

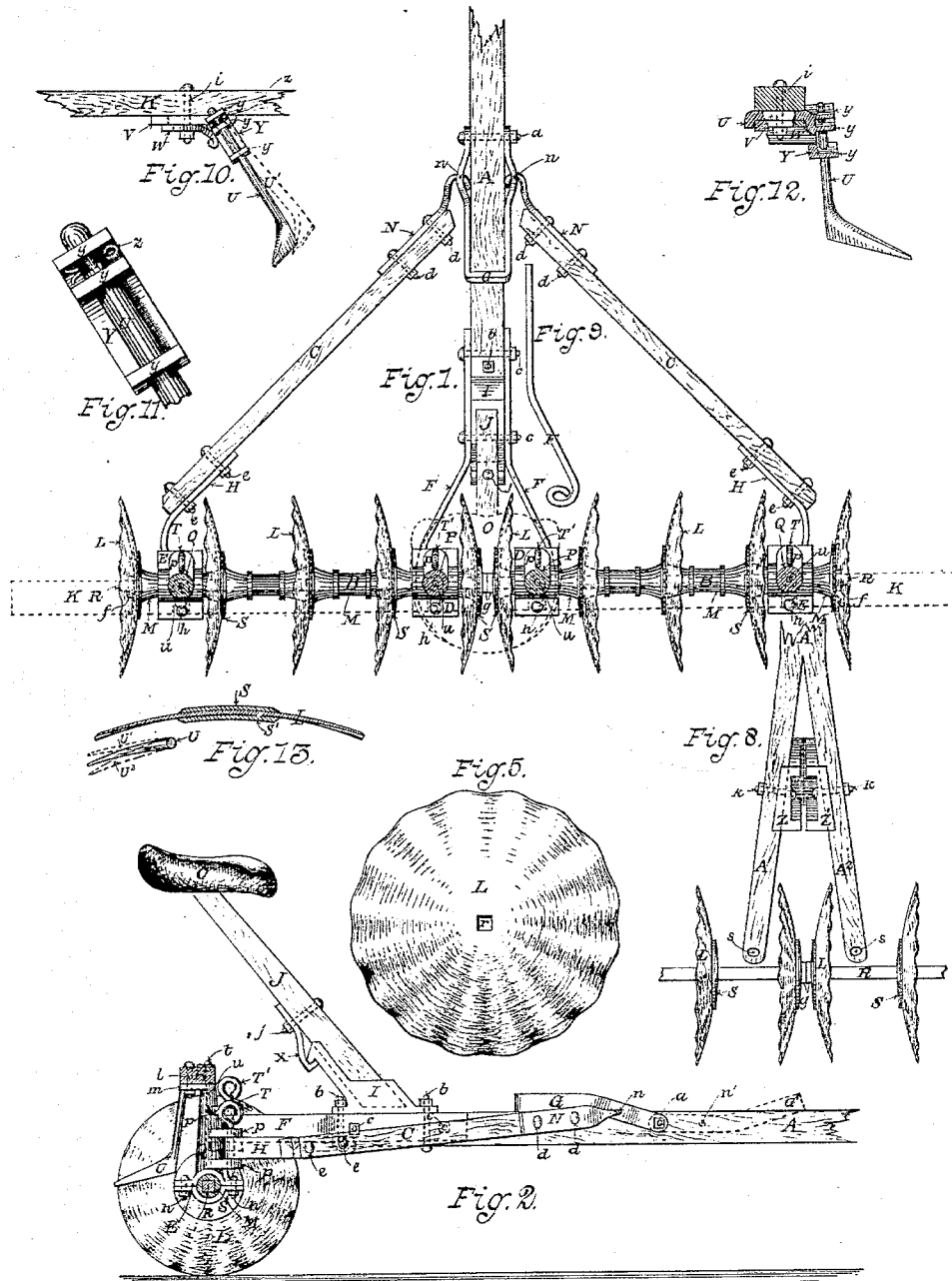
(No Model.)

3 Sheets—Sheet 1.

C. LA DOW.
DISK HARROW.

No. 323,343.

