(Model.)

2 Sheets—Sheet 1.

C. LA DOW.

WHEEL HARROW AND CULTIVATOR.

No. 301,729. Patented July 8, 1884.

Fig. 1.

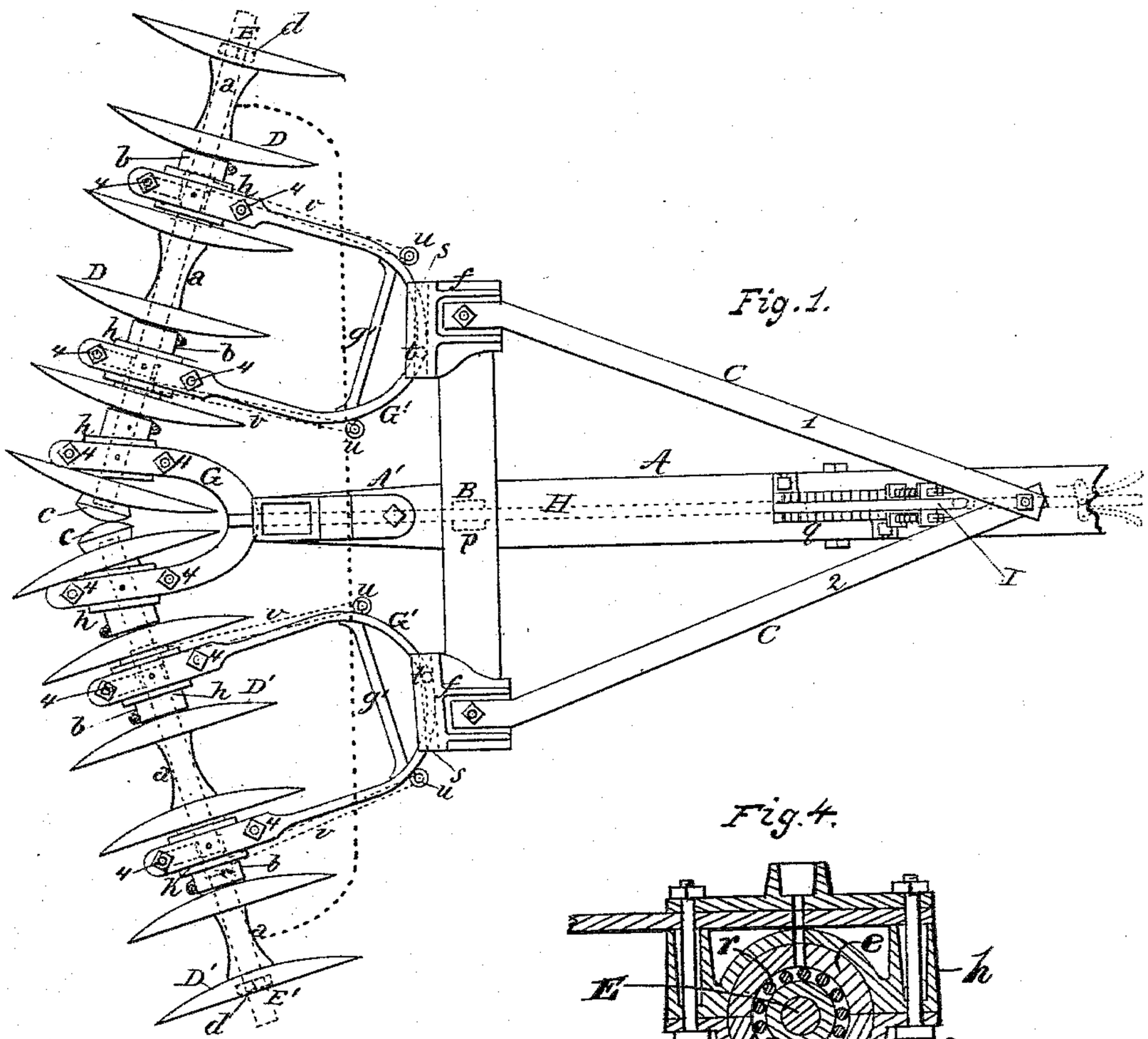

Fig. 4.

Witnesses:

J. A. Rutherford.

Robert Everett.

Inventor.

Charles La Dow.

By James L. Norris.

Atty

(Model.)

