

No. 612,214.

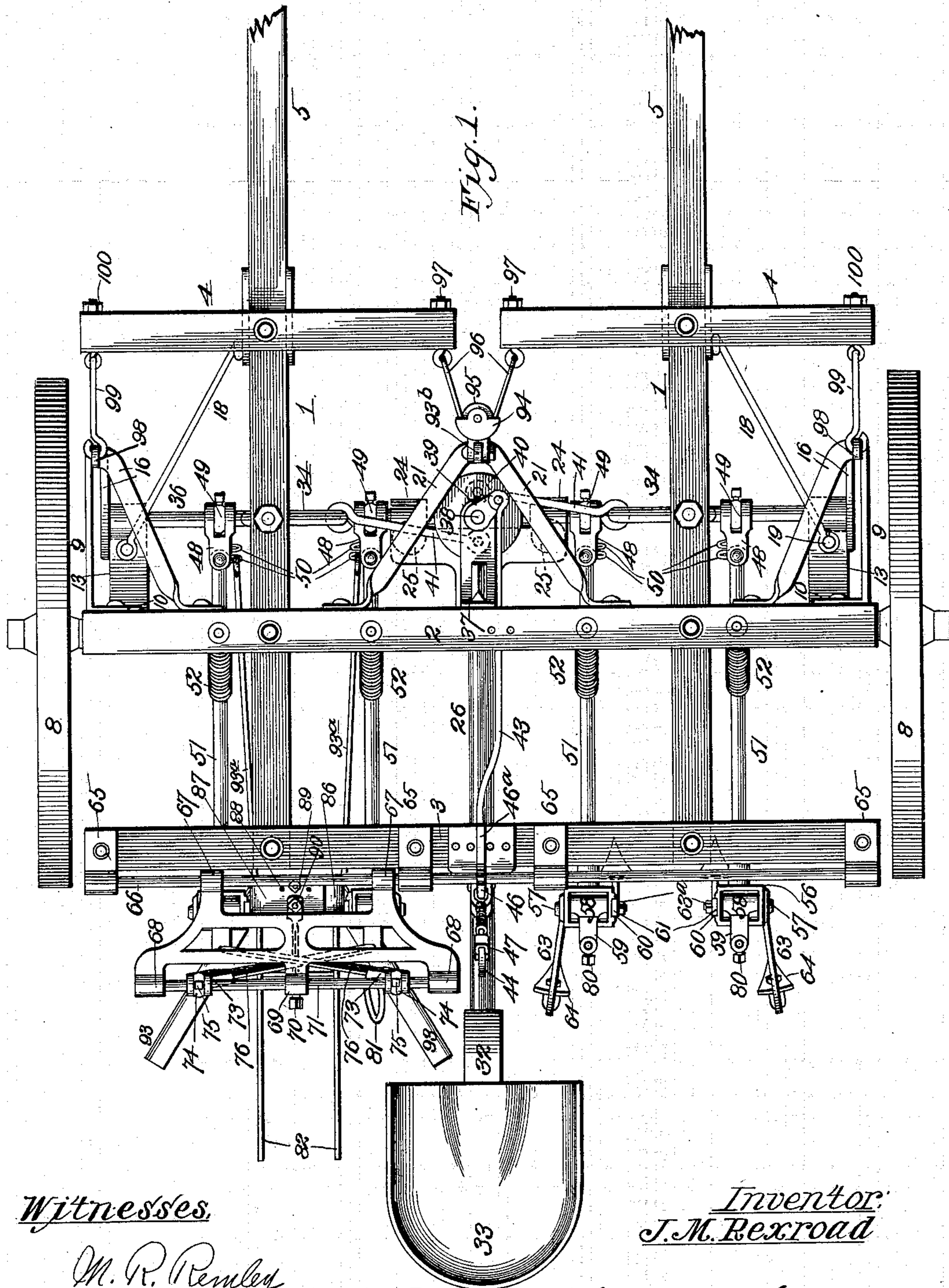
Patented Oct. 11, 1898.

J. M. REXROAD.
STRADDLE ROW CULTIVATOR.

(Application filed July 30, 1897.)

(No Model.)

4 Sheets—Sheet 1.



Witnesses.

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4 Sheets—Sheet 2.

Fig. 2.

