No. 833,841. PATENTED OCT. 23, 1906.

G. F. MAIERS.

DISK HARROW.

APPLICATION FILED APR. 10, 1906.

2 SHEETS—SHEET 1.

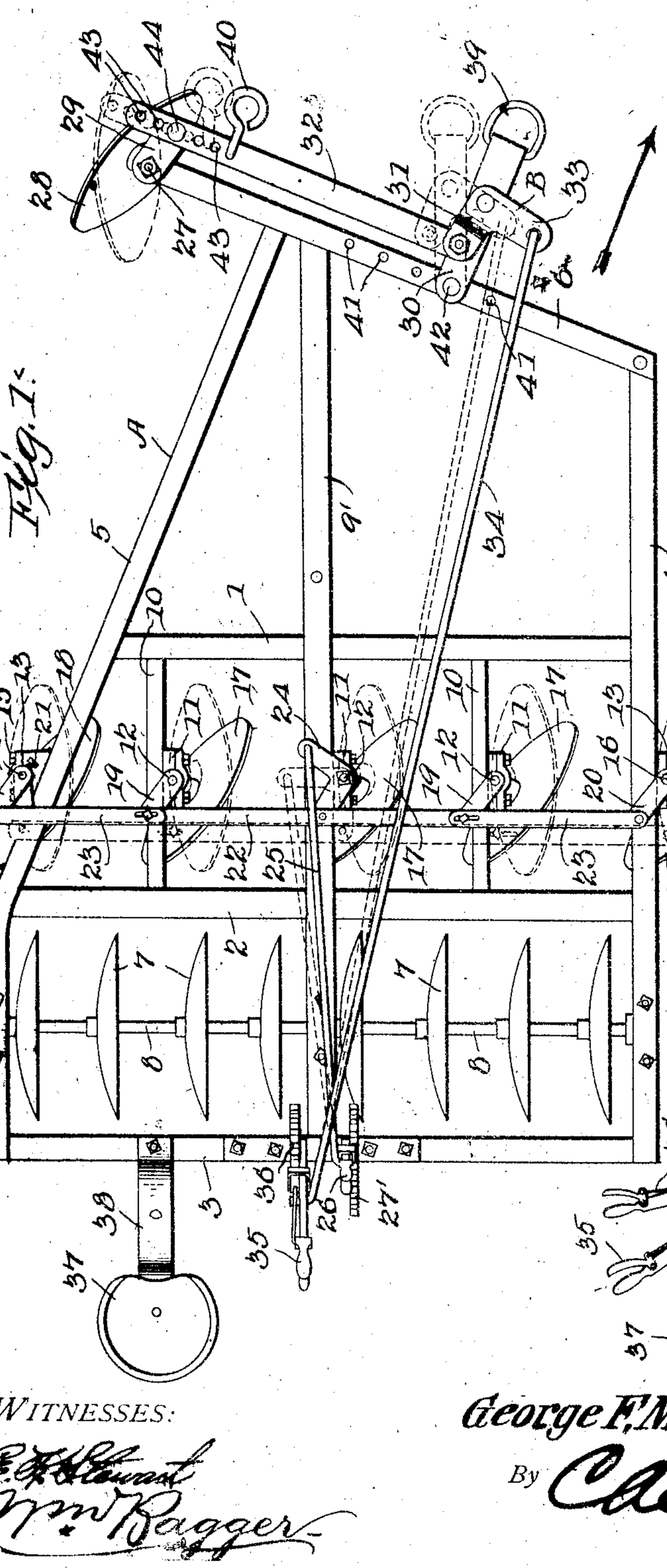

Fig. 1.

