(No Model.) 3 Sheets—Sheet 1.

S. G. RANDALL.

COMBINED DISK HARROW AND SEEDER.

No. 333,670. Patented Jan. 5, 1886.

Fig. 1.

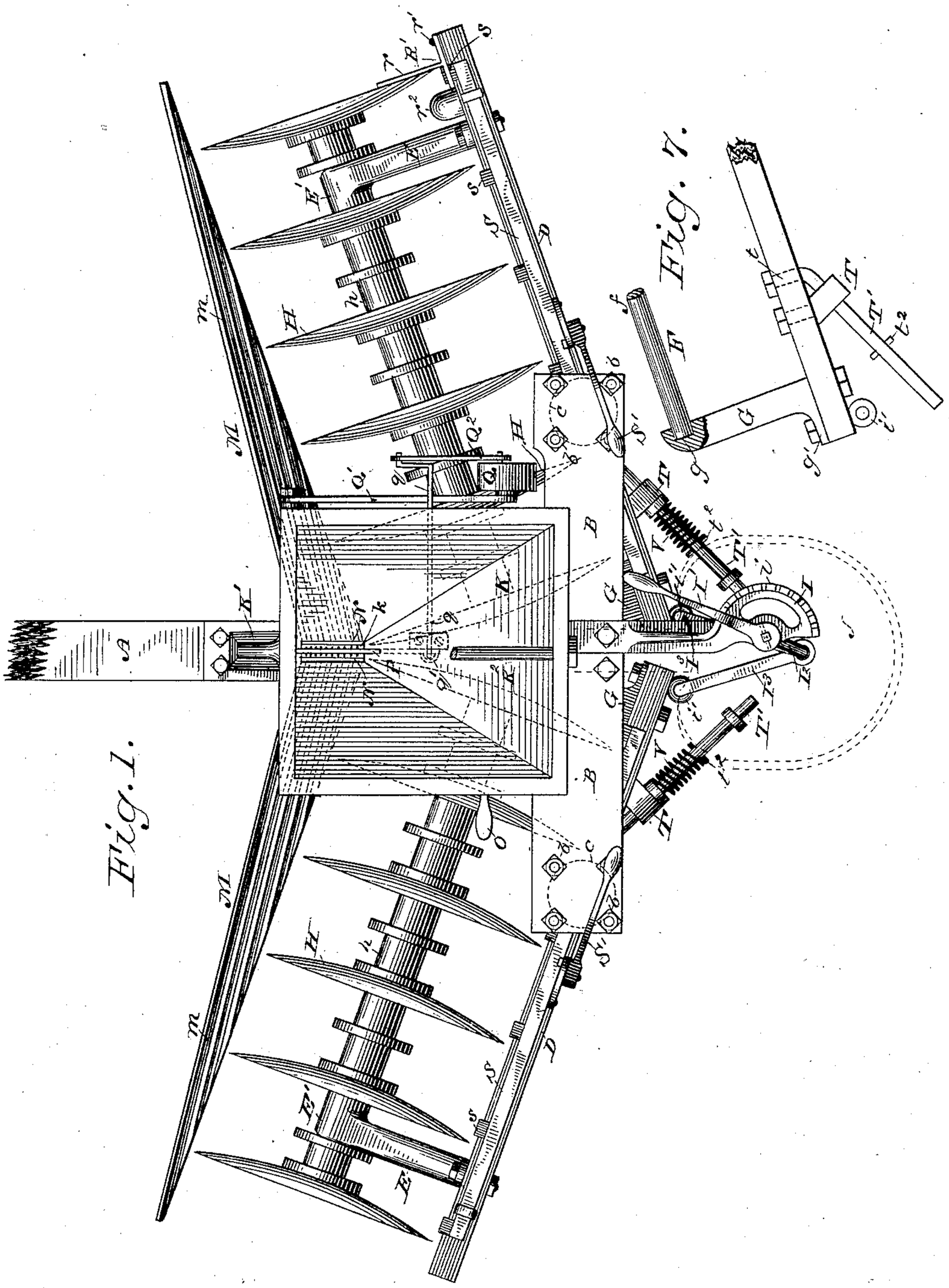

Fig. 7.

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Fig. 5.

