Feb. 27, 1940. S. J. MILLER 2,191,537

DISK HARROW

Filed May 5, 1938 3 Sheets-Sheet 1

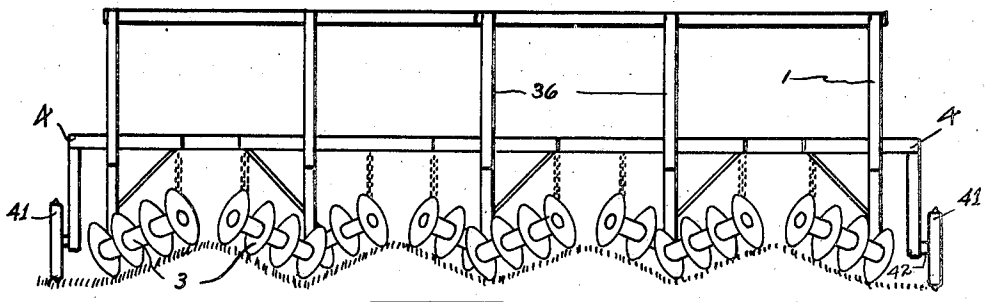
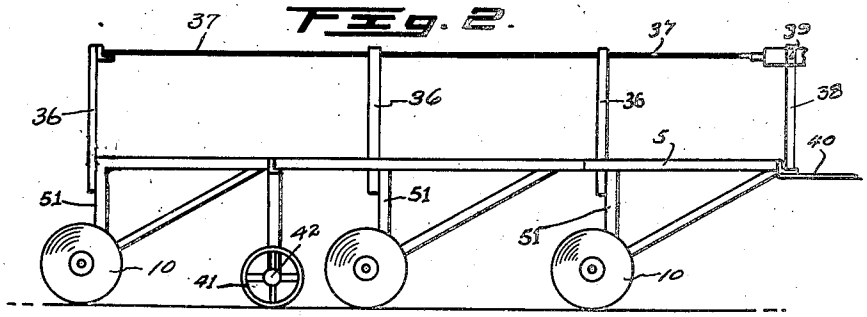


Fig. 1.

Fig. 2.



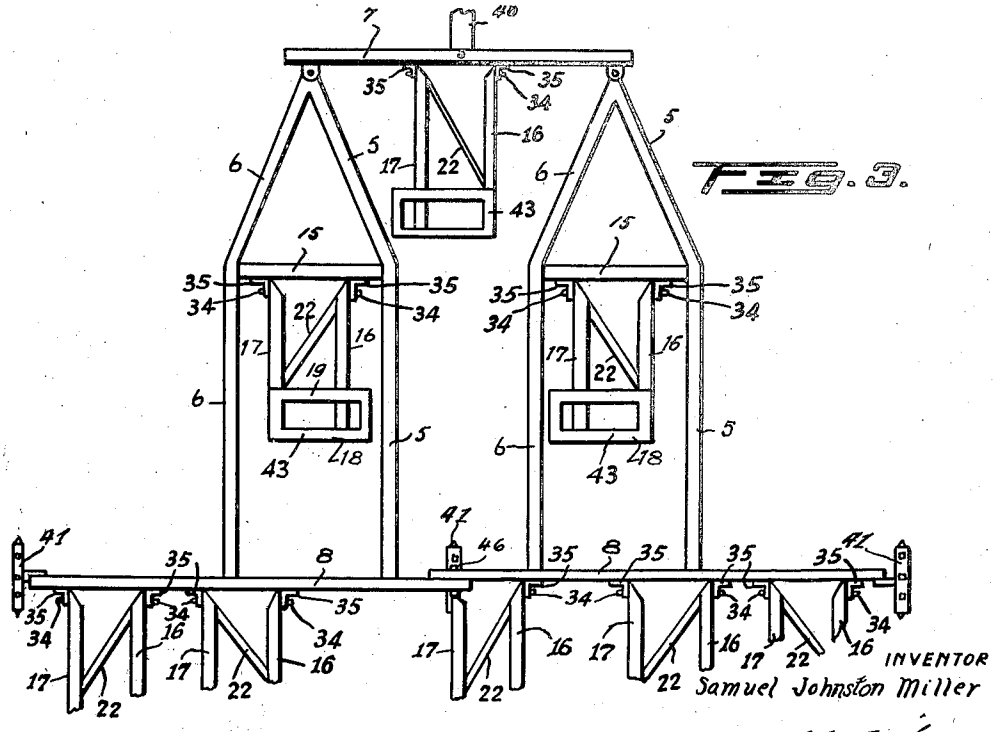


Fig. 3.

