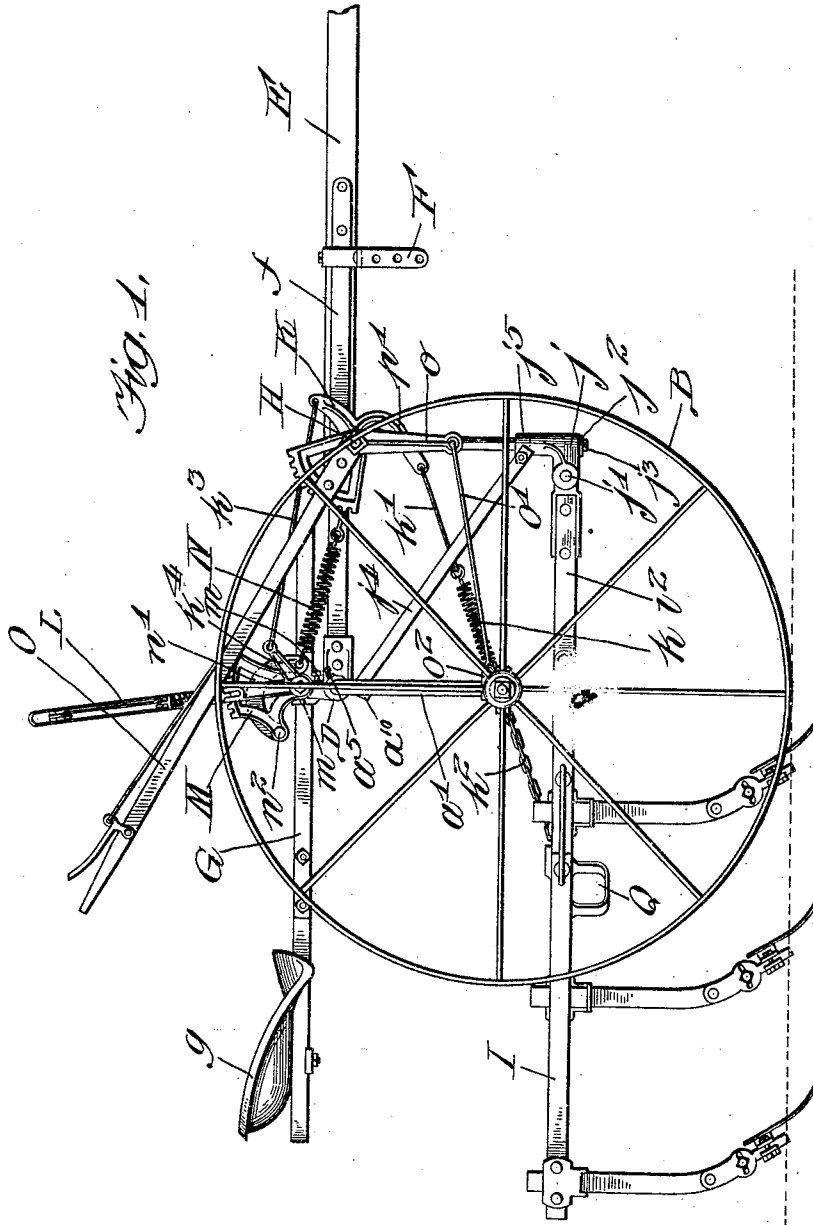


APPLICATION FILED JAN. 19, 1906.

Patented Nov. 16, 1909.

6 SHEETS—SHEET 1.



Inventor:
William E. John, son
By Buckley & Durand
Attys.

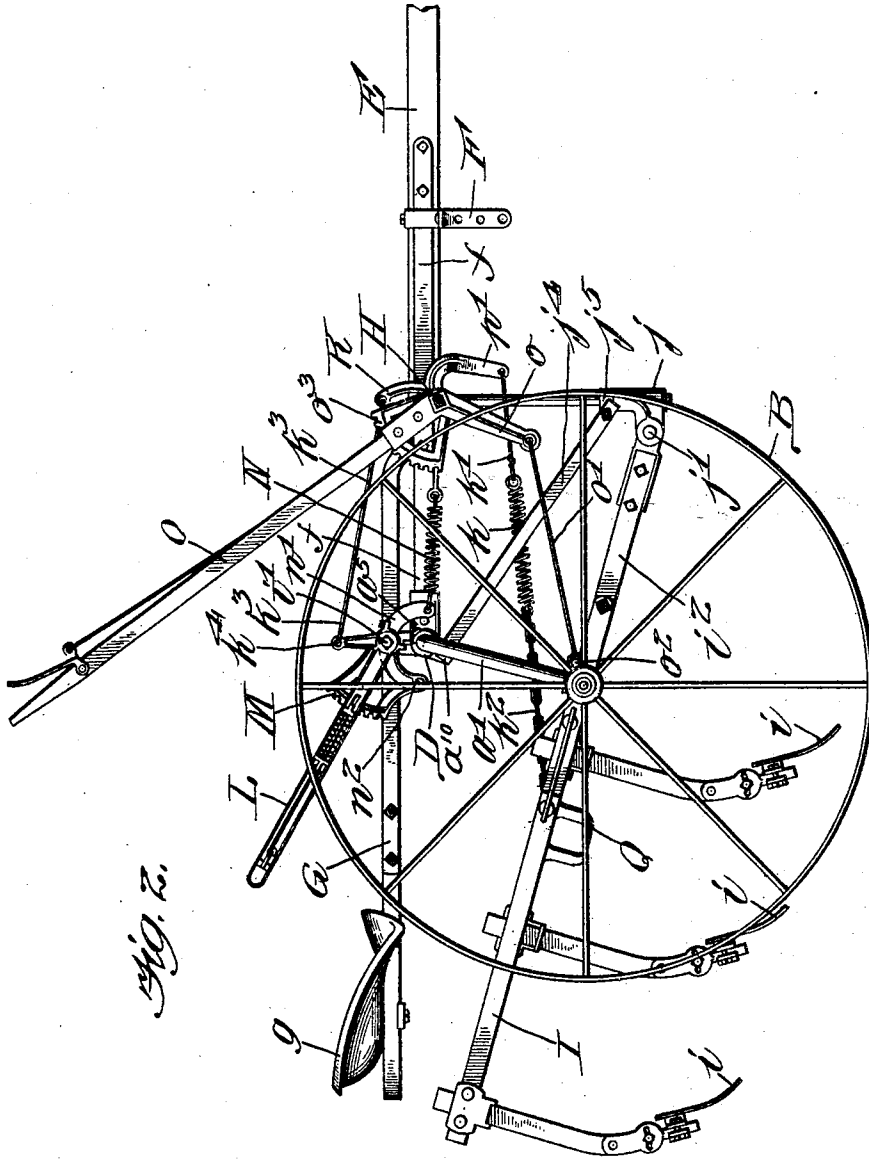
W. E. JOHNSON.
CULTIVATOR.

