Jan 9, 1923.

1,441,356

L. H. KAUPKE.
TRACTOR PLOW.
FILED APR. 20, 1916.

7 SHEETS-SHEET 1

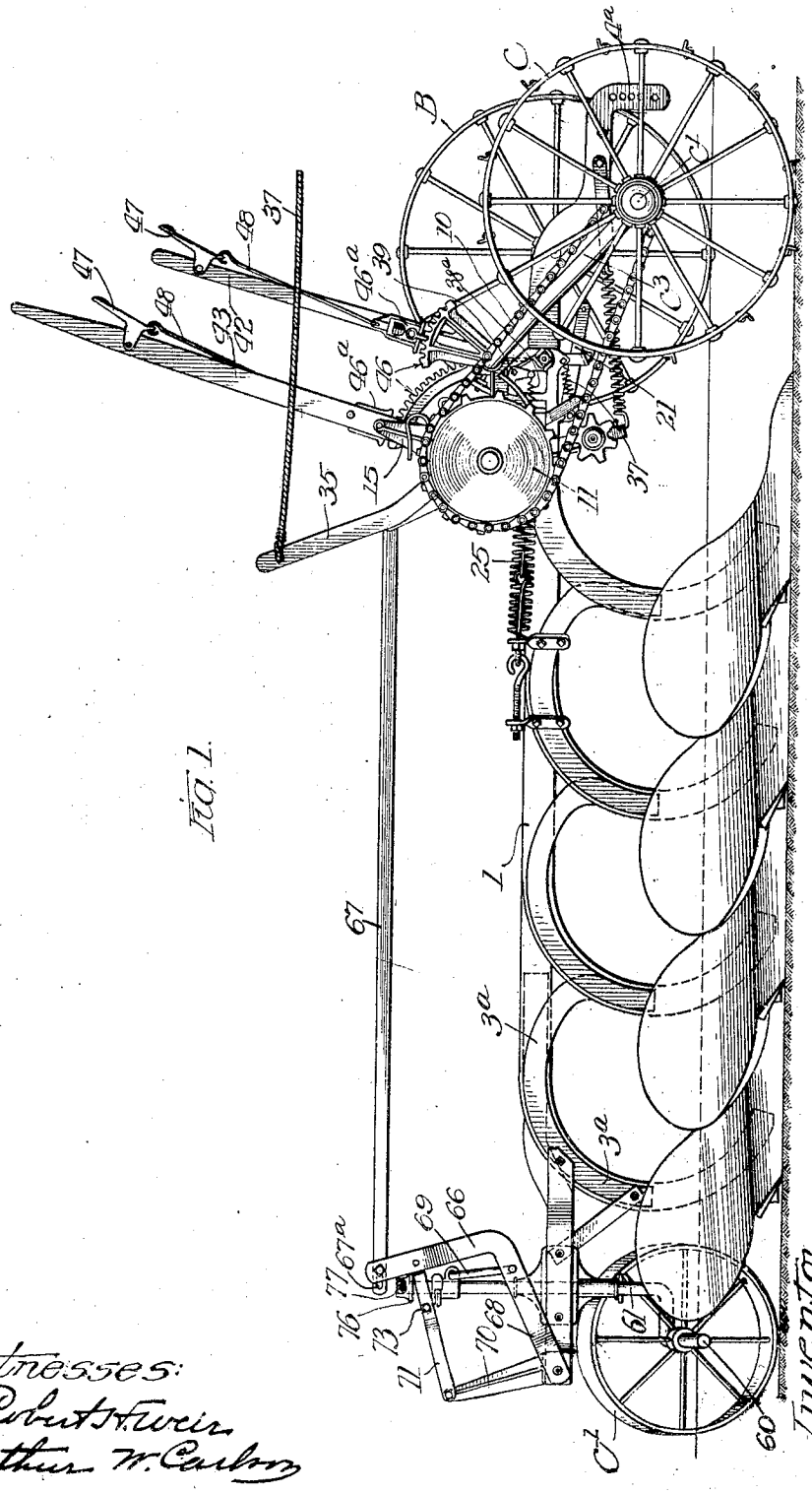


FIG. 1.

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Arthur W. Carlson

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Jan. 9, 1923.

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L. H. KAUPKE.
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7 SHEETS-SHEET 2

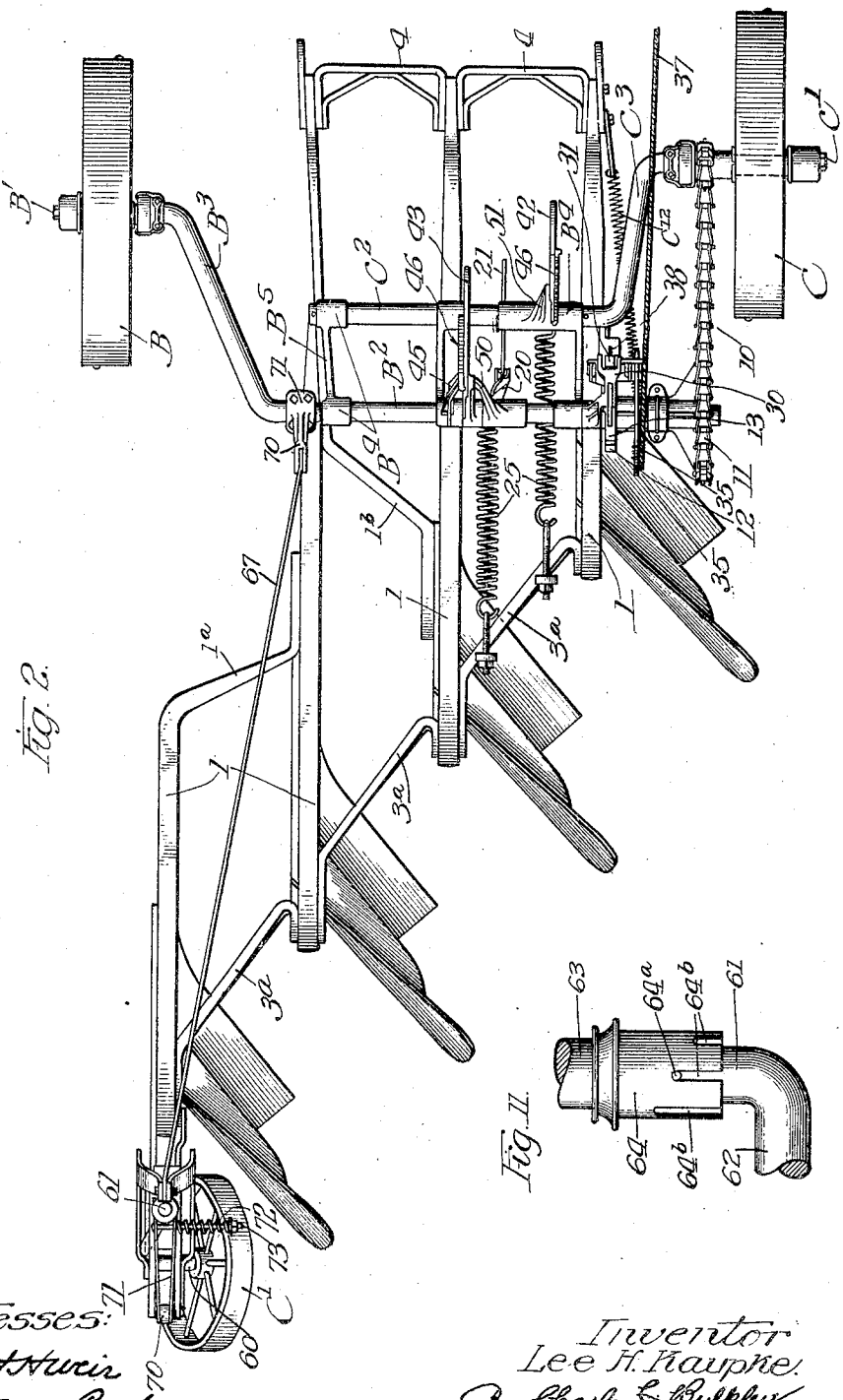


Fig. 2.

