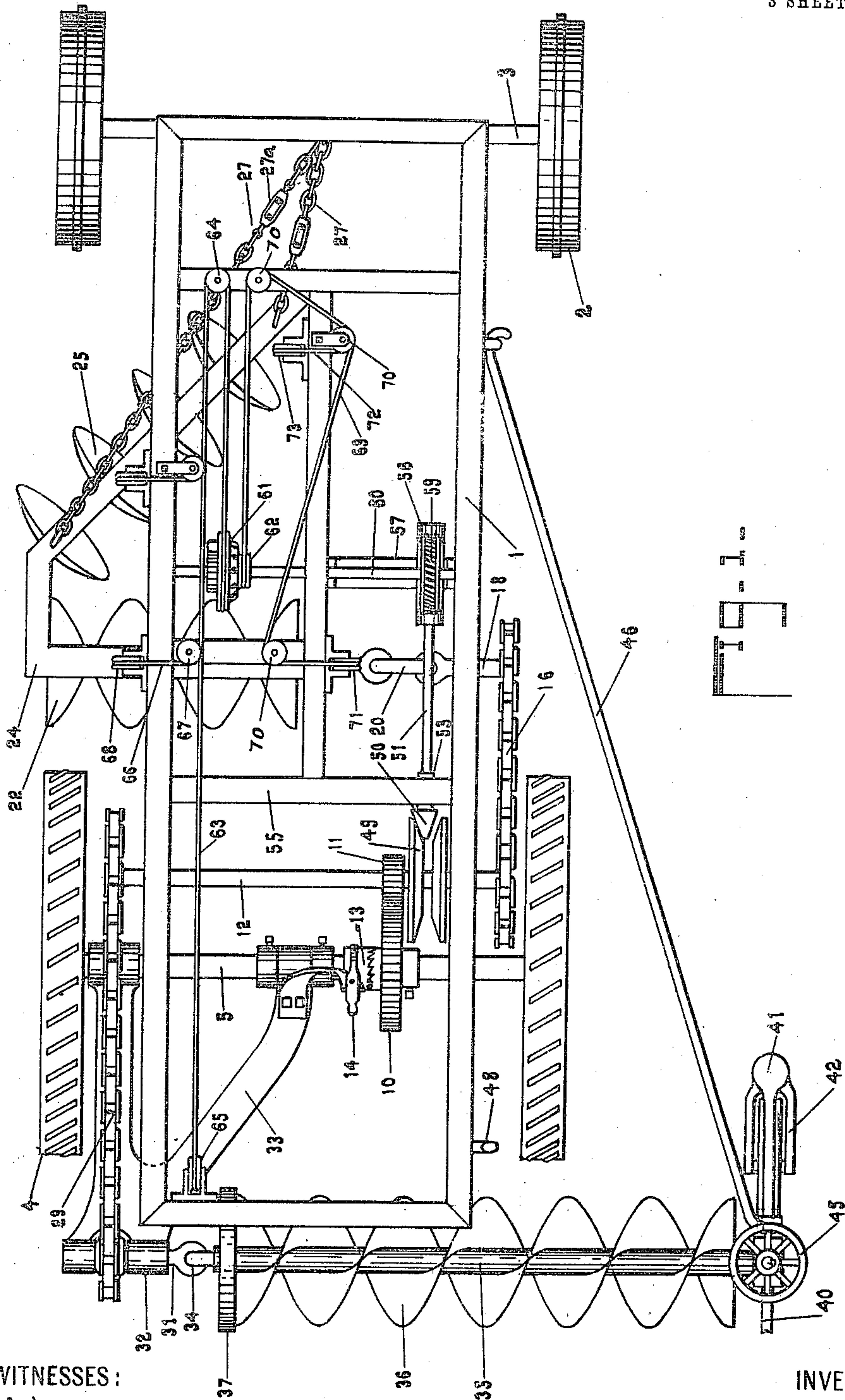


982,944.

J. B. FENDER.  
ROAD GRADER.  
APPLICATION FILED OCT. 19, 1909.

Patented Jan. 31, 1911.  
3 SHEETS—SHEET 1.



WITNESSES:

