No. 847,323. PATENTED MAR. 19, 1907.

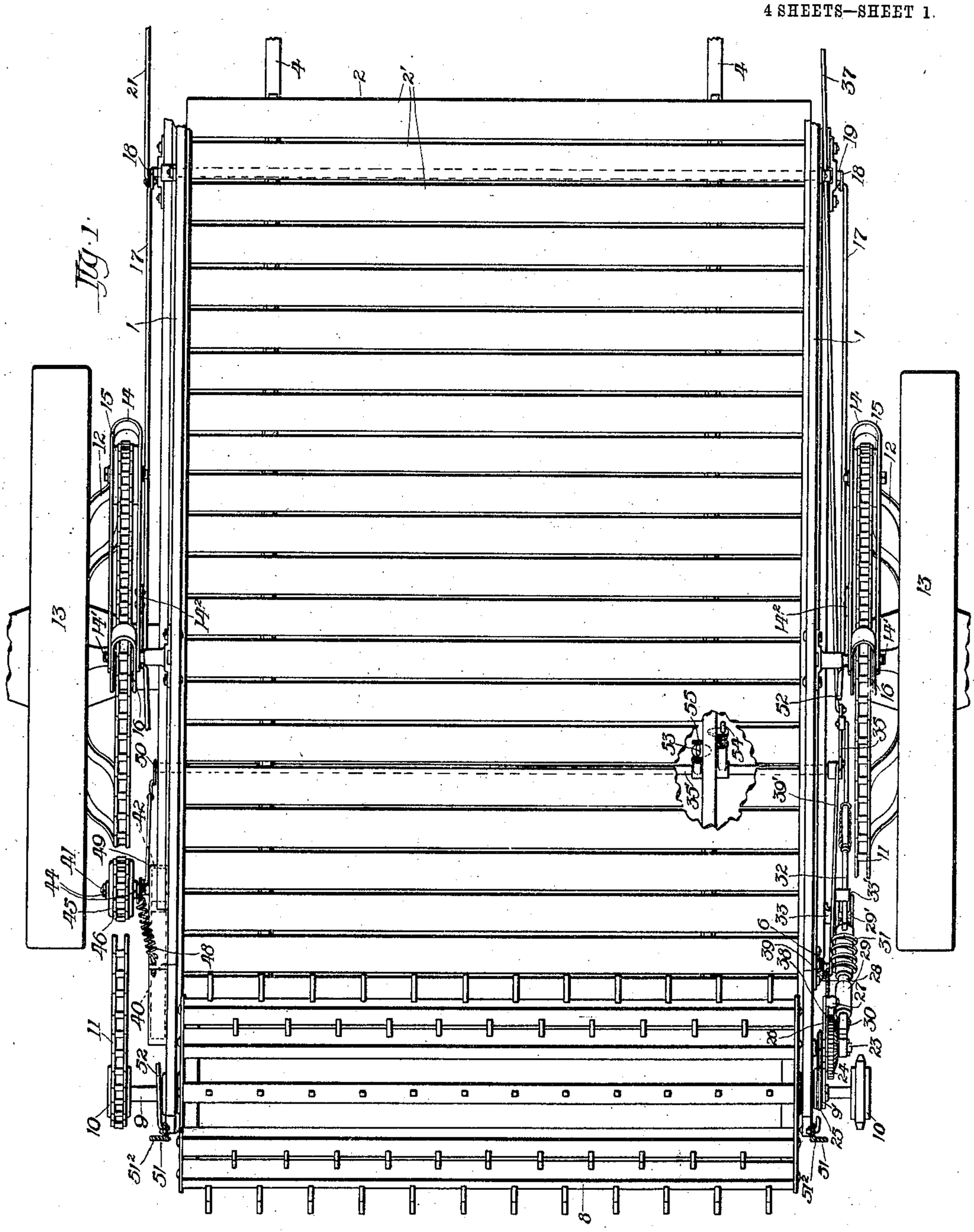
S. K. DENNIS & F. W. RICE.

FERTILIZER DISTRIBUTER.

APPLICATION FILED OCT. 12, 1906.

4 SHEETS—SHEET 1.

Fig. 1.



Witnesses:
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4 SHEETS—SHEET 2.

