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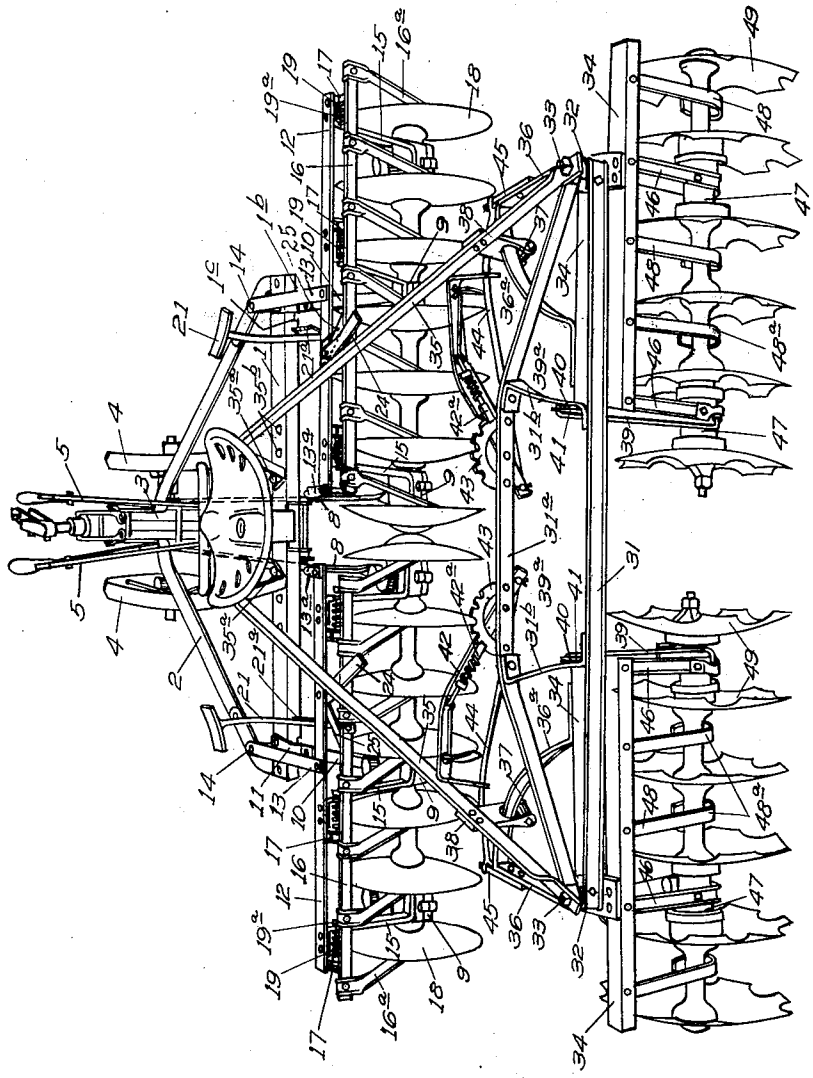
DISK HARROW.

APPLICATION FILED JUNE 20, 1914. RENEWED MAY 11, 1916.

1,189,890. Patented July 4, 1916.

4 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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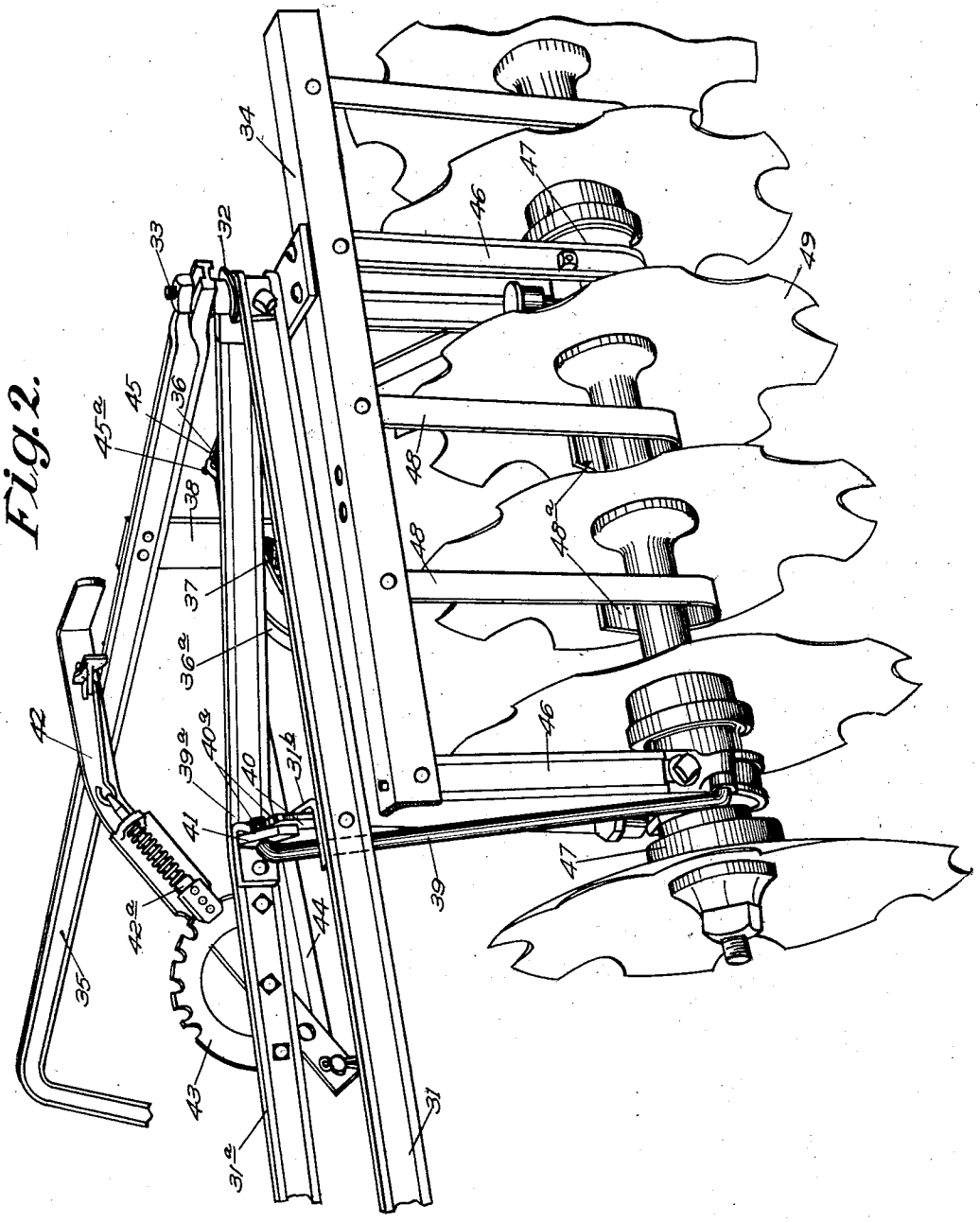
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4 SHEETS—SHEET 2.