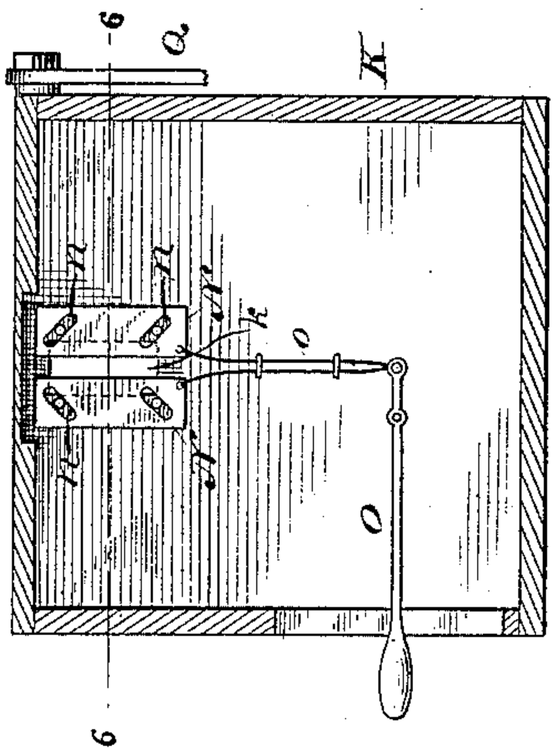

Fig. 2.

Fig. 6.

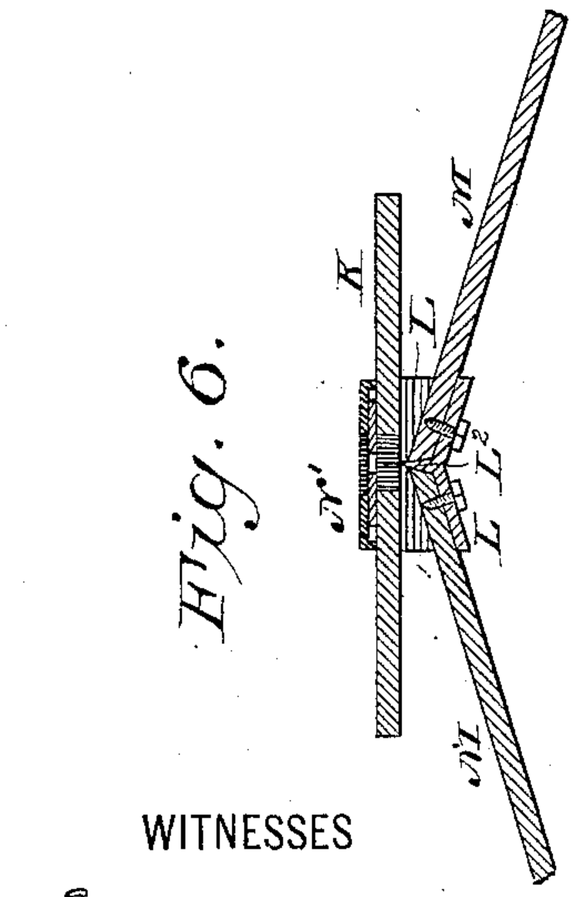

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Fig. 3.