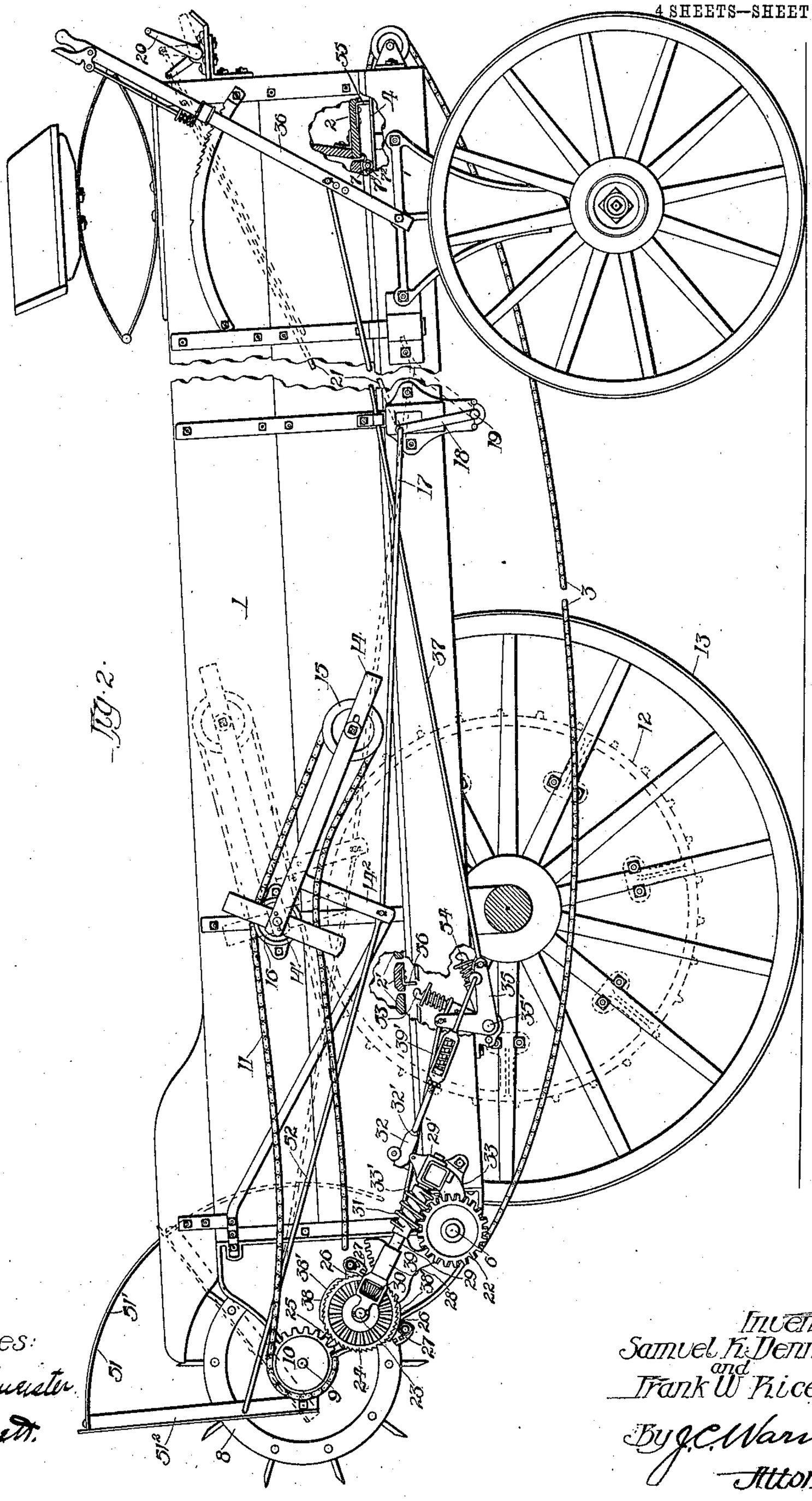

Fig. 2.

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4 SHEETS—SHEET 3.

Fig. 1.

