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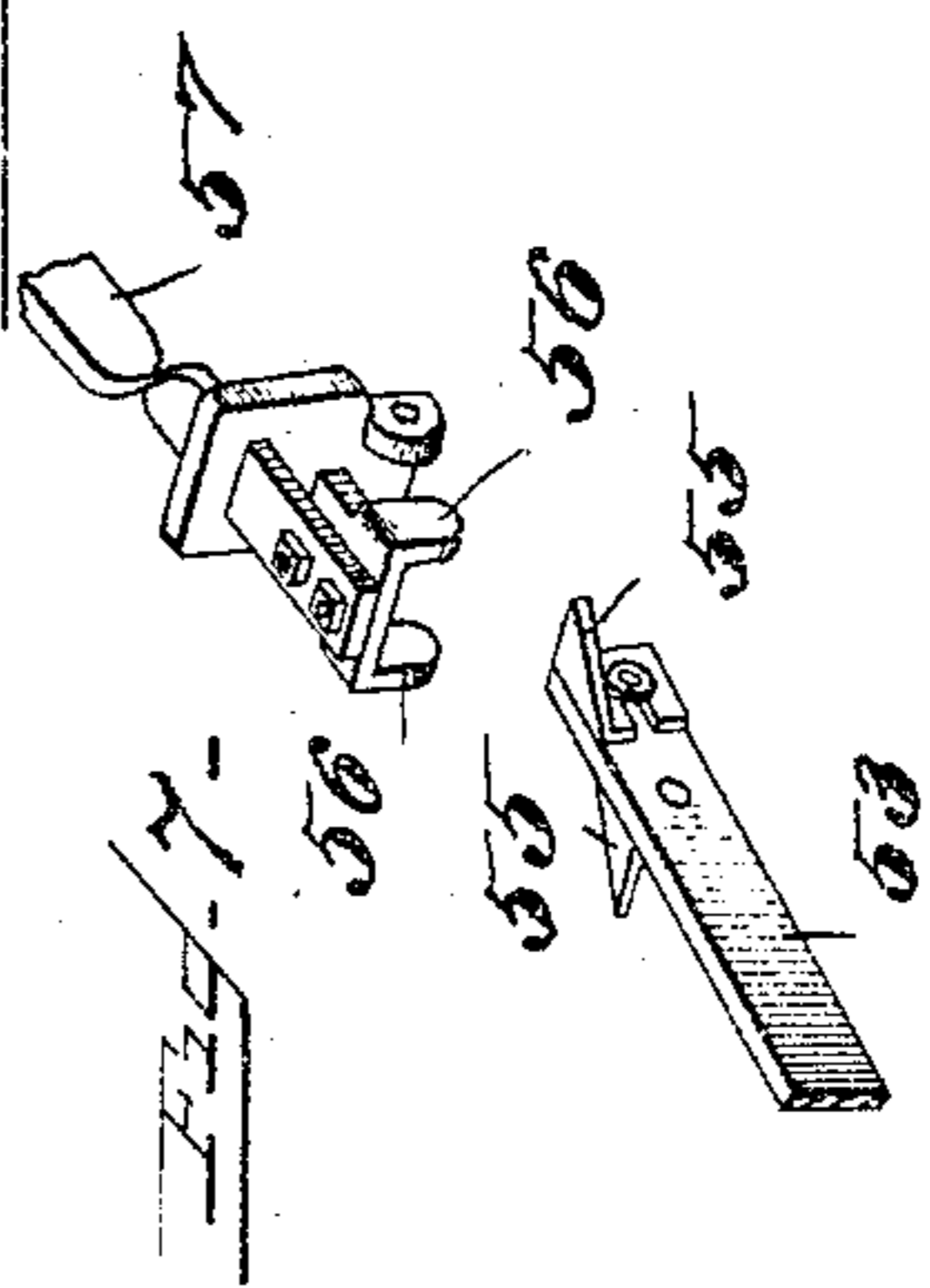