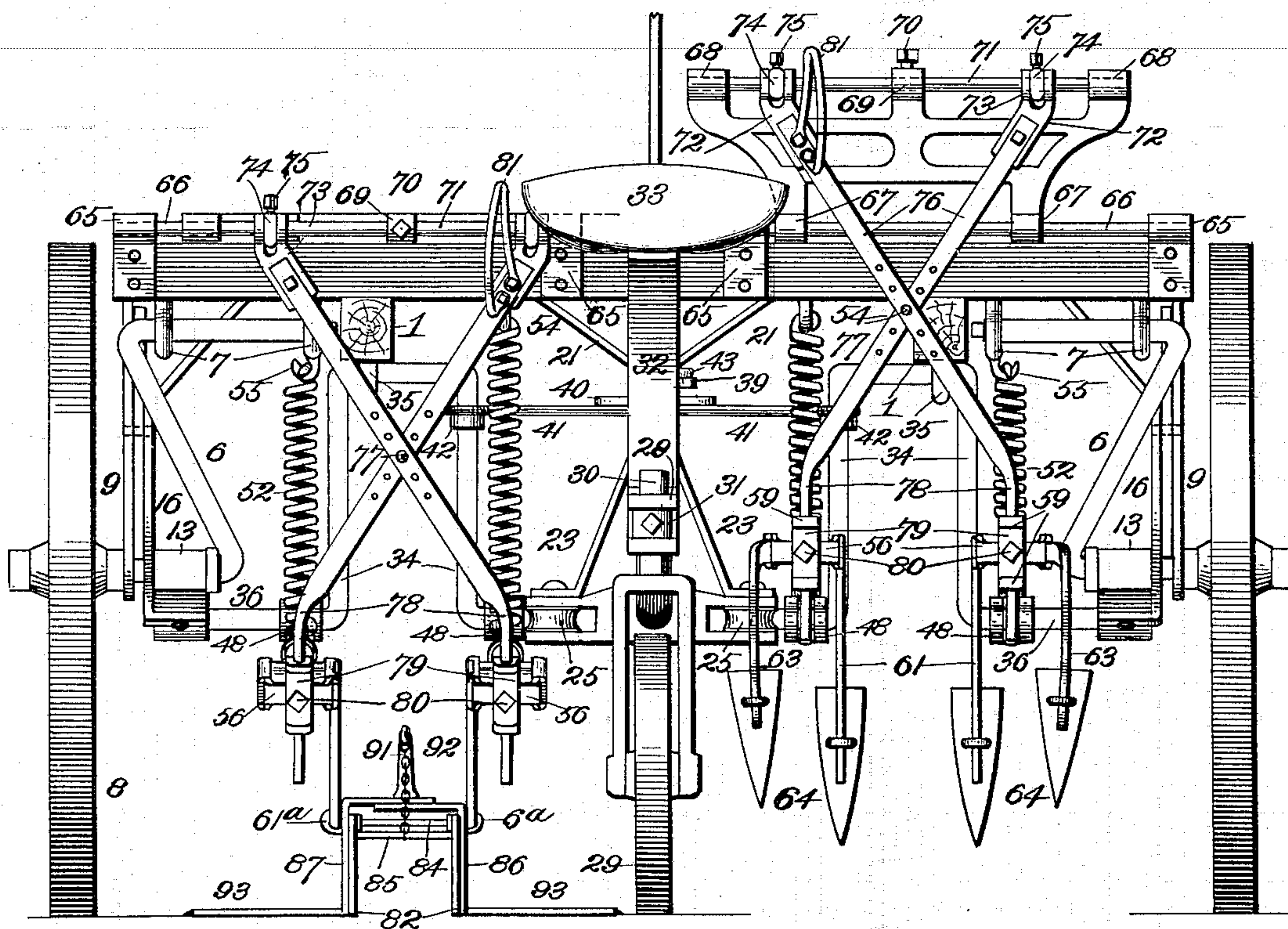
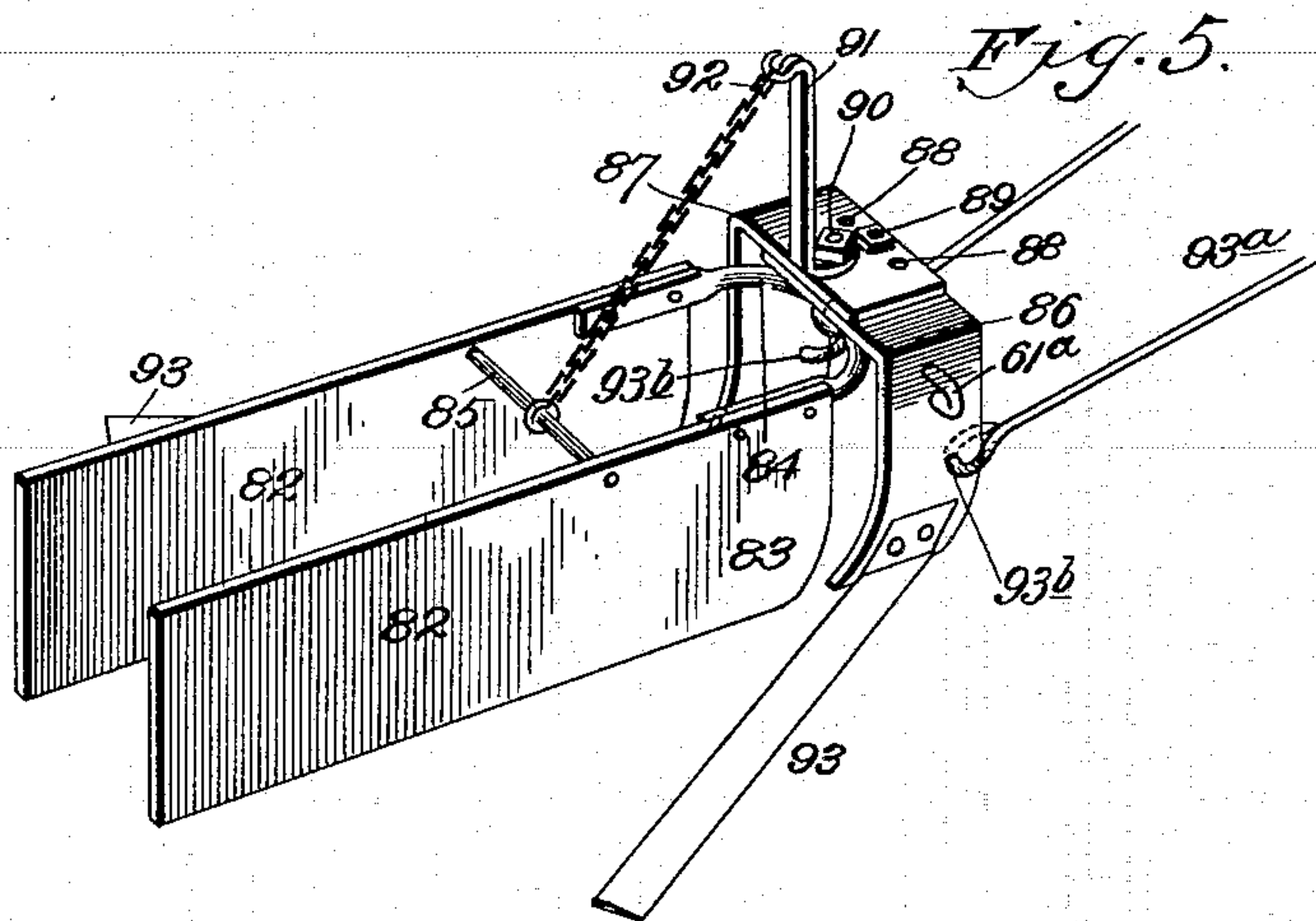


Fig. 5.



