No. 879,850. PATENTED FEB. 25, 1908.

J. BODA.

GRAIN SHOCKER.

APPLICATION FILED JAN. 16, 1907.

9 SHEETS—SHEET 1.

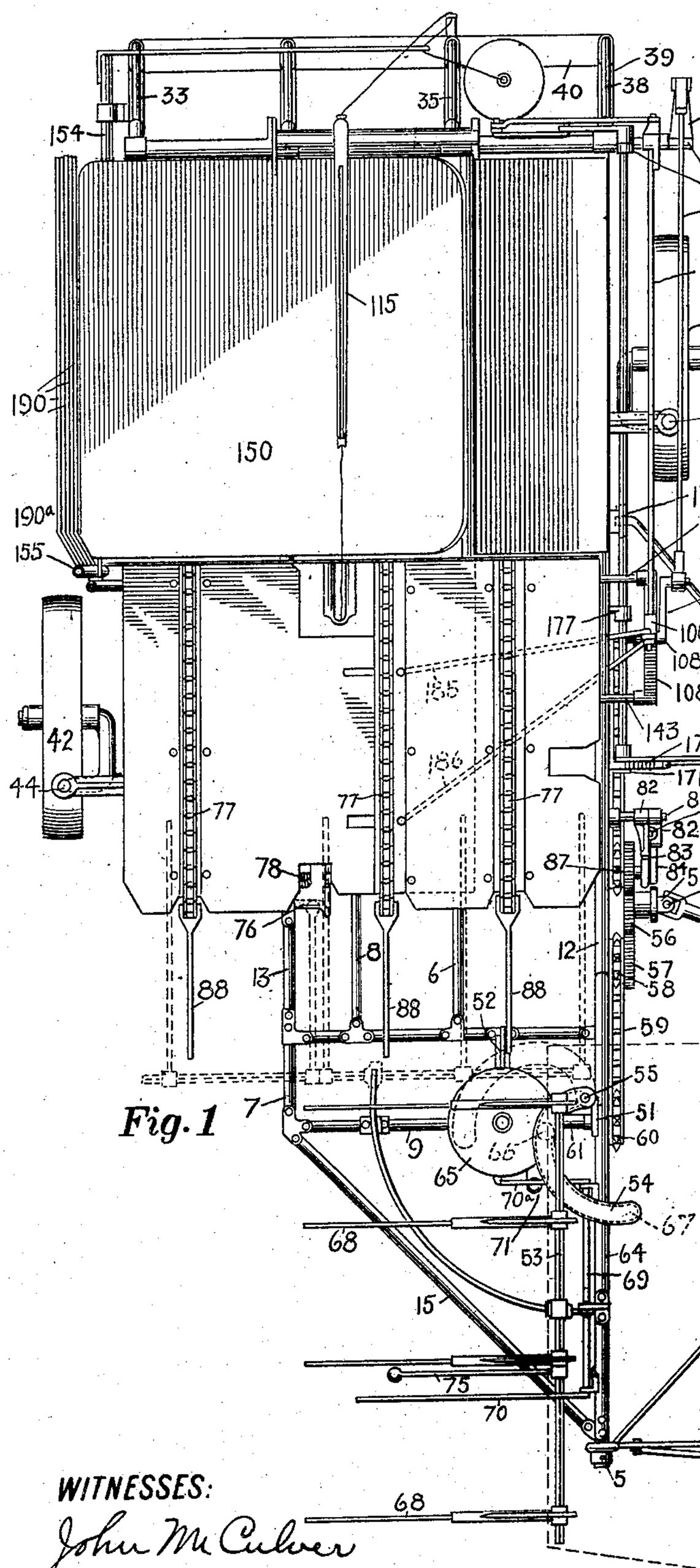

Fig. 1

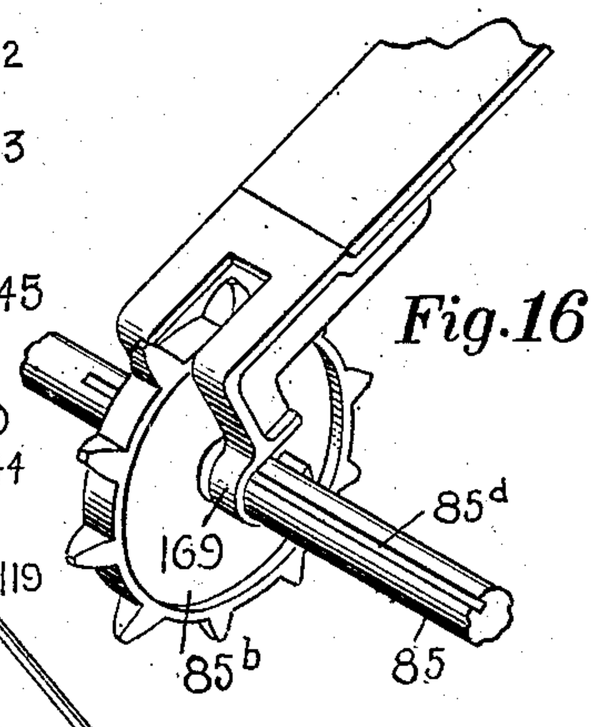

Fig. 16

WITNESSES:

John McCulver

M. Gertrude Ady.

INVENTOR

Joseph Boda

by Burton W. Burton

his attys.

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9 SHEETS—SHEET 2.

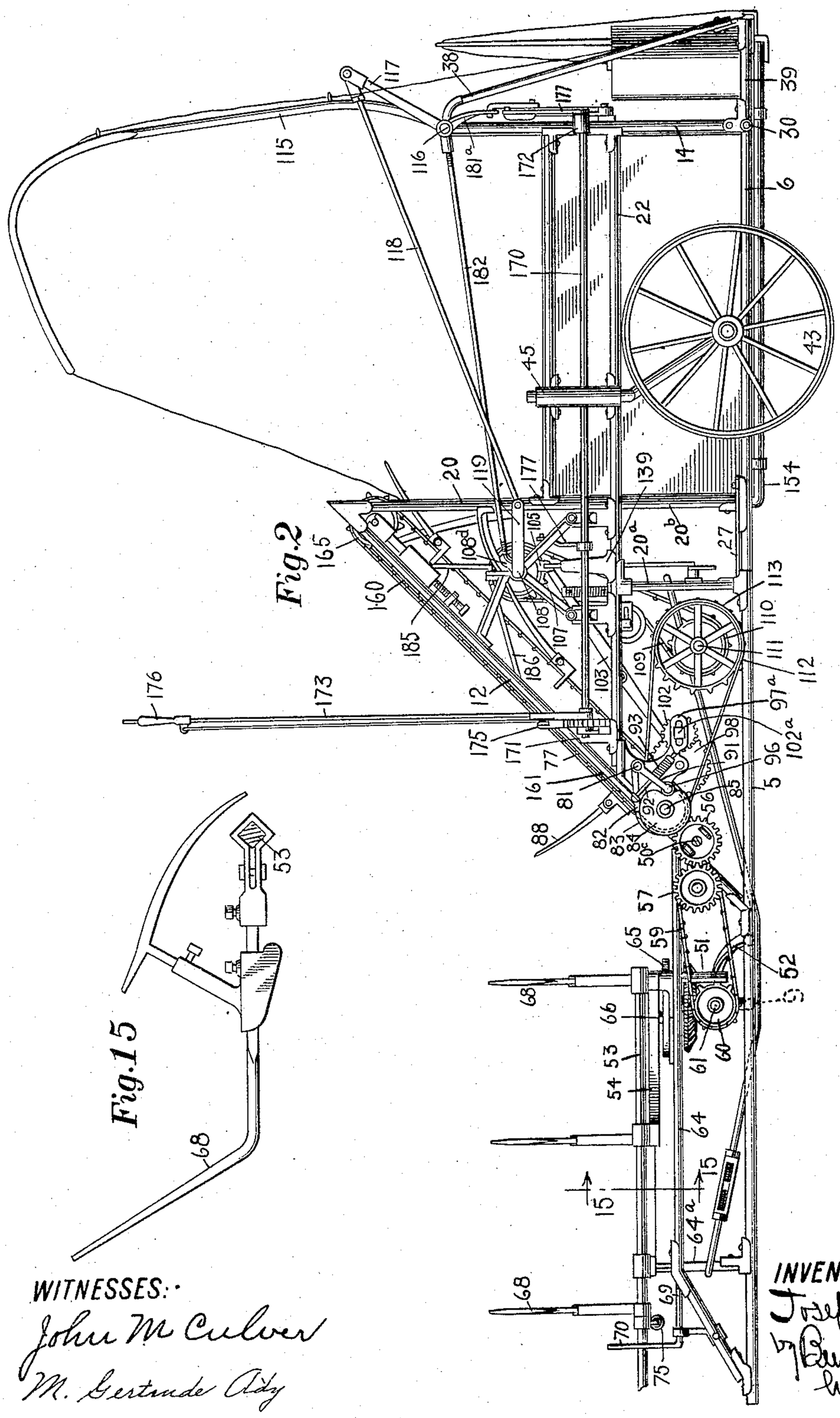

Fig. 2

Fig. 15

WITNESSES:

John M Culver

M. Gertrude Addy

INVENTOR

Joseph Boda

by Burton & Burton

his Attys.

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J. BODA.

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9 SHEETS—SHEET 3.

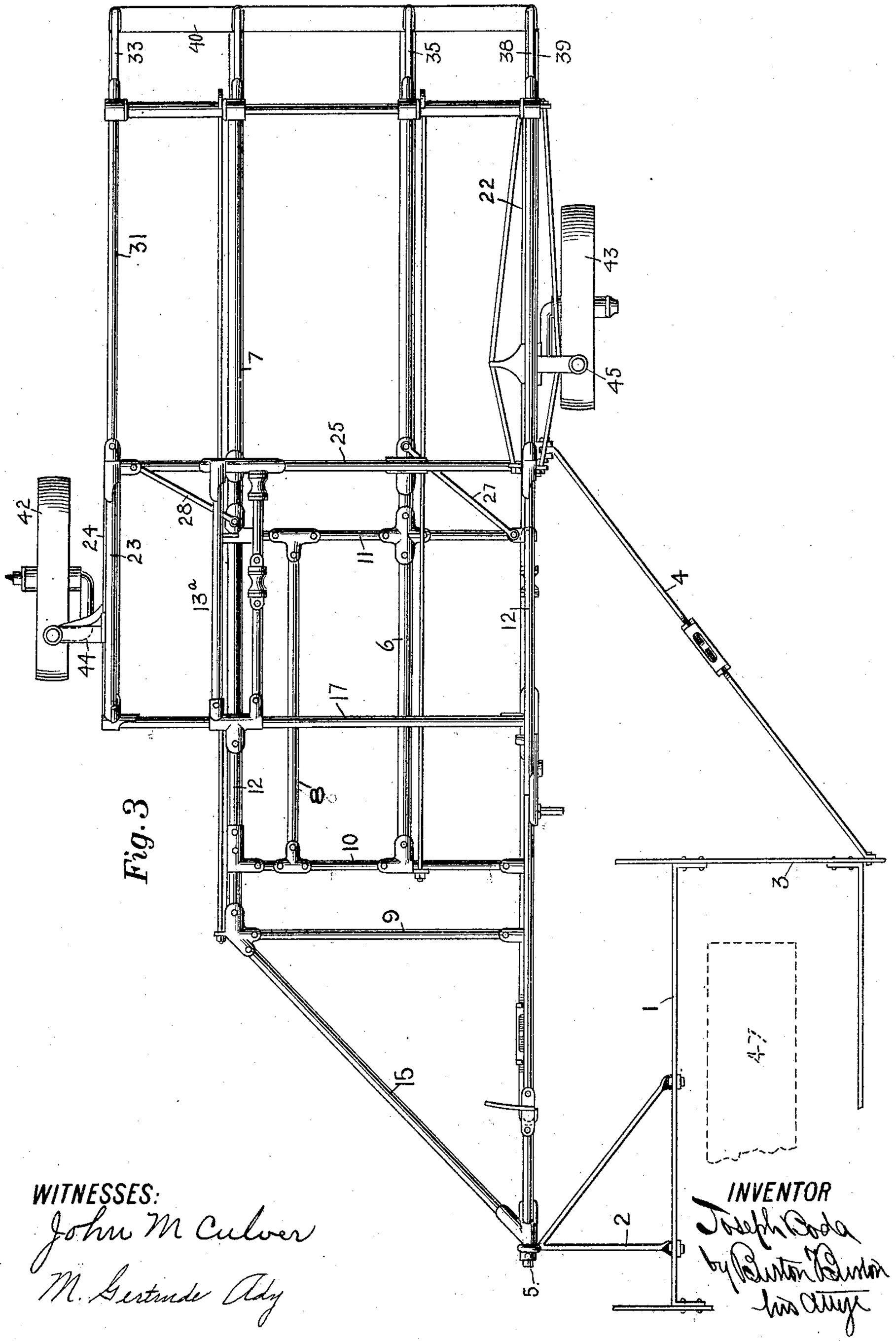

Fig. 3

WITNESSES:
John M Culver
M. Gertrude Ady

INVENTOR
Joseph Boda
by Burton Burton
his Attys

No. 879,850. PATENTED FEB. 25, 1908.