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*A. S. Knight*

INVENTOR

*John Brown Fender*

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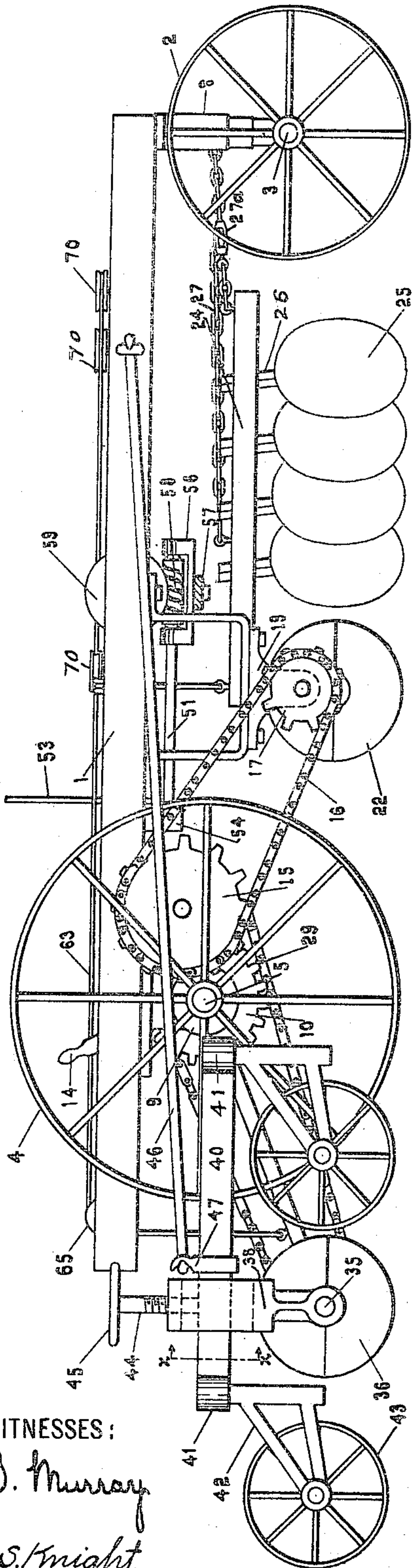
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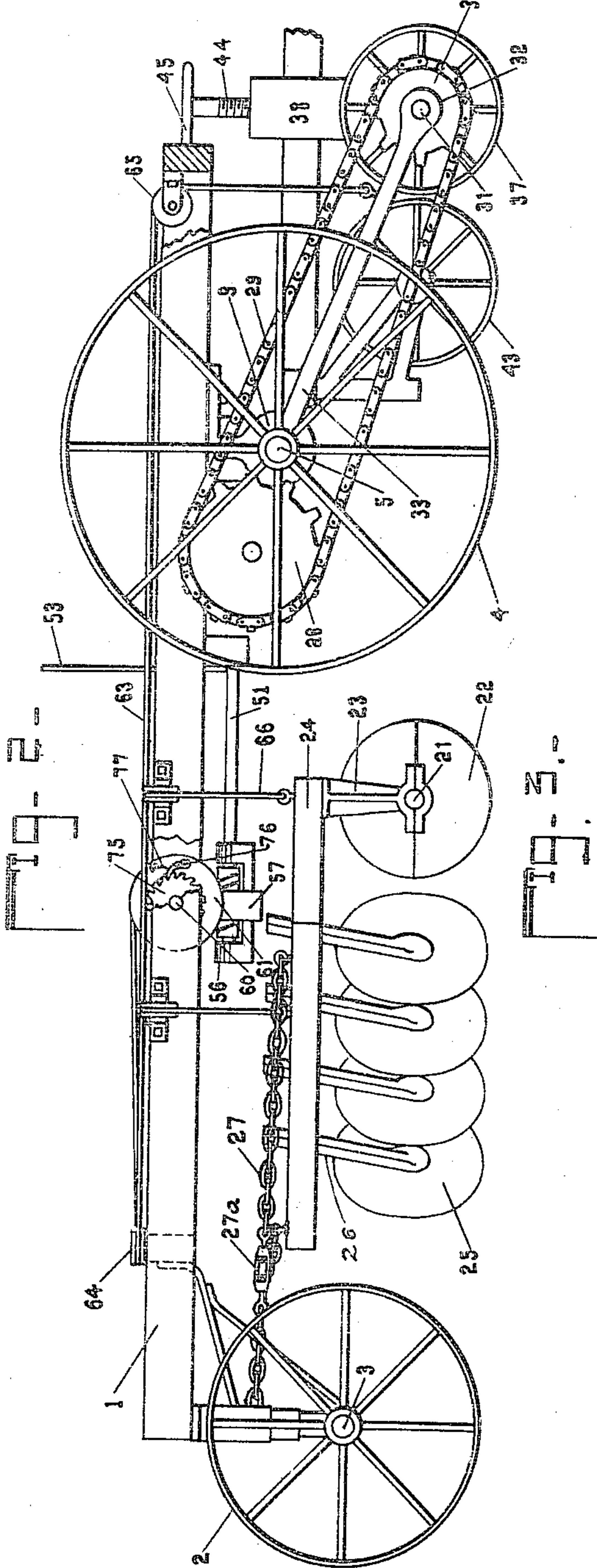
Patented Jan. 31, 1911.

3 SHEETS-SHEET 2.



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3 SHEETS—SHEET 3.

