I. A. WEAVER.

PLOW.

APPLICATION FILED AUG. 10, 1914.

1,301,628.

Patented Apr. 22, 1919.

5 SHEETS—SHEET 1.

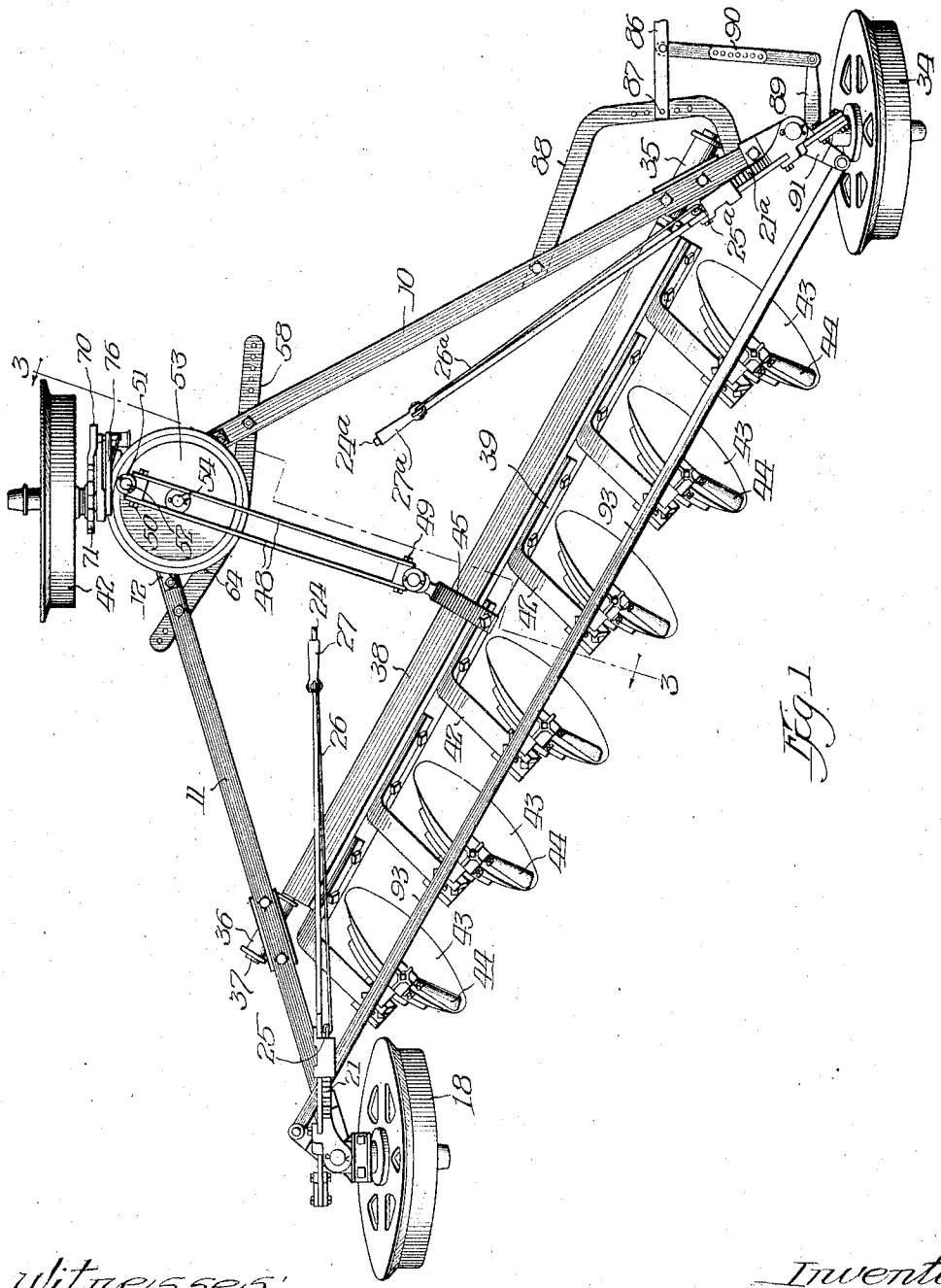


Fig. 1

