Aug. 19, 1952 B. E. ROSE 2,607,177

OFFSET HARROW

Filed Aug. 22, 1945 2 SHEETS—SHEET 1

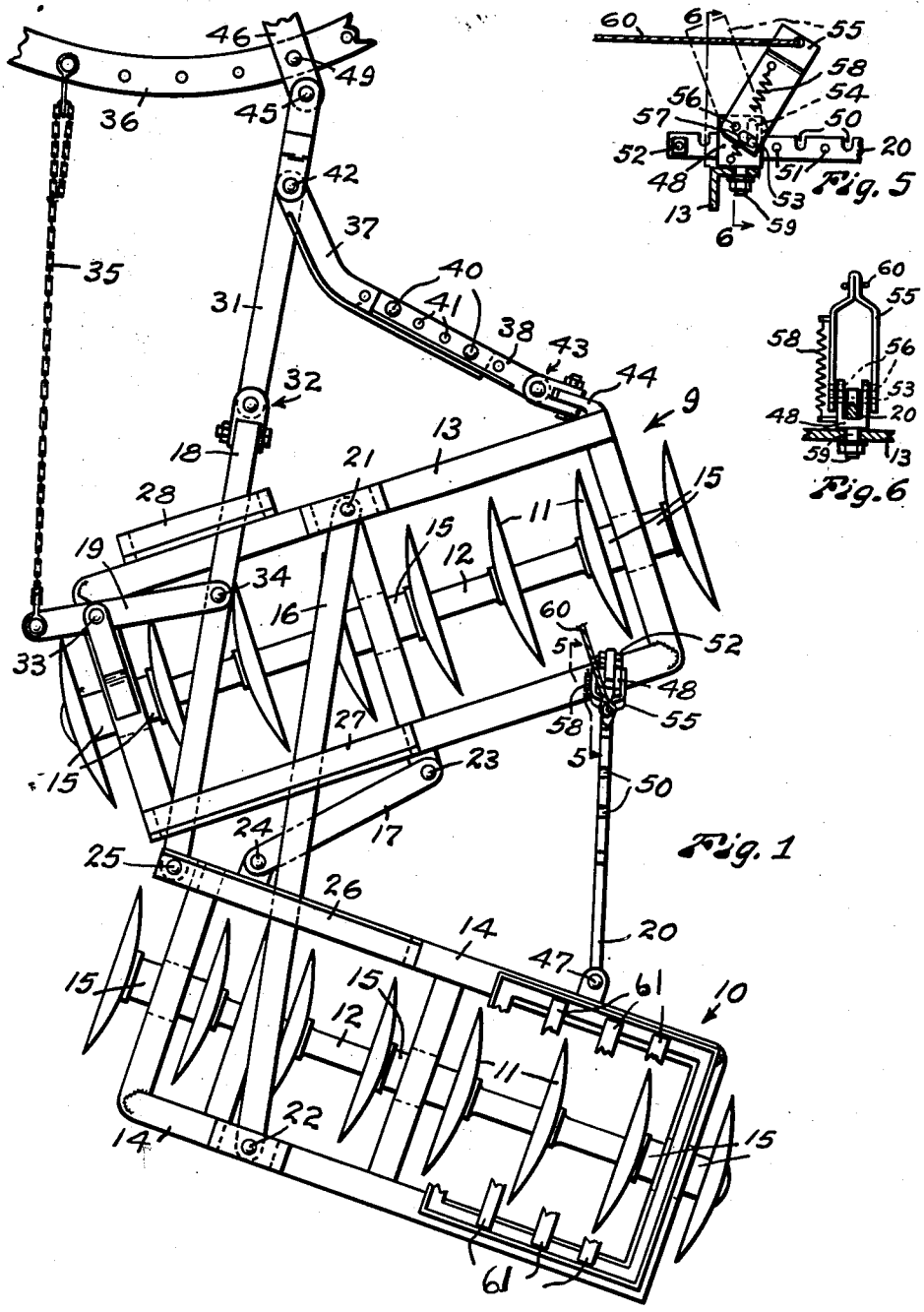


Fig. 1

Fig. 5

Fig. 6

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Fig. 2

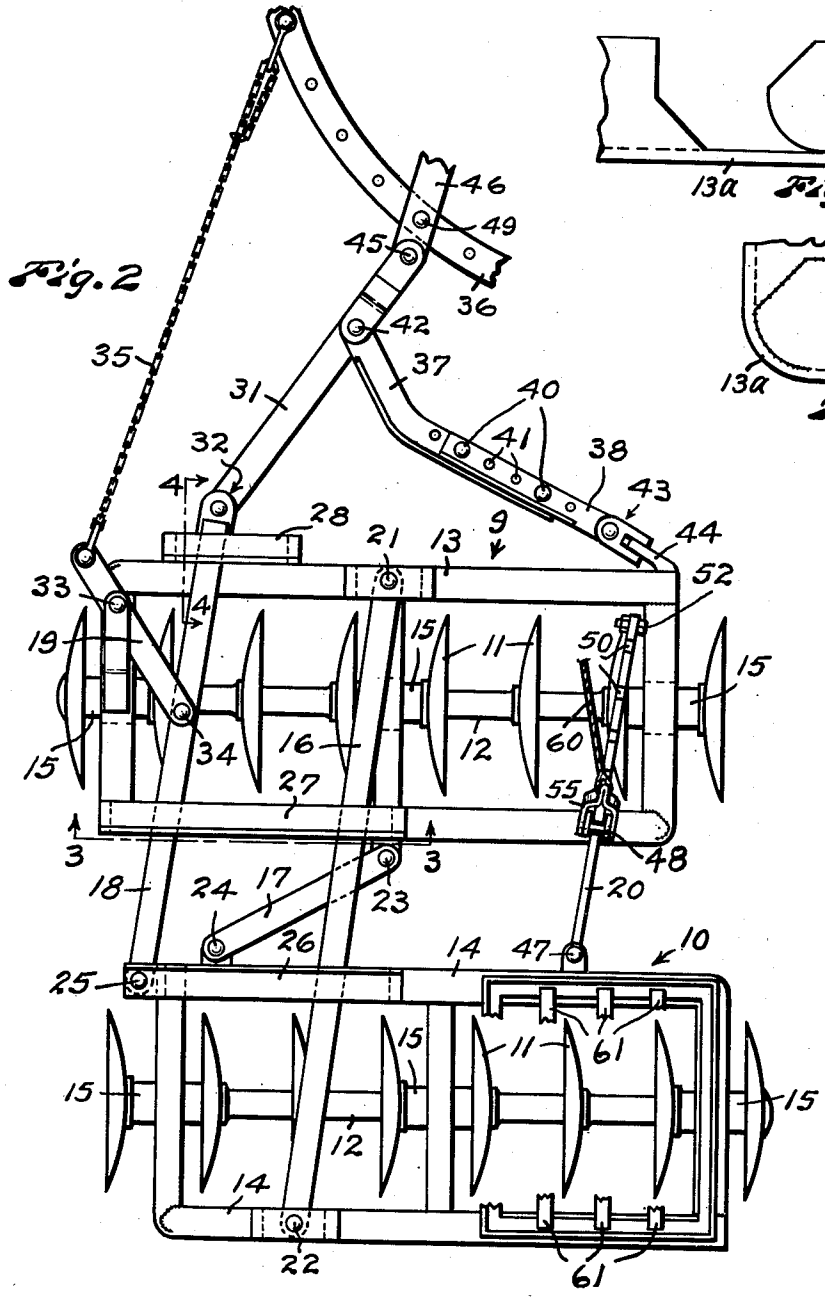


Fig. 7

Fig. 8

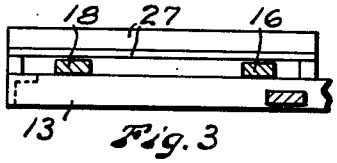


Fig. 3

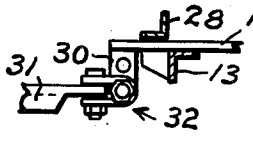


Fig. 4

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OFFSET HARROW

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6 Claims. (Cl. 55—83)

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This invention relates to disc harrows of the offset gang type and the present invention is in the nature of an improvement over the offset harrows disclosed in my two prior patents, No. 1,895,136, issued January 24, 1933, and No. 1,924,416, issued August 29, 1933.

In offset harrows of the type in which two gangs of discs are positioned in tandem and have their axes relatively angularly disposed when in operation, it is relatively easy to turn the harrow in the direction toward which the axes of the gangs converge but is difficult to turn said harrow in the opposite direction or in the direction toward which the axes of the gangs diverge. In common practice the axes of the gangs of harrows of this type are made to diverge toward the right of the harrow and they will be so referred to in this description. However, it will be understood that the direction of divergence of these axes may be reversed.

