(No Model.) 4 Sheets—Sheet 1.

S. G. RANDALL.

DISK HARROW OR CULTIVATOR.

No. 259,919. Patented June 20, 1882.

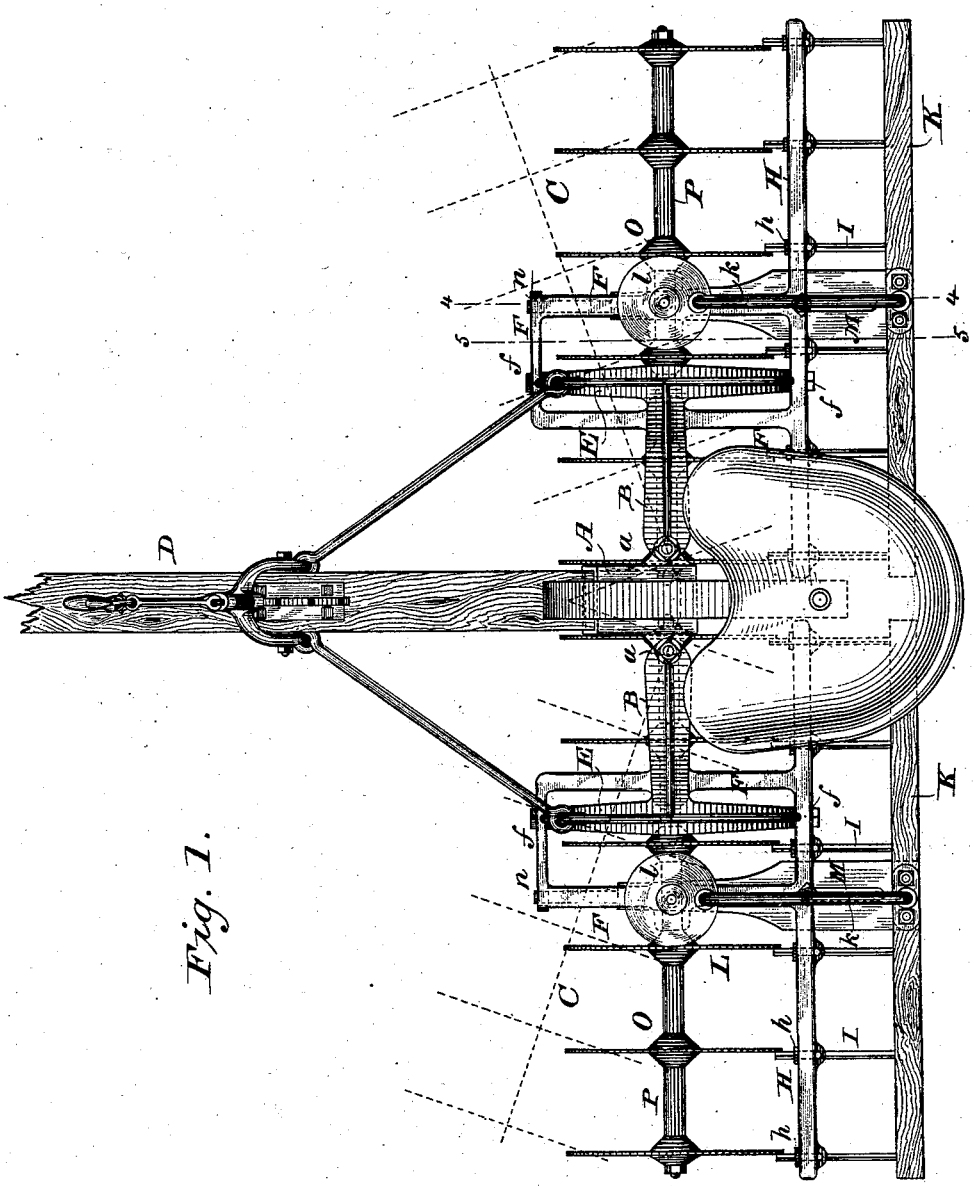

Fig. 1.

WITNESSES

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S. G. RANDALL.