Fig. 2.



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4 SHEETS—SHEET 3.

Fig. 3.

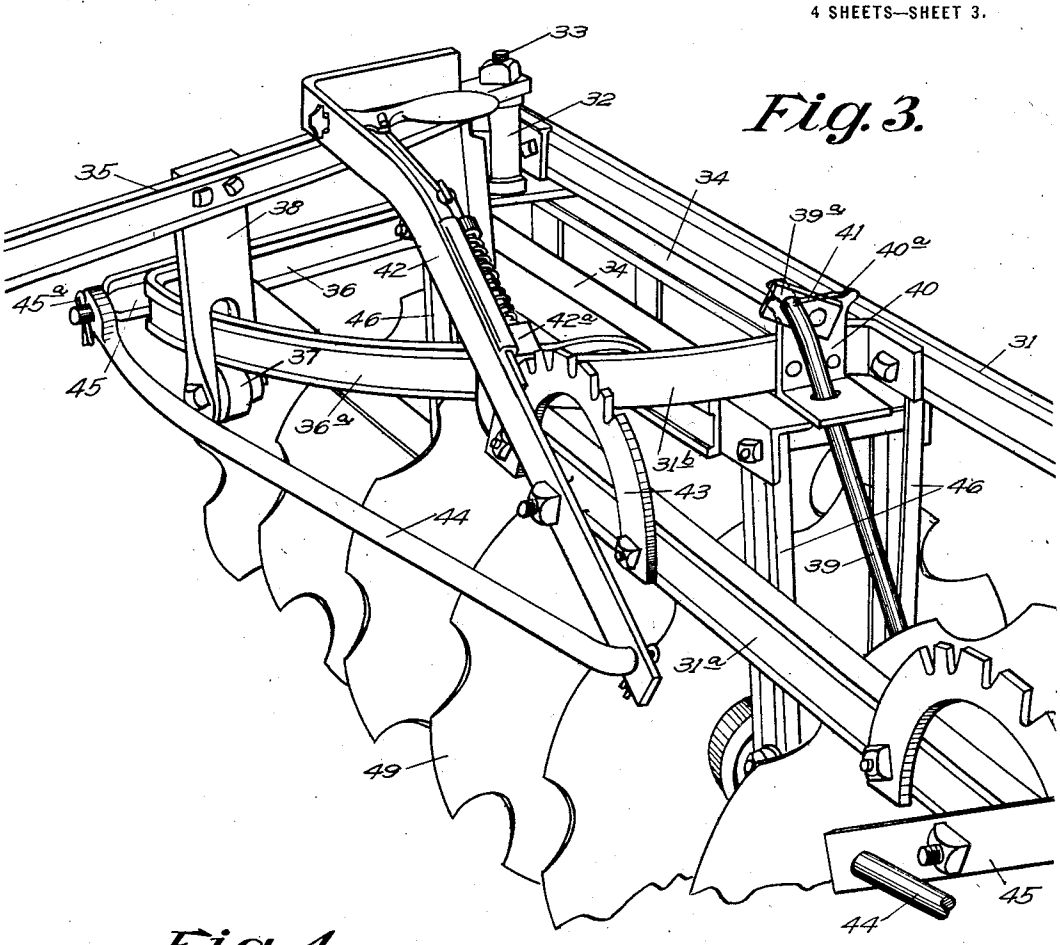


Fig. 4.

