

July 31, 1923.

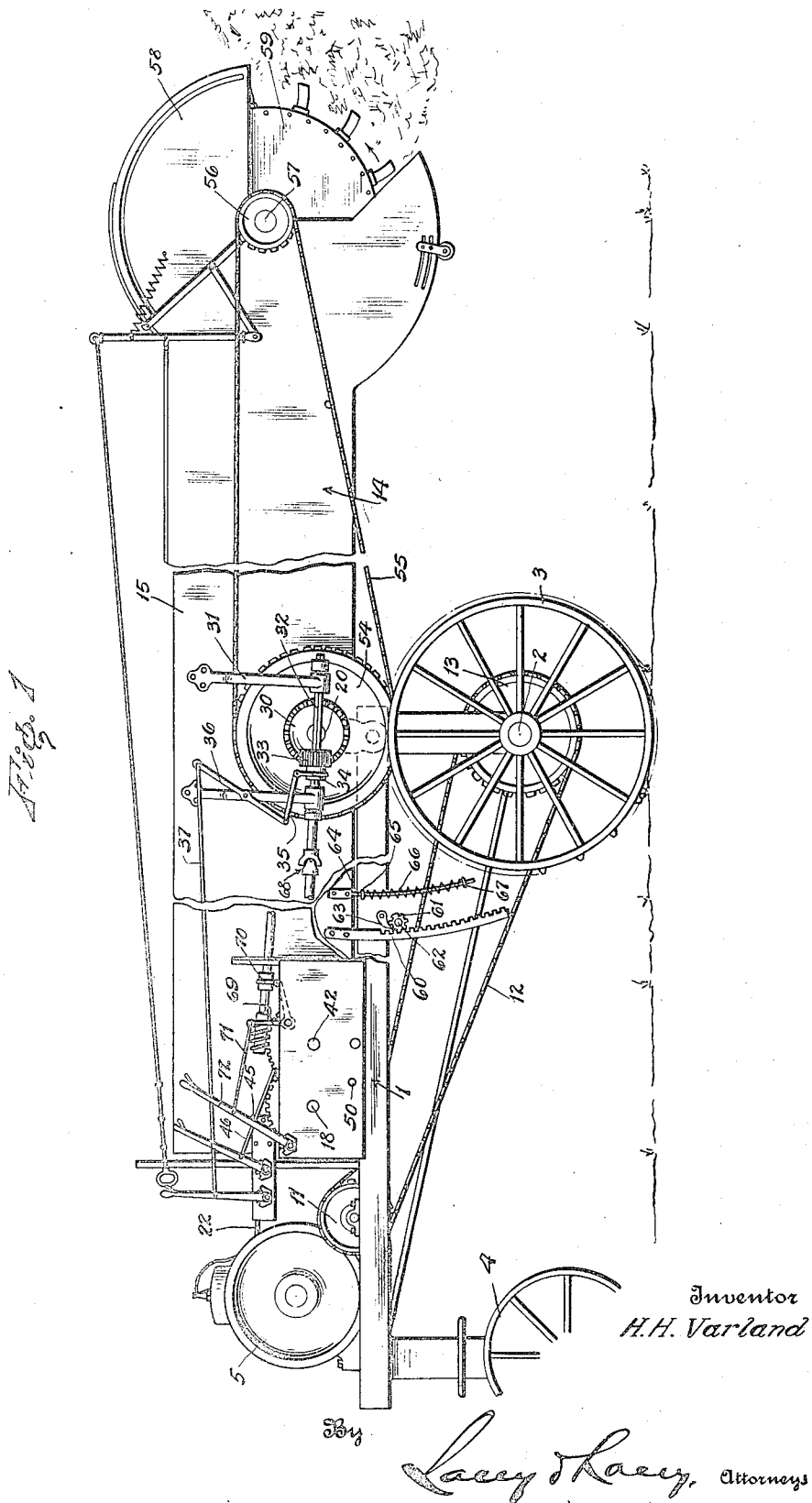
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H. H. VARLAND

COMBINED MANURE LOADER AND SPREADER

Filed Nov. 15, 1920

5 Sheets-Sheet 1



July 31, 1923.