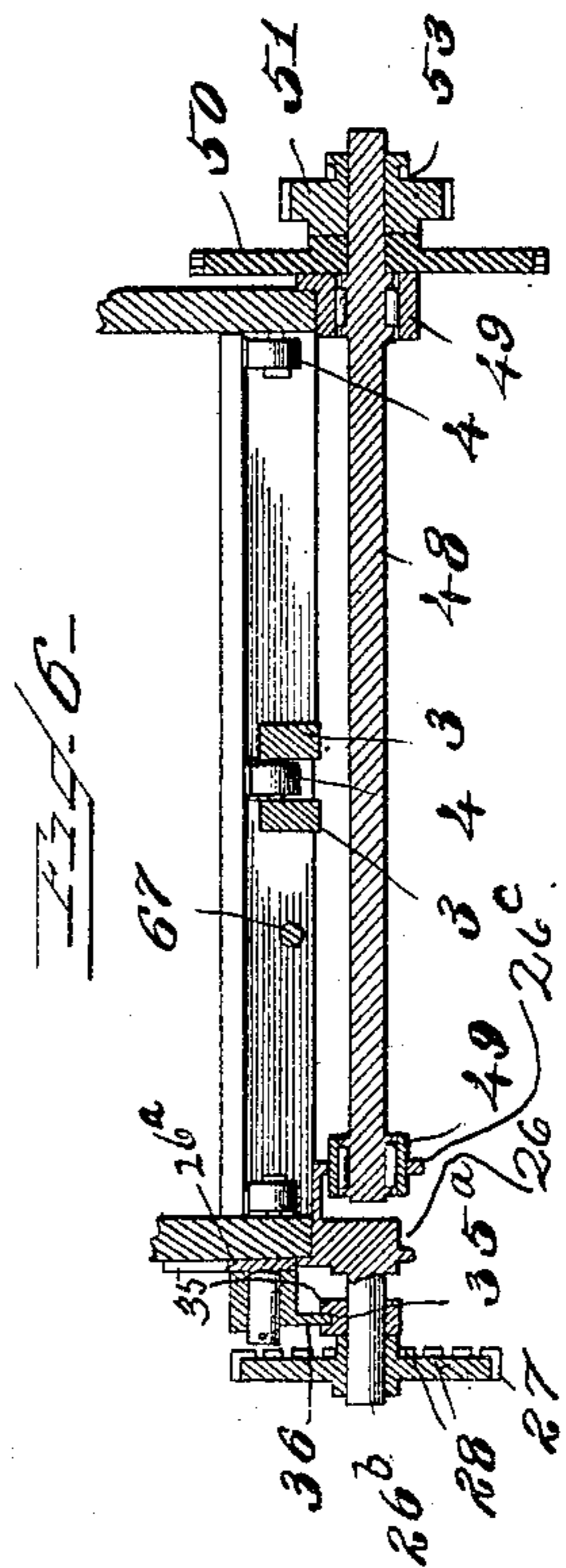
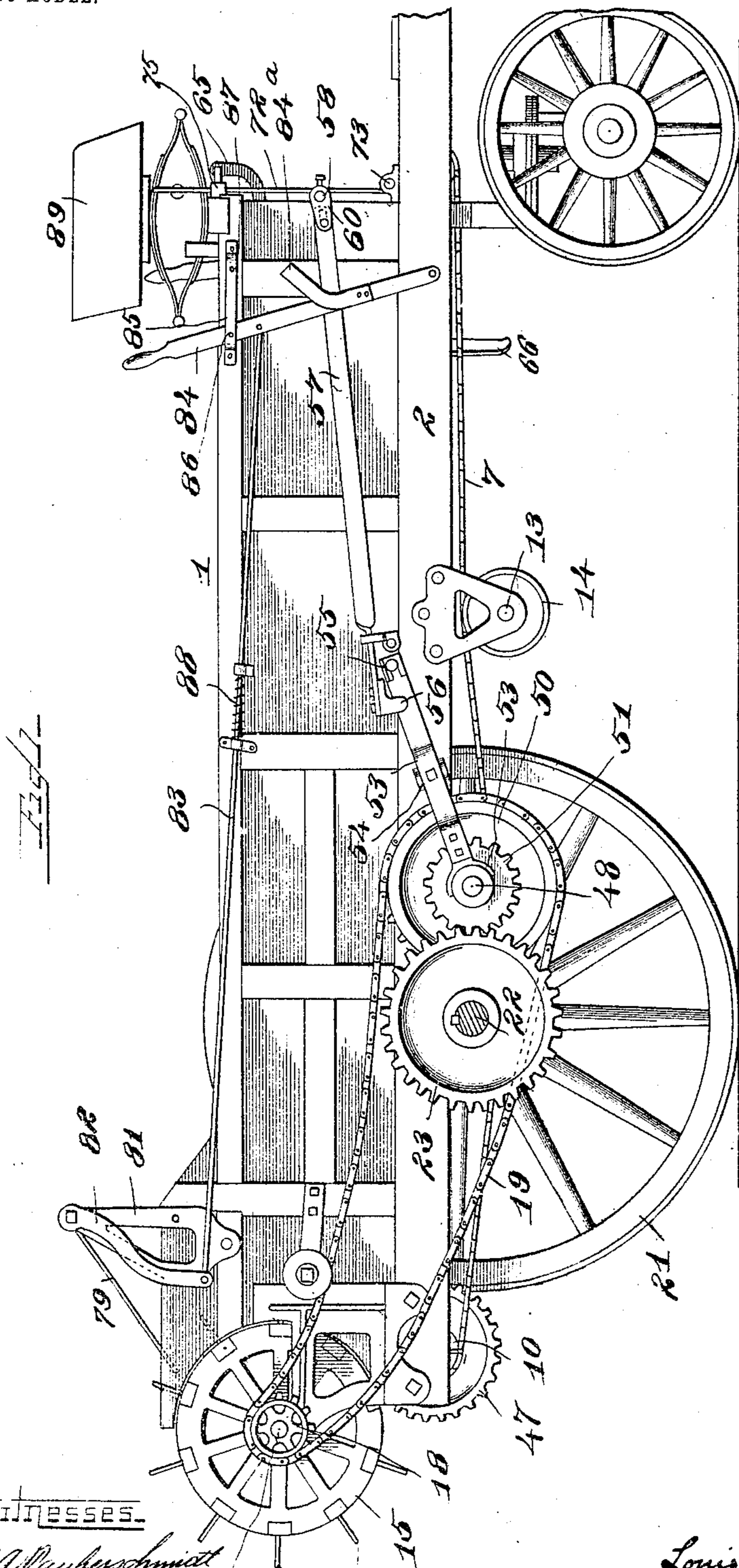
L. A. KEENE & M. R. PHARIS.