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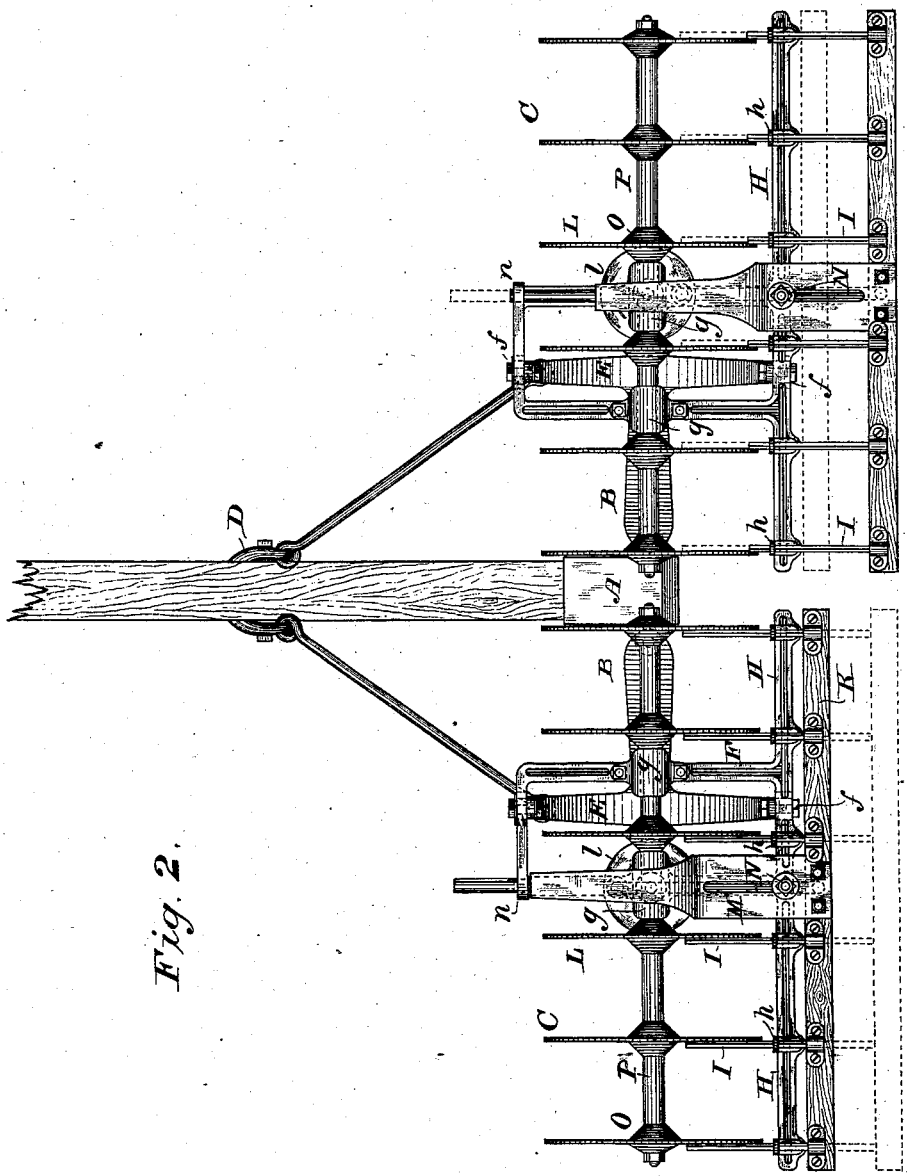

Fig. 2.

WITNESSES

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(No Model.) 4 Sheets—Sheet 3.

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DISK HARROW OR CULTIVATOR.