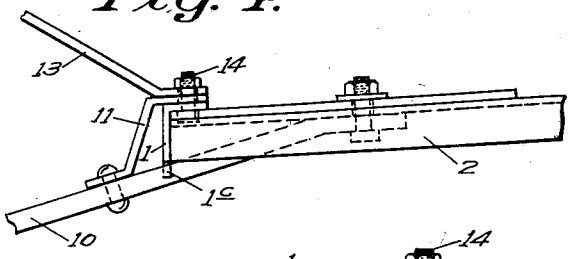


Fig. 5.

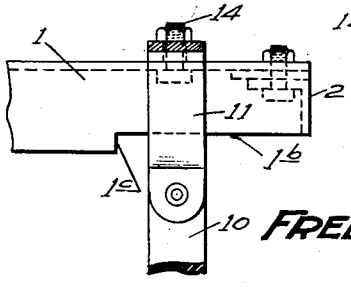
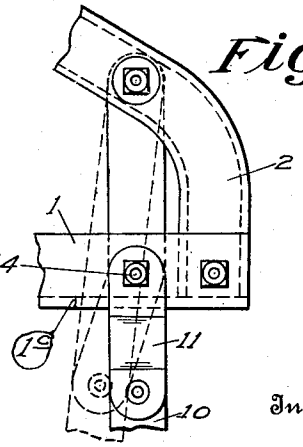


Fig. 6



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4 SHEETS—SHEET 4.

Fig. 7.

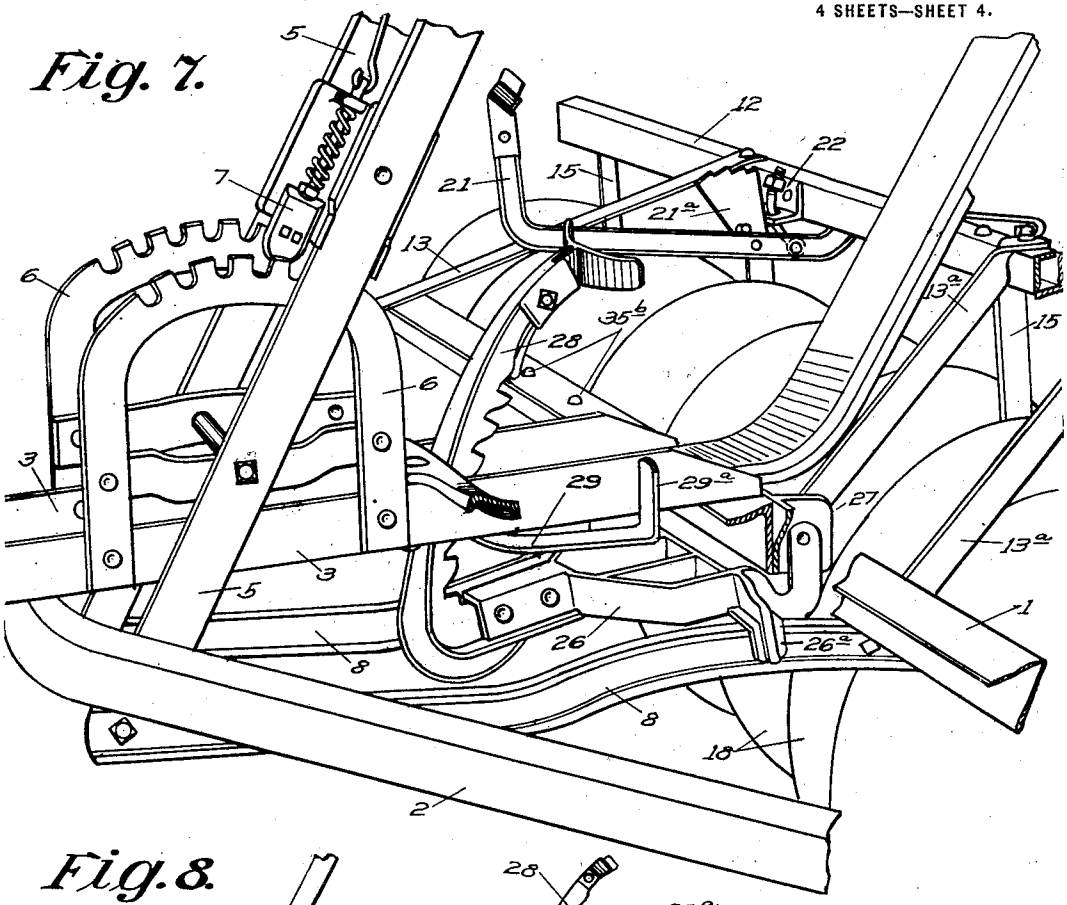


Fig. 8.

