July 15, 1930. W. P. SIMPSON 1,770,437

MANURE DISTRIBUTOR

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FIG. 1

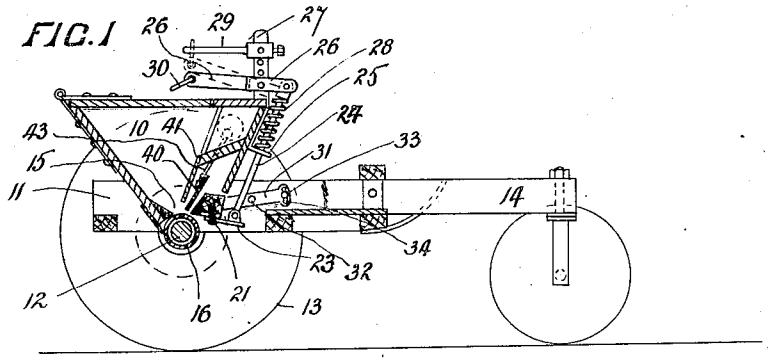


FIG. 2

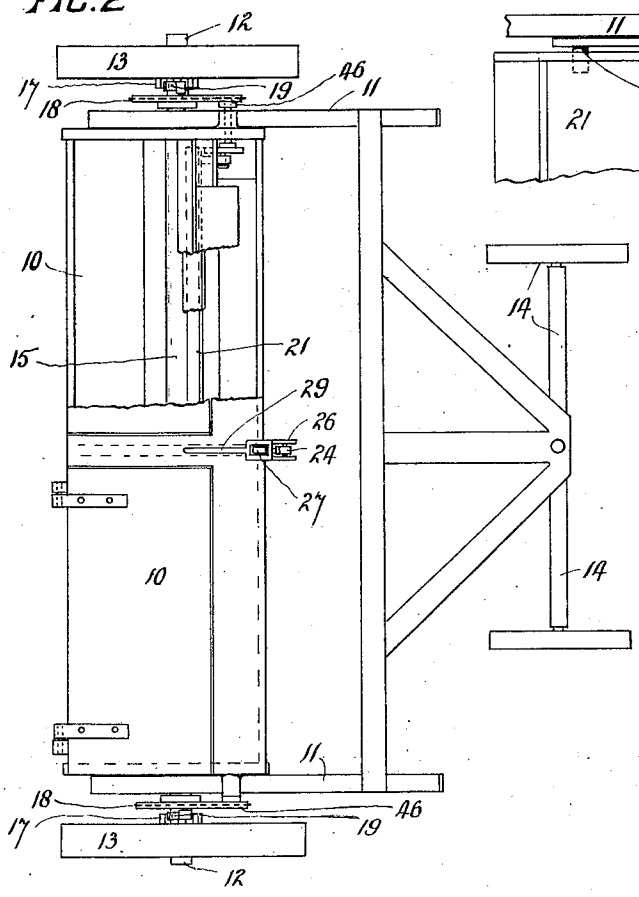
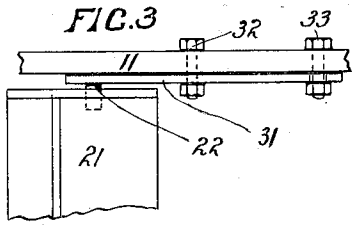