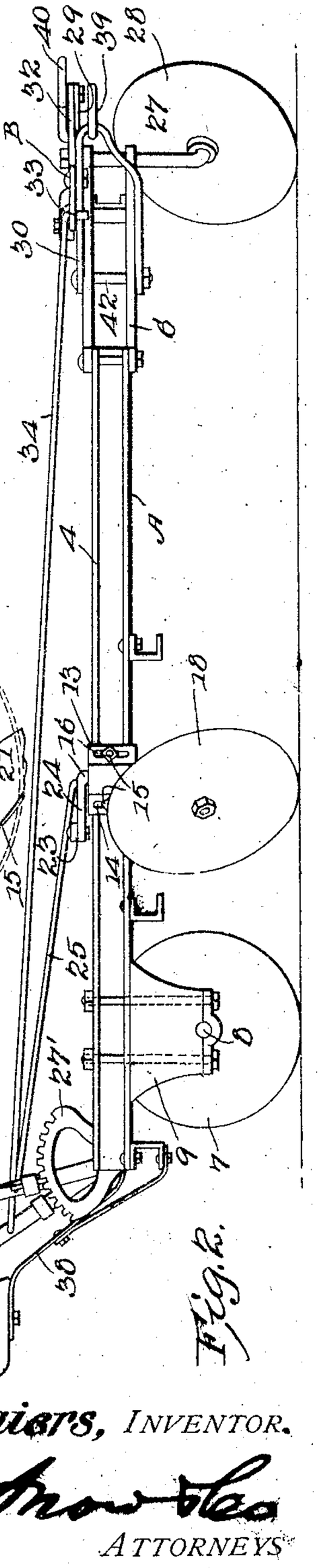

Fig. 2.

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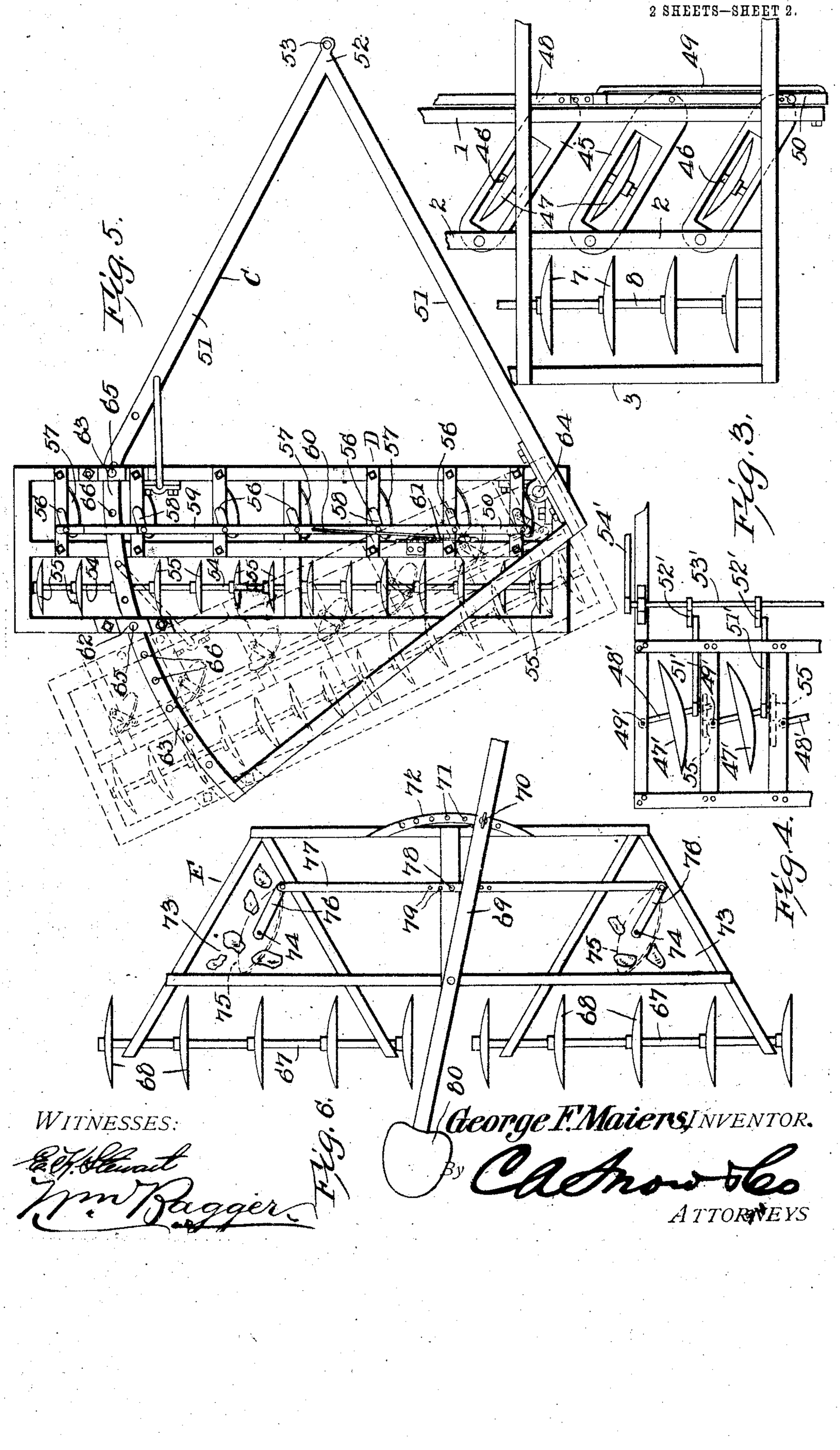

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GEORGE F. MAIERS, OF GOLETA, CALIFORNIA.