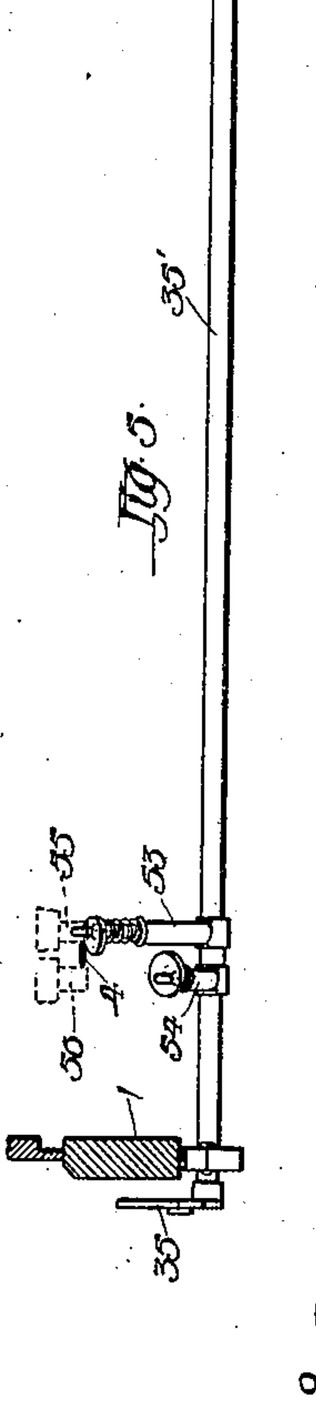


Fig. 2.

Fig. 11a.

Fig. 13.

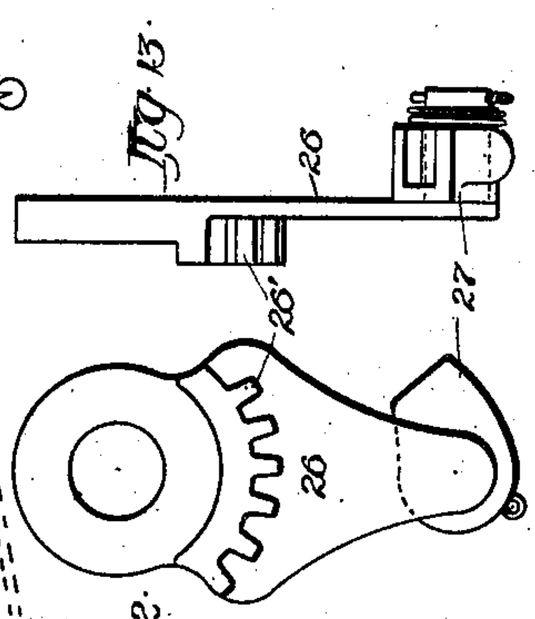


Fig. 12.

Fig. 4.

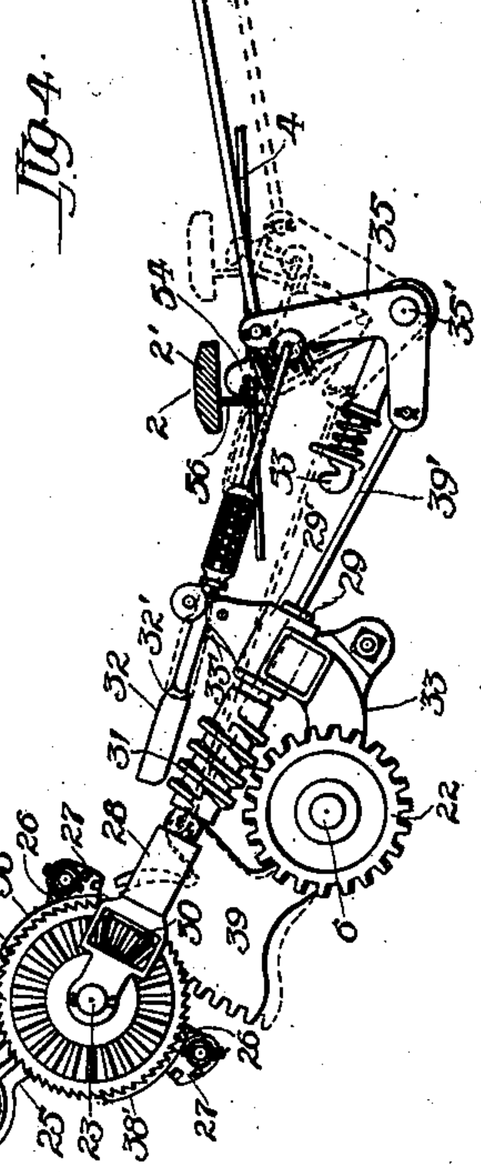
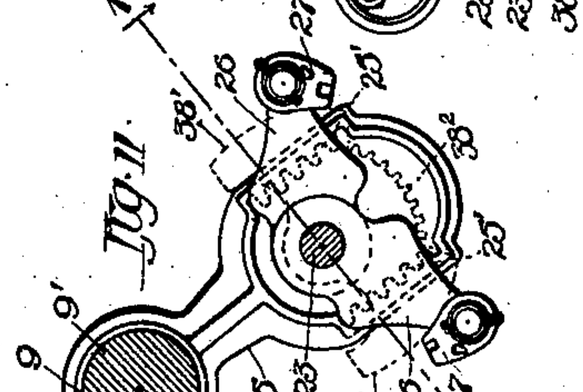


Fig. 11.



