To all whom it may concern:

Be it known that I, DAVID A. BIEBINGER, of Moline, Illinois, have invented certain new and useful Improvements in Double-Row Listing-Plows; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to riding-plows, and more particularly to that class technically denominated in the art as "double-row listing-plows."

The principal object of the invention is to provide a simple and efficient device of this character and arrange the several elements constituting the plow and cultivator devices in such manner that said elements may be more easily and quickly controlled and regulated from the driver's seat, while at the same time the work performed thereby will be always under direct observation of the driver occupying said seat.

Further objects are to provide means for altering the relation of the plows and for independently raising and lowering one plow separately within certain limits or raising and lowering both plows simultaneously, according to requirements; to provide means for limiting the upward movement of the plow-beams, so as to prevent pulling the plows out of the ground by unevenness of draft; to provide means for connecting the seed-dropping mechanism with the operating devices therefor on the lowering of the plows into the ground and disengaging said mechanism on raising the plows; to provide means for allowing movement of the tongue of the plow freely upward and downward in such manner as to relieve the necks of the horses from all weight and strain; to provide means for relieving the weight of the plows, so as to enable the same to be elevated or lifted with comparatively little effort on the part of the operator; to simplify the construction and arrangement of the operative parts and their connecting and adjusting devices, and to improve generally upon devices of this same general character.

The invention will first be hereinafter more particularly described with reference to the accompanying drawings, which form a part of the specification, and then pointed out in the claims following this description.

In said drawings, in which corresponding parts in the several views are designated by similar characters of reference, Figure 1 is a perspective view of a double-row listing-plow embodying my invention, parts of the mechanisms being broken away for greater clearness of illustration. Fig. 2 is a side elevation, partly in section, showing in dotted lines the position assumed by certain of the elements on rearward manipulation of the main operating hand-lever. Fig. 3 is a rear end elevation, partly in section, showing one of the plows in working position and the other as resting upon the surface of the ground. Fig. 4 is a plan view with the driver's seat removed, the said view indicating more clearly the general construction and arrangement of parts. Fig. 5 is a detail sectional view of a part of the trip mechanism for effecting engagement and disengagement of the connections for operating the seed-dropping mechanism, and Fig. 6 is a detail view showing disk covering instead of knife covering devices.

Referring to the drawings by specific characters of reference, A represents as a whole the main supporting-frame of my improved double-row listing-plow, said frame having a central transverse member or cross-beam a, formed or provided at each end thereof with a vertical pendent portion b. To the rearward sides of said pendent portions b there are secured removable bearings c for the outer journal portions d of two crank-shafts B and B', (hereinafter more specifically referred to,) the inner portions of which crank-shafts are both supported in a similar bearing f, secured to a bracket g, pendent from the cross-beam a, substantially centrally of the machine. The main supporting-wheels 1 and 2 are journalled upon the outer ends of the journal portions d of said crank-shafts B and B' in the usual manner. In order to obtain the proper disposition of the central bearing f, so as to bring the same substantially in line with the outer bearings c and also in order to obtain a se-
eure fastening of the said central bracket to the said cross-beam $a$, I preferably provide a block $b$, formed on its inner side or face with transverse lugs $l$, between which a portion of the cross-beam $a$ is rigidly embraced, (see Figs. 1 and 4,) and formed also on its opposite face with a vertical channel or recess $j$, within which is received the upper end of the said bracket $g$, which bracket may be bent inwardly at $k$ to bring the said in proper relative position. A staple or strap $l$, Fig. 4, passes around cross-beam $a$ at this point, with its ends extending through openings in both the block $b$ and upper end of the bracket $g$ projected upwardly some $m$, whereby a very secure fastening is obtained. Secured in place by means of the same devices is the upper bent end of a downwardly and forwardly extending brace-plate $o$, fastened at its lower end to a substantially central point of a cross-bar $C$ by means of a bolt $p$ or similar device. Said cross-bar $C$ is bent rearwardly at its ends and secured to the front faces of the two pendant portions $b$ of the main frame, as shown, thus serving as a brace between the main, and said bar also serves an additional function, hereinafter explained. Fastened to the outer side of each of the vertical portions $b$ of the cross-beam $a$ by means of a staple or strap, as a block $r$, each of which is provided with a longitudinal channel or recess in which is fitted the forward end of a side portion $t$ of a rearward section $E$ of the main frame, said section comprising, with said side portions, a rearward transverse connecting member $u$. The forward ends $s$ of the said side portions $t$ project rearwardly somewhat beyond the pendant portions $b$ of the cross-beam $a$, Fig. 4, and are hinged or pivotally connected by a suitable bolt $y$ to the rearward bent and overlapping portions $v$ of a pair of brace bars or members $D$. The said brace-bars $D$ converge rearwardly, and the usual tongue $E$ is secured by a bolt $y$ and fastening-nuts therefor on one side lengths thereof by bolts $l$, and fastening-nuts therefor on the other suitable means. Said brace-bars constitute a substantially triangular forward frame-section of a machine, and said bars may be braced or rigidly connected to the inner end of said tongue by means of brace-rods $d$, as shown in Fig. 4. The tongue $E$, with its triangular framework of brace $D$ and $d'$, forms a strong and light structure hinged, as before stated, at its rearward end and free to rise or fall at its forward end. By this construction it is evident that none of the weight of the engine is transferred to the horses’ necks, an advantage that needs no comment.