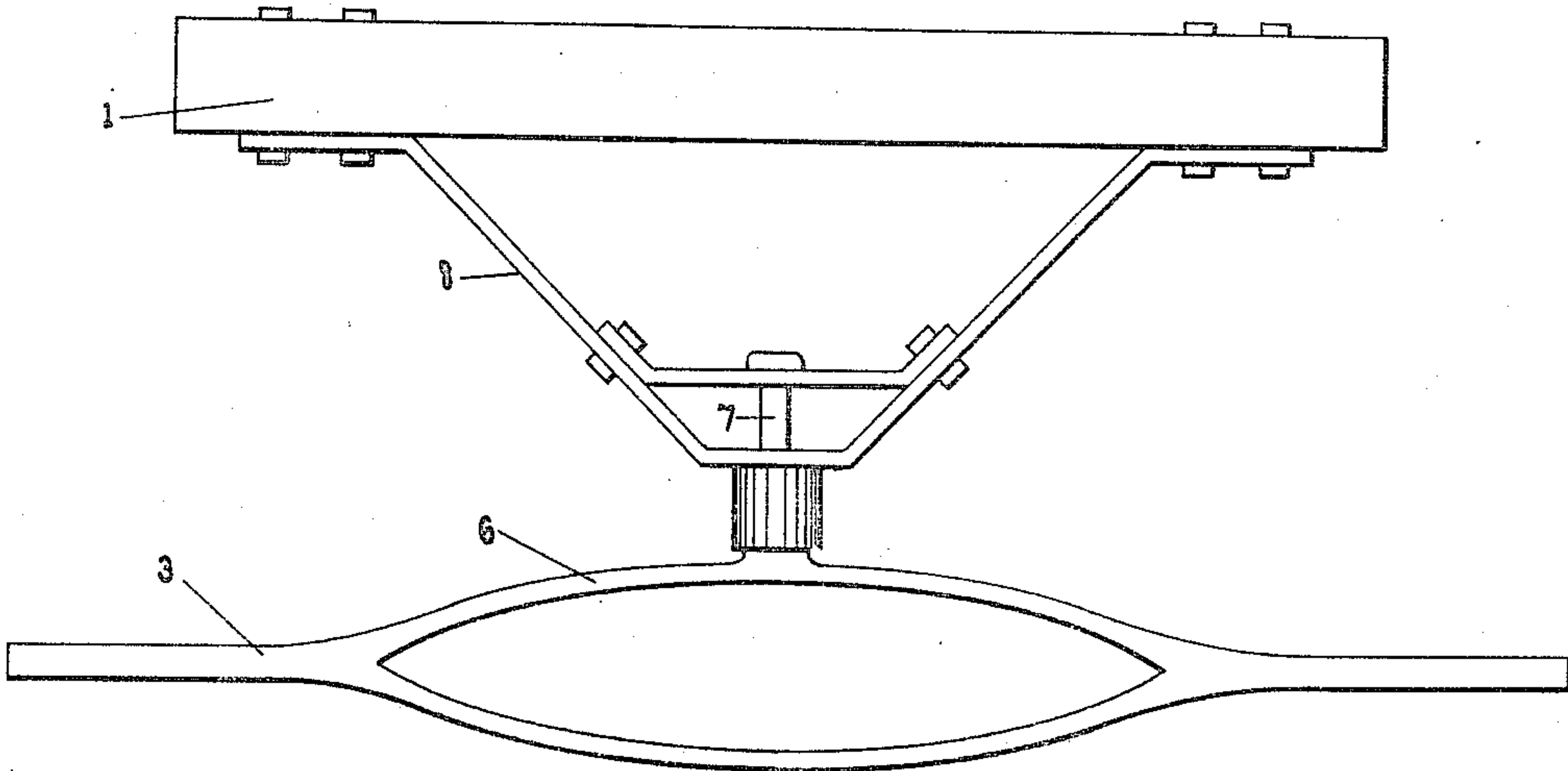


Fig. 4.