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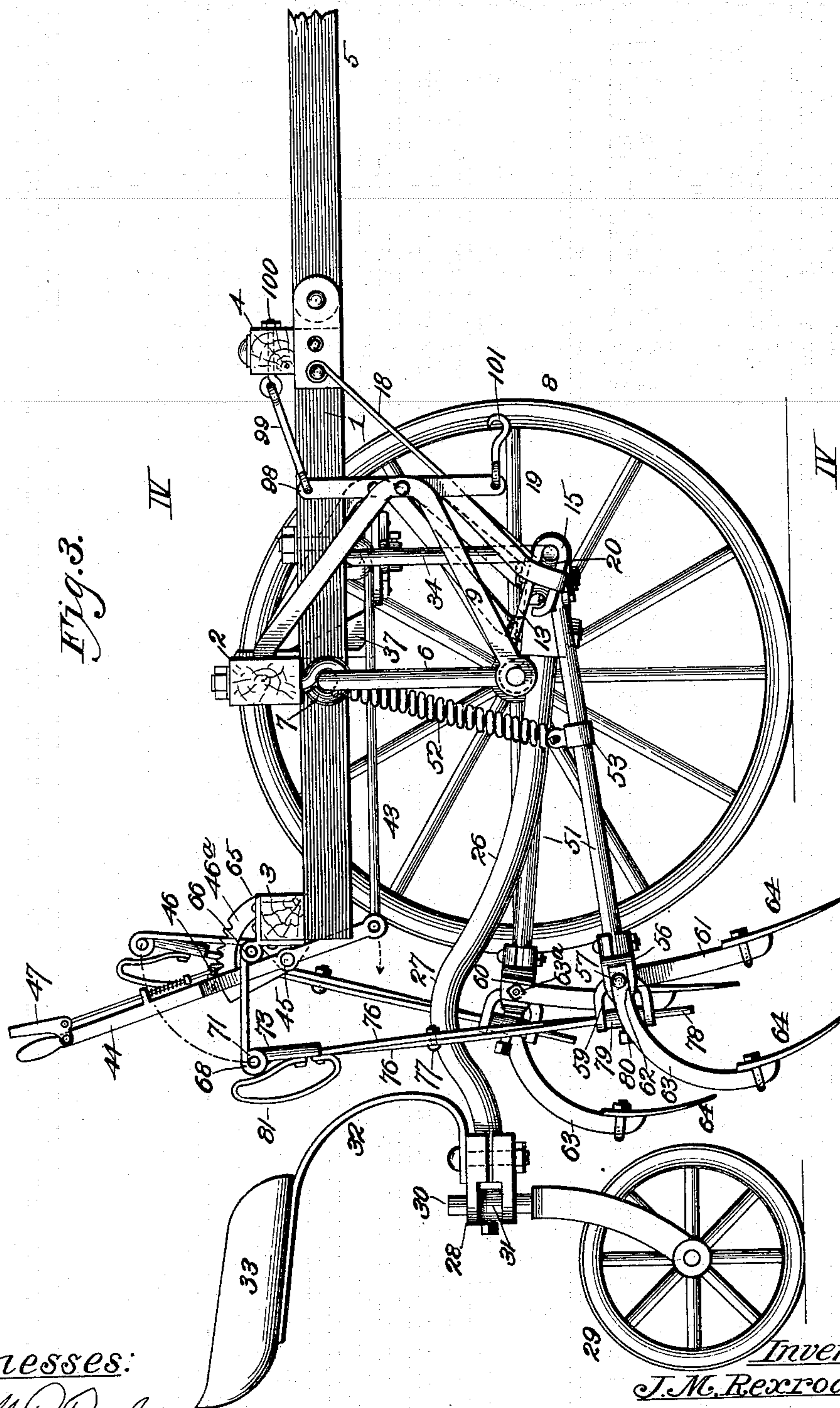
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4 Sheets—Sheet 3.



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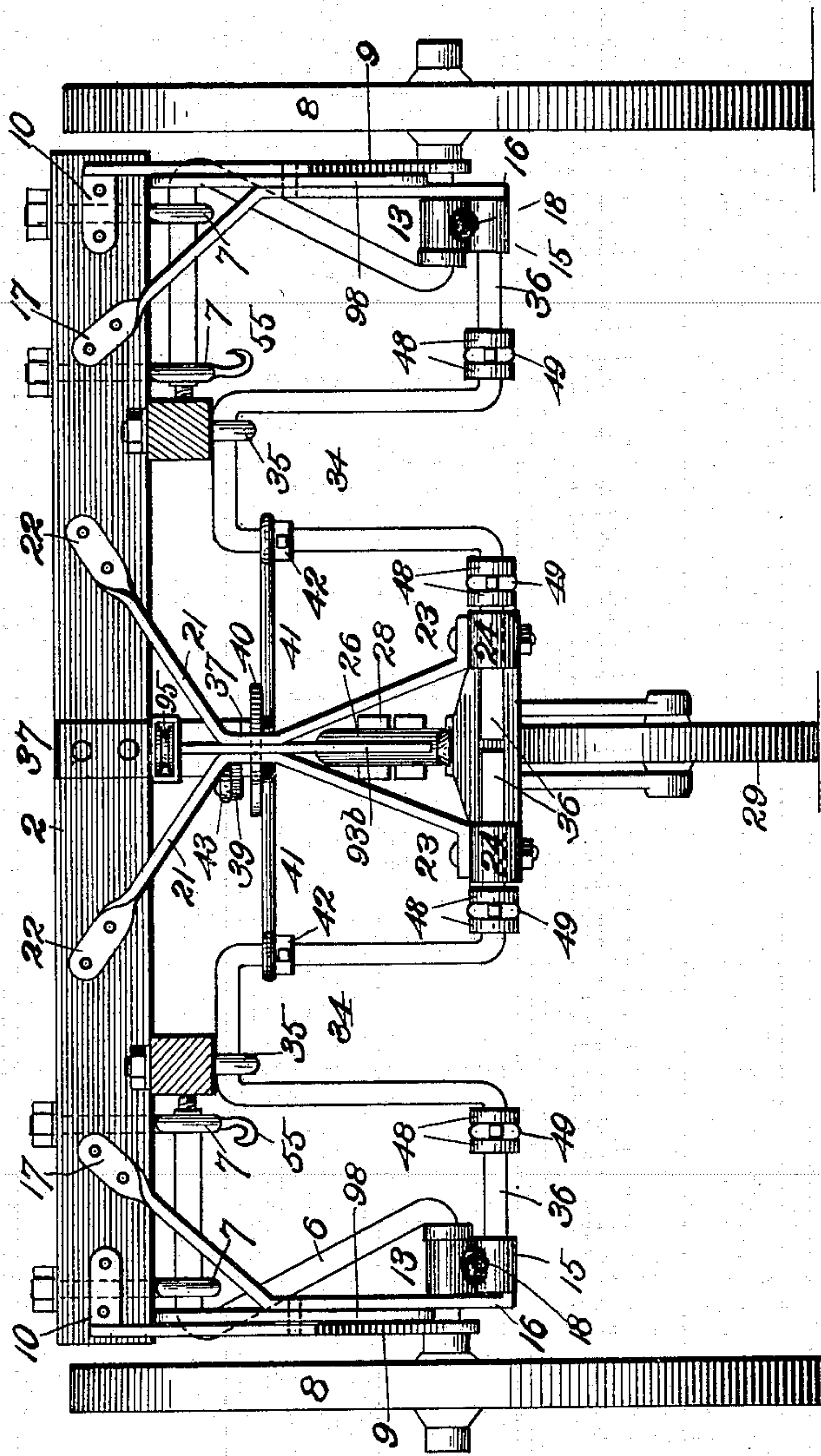
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4 Sheets—Sheet 4.