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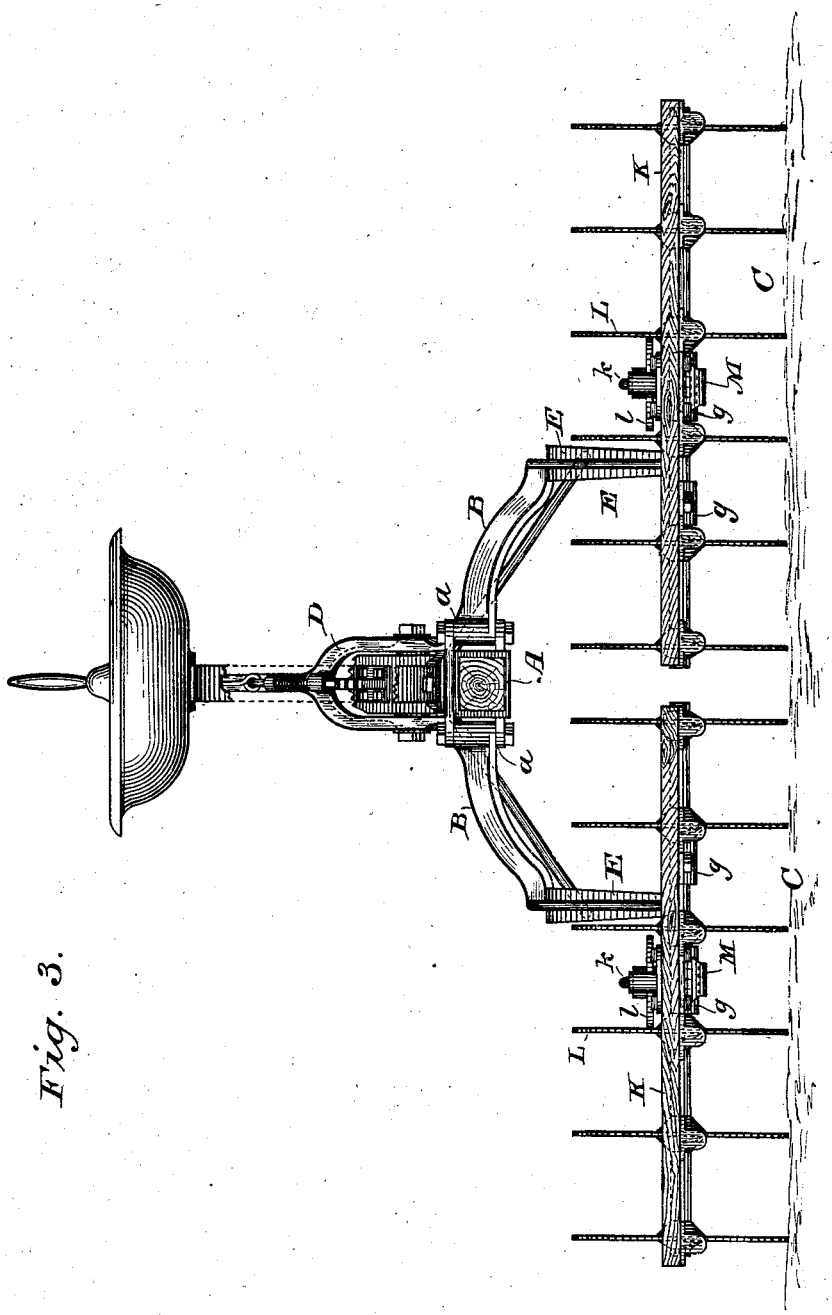

Fig. 3.

WITNESSES

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(No Model.) 4 Sheets—Sheet 4.

S. G. RANDALL.

DISK HARROW OR CULTIVATOR.

