Aug. 7, 1951 E. S. GANDRUD 2,563,165

MOUNTING FRAME FOR FERTILIZER SPREADERS AND THE LIKE

Filed Oct. 28, 1949 3 Sheets-Sheet 1

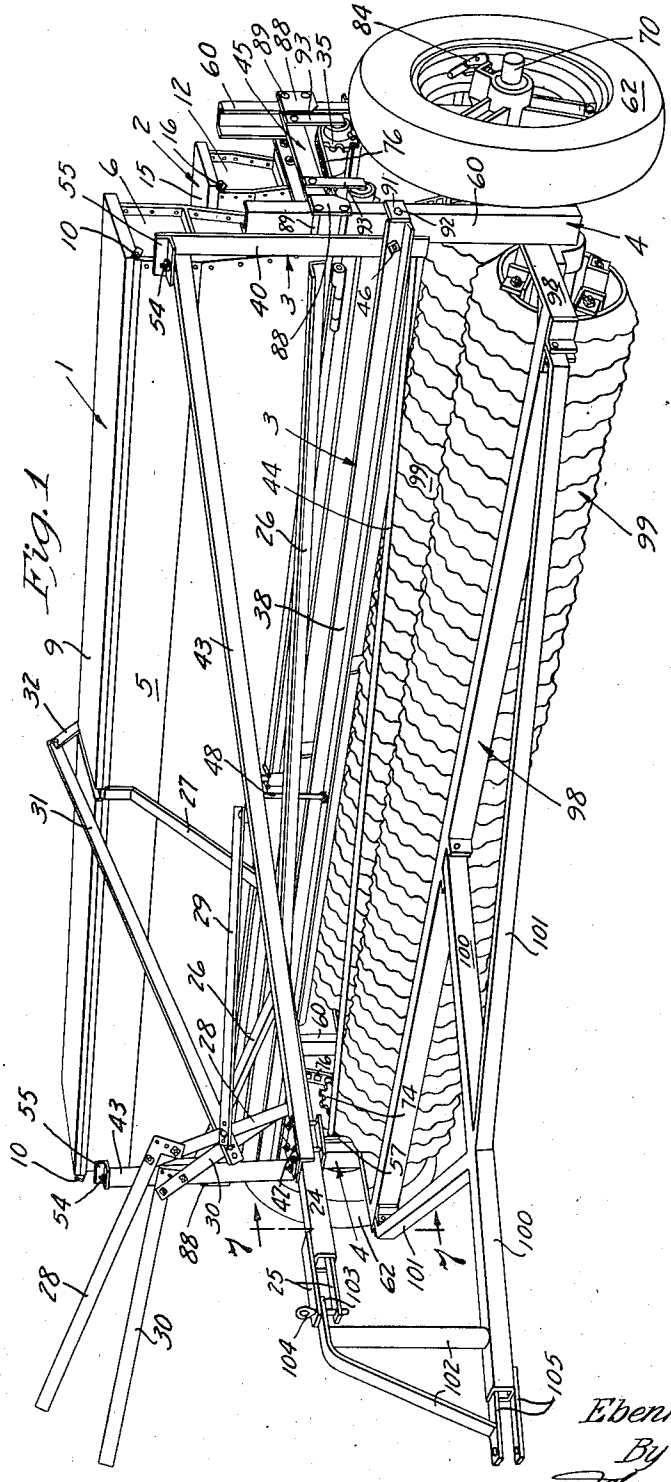

Fig. 1

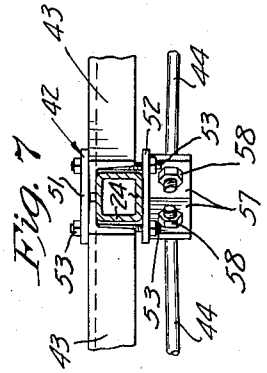

Fig. 7

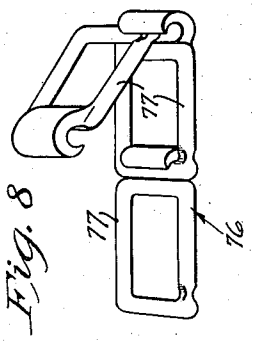