J. BODA.

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9 SHEETS—SHEET 4.

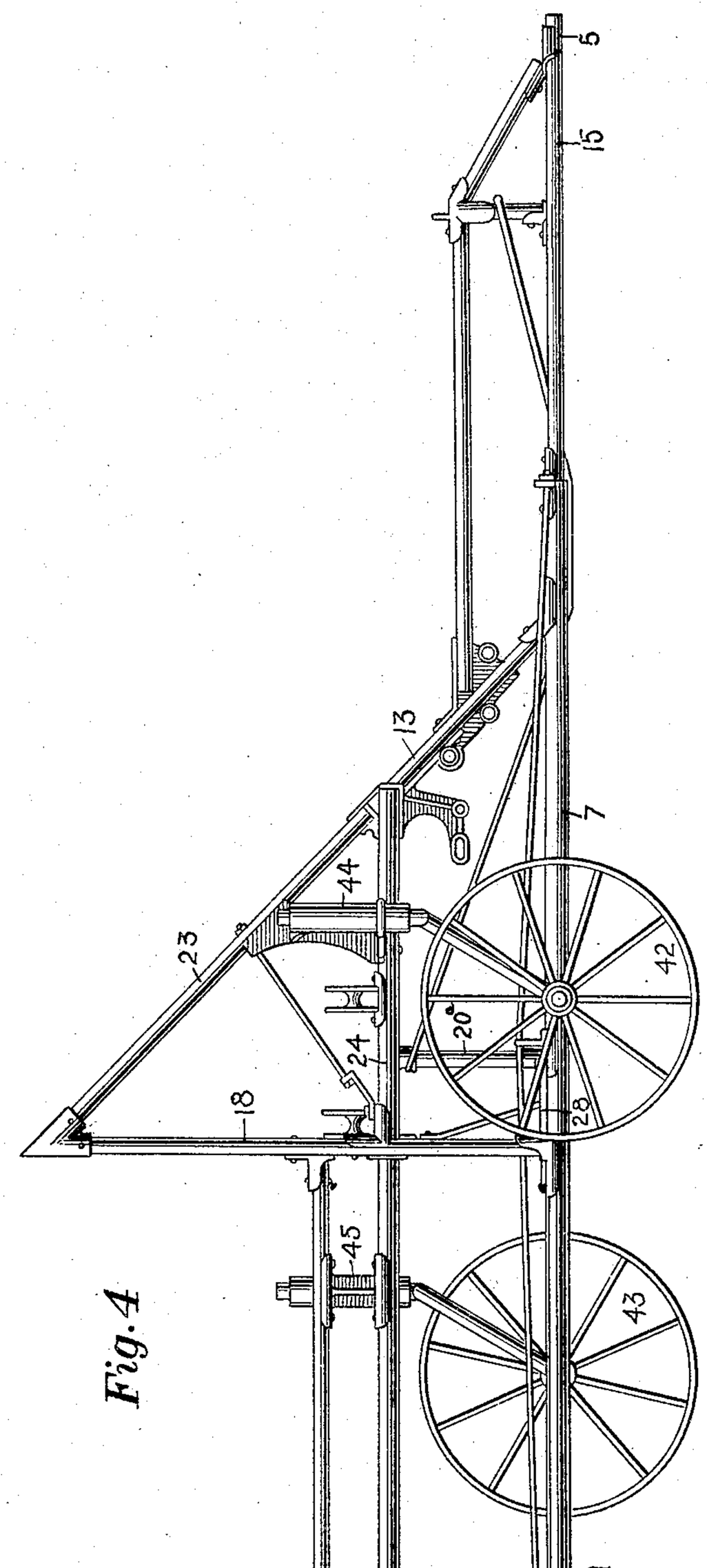

Fig. 4

WITNESSES:

John M Culver

M. Gertrude Ady.

INVENTOR

Joseph Boda

by Burton & Burton

his attys.

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9 SHEETS—SHEET 5.

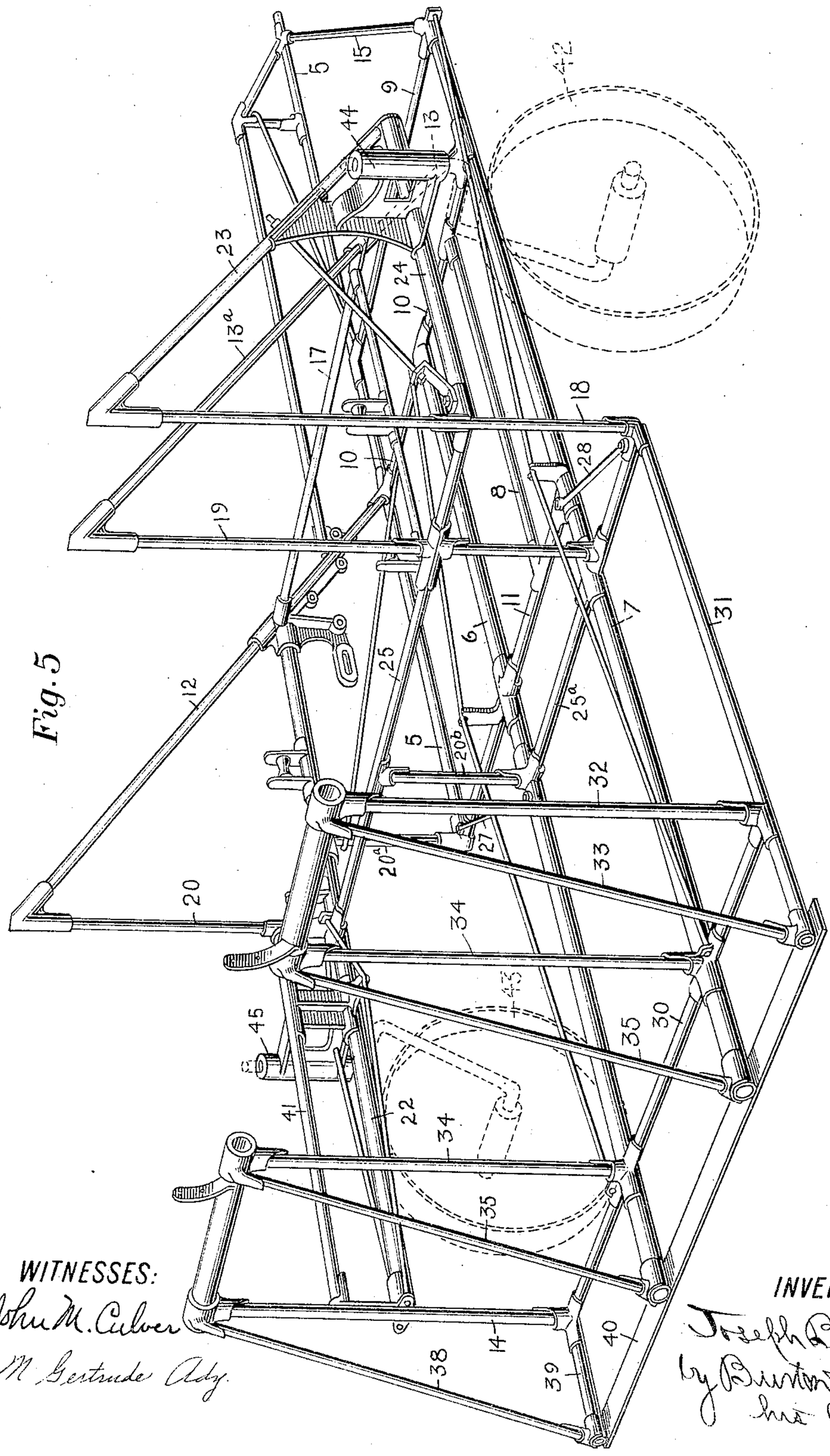

Fig. 5

WITNESSES:

John M. Culver

M. Gertrude Ady.

INVENTOR

Joseph Boda

by Burton & Burton

his Attys.

No. 879,850. PATENTED FEB. 25, 1908.

J. BODA.

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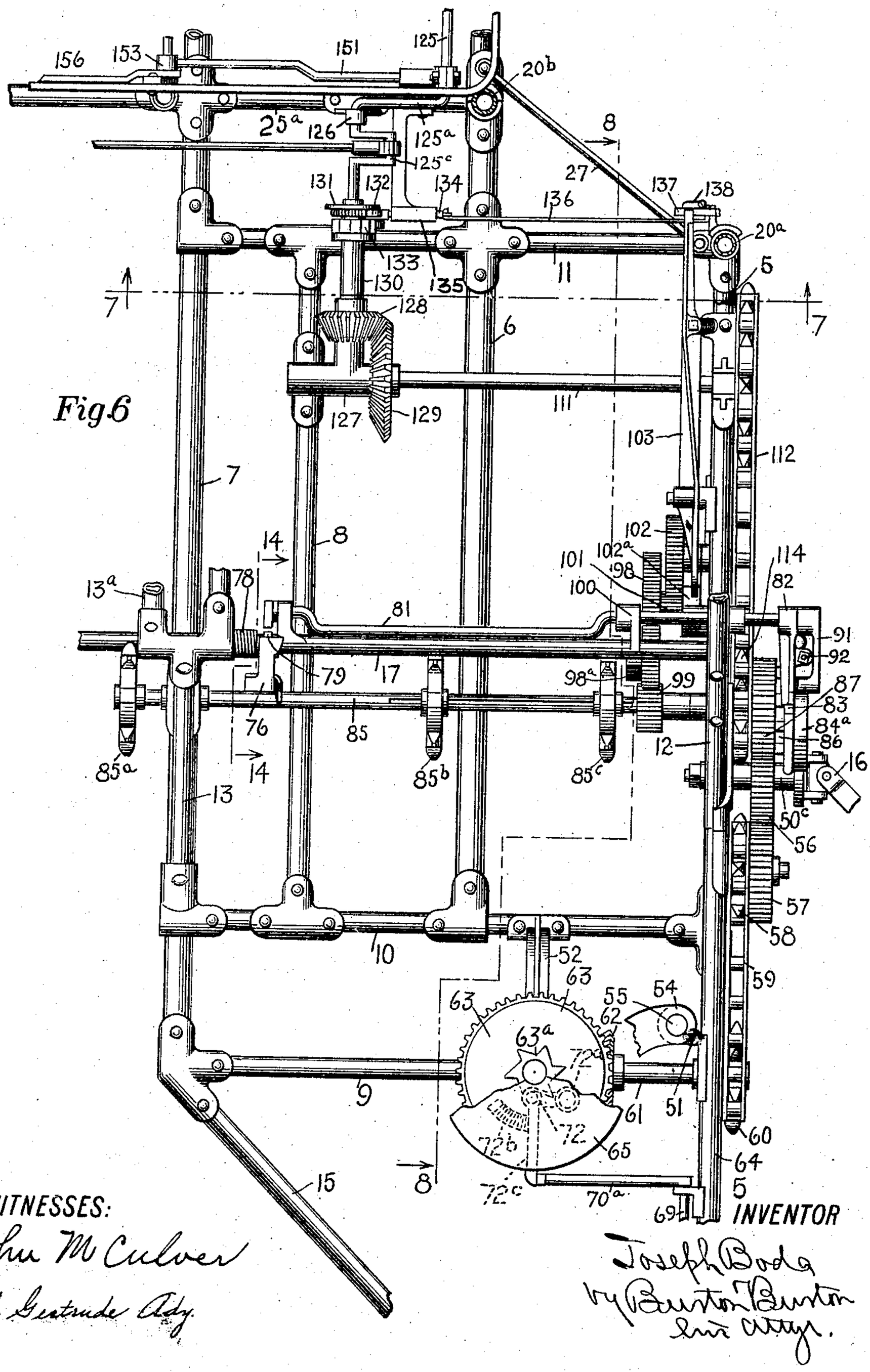
9 SHEETS—SHEET 6.

Fig. 6



WITNESSES:

John M Culver

M. Gertrude Ady.

INVENTOR

Joseph Boda

by Burton Burton

his Attys.

No. 879,850. PATENTED FEB. 25, 1908.

J. BODA.

GRAIN SHOCKER.

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9 SHEETS—SHEET 7.