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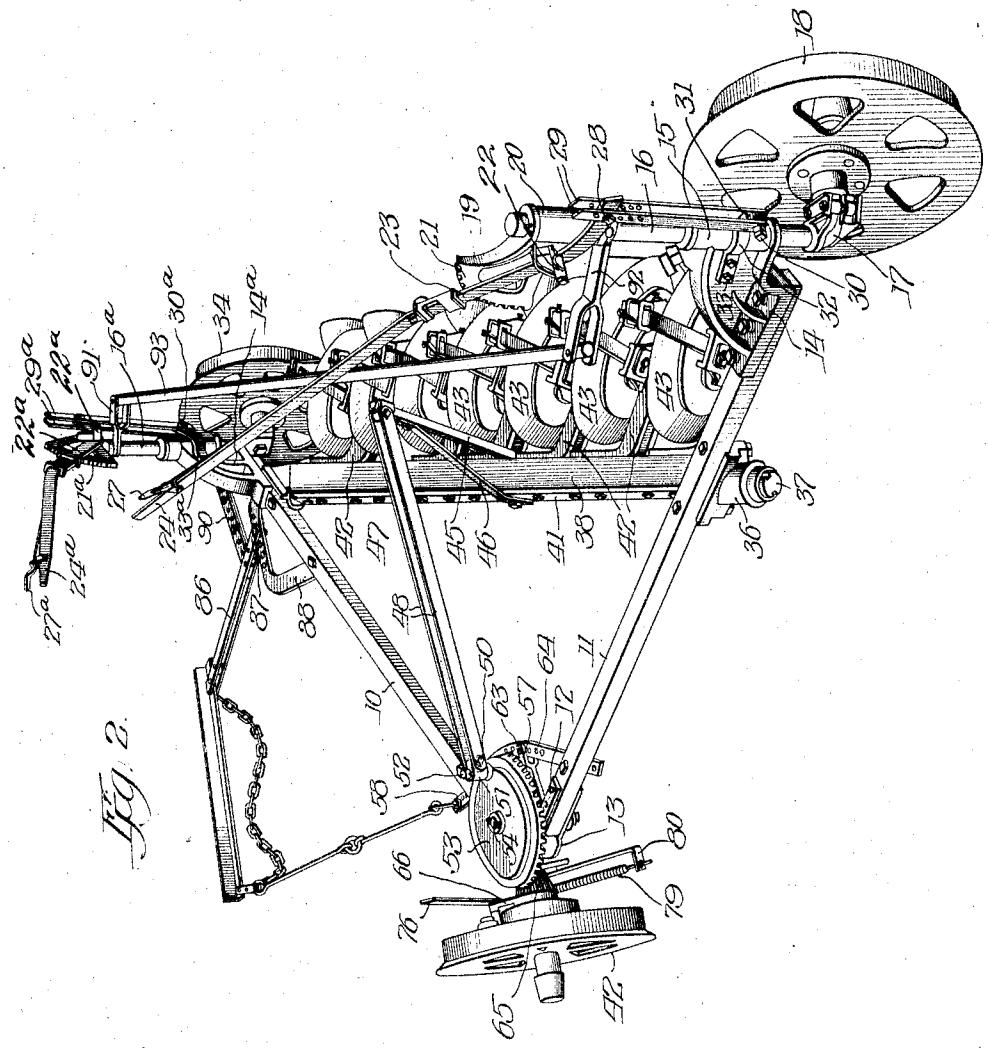


Fig. 2.

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5 SHEETS—SHEET 3.

