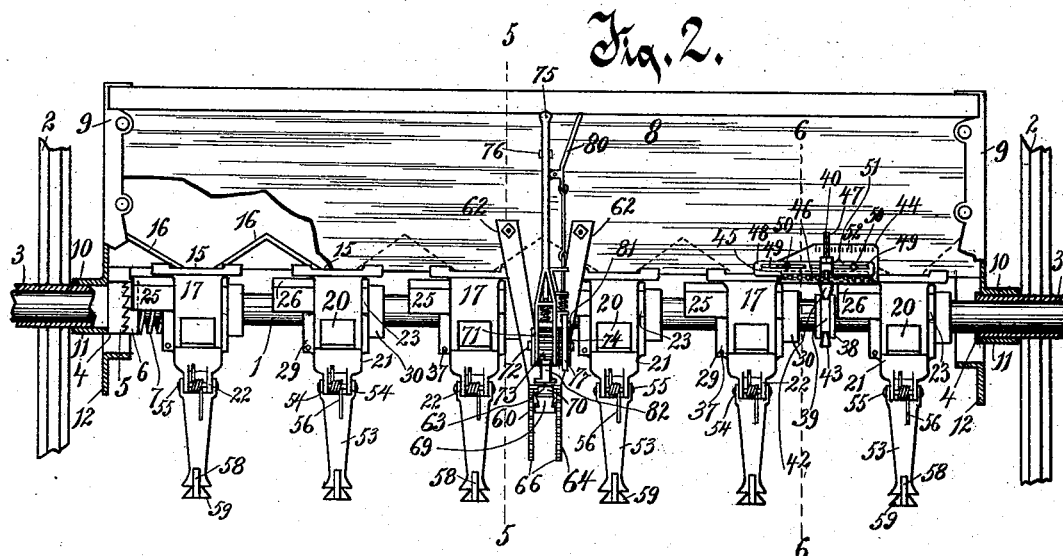
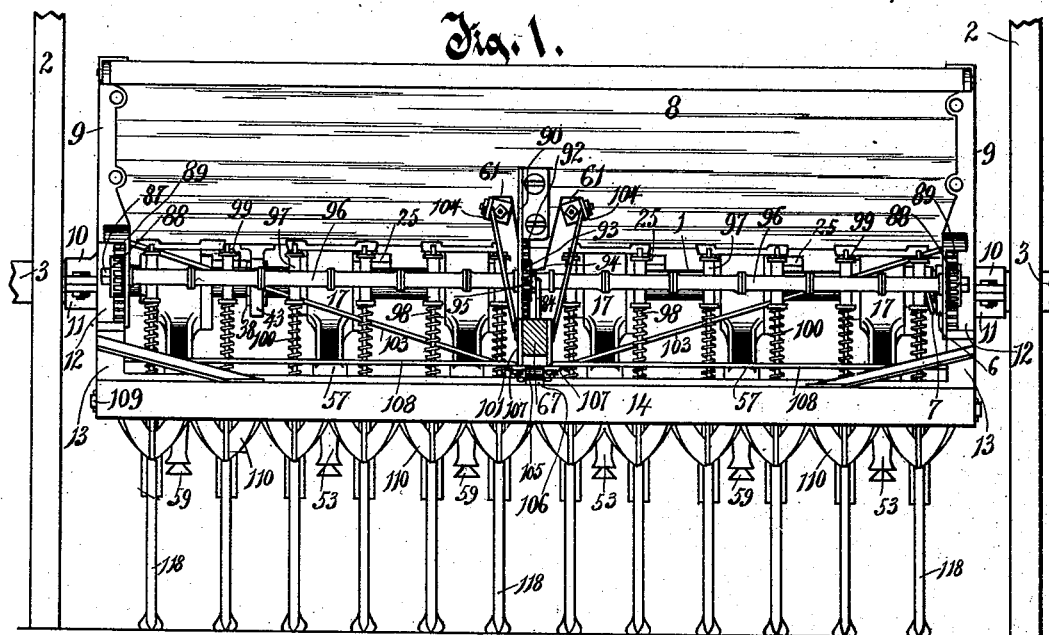


E. H. GRAFUNDER. BROADCAST SEEDER.

No. 491,167.

Patented Feb. 7, 1893.



Witnesses.

A. Keeney,
Anna V. Faust.

Inventor.

Ernst H. Grafunder,
By
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Attorneys.

(Model.)

