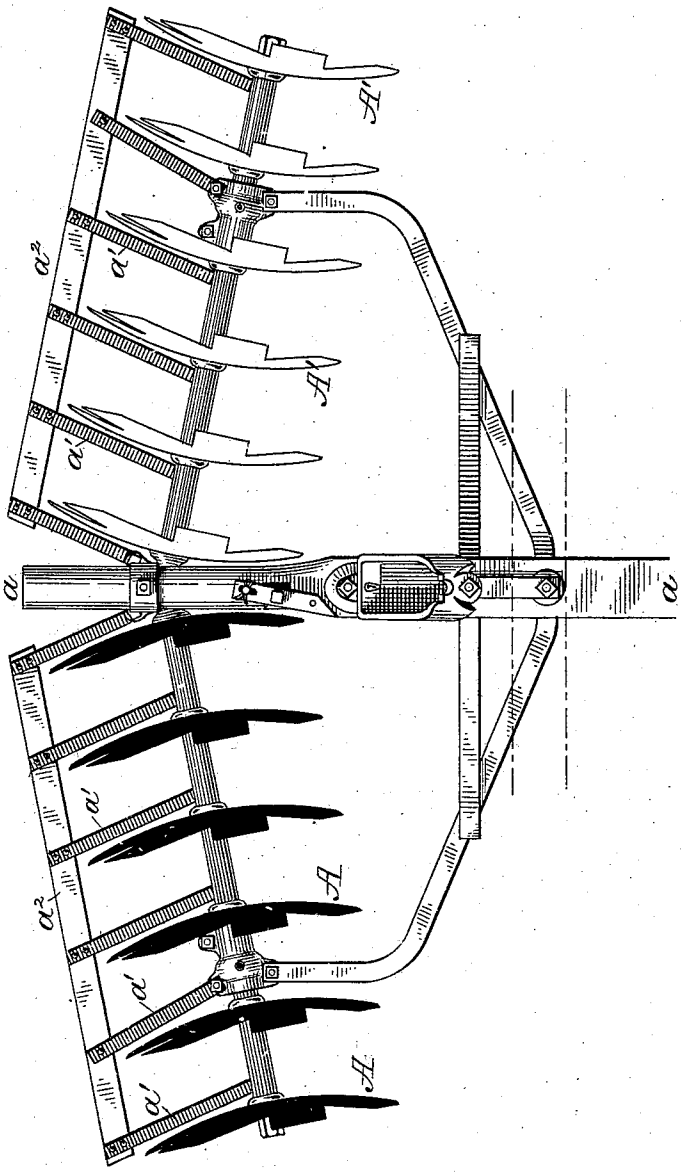
(No Model.) 2 Sheets—Sheet 1.

G. M. CLARK.

DISK HARROW.

No. 369,163. Patented Aug. 30, 1887.

Fig. 1.



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(No Model.) 2 Sheets—Sheet 2.

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DISK HARROW.

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Fig. 2.

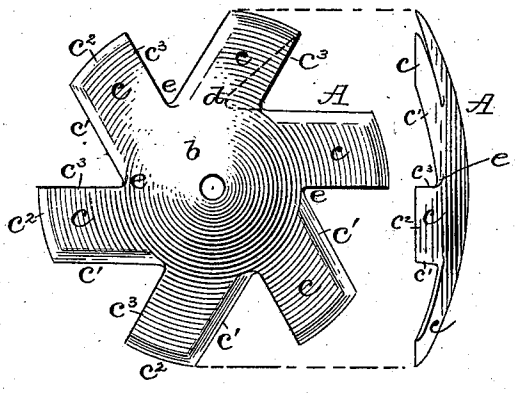


Fig. 3.

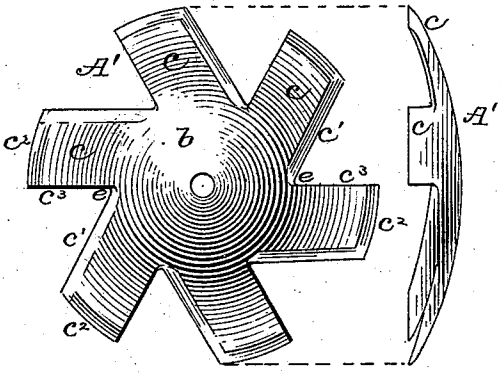


Fig. 4.

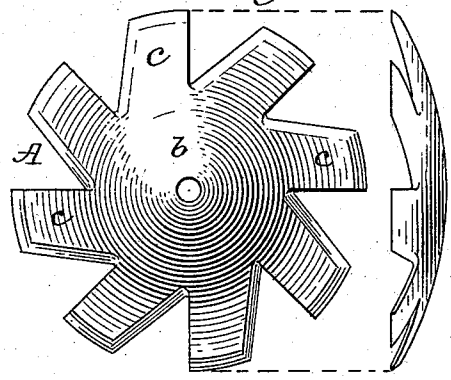


Fig. 5.