DISK HARROW.

No. 833,841. Specification of Letters Patent. Patented Oct. 23, 1906.

Application filed April 10, 1906. Serial No. 311,010.

To all whom it may concern:

Be it known that I, GEORGE F. MAIERS, a citizen of the United States, residing at Goleta, in the county of Santa Barbara and State of California, have invented a new and useful Disk Harrow, of which the following is a specification.

This invention relates to rotary-disk harrows; and among the objects of the invention are to simplify and improve the construction and operation of this class of devices.

The invention has special reference to that class of machines in which a plurality of disks are mounted upon a common axis. When a plurality of disks have thus been mounted in series it has been difficult to overcome the side draft or the tendency to lateral movement of the machine caused by the suction of the disks in engaging the soil, and one object of the present invention is to overcome this tendency to lateral movement or side draft. By the present invention I also aim to avoid the formation of ridges and to leave the land in a mellow, pulverized, and level condition.

Another feature of the invention consists in improved steering means to facilitate the turning of corners or angles without necessitating the lifting of the disks from the ground, so that the land will be operated upon at the corners of the field where turns are made. Other features of the invention reside in improved structural features, to be hereinafter described.

With these and other ends in view, which will readily appear as the nature of the invention is better understood, the same consists in the improved construction and novel arrangement and combination of parts, which will be hereinafter fully described, and particularly pointed out in the claims.

In the accompanying drawings have been illustrated simple and preferred forms of the invention, it being, however, understood that no limitation is necessarily made to the precise structural details therein exhibited, but that changes, alterations, and modifications within the scope of the invention may be made when desired.

In the drawings, Figure 1 is a top plan view of a rotary-disk harrow constructed in accordance with the principles of the invention. Fig. 2 is a side elevation of the same. Fig. 3 is a detail plan view illustrating a modification of the means for preventing side draft. Fig. 4 is a detail top plan view illustrating a further modification. Figs. 5 and 6 are top plan views illustrating modified forms of the invention.

Corresponding parts in the several figures are indicated throughout by similar characters of reference.

The frame A in the preferred form of the invention (illustrated in Figs. 1 and 2 of the drawings) includes three parallel transversely-disposed bars 1, 2, and 3, which are connected with and by the side bars 4 and 5. The said side bars are connected at their front ends by a cross-bar 6, which is disposed obliquely with relation to the transverse bars 1, 2, and 3.

The harrow-disks 7, which are of the ordinary concavo-convex type, are mounted upon a shaft 8, which is supported in bearings, as 9, upon the under side of the harrow-frame, said disk-carrying shaft being disposed intermediate the cross-bars 2 and 3, which latter is the rear cross-bar of the frame. The disks may be of any desired size, and any desired number of these disks may be used. It will also be understood that the disks may be mounted for rotation upon the supporting-shaft, or the said disks may be fixed upon the shaft and the latter may then be supported for rotation, or the shaft may be supported for rotation in its bearings, and the disks may be mounted for rotation upon the shaft, all within the scope of the invention. The frame of the machine has been shown as provided with a central longitudinal bar 9′, serving to reinforce the transverse bars, which latter will naturally be subjected to a considerable strain when the machine is in operation. It will be understood that an intermediate bearing for the shaft 8 may be mounted upon the under side of the bar 9′, thus enabling the said disk-carrying shaft to resist strain.

The cross-bars 1 and 2 are connected with each other by means of bars or braces 10 10, and upon said braces, as well as upon the longitudinal bar 9′ intermediate the cross-bars 1 2, there are secured boxes or bearings 11, in which are journaled vertical shafts or spindles 12. Similar boxes or bearings 13 are secured upon the side members 4 and 5 of the frame; but the boxes 13 are provided with slots 14 for the passage of the fastening bolts or members 15, thus enabling said boxes to be vertically adjusted together with the shafts 16, that are journaled in said boxes and the parts connected with said shafts. The

shafts 12 and 16 carry rotary blades or disks 17 and 18, and with regard to these blades or disks it is desired to be understood that they may be flat disks, as illustrated in Figs. 1 and 2 of the drawings, and that disks of this character will probably be preferred; but no limitation is made to the disks of this character, inasmuch as concavo-convex disks similar to the disks 7 may be substituted. It is also desired to be understood that while the disks 17 and 18 are preferably mounted in a tilted position, as will be best seen by reference to Fig. 1, the tilt of said disks may be varied, or said disks may be disposed perpendicularly, if so desired, without departing from the spirit or scope of the invention. The explicit function of these disks is to counteract the tendency to side draft, caused by the suction of the disks 7, and the disks 17 and 18 are to be disposed in the most advantageous position to attain this result under varying conditions of work to be performed.