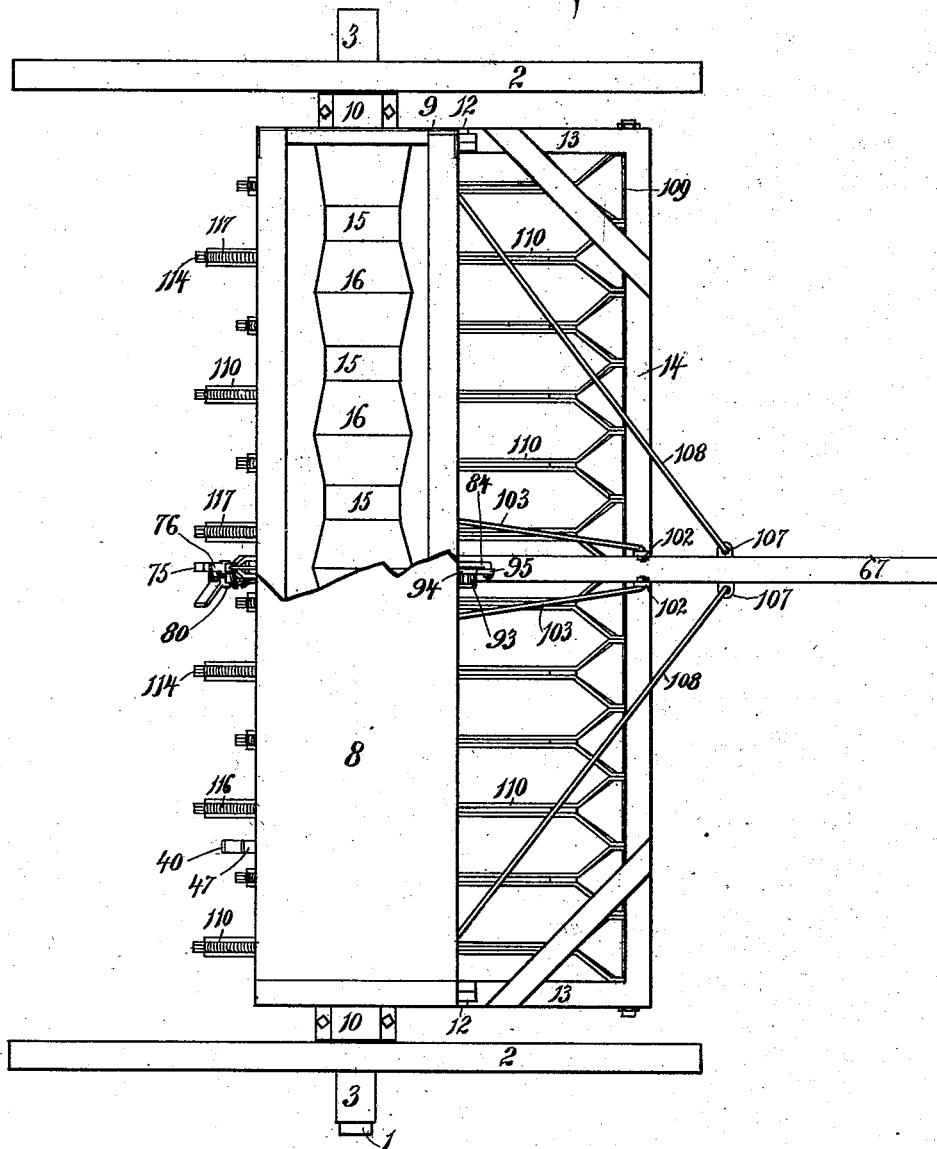
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E. H. GRAFUNDER.
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Fig. 3.



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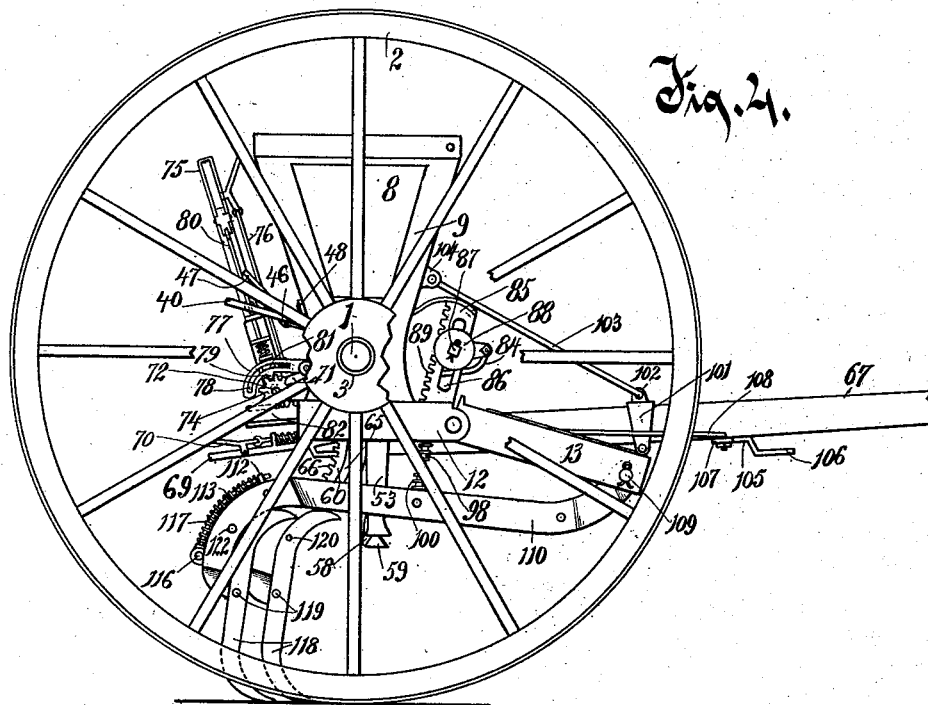
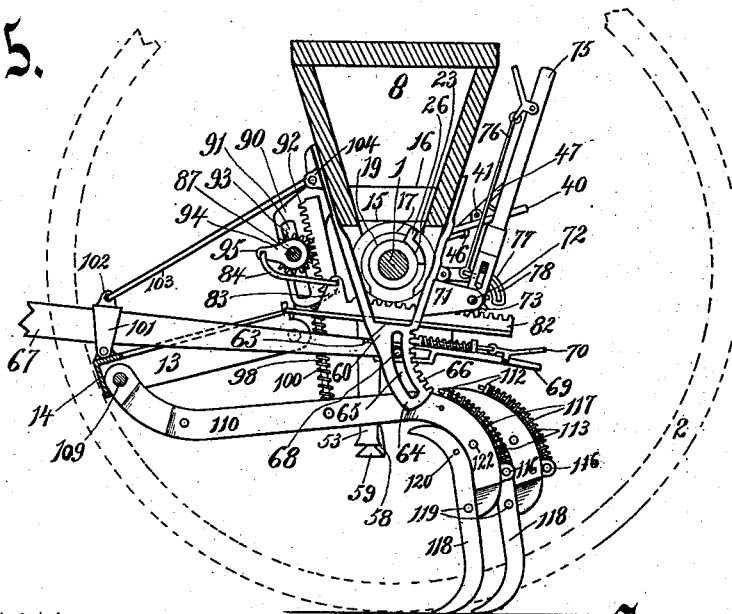


