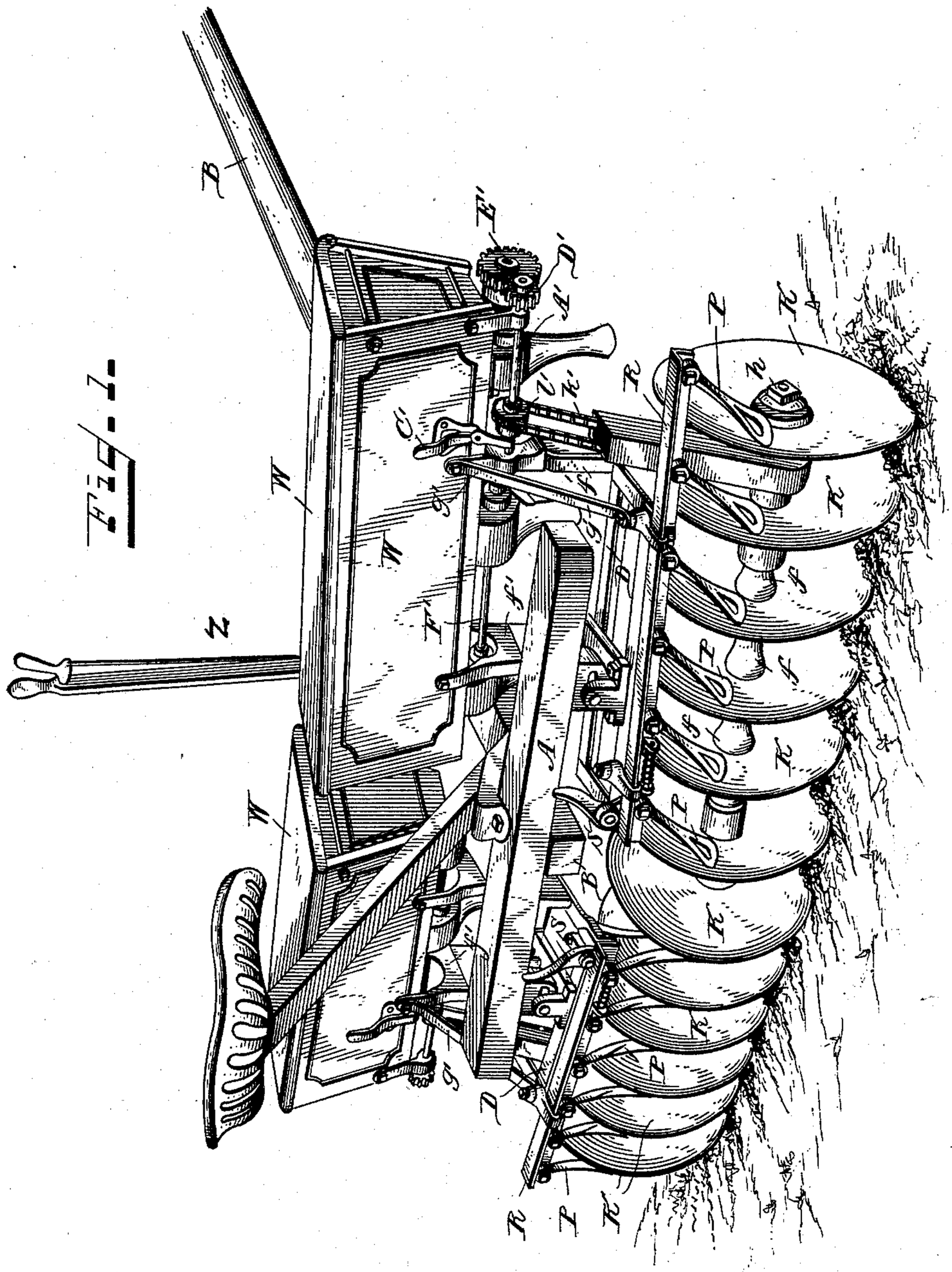
(No Model.) 5 Sheets—Sheet 1.

# W. H. NAUMAN.

## COMBINED HARROW AND SEEDER.

No. 477,441. Patented June 21, 1892.



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(No Model.) 5 Sheets—Sheet 2.

# W. H. NAUMAN.

## COMBINED HARROW AND SEEDER.

No. 477,441. Patented June 21, 1892.

Fig. 2.

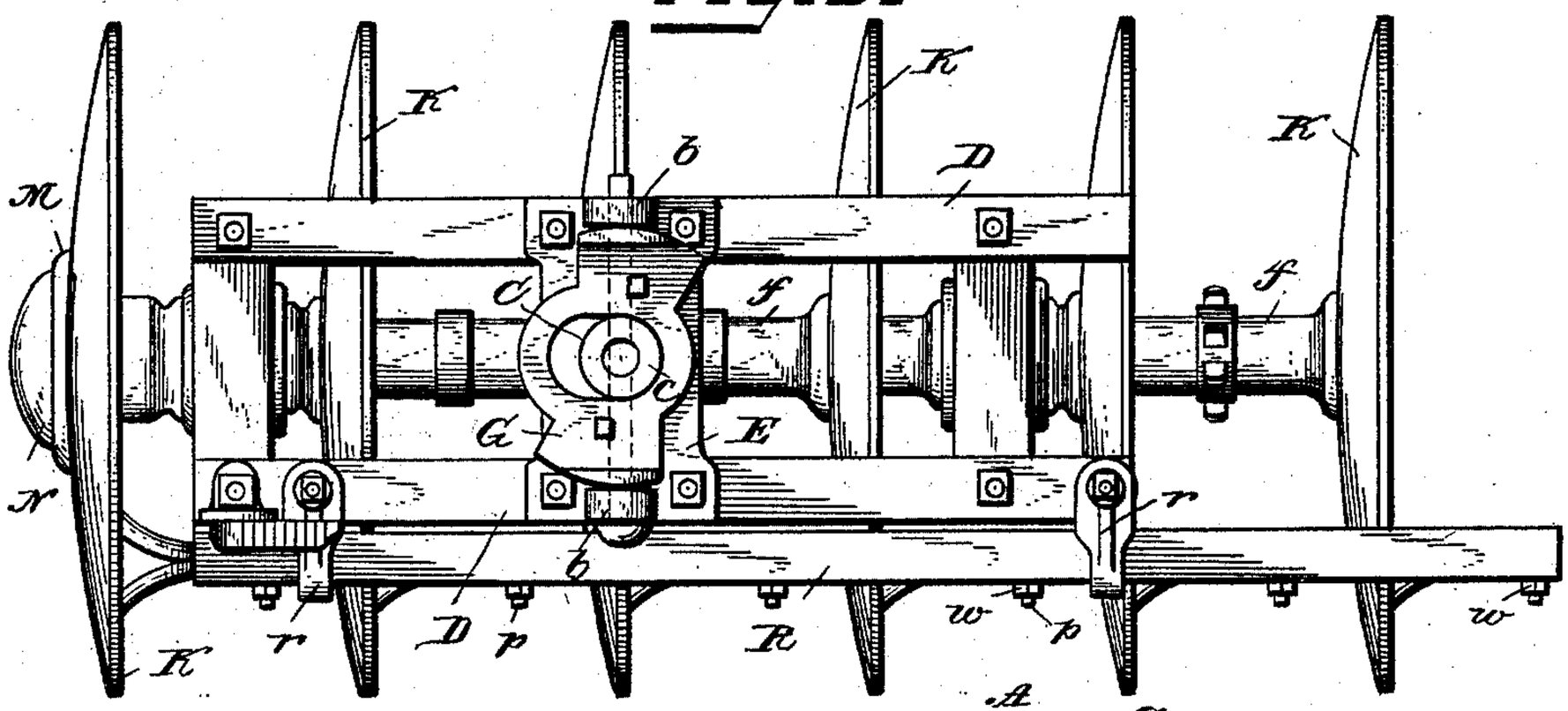



Fig. 2a.