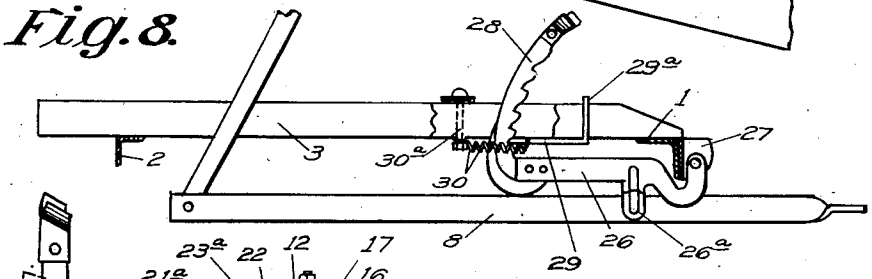
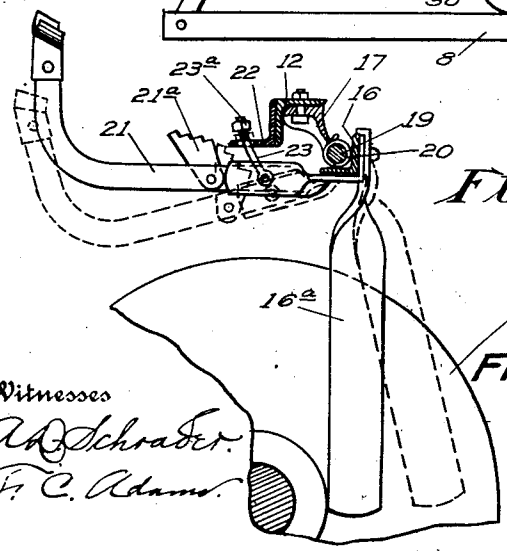


Fig. 9.



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UNITED STATES PATENT OFFICE.

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DISK HARROW.

1,189,890. Specification of Letters Patent. Patented July 4, 1916.

Application filed June 20, 1914, Serial No. 846,225. Renewed May 11, 1916. Serial No. 96,939.

To all whom it may concern:

Be it known that I, FREDERICK C. WARNE, a citizen of the United States, residing at Mansfield, in the county of Richland and State of Ohio, have invented certain new and useful Improvements in Disk Harrows, of which the following is a specification.

My invention relates to improvements in disk harrows, the present embodiment relating more particularly to that class or type known as "double disk harrow" in which two sets or gangs of rotary disks or cutters are arranged one in front of the other and in which the disks of each gang are usually angled and turned in opposite directions so that the rear set will level off and thoroughly pulverize the ground thrown up by the forward set and the ground be thus effectively treated in one operation. While I have shown my improvement applied to or incorporated in a disk harrow of the double disk type, that is to say,—one in which front and rear units are employed, it is apparent that any of the improvements or attachments are equally applicable for use in connection with disk harrows of the single section type.

The primary object of my invention is to provide a generally improved disk harrow of simple and efficient construction which may be readily adjusted to meet the varying demands of actual service, and with this end in view, the improved harrow has its parts so constructed, arranged and disposed relative to each other as to result in a construction having the requisite strength, flexibility and general adjustability which experience has shown to be necessary or desirable.

Heretofore in disk harrows of the double disk or tandem type, the frames carrying the two gangs of disks have either been rigidly connected together to form a single rigid frame or the frames for the two gangs have been separate and merely coupled together by a single centrally located coupling or reach-bar. In the former case the rigidity of the single frame presents difficulties in turning corners while in the latter difficulty is experienced in keeping the two sets of gangs in line while traversing the field. It is to obviate these objections or difficulties that my improvements in their relation to harrows of this class or type are directed, and with this end in view, I provide a strong rigid rear harrow frame and to the opposite or outer ends of said rear frame I pivotally connect two draft or reach bars the latter extending forwardly and in converging relation to each other and being pivotally connected to a transverse bar or member of the front frame at two points equally distant from the longitudinal center of the harrow or the line of draft thereof. By reason of this arrangement and connection of the draft or reach bars and the fact that the latter extend rearwardly at a diverging angle equally distant from the longitudinal center or line of draft under normal conditions, the rear harrow or trailer follows the front harrow in a true centralized trailing position when the front harrow is traveling in a straight line, and such construction also eliminates to some extent the swaying back and forth or lateral vibrations of the rear harrow which is possible and often occurs in double disk harrows employing a single reach bar. In turning, this construction also greatly assists and facilitates in throwing the rear section or trailer off in the general direction in which the front harrow is being turned, and at the same time substantially follows the radius of the front harrow thereby greatly lightening the draft in turning corners and preventing the ridging up of the ground as frequently occurs with other disk harrows of the general construction hereinbefore referred to.

The improved scraper blade supporting actuating and adjusting mechanism shown and described but not claimed herein is made the subject of an application filed March 3, 1915, Serial No. 11,661.

A still further object is the provision of an improved foot controlled disk gang regulating and leveling device for use in connection with the front harrow or section.

The front or draft frame, and the improved foot controlling disk gang regulating and leveling device herein shown and described but not claimed herein is made the subject-matter of a divisional application filed February 12th, 1915, Serial No. 7,701.

A still further object is to improve the construction, adjustment and mountings of the rear disk gangs whereby the latter may be readily adjusted to the desired angle of

incidence and when so adjusted may be properly maintained in such position.