Fastened at their upper ends to the rearward member $u$ of the frame-section $E$, at about the point of joiner thereof with the side portions $t$, are brace-rods $a' d'$, extending downwardly and forwardly of the machine and secured at their front lower portions to the sides of the block $b$, which secure said bearings to the pendant portions $b$, on which they are mounted.

Secured at its forward end to the central cross-beam $a$ is a rearwardly-extending frame-section $F$, comprising suitable side members $e' e'$, having rearwardly inclined or converging portions $f' f'$, finally terminating in short straight portions $g' g'$, which embrace a block $m$, hereinafter referred to. The said converging portions $f'$ are preferably united or joined together by a brace $l'$, and the forward straight portions of said members $e' e'$ rest upon and are securely clipped to the rearward transverse member $a$ of the supporting-frame. The frame-section $F$ may be rigidly secured to the central cross-beam $a$ by means of suitable blocks $i$, each having a channel or recess on its under side to receive the forward end of one of the side portions, which latter are twisted at $f$ both to strengthen the same and to bring the ends thereof beneath the said cross-beam $a$ flatwise. The portions $i$ of the $l'$ are also each formed at their upper sides with similar channels or recesses in which the cross-beam is fitted, and the parts are rigidly secured together by means of staples or straps $l' l'$, embracing said cross-beam and passing through openings in both the blocks $t$ and the flattened ends of the side portions $e' e'$, and the portions $i$ of said frame-section $F$ by means of suitable bolts $l'$. Said block is provided with a vertical bore or bearing to receive the upper end of a spindle $o'$, forming a telescopic portion $l$ of the central member $u$, depending from the block. The said spindle is bent slightly rearward at $p$ and bent again at its lower end substantially at right angles to form a journal for a rear easter-wheel $3$, which permits of the machine being turned around properly at the ends of the trench and laid back parallel to the directions of the different rows. The seat $G$ for the driver is mounted upon the upper end of a strong bent spring-plate $l'$, the lower end of which rests upon the upper edges of the frame and is secured in place by means of a bolt $o'$, arranged against the lower edges of said portions.

The letters $H$ and $H'$ designate the plows, which are suitably secured to the rearward ends of the plow-beams $5$, the forward ends of which may be provided with the usual creases for attachment of the draft connections. The said plow-beams are supported by and rigidly attached to the cranked portions of
the crank-shafts B and B', each being preferably secured by bolts 8 or other suitable means between flat plates 6, upstanding from duplicate sleeves 4, mounted on said crank-shafts. The said duplicate sleeves are adjustable longitudinally of the crank-shafts by means of collars 9 at the outer ends of said sleeves, which are secured on said shafts by set-screws 10, as shown more clearly in Figs. 3 and 4.