MANURE SPREADER.

APPLICATION FILED JUNE 1, 1903.

NO MODEL.

4 SHEETS—SHEET 1.



WITNESSES.

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No. 773,505.

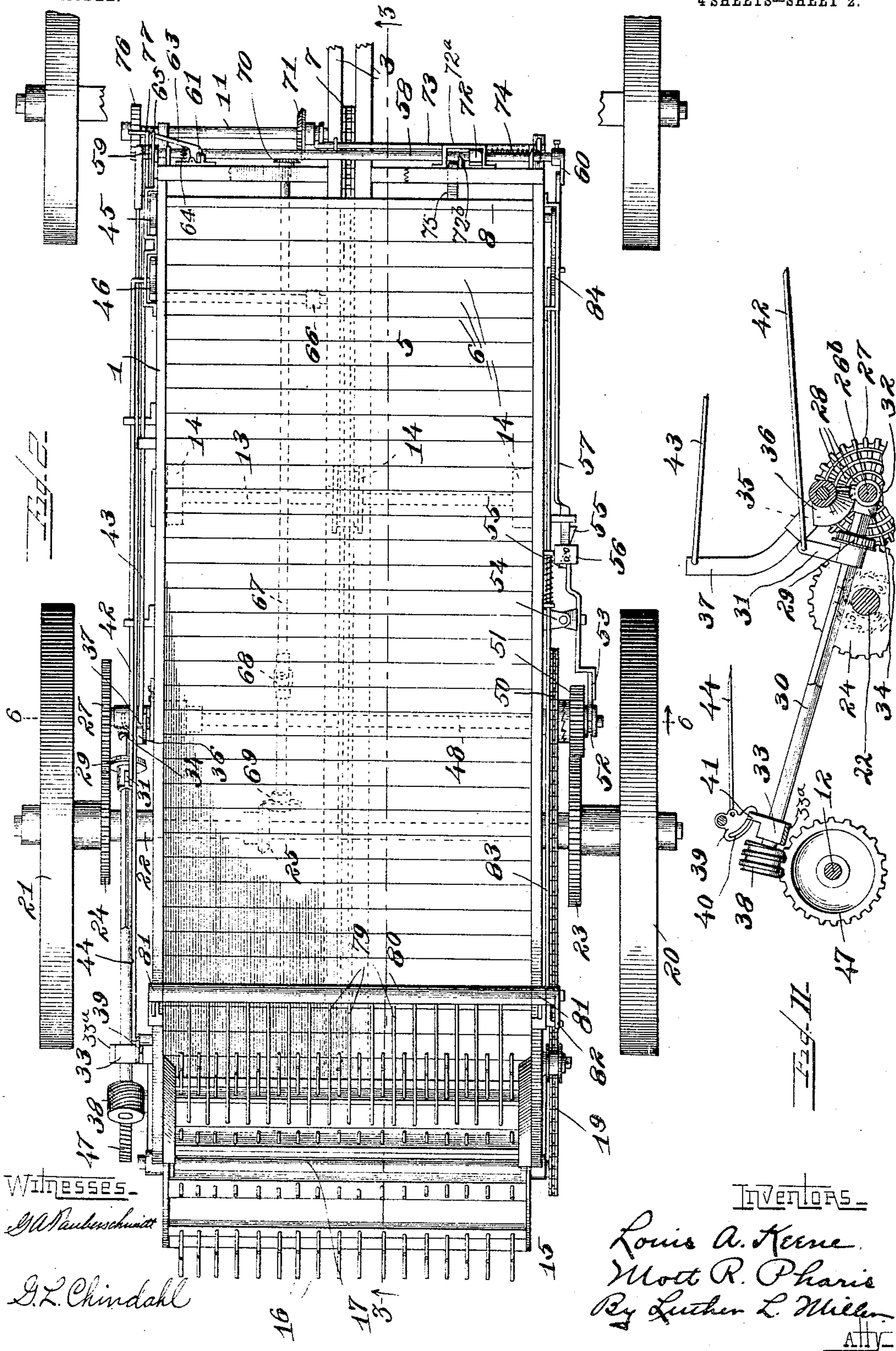
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4 SHEETS—SHEET 2.



Witnesses.

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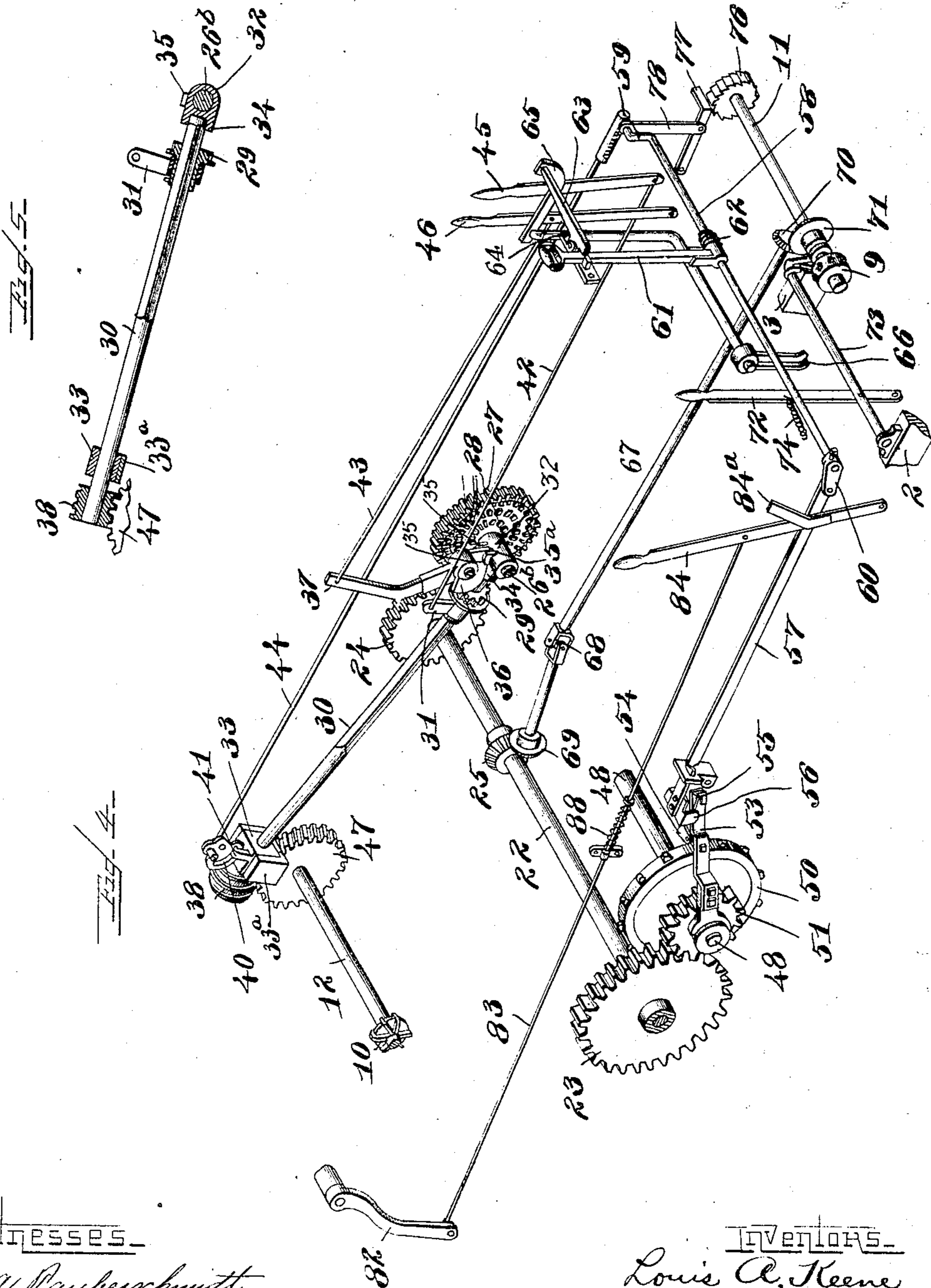
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MANURE SPREADER.