With the above mentioned and other ends in view, the invention consists in the novel construction, arrangement, and combination of parts, hereinafter described, illustrated in one of its embodiments in the accompanying drawings, and particularly pointed out in the appended claims.

Referring to the drawings forming a part of this specification, Figure 1, is a rear top view of a double disk harrow constructed in accordance with this invention, showing the position of the parts prior to the adjustment of the disk gangs of the front and rear units or sections to their angular position or relation to each other for active or operative use in cultivating the soil. Fig. 2, an isometric view of a portion of the rear harrow frame and one of the adjustably mounted disk frames carried thereby looking downwardly from at the rear thereof and illustrating more particularly the bearings and adjustable connections between said frames. Fig. 3, a similar view of said parts looking downwardly from in front of and at one side thereof. Fig. 4, a fragmentary side elevation of the draft and brace bar connections of the front frame or unit. Fig. 5, a fragmentary rear view of the same. Fig. 6, a fragmentary top plan view of the same, Fig. 7, an isometric view of the front frame or unit looking downwardly from in front of and at one side thereof and illustrating more particularly the front disk gang leveling and adjusting device. Fig. 8, a detached view, partly in side elevation and partly in central longitudinal section through the front frame, and illustrating more particularly the front disk gang leveling device and the connections between the latter and the stub-pole and adjustable draft bars leading to the front disk gangs. Fig. 9, a cross sectional view of one of the front disk frames and illustrating more particularly the scraper blade actuating and adjusting mechanism carried thereby.

Similar numerals of reference designate like parts throughout all the figures of the drawings.

The improved disk harrow comprises a draft frame consisting, in the present instance, of a transverse bar 1, and a curved draft frame member 2, the latter having its forward middle portion secured to a stub-pole 3, which latter is made up of spaced angle bars secured at their rear to the transverse bar or member 1, said stub-pole being adapted to receive a fore truck 4, as shown, or other draft appliance.

The stub-pole 3, is provided with a set of pivotally mounted levers 5, and sector racks 6, said levers being provided with suitable detents 7, adapted to coöperate with the racks 6, the lower ends of said levers being connected to draft bars 8, the latter having their rear ends flexibly attached to bearing or axle boxes 9, at the inner ends of the front disk gangs whereby the latter may be given the desired angle with respect to each other and the line of draft.

As a means of connecting the draft frame or front harrow frame to the disk gangs, draft bars 10, are pivotally connected to the under outer portions of the curved frame member 2, and in front of the transverse bar 1, said draft bars extending rearwardly beneath the latter and being flexibly connected to axle boxes 9, at or near the centers of the disk gangs, and as a means of limiting the lateral movements of the draft bars 8, the under side portions of the transverse bar 1, are provided with cut away portions 1^b, providing stop shoulders 1^c, as shown most clearly in Figs. 4 and 5 of the drawings. As a means of supporting and maintaining the draft bar 10, in proper horizontal relation to the transverse bar 1, the latter is provided with supporting clips 11, adapted to be moved horizontally and laterally as indicated by dotted lines in Fig. 6, said clips being pivotally connected to the top portions of the draft bars 10, and at the rear of the transverse bar 1, and as a means of flexibly connecting the draft frame to the upper or transverse bars 12 of the disk gang frames, brace members 13 are provided the latter extending upwardly and rearwardly from the top of the transverse bar 1, of the draft frame and being likewise pivotally connected to the bar 1, with the supporting clips or braces 11, by pivot securing bolts 14. Brace members 13^a, also extend from the inner ends of the bars 12, of the disk frames to the adjustable draft bars 8, connected to the lever members 5. The disk frame bars 12, are connected to the axle boxes 9, by means of supporting bracket or brace members 15.

The improved scraper blade supporting actuating and adjusting mechanism for the disks comprised in the disk gangs comprises longitudinally and circumferentially movable scraper blade carrying bars 16, mounted upon and carried by the bars 12, of the disk frames through the medium of bearing clips or bracket 17, the scraper blades 16^a, extending downwardly and laterally from the carrying bars 16, and along the concaved or dished sides of the disks 18, (see Figs. 1 and 9), said carrying bars 16, being provided with bearing bolts 19, extending through the bearing clips or members 17, said bearing bolts being secured to the bars 16, by means of attaching clips or members 19^a, and being surrounded by coiled springs 20, which latter are interposed between and secured to the brackets 17, and 19, whereby these springs are adapted to resist the longitudinal and circumferential movements of the scraper carrying bars 16, on the hinged

or bearing members 19, when actuated by the mechanism hereinafter described, and will return these bars and scrapers to their original positions when pressure is released by the actuating mechanism.

As a means for operating or moving the scraper carrying bars 16 circumferentially whereby the scraper blades 16ª may be moved toward and from the axial centers of the disks as indicated most clearly in Fig. 9 of the drawings, foot levers 21 are attached to the bars 16, and extend forwardly and upwardly therefrom, and as a means for securing the levers 21 in any desired adjusted or depressed position said levers are provided with pivotally mounted upwardly extending notched blades 21ª, adapted to be brought into engagement with brackets 22, projecting from the bars 12, of the disk frames. As a means of limiting the downward movements of the levers 21, and consequently the outward movements of the blades 16ª, toward the periphery of the disks 18, eye bolt members 23, are pivotally mounted at the sides of the levers 21, and are provided with upwardly extending threaded portions extending through openings in the brackets 22, said upwardly extending threaded portions of the bolts being provided with adjustably mounted stop nuts 23ª, whereby the circumferential movements of the bars 16, and the tilting movements of the blades 16ª, may be regulated and stopped at any desired point toward the outer periphery of the disks 18, as illustrated most clearly in Fig. 9 of the drawings.