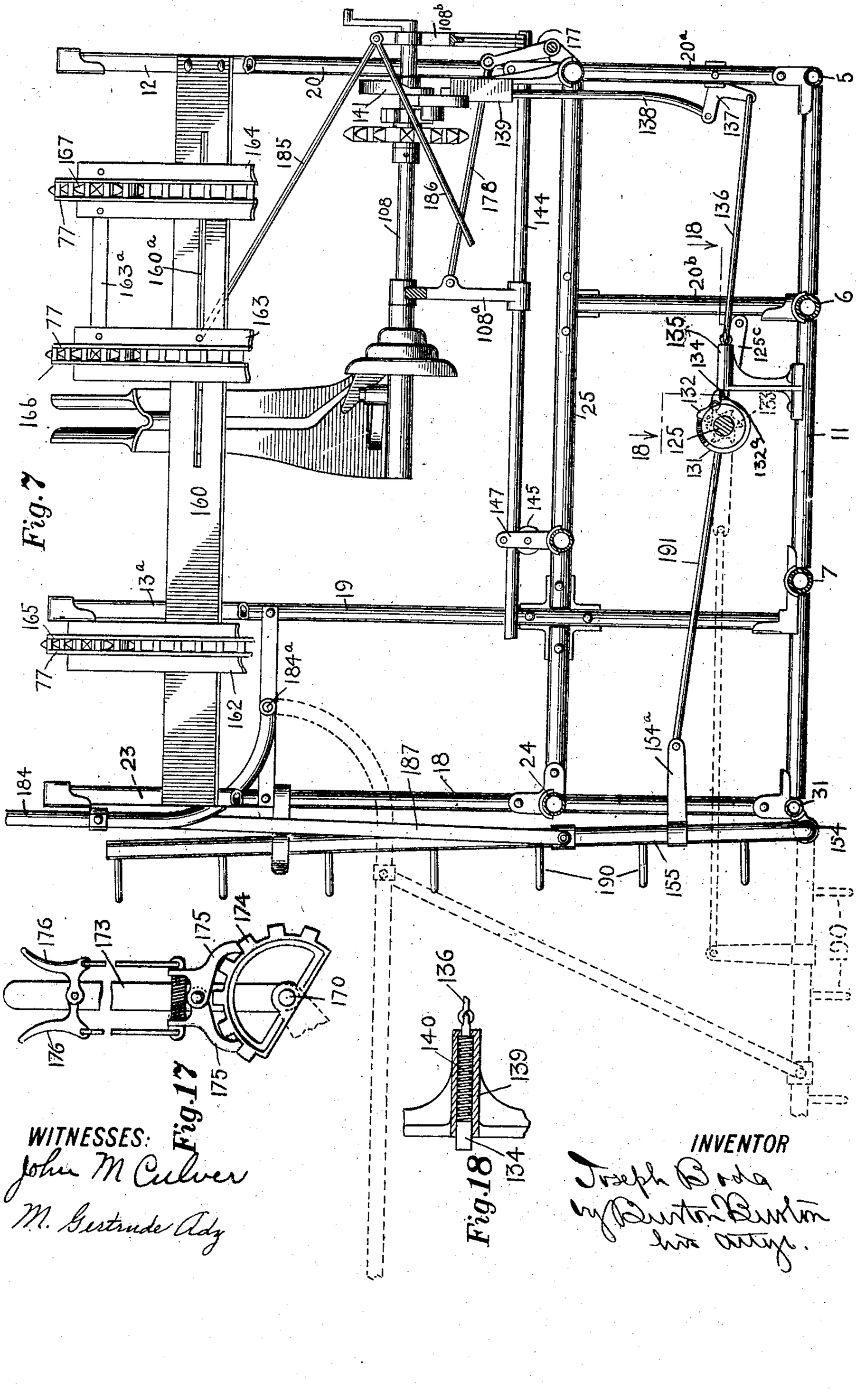

Fig. 7

Fig. 17

Fig. 18

WITNESSES:
John M Culver
M. Gertrude Ady

INVENTOR
Joseph Boda
by Burton Burton
his attys.

No. 879,850. PATENTED FEB. 25, 1908.

J. BODA.

GRAIN SHOCKER.

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9 SHEETS—SHEET 8.

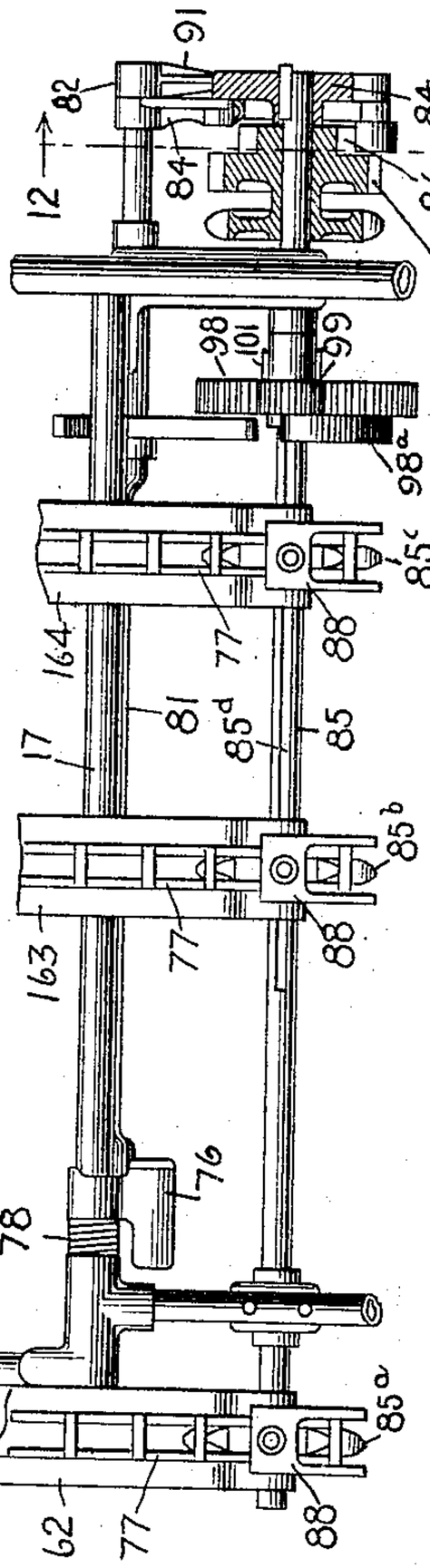

Fig. 11

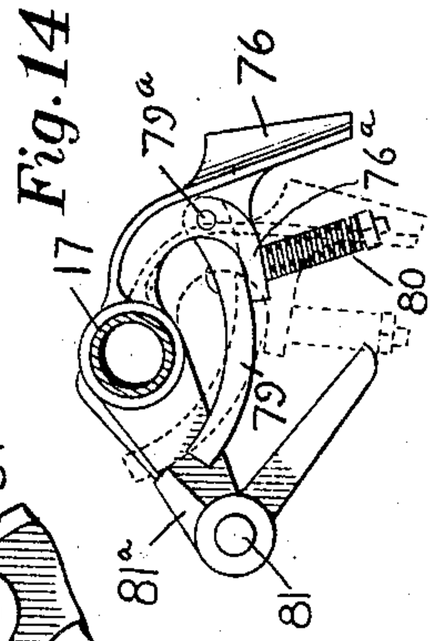

Fig. 13

Fig. 14

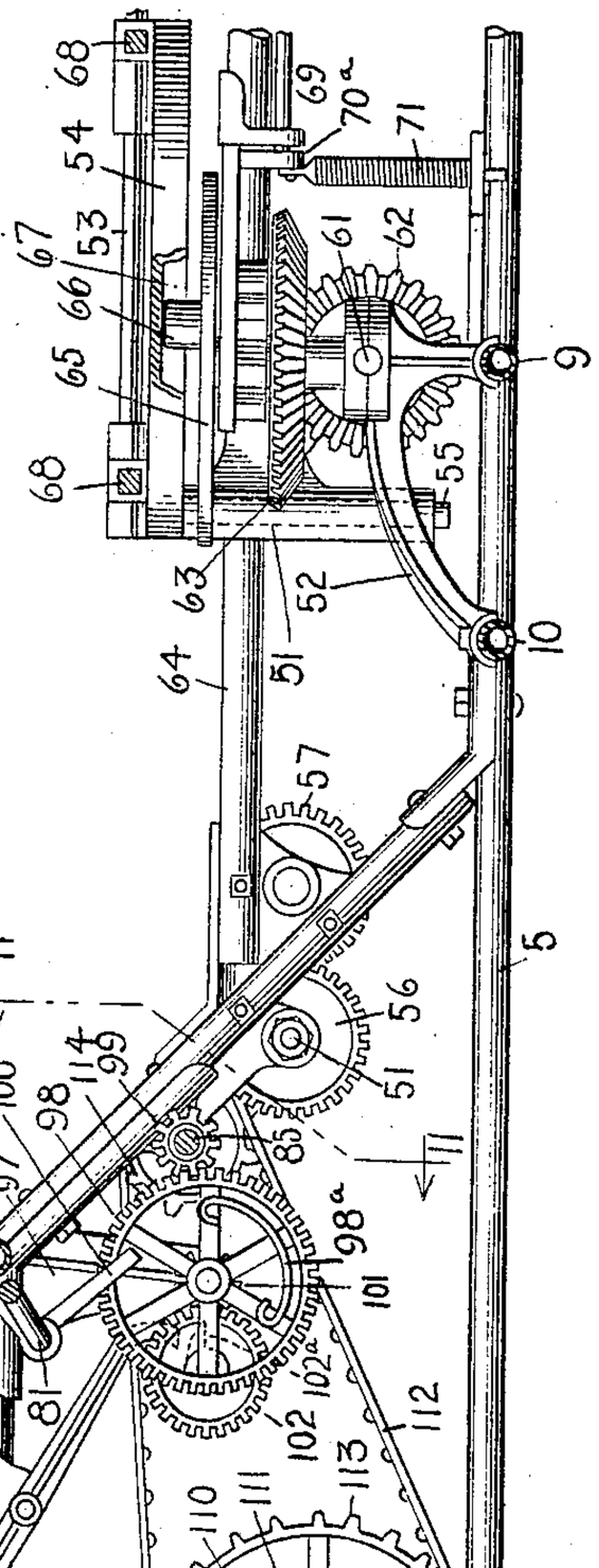

Fig. 12

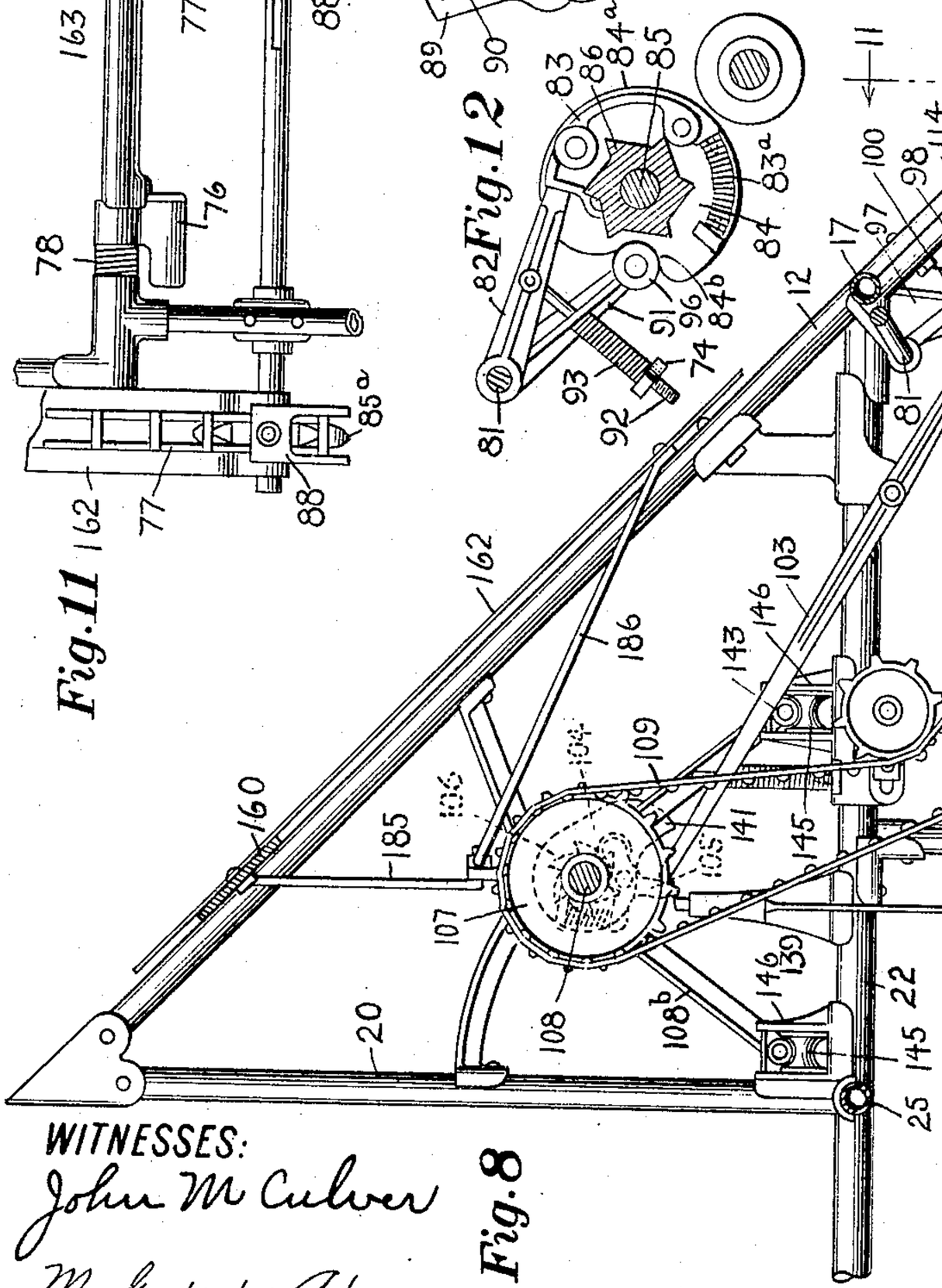

Fig. 8

WITNESSES:

John M Culver

M. Gertrude Ady

INVENTOR

Joseph Boda

by Burton & Burton

Attys.