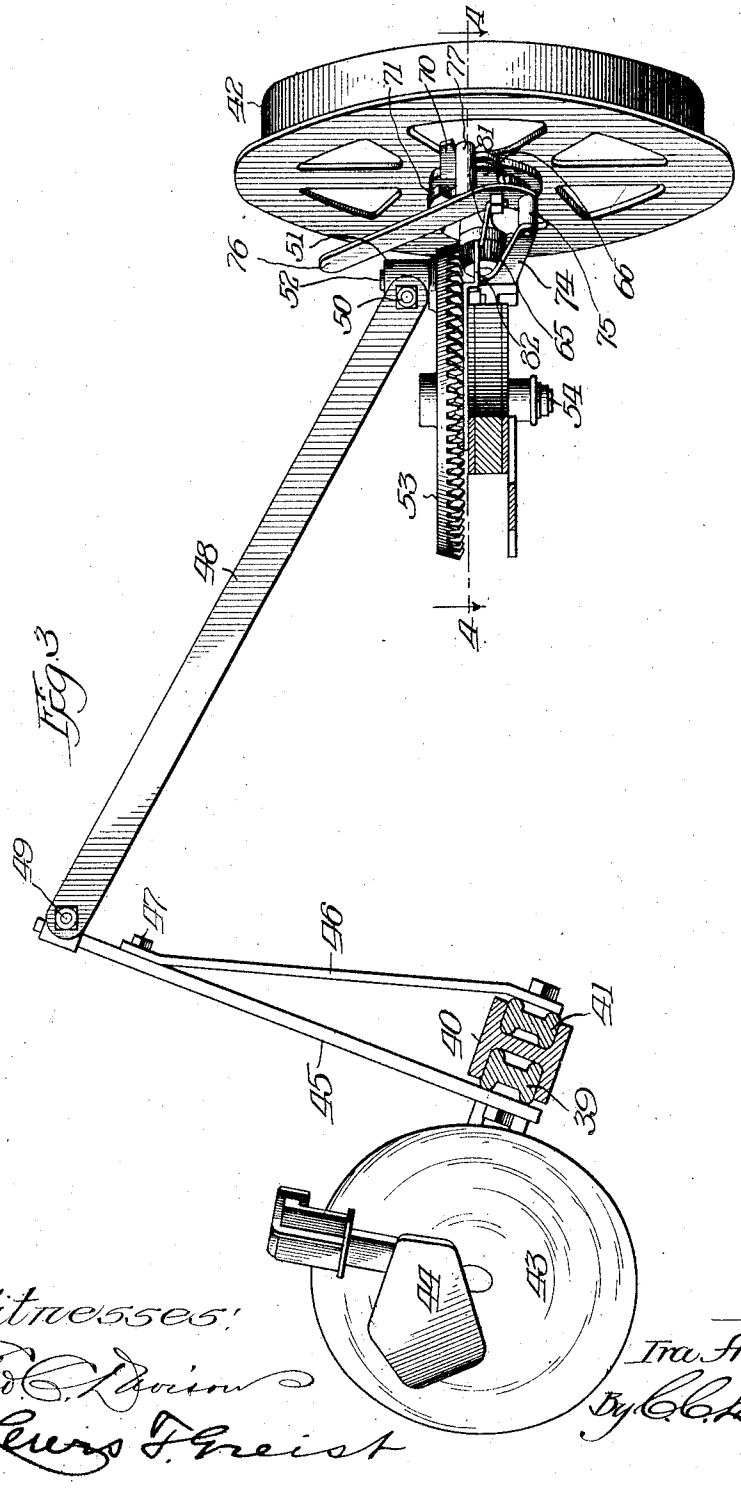


Fig. 3

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5 SHEETS—SHEET 4.

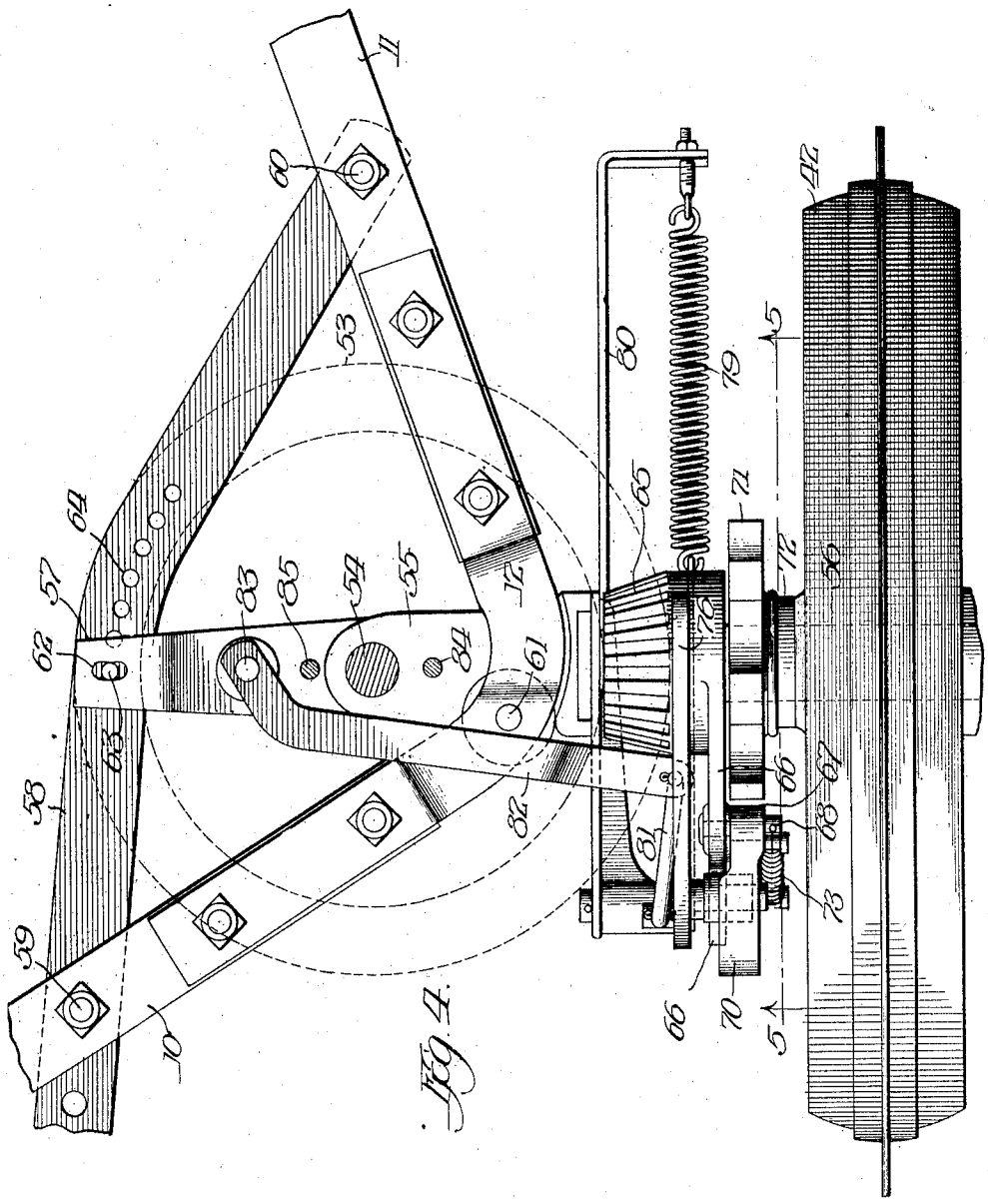


Fig. 4.