Fig. 8

Inventor
Ebenhard S. Gandrud
By his Attorneys
Merchant & Merchant

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MOUNTING FRAME FOR FERTILIZER SPREADERS AND THE LIKE

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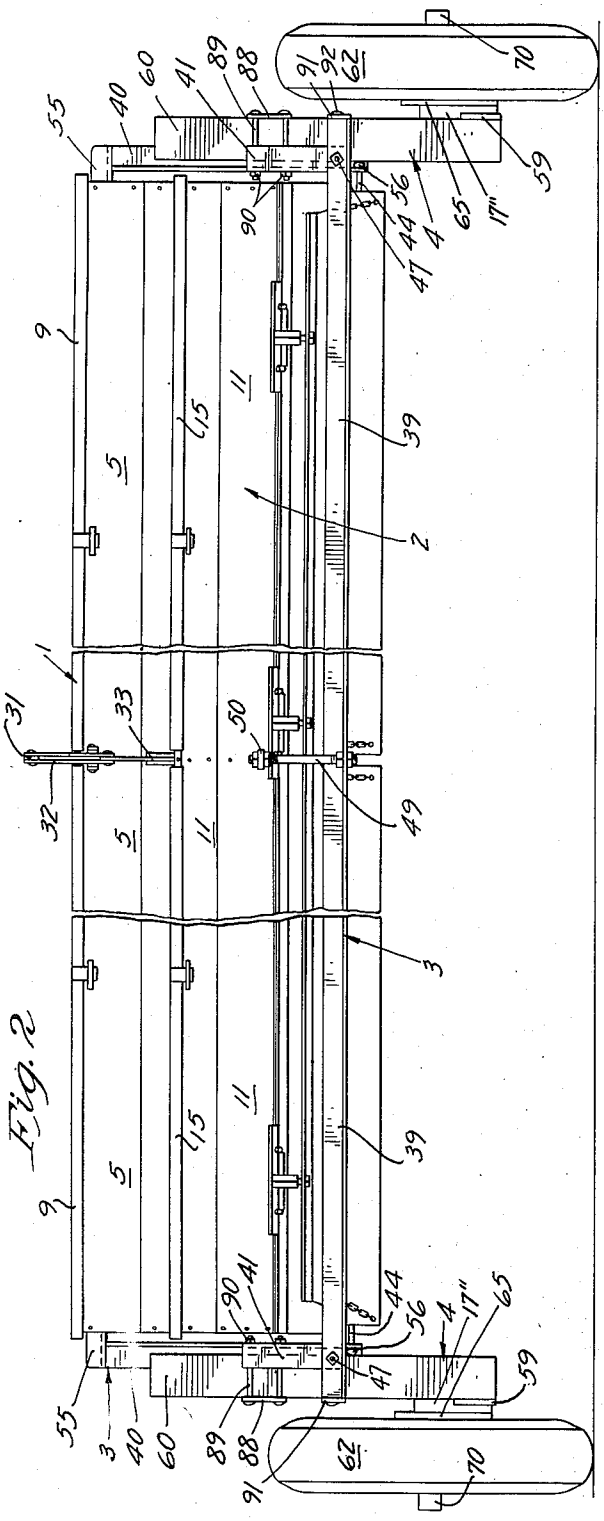

