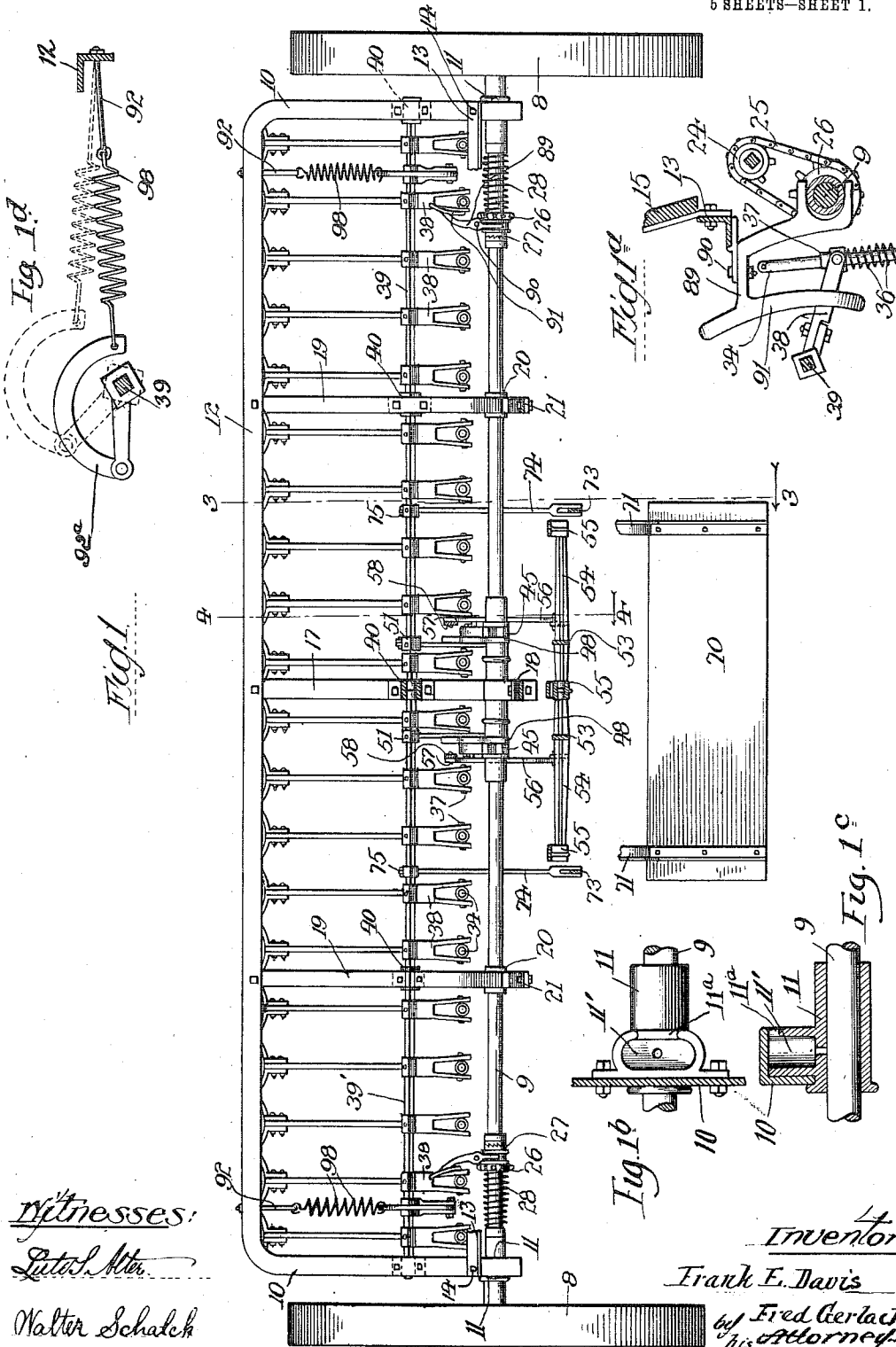


F. E. DAVIS.
SEEDING MACHINE.
APPLICATION FILED MAR. 9, 1905.

Patented July 19, 1910.

5 SHEETS—SHEET 1.

964,761.



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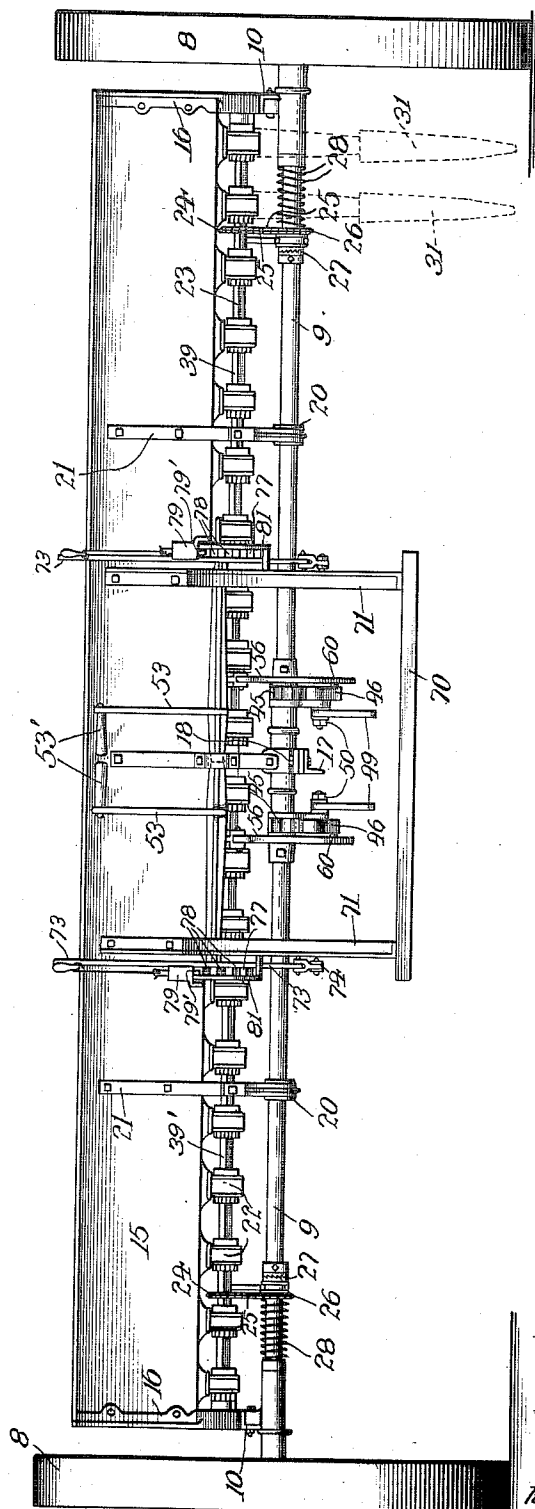
964,761.