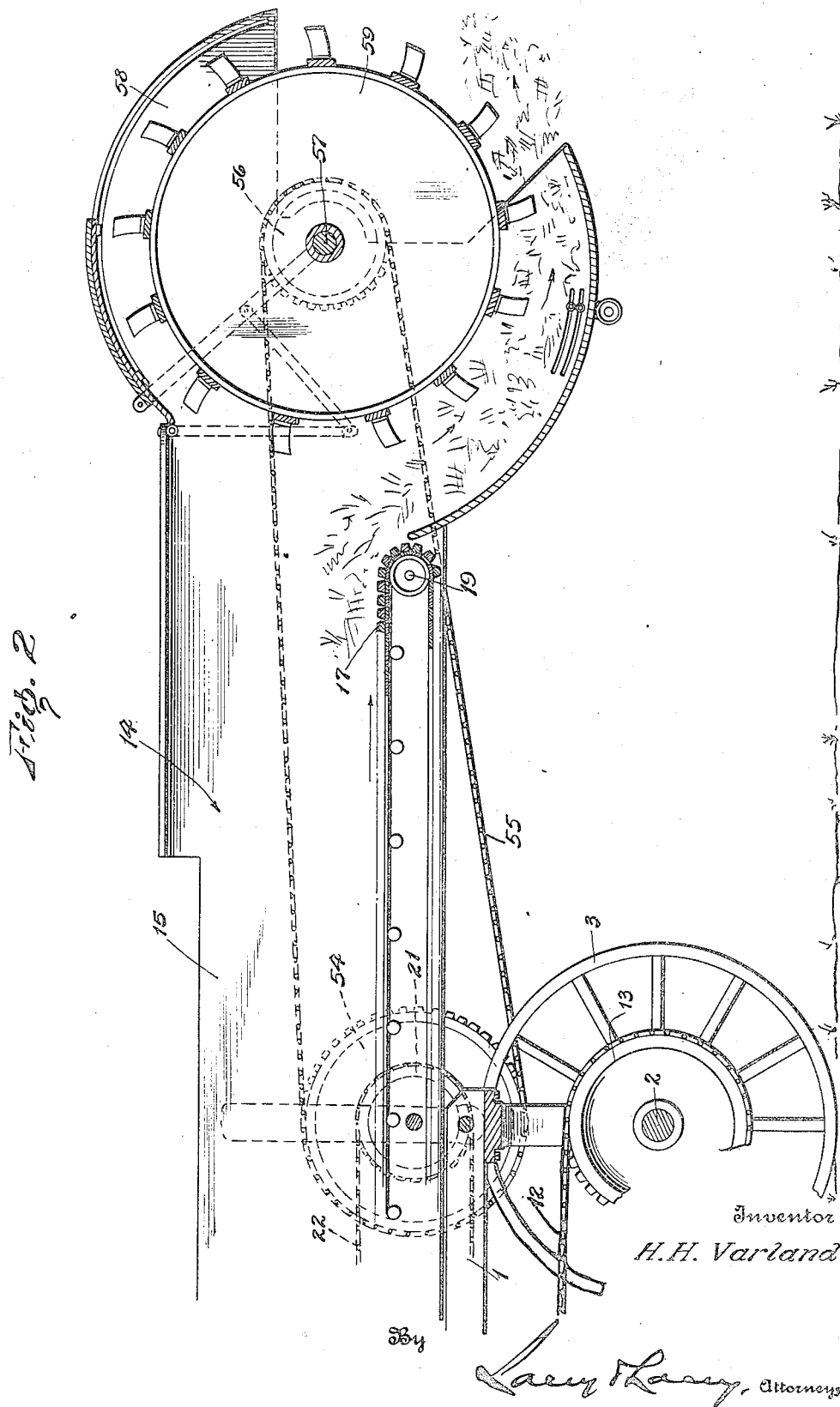
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July 31, 1923.