Fig. 2

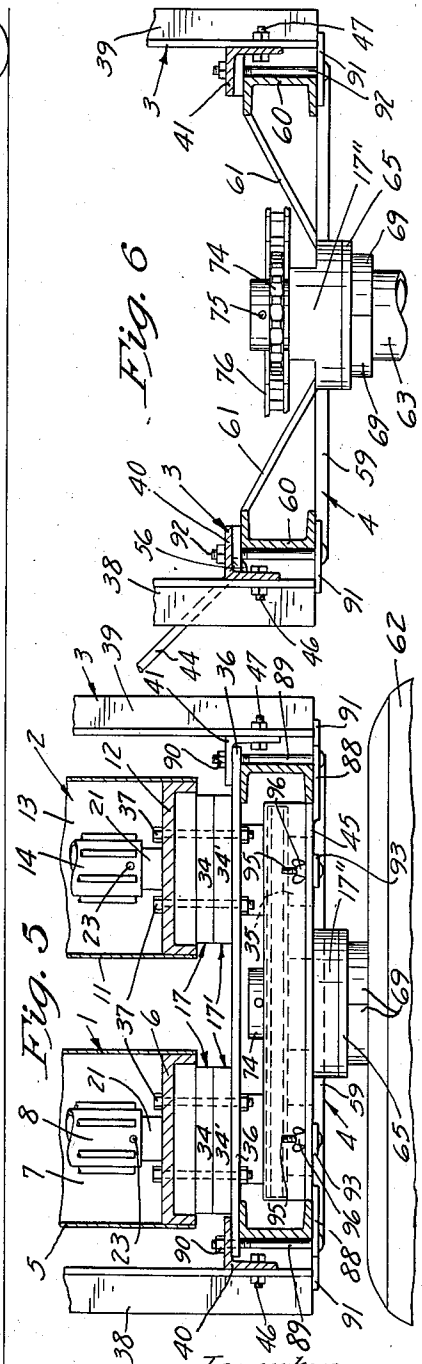

Fig. 6

Fig. 5

Inventor
Ebenhard S. Gandrud
By his Attorneys
Merchant & Merchant

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MOUNTING FRAME FOR FERTILIZER SPREADERS AND THE LIKE

Filed Oct. 28, 1949 3 Sheets-Sheet 3

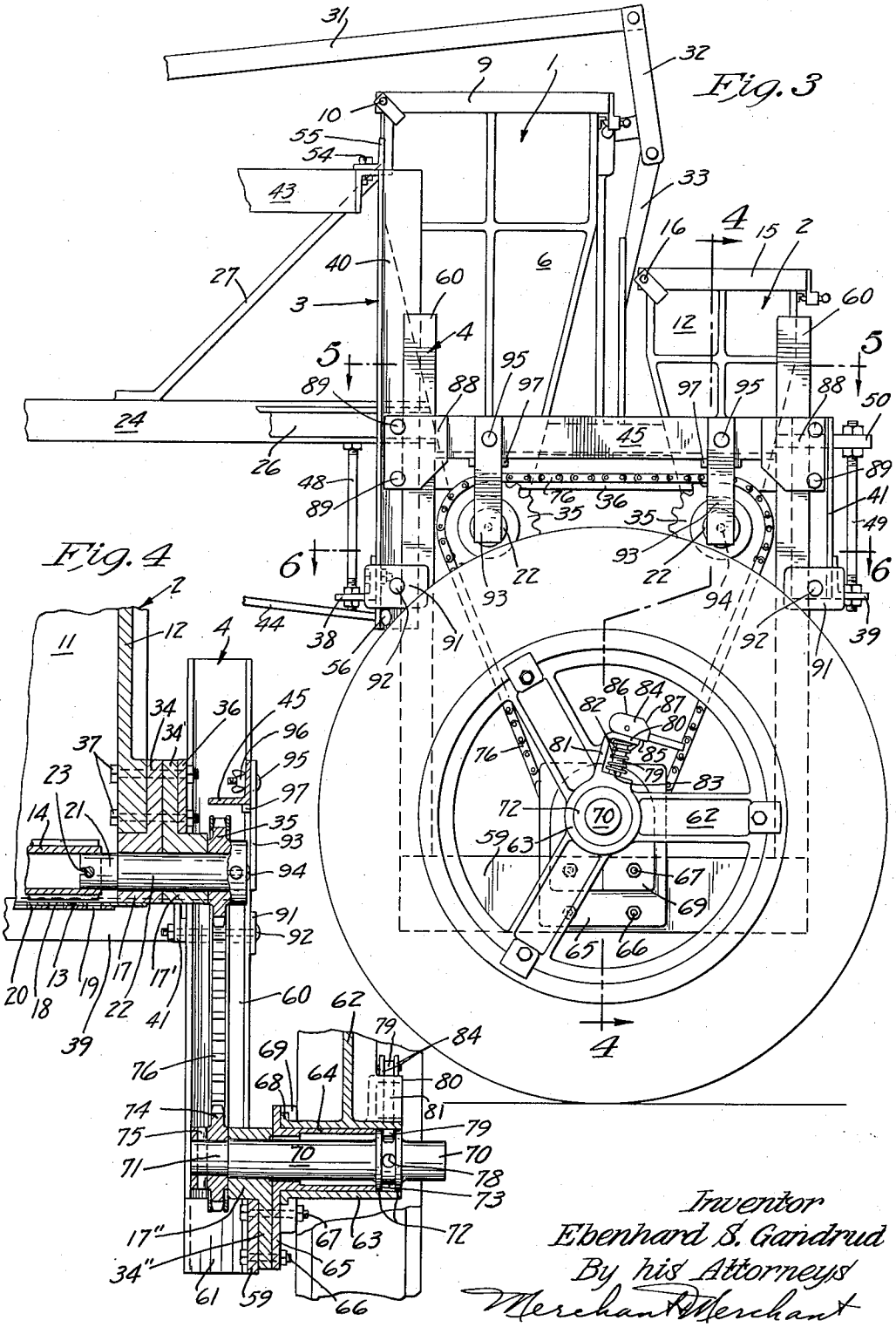

Fig. 3

Fig. 4

Inventor
Ebenhard S. Gandrud
By his Attorneys
Merchant & Merchant

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2,563,165

MOUNTING FRAME FOR FERTILIZER SPREADERS AND THE LIKE

Ebenhard S. Gandrud, Owatonna, Minn.

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4 Claims. (Cl. 275—2)

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My invention relates generally to machines for spreading fertilizer, sowing seed and the like, and, more specifically, to mobile adjustable mounting means for machines of this type.

Heretofore, it has been the practice in farming to prepare the soil for seeding by harrowing and the like, after which fertilizer may be spread over the field, worked into the soil, and the field seeded, these separate operations each requiring a different transversing of the field with a resultant excessive consumption of time. The primary object of my invention, therefore, is the provision of a broadcast spreading device which may be coupled to a tractor or other pulling device, and which will cooperate with soil-working equipment to spread fertilizer and sow seed while the soil is being worked by the soil-conditioning apparatus in a single passage over the field.

Another highly important object of my invention is the provision of means adapted to straddle soil-conditioning equipment, such as cultivators, harrows, soil pulverizers, and the like, and independently support a broadcast spreader thereover for movements simultaneous therewith but acting independently thereof.

Another object of my invention is the provision of a mounting frame for fertilizer spreaders and the like, which is quickly and easily adjustable to support a fertilizer spreader in overlying relationship to soil-conditioning equipment or in closely spaced relationship to the ground for use without other equipment.

Another object of my invention is the provision of a wheel-mounted device above-described having a rotary agitator which may be driven from the supporting wheels thereof in any desired elevation of the machine.