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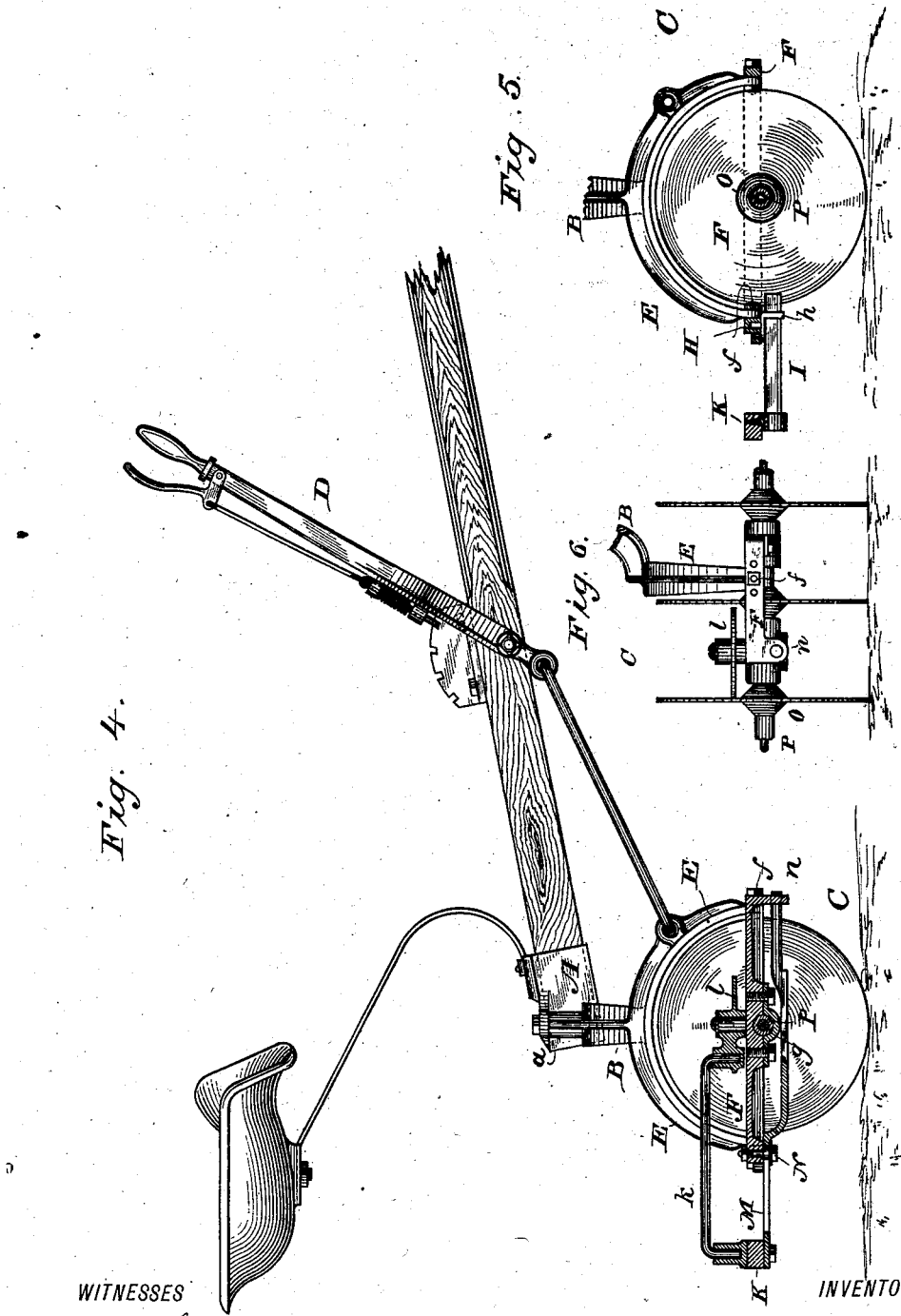

WITNESSES

Wm. A. Skinkle.

Edwin A. Newman.

INVENTOR

Silas. G. Randall

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UNITED STATES PATENT OFFICE.

SILAS G. RANDALL, OF GREENE, NEW YORK.

DISK HARROW OR CULTIVATOR.

SPECIFICATION forming part of Letters Patent No. 259,919, dated June 20, 1882.

Application filed February 14, 1882. (No model.)

To all whom it may concern:

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

My invention consists in an improved organization for effecting the adjustment of the disk-gangs relatively to the line of draft; in certain improved organizations and devices for cleaning the disks; in an improved manner and organization of devices for connecting the disk-gangs to the frame, and in an improved arrangement for decreasing the friction of the end-thrust of the gang.

The details and special organizations of the several features of my invention will be fully described and specifically claimed hereinafter.

In the accompanying drawings, Figure 1 is a plan view, in which the dotted lines indicate one of the adjusted positions of the disk-gangs; Fig. 2, a bottom plan view of the machine; Fig. 3, a rear elevation; Fig. 4, a transverse section on the line 4 4 of Fig. 1; Fig. 5, a detail sectional view on the line 5 5 of Fig. 1; and Fig. 6, a detail elevation, looking at the front of the disk-gang frame.

The main frame of the machine is formed in three sections. The center section, A, which is preferably cast, is provided with a recess or socket for the reception of the draft-pole or tongue of the machine. The outer sections, B B, also preferably cast, are pivoted between upper and lower lugs on each side of the central casting, as shown at *a*. The central cast section of the frame may be dispensed with and the side sections pivoted directly in or on the tongue, in which case the tongue should be bound or faced with metal to strengthen it. I prefer to use the central section; but the latter construction is practical.

The disk-gangs C are carried at the outer lower ends of the sections B of the frame, and are mounted therein in a manner which will hereinafter be described. The frame of the machine therefore consists of a central portion, which may be a tongue or draft-frame or an independent section, as above described, to which the two side sections or wings are pivoted so as to swing horizontally, in order to adjust the angle of the disk-gangs relatively to the line of draft. This adjustment is effected by a lever, D, on the tongue, which is provided with the usual detent and rack, and is connected by link-rods with the pivoted sections B B of the frame.