Brackets or hangers 13 are secured at corresponding points on the forward straight portions of side members c of frame-section F by means of suitable bolts 12 and fastening-nuts. (See Fig. 3.) Said brackets are formed or provided with tubular bearings 14 and support between them a shaft 15, squared or rectangular in cross-section and provided at its ends with sleeves 16, which are fitted within said tubular bearings 14, so as to be capable of turning or revolving therein. Said shaft is located to the rear of and slightly below the cross-piece a of the supporting-frame M mounted thereon at near one end (to the right) a yoke 16a, to which is clamped by means of suitable bolts 17 a main operating hand-lever M, provided with a hand-operated locking lever or device 18, having a spring-actuated bolt 19, which engages the teeth 20 of a toothed sector 21, secured by means of bolts 22 and 23 to one of said members c of the frame. The sector is herein shown bent inwardly at its forward portion to bring the sector-teeth into a plane for proper engagement by the locking-bolt 19, which construction, of course, brings the rearward end of said sector inwardly beyond the side of the main frame, and therefore the rear fastening-bolt 23 is shown provided with a sleeve 24, the ends of which abut between the outer side of the sector and the inner side of the frame-piece. The said main operating hand-lever M is bent downwardly and forwardly near its lower end, and its short arm 25 is pivotally connected, as at 26, with the upper end of a link 27, mounted upon the cranked portion of the crank-shaft B slightly within the position occupied by the right-hand bow-lever. Mounted upon the shaft 15, near its opposite end, (to the left,) is a toothed sector 28, the arc of which is somewhat less or shorter than that of sector 21, and said sector 28 is fast with a collar 29, secured to and turning with the said shaft. Fulcrumned on said sector 28 is an auxiliary hand-lever N, also having a hand-operated locking lever or device 31, provided with a spring-actuated bolt 32, which engages the teeth of said sector 28. Said auxiliary hand-lever N is also bent downwardly and forwardly near its lower end, so as to form an arm, which is pivotally connected with the upper end of a link 33, mounted upon the cranked portion of the crank-shaft B. From the construction and arrangement shown and described it will be seen that by releasing the locking-bolt 19 and throwing the main lever M forward the shaft 15 will be rocked or turned on its bearings, and thus the plows H and H' will both be lowered into the ground simultaneously, this effect being due to the connections between the levers and the crank-shafts. Inasmuch as the auxiliary lever N is at this time locked to the sector 28, both the said auxiliary lever and sector will turn with said shaft and said main operating-lever M. Now should it be desired for any reason to alter the relation of plow H' to plow H the auxiliary lever is grasped and the locking-bolt 32 released from engagement with the teeth of sector 28, whereupon by either carrying the auxiliary lever still farther forward or drawing it backward the depth to which plow H' enters the ground can be increased or lessened by reason of the independent action of crank-shaft B' and auxiliary lever N, together with the connections between the two. Should it be desired to vary the depth of penetration of plow H and also still retain the plow H' at its present depth, the main lever M is opened in the proper direction, of which course will correspondingly raise or lower both plows, and as soon as the desired depth of said plow H is obtained the auxiliary lever N is then operated independently to again bring the plow H' to the position or depth it previously occupied. In this way the relation of the plows to each other can be readily changed or altered at will, as is evident. It will be understood that a separate auxiliary hand-lever may be employed between the shaft 15 and crank-shaft B, if desired; but for most practical purposes the single auxiliary lever N has been found sufficient.

The seedboxes are designated by the letters S and S' and are of ordinary construction except in regard to certain details adapting them to the present machine. Each of said seedboxes may be bolted at its outer side to a suitable bracket 37, (see Figs. 2 and 3,) secured to the rearward transverse member u of the frame-section E' by means of straps 38, and said bracket is formed or provided with a horizontally-disposed plate 39, which practically constitutes the bottom of the seed-box. It is evident from the manner in which said seedboxes are mounted and supported that they can be readily adjusted to either side of the machine, as the exigencies of the case may demand. Extending laterally from said plate 39, at opposite sides and pendently thereof, are sleeves or collars 40 and 41, respectively, and located within the box upon said plate 39 is a rotatable disk 42, having peripheral bevel-gear teeth and having a central hub 44, through which passes axially a bolt or pin 45, entered through the bottom plate 39 and provided at its upper end with a fastening-screw 46. The bottom plate 39 has an opening or seed-outlet 47, (see Fig. 2,) with which a series of openings 45 in the disk 42 successively register as said disk rotates. Having its bearings in the sleeves or collars 40 and 41 of the two seedboxes is a shaft 50, Fig. 3,
provided at the proper points with beveled gear-wheels 51, which partially project into the seedboxes from beneath through suitable openings provided therefor in the bottom plates 39 and engage the teeth of the disk 42. The said seedboxes are each provided with a lid or cover 40, and passing through an opening in an offset 49 of each cover, and also of the adjacent plow-beam by a rod 40, having on its lower end a fastening-nut 40, by means of which the feed-boxes are bolted to the machine and additionally strengthened and the covers securely held in place. Communicating with the seed-outlet opening 47 of each seedbox is a flexible or other suitable tube 41, leading to and emptying the seed through a funnel 43, supported from the adjacent plow-beam by means of a pair of arms 43, bolted to said plow-beam at 44 and connected by a bolt 44, which passes through a lug projecting rearwardly from said funnel. The neck of the funnel leads to a point above the tranches and is located intermediate the opening or subsoiler devices and the covering devices, both hereinbefore specifically referred to. It will be understood that by imparting a rotary motion to the shaft 50 the disk 42 of each seedbox is rotated or operated to effectually perform the dropping of the seed into the tranches as the latter are formed by the plows. As a convenient means for operating said shaft 50 I provide the bearing c for the journal portion d of crank-shaft B' with a socket 51, Figs. 2, 3, and 5, which serves as a bearing for the lower end of a shaft 52, arranged longitudinally of the machine at a suitable inclination and having at its upper end a beveled gear-wheel 53, gearing with a similar gear-wheel 54 on the corresponding end of said shaft 50. The upper end of said inclined shaft 52 is supported in a bracket 55, secured to the rearward side of the brace-rod 56, arranged at this side of the machine. The said shaft 52 is also provided at or near its lower end with a beveled gear-wheel 50, which is engaged by a larger beveled gear-wheel 57, the hub of which, Figs. 3, has a clutch or interlocking engagement at 59 with the hub 60 of the main wheel 2. Thus as the main supporting-wheels are turned the said shaft 52 is given the desired rotation or movement, which is communicated to the shaft 50, as already explained.