It is an object of this invention to provide simple and efficient means of very strong and rugged construction for connecting together the two gangs of an offset harrow in such a manner as to facilitate turning said harrow to the right or in the direction toward which the gangs diverge when in operation.

It is a further object of this invention to provide simple and efficient means for automatically changing the angle of axial divergence between the two gangs of an offset harrow in response to a change in the direction of travel of a prime mover that is being used to pull the harrow. As the commonly used prime mover is a tractor, the term tractor is employed herein by way of example and not as a limitation.

The above mentioned general objects of my invention, together with others inherent in the same, are attained by the mechanism illustrated in the following drawings, the same being a preferred exemplary form of embodiment of my invention, throughout which drawings like reference numerals indicate like parts:

Figure 1 is a plan view (with parts broken away) of an offset harrow constructed in accordance with this invention showing the gangs in an operative ground cultivating position;

Fig. 2 is a similar view showing the gangs in a postion they will assume when making a right turn, this also being a preferred position of the gangs when the harrow is being moved but is not being used for ground cultivation;

Figs. 3 and 4 are fragmentary sectional views, with parts in elevation, taken substantially on broken lines 3—3 and 4—4 respectively of Fig. 2;

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Fig. 5 is a view taken substantially on broken line 5—5 of Fig. 1 and showing a releasable device for locking an adjustable bar employed in my invention—a portion of the spring 58 being broken away to illustrate parts therebehind;

Fig. 6 is a sectional view taken substantially on line 6—6 of Fig. 5;

Fig. 7 is a fragmentary plan view of a cut away angle member before bending which is bent to form corner constructions of frame members employed in my invention; and

Fig. 8 is a view of the parts of Fig. 7 after bending and welding to form a corner construction.

In the drawings, 9 and 10 indicate, in a general way, the front and rear gangs of an offset harrow.

Each gang 9 and 10 comprises a plurality of concavoconvex discs 11 assembled in spaced apart relation on axle means 12. The concave sides of the discs 11 of the front and rear gangs are oppositely directed. The front and rear gangs 9 and 10 are respectively provided with rectangular frames 13 and 14 that are connected by bearing means 15 with the axle means 12 of the gangs. Where the corners are rounded, the corner construction of the frames 13 and 14 preferably follows that which is best illustrated in Figs. 7 and 8. The frames 13 and 14 are made of angle iron having two plates 13*a* and 13*b* which are substantially of the same width. One of the plates, such as 13*b*, is cut away as shown in Fig. 7 of the drawings. Then the plate 13*a* is bent as indicated in Fig. 8 so that the portions of the plate 13*b* will interfit to form a right angle bend. Thereafter the parts of the plate 13*b* are welded together. This forms a corner construction which can be bent cold and where the bend is over a large area. The bend can thus be accomplished without weakening of the member 13*a* and after bending, the plates 13*a* and 13*b* can be welded together and the weld area will be extensive as indicated. Thus I provide a corner construction which is characterized by utmost ease and economy of manufacture and utmost strength after completion. The other above described parts are of well known construction.

It is to be understood that the terms right and left as herein used refer to the positions of parts as shown in Figs. 1 and 2 and are applied to a harrow in which the axes of the gangs diverge to the right when the harrow is in operation.

The novel means herein disclosed for connecting the two gangs together comprises three links or bars 16, 17 and 18, a lever 19 and an adjustable bar 20.

The bar 16 is a coupling or reach bar that

pivotally connects the front and rear gangs. The front end portion of this reach bar 16 is connected by a pivot 21 with the front bar of the front frame 13. The pivot 21 is positioned substantially midway of the length of the front frame 13. The rear end portion of the reach bar 16 is connected by a pivot 22 with the rear bar of the rear frame 14. The pivot 22 is positioned approximately halfway between the center and the left end of the rear frame 14.

The diagonal link 17 extends diagonally or obliquely between the two frames 13 and 14 and in part controls the relative transverse positioning of the two gangs. The front end portion of the diagonal link 17 is connected by a pivot 23 with the medial portion of the rear bar of the front frame 13. The rear end portion of the diagonal link 17 is connected by a pivot 24 with the front bar of the rear frame 14 near the left end of said frame.

The diagonal link 17 further serves as a compression member to withstand or counterbalance the side thrust in opposite directions of the two gangs when the gangs are in operation in the ground.