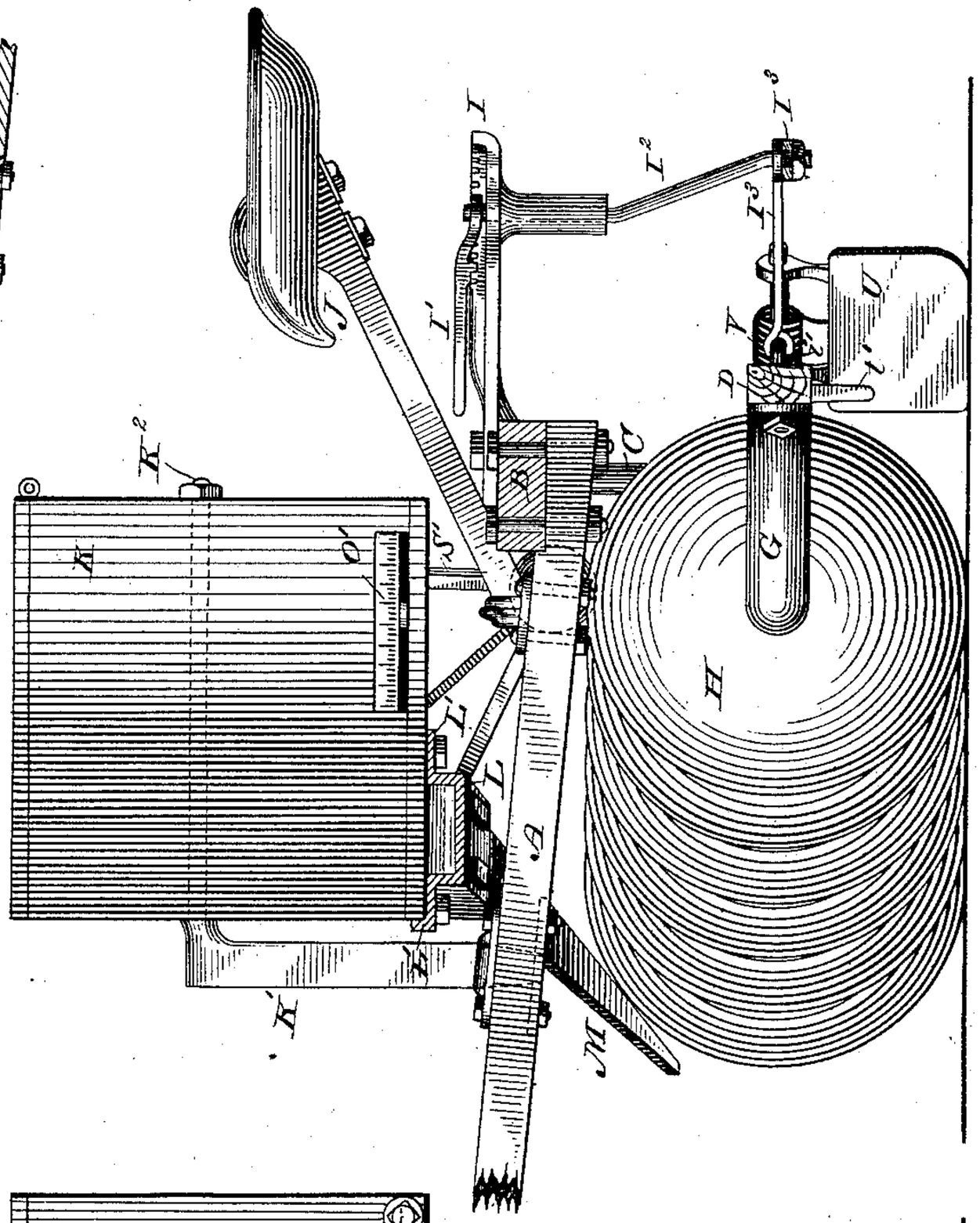


Fig. 4.

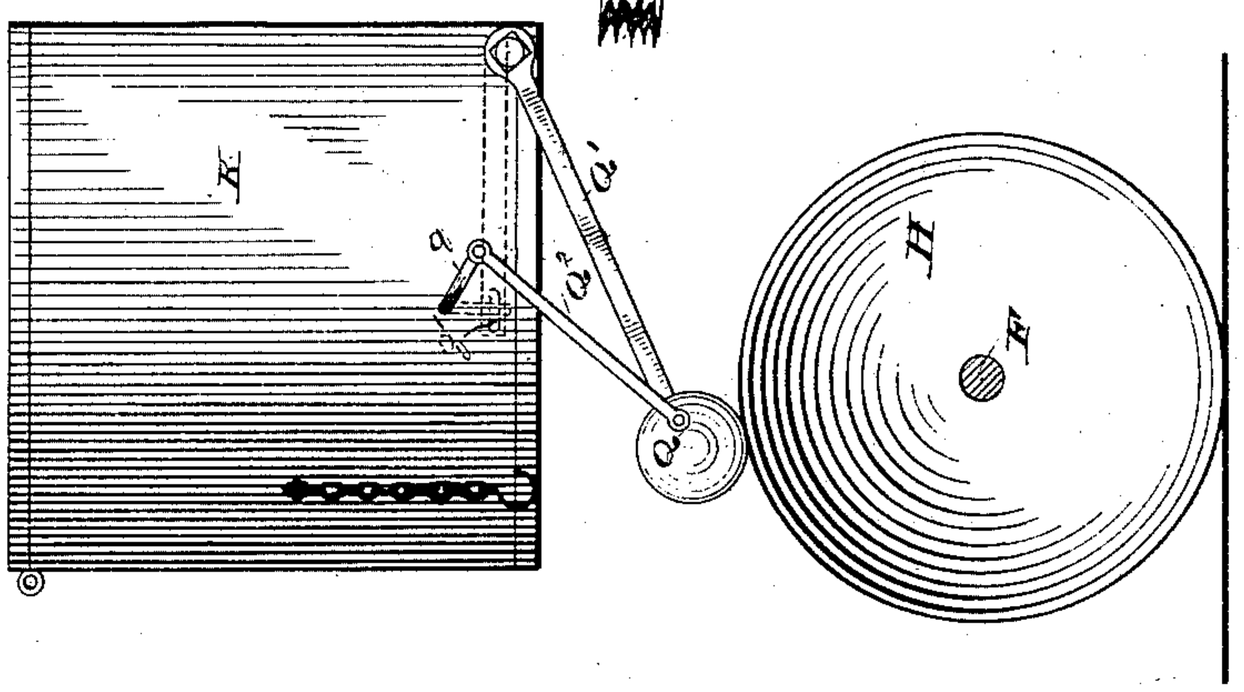
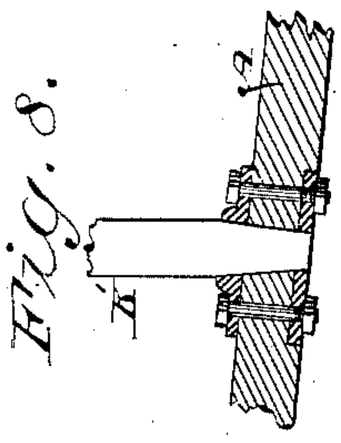