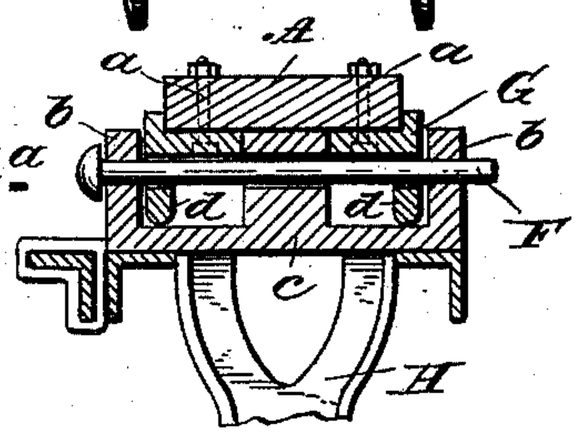
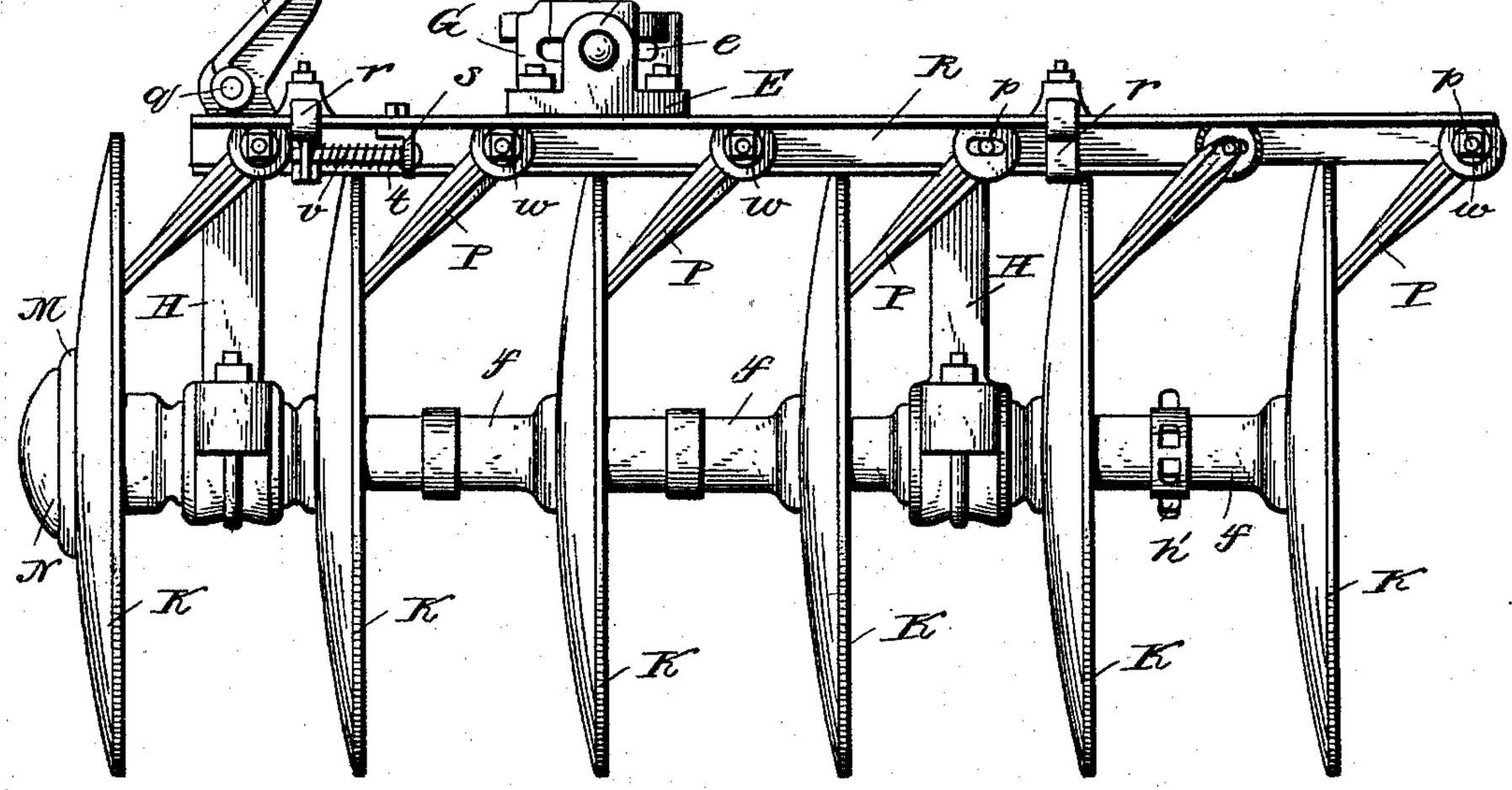



Fig. 3.




Witnesses.
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(No Model.) 5 Sheets—Sheet 3.

# W. H. NAUMAN.

## COMBINED HARROW AND SEEDER.

No. 477,441. Patented June 21, 1892.

Fig. 4.

