C. S. SHARP.

DISK HARROW.

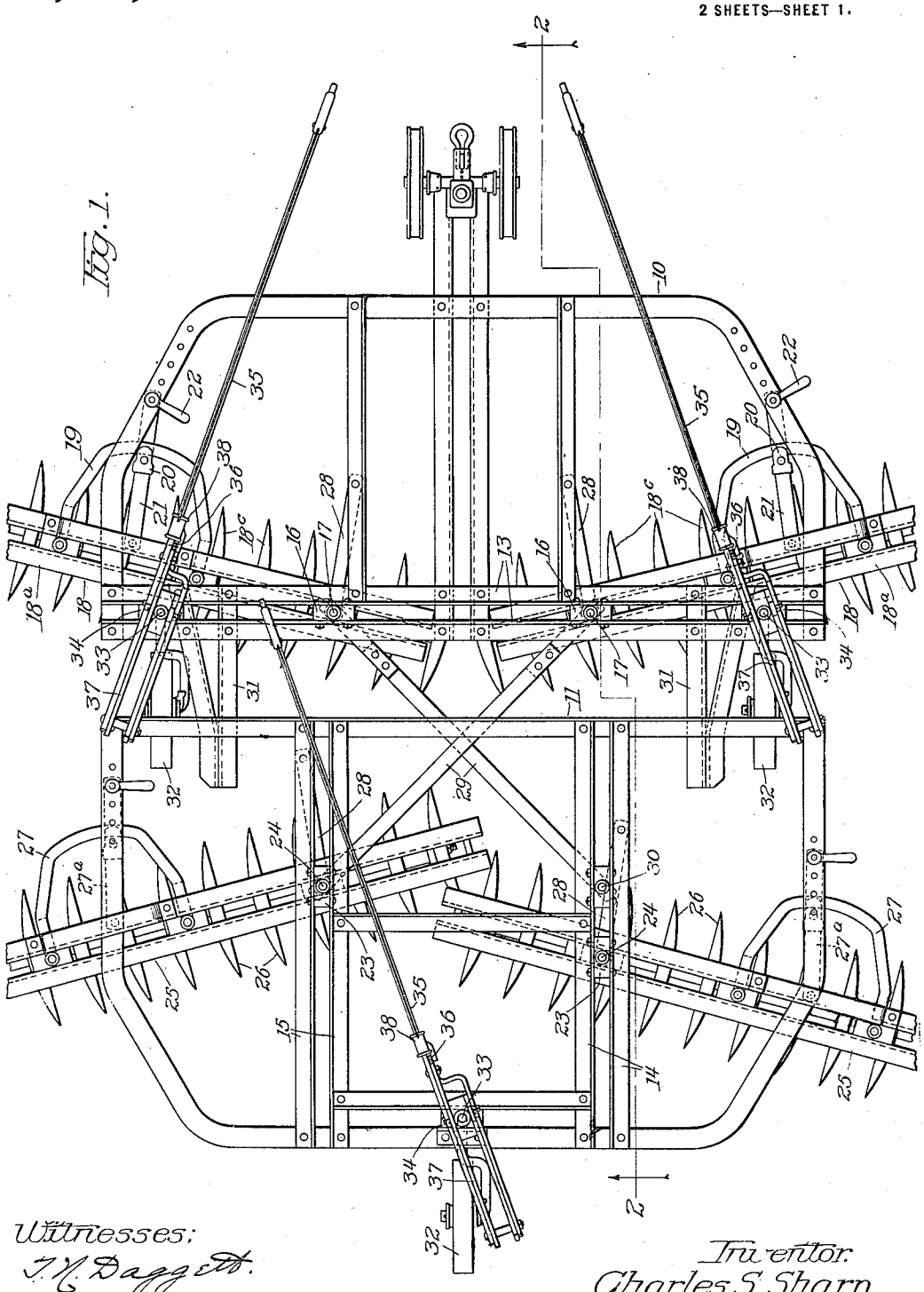
APPLICATION FILED JAN. 16, 1915.