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4 SHEETS—SHEET 4.

Fig. 6.

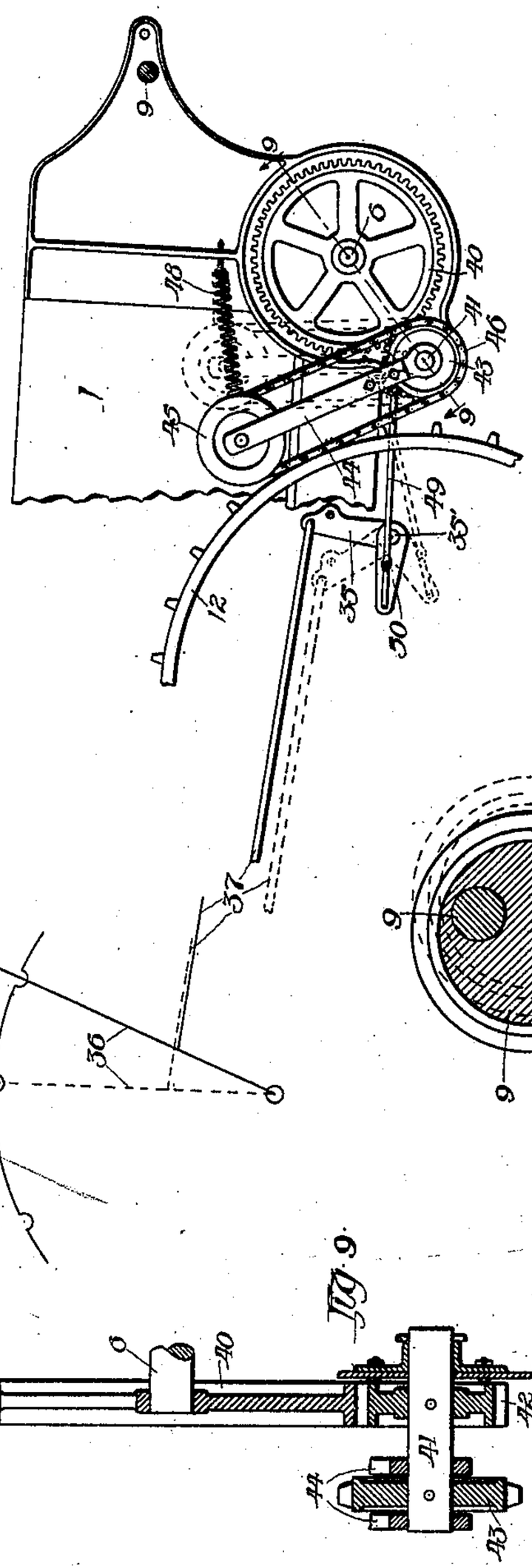

Fig. 8.

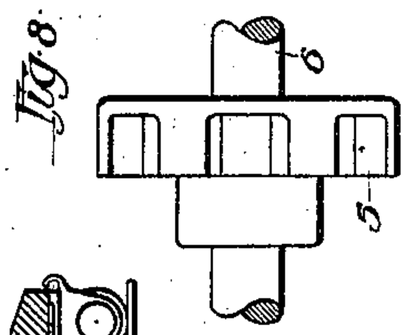

Fig. 7.