INVENTOR
Samuel Johnston Miller

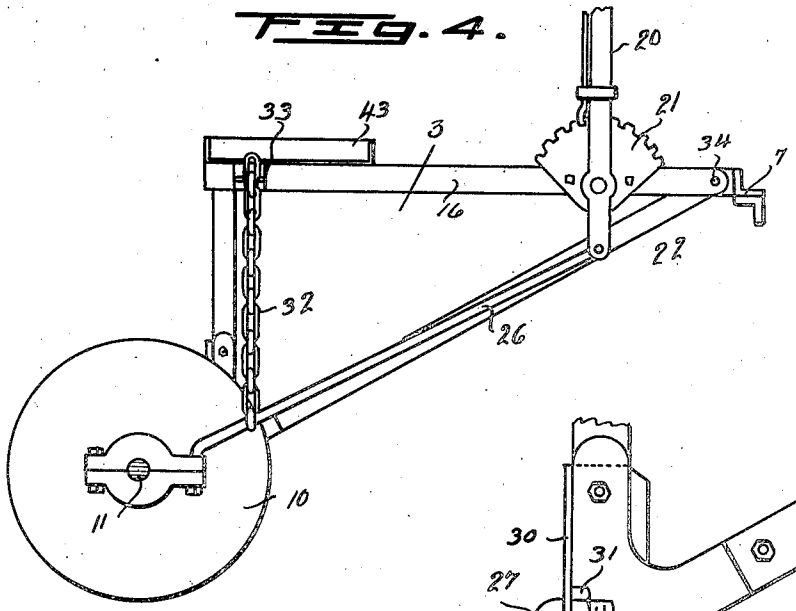
ATTORNEY

Feb. 27, 1940. S. J. MILLER 2,191,537

DISK HARROW

Filed May 5, 1938 3 Sheets-Sheet 2

FIG. 4.



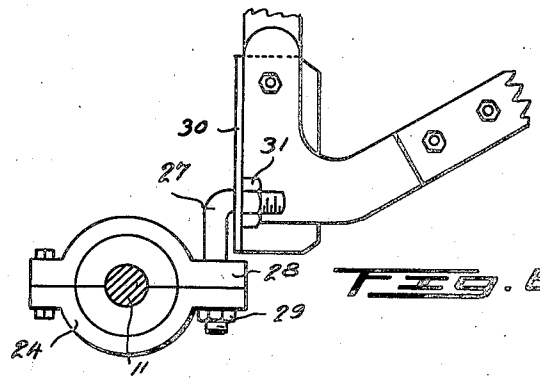


FIG. 6.

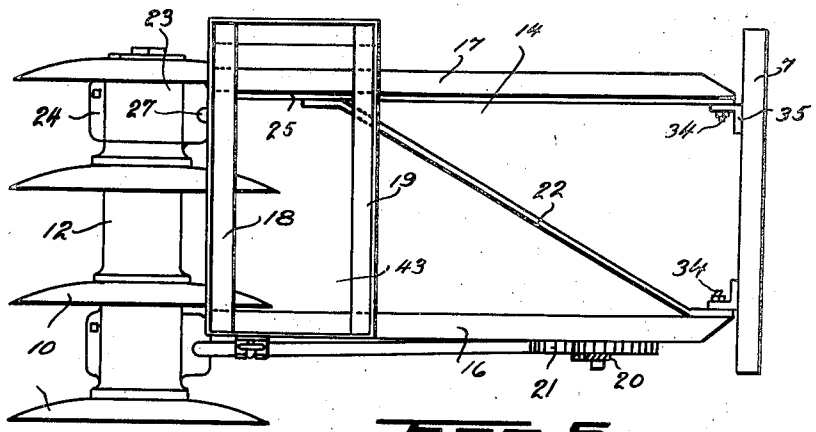


FIG. 5.