Fig. 4.



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UNITED STATES PATENT OFFICE.

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WALTER C. PIERCE, OF BOOTH, KANSAS.

STRADDLE-ROW CULTIVATOR.

SPECIFICATION forming part of Letters Patent No. 612,214, dated October 11, 1898.

Application filed July 30, 1897. Serial No. 646,560. (No model.)

To all whom it may concern.

Be it known that I, JAMES M. REXROAD, of Partridge, Reno county, Kansas, have invented certain new and useful Improvements in Straddle-Row Cultivators, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part thereof.

My invention relates to straddle-row cultivators, and more particularly to machines of this class for cultivating two rows at a time.

The object of the invention is to generally improve this class of machines.

The invention consists in certain novel and peculiar features of construction and combinations of parts, which will be hereinafter described and claimed.

In order that the invention may be fully understood, I will proceed to describe it with reference to the accompanying drawings, in which—

Figure 1 represents a plan view of a straddle-row cultivator embodying my invention. Fig. 2 represents a rear view of the same. Fig. 3 represents a side view of the same with the rear wheel omitted. Fig. 4 represents a cross-section taken on the line IV IV of Fig. 3. Fig. 5 represents a detail perspective view of the fender or shield used in cultivating listed corn.

Similar reference-numerals represent corresponding parts in all of the figures.

A horizontal frame, of wood or metal, comprises the parallel longitudinal timbers 1 1; the cross-beam 2, bolted upon and connecting the same, and a cross-beam 3, arranged parallel with the beam 2 and bolted to the rear ends of and upon the timbers 1, said beam 3 being of somewhat greater length than the beam 2 and both projecting some distance beyond said timbers. Pivotaly bolted upon the front ends of the timbers 1 are a pair of bars 4, which extend substantially parallel with the beams 2 and 3 and form a part of an evener for equalizing the pull of the draft-animals.

5 5 designate tongues which are pivoted to operate in a vertical plane between plates secured to and projecting from the front ends of the timbers 1 of the horizontal frame above described.

6 6 designate a pair of Z-shaped axles. Their upper horizontal arms are journaled in eye or U bolts 7, depending from the cross-beam 2 outward of the timbers 1, while their lower horizontal arms form journals for the carrying-wheels 8. These axles are preferably Z-shaped, but not necessarily so. It is desirable, however, that the axle be provided with two horizontal portions, so that their positions may be reversed after their wheel-supporting arms have been worn to such an extent as to render their breakage liable at any moment. This, of course, will practically double the life of the axle, as the upper arms are not subjected to any appreciable wear. Said axle-sections are maintained in their proper relative positions by means of braces 9. These braces are of approximately V form and are secured at their upper ends, as at 10, to the cross-beam 2. At their opposite ends they are provided with openings through which the lower horizontal portions of the axles extend. As an additional means for bracing and securing said axles in their proper positions and also for providing supports for parts to be hereinafter described, I employ the brackets 13, which are mounted at their rear ends upon the lower horizontal portions of the axles inward of the braces 9. They are supported in turn in the position shown by means of the braces 16, which are bolted to the under side of said loops, and are secured at their upper ends to the cross-beam 2. Said braces 16 in side view are approximately V-shaped and from their apex downward occupy a vertical plane. The apex portion of each of said braces is just inward of and parallel with the apex portion of the braces 9, while the upper arms preferably diverge with respect to the upper arms of the braces 9, as shown clearly in Figs. 1 and 4. The brackets 13, and incidentally the axles, are additionally braced by the rods 18, which are secured at their upper ends to the front ends of the timbers 1 or plates secured thereto, and at their lower ends to the upper sides of the brackets 13, preferably by the same bolts which connect the braces 16 with said brackets. These bolts are numbered 19 and also form journals for the grooved rollers 20, arranged in elongated loops 15 of said brack-

ets, for a purpose which will hereinafter appear.

21 21 designate a pair of braces approximately V-shaped in side view. They are arranged centrally between the braces 16 and are bent relatively so as to dispose their apices vertically and parallel with each other, their upper arms divergently with respect to each other, and bolted to the front side of the cross-beam 2 at their upper ends and their lower arms divergent with respect to each other and bolted, as at 23, to a casting. This casting occupies the same horizontal plane about as the rollers of the brackets 13, and is formed with forwardly-projecting loops or slotted arms 24, in which are journaled the antifriction-rollers 25, said rollers being of the same construction as the rollers 20. Said casting is bolted or otherwise rigidly secured upon the front end of the longitudinal beam 26, which near its rear end is preferably arched upwardly, as shown at 27, for a purpose to be hereinafter explained. Clamped upon the rear end of said beam is a bracket 28.

