping and carrying provisions, of a rotatable shock-forming table, or platform, upon which the sheaves to form the shock are consecutively placed and provided with a drop portion to give clearance for the shock when lowering to the ground, and obviating a long carry of the shock before depositing the same upon the ground, substantially as set forth.

6. In a shock-forming attachment, the combination with a shock-forming table, or platform, having a drop portion and a support to sustain the drop portion of the table in a horizontal position, of a carrier for depositing the shock upon the ground, and a stop provided on the said carrier to engage with the support and hold the latter in a normal position until the carrier moves to deposit the shock, when the said support and drop portion of the shock-forming table will fall, as and for the purpose set forth.

7. In a shock-forming attachment, the combination of a rotatable shock-forming table having a trip, and provided with a drop portion, a carrier provided with shock-supporting devices, actuating mechanism for the carrier thrown into operative relation by means of the trip on the shock-forming table, a support for the drop portion of the shock-form-



ing table, and a stop on the carrier to sustain the said support in a horizontal position, as and for the purpose set forth.

8. In a shock-forming attachment, the combination of parallel posts placed in vertical relation, shock-gripping arms slidably mounted upon the posts to turn therewith and adapted to descend under the weight of the shock when the latter is lowering upon the ground, means for releasing the arms and returning them to a normal position upon the posts after the shock has been deposited upon the ground, a shaft, connections between the shaft and the turn-posts to operate the latter, and a detent mechanism to secure the shaft against turning back until released by the action of the shock just prior to its settling upon the ground, substantially as specified.

9. In a shock-forming attachment, the combination of vertical and parallel turn-posts, shock-gripping arms slidably mounted upon the said posts to turn therewith and adapted to move downward with the shock when the latter is descending by gravity, means for automatically returning the arms to an initial position upon the turn-posts after being relieved of their load, a shaft operating between the turn-posts and having oppositely-extending arms, lugs pivotally connected with the turn-posts, links connecting the said oppositely-extending arms with the pivotal lugs, a detent mechanism to hold the shaft from turning back when the shock is gripped, and a releasing mechanism actuated by the descent of the shock to liberate the said shaft and the shock-gripping arms, substantially as described.

10. In a shock-forming attachment, the combination with a carrier and turn-posts mounted thereon in vertical relation, of shock-gripping arms adapted to move vertically on the turn-posts and turn with the latter, and spring connections for returning the shock-gripping arms to a normal position upon the turn-posts after the shock has been deposited upon the ground, substantially as set forth.

11. In combination in a shock-forming attachment, a track provided with a stop at its rear end, a carrier adapted to travel on the track, and provided with turn-posts, shock-gripping arms adapted to move vertically upon the turn-posts, catches to sustain the shock-gripping arms at their highest position, and a rod having connection with said catches, and adapted to be tripped by the said stop, whereby the shock-gripping arms are released, substantially as set forth.

12. In a shock-forming attachment, the combination of a track, a carrier adapted to travel upon the track, turn-posts, shock-gripping arms adapted to move vertically upon the turn-posts, actuating mechanism for the carrier and the turn-posts, and comprising a pitman having a longitudinal and a branch slot, a crank-arm having a portion operating in the said slots, and a trip mechanism adapted to be released by the descent of the shock-grip-

ping arms to release the latter from the shock, substantially as and for the purpose set forth.

13. In combination in a shock-forming attachment, a carrier, turn-posts mounted on the carrier, shock-gripping arms adapted to move vertically upon the turn-posts, a transverse shaft operatively connected with the turn-posts, and having a crank-arm, a pitman having a longitudinal slot and a branch slot in which a portion of the said crank-arm operates, a lever adapted to engage with the pitman, and a trip operatively connected with the said lever, and actuated by the descent of the shock-gripping arms to release the pitman from the said crank-arm, whereby the latter is adapted to move in the manner set forth and permit the disengagement of the shock-gripping arms from their load, substantially as set forth.

14. In a shock-forming attachment, the combination of a track having a stop, a carrier adapted to travel upon the track, turn-posts mounted upon the carrier and carrying shock-gripping arms, a shaft operatively connected with the turn-posts to cause the gripping of the said arms about the shock, and having a crank-arm, actuating mechanism for the said crank-arm and carrier, and a lever having one end in engagement with the said stop on the track, and having its opposite end projected within the path of the crank-arm to be engaged thereby so as to release the carrier and permit a movement of the latter upon the track, substantially as set forth.

15. In a shock-forming attachment, the combination with a platform, or table, and a track, of a carrier adapted to travel upon the track, and provided with shock gripping and sustaining arms, and constructed to engage with a side portion of the said track, whereby the carrier is caused to tip and lift the shock from its supporting table, or platform, and prevent dragging of the shock thereon, substantially as set forth.

16. In a shock-forming attachment, the combination of vertical and parallel turn-posts, a shaft having oppositely-disposed arms, links connecting the arms with the turn-posts, a recoil-spring mounted upon the shaft and having connection therewith to return it and the turn-posts to a normal position, heads having openings and slidably mounted upon the turn-posts, rollers at diagonally-opposite points of the openings in the heads through which the turn-posts pass, and shock-gripping arms connected with the slidable heads, substantially as and for the purpose set forth.

17. The combination with a rotatable shock-forming table and shock-gripping arms, of a supporting-wheel located over the central point of the table, and having connection with one of the shock-gripping arms, as and for the purpose set forth.

18. The combination of a rotatable shock-forming table, a carrier provided with shock-gripping arms, and a supporting-wheel located about centrally above the table, and having



adjustable connection with one of the shock-gripping arms, substantially as described.

19. In combination, a rotatable shock-forming table, a carrier provided with shock-gripping arms, a slide mounted upon one of the shock-gripping arms, a star-wheel, an arm supporting the star-wheel, and having adjustable connection with one of the shock-gripping arms, and having its inner end curved and operating through a guide, and a spring

mounted upon the curved end portion of the said arm, substantially as described for the purpose set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

WILLIAM S. SHAKEL.

Witnesses:

JOHN J. APPEL,

E. N. MESSICK.