APPLICATION FILED JAN. 19, 1906.

Patented Nov. 16, 1909.

6 SHEETS—SHEET 2.

940,159.



Witnesses:
Robert A. Weir
J. B. Weir

Inventor:
William E. Johnson
By Buckley & Durand
Attys.

CULTIVATOR.

APPLICATION FILED JAN. 19, 1906.

Patented Nov. 16, 1909.

6 SHEETS--SHEET 3.

940,159.



ladies:
 Robert Alden
 JW Weir

Inventor:
William E. Johnson
By Ruckley & Neraud
Attys.

940,159.

W. E. JOHNSON.
CULTIVATOR.
APPLICATION FILED JAN. 19, 1906.

Patented Nov. 16, 1909.
6 SHEETS—SHEET 4.

Fig. 4.

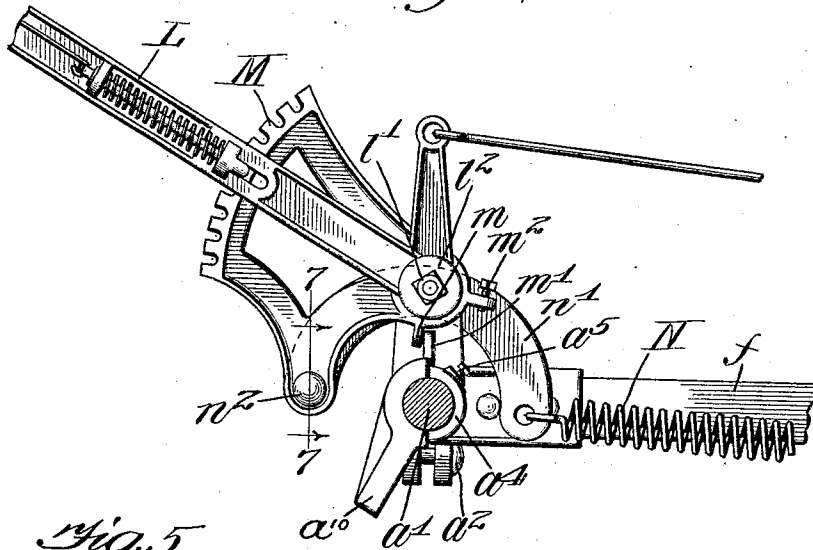


Fig. 5.

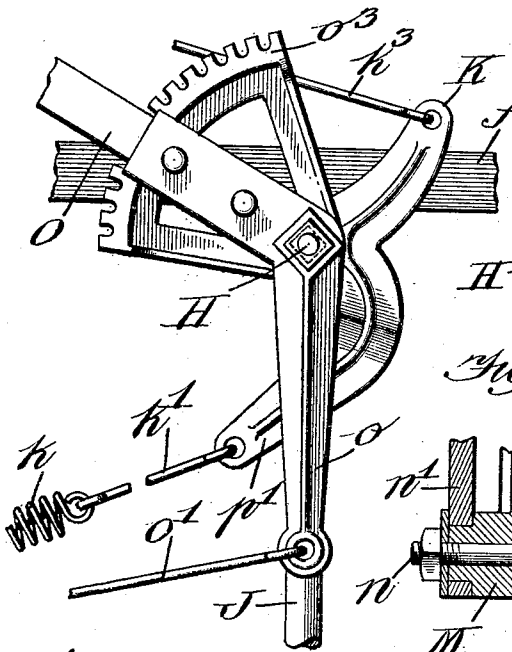


Fig. 6.

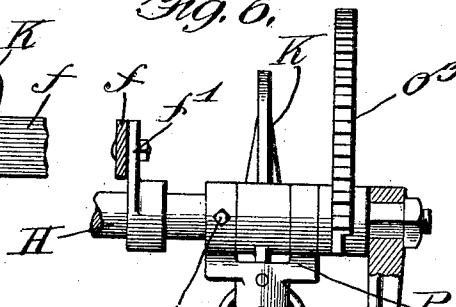
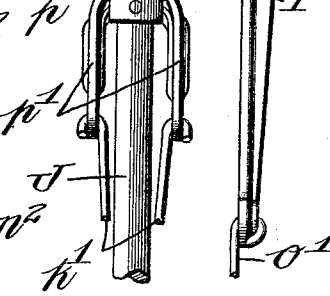
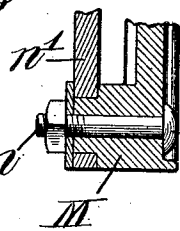


Fig. 7.