Patented July 28, 1885.



Witnesses.
Ed. Davidson
James Young

Inventor.
Chas. La Dow
by his Attorneys
Baldwin, Hopkins & Peck

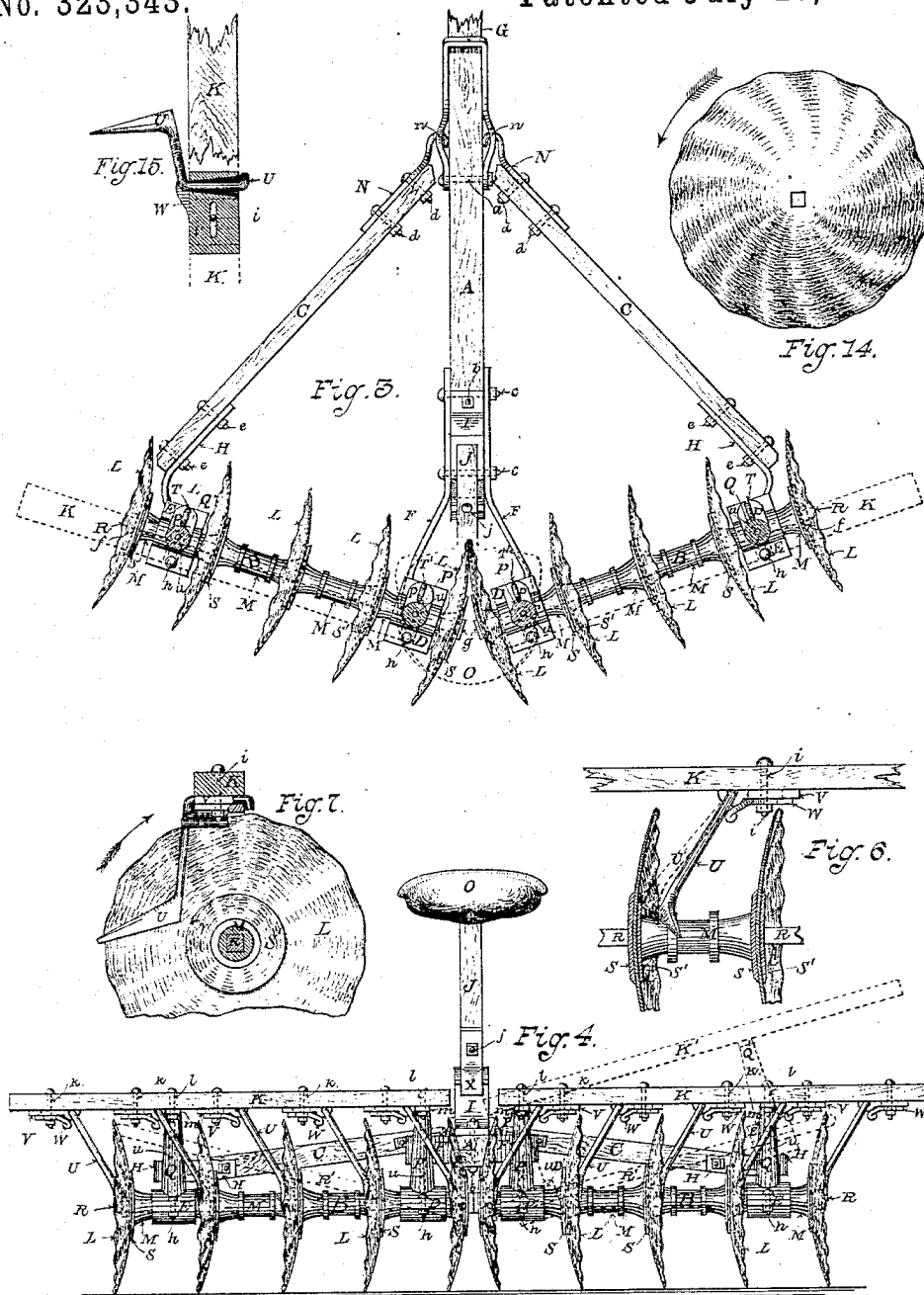
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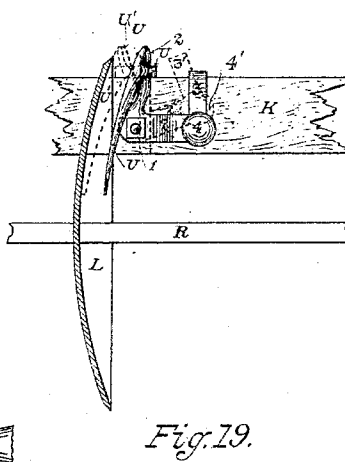