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J. BODA.

GRAIN SHOCKER.

APPLICATION FILED JAN. 16, 1907.

9 SHEETS—SHEET 9.

Fig.9

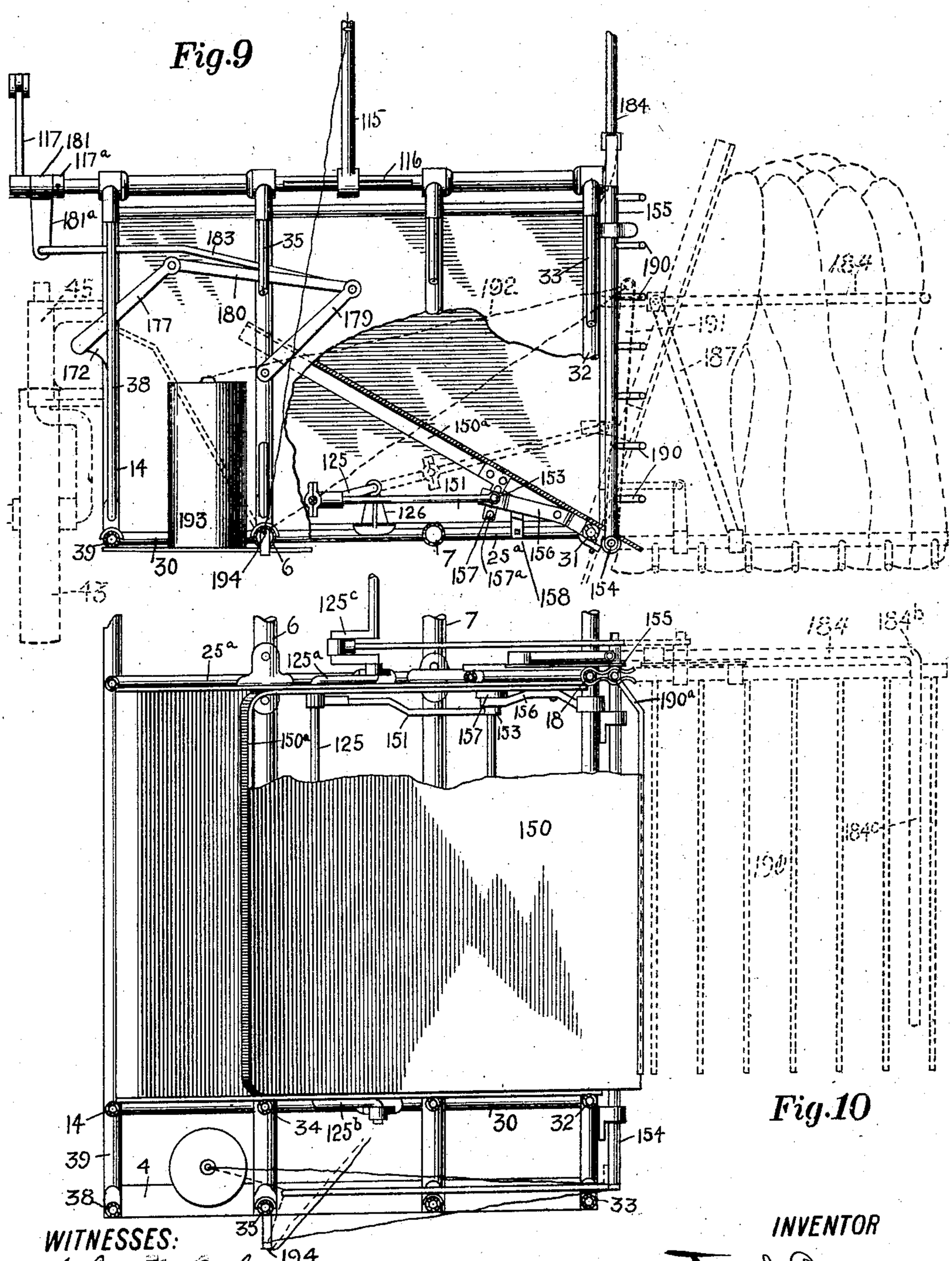

Fig.10

WITNESSES:

John McCulloch

M. Gertrude Ady

INVENTOR

Joseph Boda

by Burton Burton

his Attys

UNITED STATES PATENT OFFICE.

JOSEPH BODA, OF PLANO, ILLINOIS, ASSIGNOR TO INDEPENDENT HARVESTER COMPANY, OF PLANO, ILLINOIS, A CORPORATION OF MAINE.

GRAIN-SHOCKER.

No. 879,850. Specification of Letters Patent. Patented Feb. 25, 1908.

Application filed January 16, 1907. Serial No. 352,544.

To all whom it may concern:

Be it known that I, JOSEPH BODA, a citizen of the United States, residing at Plano, in the county of Kendall and State of Illinois, have invented new and useful Improvements in Grain-Shockers, of which the following is a specification, reference being had to the drawings forming a part thereof.

This invention relates to improvements in mechanism for shocking grain, and particularly to that class of grain shockers in which the sheaves are received by the shocker mechanism from a self-binding harvester to which the shocker is attached and from which its several mechanisms derive power.

The improvements relate to means for transferring the sheaves from the point of delivery by the harvester to the mechanism of the harvester by which they are accumulated in the shock receptacle; the mechanism for tripping the sheaf-accumulating mechanism into action; mechanism for elevating the sheaves for the purpose of delivering them into the shock receptacle; mechanism for tripping the shock receptacle for upsetting and dumping the shock mechanism for operating the shock-upsetting means; mechanism for checking the shock at erect position to prevent it from being prostrated upon delivery to the ground, and construction for permitting the adjustment of the shocker binder and shock receptacle for long and short bundles, and for making such adjustment.

The invention consists in the elements and features of construction and combinations for these purposes which are shown and described and set out in the claims.

In the drawings:—Figure 1 is a plan view of a shocker embodying my invention shown connected to the stubbleward portion of a harvester with which it is designed to operate. Fig. 2 is a grainward side elevation of a shocker disconnected from the harvester. Fig. 3 is a plan view of the shocker frame stripped of mechanism. Fig. 4 is a stubbleward side elevation of the frame stripped of mechanism. Fig. 5 is a perspective view of the frame stripped of mechanism. Fig. 6 is a plan view of a portion of the shocker and a portion of the mechanism thereon, the elevator frame bars being broken away and the elevating mechanism removed. Fig. 7 is a partly sectional elevation looking rearward of a portion of the shocker frame and certain parts of the mechanism thereon, certain frame bars and shafts being shown in section at the line 7—7 on Fig. 6. Fig. 8 is a fore-and-aft section at the line 8—8 on Fig. 6. Fig. 9 is a rear elevation of the shock receptacle and mechanism thereon, showing the rear wall of the receptacle broken away to disclose the interior parts. Fig. 10 is a plan view of the portion of the structure shown in Fig. 9. Fig. 11 is a partly sectional detail elevation looking rearward of the lower portion of the elevating devices, section being made axially through the driving sprocket wheel and tripping devices connected therewith. Fig. 12 is a detail section at the line 12—12 on Fig. 11. Fig. 13 is an enlarged view of certain details of the tripping devices shown in Fig. 12. Fig. 14 is a detail section on an enlarged scale at the line 14—14 on Fig. 6. Fig. 15 is a detail section at the line 15—15 on Fig. 2. Fig. 16 is a detail perspective view of one of the sliding driving sprocket wheels of the elevator and its connections with its shaft for sliding and being driven. Fig. 17 is a detail elevation of the ratchet connections for operating the binder and elevator adjusting devices. Fig. 18 is a detail vertical section at the line 18—18 on Fig. 7.

The above described drawings show shocking mechanism mounted on a frame adapted to be attached to a grain harvester frame at the stubble side so as to be drawn by the harvester frame as a substantially rigid extension thereof; that is, having only such flexibility at its connection as to adapt it to accommodate itself to the varying level of the ground, but having rigidity with the harvester frame in horizontal plane. The operating mechanism mounted on such frame derives power from the harvester train by one shaft connecting a rotating part mounted on the harvester frame and a rotating part mounted on the shocker frame, the connections of such shaft at both ends being made by universal joints, and the shaft itself being provided with means for telescoping so as to accommodate the changes of relative position of the harvester frame and shocker frame as the machine travels over uneven ground.

The rigid frame bar, 1, of the harvester frame at the stubble side has projecting rigidly from it near the forward end a bracket, 2, and a rear frame bar, 3, of the harvester frame has secured to it, and projecting off

obliquely, rearwardly and stubblewardly from it, a tie rod or bar, 4. The extremities of the bracket, 2, and tie rod or bar, 4, are approximately in the same fore-and-aft line and to them at their extremities the frame of the shocker is attached, the attachment being made in a pivotal manner by means about which the shocker frame may pivot for accommodating itself to variations in the ground.

The shocker frame is substantially rigid within itself. It comprises a fore-and-aft sill, 5, which at the forward end is connected, as described, to the stubbleward extremity of the bracket, 2, and at a point back of the middle of the length of the entire shocker frame is connected to the extremity of the tie bar, 4, as described. The shocker frame comprises, in addition to this longitudinal fore-and-aft bar, 5, a parallel bar, 7, and these two bars are connected at their forward ends by an oblique bar, 15. They are further connected by direct transverse bars, 9, 10 and 11. The bar, 5, does not extend rearward beyond the bar, 11. The bar, 7, extends past the bar, 11, underneath the shock receptacle to the extreme rear of the machine. There is another fore-and-aft bar, 6, of the same size as the bar, 7, which extends from the transverse bar, 10, to the rear of the machine, and intermediate the bars, 6 and 7, there is a fore-and-aft bar, 8, extending only between the transverse bars, 10 and 11, to assist in supporting the mechanism. All the bars thus far mentioned are at the same level, which may be called the "lower frame level" of the machine. From the fore-and-aft bars, 5 and 7, slant bars, 12 and 13, extend up rearwardly for the elevator frame. From the junction of the fore-and-aft bar, 5, with the transverse bar, 11, a post, 20^a, projects upward, and the fore-and-aft bar, 22, parallel with the bar, 5, extends directly above the latter, crossing and being secured upon the top of the post, 20^a, and joined at its forward end to the slant-bar, 12, and at its rear end to the rear grainward corner-post, 14, of the shock receptacle. This bar, 22, is located at what might be termed the "second frame level" of the machine. From the junction of the bar, 22, with the slant-bar, 12, a transverse bar, 17, extends stubbleward horizontally crossing the slant-bar, 13, and extending stubbleward beyond the same. The slant-bar, 13, is jogged stubbleward where the transverse bar, 17, crosses it, the portion, 13^a, extending thence the remainder of the slant distance rearward. An upright post, 20, extends from the bar, 22, being footed thereon at a distance rearward from the top of the post, 20^a, and makes an acute angle junction at its upper end with the slant-bar, 12.

The upright element of the elevator frame and forward side of the shock receptacle consists of this upright post, 20, and two other uprights, 18 and 19, located in the same transverse vertical plane. The bar, 19, makes junction at its upper end with the slant-bar, 13^a, and is footed at its lower end near the fore-and-aft bar, 7. From the junction of the foot of the post, 20, with the fore-and-aft bar, 22, a horizontal bar, 25, extends transversely stubbleward, crossing and being secured to the upright, 19, and extending stubbleward therefrom as far as the transverse bar, 17. At the stubbleward end of this transverse bar, 25, it is joined to the upright post, 18, which extends downward below the junction to the lower frame level of the machine. A bar, 24, connects the stubbleward ends of the bars, 17 and 25, and from the junction of said bar, 24, with the bar, 17, a slant-bar, 23, extends up to the top of the post, 18, which is in line with the tops of the posts, 19 and 20, and there is thus formed the stubbleward triangular frame element of the elevator. The bar, 25, is further supported by a short post, 20^b, extending from the fore-and-aft bar, 6, directly up to said transverse bar, 25. From the foot of the post, 20^b, on the bar, 6, a transverse bar, 25^a, extends across the bar, 7, to which it is joined, to the foot of the post, 18, to which it is joined. An oblique brace, 27, connects the corner formed by the rear end of the bar, 5, upright post, 20^a, and transverse bar, 11, with the junction of the post, 20^b, transverse bar, 25^a, and the fore-and-aft bar, 6. A similar oblique brace, 28, connects the corner formed at the foot of the post, 18, by its junction with the bar, 25^a, with the bar, 7, to which said brace is joined near the junction therewith of the transverse bar, 11.