Witnesses:
Robert A. Weir
J. B. Weir

Inventor:
William E. Johnson
By Buckley & Durand
Attys.

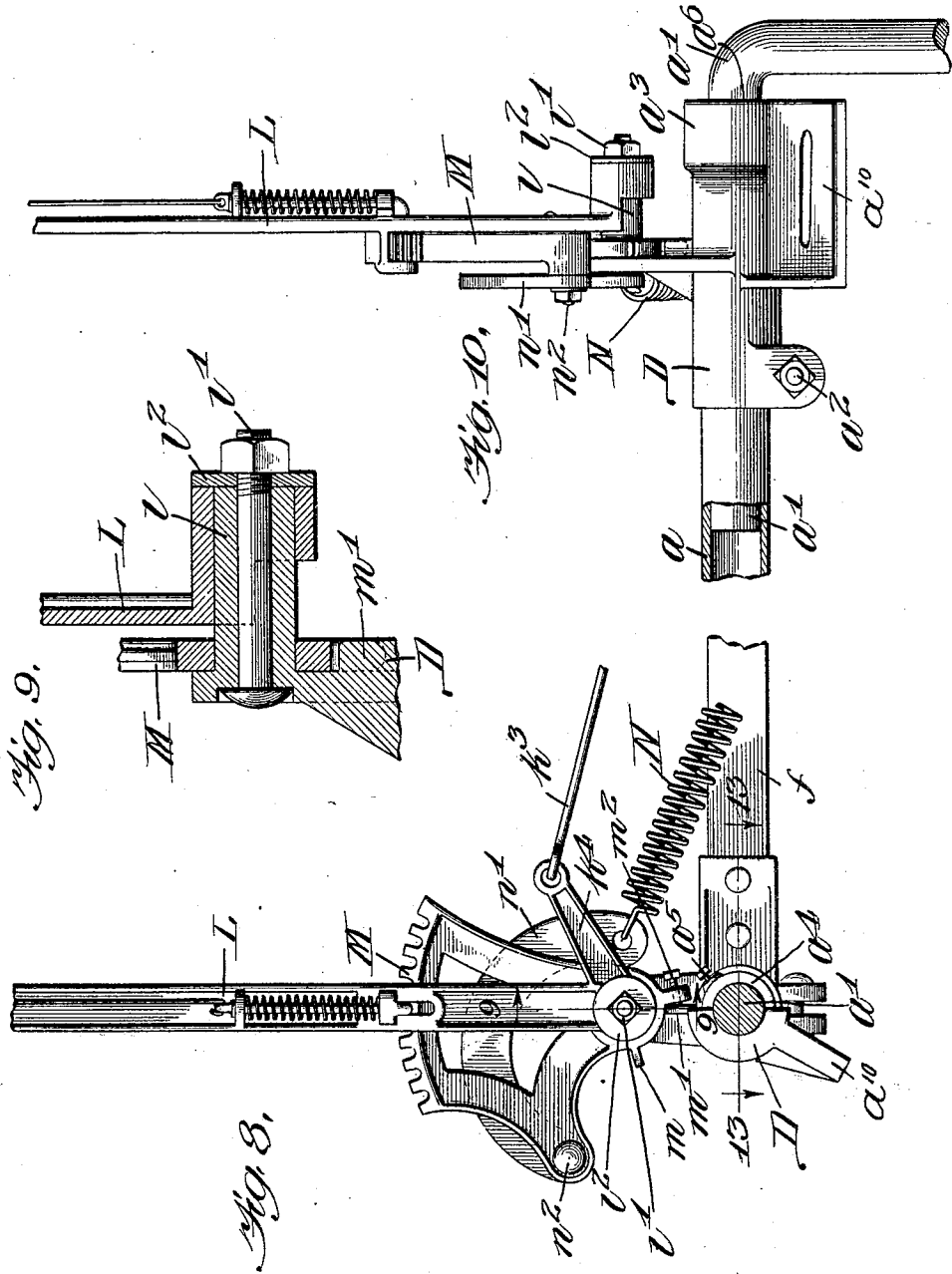
W. E. JOHNSON.
CULTIVATOR.

APPLICATION FILED JAN. 19, 1908.

Patented Nov. 16, 1909.

6 SHEETS—SHEET 5.

940,159.