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NO MODEL.

4 SHEETS—SHEET 4.



WITNESSES.

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UNITED STATES PATENT OFFICE.

LOUIS A. KEENE AND MOTT R. PHARIS, OF WATERMAN, ILLINOIS.

MANURE-SPREADER.

SPECIFICATION forming part of Letters Patent No. 773,505, dated October 25, 1904.

Application filed June 1, 1903. Serial No. 159,567. (No model.)

To all whom it may concern:

Be it known that we, LOUIS A. KEENE and MOTT R. PHARIS, citizens of the United States, residing at Waterman, in the county of Dekalb and State of Illinois, have invented certain new and useful Improvements in Manure-Spreaders, of which the following is a specification.

This invention refers to manure-spreaders, and relates to various improvements in the general construction of such spreaders.

One of the objects of the invention is the production of a manure-spreader the operative parts and mechanisms of which are at all times within the control of the operator from a position upon the driver's seat.

A further object of the invention consists in the provision of means for balancing or equalizing the strain of the drive-gearing for the spreader-cylinder.

A further object of the invention is the provision of means for automatically stopping the apron-feed when the apron reaches the limit of its rearward travel.

A further object is the provision of means for simultaneously starting or stopping the rotation of the cylinder and the rearward travel of the apron at any time in the operation of the machine.

A further object is the provision of means for altering the rate of travel of said apron.

The invention further relates to a means for returning the apron to its normal position after the spreading operation is completed.

In the accompanying drawings, Figure 1 is a side elevation of a manure-spreader embodying the features of our invention, the traction-wheel on the near side being removed. Fig. 2 is a top plan view of said spreader.

Fig. 3 is a longitudinal vertical central section through the spreader, taken on dotted line 3 3 of Fig. 2. Fig. 4 is a perspective view showing the mechanism for operating the apron-traveling means and the spreader-cylinder-rotating means. Fig. 5 is a view, partly in section, of a portion of the apron-traveling mechanism. Fig. 6 is a detail transverse section through the spreader on dotted line 6 6 of Fig. 2. Fig. 7 is a detail perspective view showing the operating mechanism for the

clutch that drives the spreader-cylinder. Fig. 8 is a transverse sectional view through said cylinder on dotted line 8 8 of Fig. 3 looking in the direction of the arrow. Fig. 9 is a detail view showing in front elevation the operating-lever for stopping and starting the machine, also the means for locking said lever in an operative position. Fig. 10 is a horizontal section on dotted line 10 10 of Fig. 9, showing said locking means. Fig. 11 is a side elevation of the driving means for the apron, together with the means for changing the speed of said apron.

In the embodiment of this invention a vehicle in the form of a wagon is built, the bottom of the wagon-box being made up of an apron mounted upon a series of rollers at each side of said box and along the middle line thereof and being thus adapted to be moved longitudinally of the wagon-box. The rear end of the wagon-box is occupied by a spreader-cylinder rotatably mounted in suitable bearings. The rear wheels of the wagon are traction-wheels and have a pawl-and-ratchet connection with their supporting-shaft. This supporting-shaft for the traction-wheels is geared to rotate said spreader-cylinder, a clutch being provided for connecting said cylinder with and disconnecting it from said driving means. Said shaft has a gear connection with the apron-traveling mechanism, means being provided for disconnecting said apron from its traveling mechanism and for changing the speed of travel of the apron. Between said traction-wheels the shaft carries a bevel-gear, which by suitable connections is adapted to restore the apron to its normal position in the wagon-box, which restoring mechanism is adapted to be actuated by said apron when it reaches its rearmost position.

In the drawings, 1 refers to the wagon-body, having the side sills 2 and the center two-part bolster 3, which sills and bolster are each provided with a series of rollers 4 for supporting the edges and middle of the apron to be next described.

The bottom of the wagon-body is in the form of an apron 5, made up of a plurality of transverse cleats 6, flexibly secured together side by side in any suitable manner and mount-

ed upon an endless chain 7, extending through the longitudinal center of said apron. At its forward end the apron 5 has an upright end board 8. To move the endless chain 7, and thus to travel the apron, said chain is supported upon sprocket-wheels 9 and 10, fixed upon shafts 11 and 12, rotatably supported in suitable bearings at the forward end and rear end, respectively, of the wagon-body. Intermediate its ends the lower portion of the endless chain 7 and the apron 5 when in its rearward position are supported upon an idler-shaft 13, carrying the pulley 14.

A rotatable spreader-cylinder 15, having radially-projecting teeth 16, is fixed upon a shaft 17, rotatably mounted in suitable bearings at the rear end of the wagon-body 1. The shaft 17 carries a sprocket-wheel 18 for receiving the endless chain 19, by means of which the cylinder 15 is rotated. Power for traveling the apron and rotating said cylinder 15 is taken from the two rear wheels 20 and 21 of the wagon, which wheels are loosely mounted upon a rotative shaft 22, each wheel being connected to said shaft by means of a pawl and ratchet, (not shown,) whereby forward movement of the vehicle is transmitted through the wheels to rotate said shaft, while backward movement of the vehicle causes the pawls in the hubs of said wheels to click over their ratchets. At each side of the wagon-body a spur-gear 23 and 24 is fixed to the shaft 22, and intermediate said wheels a bevel-pinion 25 is rigidly mounted upon said shaft.