Fig. 4.

Fig. 5.



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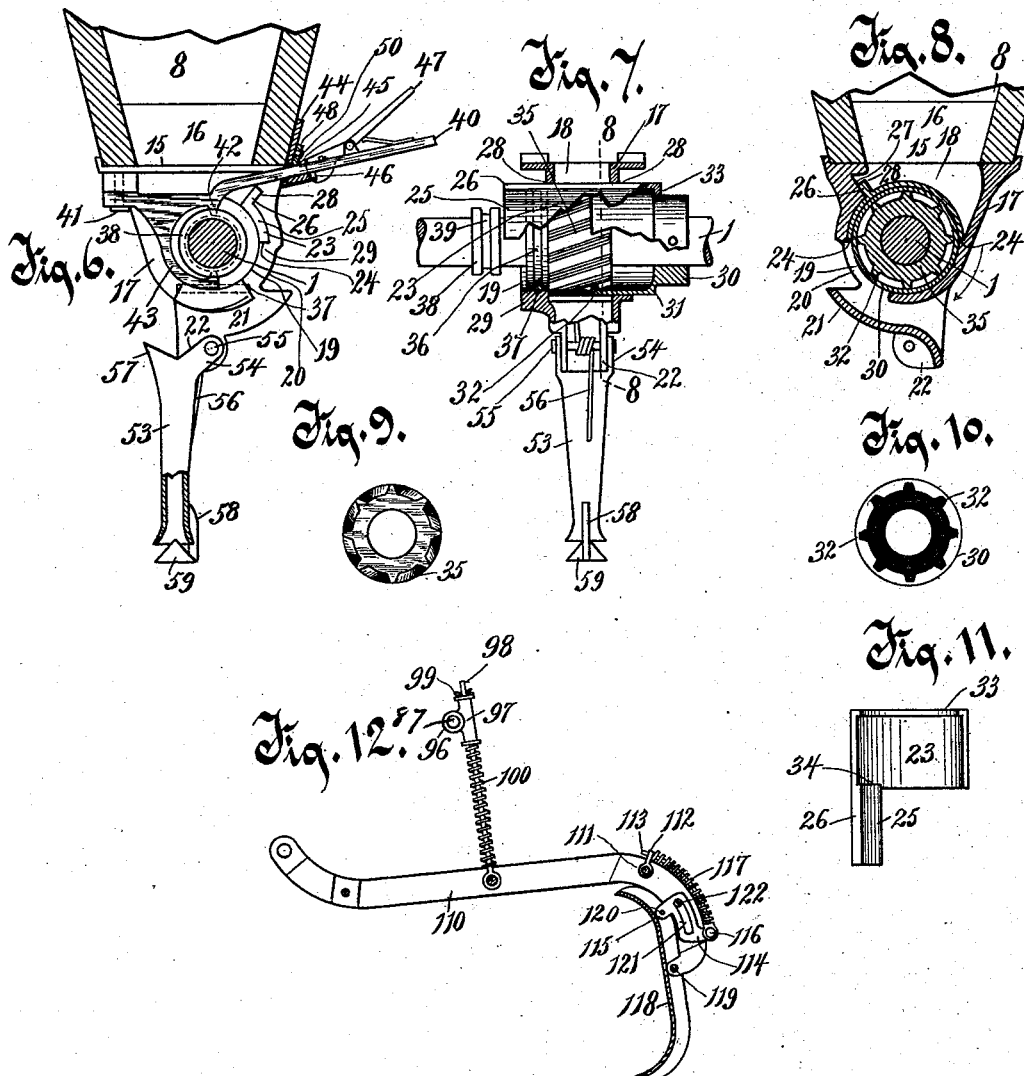
(Model.)