**1,247,017.**

**Patented Nov. 20, 1917.**

2 SHEETS—SHEET 1.

Fig. 1.




Witnesses:

F. N. Daggett.

W. A. Loftus.

Inventor.

Charles S. Sharp.

by Chas. E. Lord, Atty.

C. S. SHARP.

DISK HARROW.

APPLICATION FILED JAN. 16, 1915.

1,247,017.

Patented Nov. 20, 1917.

2 SHEETS—SHEET 2.

Fig. 3.

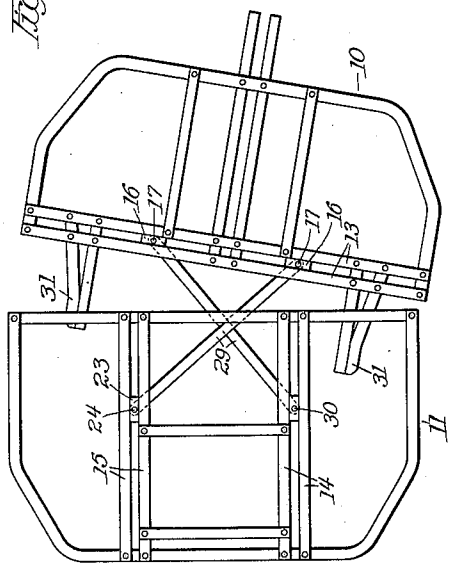
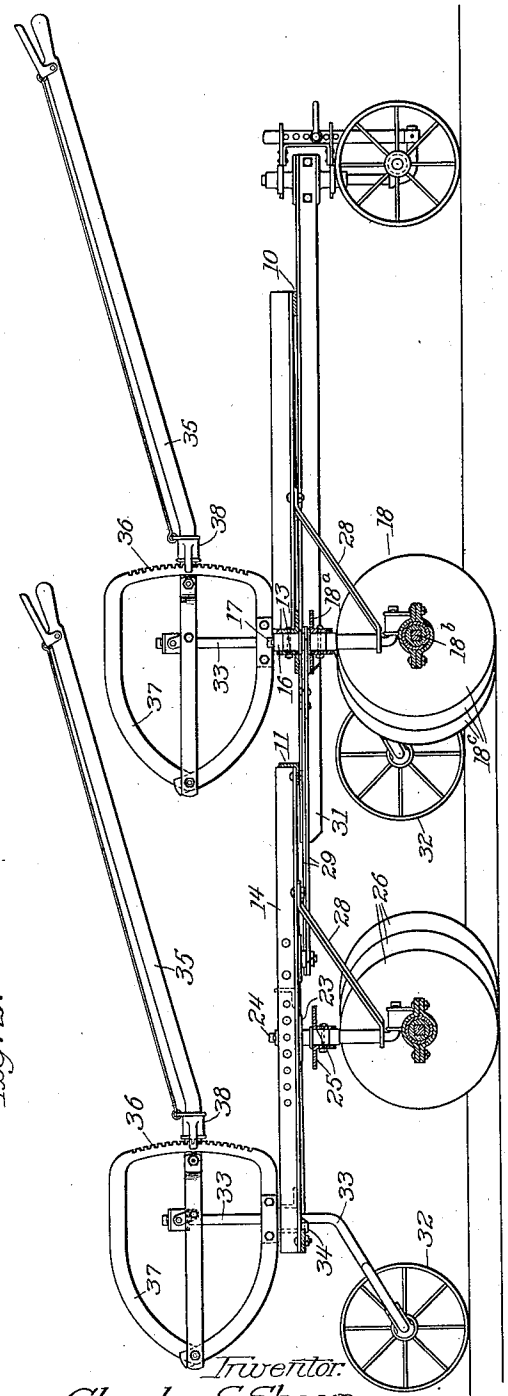



Fig. 2.