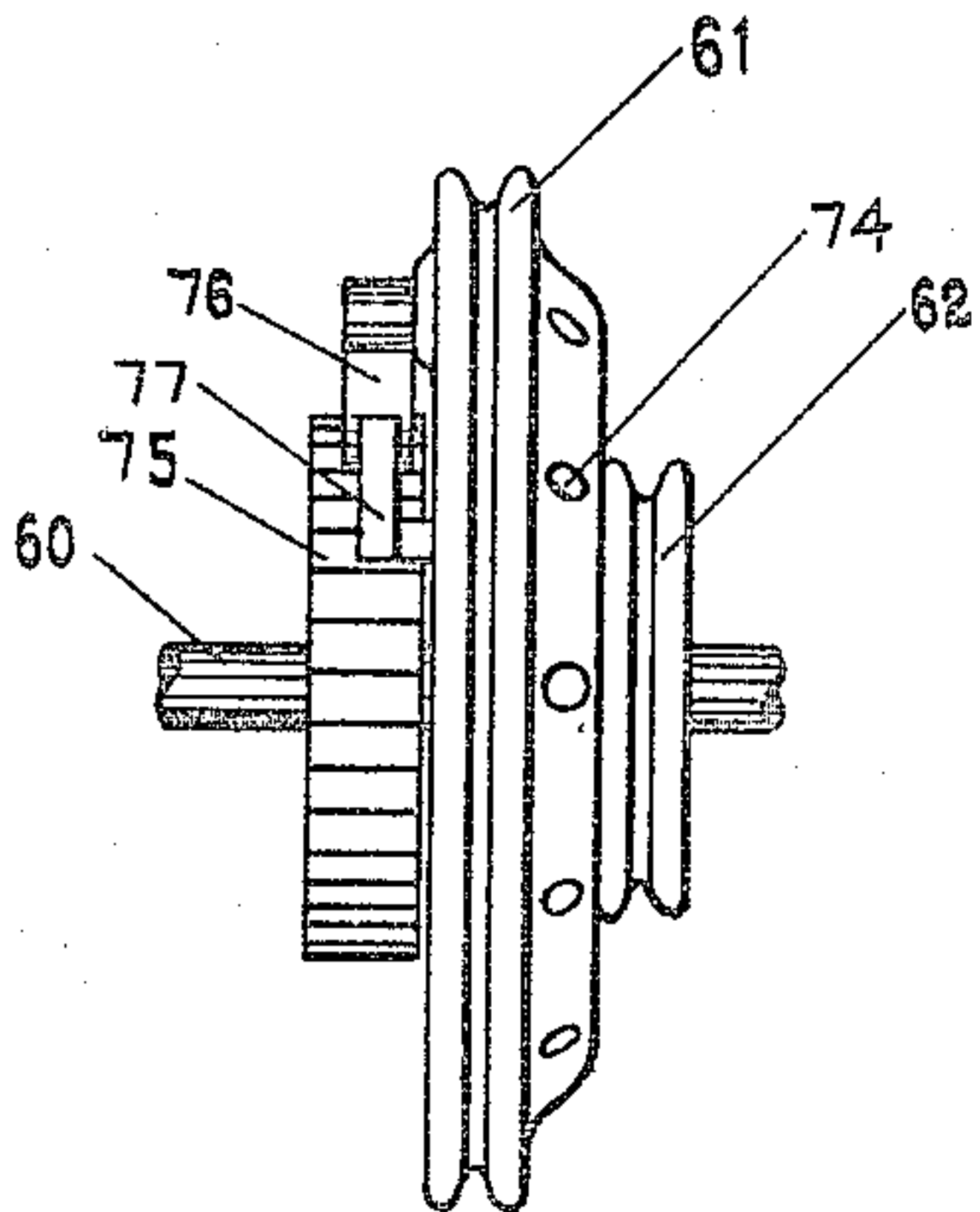


Fig. 5.

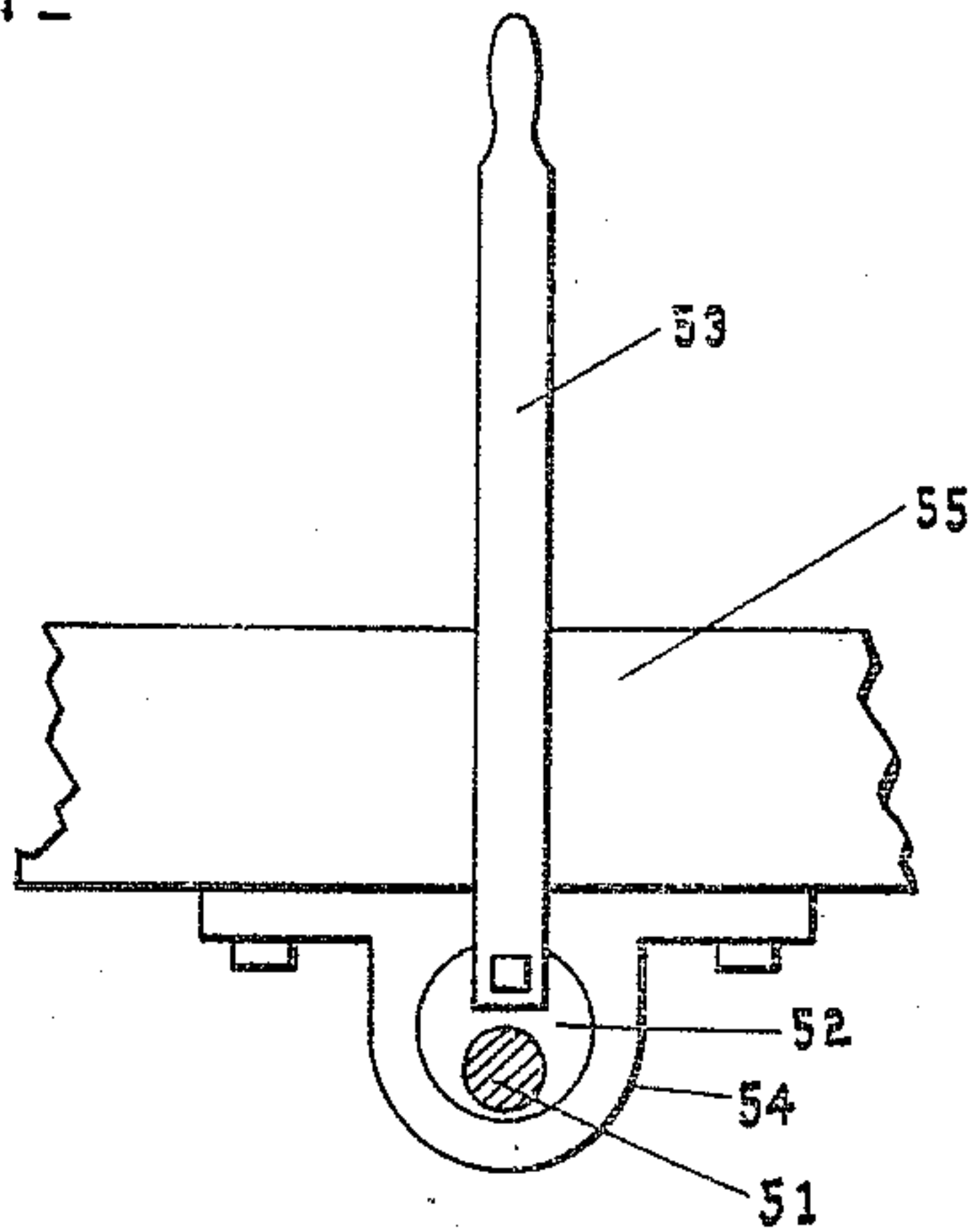


Fig. 6.