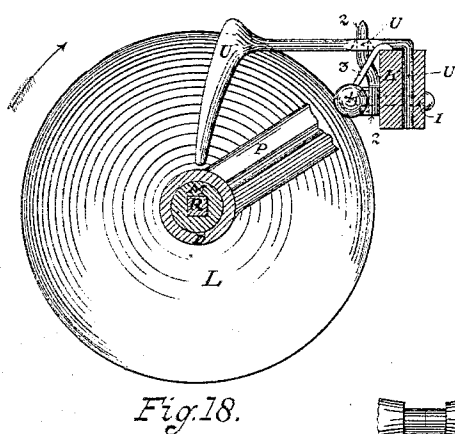
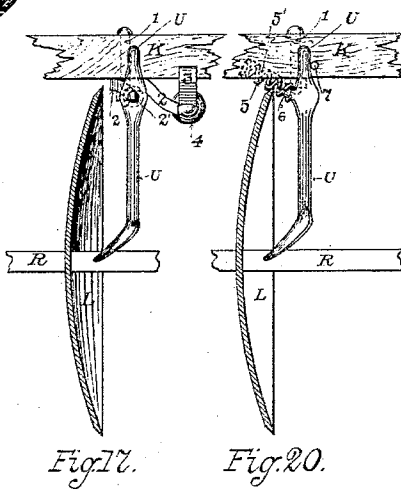
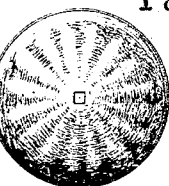
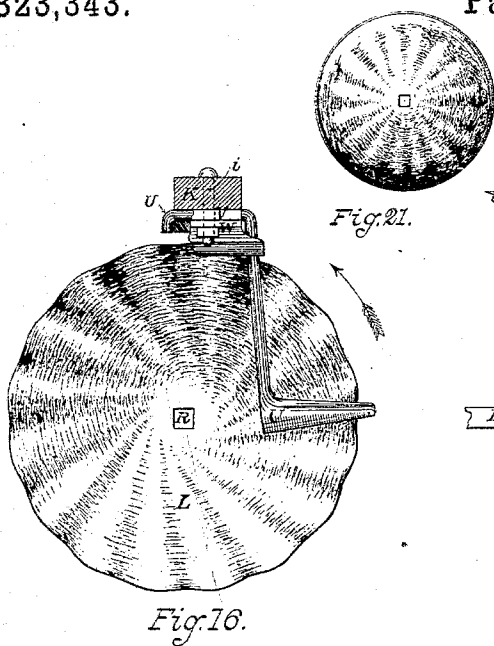
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UNITED STATES PATENT OFFICE.