It will be observed that by operating the lever the sections B of the frame will be swung on their pivots, either forward or back, and that the gangs carried thereby are thus adjusted relatively to the line of draft, the centers of motion being the pivot-connections between the central section, A, and the sections B B of the frame. These pivots may be placed vertically above the inner ends of the gang-shafts, as illustrated in the drawings, or may be placed outside of the vertical plane, passing longitudinally through that shaft.

An essential feature of this part of my invention is the adjusting of the gangs by swinging the pivoted sections of the main frame to bring the disks to the desired angle relatively to the draft-line, instead of pivoting or hinging the gangs at their inner ends to the frame or turning them upon a vertical pivot the axis of which passes through the gang-shaft at some point intermediate its ends, as, so far as I am aware, has heretofore been the case.

Each hinged or pivoted section B of the frame extends outward laterally from the central portion and then downward, the depending or downwardly-projecting portions E being forked and spread, as clearly shown in Fig. 4.

An open or skeleton gang-frame, F, in which the disk-gang shaft has its bearings, is pivoted at *f f* in the forked ends E of the frame-section B. This gang-frame is preferably cast, and should be so formed as to give sufficient strength and the least weight, as will be understood. It straddles or embraces one or more of the cutting-disks, and the gang-shaft has its bearings on the inner and outer sides thereof at two points, *g g*, which may be arrayed at any suitable and desired distance apart.

By supporting each gang-shaft in a gang-frame at the two bearing-points *g g*, the shaft is held firmly relatively to that frame against unequal strains upon the ends of the gang, and as the pivots of the gang-frame are in front and rear of the gang-shaft the shaft and

gang-frame will also be securely sustained against strains in that direction. The pivotal connections between the gang-frames and the frame D D constitute the only connection between the gangs and main frame. By this construction I am enabled to dispense with the usual draft or stay rods or chains at the inner ends of the gangs, which are necessary where the gang is pivoted or has its bearing at a single point, as has heretofore been the case.

The front and rear edges or faces of each gang-frame are provided with a series of bearing-apertures, *f*, (see Fig. 6,) or points for pivotal attachment to the forked arms E E of the frame, so that the gang and its frame can be adjusted endwise with great nicety to bring it into the proper relation to the draft of the machine. This is an advantage that will be readily understood by those familiar with this class of machines. However, whether machines are sent into the field with such a series of apertures or not, it will be noted that by employing a gang-frame, which is pivoted or connected to the main frame, the pivotal line, or the line on which the draft is applied to the gang, may be adjusted, or the gang shifted endwise to any desired extent with great accuracy by the manufacturer. I am aware, however, that this feature is not new, broadly.

Each disk-gang rocks vertically on the pivots *f f* to conform to the surface traversed, and the axis of the pivots passes through or about through the gang-shaft. By placing the pivots of the gang-frame down on the horizontal plane of the gang-shaft, close to the point where the pressure of the earth is received, and by pivoting it in front and rear of the gang-shaft, the gang is held firmly, and a level action and a correspondingly uniform cut insured. So far as I am aware I am the first to use such a gang-frame so pivoted, though I am aware that it is not new, broadly, to place the pivot of a gang down in line with the gang-shaft.

The gang-frame has been described, and is shown in the drawings, as pivoted in the ends E E of the swinging section B, so as to form a flexible machine. Obviously, however, the ends of the arms E E might be made sufficiently wide and the frame be bolted to each arm at two points in front and two points in rear of the gang-shaft, and thus make a perfectly rigid and strong machine; or the connection between the main and gang frames may be in front or rear only if the parts are made sufficiently strong to stand the strain. I prefer, however, to connect in front and in rear, as this construction is practically the best.

Heretofore much difficulty has been experienced from the clogging of the disk scraping or cleaning devices in this class of machines. Small tough roots and weeds accumulate upon the cleaning devices and clog them, thus greatly increasing friction and draft and seriously impairing the efficiency of the machine. In order to obviate these objections and thoroughly clean the disks, I employ a scraper which cleans the disk and a cleaner which cleans the scraper.

A bar, H, carried by the rear end of the gang-frame F, parallel with the gang-shaft, is shown as formed in one piece with the frame. The bar and frame are preferably cast together where it is designed to use scrapers; but it should be understood that scrapers may or may not be used in the organization of machine above described. This cleaner-bar is provided with a series of cleaning-eyes, *h*, through which the reciprocating scrapers I pass. The scrapers I are secured upon the laterally shifting or reciprocating bar K, which is actuated by a pitman, *k*, driven by a friction crank-wheel, *l*, having its bearing on the upper face of the frame F. This crank-wheel is rotated by frictional contact with the disk next to it.

