No. 662,823.

Patented Nov. 27, 1900.

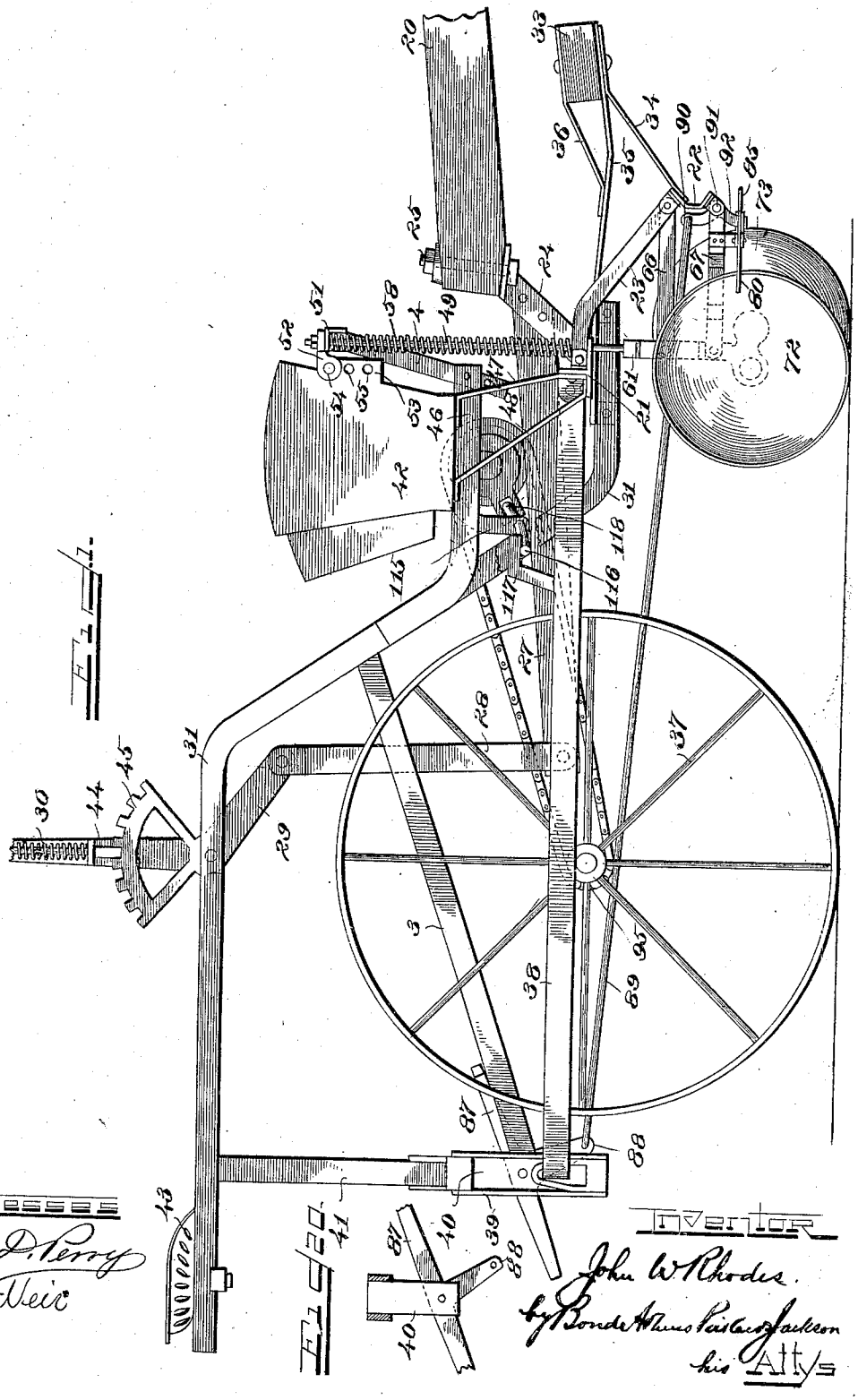
J. W. RHODES.

GRAIN DRILL.

(No Model.)

(Application filed Apr. 16, 1900.)

7 Sheets—Sheet 1.



Witnesses
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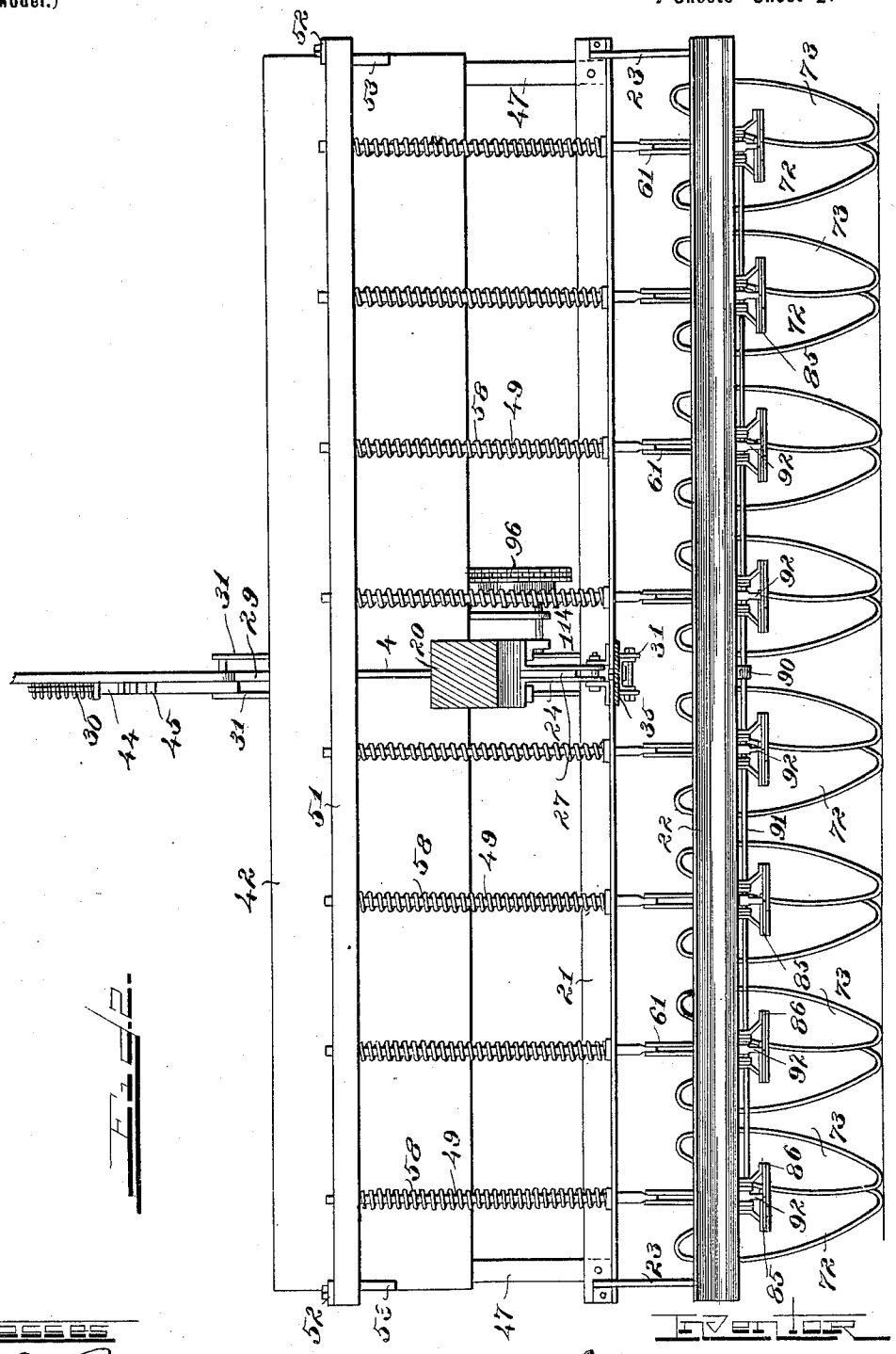
No. 662,823. Patented Nov. 27, 1900.