CHARLES LA DOW, OF ALBANY, NEW YORK.

DISK-HARROW.

SPECIFICATION forming part of Letters Patent No. 323,343, dated July 28, 1885.

Application filed January 15, 1885. (No model.)

To all whom it may concern:

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

My invention relates to harrows employing rotary disks, which are peculiarly adapted for breaking up new prairie sod.

It also relates to harrows having disks in gangs adjustable to the line of draft.

It further relates to scrapers having automatic action for cleaning the disks.

It also relates to disk-gangs attached directly to the pole, and also to methods of construction adapted to the requirements of transportation, and ready detachment and attachment of the parts.

It also relates to novel methods of constructing the disks.

My invention consists in providing the disks with scrapers having automatic action for removing the soil that may accumulate on the disks.

It further consists in providing the disks with scrapers adapted to automatically approach and recede from the disks.

It further consists in providing the disks with scrapers which have automatic action, and which are adapted to conform to the irregularities of the disks.

It further consists in corrugating or otherwise shaping the disk in such manner that greater strength may be secured with less thickness of metal.

It further consists in providing the disk with corrugations which strengthen it and also enable it to more thoroughly turn and pulverize the soil.

It further consists in adapting the draft-pole to be hinged directly to the disk-gangs, and combining the same with parts adapted to be hinged together, which in their united relation with the pole constitute a draft-frame for the gangs.

It further consists in providing the gangs with an adjusting-lever adapted to receive the side thrusts and draft of the gangs, and to transmit the same directly to and in line with the pole and without torsion thereof.

It further consists of other combinations

and details of construction, hereinafter described and specifically claimed.

The objects and purposes of my invention I accomplish by means of the devices and construction shown in the accompanying drawings, which form part of this specification, and and in which—

Figure 1 is a top view with forward part of pole removed. It shows the gangs connected directly to the pole by the hinged braces F F (of one of which Fig. 9 is an edge view) and C C. It shows seat in dotted line and seat-bar J in connection with the pole, and also the adjusting-lever G. The scrapers and scraper-bar are removed. Fig. 2 is a side view with the first rear or outer disk removed to display the brace N and the method of hinging it to the gang. It shows one of the scraper pendent from the scraper-bar, and also the method of mounting the seat and the lever G. Fig. 3 is a top view of the parts shown in Fig. 1, showing the position of the braces C C, the lever G when the gangs are angled with the line of draft, and the inner disks of each gang abutting. Fig. 4 is a rear view and elevation showing scraper-bar and scrapers. Fig. 5 is a disk, showing corrugations radiating in a straight line from the axle. Figs. 6 and 7 show relative position of scraper-disk and scraper-bar, dotted lines in Fig. 6 showing the position occupied by the scraper when in process of cleaning the disk. Fig. 8 shows a modification of the pole, its rear end being divided so as to be attached to the gangs without the use of braces F F. Fig. 9 is an edge view of one of the braces F, to show its construction in detail. Figs. 10, 11, and 12 show the construction of one of the scrapers and the method of mounting the same on the bar by means of double hinges. Fig. 13 shows the torsional action of the doubly hinged or swiveled scraper relative to the corrugations of the disk. Fig. 14 shows a modification in the radiations of a corrugated disk. Fig. 15 represents a modification of a scraper adapted to be loosely hinged into its casting on the bar, so that the blade of the scraper may thus obtain torsional movement relatively to the disk. Fig. 16 represents a disk whose corrugations do not run outward in a straight line from the center. Figs. 17, 18, and 19 represent automatically-operating scrapers having their

blades arranged on a vertical plane, and their arms or shanks arranged on a horizontal plane and adapted to be held away from the disk by a counterbalance-weight sufficient to maintain the scraper normally out of contact with the disk, but allowing it to approach the disk to clean the same. Fig. 20 represents the scraper last described, but having a spring substituted for the counterbalance-weight, and adapted to perform the same office. These figures show the scraper as applied to plain disks; but they, as well as the forms described in Figs. 6, 7, 12, and 15, are designed to operate with corrugated disks equally well. Fig. 21 shows a disk having corrugations deepest near the center. Fig. 22 shows a spool with corrugated ends adapted to mesh into the corrugations of the disk.

The same letters denote the same parts in all the figures.

Obviously, the details of construction of the several parts may be varied in various equivalent well-known ways without departing from the spirit of the invention. Some of the parts may be used without the others and in machines differing in construction from that herein shown.

To accomplish the purposes of my invention, I mount a suitable number of disks on their axles B B, separating the disks by spools of suitable size in the usual manner. These spools M, Figs. 6 and 7, are provided, preferably, with separate flanges or plates bracing up against the disks, as S S' in the figures, and adapted to fit the corrugations and configuration of the disks for the purpose of strengthening them.