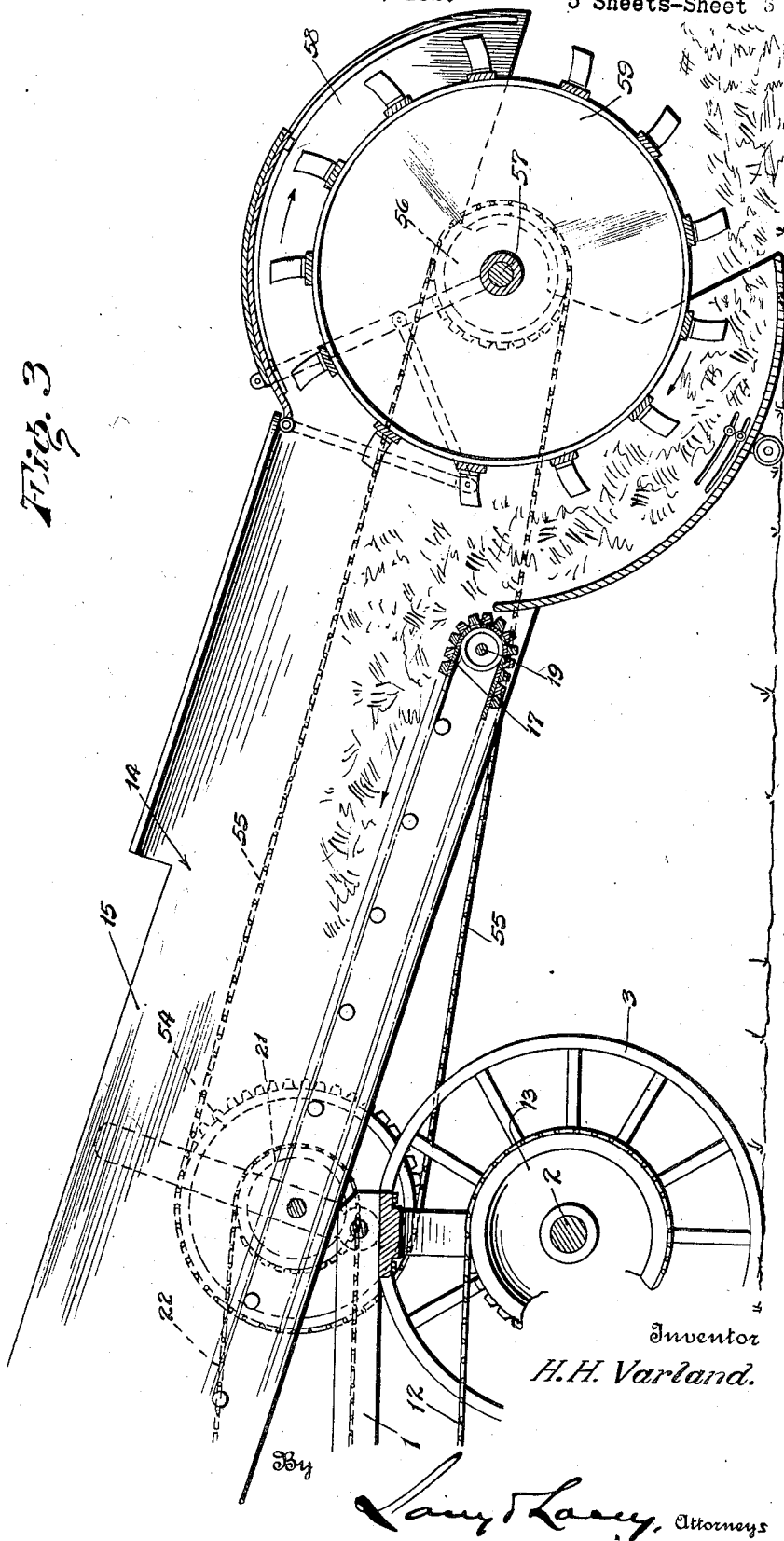
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July 31, 1923.