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5 SHEETS—SHEET 2.

Fig. 2.



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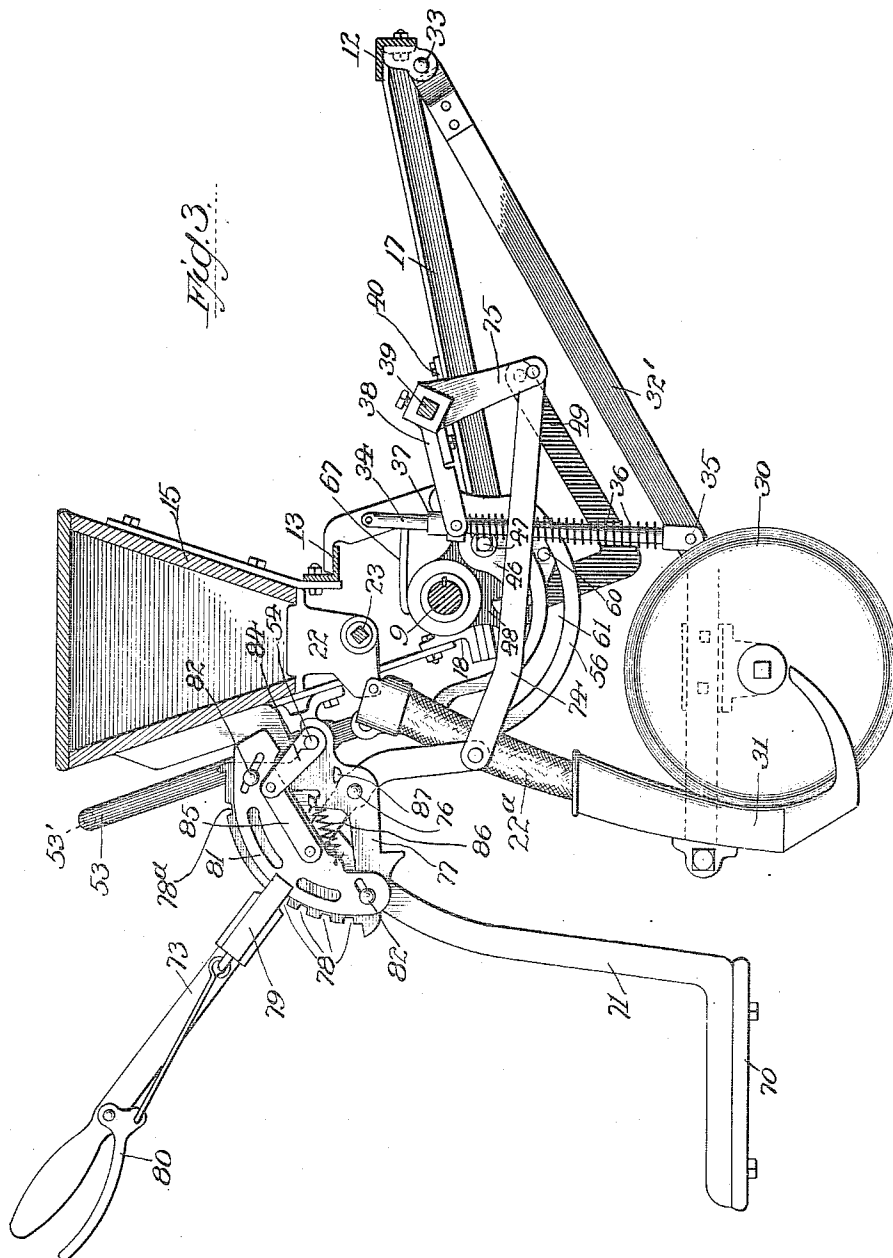
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5 SHEETS—SHEET 3.



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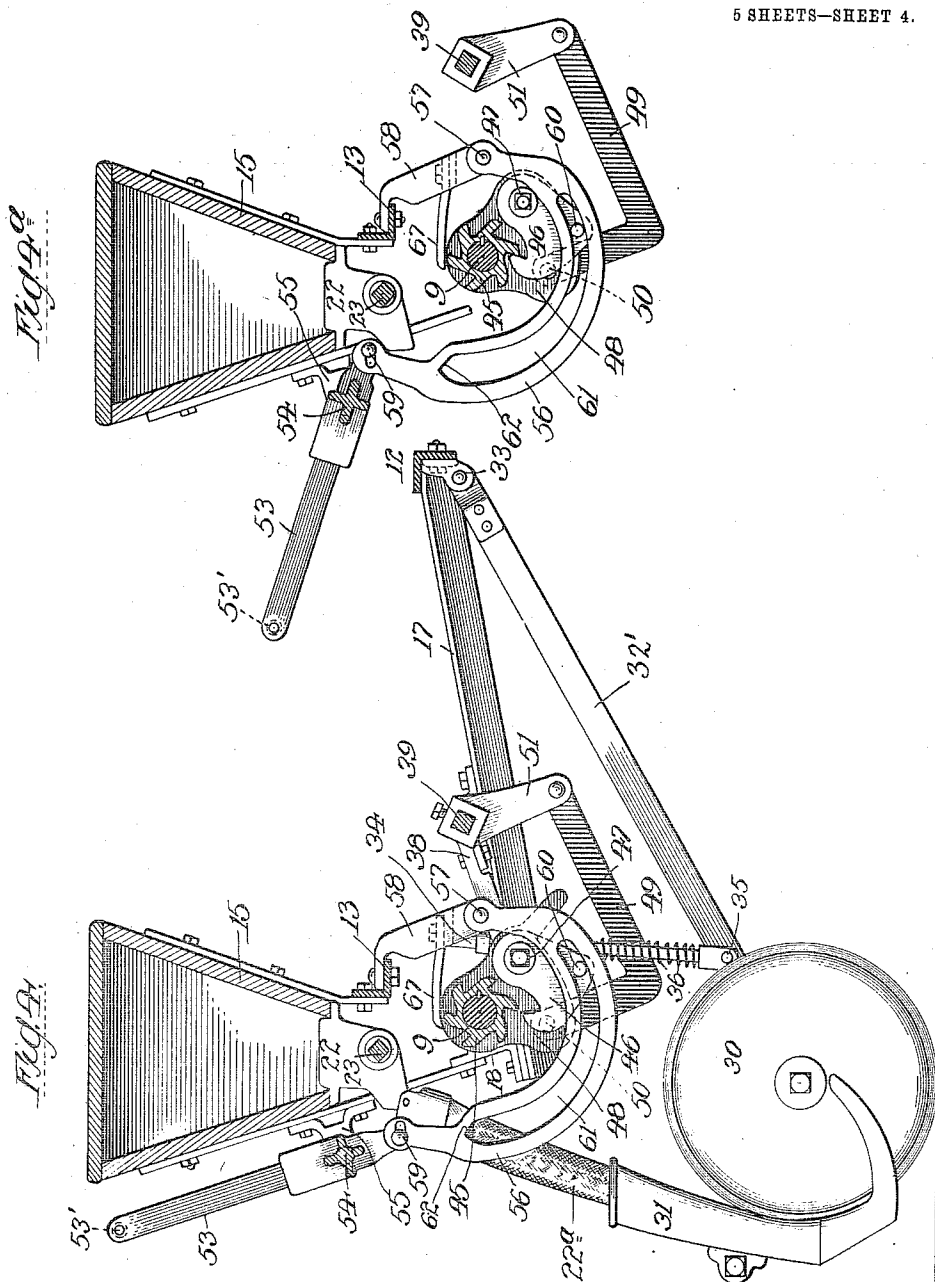
64

964,761.