It will be understood by reference to Fig. 1 that the pressure of the earth tends to press each cutting disk inwardly upon its gang-shaft toward the center of the machine. The effect of this is to press the cutting-disk L against the periphery of the friction crank-wheel and insure its rotation and the reciprocation of the scraper-bar.

The laterally-reciprocating scraper-bar carries a slotted guide plate or arm, M, which extends beneath the gang-frame F and moves upon a guide-bolt, N, on the rear side of the frame and through an eye at *n* in the front of the frame.

It will be understood that as the machine moves forward the rotation of the cutting-disk L will rotate the crank-wheel *l*, which reciprocates the scrapers I through the cleaning-eyes *h*. The scrapers reciprocate radially in rectilinear paths across the faces of the disks, and shear or cut off any adhering matter, and are in turn thoroughly cleaned by their cleaning-eyes, through which they reciprocate.

The entire disk-cleaning mechanism is adjusted with the gang, so that the parts always maintain the same relative positions. The size of the crank-wheel *l* relatively to the diameter of the portion of the disk L which actuates it may of course be varied to produce any required reciprocation of the scrapers relatively to the rotation of the disks.

In the drawings, the crank-wheel and its point of contact with its actuating-disk L are so proportioned that the crank-wheel is rotated once, and consequently causes one complete reciprocation of the scrapers, during two revolutions of the cutting-disk. I thus completely clean the disks, and at the same time remove any clogging matter that might otherwise adhere to the scrapers and tend to obstruct the working of the machine. The scrapers may, by any suitable mechanism, be actuated in other ways and directly from the gang-shaft. This part of my invention contemplates, among other things, first, an automatically-reciprocating scraper in combination with a cutting-disk, broadly; second, broadly, a reciprocating scraper in combination with a cleaner; and,

third, a scraper, whether moving or stationary, in combination with a scraper-cleaning device, broadly.

So far as I am aware I am the first ever to use a cleaner for a disk-scraper. Though I prefer the construction herein described, the scraper and its cleaner may be used in different relations to each other, and other kinds of scrapers and cleaners may be employed, and in machines differing in general construction from that herein described, without departing from this broad feature or part of my invention.

The operation of the scraping devices is clearly illustrated in Fig. 2, where on the left-hand side of the machine the scrapers are shown at the limit of their thrust toward the gang-shaft and on the right-hand side of the machine in their opposite position.

Straight or flat disks are shown, and I prefer to use them, though concavo-convex disks may be employed, if desired, and the scraping mechanism so adjusted that the scrapers will enter the concave faces of the disks.

The friction-wheel *l* has been described only as a crank-wheel for actuating the reciprocating scraper-bar. It has, however, another and very different function, which is entirely distinct from the scraper mechanism.

Each cutting-disk has a hub, O, and the disks are separated by spacing thimbles or spools P. The spools, disks, and gang-shaft are all bound rigidly together by clamping-nuts on the ends of the shaft. The several parts therefore act as a unit, and the pressure of the earth on the disks tends to force the entire gang bodily toward the center of the machine. The rotating disk *l* on the gang-frame receives through the disk L this end-thrust of the gang, and relieves the bearing *g* from it, thus diminishing friction and the wear of the parts. More than one rotating wheel may be employed, if desired, either in contact with the same disk or others.

So far as I am aware I am the first ever to employ a rotating disk or wheel to receive the end-thrust of a disk-gang.

The general operation and mere details will be understood upon inspection of the drawings by those familiar with machines of this class.

I reserve the right to hereafter file a separate application for any subject-matter herein shown, but not specifically claimed.

I am aware that heretofore a reciprocating clearer-arm has been used in connection with the colter of a plow, such construction being shown in the patent of A. B. Mattoon, granted June 15, 1869. I am also aware that a reciprocating cleaning-saw has been used in connection with a slotted cultivator-tooth, such an arrangement being shown in the patent of D. H. Paul, granted July 6, 1869. I am also aware that it is old to employ an anti-friction wheel or roller in connection with the rotary mold-board of a plow, and also in connection with the push-wheel of a road-scraper, such organizations being respectively shown in the patents of Page, granted August 7, 1847, and Garlinghouse, granted January 31, 1871. I therefore make no claim to any of the subjects-matter above recited.