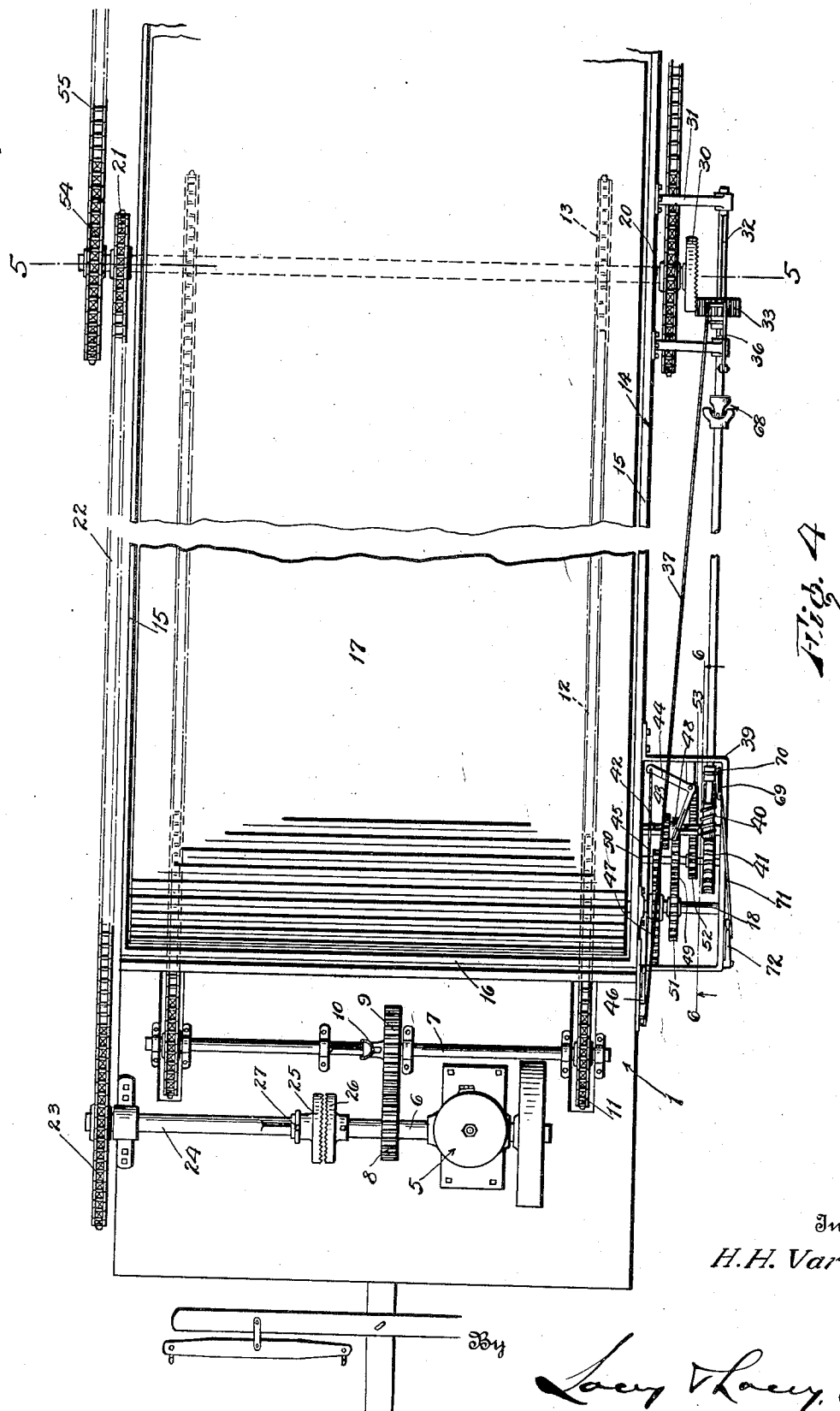
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COMBINED MANURE LOADER AND SPREADER