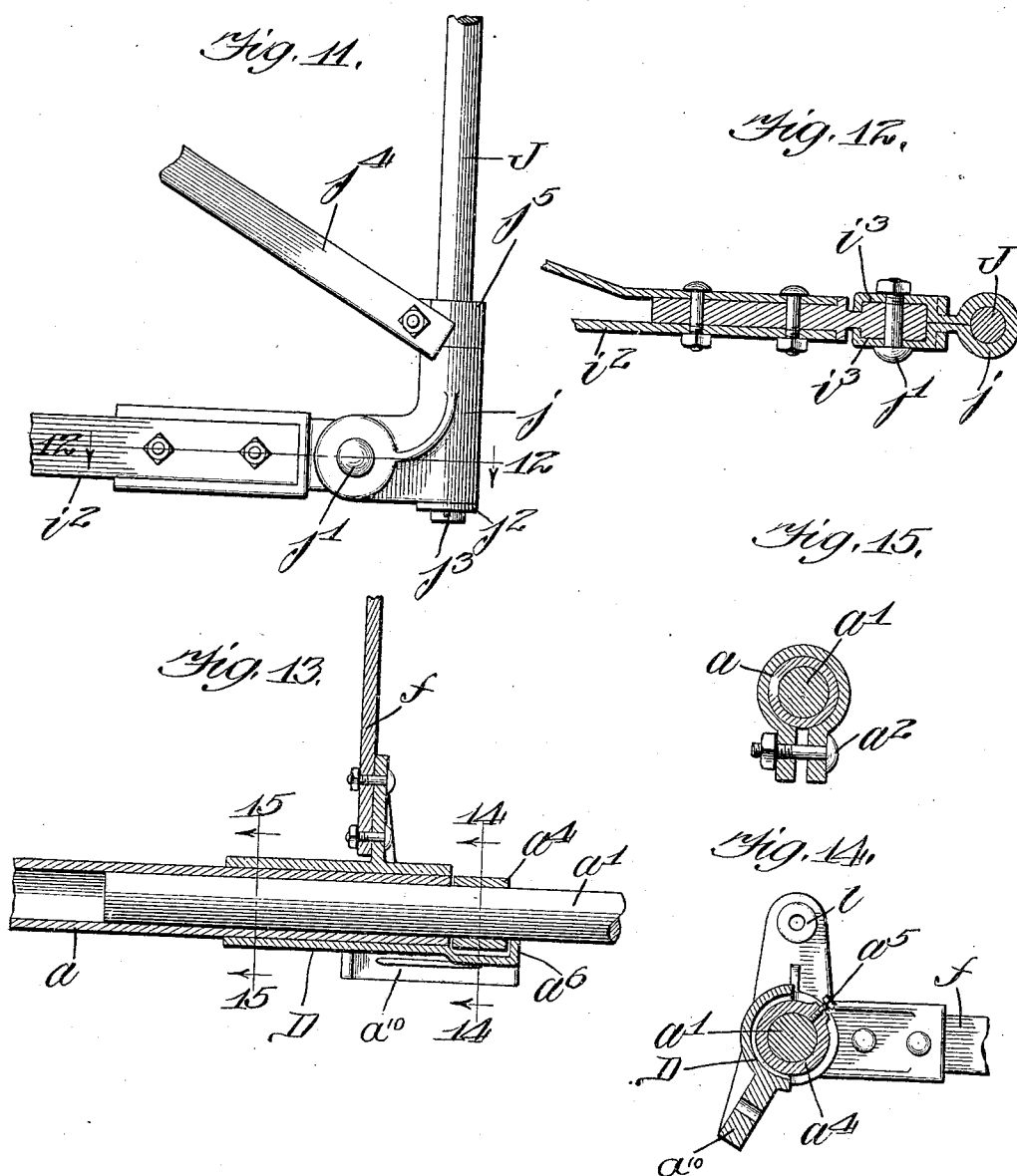
Witnesses:
Robert H. Blair
J. B. Wren

Inventor:
William E. Johnson
By Buckley & Durand
Attys.

940,159.

W. E. JOHNSON.
CULTIVATOR.
APPLICATION FILED JAN. 19, 1906.

Patented Nov. 16, 1909.
6 SHEETS—SHEET 6.



Witnesses:
Robert A. Weir
J. B. Weir

Inventor:
William E. Johnson
By Buckley Durand
Atty.

UNITED STATES PATENT OFFICE.

WILLIAM E. JOHNSON, OF ROCK ISLAND, ILLINOIS, ASSIGNOR TO ROCK ISLAND PLOW COMPANY, OF ROCK ISLAND, ILLINOIS, A CORPORATION OF ILLINOIS.

CULTIVATOR.

940,159.

Specification of Letters Patent.

Patented Nov. 16, 1909.

Application filed January 19, 1906. Serial No. 296,751.

To all whom it may concern:

Be it known that I, WILLIAM E. JOHNSON, a citizen of the United States of America, and resident of Rock Island, Rock Island county, Illinois, have invented a certain new and useful Improvement in Cultivators, of which the following is a specification.

My invention relates to cultivators in general, but more particularly to cultivators in which the shovels are arranged in two groups or gangs, and especially to cultivators in which provision is made for carrying the driver or operator; cultivators of this particular type being ordinarily known as 15 combined riding and walking cultivators.

Generally stated, the object of my invention is the provision of an improved and highly efficient cultivator of the foregoing general character.

20 Special objects of my invention are the provision of improved means for raising and lowering the shovel gangs; the provision of an improved arrangement for regulating or varying the depth to which the shovels may enter the ground; the provision of an improved balancing arrangement for moving the wheel axle forward and back, and for thereby maintaining the desired balance of 25 the weight upon the cultivator; the provision of an improved construction and arrangement for sustaining the drag or back-pull of the shovel gangs; and the provision of certain details and features of improvement tending to increase the general efficiency and serviceability of a cultivator of this particular character.

To the foregoing and other useful ends, my invention consists in matters hereinafter set forth and claimed.