Witnesses:

J. N. Daggett.

W. W. Loftus

Inventor:

Charles S. Sharp.

by Chas. E. Lord Atty.

# UNITED STATES PATENT OFFICE.

CHARLES S. SHARP, OF AUBURN, NEW YORK, ASSIGNOR TO INTERNATIONAL HARVESTER COMPANY OF NEW JERSEY, A CORPORATION OF NEW JERSEY.

## DISK HARROW.

1,247,017. Specification of Letters Patent. Patented Nov. 20, 1917.

Application filed January 16, 1915. Serial No. 2,539.

*To all whom it may concern:*

Be it known that I, CHARLES S. SHARP, a citizen of the United States, residing at Auburn, in the county of Cayuga and State of New York, have invented certain new and useful Improvements in Disk Harrows, of which the following is a full, clear, and exact specification.

This invention relates to disk harrows, and more particularly to the type known as tandem harrows. My object is to simplify and improve the construction and operation of such devices.

Heretofore the front and rear units in tandem harrows have been connected by a single central pivot and thus allowed absolutely free and independent lateral movement, failing thereby to properly trail; or they have been connected by permanent rigid frame members which, of course, are disadvantageous in turning corners. The demand is for a tandem disk harrow wherein the front and rear units shall be connected with some degree of rigidity as they advance over the field in operation in order to overcome lateral shifting and consequent disalinement; but for turning corners this connection must be free to move in order to permit the units to flex.

I have accomplished this desirable result by means of the provision of connecting elements so arranged that the rear section of the harrow will be held and maintained in the line of advance, and in turning corners will move to position where the rear unit will travel in an arc of a circle, thereby avoiding ditching out of the ground. I have provided also means to receive the down thrust of the rear frame and relieve all strains from the pivotal connection.

It has been customary also in harrows of this class to arrange the units in cruciform relation, with the sections of the rear unit having central pivot points in transverse alinement. This cruciform arrangement is open to the objection that the inner disks of the rear gangs are brought to a common point, leaving a space between the cutting edges which will be untilled, and in many cases it is necessary to attach between these spaced cutting edges a cultivator tooth or similar member to stir that portion of the soil which is otherwise untouched. The central pivot for the disk gangs makes for instability, and a rocking tendency is encountered in the rear sections which in practice permits a downward dip of the inner ends due to the suction. Special anti-tilting devices have been found necessary in such constructions to overcome the rocking. In my construction the inner ends of the inthrow gangs may be overlapped and thereby no uncultivated soil will be left. I also arrange the pivots for the gang members near their ends and thereby the rocking tendency is overcome and the necessity for anti-tilting devices is dispensed with.

The angle of the gangs of each unit is a thing which is seldom changed in practical operation; in fact, it is difficult in many harrows to discover the angular adjustment at which the gangs will draw straight. When this is once found it should not be changed. Adjusting levers for this purpose have been provided heretofore which adjusted the gangs in pairs, but, obviously, these levers are used so infrequently as to be advantageously dispensed with. I have provided simple means for adjusting the angles of the gangs separately and by hand, and am thereby enabled to obtain a better and finer adjustment and to economize in the construction of the harrow. In order to minimize the necessity for at any time changing the angles of the gangs and thereby destroying their working arrangement, I have provided transport wheels capable of carrying the entire harrow in an elevated position and adjustable to serve also as gage wheels, or to be moved to inoperative position through control levers arranged within convenient reach of the operator.

One form of my invention is exemplified in the following description and illustrated in the accompanying drawings, in which—

Figure 1 shows a plan view of a tandem disk harrow embodying my invention;

Fig. 2 shows a vertical sectional view taken on the line 2—2 of Fig. 1;

Fig. 3 shows a diagram of the front and rear frames and the connecting elements therefor.