For completing the frame of the shock receptacle, a transverse bar, 30, extends across and is joined to the bars, 6 and 7, a short distance forward of their rear ends, and a fore-and-aft bar, 31, extends from the foot of the post, 18, at the lowest frame level of the machine rearward past the stubbleward end of the transverse bar, 30, to which said bar, 31, is joined and beyond which it projects as far as the bars, 6 and 7. Four triangular frames constitute the rear wall of the shock receptacle, the first comprising the upright post, 32, the slant-post, 33, joined at their upper ends and at their lower ends footed on the bar, 31, at the junction of the bars, 30 and 31, and the slant-post, 33, at the rear end of the bar, 31. Two similar triangular frames consist each of an upright post, 34, and slant-post, 35, making junction at their upper ends, the bases being formed by the bars, 6 and 7, the posts, 34, being so footed at the intersections of the bar 30 with the bars, 6 and 7 respectively, and the slant-posts, 35, being footed at the rear ends of the bars, 6 and 7. A fourth triangular frame is formed by the upright post, 37, slant-post, 38, and short tri-

angular base-bar, 39, said frame being joined at its right angle at the foot of the upright, 14, to the grainward end of the bar, 30, and having said upright post joined, as already stated, to the fore-and-aft bar, 22. A flat bar, 40, extends across the rear ends of the bars, 6, 7 and 31, and across the bar, 39, for further rendering them rigid. An additional tie-bar, 41, parallel with the bar, 22, connects the upright post, 14, to the upright post, 20, at the grainward side of the shock receptacle.

Upon considering this frame construction it will be observed that by the termination of the bar, 5, at the point forward of the shock receptacle, and of the bar, 25ª, at a point stubbleward of the grainward side of said receptacle, provision is made for a recess or clear opening into the space which, in general, is defined by the outlines of the frame at the grainward end of the shock receptacle, such recess extending forward of the receptacle under the elevator for some distance,—that is, to the post, 20ª. At the stubbleward side a similar recess will be observed formed under the stubbleward portion of the elevator frame which extends beyond the vertical plane of the triangular frame element consisting of the post, 19, slant-bar, 13, and fore-and-aft bar, 7. These recesses are particularly provided to accommodate the caster wheels, 42 and 43, as further hereinafter described.

The triangular portion of the horizontal frame-work formed between the bars, 5, 9 and 15, at the forward end, it will be observed, extends opposite and directly behind the delivery side of the harvester binder deck, and upon this portion of the frame there is mounted means for receiving the bundles from the harvester and carrying them from position extending longitudinally fore-and-aft, around through a 90 degree path to a position extending transversely of the path of travel of the machine, ready to be advanced sidewise rearward for accumulating them in the shock receptacle which is mounted above the rear end portion of the frame, as already described. Over the space defined between the transverse bars, 10 and 25, upon the slant-frame already described, there is mounted mechanism for lifting the bundles in order to deliver them by gravity over into the shock receptacle located behind the elevator. In the triangle defined by the oblique tie-rod, 4, and transverse and fore-and-aft of lines from its front and rear ends respectively, universal-jointed telescoping shafts, 16, extend from the shaft of a wheel on the harvester frame to the shaft of a wheel on the shocker frame for transmitting power from the harvester train to the shocker train, as hereinafter more particularly described.

The mechanism of the shocker is constructed for accumulating bundles to form the shock prostrate in the shock receptacle at the position indicated, with their heads grainward and their butts stubbleward, and for delivering the shock by tilting it outwardly upward from prostrate to upright position, thereby delivering it stubbleward,—sideward with respect to the direction of travel,—out of the shock receptacle. In order to afford a clear path for such sideward delivery of the shock it is necessary to avoid any obstruction in the path of the outgoing shock, and means for supporting the shocker at the stubbleward side, therefore, consist only of a caster-wheel, 42, which is mounted on a suitable bracket, 44, rigidly secured to the horizontal bar, 24, and the slant-bar, 23, of the elevator frame, so that the caster-wheel may swing in the recess mentioned, of the frame under the overhanging stubbleward end portion of the elevator forward of the shock receptacle and of the outgoing shock. It will be noticed that the foremost support of the shocker is obtained at the pivotal connection of the forward end of the sill, 5, with the bracket, 2, which is projected for the purpose stubbleward of the harvester frame, said harvester frame becoming thus the means for carrying the front grainward corner of the shocker frame. In order to render the shocker frame suitably stable and at the same time adapted to accommodate itself to the ground and to be carried with the harvester frame in turning corners without dragging its wheels, a third support is provided for it consisting likewise of a caster-wheel, 43, mounted on a bracket, 45, which projects rigidly grainward from the shock receptacle, to whose grainward side-bars, 22 and 41, it is secured. The wheel, 43, is thus located, substantially opposite grainwardly from the center of the shock receptacle. The three points of support of the shocker frame,—at the end of the bracket, 2, and on the two caster-wheels, 42 and 43,—thus define a triangle above which are located all the heavy portion of the mechanism and beyond which there is projecting only a portion of the shock receptacle which requires only sufficient stiffness to safely carry the weight of the shock at the portion which thus overhangs the rear side of the triangular base of support afforded by the three supporting points mentioned. Both the wheels, 42 and 43, being caster-wheels accommodate themselves in turning corners to the necessary paths of movement of the points in the machine at which they are mounted.

For transmitting power from the harvester train to the shocker train, any convenient continuously rotated shaft or wheel on the harvester train, as a transverse shaft, 45ª, commonly found in prevailing types of harvesters at the rear of the traction wheel, 47, may be selected and provided with a sprocket wheel, 48, from which is driven by a

chain, 49, an added sprocket wheel, 50, mounted in a bracket, 50^b, on the rear sill of the harvester. A short stub axle 50^a, of this added sprocket wheel, 50, becomes the shaft on the harvester frame to be connected with a shaft on the shocker frame by the telescoping shaft, 16, having its forward grainward end a universal joint, 16^a, connecting it with the stub axle or shaft, 50^a, of the wheel, 50, and having at its rearward stubbleward end a like universal joint, 16^a, which connects it with a shaft, 50^c, journaled on the shocker frame and having connections hereinafter described by which the several trains or parts of the entire train of the shocker are actuated.

For receiving the bundles and turning them from their fore-and-aft position at delivery from the harvester to a transverse position preparatory to moving them sidewardly rearward to accumulate them to form a shock, there is provided a cradle mounted to swing upon a vertical axis at the rear end and delivery side of the harvester deck. For this purpose, a bracket, 51, is mounted upon the sill, 5, and a frame, comprising a bar, 53, is secured to a cam plate, 54, having a rigid stud or pivot spindle, 55, by which the cam and the frame bar, 53, are pivotally mounted in the bracket, 51, for swinging in a horizontal plane about said pivot. On the shaft, 50^c, from which all power for the shocker mechanism is derived, a gear, 56, is secured rigidly, and this gear meshes with the gear, 57, having rigid with it a sprocket wheel, 58, and mounted on a stud axle projecting from the frame sill, 5. A chain, 59, from the sprocket wheel, 58, drives the sprocket wheel, 60, on the grainward end of a shaft, 61, which is journaled in a bracket, 52, which is mounted on the bars, 9 and 10, and also in a suitable bearing on the bracket, 51. A beveled pinion, 62, on the shaft, 61, meshes with a bevel gear, 63, which is also journaled in the bracket, 52, at the upper side thereof, and which has a further bearing on a fore-and-aft frame bar, 64, parallel with and above the bar, 5, and made rigid therewith by a spacing bracket, 64^a, at the forward end, and by being secured at the rear end to a bracket on the elevator slant bar, 12. At the upper side of the bar, 64, there is mounted on the shaft of the gear, 63, a crank plate, 65, having a stud-and-roll crank wrist, 66, which engages in the slot, 67, of the cam plate, 54. The form of the slot of the cam plate is such that the rotation of the crank wrist engaged therewith swings the cam plate and thereby the cradle mounted on the bar, 53, back and forth through a swing of 90 degrees about the pivot of the cam plate in the bracket, 51. On the bar 53, there is mounted the cradle consisting of two or more curved arms, 68, for receiving the bundle. A rock shaft, 69, mounted on the bar, 53, parallel therewith has a trip arm, 70, extending in position to receive the impact of the bundles as they are delivered from the harvester deck, and a trip finger, 70^a, is connected with a spring, 71, tending to uphold the trip arm, 70. On the crank-plate, 65, there is pivoted a dog, 72, having a stud-and-roll abutment, 72^a, for engaging any tooth of the ratchet hub, 63^a, on the gear, 63. A spring, 72^b, operates against the lever arm, 72^c, of said dog to throw the dog into engagement with the ratchet hub. The trip finger, 70^a, projects into the path of the lever arm, 72^c, when the bundle cradle is at normal position for receiving the bundle from the harvester, and there is no bundle operating on the trip arm, 70; and at that position the arm, 72^c, holds the dog out of engagement with the ratchet hub. The lodgment of the bundle in the cradle against the arm, 70, disengages the dog, 72, and causes the engagement of the crank plate with the gear, 63, and one rotation of the crank plate gives to the cradle its quadrant swing for carrying the bundles lodged upon it around to the elevators as hereinafter described, the trip arm, 70, being released as soon as the bundle is carried off the cradle arms; and when the cradle returns to bundle-receiving position the trip-finger, 70^a, stands in the path of the lever arm, 72^c, of the dog, and engages said lever arm when it comes around again nearly to the end of its rotation, and by said engagement disengages the dog from the gear, 63, causing the cradle to come to rest after having made its swing out and back during one revolution of the crank plate and gear, 63.

When the bundle is received by the cradle, and the mechanism for swinging the cradle is thereby tripped into action as described, the cradle makes a 90-degree swing from the position at which the bundle is received extending fore-and-aft to a position transverse thereto for delivering the bundle to the elevator; and for tripping the elevator into action to cause it to carry the bundle up one step and present a new set of carrier arms or fingers in position to receive the next bundle, there is provided on the cradle shaft a rigidly projecting arm or tripper, 75, the end of which collides, in the finishing part of the 90-degree swing of the cradle, with the trip, 76, which is mounted loosely on the frame-bar, 17, and acted upon by a coiled spring, 78, stopped at one end on its arm and at the other end on the frame, so as to be put under tension by the rocking of the trip-arm, 76, caused by the collision therewith of the tripper, 75, as described.

79 is a finger pivoted at 79^a on the arm of the trip, 76, and held by a spring, 80, against a seat, 76^a, on said arm, the spring permitting it to turn about its pivot away from the seat, that is, toward the frame-bar, 17.

81 is a rock shaft mounted in bearings projecting from the frame bar, 17, having a short lever arm, 81ª, in position to be encountered by the end of the finger, 79, when the arm of the trip, 76, is swung inward by the encounter of the tripper, 75, and such encounter rocks the shaft, 81. Said shaft extends grainward beyond the grainward slant-bar, 12, of the elevator on which it is afforded bearing, and at its grainward end there is mounted on it a trip arm, 82, which, at the normal position of the shaft,—that is, before the encounter of the tripper, 75, with the trip, 76, extends in position to stop a trip dog, 83, on a disk, 84, which is fast on the grainward end of a shaft, 85, which extends across the elevator frame and actuates the sprocket wheels, 85ª, 85ᵇ and 85ᶜ, for operating elevator chains, as hereinafter more particularly described. Upon the rocking of the shaft, 81, by the encounter of the tripper, 75, with the trip, 76, the arm, 82, is disengaged from the dog, 83, and the dog is thereby forced by its spring, 83ª, into engagement with a tooth of the ratchet hub, 86, on the gear wheel, 87, which is continuously rotated by the engagement of the gear, 56, on the initial shaft, 51, of the shocker train, and thereby the elevating mechanism is set in motion for carrying up by means of the arms, 88, of the elevator chains, 77, the bundle which has been deposited above those arms by the cradle in the same movement which tripped the elevating mechanism into action, as described. The rock-shaft, 81, after being rocked by the encounter of the tripper, 75, with the trip, 76, may quickly recover its position because the cradle immediately retreats after that encounter; and in order that the trip-arm, 82, may not drop back and reëngage the dog, 83, before the latter has time to become engaged with the ratchet hub, the dog is provided with a spring-pressed terminal, 89, which directly receives the encounter of the trip arm, 82, with the dog, and is thrown back by its spring, 90, instantly when the trip arm is rocked out from behind it, and it thereby prevents the trip arm from coming back behind it, even if the engagement of the dog with the ratchet hub should be delayed. Loose on the rock-shaft, 81, outside the trip arm, 82, there is a second arm, 91; and a link, 92, extends from the arm, 82, through the arm, 91, which is provided with an eye for that purpose; and beyond the arm, 91, a spring, 93, is coiled around the link and stopped by a nut, 74, on the end thereof, reacting to force the two lever arms together and resist their angular spread. The arm, 91, bears against a cam edge, 84ª, of the disk, 84, and this lodgment or stoppage of the arm, 91, causes it to act as a stop for the spring, 93, so that the spring resists the rocking of the shaft, 81, in the movement which disengages the trip arm, 82, from the dog, and tends to return said arm to position for again tripping the dog when it completes a revolution.

