(No Model.) 3 Sheets—Sheet 1.

C. LA DOW.

DISK HARROW.

No. 343,132. Patented June 1, 1886.

Fig. 1.

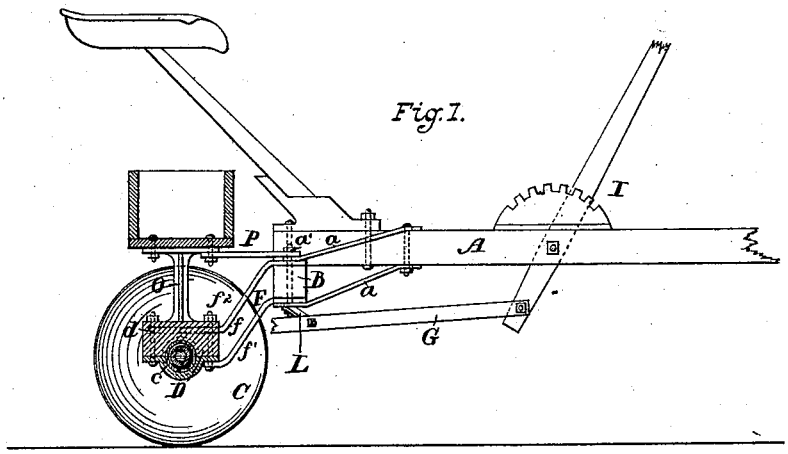
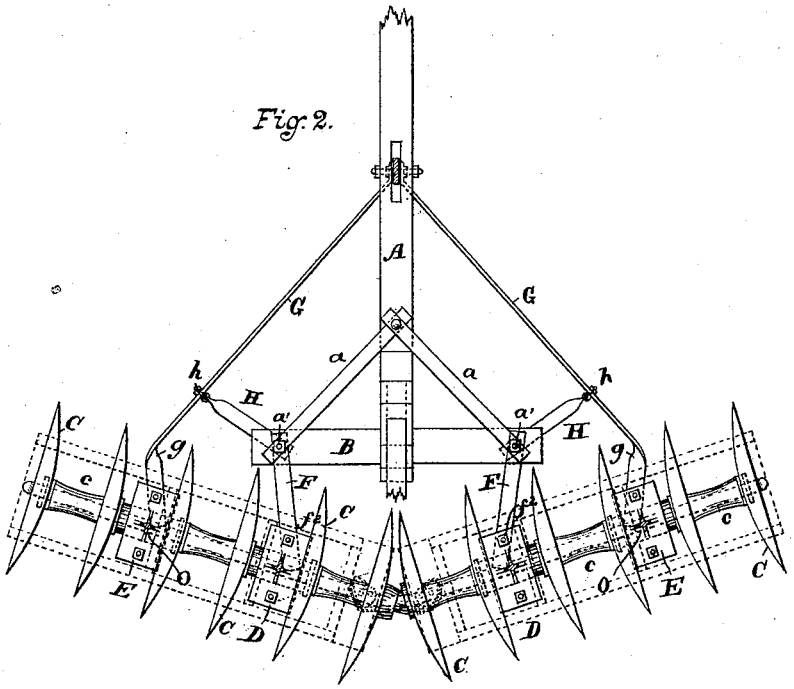


Fig. 2.



Witnesses:
E. C. Davidson.
James Young.

By his Attorneys,
Baldwin, Hopkins & Peyton.

Inventor:
Charles La Dow.

(No Model.) 3 Sheets—Sheet 2.

C. LA DOW.

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Fig. 3.

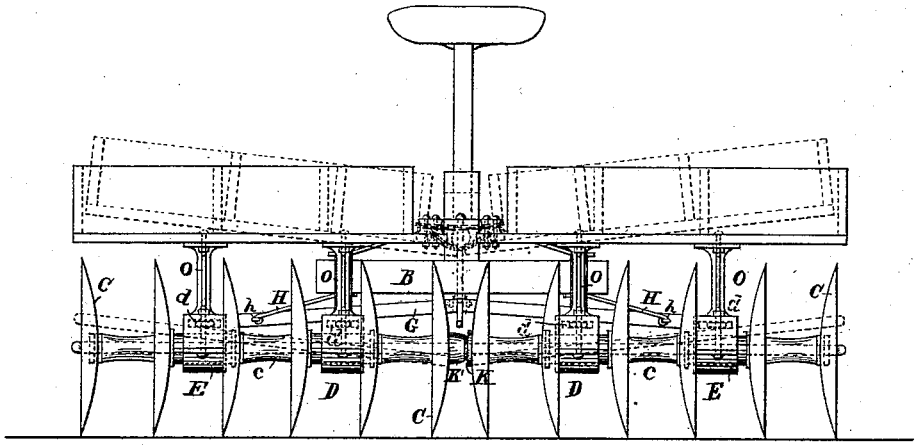


Fig. 6.