Fig. 5.



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UNITED STATES PATENT OFFICE.

SILAS G. RANDALL, OF GREENE, NEW YORK, ASSIGNOR TO AMELIA A. RANDALL, OF SAME PLACE.

COMBINED DISK-HARROW AND SEEDER.

SPECIFICATION forming part of Letters Patent No. 333,670, dated January 5, 1886.

Application filed April 4, 1885. Serial No. 161,231. (No model.)

To all whom it may concern:

Be it known that I, SILAS G. RANDALL, of Greene, Chenango county, New York, have invented certain new and useful Improvements in Combined Harrows and Seeders, of which the following is a specification.

The object of my invention is to produce a combined harrow and seeder of efficient, simple, and cheap structure. The details are fully set forth below.

In the accompanying drawings, Figure 1 is a plan view with the disks in working position; Fig. 2, a rear elevation with the disks parallel with the draft-line or in the position for transporting the machine; Fig. 3, a side elevation, partly in section, with one of the gangs removed. Fig. 4 is a detail view showing the means for actuating the seed-discharge devices. Fig. 5 is a detail view showing the manner of regulating the flow of seed from the hopper. Fig. 6 is a detail sectional view of the casting which supports the seed-distributing guides or boards. Fig. 7 is a detail view showing the bearing-support of the inner end of one of the gangs and the bracket and arm which carries one of the central covering-blades; and Fig. 8 is a detail view showing the preferred way of mounting the supporting bracket or standard of the seed-box.

Referring first to the harrowing part of the machine, A is the pole or tongue, upon the rear end of which is bolted a transverse cross-beam, B. In each end of the cross-beam a suitable number of bolts, *b*—say four—are secured. The ends of these bolts, which project from the under side of the cross-beam, are hooked, as clearly shown in Fig. 2, and embrace the circular head *c* of a depending standard, C, the construction being such as to permit the rotation of the head, as is hereinafter described.

A horizontal disk-gang beam, D, is secured in the following manner to the standard C: The lower end of each standard C, which is preferably of hollow cast-iron, is formed with a jaw, *c'*, which straddles the beam and is bolted thereto by a single bolt, c^2, which passes through the beam and jaws. By this construction the gang-beam, and with it the disk-gang, as presently appears, is capable of vertical vibration, to conform to the undulations of the ground, as is well understood, to more fully cover the seed which is delivered in front of the gang, as fully described below. A bearing-bracket, E, is bolted to each beam D near the outer end, and is formed with a bearing, E', at its outer end, in which the gang-shaft F has one of its bearings. This bearing is preferably located between the two outer disks, and the point of connection between the beam D and the standard C is preferably about one-third the distance from the inner end of the beam. The inner end of each gang-shaft F has its bearing in a bracket, G, securely bolted, as shown in Figs. 1 and 7, to the inner end of the beam D. The gang-shaft is seated in a socket in the outer end of the bracket G, as clearly shown at *g*, so that the end-thrust of the gang is received on the bracket. The bracket is therefore formed with a foot or brace, *g'*, to resist this strain. The disks H are arranged in any ordinary way upon the gang-shaft, and are spaced by suitable spacing-thimbles, *h*. They are shown as arranged to turn the earth from the central draft-line of the machine; but, so far as part of my invention is concerned, they may obviously be arranged to turn the earth toward the center of the machine. Obviously, now, the gang-beams, and with them the disk-gangs, may be swung or adjusted relatively to the line of draft to bring them into working position relatively to the seeding devices, the heads *c* of the standards C turning in the grasp of the bolts *b*. I effect this adjustment in the following manner: A casting, I, which is clearly shown in Figs. 1, 2, and 3, is bolted to the cross-beam B or to the pole, and extends rearwardly about in line with the pole. At its outer end this casting is enlarged on one side into the arc of a circle, as clearly seen in Fig. 1, and around the arc are arranged teeth forming a detent-rack, *i*. A horizontal lever, I', is connected with a depending cranked or bent arm, I^2, which has an elongated bearing in the casting I at the center, from which the arc of rack *i* is described, and at or about in the central line of the machine. The under side of the lever I' is formed so as to engage with the teeth of the rack *i*, while the lower end of