Fig. 11.

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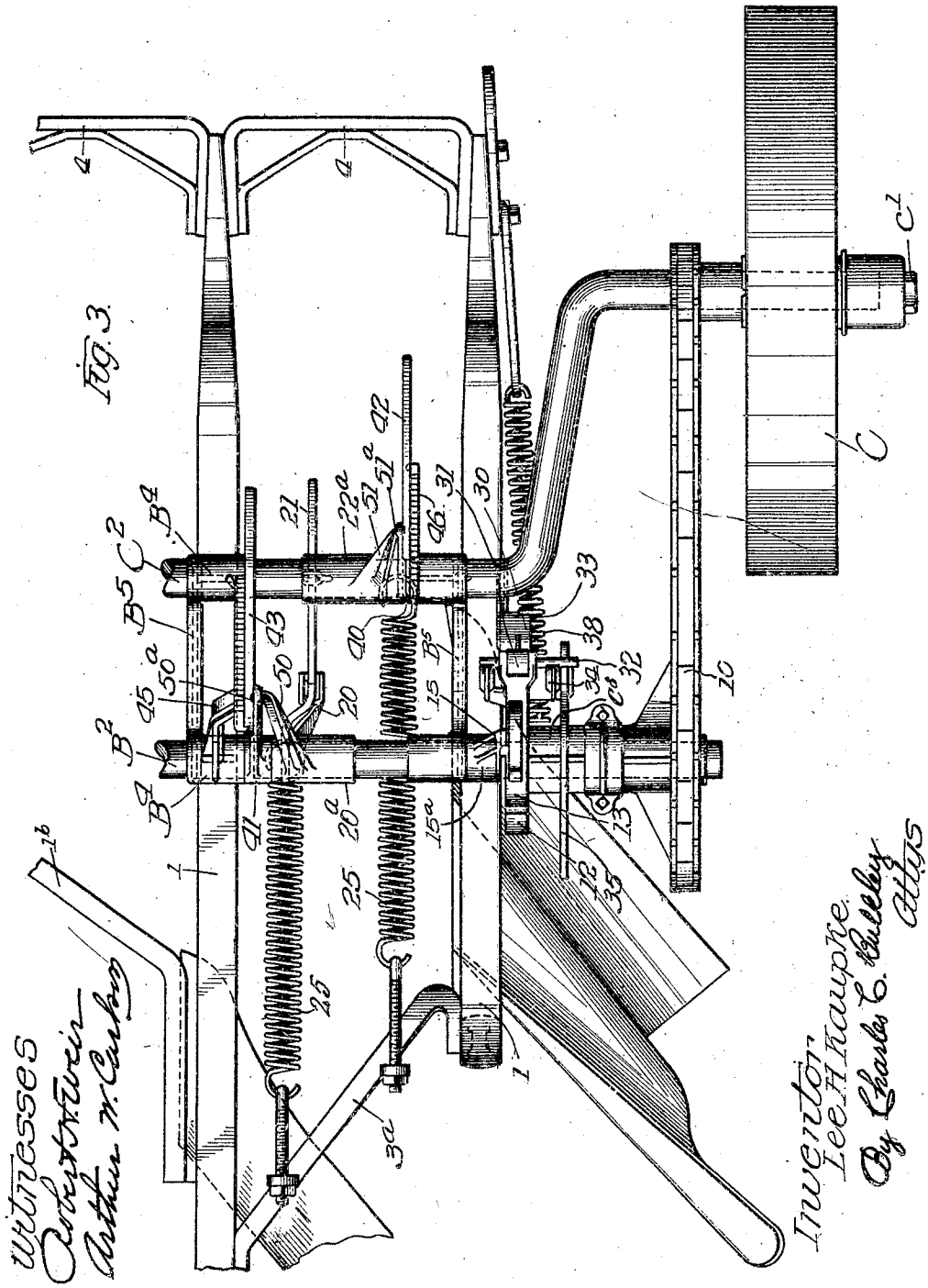
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Jan. 9, 1923.

1,441,356

L. H. KAUPKE.
TRACTOR PLOW.
FILED APR. 20, 1916.

7 SHEETS-SHEET 3



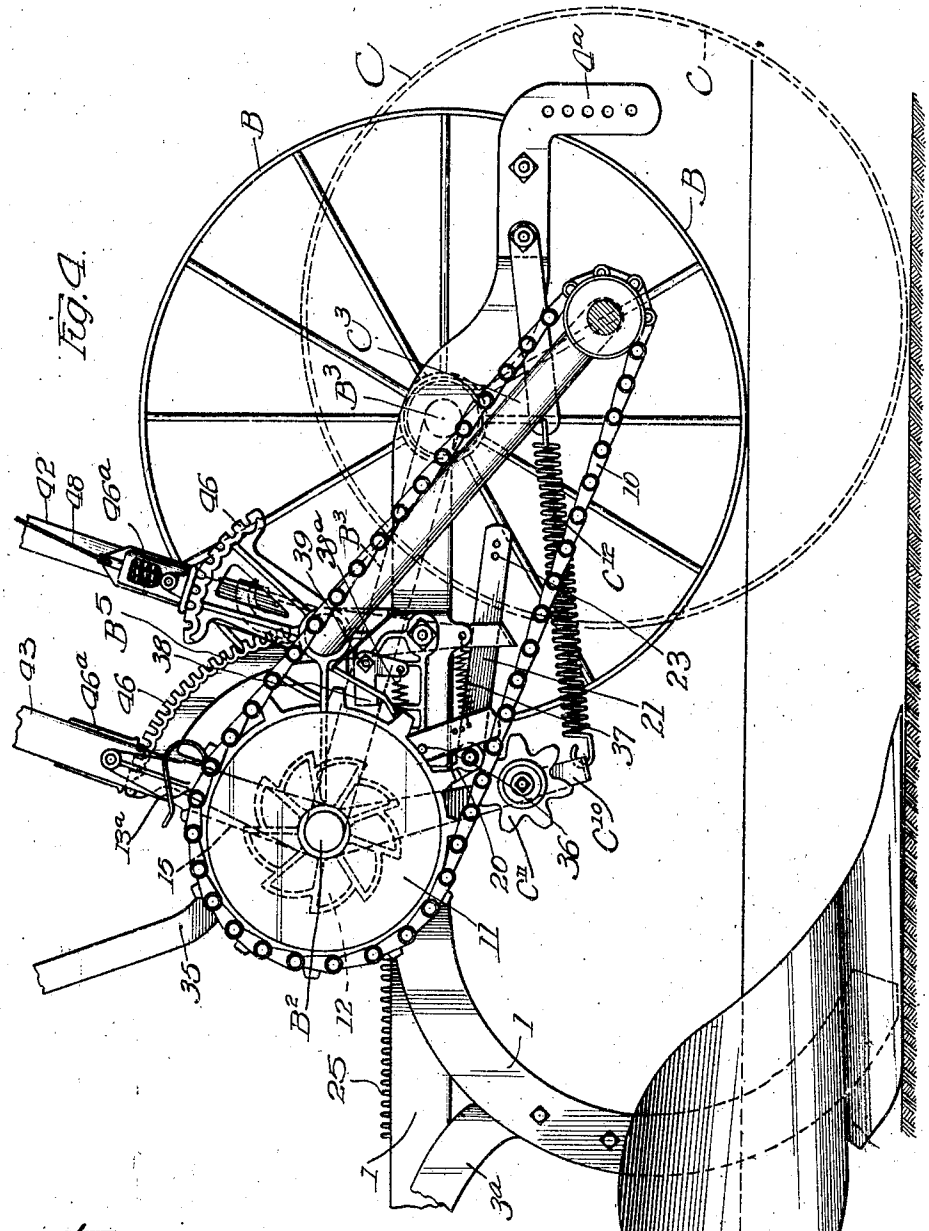
Jan. 9, 1923.

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L. H. KAUPKE.
TRACTOR PLOW.
FILED APR. 20, 1916.

7 SHEETS-SHEET 4

Fig. 4.