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(No Model.) 7 Sheets—Sheet 2.



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GRAIN DRILL.

(Application filed Apr. 16, 1900.)

(No Model.) 7 Sheets—Sheet 3.

Fig. 3.

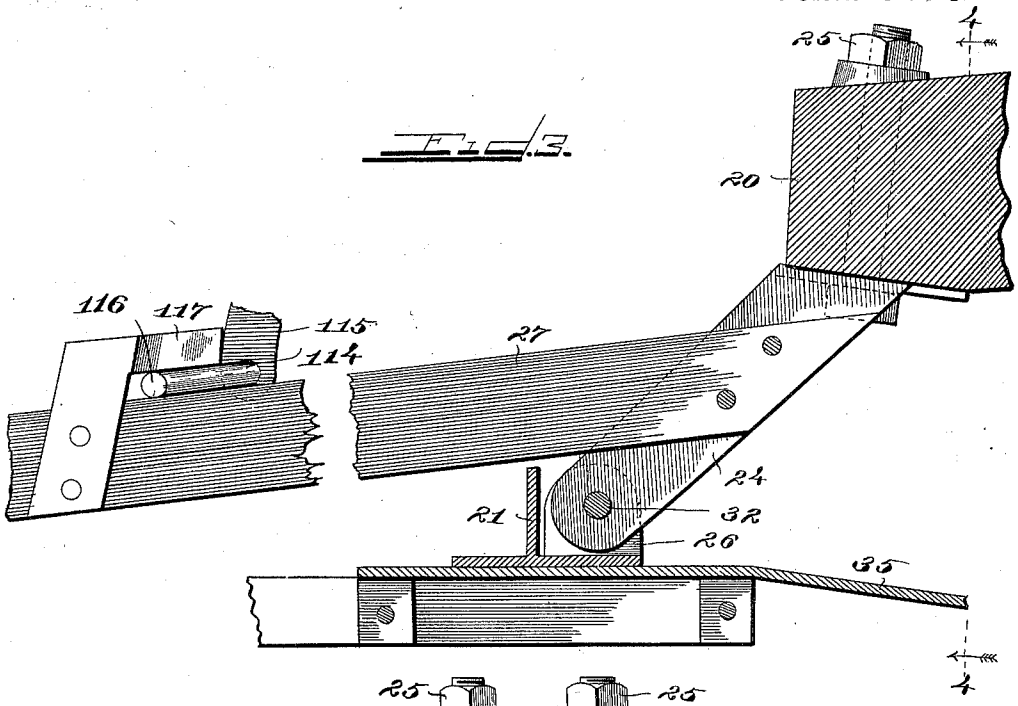
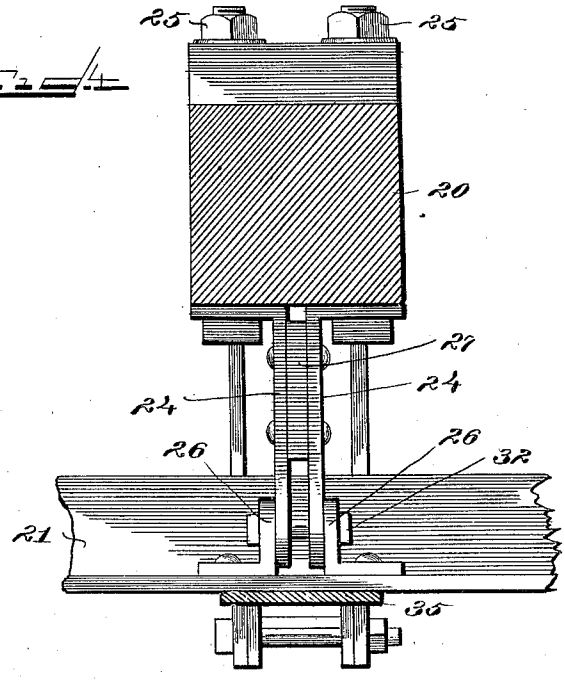


Fig. 4.



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(Application filed Apr. 16, 1900.)

(No Model.)

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Fig. 6.

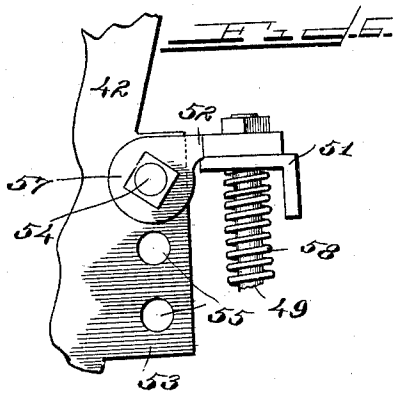


Fig. 7.

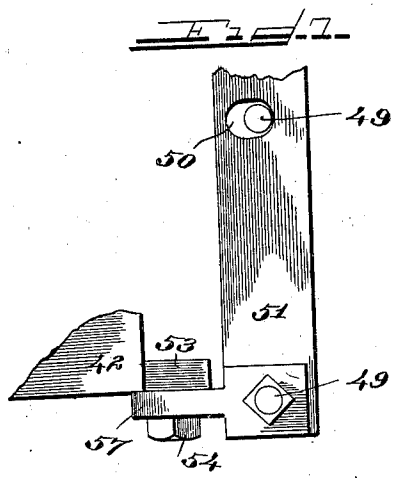
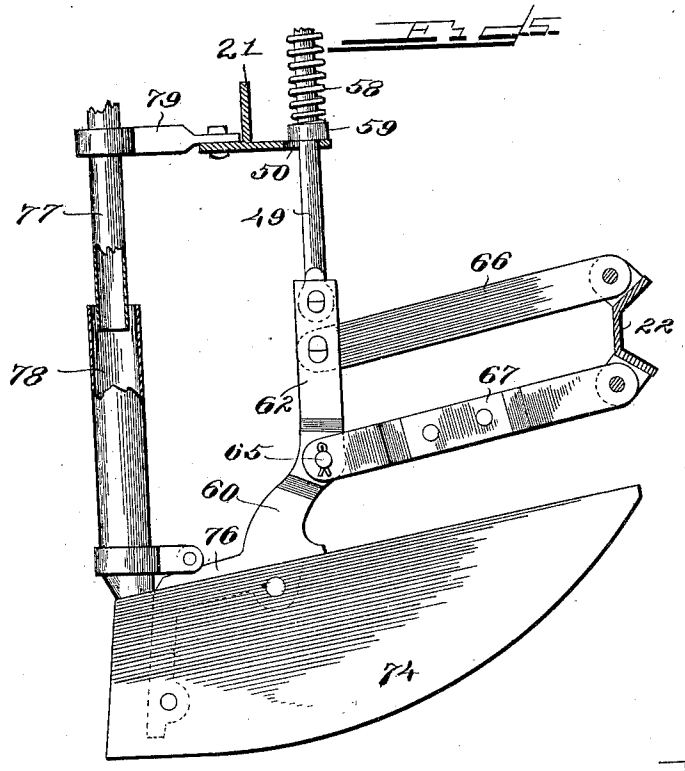