INVENTOR

Samuel Johnston Miller

A. Harold Fiske

ATTORNEY

Feb. 27, 1940. S. J. MILLER 2,191,537

DISK HARROW

Filed May 5, 1938 3 Sheets-Sheet 3

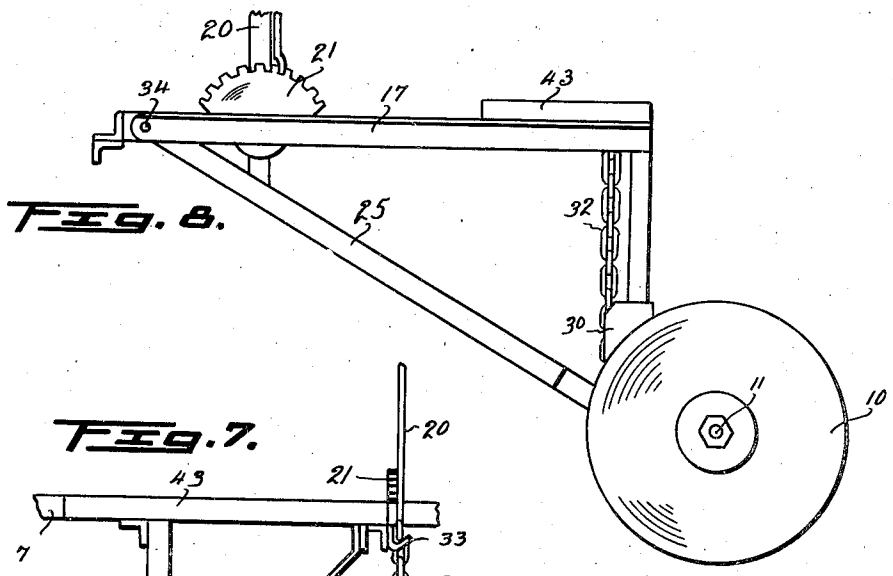


Fig. 8.

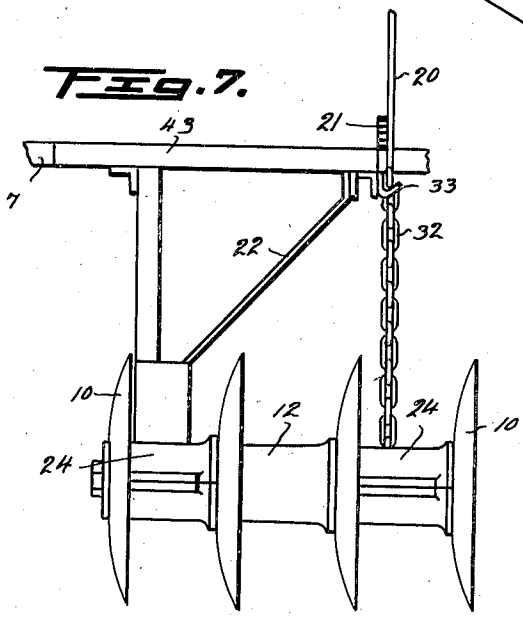


Fig. 7.

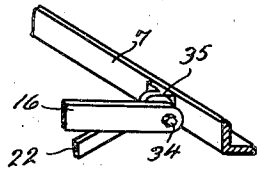


Fig. 9

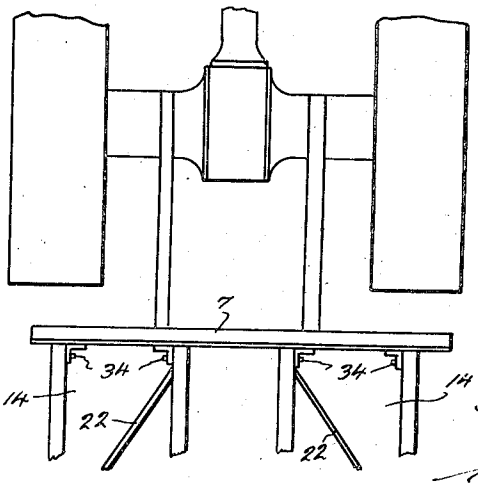


Fig. 10.

INVENTOR
Samuel Johnston Miller

ATTORNEY

Patented Feb. 27, 1940 2,191,537

UNITED STATES PATENT OFFICE

2,191,537

DISK HARROW

Samuel Johnston Miller, Corpus Christi, Tex., assignor of fifty per cent to Fleury-Bissell Limited, Elora, Ontario, Canada, an incorporated company

Application May 5, 1938, Serial No. 206,142

6 Claims. (Cl. 55—73)

My invention relates to an improved disk harrow and is particularly directed towards that type of multiple unit harrow commonly known as a gang harrow.