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UNITED STATES PATENT OFFICE.

ERNST H. GRAFUNDER, OF HORICON, WISCONSIN.

BROADCAST SEEDER.

SPECIFICATION forming part of Letters Patent No. 491,167, dated February 7, 1893.

Application filed March 3, 1892. Serial No. 423,598. (Model.)

To all whom it may concern:

Be it known that I, ERNST H. GRAFUNDER, of Horicon, in the county of Dodge and State of Wisconsin, have invented a new and useful Improvement in Broadcast Sowers, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

My invention has relation to improvements in drills for sowing wheat, oats, barley, flax, grass seed and like grain, the form herein shown and described being more especially designed for sowing broadcast.

In the ordinary form of drills, an extra rod called the "feed cup-rod" is usually employed. This in practice is found to be an inconvenient and cumbersome arrangement, and my invention, therefore, is designed to dispense entirely with the rod referred to and instead thereof locate the feed-cups directly upon the axle.

Among the other objects comprehended by my invention are the provision of improved means for regulating the height of the shares; means for adjusting the height of the pole of the machine; and improved means for clearing obstructions, the construction of all of which will hereinafter more fully appear.

In the accompanying drawings, Figure 1, is a front elevation of the complete machine. Fig. 2, is a rear elevation thereof, certain parts being broken away for clearer illustration, and certain parts omitted. Fig. 3, is a plan view with a portion of the cover of the hopper broken away to disclose the interior of said hopper. Fig. 4, is a side elevation. Fig. 5, a transverse section on the plane indicated by the line 5—5 of Fig. 2. Fig. 6, is a sectional view on the plane indicated by the line 6—6 of Fig. 2. Fig. 7, is a rear view of Fig. 6, parts being broken away for clearer illustration, and the lever, for shifting the axle longitudinally, omitted. Fig. 8, is a sectional view on line 8—8 of Fig. 7. Fig. 9, is an end view of the seed conveying cylinder. Fig. 10, is an end view of the cut-off which engages the ribs of the seed cylinder. Fig. 11, an inverted plan of the flanged plate for preventing seed from passing forwardly above the cut-off, and Fig. 12, a longitudinal sectional view through one of the shares and frames connected therewith.

Like numerals of reference indicate like parts throughout the several figures.

Referring to the drawings, the numeral 1 indicates the axle of the machine upon which are mounted the wheels 2, 2, said wheels having tubular hubs, 3, 3, extending laterally upon both sides thereof, and through which the ends of the axle loosely pass. The inner ends of the hubs are provided with annular shoulders, 4, 4, which prevent the same from working out laterally. Upon one side the inwardly extending tubular hub has its inner edge toothed to form the fixed member, 5, of clutch mechanism, the movable portion 6 of said clutch being feathered upon the axle, and held normally in engagement with the fixed member referred to by a spring, 7, bearing thereagainst. The meshing teeth of the two members of the clutch are so arranged that when the machine moves forward the axle will move in unison with the wheels, while when the machine is backed or turned around, the bevels of the teeth will ride by each other without rotating the axle.

The numeral 8 indicates a seed box or hopper, having secured to the ends thereof brackets, 9, 9. Each of these brackets extends below the hopper, and has formed therein a semicircular bearing, 10, for the axle 1, an underclip 11, completing the bearing through which said axle passes freely. To the lower extremities of these brackets are secured fixed side pieces, 12, 12, of the frame of the machine, to the forward ends of which is pivotally secured the movable portion of the frame, consisting of the side pieces, 13, 13, and the front connecting piece, 14. The bottom of the hopper is provided with a series of seed apertures, 15, the partitions between said apertures having, conically-shaped tops, as indicated at 16, to provide for converging the seed toward the openings.

In Fig. 8, is shown clearly a section of one of the series of feed-cups, 17, which are located and secured beneath the bottom of the hopper at points corresponding to the position of the seed openings 15. The top of the feed-cup is provided with the rectangular opening 18, registering with one of said seed openings, while the feed-cup is transversely apertured, as indicated at 19, for the passage of the axle and the accommodation of other parts,