The shafts or spindles 12 and 16 are provided near their upper ends with arms or cranks, designated, respectively, 19 and 20, the latter cranks 20 being preferably secured adjustably upon their respective shafts, as by means of set-screws 21. The cranks 19 are connected in series by means of a link-rod 22, and the latter is connected with the cranks 20 by means of short links 23, so that the cranks of the several shafts 12 and 16 will be connected in series and may be simultaneously operated to turn the several shafts upon their axes, thus changing or adjusting the angles of the disks 17 and 18 with relation to the line of progress. The separate links 23 and the adjustable cranks 20 are obviously required when the boxes 13, carrying the shafts 16 and disks 18, are adjusted vertically, this being sometimes done in order to support the frame of the machine upon the disks 18, as upon carrying-wheels, for the purpose of elevating the intermediate disks 17. Under such circumstances carrying-wheels of suitable construction may also be substituted for the disks 18; but it is desired to be understood that stationary boxes, like the boxes 11, may be substituted for the boxes 13, and the cranks 20 may then be permanently secured upon their respective shafts and the separate links 23 may be dispensed with, the link-bar 22 being extended and connected directly with the cranks 20.

One of the shafts 12 is provided with a laterally-extending arm 24, which is connected by a link-rod 25 with an adjusting-lever 26, pivoted upon and adapted for engagement with a segment-rack 27′, whereby the parts may be securely retained at various adjustments.

The front cross-bar of the frame is provided with a bearing for a vertical spindle or shaft 27, carrying a steering wheel or disk 28 and having at its upper end a crank 29. A draft member 30 is pivoted upon the front cross-bar 6, and upon said draft member there is pivoted a bell-crank lever B, one arm of which, 31, is connected with the crank 29 by a link-bar 32. The other arm 33 of the bell-crank lever is connected by a link-rod 34 with an adjusting-lever 35, pivoted upon and adapted for engagement with a rack-segment 36, which is supported upon the rear cross-bar 3 of the frame in a position convenient to the driver or operator, whose seat 37 is mounted upon a spring-bar 38, likewise connected with said rear cross-bar, the seat being in a position that will enable the driver to oversee the operation of the machine. When the machine is in operation, it is propelled by draft attached to the draft member 30, as by means of a link 39. When the machine is to be transported, the draft is preferably attached to the link-bar 32, as by means of a draft-hook 40, adjustably connected with said bar.

As will be observed by reference to Fig. 1 of the drawings, the draft member 30 is connected adjustably with the front cross-bar 6 of the frame, said cross-bar being provided with a plurality of apertures 41 for the reception of the bolt or connecting member 42. The link-bar 32 is likewise connected adjustably with the crank 29, said bar being provided with a plurality of apertures 43 for the passage of the connecting bolt or member 44.

From an inspection of Fig. 1 it will be observed that the longitudinal bar 9′ extends through approximately the center of the frame, for which reason if the draft member 30 were attached to the frame adjacent the forward end of the center bar 9′ said frame would be dragged approximately in a straight line behind the team, although the position of the frame might be slightly affected by the side draft of the disks 7. As one of the purposes of the present invention is to cause the cutting-disks 7 automatically to assume an angular position with relation to the line of draft, I propose to secure the draft member 30 loosely to the frame at one side of the center of balance thereof, so that the draft action, which is in the direction of the arrow in Fig. 1, will cause the frame to swing into such position that the disks 7 will extend at an angle across the line of draft. It will be apparent that by adjusting the draft member 30 toward or away from the center of balance of the frame by means of the bolt 42 and perforations 41 the degree of the angle of the disks 7 with respect to the line of draft can be changed. The adjustment of the draft member 30 is rendered easy by reason of the fact that the oblique front bar 6 in the position shown in Fig. 1 extends at a right angle across the line of draft. It will be obvious that by means of my arrangement in which the draft member is loosely connected with the frame at one side of the center of balance thereof, so that the disks 7 will automatically assume an