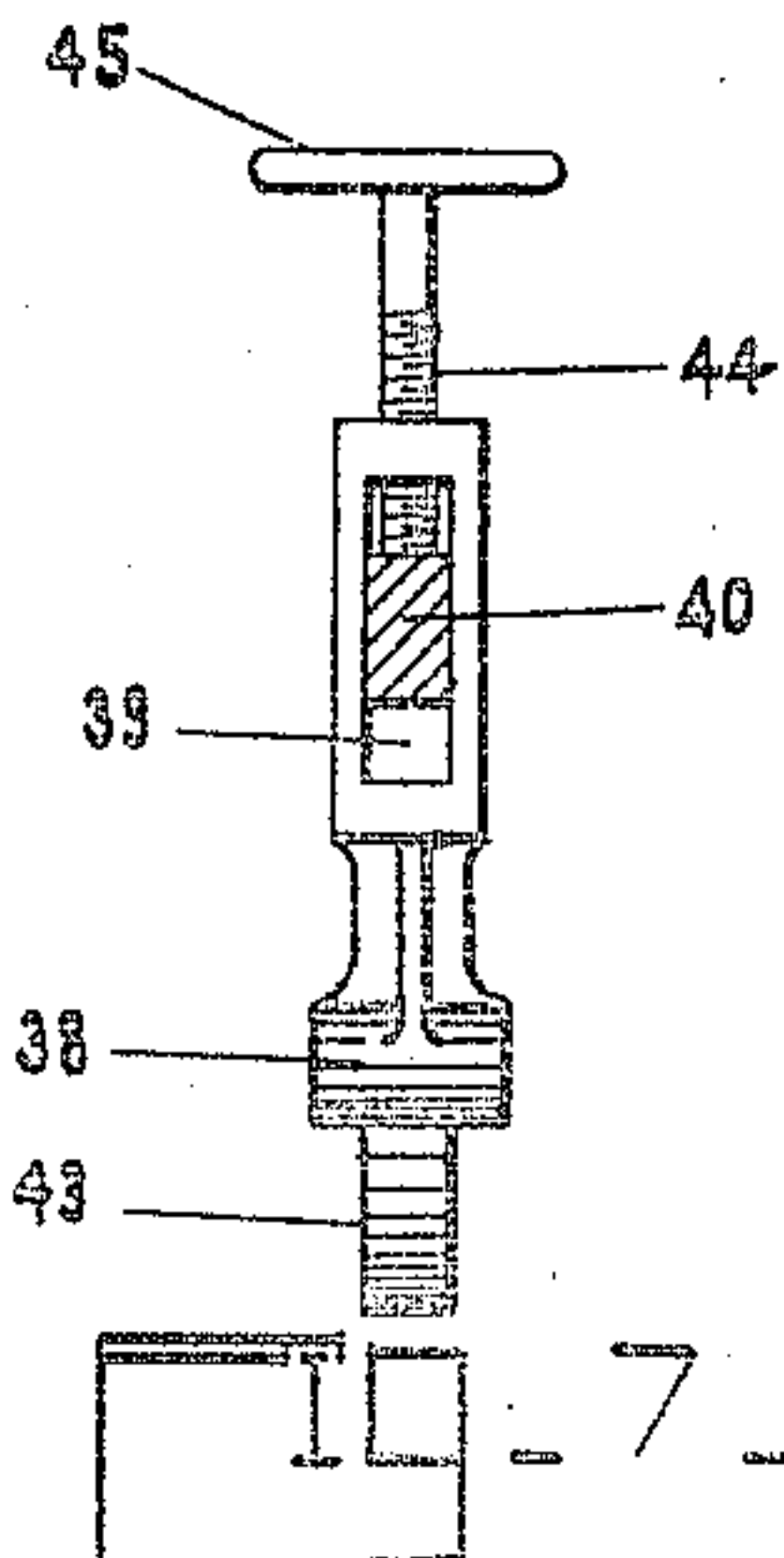


Fig. 7.

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# UNITED STATES PATENT OFFICE.

JOHN BROWN FENDER, OF KAUFMAN, TEXAS.

## ROAD-GRADER.

982,944.

Specification of Letters Patent.

Patented Jan. 31, 1911.

Application filed October 19, 1909. Serial No. 523,462.

*To all whom it may concern:*

Be it known that I, JOHN BROWN FENDER, a citizen of the United States, residing at Kaufman, in the county of Kaufman and State of Texas, have invented certain new and useful Improvements in Road-Graders, of which the following is a specification.

My invention relates to new and useful improvements in road graders. Its object is to provide a road grader adapted to simultaneously excavate a ditch at the side of a road, and to distribute the dirt from said ditch at a proper gradient upon the road.