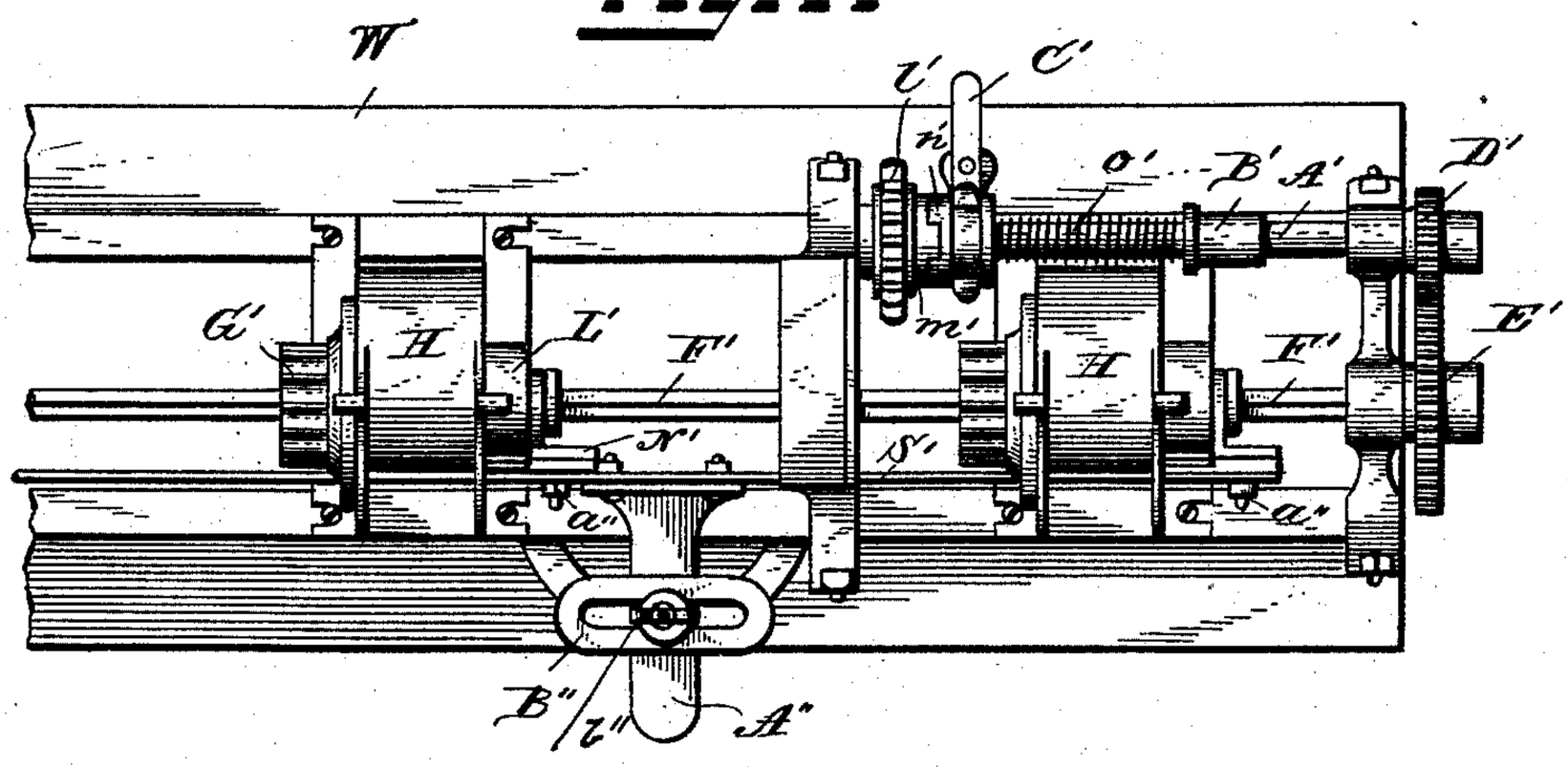



Fig. 5.

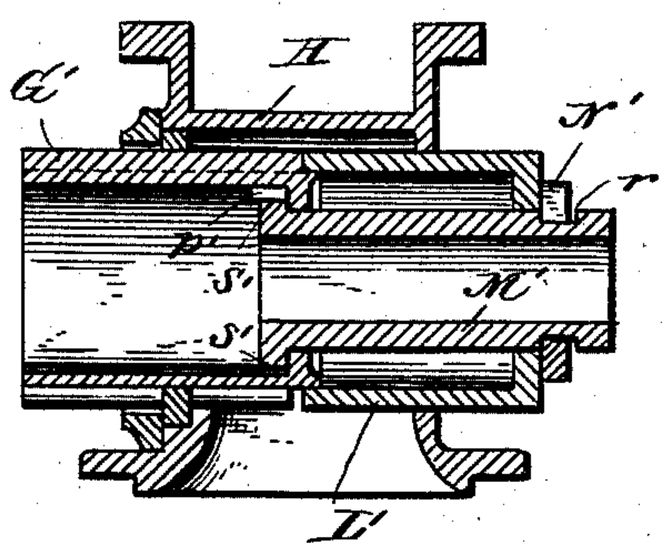
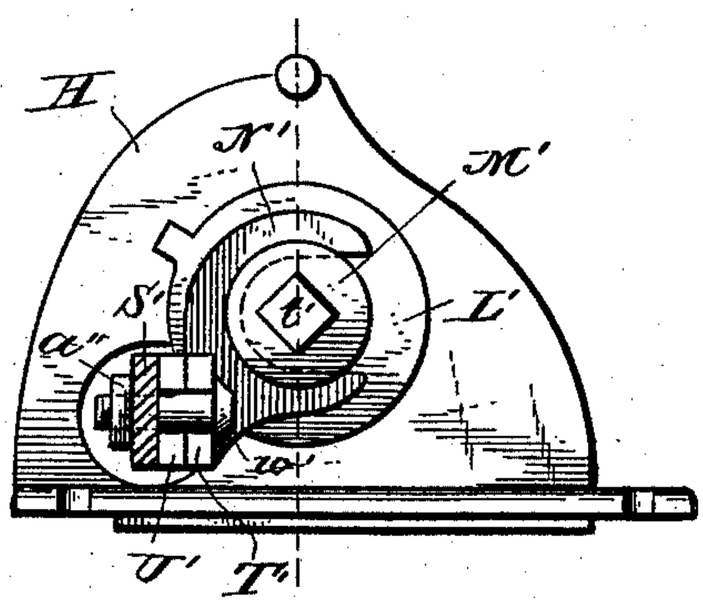



Fig. 6.



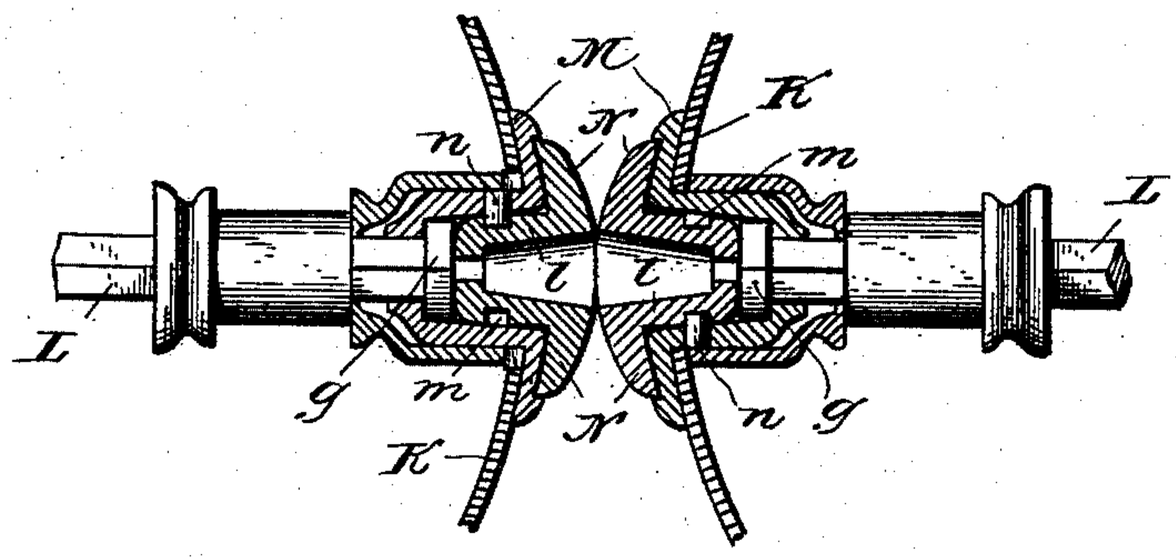




Fig. 7.