The link 18 has its rear end portion connected by a pivot 25 with the left end portion of the front bar of the rear frame 14. Preferably the pivot 25 is offset a short distance to the left of the left end of the rear frame 14 as shown.

Three hold-down bars 26, 27 and 28 are rigidly secured respectively to the front bar of the rear frame 14, to the rear bar of the front frame 13 and to the front bar of the front frame 13. Each hold-down bar is spaced above the frame piece to which it is secured far enough to provide working clearance for the bars 16 and 18. The reach link 16 operates between the frames 13 and 14 and the hold-down bars 26 and 27. The draw link 18 operates between the frame 13 and the hold-down bars 27 and 28.

The front end portion of the draw link 18, see Fig. 4, has a downwardly extending block or arm 30 fixedly secured thereto forwardly of the front frame 13 and hold-down bar 28. The arm 30 serves as a hitch with which a main draw bar member 31 is connected by pivot means 32 as hereinafter explained.

The lever 19 functions to adjust the angle between the axes of the two gangs 9 and 10 This lever 19 is fulcrumed, by a pivot 33, on the left end portion of the front frame 13 near the forward left corner of said front frame.

One end portion of the lever 19 overhangs the front frame 13 and is connected by a pivot 34 with the draw link 18. The other end portion of the lever 19 extends sidewise to the left of the frame 13 and has a flexible control member, such as a chain 35, connected therewith. The forward end portion of the control chain 35 is connected with a tractor frame member 36 at a point to the left of the main draft connection to the tractor when the harrow is in use.

The draft means for connecting the harrow to the tractor comprises the previously mentioned draw bar member 31 and another draw bar member made up of two links 37 and 38 that are adjustably secured together as by pin 40 passing through selected spaced holes 41. By adjusting the effective length of links 37 and 38 by means of holes 41 and pins 40, the amount of offset of the gangs 9 and 10 relative to each other can be regulated. The forward end portion of the link 37 is connected by a bushed pivot 42 with the draw bar member 31 and the rear end portion of the link 38 is connected by pivot means 43 with a fixed lug 44 on the forward right corner portion of the front frame 13.

The forward end portion of the draw bar member 31 is connected by a pivot 45 with a swinging draw bar 46 of the tractor. The swinging draw bar 46 may be adjusted into various different positions relative to the tractor frame member 36 and is preferably connected with said tractor frame member 36 by pin means 49 being inserted in a suitable opening in the tractor frame member 36.

The bar 20, shown at the right in Figs. 1 and 2, is for the purpose of locking the right end portions of the two gangs 13 and 14 in any desired relative angular position. This bar 20 is connected by a pivot 47 with the rear frame 14 and is slidably disposed in a U shaped latch member 48 that is pivotally connected with the front frame 13 by pivot means 59 (Figs. 5 and 6). The bar 20, Figs. 5 and 6, has notches 50 in its top edge portion and is provided at intervals with holes 51. A stop bolt 52 may be inserted in any one of the holes 51 to limit the maximum movement of the bar 20 relative to the latch member 48 through which it slides.

The U shaped latch member 48 has a cross bolt 53 operable in upright slots 54 therein and adapted to lock within or be raised clear of the notches 50 in the bar 20.

A lever 55 of inverted U shape fits over the latch member 48 and is connected therewith by pivot means 56. The lever 55 has horizontal slots 57 that slidably receive the outer end portions of the cross bolt 53 so that the lever 55 will raise and lower the cross pin 53 when said lever 55 is angularly moved on its pivot means 56 One or more tension springs 58 are secured to the lever 55 and U shaped member 48. The springs 58 are positioned so that their line of pull will be on one side of the pivot means 56 when the cross pin 53 is in a notch 50 in the bar 20 and on the other side of said pivot means 56 when the locking pin 53 is raised and retracted clear of the bar 20. In Fig. 5 the locked position of lever 55 and pin 53 is shown by full lines and the unlocked position thereof is shown by dot and dash lines. Obviously the springs 58 will yieldingly hold the lever 55 in either of the two positions in which it is shown in Fig. 5. A flexible control means 60 is connected with the upper end portion of the lever 55 and extends forwardly to the tractor for operation by the driver. A pull on the control means 60 will move the lever 55 from the full line locked position of Fig. 5 into the dot and dash line released position. A proper flip of this means will move the lever 55 from the dot and dash line released position of Fig. 5 to the full line locked position. Of course, devices may be provided to directly move (by a pull thereon) the lever 55 from its dot and dash line position to its full line position, but the same have not been found necessary in practice. Thus, devices shown in detail in Figs. 5 and 6 are illustrative of one convenient means, operable from the tractor, for rigidly and adjustably holding the gangs at different angles relative to each other.