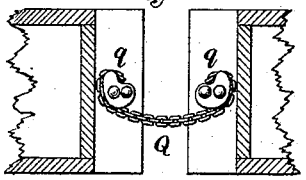


Fig. 5.

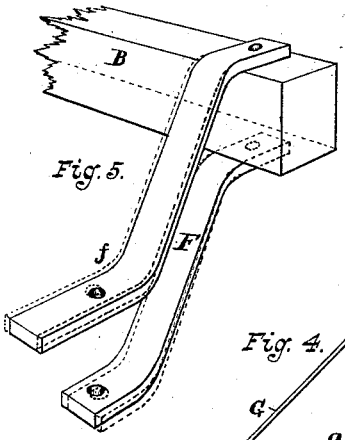


Fig. 7.

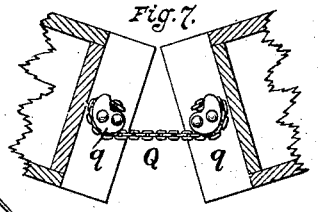
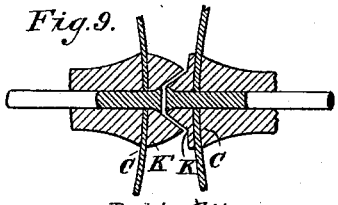


Fig. 4.

Fig. 8.

Fig. 9.



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(No Model.) 3 Sheets—Sheet 3.

C. LA DOW.

DISK HARROW.

No. 343,132. Patented June 1, 1886.

Fig. 10.

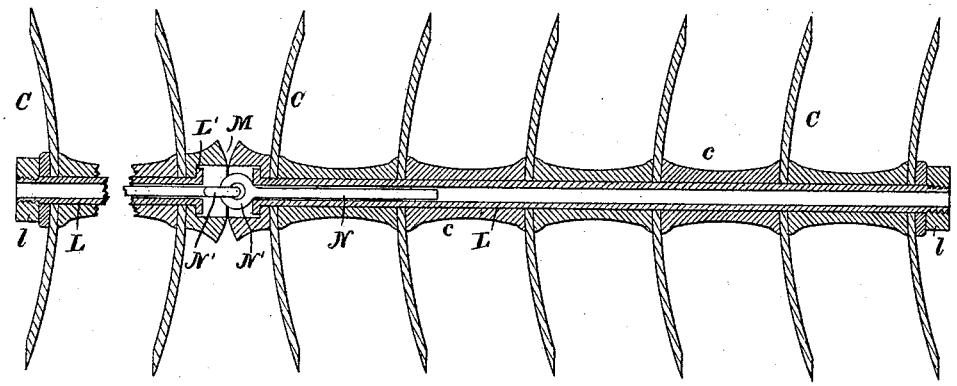
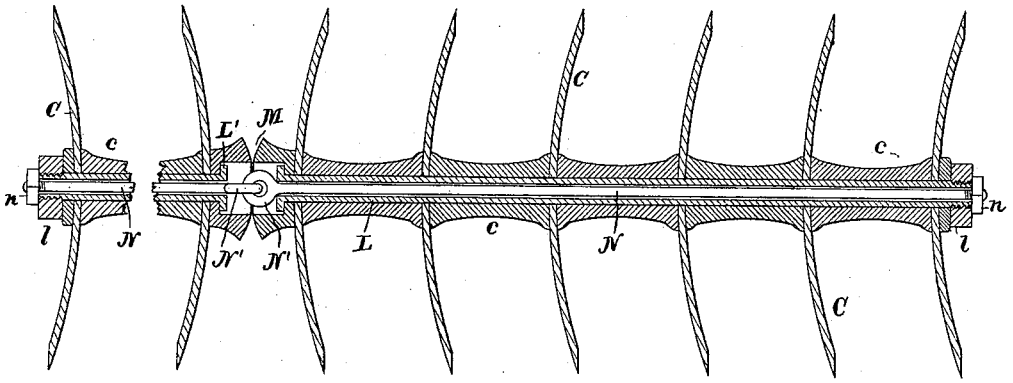


Fig. 11.