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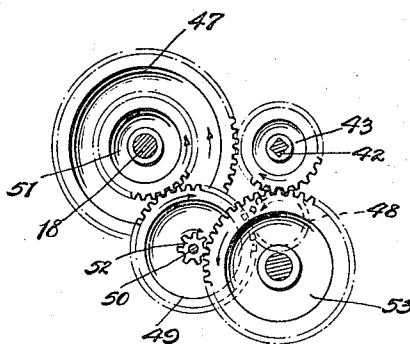
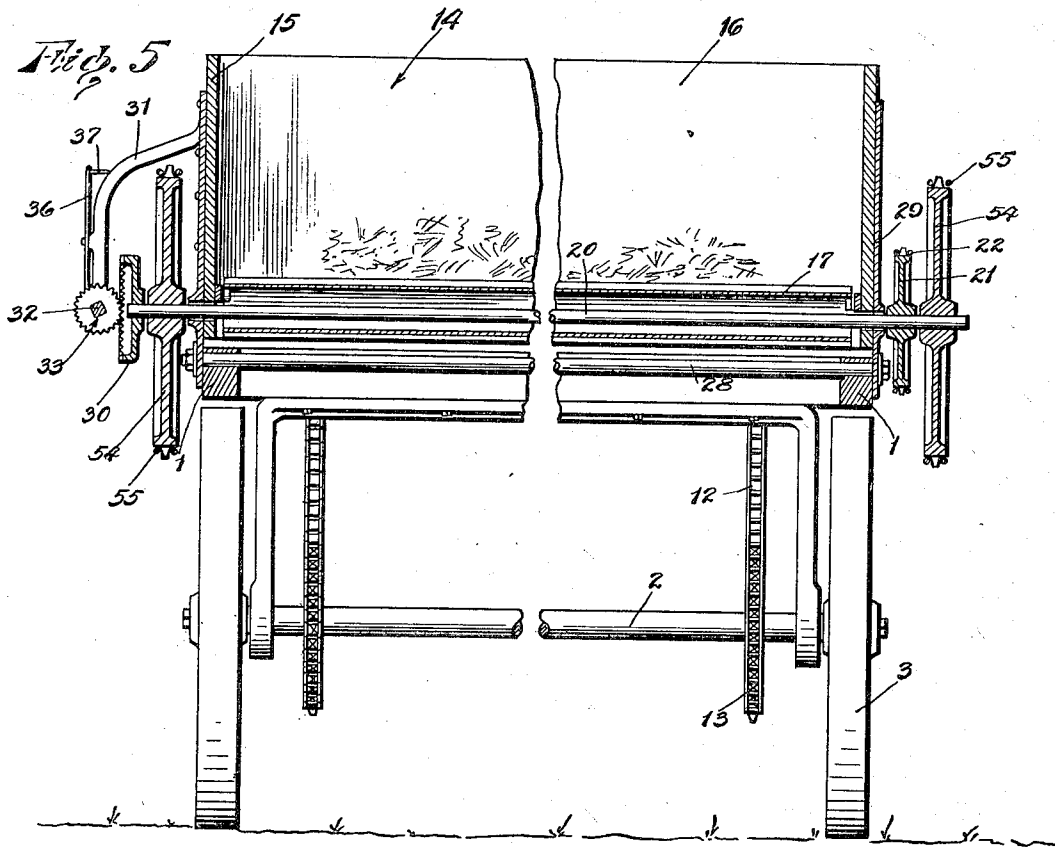


Fig. 6

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UNITED STATES PATENT OFFICE.

HIRAM H. VARLAND, OF DES MOINES, IOWA.

COMBINED MANURE LOADER AND SPREADER.

Application filed November 15, 1920. Serial No. 424,258.

To all whom it may concern:

Be it known that I, HIRAM H. VARLAND, a citizen of the United States, residing at Des Moines, in the county of Polk and State of Iowa, have invented certain new and useful Improvements in Combined Manure Loaders and Spreaders, of which the following is a specification.

This invention relates to machines for handling manure and has as its primary object to provide a machine capable of employment both as a spreader and as a loader. As is well known, considerable time and labor must be expended in loading the boxes of manure spreaders of the ordinary type now in use as this work must be accomplished manually by the use of pitch forks. Even aside from this objection, in the manual loading of the spreader box the manure in windy weather is liable to be blown about and much of it wasted. As stated, therefore, it is the primary object of the present invention to provide a machine for handling manure, which machine may have its parts readily and quickly so adjusted as to adapt the machine to work into a pile of manure and automatically load the same into the box of the machine, the machine being capable of having its said parts restored to normal positions and conditions so that the machine may then be subsequently employed in distributing the load of manure. In short, the object of the invention is to provide a machine which may be operated to take up a load of manure from the pile and may then be employed in distributing the loaded manure.