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Robert N. Lucier
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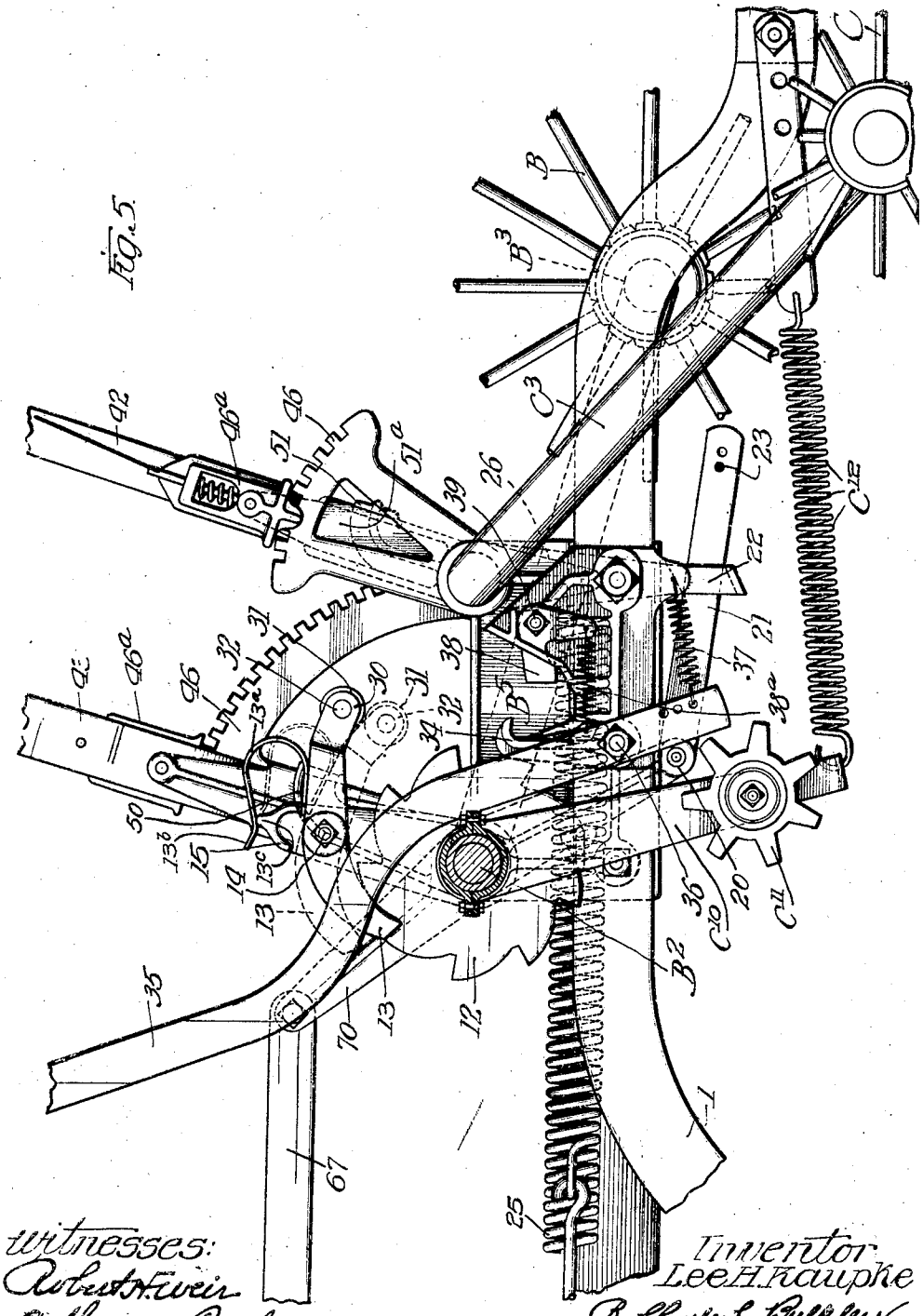
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Jan. 9, 1923. 1,441,356

L. H. KAUPKE.
TRACTOR PLOW.
FILED APR. 20, 1916.

7 SHEETS-SHEET 5

Fig. 5.

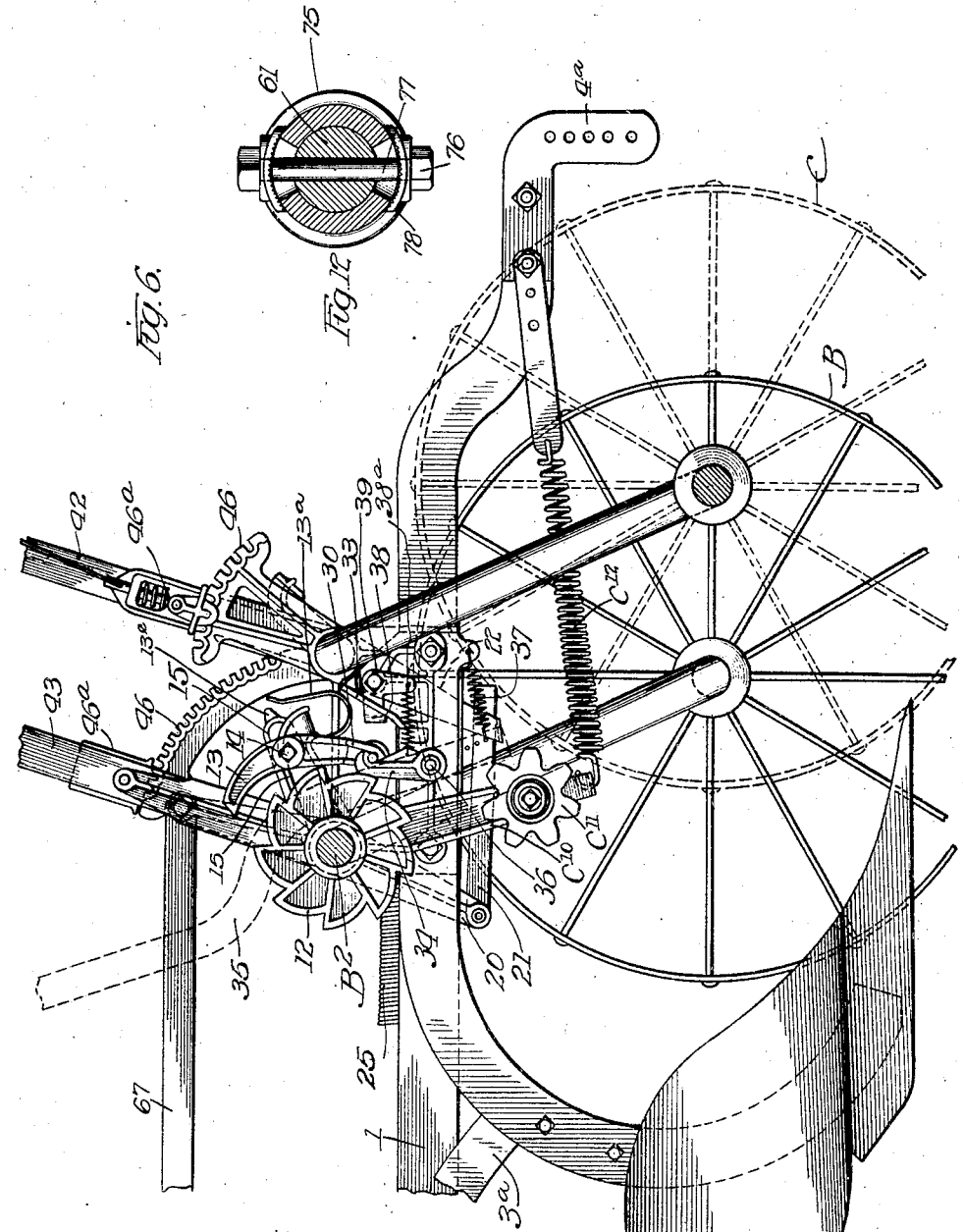


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Jan. 9, 1923. 1,441,356

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TRACTOR PLOW.
FILED APR. 20, 1916. 7 SHEETS-SHEET 6



Jan. 9, 1923. 1,441,356

L. H. KAUPKE.
TRACTOR PLOW.
FILED APR. 20, 1916. 7 SHEETS-SHEET 7

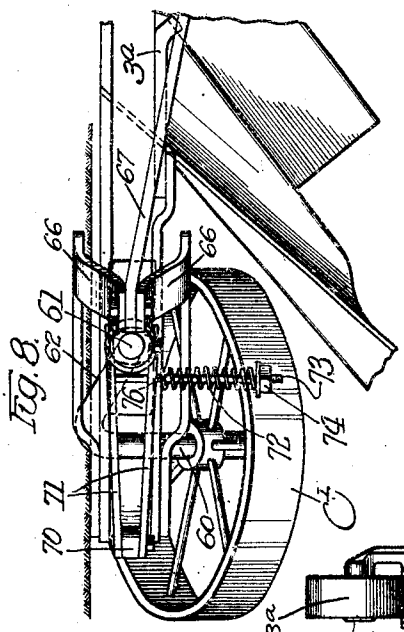


Fig. 8.