Witnesses.
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(No Model.) 5 Sheets—Sheet 4.

# W. H. NAUMAN.

## COMBINED HARROW AND SEEDER.

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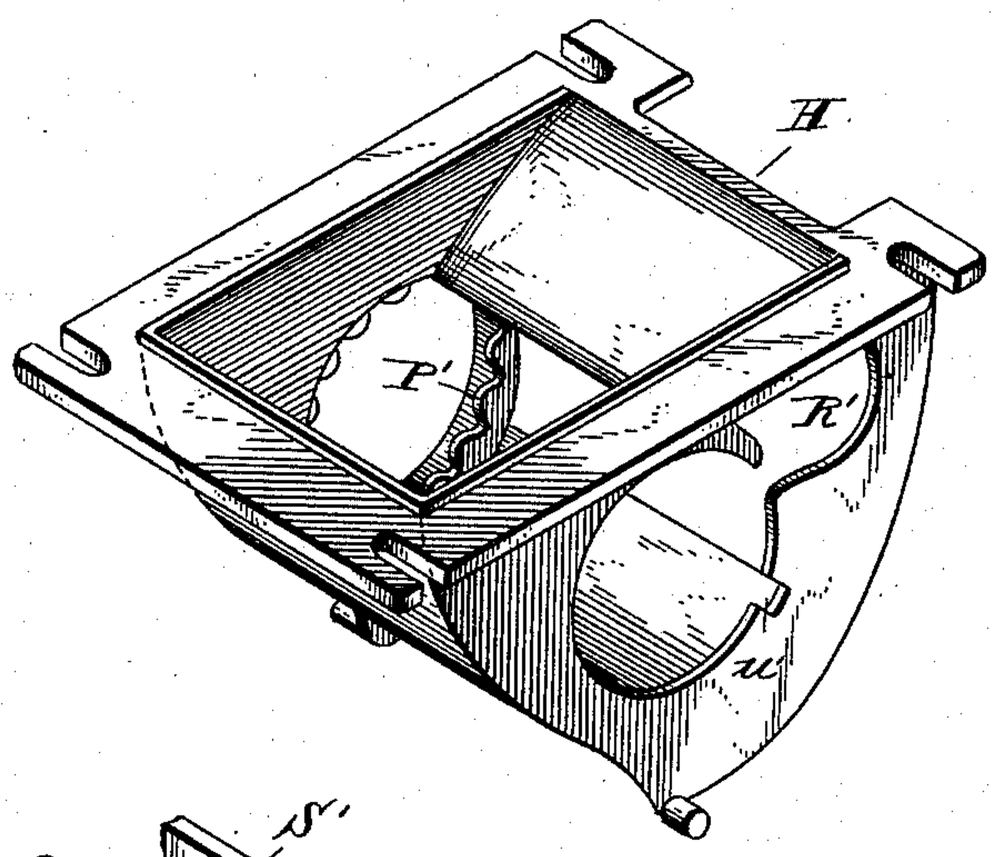


Fig. 8.

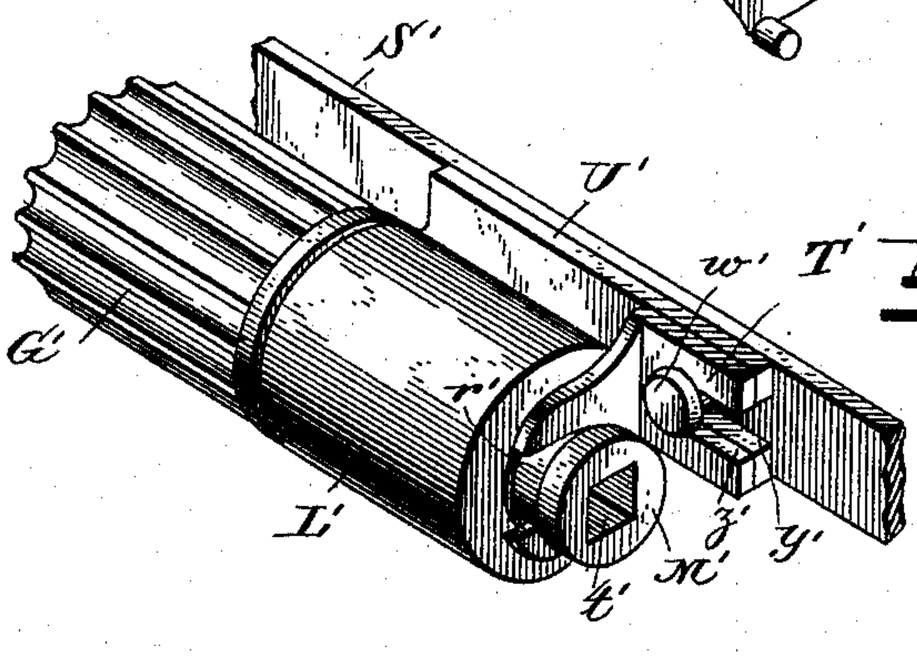


Fig. 9.