F. E. DAVIS.
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APPLICATION FILED MAR. 9, 1905.

Patented July 19, 1910.

5 SHEETS—SHEET 4.



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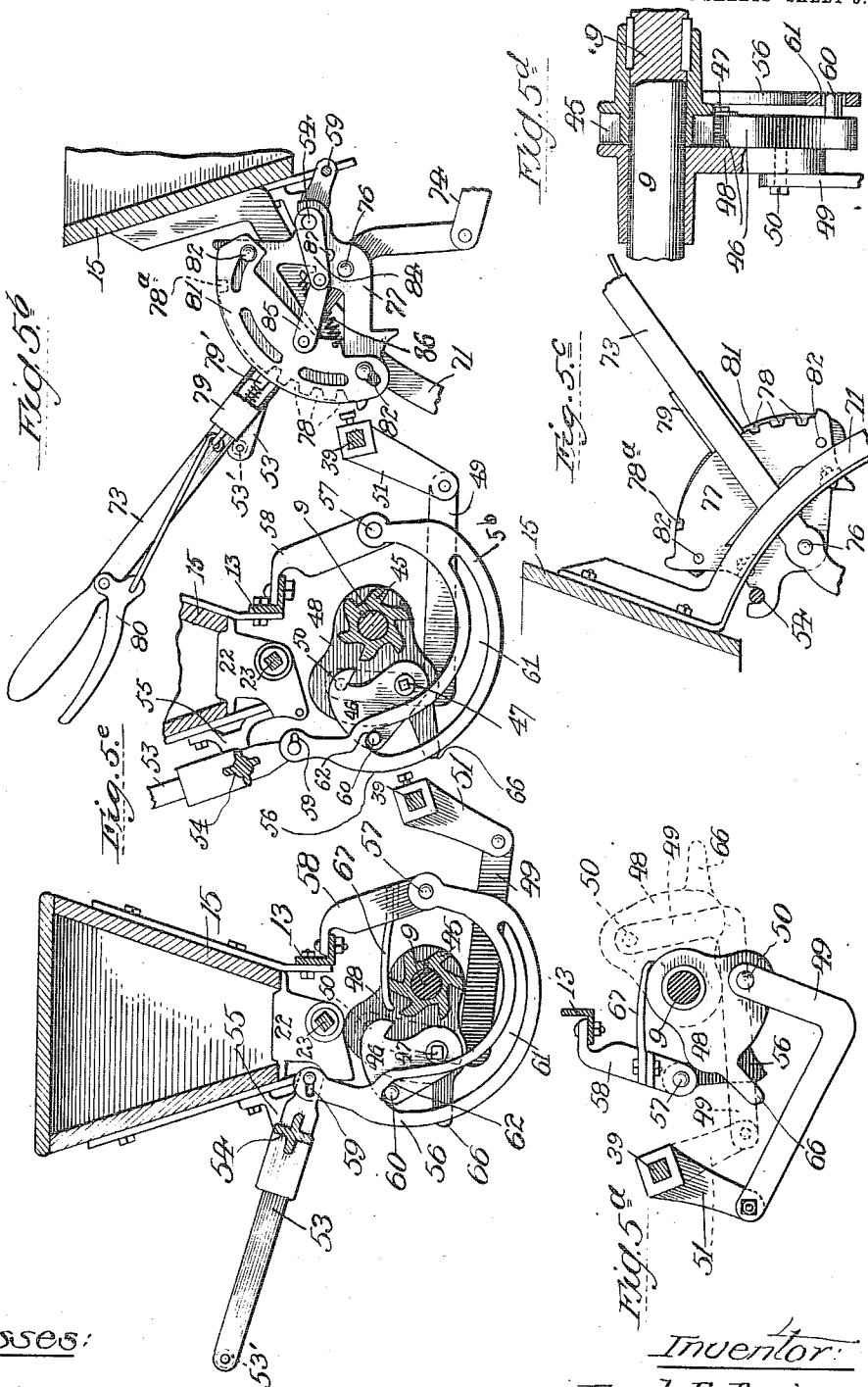
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964,761.

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5 SHEETS—SHEET 5.



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UNITED STATES PATENT OFFICE.

FRANK E. DAVIS, OF LA CROSSE, WISCONSIN.

SEEDING-MACHINE.

964,761.

Specification of Letters Patent.

Patented July 19, 1910.

Application filed March 9, 1905. Serial No. 249,158.

To all whom it may concern:

Be it known that I, FRANK E. DAVIS, a resident of La Crosse, in the county of La Crosse and State of Wisconsin, have invented certain new and useful Improvements in Seeding-Machines, of which the following is a full, clear, and exact description.

In Letters Patent of the United States, No. 709,472, granted to me September 23, 1902, for a seeding machine, there is disclosed a seeding machine in which the soil-openers or shoes are operated by draft-operated lifting-mechanism.

One object of the present invention is to provide improved lifting-mechanism for the type of machine set forth in said patent.

In practice it has been found that occasions arise when it is very desirable to have not only draft-operated lifting-mechanism, but also mechanism or a device by which the furrow-openers can be manually operated, *e. g.*, if occasion should arise for raising the openers while the machine is stopped or the draft-operated lifting-mechanism should become disarranged or inoperative.

Another object of the invention is to provide a manually operable pressure device whereby the openers can be forced or held in the ground at any desired depth, and this function is performed by the lever which serves also for manual lift of the soil-openers.

The invention further designs to provide a seeding machine having a plurality of soil-opener gangs, draft-operated lifting-mechanism for each of the gangs which can be independently or conjointly controlled, and which may be, if desired, manually operated, and thereby the necessity of rendering the whole of the machine inoperative, which is frequently unnecessary, is avoided. By means of the controlling-mechanism, however, the machine is made easy of operation, because the operator may, at will, operate the gangs independently or conjointly.

Another object of the invention is to provide an improved controller for the draft-operated lifting-mechanism whereby shift of the soil-openers from either of their alternative positions to the other can be effected, *i. e.*, to avoid the necessity of employing separate controlling devices for raising or lowering the openers.