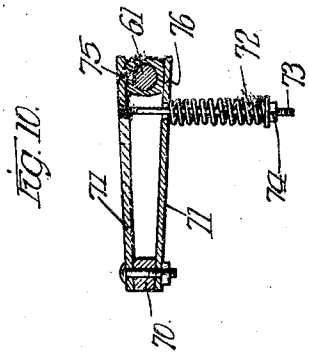


Fig. 10.

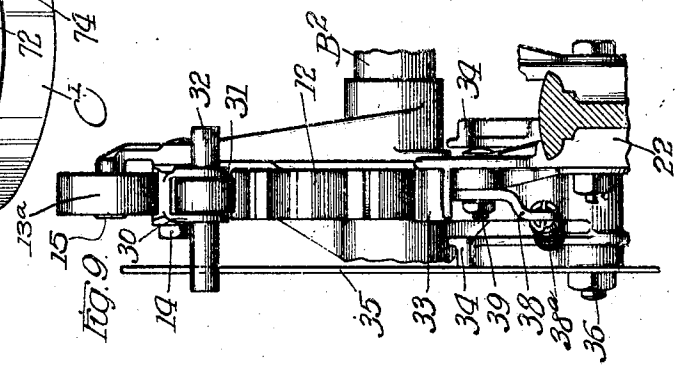


Fig. 9.

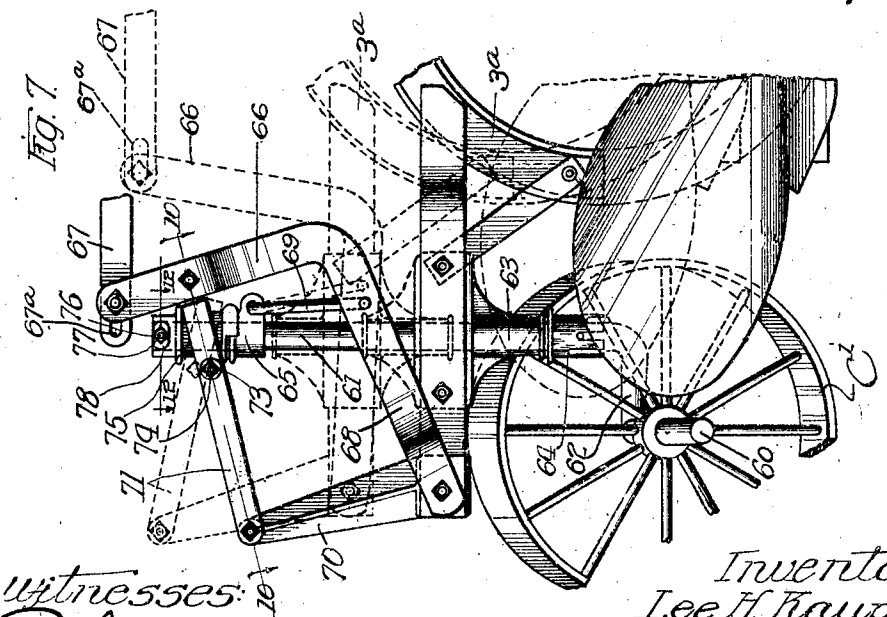


Fig. 7.

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By Charles C. Bulkley
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Patented Jan. 9, 1923. 1,441,356

UNITED STATES PATENT OFFICE.

LEE H. KAUPKE, OF ROCK ISLAND, ILLINOIS, ASSIGNOR TO ROCK ISLAND PLOW COMPANY, OF ROCK ISLAND, ILLINOIS, A CORPORATION OF ILLINOIS.

TRACTOR PLOW.

Application filed April 20, 1916. Serial No. 92,343.

To all whom it may concern:

Be it known that I, LEE H. KAUPKE, a citizen of the United States of America, and resident of Rock Island, Rock Island County, Illinois, have invented a certain new and useful Improvement in Tractor Plows, of which the following is a specification.

This invention relates to improvements in plows, and more particularly to improvements in gang plows of the tractor type; that is of the type adapted to be drawn or propelled by tractor engines.

One of the objects of my invention is to provide an improved plow of this character which can be raised and lowered at will, and which will, through the medium of the lifting mechanism, utilize the tractive effort of the wheels as power for actuating or driving this lifting mechanism.

A further object is to provide an improved plow of this character in which the lifting mechanism may be either manually operated or power operated, and to provide a one-man structure; that is a structure in which the operator on the engine is enabled to control the power lifting mechanism of the plow from his seat.

A further object is to provide an improved structure of this character which will be simple, durable and reliable in construction and effective and efficient in operation.

Other objects of my invention will appear hereinafter.

My invention consists in the features of novelty exemplified in the construction, combination and arrangement of parts herein described, shown in the accompanying drawings and more particularly set forth in the appended claims.

Referring to the accompanying drawings:

Figure 1 is a view in elevation of a tractor plow embodying my invention, the plow being shown in the act of plowing;

Fig. 2 is a top plan view of the structure shown in Fig. 1;

Fig. 3 is an enlarged plan view of the forward portion of the structure shown in Fig. 2;

Fig. 4 is an enlarged view in side elevation of substantially that portion of the structure which is shown in Fig. 3, the parts being shown in their plowing or operating condition;

Fig. 5 is an enlarged view of substantially the structure shown in Fig. 4 except that the furrow wheel and the mechanism by which it transmits power to the lifting mechanism have been omitted to better disclose the parts in the rear thereof;

Fig. 6 is a view illustrating the parts shown in Fig. 5 in an operated condition and the plow frame in its raised position;

Fig. 7 is an enlarged view in elevation of the rear portion of the plow structure showing the caster wheel support therefor and showing in dotted lines the plow frame raised at its rear end;

Fig. 8 is a top plan view of the structure shown in Fig. 7;

Fig. 9 is an enlarged detail of the clutch for connecting and disconnecting the source of power with respect to the frame lifting mechanism;

Fig. 10 is a detail section on the line 10—10 of Fig. 7;

Fig. 11 is an enlarged detail view of the heighth adjuster for the rear end of the structure; and

Fig. 12 is a detail section on the line 11—11 of Fig. 7.

The structure which I have shown in the accompanying drawings, and which embodies my invention, has what might be termed an articulated substantially horizontally disposed frame, because it is made up of a number of parallelly disposed plow beams 1, and braces 3^a and 4. The plow beams are disposed horizontally and extend forwardly. At their rear ends these beams curve downwardly and carry the plow shares at their lower extremities. The curvature of the beams forms comparatively high arches which provide a maximum clearance between the frame and the ground surface. The beams are rigidly braced apart by the diagonal braces 3^a at their rear ends, and at their forward ends by the braces 4. In this structure, there are four parallel beams 1, and the three adjacent the furrow side of the frame extend forward a considerable distance and are rigidly held in position by the brace members 4. The inner beam 1 on the land side of the plow has its forward end 1^a turned laterally and fastened to the next adjacent beam. I also provide another brace 1^b between the two middle beams. This construction provides a strong, rigid and substantial frame capable of withstanding the shocks and strains to which a structure of

this character is generally subjected and yet it is light in weight because all excess frame bars are eliminated and instead the plow beams are used. The plow shares all depend from their supports substantially at the same distance below the frame. At the forward end of the frame any suitable form of hitch 4^a may be used but I prefer one which is rigidly attached to the plow frame to enable the plow to be backed as well as pulled or drawn forward through the medium of the hitch.