2 Sheets—Sheet 2.

C. LA DOW.

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Fig. 2.

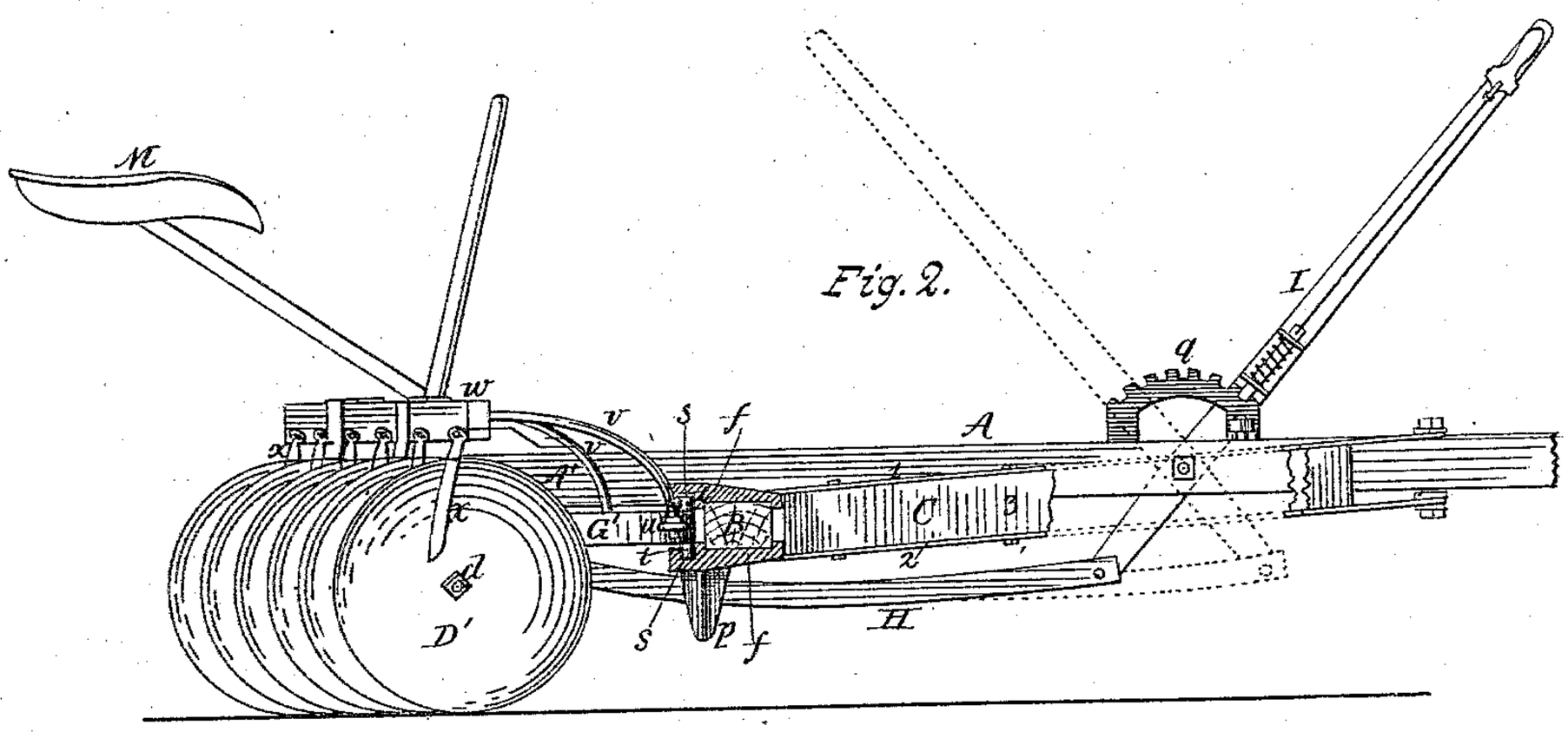


Fig. 3.