When the finger, 79, collides with the lever arm, 81ª, for rocking the shaft, 81, it runs past the end of that lever arm after rocking the shaft a certain distance, thus permitting the shaft-trip, 76, to be rocked through an angle not limited by the rocking of the shaft, 81; and as soon as the cradle starts in its return trip toward the harvester deck and withdraws the tripper, 75, from the trip, 76, the spring, 78, rocking back the trip, 76, retracts the finger, 79, over the end of the lever arm, 81ª. In running up beyond the end of the lever arm, 81ª, the finger, 79, is deflected, the spring, 80, yielding for that purpose, leaving both the trip, 76, and the shaft, 81, free to rock back to normal position. The shaft, 81, rocking back thus, the trip arm, 82, is drawn back by the spring, 93, into the path of the terminal of the dog, 83, and collides with the latter upon the completion of one revolution of the shaft, 85, bringing the shaft and the entire elevating mechanism to rest. The cam edge, 84ª, of the disk 84, comprises a radial shoulder, 84ᵇ, and is spirally shaped from the inner to the outer end of the shoulder, so that as it rotates, the tension of the spring, 93, is increased by the crowding back of the lever arm, 91, and the abutment—a stud-and-roll, 96,—at the end of the arm which rests upon the edge of the spiral cam runs off the shoulder and becomes engaged behind the same when the encounter of the dog with the lever arm, 82, halts the rotation of the shaft. Such engagement of the lever, 91, with the shoulder prevents the reverse rotation of the elevating mechanism, which might otherwise be caused by the weight of the bundles carried on the elevator tending to run it back. The distance to which the elevator is moved up its inclined path by one rotation of the shaft, 81, is about half the entire length of that path, so that a bundle received at the foot of the elevator is halted about midway, and a second bundle received upon the next trip of the cradle is carried to the middle, while the preceding one is carried to the top. It is the intention of the mechanism as constructed to deliver three bundles from the upper end of the elevator over into the shock receptacle by the travel of the elevator at the time the third bundle is received; and to give the elevator the necessary longer travel for each third bundle delivered to it, there is journaled in a hanger or bracket, 97, mounted on the frame, a gear, 98, which is meshed with a pinion, 99, on the shaft, 85, the gear, 98, having upon one side a flange, 98ª, extending through about 120 degrees about the axis of the wheel, and the rock shaft, 81, has a lever arm, 100, projecting in position to be encountered by the flange, 98ª, and lodged thereon through the portion of the rotation

of the wheel, 98, corresponding to the angular extent of the flange. While the lever arm is thus lodged on the cam, the shaft, 81, is prevented from rocking to carry the trip arm, 82, back into the path of the dog, 83, and the rotation of the shaft, 85, and the action of the elevator is continued, therefore, during the portion of the rotation of the gear, 98, corresponding to the extent of its said flange.

The gear, 98, has five times the number of teeth of the pinion, 99. During the first two revolutions of the gear, 98, the flange, 98[a], is passing through a portion of its course out of the way of the lever arm, 100, and the gear, 98, is therefore without effect upon the tripping of the elevator; but during the third revolution of the gear, 98, the flange, 98[a], encounters the lever arm, 100, and before the completion of that revolution that lever arm is lodged on the flange so as to hold the shaft, 81, in position to keep the trip arm, 82, out of the path of the dog; and the extent of the cam as stated,—about 120 degrees,—is sufficient to keep the lever in this position until the fifth revolution of the shaft, 85, so that after being tripped at the end of the first and second revolutions, the dog is again encountered by the trip arm and the elevating mechanism disengaged and brought to rest only at the end of the fifth revolution, and during the last three revolutions the first two bundles which have been received and carried up,—the first, one step, and the second, two steps,—are carried over and dropped into the shock receptacle, and the third bundle received at the commencement of the third revolution is carried three steps and thereby also dropped into the receptacle.

In the mechanism as constructed, it is designed that three or four successive groups of three bundles each shall be deposited in the shock receptacle to form a shock before the shock-binding mechanism is tripped to bind them and the tilting mechanism is operated for setting up and discharging the shock. In order to control the number of groups of three bundles each which are thus put into the shock receptacle before its binder is tripped, there is provided, rigid with the gear, 98, a pinion, 101, which meshes with a gear, 102. This gear is journaled on a bearing, 102[a], which is adjustable toward and from the axis of the pinion which drives it, as shown by the slotted arm, 97[a], of the bracket, 97. (See Fig. 2.) The purpose of this adjustability is to provide for substitution of gears of different sizes at this point, said gear, 102, when designed for controlling the delivery of three groups of bundles of three each to form a shock of nine bundles, having three times the number of teeth of its driving pinion, and being substituted by a gear having four times that number for delivering four such groups; and the same means may be employed to any extent by providing additional interchangeable gears having teeth to a number of a still larger multiple of the number of teeth of the pinion.

On the elevator frame there is fulcrumed a lever, 103, having one end extending alongside the gear, 102, and the other end alongside the cam wheel, 104, of the shock binder, and in position to encounter the tail of the dog, 105, for tripping it out of engagement with the ratchet hub, 106, on the sprocket wheel, 107, which is loose on the binder driving shaft, 108, in a manner well understood. On the face of the gear wheel, 102, there is an abutment, 102[a], which encounters the lower end of the lever, 103, once in each rotation of the gear, 102, and rocks said lever, 103, for disengagement of its upper end from the trip dog, thereby throwing the binder into action. The binder, which is represented as a familiar form of harvester binder, comprising a binder frame, 142, performs one complete action in the rotation of the binder shaft, 108, and the abutment on the wheel, 102, having run past the lever arm, 103, immediately after the latter is actuated for tripping the binder, said lever arm is back in position for encountering the trip dog, bringing the binder to rest when its rotation is completed. In order that the binder may be thus tripped into action, the wheel, 107, is continuously driven by the chain, 109, passing about said wheel, 107, and about the sprocket wheel, 110, fast on the shaft, 111, which is continuously rotated in journal bearings mounted on the frame bars, 5 and 8, by means of a chain, 112, passing around the sprocket wheel, 113, on the grainward end of said shaft, 111, and around the sprocket wheel, 114, which is rigid with the gear, 87, which is continuously driven, as hereinbefore explained.

The binder arm, 115, extends in a vertical fore-and-aft plane from its rock shaft, 116, which is mounted on the top of the rear side of the shocker frame, being actuated by the connection of the lever arm, 117, of said rock shaft by means of a link, 118, with the crank arm, 119, on the binder shaft, 108.

The shock-discharging devices, comprising means for uptilting the shock and carrying it out stubbleward, are actuated by the shock-operating crank shaft, 125, as more particularly hereinafter described. This shaft, 125, has a journal bearing in a bracket, 126, on the frame bar, 25[a], and at the forward end it extends through the sleeve-shaft, 130, and is journaled in the bracket, 127, mounted on the bar, 8, in which the shaft, 111, is also journaled. The bevel pinion, 128, on the forward end of the sleeve-shaft, 130, meshes with and is driven by a bevel-gear, 129, on the shaft, 111. A clutch device of familiar construction connects the shaft, 125, with the sleeve-shaft, 130, com-

prising a disk, 131, on the shaft, 125, on which is pivoted a spring-actuated dog, 132, whose spring tends to hold it in engagement with the ratchet disk, 133, on the rear end of the sleeve-shaft, 130. A trip bolt, 134, sliding in a bearing, 135, supported on the frame bar, 25[a], is connected by a link, 136, with a bell-crank lever, 137, fulcrumed on the upright post, 20[a], the other arm of the lever being connected to a slide bar, 138, mounted for sliding in a bearing, 139, formed in a bracket which is mounted on the bar, 22. A spring, 140, operates on the crank lever and connected parts from and including the slide-bolt, 134, to and including the slide-bar, 138, tending to hold the slide-bolt protruded (as shown in Fig. 18,) into the path of the stop-lug, 132[a], on the dog, 132, for holding the ratchet-engaging abutment of the dog out of engagement with the ratchet disk, 133. A cam, 141, on the binder shaft, 108, is shaped to come into collision with the end of the slide-bar, 138, for thrusting down said slide-bar, 138, at the proper time in the rotation of the binder-shaft to disengage the slide-bolt, 134, from the dog, 132, to permit the latter to become engaged with the ratchet disk, 133, thereby bringing the shock upsetting and discharging devices into action just before the binder comes to rest upon the retraction of the needle to its normal position of rest (shown in Fig. 2).

The devices for up-ending and discharging the shock comprise a bottom, 150, for the shock receptacle which is pivoted on the bar, 31, at the bottom of the stubbleward side of the receptacle, which is open except as obstructed by the gate hereinafter described. At its position of rest, the bottom, 150, extends from its pivot on the bar, 31, upward grainward at a considerable inclination from horizontal,—from twenty to thirty degrees. For operating it to tilt it up to vertical position for up-ending and discharging the shock, links, 151 and 152, at the front and rear are connected with the cranks 125[a] and 125[b], of the crank shaft, 125, and from cranks extend to pivots, 153, at the inner or under side of the floor, 150. For convenience in adjusting these pivots as may be desirable, they are formed at the end of bars, 156, each fastened by a single bolt to the vertical web of the angle iron frame, 150[a], of the floor, 150, and extending from their fastening past lugs, 157, which project down from said frame bar, said lugs being each provided with a plurality of holes, 157[a], at which the bars, 156, may be bolted to the lugs. By shifting from hole to hole, the position of the pivots, 153, may be changed sufficiently to vary the angle of inclination of the floor through several degrees as may be desirable to adapt the slope to the relative diameters of the heads and butts of the bundles which will vary in different grain. Stops, 158, are provided to arrest the pitman links, 151 and 152, at substantially horizontal position, so that at all adjustments of the pivots, 153, the pitman links extend at an obtuse angle to the line from their said pivots to the pivot of the floor, 150, on the bar, 31. At this horizontal position the pitman links extend very nearly in the plane of the cranks, so that when the cranks start downward in their rotation they operate with great advantage for lifting the floor, traveling through nearly one-sixth of a revolution in order to tilt the floor up the first few inches. By the time the rotation of the cranks brings them somewhere nearly at right angles to the pitmen so that they thrust the latter quite directly against the load for lifting it, the load itself has approached so far toward vertical position that the work of lifting it is greatly reduced; and in practice with this construction the work of starting up the load is not materially greater than that of continuing its upward movement until it is up-ended and discharged. This is a feature of considerable importance in a machine of this sort in which it is important to avoid imposing upon the harvester traction wheel too great work at any one point, which would cause it to slip on the ground.

To the slant bars of the elevator frame there are secured transverse plates, 160 and 161, and lodged on these plates and extending across them are slant bars, 162, 163 and 164, which serve as track plates for the three elevator chains or bundle carriers, 77, 77, 77. The track plate, 161, supports at its upper end the bearing for the upper sprocket wheel, 165, of the stubbleward elevator chain, 77, whose driving sprocket wheel, 85[a], is fast on the shaft, 85, just stubbleward of the vertical plane of the slant bar, 13. The other two track plates, 163 and 164, are rigidly connected by cross ties, 163[a], so that they are adapted to move together as a rigid unitary structure. They are not secured to the transverse plates, 160 161, but are mounted for sliding longitudinally thereof in direction transverse to the line of travel of the machine, the plates, 160 and 161, having longitudinal slots, 160[a], and the track plates having guide studs taking into such slots.

At the upper ends of the track plates, 163 and 164, are mounted the upper sprocket wheels, 166 and 167, of the two grainward elevator chains or endless carriers, 77, whose driving sprocket wheels, 85[b] and 85[c] are mounted on the shaft, 85, for rotation therewith and capacity for sliding thereon, which is effected by a flat key seat, 85[d], on said shaft, 85, to which keys in the hubs of the wheels are suitably adapted and may be understood without illustration or further explanation. The track bars, 163 and 164,

at their lower ends have forks, 169, embracing the hubs of the sprocket wheels, 85[b] and 85[c], close to the shaft, 85, so as to slide the sprocket wheels on the shaft whenever the track plates are moved laterally, as permitted by their mounting and guidance on the transverse plates, 160 and 161. The binder frame, 142, is mounted for sliding transversely on the rigid shocker frame, being for that purpose made to consist of two bifurcated standards, 108[a] and 108[b], the corresponding legs of the two standards being respectively in the same transverse planes, and the legs of each standard diverging fore-and-aft.

The forward legs are connected by a transverse rod or bar, 143, and the rear legs are similarly connected by a bar, 144. The bars, 143 and 144, are lodged upon rollers, 145, mounted at the upper ends of two standards, 146, which are mounted on and project rigidly up from the fore-and-aft bar, 22, and two similar standards, 147, which are similarly mounted on and project up from the bar, 17. A rock shaft, 170, is mounted in bearing brackets, 171, at the forward end, and 172 at the rear end, the bracket, 171, being secured in the angle between the bar, 22, and the slant bar, 12, and the bearing, 172, being mounted upon a rear grainward corner post of the shock receptacle. Means for rocking this shaft are provided comprising a hand lever, 173, which extends to a point in reach of the driver's seat (not shown) on the harvester, and a ratchet wheel, 174, on said shaft, 170, which is engaged by dogs, 175, connected in a manner requiring no detailed explanation with finger-pieces, 176, adjacent the handle end of the lever, 173. The rock shaft, 170, has a lever arm, 177, from which a link, 178, extends to one of the arms, 108[a], of the binde. frame, so that the rocking of the shaft slides that frame transversely in its supports on the rollers, 145. The other lever arm, 177, of the rock shaft, 170, is designed for similarly and equally sliding the needle rock shaft, but this rock shaft being necessarily mounted at a higher position than the binder driving shaft in the binder frame, 108, provision is made for covering this greater distance from the horizontal shaft, 170, without employing longer lever arms, which would give the needle rock shaft a longer movement by mounting on the rear side of the shock receptacle a third lever arm, 179, equal in length to the arm, 177, and connecting the ends of the two lever arms, 177 and 179, by a link, 180, equal in length to the distance between the pivots of the two lever arms. On the needle rock shaft there is mounted loosely, but longitudinally stopped thereon, as, for example, between the hub of the lever arm, 117, and a stop collar, 117[a], a sleeve, 181, which is prevented from turning on the shaft or with the shaft by a tie rod, 182, which extends from said sleeve to a lug, 108[d], on the binder frame.