A still further object of my invention is the provision of a machine of the type above-described having a rotary agitator which may be quickly and easily engaged or disengaged from driving connection with the supporting wheels thereof for material spreading or for transport, as desired.

Still another object of my invention is the provision of a machine which is relatively inexpensive, efficient in operation, rugged in construction, and durable in use.

The above and still further important objects of my invention will become apparent from the following detailed specification, appended claims, and attached drawings.

Referring to the drawings, in which like characters indicate like parts throughout the several views:

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Fig. 1 is a view in perspective of a fertilizer spreading and seeding device mounted in accordance with my invention astride a conventional soil-working device;

Fig. 2 is an enlarged view in rear elevation of the structure of Fig. 1, the soil-working device being removed and some parts being broken away;

Fig. 3 is a fragmentary view in end elevation on a still further enlarged scale;

Fig. 4 is a detail, partly in elevation and partly in section, taken substantially on the line 4—4 of Fig. 3;

Fig. 5 is a fragmentary detail, partly in plan and partly in horizontal section, taken on the line 5—5 of Fig. 3;

Fig. 6 is a view, partly in plan and partly in horizontal section, taken substantially on the line 6—6 of Fig. 3;

Fig. 7 is an enlarged fragmentary detail, taken substantially on the line 7—7 of Fig. 1; and

Fig. 8 is a view in perspective of a driving chain utilized in my invention.

The structure shown in the drawings includes a pair of elongated dispensing or spreading units 1 and 2 mounted in side-by-side relationship in a generally rectangular hopper frame 3. The hopper frame 3 is vertically adjustably slidable in a pair of wheel-mounted supporting frames 4.

As shown, the spreading units 1 and 2 are identical in construction except as to the capacity of the hoppers thereof, the hopper of the former being of greater size than that of the latter. The fertilizer spreading unit 1 comprises an elongated hopper 5 having opposite end walls 6, a concave or semi-cylindrical bottom 7, and a rotary agitator 8. The top of the hopper 5 is normally closed by a pair of lids 9 hinged to the hopper 5 as indicated at 10. The seeder unit 2 comprises a hopper 11 having opposite end walls 12, a concave bottom 13, and a rotary agitator 14. The hopper 11 has its top closed by a pair of lids 15 hinged to the hopper 11 as indicated at 16 (see particularly Fig. 3).