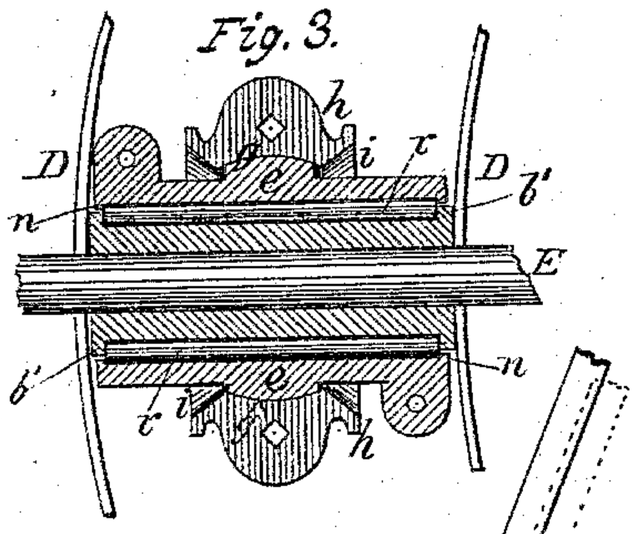
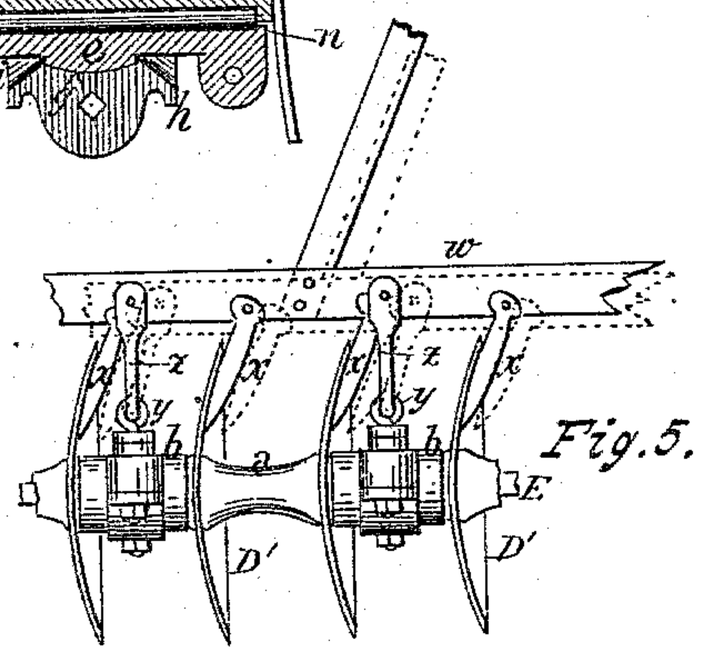


Fig. 5.



Witnesses:
J. A. Rutherford
Robt Ewalt.

Inventor.
Charles La Dow.
By James L Norris.
Atty.

UNITED STATES PATENT OFFICE.

CHARLES LA DOW, OF ALBANY, NEW YORK.

WHEEL HARROW AND CULTIVATOR.

SPECIFICATION forming part of Letters Patent No. 301,729, dated July 8, 1884.

Application filed August 6, 1881. (Model.)

To all whom it may concern:

Be it known that I, CHARLES LA DOW, a citizen of the United States, residing in the city and county of Albany and State of New York, have invented certain new and useful Improvements in Wheel Harrows and Cultivators, of which the following is a specification.

My invention relates to wheel harrows and cultivators in which mechanism is employed for reducing friction and for adjusting the angles of the disk-gangs, and also for adapting the gangs to better conform to the irregularities of the soil operated upon.