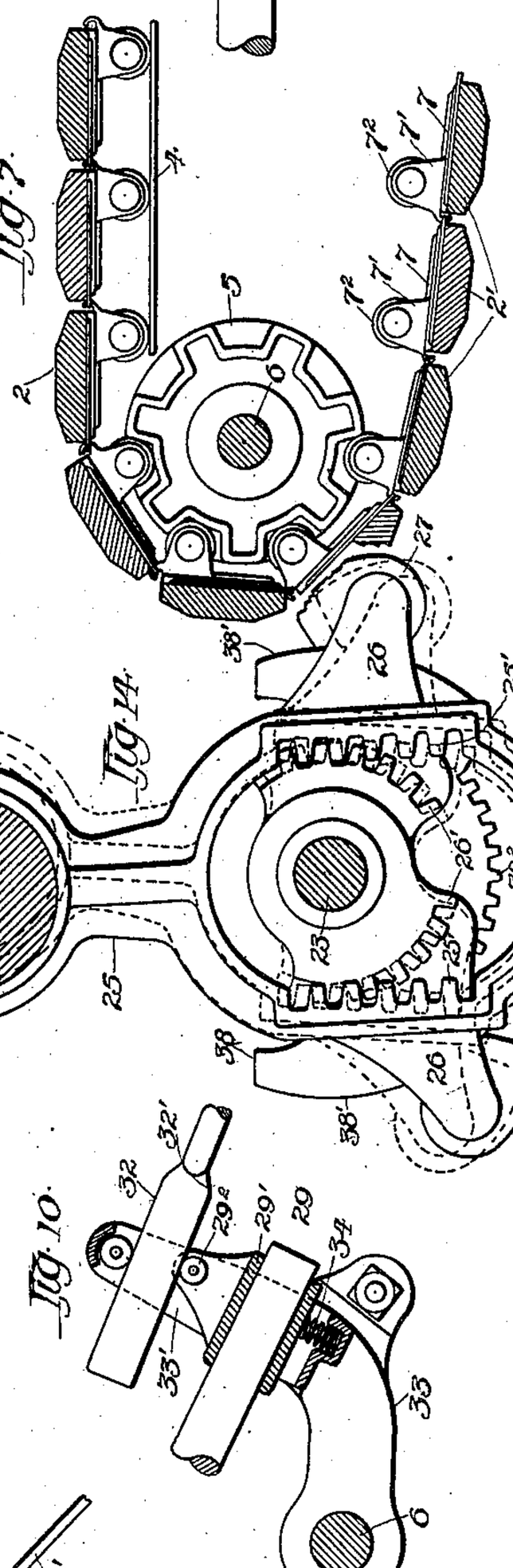

Fig. 14.

Fig. 9.

Fig. 10.

Fig. 13.

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UNITED STATES PATENT OFFICE.

SAMUEL K. DENNIS AND FRANK W. RICE, OF CHICAGO, ILLINOIS, ASSIGNORS TO INTERNATIONAL HARVESTER COMPANY, A CORPORATION OF NEW JERSEY.

FERTILIZER-DISTRIBUTER.

No. 847,323. Specification of Letters Patent. Patented March 19, 1907.

Application filed October 12, 1906. Serial No. 338,548.

To all whom it may concern:

Be it known that we, SAMUEL K. DENNIS and FRANK W. RICE, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Fertilizer-Distributers, of which the following is a complete specification.

This invention relates to various improvements in the details of construction of fertilizer-distributers, and more particularly to the automatic stop operating in connection with the forward and return movement of the movable apron, the construction and arrangement of the apron and cylinder-drive, with the means for controlling same, the means for returning the movable apron, and other structural details, the object being to improve the general construction and operation of the machine.

Referring to the accompanying drawings, Figure 1 represents a plan view of the rear end of a fertilizer-distributer embodying our improvements. Fig. 2 is a side elevation of the same with a portion of its body cut away. Figs. 3 and 4 illustrate the construction of the apron-drive and the means for controlling same, Fig. 3 showing the driving-gears in mesh, and Fig. 4 the same when disengaged. Fig. 5 represents a side elevation of the trip-lever rock-shaft, the trip-levers thereon, and the lugs on the apron for actuating same. Fig. 6 is a fragmentary elevation of the left-hand side of the machine, designed to show the construction and arrangement of the means for returning the apron to its forward position. Fig. 7 represents a longitudinal section taken through the rear end of the apron and the apron-shaft and is designed to show the construction of the chain-links and rollers thereon. Fig. 8 is a detail view of the sprocket-wheel shown in Fig. 7. Fig. 9 represents a longitudinal section through the left-hand end of the apron-shaft and driving-pinion adjacent thereto, taken as indicated by the line 9 9 in Fig. 6. Fig. 10 is fragmentary section designed to show the construction of the casting which supports the free end of the vibratory worm-shaft. Fig. 11 shows the pawl-arms in engagement with the toothed eccentric-link. Fig. 11^a is a longitudinal section through the parts shown in the preceding figure, as indicated by the line 11^a 11^a thereon. Figs. 12 and 13 are detail views showing an inside and front elevation, respectively, of one of the pawl-arms. Fig. 14 is designed to illustrate the manner in which movement is imparted to the pawl-arms by the toothed eccentric-link when the latter is crossing its dead-center; and Fig 15 is a detail showing in side elevation the cam-lever for controlling the effective movement of the pawls and the gear-segment for controlling same.