Fig. 5.



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(Application filed Apr. 16, 1900.)

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Fig. 8.

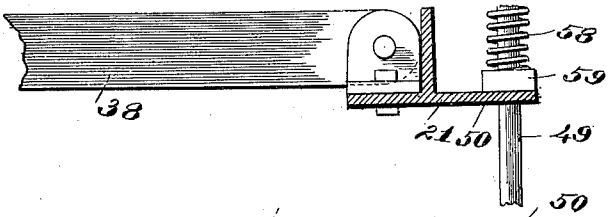


Fig. 12.

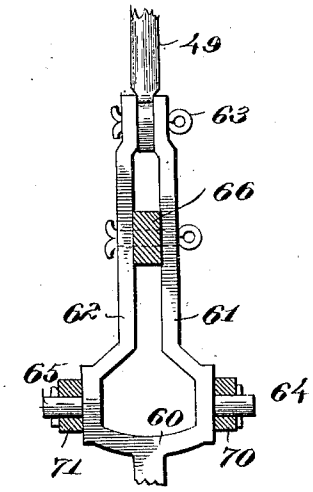


Fig. 9.

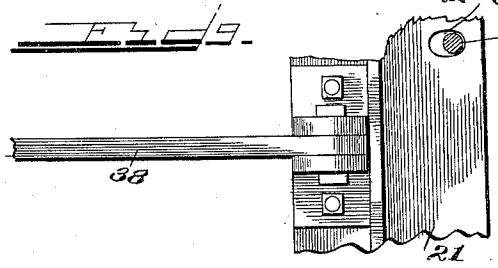


Fig. 10.

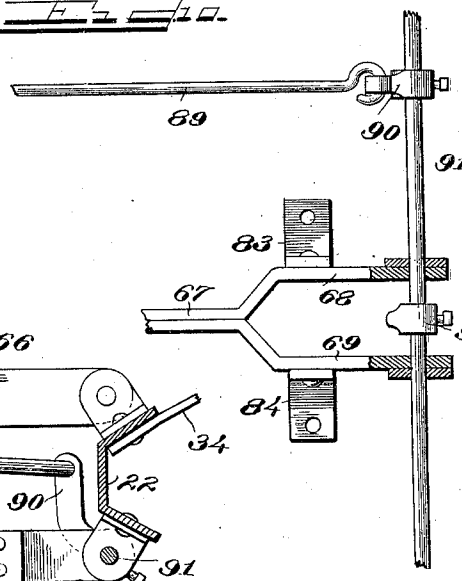
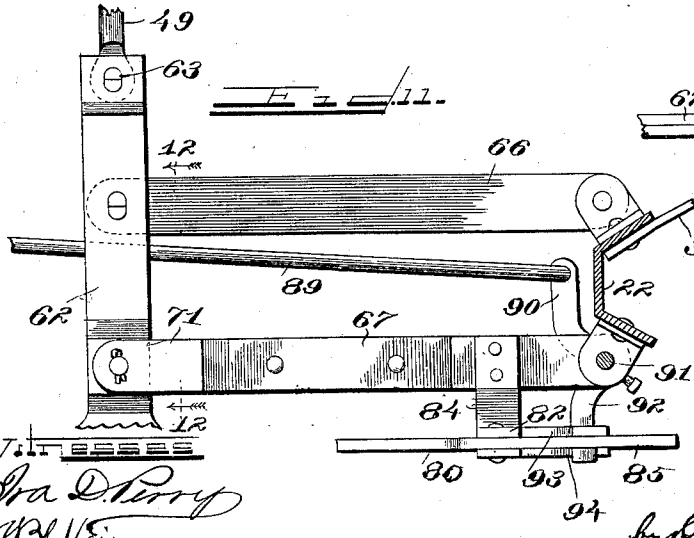


Fig. 11.



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(No Model.)

(Application filed Apr. 16, 1900.)