40 In the accompanying drawings, Figure 1 is a side elevation of a cultivator embodying the principles of my invention. Fig. 2 is a similar view showing the shovel gangs raised from the ground. Fig. 3 is a plan of the said cultivator. Fig. 4 is an enlarged detail side elevation of the hand lever device for raising and lowering and varying the working depth of the shovel gangs. Fig. 5 is an enlarged detail side elevation of one of the forward connections for raising and 50 lowering the gangs, and of the associated connections for effecting a balance of the frame and rider upon the cultivator. Fig. 6 is a rear elevation of the device shown in 55 Fig. 5. Fig. 7 is an enlarged detail sectional

view on line 7—7 in Fig. 4. Fig. 8 shows a different position of the mechanism shown in Fig. 4. Fig. 9 is a section on line 9—9 in Fig. 8. Fig. 10 is a rear elevation of the devices shown in Fig. 8. Fig. 11 is an enlarged side elevation of one of the couplings or draft connections for the shovel gangs. Fig. 12 is a horizontal section on line 12—12 in Fig. 11. Fig. 13 is an enlarged section on line 13—13—in Fig. 8. Fig. 14 is a detail cross-section on line 14—14 in Fig. 13. Fig. 15 is a detail cross-section on line 15—15 in Fig. 13.

As thus illustrated, and referring more particularly to Figs. 1, 2 and 3, my improved cultivator comprises a bail-shaped axle A having its ends provided with spindles upon which are mounted the vehicle-supporting wheels B. Upon the upper transverse portion of said axle there are mounted a couple of castings C and D, the same being suitably separated and adapted to serve as bearings in which the axle is held. The pole or tongue E is provided with a draft member F and is connected with these two castings on the axle by means of straps or frame members f, the same being bent together and fastened to the sides of the tongue or pole, as shown in the drawings. In addition, the frame or body of the cultivator comprises a couple of rearwardly converging straps or bars G which are secured to the frame members f at their forward ends and which are allowed to rest upon the axle. At their rear ends these straps or bars G are adapted to support the driver's seat g, the cultivator being of the character known as a riding or walking cultivator. At their elbows or angles the frame members f are provided with bracket bearings f¹ which hang down therefrom and in which is mounted the balancing shaft H, the latter, as will hereafter more fully appear, being also of service in supporting the forward couplings or connections for the shovel gangs I. These shovel gangs can be provided with shovels of any suitable, known or approved character. At their forward ends the beams i² of these shovel gangs are provided with bolt holes and a couple of laterally projecting circular bosses i³, as shown more clearly in Fig. 12. The coupling posts J are hung upon the upper end portions of the balancing shaft H, and are provided at their lower ends with split

coupling members j , the latter being clamped upon the forward ends of the gang beams by means of bolts j^1 , it being observed that the clamping portions of these coupling members are formed on their inner surfaces with recesses adapted to receive the bosses i^3 . In this way the strain does not come upon the bolts j^1 —that is to say, these bolts do not sustain the draft or back pull of the gangs, and consequently there is never any tendency toward sheering of these bolts; in other words, the draft is sustained by the bosses i^3 , and these bolts j^1 serve merely to bind and hold the two portions of each coupling member together and in engagement with the beams of the shovel gangs. With this arrangement, the gangs can swing up and down, and can also swing toward and away from each other, inasmuch as the coupling members j are adapted to turn upon the coupling posts J . The washers j^2 and cotter pins j^3 support the coupling members upon the posts J . It will also be seen that braces j^4 are arranged to connect the rings or coupling members j^5 on the said posts with the said castings C and D , whereby the tongue or pole E , the said coupling posts J and the braces j^4 constitute a right-angle triangle when viewed from the side. See Fig. 1.

With respect to an adjustment of the coupling posts toward and away from each other, in order to vary the distance between the gangs, the rear ends of the braces j^4 are preferably secured to the castings C and D through the medium of the slotted lugs a^{10} , the slots in these lugs permitting the bolts to be shifted laterally to correspond with any lateral adjustment which may be desired on the part of the coupling posts.

The intermediate lifting levers K are mounted to rock upon the balancing shaft H , and have their lower ends connected with the shovel gangs through the medium of springs k , and also through the medium of rods k^1 and chains k^2 . The upper ends of these intermediate lifting levers K are connected by rods k^3 with the shorter arms k^4 of the operating or hand levers L , which latter are pivoted on the cylindrical bosses l of the castings C and D , as shown more clearly in Fig. 9. These hand levers L are held upon their respective mountings by bolts l^1 and washers l^2 . The usual hand-operated locking devices upon these hand levers L are adapted to engage racks M ; but as a matter of further improvement these curved racks are also pivotally mounted upon the cylindric bosses l , so that the levers L and the said curved racks can be locked together and swung or vibrated in unison. The lifting and lowering springs N have their forward ends hitched to brackets n on the frame members f , and have their rear ends hitched to curved or semi-circular connect-

ing links n^1 , which latter are pivotally connected with the racks M . The construction is such that the points of pivotal connection n^2 between the said racks and curved links will be just above the axis about which the racks swing when the gangs are in the ground, as shown in Fig. 1. However, when the gangs are raised or lifted out of the ground, as shown in Fig. 2, then the pivotal points n^2 are considerably below the said axis. In this way the springs N yieldingly draw the gangs up and also tend to yieldingly hold the links K in the down position, inasmuch as the pivotal or connecting points n^2 are adapted to pass above and below the center or axis about which the racks M and levers L swing or vibrate; in other words, the said springs N yieldingly hold the levers K — K in either the up or the down position. It will be seen that the lugs m on the said racks are adapted to engage lugs m^1 on the castings upon which the same are mounted, so as to limit the downward and rearward movements of said racks. On the other hand, the set screws m^2 carried by the said racks are adapted to engage the lugs m^1 when the racks and levers are swung in the opposite direction, thus limiting the upward and forward movement of the racks and hand levers.