FIG. 3



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FIG. 4

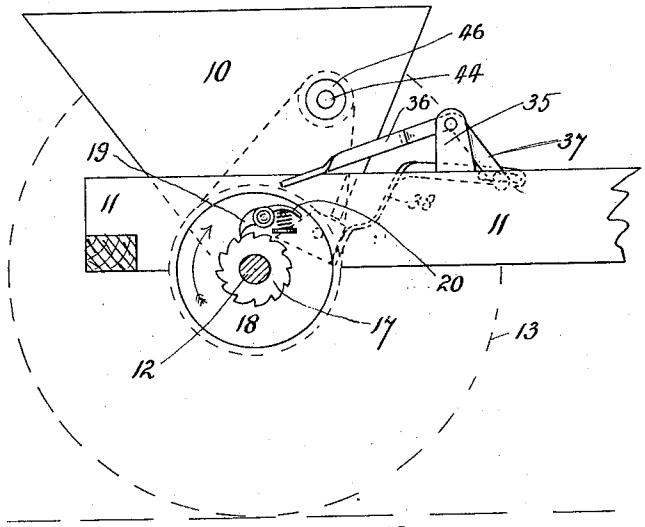


FIG. 6

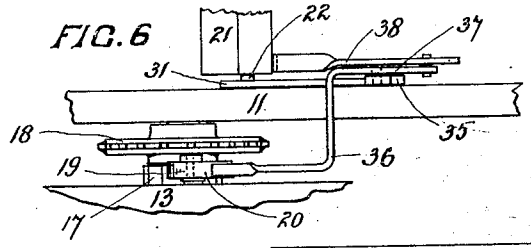
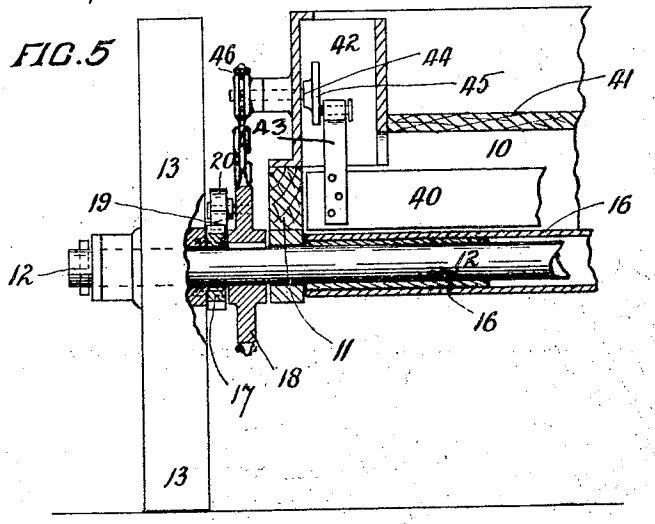


FIG. 5



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UNITED STATES PATENT OFFICE

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MANURE DISTRIBUTOR

Application filed July 28, 1928, Serial No. 296,041, and in New Zealand October 28, 1927.

This invention relates to improvements in a machine for use in the broadcast distribution of manures of all kinds and which machine by its features of construction is adapted to spread, by the agency of a roller rotating beneath a discharge opening in the manure hopper, a readily regulatable quantity of manure over a course approximating to its width in a continuous and regular manner, and that also may be adjusted so that the amount thus spread may be varied across the width to provide for a thicker spreading near one edge than at the other.

The invention comprises means whereby any lumps contained in the manure will be broken up to permit of their feed from the machine. It also comprises special means whereby the travel of the machine on its running wheels will actuate the spreading mechanism and also whereby such mechanism may be automatically put out of operation by the closing of a feed gate.

In fully describing the invention reference will be made to the accompanying sheet of drawings, in which:—

Figure 1 is a cross sectional elevation of the machine.

Figure 2 is a plan thereof, parts being broken away to expose the parts beneath.

Figure 3 is a detail enlarged view showing the means for use in mounting the delivery gate of the machine at each of its ends.

Figure 4 is an enlarged end view of the machine, the near wheel being removed.

Figure 5 is a front sectional elevation, also on an enlarged scale, of one end of the machine.

Figure 6 is a plan view of the automatic gear controlling means at one end of the machine.

In giving effect to the invention a hopper 10 of approximately V shape in cross section is secured to extend between main side frame members 11 and such members are carried on a transversely extending axle 12 that is journalled in these side members and on each end of which a driving wheel 13 is loosely mounted. The forward ends of the frame members 11 are supported upon a fore-carriage 14 of approved design.

The hopper 10 and axle 12 are so disposed relatively that the axle extends along beneath the bottom of the hopper and such hopper is formed with an opening 15 extending along such bottom above the axle. A sleeve roller 16 is fixed on the axle to extend along it between the members 11 of the frame and such roller in effect forms the bottom of the hopper.

The driving wheels 13, as mentioned, are loose upon the axle 12, but each wheel is designed to be locked to the corresponding end of the axle so as to cause the axle and roller 16 to rotate with the driving wheels and in the same direction. The means for this purpose consist in a ratchet wheel 17 that is secured upon the inner side of the wheel boss, and a disc wheel 18 (which is in the form of a sprocket wheel for a purpose to be afterwards described) that is arranged adjacent thereto upon the axle and made fast thereupon, and which wheel has a spring controlled pawl 19 pivoted on its outer side face. This pawl is so disposed that its tooth end extends rearwardly and its spring acts to turn it inward into engagement with the teeth of the ratchet wheel 17, as shown in Figure 4. The forward travel of the driving wheel 13 therefore acts through the ratchet wheel and pawl to turn the axle 12 and sleeve 16 with the driving wheel. Backward movement of the machine may take place without driving the axle and roller, the ratchet teeth running idly beneath the pawl.

The pawl 19 is made with a tail extension 20 beyond its pivot, which may be depressed to free the pawl from the ratchet and may then be locked out of engagement by any approved agency, to permit of the machine being drawn forwardly without operating the roller sleeve 16. The invention however comprises special means for automatically lifting both pawls when the sowing aperture 15 is closed by the means hereinafter described.