The frame is supported by a land wheel B and a furrow wheel C, both of which are positioned at the forward end of the frame, and by a caster wheel C′ at the rear end. The land and furrow wheels B and C are mounted each upon separate or individual axles B^1 and C^1 respectively, which are continuations of the shafts B^2 and C^2, being offset considerably from alignment with said shafts by the intermediate portions B^3 and C^3, and forming in effect integral Z-shaped bars or members. The shafts B^2 and C^2 are pivoted or journalled in suitable transverse bearings on the frame so that the axles and wheel may revolve bodily about them as centers. These bearings B^4 are mounted to hold the shafts spaced apart and the bearings on corresponding sides of the frame are connected by webs B^5 and fastened to the frame. The axles for both land and furrow wheels are thus pivotally arranged or mounted on the frame and when they are swung downwardly and rearwardly it will have the effect of elevating or lifting the frame; and vice versa, when the axles are swung forwardly and upwardly about their pivots, the frame will be correspondingly lowered. In other words, the entire frame mechanism, including the axles, is so arranged that it may be said to fold or buckle up, and since the land and furrow wheels are confined against downward movement by the ground on which the machine rests, the buckling or folding operation results in lifting or raising the frame relatively to the ground; and vice versa, the unfolding or flattening out the frame results in lowering the frame toward the ground. It will be noted, however, that both axles are independent of each other, so far as their pivotal relation to the frame is concerned. In the present structure I utilize the tractive effort of the furrow wheel for supplying the power to the lifting mechanism for the purpose of raising the frame and lifting the plows out of operative relation to the ground when the machine is to be transported from place to place or for any other purpose. And I prefer to utilize the tractive effort of the furrow wheel rather than that of the hand wheel because this tractive effort is more uniform and of much greater degree than that exerted by the land wheel. This is due to the fact that the furrow wheel travels in the bottom of the furrow and is always running on solid, smooth and level ground. This reduces the possibility of slipping when the plow is raised. In this particular structure the power is transmitted from the furrow wheel C to the shaft B^2 of the land wheel through the medium of a sprocket drive chain 10 and a clutch. The drive chain extends from a suitable sprocket on the axle C^1 which is connected to the furrow wheel C to a larger sprocket 11 which is mounted on the end of the shaft B^2 of the land wheel axle and is free to rotate idly on said shaft when it is not connected by the clutch to the shaft. This sprocket has an extended hub C^8 which carries a toothed ratchet wheel 12 so that it will be constantly driven by said sprocket. A belt tightener acts on the chain to maintain it taut at all times and especially when the frame is raised or lowered. This consists of a depending arm C^{10} loosely journalled on the hub C^8 and carrying an idler sprocket C^{11}, the idler sprocket being held in engagement with the chain by a spring C^{12} connected between the lower end of the arm C^{10} and the forward end of the frame. The shaft B^2 is adapted to be connected with the ratchet wheel 12 and driven thereby by means of a pawl 13 which is pivotally mounted at 14 on an arm 15. This arm is carried by a collar 15^a which is keyed on the shaft B^2. Thus when the pawl 13 is thrown into engagement with the teeth of the ratchet wheel 12 it will lock the arm 15 to the ratchet wheel and rotate the shaft B^2. The powerful tractive effort exerted by the furrow wheel will thus be transmitted directly to the shaft B^2 and will tend to swing the axle downwardly and rearwardly about the shaft B^2 as a center. Since the land wheel B, which is carried by the axle B^1, bears on the ground it cannot move downwardly and the leverage thus furnished will raise or elevate the plow frame, the parts being all so proportioned that this elevation is sufficient to raise the plows clear of the ground. It is, of course, desirable that the power for elevating or raising the frame be applied not only to the land wheel but also to the furrow wheel axle shaft C^2, and I therefore interconnect the two for this purpose. I extend an arm 20 downwardly from a collar 20^a which is keyed or pinned on the shaft B^2, and at its lower end I pivotally mount a link 21 which extends substantially horizontally into connection with a similar arm 22, the latter arm being carried by a collar 22^a which is keyed to the shaft C^2 of the furrow wheel. It will be observed, however, that the land and furrow wheels normally operate at different levels, the furrow wheel traveling at a lower level in the furrow than the level in which the land wheel

travels. It is desirable, however, when the plow frame is in its elevated or raised position that both wheels travel at the same level so as to maintain the relative horizontal position of the frame. In order to compensate for this difference, during the lifting operation, I arrange the link 21 so that it will not exert any pull upon the furrow wheel axle until the frame has been raised to a point where the two wheels occupy corresponding positions at a given level. By reference more particularly to Figs. 5 and 6 it will be observed that the lower end of the arm 22 is forked and between the member of which fork the link 21 is positioned to slide. The link carries at its free end a transverse pin 23 which engages the arm 22 when the frame has been lifted to a point where the land and furrow wheels occupy the same level. At this point the pin engages the arm 22 and from then on during the remaining portion of the lifting operation the power will be applied positively to the furrow wheel axle as well as the land wheel axle. A lifting or assisting spring 25 is provided to relieve the lifting mechanism to a great extent of the weight of the plow and to prevent the frame from lowering too suddenly, as will be later explained. This spring is anchored at its rear end to one of the frame braces 3^a, this anchorage being adjustable to regulate the tension of the spring as desired. The other end of this spring is fastened to the arm 20 depending from the axle shaft B^2. The spring thus constantly exerts a pull on the land wheel axle tending to raise the frame.

It is understood of course, that when the machine is traveling the sprocket 11 and ratchet 12 are being driven constantly. It is, therefore, necessary to release the ratchet from the lifting mechanism after the plow has been elevated to its proper position. In the present structure I provide means not only for releasing or disconnecting the lifting mechanism from the source of power but also for locking the parts to maintain the frame in raised position until restored to its normal position. I provide the pawl 13 with an extension arm 30 (see Figs. 6 and 9). This extension arm 30 is forked at its end and carries a roller 31, the shaft 32 of which projects considerably beyond the arm on both sides. When the pawl is engaged with the ratchet wheel 12 it is of course carried bodily around with said ratchet wheel. During the latter portion of the lifting operation the roller 31 is arranged to strike a cam member 33 which is secured to the frame of the machine and which deflects the roller and swings the arm and pawl out of engagement with the ratchet teeth to release the lifting mechanism from the ratchet and permit said ratchet to continue its rotation. About the time that the pawl disengages the ratchet the roller extension arm 30 is thrown by a spring 13^a in against a pair of hooks 34 which are fixed on the frame of the machine. The shaft 32 of the roller, as shown clearly in Fig. 6, is caught beneath the hook members 34 thus locking the frame in its elevated position, the roller passing in between the hooks which are positioned far enough apart to provide space therefor. The control of this operation is accomplished by means of a lever 35 which is pivoted at 36 to the frame of the machine and which is held in its normal or off-position by means of a spring 37 which is anchored on the frame and fastened to an extension of said operating member below the pivot thereof. This lever may be actuated by an operator seated on the machine itself but I prefer that its actuation be governed by the operator of the traction engine from his position on said engine. This is apparent because by so arranging the mechanism I am enabled to employ a single operator for both the traction engine and plow with all of the mechanism entirely under his control. I therefore provide means of any sort (in this case a rope 37) which is fastened to the upper end of the controlling lever 35 and which extends forward to the operator's position on the traction engine (not shown). This lever, when thrown about its pivot, is adapted to engage the projecting end of the shaft 32 of the pawl 30, as shown in Figs. 6 and 9, and swing said pawl about its pivot 14. When the machine is in its normal lowered or operating position and the controller lever 35 is operated it engages the shaft 32 and throws the pawl into engagement with the ratchet, thus connecting the lifting mechanism with said ratchet 12. If the plow frame is locked up in its elevated position, as heretofore described, the controller lever when operated engages the shaft 32 throws the shaft out of engagement with the locking hooks 34. This releases the frame and permits it to drop of its own weight against the tension of the assisting or lifting springs 25. There would be danger, when the controlling lever 35 is operated to unlock the frame, of throwing the arm 30 too far and thus again engaging the pawl 13 with the ratchet, but to prevent any possibility of overthrowing the pawl I provide a limit stop or bumper 38 which projects through an opening in the face of the cam member 33 and in the path of the roller 31. This permits the roller to swing outwardly far enough to release the pawl from the locking hooks but does not allow the pawl to engage the ratchet 12. This bumper or limit stop 38, however, does not interfere with the action of the roller 30 on the cam member 33 during the locking operation as above de-