The agitators 8 and 14 have their opposite ends journalled in bearings 17 rigidly secured to the lower portions of opposite end walls 6 and 12 of the hoppers 5 and 11 respectively. As shown in Fig. 4, the concave hopper bottom 13 is provided with longitudinally-spaced apertures 18 at its bottom that are adapted to be aligned with similar apertures 19 in a longitudinally sliding gate 20. Although not shown, the hopper 5 is similarly provided with apertures in its concave bottom 7 and an apertured longitudinally-sliding

gate. One end of each agitator 8 and 14 telescopes over the reduced end portion 21 of one of a pair of rotary shafts 22 journalled in the bearings 17. The agitators 8 and 14 have slot and pin connections 23 for locking said agitators against rotation with respect to their respective shafts 22. The structure above-described is, in almost all respects, identical to that disclosed in my prior Patent No. 2,350,107, issued May 30, 1944.

A drawbar 24 extends forwardly of the hopper 5 and is provided at its front end with a coupling fork or the like 25. The rear end of the drawbar 24 is suitably secured to the hopper 5 and braced by angularly-disposed horizontal brace members 26 and a rearwardly-inclined brace member 27. A control lever 28 has its lower end journalled to the intermediate portion of the drawbar 24 and is connected by a rigid link 29 to suitable mechanism not shown for shifting the valve-acting gate of the hopper 5. The valve-acting gate 20 is controlled by a control lever 30, which may be assumed to have its lower end journalled to the intermediate portion of the drawbar 24, through a rigid link 31, a rock arm 32, a link 33, and other suitable mechanism not shown. The above control system for the valve-acting gates forms no part of the instant invention, and it is thought that detailed disclosure thereof is unnecessary.

It will be seen, by reference to Figs. 4 and 5, that the bearings 17 are provided with upstanding flanges 34 that engage a portion of the outer surface of end walls 6 and 12. The shafts 22 each extend through a bearing 17 and another bearing 17' identical to its cooperating bearing 17 and having its upstanding flange 34' abutting the flange 34. A sprocket wheel 35 is pinned or otherwise rigidly secured to each of the rotary shafts 22 axially outwardly of the aligned bearings 17 and 17'. The hopper-mounting frame 3 includes a pair of transverse bars or plates 36 (one of which is shown) disposed longitudinally outwardly of the opposite ends of the hoppers 5 and 11 and to which the hoppers are rigidly secured by nut-equipped bolts 37. It will be seen, by reference to Figs. 4 and 5, that the bolts 37 extend through the end walls of the hoppers 5 and 11, the flanges 34 and 34' of the abutting bearings 17 and 17', and one of the bars 36, whereby to rigidly secure the hopper end walls, the bearings, and the adjacent bar 36, together. The hopper-mounting frame 3 further includes longitudinally-extending front and rear frame members 38 and 39 respectively, a pair of front vertical frame members 40, a pair of rear vertical frame members 41, a clamping head 42, diagonal brace members 43, tie rods 44, and clamping bars 45. Each of the bars 36 is welded or otherwise rigidly secured at its front end to the intermediate portion of the vertical frame member 40 and at its rear end to the upper end portion of the vertical frame member 41. The front vertical frame members 40 are bolted or otherwise rigidly secured to the front longitudinal frame member 38 adjacent its opposite ends, as indicated at 46, and the lower end portions of the rear vertical frame members 41 are bolted or otherwise rigidly secured to the rear longitudinal frame member 39 adjacent its opposite ends, as indicated at 47. At its central portion, the frame member 38 is rigidly connected to the rear end portion of the drawbar 24 by a brace bolt 48, whereby to impart stability to the central portion of the hopper 5. A brace bolt 49 is rigidly connected at one end to the central portion of the rear frame member 39 and at its other end to a rigid tongue 50 extending rearwardly from the seeding hopper 11, whereby to brace the intermediate portion of said seeding hopper.