The objects of my invention are as follows: first, to provide the disk-gangs with mechanism between their inner ends to receive their side thrusts without coupling their axles together; second, to provide means by which the end friction of the journals of the disk-gangs will be reduced; third, to provide, in a disk-harrow having two opposing disk-gangs, buffer-heads made with the inner ends of the gang-axles, whereby the inner disks of the opposing gangs will be held uniformly apart during all stages of adjustment or operation; fourth, to provide, in a disk-harrow having two opposing disk-gangs mounted in independent horizontal yoke-frames, mechanism which will connect the independent inner ends of the said opposing disk-gangs with a lever, ratchet, and pawl, and yet allow them to oscillate freely in vertical directions and permit their angular adjustment; fifth, to provide, in a disk-harrow having two opposing disk-gangs which are supported in bearings which are adapted to oscillate both vertically and horizontally, a yoking mechanism and opposing buffer-heads, whereby the said disk-gangs will be prevented from spreading apart endwise and their inner ends be prevented from being crowded past each other during adjustment or operation; sixth, to provide, in a disk-harrow, specific devices whereby the yoking mechanism of a disk-gang and its bearings will be adapted to oscillate both vertically and horizontally from the main frame; seventh, to provide, in a disk-harrow, a combination of specific elements which form a means whereby each disk-gang will be supported and revolved from bearings which will be uniformly held in the same axial line in all their vertical and horizontal vibrations and adjustments of the same, and also be held from spreading outward endwise; eighth, to provide, in a disk-harrow, a combination of elements which will form a means for carrying scrapers or cleaning-knives toward or from the cutting-disks without their being materially elevated or depressed; ninth, to arrange a vibratory and angularly-adjustable yoke in advance of its disk-gang, that the draft may be transmitted in substantially a direct line from the draft-frame to the gang through the medium of said yoke, in order to avoid torsional strain on the yoke, and to so apply the adjusting mechanism that it has leverage in line with the transverse strains on the gangs; tenth, to provide a disk-gang axle with a yoke located on substantially the same horizontal plane, and to connect said yoke to the draft-frame by a single hinge or pivot, on which the gang may vibrate and be also angularly adjusted, and to provide mechanism for changing and holding the gang at various angles to the line of draft; eleventh, to provide a draft-frame and disk-gangs with a yoke-frame for each gang, which shall be located in rear of the draft-frame and in front of its gang, and with braces which connect the pole and cross-bar of the draft-frame, and with a set-lever attached to the gang between the points which connect them to the draft-frame; twelfth, to provide a disk-gang with a scraper-bar on a disk-gang frame independent of a main frame, and adapted to be moved endwise and maintain a uniform distance from the edges of the disks, and with mechanism for operating the bar.

One of the advantages gained by the organization of parts described in these objects of my invention is that by the use of buffer-heads between the gangs the front edges of the inner disks can (when set at an angle to each other) be brought sufficiently near together to cut all the earth between the gangs, and the side thrust of one gang is counteracted by the side thrust of the other acting against the buffers, which are not inclosed in boxing, and when set at an angle revolve with a planetary motion around their respective centers, thus avoiding any rubbing friction between the gangs when set at angles or when vibrat-

ing. Another advantage is that each gang is drawn from two bearings by a horizontal yoke-frame, said bearings having no hinge movement on their axle, and that the angular adjustment for each gang is obtained by a rod adapted to receive the strain of the draft in line therewith, and is coupled to a third bearing or hinge-connection with the gang. The draft-rod shown is provided with a yoke at its rear end, and when this construction is used it serves to prevent the gangs from spreading apart when the machine is backed, and its connection with the gangs allows their inner ends to vibrate up and down independently of each other; but I do not confine myself to the precise construction shown in the drawings, as it is obvious other forms of draw-rods can be used without departing from the spirit of my invention. Other advantages are derived from arranging the vibrating and adjustable draft-yokes in substantially a horizontal plane in advance of their gang-axles, to which they are attached, as torsional strain on the yokes, which would ensue from the draft of the machine, (if they were arranged above the gangs,) is avoided, and the adjusting mechanism coupled to the inner ends of the gangs in line with the draft-strains coacts with the horizontal yoke-frames in obviating torsion of the yokes or frames that might be caused by the draft, and torsional strain upon the draft-frame, caused by the weight of the driver, is entirely obviated by combining the braces with the pole, cross-bar, and horizontal yoke-frames, as the braces are preferably arranged on the cross-bar at or near the points at which the yoke-frames are hinged thereto. Other important advantages are that the gangs, through the medium of their horizontal yoke-frames, may vibrate in rear of their draft-frame without striking against the same, and be adjusted horizontally on the same hinge which permits their vibration, by any mechanism desired for that purpose.

I do not confine myself to the construction of the hinges shown herein for pivoting the yokes to the draft-frame, as any form of hinge that will allow both vertical vibration and angular adjustment of the gangs will answer the purpose. Neither do I confine myself to the construction of the yoke-frames herein shown, as a bar of wood may be used at the forward end thereof, and connected to the gang by arms of metal arranged at right angles to the front part of the yoke. In any construction the brace-bar g' may be omitted, if desired.

I do not confine myself to the precise method shown of supporting or operating the scrapers, as they may be supported and operated in any other well-known manner. These objects are attained, preferably, by means of the mechanism illustrated in the accompanying drawings, in which similar letters refer to similar parts throughout the several views.