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FIG 13

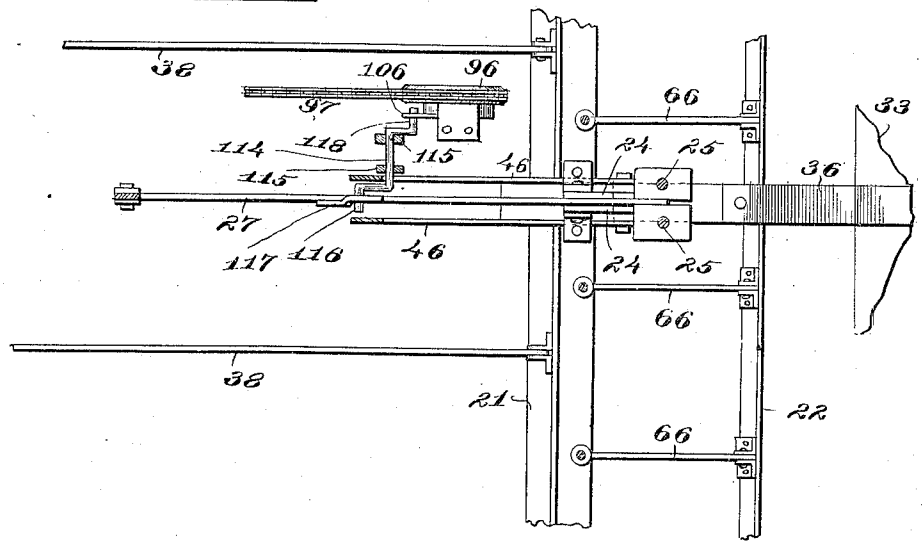


FIG 14

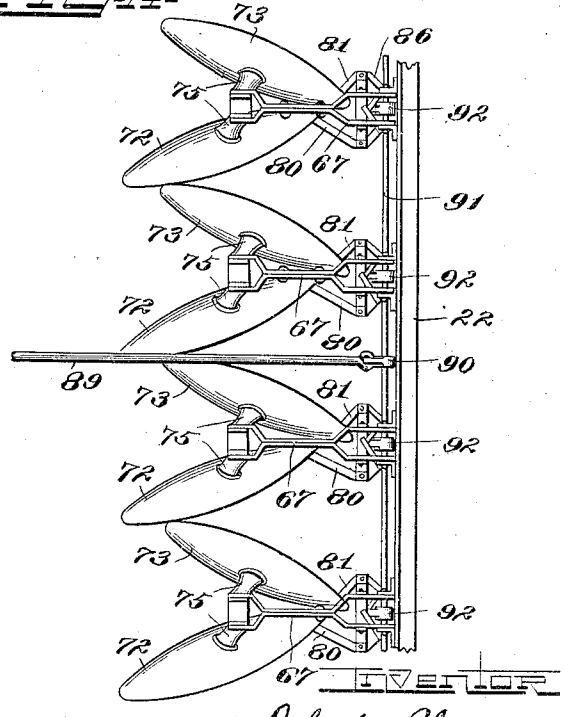
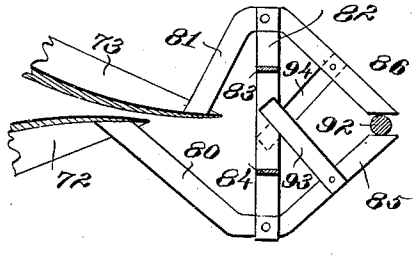


FIG 15



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J. W. RHODES.

GRAIN DRILL.

(No Model.) (Application filed Apr. 16, 1900.)

7 Sheets—Sheet 7.

Fig. 16.

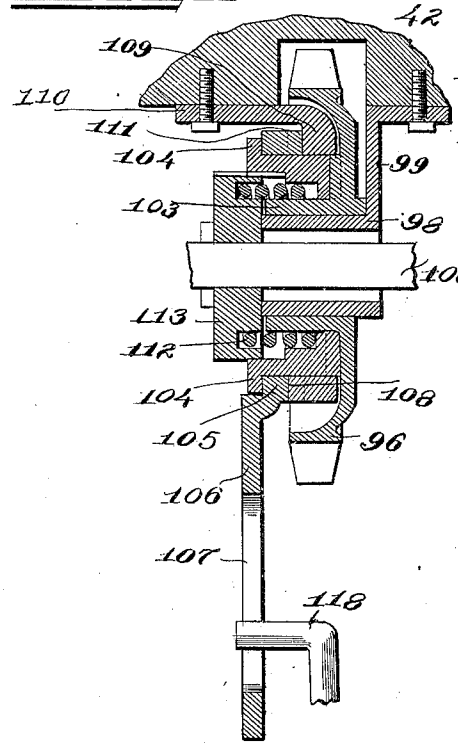


Fig. 17.

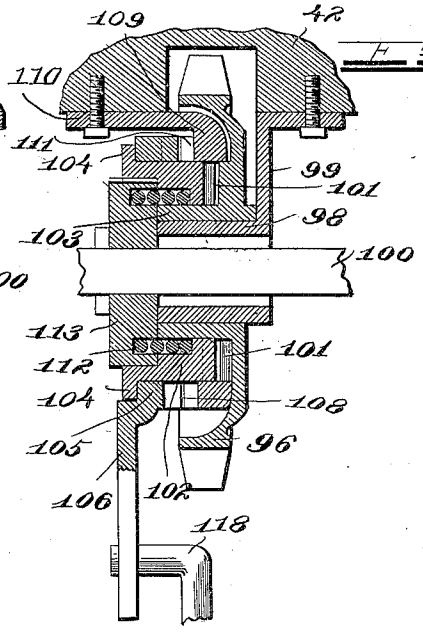


Fig. 18.

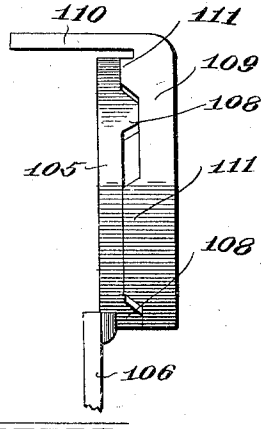
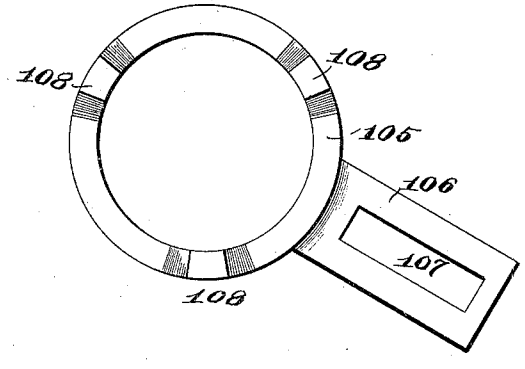


Fig. 19.



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UNITED STATES PATENT OFFICE.

JOHN W. RHODES, OF HAVANA, ILLINOIS.

GRAIN-DRILL.

SPECIFICATION forming part of Letters Patent No. 662,823, dated November 27, 1900.

Application filed April 16, 1900. Serial No. 13,046. (No model.)

To all whom it may concern:

Be it known that I, JOHN W. RHODES, a citizen of the United States, residing at Havana, in the county of Mason and State of Illinois, have invented certain new and useful Improvements in Grain-Drills, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to grain-drills, and has to do particularly with drills provided with furrow-openers, behind which the seed is dropped, and with press or covering wheels for pressing down the soil over the dropped grain or otherwise covering it. Heretofore in drills of this character it has been the practice to provide the drill with a front or furrow-opener frame and rear or wheel frames pivoted thereto, the tongue being rigidly secured to the furrow-opener frame. This construction is objectionable, inasmuch as the furrow-opener frame cannot move independently of the tongue, owing to its rigid connection therewith, and the backward pressure on the furrow-openers, due to the resistance of the soil, exerts a continual downward pressure on the necks of the team. Furthermore, when the furrow-opener frame is raised from the ground for any purpose by operating the usual lifting-lever it is tilted forward, which is objectionable.

My present invention has for its object to avoid the objections above noted and to provide certain other improvements in machines of this character.

To this end it consists in pivotally connecting the furrow-opener frame with the tongue, thereby avoiding the downward pressure on the necks of the team while the machine is in operation.

It further consists in a construction by which the draft of the team is applied directly to the furrow-openers instead of to the tongue, as is usual in prior constructions, so that the draft of the team is efficiently employed.

It further consists in so mounting the furrow-openers and the standards which support them that they do not tilt backward or forward independently of the furrow-opener frame while adjusting themselves to the inequalities of the ground, but are held in a position substantially perpendicular to the furrow-opener frame while they are free to move vertically, as may be necessary.

My invention further consists in improved spring mechanism for holding the furrow-openers downward in contact with the soil, in improved means for throwing the operating mechanism of the seed-dropping devices into and out of operation when the furrow-openers are raised out of operative position, in improved scraping mechanism for cleaning the furrow-opener disks, and in certain other details which will be specifically hereinafter pointed out.

That which I regard as new will be set forth in the claims.