As a means of moving the scraper blade carrying bars 16, laterally or longitudinally and against the resistance of the coiled springs 20, surrounding the bearing bolts 19, hand levers 24, are pivotally connected to the disk frame bars 12, said levers being connected to link members 25, extending outwardly and connected to the scraper carrying bars 16, so that by moving the hand levers 24 outwardly, the bars 16 will be moved longitudinally or laterally against the resistance of the springs 20, carrying the blades 16ª, away from the disks 18, the connection between the link members 25, and hand levers 24, being such that when the latter are thrown to their extreme outer position as illustrated at the right hand side of Fig. 1 said bars and blades will be held in such position in an obvious manner thus keeping the scrapers entirely away from the disks to prevent their rubbing the latter when the scrapers are not needed.

As a means of providing an improved foot controlled disk gang leveling or regulating device for use in connection with the front harrow or draft frame, a leveling or snubbing block 26, is interposed between the longitudinally movable or adjustable draft bars 8, leading to the inner ends of the disk gangs and the draft frame, said leveling block 26, in the present instance, being disposed immediately beneath the transverse bar 1, and pivotally attached to the latter by means of bearing brackets 27, said block 26, extending forwardly and, in the present instance, being provided with depending lugs 26ª, adapted to frictionally receive and retain the longitudinally movable draft bars 8, as well as form a friction bearing surface for the latter in any of their various adjusted positions in angling the disk gangs to the line of draft.

As a means of depressing the forward end of the leveling block 26, and consequently depressing the draft bars 8, and the inner ends of the disk gangs, the forward or free end of the pivotally mounted block 26, is provided with an upwardly extending foot lever or rack arm 28, whereby the operator or attendant from the seat of the harrow may by the foot readily depress the foot lever and consequently depress the draft bars through the medium of the lever movement imparted to the pivoted block 26, and as a means for readily locking the foot lever in any desired depressed position a rack engaging lever or dog 29, is pivotally mounted beneath one of the members of the stub-pole 3, and extends outwardly and rearwardly at one side of the latter terminating in an upwardly extending bracket portion 29ª, for the convenient operation of the lever or dog in releasing by the foot the toothed portion of the foot lever when desired, and as a means for holding or drawing the free portion of the lever or dog 29, toward the rack arm or lever 28, a spring 30, may be mounted beneath the stub-pole 3, and secured to the latter by means of a bolt 30ª, as shown most clearly in Fig. 8 of the drawings.

Referring now to the rear harrow or trailer and the means for attaching the latter to the front harrow or draft frame whereby a generally improved double disk harrow is provided, it will be seen that I provide a strong rigid rear harrow frame made up, in the present instance, of a transverse bar 31, and a forwardly extending curved bar 31ª, suitably braced or connected to the transverse bar 31, as for example, by means of brace members 31ᵇ, said rear harrow frame being provided at its outer ends with bearing blocks or members 32, the latter being adapted to receive the pivoted or swiveled bearing members 33, of the rear disk harrow frame members 34.

As a means of properly connecting the rear harrow or trailer to the front harrow or draft frame whereby the rear harrow is adapted to follow the front harrow in a true centralized position when the front harrow is being moved forwardly in a direct

line as well as providing a construction adapted to eliminate to a great extent the lateral swaying motions or vibrations of the rear harrow frame now so manifest in double disk harrows in which the rear harrow or trailer is connected to the front draft frame through the medium of a single centrally located reach bar, and furthermore as a means of causing the rear section or trailer to be thrown off and to follow the general direction in which the draft frame or front harrow is being turned, I pivotally connect two draft or reach bars 35, to the opposite or outer ends of the rear harrow frame, in the present instance, to the bearing members 33, of the rear disk gangs, said draft bars extending forwardly in converging relation to each other and being normally disposed at an angle equally distant from the longitudinal center or line of draft when the harrow as a whole is traveling in a true forward position. The front or converging ends of the draft bars are flexibly connected to the draft frame or front harrow frame at two points equally distant from the longitudinal center of the harrow or the true line of draft thereof, in the present instance, being pivotally connected to the transverse bar through the medium of pivot bolts 35[a], said bolts or pivot members 35[a], being mounted in suitably spaced openings 35[b], in the bar 1, so that the reach bars 35, may be horizontally and laterally adjusted in proper relation to each other as desired.

As a means of properly supporting and holding the rear disk gangs in their various adjusted positions to each other and particularly when shifted to their forwardly converging angle to the line of draft when the harrow is in operation, as well as assisting in holding the parts of the rear unit or trailer in a true trailing position and preventing lateral swaying movements or vibrations, the front members 34, of the rear disk frames are provided with forwardly extending brackets 36, including curved guide supporting members 36[a], which latter extend over and are adapted to travel upon supporting rollers 37, mounted in and carried by bearing brackets 38, which latter are mounted upon and carried by the draft or reach bars 35.