scribed because it is made to yield so that the roller may push it out of the way when passing downwardly along the cam member 33. The limit stop is made in the form of a bell crank lever which is pivoted at 39 on the frame of the machine and one arm of which projects through the face of the cam member 33 to serve as the limit stop. The other arm of this bell crank projects downwardly and is connected to a spring 38ª which is anchored for convenience on one of the locking hooks 34 and which acts to yieldingly maintain the limit stop 38 in position. The pawl 13 which engages the ratchet is subject to considerable vibration when it is both idle and in operation and must be prevented from accidental operation. The V-shaped spring 13ª, hereinbefore mentioned, acts on the pawl to prevent such accidental operation. One end of this spring is fixed to the pawl and the other end 13ᵇ is turned at an angle so that it will ride over the pointed end 13ᶜ of the arm 15 which supports the pawl (see Fig. 5). The position of this spring on either side of the pointed end 13ᶜ of arm 15 causes it to bear against the point 13ᶜ and exert pressure on either side of the pivotal center of the pawl as the case may be to yieldingly hold the pawl in or out of engagement with the ratchet or holds the roller shaft 30 in or out of engagement with locking hooks. Furthermore, as previously explained, this spring acts on the pawl to throw either end thereof into position. The action of the controller lever 35 on said shaft 32, as above described, overcomes the tension of spring 13ª and snaps the pawl into either of its positions, as the case may be.

I have also provided means for manually actuating the lifting mechanism. In this structure both axle shafts have loose collars 40 and 41 from which operating levers 42 and 43 respectively upstand in convenient position to be manipulated. These levers are both independent of their shafts so as to permit the shafts to rotate when the power mechanism is operated. Rising from the bearings B⁴ are fixed arms or standards 45 which carry toothed segments 46 at their upper ends and which are positioned close to the levers. Each lever has a slidable spring-actuated locking member 46ª which engages the teeth of the corresponding segment and which is operated to release the levers by hand grips 47 which are positioned on the levers 42 and 43 near the upper ends. These hand grips are connected to the locking members by the pull rods 48. The locking members hold the operating levers in any position in which they are adjusted, and thus prevent the levers from flopping around loosely. The collars 20ª and 22ª which are keyed to the respective shaft, as before described, have upstanding arms 50 and 51 respectively, positioned close to the operating levers and having their outer ends 50ª and 51ª turned laterally so as to be engageable by said operating levers when rotated in a lifting direction. Thus when the operating levers are rotated manually in a direction to lift the plow, they engage the arms 50 and 51 and thereby actuate the plow lifting mechanism. When, however, the frame is lifted by the power mechanism as previously described, the arms 50 and 51 simply rotate away from the manual levers. The hand levers also enable the operator to partially lift the frame at any time and without actually removing the plows entirely from the ground to relieve the traction engine when hard spots in the ground are encountered. This arrangement also performs another important function besides the manual operation of lifting the plow. It will be observed that these levers in conjunction with the arms 50 and 51 with their laterally turned ends form limit stops which determine the degree to which the frame can be lowered. That is, by adjusting the manual levers and locking them in their adjusted position, the depth at which the plow will operate can be very accurately regulated and each time the frame is dropped or lowered after having been raised by the power mechanism, it will always return to the same position until this position is changed by the re-adjustment of the hand levers. I provide another lifting spring 25ª similar to spring 25. This is anchored at its rear end to the frame and at its forward end is connected to a small arm 26 depending from the collar 40. This spring thus comes into play to assist in the lifting operation only when this lifting operation is done manually, i. e., by the manual actuation of the hand levers 42 and 43.

The rear end of the frame is supported by a furrow or caster wheel C¹ which is mounted to rotate on the lower laterally turned end 60 of a vertical shaft 61, this laterally turned end 60 being offset with respect to the shaft 61 by the angularly disposed portion 62 so that the wheel will trail more directly in alignment with the vertical shaft 61 and still operate as a caster wheel when the machine is turning curves, and furthermore so that the wheel may be placed at the proper angle to the furrow. The frame at its rear end has a comparatively long substantial bearing sleeve 63 in which the vertical shaft may rotate but this bearing and consequently the frame may slide up and down on said shaft, the intention being that the frame shall have substantially as great a range of movement at its rear end as at its forward end to maintain its level relation and that of the plow shares while being raised and lowered. This prevents the rear plows from dragging trash when the frame

is elevated and traveling from place to place. A stop collar 64 on the lower portion of the shaft limits the downward movement of the frame. The collar 64, see Figs. 7 and 11, however, is arranged for adjustment on the shaft 61 for the purpose of regulating the suck of the plows. A transverse pin 64^a extends through the shaft 61 and the collar 64 has several pairs of notches 64^b, the notches of each pair being diametrically opposed so as to register with the pin 64^a. The sets of notches are arranged angularly around the collar and are disposed at different levels so that the height of the collar on the shaft will be determined by the particular notches engaging the pin. This arrangement provides a suitable range of adjustment for the rear end of the frame to regulate the suck of the plows. Another collar 65 at the shaft's upper end determines the upper limit of its range of movement. The raising and lowering of the rear end of the frame is accomplished by means of a pair of parallelly disposed bell crank levers which are arranged at the sides of the frame. The arms 66 of these levers are joined together at their upper ends and pivotally connected to the rear end of a pull rod or link 67. The rear ends of the arms 68 of said bell cranks are like-wise pivotally connected to the rear end of the frame. The bell cranks are pivotally suspended from the collar 65 by the links 69. It is thus observed that when the bell cranks are rotated the frame will be raised or lowered as the case may be. Power is transmitted to the bell cranks from the forward lifting mechanism by means of the pull rod 67, the forward end of which is pivotally attached to the end of an arm 70 outstanding from a collar 71 keyed on the shaft B^2. These parts are so proportioned that the rear end of the frame will raise and lower in unison with the forward portion and is substantially the same ratio. While I have stated that the forward and rear ends of the frame raise and lower in unison, I prefer that the forward end shall have a slight lead over the rear end during the initial movement both in raising and lowering, and the purpose of this is that when raising the points of the plows will be inclined slightly upwardly and thus assist them out of the ground; and vice versa, when lowering the points will be inclined slightly downwardly which assists them in readily and quickly entering the ground. This function of the mechanism is accomplished in a very simple manner by providing a slot 67^a in the rear end of the pull rod 67 for the pivot bolt to move in. This gives a sufficient lost motion for the purpose.