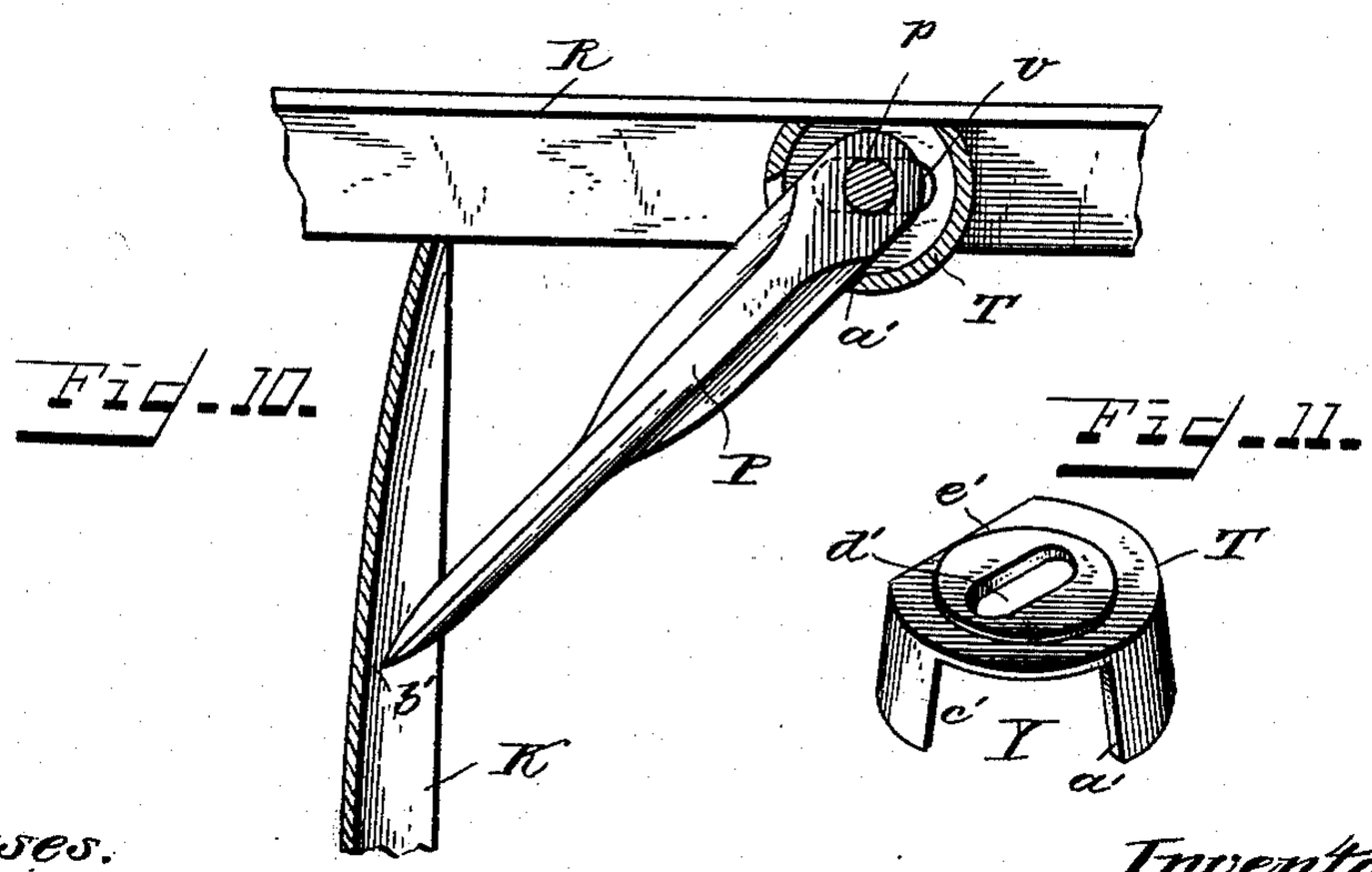


Fig. 10.




Fig. 11.

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(No Model.) 5 Sheets—Sheet 5.

# W. H. NAUMAN.

## COMBINED HARROW AND SEEDER.

No. 477,441. Patented June 21, 1892.

Fig. 12.

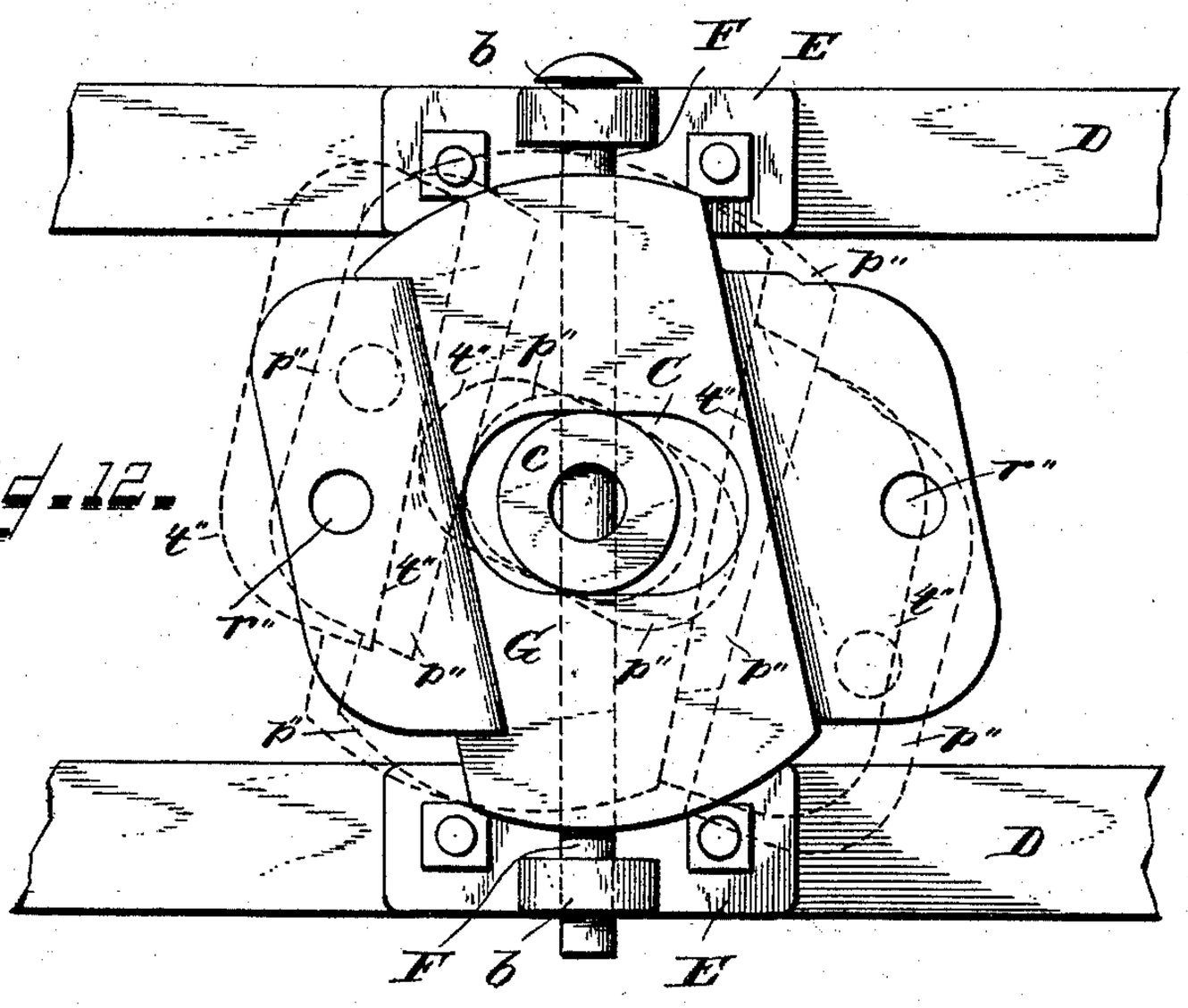
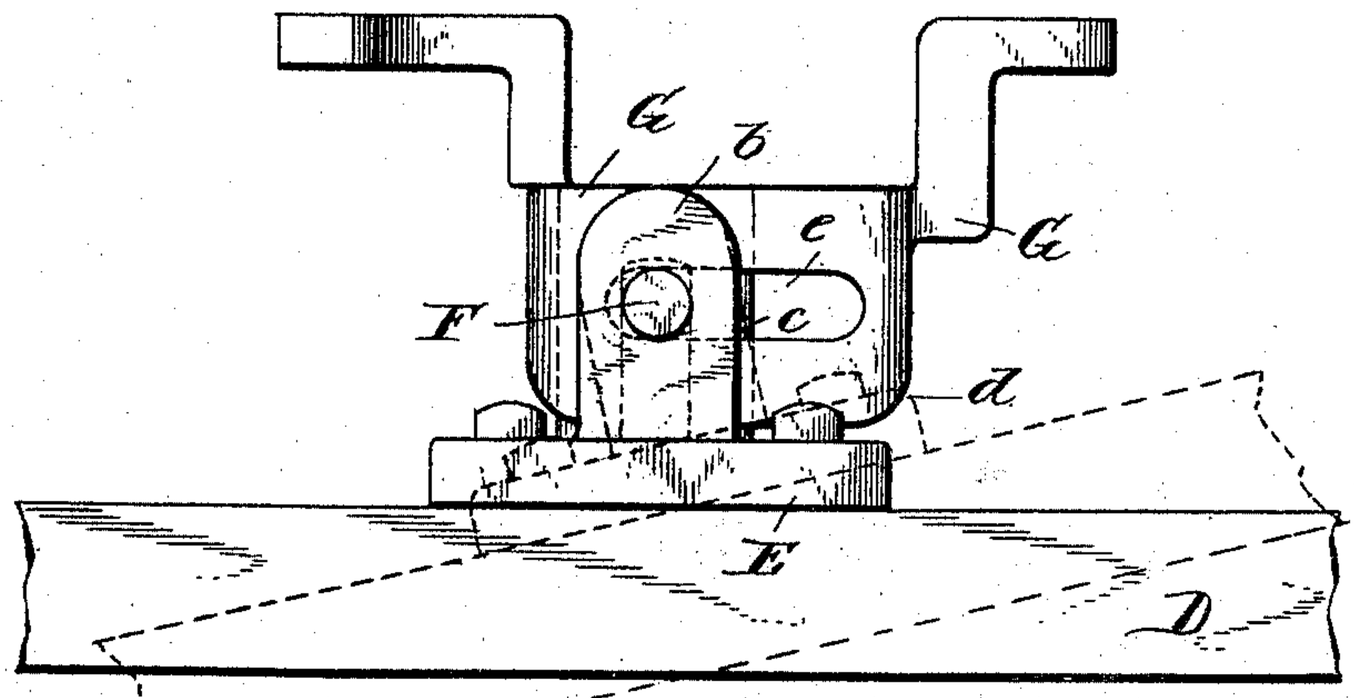