In order to explain the operation of certain devices for disconnecting the mechanism which operates the seed-dropping devices, it will be necessary at this point to again refer to the plow H and plow I, together with the means and devices by which they are operated or manipulated, either both together or separately, in the manner already explained. Thus, as shown in Fig. 2 in full lines, the main lever M is in the position it occupies when both plows are resting on the surface of the ground as well as when the right-hand plow H only is resting on the ground after the left-hand plow H' has been forced into the ground by pushing the auxiliary lever N 70 forward, as heretofore mentioned. Now assuming the lever N to be in the same position as the lever M (full lines, Fig. 2) then it will be understood that both plows are resting on the surface of the ground. By now pushing lever M the shaft 50, shaft 52, wheel 53 and pin when the crank-shaft is turned, so that when the two plows are raised or elevated to the position shown in dotted lines in Fig. 2 the cranked portions of the crank-shafts B B' are also carried upward or raised, and in this way the said projection 57 engages the said angled portion 56 of said rod 56, as will be understood by referring to Fig. 3, and by riding against the same causes the rod to be drawn forward, carrying with it the beveled gear-wheel 53 and its hub 53. This movement of the said wheel and its hub disconnects said wheel from the wheel 54, and thus the operation of the seed-dropping device is stopped. At the same time the spring 55 is compressed together with the pin 57 by the force of the two plows that are lowered into the ground. The said spring again expands and by its pressure forces said wheel 53 into engagement with said wheel 54. The operation just described will be understood to be carried into effect principally on the turning of the machine at the ends of the rows, although the
same can be effected at any time desired. It will thus be seen that the plow II and its operative connections and hand-lever can be manipulated within certain limits without affecting the operation of the seed-dropping devices, but that when both plows are raised or elevated together beyond a certain limit the said seed-operating devices will be cut off or stopped temporarily. It is of course apparent that other trip mechanism than that described can be employed with equal effect.

Connecting the rearward brace h' with the shaft 15 is a release-spring 60 under tension, which partially sustains the weight of the plows and appurtenances, and thereby greatly assists the driver in the different manipulations of the parts referred to.

The opening and covering devices will now be explained. Each of the seed-funnels 42a is formed or provided with a sleeve 61, in which is fitted the shank 62 of a combined opening-knife and subsoiler device 63, said shank being vertically adjustable in said sleeve by means of a set-screw 64, whereby the depth of the planting trench or furrow may be regulated. Said knife (indicated at 65) is flared at 66 on both sides of the heel, so as to loosen up the dirt in the bottom of the furrows, the advantage of which construction will be obvious. The covering devices may consist of the pairs of curved or bent blades 67, (see Figs. 2 and 3,) supported from the plow-beams and being adjustable vertically, or they may each consist of a pair of disks 68, (see Fig. 6,) also supported adjustable from the plow-beams, or any other suitable devices may be employed.