In the drawings the body of the distributer is designated by 1, the movable apron by 2, and the chain which connects the ends of said apron by 3. The apron is mounted on the slides 4, (see Fig. 7,) which are secured to the inner side of the body and near the bottom thereof and is driven by the sprocket-wheels 5, which are fixed to the ends of the apron-driving shaft 6. The apron 2 consists of a series of wooden strips 2′, which are connected by means of the special links 7, these special links being provided with the inwardly-projecting lugs 7′, between which are journaled the antifriction-rollers 7^2. To lessen the transverse strain on the links, the lugs are made to project, preferably, from near one end thereof. These rollers 7^2 are engaged by the sprocket-wheels 5 and constitute the bearing-points between the apron-chain and the driving sprocket-wheels.

At the rear end of the body 1 is mounted the toothed distributing-cylinder 8 on the shaft 9. To each end of the shaft 9 is fixed a sprocket-wheel 10, which is engaged by the driving-chains 11. These driving-chains extend forwardly above the sprocket-wheels 12, which are fixed to the rear supporting-wheels 13. The forward ends of these cylinder driving-chains are arranged to be lowered and raised into and out of engagement with the driving-sprockets 12 by means of the arms 14, bearing the idler-wheels 15, about which the forward ends of the chains pass. The arms 14 are pivotally mounted on the box or body 1 at points 14′ substantially above the center of the sprocket-wheel 12, and on each of these pivotal axes is also mounted a second idler-wheel 16, upon which rests the upper run of the chain 11. The lower run of the said chain engages the sprocket-wheel 12 when the arm 14 occupies the lower or full-line position of Fig. 2, but when raised to the upper or

dotted-line position of the same figure the chain is out of engagement with its driving-wheel and the distributing-cylinder 8 stops. To control the position of the arms 14, they are provided each with a downwardly-projecting portion 14^2, which portions connect through the rods 17 with the levers 18, secured to the ends of the rock-shaft 19. The foot-lever 20, which is within reach of the operator, connects through the rod 21 with the lever 18 on the rock-shaft 19, and thereby enables the chains 11 to be engaged or disengaged from their driving-wheels.

To drive the apron 2 rearwardly at any desired rate of speed, the following means are employed: On the end of the apron-shaft 6 is secured the worm-gear 22, and on the stub-shaft 23 is journaled the combined ratchet and bevel-gear 24. Movement is imparted to this gear by the toothed eccentric-link 25, which is driven by the eccentric 9′ on the cylinder-shaft 9. This link is bifurcated at its lower end, each arm thereof being provided with a toothed rack 25′, which meshes with the corresponding toothed segment 26′ on the pawl-arms 26. These pawl-arms (see Figs. 11 and 12) are pivotally mounted and oppositely disposed on the stub-shaft 23, so that when a reciprocating motion is given the link 25 by the eccentric 9′ it will impart a rocking movement to the pawl-arms. On the pawl-arms 26 are mounted the pawls 27, which are adapted to engage the ratchet portion of the gear and ratchet 24. By employing the rack-and-pinion drive above described a more uniform motion is imparted to the pawl-arms 26 than could be secured by the ordinary link connection, since the effect of angularity in said arms is overcome. Moreover, a movement is imparted to the pawl-arms by the toothed link 25 when the latter is crossing the lower dead-center, as will be seen from an inspection of Fig. 14. The link in passing from the full to the dotted line position shown in this figure passes the lower dead-center and has no appreciable longitudinal movement, but rocks about a center coincident with the stub-shaft 23 and in such rocking movement advances the pawl-arms the amount indicated. The arrangement thus results in a comparatively uniform motion being imparted to the gear and ratchet wheel 24, and hence a more uniform speed to the apron rearwardly. On the stub-shaft 23 is also mounted the casting 28, which forms a journal-bearing for the vibratory worm-shaft 29 and a housing for the pinion 30, fixed thereto. The pinion 30 meshes with and is driven by the bevel-gear portion of the gear 24, and thus imparts movement to the worm 31, which in turn is adapted to engage and drive the worm-gear 22 on the apron-shaft 6. Movement of the shaft 29 about its pivotal center on the stub-shaft 23 is effected by means of a bar 32. A fixed casting 33 is provided with a yoke-like opening 33′, which engages a collar 29′ on the end of the worm-shaft 29, and a roller 29^2 is mounted in a bracket on said collar. The wider portion of the bar 32 above the shoulder 32′ thereon engages the roller 29^2 on the collar 29′ and forces the worm 31 into engagement with the gear 22, while the coil-spring 34 operates to hold same normally out of engagement. The bar 32 is mounted at its lower end on one arm of the angle-lever 35 on the rock-shaft 35′, this angle-lever connecting with the hand-lever 36 through the rod 37, and thereby enabling the worm 31 to be thrown into and out of engagement with the gear 22.