To travel the apron backward during the spreading operation, the following-described mechanism is provided: A bearing-bracket 26, rigidly secured to the wagon-body by means of the ears 26^a, is provided upon one side with a stub-shaft 26^b, projecting outwardly from the wagon-body, and upon its opposite side with an eye or loop 26^c, adapted to receive and support a shaft-bearing to be hereinafter mentioned. Upon the stub-shaft 26^b is rotatably mounted a spur-gear 27, meshing with the similar gear 24. The inner face of said spur-gear 27 is provided with several rings of teeth 28 of differing diameters, the teeth of which rings are adapted to mesh with a pinion 29, slidably mounted upon the squared portion of a shaft 30 and having an upwardly-extending arm 31, by means of which said pinion is moved longitudinally of its shaft. The shaft 30 is rotatably mounted in two bearing-brackets 32 and 33, the former bracket being in sleeve form surrounding the stud 26^b and having a bearing-socket 34 for the forward end of said shaft 30. The sleeve portion of said bracket 32 is provided on its upper side with two ears 35, forming between them the transverse groove 35^a, adapted to receive an oscillatory cam-wing 36, fixed with relation to an operating-arm 37. The opposite end of the shaft 30 carries a worm 38, fixed to said shaft, and the bearing 33 for this end of the shaft is

vertically movable within a bracket 33^a, secured to the side of the wagon-box, to withdraw said worm from engagement with the teeth of its worm-wheel, to be hereinafter described. The vertical movement of said bearing 33 is accomplished by means of an oscillatory sector 39, having an eccentric cam-slot 40, within which cam-slot a finger 41, fixed with relation to said bearing, extends. Connecting-rods 42, 43, and 44 extend from the arm 31 for the pinion 29, the operating-arm 37 for the wing-cam 36, and the oscillatory sector 39 to the forward part of the wagon-body, where the connecting-rods 42 and 43 are pivotally connected to the shifting-levers 45 and 46, respectively, and the connecting-rod 44 to a crank-arm to be hereinafter described.

The apron-supporting shaft 12 at the rear end of the wagon-body carries a worm-wheel 47, fixed to said shaft, which worm-wheel is adapted to be engaged by the worm 38.

Rotative movement is imparted from the spur gear-wheel 23 to the spreader-cylinder 15 by a mechanism to be next described. A shaft 48 is mounted underneath the wagon-body forward of the drive-shaft 22 in roller-bearings 49, the roller-bearing 49 for one end of said shaft lying within the loop 26^c of the bearing-bracket 26. The loop 26^c has an internal diameter slightly greater than the outer diameter of the sleeve of the roller-bearing 49, thus permitting a slight universal movement of said roller-bearing within the loop 26^c. This method of supporting the bearing 49 permits it to adjust itself to any irregularities of motion of the shaft 48 due to bends in said shaft, twisting of the wagon-box, or from other causes. The shaft 48 carries a sprocket-wheel 50, fixed to said shaft, said sprocket-wheel and the sprocket-wheel 16 on the spreader-cylinder shaft 15 being connected by means of the endless chain belt 19. A spur-pinion 51 is loosely mounted upon the outer end of the shaft 48 adjacent to said sprocket-wheel 50, the adjacent faces of the hubs of said sprocket-wheel and said pinion being provided with engaging clutch-teeth. It will be noted that the drive-shaft is located intermediate the spreader-cylinder and the shaft 48 and that the driving force exerted by the gear-wheel 23 and the resistance placed in operation upon the sprocket-chain are opposed to each other, thereby relieving the bearings of the shaft 48 of the injurious pressure resulting when the sprocket-shaft is intermediate the drive-shaft and the beater-cylinder. By means of this arrangement of the driving-gear a much lighter draft of the vehicle is secured and a freedom from breakage of the bearing-boxes and other parts of the mechanism obtained. The outer portion of the hub of the pinion 51 is provided with a groove 52 to receive the end of a shifting-lever 53, pivotally mounted in a bracket 54 upon the side of the wagon-body,

by means of which shifting-lever the pinion 51 is moved into and out of clutch engagement with the sprocket-wheel 50. The forward end of the shifting-lever 53 is provided with two oppositely-extending wedges 55, adapted to lie between the fingers 56 of a longitudinally-slidable shifting rod 57, the forward end of which is pivotally connected with a crank-arm of the starting and stopping mechanism to be next described. This starting and stopping mechanism comprises a shaft 58, extending transversely of the wagon-body and supported in suitable bearings upon the forward end of said body. Upon its opposite ends are fixed crank-arms 59 and 60, pivotally connected with the connecting-rod 44 and the shifting rod 57, respectively. An operating-lever 61 is fixed upon said shaft 58 and engaged by one end of a spring 62, coiled about said shaft, the other end of said spring bearing against the forward end of the wagon-body or any other fixed member, said spring thus tending to throw said lever forward into a horizontal position. A detent-arm 63 is adapted to engage the operating-lever 61 to hold it in an upright or working position, said detent-arm being held forward to engage said operating-lever by means of a coil-spring 64. The outer end of the detent-arm is pivotally connected, by means of a link 65, with a releasing-lever 66, pivotally mounted at the side of the wagon-body. The lower end of said releasing-lever extends into the path of the rear end of the apron 5 and is adapted to be engaged by the rear cleat 6 of said apron when the rear end of said apron reaches the forward limit of its movement.

From the foregoing it will be seen that an upward movement of the operating-lever 61 oscillates the shaft 58 and through the connecting-rod 44 connection with the sector 39 throws the worm 38 into engagement with the worm-wheel 47, also moves the shifting rod 57, oscillating the shifting-lever 53 and throwing the pinion 51 into clutch with the sprocket-wheel 50, thus traveling the apron 5 and rotating the spreader-cylinder 15.