The depth to which the shovels may enter the ground may be varied by adjusting the hand levers L relatively to the racks M —that is to say, by first unlocking the hand levers from the said racks, and by then locking the same in different relative positions, according to the depth desired.

The axle A is composed of a horizontal tubular section a and two end or vertical solid sections a^1 , the upper ends of the latter being inserted or telescoped in the ends of the former. The castings C and D are clamped upon the tubular pipe section A by means of bolts a^2 , and the said castings are provided with enlarged outer end portions a^3 adapted to inclose the collars a^4 . As shown more clearly in Figs. 10, 14 and 15, these collars a^4 are mounted upon the solid end sections of the axle and provided with set screws a^5 for securing them thereon. In this way the wheels can be moved toward and away from each other, by loosening the set screws a^5 , so as to permit the ends of the axle to move toward and away from each other by reason of their sliding connection with the upper or horizontal portion of the same. In addition, the balancing hand lever O is mounted upon the balancing shaft H and provided with a downwardly extending arm o . This lever arm o is connected by a rod o^1 with the casting o^2 mounted upon the axle. The usual hand-operated locking device on the hand lever O is adapted to cooperate with the curved rack o^3 in locking the said lever at any desired position, it being under-

stood that this rack can be made rigid or held in any suitable manner. At its other end the balancing shaft H is provided with an arm similar to the arm *o*, or of any other suitable character, and the lower end of this arm is connected by the rod *o*⁴ to the casting *o*⁵ on the axle. In this way the lever O can be employed for rocking the axle and thereby shifting the same relatively to the frame for the purpose of balancing the weight. In other words, the shaft H is rocked in its bearings for the purpose of drawing the wheels B forward or pushing them back, according to whatever adjustment is necessary in order to balance the weight upon the axis about which the wheels turn.

It will also be seen that the coupling posts J are provided at their upper ends with coupling members P which are bifurcated and mounted upon the balancing shaft H. These castings can be secured in place upon said shaft by means of set screws *p*. The intermediate lifting levers K are mounted on the shaft H at points between the prongs or upper end portions of the said castings or coupling members P and are thus brought into alinement with the coupling posts J. With this arrangement it is desirable that the lower arms *p*¹ of the said levers K be bifurcated in form, so as to straddle the upper end portions of the coupling posts J, as shown more clearly in Fig. 6. With this construction each lever K is provided with two rods *k*¹ which connect at their rear ends with the forward end of one of the springs *k*. Thus the draft is directly in line with the coupling posts J and a strong and rigid and well-balanced construction is provided.

The distance between the coupling posts J can be varied by loosening the set screws *p* and sliding the coupling members P away from each other on the balancing shaft H. It will be seen that said balancing shaft H has a suitable connection with the rear end of the tongue or pole E.

With further respect to the castings C and D, it will be seen that the end sections of the axle are prevented by the lugs *a*⁶ from shifting outwardly in an endwise direction. They are also prevented by the ends of the tubular or hollow sections *a* from shifting inwardly in an endwise direction.

It will also be understood that the gangs can be provided with stirrups or members Q in which the driver can place his feet for the purpose of controlling the lateral movements of the said gangs.

With the foregoing construction, it will be seen that the entire arrangement is such that the pull is forwardly, it might be said, on a direct line, as the coupling posts are braced back to the frame in a straight line, while the couplings themselves are of such a construction as to throw the draft of the shovel gangs on a perfectly straight line

from the center of the posts, regardless of the angle at which they may be working, thus making twisting or tilting impossible. Furthermore, the connection from the lifting levers forward to the rocker or intermediate lifting levers K, and down and back to the rear of the shovel gangs, is also in a straight line, which results in the gangs always hanging in a perfectly central position and not swinging to one side or the other when raised out of the ground. Either shovel gang can be raised or lowered independently of the other and the long connection from each rocker arm on the balancing shaft to a point so far to the rear on its allotted gang allows the gangs to be swung laterally as far as possible—the gangs do not rise as they are moved from one side to the other. When the levers L are locked in the racks for any desired or proper depth of cultivation, they are then never changed, as by throwing them up and down without manipulating the hand locks the racks are rocked and the gangs raised and lowered.

The balancing lever, it will be seen, is within easy reach of the operator or driver and is manipulated with the least effort possible. Furthermore, the lifting springs, by passing below or above the center or axis, tend to hold the shovel gangs in or out without the aid of other devices.

As the crank axles are telescoped within the ends of the upper tubular section or pipe, it follows that the same can be easily and quickly adjusted for the purpose of changing the tread with reference to wide and narrow rows.

The seat can be folded forward, and the machine used as a walking cultivator, and when thus used the forward rocking movement of the racks is limited so that the lifting springs cannot pass above the center or axis, as it would obviously be inconvenient for the operator to be obliged to pull down on the lifting levers to raise the gangs while walking. This, of course, is accomplished by adjusting the set screw *m*² so as to properly limit the forward rocking movement of the racks M.

What I claim as my invention is—

1. A cultivator comprising gangs, a combined balancing shaft and arch, a wheel axle, a frame supported on the wheel axle, connection between the balancing shaft and the wheel axle, a lever for rocking said balancing shaft, and thereby rocking the axle relatively to the frame, coupling posts hung from said balancing shaft, braces uniting said coupling posts to the axle whereby the draft is thrown on the arch, articulated couplings between said posts and shovel gangs, and connections for raising and lowering said shovel gangs.