The clamping head 42 comprises upper and lower clamping plates 51 and 52 respectively and nut-equipped clamping bolts 53. By reference to Figs. 1 and 7, it will be seen that the front ends of diagonal brace members 43 are clamped between the clamping plate 51 and the top surface of the drawbar 24. At their rear ends, the brace members 43 are rigidly secured by nut-equipped bolts 54 to short angle brackets 55 welded to the extreme upper ends of the front vertical frame members 40. Tie rods 44 extend through apertures in the extreme lower end portions of opposite vertical frame members 40 and are provided at their rear ends with heads 56 which engage said members 40. The forward ends of the tie rods 44 extend through depending lugs 57 rigidly secured to the clamping plate 52 and are threaded to receive nuts or the like 58. As shown, the brace members 43 are made from angle iron or the like, and the clamping bolts 53 extend downwardly therethrough so that there can be no relative movement between the clamping head 42 and the brace members 43. Tightening of the nuts 58 places the tie rods 44 under tension to impart adequate rigidity to the front portion of the entire hopper-mounting frame 3.

The wheel-mounting supporting frames 4 are disposed one each at opposite ends of the hopper-mounting frame 3 and are of U-shape each comprising a horizontal base member 59 and a pair of upright cross-sectionally channel-shaped legs 60. The lower ends of the legs 60 are welded or otherwise rigidly secured to the opposite ends of their respective base members 59 and each leg 60 is further braced by diagonal brace bars 61 welded thereto and to the intermediate portions of their respective base members 59. Each frame 4 is supported by a tire-equipped ground-engaging wheel 62 having a tubular hub 63 which is journalled on a tubular trunnion 64. The tubular trunnion 64 is provided with an integrally-formed mounting flange 65 which has abutting engagement with the flange 34'' of a bearing 17''. Bearing 17'' is identical to bearings 17 and 17' and, together with the flange-equipped trunnion 64, is rigidly secured to the intermediate portion of the base member 59 by nut-equipped bolts 66 and 67. It will be observed, by reference to Fig. 4, that the wheel hub 63 is provided at its inner end with a circumferential flange 68 abutting the outer surface of the flange 65 of the trunnion 64. A pair of retaining plates 69 limit axial movements of the wheel 62 with respect to the trunnion 64. It will be seen, by reference to Figs. 3 and 4, that the bolts 67 extend through the retaining plates 69 as well as the flanges 65 and 34''. It is important to note that the tubular trunnion 64 and the bearing 17'' of each supporting frame 4 are in axial alignment.

Journalled in each bearing 17'' is a drive shaft 70 having a diametrically-reduced inner end portion 71 and a pair of axially-spaced radial flanges 72 which define annular shoulders 73. A driving sprocket 74 is rigidly secured to the reduced portion 71 of the drive shaft 70 by means of a pin or the like 75 and is in line with the sprocket wheels 35 on the rotary shafts 22. An endless

link chain 76, preferably of the type illustrated in Fig. 8, runs over the sprockets 74 and 35 (see particularly Figs. 3 and 4). The chain 76 is preferably made up of links 77 that are quickly and easily detached, whereby the chain may be lengthened or shortened without the use of tools, for a purpose which will hereinafter become apparent.

The hubs 63, trunnions 64, and drive shafts 70 are substantially of the same construction as that disclosed in my copending application filed May 21, 1949, Serial No. 94,651, and entitled "Axle Construction for Fertilizer Spreaders." Each driving shaft 70 is provided with radially outwardly-opening recesses 78 disposed between the shoulders 73 and alignable with a locking pin 79. Locking pin 79 is mounted for axial movements radially of the shaft 70 through the hub 63 and a bearing plate 80 carried by a bracket 81 integrally formed with the wheel hub 63. A coil compression spring 82 has one end seated against the bearing plate 80 and its other end working against a washer-equipped pin 83 in the locking pin 79, whereby to bias the locking pin in a radially inward direction. A three-position handle-equipped cam 84 is pivotally secured to the upper end of locking pin 79 with its camming surfaces engaging the bearing plate 80 against bias of the spring 82. In one position of the cam 84, the locking pin 79 is moved to its radially innermost position where it is seated within one of the recesses 78. In this position, the drive shaft 70 is locked to the hub 63 of its cooperating drive wheel 62, whereby rotation of the wheel 62 will cause rotation of the agitators 8 and 14 in the dispensing units 1 and 2. Movement of the cam 84 to a second position will move the inner end of the locking pin 79 out of engagement with the recess 78 but will maintain the same in a position to be engaged by the annular shoulders 73 of the flanges 72. In this position of the locking pin 79, the wheel 62 is rotatable independently of its cooperating drive shaft 70. It might here be stated that the above-mentioned first position of cam 84 is illustrated in Figs. 3 and 4, with a surface 85 of the cam engaging the bearing plate 80. When the cam is moved to the above-mentioned second position thereof, a surface 86 on the cam 84 engages the bearing plate 80. Cam 84 is also movable to a third position wherein a cam surface 87 lies against the bearing plate 80. In this position, the locking pin 79 is withdrawn radially outwardly from between the annular shoulders 73 permitting axial withdrawal of the drive shaft 70 from the bearings 17'', provided, however, that the sprocket wheel 74 is removed from the shaft 70.