- to be explained, carried by said axle. The rear side of the feed-cup is provided with an opening, 20, while immediately below said opening is formed a chute, 21, extending from the rear to the front portion of the feed-cup. The lower extremity of said feed-cup is also provided with apertured ears, 22, 22, for the pivotal connection of the seed tube hereinafter to be explained.
- The numeral 23 indicates a partly circular plate (shown in detail in Fig. 11) said plate having its edges resting upon shoulders 24, 24 arranged at approximately opposite points of the wall bordering the transverse aperture.
- The plate is also provided with an extension, 25 and both the plate proper and said extension have extending therefrom a radial rib, 26, which rests and slides against an inclined surface, 27 of the feed-cup, said inclined surface joining corresponding inclined slits, 28, 28, in the sides of the feed-cup, through which the rib is free to slide, the movement of the plate one way being limited by the left hand side wall, 29, of the feed cup. This rib or flange of the plate closes the space above the cut-off, and thus prevents the escape of any of the seed forwardly through said space in a direction opposite to the direction of the rotation of the shaft.
- The numeral 30 indicates a cut-off, a series thereof equal to the number of feed-cups being arranged fixedly upon the shaft or axle 1. The left hand end of this cut-off is enlarged both interiorly and exteriorly, forming an exterior shoulder 31, upon the right hand end. The bore of the enlarged left hand end has extending therein for a slight distance a series of spiral grooves 32, shown clearly in Fig. 10. The axle 1, of course, passes through the transverse aperture in the feed-cup, the portions so passing through carrying the cut-off 30. The flanged plates 23 are arranged to partly surround these collars, as fully shown in Fig. 7 and are provided upon their under surfaces, each, with two shoulders, 33 and 34, the former registering with the shoulder, 31, of said cut-off, and the latter with the enlarged end of the cut-off so that when the latter moves longitudinally with the shaft, as will be hereinafter explained, the flanged plates are likewise given a similar movement, although they do not partake of the rotation of the shaft. A series of spirally ribbed cylinders, 35, equal in number to the feed-cups, is mounted loosely upon the axle. The ribs upon the exterior surface of each of these cylinders, as clearly illustrated in the detail view Fig. 9, are spiral, and the right hand end of the cylinder is adapted to enter the contiguous end of the cut-off 30, so that the ribs will register with the grooves extending inwardly from the left hand end of said cut-off. These ribbed cylinders are designed to be rotated with the axle, but not to have longitudinal movement therewith. To prevent the latter each cylinder at its outer end is provided with an annular groove, 36, into which enters a pin, 37, passing horizontally through the metal of the feed-cup, and bearing in said groove.
- From the description thus far it will be apparent that inasmuch as the axle is normally held in mesh with the clutch portion of one of the wheels, as the machine is moved forward over the ground to be planted, axle 1 is rotated and the fixed cut-offs, 30, thereon likewise rotated. As the grooves in these fixed cut-offs are engaged by the spiral ribs of the cylinders, 35, the latter are also necessarily rotated. The spaces between these spiral ribs form cavities for the seed, and if the adjustment of the cut-off, 23, is such as to leave a clear opening from the seed box or hopper to the feed-cup, these seed cavities will be successively filled as the cylinder is rotated, and will successively empty their contents through the opening, 20, at the forward portion of the feed-cup into the chute, 21, for deposit in the seed tube.
- The axle 1 has mounted rigidly thereon a collar, 38, as clearly shown in Figs. 2 and 6, said collar provided with an annular groove 39. A lever, 40, passes beneath the hopper and its forward end is pivoted at the point 41. This lever is provided with a depending lug, 42, which enters, above the axle, the annular groove 39, of collar 38. The lever is also provided with a curved arm, 43, extending downwardly from the forward end and provided with a lug entering the groove from beneath the axle. An angle plate or bracket, 44, is secured to the rear side of the hopper, and extends slightly below the bottom thereof where the vertical portion is provided with a horizontal slot 45, shown in Fig. 6 and by dotted lines in Fig. 2, through which slot the lever 40 passes. The edge of the horizontal portion of the bracket is formed into a rack-bar 46, which a spring-pawl 47 upon the lever is adapted to engage. A transverse bar, 48, is secured to said lever, and rests and slides upon the horizontal portion of the bracket. This bar is provided with elongated slots, 49, 49, through which pins, 50, 50, extending from the vertical portion of the bracket, pass. Upon its upper edge the bar is provided with an index finger 51, which points toward a scale, 52, upon the bracket. When the lever 40, is at the extreme right hand end of the rack, 46, practically a clear opening is afforded from the hopper to the seed cavities of the spirally ribbed cylinders, which will allow for a full discharge of seed to the seed tubes. It is, of course, desirable at times to regulate the quantity of discharge of the seed. In that event, the spring pawl of the lever is released from engagement with the rack bar, and said lever moved toward the left until the desired position is reached, when the pawl is again allowed to engage the rack bar and hold the lever in its adjusted position. As lever, 40, is thus moved toward the left, the depending

lug, 42, and the lug of the curved arm, 43, engage the annular groove of fixed collar, 38, and cause the axle to move in a similar direction, said axle, of course, being free to move through the movable member, 6, of the clutch, which is merely feathered thereon, and also to move freely in the tubular hubs, 3 of the wheels. The axle in the movement thus described, of course, carries with it cut-off 30. As the spiral grooves of the cut-off are engaged by the spiral ribs of the cylinders, 35, it will be apparent that as the cut-off 30, thus moves toward the left, it will be forced farther upon the spiral ribs, and as the cylinder upon which these ribs are formed is loose upon the shaft, and is held against longitudinal movement by the pin, 37, it will of course remain stationary. As the cut-off moves up upon the ribs, however, by reason of the spiral formation thereof the cylinder 35, will be caused to rotate, and the seed contained within the cavities between the ribs will be conveyed to the seed tube. By providing the scale, 52, the required movement of the lever to secure a desired width of opening may be readily determined. Of course, in widening the seed opening of the hopper a reverse movement of the lever is given, that is, toward the right.