29 designates a caster-wheel which is arranged to travel centrally between the carrying-wheels 8. It is journaled in the customary caster-stand, provided with a cylindrical stem 30, journaled in said brackets 28, and secured at the desired point of vertical adjustment by means of the collar 31 and the set-screws carried thereby in the customary manner. This caster-wheel forms a trailing support for the rear end of the machine, and thereby relieves the draft-animals from sustaining its weight on their necks. They support the tongue only.

32 designates a spring-standard which is bolted to the upper side of the bracket 28 and at its upper end carries the seat 33.

34 designates a pair of inverted-U-shaped frames which are slidably mounted at their upper ends in the depending U-bolts 35 of the timbers 1, and they are arranged in the same vertical plane as the front ends of the loops 15 and 24 in order that their laterally-projecting arms 36 may fit snugly in or project through said loops, their lateral adjustment relative thereto being made easy and facilitated by the antifriction-rollers 20 and 25.

37 designates an angle-bracket which is bolted at its upper end to the middle and front side of the cross-beam 2. Journaled vertically in the horizontal arm of said bracket and in the vertical plane of the U-shaped sliding frames 34 is a short shaft 38, and mounted rigidly upon the upper and lower ends, respectively, of said shaft are arms 39 and 40, the latter being in the form, preferably, of a disk or circular plate. The said arm or disk 40 is pivotally connected at diametrically opposite points by links 41 with the U-shaped frames 34, and said links are maintained in a horizontal plane, preferably, by means of collars 42. When said frames are occupying their innermost points of adjustment, as shown most clearly in Fig. 4,

the points of connection of the links 41 with the arm or disk 40 are in the same longitudinal plane, one being in advance and the other rearward of the axis of said plate. When said frames attain their outermost limits of adjustment, said points of connection have moved a distance of ninety degrees and are in transverse alinement, as will be understood. When the frames occupy their innermost positions, as shown, the arm 39 projects forward at an inclination of about forty-five degrees, as shown, and when they occupy their outermost limit of adjustment said arm projects rearwardly at an angle of ninety degrees to the position illustrated. This movement of said arm and the adjustments, above referred to, of the frames are accomplished by means of a lever and a longitudinally-arranged link-rod 43.

The lever 44 is mounted pivotally, as at 45, upon a bracket secured to the rear cross-beam at its middle, and is provided with a spring-actuated dog 46, of the customary construction, which engages a notch of the sector 46^a, which preferably is formed integral with the bracket to which the lever is pivoted. Said lever is provided with the usual pivoted grip 47, by which said dog may be retracted when it is desired to operate the lever.

A bracket is secured adjustably upon each laterally-projecting arm of the U-shaped frames 34, and said brackets at their rear ends are bifurcated horizontally and at their front ends are bifurcated vertically. The vertically-bifurcated portion is mounted loosely upon the said laterally-projecting arms 36 of the frames, which are circular in cross-section and embrace the opposite sides of the collars 49, secured by set-screws at any desired point of adjustment. Said brackets are provided at their rear ends and inner sides, with respect to their respective frames 34, with eyes 50, for a purpose which will be hereinafter explained.

51 designates cultivator-beams which are preferably tubular and are pivotally mounted at their front ends in the rear bifurcated ends of the brackets 48.

52 designates retractile springs which are attached at their lower ends to collars 53, mounted upon the cultivator-beams, and at their upper ends, preferably, to the axle-arches. For convenience of illustration two of them are shown as connected to the eyebolts 54, depending from the cross-beam 2, while the others are connected to hooks 55, formed, preferably, at the lower ends of the innermost eyebolts 7, in which the axles are mounted. The function of these springs will be hereinafter referred to.

56 designates rectangular brackets which are clamped or otherwise suitably secured to the rear ends of the cultivator-beams, and horizontally-arranged bolts which extend through said longitudinal brackets. Bifurcated brackets are swiveled upon said bolts so as to swing in a vertical plane and com-

prise the sleeves 58, mounted upon said bolts, and the arms 59, which project rearly therefrom above and below the bracket 56. The inner and opposing sides of each companion pair of brackets 56 are formed with vertical grooves 60, in which fit snugly the upper ends of the cultivator-shanks 61, said shanks being mounted upon the bolts 57. By this arrangement it is obvious that one bolt is sufficient to clamp said shanks firmly and reliably in position. The outer sides of said brackets are provided with horizontal grooves 62, in which fit snugly the upper and front ends of the curved cultivator-shanks 63, said shanks being also mounted upon the bolts 57 and clamped reliably in position by means of the nuts 63^a, engaging the threaded ends of said bolts 57.

The cultivating appliances or shovels 64, of the customary or any preferred construction, are clamped upon the shanks 61 and 63 in the customary manner.

65 designates a number of bearing-brackets which are bolted to and project rearwardly from the beam 3, and mounted in said brackets is a guide or supporting rod 66. A hanger or bracket of skeleton form is pivotally mounted, as at 67, at opposite sides of the lever 44 upon the rod 66, so that it may slide thereon when necessary. Said hangers or brackets increase in width at their free or outer ends, that by their greater width they may allow more space in which to laterally adjust the cultivating appliances, and they are connected to said appliances at their outer ends by means of X-frames, as hereinafter explained, having an adjustable connection by means of hooks at their upper ends to the said frames, or such connection may be accomplished by the means illustrated. In this case at their outer corners they are formed with bearings 68 and central bearings 69, and set-screws 70, carried by the bearings 69, impinge upon the rotatable rods 71, mounted in said bearings. Two sets of angular brackets 72 are bifurcated at one end, and said bifurcated ends are pivoted upon the rods 71, being located at opposite sides of the central bearings 69 and so disposed that their body portions converge with respect to each other and may be secured at any desired point of adjustment by means of the collars 74, embraced by the bifurcated ends, and secured upon the rods by set-screws 75. Each X-frame, hereinbefore referred to, comprises a pair of intersecting bars 76, having longitudinal series of perforations and united by a bolt 77, which extends through registering perforations near or at their middle, and said bars are bolted or otherwise secured at their upper ends to the brackets 72 and terminate at their lower ends in approximately vertical cylindrical stems 78, which extend downward through the bifurcated arm 59, projecting from the sleeves 58, swiveled to the brackets 56. Collars or sleeves 79, arranged within the bifurcated arms 59, are mounted upon said