Figure 1 represents a plan view from above of my improved harrow. Fig. 2 is a side elevation of the same, partly in section. Fig. 3 is a longitudinal horizontal section, on an enlarged scale, of a gang-axle, gang-journal, bearing of said journal, rollers, and universal-joint box employed by me in my harrow. Fig. 4 is a central cross-sectional view of Fig. 3, omitting the disks; and Fig. 5 is a rear view of a section of the gang-disks cleaner mechanism.

In the drawings, A represents the pole. B is the transverse bar or frame, rigidly secured to said pole. C C are braces stiffening said cross-bar of frame with the pole. The side braces, C, are each formed by metal plates 1 and 2, with a wooden bar, 3, between, and firmly held together by bolts, as shown in Fig. 2. By this manner of construction the transverse bar or frame is made to have a stiff connection and capable of enduring great twisting strain.

D D′ are rotating disks made of any of the forms known to the trade, and secured to axles E E′, (indicated by dotted lines in Fig. 1 and shown in Figs. 3 and 4.) The drawings show the said disks secured to their respective axles, and held from twisting thereon by means of thimbles a, thimble-journals b, buffer-heads c, and screw-threaded nut d. In the operation of said parts the buffer-heads c resist the draft of the headed nuts d, while the said nuts will force the ends of the thimbles a and thimble-journals b, abutting their neighboring disks, against the marginal sides surrounding the central holes of said disks, and cause those parts to be clamped one with the other, so that the disks, thimbles, thimble-journals, buffer-heads, and axles will revolve together, as if made in solid connection or keyed together. The thimble-journals b are each made with cylindrical form, and provided with a bore corresponding with the diameter of the axles passing through the same, and the outer ends of said journals are each provided with flanges b', which flanges abut against their neighboring disks, as shown in Fig. 3. The said thimble-journals are each held in bearings formed by half-boxes e e, and clamped together by bolts e^2, as shown in Fig. 4. The bore of said bearings or boxes is made with such a greater diameter than that of the said journal as to receive a circular series of cylindrical pieces of metal or rollers, r, which in the aggregate will about nicely fill the annular chamber m, formed between the periphery of said journal and the inner surface of the bore of the bearings. By means of said rollers between said journals and their respective bearings, the rubbing friction of said journals with their bearings is obviated, and a rolling friction is substituted between those parts, thereby reducing the draft of the machine and dispensing with the use of oil. The outer ends of the bearings or half-boxes e e are each provided with an inwardly-projecting flange or circular lip, n, which flanges operate with flanges b' of the thimble-journals b to cover over the ends of rollers r, and also operate with the ends of said rollers to prevent said

bearings from shifting endwise. The rollers may be omitted, and ordinary journals substituted.

Secured to the ends of the transverse bar of frame B are shackle-brackets *f f*, Figs. 1 and 2, one above and one below, as shown in Fig. 2. Made in the inner and facing sides of said brackets are oblong slots *s*. (Shown by full lines in Fig. 2 and by dotted lines in Fig. 1.) The said slots are made to have their line of extension of length in direction and transverse to the line of draft of the harrow and slightly out of a line at right angles with the same, as shown by dotted lines in Fig. 1.

Made with the outer periphery of each of the bearings or half-boxes *e e*, and located about midway between the ends of the same, is an annular or ring spherical section, *g*, (see Figs. 3 and 4,) which ring spherical section operates as the ball of a ball-joint or universal joint. Surrounding the said ring spherical section, and receiving the same, is an outer box, *h*, Fig. 3, which box has its middle portion of bore made concave and corresponding to the convexity of the section *g*, so as to nicely fit the same when said box is in place. Annular inclines *i* of the bore of the box are provided, by which the thimble-journal is permitted to oscillate in the center box, *h*, in any direction, substantially the same as will a ball in a socket of a ball-socket joint or coupling.