Referring to the drawings, Figure 1 is a side elevation. Fig. 2 is a front view, the tongue being in section. Fig. 3 is an enlarged detail illustrating the way in which the tongue is pivoted to the furrow-opener frame and a part of the mechanism for controlling the operating mechanism of the seed-dropping devices. Fig. 4 is a vertical section on line 4 4 of Fig. 3. Fig. 5 is a detail, parts being in section, illustrating the furrow-opener-supporting devices. Fig. 6 is an enlarged detail illustrating the adjusting devices for adjusting the furrow-opener springs. Fig. 7 is a plan view of the parts shown in Fig. 6. Fig. 8 is a detail, parts being in section, illustrating a part of the furrow-opener frame, the upper end of one of the furrow-opener standards, and a part of the wheel-frame. Fig. 9 is a detail, being a plan view of some of the parts shown in Fig. 8. Fig. 10 is a plan view, parts being in section, illustrating the forward end of one of the parallel bars and part of the scraper-operating devices. Fig. 11 is a side view of the parallel bars, showing their connection to the furrow-opener standards, the forward part of the furrow-opener frame being shown in section. Fig. 12 is a vertical section on line 12 12 of Fig. 11. Fig. 13 is a plan view illustrating some parts of the furrow-opener frame, the tongue, and the devices for throwing the operating mechanism of the seed-dropping devices into and out of operation. Fig. 14 is a plan view illustrating the disk furrow-openers and the scrapers therefor. Fig. 15 is an enlarged detail, being a horizontal sectional

view showing the scrapers. Fig. 16 is a vertical section of the controlling devices for the seed-dropping mechanism, showing them in operative position. Fig. 17 is a similar view showing the same parts in inoperative position. Fig. 18 is a detail, being an end elevation showing a part of the controlling mechanism. Fig. 19 is a face view of one of the parts illustrated in Fig. 18, and Fig. 20 is a detail showing the scraper-operating-lever support.

In the drawings, 20 indicates the tongue, which is pivoted at or near its rear end to a furrow-opener frame consisting of transversely-extending bars 21 22, arranged parallel with each other and connected by inclined bars or braces 23 and draft-bars 34 35, as shown in Fig. 1. The bar 21 is preferably of inverted-T shape, as shown in Figs. 1 and 3, so that the different parts may be more readily connected thereto. The bar 22 is preferably a channel-bar, having its sides outwardly inclined, as illustrated in Figs. 1 and 5. The connecting-bars 23 are best illustrated in Figs. 1 and 2. The tongue 20 is pivoted to the bar 21 by means of connecting-bars 24, secured to its under side by bolts 25, as best shown in Fig. 4, said bars 24 being pivotally secured to the forwardly-projecting web of the bar 21 by suitable angle-irons 26, as shown in Figs. 3 and 4.

27 indicates a rearwardly-projecting arm or extension of the tongue 20, the forward end of which is secured between the bars 24, as shown in Fig. 4. The arm 27 extends back a considerable distance from the rear end of the tongue 20 and is connected at its rear end by a connecting-bar 28 with an arm 29 of a lifting-lever 30, as shown in Fig. 1. The lifting-lever 30 is mounted on the seat-supporting bar 31, as will be hereinafter more fully described.

32 indicates the pivot of the bars 24, which, as shown in Figs. 3 and 4, is arranged in a horizontal position, thereby so supporting the tongue that its front end is movable vertically independently of the furrow-opener frame.

33 indicates the doubletree, which is supported by the draft-bars 34 35, which extend from and form a part of the furrow-opener frame, as illustrated in Fig. 1. A draft-bar 36 extends from the bar 35 over the doubletree 33, as shown. By this construction the draft of the team is applied directly to the furrow-opener frame instead of to the tongue, as in prior constructions. 37 indicates the covering-wheels, one of which is provided behind and in line with each seed-tube. Said wheels are mounted upon axles carried by the wheel-frames 38, which are pivoted at their forward ends to the transverse bar 21, as shown in Fig. 1. Two or more wheel-frames are usually provided, so that the wheels can better adjust themselves to the inequalities of the ground. 39 indicates a curved equalizing-bar which connects the wheel-frames at the rear. These parts form no part of my present invention, and for a more complete description thereof reference is made to my prior patent, No. 502,831, dated August 8, 1893.

The seat-supporting bar 31 at its rear end is arranged horizontally and is supported by bars 41 upon the equalizer-bar 39. The front end of the seat-supporting bar 31, which is preferably bifurcated, extends downward in an inclined position and is secured fixedly to the under side of the furrow-opener frame, as shown in Fig. 1.

43 indicates the seat. The lifting-lever 30 is pivotally mounted upon the seat-bar 31 and is provided with a dog 44, adapted to engage a segmental rack 45 for locking the lifting-lever in different positions of adjustment. The dog 44 is operated by a hand-lever in the usual way.

46 indicates braces which extend from the forward portion of the seat-bar 31 to the under side of the hopper 42, to which they are rigidly secured, supporting the center thereof. The braces 46 also extend forward and carry a center support for the bar 51, hereinafter described. The hopper or seedbox 42 also is supported from the furrow-opener frame, being connected therewith by supports 47 48, as shown in Fig. 1. As many of such supports may be employed as is desirable.

The furrow-openers, which consist either of disks or runners, are carried by standards supported from the furrow-opener frame. Said standards are preferably composed of two sections pivotally connected together. The upper section consists of a rod 49, which projects through a suitable passage 50 in the forward portion of the bar 21 and extends upward to a transversely-arranged guide-bar 51, secured to the front side of the seedbox 42, as shown in Fig. 1. The guide-bar 51 is held in position by connecting-links 52, connected to ears 53, projecting from the ends of the seedbox 42, as shown in Fig. 6, and by a central support 4, carried by the braces 46, as shown in Fig. 1. The links 52 are connected with the ears 53 by bolts 54, which pass through perforations in said links and through suitable holes 55 in the ears 53, a number of said holes 55 being provided, so that the links 52 may be adjusted vertically. A further adjustment is secured by placing the holes in the links 52 out of line with that part of said links which fits over the upper ends of the rods 49, as illustrated in Fig. 6. To this end the rear portion of the links 52 is flattened to form a wing 57, which lies at right angles to the forward portion of said links, the hole for the bolt 54 being in such wing portion. By this construction the forward portion of each link 52 may be vertically adjusted without changing the position of the bolt 54 by simply turning the link over. The object of making the links 52 adjustable vertically is to provide for adjusting-springs 58, which are mounted on the rods 49 and bear at their upper ends against the transverse bar 51, while at their lower ends they bear down upon collars 59, se-

cured upon the rods 49, as shown in Figs. 5 and 8. The springs 58, therefore, press downward on the furrow-openers, and it is evident that by adjusting the position of the links 52 the tension of said springs may be varied to meet the various conditions of soil to be planted.

60 indicates the lower sections of the furrow-opener standards. Said sections are best illustrated in Figs. 5 and 12. As there illustrated, they are bifurcated, having arms 61 62, which at their upper ends are connected by a key 63 to the rod 49.