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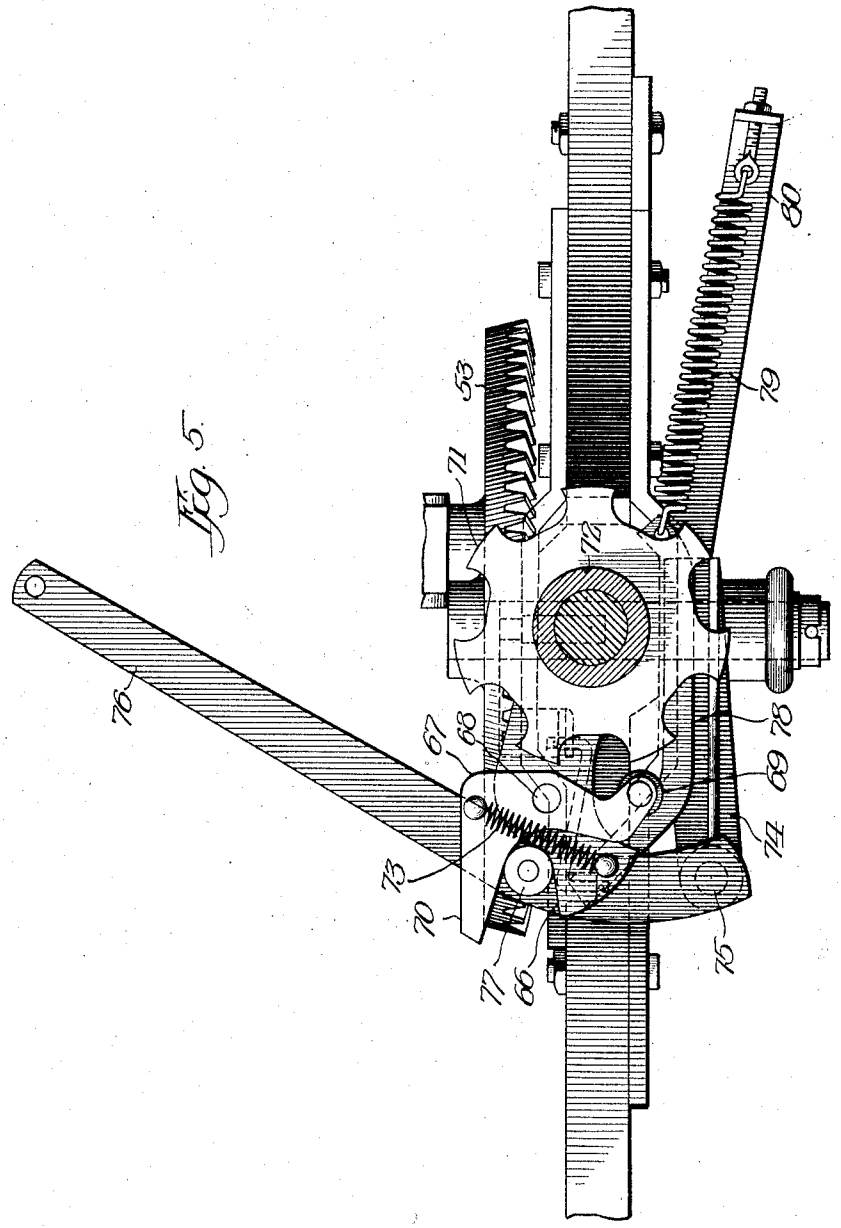
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5 SHEETS—SHEET 5.

Fig. 5.



Witnesses:

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UNITED STATES PATENT OFFICE.

IRA A. WEAVER, OF SPRINGFIELD, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO MONTGOMERY WARD & CO., INCORPORATED, OF CHICAGO, ILLINOIS, A CORPORATION OF NEW YORK.

PLOW.

1,301,628. Specification of Letters Patent. **Patented Apr. 22, 1919.**

Application filed August 10, 1914. Serial No. 855,964.

To all whom it may concern:

Be it known that I, IRA A. WEAVER, a citizen of the United States, residing at Springfield, in the county of Sangamon and State of Illinois, have invented certain new and useful Improvements in Plows, of which the following is a specification.

One object of the present invention is the provision of a plow-structure, preferably of the gang-type, which shall be simple in construction, easily operated and adjusted, and shall incorporate but few parts of relatively simple design, which may be assembled with facility and despatch.

A further object of the invention is to so construct and design the parts that a small amount of power only shall be required in effecting the automatic mechanical or power operated raising and lowering of the plows, the construction being such that a high lift or elevation of the plows can be secured without excessive tipping of the frame.

Another salient feature of the invention is the designing of the plow-structure in such a way that the depth of cut of the plows may be easily regulated and the lifting of the frame carrying the plows may be readily accomplished in the preferred embodiment of the invention by the same means that adjusts the depth of penetration.

In the structure incorporating the preferred embodiment of the invention, a plurality of plow-disks are mounted on a beam rockingly supported on the frame so that the plows may be raised and lowered by the oscillation of such beam which is effected mechanically by a mechanism associated with one of the carrying-wheels, the structure being such that the wheel may be angularly adjusted with respect of the frame to vary its lead without interfering with its operative functions.