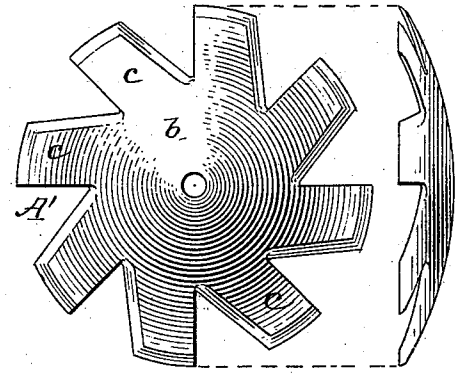


Fig. 6.

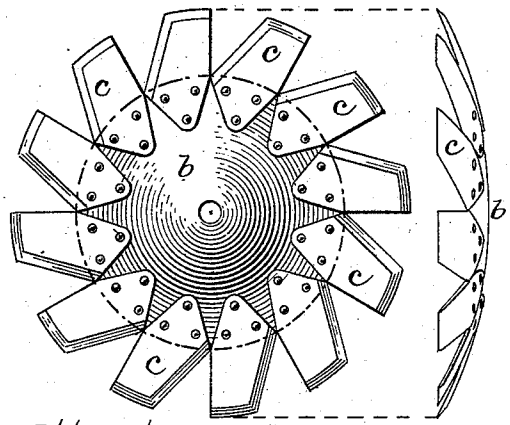
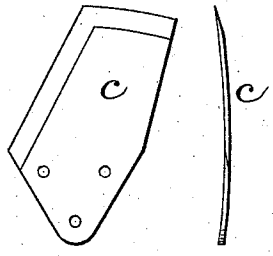


Fig. 7.



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UNITED STATES PATENT OFFICE.

GEORGE M. CLARK, OF HIGGANUM, CONNECTICUT.

DISK-HARROW.

SPECIFICATION forming part of Letters Patent No. 369,163, dated August 30, 1887.

Application filed July 22, 1887. Serial No. 244,995. (No model.)

To all whom it may concern:

Be it known that I, GEORGE MARSHALL CLARK, of Higganum, in the county of Middlesex and State of Connecticut, have invented certain new and useful Improvements in Harrows; and I do hereby declare that the following specification, taken in connection with the drawings furnished and forming a part thereof, is a clear, true, and complete description of the several features of my invention.

The prime object of my invention is to provide in a harrow soil-working devices which, as far as may be practicable, shall possess the operating capacities of soil-working devices in the best-known forms of prior revolving toothed harrows, and also of those in the best forms of prior revolving disk-harrows, while reducing to a minimum many objectionable results well known to be incident to the operation of both of said types of harrows.

With prior revolving toothed harrows the balling or winding of roots, weeds, stalks, stubble, &c., is a well-known incident in their operation, and in proportion as that has been heretofore obviated in any prior harrow its soil-working capacity has been impaired. I now obviate said balling and winding of roots, weeds, &c., and still maintain an unimpaired soil-working capacity.

With prior revolving disk-harrows an undue lateral displacement of surface-soil is incident to their operation, and any excess in such displacement is not only useless, but it involves heavy draft and a useless waste of team-power.

Among the many prior harrows heretofore patented are some which embody what may be termed "revolving bladed disks," because of their general disk-like form and the presence of a series of blades which have not only a cutting capacity, but also the function of harrow-teeth; and there are other forms of harrows embodying disks which have corrugated edges, and still others which have teeth which are not cutting-blades.

As compared with any prior harrow known to me, a harrow embodying my invention has soil-working devices each of which in its best form possesses all of the following characteristics, viz: first, a central circular earth-working face, which may be flat, but which in its best form is concave; second, cutting-blades which have their forward edges sharpened, and also their outer ends, and said outer ends occupy a circular line concentric to the axis of the disk; third, said forward edges are substantially tangential to said central circular working-face, and in its best form each blade as a whole is substantially tangential to the axis of the disk; fourth, at the junction of the edges of any two adjacent blades their lines are merged, so that no wedging crevice is afforded into which a root or stalk can be forced and retained therein; fifth, when employed in gangs angular to each other and to the line of draft, my bladed disks of one gang must be "rights," and those of the other "lefts," as distinguished from any prior harrow known to me, whether it had either toothed or bladed devices, with the single exception of a certain special type of prior harrow embodying an angular frame and having at each side thereof individual earth-working wheels provided with spade-like blades which were twisted substantially parallel with the axis and then at their outer ends bent or curved in the line of the periphery of the wheel, and hence said blades were specially bent in each wheel for service at one particular side of said frame.

To more particularly describe my invention, I will refer to the accompanying drawings, in which—

Figure 1 is a top or plan view of a harrow embodying my present invention and having its gangs angularly adjusted for service, the usual driver's seat being removed. Fig. 2 in side and edge views illustrates a right-handed six-bladed disk embodying my invention. Fig. 3 in like manner illustrates a left-handed six-bladed disk. Figs. 4 and 5 similarly illustrate right and left handed eight-bladed disks. Fig. 6 illustrates in side and edge views a large right-handed twelve bladed disk having detachable blades. Fig. 7 illustrates one of said detachable blades in side and edge views.