64 65 indicate trunnions which extend outwardly from the lower portions of the arms 61 62.

It will be seen from the foregoing that the furrow-opener standards are vertically adjustable. In order to prevent them from materially changing their angular position with reference to the furrow-opener frame when adjusted vertically, the lower sections 60 of said standards are connected by upper and lower parallel bars 66 67, respectively, with the transverse bar 22 of the furrow-opener frame, as best shown in Figs. 5 and 11. The parallel bar 66 is a simple strap, the front end of which is pivoted to the upper portion of the channel-bar 22, its rear end being pivotally secured between the arms 61 62, as shown in Fig. 12. The lower parallel bar 67 is preferably composed of two straps secured together, their ends being separated so that said bar is bifurcated at both ends. The forward ends 68 69 are pivoted to the channel-bar 22, while their rear ends 70 71 are pivoted, respectively, on the trunnions 64 65, carried by the arms 61 62, respectively, as illustrated in Fig. 12. This construction results in steadying the standard-sections 60 and prevents lateral movement of the furrow-openers, while freely permitting vertical movement thereof. The parallel bars together hold the furrow-opener standards in a fixed angular position with reference to the furrow-opener frame, and they are adjusted so that the furrow-openers are raised perpendicularly from the ground when adjusted by the resistance of the soil in operation. In order to permit the necessary forward and backward movement of the rod 49, the passages 50 are made elliptical, as shown in Figs. 5 and 7.

In Fig. 1 and in various other figures I have illustrated the furrow-openers as consisting of a pair of disks 72 73 placed one behind another inclined in opposite directions, as fully described in my former patent, No. 502,831, hereinbefore referred to. In Fig. 5 I have illustrated the use of runners 74 as furrow-openers. In the use of either disks or runners the furrow-openers are secured to the lower ends of the standard-sections 60. Where disks are used, suitable supports 75 are provided for them. Where runners are used, the lower ends of the standard-sections 60 are extended downward, forming brackets 76, to which the runners are secured, said brackets being arranged to be secured to the rear ends of said runners, and for this purpose being extended backward and downward, as illustrated in Fig. 5. By this construction the heel of the runner is held down in proper operative position and the runner is prevented from tipping forward when it encounters an obstruction and causing the grain to be planted at a more uniform depth.

77 indicates one of the seed-tubes which conducts seed from the seedbox 42 to the disk or runner, as the case may be. Where disks are used, the seed-tube 77 extends down near to the ground, but where runners are used a telescopic extension-tube 78 is provided which is supported at its lower end on the standard 76 and rises to the tube 77. If desired, an extension-tube 78 may also be provided where disks are used, being supported from the standard-section 60. The tubes 77 are guided by guide-brackets 79, which embrace said tubes and are connected with the transverse bar 21, as shown in Fig. 5. Where disks are used, it is desirable to provide scrapers to remove dirt accumulating on the concave surfaces thereof, and to this end I provide suitable scraping apparatus by which at the pleasure of the operator, the disks may be cleaned. The scrapers are best illustrated in Figs. 11, 14, and 15.

80 81 indicate a pair of scrapers for the disks 72 73, respectively. Said scrapers are arranged in a substantially horizontal position and are supported on supporting-bars 82, connected by vertically-arranged hangers 83 84 with the parallel bars 67, as illustrated in Figs. 10 and 11. The pivots of the scrapers 80 81 are vertically arranged, so that said scrapers may swing in a horizontal plane toward and from their respective disks. Said scrapers are provided, respectively, with forwardly-extending arms 85 86, which arms are inclined toward each other, as shown in Fig. 15, their front ends being in contact when the scrapers are out of contact with their respective disks. By separating the arms 85 86 the scrapers are moved inward to engage the furrow-opener disks. The scrapers are operated by means of a foot-lever 87, pivoted at the rear of the wheel-frames to a hanger 40, depending from the equalizer 39, and braced by a brace-rod 3, secured to the lower end of the hanger 40 and to the seat-beam 31, as shown in Figs. 1 and 20. The lever 87 is connected by an arm 88 and connecting-rod 89 to a lever 90, mounted upon a transversely-extending pivot-rod 91, as shown in Figs. 1 and 11. The pivot-rod 91 serves also to connect the parallel bars 67 with the channel-bar 22, as shown in Fig. 11. The lever 90 is provided with a downwardly-extending arm 92, which projects between the arms 85 86 and the supporting-bar 82, as shown in Figs. 11 and 15, and is adapted to bear against the forward portions of said arms to separate them, as illustrated in Fig. 15. By this construction when the lever 90 is moved backward, as is the case

when the front end of the foot-lever 87 is depressed, the arm 92 of said lever 90 is moved forward, bearing against the forward ends of the arms 85 86 and separating them, owing to their inclined position, thereby forcing the scrapers 80 81 inward into engagement with their respective disks. When the arm 92 moves far enough to pass between the opposite ends of the arms 85 86, it constitutes a lock, which holds the scrapers in engagement with the disks. This does not, however, interfere with the vertical adjustment of the disks while the scrapers are applied to them, since the parallel edges of the ends of the arms 85 86 are long enough to permit a single pair of disks to be elevated as high as the construction will permit without allowing the arm 92 to pass entirely out from between the ends of the arms 85 86. In order to move the scrapers out of operative engagement with the disks, the rear end of the foot-lever 87 is depressed, thereby moving the lever 90 forward and throwing the arm 92 back until it strikes arms 93 94, carried by the arms 85 86, respectively, and projecting backward at right angles to such arms, the result being that the operation is the reverse of that which takes place when the scrapers are moved into operative position, the arms 85 86 being caused to approach each other, and consequently moving the scrapers 80 81 away from their respective disks.

The seed-dropping mechanism, which may be of the usual description, is operated from the wheels 37 by means of sprocket-wheels 95 96 and chain 97. The sprocket-wheel 95 is rigidly secured to the wheel-shaft of one of the rear frames and rotates therewith, said wheel-shaft being rotated by means of the usual springs, clutches, and collars, so arranged that each wheel drives the wheel-shaft only when revolving forward. The sprocket-wheel 96 is mounted on a suitable spindle 98, supported by a bracket 99, secured to the bottom of the seedbox 42, as shown in Figs. 16 and 17. Intermediate mechanism is provided for controlling the connection between said sprocket-wheel 96 and a drive-shaft 100, which drives the seed-dropping devices under the seedbox. The seed-dropping devices proper may be of any approved type capable of being driven by the shaft 100. The intermediate mechanism for connecting the sprocket-wheel 96 with the drive-shaft 100 is arranged to be automatically operated to connect said sprocket-wheel with said shaft when the furrow-opener devices are in their operative position and to disconnect said parts when the furrow-openers are raised to an inoperative position. For this purpose the sprocket-wheel 96 is provided on one face with a clutch-section 101, adapted to be engaged by a clutch-section 102, mounted on the hub 103 of the sprocket-wheel 96 and arranged opposite the clutch-section 101. The clutch-section 102 is provided with a peripheral flange 104 and has fitted upon it a cam-ring 105, as shown in Figs. 18 and 19. The cam-ring 105 is provided with an operating-lever 106, having a slot 107, as shown in Fig. 19, and on one face said ring 105 is provided with one or more projecting cams 108, as shown in Figs. 18 and 19. Said cams 108 are arranged oppositely to a stationary cam-ring 109, which is supported from the seedbox 42, it being provided with an arm 110, by which it is secured to the seedbox, as shown in Figs. 16 and 17. The cam-ring 109 is provided with cam projections 111, arranged to coact with the cam projections 108, so that when said cam-ring 105 is partially rotated the cam projections 108 riding on the projections 111 cause a separation of said parts. The cam projections 111 are far enough apart to permit the cam-ring 105 to rotate a short distance without effecting the separation of said rings. The clutch-section 102 and the cam-rings 105 and 109 are so adjusted that when the cam-rings are in the position shown in Fig. 18 the clutch-section 102 may engage the clutch-section 101. When, however, the cam projections 108 ride on the cam projections 111, said clutch-sections are separated.