WITNESSES

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UNITED STATES PATENT OFFICE.

CHARLES LA DOW, OF ALBANY, NEW YORK.

DISK-HARROW.

SPECIFICATION forming part of Letters Patent No. 343,132, dated June 1, 1886.

Application filed July 1, 1884. Serial No. 136,560. (No model.)

To all whom it may concern:

Be it known that I, CHARLES LA DOW, a citizen of the United States, residing in Albany, in the county of Albany and State of New York, have invented certain new and useful Improvements in Disk-Harrows, of which the following is a specification.

The object of my invention is to improve the structure and operation of harrows of this class; and the invention consists in certain improvements hereinafter fully described and specifically claimed.

In the accompanying drawings, Figure 1 is a transverse sectional view of the machine; Fig. 2, a plan view; Fig. 3, a rear view; Fig. 4, also a plan view, showing the machine in a somewhat different position; Fig. 5, a detail view showing by full lines the bifurcated draft-connection between the disk-gangs and the cross-beam of the machine, and by dotted lines the side action of the rear ends of the draft-connections in opposite directions for permitting the vertical vibration of the ends of the gangs. Figs. 6, 7, and 8 are detail views showing the inner ends of the weight-boxes and the chain which connects them. Fig. 9 is a detail view showing one form of connection between the inner ends of the disk-gangs, and Figs. 10 and 11 are detail views illustrating other and preferred manners of connecting the inner ends of the disk-gangs.

A is the tongue or pole of the machine, and B the cross-bar, which is shown as bolted to the under side of the tongue. Bifurcated braces or connections *a* extend from the outer ends of the cross-bar to the pole—that is, on each side there is a pair of braces *a*, which embrace both the upper and lower sides of the cross-bar and tongue. The disks C are mounted upon a gang-shaft and separated by suitable spacing-thimbles, *c*, as usual. The special and preferred construction of the gang-shaft and the manner of joining the gangs at their inner ends are described hereinafter. Each gang is provided with two bearing-boxes, D and E. These boxings, so far as the bearing of the gang-shaft therein is concerned, may be constructed in the manner set forth in my Patent No. 297,524, granted to me April 22, 1884, or in any other suitable manner which will permit the desired vertical and horizontal rocking of the gang-shafts. The upper sections of the boxings are, however, preferably cast as illustrated, particularly in Figs. 1 and 3, so as to leave a horizontal slot, *d*, therein.

The connections between the inner boxes, D, and the cross-beam B constitute the draft-bars, and the construction is as follows: There is a bifurcated draft-connection, F, between each box and the end of the cross-beam. The rear end of the upper bar, *f*, of each pair of bars F, which constitute a draft-connection, is inserted in the horizontal slot *d* in the upper section of the box D, and projects over and rests on the axle of the gang. The other end of this bar embraces the top of the cross-beam, while the other bar, *f'*, extends from the under side of the boxing D to the under side of the cross-beam, the two bars constituting the bifurcated connection being bolted to the boxing by a vertical bolt, f^2, about which they turn, as is hereinafter described. The opposite ends of the bars *f f'* are also bolted to the end of the cross-beam by a bolt, *a'*, which also serves to pivot the bifurcated braces *a* to the cross-beam. It will be perceived by this structure that the bifurcated braces F turn on vertical pivots both at the boxings D and at the ends of the cross-beam, to accommodate the varying adjustments of the gangs, and also to permit vertical vibration of the ends of the gangs. The bifurcated draft-connections may be attached rigidly to the cross-bar, and may be hinged to the gang in any preferred way.

The adjusting-bars G, by which the angle of the gangs is varied, are connected with a lever pivoted in the pole of the machine, and provided with a suitable rack and detent, as usual. From this lever the bars extend rearwardly in divergent directions, and are preferably bolted in horizontal slots *d* in the boxings E, in the same manner that the draft-bars *f* are seated in the slots in the boxings D; but they may be attached in other ways. The rear ends of the bars G are bent at *g*, so as to properly enter between the disks on each side of the boxings E, and from the bend *g* to their ends they are substantially parallel with the bifurcated draft-connections F. Pivoted brace-bars H, which are bolted to the ends of the cross-beam by the pivot-bolts *a'*, are connected with the bars G by swivel-connections *h*.

Chains may be usedinstead of the brace-bar H, and either construction is designed to prevent lateral movement of the frame relatively to the gangs. It will be obvious now that by means of the bars G the angle of the gangs may be adjusted, and that the bifurcated draft-bars F and the adjusting-bars G will turn upon their vertical pivot-bolts, and permit the free horizontal movement of the gangs.