What I claim as my invention is—

1. The combination of a draft-pole or tongue, a main frame consisting of a central portion and two pivoted side sections, disk-gangs carried by the side sections, and mechanism for swinging the side sections on their pivots to adjust the angle of the disks relatively to the line of draft.

2. The combination, substantially as set forth, of a draft-pole, the main frame consisting of the central portion or section and the side sections pivoted thereto, a lever on the pole or tongue, connecting-rods between the lever and the side sections of the frame, and the disk-gangs carried by the side sections.

3. The combination, substantially as set forth, of the disk-gang frame, the gang-shaft having bearings therein, the main frame, and connections between the main and gang frames in front and in rear of the gang-shaft, the connections being at or about in the horizontal plane of the gang-shaft.

4. In a harrow or earth-treating machine, the combination of a rotating cutting-disk and an automatically-reciprocating scraper which reciprocates across the face of the disk, for the purpose set forth.

5. In a harrow or earth-treating machine, the combination, substantially as set forth, of a rotating cutting-disk and a reciprocating scraper which reciprocates radially across the face of the disk.

6. In a harrow or earth-treating machine, the combination, substantially as set forth, of a rotating cutting-disk and a scraper which automatically reciprocates in a rectilinear line across the face of the disk.

7. In a harrow or earth-treating machine, the combination, substantially as set forth, of a rotating cutting-disk, a reciprocating scraper, and a cleaner for the scraper.

8. In a harrow or earth-treating machine, the combination, substantially as set forth, of a rotating cutting-disk, a scraper, and a cleaner for the scraper.

9. In a harrow, the combination, substantially as set forth, of a gang of cutting-disks, a series of reciprocating scrapers adapted to clean the faces of the cutting-disks, and a series of cleaners for clearing the scrapers.

10. The combination, substantially as set forth, of a gang of disk-cutters, a laterally shifting or reciprocating bar arranged at or about parallel to the disk-gang shaft, mechanism for shifting it, a series of scrapers carried by the reciprocating bar, and a series of cleaning-eyes, through which the scrapers reciprocate.

11. The combination, substantially as set forth, of a gang of disk-cutters, a gang-frame

in which the disk-gang shaft has its bearings, a bar carried by the gang-frame in rear of the disk-gang, a series of cleaning-eyes carried by the bar, a laterally shifting or reciprocating scraper-bar, a series of scrapers carried thereby, which pass through the cleaning-eyes, and mechanism actuated by the rotation of a cutting-disk for reciprocating the scrapers.

12. The combination, substantially as set forth, of a gang of disk-cutters, the gang-frame in which the gang-shaft has its bearings, a bar carried by the gang-frame in rear of the disk-gang, a series of scraper-cleaning eyes carried by the bar, a laterally shifting or reciprocating scraper-bar, a series of scrapers carried thereby, which pass through the cleaning-eyes, a guide plate or arm on the shifting scraper-bar, a friction crank-wheel mounted on the gang-frame and adapted to be rotated by the friction of a cutting-disk, and a pitman connecting the crank-wheel and shifting scraper-bar.

13. In a harrow, the combination, substantially as set forth, of a disk-gang shaft, its bearings, a gang of disk-cutters, and a rotating wheel or disk which receives the end-thrust of the entire gang.

14. In a harrow, the combination, substantially as set forth, of the gang-frame, the disk-gang shaft, its bearing in the frame, the gang of disk-cutters, and the disk on the frame which receives the end-thrust of the entire gang.

15. The combination, substantially as set forth, of a main frame, a disk-gang frame, a gang-shaft mounted therein, a gang of cutting-disks adapted to work at an angle to the line of draft, carried by said shaft, and a pivotal connection between the main frame and gang-frame at or about in the horizontal plane of the gang-shaft, which pivotal connection permits the latter to rock transversely to conform to the ground.

16. The combination, substantially as set forth, of a disk-gang frame, a gang-shaft mounted therein, and a series of bearings on the gang-frame for connection to the main frame, which bearings are at or about in the plane of the gang-shaft, for the purpose set forth.

In testimony whereof I have hereunto subscribed my name this 8th day of February, 1882.

S. G. RANDALL.

Witnesses:
E. C. DAVIDSON,
LLOYD B. WIGHT.