112 indicates a spring placed between the clutch-section 102 and a collar 113, mounted on the drive-shaft 100 and keyed thereto, so that said spring acts to force the clutch-section 102 toward the clutch-section 101. The spring 112 therefore acts to force the clutch-sections into engagement with each other when the cam-rings are in such position as to permit of such movement. The clutch-section 104 is mounted on a feather on the collar 113, so that said clutch-section rotates with said collar. The cam-ring 105 is rocked to control the position of the clutch-section 102 by means of a lever 114, pivotally supported from the seedbox 42 by hangers 115, as shown in Figs. 1 and 13. The lever 114 may be termed a "double crank-lever." Its lower crank-arm 116 projects under a fixed arm 117, carried by the extension 27 of the tongue, as shown in Figs. 1, 3, and 13, so that when the tongue extension 27 rises or falls the lever 114 is rocked. The upper end 118 of the lever 114 projects into the slot 107 of the cam-ring 105, as shown in Figs. 13, 16, and 17. It will be evident, therefore, that when the lever 114 is rocked by the movement of the tongue extension 27, as above described, the arm 106 of the cam-ring 105 will also be rocked, rotating said cam-ring and throwing the clutch-sections 102 and 101 into or out of engagement with each other. When said clutch-sections are thrown into engagement with each other, the clutch-section 104, and consequently the collar 113 and drive-shaft 100, rotates with the sprocket-wheel; but when said clutch-sections are out of engagement with each other the sprocket-wheel rotates idly on its spindle 98, the shaft 100 being stationary.

In this construction the direct draft from the furrow-openers prevents the tendency of the front frame to tilt down in front and per-

mits the pivoting of the tongue to it, thereby doing away with neck-draft caused by the tilting of the frame while the machine is in operation. When the lifting-lever is operated to lift the furrow-opener frame, said frame rises, turning about the wheel-axles as a center, the weight being borne partly by the wheels and partly by the horses through the tongue. As already described, the furrow-openers are prevented from changing their angular position with reference to the furrow-opener frame, and consequently do not tip when encountering an obstruction, this result being secured by the parallel bars, which prevent angular adjustment of the furrow-opener standards. An important advantage of this construction is that it secures uniformity in the planting of the grain, the depth of planting being more constant. The arrangement of the scrapers on one of the parallel bars holds them in proper position to engage the disk-surfaces whatever their position of adjustment. Furthermore, by mounting the operating-lever which operates the scrapers on the rod 91 all the scrapers may be operated simultaneously by the actuation of a single lever.

By rigidly attaching the front end of the seat-bar to the front or furrow-opener frame, as described, the front and rear frames, though pivotally connected, do not tilt forward or backward in relation to each other, as is the case when the front end of the seat-bar is pivotally attached to the front frame, since the rigid attachment of the seat-bar to the front frame has the same effect on the tilting movement between the two frames as the rigid attachment together of said frames. The front and rear frames are pivoted together to permit of a side tilting of the latter, so that the pressure of the wheels on the planted grain is more even.

It should be understood that while I have described in detail the embodiments of my improvements shown in the drawings my invention is not restricted to such specific details except in so far as they are expressly claimed, but includes equivalents and modifications.

That which I claim as my invention, and desire to secure by Letters Patent, is—

1. In a seeding-machine, the combination of a rear wheel-frame, wheels mounted therein, a furrow-opener frame pivotally connected with said wheel-frame forward of said wheels, a tongue pivotally connected with said furrow-opener frame, and means connected with the tongue for lifting said furrow-opener frame, substantially as described.

2. In a grain-drill, the combination of a wheel frame or frames, a furrow-opener frame in front thereof and pivotally connected thereto, a tongue pivotally connected with said furrow-opener frame, and a seat-support rigidly secured to said furrow-opener frame, substantially as described.

3. In a grain-drill, the combination of a wheel frame or frames, a furrow-opener frame in front thereof and pivotally connected thereto, a tongue pivotally connected with said furrow-opener frame, a seat-support rigidly secured to said furrow-opener frame, and a lifting-lever mounted on said seat-support and connected with said tongue, substantially as described.

4. In a grain-drill, the combination of a wheel frame or frames, a furrow-opener frame in front thereof and pivotally connected thereto, draft devices connected with said furrow-opener frame, and a tongue disconnected from said draft devices and pivotally connected with said furrow-opener frame, substantially as described.

5. In a grain-drill, the combination of a furrow-opener frame, a tongue pivotally connected therewith, wheels arranged back of the furrow-opener frame, draft devices connected with said furrow-opener frame and lifting mechanism for said furrow-opener frame, substantially as described.

6. In a grain-drill, the combination of a wheel frame or frames, a furrow-opener frame, one or more furrow-openers carried by said furrow-opener frame, said furrow-openers being vertically adjustable, and means substantially preventing angular adjustment of said furrow-openers with reference to said furrow-opener frame, substantially as described.

7. In a grain-drill, the combination of supporting devices, one or more furrow-openers carried thereby, said furrow-openers being vertically adjustable, and means for preventing forward or backward tipping of said furrow-openers when adjusted vertically, substantially as described.

8. In a grain-drill, the combination of a furrow-opener frame, one or more vertically-adjustable furrow-openers carried thereby, and means preventing said furrow-openers from tilting forward or backward independently of the supporting devices, when adjusted vertically, substantially as described.

9. In a grain drill, the combination of a furrow-opener frame, one or more furrow-opener standards, furrow-openers carried by said standards, said furrow-openers being vertically adjustable, and parallel bars carried by said furrow-opener frame and connected with said furrow-opener standards, for preventing angular adjustment of said standards with reference to the furrow-opener frame, substantially as described.

10. In a seeding-machine, the combination of a rear wheel-frame, wheels mounted therein, a furrow-opener frame pivotally connected with said wheel-frame forward of said wheels, furrow-openers connected with said furrow-opener frame, said furrow-opener frame being supported on said furrow-openers alone when the machine is in operation, and a tongue pivotally connected with said furrow-opener frame, substantially as described.