The braces H may be omitted, and, if desired, a stop may be attached to each end of cross-bar for the swinging draft-links to strike against, and thus limit the horizontal motions of the gangs. By employing a bifurcated draft-connection between the cross-bar and disk-gang I also obtain great freedom and range of vertical movement for the ends of the gangs, as the upper and lower limbs of said draft-connections are free to swing horizontally at their rear ends in opposite directions from their pivot on the cross-bar, as shown by dotted lines in Fig. 5. Said form of draft-connections also prevents deflection of the main frame at the cross-bar, and the upper rear ends of the said draft-connections resting over the center of the axle prevents torsional strain on the vertical pivots at those points.

Single draft-connections having bifurcated ends, or single draft-connections entering into bifurcations formed on the journal-boxes and on the cross-bar, may be substituted, if desired; but I prefer the construction shown in the drawings.

So far as I am aware I am the first to connect the adjusting-bars of the gangs outside of their draft-connections with the main frame or cross-beam. By this construction I obtain a greater facility of adjustment, and I consider the change a substantial and practical improvement.

Heretofore it has been customary to connect the gangs to the frame in such a manner that the outer connections had no vertical movement, but formed a rigid fulcrum on which the gangs vibrated; nor, heretofore, have the outer connections been free to move horizontally to accommodate the adjustment of the gangs. These two features I consider material improvements.

By employing a bifurcated draft-connection F, which is bolted to the boxing and to the cross-beam by vertical pivot-bolts, the gang is prevented from tilting or rocking sidewise—a feature which is specially important when weight-boxes are used in connection with a harrow—as hereinafter described. I also, by means of the vertical pivot-bolts, give the structure great freedom of motion and facility of adjustment without binding or straining the parts; and this structure, in connection with the bifurcated braces *a*, which connect the pole and cross-beam, give the machine strength and simplicity. By pivoting the draft-connection at one end to the cross bar and by a vertical pivot to the gang at the rear end the buffers abut during all angular and vertical vibrations of the gangs, as the pivoted draft-arms swing to accommodate the movement of the gangs.

The lever for adjusting the gangs may be pivoted in the pole nearer the seat of the machine than shown in the drawings. In that case, however, I prefer to employ a pivoted short lever, I, in the position in which the main lever is shown in the drawings, and to connect the main lever with the short lever by a horizontal link either above or beneath the pole, as desired.

In Figs. 2, 3, 4, and 9 (for counteracting the end-thrust of the gangs) I have shown their adjoining or inner ends with a conically-shaped buffer, K, on the end of one of the gang-shafts, which fits into a correspondingly conically-socketed piece, K′, on the other end of the gang-shaft. This construction also prevents the ends of the gang-shafts from rising and falling independently of each other, and the conjoint action of the two conical surfaces tends constantly to bring the gang-shafts into the same horizontal plane, and admits of their horizontal adjustment and vertical vibration. This construction is new with me, so far as I am aware, and works well; but the same results are accomplished by the arrangements shown in Figs. 10 and 11, by which the gangs are also kept from spreading apart. The same results may also be accomplished in other ways.

In Fig. 11 the gang-shafts L are hollow, and are formed with a shoulder or flange at the inner end, between which and the clamp-nuts *l*, on the outer ends of the shafts, the disks and thimbles are clamped. Buffers M, with convex abutting-faces, are also secured on the inner ends of the gang-shafts, between the inner disks and the flanges or shoulders L′, above mentioned. The abutting convex surfaces of the buffers M permit the inner ends of the gang-shafts to roll upon each other. When desired, however, to prevent their separation under any circumstantes, I employ bolts N, which pass entirely through the hollow gang-shafts, and are provided with clamp-nuts *n* at their outer ends. The inner ends of these bolts are formed with eyes N′, which interlock, so that when the bolts are passed through the gang-shafts, as shown in Fig. 11, and the nuts *n* screwed up the gangs will be united by a strong swivel-connection, which leaves them free to roll upon each other, as above described. The buffers M are socketed or cut out, as clearly indicated in Fig. 11, for the accommodation of the eyes N′. This is the structure which I prefer to use, and it allows the gangs to revolve independently or turn in opposite directions, as the hollow axle is designed to revolve without revolving the bolt passing through it. The axle need not be hollow its entire length. In Fig. 10, however, I have shown an arrangement substantially the same in principle, which is preferably employed when some other means of preventing the separation of the inner ends of the gang-shafts is adopted—as, for instance, in the present case, where a chain which connects the inner ends

of the weight-boxes is employed, as is hereinafter described.