The sleeve, 181, has an arm, 181[a], extending downward, and this arm is connected by a link, 183, with the pivot of the link, 180, to the lever arm, 179, which having the same movement as the lever arm, 177, and through the corresponding arc about its pivot which also corresponds to the arc of movement of the other lever arm, 176, of the rock shaft, 170, gives to the sleeve, 181, and thereby to the rock shaft, movement precisely equal to that which is communicated to the binder frame, 108. The same extent of movement it is desirable to communicate to the two movable elevator chains or endless carriers, 77, which have their upper sprocket wheels mounted, as described, upon the track bars, 163 and 164, since the movement in question is employed to adjust the mechanism to different lengths of bundle, and such adjustment is as desirable in order to cause the bundles to be properly carried up to the elevator as to cause them to be properly related to the plane of the binding cord in the shock. In order to adjust these elevator carriers at the same time as the binder and by the same device, so as not to require a different action of the driver, the grainward binder standard, 108[a], is connected by diverging links, 185 and 186, with the track plate, 163, which is the stubbleward of the two rigidly connected and movable track plates by which the two elevator chains in question are carried.

The shock receptacle is provided at the stubbleward side at which the shock is ejected with a gate for retaining the shock until it is to be ejected and which serves as a butt-evener in the process of accumulating the bundles and a support for the shock while it is being up-ended and ejected. This gate consists of a horizontal rock shaft, 154, which is mounted at the stubbleward side of the frame bar, 31, and provided at its forward end with an arm, 155, at right angles to said rock shaft, and carrying projecting from it so as to extend parallel from the rock shaft a series of fingers, 190. The rock shaft, 154, is operated by means of a link, 191, connected to an offset arm, 154[a], of said rock shaft and to a crank, 125[c], of the shaft, 125, so that the rotation of said shaft by which the bottom of the shock receptacle is swung up for up-ending and ejecting the shock swings the arm, 155, from upstanding position at which the fingers, 190, extend across the otherwise open side of the shock receptacle for stopping the butts of the bundles in the accumulation of the shock down to a substantially horizontal position extending off stubbleward from the frame bar, 31, with the fingers, 190, extending fore-and-aft under the butts of the shock, which by the ejecting movement

is set up on the stubble outside the machine. The fingers, 190, preferably extend, as shown, from the outer or under side of the arm, 155, for a very short distance and are then bent so as to extend rearwardly parallel with the rock shaft. The short offset, 190[a], being designed to be sufficient to reach the stubble so that the shock while resting on the fingers will be practically supported by the stubble and will not have its weight carried by the fingers to any large extent, and the fingers being thus free to withdraw from under the shock as the machine advances after the latter is ejected and set up on the stubble. In order to prevent the tendency of the shock to tip forward when the butts reach the stubble, such tendency resulting from the momentum of the movement of the shock with the machine by which it has, up to that point, been carried, there is provided a stop arm, 184, which is pivoted at 184[a], at the forward side of the receptacle, and extends thence in a fore-and-aft vertical plane to a point which, when an arm is horizontal, is outside the shock when the latter is set up on the stubble, and at such point, 184[b], it is bent rearward, forming a stubbleward guard, 184[c]. This arm, pivoted as described, is connected by a link, 187, with the arm, 155, so that the rocking of the shaft, 154, carrying the arm, 155, from upstanding horizontal position swings the guard arm down stubbleward in front of the shock, its rearwardly extending arm, 184[c], passing down outside the shock, so that the latter is checked against a tendency to fall either forward or stubbleward when it is ejected from the machine and the butt strikes the stubble.

On the rear end of the rock shaft, 154, there is attached a lever arm, 191, having in its end an eye, 191[a], for the binding cord, 192, which runs from the cord receptacle, 193, to said eye and thence through an eye, 194, of a small bracket mounted at the rear end of the frame bar, 6, to the eye of the needle or binder, 115. The length of the arm, 190, in view of the arc through which it swings, is calculated to be sufficient to draw nearly enough cord to serve substantially for encompassing the shock, and the binder arm is relieved of the duty of drawing the cord for this purpose, except to such extent as the slack drawn by the arm, 190, may be intentionally made a little less than required, so that the cord may receive a little tension in the finishing movement of the binder arm for encompassing the shock with the cord.

I claim:—

1. In combination with a harvester frame, a grain shocker having a rigid frame pivotally attached thereto at the stubbleward side, the axis of the pivotal connection being fore-and-aft, and having for its support, in addition to its pivotal attachment to the harvester frame, two caster wheels, one at the stubble-side and the other at the grain-side further rearward than the stubble-side wheel.

2. A shocker for a grain harvester, comprising, in combination with the harvester frame, a rigid shocker frame pivotally attached to the harvester frame at a fore-and-aft pivot line, and supported by the harvester frame, said shocker frame comprising a shock receptacle at the rear end, the supports for such frame, in addition to the harvester frame, being a caster wheel opposite the shock receptacle at the grainward side, and a second caster wheel at the stubbleward side forward of the shock receptacle.

3. A grain shocker comprising, in combination with the harvester frame, a rigid shocker frame pivotally connected to the stubbleward side of the harvester frame at a fore-and-aft pivot line and supported by the harvester frame with capacity for rocking about such pivot, the support for the stubbleward side of the shocker frame being a caster wheel located opposite the rear end of the pivotal connection of said frame to the harvester frame.

4. In combination with a harvester frame, a shocker frame pivoted thereto at the stubbleward side by a fore-and-aft pivot, having a shock receptacle located rearward of the rear line of the harvester frame and beyond the rear pivotal connection of the two frames, the support of the shocker frame other than the harvester frame consisting of a caster wheel at the stubbleward side forward of the shock receptacle, and a caster wheel at the grainward side opposite the shock receptacle.

5. A shocker for a grain harvester comprising a cradle for receiving the bundles from the harvester deck mounted for swinging about a vertical pivot at the rear end from a position parallel with the line of travel to a position transverse thereto; a trip arm on the cradle in position to receive the impact of a bundle delivered thereinto from the harvester deck; mechanism for swinging the cradle to and from said transverse position and means by which it is tripped into action by the bundle lodging against said trip arm; an elevator extending inclined upward and rearward from the transverse position to which the cradle swings; mechanism for operating the elevator and means by which it is tripped into action by the cradle when it reaches said transverse position.

6. In a shocker for a grain harvester, in combination with a cradle for receiving the bundles from the harvester and carrying them to a position transverse to the line of travel; an elevator which receives the bundles at that position and carries them up rearward; a shock receptacle into which the bundles are delivered by gravity from the elevator in such transverse position; a binder which binds the bundles constituting the

shock in the receptacle; means for adjusting the binder to the length of the bundles, and connections from the binder frame to the elevator for adjusting the latter with the binder.

7. In a shocker for a grain harvester, means for receiving the bundles from the harvester and turning them to a position transverse to the line of travel of the machine; a shock receptacle and a binder for binding the shock therein, mounted for movement transverse to the line of travel; an elevator intermediate the turning devices and the shock receptacle comprising a carrier for the butts located stubbleward of the vertical plane of the extreme stubbleward position of the binder arm or needle; a plurality of additional carriers having the frame on which they are mounted connected for transverse movement of the binder frame, such additional carriers being located grainward of the vertical plane of the binder arm, and means for moving the binder frame transversely.

8. In a shocker for a grain harvester, in combination with means for receiving the bundles from the harvester and turning them to a position transverse to the line of travel of the machine; a shock receptacle and a binder for binding the shock prostrate therein; an elevator intermediate the turning devices and the shock receptacle; a rigid shocker frame supporting all said devices, the binder frame being mounted for transverse movement on said shocker frame, the elevator comprising carriers for lifting the bundle and a frame on which they are mounted lodged and movable transversely on the rigid shocker frame, and a hand lever and connections by which it gives both the elevator frame and the binder frame their said transverse movement.

9. A shocker for a grain harvester comprising, in combination with the rigid shocker frame, mechanism mounted thereon for turning the bundles to a position transverse to the line of travel; a shock receptacle and a binder for binding the shock prostrate in such receptacle; a bundle elevator intermediate the turning devices and the shock receptacle comprising a carrier frame which is mounted for right and left movement on the rigid shocker frame; a rock shaft on said frame; a double-acting ratchet wheel rigid with the rock shaft; a hand lever pivoted loose on the rock shaft and a pawl connected therewith for operating the ratchet wheel, and connections from the rock shaft for moving both the elevator frame and the binder frame.

10. In a shocker for a grain harvester, in combination with a rigid shocker frame and means for pivotally connecting it to the harvester frame; a shaft on the shocker frame and means for operatively connecting it with a continuously rotating wheel on the harvester frame; a train continuously operated by said shaft on the shocker frame comprising a wheel for operating a bundle-turning mechanism, a wheel for operating a bundle-elevating mechanism, a wheel for operating a shock-binding mechanism, and a wheel for operating a shock-discharging mechanism; a bundle-turning mechanism, a bundle-elevating mechanism, a shock-binding mechanism and a shock-discharging mechanism; clutches for connecting the several wheels in said continuously operating train with said several mechanisms respectively; means for tripping the bundle-turning mechanism in connection with its said wheel by the delivery of the bundle from the harvester; means for tripping the elevating mechanism into connection with its said wheel by the delivery of the bundle from the turning mechanism; means for tripping the shock-binding mechanism into connection with its said wheel upon the delivery of a predetermined number of bundles to the shock receptacle, and means for tripping the shock-discharging mechanism into connection with its wheel by the completion of the cycle of the binder's action.

11. In a shocker for a grain harvester, in combination with a bundle-elevating mechanism and means for delivering the bundles thereto comprising an elevator driving train having therein a clutch wheel, a second wheel making a full revolution in a predetermined maximum number of revolutions of the clutch wheel; a third wheel operated by the elevator train having a binder tripping cam thereon, said third wheel making one complete revolution for a predetermined number of revolutions of said second wheel, and being movable, the bearing of said wheel being adjustable to adapt it for the substitution therein of binder tripping wheels of different size to make a complete revolution in a different number of revolutions of said second wheel.

12. In a grain shocker, a bundle elevator and means for delivering the bundles thereto; a shock-receptacle in which the elevator delivers the bundles, and a binder for binding the shock therein; means for tripping the elevator into action by the delivery of a bundle thereto; means for arresting the elevating action after each tripping when the bundle which operates the tripping device has been carried up a step less in length than the full travel of the elevator; means for interfering with the action of the arresting device; a wheel in the elevator train which makes a complete revolution for a predetermined number of normal steps of the elevator's action plus an additional step which is a multiple of the normal step; a cam on said wheel which operates said interrupting device, said cam being extended about the circumference of the wheel a distance corresponding to the

length of said multiple step; a wheel operated by the elevator train and a cam thereon for tripping the binder train into action, said wheel making one complete revolution for a predetermined number of revolutions of said cam-carrying wheel, said binder-tripping wheel being removable and having its bearing adjustable and adapted for the substitution therein of binder-tripping wheels which are a different multiple of the driving wheel, to vary at will by such substitution the number of deliveries into the shock receptacle necessary to trip the binder.

13. In a grain shocker, in combination with a shock receptacle; a binder for binding the shock prostrate therein; mechanism for up-ending and discharging the shock; a continuously driven shaft in the shocker train; a shaft for operating the up-ending and discharging mechanism; clutch devices for connecting the two shafts; a trip for operating said clutch devices to effect engagement, and a cam on the main binder shaft which operates said trip at the closing part of the binding action.

14. A grain shocker, in combination with a shock receptacle, means for binding the shock prostrate therein; means for up-ending and discharging the shock comprising a shaft for operating the up-ending and discharging mechanism; a continuously driven shaft in the shocker train and a clutch for connecting it with the shock-operating shaft; means in the binder train for tripping said clutch to effect engagement and means for bringing the shock-operating devices to rest.

15. In a grain shocker, in combination with a shock receptacle; means for accumulating the bundles prostrate therein; a binder for binding them prostrate in the receptacle; means for uptilting and discharging the bound shock, and means connected with the shock-discharging devices for drawing slack cord for the binder arm in the discharging movement.

16. In a grain shocker, in combination with a shock receptacle and means for accumulating bundles therein to form a shock; a binder for binding the shock prostrate in such receptacle; means for uptilting the shock and discharging the same from the receptacle; an arm connected with said uptilting and discharging devices having means for engaging the cord running from the cord receptacle to the binder arm for drawing out cord during the discharge movement of the shock for encircling the next shock.