As a means of properly supporting the inner ends of the rear disk gangs in their respective adjusted positions and also as a means of eliminating friction from said supporting means when the inner ends of the rear disk gangs are shifted or adjusted to assume their forwardly converging angular relation to each other by the shifting mechanism hereinafter described, vertically swinging link members 39, are provided said link members being connected to and depending from the intermediate portions of the rear harrow frame, the upper ends of said links 39, in the present instance, extending through openings in supporting brackets 40, which latter are provided with pivoted movable bearing members 41, for supporting and giving a limited movement to the angular bearing portions 39[a], of the links 39, so that when the latter are moved or shifted through the movements of the rear disk gangs the upper bearing portions 39[a], will be given the requisite movements, as the inner ends of the rear disk gangs are shifted, the angular bearing portions 39[a], being adapted to normally rest in and be supported by the notched bearing portions 40[a], of the supporting brackets as shown most clearly in Figs. 2 and 3 of the drawings.

As a convenient means of adjusting the rear disk gangs upon their pivots and particularly as a means of moving the inner ends thereof forwardly to assume a forwardly converging angle with respect to each other, a pair of levers 42 are pivotally mounted upon the rear frame harrow, in the present instance, on the forwardly curved member 31[a], said levers being provided with suitable detents 42[a], adapted to coöperate with suitable racks 43, in a well known and understood manner, the lower ends of said levers being provided with links 44, extending outwardly and connected to the forward ends of the forwardly extending brackets 36, of the rear disk frames, this connection, in the present instance, being made through the medium of separate bearing arms 45, to which the outer or looped ends of the links are secured by means of cotter pins 45[a].

The rear disk frame members 34, in the present instance, are connected to the axle portions of the rear disk gangs through the medium of depending bearing brackets 46, extending over and connected at their lower ends to axle boxes 47, the rear member 34, of the rear disk frames being also provided with depending bars 48, terminating in looped portions 48[a], extending about the axle portions of the rear disk gangs, said bars 48, being adapted to prevent the accumulation of mud and dirt between the cut-out disks 49, in a well known and understood manner.

From the foregoing description, taken in connection with the accompanying drawings, the operation and advantages of my invention will be readily understood.

Having thus described one of the embodiments of my invention, what I claim and desire to secure by Letters Patents, is:—

1. In a double disk harrow, front and rear harrow frames, gang frames carried thereby and reach bars flexibly connected to said rear harrow frame and extending in a forwardly converging angle and flexibly

connected at their front ends to said front harrow frame at points equally distant from the line of draft.

2. In a double disk harrow, the combination with front and rear harrow frames provided with adjustably mounted disk gangs; of forwardly converging draft bars flexibly connected at their opposite ends to said front and rear harrow frames at points equally distant from the common longitudinal centers of said frames.

3. In a double disk harrow, the combination with a front harrow frame and adjustable disk gangs carried thereby; of a rear harrow frame provided with separate disk frames vertically pivotally connected therewith, separate forwardly converging reach bars horizontally pivoted at their ends to said front and rear harrow frames, and horizontally movable engaging and supporting members between said rear disk frames and said reach bars.

4. In a double disk harrow, the combination with a front harrow frame and adjustable disk gangs carried thereby; of a rear harrow frame provided with forwardly converging reach bars flexibly connected to said front frame at points equally distant from the longitudinal center thereof, adjustable disk gangs carried by said rear harrow frame, and anti-friction supporting devices connected to said reach bars and rear disk gangs for vertically supporting the latter in their adjusted positions.

5. In a double disk harrow, the combination of front and rear harrow frames provided with adjustable disk gangs, and independently mounted forwardly converging reach bars flexibly connected to said front and rear frames and normally extending at equal angles to the longitudinal center of said harrow, and means for vertically supporting said rear disk gangs in their various adjusted positions relative to said rear harrow frame and said reach bars.

6. In a double disk harrow, the combination with a draft frame including a transverse bar and adjustable disk gangs connected to said frame; of a rear harrow frame provided with separate disk frames vertically pivotally connected therewith, separate forwardly converging reach bars pivotally connected to said rear harrow frame and said transverse bar of said draft frame at points equally distant from the centers of said transverse bar and said rear harrow frame and horizontally movable connections between said reach bars and said gang frames for vertically supporting the latter in their adjusted positions.

7. A trailing disk harrow, comprising a rigid horizontally trussed harrow frame, separate disk gangs and frames adjustably and pivotally connected therewith, separate forwardly converging horizontally adjustable reach bars pivotally connected to the outer portions of said harrow frame, and horizontally movable supporting connections between said disk gangs and frames and said reach bars.

8. In a trailing or rear harrow section, a trussed transversely extending harrow frame, disk frames vertically pivotally connected to the outer portions thereof and provided with forwardly extending brackets, hand lever members transversely movable and adjustable on the forward central portions of said harrow frame, and outwardly extending links connected to said hand levers and said forwardly extending brackets.