Still another object of the invention is to provide an improved operative connection

between the wheel-operated shaft and the openers whereby the weight of the openers will be differentially applied, and so as to tend to hold the openers in raised position and thereby causing the connection to automatically hold the openers in raised position without locking-means.

The invention designs also to provide improved draft-operated lifting-mechanism and controlling-mechanism and to improve the construction and operation of seeding-machines.

The invention consists in the several novel features hereinafter set forth and more particularly defined by claims at the conclusion hereof.

In the drawings: Figure 1 is a plan view of a seeding machine, the seed box and other parts being removed or shown in section. Fig. 1^a is a detail section showing the mechanism for controlling the operation of the driving-mechanism for the seed delivery-means. Fig. 1^b is a vertical section through one of the bearings for the wheel-shaft. Fig. 1^c is a plan of said bearing the angle-iron frame-bar being shown in section. Fig. 1^d is a detail showing the cushion spring for the soil-openers. Fig. 2 is a rear view, the grain-drills being omitted. Fig. 3 is a view in vertical longitudinal section, taken on line 3—3 of Fig. 1. Fig. 4 is a similar view, taken on line 4—4 of Fig. 1. Fig. 4^a is a view showing the draft-operated lifting-mechanism in position assumed while the openers are being raised thereby. Fig. 5 is a view showing the lifting-mechanism in position assumed when the soil-openers are held in raised position thereby. Fig. 5^a is a detail of the link-connection between the wheel-operated shaft and the rock-shaft to which the soil-openers are connected. Fig. 5^b is a detail view of the hand-lever whereby the soil-openers can be operated, and showing the lever-lock released by the controller for the draft-operated lifting-mechanism. Fig. 5^c is a view of the same from the opposite side. Fig. 5^d is a detail longitudinal section through the ratchet-wheel and the lifting-member which is pivotally sustained by the wheel-shaft. Fig. 5^e is a detail of the parts shown in Fig. 5, showing the controller and lifting connection in position when the connection has been shifted across the dead center so the weight of the openers will be applied to lower them.

At each side of the machine, is a carry-

ing-wheel 8 in which is supported an axle or shaft 9 whereby the several parts of the machine are supported. This shaft is operatively connected so it will be driven by the carrying-wheels and usually by a one-way connection such as a pawl and ratchet, so the shaft will only be driven by the carrying-wheels, when the machine travels forwardly. A frame formed of an angle-iron bar which is bent to form end-bars 10, connected to shaft 9 by bearing-brackets 11 and extends across the front of the machine as at 12 to furnish a frame connection for the drag-bars. The rear frame-bar 13 extends across the machine and is secured to the end-bars as at 14. The frame also comprises a central longitudinally extending bar 17, secured to front-bar 12 and bearing-bracket 18 through which the wheel shaft extends, and braces 19 secured to bearings 20, through which the wheel shaft also extends. As shown in Figs. 1^b and 1^c, each bearing 11 is bolted to the vertical web of angle-iron bar 10 and provided with an oil-reservoir 11' which lies beneath the horizontal web of said bar so the horizontal web will serve as a cover for the reservoir. The edge of the wall around the reservoir is notched as at 11^a for the admission of the lubricant. This construction is of advantage and dispenses with the need of a closure for the top of the reservoir.

A seed-box 15, which may be of any suitable construction, extends across the machine, is sustained, by brackets 16 which are secured to end-bars 10 of the frame and by straps 21 which may be secured to the frame in any suitable manner. Beneath the seed-box are arranged a series of seed-delivery-devices 22, which may be of any suitable and well known construction, as the particular construction of these devices forms no part of the present invention. These devices are operated by a shaft 23 which is operatively connected to the wheel shaft by a sprocket 24, chain 25, and a sprocket 26 mounted on the wheel-shaft and adapted to be driven thereby. Sprocket 26 is slidably mounted on the wheel-shaft and connected thereto by a clutch 27. Sprocket 26 is normally held in position to be operated by said clutch, by a spring 28. One of the seed-shafts 23 extends from the center of the machine to the end thereof, and another seed-shaft and operative connection are provided for the other side, the purpose of this being to permit the seed-devices to be operated in conformity with the arrangement of the soil-opener gangs, as hereinafter set forth.

A series of disk-drills are provided for opening the soil and in the construction shown, these comprise disks 30, seed-boots 31 and drag-bars 32', pivotally connected at their upper and front ends as at 33 to the frame. A boot and disk is connected to

each of the drag-bars in manner well understood in the art. A flexible tube 22^a suspended from each of the seed-delivery-devices 22 conveys the discharged seed into the boot. The drills are arranged to be operated in gangs, each gang extending from the center of the machine to the end thereof. Each drag-bar is operatively connected to a rock-shaft, by a connection consisting of a rod 34 which is pivoted at 36 to the drag-bar, a spring 36 around said rod, a trunnion-collar 37 slidable on said rod and adapted to engage a stop at the upper end of said rod, and an arm 38 on the rock-shaft. A rock-shaft 39 operates one of the drill gangs, and a rock-shaft 39' operates the other drill-gang and these shafts are journaled in bearings 40 which are secured to the drill-frame. By employing independent shafts, the soil-opener-gangs can be operated independently of the other. A spring 98 (Figs. 1 and 1^a) is applied to each rock-shaft 39 by means of link 92 connected to the frame and link 92^a connected to the shaft to prevent sudden dropping of the gangs and to assist in raising the gangs when these are manually raised as hereinafter set forth.

A draft-operated lifting-mechanism is provided for each gang and is connected to one of the rock-shafts so the gangs can be independently lifted by such mechanism. Said mechanism comprises a toothed or ratchet-wheel 45, secured to wheel-driven shaft 9 so it will be constantly rotated while the machine is advancing. A dog 46 is pivotally connected as at 47 to a dog-support or lifting-member 48, which is loosely mounted on shaft 9 and adapted to be swung when the dog engages the ratchet-wheel, and is operatively connected by a link 49 to the rock-shaft. Said link is pivotally connected to the dog-support at 50 and to the lower end of an arm 51 secured to said rock-shaft. The dog-support operates as a crank for operating the lifting connection, the link being eccentrically connected thereto at 50. This crank and link-connection between the wheel-operated shaft and the rock-shaft (see Figs. 5 and 5^a) is adapted to cross the "dead center" of the connection, so that the weight of the openers applied through the rock-shaft will be differentially applied, *i. e.*, when the connection is in position seen in Fig. 5, the weight of the openers will be applied to hold the connection in position to retain the openers in raised position, and when in lowered position, the connection will leave the openers free to enter the soil. The link 49 pivotally connected to arm 51 at one end and to dog-support 48 at its other end, provides a linkage which can cross the dead-center of its pivotal connections with respect to shaft 9.