In the arrangement shown in Fig. 10 the structure is substantially the same as in Fig. 11, except that the bolts N extend only part way into the hollow gang-shafts L, so that should the ends of the gangs separate the bolts will slide in the hollow shafts and permit the movement. The buffers on the ends of the gangs are, however, prevented by the bolts from slipping past each other, and the inner ends of the gangs are thus maintained in substantially the same horizontal plane. Of course the arrangement shown in this figure may be used with or without other means for preventing the endwise movement of the gangs, as it is obvious that the bolts N could be of such length as to render their entire withdrawal from the hollow shaft impossible, and they would still tend to maintain the gang-shafts in the same horizontal plane. It is obvious that the end-thrust of the gangs tends to cause the buffers to abut against each other.

A construction in which the inner ends of the gangs make contact in some manner and the adjusting-bars diverge from their point of connection on the pole is desirable, for the reason that there is no liability of sod and rubbish being dragged by the bars and dropped in front of the adjacent edges of the inner disks, as is the case where a single bar is arranged beneath the pole. The space between the inner disks is therefore less liable to become clogged with rubbish, and they can make a clean smooth cut.

In Figs. 1 and 3, and in dotted lines in Figs. 2 and 4, I have indicated weight-boxes for insuring the uniform cut of the disks, as is well understood. These boxes are mounted upon standards O, which are preferably cast in one piece with the upper sections of the journal-boxes D E, though they may be made separate and bolted to the said boxes, if desired. Partitions may divide the space in the boxes and the weight therein be apportioned as desired. The weight-boxes also, of course, constitute gang frames or beams.

I prefer to employ a brace-link, P, which extends from the under side of each weight box or beam to the end of the cross-beam, and is secured by the bolt *a*. This link supplements the bifurcated connection F, and serves to maintain the weight-box in a vertical position. It is not, however, an essential element, though a desirable one.

The inner ends of the weight-boxes are connected by a chain, Q, which prevents the separation of the gangs, as before referred to. This chain is preferably connected with cams *q* on the ends of the weight-boxes. The purpose of this arrangement is that in the horizontal adjustment of the gangs the chain will be wound or unwound on the edges of the cams, so that it is kept substantially at the same tension all the time. The cams, however, are not necessary for this purpose, though they are desirable. The chain may be removably secured on the cams so as to be adjusted. The buffers striking against each other, and the chain being maintained under a suitable tension, the inner ends of the gangs will be prevented from rising by the strain of the chain, while they will be free to fall as the chain will be slackened by that movement. The chain also prevents the gangs from spreading apart when the machine is backed; but other means may be employed for this purpose, and the chain may be removed, in which case the inner ends of the gangs can rise, and then they will be flexible in both up and down movements to conform to unevenness of surface.

It is obvious that so far as some of the features of my invention are concerned, others may be dispensed with. While I describe the details of construction preferred by me, it is obvious that they may be varied without departing from the invention, which contemplates, broadly, such organization as shall render any other equivalent mechanism capable of operating substantially as the elements hereinbefore described.

I claim as my invention—

1. The combination of a main frame composed of a pole and a rigid cross-bar, disk-gangs, draft-connections between the main frame and disk-gangs, and adjusting-bars for varying the angle of the gangs relatively to the cross-bar and connected with the gangs outside of the draft-connections.

2. The combination of a pole, a rigid cross-bar, disk-gangs connected with the cross-bar by draft-connections, an adjusting-lever on the pole, and connections between the lever and the disk-gangs at points outside of the connections between the gangs and the cross-bar, for varying the angle of the disks relatively to the cross-bar.

3. The combination, substantially as set forth, of the frame composed of a pole and rigid cross-bar, the disk-gangs, the draft-connections between the disk-gangs and cross-bar, the adjusting-bars connected with the disk-gangs outside of the draft-connections of the gangs, and connections between the frame and the adjusting-bars.

4. The combination of a pole, a rigid cross-bar, two disk-gangs, the draft-bars between the disk-gangs and the cross-bar, and the adjusting-bars for varying the angle of the gangs connected with the gangs outside of the draft-connections, and arranged parallel with the draft-bars.

5. The combination of a frame consisting of a pole and cross-bar, disk-gangs angularly adjustable independently of the frame, draft-connections between the frame and disk-gangs, and adjusting devices for varying the angle of the gangs, applied to the gangs outside of the draft-connections.