The invention is designed more especially as an improvement on the structure shown in my Patent No. 1,346,433, issued July 13, 1920. In the patented structure the box of the machine is formed in two sections, one section being fixedly mounted and the other section being adapted to be dropped to a lowered position to facilitate the loading operation. While the machine thus constructed is efficient in its operation and is entirely practicable, nevertheless there are advantages which are to be gained by reconstructing the same in accordance with the present invention and with this object in view the invention contemplates providing a machine with a box which is integral throughout and in so mounting the box that the same as an entirety may be tilted to loading position.

In the accompanying drawings:

Figure 1 is a side elevation of the machine embodying the improvements of the present invention, the box being shown in position for distributing its load;

Figure 2 is a vertical longitudinal sectional view through the loading and distributing end of the box, the box being shown in distributing position;

Figure 3 is a similar view illustrating the box in loading position;

Figure 4 is a top plan view of the other end of the machine;

Figure 5 is a vertical transverse sectional view on the line 5—5 of Figure 4;

Figure 6 is a vertical sectional view taken substantially on the line 6—6 of Figure 4 looking in the direction indicated by the arrows.

In the drawings, the numeral 1 indicates in general the bed frame of the machine and this frame may be of any desired construction and is supported at one end by means of an axle 2 and traction wheels 3 mounted upon the ends thereof. At its other end the frame is supported by ground wheels 4 which may be mounted in any suitable manner to turn so that the machine may be guided in its travel. During the spreading operation, this last-mentioned end of the frame will constitute the forward end thereof but during the loading operation the direction of travel of the machine will be reversed so that this end then becomes temporarily the rear end. However, for convenience in describing the machine and particularly in relatively locating the various parts thereof, it will be considered that the wheels 3 are located at the rear and the wheels 4 at the front of the machine as a whole. So far as the operation of the mechanism which will be hereinafter specifically described is concerned, the machine may be drawn or propelled in any desired manner as for example by a tractor or by draft animals, and likewise any suitable means may be provided for steering or guiding the machine in its travel. However, particularly when the machine is to be horse-drawn, it may be found desirable to provide upon the machine itself a means whereby the machine may be propelled in a rearward direction during the loading operation so as to advance the loading and distributing end of the box into the pile of manure to be loaded, and with this object in view, a source

of power such for example as an internal combustion engine 5 is mounted upon the bed frame 1 at the forward end thereof. The shaft of this motor is indicated by the numeral 6, and mounted upon the bed frame parallel to the said shaft is a driving shaft 7. A gear 8 is fixed upon the shaft 6, and a gear 9 is splined upon the shaft 7 and is slidable thereon through the medium of a shifting lever 10, so as to be movable into and out of mesh with the gear 8. Thus when the gears 8 and 9 are in mesh and the motor 5 is in operation, the shaft 7 will be rotated, and in order that rotary motion may be transmitted from this shaft to the axle 2 upon which the traction wheels 3 are mounted, sprocket gears 11 are fixed upon the said shaft 7 at the ends thereof and are connected by chains 12 with sprocket gears 13 mounted upon the said axle 2. At this point it will be evident that by shifting the lever 10 to bring the gear 9 into mesh with the gear 8, the machine may be propelled in a rearward direction so that when the box of the machine is tilted in the manner to be presently explained, the loading and distributing end may be advanced into the pile of manure during the loading operation. It will also be evident that if desired the motor 5 may be employed for the purpose of propelling the machine in a forward direction during the distributing operation although its primary function is to propel the machine rearwardly as above pointed out and to operate the mechanism by which the load is taken up and finally distributed.