One of the features of my invention resides in the construction of a multiple unit harrow consisting of a number of units, each unit being individually and hingedly suspended from and carried by a common main frame.

A principal feature of my invention resides in the novel manner in which I hingedly attach each harrow unit to the main frame, or to the tractor draw bar as specific conditions warrant, so that it is held firmly in fixed position insofar as horizontal and vertical angularity, tillage depth and side sway are concerned and, at the same time, each unit is free to rise over any obstructions, such as rocks, independently of the other units thereby avoiding possibility of damage to the disks, or all the units may be raised simultaneously from contact with the ground for such purposes as turning or moving when not in use.

A further feature of my invention resides in the construction of each unit so that the horizontal and/or the vertical angle formed between each unit and the direction of movement of the harrow may be adjusted independently of the other units and when adjusted is held firmly in fixed position.

A still further feature of my invention resides in the novel arrangement of the main frame, or tractor draw bar as the case may be, which permits the independent raising and lowering of each harrow unit without causing any twisting of the frame members or any angular displacement of the remainder of the units.

A clear understanding of the above features and the manner in which I attain them may be had from the following description and accompanying drawings in which like reference characters refer to like parts throughout.

Figure 1 is a rear view of a tractor- drawn multiple unit harrow embodying my invention.

Figure 2 is a side elevation of the modification shown in Figure 1.

Figure 3 is a top plan view showing the main frame construction.

Figure 4 is a side elevation of a single unit.

Figure 5 is a top plan view of a single unit.

Figure 6 is a detail view of the universal joint construction.

Figure 7 is a rear view of a single unit.

Figure 8 is a side elevation taken from the opposite side to that shown in Figure 3.

Figure 9 is a detail view of the hinged suspension means, shown slightly in perspective.

Figure 10 is a plan view showing the disk harrow units attached directly to the rear of a tractor.

In the preferred embodiment of my invention described and illustrated herein the multiple unit harrow is adapted to be attached to and drawn by a tractor.

The multiple unit harrow consists of a number of disk units 3 individually and hingedly suspended from and carried by a main frame construction in the following manner.

The main frame is formed preferably in two sections constructed of angle iron sufficiently heavy to withstand the stresses and strains to which it is subjected. Each section is constructed with side members 5 and 6 which converge towards and are joined at the front in substantially a V-shape. The sides 5, 6 are joined at the rear by a cross member 8 and in the middle by an intermediate cross member 15. The joining of the members 5, 6, 8 and 15 may be done by rivetting or welding to provide the necessary strength and rigidity. The front end of each section is pivotally connected to a front cross member 7 by means of the pivot 50. The rear cross members 8 are hingedly connected together at the rear by means of the pivot 46. The sections are supported on wheels 47.

In the preferred embodiment of my invention described and illustrated herein, the multiple unit harrow is constructed with eight individual disk units, one of which is hingedly attached to the front cross member 7, two are hingedly attached to the intermediate cross members 15 and five are hingedly attached to the rear cross member 8.

Each disk unit 3 in this instance is carried by a disk unit frame comprising side members 16 and 17 and a rear cross member 18.

An intermediate cross member 19 is connected to the members 16, 17 in front of the member 18 forming a platform 43 adapted to receive a load, such as a sandbag, to ensure sufficient weight on the unit to force the disks into the soil to the full desired tillage depth. Connected to and extending downwardly from each cross member 18 at its juncture with the member 17 is a strut 51.

Each disk unit frame is preferably hingedly secured to its proper cross member of the main frame in the following manner. The cross member 7 is provided with a pair of lugs 35 spaced apart so that the side members 16, 17 will en-

gage between the inner faces of the lugs. Each of the cross members 15 are provided with a pair of lugs spaced similarly to those with which the cross member 7 is provided. The cross members 8 are provided with five pairs of similarly spaced lugs 35, each pair being positioned on the cross bars 8 substantially as shown in Figure 3. The rearwardly projecting parts of the lugs 35 are formed with a bolt hole and the forward ends of the members 16, 17 are formed with a bolt hole which mates with the bolt hole in the lugs. A bolt 34 is entered through the bolt holes in the lugs and the forward end of the members 16, 17, thereby hingedly securing the disk unit frame to its proper cross member. This hinged connection permits the vertical movement of each unit, either deliberately as shall be set out hereinafter, or independently to raise the unit to pass over any obstruction in the soil such as rocks or boulders, which would otherwise damage the disk.