Referring now in detail to these drawings, there is shown a front main frame 10 and a rear main frame 11, each substantially rectangular in form. These frames are preferably constructed of angle bars, the front one being provided at its rear end with transverse spaced members 13, and the rear one having longitudinally arranged

spaced members 14 and 15 on opposite sides of the central draft line. Carried between the spaced bars 13 on the front frame are bearing boxes 16 on opposite sides of the line of draft, and fitted within these bearing boxes are pivot members 17, each carrying a disk gang 18, comprising a frame $18^a$, and a transverse shaft $18^b$, upon which are fitted outthrow disks $18^c$. Mounted upon the disk shaft $18^b$, at the end opposite the pivot point, is a bail member 19 extending forwardly and received within a keeper 20 mounted upon a link 21, which link has a pivotal connection with the disk frame $18^a$ and an adjustable connection with the front main frame, controlled by the cam nut 22. The rear disk frame carries also bearing boxes 23 between the spaced bars 14 and 15, and within these boxes are received the pivot members 24 of the rear disk gangs 25, said gangs including inthrow disks 26. Bail members 27 and links $27^a$, similar to the members 19 and links 21, are used to connect the outer ends of the rear disk gangs adjustably to the rear frame. Brace bars 28 have been provided between each of the pivot members 17 and 24 and adjacent frame. It should be noted in this connection that the pivot members 24 of the rear harrow frame are arranged one in advance of the other on a transverse line, and thereby I am enabled to arrange the rear gangs with their inner ends overlapping and maintain in both cases the same angle with the line of draft, thereby preventing side draft on the part of the rear frame.

For connecting the two frames together I employ diagonal links 29 crossed near their middles and pivoted at their front ends on the pivot members 17 and at their rear ends one on the pivot member 24 and the other on a special pivot 30 between the spaced bars 14 in advance of the adjacent gang pivot 24. With this form of flexible connection for the frames the two parts are held in semi-rigid relation during the advance of the machine in a straight line. Should any obstruction hit one of the gangs in a manner to turn the frame thereof, it will be found that the cross links 29 will serve to oppose the turning and will permit movement only upon condition that the other frame takes a turn in an opposite direction; that is to say, a force tending to throw the front frame rearwardly at the right side will move the rear frame rearwardly at the opposite side, placing the two frames in an unnatural position where they will not long remain under the force of the draft. In this way the two frames are held to a great extent in exact alinement, no freedom of movement on the part of one being permitted. The advantage of this over the single central pivotal connection used in harrows heretofore is believed to be obvious.

In turning a corner the front frame will be swung to the position shown in Fig. 3, and the rear frame will thereby be drawn in its wake along the arc of a circle, and the rear disks will follow the paths of the front disks just as evenly as when working in a straight line. Corners will thus be double disked in the same manner as straight paths, and ridging or ditching out of the soil will be prevented.

It is obvious that there is a strong downward thrust on the part of the rear frame on account of the resistance of the ground pulling the disks rearwardly. It would be detrimental to have this strain fall upon the pivot links 29, and I have, therefore, provided extensions 31 secured to the rear end of the front frame and projecting rearwardly beneath the rear frame. The strains are thus borne by these extensions, and the pivot links are left free to move readily and the likelihood of the links buckling downward is eliminated.

The means for adjusting the angles of the gangs, as stated before, comprises the bail members 19 and 27 in coöperation with the adjustable links 21 and $27^a$. The levers which have heretofore been supplied for this purpose are dispensed with and the gangs are thereby made independently and separately adjustable, it being possible in this manner to obtain a finer adjustment than where the gangs are adjusted in pairs. With this arrangement also I am enabled to locate the pivot points for the gangs well toward their inner ends and thereby the separate anti-tilting devices heretofore used can be dispensed with. The spaced angle bars for receiving the pivot bearings are particularly advantageous in this construction for the reason that they permit, in the case of the front units, lateral adjustment of the bearing blocks so that gangs of different lengths may be employed on the one frame, and on the rear frame the bearing blocks are adjustable in a fore and aft direction so that the gangs may be overlapped at their inner ends and still maintain a common angle; or, if desired, the bearings may be moved to position where they are in transverse alinement and gangs employed which meet at a common point at their inner ends, in which case a cruciform arrangement of all of the gangs may be obtained.