The box of the machine is indicated in general by the numeral 14 and the said box comprises side walls 15 and a front end wall 16, the box being open at its rear end, and the bottom of the box comprising an endless conveyor apron 17 which is trained over sprockets fixed upon the shafts 18 and 19 mounted respectively at the front and rear ends of the box 14. A shaft 20 is rotatably mounted within the box between the front and rear ends thereof and has its ends projecting beyond the side walls of the box. Fixed upon one projecting end of the shaft is a sprocket 21 about which is passed a sprocket chain 22, this chain passing also about a sprocket gear 23 fixed upon one end of a shaft 24 mounted upon the bed frame of the machine and carrying one member of a clutch, the other member of which clutch is indicated by the numeral 26 and is carried by the engine shaft 6. The clutch member 25 is shiftable through the medium of a lever 27 and when brought into engagement with the member 26 serves to connect the shaft 24 for rotation with the engine shaft 6 so as to impart rotary motion to the shaft 20. The shaft 20 is located immediately above and close to a transverse rod 28 mounted in the bed frame of the machine

and which rod is fixed at its ends through brackets 29 fixed upon the sides of the box 14 so that the box is in this manner supported for tilting movement and may therefore be caused to assume a horizontal position with its forward portion resting upon the top of the bed frame, as shown in Figure 2 of the drawings, or a downwardly tilted position, as shown in Figure 3 of the drawings. The rod 28 and brackets 29 constitute a convenient means for mounting the box for tilting adjustment, but it will be evident that various other pivotal, hinged, or swinging connections may be provided for supporting the box upon the bed frame so that the box may be tilted in the manner above pointed out. Also at this point it will be evident that due to the location of the shaft 20 in close proximity to the pivotal or hinged connection of the box with the bed frame, the driving connection between the said shaft and the shaft 24 is not in any way interfered with, and therefore power may be supplied to the shaft 20 whether the box be in horizontal position or in tilted position.

A crown gear 30 is fixed upon the other end of the shaft 20, and rotatably mounted in position transversely of the face of the gear 30 in suitable brackets 31, is a shaft 32 upon which is supplied a gear 33 which in this manner is movable upon the shaft 32 across the face of the gear 30 to mesh with the same at either side thereof and thus provide for reversal of the travel of the apron. In order that the gear 33 may be shifted as stated, a yoke 34 is connected therewith and this yoke is connected by a link 35 with the lower end of a rocker 36 mounted upon one end of the brackets 31. A rod 37 is connected to the upper end of the rocker 36 and to an operating lever 38 by swinging which the rocker 36 may be swung so as to shift the gear 33 into and out of mesh with the gear 30. The shaft 32 is led forwardly through a bearing frame 39 mounted upon one of the side walls of the box 14 and is provided with a worm 40 which meshes with a worm gear 41 fixed upon a shaft 42 which shaft is rotatably mounted upon the said frame 39. The shaft 42 has splined upon it a gear 43 which is slidable along the shaft, and in order that the gear 43 may be shifted, a rocker 44 is mounted within the frame and has one arm connected with the gear and its other arm connected to a rod 45 which leads forwardly to an operating lever 46 through a movement of which the rocker may be swung to adjust the said gear 43. A gear 47 is fixed upon the shaft 18, and when the gear 43 is in one position of its sliding adjustment upon the shaft 42, it will mesh with this gear 47 so as to impart rotary motion to the shaft 18, the gear 43 being somewhat smaller than the gear 47 whereby the speed

of rotation of the shaft 18 will be less than that of the shaft 42. When the gear 43 is shifted to another position it is designed to mesh with a pinion 48 mounted within the bearing frame 39, and this pinion in turn meshes with a gear 49 also mounted within the frame upon a shaft 50. The gear 49 is in mesh with a gear 51 upon the shaft 18, and it will be observed that the gears 43, 48, 49 and 51 are so proportioned that when the train is driven by the gear 43 meshing with the pinion 48, the shaft 18 will be rotated at a somewhat higher rate of speed than when the gear 43 is in mesh with the gear 47. To provide for rotation of the shaft 18 at a still higher rate of speed, a pinion 52 is fixed upon the shaft 50 and is engaged by the gear 53 mounted within the bearing frame and so positioned that in another shifting position of the gear 43 the latter will mesh therewith. The gears 53 and 50 are so proportioned that when the gear 43 is in mesh with the gear 53, the shaft 50 will be rotated at a relatively high rate of speed and this motion will be transmitted at a corresponding speed through the gear 49 and gear 51 to the shaft 18. Thus by the system of gearing above described, the conveyor apron 17 may be driven selectively at different rates of speed.