At the inner end of each gang of disk-wheels, and between the first and second disks of each gang, are placed one of the above-described thimble-journals *b*, bearings *e*, and outer boxing *h*, and between each two pair of neighboring disks of each gang are placed similar thimble-journals, bearings, and boxes, as shown in Fig. 1. The boxes *h* of the inner ends of the disk-gangs are preferably yoked together by the yoke or gang frame G, Fig. 1, by means of bolts 4. Secured to the bow of said gang-frame is the draft-bar H. (Shown by dotted lines in Fig. 1 and by full lines in Fig. 2.) The forward end of said draft-bar is made to have a jointed flexible connection with pole A, and is shown in Fig. 2 to have this flexible connection made by its being pivoted to hand-lever I, pivoted to said pole. This form of connection I prefer, for the reason that the said hand-lever is a convenient means for operating the draft-rod H in either direction for increasing or lessening the angles of the disk-gangs relatively to each other. The boxes *h* at the inner ends of the disk-gangs, and consequently the disk-gangs themselves, are shown to be held from spreading apart by means of the yoke G on the draw-rod. I do not confine myself, however, to the precise form of draw-rod shown for coupling the inner end of the gangs to the draft-frame; nor to the point shown for connecting the draw-rod to the gangs, as the draw-rod may be constructed and attached to the gangs in any other well-known manner.

Secured to the lower side of the pole, and straddling the draft-rod H, is a crotched guide, *p*. (Shown by full lines in Fig. 2 and by dotted lines in Fig. 1.) The said guide prevents the said draft-rod from shifting sidewise in either direction, and maintains the inner ends of the disk-gangs in a line with the axis of pole A. A segmental rack, *q*, preferably duplex, is secured to the upper side of the pole, and elastic dogs connected with the hand-lever form means by which the lever I will be held to any place set, and thereby hold the inner ends of the disk-gangs to any position adjusted. I also employ with the boxes *h h* in each gang a yoke or gang-frame, G′, which yoke or frame is secured at the rear ends of the limbs thereof to said boxes by bolts 4. Made with said yoke or frame, at about the middle of its bow, are vertically-projecting ears *t t*, one projecting upward and working in slot *s* of the upper shackle-bracket *f*, and the other projecting downward and working in a similar slot in the lower shackle-bracket, as shown in Fig. 2. The limbs of said yoke are stiffened against being bent or deflected at the bow by cross-brace *g′*. When the axis of each gang of disks coincide with the axis of the other, the ears *t t*, projecting from the bow of the yoke or frame G′, will be in position at about the outer ends of the length of slots *s s* in the shackle-brackets *f f*; but when said disk-gangs are adjusted at an angle with each other, as shown in Fig. 1, the said ears will be moved toward the middle of said slots, as indicated by dotted lines in the same figure, while when the angles of the gangs are made to be greater the said ears will be shifted toward the inner ends of the said slots. The vertical extension of the bows of yokes or frames G′ is made less than the extensions of the openings between the facing-surfaces of the said shackle-brackets, so that the said brackets will permit the ends of the yoke or frame to vibrate vertically, (the ears *t t* being smaller than the slots *s s*.) These pins or vertical extensions of the yoke-frames also operate in connection with the shackle-brackets to prevent deflection or settling of the main frame of the machine.

I do not confine myself to the construction of the hinges between the yoke and frame hereinbefore described, as any form of hinge may be substituted that will permit vertical vibration and angular adjustment of the ends of the gangs, and that will also support the draft-frame against undue deflection.

Pivoted to yokes or frames G′ G′ by eyes *u* are rearwardly-extended arms *v*, (shown by full lines in Fig. 2 and by dotted lines in Fig. 1,) which arms connect at their rear ends to scraper-bar *w*, Fig. 2, which bar is provided with scrapers *x*.

Pivoted to the rear side portion of boxes *h*, (connected with yokes or frames G′,) by eyes *y*, Fig. 5, are vertically-standing brackets *z*, which brackets, together with the pivoted arms *v*, support the scraper-bar of each disk-gang in situation vertically over the axles of the same. The upper ends of brackets *z* are each pivoted to its scraper-bar in such a

manner that said bar is adapted to be swayed endwise in both directions and carry the scrapers *x* toward or from the cutting-disks without being materially elevated or depressed; but such bracket *z* may be omitted, and in that case the bar is supported on its arms *v*, and when moved endwise is maintained at a uniform distance from the edges of the disks. The rear end of pole A is extended rearward from the rear side of the transverse bar or frame B, as shown in Figs. 1 and 2. Connecting with the said rearwardly-extended portions A′ of the pole, and supported from the same, is the standard supporting driver's seat M, Fig. 2. By this situation of said standard the draft-animals will be relieved of the great weight heretofore carried on their necks by reason of the situation of the seat-standard on the pole. The said projection may be omitted, and the seat and its standard arranged in other well-known ways. The side pressure of the earth against the disks is counteracted by the buffer-heads *c c*, which revolve with a planetary motion around each other when the gangs are set at angle to the line of draft, and as they are not inclosed in boxing the inner disks of the gangs are brought nearer together than in harrows which have boxing interposed between the gangs; hence nearly all the earth is cut above transit of the machine, while friction and clogging between the gangs are entirely avoided.