As shown, the bars 36 each engage one side of the legs 60 of one of the supporting frames 4. Each of the clamping bars 45 has welded to the opposite end portions thereof clamping plates 88 which engage the side of the legs 60 opposite the cooperating bar 36. A pair of clamping screws 89 connect the outer end of one of the clamping plates 88 to the vertical frame member 40, and a similar pair of clamping screws 89 connect the outer end of the opposite clamping plate to the rear vertical frame member 41. The screws 89 are provided at their inner ends with clamping nuts 90 which may be tightened to frictionally lock the legs 60 between one of the bars 36 and cooperating clamping plates 88. Referring to Figs. 3 and 5, it will be seen that the clamping bar 45, preferably made from angle iron or the like, engages adjacent edges of the channel-shaped legs 60 and that the clamping screws 89 lie closely adjacent opposite faces of the legs 60 so that there is permitted a minimum of lateral play between the hopper-mounting frame 3 and the supporting frame 4. The hopper-mounting frame 3 is further locked in position on the supporting frames 4 by additional clamps 91, two of which engage a portion of adjacent legs 60 and the extreme opposite ends of hopper-mounting frame member 38 and two of which engage adjacent legs 60 and the extreme opposite ends of hopper-mounting frame member 39. The clamping plates 91 are connected to the lower end portions of cooperating frame members 40 and 41 by nut-equipped clamping screws 92.

Axial movement of the rotary shafts 22 outwardly of their respective hoppers is limited by engagement of their outer ends with stop plates 93. The outer ends of the shafts 22 are provided with bearing bosses or the like 94 that bear against the lower end portions of the plates 93 to minimize friction thereagainst. Each of the plates 93 is pivotally secured adjacent its upper end to its cooperating clamping bar 45, by means of a bolt 95 equipped with a wing nut 96. A lug 97, welded or otherwise rigidly secured to each of the plates 93, engages the lower surface of the clamping bar 45 to prevent lateral swinging movements of the plate 93 when the wing nut 96 is tightened upon the bolt 95. Each wing nut 96 may be loosened sufficiently to permit its cooperating plate 93 to be moved axially outwardly to a point where its cooperating lug will be positioned outwardly of the clamping bar 45. The plate 93 may then be swung upon the axis of the bolt 95 in an arc of 180 degrees, whereby to permit the lug 97 to rest upon the upper edge of the clamping bar 45 upon axial movement of the plate 93 toward the bar 45. With the plate 93 in this upwardly-extended position, the rotary shaft 22 may be withdrawn from the bearings 17 and 17' and out of engagement with its cooperating rotary agitator 8 or 14. The agitator may then be removed to permit cleaning or repairing the bottom of the hopper.

Loosening the several clamping plates 88 and 91 from clamping engagement with the legs 60 will permit raising and lowering of the hopper-mounting frame 3 and the hoppers carried thereby with respect to the ground. In the drawings, the hopper-mounting frame 3 is shown as being located intermediate the high and low extreme positions. Obviously, raising or lowering of the hopper frame 3 causes a variation in the distance between the sprocket wheels 35 and the driving sprocket wheel 74. For this reason, I use a driving chain 76 having links that are readily removable and insertable. When it is desired to utilize the machine for merely spreading fertilizer and/or sowing seed, the hopper-mounting frame 3 will, of course, be moved downwardly to a point close to the bottom of the supporting frames 4. However, when it is desired to use the machine simultaneously with other agricultural equipment, the hopper-mounting frame 3 is raised to a height sufficient to permit positioning of said other equipment beneath the hoppers and between the supporting wheels 22. In other words, my device is made to straddle the cooperating agricultural equipment. Fig. 1 illustrates the ability of my novel device to straddle a conventional rotary tiller or soil pulverizer. The rotary pulverizer comprises a generally rectangular frame 98 having journalled for rotation therein a double row of rotary tiller elements