A further object is to provide a road grader, employing a number of rotatably mounted disks to excavate a ditch, and spiral conveyers to properly distribute the dirt from the ditch upon the road.

A still further object is to provide means whereby the working height of the disks and conveyers may be adjusted, and by which the said parts may be operated at various angles according to the grades of the ditch and the road.

Finally, the object of the invention is to provide a device of the character described, that will be strong, durable, simple and efficient, and comparatively easy to construct, and also one in which the various parts will not be likely to get out of working order.

With these and various other objects in view my invention has relation to certain novel features of construction and operation, an example of which is described in the following specification, and illustrated in the accompanying drawing, wherein:

Figure 1 is a top view of the road grader complete, with the exception that a portion of the two-wheeled frame, in which the outer extremity of the rear conveyer is rotatably mounted, is broken away. Fig. 2 is a right side view of the complete machine. Fig. 3 is a left side view, with a portion of said two-wheeled frame again broken away, and portions of the main frame broken away at the side to show mechanism therebehind. Fig. 4 is a view showing the swivel attachment of the front axle to the main frame. Fig. 5 is a detail of a pair of rigidly connected sheaves loose upon a shaft, and an adjacent ratchet wheel fast upon the shaft, the teeth of which are engaged by a spring pressed dog carried by the larger of the two

sheaves. These form a portion of the mechanism employed to elevate the disks and conveyers and their purpose is made clear hereinafter. Fig. 6 is a detail of a reversing lever by which the mechanism for elevating the disks and conveyers is controlled, said lever being attached to a rotatable journal in which a shaft is eccentrically mounted. Fig. 7 is a detail transverse elevation of the afore-mentioned two-wheeled frame, taken on the section line  $x-x$  of Fig. 2 as indicated by the arrows.

Referring now more particularly to the drawings, wherein like numerals of reference designate similar parts in all the figures, the numeral 1 denotes the main frame of the road grader. This frame is carried by forward transporting wheels 2, rotatable upon an axle 3, and rear transporting wheels 4 fast upon an axle 5. The forward axle is split, the split portions curving up and down to form springs 6. A pin 7, projecting upward from the upper spring is pivoted in a suitable hanger 8 supported from the frame 1.

The rear axle is rotatably mounted in bearings 9, secured to the frame 1, and serves as a driving shaft from which rotation is communicated to the conveyers and to the mechanism for raising and lowering the conveyers and disks. This is accomplished by mounting a large gear 10 loose upon the axle, and engaging the same with a pinion 11 fast upon a countershaft 12. The gear 10 carries clutch teeth upon its side, adapted to be engaged by a sliding clutch 13 splined upon the axle. A lever 14 operates the clutch in the usual manner, making it possible to discontinue the rotation of the countershaft 12 at will, while the grader is in motion.

A sprocket wheel 15, fast upon the right extremity of the countershaft, communicates rotation through a chain 16, to a sprocket wheel 17, fast upon a stud shaft 18, journaled in a bearing 19. The shaft 18 is attached by a link 20 to the shaft 21 of a spiral conveyer 22. The link 20 permits the conveyer shaft to be adjusted vertically without interrupting the rotation. The shaft 21 is rotatably mounted in a pair of bearings 23, supported from the rear of a supplementary frame 24. A number of disk plows 25 are rotatably mounted in bearings 26, attached to the front of the



supplementary frame. Chains 27 extend from the forward portion of the supplementary frame to the pin 7, causing said frame to be dragged along beneath the road grader when the latter is in motion. The lengths of these chains are made adjustable by turn buckles 27<sup>a</sup>.

Upon the left extremity of the countershaft 12 is mounted a sprocket wheel 28. A chain 29 communicates rotation from said sprocket wheel to a sprocket wheel 30 rigid upon a stud shaft 31. This latter shaft is journaled in a bearing 32 at the lower extremity of a swinging bracket 33 the upper extremity of which is pivotally mounted upon the rear axle 5. The shaft 31 has a flexible connection at a point 34 to the shaft 35 of a spiral conveyer 36 mounted at the rear of the road grader. A wheel 37 rigid upon the left extremity of this conveyer shaft serves to elevate the conveyer slightly from the ground, to lessen the friction therewith. The right extremity of the conveyer shaft 35 is mounted in a hanger 38, the upper portion of which is provided with a slot 39 transverse of the bearing. Through this slot, there passes a horizontal bar 40 having vertical journal boxes 41 at each extremity. Brackets 42, having wheels 43 mounted at their lower extremities, have their upper extremities vertically pivoted in said journal boxes. In order to secure vertical adjustment of the right extremity of the conveyer 36, a screw 44 surmounted by a handwheel 45 is threaded into the upper portion of the hanger 38, its lower extremity being adapted to bear upon the bar 40. By manipulating the hand wheel 45, it is obvious that the hanger 38 may be adjusted up or down within the limits of the slot 39. A rod 46 extends from a hook 47 secured upon the bar 40 to the side of the frame 1, serving to hold the journal box of the hanger 38 in transverse alinement with the bearing 32. This arrangement makes it possible to unhook the rod 46, when the vehicle is crossing a narrow bridge, and to reduce the transverse space occupied, by allowing the conveyer to swing about the connection 34 into longitudinal alinement with the vehicle. The rear end of the rod 46 may be supported at such times upon a hook 48 upon the frame 1.