Obviously, a spool and its plates may be made in one piece; but such form involves greater expense in manufacture and does not possess the advantages of my construction, one of which is that when the journal part of the spool is worn out it may be replaced without also furnishing the plates. The spools taper down from the disks, and are stronger than straight spools having a shoulder near their ends. The spools may be used without plates, and in such case the spools have corrugated ends to mesh into the corrugations of the disks. Disks without corrugations may be used, and in such case neither plates nor spools need be corrugated.

The rear end of the pole A may be divided and its arms attached to each gang, respectively, as indicated in Fig. 8, A' A²; but I prefer to attach the pole to each gang, respectively, near its inner end by means of the iron braces or hinges F F, which are firmly bolted to the pole at c c, and by the pins T' T' are hinged to the gang. The outer ends of each gang are attached to the pole by means of two divergent bars, C C, hinged at their rear ends to the gangs and at their forward ends to the pole by means of a lever, G. This lever is a double-angled yoke pivoted at A to the pole and oscillating vertically thereon, having its arms bent longitudinally, Fig. 2, so that they

shall lie along opposite sides of the pole, parallel with it, when the movable end of the lever rests on the top of the pole forward or backward of its pivoted point A. The forward ends of the bars C C are hooked swively to their respective arms of the lever G at some point, n n, between its fulcrum a and its free end, so that when the lever G is oscillated parallel with the pole the swivel-bars C C at N N are pulled forward or backward, thereby drawing with them the outer ends of the gangs, which may thus be angled horizontally with the line of draft, Fig. 3. The braces or bars F and C are hinged to the gang-bearings with lips, preferably formed on the standards P Q. Between these lips, Fig. 2, p p, I insert the ends of these braces and connect the parts together with the pins T T'. The hinged parts F F are provided with a hole laterally larger than the pin T', for the purpose of allowing the ends of the gangs vertical motion on these hinging-pins. These pins T T' serve as pivots when the outer ends of the gangs are being moved forward or backward. By this construction the gangs have at their inner ends a vibratory and pivotal motion on the pins T' T', and at their outer ends a pivotal motion on the pins T T' and a vibratory motion at the swivel-points n n on the lever G, and can consequently be angled with the line of draft and angled or canted vertically, so as to oscillate or vibrate in conformity with the inequalities of the ground to be harrowed without disarranging or impairing the structural unity of the parts as a frame.

Obviously, the lips p p may be provided with lateral slots, or, if desired, the gangs may be adapted to swivel on their journals in the standards P P Q Q, and thus obtain movement for their ends; but I prefer the constructions shown. The standards may be placed between other disks than those where they are located in the drawings.

When the lever G is lying backward on the pole A, the draft-strain from the outer ends of the gangs is brought or transmitted through the bars C C directly and evenly upon the pole, and from opposite sides of it, since the arms of lever G lie alongside of the pole, Fig. 2. In like manner when this lever is lying forward on the pole, Fig. 2, dotted line, and Fig. 3, and the gangs are then angled, so that the draft-strain shall be greatest, then the strain is in like manner brought directly upon the pole; and since in this position the end of lever G rests on the pole, Figs. 2 and 3, and the angled arms of the lever lie parallel alongside of it, with the points of attachment of the bars C C at n n falling lower than the fulcrum a of the lever, and the draft-strain is applied in a line from the gangs to the lever G at n n, below the fulcrum a, obviously the gangs are held angled as firmly by the toggle thus formed as if the bars C C were bolted to the pole itself, the draft-strain holding lever G firmly locked in its position. By this construction in all cases the draft

tension or strain between the gangs and pole is direct and even from opposite sides of the center of the pole, without torsion thereof, and in turning the machine, though the strain through bars C C is a pull from one gang and a push from the other, still both are, by this construction, applied at the same time at points directly at opposite sides of the pole, squarely, so that neither the lever mechanism nor its attachments nor the pole are wrenched, nor is the efficacy of the parts as a frame impaired.

The gangs may be angled by backing the machine, whereby the lever G is thrown forward and locked upon the pole by the action of the team, and by slightly raising the lever (when thrown forward on the pole) and starting the team the gangs will be drawn into line with each other. By withdrawing the pins T T' T' the gangs can easily be detached from the pole, and the swivel-bars C C can be then readily unhooked from the lever G, and the parts are thus easily and readily packed for transportation or adjusted and handled.