stems 78 and are secured at the required point by means of set-screws 80, which impinge upon said stems. By this arrangement it is obvious that a swivel connection is made between the cultivator-beams 51 and the X-shaped frame, which in turn forms a link between said swivel connection and the pivoted hanger or bracket mounted upon the transverse guide and supporting-rod 66. This connection, furthermore, forms a support which will maintain the companion cultivator-beams and appliances in substantially a single horizontal plane at all times, but which at the same time permits of their independent vertical adjustment or of their synchronous lateral adjustment to accommodate the lateral movement of the sliding frames 34 when it is desired to cultivate rows of varying widths. It also affords means for adjusting the cultivator-shovels to various distances from the row. It furthermore provides a convenient and practical means for raising the cultivating appliances to and maintaining them in an inoperative position when desired, this being accomplished by grasping the handles 81, secured to the X-shaped frames or brackets, as shown, or in any other suitable or preferred manner. These handles, of course, may be of greater length in order to afford the operator an increased leverage, so that he may easily raise the cultivating appliances from their operative positions under any and all circumstances.

When the cultivating appliances are in their operative position, the hangers or brackets occupy a substantially horizontal plane, as shown at the left side of Figs. 1 and 2 and at the right-hand side of Fig. 3, and as long as they are in such position the weight of the various appliances is sufficient to counteract the upward stress of the springs 52 and hold them down in the ground when the machine is at rest. Their weight, however, is not sufficient to do more than this—that is, not sufficient to hold them down when the draft-animals are in motion, it being necessary in this case for the operator, by placing his foot upon the inner or adjacent members of each companion pair of appliances, to hold them down to their work. This pressure upon the inner members, owing to the rigidity of the structure which binds each pair together, also serves to maintain them in the same horizontal plane that they may plow to the same depth.

In case there is a "spring" or "give" to the brackets or hangers, which might permit the inner cultivating appliances of each pair to plow more deeply than the outer ones, I have provided for their vertical adjustment through the medium of the collars or sleeves 79. By means of these the outer members can be adjusted downward to compensate for more direct pressure upon the inner members, so that both shall plow to the same depth.

The springs of course are of a type to be ten-

sioned, more or less, accordingly as circumstances direct. For instance, when it is desirable to relieve the operator of the necessity of continually pressing the cultivator appliances toward the ground the tension is taken off the springs to permit the appliances by their own weight to maintain their working position.

By means of the series of holes in the bar 76 it is obvious that the members of each pair of cultivating appliances can be brought nearer together or moved farther apart, so as to accommodate plants of different growth. When the hangers or brackets are swung from their horizontal or operative to their vertical or inoperative positions, as shown at the right-hand side of Fig. 2 and the left-hand side of Fig. 3, the cultivating appliances are raised clear of the ground and are maintained in such position without further attention on the part of the driver, owing to the fact that the heft of the various appliances and connections is about in the same plane as that occupied by the bracket. The springs 52, furthermore, serve to make positive and reliable their maintenance of this position, and, in fact, are sufficiently strong, after the bracket has been moved almost to its vertical position, to continue such movement, and thereby relieve the operator of any more exertion than just enough to overcome the counterbalancing weight of the various appliances and connections.

When it is desired to shift the cultivating appliances either inward or outward, so as to accommodate either wider or narrower rows, the driver simply grasps the lever 44, retracts dog 46, and swings the lever forward or rearward, as the case may be, and consequently, through the medium of the arm or disk 40 and links 41, moves the frames 34 farther apart or brings them nearer together, the front ends of the cultivator-beams of course partaking of this movement. He then grasps the hangers or brackets by means of the handles 81 and slides said bracket outwardly or inwardly upon the guide and supporting rod 66.

It will be noted that the rear end of this cultivator is supported entirely and kept from tilting by means of the caster 29, and it is to be understood, of course, that any equivalent for the same may be used, if desired. Either the wheel or its equivalent may be employed, as it serves to keep the guide and supporting rod 66 of the cultivating appliances substantially the same distance from the ground at all times, insuring a reliable support for the rear end of the cultivating appliances. The arching of the beam 26, supported at its rear end by said caster and incidentally preventing the machine from tilting backward, is to accommodate the upward movement of either of the inner members of the cultivating appliances which may happen to be under it when the machine is turning or working.

When desiring to use the cultivator as a

listers-cultivator, the inner shovels are removed, and secured to the cultivator-shanks 61, in place thereof, is a sled cultivator attachment constructed as follows:

82 82 designate parallel plates which form the runners of the sled and are adapted to slide upon the ground at opposite sides of the plants in the customary manner, being rounded, as usual, at their front ends, as shown at 83, to facilitate such movement. They are connected at their upper front corners by the semicircular bar 84 and rearward of the same are connected by the tie-rod 85.

The construction thus far described constitutes the sled proper, and connected to it in a manner to be presently described are right-angle brackets 86 and 87, having their horizontal arms overlapping. Near their front edges said arms are provided with a series of apertures 88, and extending through registering apertures of said arms is a bolt 89. A second bolt 90 extends through registering apertures in said arms just inward of the bolt 89 and constitutes the pivot upon which said brackets swing when it is desired to set them at an angle to each other for a purpose which will be presently explained. The head of said bolt 90 is in the form of an eye, through which the semicircular bar 84 of the sled extends. Said bolt also extends through the foot portion of a standard 91, clamped upon the upper side of said brackets, and adapted to engage the hook-shaped terminal of said standard is a chain 92, secured at its lower end to the middle of the tie-rod 85 of the sled.

If it be desired to vary the angle of the knives—that is, to cause them to diverge more or less—it is only necessary to remove the bolt 89, pivotally operate the brackets 86 and 87 upon the bolt 90 until a different pair of holes 88 register, and then clamp them in their new position by securing the bolt in the newly-aligned apertures in the customary manner—viz., by means of a clamping-nut. The divergence of the knives is regulated accordingly as there are many or few roots to cut. It will be noted that this adjustment of the knives relative to each other and relative to the ground may be accomplished without varying the positions of the runners of the sled, which must be kept parallel, or approximately so, to protect the plants, and are therefore connected together.