the bent or cranked arm I^2 is pivotally connected with two links, I^3, which are respectively connected with eyebolts *i'*, secured to the inner ends of the disk-gang beams D. By adjusting the horizontal lever or arm I' the gangs may therefore be swung or adjusted relatively to the line of draft, to throw them into working position or to bring them into a line parallel with the draft for transportation. They may be held in any desired position by the rack *i*. The driver's seat J is mounted on a seat-supporting standard, J', which is secured to the cross-beam or inner end of the pole behind the seed-box, and projects backwardly so that the seat is about centrally over the bearing of the cranked arm I^2. The driver from his seat may therefore readily reach down and adjust the gangs, as desired, or may even accomplish the adjustment by means of his feet. The seed box or hopper K is supported by an upright bracket, K', removably mounted on the pole or tongue, Figs. 1 and 8, a suitable distance in front of the cross-beam, and having at its top a horizontal arm or bolt, K^2, which extends through and supports the seed-box, as clearly shown in Fig. 3. The bracket is preferably of cast metal, and may be formed with a foot or base to be bolted directly to the tongue. I prefer, however, to mount it on the machine, as shown in Figs. 1 and 8—that is, the bracket is formed with a wedge-shaped end, which is loosely seated in a socket in the pole, faced above and below with metal plates, as clearly shown. The seed-box, although rectangular in its exterior formation, is preferably formed inside with a hopper-bottom, the inclined sides of which converge toward the grain-slit *k* at the front of the box, as clearly illustrated in Fig. 1. This gives a false bottom and affords a space below the hopper-bottom for the operation of devices to agitate the grain and adjust the size of the grain-discharge opening, as is presently described. A casting, L, is bolted to the bottom of the rectangular box K, just beneath the grain-discharge slit *k* in the hopper-bottom. This casting is formed with ears or flanges L' at the front and rear, by which it is bolted to the bottom of the grain-box. The sides of the casting are open, and the bottom inclines outwardly and downwardly on each side from a central ridge, L^2, as clearly shown in Fig. 6. This ridge is about flush with the bottom of the grain-discharge opening and divides it centrally longitudinally, so that the grain in discharging is divided into two streams, which fall on distributing plates or boards M. These boards are bolted to the upper faces of the downwardly-inclined sides of the casting L, and preferably are extended in sufficiently far to abut against the central feather or separator, L^2, as clearly shown in Fig. 6. They are shown secured to the casting in the simplest manner. Any other manner of attachment may be adopted to give greater strength. The boards are parallel with the slope of the bottom of the casting L, as clearly shown in Figs. 6 and 2, and are channeled or grooved upon their upper faces, preferably in parallel lines. As they incline from the casting L to the earth, the grain as it falls or flows down upon the boards will enter the channels *m* and be deposited upon the ground in front of the disks or covers in proper relation thereto. Each board is sloped or cut away on its rear edge from the inner end outwardly, as clearly shown in Fig. 1, at such an angle that the grooves *m* terminate at different points on the board, and at the proper points deliver the grain, which runs down the grooves, in proper relation to the disks or coverers when in their working position, as shown in Fig. 1. The grain-channels in the boards are preferably caused to terminate so as to deliver the grain on the earth about midway between the forward edges of the disks, as shown in Fig. 1—that is, starting from the grain-dividing ridge, there will preferably be a drop of grain every six inches. The boards M and the casting L are comparatively light, so that the box may readily be supported in the manner described. The grain-box, being pivotally suspended by the rod K^2, is free to seek a level position, and the grain-distributing boards or plates M are relieved from the effects of the irregular or uneven movement of the machine, caused by the natural undulation of the soil or casual obstructions. The grain, therefore, flows smoothly and regularly down the channels in the boards, and is properly delivered on the ground.

If deemed desirable, a cover, of wood or canvas, may be placed over the faces of the grooved grain-boards M, to prevent any liability of the grain being thrown out of the grooves and irregularly distributed.