In operation, the chain 35 is connected with the frame member 36 of the tractor a substantial distance to the left of the draw bar connection 45—46. This chain 35 is adjusted so that it has very little or no slackness when the harrow gangs are positioned at a desired angle of divergence

for cultivating the ground and the tractor is traveling in a straight line, as illustrated in Fig. 1.

If the driver wishes to make a right turn he will first move the lever 55 to unlatched position (the dot and dash line position of Fig. 5) and will then begin to turn the tractor to the right and into the position shown in Fig. 2.

When the harrow is being pulled directly forward the tractor frame member 36 will be in the position shown in Fig. 1. In such position the flexible connector or rope 35 will be slightly slack. The pull from the tractor will be exerted through links 31 and 18 to the frame 14. Also, the links 37 and 38 will connect the link 31 with the front frame 13. The front frame 13 is preferably locked to the rear frame 14 by adjustable link 20. At the same time links 16 and 17 will maintain the frames 13 and 14 in the angular relation shown in Fig. 1 so long as the tractor pulls in the direction shown in Fig. 1 and through link 31 and with flexible connector 35 slightly slack.

Because of the direction of the discs 11 of the front gang 9 and the hitch connection, the discs 11 of the front gang will tend to follow well in the ground and not move upwardly. On the other hand because of the direction of the discs 11 of the rear gang 10 and the fact that the hitch connection connects substantially with the left end upper portion of rear gang 10, the right discs 11 of the rear gang 10 tend to move out of the ground and therefore I preferably provide a support 61, fragments of which are broken away. Thus suitable weights may be located on the supports 61 so that the right end portion of the gang 10 maintains the proper elevation for proper operation of the discs 11.

As the tractor frame 36 angularly moves from the position shown in Fig. 1 to the position shown in Fig. 2 there will be increased pull on the rope 35 and a relative decrease of pull on the linkage 31—18. Thus the lever 19 will turn clockwise and from the position shown in Fig. 1 to the position shown in Fig. 2. This will angularly move the two gangs relative to each other in such a manner as to reduce or entirely neutralize their angle of divergence to the right, or this movement can be sufficient to position these gangs so that the lines of their axes will converge toward the right. Obviously the harrow can be readily turned in a direction toward which the lines of the axes of the gangs converge or in either direction if the convergence is substantially eliminated.

In practice I find that a satisfactory right turn can be made when the axes of the two gangs are substantially parallel, as shown in Fig. 2.

The members 16 to 20, 35, 31, 37 and 38 of this harrow interconnect the two gangs 9 and 10 and provide for relative angular adjustment of said two gangs between the substantially parallel position shown in Fig. 2 and the relatively inclined position shown in Fig. 1.

When the tractor, in making a right turn, begins to straighten its course it will tend to slack the chain 35, allow counterclockwise movement of the lever 19 and relative forward motion of the links 31 and 16. This will allow the two gangs 9 and 10 to begin to assume a divergent angle. When the tractor has completed its turn and is again moving on a straight course the two gangs will assume a given angle (depending upon the relative effective length of links 37 and 38) unless the operator, by manipulation of the lever 55, locks said two gangs together at a lesser angle.

The reach bar 16 connects the front and rear gangs together for relative swinging movement. The diagonal link 17 holds the front and rear gangs in the correct adjustment relative to each other transverse to their direction of travel. Also this link 17 is the member which withstands the balanced side thrust in opposite direction of the two gangs. In this connection it is to be noted that the rear gang is positioned so that its discs 11 will cut out the cores of earth left between the discs 11 of the front gang.

The draw link 18 is part of the mechanism through which a pull is exerted and cooperates in the angular adjustment of the two gangs.

The lever 19 connects link 18 and rope 35 and transmits the force employed to reduce the angle of divergence between the two gangs in making a right turn.

Obviously, changes may be made in the forms, dimensions, and arrangements of the parts of my invention, without departing from the principle thereof, the above setting forth only a preferred form of embodiment.