To regulate the extent of effective movement of the pawls 27 on the ratchet-gear 24, a cam-lever 38 is pivotally mounted on the stub-shaft 23, this lever being provided with the cam-surfaces 38′, each of which is adapted to engage the toe of one of the pawls 27 and prevent it from engaging the said ratchet-gear 24 for a portion of the stroke of said pawl, the extent depending upon the position of the cam-lever. The cam-lever 38 is provided with a toothed segment 38^2, which meshes with the gear-segment 39, (see Fig. 15,) the latter being pivotally mounted on the apron-shaft 6 and controlled by its connection with the arm 35 on the rock-shaft 35′ through the rod 39′. Movement of the hand-lever 36 will thus control the position of the said cam-lever and determine the effective throw of the pawls, and hence regulate the rearward movement of the apron 2. For a more complete detail description of the foregoing principle of construction and operation of the apron-feed and means for regulating same reference is made to the application filed by applicants February 3, 1906, Serial No. 299,253.

To return the apron to its forward position, the following-described apron-reversing mechanism is employed: A spur-gear 40 is fixed to the left-hand end of the apron-shaft 6, and meshing therewith and mounted on the stub-shaft 41 is the pinion 42. To the stub-shaft 41 is also fixed the sprocket-wheel 43, and journaled loosely on said shaft on both sides of the sprocket-wheel are the swinging arms 44, (see Fig. 6,) between the upper or free ends of which is journaled the idler-wheel 45. A sprocket-chain 46 is made to pass about the sprocket-wheel 43 and the idler 45, and the arrangement is such that as the arms 44 are swung forwardly the said chain will be brought into engagement with the large sprocket-wheel 12, which is secured to the left-hand rear wheel 13. There is thus provided a swinging chain-carrying frame, having a gear connection with the apron-shaft, the said frame being arranged to engage the driving sprocket-wheel when swung for-

wardly, and thus impart a return or forward movement to the apron. The spring 48, which is fixed at one end to the box-frame and at the other end to the free end of the arms 44, operates to hold the chain 46 out of engagement with its driving-sprocket 12. The link connection 49, which extends between the arm 44 and an arm 50 on the end of the rock-shaft 35′, constitutes an operative connection between the apron-reversing mechanism, and this rock-shaft, which, as heretofore described, is controlled by the hand-lever 36. When the hand-lever 36 is moved to its forward position, as shown in Fig. 2, the arm 44 will be swung rearwardly from the full-line position shown in Fig. 6 to the dotted-line position in the same figure, and the apron-reversing mechanism thus be put out of operation.

To prevent the material in the box from lodging against the distributing-cylinder 8 when the machine is not in operation, a vertically-swinging end-gate 51, consisting of a curved shield 51′, secured to a swinging frame 51^2, is employed. This end-gate is connected by the link 52 to the depending arm 14^2 of the arm 14 and through this is thrown into and out of operation in conjunction with the cylinder-driving mechanism by the foot-lever 20. Ordinarily the operator of the machine would fail to give attention sufficiently careful to insure the apron being stopped exactly at the end of its movement forward and rearwardly, and hence automatic means are employed for accomplishing this end. Such means consists of two arms 53 and 54, secured to the rock-shaft 35′ and properly disposed angularly thereon. This rock-shaft 35′ lies beneath the movable apron 2, and the arms 53 and 54 project upwardly, terminating immediately below said apron. Depending lugs 55 and 56 are secured to the under side of the apron-strips 2′, the lug 55 being near the forward end of the apron, while the lug 56 is near the rear end thereof. The arrangement is such that when the apron approaches the end of its travel rearwardly the lug 55 will impinge the arm 53, moving the same from the full-line position of Fig. 3 to the dotted-line position in the same figure, in which movement the angle-lever 35 will move correspondingly, disengaging the worm 31 from the gear 22 and also rocking the cam-lever 38, the movement of this cam-lever being without effect, however, since the worm is disengaged from the gear. On the return movement forwardly of the apron the lug 56 will engage the arm 54, thus rocking the shaft 35′ forwardly and disengaging the chain 46 from the sprocket-wheel 47 of the apron-reversing mechanism. The arms 53 and 54 are made longitudinally compressible in order that they may yield on contacting the bottom of the apron when coming to a vertical position, and thus retain contact with their point of engagement for a longer period of time.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. In a fertilizer-distributer, in combination, a body, a distributing-cylinder mounted at the rear end thereof, an end-gate adapted to be moved to and from a position immediately in front of the distributing-cylinder, driving-chains for said cylinder extending forwardly from the ends thereof and arranged to be raised and lowered from and to engagement with the sprocket-wheels on the main wheels, driving sprocket-wheels mounted on the main wheels, and a single lever for controlling the movement of said chains and end-gate.