Each strut 51 carries an axle 11, on which is mounted disks 10 whereon they are held rigidly in fixed position and, at the same time, are spaced the desired distance apart by spacers 12. The number of spacers 12, of course, is dependent on the number of disks mounted on the axle 11 and also on their desired position on the axle.

Each axle 11 is attached to the lower end of strut 51 by means of a universal joint 23 so that the horizontal and vertical angular disposition of each disk unit may be changed or adjusted to the particular form of tillage desired by the operator. The universal joint 23 may be any one of several different types, but I prefer to use that form illustrated in Figure 6 of the drawings. In this construction the end of the axle adjacent the strut 51 is journalled in a bearing 24 which has or is provided with a forwardly extending plate 28. One end of an L-bolt 27 is passed through the plate 28 and secured to that plate by means of a nut 29. The other end of the L-bolt is passed through a plate 30 mounted on the lower end of the strut 51 and secured to the plate by means of a nut 31. It is necessary to brace the strut 51 and for this purpose a fixed stay rod 25 is provided, one end of which is secured to the front end of the member 17 and the other end is secured to the plate 30. A second stay rod is also provided, one end of which is attached to the front end of the member 16 and the other end is secured to the fixed stay rod at or near the plate 30.

The horizontal angularity of the axle relative to the direction of movement of the harrow is adjusted by the following means. Fulcrumed on and near the forward end of the member 16 is a lever 20 which is adapted to be held in different positions by means of a sextant 21 secured to the member 16. Movement of the lever 20 is transmitted to the axle by means of a connecting rod 26 one end of which is connected to the lower end of the lever and the other is connected to the end of the axle remote from the universal joint 23. It is therefore apparent that movement of the lever 20 will change the horizontal angularity of the axle relative to the direction of the harrow.

The axle may also be adjusted in a vertical direction, that is angularly to the horizontal plane of the axle. This is accomplished by the following mechanism. For this purpose a chain 32 is provided and one end of the chain is attached to the side member 16 by means of a clamp 33 and the other end may either be attached to the end of the axle remote from the universal joint 23 or secured to the end of the connecting rod 26 adjacent to the axle 11, as shown in Figure 4. The end of the axle 11 remote from the universal joint 23 may be readily raised or lowered by lengthening or shortening the chain 32, the movement being permitted by pivoting on the universal joint 32.

The following means are provided for the purpose of simultaneously raising all the units from the ground. Rigidly secured to each cross member 18 is an upright standard 36. The rear set of upright standards have their ends joined by a cross bar 38 as shown in Figure 1. The middle set of upright standards have their upper ends similarly joined. The rear cross bars 38 and the middle cross bar are joined to the front uprights 36 by means of a cable 37. The front end of the cable 37 is connected to one end of a chain or cable 39, the other end of which is connected to a drum (not shown) operated by a power take off drive with which the usual tractor is provided, or it may be attached to a hand operated drum if the latter is not available. By turning the drum in one direction, the disking units will simultaneously raise from the ground and by rotating the drum in the opposite direction, the disking units will be returned to the ground.

A draw bar 40 extends from the front of the front member 7 to the tractor draw bar, the connection between which is preferably pivotal to permit extremely short turns.

The main frame is provided with axles 42 on which are mounted side wheels 41 and the cross member 8 is preferably further supported on wheel 47 at the point where the sections thereof are hinged together. The main frame is thus supported in a manner which permits the moving of the harrow without having the disks on the ground and in operation prevents any sideway of the gangs due to obstructions or thrust of the frame but ensures that the harrow will move in a straight line. It will be apparent that it is necessary to move the multiple unit disk harrow in a straight line for setting out rows and in cultivating row crops. Under ordinary working conditions, however, this has not been possible heretofore.

In operation, the main frame moves on the wheels 41 and 47. The disks of each individual unit move through the soil being tilled, the depth which each unit extends into the soil depending, of course, on the weight of the unit, the added weight carried on the platforms 43 and the type of soil being tilled. As an alternative to the added weight on the platforms 43, a tension spring (not shown) may be combined with the hinged connection 34 to serve the same purpose as the weights.