The means for controlling the operation

of each draft-operated lifting-mechanism, comprises a controller-lever 53, secured to a shaft 54, mounted in bearings 55, secured at the rear of the seed-box. Controller 53 is adapted to shift the lifting-dog and is connected thereto by a dog-guide 56 which is pivotally sustained at 57 by a fixed bracket 58 and is connected by a pin and slot 59 to one end of the controller-lever. The dog is provided with a stud 60, adapted to travel in a slot 61, formed in a guide 56. The edges of this slot are formed so that when the guide is held in one of its alternative positions, the dog will remain in engagement with the ratchet-wheel until the lifting-connection has passed the dead center and lifted the soil-openers. The upper end of said slot is provided with an eccentric portion 62 which will effect withdrawal of the dog from the ratchet-wheel when the draft-operated lifting-connection has raised the soil-openers. Controller 53 is adapted to shift the dog-guide into position to effect engagement of the dog and ratchet, and also controls the operation of the lifting-connection so the soil-openers can be lowered, because the arrangement of the dog and the dog-guide is such that when the controller-handle is shifted upwardly from the position shown in Fig. 5, stud 60 of the dog will engage the end of the slot in said guide and will be in such relative position with respect to the pivotal connections of the dog, that the guide will force the dog in such direction that the dog-support will be swung downwardly across the dead center of the lifting-connection and so the openers will be free to fall. This peculiar arrangement and construction makes it possible to control the operation of the soil-openers, from either of their alternative positions to the other by a single controller, because lever 53 controls the operation of the lifting-mechanism and also effects shift of the lifting-connection across the dead center thereof. Dog-support 48 is provided with an extension 66 whereby it can be positively and directly shifted, if for any reason the controller-lever should fail to shift the support. A fixed abutment 67 is provided for positively limiting the engagement of the dog with the ratchet. The curved edges of said dog, if for any reason the controller should become disarranged or broken, will encounter said abutment and the dog will be disengaged from the ratchet thereby. This abutment prevents breakage of the lifting-mechanism in event the controller should, for any reason, become disarranged or inoperative.

A platform 70, is sustained by hangers 71. The controller-levers 53 one of which is provided for each lifting-mechanism, are arranged near the center of the machine, and each is provided with a handle 53', arranged in close proximity to each other, so the op-

erator can with one hand grasp both handles and conjointly operate both controllers, thus making it possible to employ independently controlled lifting-mechanism for the gangs which can also be conjointly controlled.

A mechanism is provided for manually operating each gang of drag-bars and comprises a hand-lever 73. Each lever 73 is connected to one of the rock-shafts by a link 74 which is pivotally connected to the lower end of said lever, and to an arm 75 on the rock-shaft operated thereby. This lever and connection also serves as a pressure device for forcing the soil-openers into the ground to the desired depth. Lever 73 is pivotally sustained at 76 in a bracket 77, which is bolted to the platform-hangers 71, and is provided with a series of notches 78 to form a fixed segmental rack with which the bolt of a lever-lock 79 is adapted to engage, and thereby the operative connection between lever 73 and the rock-shaft can be locked in position to exert the desired pressure upon the soil-openers. Lever-lock 79 can be released by a finger-lever 80, so the lever can be shifted to vary the pressure. Lever 73, link 74, and arm 75 form a connection for the rock-shaft whereby the disks of a gang can be manually raised or lowered when desired or in event the draft-operated lifting-mechanism becomes inoperative. Lever-lock 79 is operated to release lever 73 when the controller for the draft-operated mechanism is operated by a releasing-plate 81, slidably connected by bolts and slots 82 to bracket 77. The outer edge of the releasing-plate is adapted to engage bolt 79' of the lever-lock and is shifted into position to release lever 73 by a connection with controller-shaft 54, comprising an arm 84, secured to controller-shaft 54, and a link 85 connected to said arm and to the releasing-plate. When the controller is operated to cause the draft-operated lifting-mechanism to raise the soil-openers, the releasing-plate will be shifted to unlock lever 73 before dog 46 comes in contact with the teeth of ratchet 45, so said lever and its connection will permit the rock-shaft to be operated by the draft-operated lifting-mechanism. A spring 86 is connected to bracket 77 and the releasing-plate and holds said plate normally in position below teeth 78 so the dog 79 may freely enter the teeth (see Fig. 3) and arm 84 on the controller-shaft is arranged to engage a stop 87 whereby the play of the controller is limited. Said arm and the connections of link 85 are arranged to cross the dead center so that spring 86 will tend to hold the controller in its lower position when it has been shifted into said position, and hold plate 81 in position to keep dog 79 out of engagement with teeth 78 (see Fig. 5^b.) A notch 78^a is provided in bracket 77 into which lock-

bolt 79' will enter if the soil-openers are lifted by hand-lever 73, to lock the hand-lever in position to hold the openers in raised position. When the openers are manually lowered finger-lever 80 serves to release bolt 79'.

In order to operate the seed-delivery-devices when the drill gang is lowered, and to stop the operation of the delivery-devices when the corresponding drill-gang is raised, means are provided for shifting each of the sprocket-wheels 26 into engagement with clutch 27, so the seed-shaft will be driven when the gang is lowered, and so the shaft will be stopped when the corresponding gang is raised. Said means consists of a shifter 89, which is pivotally sustained (see Figs. 1 and 1^a) at 90 by a lug secured to bar 13 and has a forked end adapted to shift sprocket-wheel 26 into and out of engagement with clutch 27, and a cam-surface 91, arranged to be shifted by one of the arms 38 on the rock-shaft. Resultantly when one of the rock-shafts is operated to lower one of the drill-gangs, the shifter will be operated to connect the driving-mechanism for the seed-shaft so the seed-delivery-devices will be driven by the wheel-operated shaft, and when the rock-shaft is reversely shifted the driving-mechanism for the seed-shaft will be disconnected from the wheel-operated shaft.

The operation will be as follows: Assuming the soil-openers to be in raised position, the controller and draft-operated lifting-mechanism will be in position seen in Fig. 5. Movement while the machine is advancing will be constantly imparted to shaft 9 by the carrying-wheels. If one of the gangs is to be lowered, controller 53 for said gang is raised, which will effect a slight shift of the lifting-dog (see Fig. 5^a), so dog-support 48 and link 49 will be shifted to cross the dead center and then the weight of the gang will cause the soil-openers to fall into the ground. Simultaneously, the releasing-plate for the pressure-lever will be operated so the lever-lock can engage with either of the notches 78 of rack 77. If further pressure is desired upon the soil-openers, lever 73 can be manually lowered, and locked in assigned position. When it is desired to lower the gangs conjointly, the operator can with one hand grasp the handles 53' of both controllers and effect simultaneous lowering of both gangs. When it is desired to raise either of the gangs out of the ground it is only necessary to shift the controller downwardly to the position seen in Figs. 4^a and 5. Such operation of the controller will operate releasing-plate 81 to unlock the pressure-lever and also shift the dog-guide 56 about its pivot 57 so the dog will be shifted into engagement with the ratchet-wheel 45 (see Fig. 4^a). The ratchet-wheel will then operate the dog-support 48, link 49, arm 51 and