angular position with respect to the line of draft, the disadvantages of using rigid draft means—such, for example, as a pole which cannot be swung laterally with respect to the frame—are avoided, it being understood that where a rigid pole is employed for forcibly holding the disks at an angle with respect to the line of draft the side draft of the disks imposes a lateral strain on the rear end of the pole and also has a tendency to interfere with the free movement of the draft-animals. In my arrangement by which the draft member is loosely connected with the frame at one side of the center of balance, so that the disks are forced to assume an angular position, the draft-animals are not bothered by a rigid pole, which is subject to severe lateral strains. It will be observed, further, from Fig. 1 that the counter-disks 17 and 18 can be adjusted so that they will extend across the line of draft at an angle thereto and also at an angle with respect to the disks 7, for which reason the counter-disks and the cutting-disks will balance each other and the frame in which they are mounted will be drawn easily in the proper direction without having a tendency to move laterally with respect to the line of draft.

The facility with which the disks may be angled is an important feature of the invention. When the machine is in operation, the disks 17 and 18 may be adjusted by manipulating the lever 26 to the most advantageous angle or to the position where they will most effectively counteract the tendency to side draft caused by the suction of the disks 7. When the machine is to be transported, the draft will be applied to the draft-hook 40, which is located in such a position that the disks 7 will travel straight in a forward direction. The machine may be steered by the steering-gear, which is effective to turn the steering wheel or disk 28 in the desired direction.

A tongue may, if desired, be substituted for the draft member 30.

In Fig. 3 of the drawings has been illustrated a modification of the invention which is applicable to the form of the invention illustrated in Fig. 1, as well as to any of the modified forms of frame structure which may be used within the scope of the invention. Under this modification there are pivoted upon the frame-bar 2 in front of the disk-carrying shaft 8 a plurality of frames 45, each provided with bearings for a shaft 46, carrying a disk 47, which said disk, be it understood, may be of any desired construction, the office of the disks 47 being to counteract the tendency to side draft in the same manner as the disks 17 and 18 in Fig. 1. In Fig. 3, however, the disks 47 are of the concavo-convex type, and said disks are faced oppositely to the disks 7. The forward free ends of the frames 45 are connected in series by a link-bar 48, and the latter is connected by a link-rod 49 with an adjusting-lever 50, whereby the several frames 45 may be simultaneously adjusted, so as to place the disks 47 at whatever angle may be desirable or necessary for the end in view.

Under the construction illustrated in Fig. 4 of the drawings the disks (here designated 47′) are supported for rotation upon shafts 48′, each of said shafts being supported at one end, as upon a pivotal pin or bolt 49′, the opposite end of each shaft being slidably supported, as by means of a bracket or supporting member 55. The free ends of the shafts 48′ are connected by links 51′ with radial arms 52′, extending from a suitably-supported rock-shaft 53′, having an adjusting-lever 54′, whereby the shaft 48′ may be adjusted so as to set the disks 47′ at various angles to the line of progress.

Under a modification of the invention (illustrated in Fig. 5 of the drawings) a draft-frame C is provided, said frame being shown as including a pair of side members 51, converging forwardly to an apex 52, where draft may be applied, as through the medium of a link 53. Pivotally mounted upon the draft-frame C, near one of the rear corners of the latter, is a disk-carrying frame D, which latter has been shown as being of rectangular shape. Said disk-carrying frame serves to support a disk-carrying shaft 54, having a plurality of disks 55. The disk-carrying frame is also provided with bearings for a plurality of vertical shafts 56, carrying disks 57, which may be appropriately described as counter-disks, since their purpose is to counteract the tendency to side draft caused by the disks 55, in the same manner as the disks 17 and 18 in Fig. 1 and the disks 47 in Fig. 3, all of which may be appropriately known as "counter-disks." The disks 57 may be of any desired construction, and the shafts 56, carrying said disks, are provided at their upper ends with cranks 58, that are connected in series by a link-bar 59, which latter is connected by a link-rod 60 with an adjusting-lever 61, whereby the disks 57 may be simultaneously adjusted to various angles. The pivoted disk-carrying frame D has been shown as equipped with clips or keepers 62, engaging a segment-bar 63, which is concentric with the pivot 64, upon which the frame D is mounted. Any suitable means, such as bolts 65, extending through the keepers 62 and engaging apertures 66 in the segment-bar 63, may be utilized for the purpose of securing the disk-carrying frame D at various adjustments, thus enabling the disks 55 to be set or adjusted to various angles with relation to the line of progress. Under the construction illustrated in Fig. 5 this adjustment may be effected with the utmost ease and without the necessity of changing the point at which the draft is applied to the frame.