9. A trailer or rear harrow section, comprising a horizontally trussed rear harrow frame including a transverse member and a forwardly extending curved member, separate disk frames vertically pivotally connected therewith and provided with forwardly extending curved guide supporting members, reach bars flexibly connected to said rear harrow frame, and guide supporting members carried by said reach bars and connected with and supporting said curved guide supporting members of said disk frames.

10. In a trailer or rear harrow section, a trussed transversely extending rear harrow frame, vertically pivotally connected disk frames provided with forwardly extending brackets including curved segmental guide members, lever members mounted on said harrow frame and provided with links connected to said forwardly extending brackets, reach bars flexibly connected to the outer portions of said rear harrow frame, and guide supporting members carried by said reach bars and connected to and supporting said segmental guide members.

11. In a double disk harrow, the combination with a draft frame including a transverse bar, a rear harrow frame, and disk gangs adjustably mounted on said draft and harrow frames; of forwardly converging draft bars flexibly connected at their opposite ends to said transverse bar of said draft frame and said rear harrow frame at points equally distant from the common longitudinal centers of said frames.

12. A tandem harrow, comprising a front section and a rear section, reach bars connected to said sections at points equally distant on each side of the line of draft, respectively, said reach bars being pivotally connected at their ends to one of said sections at less distance from each other than the opposite ends on the other section to permit said reach bars and said sections to swing in horizontal planes toward and from each other in varying relative angular relation.

13. In a double disk harrow, the combi-

nation of a front frame and a rear frame each carrying earth working devices, arms connected to one of said frames at opposite sides of the line of draft and equally spaced therefrom, said arms being pivotally connected to the other of said frames at a less distance from said line of draft than at the opposite ends to permit said frames to swing toward each other in varying relative angular relation on said arms.

14. A tandem harrow, comprising a front section and a rear section, and reach bars connected at their opposite ends to said front and rear sections at points equally distant from the line of draft of said sections, respectively, said reach bars each having a horizontally swinging pivotal connection with the front section to permit said section and reach bars to swing laterally in a substantially horizontal plane in varying relative angular relation to each other and to said front section.

15. In a double disk harrow, the combination of a front section and a rear section each including longitudinally adjustable disk gangs, reach-bars connecting said sections at each side of the line of draft, said reach-bars each having a horizontal pivotal connection with one of said sections to permit said last mentioned section to swing toward the other section on said connections, said pivotal connections being spaced apart a less distance from each other and from said line of draft than the connections at the opposite ends of said reach bars, and means for vertically supporting and carrying the inner ends of said disk gangs on said rear section in a common horizontal plane in their respective shifted and unshifted positions.

16. In a double disk harrow, the combination with a front section and a rear section; of reach-bars connected to said rear section and flexibly connected horizontally to said front section to swing in a horizontal plane relative to said front section and at varying angles thereto, said points of connection between the ends of said reach-bars and the front and rear sections, respectively, being equally distant on opposite sides of the line of draft and said flexible connections on said front section being spaced from each other a less distance than the connections of said reach-bars of said rear section.

17. A double disk harrow, comprising front and rear harrow sections, said draft bars connected at their opposite ends to said front and rear harrow sections at points equally distant from the common longitudinal centers thereof, respectively, the connections between the front ends of said draft bars and said front harrow section being horizontally flexible and spaced from each other a less distance than on the rear harrow section to permit said draft bars and rear harrow section to move laterally to one side or the other in a common horizontal plane and in varying angles relative to each other and to said front harrow section.

18. In a double disk harrow, the combination of a front harrow section, a rear harrow section provided with reach-bars connected to said front harrow section at points equally distant from the line of draft, said connections on said front harrow section being spaced from each other at a less distance than the connections of said reach-bars on said rear section, and link members between said rear harrow section and the inner ends of the disk gangs carried thereby for vertically supporting the latter in a common horizontal plane in their various adjusted positions.

19. In a double disk harrow, the combination with front and rear harrow sections each including horizontally adjustable disk gangs vertically pivoted at points equally distant from the line of draft, reach-bars connected to said front and rear harrow sections at points equally distant from the line of draft, respectively, the connections between the front ends of said reach-bars and said front harrow section being horizontally flexible and spaced from each other at a less distance than on the rear harrow section, and means on said rear harrow section for vertically supporting and carrying the inner ends of said disk gangs in a common horizontal plane in their various adjusted positions thereon.

20. In a double disk harrow, the combination of front and rear harrow sections, each including horizontally adjustable vertically pivoted disk gangs, reach-bars connected to said rear section and flexibly connected horizontally to said front section to swing in a horizontal plane at varying relative angles thereto and to each other, said connections on said front section being spaced from each other a less distance than their connections to said rear section, and the points of connection on each section being equally distant on each side of the line of draft, respectively, and means on said rear section for vertically supporting said rear disk gangs in a common horizontal plane in their various adjusted positions.

In testimony whereof I have affixed my signature in presence of two witnesses.

FREDERICK C. WARNE.

Witnesses:

H. E. Fox,

M. Henry, Jr.