In this preferred style of construction, the weight of the carrying-wheels and their axles aid in holding the plows down in penetrating position, which is desirable in some kinds of soil and in some localities, but since the plow-beam is rockingly mounted on the frame, the plows may be raised and lowered by oscillating the beam without changing the position of the frame, the vertical adjustment of the latter when required giving the plows an excessive lift, which is occasionally desirable.

A preferred type of structure embodying the invention is illustrated in the accompanying drawings to which reference should be had in connection with the following detailed description.

In these drawings:

Figure 1 is a plan view of the plow;

Fig. 2 is a perspective view;

Fig. 3 is a section on line 3—3 of Fig. 1 on an enlarged scale, the parts being viewed in the direction indicated by the arrows;

Fig. 4 is a horizontal section on an enlarged scale on line 4—4 of Fig. 3, and

Fig. 5 is a vertical section on line 5—5 of Fig. 4.

The machine as illustrated in Fig. 1 is of general triangular shape, being provided with three carrying-wheels, canted or tilted as required. The main-frame comprises two bars 10 and 11 disposed at an angle to one another and connected together at their adjacent ends by upper and lower bent-straps 12 and 13, the proximate ends of the bars 10 and 11 being spaced apart from one another, leaving an opening between the uniting-straps 12 and 13, as shown in Fig. 4, for the accommodation of the axle of the carrying-wheel which operates the plow-lifting mechanism.

The rear-end of the bar 11 has fastened thereto a riser-bracket 14 with a vertical bearing 15 accommodating the upright-portion 16 of the axle 17 on which the rear furrow-wheel 18 is mounted, the bracket being slidable on the part 16 of the axle. On the upper-end of the vertical portion 16 of the axle I mount a casting 19 in such a manner that the axle-section 16 may rotate, but not slide, in the bearing-portion 20 thereof. Projecting laterally from this part 20 the member 19 is equipped with a sector 21 and the casting has a fulcrum-pin 22 on which a lever 23 is rockingly mounted, the lever having an operating-handle 24, a sliding-dog 25 adapted to coöperate with the teeth of the sector 21, a connecting-rod 26, and a

supplemental-handle 27 hinged on the main-handle 24 and adapted by its movements to slide the catch 24. The rearwardly-projecting part of the lever 23 is adjustably connected by a pivot-bolt 28 with two links 29, 29, disposed on opposite sides of the lever 23, such links at their lower ends being pivoted by a bolt 30 to the outstanding-end 31 of a bent-bar 32 bolted to the bracket 14 at 33 and shaped to conform to those portions of the bracket which it engages.

It should be obvious from this construction that by shifting the handle 24 down or up so as to rock it on its fulcrum 22, the frame-bar 11 may be made to rise or descend, the bearing 15 sliding on the vertical part 16 of the axle, and the lever 23 being capable of being locked in any adjusted position by means of its dog co-acting with the sector. The forward-end of the bar 10 is in like manner vertically adjustably mounted on the axle of the front furrow-wheel 34 by like instrumentalities, the parts of such mechanism being indicated by the same reference characters as the corresponding parts of the structure associated with the rear furrow-wheel 18, the reference characters, however, being supplemented by the letter—"*a*."

Secured to the under sides of the two bars 10 and 11 I provide the bearings 35 and 36 rockingly receiving the trunnions 37 of a beam 38 substantially rectangular in cross-section and disposed between the frame-bars 10 and 11 as illustrated. This portion 38 of the mechanism may conveniently be built up of a main-bar 40 of I-shape in cross-section accommodating in the longitudinal recess of its front-face a smaller I-beam 41, the ends of which are rounded to provide the trunnions 37. The rear groove or recess of the bar 40 accommodates the bent-ends 39 of plow supporting beams or bars 42, which are in cross-section substantially the same as that of the bar 41. Each of these rearwardly-extending parts 42, in the present instance six in number, is equipped with a disk-plow 43 and its associated scraper 44.

When the plow-beam 38 is rocked in one direction the gang of disk-plows descends into operative position, and when the plow-beam is rocked up the disks are simultaneously raised into inoperative position. It is desirable that power-means be provided to accomplish this and the power derived for this purpose is obtained from the third or land-wheel 42.

This plow-lifting and lowering mechanism comprises a post 45 secured to the rear-face of the plow-beam and braced by a bar 46 bolted thereto at 47 near its upper-end and fastened at its lower-end to the plow-beam. Two links or connecting-bars 48, 48, are pivoted or hinged to the top of the post 45 at 49 and at their other ends are pivoted at 50 to a collar 51 free to turn on a stud 52 rising from the top of a horizontal bevel gear 53 secured fixedly to the top of a vertical-shaft 54 having a bearing in the inner flattened part 55 of the horizontal axle 56 on which the land-wheel 42 is mounted.

This axle at its extreme inner end is bifurcated at 57, the spaced-ears accommodating an arch-bar 58 bolted at its ends at 59 and 60 to the two frame-members 10 and 11. The axle is fulcrumed to the connecting-straps 12 and 13 on a pin 61 so that the axle and the land-wheel 42 may be given horizontal angular adjustment by turning the same around the pin 61, and in order to lock the axle in adjusted position the ears 57 of the bifurcated-end are provided with slots 62 through which a pin 63 extends, the pin also passing through any one of a series of holes 64 in the bar 58.