The speed of apron travel with relation to the rotative speed of the cylinder may be changed by means of the gear-shifting levers 45 and 46, a movement of the latter throwing the pinion 29 out of engagement with one of the gear-rings upon the inner face of the spur-gear 27 and a movement of the lever 45 moving said pinion into coincidence with another one of said circular rows of teeth. The pinion 29 may then be thrown into engagement with said last-mentioned gear-ring by moving the lever 46 in a contrary direction.

To restore the apron to its normal forward position, Fig. 3, we have provided a mechanism to be next described. A two-part shaft 67 is mounted in suitable bearings beneath the body 1, the two parts of said shaft being connected by means of the knuckle 68. Each

of the outer ends of the shaft 67 carries a bevel-pinion 69 and 70, the former meshing with the teeth of the bevel-pinion 25, fixed upon the shaft 22, and the latter with the pinion 71, slidably mounted upon but rotatably connected with the shaft 11 for supporting the forward end of the apron 5. A lever 72, pivoted to the forward side of the wagon-body, is adapted to move said pinion 71 lengthwise of said shaft by means of the connecting-rod 73, and said pinion is held normally out of engagement with the bevel-pinion 70 by means of a coil-spring 74, extending between a fixed portion of said wagon-body and the pivoted lever 72. The upper end of the lever 72 lies within a standing loop 72^a on the wagon-body, and a stud 72^b, fixed to said wagon-body within said loop, holds the lever 72 against the action of its spring 74 when the pinions 70 and 71 are in mesh. To disconnect the apron from its restoring drive when said apron reaches its normal position, a pin 75 is fixed to the end board 8 in position to engage the lever 72 when said lever is in its operative position and to push the upper end of said lever outward beyond the end of the stud 72^b. When this occurs, the spring 74 immediately shifts the lever to its inoperative position, separating the pinions 70 and 71.

In order to hold the apron 5 in a forward or normal position when the wagon is being loaded and when the spreader mechanism is not in operation, a ratchet-wheel 76 and pawl 77 are provided, said ratchet-wheel being fixed upon the outer end of the shaft 11. The pawl is pivotally mounted upon the side of the wagon-body and is pivotally connected with the crank-arm 59 by means of a link 78. It will thus be seen that when the shaft 58 is oscillated by an upward movement of the operating-lever 61 the pawl 77 is withdrawn from engagement with the teeth of the ratchet 76; but when said operating-lever is in its forward down position the pawl 77 engages the ratchet 76.

A rake 79 is mounted upon an oscillatory shaft 80, supported in brackets 81 at the rear end of the wagon-body. The shaft 80 is provided with a downwardly-extending arm 82, by means of which the rake is moved toward or from the spreader-cylinder 15. To operate this rake from the forward end of the body 1, a connecting-rod 83 is provided, which rod is pivotally connected at its rear end to said arm 82 and at its forward end to an operating-lever 84, which lever is movable within the limits of a loop 85 and is provided with a fixed pin 86, projecting outwardly from said lever and adapted to enter either one of the openings 87 in said loop to hold the lever at one or the other extremities of its movement. A stop-arm 84^a, fixed to the lever 84, lies in the path of the crank-arm 60 when the lever is in its forward or inopera-

tive position and prevents the throwing into operation of the cylinder-rotating mechanism when the rake 79 is in its inoperative position. A coil-spring 88, surrounding said rod 5 83, tends to hold the rake in a forward position.

A driver's seat 89 is suitably supported above the forward end of the wagon-body in such position that the operating-levers are 10 within easy reach of the driver.

In operation manure is loaded into the wagon-body, the operating-lever 61 thrown forward into its horizontal position, and the wagon drawn to the place where the manure 15 is to be distributed upon the ground. When this place is reached, the operating-lever 61 is raised, in which position it is retained by the detent-lever 63. The upward movement of the operating-lever throws the worm 38 20 into engagement with the worm-wheel 47 and the clutch-pinion 51 into engagement with the sprocket-wheel 50, communicating a traveling motion to the apron 5 and a rapid rotatory motion to the distributing-cylinder 13. 25 The teeth of said cylinder are normally in engagement with the manure in the wagon-body, and in starting the cylinder a great strain is thrown upon its driving-gear. Heretofore much difficulty has arisen in the operation of manure-spreaders owing to the frequent breaking of portions of the driving-gear for the spreader-cylinder; but in the machine herein shown and described the driving strain is transmitted easily and without 35 distortion of the parts from the traction-wheels to the spreader-cylinder. The evenness of this transmission is due largely to the fact that the downward and forward pressure of the gear 23 is balanced by the upward and rearward pull of the sprocket 50 upon the chain 19, and as a consequence power is transmitted to the spreader-cylinder from the traction-wheels without undue strains upon the mechanism, obviating accidental breakage of the parts due to such strain. As the 45 wagon is drawn forward the manure is thrown rearward by the rotating spreader-cylinder, said manure being torn into fine pieces by the teeth of said cylinder and large pieces being 50 held in the box by means of the rake 79. As the portion of the apron within the body 1 travels rearward the rear end of the apron moves forward beneath the body until said rear end has been brought into contact with the releasing-lever 66, which lever when oscillated by said apron moves the detent-arm 63 by means of the link (65) connection between said releasing-lever and said detent-arm and permits the operating-lever 61 to be thrown 60 forward into a horizontal position by the action of its coil-spring 62. This forward movement of the operating-lever withdraws the worm 38 from engagement with the worm-wheel 47, throws the pawl 77 into engagement with the ratchet-wheel 76, and moves 65

the pinion 51 from clutch engagement with the sprocket-wheel 50, stopping the rearward travel of the apron and the rotative movement of the spreader-cylinder and locking the apron from further rearward movement. To 70 restore the apron to its normal position, the lever 72 is moved from right to left with reference to the driver, which movement of said lever places the bevel-gear 71 into mesh with the pinion 70, whereby the rotative motion of 75 the two-part shaft 67 is transmitted to the forward apron-supporting shaft 11, rotating said apron-supporting shaft in a direction to restore said apron to its normal position. During this restoring travel the ratchet-wheel 76 clicks under the end of the pawl 77. 80