It is obvious that other means than the buffer-heads can be used to accomplish the object of counteracting the side thrust of the gangs—such as non-revolving devices—against which the inner ends of the axles can abut, and my invention contemplates any organization of parts that is located between the gangs for counteracting their side thrust without coupling the inner ends of their axles together.

I am aware that disk-harrows have heretofore been made with devices for counteracting side thrust of the gangs, as in the Letters Patent issued to me February 13, 1877, No. 187,392; but the inner ends of the axles were coupled together, and such I do not here claim.

I am also aware that scrapers have heretofore been made capable of movement toward the faces and edges of the disk, as shown in patent to F. Bramer, December 14, 1875, and I do not claim such devices.

I am also aware that heretofore harrows have been made with yoke-frames located above the gangs and hinged to the main frame, as shown in patents to S. G. Randall, September 13, 1859, and to E. Bayliss, January 6, 1874, also with a yoke-frame hinged to the main frame on a horizontal plane with the disk-gangs, as shown in patent to A. Underwood, February 23, 1875, and I do not claim such devices; but so far as I am aware I am the first to combine a yoke-frame with a main frame and gang of disks in such manner that the gangs may be drawn and may vibrate horizontally with a yoke arranged in front of the gang, and also be capable of angular adjustment with their yoke by mechanism which shall resist transverse strains on the gangs, and be attached thereto at a point between which the gangs are hinged to the draft-frame; and so far as I am aware I am also the first to combine a yoke-frame with a main frame and a gang of disks in such manner that said yoke shall be located in substantially a horizontal plane in advance of its disk-axle, and be capable of vertical vibration therewith on the same hinge or pivot on which they are angularly adjusted; and so far as I am aware I am also the first to combine a main frame and gangs of disks with yoke-frames arranged in rear of the main frame and in front of the disk-gangs in such manner that the yokes shall be angularly adjustable with their gangs, and that the cross-bar shall resist torsional strains through the means of braces connecting the cross-bar to the pole; and so far as I am aware I am also the first to provide a gang of disks with a scraper-bar and scrapers that could be moved endwise bodily toward the faces of the disks, and that would maintain a uniform distance from the edges of the disk during its adjustment, and to combine the same with mechanism of any kind for operating the bar.

The distinction between the scraper and scraper-bar here claimed and my application for Letters Patent filed March 14, 1884, Serial No. 124,196, and other inventions, is that in the present case the scraper-bar is supported by a yoke or disk-gang frame independent of the main frame, whereby the scrapers can maintain a uniform position relative to the disk-gang during vibrations of the latter.

Having thus described my invention, what I claim is—

1. In a disk-harrow, the combination of a pole, cross-bar, disk-gangs capable of being set at an angle to the line of draft, and buffer-heads or equivalent mechanism between their inner ends for receiving their side thrust without coupling their axles together.

2. The combination of the axles, the disk-gangs, the thimbles, the thimble-journals, the threaded nuts for clamping the thimbles, journals, and disks on the axles, and the buffer-heads secured to the inner ends of the axles for resisting the draft of the nuts, and opposing each other by direct contact, substantially in the manner and for the purposes described.

3. In a disk-harrow having two opposing disk-gangs mounted in bearings and adapted to be adjusted at different angles in relation to each other, the combination, with the inner ends of the axles of the opposing disk-gangs, of the buffer-head ends *c c*, adapted to oppose each other, substantially as set forth.

4. The combination of the two opposing disk-gangs, each supported by independent horizontal yokes and capable of vibrating vertically to conform to the surface traversed, and angularly adjustable, as set forth, with a draft device extending forward from the independ-

ent inner ends of the disk-gangs, a lever flexibly connected with the draft mechanism, and a pawl and ratchet for holding the lever when adjusted, substantially as described.