I claim:

1. An offset harrow comprising a front harrow gang; a rear harrow gang; a reach bar connecting said two gangs in tandem for relative angular movement of the gangs; a diagonal link connecting said two gangs and relatively positioning said two gangs in directions longitudinally of their axes; a locking bar adjustably connecting said two gangs adjacent one side of the harrow; a draw bar member having one end connected with the rear gang adjacent the side of the harrow opposite said locking bar and the other end adapted to be connected with a harrow drawing means; a lever fulcrumed on the front gang and having a pivotal connection with said draw bar member; and lever turning devices adapted to be connected with the harrow drawing means for angularly moving the lever to control the relative angular positioning of the gangs by turning of the harrow drawing means.

2. An offset harrow comprising a front and a rear gang positioned in relatively inclined relation when in normal operation; a draw bar member connected with one end portion of said rear gang; a reach bar having its forward end pivotally connected with the front gang substantially medially of the length of said front gang and having its rear end pivotally connected with the rear gang approximately mid way between the center of said rear gang and the end thereof that is connected with said draw bar member; a diagonal link connecting said two gangs and relatively positioning said two gangs in directions longitudinally of their axes; a locking bar adjustably interconnecting the end portions of said two gangs remote from said draw bar member; a lever fulcrumed on the front gang outwardly from said draw bar member and having a pivotal connection with said draw bar member; and remotely controlled hitch means connected with said lever for moving said lever to vary the relative inclination of said gangs.

3. An offset harrow comprising a front and a rear gang; a front frame and a rear frame carried by the respective gangs; a draw bar member connected with one end portion of said rear frame; a reach bar having its forward end pivotally connected with the front frame and having its rear end pivotally connected with the rear frame; a diagonal link connecting said two frames and relatively positioning said two gangs in directions longitudinally of their axes; hold-down bars rigid with said frames and spaced above said

frames and extending over said draw bar member and said reach bar; a locking bar adjustably interconnecting the end portions of said two frames remote from said draw bar member; a lever fulcrumed on the front frame outwardly from said draw bar member and having a pivotal connection with said draw bar member; and remotely controlled hitch means connected with said lever for moving said lever to vary the relative inclination of said gangs.

4. An offset harrow comprising a front harrow gang having discs; a rear harrow gang having discs; a reach bar pivotally connected to the mid forward portion of the said front gang and forwardly of its discs and to the side rearward portion of the said rear gang and rearwardly of its discs for connecting the said gangs in tandem for relative angular movement; a diagonal link connecting the said gangs and relatively positioning the said gangs in directions longitudinally of their axes; lever means controlling the relative angular position of the said gangs, pivotally mounted on the said front gang and having arm portions extending to opposite sides of said pivotal mounting; a link connecting one arm portion of said lever means to the rear gang; hitch means for directly connecting the other arm portion of said lever means to a harrow drawing means; and a draft means connecting said link to said harrow drawing means.

5. An offset harrow comprising a front harrow gang having discs; a rear harrow gang having discs; a reach bar pivotally connected to the mid forward portion of the said front gang and forwardly of its discs and to the side rearward portion of the said rear gang and rearwardly of its discs for connecting the said gangs in tandem for relative angular movement; a diagonal link connecting the said gangs and relatively positioning the said gangs in directions longitudinally of their axes; lever means controlling the relative angular position of the said gangs, pivotally mounted on the said front gang and having arm portions extending to opposite sides of said pivotal mounting; a link connecting one arm portion of said lever means to the rear gang; flexible hitch means for directly connecting the other arm portion of said lever means to a harrow drawing means; and a draft means connecting said link to said harrow drawing means.

6. An offset harrow comprising a front harrow gang having discs; a rear harrow gang having discs; a reach bar pivotally connected to the mid forward portion of the said front gang and forwardly of its discs and to the side rearward portion of the said rear gang and rearwardly of its discs for connecting the said gangs in tandem for relative angular movement; a diagonal link connecting the said gangs and relatively positioning the said gangs in directions longitudinally of their axes; a draw bar means having one end portion adapted to be connected with a harrow drawing means and the other end portion thereof connected with the said rear gang adjacent one side portion of said gang; lever means controlling the relative angular position of the said gangs, pivotally mounted on the said front gang and having arm portions extending to opposite sides of said pivotal mounting; a link connecting one arm portion of said lever means to said rear gang; hitch means for directly connecting the other arm portion of said lever means to a harrow drawing means; and a draft means connecting said link to said harrow drawing means.

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