Fig. 13.

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# UNITED STATES PATENT OFFICE.

WILLIAM H. NAUMAN, OF DAYTON, OHIO, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE DAYTON FARM IMPLEMENT COMPANY, OF SAME PLACE.

## COMBINED HARROW AND SEEDER.

SPECIFICATION forming part of Letters Patent No. 477,441, dated June 21, 1892.

Application filed July 20, 1891. Serial No. 400,019. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM H. NAUMAN, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in a Combined Harrow and Seeder, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to a harrow of the class known as "rotary-disk harrows," upon which is mounted a seed-box whose feeding mechanism is operated by the disk gangs; and it has for its object the improvement in construction and mode of operation of such machines, the novelty of which will be hereinafter more particularly pointed out and claimed.

The first part of my improvements relates to the construction of the frame-work which supports the disk gangs and in the method of pivoting the gangs of disks to the frame, whereby the disk gangs, whether set at an angle to each other or in a straight line, will always remain with the buffer-heads on the inner end of the gangs in contact with each other, thus insuring the positive relation of the gangs of disks with each other. In rotary-disk harrows of the ordinary construction, which are provided with buffer or anti-friction heads at their inner ends, these anti-friction heads in contact are arranged, ordinarily, to touch when the gangs are set at right angles to the line of draft; but when the gangs are set at an angle to each other by operating the shifting-lever, the pivotal connection of the gangs to the supporting-frame being fixed, the anti-friction heads are thrown away from each other as they swing on independent centers, and as a result the strain on the harrow is very largely increased. The object of my improvement in this respect is to avoid this difficulty and do away with the consequent strain on the machine, and this I accomplish by providing an oblong slotted hinge connection for the swivels of the gangs, so that the gangs may be allowed to approach each other as they are turned to the angular position.

The second part of my improvements consists of a novel method of securing the anti-friction heads of the gangs, so that they may be easily fastened to the gang-shaft, and yet be free to revolve independently thereof in either direction; and it consists, chiefly, in supplying pins passing through the recessed clamping-heads, which take into an encircling groove or channeled recess in the anti-friction head, and thus secure same to the gang-shaft in the manner to be hereinafter described and claimed.

The third part of my improvements consists of a novel method of attaching the disk scrapers to the reciprocating bar which carries the series of scrapers, whereby each scraper may be independently adjusted with reference to its disk both angularly and laterally, and so that when the scrapers are brought into play they will not engage or rub against the disks, except when actively engaged in removing mud or dirt, the contact of the mud with the scraper automatically throwing it against the disk, while as soon as the mud is removed the scraper drops away from the face of the disk by its own gravity. As ordinarily constructed, scrapers of this description, while they may be independently adjustable, yet when the series of scrapers are thrown against the disks they rub against the same, causing great friction, whether there is mud to be removed or not, and if they are angularly adjustable they cannot be in the older constructions at the same time laterally adjusted independent of each other, and it is to overcome these difficulties that this part of my invention is directed.

The fourth part of my improvements relates to a novel construction of the force-feed seed-cup for the seeding attachment and to certain novel means for attaching the non-rotating cut-off cylinder to the rotating feed-wheel, so that both feed-wheel and cylinder will slide on the feed-shaft and so that each cylinder and feed-wheel may be independently adjusted with reference to its seed-cup on the reciprocating bar, while the entire series of feed-wheels may be all simultaneously adjusted to sow any quantity of seed by adjusting the reciprocating bar, the novelty of which will be hereinafter more particularly pointed out and claimed.

In the drawings, Figure 1 is a perspective

view of the combined harrow and seeder. Fig. 2 is a top plan view of one of the disk gangs. Fig. 2ª is a cross-section of the disk-gang frame, showing the swivel connection of the parts. Fig. 3 is a rear elevation of the disk gang of Fig. 2. Fig. 4 is a bottom plan view of a portion of the seed-box and seed-cups. Fig. 5 is a central longitudinal section of one of the seed-cups bottom side up. Fig. 6 is an end view of same. Fig. 7 is a central longitudinal section of the abutting anti-friction heads of the disk gangs. Fig. 8 is a perspective view of one of the seed-cups with the cylinder and feed-wheel removed. Fig. 9 is a perspective view of one of the force-feed seed-wheels and cylindrical cut-offs. Fig. 10 is a rear view of a portion of the scraper-bar and harrow-disk with the retaining-cap for the scraper in cross-section. Fig. 11 is a perspective view of the slotted retaining-cap for each scraper. Fig. 12 is an enlarged top plan view of the swivel connections of the disk gangs with the frame, showing the slotted connection-plate in three positions by means of dotted lines. Fig. 13 is a side view of the same, showing the connection-plate in the four positions by dotted lines.