Upon the rear of the pole I mount the plate I, having a ratchet to receive the seat-bar J. The seat-bar is provided with a button, X, pivoted to the seat-bar at j, having its lower end provided with a hook adapted to engage with an oppositely-turned similar hook on the plate or casting I, whereby the seat is held firmly in place. This button X can be turned laterally and unhooked to permit the seat-bar to be withdrawn from its socket, thereby providing a means for a speedy and easy attachment or detachment of the seat without unbolting the same.

In my construction, as shown, the inner ends of the gangs are adjacent to each other, and the tendency of the operation of the disks being to thrust the gangs laterally toward each other, obviously the inner disks will be thrust together, each acting as a buffer to the other, to withstand this lateral thrust. When the gangs are angled and this thrust is greatest, the edges of the circumferences of the inner disks will impinge and rotate in unison as a single-disk, whether plain or corrugated disks are used. In the latter case the corrugations will interlock, and in any case virtually a single cutting edge will be presented to the ground by the two disks, and they will make a single cut in the soil, in a straight line with the line of draft, so that all the ground traversed by the machine will be harrowed, and a narrower strip, lying between the gangs, in the path of the machine, will be left unharrowed than in machines where buffers must be employed. Above the disks I mount a scraper-bar, K K, for each gang. I accomplish this preferably by means of the upright standards P P Q Q and bolts passing through the scraper-bar and these standards. The scraper bar may be placed either in front or in rear of the disks, if desired. Upon these standards preferably I mount the lips horizontally, p p, Fig. 2, into which are pivoted the braces and

bars F F and C C, hereinbefore described, so that the disk and scraper bar structure shall be stable and held upright relatively to the pole. Upon the bars K K, at suitable distance apart, I hinge the scrapers separately to vibrate laterally against the disks. Each scraper U is shown as consisting of a flattened plate adapted to play against a disk and having a shank of suitable length, with its upper end hinged in a clip or bearing, V, Figs. 6 and 7, mounted on the scraper-bar K. The scraper is hinged to the scraper-bar at an angle vertically, Fig. 6, so that its tendency will be to drop away from the disk by gravity; but a stop, W, is provided and adjustably fastened to the scraper-bar, enabling the operator to adjust the angled inclination of the scraper-shank as may be desired, and to prevent the scraper from dropping by gravity too far from the face of the disk when not engaged in scraping.

Obviously, as the disk rotates, any dirt that clings to it is brought in contact with the scraper and causes it to draw up to the face of the disk closely and bear against it until the earth is scraped away. When the disk is cleaned, the scraper gravitates back and away from the disk. The shape and size of the scraper, its inclination, and the manner of mounting it relatively to its bar or its disk may be modified to suit the requirements of the manufacturer, the work to be performed, or the configuration of the disk.

The bearing V, Fig. 6, is provided with a slot, through which the bolt i passes for the purpose of adjusting the hinge of the scraper on the scraper bar, either toward or from the disk, so that the scraper-blade shall stand normally at any desired distance from the disk. Each scraper may have separate blades adapted to clean the same disk and operate independently of each other; or one part of the said scraper form may be adapted to clean the concave side of one disk and its fellow the convex side of the adjacent disk.

The adjustable stop may be omitted, and the casting V may be provided with a stationary stop for the scraper to strike against.

A modification of the scraper construction is shown in Figs. 10, 11, and 12, in which the shank is swiveled to a cleated or lipped block, Y, and pivoted at z between the lips y y, so that the scraper-blade shall oscillate on its shank as an axis. The cleated block Y is pivoted in the bearing V, and the stop W is provided for the purposes specified hereinbefore. Obviously, by this means the scraper may oscillate against the disk, and may rotate on its shank with the heel of the scraper as a pivotal point, so that it will follow all the irregularities of the disk's face. The scrapers in any construction are automatic in action, and each operates independently of the other, and does not require the attention of the driver. They may be used upon plain or corrugated disks, either flat or concaved, when mounted

either separately or in gangs, and may vibrate so that the plane of the scraper-plate shall always meet the plane of the disk's surface or the plane of the elevations or depressions of the corrugations of the disk's surface regularly, and so that the toe of the scraper-blade may vibrate laterally to follow and scrape the elevations and depressions of the corrugations of the disk, Fig. 13. The scrapers automatically press against the disks in proportion to the work to be done, and they are self-sharpening in use. They may be applied to either side of the disks, or be adapted to scrape both sides of one disk, and they may be applied to any shape or sized frame on any form of disk-harrow.