To change the speed of backward movement of the apron with relation to the rotative speed of the spreader-cylinder, the pinion 29 is first moved out of engagement with the 85 gear-rings 28 upon the side of the spur-gear 27 by throwing the lever 46 forward. A movement of the lever 45 now slides the pinion 29 upon the squared portion of the shaft 30 into coincidence with the desired one of 90 said gear-rings 28. When the pinion 29 has been shifted into the proper position, the lever 46 is returned to its first position to move said pinion again into engagement with one of the gear-rings. 95

The apparatus herein shown may be changed in various ways without departing from the spirit and scope of our invention, wherefore we desire to have it understood that we do not limit ourselves to the specific construction herein shown and described. 100

We claim as our invention—

1. An improvement in manure-spreaders comprising an apron, a driving-shaft, means for causing said apron to travel, a counter-shaft, a rock-shaft, connection between said 105 rock-shaft and said traveling means, a longitudinally-arranged shaft geared to said driving-shaft, a gear-wheel slidably mounted on said counter-shaft, means for moving the same 110 into gear with a corresponding pinion on said longitudinal shaft, whereby the movement of said apron is reversed, a lock adapted to engage said counter-shaft, connections between said lock and said rock-shaft, an operating-lever for said rock-shaft, and a locking device 115 for said lever.

2. An improvement in manure-spreaders comprising an apron, means for causing the same to travel, means for automatically stopping the forward travel of said apron, a reversing-shaft extending longitudinally of said apron, a counter-shaft geared to said traveling means, a pinion slidably mounted on said counter-shaft, means for throwing said pinion 125 into engagement with the forward end of said reversing-shaft, and means for automatically disengaging said pinion.

3. An improvement in manure-spreaders comprising an apron, means for causing the 130

same to travel, means for automatically stopping the forward travel of said apron, a reversing-shaft extending longitudinally of said apron, a counter-shaft geared with said traveling means, a pinion slidably mounted on said counter-shaft, means for throwing said pinion into engagement with the forward end of said reversing-shaft, and means carried by the apron for automatically effecting the disengagement of said pinion.

4. An improvement in manure-spreaders comprising an apron, means for causing the same to travel, means for automatically stopping the forward travel of said apron, a longitudinally-arranged reversing-shaft, a counter-shaft geared with said traveling means, a pinion slidably mounted on said counter-shaft, a lever adapted to move said pinion into engagement with the forward end of said reversing-shaft, a locking-stud adapted to engage the free end of said lever, and means for automatically disengaging said lever from said stud.

5. An improvement in manure-spreaders comprising an apron, means for causing the same to travel, means for automatically stopping the forward travel of the apron, a reversing-shaft, a counter-shaft geared with said traveling means, a pinion slidably mounted on said counter-shaft, a lever adapted to move said pinion into engagement with said reversing-shaft, a locking-stud adapted to engage the free end of said lever, and a pin carried by the forward end of said apron and adapted to strike said lever whereby the latter is disengaged from its locking-stud.

6. An improvement in manure-spreaders comprising a driving-shaft, an apron, means operated by said driving-shaft for causing said apron to travel, a driven shaft geared with said driving-shaft, a pinion mounted on the forward end of said driven shaft, a counter-shaft, a pinion slidably mounted thereon, means for moving said pinion into and out of engagement with the pinion of said driven shaft, and means for temporarily locking said counter-shaft against rearward rotation.

7. An improvement in manure-spreaders comprising a driving-shaft, an apron, means operated by said driving-shaft for causing said apron to travel, a driven shaft geared with said driving-shaft, a pinion mounted on the forward end of said driven shaft, a counter-shaft, a pinion slidably mounted thereon, a pivoted lever, a rod connecting said lever and said sliding pinion, and a spring acting against said lever, whereby said sliding pinion is normally held out of engagement with the pinion of said driven shaft.

8. An improvement in manure-spreaders comprising an apron, means for causing the same to travel, a pivoted operating-lever controlling said traveling means, a spring tending to move said lever in a direction to stop the travel of said apron, a detent adapted to engage the free end of said lever and hold the

same in an operative position, means adapted to be engaged by said apron in its travel for withdrawing said detent, a reversing-shaft driven by said traveling means, a counter-shaft, means for engaging said counter-shaft with said reversing-shaft, whereby the former is given a reverse rotation, and means for automatically disengaging said reversing and counter shafts, whereby said reverse rotation is stopped.

9. An improvement in manure-spreaders comprising a rotary spreader-cylinder, a drive-chain for said cylinder, a traction-wheel, a gear connection between the traction-wheel and the drive-chain, a clutch for disconnecting the traction-wheel and the drive-chain, a pivoted clutch-lever having lateral cam-wings, a sliding rod having fingers adapted to engage said wings, and a hand-lever for operating said sliding rod.

10. An improvement in manure-spreaders comprising a rotary spreader-cylinder, a drive-chain for said cylinder, a traction-wheel, a gear connection between the traction-wheel and the drive-chain, a clutch for disconnecting the traction-wheel and the drive-chain, a pivoted clutch-lever having oppositely-arranged, laterally-extending wedge-shaped cam-wings, and an operating-rod having fingers adapted to engage said wings.

11. An improvement in manure-spreaders comprising a rotary spreader-cylinder, a drive-chain for said cylinder, a traction-wheel, a gear connection between the traction-wheel and the drive-chain, a clutch for disconnecting the traction-wheel and the drive-chain, a pivoted clutch-lever having lateral cam-wings, a rock-shaft, a sliding rod connected thereto and having fingers adapted to engage said wings, a lever mounted on said rock-shaft, and a locking device adapted to engage the free end of said lever.