17. In a grain shocker, in combination with a shock receptacle and means for accumulating the bundles therein to form a shock; a binder for binding the shock in the receptacle; means for expelling the shock from the receptacle and means operated in the shock-expelling movement for drawing slack cord to encircle the next shock.

18. In a grain shocker, in combination with a shock receptacle; means for delivering the bundles thereinto to form a prostrate shock; a binder for binding the shock prostrate in the receptacle; a bottom for said receptacle; means for tilting said bottom board upward outwardly to upset and discharge the shock; a gate for closing the discharge mouth of the shock receptacle while the shock is being accumulated and bound, comprising fore-and-aft extending rods and a bar connecting them at their forward ends, said rods being unconnected at the rear and adapted to support the shock at the butts of the bundles while it is being tilted for discharge and to withdraw from under the bundles in the advance of the machine after discharge.

19. In a grain harvester, in combination with a shock receptacle in which the bundles are accumulated prostrate; means for binding the shock prostrate in such receptacle, the floor of the receptacle being mounted pivotally at the stubble side for tilting transversely upward and outward to upset and discharge the shock; a shock stop arm pivoted at the forward side of the shock receptacle for swinging in a transverse vertical plane and having at its extremity a rearwardly extending guard arm, and connections from the floor-operating means to said shock stop arm for swinging it outward in front of the shock with its guard arm extending rearwardly stubbleward of the shock in the discharging action.

20. In a grain harvester, in combination with a shock receptacle in which the bundles are accumulated prostrate; means for binding the shock prostrate in such receptacle; a bottom for said receptacle pivoted at the stubble side and means for tilting it upward outwardly to upset and discharge the shock; a gate for closing the discharge mouth of the shock receptacle while the shock is being accumulated and bound, mounted for pivotal movement about a fore-and-aft axis at the lower stubble side of the shock receptacle to carry it stubbleward and downward on to the stubble; connections from the floor-tilting means for so rocking the gate when the floor is tilted upward, and a shock stop device consisting of an arm pivoted at the forward side of the shock receptacle for swinging in a transverse vertical plane, and connections from the gate to said shock stop by which the latter is swung into shock-stopping position when the gate is swung downward.

21. In a grain harvester, in combination with a shock receptacle; means for accumulating bundles therein to form a shock; means for discharging the shock erect; a gate for barring the discharge side of the shock receptacle comprising fore-and-aft rods and a cross bar connecting them at their forward ends, said bar being pivoted at the lower forward

stubbleward corner of the receptacle, and means for tilting it outward from upright to horizontal position in the shock-discharging action.

22. In a grain harvester, in combination with a shock receptacle; means for accumulating bundles therein to form a shock; means for discharging the shock erect; a gate barring the discharge side of the shock receptacle comprising fore-and-aft extending rods and a bar which connects their forward ends, said bar being pivoted at the lower forward stubbleward corner of the receptacle; means for rocking it about its pivot outward from upright to horizontal position in the shock-discharging action; a shock stop bar pivoted to the shock receptacle at the upper part of the forward side; a link connecting said bar with the gate cross bar for swinging the shock stop bar down to horizontal position in front of the shock in the shock-discharging movement.

23. In a grain harvester, in combination with a shock receptacle; means for accumulating bundles therein to form a shock; means for discharging the shock erect; a gate for barring the discharge side of the receptacle; a shock stop bar pivoted to the shock receptacle at the upper part of the forward side; means connected with the gate for swinging said shock stop bar outward from upright horizontal position in the shock-discharging action, said shock stop bar having a guard arm extending rearward from its extremity for guarding the discharged shock at the stubbleward side.

24. In a grain shocker, in combination with a receptacle in which the bundles are accumulated prostrate to form a shock; a binder for binding the shock prostrate in the receptacle, said receptacle having a bottom pivoted at the stubbleward side of the receptacle and adapted to be rocked up and out stubbleward for upsetting and discharging the shock; a gate for closing the receptacle at the discharge side comprising a fore-and-aft rock shaft mounted below the discharge side; an arm at the forward end of the rock shaft upstanding therefrom at closed position of the gate, and bars or fingers projecting off rearwardly from said arm across the discharge opening, and connections from the bottom-operating mechanism for opening the gate when the bottom is tilted upward for discharging the shock.

25. A grain shocker comprising a shock receptacle in which the bundles are accumulated prostrate to form a shock, said receptacle having a bottom pivoted at the lower edge of the stubbleward side of said receptacle, and means for tilting it upward and outward to up-end and discharge the shock; an arm connected with said tilting bottom for swinging transversely in a vertical plane as the bottom is tilted, said arm being provided with means engaging the binder cord to draw the cord from the cord receptacle in the discharge movement of the shock to supply the needle for binding the next shock.

26. A grain shocker comprising a shock receptacle and means for accumulating bundles prostrate therein to form a shock; a binder for binding the shock prostrate in the receptacle, the binder arm of such binder being mounted at the upper rear side of the receptacle; a cord receptacle mounted at the rear of the shock receptacle adapted to render the cord to the back of the binder arm, said shock receptacle comprising a bottom for supporting the shock prostrate during binding which is pivoted at the lower edge of the stubbleward side of the receeptacle; means for tilting said bottom upward and outward to discharge the shock; a pivoted arm at the rear of the shock receptacle to which the cord runs intermediate the cord receptacle and the binder arm, and connections from the tilting shock-receptacle bottom for swinging said arm.

27. A grain shocker comprising a shock receptacle and means for delivering bundles prostrate thereinto to form a shock, said receptacle having a bottom fulcrumed at the lower stubbleward side for tilting upward and stubbleward to up-end and discharge the shock; a fore-and-aft cranked shaft fulcrumed on the shocker frame and extending underneath said tilting bottom, the cranks of said shaft being offset from the axis at the front and rear of the receptacle; links from said front and rear cranks, respectively, connected with the tilting bottom at a line back of or under the same at such position grainward from its fulcrum that the links extend below the axis of the rock shaft to reach the crank wrist at the rest position of said bottom, said crank shaft being revolved in direction to carry its cranks downward from said position for tilting the bottom upward.

28. In a grain shocker, in combination with means for turning the bundles and delivering them to an elevator; an elevator for carrying them up rearward for delivery into a shock receptacle; a shock receptacle at the rear of such elevator adapted to receive the bundles for binding prostrate to form a shock; shock-discharging mechanism adapted to up-end the shock and discharge it stubblewardly from the receptacle; a horizontal main binder shaft extending right and left at the forward side of the shock receptacle; a binder-arm or needle rock-shaft at the rear of said receptacle; a fore-and-aft rock shaft extending past the grain side of the receptacle and operating means at the forward end for rocking it; lever arms on said rock shaft, respectively behind and in front of the shock receptacle; connections from the forward lever arm for adjusting the binder frame; a lever arm fulcrumed on the shock

receptacle frame at the rear thereof; a link connecting the rear rock-shaft lever arm with said last-mentioned lever arm, and a link from said last mentioned lever arm to the needle rock-shaft-bearing for sliding said rock-shaft with the binder.

29. In a grain shocker, in combination with a shock receptacle; shock-discharging devices for up-ending the shock and discharging it stubblewardly from such receptacle; a binder comprising a binder frame at the forward side of such receptacle and the binder-arm or needle rock shaft at a higher position at the rear side thereof, said binder frame and said needle rock-shaft being adjustable transversely of the line of travel for varying lengths of bundles; a fore-and-aft rock shaft extending past the grainward side of the shock receptacle; means at the forward end for rocking it; a lever arm fulcrumed on the rear side of the shock receptacle; a sleeve stopped longitudinally on the needle rock shaft and a link connecting said lever arm to said sleeve, said fore-and-aft extending rock shaft having equal lever arms, one in front and the other behind the shock receptacle, the first being connected with the binder frame and the second being connected with the first-mentioned lever arm on the shocker frame at the pivot thereto of the link which extends from said arm for transmitting from the rocking of said shaft equal movement to the needle rock shaft and binder frame.

30. In a grain shocker, in combination with a shock receptacle, binding mechanism comprising a binder frame at the forward side of the shock receptacle and a needle rock shaft at the rear thereof, both adjustable transversely to the line of travel for varying lengths of bundles, the needle rock shaft being journaled on the shocker frame at a higher level than the main binder shaft on the binder frame; operating connections from the main binder shaft on the binder frame to the needle rock shaft extending past the grainward side of the shock receptacle; a sleeve stopped longitudinally on the needle rock shaft at the grainward side of the shock receptacle; means for sliding the binder frame at the forward side and the needle rock shaft at the rear side of the shock receptacle, comprising a fore-and-aft horizontal rock shaft extending past the rear side of the shock receptacle; means at the forward end for rocking the shaft; two lever arms on said rock shaft, one in front of and the other behind the shock receptacle, of equal length, the former connected with the binder frame; a third lever arm fulcrumed on the rear side of the shock receptacle frame equal in length to said rock shaft lever arms; a link connecting it with the rear of said rock shaft lever arms equal in length to the pivotal distance from the rock shaft to said third lever arm, and a link from the pivotal connection of said last-mentioned link and said third lever arm to said sleeve on the needle rock shaft.

31. In a grain shocker, in combination with a shock receptacle and means for accumulating bundles therein prostrate transverse to the line of travel to form a shock for binding; binding mechanism comprising a binder frame at the forward side and a needle rock shaft at the rearward side of the shock receptacle; a crank on the main binder shaft journaled in the binder frame; a lever arm on the needle rock shaft and a link connecting them extending past the grainward side of the shock receptacle; means for adjusting the binder frame and the needle rock shaft transversely to the line of travel for bundles of different lengths, comprising a rock shaft which extends fore-and-aft past the grainward side of the shock receptacle, and connections therefrom to the binder frame and the needle rock shaft for transmitting equal movement to said parts by any given rocking movement of the rock shaft.

32. In a grain shocker, in combination with a bundle-elevating mechanism and a shock receptacle in which the bundles are delivered from the elevator; binding mechanism comprising a binder frame at the forward side of the shock receptacle and a needle rock shaft and a needle arm at the rear side thereof; the bundle-elevating mechanism comprising endless carriers for elevating the bundles; wheels at the upper and lower ends of the course of the carrier, by which they are actuated and carried; track plates for the elevator carriers; bearings for the operating wheels of such carriers attached rigidly to such track plates; a rigid elevator frame having transverse plates upon which said carrier track plates are lodged with capacity for lateral movement; means for guiding them in such movement; means for sliding the binder frame and needle rock shaft, and connections from the binder frame to said elevator-carrier track-plates for moving them and thereby said carrriers with the binder frame.

33. In a grain shocker, in combination with an elevator for lifting the bundles; a shock receptacle into which the bundles are delivered from the elevator; a binding mechanism comprising a binder frame at the forward side and a needle rock shaft at the rear side of the shock receptacle; operating connections from the binder shaft and the binder frame to the needle rock shaft; means for sliding the binder frame and the needle rock shaft longitudinally of the binder shaft and needle rock shaft; the elevating mechanism comprising a plurality of endless carriers; wheels by which they are respectively carried and actuated; track plates for said carriers, and journal bearings for such wheels mounted rigidly on the track plates; a rigid elevator frame having transverse plates upon which said track plates are lodged with capacity

for adjustment longitudinally thereof, the track plates being rigidly connected, and positively operating connections from the stubbleward track plate to the binder frame for adjusting the elevator carriers with the binder.

34. In a grain shocker, a bundle elevator and a shock receptacle in which the bundles are delivered from the elevator-shock-binding mechanism comprising a binder frame mounted for adjustment transversely of the planes of movement of the elevating mechanism, said elevating mechanism comprising endless carriers, wheels by which they are actuated and carried, said wheels being mounted on their shafts for sliding longitudinally thereof; a rigid elevator frame having transverse plates; track plates for the elevator carriers lodged on said transverse elevator frame plates with capacity for lateral adjustment; means extending from said track plates engaging the elevator carrier wheels for sliding them laterally on their respective shafts, and operating connections from the binder frame to the track plates for moving them laterally with the binder frame.

35. In a grain shocker adapted to be attached to the stubble side of a harvester frame comprising a cradle in position to receive the bundle delivered from the harvester binder deck, such cradle being mounted for movement to carry the bundles away from the deck and comprising transversely-extending bundle-supporting arms; guards mounted on said arms respectively at the harvester side having guard fingers extending back grainwardly under the binder deck and projecting stubblewardly past the lower edge of such deck.

36. A grain shocker adapted to be attached to the stubble side of a harvester frame comprising a cradle in position to receive the bundle delivered from the harvester binder deck, such cradle being mounted for movement to carry the bundles away from the deck and comprising transversely-extending bundle-supporting arms; guards mounted on said arms respectively at the harvester side having guard fingers extending back grainwardly under the binder deck and projecting stubblewardly past the lower edge of such deck, such guards comprising each a fitting adjustable right and left on the cradle arm, and a guard finger having a transversely extending stem by which it is adjustable up and down in said fitting.

In testimony whereof, I have hereunto set my hand, in the presence of two witnesses, at Plano, Illinois, this eighth day of January, 1907.

JOSEPH BODA.

In the presence of—
IVAN H. SMITH,
WILLIAM C. THOMPSON.