the corresponding rock-shaft to raise the gang. When said connection has crossed the dead center, dog-stud 60 will be withdrawn from engagement by the eccentric portion 62 of guide 56, and the movement of the dog will be arrested (see Fig. 5.) The weight of the gang is then applied to hold the connection in position so the soil-openers will be held in raised position. If desired to operate either of the gangs manually, it can be done by a lever 73, the controller being in raised position, and when the lever has been operated to lift the openers, the lever will be locked in notch 78^a. Then the draft-operated lifting-connection will not be across the dead-center, and the openers will be free to drop when lever 73 is released, from notch 78^a. Thus it will be seen that it is not necessary to force the draft-operated lifting-connection across the dead center when the hand-lever 73 is employed to raise or lower the openers. When the draft-operated lifting-mechanism is operated to raise the openers, the releasing plate 81 holds the hand lever unlocked so that it is not necessary to release the lever before operating the controller to lower the openers. When the gangs are operated either by the draft-operated lifting-mechanism or operated manually by lever 73, the corresponding seed-delivery-devices are simultaneously rendered operative or inoperative.

It will be observed that the draft-operated lifting-connection and manually operable lifting-connection are separated from one another, so that if one should be rendered inoperative the gangs can be raised by the other.

The teeth of ratchet-wheel 45 and the hook on dog 46 are inclined so as to slightly interlock when in engagement during a lifting-operation, to prevent disconnection thereof when the machine is traveling over the ground. As the dog-support crosses the dead center of the linkage during a lifting operation, the weight of the openers is applied to move the dog more rapidly than the wheel driven ratchet moves and thus the dog will be disengaged from the ratchet so it may be easily withdrawn by guide 56 from the path of the teeth of the ratchet-wheel without unnecessary friction. This construction is a durable one because it avoids wear of the interlocking parts.

The invention is not to be understood as restricted to the particular embodiment shown and described, but can be varied without departing from the spirit and scope of the invention.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent, is:

1. In a seeding machine, the combination of carrying-wheels, a frame, seed delivery means, soil openers, a draft-operated lifting

connection for the openers, a controller-lever near the center of the machine, a transversely extending shaft operated by said controller and connected to operate said connection, and a lever also near the center of the machine for manually raising the openers.

2. In a seeding machine, the combination of carrying-wheels, a frame, seed-delivery-means, a plurality of soil-openers, draft-operated lifting-mechanisms whereby some of the openers can be raised and lowered independently of others, means for holding the soil-openers in the soil, and means whereby some of the openers can be manually raised or lowered independently of others.

3. In a seeding machine, the combination of carrying-wheel, a frame, seed-delivery-means, a plurality of drag-bars, a furrow-opening disk carried by each of the drag-bars, draft-operated lifting mechanisms whereby some of the drag-bars can be raised independently of others, means for holding the openers in the soil, and means whereby some of the drag-bars can be manually raised independently of others.

4. In a seeding-machine, the combination of carrying-wheels, a frame, seed delivery-means, a plurality of gangs of soil openers, a draft-operated lifting-mechanism for each gang, and a controlling device for each lifting-mechanism, said devices being independently and conjointly operable.

5. In a seeding-machine, the combination of carrying-wheels, a frame, seed-delivery-means, a plurality of gangs of soil-openers, a draft-operated lifting mechanism for each gang, a hand-lever for each gang, and a controlling device for each draft-operated lifting mechanism, said devices being independently and conjointly operable.

6. In a seeding-machine, the combination of carrying-wheels, a frame, seed-delivery-means, soil-openers, a drive-shaft operated by said wheels, a lifting-mechanism for the openers, operated by said shaft, a manually-operable lever, eccentrically pivoted with respect to said shaft, and operatively connected to the openers, a controlling-device for said lifting mechanism, and locking means for said lever.

7. In a seeding-machine, the combination of carrying-wheels, a frame, seed-delivery-means, a plurality of gangs of soil-openers, a shaft driven by the carrying wheels, a lifting mechanism for each gang operated by said shaft, and a controlling device for each lifting-mechanism, said devices being independently and conjointly operable.

8. In a seeding-machine, the combination of carrying-wheels, a frame, seed-delivery-means, a plurality of gangs of soil-openers, rock-shafts to which the openers of the gangs are respectively connected, a draft-operated

mechanism for each rock-shaft, and a controlling-device for each of said draft-operated mechanisms, said devices being independently and conjointly operable.

9. In a seeding-machine, the combination of carrying-wheels, a frame, a shaft driven by the carrying-wheels, a plurality of gangs of furrow-openers, rock-shafts to which the openers of the gangs are respectively connected, a mechanism for each rock-shaft, operated by the wheel-driven shaft, a controlling-device for each of said mechanisms, said controlling-devices being independently and conjointly operable.

10. In a seeding-machine, the combination of carrying-wheels, a frame, seed-delivery-means, a plurality of gangs of disks, a draft-operated lifting-mechanism for each gang, a controlling-device for each lifting-mechanism, said controlling devices being independently and conjointly operable.

11. In a seeding-machine, the combination of carrying-wheels, a frame, soil-openers, seed-delivery-means, a shaft driven by said wheels, draft operated lifting mechanism for the soil-openers operated by said shaft, a lever whereby the openers can be manually lifted, means for securing the lever in different positions when the openers are in the soil, said lever being eccentrically pivoted with respect to said shaft, a controlling device for the lifting-mechanism, and releasing-means for the securing-means, operated by said controlling-device.

12. In a seeding machine, the combination of carrying-wheels, a frame, seed-delivery-means, a rock-shaft, drag-bars, furrow opening disks carried by the drag-bars, arms on the rock-shaft, connections between the arms and the drag-bars comprising springs and rods, a shaft driven by said wheels, a draft-operated lifting-mechanism operated by the wheel-driven shaft and comprising an arm secured to said rock-shaft, a hand-lever operatively connected to said rock-shaft eccentrically pivoted with respect to the wheel-driven shaft and arranged near the center of the machine, and means for locking said lever in different positions when the disks are in working position.

13. In a seeding-machine, the combination of carrying-wheels, a frame, soil-openers, seed-delivery-means, a draft-operated lifting-connection for the openers, a pressure-lever for forcing the openers into the soil, a lock for said lever, and means independent of said lock for holding the openers in raised position when they have been raised by the draft-operating lifting-mechanism.

14. In a seeding-machine, the combination of, carrying-wheels, a frame, soil-openers, seed-delivery-means, a draft-operated lifting-connection for the openers, a pressure-lever, locking-means for said lever, and automatically operating means independent of

said locking-means for holding the openers in raised position when they have been raised by the draft-operated mechanism.