A is the main or cross beam of the machine, to which the pole or tongue B is rigidly secured. To this main beam A, at about the middle of each half, are firmly secured by the bolts *a a* through the bolt-holes *r'' r''* the pair of slotted plates G G, provided with longitudinal central slots C. To these plates the pair of gang-frames D D are hinged, as follows: Securely bolted to the top of the frames are the plates E E, having upwardly-extending ears *b b* and a central pivot-pin *c*, while the bolt F passes through these ears *b b* and through the downwardly-extending lugs *d d* of the plates G G, thereby hanging the gang-frames to the main beam A of the machine, so that the gang of disks can swing up and down at the ends to conform to any incline in the ground, as shown in dotted lines, Fig. 13. The lugs *d d* of the plates E are provided with horizontal slots *e* to receive the bolt F and allow the gang-frame to be set at an angle to the main beam, as shown in dotted lines *p''* in Fig. 12, the frames turning on the pivot-pin *c*. In order to allow the gang-frames to approach each other when set at an angle, the bearing of this pivot-pin in the plate G is slotted, as shown in Figs. 2 and 12, and as the lugs *d d* are likewise slotted the pair of frames can move toward or away from each other within the limits of these slots, as shown in dotted lines *t''* in Fig. 12.

Secured to the gang-frames D D are hangers H H, within which are journaled in the usual manner a gang of concavo-convex disks K K. These disks are fixed on square shafts L L, Fig. 7, between spools or sleeves *f f* in the usual way. The disks and spools being provided with square openings through the center to fit the shaft are slipped onto the shaft alternately, each disk being embraced by two spools, or, as in the end disks, with a nut or head. *g g* are the heads on the inner ends of the shafts L L, and *h h* the nuts on the outer ends. By screwing up these nuts *h h* the disks are tightly clamped and held firmly in place. The inner disks of each gang are fitted to clamping-heads M M, as shown in Fig. 7, which are provided with central cylindrical openings to receive the cylindrical necks *l l* of the independently-revolving anti-friction heads N N, whose meeting surfaces are convex and are at all times in contact with each other. In order to keep these anti-friction heads permanently in place, the inner end of the necks *l l* of the heads are each provided with a circumferential channel or groove *m*, and a pin *n* is inserted through the clamping-head M, so as to engage within the groove *m* of the anti-friction head, and thus the heads are effectively held in place.

In order that the gang-frames may be especially strong and rigid, while at the same time light in weight and simple in construction, I make these frames of angle iron or steel securely bolted together, as shown in the drawings. Instead of two gangs of disks, it will of course be understood that more than two may be employed, if desired, and that the disks are angled to the line of draft by means of the operating hand-lever Z, which is connected with the gangs in any of the well-known ways, so that the movement of the hand-lever shifts the gangs at an angle. The method I prefer to use is that shown and described in the Letters Patent granted to me October 22, 1889, and numbered 413,539.

P P are scrapers, one for each disk, which are secured to the reciprocating bars R by the bolts *p p*. These reciprocating bars, one for each disk gang, are made of angle-iron and are held to the gang-frames by the clips *r r*, which are securely bolted to the frames, the bars R being arranged to slide loosely in these clips. A foot-lever S is fulcrumed at *q* to the frame and secured at its end to the bar R, so that upon pressing down on the lever the bar R, and with it the series of scrapers, will be brought into contact with their respective disks. Secured to the scraper-bar R is a lug *s*, and a coiled spring *t* is held between this lug *s* and the clip *r* by the bolt *u*, which slides loosely through openings in the lug and the clip. When the lever S is operated, bringing the lug *s* on the scraper-bar and the clip *r* on the frame nearer together, the coiled spring *t* is compressed, so that as soon as the lever S is released the scraper-bar is returned to its normal position. In order that these scrapers may be independently adjusted along the scraper-bar and set independently at any desired angle to their respective disks and at the same time be automatic in their action, so that they will not rub or scrape against their disks except when there is mud or dirt to be removed, I provide a novel method of securing these scrapers to the scraper-bar. The opening in

the bar through which the securing-bolt *p* passes is slotted, as shown at *v*, Fig. 10, which enables each scraper to be adjusted within the limits of the slot *v* along the bar. A slotted cap T, Fig. 11, surrounds the head of the scraper, against which the nut of the bolt *p* bears in securing the scraper to the bar. This cap is cut away at Y to allow room for the passage of the shank of the scraper, the opening Y being slightly wider than the shank, so that in its normal position the shank of the scraper will rest against the lower edge *a'* of the opening in the cap. The scrapers are so adjusted on the reciprocating bar that in their normal position their scraping-edges are a short distance from the concave surface of their respective disks, so that they will not rub against their disks, but will leave a slight space between the edge of the scraper and the disk, as shown at *b'*, Fig. 10. Should there be any mud or dirt on the face of the disk, however, the edge of the scraper, coming in contact with the mud, will then be thrown up into contact with the disk, so that the shank of the scraper will then bear against and be stopped by the upper edge *c'* of the cap T and the mud will be completely scraped off, when the scraper will at once by its own gravity return to its normal position, resting against the face *a'* of the cap. In this way the scrapers are automatic in their action, never rubbing against the disks except when engaged in active work, and thus the friction of the machine is very largely decreased. Should the mud be very tenacious, however, the driver by pressing on the foot-lever S can bring the entire series of scrapers to bear on the disks more strongly than they act under their automatic action. In order that each scraper may likewise be set at any desired angle to the face of the disk, the cap T is slotted at *d'* and the upper part of the cap is cut away at *e'*, so as to fit up closely against the lower face of the angle-iron scraper-bar, as shown in Fig. 10, and it will be manifest that if the head of the scraper is fixed in one position on the scraper-bar and the cap T is moved back and forth within the limits of the slot the bearing of the face *a'* of the cap against the shank of the scraper will cause the scraper to swing on the bolt *p* as a center, and the angle of the scraper to the bar or to the disk can thus be varied at will.

W W are a pair of seed boxes or hoppers of the usual construction, rigidly secured to the frames D D by the standards *f' f'*, and braced by straps *g' g'*.

Upon one of the spools or sleeves *f* of each gang of disks is a sprocket-wheel *h'*, from which a sprocket-chain *k'* extends up to a sprocket-wheel *l'*, having a clutch-hub *m'* and loose on the shaft A', journaled in suitable hangers extending down from the seed-box. Keyed to this shaft A', so as to revolve with it, but adjustable along the shaft, is another clutch-hub *n'*, which is thrown into mesh with the sprocket-wheel hub *m'* by the action of the coiled spring *o'*, surrounding the shaft A', one end of which bears against the collar B', fixed to the shaft, and the other against the movable clutch-hub *n'*.

C' is a hand-lever connected with the movable clutch-hub *n'* to throw the same out of mesh with the sprocket-wheel hub when the feeding mechanism is not to be operated.

Upon the end of the shaft A' is secured a pinion D', which meshes with the gear-wheel E' on the feed-shaft F' of the seed-box. This feed-shaft F' is journaled in suitable bearings at the ends of the seed-box and extends lengthwise across the bottom of the hopper, and is preferably square in cross-section.

At suitable intervals as many seed-cups H, Fig. 8, as may be desirable are arranged along the bottom of the hopper, through the center of each of which the feed-shaft F' extends. On this shaft are arranged the longitudinally fluted or ribbed hollow force-feed wheels G', one for each seed-cup.

Alongside of each feed-wheel on the feed-shaft and preferably of equal diameter therewith are the smooth cut-off cylinders L', which are coupled to the feed-wheels by means of the collar or sleeve M', which at its inner end is provided with a flange *s'*, and is secured to the feed-wheel so as to revolve with it by the lug *p'* on the inner face of the feed-wheel taking into a groove or notch in the flange of the collar. At its outer end this collar is provided with a circumferential groove *r'*, within which a key-plate N' is inserted, and thus the cut-off cylinder L' is coupled to the feed-wheel.