The mechanism for raising or lowering the supplementary frame 24 and the left extremity of the conveyer 36 is operated from the countershaft 12 by the forward motion of the vehicle. A pair of friction cones 49 are adjacently mounted upon the countershaft 12 and are adapted to be either one engaged by a friction cone 50 upon a transversely adjustable shaft 51. The transverse adjustment of this shaft is accomplished by the mechanism illustrated in Fig. 6, consisting of a bearing 52 in which the

shaft is eccentrically mounted, said bearing being adapted to be rocked by a lever 53, and being mounted in a journal box 54 secured to a transverse beam 55. The forward extremity of the shaft 51 is mounted in a bearing 56. This bearing is mounted upon a transverse beam 57 and is pivoted thereupon to allow for the turning of the shaft 51 when its rear end is shifted. A worm 58 carried by said forward extremity engages a worm wheel 59 rigid upon a transverse shaft 60. Upon this shaft are also mounted loose the two rigidly connected sheaves 61 and 62 illustrated in Fig. 5. A flexible connection 63, attached to the rim of the larger sheave 61 is carried over horizontal pulley 64 and a vertical pulley 65 to the rear of the machine where it is attached to the lower extremity of the bracket 33. Flexible connections 66, spliced on to the connection 63 encircle horizontal pulleys 67 and vertical pulleys 68 and are attached to the left side of the supplementary frame 24. A flexible connection 69 is secured to the rim of the smaller sheave 62 and after passing over the horizontal pulleys 70 and the vertical pulley 71, is attached to the rear right side of the supplementary frame. A flexible connection 72 is spliced on to the connection 69 and after passing over a pulley 73, is attached to the forward right side of the supplementary frame.

It is apparent from the above description that when the sheaves 61 and 62 are so rotated as to unwind the flexible connections attached to their rims, the supplementary frame and the left side of the rear conveyer will be lowered. The sheave 61 is of greater diameter than the sheave 62 in order to produce a more rapid vertical adjustment of the left side of the frame 24 than of its right side, so that when the frame 24 is lowered to its working position, it will lie at the proper angle to cut the ditch. The lever 53 will normally stand vertically, and will be thrown to one side or the other only when it is desired to raise or lower the suspended machinery.

In case it should be necessary to raise or lower the plows and conveyers, while the road grader is not in motion, means are provided to accomplish this manually, consisting in a plurality of holes 74, radially positioned in a hub upon the larger sheave. These holes are adapted to receive the extremity of a crow bar, by which the sheaves may be rotated. The sheaves are loose upon the shaft in order to make their manual rotation possible. A dog and ratchet wheel connection between the larger sheave and the shaft communicates rotation to the sheaves when the plows and conveyers are being mechanically raised, and locks the sheaves against reverse rotation when the plows and conveyers are being elevated



manually. The ratchet wheel 75 is fast upon the shaft 60, and the dog 76 which engages it is mounted upon the larger sheave, a spring 77 serving to maintain the engagement.

Motive power for the above road grader may be obtained from any suitable source, it being equally practical to couple the machine behind a traction engine or to mount an engine upon the frame of the road grader itself.

In operation, the machine will travel at one side of the road to be graded, the frame 24 being lowered so as to permit the plows 25 to excavate a ditch. The conveyer 22 will remove the dirt from the ditch and deposit it at the edge of the road bed. It will then be taken up by the conveyer 36 and spread upon the road, at a grade depending on the adjustment given to said conveyer.

The herein-described machine is devised to accomplish simultaneously the various operations of road grading, which in the present practice require separate machines, working successively.

I am aware that changes may be made in the form and proportion, of parts and details of construction of the device herein described as a preferable embodiment of my invention without departing from the spirit, or sacrificing the advantage thereof, and I therefore reserve the right to make such changes and alterations in said device as fairly come within the scope of the following claims.

What I claim is:

1. In a road grader, the combination with the frame, axles and transporting wheels thereof, of a plurality of rotatably mounted disk plows, carried by said frame, having their axes in alinement, a spiral conveyer rotatably mounted behind said plows, adapted to remove the dirt from the ditch which the plows excavate, means by which said conveyer and plows may be raised or lowered, means by which the conveyer and the center line of the plows may be adjusted at an angle with the ground, a second spiral conveyer adapted to receive the dirt ejected from the first named conveyer and to spread it upon the road, and mechanism by which the power generated by the motion of the machine is applied to rotate the two conveyers.

2. In a road grader, the combination with the main frame, axles, and transporting wheels thereof, of a supplementary frame suspended from the main frame, means by which the last-named frame may be raised or lowered, a plurality of disk plows rotatably mounted upon last-named frame, means mounted behind said plows upon the supplementary frame for ejecting the earth from the ditch excavated by the plows, and

means supported from the main frame by which said earth may be spread to form a road bed.