11. In a grain-drill, the combination of wheel and furrow-opener frames, a tongue

pivoted to said furrow-opener frame, a lifting-lever connected with the tongue for raising said furrow-opener frame to an inoperative position, seed-dropping mechanism operated by the movement of the machine, and means for automatically throwing said seed-dropping mechanism out of operation when the furrow-opener frame is raised to an inoperative position, substantially as described.

12. In an agricultural implement, the combination of one or more disk furrow-openers, said furrow-openers being vertically adjustable, and a scraper for each of said disks, said scrapers being supported independently of said disks and being adjustable similarly thereto, whereby said scrapers may engage said disks in their various positions of adjustment, substantially as described.

13. In an agricultural implement, the combination of a furrow-opener frame, one or more disk furrow-openers supported thereby, vertically-adjustable standards supporting said furrow-openers, a link pivotally connected to each of said standards and to the furrow-opener frame, scrapers supported on said links, and means for operating said scrapers, substantially as described.

14. In an agricultural implement, the combination of a furrow-opener frame, one or more disk furrow-openers supported by vertically-adjustable standards, a link pivotally connected to each of said standards and to the furrow-opener frame, scrapers supported on said links, and means for operating said scrapers from the same pivot-line on which the link is attached to the furrow-opener frame, substantially as described.

15. In a seeding-machine, the combination of a rear wheel-frame, wheels mounted therein, a furrow-opener frame pivotally connected with said wheel-frame forward of said wheels, a tongue pivotally connected with said furrow-opener frame, and means connected with the rear end of said tongue for lifting said furrow-opener frame, substantially as described.

16. In a seeding-machine, the combination of a rear wheel-frame, wheels mounted therein, a furrow-opener frame pivotally connected with said wheel-frame forward of said wheels, a tongue pivotally connected with said furrow-opener frame, means for lifting said furrow-opener frame, and a seat-support rigidly secured to said furrow-opener frame, substantially as described.

17. In an agricultural implement, the combination of a plurality of disks connected with a common frame and vertically adjustable independently of each other, a scraper for each of said disks, and means controlled by the driver for adjusting said scrapers simultaneously, substantially as described.

18. In a seeding-machine, the combination of a rear wheel-frame, wheels mounted therein, a furrow-opener frame pivotally connected with said wheel-frame forward of said wheels, a tongue pivotally connected with said furrow-opener frame, means connected with the rear end of said tongue for lifting said furrow-opener frame, and a seat-support rigidly secured to said furrow-opener frame, substantially as described.

19. In a grain-drill, the combination of a machine-frame, a furrow-opener frame, a furrow-opener, spring mechanism between said machine-frame and the furrow-opener, said furrow-opener being adjustable in a vertical plane, and means substantially preventing forward and backward tipping of said furrow-opener in relation to the furrow-opener frame when adjusted vertically, substantially as described.

20. In a grain-drill, the combination of a machine-frame, a furrow-opener frame, a furrow-opener, spring mechanism between said machine-frame and the furrow-opener, said furrow-opener being adjustable in a vertical plane, means substantially preventing forward or backward tipping of said furrow-opener in relation to the furrow-opener frame when adjusted vertically, and means for adjusting said spring mechanism, substantially as described.

21. In a grain-drill, the combination of a machine-frame, a furrow-opener frame, a furrow-opener standard supported thereby and movable independently thereof only in a vertical plane, a furrow-opener carried by said standard, and means substantially preventing forward or backward tipping of said furrow-opener in relation to the furrow-opener frame when adjusted, substantially as described.

22. In a grain-drill, the combination of a machine-frame, a furrow-opener frame, a furrow-opener standard supported thereby and movable independently thereof only in a vertical plane, a furrow-opener carried by said standard, means substantially preventing forward or backward tipping of said furrow-opener in relation to the furrow-opener frame when adjusted vertically, and a spring on said standard, substantially as described.

23. In a grain-drill, the combination of a machine-frame, a furrow-opener frame, a furrow-opener standard supported thereby and movable independently thereof only in a vertical plane, a furrow-opener carried by said standard, means substantially preventing forward or backward tipping of said furrow-opener in relation to the furrow-opener frame when adjusted vertically, a spring on said standard, and means for adjusting said spring, substantially as described.

24. In a grain-drill, the combination of wheel and furrow-opener frames, one or more furrow-opener standards carried by said furrow-opener frame, said standards being normally in a vertical position, furrow-openers carried by said standards, and parallel bars pivoted to said standards and to the furrow-opener frame, substantially as described.

25. In a grain-drill, the combination of wheel and furrow-opener frames, one or more

furrow-opener standards carried by said furrow-opener frame, said standards being normally in a vertical position, furrow-openers carried by said standards, and means for preventing said standards from moving laterally independently of the furrow-opener frame, substantially as described.

26. In a grain-drill, the combination of wheel and furrow-opener frames, one or more furrow-opener standards carried by said furrow-opener frame, said standards being normally in a vertical position, furrow-openers carried by said standards, and parallel bars pivoted to said standards and to the furrow-opener frame, one of said bars having its ends bifurcated to provide extended bearings at the sides of said standards, thereby preventing lateral movement thereof, substantially as described.

27. In a grain-drill, a frame, a furrow-opener-supporting frame suitably connected thereto, means carried by said frame for elevating said furrow-opener frame, a series of vertically-adjustable furrow-opener standards mounted in the furrow-opener frame, an adjustable spring mechanism mounted on said standards, a series of furrow-openers connected to said standards, means connected to said standards and said frame and adapted to prevent the tipping of said openers when adjusted vertically, and means connected to said furrow-opener frame and adapted to engage said openers for scraping the same.

28. In a grain-drill, a frame, a furrow-opener-supporting frame suitably connected thereto, means carried by said frame for elevating said furrow-opener frame, a series of vertically-adjustable furrow-opener standards mounted in the furrow-opener frame, an adjustable spring mechanism mounted on said standards, a series of furrow-openers connected to said standards, means connected to said standards and said frame and adapted to prevent the tipping of said openers when adjusted vertically, means connected to said furrow-opener frame and adapted to engage said openers for scraping the same, and means carried by said frames for operating said scraping mechanism.

29. In a grain-drill, a furrow-opener-supporting frame, a series of standards mounted therein and adjustable vertically independent of said frame, a spring mechanism mounted on said standard, means for adjusting said spring mechanism, a series of furrow-openers connected to said standards, means connected to said frame and adapted to engage said openers for scraping the same, and means for bringing said scraping mechanism into operative engagement with said openers.

30. In a seeding-machine, the combination of a supporting-frame, one or more furrow-opener standards carried thereby, furrow-openers carried by said standards, and draft devices connected with said standards or standard for drawing the furrow-openers through the ground, substantially as described.

31. In a seeding-machine, the combination of a supporting-frame, one or more furrow-opener standards carried thereby, furrow-openers carried by said standards, draft devices, and links connected with said draft devices and with said standards, substantially as described.

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