Sprocket gears 54 are fixed upon the shaft 20, and sprocket chains 55 are trained over these gears and over sprocket gears 56 fixed upon the ends of a shaft 57 mounted with a hood 58 at the rear end of the box 14. This shaft 57 supports a beater 59 the periphery of which passes in close proximity to the rear end of the conveyor apron 17. The construction of this beater as well as the construction of the hood within which it is mounted constitutes the subject matter of another application filed Sept. 1, 1920, Serial No. 407,317 and therefore need not be herein specifically described. It will be evident however that when the beater 59 is rotating in one direction and the upper stretch of the conveyor apron is traveling in the direction of the beater, the load within the box will be fed to the beater and will be disintegrated and thrown rearwardly by the beater teeth and thus distributed over the ground surface. On the other hand when the box of the machine is tilted as shown in Figure 3 of the drawings and the beater 59 is rotating in the same direction and the upper stretch of the conveyor apron is traveling forwardly, manure will be taken up from the pile by the teeth of the beater and thrown onto the apron and thus carried into the box.

In order that the box may be tilted and also in order that it may be restored to horizontal or distributing position after it has been tilted and loaded, an arcuate rack 60 is fixed to the side of the box and meshes with

a pinion 61 fixed upon a shaft 62 which may be rotated through the medium of a hand crank or the like, this shaft being mounted upon the bed frame 1 as shown in Figure 1 of the drawings. A pawl 63 is provided in connection with the pinion 61 so that when the box is in horizontal or distributing position the shaft 62 may be held against rotation and thus the box will be prevented from accidentally swinging down to its tilted position. The point of support for the box is located so that the box will be substantially balanced and in order that the downward tilting of the box may be cushioned and thus avoid injury to the mechanism carried thereby or associated therewith, an arcuate rod 64 is mounted upon the side of the box and extends downwardly through a guide 65 upon the side of the bed frame 1, a spring 66 being arranged upon the rod between the guide and a stop shoulder or collar 67 upon the said rod. Normally this spring is expanded, but as the box is tilted downwardly at its rear end, the rod 64 will move upwardly through the guide 65 thus compressing the said spring 66.

In order that the worm 40 may be lifted out of engagement with the worm gear 41 so as to stop the rotation of the shaft 32, the said shaft is provided with a universal joint 68, and an angle lever 69 is mounted upon the frame of the machine and has one arm connected as at 70 with the said shaft adjacent the said worm. A rod 71 is connected to the other arm of this lever and to a hand lever 72 so that by rocking the said hand lever, the angle lever may be rocked and the said shaft 32 elevated to bring the worm out of mesh with the worm gear. In this manner the power may be disconnected from the travelling apron of the conveyor whenever required.

It will be evident from the foregoing that in the operation of the machine the conveyor belt may be caused to travel at various speeds as desired both when loading and unloading.

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

1. In a machine for handling manure, a bed frame supported for travel, a box mounted at a point intermediate its length upon the bed frame for bodily tilting movement independently of the bed frame whereby one of its ends may be brought to a lowered position, a conveyor within the box, a shaft mounted adjacent to the tilting point of the box, a drive shaft upon the bed frame, operative connection between the drive shaft and the first-mentioned shaft, and gear connection between the said first-mentioned shaft and the conveyor.

2. In a machine for handling manure, a bed frame supported for travel, a box

mounted thereon at a point intermediate its length for bodily tilting movement independently thereof whereby one of its ends may be brought to a lowered position, a conveyor within the box, a shaft mounted in proximity to the point of support of the box, a shaft for driving the conveyor, variable speed gearing for transmitting power from the first-mentioned shaft to the second-mentioned shaft, power means upon the bed frame, and drive connection between the power means and the first-mentioned shaft.

In testimony whereof I affix my signature.

HIRAM H. VARLAND. [L. s.]