A very important feature of my organization is the relation of the seed-box and seed-discharge devices to the disk-gangs and the frame of the machine. It will be noted that the seed-distributing plates or boards are arranged parallel with the disk-gangs when they are thrown forward into their working position—that is, they present a V-shaped structure corresponding in its angle of inclination with the inclination of the disk-gangs when they are thrown forward, as shown in Fig. 1. This brings the inner ends of the grain-distributing boards considerably within the line of or behind the outer disks of the gangs. I am therefore enabled to locate the seed-box over the inner ends of the disk-gangs, and thus not only give a machine of great compactness and convenience of structure, but can also keep the weight of the seeding devices well back on the pole to relieve the load on the necks of the horses.

The upright standard or bracket K', instead of being mounted, as shown in the drawings, directly upon the pole of the machine, might be placed at the rear of the grain-box, if preferred, without in any other respect changing the structure shown in the drawings, except to slot the seat-standard and form a socket for the reception of the end of the bracket K' in

the cross-beam. It would also of course be entirely possible to support the seed-box both at the front and back, or upon a standard secured centrally to the bottom of the box and seated in a socket in the pole of the machine. I prefer, however, to mount the box so that it can rock to maintain a level position.

By locating the seeding devices on the pole in front or partly in front of the disk-gangs and placing the devices for adjusting the gangs in rear of the gangs, I get a compact and convenient structure not heretofore obtained.

My improved structure dispenses with the ordinary grain tubes and devices for each disk or coverer, and gives a combined harrow and seeder of great simplicity, lightness, and cheapness of construction.

In order to regulate the size of the grain slit or discharge in the bottom of the hopper-box K, I provide an arrangement which is clearly shown in Figs. 5 and 6. I employ two sliding plates, N N, arranged on each side of the grain-opening. Each plate is formed with parallel inclined slots *n*, in which guide bolts or pins secured in the bottom of the hopper work. A pivoted lever, O, the handle of which projects through a slot in one of the side walls of the hopper, is connected, by means of a couple of light metal rods, *o*, guided by suitable eyes or staples, with the sliding plates N N. By the movement of the lever O, therefore, the plates N N are caused to slide and to approach or recede from each other, thus partly closing or opening the grain-discharge opening in the bottom of the hopper. A scale, O′, may be arranged on the outside of the box at the slot from which the handle of the lever O projects, so that the operator may gage the exact amount of grain to be fed. Of course the grain-discharge may be completely closed when the machine is being transported. These devices are all arranged between the outer bottom of the box K and the hopper-bottom. The plates N N are preferably covered by a slotted shield, N′, as shown in Fig. 6, to prevent their displacement or the filling of the slots *n* with grain. This shield is omitted in Fig. 5.

The grain-agitator P, which in this instance is shown as consisting of a reciprocating rod extending above and along the opening in the hopper-bottom and parallel therewith, slides in apertures in the hopper-frame, and is actuated in the following manner: A crank friction-wheel, Q, is mounted in bearings on the end of a pivoted rising-and-falling rod, Q′, secured to the grain-box. A crank-connection or pitman, Q^2, extends from the crank-wheel Q to the crank-shaft *q*, projecting from the side of the grain-box. The end of the shaft *q* within the box is turned down and engages in an eye, *q*′, on the end of the shaft of the agitator P, as clearly shown in the drawings. The friction-wheel Q is made sufficiently wide to insure its proper frictional contact with one of the disks H of one of the disk-gangs when the gangs are in working position, as shown in Fig. 1. As there is but a single grain-discharge opening in the grain-box, the agitator is small and light, and requires a minimum power to actuate it. The mere gravity, therefore, of the wheel Q and the lever and pitman Q′ Q^2 gives sufficient pressure of the wheel against the edge of the disk to actuate the agitator. The wheel Q is preferably made of hard wood, but any other suitable material may be employed, and, if deemed expedient or desirable, it may be weighted, in order to cause a firm contact with the edge of the disk H. However, by my improved manner of distributing the grain for all the disks from a single discharge-opening, a very small power is required to cause the proper flow of the grain.

I have spoken of a single grain-discharge opening and prefer to use but one, though it will be obvious that an opening for the grain-board of each disk-gang might be employed.

The grain-driving wheel may be lifted and suspended by a chain and hook or other suitable device, q^3, on the grain-box when the machine is being transported from place to place.