When the scrapers are hinged to a frame or bar in advance of the disks, I prefer to combine them with either a counterbalance-weight or a spring to hold them normally out of contact with the disks, as shown in Figs. 16, 17, 18, 19, and 20. These scrapers are automatic in operation and work on the same principle of scraping as those shown in Figs. 6 and 7.

The scrapers may be united by any well-known mechanism, so that all the scrapers in a gang may act in concert, approaching the disks by the suction of the soil adhering to the disks, and falling away therefrom (after the earth is scraped off) by their own gravity or by the gravity of another body coacting therewith, or by means of a spring attached; but I prefer that each scraper have action independent of other scrapers on the same gang of disks.

When the pole is divided, as in Fig. 8, and hinged to the gangs, I mount the seat-bar casting *Z Z* in between the divided part of the pole by bolts *k k*, and mount the seat thereon, as before described.

The disks may be either flat or plain concaved, as ordinarily constructed, and mounted in any of the usual well-known ways; but as herein shown, Figs. 5, 7, and 14, I construct my disks of a single plate of metal, concaved, with corrugations radiating from the middle of the wheel to or near to the circumference, or with these radiations curved from the middle of the wheel to the circumference, or radiating from points between the middle and circumference of the disk, so that the blade of the disk shall cut the earth with the edge of the corrugations vertical to the surface to be harrowed. By means of this corrugated construction the wheels are greatly strengthened proportionally to the thickness of the material used in their construction, and consequently much less material can be used in constructing disks without impairing their strength and working capacity; also, the thin waving edge and corrugated surface make a deeper and wider cut, and are adapted to distribute the soil more broadly and to pulverize it more thoroughly, and at the same time less disks are required to the gang. Moreover, the tendency of the disks to warp in the process of manufacture is counteracted by the process

of corrugating, and the undesirable irregularities and blisters on the faces of the disks that cannot be obviated in the manufacture of plane concave-faced disks are taken up in the elevations and depressions of the corrugated surfaces herein described.

By corrugating the disks the thinness of the material employed renders it possible and available to manufacture plates already polished into disks in the shape desired without heating, and thereby obviate the necessity and overcome the difficulties of polishing out the concave sides of the disks after construction. Further, by employing such corrugations the disk is tapered from its middle to the edge, and the thickness of the plate being thus gradually reduced from the middle of the edge of its circumference, it is adapted to penetrate the ground deeper, and retains its sharp edge till worn out, and by this means the necessity of occasionally sharpening the edge during use is entirely obviated, as well as the necessity of sharpening the edge when first constructed; but the disks may be sharpened before being corrugated, and then they are preferably beveled on both sides.

Any number of corrugations desired may be employed, and the disks need not be set at so great an angle to the line of draft to accomplish the same work, and so lessen the draft-strain upon the team.

The disks may be corrugated as shown in Fig. 21, or in any other form desired, so far as many of the features of my invention are concerned. In Fig. 21 the corrugations are shown as increasing in depth as they leave the cutting-edge of the disk. This gives a disk of great strength, and also insures a good permanent cutting-edge.

When the corrugations are made on the ends of the spools themselves, I prefer to make the spool in two parts, as shown in Fig. 22. The ends of the spools may be enlarged and the bracing-plates omitted, if desired.

The corrugated bracing-plates may be used, if desired, with the spools having corrugated ends; or the bracing-plates may be used against disks that are not corrugated, and with spools whose ends are not corrugated.

The bracing-plates may be used on the concave or convex sides of the disks, or on both.