As the knives get dull it is desirable to tilt the bracket to cause them to cut more deeply, and this is done, as hereinafter explained, without tilting the sled to any appreciable extent, at least so as to prevent too much dirt backing up against the plants.

The angle-brackets 86 and 87 are provided with the laterally-projecting loops 61^a as a convenient means of hinging to the lower ends of the cultivator-shanks 61 or shanks of substantially the same construction employed in lieu thereof, and the pulling strain is removed from said shanks in large measure by

means of the draw-bars 93^a, which are each hooked in holes in the lower ends of the brackets 86 and 87 (see Fig. 5) at their rear ends and at their front ends adjustably to the eyes or loops 50, projecting from the rear ends of the brackets 48, as shown in Fig. 1. These draw-bars secure the points of greatest resistance—viz., the lower parts of plates 86 and 87—to the front ends of the cultivator-beams, and thereby prevent said plates from hinging backward or forward on the supporting loop or hinge 61^a, and owing to the fact that the draw-bars are hooked to the plates through the holes 93^b below the said loops or hinges the sled attachment is enabled to remain at all times parallel to the row of corn irrespective of the fact that the cultivator leans or not. Said draw-bars also serve the purpose of runners, or rather the front and beveled ends of runners, by being attached as low down on the plates as practicable, thereby guiding trash, &c., under the sled instead of interfering with its progress. Furthermore, by longitudinally adjusting the front end of the draw-bars the pitch of the knives can be varied.

Referring now to the evener construction, 93^b designates the rock-lever, which is pivotally mounted between the apices of the braces 21, and 94 a pulley-block casting pivoted to the upper end of said lever, the pulley 95 being horizontally arranged therein and engaged by the chain or cable 96, attached at its front ends to the adjacent ends of the eveners 4 through the medium of the eyebolts 37 or their equivalents. 96 designates a similar pair of levers, which are pivotally mounted between the apices of the braces 9 and 16, and said levers are pivotally connected at their upper ends by the links 99 with the eyebolts 100, secured to the outer end of said evener. At their lower ends all of said levers carry hooks 101, to each of which a draft-animal is adapted to be hitched and connected to the front end of the tongues 5 in the customary or any preferred manner. By this construction it will be seen that the pulling strain of the draft-animals is equally distributed.

From the above description it will be apparent that I have produced a straddle-row cultivator which embodies the features of advantage enumerated in the statement of invention and which is simple, strong, durable, and comparatively inexpensive of manufacture. It is to be understood, of course, that various changes may be made in the form, detail construction, and arrangement of parts without departing from the spirit and scope or sacrificing any of the advantages of the invention.

Having thus described the invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a straddle-row cultivator, the combination with cultivating appliances, of a support for each end thereof, the same comprising a rod extending substantially at right an-

gles to the line of draft, a bracket pivotally and slidingly mounted on said rod and connected to the cultivating appliances, and an elastic support for the cultivating appliances, substantially as described.

2. In a straddle-row cultivator, the combination with a wheeled framework, provided with a supporting-caster to the rear, and with cultivating appliances, of a support for the rear end thereof, the same comprising a rod extending substantially at right angles to the line of draft, a bracket pivotally and slidingly mounted on said rod and connected to the cultivating appliances, and an elastic support for the cultivating appliances, substantially as set forth.

3. In a straddle-row cultivator, the combination of cultivating appliances pivoted at their forward end so as to trail in the line of draft, and a caster, of a support for the said appliances, consisting of a rod extending substantially at right angles to the line of draft, a bracket pivotally mounted on said rod and overhanging said appliances, a frame pivotally connected to the free end of said bracket, and a coupling forming a part of the cultivating appliances, and vertically adjustable upon said frame, substantially as described.

4. In a straddle-row cultivator, the combination with a suitable wheeled framework having a supporting-caster to the rear, and a rod extending substantially at right angles to the line of draft, a bracket pivotally and slidingly mounted on said rod, and a frame pivotally connected to said bracket, of cultivator-beams pivotally mounted at their front ends to swing in a vertical plane and trail in the line of draft, a coupling between said cultivator-beams and said pivoted frame, cultivating appliances connected thereto, and means to exert an upward stress at all times upon said cultivating appliances, substantially as described.

5. In a straddle-row cultivator, the combination with a suitable wheeled framework, having a supporting-caster to the rear, and a rod extending substantially at right angles to the line of draft, a bracket pivotally and slidingly mounted on said rod, and a frame pivotally connected to said bracket, of cultivator-beams pivotally mounted at their front ends to swing in a vertical plane and trail in the line of draft, a coupling between said cultivator-beams and said pivoted frame and vertically adjustable upon the latter, cultivating appliances connected thereto, and means to exert an upward stress at all times upon said cultivating appliances, substantially as described.

6. In a straddle-row cultivator, the combination with two sets of cultivating appliances, for working at both sides of a row, said cultivating appliances being pivoted at their forward ends so as to trail in the line of draft, of a support for the rear end thereof, consisting of a rod extending substantially at right angles to the line of draft, a bracket pivot-

ally mounted upon said rod, a laterally adjustable or expansible frame pivoted to said bracket, and connected to said cultivating appliances, and means exerting an upward stress continuously upon the cultivating appliances, substantially as described.

7. In a straddle-row cultivator, the combination with a suitable wheeled framework provided with a supporting-caster to the rear and with two sets of cultivating appliances for working at both sides of the row, said cultivating appliances being pivoted at their forward ends so as to trail in the line of draft, of a support for the rear ends thereof, consisting of a rod extending at right angles to the line of draft, a bracket pivotally mounted and laterally adjustable on said rod, and laterally adjustable or expansible frame pivoted to said bracket, and having a vertically-adjustable connection with the cultivating appliances, and a spring exerting continuously an upward stress upon said cultivating appliances, substantially as described.

8. In a straddle-row cultivator, the combination with two sets of cultivating appliances for working at both sides of a row, said cultivating appliances being pivoted at their forward ends so as to trail in the line of draft, of a support for the rear end thereof, consisting of a rod extending substantially at right angles to the line of draft, a bracket pivotally mounted on said rod, a frame pivoted at its upper end to said bracket, a coupling between the cultivating appliances and said frame, and having a vertical adjustment upon the latter, and means exerting an upward stress continuously on said appliances, substantially as described.