5. In a disk-harrow having two opposing disk-gangs, each supported in bearings and adapted to oscillate in both horizontal and vertical directions, the combination, with a yoking mechanism which holds the said bearings and said opposing disk-gangs, of the opposing buffer-end head *c c*, whereby both said bearings and disk-gangs are held from shifting endwise, either outward from or toward each other, substantially as set forth.

6. In a disk-harrow, the combination, with a yoking device, G′, which extends rearwardly from the main frame of the harrow, and by its rear ends connects with and is supported by two bearings of the same disk-gang, of shackle-brackets *f f*, provided with slots *s s* and vertical ears *t t*, made with or attached to the forward end of said yoking device, whereby the said yoking device and its connected bearings will be adapted to vibrate both vertically and horizontally from said main frame, substantially as set forth.

7. In a disk-harrow, the combination, substantially as described, of concave disks mounted in two opposing disk-gangs, which are each supported from two bearings situated between the ends of its axles and yoking or gang frames, which extend forward from said bearings and have a jointed connection with the pole or pole-frame, of a third bearing made with each of said disk-gangs, and a yoking device which connects at its rear ends with each of said third bearings and at its forward end to the pole or pole-frame, whereby each disk-gang will be supported and revolve from bearings uniformly held in the same axial line in all the vertical and horizontal vibrations and adjustments of the same, and be held from spreading outward endwise, as set forth.

8. In a disk-harrow, the combination with a yoke or gang frame supporting a disk-gang and extending forward from the same to a transverse bar or frame, and a scraper-bar arranged over the disks of said gang and provided with knives or scrapers, *x*, of horizontally-swinging arms *v*, pivoted to said yoke or gang frames, and vertically-projecting brackets *z*, pivoted to the boxes or bearings of the disk-gangs, whereby said scraper-bar will be supported at one given plane from oppositely-situated pivots, and be adapted to be vibrated endwise to carry the scrapers toward or from the disks without relatively rising or falling.

9. The combination, in a wheel-harrow, of the following elements, viz: a pole, a cross-bar projecting laterally therefrom, braces attached to the pole and cross-bar, disk-gangs, a yoke for each gang, located horizontally in advance thereof, and pivoted to the draft-frame, so as to move horizontally with its gang, and mechanism attached to the gangs between the points at which the yoke-frames are hinged to the draft-frame, for varying the angles of the disk-gangs.

10. The combination, in a wheel-harrow, of the following elements, viz: a draft-frame, disk-gangs, a yoke attached to each gang-axle and arranged on a horizontal plane therewith, a connection from each yoke to the draft-frame, which permits the ends of each gang to have both vertical and horizontal movement on one hinge, and mechanism for varying and holding the angles of the gangs.

11. The combination, in a wheel-harrow, of the following elements, viz: a pole, a cross-bar projecting laterally from the pole, disk-gangs mounted in yoke-frames which are located in rear of the cross-bar and in advance of the disk-gangs, and which are angularly adjustable with the gangs, braces between the cross-bar and pole, and a set-lever attached to the gangs between the hinges, which connect the gangs with the draft-frame.

12. The combination of a disk-gang, a scraper-bar, and scrapers supported by a disk-gang frame independent of the main frame and adapted to move endwise bodily and maintain a uniform distance from the edges of the disks, and mechanism for operating the bar.

13. The combination of a pole, a main frame, braces, an angularly-adjustable disk-gang, a vertical pin-hinge attached to its gang and capable of permitting the vertical vibration of its gang without causing torsion of the brace, and a casing for the pin.

14. The combination of a pole, a cross-bar, braces, an angularly-adjustable disk-gang, and a pin adapted to hinge the gang to the brace or an extension thereof, and to allow vertical vibrations of its gang without torsion of said brace.

15. The combination of a pole, a cross-bar, a brace, an arm or extension of the brace in rear of the cross-bar, a disk-gang, and a rigid pin for coupling the gang to the arm, and adapted to permit horizontal or vertical vibrations of its gang.

16. In a disk-harrow, the arrangement, substantially as described, of a draft-frame, a disk-gang, a yoke-frame for the gang, located in advance of the disks, and a scraper-bar arranged above the disks.

17. In a disk-harrow, the combination of a pole, a cross-bar, and a disk-gang capable of angular adjustment, and supported at three points against the draft, and having all of said supporting-points arranged in substantially the same horizontal plane.

CHARLES LA DOW.

Witnesses:
R. P. DUMARY,
JNO. F. WOLFF.