The corrugated disks are better adapted than smooth-faced disks to pulverize and break up hard soil, or that which contains rooty or fibrous matter—such as new prairie sod, which can by the use of this machine be made to produce a crop the first year—as the corrugations in the disks take hold of the soil and lift and break the same, and the automatically-operating scrapers clean out the corrugations as fast as they become filled, thus adapting the machine for work not possible to do heretofore.

I am aware that heretofore scrapers have been made that could be pushed up to and removed from the disks by the operator; also

that scrapers have heretofore been made to move across the radial faces of the disks by various mechanisms; but, so far as I am aware, I am the first to combine scrapers with disks in such manner that the earth adhering to or accumulating on the disks shall cause the scrapers to approach and clean the disks.

I am also aware that heretofore disks have been strengthened by forming ribs on the side of the disks; also that many articles have heretofore been corrugated to increase their strength or rigidity; but, so far as I am aware, I am the first to form a disk for pulverizing the soil from a single plate of metal and so corrugate the same as to increase its strength and efficiency.

No claim is herein made to the abutting of the inner disks for the two gangs, whereby the end-thrust of the gangs is equalized and the relation of the disks insured, as such subject-matter is claimed in another application, filed by me July 6, 1885, Serial No. 170, 800, and obviously the other features of the machine herein shown and claimed are entirely independent of such a construction.

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

1. The combination of a disk, a scraper held normally out of contact with the disk and adapted to be forced against the disk by the soil adhering thereto, and a support or supports for the disk and scraper.

2. The combination of a disk with a scraper hinged to its support and adapted to automatically approach the disk to clean the same and to move in a lateral direction from the disk when cleaned, and a frame for the disk and scraper.

3. The combination of a disk, a scraper adapted to approach the disk and to gravitate therefrom independently of other scrapers in the same gang, and a frame for supporting the disk and scraper.

4. The combination of a disk, a scraper held normally out of contact with the disk and adapted to automatically approach the disk and to follow the inequalities thereof, and a support or supports for the disk and scraper.

5. A corrugated disk, in combination with a scraper adapted to conform to the corrugations, and a support or supports for the disk and scraper.

6. The combination of a disk and a hinged scraper adapted to automatically approach the disk laterally, the hinge being located outside of the circumference of the disk.

7. A gang of disks and a frame in which they are mounted, in combination with a gang of scrapers adapted to independently and automatically approach and recede in a lateral direction from the sides of the disks.

8. The combination of the disk L, a draft frame or support therefor, the bar K, and the hinged scraper U, arranged at an angle relatively to the side of the disk and adapted to be forced against it by the suction of the earth adhering on the disk.

9. The disk L, in combination with the hinged scraper U, arranged at an angle to the face of the disk and adapted to automatically approach and recede therefrom.

10. The combination of a seat standard, the casting I, having the seat-standard socket, and the swinging or pivoted locking-button for uniting the standard to the casting.

11. The combination of a disk and a scraper held normally out of contact with the disk and adapted to have both lateral and torsional movement in cleaning the disk.

12. The combination of a disk, a scraper adapted to have both lateral and torsional movement on a single hinge, and a support or supports for the disk and scraper.

13. The combination of the pole A, the adjustable disk-gangs B B, the lock-joint lever G, and the bars C C, adapted to push and pull in line with the side of the pole.

14. The concavo-convex cutting-disk for a plow or harrow, made of a single plate of metal and formed with radial corrugations adapted to strengthen the disks against lateral pressure.

15. The herein-described corrugated cutting-disk for a plow or harrow, made of a single plate of metal, in combination with mechanism for varying the angle of the disk.

16. A harrow-frame, in combination with a disk having corrugations which diminish in depth as they approach the edge of the disk.

17. A gang of corrugated disks and spools having corrugated ends, in combination with an axle and nut for clamping the corrugated parts together.

18. A disk-harrow having a pole forked at its rear end and adapted to be thereby hinged to the disk-gangs, draft-bars for adjusting the angle of the gangs, and mechanism for shifting the draft-bars.

CHARLES LA DOW.

Witnesses:

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ERNEST J. ATKINS.