9. In a straddle-row cultivator, the combination of a suitable framework, frames carried thereby, cultivating appliances pivotally connected at their front ends to said frames, so as to trail in the line of draft, a shaft provided with an arm or disk, tie-rods pivotally connecting the same and said frames, a lever linked to said arm or disk for operating said shaft so as to laterally adjust said frames and move the front end of the cultivating appliances nearer together or farther apart, substantially as described.

10. In a straddle-row cultivator, the combination with a suitable wheeled framework and a rod carried thereby, and extending substantially at right angles to the line of draft, of laterally-adjustable frames near the front end of the framework, cultivating appliances connected at their front ends to said frames, a laterally-adjustable support for the rear ends of the cultivating appliances, comprising a bracket pivotally and slidably mounted upon said rod, and a frame pivotally connecting said bracket with the cultivating appliances, a spring to exert continuously an upward stress upon the cultivating appliances, means to laterally adjust said sliding frames, substantially as described.

11. In a straddle-row cultivator, the combination of a suitable framework, reversible axles provided with horizontal arms secured to said framework, wheels mounted upon said axles, braces between said frame and said axles, brackets projecting forwardly from said axles, and formed with elongated loops, braces connecting said brackets and said frame, a central bracket or casting provided with elongated loops, braces connecting the same with the framework, a longitudinal beam secured at its front end to said central bracket or casting, and mounted at its rear end upon a caster, a seat mounted upon said beam, inverted-U-shaped frames slidably mounted in said frame and said brackets, means to laterally adjust said frames and lock them at any desired point, cultivating appliances connected at their front ends to said frames so as to swing laterally or vertically, springs exerting an upward stress thereon, and a laterally-adjustable support for the rear ends of the cultivating appliances, comprising a bar extending substantially at right angles to the line of draft, brackets pivotally mounted in said bar, and connections between said brackets and the cultivating appliances, substantially as described.

12. In a straddle-row cultivator, the combination of a suitable wheeled framework, laterally-adjustable frames mounted thereon, cultivating appliances having a pivotal and laterally-adjustable connection at their front ends with said frames, a spring exerting an upward stress upon said cultivating appliances, and a support for the rear ends thereof, the same consisting of a rod extending substantially at right angles to the line of draft, a bracket pivoted to and laterally adjustable upon said rod, and a laterally adjustable or expansible connection between said bracket and the cultivating appliances, substantially as described.

13. In a straddle-row cultivator, the combination with a suitable framework, of cultivating appliances connected to the framework so as to trail in the line of draft, consisting of a sled, and brackets connected thereto and having independent lateral or vertical oscillatory movement, substantially as described.

14. In a straddle-row cultivator, a lister-sled, comprising a pair of runners connected together, and a pair of brackets connected together and pivoted to the sled so as to have independent lateral or vertical oscillatory adjustment, and knives projecting divergently rearward from said brackets, substantially as described.

15. In a straddle-row cultivator, a lister attachment comprising a sled provided with a semicircular rod connecting the front ends of the sled-runners, a pair of angle-brackets secured together and connected to the sled, and provided with rearwardly-divergent

knives, and a standard, and an adjustable connection between the standard and the sled, substantially as and for the purpose described.

16. In a straddle-row cultivator, a lister-sled provided with a semicircular rod connecting the front ends of the sled-runners, a pair of angle-brackets provided with horizontal overlapping arms containing apertures, a bolt extending through a pair of registering apertures and formed with an eye at its lower end, loosely embracing said semicircular rod, a second bolt extending through a pair of registering apertures of the arms in advance of the first-named bolt, and a standard projecting upwardly from said bracket, and a flexible connection between said standard and the sled, substantially as and for the purpose described.

17. In a straddle-row cultivator, a lister-sled, and a pair of angle-brackets connected thereto having independent vertical oscillatory or lateral adjustment relative to the sled, and provided with rearwardly-diverging knives, said brackets having also a pivotal adjustment in a horizontal plane so as to vary the angle between the said knives, substantially as described.

18. In a straddle-row cultivator, the combination with the cultivator-beams provided with depending shanks, of a lister-sled, and brackets pivoted together and to said sled; said brackets being hinged to said shanks, and draw-bars attached at their front ends to the cultivator-beams and at their rear ends to said brackets below said hinge-points, substantially as described.

19. In a straddle-row cultivator, the combination with the cultivator-beams provided with depending shanks, of a lister-sled, and a pair of brackets connected together and to said sled; said brackets being hinged to said shanks, and draw-bars detachably secured at their front ends to the cultivator-beams and connected at their rear ends to the brackets below the said hinge-points, substantially as described.

20. In a straddle-row cultivator, the combination of a suitable framework, and culti-

vating appliances arranged to travel in the line of draft, with a rod extending substantially at right angles to the line of draft, a bracket pivotally mounted upon said rod, and an X-frame connecting said bracket at its free or outer end with said cultivating appliances, substantially as described.

21. In a straddle-row cultivator, the combination of a suitable framework, and cultivating appliances arranged to travel in the line of draft, with a rod extending substantially at right angles to the line of draft, a bracket pivotally mounted upon said rod, and an X-frame connecting said bracket with the cultivating appliances, and consisting of a pair of intersecting bars pivoted together and having their upper ends adjustably connected to said bracket, substantially as described.

22. In a straddle-row cultivator, the combination of a suitable framework and cultivating appliances arranged to travel in the line of draft, with a rod extending substantially at right angles to the line of draft, a bracket pivotally mounted upon said rod, an X-frame connecting the cultivating appliances with the bracket, and consisting of a pair of intersecting bars having their upper ends independently and adjustably connected to the outer or free end of said bracket, and having longitudinal series of holes, and a bolt extending through certain of said holes and clamping said bars together at their point of intersection, substantially as described.

23. In a straddle-row cultivator, the combination with cultivating appliances, of a support for the rear end thereof, the same comprising a rod extending substantially at right angles to the line of draft, and a bracket pivotally mounted on said rod and connected to the cultivating appliances, for the purpose set forth.

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

JAMES M. REXROAD.

Witnesses:

C. M. WILLIAMS,
E. F. COLLADAY.