Under still another modification, which is

illustrated in Fig. 6 of the drawings, a suitable frame structure E is provided with bearings for alining shafts 67, carrying disks 68, said frame being also provided with a pivoted tongue or draft member 69, which may be adjusted to various angles by means of a pin or bolt 70, adapted to engage any one of a plurality of perforations 71 in a segment-bar 72, which is secured upon the frame E. The latter is provided with weight members 73, provided with bearings for vertical shafts 74, carrying counter-disks 75 and provided at their upper ends with cranks 76, connected with each other by a link-bar 77, which latter may be adjustably secured with relation to the frame, as by means of a pin or bolt 78, extending through any one of a plurality of perforations 79 in the said link-bar. The counter-disks may thus be adjusted to various angles with relation to the cutting-disks 68, and the angle of the latter with relation to the line of progress will be determined by the position of the draft member 69 with relation to the frame E. The tongue or draft member 69 has been shown as carrying a seat 80 for the driver or operator.

From the foregoing description, taken in connection with the drawings hereto annexed, the operation and advantages of the invention in its various forms will be readily understood by those skilled in the art to which it appertains.

The facility with which the cutting-disks in the various forms of the invention may be adjusted to various angles with relation to the line of progress will be readily appreciated, and in any of the various forms of the invention provision is made for adjusting the counter-disks to the most advantageous position with relation to the cutting-disks.

The device, as a whole, is simple in construction, easily operated, and thoroughly efficient for the purposes for which it is provided.

Having thus described the invention, what is claimed is—

1. In a rotary-disk harrow, a frame having a disk-carrying shaft, cutting-disks upon said shaft, a plurality of independently-pivoted counter-disks supported in front of and closely adjacent to the cutting-disks, the pivot points of the counter-disks being arranged in a line which is parallel with the disk-carrying shaft and means for adjusting the counter-disks at various angles.

2. In a rotary-disk harrow, a shaft having a plurality of cutting-disks, and a plurality of independently-pivoted counter-disks supported in series, the pivot-points of the counter-disks being arranged in a line which is parallel with the shaft.

3. In a rotary-disk harrow, a plurality of cutting-disks having a common axis, and a plurality of independently-pivoted counter-disks having their pivot-points arranged in a line parallel with the axis of the cutting-disks.

4. In a rotary-disk harrow, a plurality of cutting-disks having a common axis, a plurality of independently-pivoted counter-disks having their pivot-points arranged in a line parallel with the axis of the cutting-disks, means for adjusting the counter-disks at various angles, and means for effecting the vertical adjustment of some of the counter-disks.

5. A rotary-disk harrow comprising a frame, a plurality of cutting-disks journaled in said frame, a plurality of counter-disks journaled in said frame and disposed at an angle to the cutting-disks, means for adjusting said counter-disks, and a draft member loosely connected for swinging movement with said frame at one side of the center of balance thereof, whereby the draft action automatically causes the cutting-disks to assume an angular position with relation to the line of draft.

6. In a rotary-disk harrow, a frame, a shaft journaled in said frame, a series of cutting-disks upon said shaft, a plurality of counter-disk-carrying shafts arranged in a line which is parallel with the cutter-disk-carrying shaft, means connecting the counter-disk carrying-shafts for adjustment in series, and draft means adjustably connected with the frame for effecting adjustment of the angles of the cutting-disks with relation to the line of progress.

7. In a rotary-disk harrow, a frame, a shaft journaled in said frame, a series of cutting-disks upon said shaft, a plurality of counter-disks each having an individual pivotal connection with the main frame the pivotal connection of all the counter-disks being arranged in a line which is parallel with the cutting-disk-carrying shaft, and means connecting the counter-disk for adjustment in series.

8. In a rotary-disk harrow, a frame, a shaft supported for rotation in said frame, a series of cutting-disks upon said shaft, a plurality of individual counter-disks connected pivotally with the main frame the pivot-points of all the counter-disks being arranged in a line which is parallel to the disk-carrying shaft, means connecting the counter-disks for adjustment in series, and draft means adjustably connected with the main frame to regulate the angle of the cutting-disk-carrying shaft to the line of progress.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

GEORGE F. MAIERS.

Witnesses:
JESSE L. HURLBUT,
LAURA MCDANIEL.