From the foregoing it will be seen that the machine can be easily handled or manipulated by the driver and that the work being performed is always under his direct observation. The third or rear wheel casters freely when the machine is turned at the end of the rows or at any other time. The advantages presented by the machine result largely from the peculiar construction and arrangement of the parts constituting the skeleton-like supporting framework, together with the disposition of the driver's seat and the plowing or cultivating devices or elements. It will be seen that the plow-beams can be adjusted vertically between the sets of sleeves, which keep them in proper place or position on the crankshafts, and also that said beams can be adjusted longitudinally of said crankshafts by loosening the set-screws passing through the collars at the outer ends of the sleeves and then moving said sleeves and collars in either direction desired along said shafts, after which the collars are tightened, as before, by means of said set-screws. The seedboxes can also be adjusted to correspond to any side-wise adjustment of the plows, as can the gear-wheels, which engage the rotatable disks in said boxes. During the operation of the plows the latter will be prevented from pulling out of the ground by uneven or indirect draft strain, since the plow-beams are prevented from rising beyond a certain point by means of the cross brace or frame C, already described. The general operation of the several elements and combinations thereof has already been clearly explained, and of course it will be understood that I do not limit myself to any particular to the specific details of 75 construction and arrangement herein set forth and shown. When one or both plows are raised and lowered, one or both sets of the cultivator devices are correspondingly raised and lowered therewith, and from the arrangement of the seed-funnels and the seed-tubes leading from the seedboxes it will be seen that said cultivator devices can readily be raised and lowered without hindrance.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. A double-row listing-plow comprising main supporting-wheels, and suitable plows and cultivator devices, suitable seed-dropping mechanism, means within reach of the driver for simultaneously raising and lowering both plows, together with said cultivator devices, means for shutting off the seed-dropping mechanism by the raising of both plows, and means for independently raising and lowering one of the plows, together with its particular cultivator devices; substantially as described.

2. A double-row listing-plow comprising main supporting-wheels, and suitable plows and cultivator devices, suitable seed-dropping mechanism, means within reach of the driver for simultaneously raising and lowering both plows, together with said cultivator devices, means for shutting off the seed-dropping mechanism by the raising of both plows, means for again starting said mechanism upon the lowering of said plows, and means for independently lowering and raising one of the plows, together with its particular cultivating devices; substantially as described.

3. A double-row listing-plow comprising main supporting-wheels and suitable plows and cultivator devices, means within reach of the driver for simultaneously raising and lowering both plows, together with said cultivator devices, means for locking said parts to whatever position they may be brought, means independently of said simultaneously raising and lowering one of the plows, together with its particular cultivator devices, and independent locking means therefor; substantially as described.

4. A double-row listing-plow comprising main supporting-wheels, suitable plows and cultivator devices, a seat for the driver mounted centrally on the machine and to the rear of said plows and cultivator devices, a third or 130 castor wheel located beneath the seat, means within reach of the driver for simultaneously raising and lowering both plows, together with said cultivator devices, and means for inde-
pendently raising and lowering one of the plows, together with its particular cultivator device, substantially as described.

5. A double-row listing-plow comprising main supporting-wheels, suitable plows and cultivator devices, together with seed-dropping mechanism, a seat for the driver mounted centrally of the machine and to the rear of all of the said mentioned elements, means within reach of the driver for simultaneously raising and lowering both plows, together with said cultivator devices, means for shutting off the seed-dropping mechanism by the raising of both plows, and means for independently raising and lowering one of the plows, together with its particular cultivator device; substantially as described.

6. A double-row listing-plow comprising main operating-wheels, suitable plows and cultivator devices, together with seed-dropping mechanism, a seat for the driver mounted centrally of the machine and to the rear of all of the said mentioned elements, means within reach of the driver for simultaneously raising and lowering both plows, together with said cultivator devices, means for stopping the seed-dropping mechanism by the raising of both plows, and means for independently raising and lowering one of the plows, together with its particular cultivating device; substantially as described.

7. A double-row listing-plow comprising main supporting-wheels, suitable plows and cultivator devices, and suitable seed-dropping mechanism, a seat for the driver mounted centrally of the machine and to the rear of all of the said mentioned elements, means within reach of the driver for simultaneously raising and lowering both plows, together with said cultivator devices, means for stopping the seed-dropping mechanism by the raising of both plows, means for again starting said mechanism on the lowering of both plows, and means for independently raising and lowering one of the plows, together with its particular cultivator device; substantially as described.

8. A double-row listing-plow having main wheels and suitable plows, and a sectional frame comprising a middle section mounted on said wheels and supporting the plows and other operating devices, a front section having a seat mounted thereon, said sections being detachably fastened together so as to form a rigid frame, substantially as described.