3. In a road grader, the combination with the main frame, axles, and transporting wheels thereof, of a supplementary frame adjustably suspended from the main frame, a plurality of plows carried by said supplementary frame adapted to excavate a ditch, means carried by the supplementary frame adapted to remove the earth from the ditch to one side thereof, means by which the supplementary frame may be raised or lowered, a device supported from the main frame adapted to distribute the earth upon a road bed, and means for varying the angle of the last-named device with the surface of the road.

4. In a road grader, the combination with the frame, axles and transporting wheels thereof, of a supplementary, adjustable frame adapted to drag beneath the main frame, means by which the supplementary frame may be raised or lowered, a plurality of disk plows rotatably mounted upon said supplementary frame, adapted to excavate a ditch, a spiral conveyer rotatably mounted on the supplementary frame behind said plows, adapted to eject the earth to one side of the ditch, a spiral conveyer rotatably mounted behind the first named conveyer adapted to spread the earth upon the road bed, mechanism communicating rotation to the conveyers from one of the axles, and means whereby the last named conveyer may be adjusted at various angles with the surface of the road bed.

5. In a road grader, the combination with the frame axles, and transporting wheels thereof, of a supplementary frame suspended from the main frame, and adapted to drag therebeneath, a plurality of disk plows rotatably mounted upon said supplementary frame, adapted to excavate a ditch, a spiral conveyer rotatably mounted upon the supplementary frame, behind said plows, a spiral conveyer rotatably mounted at the rear of the machine, a countershaft actuated from one of the axles, means by which the communication of rotation to the countershaft may be interrupted, mechanism adapted to communicate rotation from the countershaft to the conveyers, and a mechanism adapted to be operated from the countershaft for raising or lowering the supplementary frame and for adjusting the same at an angle with the ground.

6. In a road grader, the combination with the frame, axles and transporting wheels thereof, of a plurality of plows carried by said frame, a spiral conveyer, rotatably mounted behind said plows, means by which rotation is applied to said conveyer, mechanism actuated by the motion of the machine, by which one end of the conveyer may be



adjusted vertically, and means by which the operation of the last named mechanism may be interrupted.

7. In a road grader, the combination with the frame, axles and transporting wheels thereof, of a plurality of rotatably mounted disk plows, carried by said frame, having their centers in alinement and arranged obliquely with the vertical, a spiral conveyer rotatably mounted behind said plows, means by which rotation is applied to said conveyer, mechanism by which the axis of the conveyer and the center line of the plows may be simultaneously adjusted at an angle with the ground, said mechanism being actuated by the forward motion of the machine, and means by which the operation of the last named mechanism may be interrupted.
8. In a road grader, the combination with the frame, axles and transporting wheels thereof, of a supplementary frame suspended from the main frame, and adapted to drag therebeneath a plurality of disk plows rotatably mounted upon said supplementary frame behind said plows, a spiral conveyer rotatably mounted at the rear of the machine, a countershaft actuated from one of the axles, means by which the communication of rotation to the countershaft may be interrupted, mechanism adapted to communicate rotation from the countershaft to the conveyer, a shaft mounted longitudinally of the machine, means by which either a right or left hand rotation may be communicated to the last named shaft from the said countershaft, a worm and worm wheel mechanism communicating a rotation of decreased velocity to a transversely mounted shaft, and means by which the rotation of the last named shaft is applied to simultaneously raise or lower the supplementary frame and one end of the conveyer.
9. In a road grader, the combination with the frame, axles and transporting wheels thereof, of a plurality of plows carried by said frame, a spiral conveyer rotatably mounted behind said plows, a wheel mounted upon one extremity of the conveyer shaft preventing contact of said extremity with the ground, a wheeled carriage in which the other extremity of said shaft is rotatably mounted, and a detachable connection be-

tween said carriage and the frame of the machine.

10. In a road grader, the combination with the frame, axles and transporting wheels thereof, of a plurality of plows carried by said frame, a spiral conveyer rotatably mounted behind said plows, a wheel having a diameter greater than that of the conveyer mounted upon one extremity of the conveyer shaft, a wheeled carriage in which the other extremity of said shaft is rotatably mounted and means carried by said wheeled carriage adapting the extremity of the conveyer shaft carried thereby, to be manually adjusted vertically.

11. In a road grader, the combination with the frame, axles and transporting wheels thereof, of a plurality of plows carried by said frame, a spiral conveyer rotatably mounted behind said plows, a wheel having a diameter greater than that of the conveyer, mounted upon the extremity of the conveyer shaft, a wheeled carriage rotatably supporting the other extremity of the conveyer shaft, means carried by said wheeled carriage adapting the extremity of the conveyer shaft carried thereby to be adjusted vertically, and detachable means connecting said wheeled carriage to the frame.

12. In a road grader, the combination with the frame, axles and transporting wheels thereof, of a plurality of disk plows carried by said frame, and having their centers in alinement, a spiral conveyer rotatably mounted behind said plows, adapted to remove dirt from the ditch which the plows excavate, means by which said conveyer and plows may be raised or lowered, means by which the conveyer and the center line of the plows may be adjusted at an angle with the ground, a second spiral conveyer, rotatably mounted at the rear of the machine, rotatable means by which the last named conveyer is supported above the surface of the ground, and means by which rotation is applied to the shafts of both conveyers.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN BROWN FENDER.

Witnesses:

G. B. COULSON,  
J. S. MURRAY.