The outer cylindrical-portion of the axle has a pinion 65 loosely mounted thereon and in mesh with the horizontal gear 53. An arm 66 rigid with the pinion 65 carries a pawl 67 pivoted to it at 68, the pawl having at its inner-end a roller 69 and at its other end having an outwardly-extended tail 70. This pawl and its roller are adapted to coöperate with a star wheel 71 fixed on the hub 72 of the land-wheel 42 so that it is driven by the wheel, the hub, wheel, and ratchet-wheel turning freely on the cylindrical-portion of the axle. The pawl has associated with it and the arm 66 a coil contractile spring 73 which tends to rock the pawl or dog on its pivot-pin to bring this roller 69 into one of the notches of the companion ratchet-wheel, as will be readily understood. In order to hold the pawl retracted out of coöperative relation with the ratchet-wheel, an arm 74 is mounted on the axle and has fulcrumed thereon at 75 a handle 76 carrying a roller 77 adapted to co-act with the tail of the pawl and hold the roller 69 retracted out of engagement with the ratchet, as is illustrated in Fig. 5. In order to yieldingly pull this handle 76 into the position shown in Fig. 5, the handle has connected to it a bent-bar 78 disposed beneath the axle and connected by means of a coil contractile spring 79 to a companion extension-bar 80 also carried by the axle.

In this mechanism the plows are lifted during a half revolution of the gear 53 and are lowered during the next succeeding half revolution, and during each of these half revolutions the land-wheel 42, which operates the plow-lifting and lowering mechanism, makes two complete revolutions and, of course, its associated pinion 65 will make two revolutions during the same interval. It is, therefore, necessary to provide some means to prevent the pawl 67 from being withdrawn from the ratchet-wheel at the completion of the first revolution of the lat-

ter and yet, permit such retraction at the completion of the second revolution, so that the land-wheel will be automatically unclutched from the plow-lifting mechanism at the end of its second revolution.

To accomplish this result, the handle 76 which may be operated directly by hand or by a pulling-cord, has fulcrumed thereto one end of a link 81 which is pivoted at its other end to an arm 82 fulcrumed on the axle at 83, such arm being in the path of rotation of two diametrically-disposed, downwardly-extended pins 84 and 85 on gear 53. One of these pins is adapted to hold the lever or handle 76 retracted at the completion of the first revolution of the ratchet-wheel during the plow-lifting operation, and the other pin to perform the same function during the plow-lowering operation.

Referring to the draft-mechanism of the plow, it will be apparent that one end of the draft-appliance is connected to the forwardly-extended end of the bar 58 and the draw-bar 86 is connected at its rear-end adjustably at 87 to a bent-bar 88 fastened to the frame-member 10. The axle of the front-furrow-wheel is supplied with a forwardly-projecting arm 89 to which the draw-bar is connected by a link 90, adjustable as to length. The vertical-portion 16^a of the axle of the front furrow-wheel 34 has rigidly attached thereto a rearwardly-extending arm 91 and the vertical-portion 16 of the axle of the rear furrow-wheel 18 has rigidly fastened thereto a forwardly-projecting arm 92, the two arms being connected together by a rod 93 pivotally associated with each, such rod acting not only to transmit the motion of the forward axle to the rear axle, but also performing the function of a guard over the plows.

Obviously, as the draft appliance turns the front furrow-wheel, the rear furrow-wheel will be simultaneously turned, thereby facilitating the steering of the appliance and its proper travel.

Operation: The operation of this mechanism takes place substantially as follows: Assuming that the machine is traveling forwardly and that the plows are depressed or in lowered position, as illustrated in Fig. 2, then the gear 53 will be in such position that its shaft or pin 52 will be nearest the rocking plow-beam. When it is desired to raise the plows, which, as is clearly shown are arranged in a row diagonally of the direction of travel of the machine, the operator either directly or by means of a cord, swings the handle 76 forwardly so as to move the roller 77 carried thereby from under the tail 70 of the pivoted pawl 67. As soon as the pawl is thus released, it responds to the action of its contractile-spring 73 and the roller enters one of the notches of the constantly rotating ratchet-wheel 71, which is turned by the land-wheel 42. This engagement of the pawl with the ratchet clutches the carrying-wheel to the pinion 65 so that the rotation of the carrying-wheel is transmitted through these elements not only to the pinion 65 but also to its coöperating horizontal gear 53, the arm 76 and the pawl 67 mounted thereon revolving with the pinion and ratchet-wheel.

The gear 53 travels counter clockwise as viewed from above and the travel of its stud or pin 52 in a semi-circle during a half revolution of the gear rocks the plow-beam and the plows carried thereon upwardly through the connecting-links 48 and the post or standard 45, the plow-lifting operation being completed during such half revolution of the gear.