As shown in Fig. 1, the two gangs of disks are mounted and arranged with reference to the pole *a*, as disclosed in my application for Letters Patent filed September 22, 1886, Serial No. 214,242, said gangs being angularly arranged and adjustable, and having clod-breakers *a'* between the disks mounted on the bar a^2, as heretofore devised by me.

The bladed disks A are on the right-hand side of the driver while on the seat, and the disks A′ are on the left-hand side. Each disk has essentially a central circular earth-working face, *b*, which performs a duty similar to that performed by the face of the ordinary circular disk, and although said face may be flat, it should be concave for obtaining the best results.

The number of blades *c* on each disk may be widely varied without departure from my invention. In Figs. 2 and 3 six blades are shown, and in Figs. 4 and 5 there are eight blades. As one essential feature, each blade must have its forward or front cutting-edge, *c′*, on a line tangential to the central circular working-face, *b*, and said edge is well sharpened. The outer end, c^2, of each blade is also sharpened, and affords a cutting-edge which occupies a line concentric with the axis of the disk, as distinguished from the blades in one form of prior harrow having bladed earth-working devices unprovided with a central circular earth-working face, and having the blades twisted laterally somewhat after the manner of the blades of a propeller-wheel.

The rear edge, c^3, of each blade is functionless; but in order that the face of the blade may be as wide as possible, said edge occupies a line substantially radial to the axis of the disk. Said rear edge may, however, be retired at its inner end, as indicated in dotted lines at *d* in Fig. 2. Care should, however, be taken in all cases to avoid at the junction *e* of the edges *c′* and c^3 such angles or lines as will be liable to afford a retaining-jaw or wedging-crevice which can retain roots and other solid matter liable to be encountered in soil-working.

The cutting-edges *c′* being tangential, as shown, readily free themselves from roots and clods, which, although partially lifted by said edges, are promptly dropped as the disk revolves.

The cutting-edges at the end c^2 perform a duty like that of a corresponding portion of the edge of the ordinary disk.

The blades of the right-handed disk, A, Fig. 2, are reversed in position, as compared with those of the left-handed disk, A′, Fig. 3, so as to properly locate the forward or tangential cutting-edges *c′* with reference to the concave central working-face and the direction in which they are revolved when in service, and said tangential arrangement of the said forward cutting-edges enables them to operate on roots and turf with a thrusting cut, which is quite as effective as a draw cut.

While working soil the central working-face, *b*, will of course effect as much lateral displacement of the surface soil as an ordinary disk of the same diameter; but the spaces between the blades greatly reduce the lateral displacement as compared with that of ordinary disks of a diameter corresponding with my bladed disks, and as a result thereof a much more even and desirable surfacing effect is produced than with the ordinary disks, and with the expenditure of much less draft-power. Inasmuch as the entire tangential edge of each blade is effective as a cutting-edge, it will be seen that the aggregate length of all the cutting-edges *c′* and c^2 quite equals the entire length of a cutting-edge afforded by a sharp-edged disk of the same diameter.

The bladed disks shown in Figs. 2 to 5, inclusive, have the blades integral with the central working-face, and this I deem most desirable for ordinary diameters, and for obtaining the best results they are composed of steel carefully tempered.

In Figs. 6 and 7 the central circular working-face, *b*, is constructed in one piece, separately from the blades *c*, and hence, while the blades may be made of tempered steel, the central portion may, if desired, be composed either of cast malleable iron or of wrought-iron, the blades being of steel and strongly bolted or riveted thereto, thus providing for the substitution of new blades for such as may have become broken or worn. This form of bladed disk is specially desirable when large diameters are sought, and in some cases short integral blades may be profitably employed, alternating with longer detachable blades.

Although for obtaining the best results the bladed disks should be formed and arranged substantially as shown, it is to be understood that it will be within certain portions of my invention if the disks be flat, instead of concavo-convex, provided they be otherwise constructed as shown and described.

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

1. In a harrow, the combination of angularly-arranged gangs of bladed disks, each disk having a circular central earth-working face, and also cutting-blades, each having a forward or front cutting-edge tangential to said central working-face, and a cutting-edge at its outer end in a line concentric to the axis of the disk, substantially as described.

2. A harrow-disk having a central circular earth-working face and blades having front cutting-edges which are tangential to said central face, substantially as described.

3. A harrow-disk having a central circular concave earth-working face, blades having front cutting-edges which are tangential to said face, and cutting-edges at their outer ends which occupy a line concentric with the axis of the disk, substantially as described.

4. A harrow-disk provided with blades having tangential front cutting-edges, cutting-edges at their outer ends in a line concentric to the axis, and a rear edge which is substantially radial to said axis.

GEORGE M. CLARK.

Witnesses:
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