The numeral 53 indicates a seed tube, one being provided for each feed-cup, said tube having rearwardly and upwardly extending apertured ears or lugs 54 which register with the ears, 22, of the feed-cup and receive a transverse shaft, 55, whereby a pivotal connection is formed between the two. A spring 56 is secured upon the shaft and acts to return the tube to the normal position illustrated in the drawings after the same has been swung back by meeting with an obstruction or other impediment. In this way provision is made for the successful clearing of obstructions without danger of damaging the parts. The mouth of the tube extends forwardly, as indicated at 57, so as to effectually catch the seed as they leave the chute, 21, of the feed-cup. An arm 58 projects from the rear side of the tube slightly below the lower end thereof, and is provided with an extension, 59, at right angles thereto, said extension having its top surface conically formed. The seed, of course, after passing through the seed tube strike upon the apex of this conical surface and are thus spread out evenly and caused to be sown broadcast.

The numeral 60, indicates a central yoke which is provided with two arms 61, 61, at the front and the same number of arms 62, 62, at the rear of the machine, said arms being secured to the seed box or hopper. Depending from the bottom, 63, of the yoke are two rearwardly curved arms, 64, 64, having elongated curved slots, 65, 65, therein, and having their rear edges toothed as at 66. The pole 67 of the machine has its rear end passing between these arms, 64, and said pole is provided upon opposite sides with laterally-extending trun-

nions 68, 68, which enter the elongated slots 65. The pole is furthermore provided at its rear extremity with a handle or arm 69 upon which is mounted a spring-pawl, 70, adapted to engage the teeth, 66, of the arms 64. Extending from the rear arms, 62, of the yoke are lugs 71, 71, in which is journaled a transverse shaft, 72, said shaft having rigidly mounted thereon between the lugs a cog wheel, 73, and upon one end, outside of the lug adjacent, a second cog wheel, 74, is also fast upon the shaft.

The numeral 75 indicates a lever having its lower end bifurcated, through which bifurcated portion the shaft, 72, loosely passes, the arms of said bifurcated portion being located on the shaft upon each side of the central cog wheel 73. A spring-pawl, 76, is located upon the top of the lever, and extends down to engage the cog wheel 73. Pivoted to one side of the rear arms 62, of the yoke, is a curved arm, 77, having a curved slot, 78, concentric with the shaft, said arm also provided with a depending lug, 79, adapted to engage the teeth of cog wheel 74. Upon the side of lever 75, corresponding to cog wheel 74 is a spring-actuated arm, 80, having a suitable finger piece at the top, and provided at its lower end with a lug, 81, extending into the slot 78 of curved arm 77.

The cog wheel 73 is adapted to mesh with a rack bar, 82, which rests and slides upon the bottom, 63, of the yoke. The forward end of rack bar 82, is provided with an upwardly-extending lug, 83, to which one end of a link, 84, is attached. The brackets 9, 9, are formed or provided with forwardly extending plates, 85, 85, which are provided with vertical slots, 86, 86, to receive the opposite ends of a front transverse shaft, 87, the extremities of said shaft having fixed thereon gear wheels 88, 88, which mesh with racks, 89, 89, formed upon the outer sides of plates 85. A bracket 90 is secured to the front side of the hopper at about the center thereof, and is provided with a vertical slot, 91, and also upon one side with a rack 92. The shaft 87 passes through the slot of this bracket, and also carries medially a toothed wheel or pinion 93, which meshes with the rack 92. This toothed wheel forms part of a collar, 94, which is fixed upon the shaft, and said collar is provided with a crank, 95, extending therefrom, to which the forward end of the link, 84, is attached.