In order to clear the disks of adhering earth and clogging matter and cause them to cover the seed more neatly and evenly, I employ scrapers R, one of which only is shown at the right-hand sides of Figs. 1 and 2, to avoid the unnecessary complication of the drawings. The scraper proper, *r*, projects from a plate, R′, one end of which is pivoted to the disk-gang beam D at *r*′. The other end carries a weight, r^2, which tends, as will be obvious, to force the scraper *r* toward the disk. The scraper *r*, instead of being straight, as illustrated, may be curved or inclined, so as to enter the face of the disk. The scrapers of each gang are thrown into and out of action by a sliding scraper-bar, S, which lies on top of each gang-beam, and is actuated by a scraper-lever, S′. A series of wedge-shaped lugs, *s*, one for each scraper, projects laterally from this bar toward the disks, and the scraper-plates R rest thereon, so that when the bar is caused to slide endwise away from the center of the machine the wedge-shaped projections *s* turn the pivoted scraper-plates R′ on their pivots *r*′ and throw the scrapers away from the disks. When the bar is moved in the opposite direction, the wedges *s* are withdrawn and the scrapers thrown into action. When the scrapers are thrown up by the jostling of the machine, or by the abrupt effect of lumps of earth on the disks, the weights serve to return them with considerable power or impact against the clogging material, and thus free the disks from the earth, and also keep the scrapers themselves free from the accumulations of dirt.

Where the disks are arranged to throw the earth from the center of the machine, as here illustrated, the inner disks of the gangs must either be arranged quite close together, in which event they cut out and leave a large furrow in the middle of the track of the machine, or they are placed somewhat apart, in which event quite a strip of ground is left in the

middle where the seed delivered in front of the gangs will not be properly covered.

In order to thoroughly cultivate the soil and cover the seed, and yet leave the track of the machine smooth and uniform, I employ in connection with the inner disks, which I place close together, as seen by dotted lines in Fig. 1, scrapers or levelers placed at an angle to the line of draft, which serve to throw the earth back into the central furrow and leave the ground in smooth uniform condition. A bracket, T, is secured on the rear side of each disk-gang bar a short distance from its inner end. A bar, T′, the bent end *t* of which passes through the beam D and is secured by a suitable nut, also passes through this bracket and projects rearwardly from the bar toward the center of the machine, as illustrated in Fig 7. Levelers or soil-eveners U are mounted on the bars T′ by means of straps fastened to the levelers, the upper ends of which are formed with eyes, through which the bars T′ pass. Springs V, coiled around the bars T′ and having their free ends bearing upon the eveners, tend to press them forward or toward the soil. The motion of the eveners in that direction is, however, limited by depending prolongations *t′* of the brackets T. The straps U′ are prevented from slipping endwise on the bars by cross-pins t^2, between which and the straps U′ nearest the disk-gang beams the coiled springs V are interposed. Of course any other construction may be adopted, but this I consider efficient and simple. The eveners are arranged just behind the inner disks of the gangs, and serve to throw more or less of the earth back into the central furrow cut by the disks.

I have now described my improvements as organized in a simple and efficient manner, well adapted for their practical application. Their details may, however, be varied in many respects without departing from the spirit of my invention.

It will be plain that a machine might be organized according to my invention with the disks arranged to turn the earth inward.

I am aware of Patent No. 290,293, which shows an inclined board divided into passages partly closed by cross-pieces, for the purpose of distributing liquid manure, and I do not therefore claim such subject-matter.

I am also aware that it is common in this class of machines to employ scrapers which are held in their normal relation to the cutting-disks by means of springs, and I do not of course claim such subject-matter.

I am also aware that in a cultivator it has been proposed to employ a pair of scrapers secured on the frame between the inner ends of the opposing sets of cultivating devices, for the purpose of cleaning out the center of the furrow, and I do not therefore claim such subject-matter.

I claim as my invention—

1. The combination, with the harrow and its frame, of the grain carrying and discharge devices, the distributing grain plate or board having inclined unobstructed grooves or grain-conveying ways which run from the point where the grain is delivered in bulk upon the board and terminate at different points along the edge of the board, whereby it is adapted to receive the grain in bulk and deliver it upon the ground at the required intervals in front of the disks.

2. The combination, with the harrow, its frame, and a grain-receptacle and discharging devices, of inclined grain-distributing drill plates or boards extending laterally on each side from the grain-discharge opening or openings, and having unobstructed grooves or grain-conveying ways which extend on both sides from the center of the board where the grain is delivered in bulk and terminate at different points along the edge of the board, whereby the board is adapted to receive the grain in bulk and deliver it upon the ground in proper position at the desired intervals in front of the harrowing devices, as set forth.

3. The combination, with the harrow, its frame, and a grain-receptacle and discharging devices, of grain-distributing drill plates or boards which extend laterally on each side from the central grain-discharge opening or openings, are inclined outwardly and downwardly from the center, as shown, and have unobstructed grooves or grain-conveying ways which extend from the central grain-discharge outwardly in both directions and terminate at different points along the edge of the board, substantially as described.