The forward edge of the hopper opening 15 is formed by a gate bar 21 the bottom rear corner of which is adapted to lie above the roller 16 and to form with the periphery of the roller a slot extending along the full length of the hopper 10. This gate bar is so

mounted that it may be rocked on a longitudinal axis to close the slot by causing its edge to engage the roller, or to open the slot to a variable extent so that the feed of the manure caused by the roller rotating beneath the gate will be regulatable in quantity. The gate bar is also so mounted that the slot opening may be varied in width from one end to the other.

This is effected by mounting each end of the bar upon a trunnion pin 22 fitted to extend into its end and which pin is mounted on the inside of the adjacent main frame member 11. At the middle of the gate length, an arm 23 is fixed to extend rigidly from its underside so that by up and down movements of this arm the gate bar may be rocked on the longitudinal axis formed by the trunnion pins 22. To the outer end of the arm 23, a rod 24 has its lower end pivoted and such rod extends up the front of the hopper 10 and passes through a guide 25 affixed to such front and then has its upper end pivotally connected with the forward end of a lever 26 that is pivoted in a standard 27 fixed vertically upon the top of the hopper. A spring 28 is provided to encircle the upper end of the rod and such spring is in compression between the rod end and the guide 25 so that it acts normally to force the rod upward and thereby to raise the arm 23 and tilt the gate bar 21 to cause its corner to press upon the roller 16 and close the discharge. By raising the rear end of the lever 26, the rod is depressed against the spring, to tilt the gate bar corner upwardly more or less in correspondence with the amount of lift given the lever, and thus to open the discharge to any desired width.

To retain the gate bar in its opened position and at the required degree of opening, an arm 29 is mounted to slide up and down upon the standard 27 and to be locked at any desired height thereon. This arm extends parallel with and above the rear end of the lever 26, and such lever end has a link 30 swivelled in it that may be swung up over the arm end when the lever end is raised and will hold such end up. The adjustment of the arm on the standard will thus regulate the lifting movement of the lever end. To close the gate bar it is only necessary to slip the link 30 off the arm 29, when the spring 28 will be free to act.

The gate bar trunnion pin 22 at each end is affixed to a bar 31 (shown in Figure 1 and in enlarged detail in Figure 3) that is arranged to extend along the inside of the frame member 11 and is attached thereto by a bolt 32 passing through the bar at about its middle, and a bolt 33 passing through a slot 34 in the bar near its other end. By loosening this latter bolt 33, the bar may be turned on the bolt 32 as a pivot to raise or lower the trunnion pin 22 and thus to set the gate bar level with respect to the roller 16 at each of its ends. Then by tightening the bolt 33 it will be locked in the set position. This allows for the gate bar being so set as to cause a wider slot opening at one end than at the other and thus for the amount of manure fed by the roller being greater along one edge than upon the other of the machine's action. This provision will be of service in manuring orchards or other places where trees are arranged in rows, as allowing for the manure being more profusely spread close up to the roots.

The operation of closing the gate bar 21 in the manner described is designed to automatically lift the pawls 19 out of engagement with their respective ratchet wheels 17 so that the roller 16 is simultaneously cut out of action, by the use of the means shown in Figures 4 and 6. These comprise, on each end of the machine, a bell crank lever that is pivoted to a bearing plate 35 fixed upon the frame member 11 at that end, and one arm 36 of which is bent outwardly and carried rearwardly along the outside of the sprocket wheel 18 to a point above the pawl so that when such end is depressed, it will lie in the path of the pawl tail 20 to depress such tail and lift the pawl from the ratchet wheel. The other arm 37 of the bell crank lever extends forwardly and downwardly and is pivotally attached to the forward end of a lever arm 38 that is affixed to the bottom of the gate bar to project forwardly and thus to be raised and lowered with the opening and closing of the said gate. The upward movement of the lever arm 38, upon the closing of the gate, will thus convey a downward movement of the rear arm 36 of the bell crank, and the leverage lengths are so adjusted that the amount of movement conveyed to this arm will be sufficient to move it into the course of the pawl tail's travel, as it passes round with the driving wheel, and depress it sufficiently to lift the pawl clear of the ratchet wheel. When the gate is opened, the bell crank 36—37 is actuated to raise its arm 36 free of the pawl and thus allow the pawl's spring to force it back into engagement with the ratchet wheel again.

Arranged within the hopper is a crusher 40 that is formed by a flat plate arranged to extend edge on from above the opening 15, and along the full length of such opening, immediately behind the discharge slot formed between the gate bar and the roller. This crusher plate is adapted to be work reciprocally up and downward so that its lower edge will engage the manure between itself and the roller surface and will break it up and crush any lumps so that the manure will be carried smoothly and freely on the roller's surface out through the discharge slot, to fall in a stream from the bottom side of the roller.

This crusher plate is contained within a covering 41 fitted within the front of the hopper, and the rear side of which covering ex-

tends downwards and forms a false front to the hopper, ceasing a distance up from the roller, so that manure placed within the main hopper will be free to pass forwardly on the roller, while the crusher is protected from the mass of the manure within the hopper.