It will, of course, be understood that so long as lug 79 of the curved pawl, 77, is in engagement with the teeth of ratchet wheel 74, it will be impossible to move lever 75 owing to the fact that shaft 72 is locked against rotation by the engagement of said lug with the rigid ratchet wheel 74. If, therefore, it is desired to shift the position of the lever so as to move the rack bar, 82, all that is necessary is simply to press upon the finger-piece of spring-actuated arm 80 and thus raise the arm and at the same time the curved pawl,

77, out of engagement with ratchet wheel 74. By now moving the lever 75 downwardly, the rack bar is forced forwardly, and by moving the same upwardly the rack bar is forced rearwardly. When the proper position of the rack bar is attained, pressure upon the finger piece of the spring-actuated arm is removed, and the pawl allowed to assume its normal position. If it is desired to shift the position of lever 75 without affecting the rack bar, all that is necessary to be done, is simply to press upon the finger-piece of spring-pawl 76 so as to raise said pawl out of engagement with cog wheel 73. Now, it is obvious that as rack bar 82 is moved forward or rearward in the manner just described the front transverse shaft 87 is raised or lowered as the case may be in the several vertical slots which form bearings therefor, said raising and lowering being accomplished by the connection of link 84 with lug 83 of the rack and with crank 95 formed upon collar 94 rigidly mounted upon the shaft. This vertical movement of the shaft is facilitated by the pinions thereon meshing with the several racks.

Located upon shaft 87 is a series of collars, 96, provided at their rear with tubular extensions, 97, at right angles thereto. Through these tubes pass the upper ends of a series of rods, 98, the lower ends of said rods being attached to the drag-bar hereinafter referred to. It will thus be seen that the upper ends of the rods pass loosely through the tubes referred to, and have transverse pins, 99, passing therethrough above the tubes. Each rod is encircled by a coiled spring, 100, confined between the drag-bar and the lower end of the tube. It will thus be seen that as the transverse shaft 87 is raised and turned in the manner previously pointed out, collars 96 are carried therewith, and consequently the drag-bars also elevated through the medium of rods 98. In this way the depth of the incision of the shares may be diminished, or said shares elevated entirely clear of the ground, if desired. On the other hand, when the shaft is lowered the depth of the incision is increased. This movement is accomplished, as will be readily understood by the manipulation of the lever 75. As the collars and the shaft are carried upwardly, the upper ends of the tubular extensions 97 strike against the transverse pins of the rods, and thus elevate said rods and at the same time the drag-bars. Upon the reverse movement of lever 75 the drag-bars are necessarily returned to their normal position by the lowering of the shaft, which relieves the pressure of the upper end of the tubes upon the transverse pin. By providing the interposed spring, the rods are held yieldingly in any position to which they may be adjusted, and at the same time, when shaft 87, is lowered, the tubular extension compresses the springs and causes the same to bear firmly upon the drag-bar, and causing a deeper cut to be made. Heretofore in order

to attain the elevation of the covering shares link chains, or equivalents, have been employed. It will be seen that my structure provides quite an improvement over the form now in common use in which such chains are used.

Pivoted to the front connecting piece, 14, of the movable frame, is a clip, 101, through which the forward end of the pole, 67, passes. This clip is provided with upwardly extending apertured ears, 102, to which the lower ends of supporting arms 103, 103, are pivoted, the upper ends of said arms being attached to lugs 104, 104, connected to the hopper. Beneath the pole is secured a clevis 105, having an angular forward extension, 106, provided with an aperture (not shown) for connecting the double-tree thereto, and also provided with laterally-extending apertured lugs, 107, 107, having the front ends of brace rods 108, 108, secured thereto, the rear ends of said rods being secured to the fixed side pieces, 12, of the frame. It will be seen that by the connection between the pole or thill of the machine and the front connecting piece, 14, of the movable frame, as the rear end of said pole is raised or lowered by manipulating the handle, 69, secured thereto, the front end of said pole through the medium of the pivoted clip, 101, causes the raising and lowering of the movable frame, and a consequent change in the angularity of the covering shares hereinafter referred to.

A transverse shaft, 109, is journaled in side pieces, 13, 13 of the movable frame, and is arranged just to the rear of the front connecting piece of said frame. Upon this shaft turn the forward ends of the horizontal drag bars. Each of these bars consists of two side pieces, 110, secured together by suitable transverse pins or rivets. They are spread out at their forward ends, and apertured to receive the transverse shaft, 109. Between the side pieces, and medially of their length, the lower ends of the rods, 98, are pivoted. The rear ends of the side pieces are spread out laterally, and curved rearwardly and downwardly, as shown clearly in Fig. 12. One of the transverse connecting rivets or pins at this rear portion of the drag-bar is encircled by a collar, 111, provided with an upwardly-extending apertured ear 112, through which the forward end of a slightly curved rod, 113, passes.

The numeral 114, indicates a crank which works between the sides of the drag-bar at the rear, said crank having at its forward and rear extremities, respectively, downwardly and upwardly-extending lugs 115, and 116, the latter having the rear end of rod 113 attached thereto, said rod receiving a coiled spring, 117, thereon confined between the lug 116, and the apertured ear 112.