12. An improvement in manure-spreaders comprising an apron, means for causing the same to travel, a rotary spreader-cylinder, means for rotating the same, a rake supported adjacent said cylinder, an operating-lever therefor, a rock-shaft, connections between said rock-shaft and said traveling and rotating means, and an arm or member carried by said operating-lever adapted to engage said rock-shaft.

13. In a manure-spreader, in combination, a spreader-cylinder; a sprocket-wheel for said cylinder; a sprocket-wheel shaft; a sprocket-wheel on said shaft; a sprocket-chain extending over said sprocket-wheels; a drive-shaft supported intermediate said sprocket-wheels; a driving-gear on said drive-shaft; and a gear rotatably mounted on the sprocket-wheel shaft on the same side of the bearings of said shaft as the sprocket-wheel on said sprocket-wheel shaft, said gear being arranged to mesh with said driving-gear and to have a driving engagement with said second sprocket-wheel,

whereby the pull of said sprocket-chain tending to hold said sprocket-wheel shaft against one side of its bearings is counteracted by the push of the driving-gear tending to throw
5 said sprocket-wheel shaft to the opposite side of its bearings.

14. In a manure-spreader, in combination, a spreader-cylinder; a sprocket-wheel for said cylinder; a sprocket-wheel shaft; a sprocket-wheel on said shaft; a sprocket-chain extending over said sprocket-wheels; a drive-shaft supported intermediate said sprocket-wheels; a driving-gear on said drive-shaft; a gear slidably mounted on said sprocket-wheel shaft
15 on the same side of the bearings of said shaft as the sprocket-wheel on said sprocket-wheel shaft, and adapted to mesh with said driving-gear, whereby the pull of said sprocket-chain tending to hold said sprocket-wheel shaft
20 against one side of its bearings is counteracted by the push of the driving-gear tending to throw said sprocket-wheel shaft to the opposite side of its bearings; and means for sliding said gear on said sprocket-wheel shaft
25 to place it in driving engagement with said second sprocket-wheel.

15. In a manure-spreader, in combination, a spreader-cylinder; a sprocket-wheel for said cylinder; a sprocket-wheel shaft; a sprocket-wheel on said shaft; a sprocket-chain extending over said sprocket-wheels; a drive-shaft supported intermediate said sprocket-wheels; a driving gear-wheel on said drive-shaft; a pinion slidably mounted on said sprocket-wheel shaft on the same side of the bearings
35 of said shaft as the sprocket-wheel on said shaft, and adapted to mesh with said driving gear-wheel, whereby the pull of said sprocket-chain tending to hold said sprocket-wheel shaft against one side of its bearings is counteracted by the push of the driving-gear tending to throw said sprocket-wheel shaft to the opposite side of its bearings, the hubs of said pinion and said second sprocket-wheel having
45 clutch-faces; and means for moving said pinion into and out of engagement with said second sprocket-wheel.

16. In a manure-spreader, in combination, a wagon-body; a spreader-cylinder rotatably
50 supported at the rear end of said wagon-body; a sprocket-wheel for said cylinder; a sprocket-wheel shaft rotatably mounted upon the wagon-body forward of said spreader-cylinder; a sprocket-wheel on said shaft; a sprocket-chain extending over said sprocket-wheels; a drive-shaft supported on the wagon-body between the spreader-cylinder and said sprocket-wheel shaft; a gear on said drive-shaft; and a gear rotatably mounted upon
55 said sprocket-wheel shaft, arranged to mesh with the gear on the drive-shaft and to have a driving engagement with the sprocket-wheel on said sprocket-wheel shaft.

17. In a manure-spreader, in combination, a

wagon-body; a spreader-cylinder rotatably
65 supported at the rear end of said wagon-body; a sprocket-wheel for said cylinder; a sprocket-wheel shaft rotatably mounted upon the wagon-body forward of said spreader-cylinder; a sprocket-wheel on said shaft; a sprocket-chain extending over said sprocket-wheels; a drive-shaft supported on the wagon-body between the spreader-cylinder and said sprocket-wheel shaft; a gear on said drive-shaft; a pinion adapted to mesh with said
75 gear-wheel, the hubs of said pinion and said second sprocket-wheel having clutch-faces; and means for moving said pinion into and out of engagement with said second sprocket-wheel.
80

18. A bearing-bracket having a stub-shaft on one side thereof and a loose bearing on its other side, said bracket being provided with means for securing it to a wagon-body.

19. In a manure-spreader, in combination, a supporting-frame; a spreader mechanism; a shaft for actuating said spreader mechanism; a bearing in said supporting-frame for one end of said shaft; a bearing for the other end of said shaft; and a bracket rigidly secured
90 to said supporting-frame, which bracket comprises a loose bearing adapted to receive and support said last-mentioned shaft-bearing to permit a universal movement of said shaft-bearing therein.
95

20. In a manure-spreader, in combination, a supporting-frame; a spreader-cylinder; a shaft; a bearing in said supporting-frame for one end of said shaft; a bearing for the other end of said shaft; a bracket rigidly secured
100 to said supporting-frame, which bracket comprises a loose bearing adapted to receive and support said last-mentioned shaft-bearing to permit a universal movement of said shaft-bearing therein; and a driving connection between said shaft and said spreader-cylinder.
105

21. In a manure-spreader, in combination, a supporting-frame; a spreader-cylinder rotatably mounted in said supporting-frame; a sprocket-wheel for said cylinder; a sprocket-wheel shaft; a bearing in said supporting-frame for one end of said shaft; a bearing for the other end of said shaft; a bracket rigidly secured to said supporting-frame, which bracket comprises a loose bearing adapted to receive and support said last-mentioned shaft-bearing to permit a universal movement of said shaft-bearing therein; a sprocket-wheel on said sprocket-wheel shaft; a sprocket-chain extending over said sprocket-wheels; a drive-shaft supported intermediate said sprocket-wheels; and a gear connection between said drive-shaft and said sprocket-wheel shaft.
120

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Witnesses:

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