2. In a fertilizer-distributer, in combination, a body, a movable apron mounted in the bottom thereof, a distributing-cylinder mounted at the rear end of said body, rear supporting-wheels, driving sprocket-wheels secured thereto, means for moving the apron rearwardly, and an apron-return mechanism comprising a gear on the end of the apron-shaft, a stub-shaft having a gear and sprocket wheel mounted thereon, a swinging arm pivotally mounted on the stub-shaft and carrying at its free end an idler, a chain engaging the sprocket and the idler, the said chain arranged to swing into engagement with the driving sprocket-wheel on the main wheel and thereby impart return movement to the apron, and means for controlling the position of said swinging arm.

3. In a fertilizer-distributer, in combination, a body, a movable apron in the bottom thereof, means for driving the apron rearwardly, an apron-reversing mechanism, a lever-actuated rock-shaft mounted beneath said apron for controlling the apron-drive and the apron-reversing mechanism, upwardly-projecting longitudinally-compressible arms fixed on said rock-shaft, and depending lugs on said apron arranged to impinge said arms and thereby control the driving apron-moving devices.

4. In a fertilizer-distributer, in combination, a body, a movable apron in the bottom thereof, means for driving the apron rearwardly, an apron-reversing mechanism, a rock-shaft mounted beneath said apron for controlling the apron-drive and the apron-reversing mechanism, a hand-lever within reach of the operator, said lever having an operative connection with the rock-shaft, two angularly-disposed upwardly-projecting arms secured to said rock-shaft, and a depending lug on each end of the apron arranged to impinge said arms coincident with the apron reaching the limit of its travel rearwardly and forwardly, and thereby disengage, respectively, the apron-drive and the apron-reversing mechanism.

5. In a fertilizer-distributer, in combination, a body, a movable apron mounted in the bottom thereof, a distributing-cylinder mounted at the rear end of said body, mechanism for moving said apron toward the cylinder, said mechanism comprising a shaft connected with said bottom, a gear-wheel secured to said shaft, a worm adapted to engage with said wheel, said worm having a gear connection with a ratchet-wheel rotatably mounted upon a fixed part of the machine, a pawl and a pawl-carrying arm adapted to engage with said ratchet-wheel, the said pawl-arm having a toothed segment in connection therewith, an eccentric-link provided with a toothed rack and arranged to form an operative connection between the distributing-cylinder and the pawl-arms, and means for controlling the operation of said apron-driving mechanism.

6. In a fertilizer-distributer, in combination, a body, a movable apron mounted in the bottom thereof, a distributing-cylinder mounted at the rear end of said body, mechanism for moving said apron toward the cylinder, said mechanism comprising a shaft connected with said bottom, a gear-wheel secured to said shaft, a worm adapted to engage with said wheel, said worm having a gear connection with a ratchet-wheel rotatably mounted upon a fixed part of the machine, two oppositely-disposed pawl-carrying arms pivotally mounted on an axis coincident with the axis of said ratchet-wheel, said arms having toothed segments in connection therewith, pawls mounted on said arms and adapted to engage the ratchet-wheel, an eccentric-link driven from said cylinder and terminating at its lower end in opposite parallel toothed racks arranged to engage the toothed segment of the pawl-arms and vibrate same, and means for controlling the operation of said apron-driving mechanism.

7. In a fertilizer-distributer, in combination, a body, a movable apron mounted in the bottom thereof, a distributing-cylinder mounted at the rear end of said body, mechanism for moving said apron toward the cylinder, said mechanism comprising a shaft connected with said bottom, a gear-wheel secured to said shaft, a worm adapted to engage with said wheel, said worm having a gear connection with a ratchet-wheel rotatably mounted upon a fixed part of the machine, two oppositely-disposed pawl-carrying arms pivotally mounted on an axis coincident with the axis of said ratchet-wheel, said arms having toothed segments in connection therewith, pawls mounted on said arms and adapted to engage the ratchet-wheel, an eccentric-link driven from said cylinder and terminating at its lower end in opposite parallel toothed racks arranged to engage the toothed segment of the pawl-arms and vibrate same, a cam-lever for controlling the effective movement of the said pawls, said cam-lever being provided with pawl-engaging cam-surfaces and a toothed segment, a gear-segment having connection with the controlling-lever for operating the said cam-lever, and a lever for controlling the operation of the apron-driving mechanism.

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