The covering share or tooth is indicated by the numeral 118, and is composed, preferably, of sheet metal, which I find desirable to swage out instead of casting, the metal being swaged

up throughout its length centrally, forming an open upper edge. It will be noticed that the share is provided at both ends with points, so that it may be made reversible, this being
 5 a convenient arrangement where one point, after long use, becomes considerably worn. The share is pivoted medially, as indicated at 119, to the lower end of the drag-bar frame, and is also provided near its upper end with
 10 a transverse pin 120, which receives the downwardly extending lug, 115, of crank 114. This crank also is provided with an elongated slot, 121, which receives a transverse guide pin, 122, across the side pieces of the drag-bar.
 15 It will be readily apparent that by this arrangement, the moment the lower end of the covering share strikes an obstruction, the upper end will be forced down which will have the effect of turning the crank 114 and compressing the spring 117, thus allowing the
 20 share to pass clear of the obstruction. As soon, however, as the obstruction is thus successfully passed, the coiled spring expands and returns the share to its normal operative
 25 position.

It will be understood, that if the ribs upon the conveying cylinders were straight, and the cut-offs, 30, moved upon the same lengthwise, the seed contained within the cavities
 30 would necessarily be crushed by the action of the collars in this movement. In providing spiral ribs, however, this difficulty is obviated, inasmuch as the collars 30 moving lengthwise upon the conveying cylinders will have the
 35 effect of rotating said cylinders, by reason of the spiral formation of the ribs, and thus cause the seed contained within the cavities to be carried to the chute, with very little, if any, crushing as the result.

40 Having thus described my invention what I claim and desire to secure by Letters Patent of the United States is:

1. In a grain drill, the combination, of a rotatable and longitudinally movable axle, a
 45 cut-off for regulating the width of the seed opening from the hopper, a flanged plate movable longitudinally with the axle but not rotatable therewith, said plate constructed to prevent the passage of the seed above the cut-off, and a seed conveying cylinder rotatable
 50 with the axle, and also having a rotation independent thereof as said axle and the flanged plate are moved longitudinally, substantially as set forth.

55 2. In a grain drill, the combination, of a hopper having a series of seed openings therein, a rotatable and longitudinally movable axle, a series of cut-offs fast upon said axle, one end of each of said cut-offs being enlarged
 60 and provided with a series of spiral grooves extending a distance inwardly, flanged plates movable longitudinally with the cut-offs, and axle, but not rotatable therewith, said cut-offs constructed to regulate the width of the opening
 65 from the hopper, a series of seed conveying cylinders through which the axle loosely

passes, provided with spiral ribs forming seed pockets or cavities, said ribs constructed to engage the radial grooves of the cut-offs, and the cylinders held against longitudinal move-
 70 ment with the axle, and feed-cups beneath the hopper through which the axle passes and in which the cut-offs, flanged plates and cylinders operate, substantially as set forth.

3. In a grain drill, the combination, of a
 75 shaft having a crank arm extending therefrom, a horizontally sliding rack bar, a link connecting the forward end of said bar with the crank arm of the shaft, and a lever having a spring pawl engaging the rack bar, sub-
 80 stantially as set forth.

4. In a grain drill, the combination, of a shaft having a crank arm extending therefrom, a horizontally sliding rack bar, a link
 85 connecting the forward end of said rack bar with the crank arm, a rotatable shaft carrying a medial and an end gear wheel fast thereon, a pivoted curved pawl having a curved slot therein, and provided with a depending
 90 lug adapted to engage the end gear wheel, and an operating lever provided with a spring-actuated pawl engaging the medial gear wheel and with a spring-actuated arm having a lug engaging the slot of the curved
 95 arm, substantially as set forth.

5. In a grain drill, the combination of a movable frame consisting of pivoted side
 100 pieces, and a front connecting piece, a series of share-carrying frames secured thereto, a clip or yoke pivotally connected to the forward connecting piece of the frame, a pole or
 105 thill having its forward end passing through the clip or yoke, and its rear end provided with an operating handle or arm having a spring pawl thereon, and depending arms provided with elongated slots, receiving the ends
 110 of trunnions extending from the pole, and having their rear edges formed into racks adapted to be engaged by the spring pawl, substantially as set forth.

6. In a grain drill, the combination, of a drag-bar having its rear curved end spread
 115 apart and also having an eyed lug extending upwardly from said spread apart portion, a crank within the opening provided with an elongated slot to receive a transverse pin, a curved rod having its lower end pivotally secured to the crank and its upper end passing
 120 through the eye of the lug, a spring encircling said rod, and a share pivoted medially to the extremity of the frame and also connected near its upper end to the crank, substantially as set forth.

7. In a grain drill, the combination of a
 125 drag-bar consisting of two side pieces connected together, having their forward ends, connected to the frame proper of the machine and their rear ends spread apart and curved downwardly and rearwardly, an eyed lug extending upwardly from the rear curved
 130 portion of the bar, a crank disposed between the spread apart rear portion of the sides of the

bar, said crank provided with an elongated slot to receive a transverse pin, a curved rod having its lower end pivoted to an upwardly extending lug from one end of the crank and
5 having its other end passing through the eye of the lug, a spring encircling said rod, and a share pivoted medially to the extremity of the frame, and also connected near its upper

end to a downwardly extending lug from the crank, substantially as set forth. 10

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

ERNST H. GRAFUNDER.

Witnesses:

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ANNA V. FAUST.