The horizontal and vertical angular disposition of each unit is dependent on the purpose of the tillage. For example, for the purpose of setting out rows, say for the planting of cotton, the vertical and horizontal angularity of the units are adjusted to build the rows to the desired width and height. For growing row crops the disks may be set to throw the soil away from the plants or hill the soil up to them. In this latter position, only the horizontal angle of the disks is changed. It will be understood, of course, that all changes necessary for the various operations are made by merely changing the gang assembly to the desired position which is provided for in the main frame. For example, a cross member may be attached to the rear of the main frame

and is so placed as to drag on the ground, when the harrow is in use, to level off the top of the row so made, and the usual marker outlining the position of the next row to guide the operator.

I have found that my improved harrow overcomes the shortcomings inherent in the gang harrows used heretofore. For example, it may be readily changed from a general purpose harrow or tillage implement to a single purpose implement by several simple and easily executed adjustments. The facility with which it is raised from the ground, either as an individual unit when an obstruction is encountered, or all the units raised simultaneously, permits extremely short turns, or, when moving when not in use, ensures a long life resulting from the removal of unnecessary stresses and strains which are otherwise set up in the machines. It is very easily operated and through its construction is ideally adapted for not only general tillage purposes but also for laying out fields in rows preparatory to planting.

It will be apparent, of course, that modifications may be made in the preferred embodiment of my invention described hereinabove. For example, a number of disk harrow units may be hingedly attached directly to the tractor, as shown in Figure 10, thus doing away with the necessity of providing a main frame in certain specific instances. This and other modifications may be made without departing from the scope of the appended claims.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A multiple unit harrow comprising a main frame, a supporting axle and wheels mounted on said axle, a series of disk harrow units hingedly attached to said main frame, each of said units comprising a frame, a supporting axle and a plurality of disks mounted on said axle, a universal joint approximate to one end of said last-mentioned axle, means for adjusting the horizontal and vertical angles of each disk unit relative to the direction of movement of said harrow by pivoting said axle on said universal joint and means for securing said axle firmly in its adjusted position.

2. A multiple unit harrow comprising a main frame, a supporting axle and wheels mounted on said axle, a series of disk harrow units hingedly attached to said main frame, each of said units comprising a frame, a supporting axle and a plurality of disks mounted on said axle, means for adjusting the horizontal angles of each disk unit relative to the line of drive comprising a universal joint approximate to one end of said last-mentioned axle, a fixed stay rod secured to said unit frame and said universal joint, a lever actuated connecting rod fixed approximate to the end of said axle remote from said universal joint and means for holding said lever actuated connecting rod firmly in adjusted position.

3. A multiple unit harrow comprising a main frame, a supporting axle and wheels mounted on said axle, a series of disk harrow units hingedly attached to said main frame, each of said units comprising a frame, a supporting axle and a plurality of disks mounted on said axle, a universal joint approximate to one end of said last-mentioned axle, lever actuated connecting rod means adapted to adjust the horizontal angle of said disk unit relative to the direction of movement of said harrow and means for simultaneously raising or lowering all the disk units on the main frame out of or into contact with the soil.

4. A multiple unit harrow comprising a main frame, a supporting axle and wheels mounted on said axle, a plurality of disk harrow units, each unit comprising a unit frame hingedly connected to the main frame for up and down movement, a supporting axle and a plurality of disks mounted on said axle, a universal joint at one end of said axle connecting it to the unit frame, a fixed stay rod secured to the unit frame and said universal joint, a lever actuated connecting rod fixed approximate to the end of said axle remote from said universal joint for adjusting the angle of said axle relative to the direction of movement of said harrow, means for holding said lever actuated connecting rod firmly in adjusted position, and means for adjusting each unit axle in a vertical direction.

5. A multiple unit harrow comprising a main frame, a supporting axle and wheels mounted on said axle, a plurality of disk harrow units each of said units comprising a unit frame hingedly connected to the main frame for up and down movement, a supporting axle pivotally connected to the unit frame, a plurality of discs mounted on said axle, means for adjusting the angle of each disk unit relative to the direction of movement of said harrow, and means for adjusting each unit in a vertical direction.

6. A multiple unit harrow comprising a main frame, a supporting axle and wheels mounted on said axle, a plurality of disking units each of said units having a frame hingedly connected to the main frame for up and down movement, a supporting axle pivotally carried by said frame and a plurality of disks mounted on said axle, and means for pivoting each axle whereby the angularity of each disk unit relative to the soil being worked and to the direction of movement of said harrow may be adjusted.

SAMUEL JOHNSTON MILLER.