2. A cultivator comprising a combined balancing shaft and arch, means operated

by the said balancing shaft for balancing the weight of the cultivator, shovel gangs, and articulated coupling members for said gangs supported from the end portions of the said balancing shaft.

3. A cultivator comprising a pair of wheels, a body frame supported upon said wheels, a combined balancing shaft and arch and means operated thereby for balancing the weight upon said wheels, shovel gangs, articulated coupling members for said gangs supported from the said balancing shaft, and connections for raising and lowering said gangs.

4. A cultivator comprising a pair of wheels, a combined balancing shaft and arch, and means operated thereby for balancing the weight upon said wheels, shovel gangs, articulated coupling members hung upon said balancing shaft and connected with the forward ends of said gangs, and gang lifting and lowering means mounted on said balancing shaft.

5. A cultivator comprising a pair of wheels, a combined balancing shaft and arch and means operated thereby for balancing the weight on said wheels, shovel gangs, draft connections for said gangs, rocker arms on said balancing shaft, hand levers connected with the upper ends of said rocker arms, and suitable articulated connection between said gangs and the lower ends of said rocker arms.

6. A cultivator comprising shovel gangs, draft connections for the gangs, forwardly mounted rocker arms, suitable connections between the lower ends of said arms and the said gangs, pivoted curved racks, hand levers associated with said racks and having axes coincident with the axes of the same, means for limiting the forward and back swing of said racks, hand-operated means on said levers for engaging said racks, and connections between said hand levers and the upper ends of said rocker arms.

7. A cultivator comprising shovel gangs, draft connections for said gangs, pivoted hand levers, connections extending forward from said hand levers and thence down and rearward to the gangs, pivoted curved racks associated with said hand levers and having axes coincident with the axes of the same, means for limiting the forward and back swing of said racks, hand-operated devices on said levers for engaging between the teeth of said racks, and for thereby locking the levers in any desired position, and wheels for said cultivator.

8. A cultivator comprising shovel gangs, draft connections for said gangs, pivoted hand levers, connections extending forward from said hand levers and thence down and rearward to the gangs, pivoted curved racks associated with said hand levers and having axes coincident with the axes of the same,

means for limiting the forward and back swing of said racks, hand-operated devices on said levers for engaging between the teeth of said racks, and for thereby locking the levers in any desired position, and wheels for said cultivator, together with lifting springs connected with said racks at points adapted to swing above and below the center, whereby said springs are adapted to exert their tension in holding the gangs either in or out of the ground.

9. A cultivator comprising shovel gangs, draft connections for said gangs, pivoted hand levers, pivoted curved racks associated with said hand levers, wheels for the cultivator, a frame supported by the wheels, lifting and lowering connections between the hand levers and the gangs, means for limiting the forward and back swing of the curved racks, devices on said levers for engaging between the teeth of said racks, curved links attached to the rear ends of said racks and extending over and in front of the axes of the latter, and springs attached to the forward ends of said links and extending forward to points of attachment on the said frame, the points of connection between the said links and racks being adapted to swing above and below the center or axis, whereby said springs are adapted to exert their tension in yieldingly holding the gangs either in or out of the ground.

10. A cultivator comprising a frame to be balanced, shovel gangs forward articulated coupling members, and a combined balancing shaft and arch.

11. A cultivator comprising shovel gangs having their forward ends provided with bolt holes and lateral circular bosses, coupling posts, and split couplings on said posts, said couplings having rear portions bent together to engage said bosses, together with clamping bolts inserted through said bolt holes and holding the couplings in draft-sustaining engagement with said bosses, whereby said bolts sustain no draft and are not subject to sheering strains or tendencies.

12. In a cultivator, the combination of an axle composed of an upper horizontal tubular portion, and solid upright end portions telescoped within the ends thereof, castings on said tubular portion of the axle, collars on said solid sections of the axle, set screws for fastening the collars to the solid sections of the axle, wheels on the end portions of said axle, a combined balancing shaft and arm, shovel gangs mounted thereon with suitable draft connections, hand levers mounted on said castings and provided with short arms suitably connected for raising and lowering said gangs, articulated coupling members supported from said balance shaft, pivoted racks on said castings, means on the hand levers for engaging the racks, and means carried by the said castings for

engaging said collars, and thereby preventing endwise displacement of the solid end sections of the axle, said set screws permitting the collars to be loosened for the purpose of sliding the end sections of the axle within the tubular section thereof, without disturbing the pivoted connections of said racks, and thereby changing the tread or distance between said wheels.

13. In a cultivator, the combination of a frame, a combined balancing shaft and arch, of shovel gangs mounted thereon, draft connections therefor, a bail-shaped axle having solid end sections and a tubular upper or horizontal section, the two end sections telescoping within the upper tubular section, wheels on the ends of said axle, means carried by the tubular section of the axle for preventing endwise displacement of the solid sections thereof, pivoted racks and levers carried by said tubular section and connected for raising and lowering the shovel gangs, articulated coupling members supported from said balance shaft together with means on said solid sections for permitting a lengthening or shortening of said axle without disturbing the pivoted connections of said racks, to change the tread or distance between said wheels.

14. A cultivator comprising shovel gangs, coupling posts, couplings between the lower ends of said posts and the forward ends of said gangs, rocker arms having bifurcated lower ends adapted to straddle said posts, connections between said gangs and the said bifurcated lower ends of the rocker arms, hand levers, and connections between said levers and the upper ends of said rocker arms.