The rear end of the frame has an upwardly inclined standard or arm 70^a fixed thereon and at its upper end this arm carries two pivotally connected bars or clamping members 71^a which, as shown in Figs. 7, 8 and 10, are spaced apart and at their free ends clamp the vertical shaft 61. The clamping action is supplied by means of a compression spring 72 which is positioned on a rod 73, between one of the clamping bars 71 and an adjustable nut 74 on the outer end of the rod 73. This rod, as shown in Fig. 8, is fastened to one of the clamping bars 71 and extends loosely through and beyond the other clamping bar 71. The action of this clamping bar or locking device is to yieldingly clamp the shaft and offer considerable resistance to its rotation to prevent the caster wheel from swinging or turning about its pivotal axis. But in order that the clamping action may be definite in that position of the wheel corresponding to the straight ahead travel of the structure, I provide on the shaft 61 a collar 75 having two flattened faces or flat surfaces 76 (see Fig. 10). The clamping bars or locking devices act against these flattened faces and are thereby enabled to offer a greater resistance to the turning of the shaft. When the structure turns out of straight line the ground resistance offered by the furrow causes the caster to continue in the straight line of travel, and this resistance is sufficient to overcome the resistance offered by the locking device. The caster wheel will right itself, however, upon the machine again assuming a straight-ahead position. This mechanism also serves to prevent the caster wheel from veering or wabbling. This locking mechanism is, as shown in dotted lines in Fig. 7, effective whether the frame is in raised or lowered position. It is desirable to vary the angular relation of the caster wheel with respect to the line of travel of the machine for the purpose of regulating the suck of the plow. For this reason I arrange the collar 75 so that it may be rotatably adjusted on the shaft 61 to change the relative position of the flattened faces 76 with respect to the line of travel of the machines. The shaft at its upper end has a transverse clamping bolt 77 extending therethrough and projecting beyond the shaft. The projecting ends of this bolt are positioned in slots or openings in the collar, which arrangement permits the collar to be rotatably adjusted. The bolt has a head 76 on one end and a nut on the other end, and between the head and nut and the collar are clamping plates 78 which is for fastening the shaft in its adjusted position. The clamping plates have corrugated surfaces which co-operate with corresponding corrugated portions of the collar to increase the clamping hold on the shaft.

What I claim as my invention is:

1. In combination, a plurality of plow beams, plows supported thereby, a pair of shafts independently journaled on said

beams and having angularly disposed axle extensions, wheels on said axle extensions normally operating in different levels, a power transmission mechanism constantly driven by one of said wheels, a clutch for connecting the power transmission mechanism of one of said shafts to rotate the same against the resistance offered by the ground to the wheel carried on its axle extension, a connection from said shaft to the second of said shafts, said connection consisting of an arm depending from each of said shafts, and a link connecting the outer ends of said arms, said link having a loose connection with one of said arms, whereby initial movement is permitted of said first shaft independently of said second shaft.

2. In combination, a plurality of plow beams, plows carried thereby, a pair of shafts journaled on said beams and having angularly disposed axle extensions, a land wheel carried by one of said axle extensions, a furrow wheel carried by the other of said axle extensions, a wheel supporting the rear end of said plow beams, and means for raising said plow beams, said means operating first to lower said land wheel with respect to said plow beams, and then to raise the rear end of said plow beams, and then to lower said furrow wheel with respect to said plow beams, said plow beams being adapted to be lowered by gravity independently of said raising means.

3. In combination, a plurality of plow beams, plows carried thereby, a pair of shafts journaled on said beams and having angularly disposed axle extensions, a land wheel carried by one of said axle extensions, a furrow wheel carried by the other of said axle extensions, a wheel supporting the rear end of said plow beams, and power transmission mechanism driven by one of said wheels, for raising said plow beams, said means operating first to lower said land wheel with respect to said plow beams, and then to raise the rear end of said plow beams, and then to lower said furrow wheel with respect to said plow beams.

4. In combination, a plurality of plow beams, plows carried thereby, a pair of shafts journaled near the forward ends of said beams and having angularly disposed axle extensions, wheels on said axle extensions for supporting the forward ends of said beams, a third wheel for supporting the rear end of said beams, a connection from one of said axles to the rear end of said beams, said connection including a bell crank lever pivotally supported on a fore-and-aft swinging pivot having one point thereof connected to the rear end of said beams, and a forwardly extending link, the forward end of which is connected to one of said axles, and a loose connection between the rear end of said link and a second point of said bell crank, whereby initial movement of said forward axle is permitted independent of said bell crank whereby the forward end of the beam is raised slightly in advance of the rear end thereof.

5. In combination, a plurality of plow beams, plows supported thereby, a pair of shafts independently journaled near the forward ends of said beams and having angularly disposed axle extensions, wheels on said axle extensions for supporting said plow beams, a third wheel having an upwardly extending axle extension for supporting the rear ends of said beams, power transmission mechanism driven by one of said forward wheels for rotating said shafts against the resistance offered by the ground to the wheels carried thereby for raising said plow beams, and a connection from one of said shafts to the rear end of said plow beams, including a bell-crank lever pivotally mounted on a fore-and-aft swinging pivot whereby rotation of said shafts causes the rear end of said plow beams to be slid upward on the axle extension of said rear wheel, said connection permitting initial movement of said front axle independent of the rear end of said beam whereby the front end of the beam is raised slightly in advance of the rear end thereof.

6. In combination, a plurality of plow beams, plows supported thereby, a pair of shafts independently journaled near the forward ends of said beams and having angularly disposed axle extensions, wheels on said axle extensions for supporting the forward ends of said beams, a rear wheel having a vertical axle extension for supporting the rear end of said beams, power transmission mechanism driven by one of said wheels for rotating said shafts against the resistance offered by the ground to the wheels carried thereby for raising said plow beams, and a connection from one of said axles to the rear of said frame, said connection including a link connected to one of said axles and loosely connected at its rear end to one arm of a bell crank lever, mounted on a pivot carried by a fore-and-aft swinging link the other arm of said lever being connected to the rear end of said beams, whereby rotation of said axle causes said plow beams to be slid upward on the axle extension of said rear wheel, said loose connection permitting initial movement of the forward end of said beams independently of the movement of the rear ends thereof.

7. The combination of a plow frame, a plurality of plows suspended therefrom, a pair of independent axles journalled on said frame at the forward end thereof and normally extending in a substantially forward direction, a wheel on each of said axles, a clutch on one of said axles connected with and driven by the wheel on the other of said axles, means for connecting the first-

mentioned axle with said clutch to rotate said axle downwardly against the resistance of the ground to raise the plows, an automatic release for disconnecting the clutch when the plows have been raised a predetermined distance out of the ground irrespective of the depth in the ground of the plows, and a lock for retaining the frame in its raised position.

8. The combination of a plow frame, a plurality of plows suspended therefrom, a pair of independent axles journalled on said frame at the forward end thereof and normally extending in a substantially forward direction, a wheel on each of said axles, a clutch on one of said axles connected with and driven by the wheel on the other of said axles, means for connecting the first-mentioned axle with said clutch to rotate said axle downwardly against the resistance of the ground to raise the plows, an automatic release for disconnecting the clutch when the plows have been raised a predetermined distance out of the ground irrespective of the depth in the ground of the plows, a lock for retaining the frame in its raised position, and means for interconnecting said axles for actuating the other axle.

9. The combination of a plow frame, a plurality of plows suspended therefrom, a pair of independent axles journalled on said frame at the forward end thereof and normally extending in a substantially forward direction, a wheel on each of said axles, a clutch on one of said axles connected with and driven by the wheel on the other of said axles, means for connecting the first-mentioned axle with said clutch to rotate said axle downwardly against the resistance of the ground to raise the frame, an automatic release for disconnecting the clutch when the frame has been raised, a lock for retaining the frame in its raised position, hand levers for manually actuating said axles independently of the clutch to raise the plows out of the ground, and means for locking said levers to determine the degree to which said frame may be lowered.

10. The combination of a plow frame, a pair of axles independently journalled on said frame and extending in a substantially forward direction, a land wheel mounted on one of said axles, a furrow wheel mounted on the other axle and located at a lower level than the land wheel, spring mechanism acting on said axles tending to swing them downwardly, power mechanism connected with and driven by the tractive effort of said furrow wheel and acting on one of said axles to raise the frame, the compensating action between said axles arranged to act on said furrow wheel axle until the wheels occupy the same level, an adjustable lock for determining the lower operating position of the frame, hand levers for actuating said axles independently of the power mechanism, and means for adjustably locking said hand levers to determine the lower position of said frame.

11. In combination, a plurality of plow beams, plows supported thereby, a pair of shafts having horizontal sections independently journaled on said beams and having angularly disposed axle extensions, wheels on said axle extensions for supporting said plow beams, power transmission mechanism constantly driven by one of said wheels, means for connecting the power transmission mechanism with the horizontal section of one of said shafts to rotate this shaft against the resistance offered by the ground to the wheel to thereby raise said plow beams, and means for causing said connecting means to operably connect the transmission mechanism with said shaft to variably rotate said shaft, depending upon the depth at which the plows are operating, whereby the plow beams are always raised to the same height with respect to the wheels irrespective of the depth at which the plows are operating.