or discs 99. A drawbar 100 is pivotally secured at its rear end to the frame 98 and is reinforced by a pair of diagonal braces 101 rigidly secured at their front ends to the intermediate portion of the drawbar 100 and at their rear ends pivotally secured to opposite end portions of the frame 98. The drawbars 24 and 100 may be independently coupled to a tractor or the like. However, I have found it convenient to provide a vertically-disposed bracket 102 which terminates in a rearwardly-extending tongue 103 which may be connected in a conventional manner to the fork 25 of the drawbar 24, such as by a coupling pin 104. One leg of the bracket 102 is connected at its lower end to one arm of a bifurcated coupling yoke 105 welded to the forward end of the drawbar 100.

During a single passage of the combined equipment above-described through a field, fertilizer may be dispensed or spread over the ground from the unit 1 in front of the forward row of discs or rollers 99, where it is worked into the ground by the front row of rollers 99. Seeds may be sown from the rear unit 2 between the rows of rollers 99 and covered by the action of the rear row of rollers. Thus, a number of operations are performed during a single passage of the equipment across a field; and a considerable savings in time is achieved. It will be understood that other soil-working equipment may be substituted for the pulverizer illustrated, such as disc harrows, toothed harrows, and cultivators and the like. It will also be appreciated that the machine will work just as effectively with a single hopper as with two hoppers by merely uncoupling the chain from one of the sprockets 35 and connecting it between the desired sprocket 35 and the driving sprocket wheel 14. Obviously, when one hopper is used, the chain must be shortened to an efficient operating length. It will further be understood that, if the hoppers are divided into double chambers both having axially-aligned agitators as disclosed in my prior Patent No. 2,350,107, one each of the aligned agitators will be driven from one of the wheels 62, the other of each being driven from the other of said wheels 62. However, in the event that a single agitator is used in each of the hoppers 5 and 11, the agitators thereof will be driven from one driving wheel 62 only.

My invention has been thoroughly tested and found to be adequate for the accomplishment of the objectives set forth; and, while I have illustrated and described a commercial embodiment thereof, it will be understood that the same is capable of modification without departure from the spirit and scope of the invention as defined in the claims.

What I claim is:

1. In a device of the class described, a hopper frame, a pair of elongated hoppers rigidly secured to said frame in side-by-side relationship, a pair of horizontally-spaced vertically-extended supporting frame members, means mounting said hopper frame between said supporting frame members for vertical sliding movements, rotary agitators within each of said hoppers, ground wheels on the lower ends of said supporting frame members, and adjustable drive connections between said agitators and one of said ground wheels, said means for mounting said hopper frame to said supporting frame members including opposed clamping members carried by said hopper frame adapted to frictionally engage said supporting frame members whereby to maintain said hoppers in adjusted set positions.

2. The structure defined in claim 1 in which said supporting frame members include horizontally-disposed base members and opposed channel-shaped laterally-spaced legs, said mounting wheels being secured one each to one of said base members and said clamping members exerting clamping pressure upon opposite side portions of said legs.

3. In a device of the class described, a hopper frame, a pair of elongated hoppers rigidly secured to said frame in side-by-side relationship, a pair of horizontally-spaced vertically-extended supporting frame members, means mounting said hopper frame between said supporting frame members for vertical sliding movements toward and from the ground, rotary agitators within each of said hoppers, said agitators operatively terminating in rotary stub shafts which project outwardly from adjacent ends of said hoppers in spaced parallel relationship, drive wheels secured to the lower ends of each of said supporting frame members, and adjustable drive connections between said stub shafts and said drive wheels, said supporting frame members including a pair of laterally-spaced upstanding legs, said means for mounting said hopper frame to said supporting frame members including a horizontally-disposed hopper frame member spanning said legs at one side thereof, a clamping bar spanning said legs at the opposite sides thereof, and clamping screw means connecting said clamping bar with said hopper frame member whereby to maintain said hoppers in adjusted set positions, and stop means on said clamping bar preventing axial movements of said stub shafts in one direction.

4. The structure defined in claim 3 in which said stop means comprises a pair of stop plates removably secured to said clamping bar and positioned thereon to engage the outer ends of said stub shafts, removal of said stop plates permitting axially outward movement of said stub shafts irrespective of the position of the hopper frame with respect to the supporting frame members.

EBENHARD S. GANDRUD.

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