15. In a seeding-machine, the combination of carrying-wheels, a frame, soil-openers, seed-delivery means, draft-operated lifting-mechanism for the openers, a controlling-lever for said mechanism, a hand-lever having a connection with the soil-openers and movable independently of the controller, a lock for the hand-lever, and a lock-releasing device operated by the controlling-lever.

16. In a seeding machine, the combination of carrying-wheels, a frame, soil-openers, seed-delivery means, draft-operated lifting-mechanism for the openers, a controller for the lifting-mechanism, a hand-lever movable independently of the controller and having a connection with the soil-openers whereby the openers can be raised or lowered, a lever-lock whereby the lever will be secured in assigned position, and a releasing-device for said lock, connected to the controller.

17. In a seeding machine, the combination of carrying-wheels, a frame, soil-openers, seed-delivery means, draft-operated lifting-mechanism for the openers, a controller for the lifting-mechanism, a hand-lever having a connection with the openers whereby the openers can be raised or lowered, a lever-lock comprising a fixed rack, and a releasing-plate operated by the controller.

18. In a seeding machine, the combination of carrying-wheels, a frame, soil-openers, draft-operated lifting-mechanism for the openers, a controller for the lifting-mechanism, a rock-shaft to which the openers are connected, a lever mounted to move independently of the controller and connected to said rock-shaft and whereby the openers can be raised or lowered, a lever-lock, and a releasing-device for said lock operated by said controller.

19. In a seeding machine, the combination of carrying-wheels, a frame, seed-delivery-means, soil-openers, draft-operated lifting-mechanism for the openers, a controller for said mechanism, and means whereby the controller will control shift of the openers from either of their alternative positions to the other.

20. In a seeding machine, the combination of carrying-wheels, a frame, seed-delivery-means, soil-openers, draft-operated lifting-mechanism for the openers, a controller-lever for said mechanism, and means connecting the controller-lever and said mechanism whereby the said lever will control shift of the openers from either of their alternative positions to the other.

21. In a seeding machine, the combination of carrying-wheels, a frame, seed-delivery-means, soil-openers, draft-operated lifting-mechanism for the openers, a hand-lever for controlling said mechanism, and a connec-

tion whereby said lever will control shift of the openers from either of their alternative positions to the other.

22. In a seeding machine, the combination of carrying-wheels, a frame, seed-delivery-means, soil-openers, a shaft operated by the carrying-wheels, lifting-mechanism operated by said shaft, a controller for said mechanism, and a connection whereby said controller will cause the shift of the openers from either of their alternative positions to the other.

23. In a seeding machine, the combination of carrying-wheels, a frame, seed-delivery-means, soil-openers, draft-operated lifting-mechanism for the openers, a controller for said mechanism, a connection whereby shift of the openers from either of their alternative positions to the other will be controlled by said controller, and a lever whereby the openers can be manually operated.

24. In a seeding machine, the combination of carrying-wheels, a frame, seed-delivery-means, soil-openers, draft-operated lifting-mechanism for the openers, a controller for said mechanism, a connection whereby shift of the openers from either of their alternative positions to the other will be controlled by said controller, a lever whereby the openers can be manually operated, and locking-means whereby the openers can be held in assigned position, and operated by said controller.

25. In a seeding machine, the combination of carrying-wheels, a frame, seed-delivery-means, soil-openers, draft-operated lifting-mechanism for the openers, a controller, and a means between said controller and said mechanism whereby the controller will control the operation of said mechanism to lift the openers, and will also control lowering of the openers.

26. In a seeding machine the combination of carrying-wheels, a frame, seed-delivery-means, soil-openers, a shaft driven by said wheels, lifting-mechanism operated by said shaft, a controller for said lifting-mechanism, and means whereby said controller will control operation of the lifting-mechanism to raise the openers, and will also control lowering of the openers.

27. In a seeding machine, the combination of carrying-wheels, a frame, seed-delivery-means, a plurality of gangs of soil-openers, draft-operated lifting-means, a controller for each lifting-mechanism, and a connection for each controller whereby the lifting-mechanism can be operated to raise the openers, and whereby the openers can be lowered.

28. In a seeding machine, the combination of carrying-wheels, a frame, seed-delivery-means, a plurality of gangs of soil-openers, draft-operated lifting-means, a controller for each lifting-mechanism, and a connec-

tion for each controller whereby the lifting-mechanism can be operated to raise the openers, and whereby the openers can be lowered, the controllers being arranged so they can be conjointly operated.

openers will be applied to hold the openers in one position, and controlling-means whereby the connection will be shifted so the weight of the openers will be differentially applied.

29. In a seeding-machine, the combination of carrying-wheels, a frame, seed-delivery-means, soil-openers and draft-operated lifting-mechanism for the openers comprising a connection whereby the weight of the openers will be differentially applied to hold the openers in raised position and to lower them respectively when they are in raised and lowered position.

30. In a seeding-machine, the combination of carrying-wheels, a frame, seed-delivery-means, soil-openers, a shaft operated by the carrying-wheels and draft-operated lifting-mechanism for the openers comprising a connection to which the weight of the openers will be differentially applied when they are in raised and lowered position respectively.

31. In a seeding-machine, the combination of carrying-wheels, a frame, soil-openers, seed-delivery-means, a wheel-driven shaft, and a draft-operated linkage for the openers disposed to cross the dead center so the weight of the openers will be applied to the linkage to hold the openers in raised position, a toothed wheel, a dog, and means for releasing the dog when the linkage has passed the dead center.

32. In a seeding-machine, the combination of carrying-wheels, a frame, soil-openers, seed-delivery-means, a wheel-driven shaft, a draft-operated linkage for the openers disposed to cross the dead center so the weight of the openers will be applied to the linkage to hold the openers in raised position, a toothed wheel, a dog, and means for releasing the dog when the linkage has passed the dead center, and a stop for the linkage when it has thus been released.

33. In a seeding machine, the combination of carrying-wheels, a frame, a seed-delivery-device, soil-openers, and draft-operated lifting-mechanism comprising a crank and link connection arranged to cross the dead center thereof, and whereby the furrow-openers will be held in lifted position.

34. In a seeding machine, the combination of carrying-wheels, a frame, a seed-delivery-device, soil-openers, a wheel-operated shaft, and lifting-mechanism operated by said shaft and comprising a crank and link connection arranged to cross the dead center and whereby the furrow-openers will be held in lifted position.

35. In a seeding machine, the combination of carrying-wheels, a frame, a seed-delivery-device, soil-openers, draft-operated lifting-mechanism for the openers comprising a link-connection arranged to cross the dead center so the weight of the furrow-

36. In a seeding machine, the combination of carrying-wheels, a frame, a seed-delivery-device, soil-openers, draft-operated lifting-mechanism for the openers comprising a link-connection arranged to cross the dead center so the weight of the furrow-openers will be applied to hold the openers in raised position, and controlling-means whereby the connection will be shifted to differentially apply the weight of the openers.