12. In combination, a plurality of plow beams, plows supported thereby, a pair of shafts having horizontal sections independently journaled on said beams and having angularly disposed axle extensions, wheels on said extensions for supporting said beams, power transmission mechanism driven by one of said wheels, a clutch for connecting said mechanism with the horizontal section of one of said shafts to rotate the same against the resistance of the ground to thereby raise said plow beams, means for permitting said plow beams to be lowered to varying levels to regulate the depth of plowing, and means for controlling said clutch to cause the same to operably connect the power transmission mechanism with said shaft to variably rotate said shaft depending upon the depth at which the plows are operating, whereby the plow beams are always raised to the same level with respect to the wheels irrespective of the depth to which the beams have been lowered for plowing.

13. In combination, a plurality of plow beams, plows carried thereby, a pair of shafts journaled on said beams and having angularly disposed axle extensions, wheels on said axle extensions, power transmission mechanism driven by one of said wheels for rotating said shafts to raise the plow beams so as to raise the plows out of the ground, and manually controlled means for rotating said shafts, said means including a hand lever loosely mounted on one of said shafts, and an arm fixed to said shaft having an end portion adapted to be engaged by said hand lever, whereby operation

of said hand lever causes said shaft to be rotated so as to raise the plows out of the ground.

14. In combination, a plurality of plow beams, plows carried thereby, a pair of shafts journaled on said beams and having angularly disposed axle extensions, wheels on said axle extensions, power transmission mechanism driven by one of said wheels for rotating said shafts to raise the plow beams so as to raise the plows out of the ground, and manually controlled means for rotating said shafts, said means including a hand lever loosely mounted on one of said shafts, and an arm fixed to said shaft having an end portion adapted to be engaged by said hand lever, said arm when controlled by said power mechanism moving away from said hand lever independently thereof, the engagement between said arm and lever on the return of said arm determining the depth to which the plows are lowered.

15. In combination, a plurality of plow beams, plows carried thereby, a pair of shafts journaled on said beams and having angularly disposed axle extensions, wheels on said extensions for supporting said beams, power transmission mechanism driven by one of said wheels for rotating said axles against the resistance offered by the ground to the wheels carried thereby for raising said plow beams, said means including a clutch, means for disconnecting the said clutch when the beams have been raised, a lock for retaining the beams in raised position, manually controlled means for rotating said shafts, said means including a hand lever loosely mounted on one of said shafts, an arm fixed to said shafts having an end portion adapted to be engaged by said hand lever, whereby operation of said hand lever causes said shaft to be rotated so as to raise the plows out of the ground, and means controlled by said lever to determine the degree to which said beams may be lowered.

16. In combination, a plurality of plow beams, plows carried thereby, a pair of shafts journaled on said beams and having angularly disposed axle extensions, wheels on said extensions for supporting said beams, power transmission mechanism driven by one of said wheels for rotating said axles against the resistance offered by the ground to the wheels carried thereby for raising said plow beams, said means including a clutch, means for disconnecting said clutch when the beams have been raised, a lock for retaining the beams in raised position, manually controlled means for rotating said shafts, said means including a hand lever loosely mounted on one of said shafts, an arm fixed to said shaft having an end portion adapted to be engaged by said hand lever, whereby operation of said hand lever causes said shaft to be rotated so as to raise the plows out of the ground, said arm when controlled by said power mechanism, moving away from said hand lever independently thereof, the engagement between said arm and the lever on the return of said arm determining the depth to which the plows are lowered.

17. The combination of a frame, a bail axle journalled thereon to swing about a horizontal axis whereby to permit the raising and lowering of the frame, wheel supports on said frame and axle, a clutch member constantly driven from one of said wheel supports, a second clutch member connected to said bail axle, a catch carried by said second clutch member for engagement with the constantly driven clutch member, manually controlled means for operating said catch to connect the clutch members and raise the frame, an automatic release for said catch operable after the frame has been raised to disconnect the clutch member, and a lock for retaining the frame in its raised position, said manually-controlled means being adapted on further operation to release said lock to permit said frame to be lowered.

18. In combination, a plurality of plow beams, plows carried thereby, a pair of shafts journaled on said beams and having angularly disposed axle extensions, a land-wheel carried by one of said axle extensions, a furrow wheel carried by the other of said axle extensions, a wheel supporting the rear end of said plow beams, and power transmission mechanism driven by one of said wheels, for raising said plow beams, said means operating first to lower said land wheel with respect to said plow beams, and then to raise the rear end of said plow beams, and then to lower said furrow wheel with respect to said plow beams, said plow beams being adapted to be lowered by gravity independently of said raising means.

19. The combination of a frame having a plurality of plows depending therefrom to substantially the same level, a pair of shafts independently journalled on said frame and having angularly disposed axle extensions, wheels mounted on said axle extensions, power mechanism connected with and driven by one of said wheels mounted on the axle extension of one of said shafts, a clutch for connecting the other of said shafts with and disconnecting it from the power transmission mechanism to rotate said shaft against the resistance offered by the ground to the wheels to elevate the frame and plows, a wheel support for the rear end of the frame, and means actuated by said power mechanism for elevating the front end of the frame slightly in advance of the rear end

thereof, said frame and plows adapted to be lowered by gravity independently of said elevating means.

20. The combination of a plurality of plows, a frame for supporting said plows, a pair of shafts independently journalled on the frame and having angularly disposed axle extensions, wheels on said axle extensions normally operating in different levels, a power transmission mechanism constantly driven by one of said wheels mounted on the axle extension of one of said shafts, a clutch for connecting the power transmission mechanism with the other of said shafts to rotate the shaft against the resistance offered by the ground to the wheel carried on its axle extension, an automatic release operable when the frame has been raised to disconnect the power mechanism from the shaft, and compensating means for bringing the wheels to the same level during the raising of the frame, said frame and plows adapted to be lowered by gravity independently of said elevating means.

21. In combination, a plurality of plow beams, plows carried thereby, a pair of shafts independently journaled on said beams, a ground wheel on one of said shafts, a member on the other of said shafts adapted to be driven by said wheel to thereby rotate said member, means controlled by the rotation of said member to raise said plow beams and plows carried thereby, and means for holding said beams in raised position, said beams being adapted to be lowered by gravity independently of said raising means.

22. In combination, a plurality of plow beams, plows carried thereby, a pair of shafts journaled near the forward ends of said beams and having angularly-disposed axle extensions, wheels on said axle extensions for supporting the forward ends of said beams, a third wheel for supporting the rear end of said beams, a connection from one of said axles to the rear end of said beams, said connection including a bell-crank lever pivotally supported on a fore-and-aft swinging pivot and having one point thereof connected to the rear end of said beams, a forwardly-extending link, the forward end of which is connected to one of said axles, and a connection between the rear end of said link and a second point of said bell-crank whereby rotation of said shafts causes the rear end of said plow beams to be raised.

23. In combination, a plurality of plow beams, plows supported thereby, a pair of shafts independently journaled near the forward ends of said beams and having angularly-disposed axle extensions, wheels on said axle extensions for supporting the forward ends of said beams, a rear wheel having a vertical axle extension for supporting the rear end of said beams, power transmission mechanism driven by one of said wheels for rotating said shafts against the resistance offered by the ground to the wheels carried thereby for raising said plow beams, a connection from one of said axles to the rear of said frame, said connection including a link connected at its forward end to one of said axles and connected at its rear end to one arm of a bell-crank lever, the other arm of said bell-crank lever being connected to the rear end of said beams whereby rotation of said shafts causes said plow beams to be slid upward on the upstanding axle extension of said rear wheel, said bell-crank lever being swingingly supported on a pendent swinging link supported on said upstanding axle extension.

Signed by me at Chicago, Illinois, this 8th day of March 1916.

LEE H. KAUPKE.

Witnesses:
E. H. CLEGG,
AMY JEHLE.