6. The combination of a pole, a cross-bar, bifurcated braces connecting the pole and cross-bar, disk-gangs and bifurcated draft-bars which pivotally embrace the upper and

lower sides of the cross-bar, and which are pivoted by a vertical pivot directly to the gang or journal frame.

7. The combination of a pole and cross-bar, disk-gangs, bifurcated draft-connections each consisting of two bars substantially parallel with each other, which connect each disk-gang and the cross-bar, and are hinged to the gang, and mechanism for adjusting the angle of the gangs.

8. The combination of a pole, a cross-bar, adjustable disk-gangs, and bifurcated draft-arms which connect the cross-bar and disk-gangs, and are adapted to permit the gangs to be horizontally adjusted on pivot-bolts connecting the draft-arms to the gang or journal-frame, and also adapted to permit the vibration of the ends of the gangs through the motion of the draft-arms on their pivot-bolts at the cross-bar.

9. The combination, substantially as set forth, of the frame, a disk-gang, a horizontal slotted boxing on the gang, and a draft-bar, *f*, in the slot, and another or under draft-bar attached to the under side of the boxing.

10. The combination of the frame, a disk-gang, a horizontally-slotted boxing on the gang, and a bifurcated draft-bar consisting of bars *f f'*, which embrace the upper and lower sides of the boxing and frame.

11. The combination of a main frame, disk-gangs hinged thereto, and a chain or other flexible connection connecting the gangs, and arranged above their inner ends, and adapted to act as a stop to prevent the inner ends of the gangs from rising.

12. The combination of a main frame, disk-gangs hinged thereto, and a flexible connection without incasing boxing, arranged between the inner ends of the gangs.

13. The combination of the pole, a rigid cross-beam, vibratory disk-gangs, the draft-connections between the cross-beam and disk-gangs, and the connections between the pole or frame and the disk-gangs outside of the draft-connections, said latter outside connections being free to rise and fall with the vibrations of the gangs, and adapted to push and pull to adjust the angle of the gangs.

14. The combination of a frame consisting of a pole, a rigid cross-bar, disk-gangs, draft-links between the cross-bar and disk-gangs, and the adjusting-connections between the frame and disk-gangs, outside of the draft-links, both the inner links and outer connections being adapted to follow the horizontal movement of the gangs in their adjustment.

15. The combination of the disk-gangs and mechanism (without a casing or box) adapted to cause the inner ends of the gangs to run toward a common center.

16. The combination of the main frame and disk-gangs with eyebolts or equivalent devices, which connect the inner ends of the gangs.

17. The combination of the hollow gang-shafts, the eyebolts which interlock at the inner ends of the shafts and extend through the hollow gang-shafts, and securing devices on the ends of said bolts.

18. The combination of the hollow gang-shafts, the interlocking securing-bolts which extend through the shafts, and the recessed buffers on the inner ends of the gang-shafts.

19. The combination of the main frame, disk-gangs, draft-connections embracing the top and bottom of the main frame and gang or journal frame, a vertical pivot at each end of said connections, from which the gangs derive both vertical vibration and horizontal adjustment, and mechanism for varying the angle of the gangs.

20. The combination of a main frame, angularly-adjustable disk-gangs, and mechanism without a boxing independent of the gang-shafts, adapted to receive their end-thrust, and also to prevent their inner ends from slipping past each other.

21. The combination of a main frame, disk-gangs mounted on hollow shafts, and devices entering the hollow of said shafts and adapted to maintain the inner ends of the gangs on substantially the same horizontal plane.

22. The combination of a main frame, disk-gangs hinged thereto and mounted on recessed shafts, and devices entering the recess of said shafts and adapted to prevent lateral movement of the gangs relatively to each other.

23. The combination of a main frame, disk-gangs hinged thereto, a chain or other flexible connection arranged above the inner ends of the gangs, and abutting devices attached to each gang below the chain and adapted to act as a fulcrum against the tension of the chain, to prevent the inner ends of the gangs from rising.

24. The combination of a pole, vibrating disk-gangs which make contact at their inner ends, adjusting mechanism on the pole, and adjusting-bars which diverge from their connection on the pole to their connections on the gangs, and are free to vibrate vertically at their rear ends to allow the inner ends of the gangs to vibrate above or below a level position.

In testimony whereof I have hereunto subscribed my name.

CHARLES LA DOW.

Witnesses:
WM. P. RUDD,
B. I. STANTON.