9. A double-row listing-plow having main wheels and a main shaft, and a supporting-frame comprising a central cross-beam having pendent portions provided with bearings for said shaft, a central frame-section extending rearwardly of said cross-beam, a forwardly-extending section having the draft-tongue secured thereto, and another section extending rearwardly of said central section and having a seat mounted thereon; substantially as described.

10. A double-row listing-plow having main wheels and shaft and suitable plows and cultivator devices, and a supporting-frame comprising a central cross-beam having pendent portions provided with bearings for said shaft, a central frame-section extending rearwardly of said cross-beam, a forwardly-extending section having the draft-tongue attached thereto, and another section extending rearwardly of said central section and having a seat mounted thereon to the rear of said plows and cultivator devices; substantially as described.

11. A double-row listing-plow having a supporting-frame comprising a central cross-beam, a central section extending rearwardly of said beam and connecting therewith at the ends, converging portions extending forwardly of said beam and connecting with the ends of said central section, a draft-tongue secured between the forward ends of said convergent portions and a rearwardly-extending frame-section having a seat mounted thereon; substantially as described.

12. A double-row listing-plow comprising main wheels and independent crank-shafts thereof, suitable plows mounted on the cranked portions of said crank-shafts, means for rocking both crank-shafts simultaneously for raising and lowering both plows together, and independent means for rocking one crank-shaft to change the relation of the plows while at work, substantially as described.

13. A double-row listing-plow comprising main wheels and independent crank-shafts thereof, suitable plows and cultivator devices mounted on the cranked portions of said crank-shafts, means for rocking both crank-shafts simultaneously for raising and lowering both plows with their cultivator devices together, and independent means for rocking one crank-shaft to raise or lower one plow with its particular cultivator devices independently, substantially as described.

14. In a double-row plow, the combination with a suitable frame mounted on supporting-wheels, of independent crank-shafts each carrying a suitable plow, a lever connected to and adapted to turn both crank-shafts, and a second lever connected to and adapted to turn one crank-shaft independently of the other, substantially as described.

15. A double-row listing-plow comprising independent crank-shafts and main supporting-wheels thereon, a plow and cultivator devices mounted on each of said shafts, a rock-shaft, a main operating-lever moving with said rock-shaft and movably connecting with one of the crank-shafts, locking devices for said lever, an auxiliary lever movable with the rock-shaft but having an independent fulcrum, said auxiliary lever movably connecting with the other crank-shaft, and devices also movable with said rock-shaft for
effecting the locking of said auxiliary lever; substantially as described.

16. A double-row listing-plow comprising independent crank-shafts each having a main wheel journaling thereon, a central bearing for the inner ends of said shafts, a plow and cultivator devices supported on each shaft, a rock-shaft, a main lever on said rock-shaft for raising and lowering both of said crankshafts, and an auxiliary lever for raising and lowering one of said crank-shafts independently; substantially as described.

17. A double-row listing-plow comprising main wheels and a main supporting-frame, independent crank-shafts for said wheels each supported in said frame and having a plow and cultivator devices thereon, a rock-shaft also supported by the frame, a main lever moving with said rock-shaft and movably connecting with one of the crank-shafts, a toothed sector on the frame engaged by a locking device on said main lever, a toothed sector also movable with said rock-shaft, an auxiliary lever, fulcrumed on said latter sector and movably connecting with the other crank-shaft, and locking devices on said auxiliary lever for engaging said latter sector; substantially as described.

18. A double-row listing-plow comprising main wheels and independent crank-shafts, a plow and cultivator devices mounted on each of said crank-shafts, a squared rock-shaft supported at the ends in hangers on the main frame, and constructed to turn in said hangers, a toothed sector secured to the frame, a main lever mounted to turn with said rock-shaft and movably connected with one of said crank-shafts, said lever having locking devices engaging said sector, another toothed sector turning with said shaft, an auxiliary lever fulcrumed on said second-named sector and having locking devices engaging therewith, and connections between said auxiliary lever and the other crank-shaft; substantially as described.

19. A double-row listing-plow comprising the main wheels and independent crankshafts, the supporting-frame, the plows and cultivator devices, the rock-shaft, and main lever and sector therein, the auxiliary lever on said sector, another sector on the frame, movable connections between said levers and the crank-shafts, devices on said levers engaging said sectors, a rearward extension of the supporting-frame, and the relief-spring connecting said rock-shaft with said rearward extension; substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

DAVID A. BIEBINGER.

Witnesses:

CHAR. H. POPE,

SCHILLER HOFORD.