The collar M' is provided with a square opening *t'* to fit around the square feed-shaft and to revolve with it, while its outer cylindrical surface fits loosely in the cut-off cylinder L', so that the collar, and with it the feed-wheel, can revolve without revolving the cut-off cylinder. Each seed-cup H is provided with one of these feed-wheels and cut-off cylinders, the farther end of the feed-wheel fitting between the flutes of the rim P', which revolves freely in the end of the seed-cup, as usual, to prevent the improper discharge of seed. The other end of the seed-cup has a cylindrical opening to receive the cut-off cylinder L', and is provided with a notch *u'* to receive the rib *v'* on the cylinder, which prevents the cylinder L' from rotating with the shaft, but allows it to slide horizontally thereon. Through the space R' in each seed-cup the bar S' is passed, and to this bar the feed-wheels and cut-off cylinders are each secured by the bolts *w'*, secured by nuts *a''*, which pass through the bar S' and the slots *z' y'* in the plates T' U', one of which plates T' is a part of the key-plate N' and the other U' is a part of the cut-off cylinder L'.

The sliding bar S', to which the feed-wheels and cut-off cylinders are attached, is provided with an arm or lever A'', securely bolted thereto, which arm slides over a slotted plate B'', secured to the bottom of the hopper, while a thumb-screw *b''* on the arm A'', bearing

against this plate, enables the feed-bar S′ to be secured in any desired position. In this way the entire series of feed-wheels can simultaneously be adjusted to sow the desired amount of seed. As the bar S′ is moved it carries with it the feed-wheels and cut-off cylinders and leaves a larger or smaller surface of the feed-wheels within the seed-cups to receive the seed and force it from the cup. Beside this simultaneous adjustment of all the feed-wheels, each feed-wheel can be adjusted individually to sow the quantity of seed desired, inasmuch as by loosening the bolt *w′* the parts can be readily adjusted at any desired position on the bar S′ within the limits of the slots *y′ z′*. More than this, the force-feed wheel G′ and the cut-off cylinder L′ can also be adjusted with reference to each other as the parts wear loose or happen to vary in size in the casting. By moving the key-plate N′ or its extension T′ on the plate U′ it will draw the feed-wheel and cut-off cylinder together. In this way three adjustments of the parts are possible, and with my improved arrangement all the parts can be cast and readily put together, so that if any of the parts become broken they alone need be supplied.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a disk harrow, the combination, with the main or cross beam and two or more gangs of disks in contact at their inner ends, with means for angling said gangs to the line of draft, of frames to support said gangs and swivels to connect said gang-frames to the main beam, one bar of each of which swivels is slotted to allow a horizontal sliding movement of the gangs, whereby upon the angling thereof said gangs of disks will always remain in contact at their inner ends, substantially as shown and described.

2. In a disk harrow, the combination, with the main or cross beam and two or more gangs of disks in contact at their inner ends, with means for angling said gangs to the line of draft, of frames to support said gangs, swivels to connect said gang-frames to the main beam, one bar of each of which swivels is slotted to allow a horizontal sliding movement of the gangs, and a pair of independently-revolving anti-friction heads applied to the abutting ends of the disk gangs, whereby upon the angling of the disk gangs said abutting anti-friction heads may be held together, substantially as shown and described.

3. In a disk harrow, the combination, with the main beam and two or more gangs of disks in contact with each other, of a swivel connection between said gangs and the main beam, one bar of which is slotted to allow horizontal sliding movement of the gangs, and a slotted hinge connection in conjunction therewith, whereby said gangs may be capable of three movements in relation to said main beam, substantially as shown and described.

4. In a disk harrow, the combination, with the main beam and two or more gangs of disks in contact with each other, with means for angling said gangs to the line of draft, of frames to support said gangs, swivel connections between said frames and the main beam, one bar of each of which swivels is slotted to allow a horizontal sliding movement of the gangs, and slotted hinge-joints between the two, whereby upon the angling of the gangs of disks the abutting ends thereof will always remain in contact and can rise and fall with reference to each other, substantially as shown and described.

5. In a disk harrow having one or more pairs of disk gangs whose ends abut, revolving anti-friction heads whose inner ends or necks are provided with circumferential grooves and rovolve in cylindrically-recessed clamping heads, and pins or lugs on the interior faces of said clamping-heads entering said grooves to retain said anti-friction heads in place, substantially as shown and described.

6. In a disk harrow, the combination, with one or more pairs of disk gangs whose ends abut, of independently-revolving anti-friction heads whose necks are provided with circumferential grooves, clamping-heads cylindrically recessed to receive said necks, pins inserted through said clamping-heads into said grooves, and spools or journals for the inner disks, fitting over said clamping-heads to retain the pins in place, all substantially as shown and described.

7. In a disk harrow, the combination, with a sliding bar therefor, of disk scrapers pivoted thereto and independently adjustable thereon both laterally and angularly, substantially as and for the purpose described.

8. In a disk harrow, disk scrapers pivoted to a sliding bar, slotted caps to retain same, and side openings in said caps for the scraper-shanks, whereby the angular adjustment of said scrapers to their respective disks may be varied at will, substantially as shown and described.

9. In a disk harrow, the combination, with a sliding bar, of disk scrapers pivoted thereto, caps to retain said scrapers, and side openings in said caps for the scraper-shanks wider than said shanks, whereby said scrapers may be made automatic in their action, substantially as shown and described.

10. In a disk harrow, the combination, with a sliding bar, of disk scrapers pivoted thereto in slots therein, slotted caps to retain said scrapers, and side openings in said caps for the scraper-shanks wider than said shanks, whereby said scrapers may be independently adjusted both lengthwise and angularly with reference to said bar and the entire series of scrapers may be simultaneously brought into play and act automatically on the mud to be removed, substantially as shown and described.

11. In a disk harrow and broadcast seeder,

the combination, with a seed-box, seed-cups, and feed-shaft therefor, of rotating feed-wheels and non-rotating cylinders sliding thereon, collars grooved at their outer ends, fitting within said feed-wheels and passing through cylindrical recesses in said cylinders, with key-plates entering said grooves to hold said collars, and slotted plates attached to said key-plates and non-rotating cylinders, whereby the feed-wheels may be adjustably coupled to the non-rotating cylinders, substantially as shown and described.

12. In a disk harrow and broadcast seeder, the combination, with the seed-box, seed-cup, and feed-shaft therefor, of rotating feed-wheels and non-rotating cut-off cylinders sliding on said feed-shaft, collars grooved at their outer ends, fitting within said feed-wheels and passing through cylindrical recesses in said cylinders, with key-plates entering said grooves to hold said collars, an independent reciprocating bar, and slotted plates attached to said key-plate and non-rotating cylinder and connecting same to said reciprocating bar, whereby said feed-wheels and cylinders may be adjustably coupled together and likewise adjusted in said seed-cups both independently and in series, substantially as shown and described.

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