4. The combination, with the harrow and its frame, of a grain-box and the grain-distributing plates or boards mounted so as to vibrate freely vertically to seek a level position, and adapted to receive the grain in bulk and deliver it upon the soil at the desired intervals in front of the harrowing devices, substantially as set forth.

5. The combination, with the harrow devices and frame, of the grain-box and the inclined grain-distributing plates formed with longitudinal parallel grooves for the purpose of conveying and distributing the grain, and cut away at an angle, as set forth, whereby the grooves are caused to terminate at different points on the boards and deliver the grain upon the ground at the desired intervals with reference to the harrowing devices.

6. The combination of the frame or pole, a grain-box, the grooved distributing grain plates or boards arranged in V shaped position or at an angle to each other, as shown, and adapted to deliver the grain received in bulk from the grain-box in drills at suitable intervals, and the disk-gangs adapted to be set in working position parallel, or substantially so, with the grain-distributing boards.

7. The combination of a disk-gang, means for adjusting the gang so as to bring the disks at an angle to the line of draft, a grain-box, and grain-discharge devices, and an inclined grain-distributing plate or board arranged

parallel with the disk-gang in its adjusted position and having longitudinal parallel grain-conveying grooves or ways, the board being cut away at an angle so as to cause the grain-grooves to terminate at the proper interval along the edge of the board which is parallel with the disk-gang.

8. The combination of the frame or tongue, the inclined grain-distributing boards arranged in V shape, the disk-gangs, means for adjusting the gangs so as to bring the disks at an angle to the line of draft, and the grain-box located at the inner ends of the grain-boards and disk-gangs.

9. The combination of the frame, the grain-distributing boards arranged in V shape, disk-gangs arranged in corresponding V shape when adjusted into working position, and the grain-box located over the inner ends of the disk-gangs.

10. The combination, with a frame and gangs of disks or harrowing devices on which the weight of the machine is carried, of mechanism for adjusting said harrowing devices at an angle to the line of draft or in V-shaped relation to each other, a grain-box located centrally on the machine or at the apex of the series of harrowing devices, and grain dropping or distributing devices arranged in corresponding V-shaped relation to said harrowing devices, as set forth.

11. The combination of the grain-box and grain-distributing devices, the driving-roller for agitating the grain, mounted on a rising and falling arm, and the disk or wheel traveling in or upon the earth with which said roller makes contact, for the purpose set forth.

12. The combination of the tongue, the cross-beam, the adjustable disk-gangs, an extension or casting projecting from the rear of the machine, a cranked arm having a bearing in such extension or casting, link-connections between the cranked arm and the inner ends of the disk-gang beams, the disk-gang shafts, and an arm or lever for operating the cranked arm to adjust the disk-gangs.

13. The combination of the pole, the cross-beam, the disk-gangs, the casting I, projecting from the rear of the cross-beam and formed with a half-circular detent-rack on one side, a vertical cranked arm having a bearing in said casting at or about the center of the machine, connections between said cranked arm and the disk-gangs or gang-beams, and the horizontally-vibrating lever for adjusting the gangs.

14. The combination of the disk-gangs arranged to turn the earth from the center of the machine and having their inner disks arranged in close proximity to each other, and the opposing scrapers or eveners arranged at an angle to the line of draft and adapted to refill or partly refill the large furrow cut by said two inner disks.

15. The combination of the disk-gang beams, the inclined rearwardly-projecting leveler or scraper-carrying rods, the levelers or scrapers carried thereby, and the springs.

16. The combination of a cutting-disk and a pivoted weighted scraper, the weight of which normally tends to throw the scraper against the disk.

17. The combination of the cutting-disk, the pivoted weighted scraper, the weight of which normally tends to throw the scraper against the disk, and the sliding wedge-block adapted to lift the weighted end of the scraper and throw it out of engagement with the disk.

18. The combination of the gang-beam, a series of pivoted weighted scrapers mounted thereon, the sliding bar carrying a series of wedge-blocks, one for each scraper, and a lever for actuating the sliding bar to throw the scrapers into and out of engagement with the disks.

19. The combination of the pole, the cross-beam, the standard having enlarged circular head, the hooked bolts which connect the standard with the cross-beam and yet permit it to turn horizontally, and the disk-gang.

20. The combination of the main frame, the depending standards, the disk-gang beams carried by said standards, bearings for the disk-gangs carried by said gang-beams and projecting forwardly therefrom, disk-gangs mounted in said bearings, and scrapers or eveners arranged to act upon the soil between the ends of the disk-gangs mounted upon the inner end of the disk-gang beams.

In testimony whereof I have hereunto subscribed my name.

SILAS G. RANDALL.

Witnesses:
E. C. DAVIDSON,
N. L. HOLMES.