It requires two complete revolutions of the carrying-wheel and the pinion, however, to complete the half revolution of the gear, and the roller 77 at the end of the first revolution of the pinion is prevented from retracting the pawl from the ratchet, that is, the handle 67 although released by the operator, is prevented from responding to the action of the spring 79, by the downwardly-extended pin 84, of the gear 53 which by striking the arm 82 swings the latter and the handle 76 by means of the connecting-link 81 so as to hold the roller 77 away from the pawl-tail. At the completion of the second revolution of the carrying-wheel and pinion 65, the pins 84 and 85 of the gear will have exchanged positions from those shown in Fig. 4 so that the handle 76 is free to swing inwardly under the influence of its spring 79 and the roller 77 striking the pawl end or tail swings the pawl on its pivot-pin 67, freeing the roller from the ratchet. Stated otherwise, at the completion of the second revolution of the carrying wheel and pinion which corresponds to the completion of a half revolution of the gear 53, the pawl-and-ratchet-clutch is automatically rendered inoperative.

When it is desired to rock the plow-beam and the plows down into operative position, this is accomplished during the next half revolution of the gear 53, during which turning of the gear the stud or pin 52 moves from its most remote position with respect to the plow-beam to its nearest position. This half revolution of the gear is accomplished in substantially the same way as the preceding half revolution except that during this movement of the parts the unclutching of the pawl and ratchet at the end of the first revolution of the carrying-wheel is prevented by a gear-pin 85 instead of the gear-pin 84. As will be readily understood, the driving-mechanism is again automatically unclutched when the plows have been lowered.

One of the important and valuable fea-

tures of this construction resides in the plurality of revolutions of the driving carrying-wheel during the raising of the plows. So far as I am advised, in all other appliances of this general character, the lifting of the plows is accomplished during a single revolution of the carrying-wheel, which experience has shown puts too great a strain on the parts and consumes too much power. By accomplishing the raising of the plows during a plurality of revolutions of the carrying-wheel, less power is required and less strain imposed on the various instrumentalities employed.

A still further valuable feature of this invention resides in the capability of horizontally angularly adjusting the axle of this power-transmitting land-wheel, without interfering with or disturbing the plow-lifting mechanism. As will be apparent, this is due to the fact that a considerable portion of the mechanism involved is mounted directly on the axle and is shifted therewith during its adjustments. In this way the lead or position of this wheel may be varied as occasion requires with facility and ease because of the lack of substantial interference with the plow-lifting mechanism.

The plows may be raised manually by lifting the frame by depressing the handles 24 and 24ª, the frame sliding vertically on the upright axle-portions 16 and 16ª of the rear and front furrow-wheels. If, therefore, the power lifting mechanism should become damaged or injured the plows can be raised by such vertical adjustment of the frame, and in case of transportation of the plow from one field to another when no plowing is being done, the plows can be given an excessive lift by securing the cumulative effect of the mechanical lifting-mechanism and the manual lifting-construction. That is to say, the plows may be raised relatively to the frame by rocking the plow-beam as has been explained, and the frame and supported plows may be given a still further elevation by the raising of the frame through the hand manipulated elements.

The handles 24 and 24ª have the further function of determining the depth of cut or penetration of the plows, the arms or levers 23 and 23ª being held in adjusted positions by their dogs 25 and 25ª coacting with the corresponding sectors 21 and 21ª.

Attention is also directed to the fact that in raising and lowering the plows by the power-operated mechanism the plow-beam and the plows carried thereby are merely rocked, the frame of the machine remaining in its original position, that is to say, the weight of the frame and carrying-wheels is not imposed upon the lifting mechanism, the actuation of which is secured through the land-wheel. Nevertheless, the weight of the frame, axles, and wheels assists in holding the plows down in penetrating position but without hindering the raising and lowering of the plows when required.

While I have herein described the structural parts of this particular embodiment of the invention with some degree of particularity, it is to be remembered that the invention is not confined and restricted to the precise and exact structural features of these various elements and that various minor mechanical changes may be incorporated in the mechanism without departure from the substance of the invention or the sacrifice of any of its benefits and advantages.

By the term "rigid" as applied in the claims to the connection between the plow beam 38 and the lifting and lowering rotary member 53, is intended to be defined a connection the elements of which enable both a pushing and pulling force to be applied to both lower and lift in a positive manner, as distinguished from a connection including an element such as a flexible cord and effective in a pulling direction only.

I claim:

1. In a plow-construction, the combination of a frame, carrying-wheels, a plow-beam rockingly mounted on said frame, one or more plows carried by said beam, means to rock said beam operated by one of the carrying-wheels, and means permitting bodily angular adjustment of said carrying-wheel to change its lead without interference with the action of said beam-rocking means, substantially as described.

2. In a plow-construction, the combination of a frame, carrying wheels for said frame, a plow-beam rockingly mounted on said frame, one or more plows carried by said beam, an axle substantially horizontally angularly adjustable on said frame, one of the carrying-wheels being mounted on said axle, and means operated by said carrying-wheel to rock said plow-beam to effect raising and lowering of the plows, substantially as described.

3. In a plow-construction, the combination of a frame, carrying-wheels for said frame, a plow-beam rockingly mounted on said frame, one or more plows carried by said plow beam, a substantially horizontal rotary member rotated by one of the carrying-wheels, and a rigid eccentric connection between said rotary member and said plow-beam whereby the latter may be rocked to raise and lower the plows, substantially as described.