37. In a seeding machine, the combination of carrying-wheels, a frame, a seed-delivery-device, soil-openers, a wheel-operated shaft, lifting-mechanism for the openers operated by said shaft, and comprising a link-connection arranged to cross the dead center so the weight of the furrow-openers will be applied to hold the openers in one of its positions, and controlling-means whereby the connection will be shifted to differentially apply the weight of the openers.

38. In a seeding machine, the combination of carrying-wheels, a frame, a seed-delivery-device, soil-openers, draft-operated lifting-mechanism for the openers comprising a link-connection arranged to cross the dead center so the weight of the openers will be differentially applied, and controlling-means for said mechanism.

39. In a seeding machine, the combination of carrying-wheels, a frame, a seed-delivery-device, soil-openers, draft-operated lifting-mechanism for the openers comprising a link-connection arranged to cross the dead center so the weight of the openers will be differentially applied, and a controller whereby said connection can be shifted.

40. In a seeding machine, the combination of carrying-wheels, a frame, a seed-delivery-device, soil-openers, a wheel-operated shaft, lifting-mechanism for the openers operated by said shaft, and comprising a link-connection arranged to cross the dead center so the weight of the openers will be differentially applied, and a lever whereby said connection can be shifted to control shift of the openers.

41. In a seeding machine, the combination of carrying-wheels, a frame, seed-delivery-means, a plurality of gangs of soil-openers, and a draft-operated lifting-mechanism for each gang comprising a connection whereby the weight of the openers will be differentially applied to tend to hold the openers in either raised or lowered position.

42. In a seeding machine, the combination of carrying-wheels, a frame, seed-

livery-means, a plurality of gangs of soil-openers, a wheel-operated shaft, and a lifting-mechanism for each gang comprising a connection whereby the weight of the openers will be differentially applied to alternately hold the openers in either raised or lowered position.

43. In a seeding machine, the combination of carrying-wheels, a frame, seed-delivery-means, a draft-operated lifting-mechanism, a hand lever whereby the openers can be manually raised and lowered, a connection whereby the hand lever can force the openers into the soil, a controller for said mechanism, a rack for said lever, a lever-lock and releasing means for the lock operated from either of its alternative positions to the other by the controller.

44. In a seeding machine, the combination of carrying-wheels, a frame, seed-delivery-means, a draft-operated lifting-mechanism, a hand lever whereby the openers can be manually raised and lowered, a connection whereby the hand lever can force the openers into the soil, a controller for said mechanism, a rack for said lever, a lever-lock and releasing means for the lock operated by the controller, said releasing means being held in inoperative position when the openers are lowered so the lever can be locked in different positions.

45. In a seeding machine, the combination of carrying-wheels, a frame, seed-delivery-means, soil-openers, a wheel-operated shaft, lifting-mechanism for the openers operated by said shaft comprising a toothed wheel, a dog, and a connection whereby the weight of the openers will be applied to hold the openers in lifted position, and controlling-means for said dog whereby the dog can be shifted to operate the connection so the weight of the openers will be differentially applied.

46. In a seeding machine, the combination of carrying-wheels, a frame, seed-delivery-means, soil-openers, a wheel-operated shaft, lifting-mechanism for the openers operated by said shaft, comprising a rock-shaft whereto the openers are connected, an arm secured to the rock-shaft, a toothed wheel, a dog, a dog-support mounted to swing about said wheel operated shaft, a link connecting said support and said arm a hand lever for shifting said dog, said dog being movable independently of said lever.

47. In a seeding machine, the combination of carrying-wheels, a frame, seed-delivery-means, soil-openers, a wheel-operated shaft, a toothed wheel, a pivotally sustained dog adapted to be shifted by said wheel, and a guide for said dog whereby the dog will be thrown into and out of engagement with said toothed wheel.

48. In a seeding machine, the combina-

tion of carrying-wheels, a frame, seed-delivery-means, soil-openers, a wheel-operated shaft, a toothed wheel, a pivotally sustained dog adapted to be shifted by said wheel, and an eccentric guide for said dog.

49. In a seeding machine, the combination of carrying-wheels, a frame, seed-delivery-means, soil-openers, a wheel-operated shaft, a toothed wheel, a pivotally sustained dog adapted to be shifted by said wheel, and a guide for said dog, and means for shifting said guide.

50. In a seeding machine, the combination of carrying-wheels, a frame, seed-delivery-means, soil-openers, a wheel-operated shaft, a toothed wheel, a pivotally sustained dog adapted to be shifted by said wheel, a guide for said dog, and a hand-lever whereby the guide can be shifted.

51. In a seeding machine, the combination of carrying-wheels, a frame, seed-delivery-means, soil-openers, a wheel-operated shaft, a toothed wheel, a pivotally sustained dog adapted to be shifted by said wheel, and a pivotally sustained guide for the dog, provided with a slot having an eccentric portion therein whereby the dog will be disengaged from the toothed wheel.

52. In a seeding machine, the combination of carrying-wheels, a frame, seed-delivery-means, soil-openers, a wheel-operated shaft, a toothed wheel, a pivotally sustained dog adapted to be shifted by said wheel, a pivotally sustained guide for the dog having a slot therein, provided with an eccentric portion whereby the dog will be disengaged from the toothed wheel, and a lever whereby the guide can be shifted to shift said dog.

53. In a seeding-machine, the combination of carrying-wheels, soil-openers, a rock-shaft to which the soil-openers are respectively connected, a shaft driven by the carrying-wheels, a draft-operated lifting connection for operating said rock-shaft from said wheel-driven shaft, means for manually operating said rock-shaft, seed-delivery mechanism, driving-mechanism operated by said wheel-driven shaft and for driving the seed-delivery mechanism, a clutch for controlling the operation of the seed-delivery mechanism by said driving-mechanism, and clutch shifting means connected to be operated by the draft-operated lifting connection and by said manually operated means.

54. In a seeding-machine, the combination of carrying-wheels, a frame, soil-openers, a rock-shaft to which the openers are connected, seed-delivery-means, a shaft driven by the wheels, draft-operated lifting-mechanism comprising a connection between said shafts, a lever, a lock for the

lever a connection between the lever and the rock-shaft separate from the draft-operated connection, a controller for the draft-operated connection and releasing-means for said lock, operated by said controller.

5 55. In a seeding-machine, the combination of carrying-wheels, a frame, soil-openers, a rock-shaft to which the openers are connected, seed-delivery-means, a shaft
10 driven by said wheels, a draft-operated lifting connection between said shafts compris-

ing a link, a hand-lever, a lock for said lever a separate connection between said lever and said rock-shaft comprising a link a controller for the draft-operated connection, 15 and releasing-means for the lock, operated by the controller.

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