It is not a desirable thing, having once fixed the angles of the disks where they work to advantage and properly trail, to destroy this adjustment; but this has been necessary heretofore in order to transport the harrow. To overcome this I have provided transport trucks for the harrow comprising caster wheels 32 arranged one on each side of the front frame at the rear thereof, and one at the central portion of the rear end of the rear frame. These

wheels have each an upwardly extending shaft 33 carried in a bearing 34, which bearings, in the case of the front wheels, are arranged between the spaced bars 13. A lever 35 is connected by pivot links to the upper end of each of the shafts 33 and extends forwardly a considerable distance so that an operator near the front end of the machine (or where the harrow is used with a tractor, in the cab) may have ready access thereto. A sector 36 formed on a bracket 37, which provides a fulcrum for the lever 35, coöperates with detent mechanism 38 to hold a wheel in the desired position. It will be seen that the caster wheels as arranged may be used also to gage the depth of the disk, but are particularly useful for transporting the harrow from place to place with the disks elevated out of contact with the ground. When so transported it is obviously unnecessary to move the gang members to transverse position, and their angular adjustment may, therefore, be left intact.

Another advantage peculiar to this form of harrow is that the bail members may readily be detached from the frames, and the gangs swung entirely around on their pivots to positions parallel with the line of draft. No parts are thus left projecting from the sides of the frames and the harrow may be transported along narrow roads and through narrow gates without interference.

While I have shown and described but a single form of my invention, it is to be understood, nevertheless, that it is susceptible of many modifications. Changes, therefore, in the construction and arrangement of the several parts may be made without departing from the spirit of the invention as disclosed in the appended claims.

What I claim as my invention, and desire to secure by Letters Patent, is:

1. In a harrow, front and rear frames carrying disk gangs, a flexible connecting element between the frames, and means carried by the front frame for relieving the downward thrust of the rear frame from the connecting element.

2. In a harrow, front and rear frames carrying disk gangs, connecting elements pivcted to said frames at either end, and means on said front frame for relieving the downward thrust of the rear frame from the connecting elements.

3. In a disk harrow, front and rear frames, a connecting element between said frames to allow a flexing movement of the frames, and means to receive the down thrust of the rear frame and relieve the strain from the connecting element.

4. In a disk harrow, front and rear frames carrying disk gangs, cross links between said frames and pivoted thereto, and means to relieve the downward thrust of the rear frame from the cross links.

5. In a harrow, a frame, disk gangs pivoted thereon, connections between each of the gangs and frame including independently adjustable bails and links, transport wheels carried by said frame, and levers for raising and lowering said wheels.

6. In a tandem harrow, connected front and rear main frames, disk gangs pivoted on said frames near their ends, bail members on the ends of said gangs opposite their pivot points, link members coöperating with said bail members and being operatively connected with the gangs and adjacent main frame, transport wheels carried by said frame, and means for raising and lowering said wheels.

7. In a harrow, a frame having side members, disk gangs pivoted thereon, bail members carried on opposite ends of said gangs, and links coöperating with the bail members and operatively connected between the gangs and the side members of said frame.

8. In a harrow, a frame, transversely arranged disk gangs pivoted thereon near their ends, said pivotal points being arranged out of transverse alinement, the inner ends of said gangs overlapping, bail members carried on the outer ends of said gangs, and links coöperating with said bail members and being operatively connected between the gangs and the frame.

9. In a tandem harrow, operatively connected front and rear main frames, said front frame including transversely extending spaced members, said rear frame including fore and aft spaced members arranged on opposite sides of the central draft line, and disk gang members supported between said spaced members.

In testimony whereof I affix my signature, in the presence of two witnesses.

CHARLES S. SHARP.

Witnesses:
F. M. MORTON,
C. E. ROSE.