4. In a plow-construction, the combination of a frame, carrying-wheels for said frame, a plow-beam rockingly mounted on said frame, one or more plows carried by said plow-beam and adapted to be raised and lowered by the rocking of said beam, a ro-

tary member adapted to be rotated by one of the carrying-wheels, a rigid eccentric connection between said rotary-member and said plow-beam whereby the latter may be rocked to raise and lower the plows, a clutch-mechanism between said carrying-wheel and rotary member, manual means to render said clutch-mechanism active, and automatic means to render said clutch-mechanism inoperative at the completion of the plow-raising or lowering movement, substantially as described.

5. In a plow-construction, the combination of a frame, carrying-wheels for said frame, a plow-beam rockingly mounted on said frame and adapted to swing in a substantially vertical plane, one or more plows carried by said beam and adapted to be raised and lowered by the rocking thereof, a substantially horizontal rotary-member rotated by one of the carrying-wheels, a rigid eccentric connection between said rotary member and said plow-beam whereby the latter may be rocked, a clutch between said rotary member and carrying-wheel, manual means to render said clutch operative, and means to automatically render said clutch inoperative at the completion of the plow-raising or lowering movement, substantially as described.

6. In a plow-construction, the combination of a frame, carrying-wheels for said frame, a plow-beam rockingly mounted on said frame and adapted to move in a substantially vertical plane, a series of plows carried by said beam arranged in a series diagonally of the direction of travel of the machine and adapted to be raised and lowered by the rocking of the beam, a substantially horizontal rotary-member geared to one of the carrying-wheels, and a rigid link eccentric connection between said rotary-member and said plow-beam whereby the latter may be rocked to raise the plows during a half revolution of the rotary member during which period the carrying-wheel makes a plurality of revolutions, the plows being lowered during the next subsequent half revolution of the rotary member, during which period the carrying-wheel makes a plurality of revolutions, the link being in line with its point of connection to the rotary member and the axis of the latter when the plows are lowered.

7. In a plow construction, the combination of a frame, carrying wheels for said frame, a plow beam rockingly mounted on said frame and adapted to move in a substantially vertical plane, a series of plows carried by said beam arranged to be raised and lowered by the rocking of the beam, a substantially horizontal rotary member rotated by one of the carrying wheels, and a rigid link eccentric connection between said rotary member and said plow beam whereby the latter may be rocked to raise the plow during the half revolution of the rotary member, the plows being lowered during the next subsequent half-revolution of the rotary member, the link being in line with its point of connection to the rotary member and the axis of the latter when the plows are lowered.

8. In a plow construction of the character described, the combination of carrying-wheels, a frame mounted on said wheels, a plow-beam rockingly mounted on said frame, plows carried by said beam, means actuated by one of the carrying-wheels and adapted to rock the plow-beam to raise and lower the plows, an axle for said wheel being horizontally angularly adjustable to vary the lead of the wheel, and a clutch on said axle adapted to connect said wheel to and to disconnect it from said plow-beam rocking means, substantially as described.

9. The combination of carrying-wheels, a frame mounted on said wheels, a plow-beam rockingly mounted on said frame, a plurality of plows carried by said plow-beam, means geared to one of the carrying-wheels adapted to rock the blow-beam to raise and lower the plows, an axle for said wheel, horizontally angularly adjustable on said frame, to vary the wheel lead, and a clutch on said axle adapted to connect said wheel to and to disconnect it from said plow-beam rocking means, said wheel making a plurality of revolutions during each plow raising and lowering operation, substantially as described.

10. In a plow construction of the character described, the combination of carrying-wheels, a frame mounted on said wheels, a plow beam rockingly mounted on said frame, a plurality of plows carried by said plow-beam and arranged in a series diagonally of the direction of travel of the machine, means geared to one of the carrying-wheels adapted to rock the plow-beam to raise and lower the plows, an axle for said wheel horizontally angularly adjustable on said frame, a clutch on said axle adapted to connect said wheel to and disconnect it from said plow-beam rocking means, and clutch-controlling means mounted on said axle, said wheel making a plurality of revolutions during each plow raising and lowering operation, substantially as described.

11. In a plow-construction of the character described, the combination of carrying-wheels, a frame mounted on said wheels, a plow-beam rockingly mounted on said frame, a plurality of plows carried by said beam and arranged in a series diagonally of the direction of travel of the machine, means to rock said plow-beam to raise and lower the plows geared to one of the carrying-wheels, an axle for said wheel horizontally angularly adjustable on said frame, a clutch on said axle adapted to connect

said wheel to and disconnect it from said plow-beam rocking-mechanism, said wheel making two revolutions during each plow raising and lowering operation, a clutch-controlling means mounted on said axle and tending normally to render said clutch inactive, and means to prevent said clutch-controlling means from rendering the clutch inactive at the completion of the first revolution of said wheel, substantially as described.

In testimony whereof I have hereunto signed my name in the presence of two subscribing witnesses.

IRA A. WEAVER.

Witnesses:
KNUD HANSEN,
HOWARD L. GEHLMAN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."