At each end of the hopper, a vertical compartment 42 is provided and the crusher plate 40 extends into such compartment and at its extremity is made fast to a strap 43 that extends up from its top edge. A stub axle 44 is journalled in the end of the hopper and its inner end extends into the said compartment. On such end a disc crank 45 is fixed. The said strap 43 has its upper end journalled on the crank pin of this disc so that by the rotation of the disc, at each end, the desired continuous up and down movement is imparted to the crusher plate.

On the outer end of each stub axle 44, a small sprocket wheel 46 is fixed, and such sprocket wheel is connected by suitable driving chain with the sprocket wheel 18 at the corresponding end of the machine. This provides for the rotation of the stub axles 44 being obtained from the driving wheels 13 in the same manner as that of the roller 16, and thus for the operation of the crusher being controlled similarly to the control of the roller.

The lower edge of the crusher plate rests and slides upon the rearwardly and downwardly inclined rear surface of the gate bar so that it acts to push back any solid matters that might be placed in the hopper and thereby prevents any shock upon the crusher or its parts.

The hopper is fitted with hinged cover lids and other devices usually installed in these appliances, and may be divided into two or more divisions in its length to prevent the packing of the manure to one end, when travelling on hill sides.

I claim:—

1. A manure distributor comprising a hopper formed with a discharge opening in its bottom, and mounted on an axle and driving wheels, a roller disposed to extend along the bottom of the said discharge opening and adapted to form the hopper bottom and to be locked to rotate with the said wheels on their forward rotation, and a gate bar arranged to extend along the forward edge of the said opening and extending between the roller surface and such edge, said gate bar being carried upon trunnion pins, one at each end, so that it may turn on a longtitudinal axis, a spring nominally causing said bar to be turned to bear upon the surface of said roller, and means whereby said bar may be turned against the action of said spring and retained in any adjusted position.

2. In a manure distributor according to claim 1, means for actuating the said gate bar comprising an arm extending horizontally from the bar bottom, a rod pivotally attached at its lower end to the forward end of such arm, a lever pivoted upon the top of the said hopper and to the forward end of which the upper end of the rod is pivotally attached, spring means acting to force the rod downward, and means for holding the inner end of the lever arm in a raised position.

3. In a manure spreader according to claim 1, means for actuating said gate bar comprising an arm extending horizontally from the bar bottom, a rod pivotally attached to the forward end of said arm, a lever pivoted upon the top of the hopper and pivotally attached at its forward end to the upper end of said rod, spring means acting to force said rod downward, means for holding the inner end of said lever in a raised position, an arm disposed in a parallel line above the inner end of said lever, a standard upon which such arm is mounted and upon which it is adjustable in height, and a link loosely swivelled on the end of the lever.

4. In a manure distributor according to claim 1, a trunnion pin for each end of the said gate bar attached to a fixture adjacent to the corresponding end of the hopper and adjustable vertically thereon.

5. In a manure distributor according to claim 1, the combination with the said axle, a roller formed as a sleeve to fit upon such axle and secured thereto, and with a driving wheel loosely mounted on each end of the axle, of a ratchet wheel fixed upon the inside of each wheel, a disc wheel arranged upon the axle adjacent to the said ratchet wheel and fixed upon such axle and a spring controlled pawl pivoted on the side of such disc wheel and arranged to normally lock with the ratchet wheel on the forward rotation of such wheel.

6. In a manure broadcaster comprising a hopper having a discharge opening in its bottom, an axle upon which such hopper is mounted, driving wheels loosely mounted on such axle and a sleeve roller surrounding such axle and extending along beneath the said discharge opening, a gate bar pivoted on a longitudinal axis to extend between the surface of the roller and the forward edge of the discharge opening, means for turning such gate bar on its axis to engage or clear the roller, a ratchet wheel upon each driving wheel, a spring controlled pawl carried upon the axle adjacent to such ratchet wheel and which pawl normally engages the ratchet wheel and means actuated by the said gate bar for engaging and freeing such pawl from its ratchet wheel when the gate is turned on its axis to engage the surface of the roller.

7. In a manure broadcaster according to claim 6, a pawl for engaging each ratchet wheel, mounted upon the side face of a disc wheel fixed upon the axle and having a tail

extension projecting outward beyond its pivot, a bell crank lever disposed upon the machine frame and having one arm arranged to extend rearwardly across above the said pawl and adapted when depressed to engage its tail and having its other arm extending forwardly and downwardly, and a lever arm affixed to extend forwardly from the said gate bar and at its forward end pivotally connected to the forward end of the said bell crank lever arm.

In testimony whereof, I affix my signature.

WILLIAM PETER SIMPSON.