15. A cultivator comprising shovel gangs, a transverse support, coupling posts having bifurcated upper end portions mounted upon said support, rocker arms pivoted on said support at points within the said bifurcated upper ends of said posts, said rocker arms having bifurcated lower ends, connections between said gangs and the said bifurcated lower ends of the rocker arms, and hand levers connected with the upper ends of said rocker arms, together with provisions for shifting the two sets of couplings posts and rocker arms toward and away from each other on said support.

16. A cultivator comprising gangs, a combined balancing shaft and arch, a wheel axle, a frame supported on the wheel axle, connection between the balancing shaft and the wheel axle, a lever for rocking said balancing shaft, and thereby rocking the axle relatively to the frame, coupling posts hung on said balancing shaft, braces uniting said coupling posts to the axle whereby the draft is thrown on the arch, articulated couplings between said posts and shovel gangs, and connections for raising and lowering said

shovel gangs, said shovel gangs having their rear ends left free to swing toward and away from each other, and each gang being controllable for raising and lowering independently of the other.

17. A cultivator comprising a balancing shaft, means operated by the said balancing shaft for balancing the weight of the cultivator, shovel gangs, and articulated coupling members for said gangs supported by shafts hung from the end portions of the said balancing shaft, said shovel gangs having their rear ends left free to swing toward and away from each other, and each gang being controllable for raising and lowering independently of the other.

18. A cultivator comprising a pair of wheels, a body frame supported upon said wheels, a balancing shaft, and means operated thereby for balancing the weight upon said wheels, shovel gangs, articulated coupling members for said gangs supported by shafts hung from the said balancing shaft, and connections for raising and lowering said gangs, said shovel gangs having their rear ends left free to swing toward and away from each other, and each gang being controllable for raising and lowering independently of the other.

19. A cultivator comprising a pair of wheels, a balancing shaft, and means operated thereby for balancing the weight upon said wheels, shovel gangs, articulated coupling members hung from shafts supported by said balancing shaft, and connected with the forward ends of said gangs, and gang lifting and lowering means mounted on said balancing shaft, said shovel gangs having their rear ends left free to swing toward and away from each other, and each gang being controllable for raising and lowering independently of the other.

20. A cultivator comprising a pair of wheels, a balancing shaft, and means operated thereby for balancing the weight on said wheels, shovel gangs, draft connections for said gangs, rocker arms on said balancing shaft, hand levers connected with the upper ends of said rocker arms, and suitable connection between said gangs and the lower ends of said rocker arms, said shovel gangs having their rear ends left free to swing toward and away from each other, and each gang being controllable for raising and lowering independently of the other.

21. A cultivator comprising shovel gangs, draft connections for the gangs, forwardly mounted rocker arms, suitable connections between the lower ends of said arms and the said gangs, pivoted curved racks, hand levers associated with said racks and having axes coincident with the axes of the same, means for limiting the forward and back swing of said racks, hand-operated means on said levers for engaging said racks, and connections for raising and lowering said

tions between said hand levers and the upper ends of said rocker arms, said shovel gangs having their rear ends left free to swing toward and away from each other, and each gang being controllable for raising and lowering independently of the other.

22. A cultivator comprising shovel gangs, draft connections for said gangs, pivoted hand levers, connections extending forward from said hand levers and thence down and rearward to the gangs, pivoted curved racks associated with said hand levers, and having axes coincident with the axes of the same, means for limiting the forward and back swing of said racks, hand-operated devices on said levers for engaging between the teeth of said racks, and for thereby locking the levers in any desired position, and wheels for said cultivator, said shovel gangs having their rear ends left free to swing toward and away from each other, and each gang being controllable for raising and lowering independently of the other.

23. A cultivator comprising shovel gangs, draft connections for said gangs, pivoted hand levers, connections extending forward from said hand levers and thence down and rearward to the gangs, pivoted curved racks associated with said hand levers and having axes coincident with the axes of the same, means for limiting the forward and back swing of said racks, connecting links pivoted thereto, hand-operated devices on said levers for engaging between the teeth of said racks, and for thereby locking the levers in any desired position, and wheels for said cultivator, together with lifting springs connected with said links at points adapted to swing above and below the center, said springs being adapted to exert their tension in holding the gangs out of the ground, said shovel gangs having their rear ends left free to swing toward and away from each other, and each gang being controllable for raising and lowering independently of the other.

24. A cultivator comprising shovel gangs, draft connections for said gangs, pivoted hand levers, pivoted curved racks associated with said hand levers, wheels for the cultivator, a frame supported by the wheels, lifting and lowering connections between the hand levers and the gangs, means for limiting the forward and back swing of the curved racks, devices on said levers for engaging between the teeth of said racks, curved links attached to the rear ends of said racks and extending over and in front of the axes of the latter, and springs attached to the forward ends of said links and extending forward to points of attachment on the said frame, the points of pivotal connection between the said links and racks being adapted to swing above and below the center or axis, about which the racks swing, said springs being adapted to exert their

tension in yieldingly holding the gangs out of the ground, said shovel gangs having their rear ends left free to swing toward or away from each other, and each gang being controllable for raising and lowering independently of the other.

25. A cultivator comprising a frame to be balanced, shovel gangs provided with forward articulated coupling members, and a combined balancing shaft and coupling member support, said shovel gangs having their rear ends left free to swing toward and away from each other, and each gang being controllable for raising and lowering independently of the other.

26. A cultivator comprising shovel gangs having their forward ends provided with bolt holes and lateral circular bosses, coupling posts, and split couplings on said posts, said couplings having rear portions bent together to engage said bosses, together with clamping bolts inserted through said bolt holes and holding the couplings in draft-sustaining engagement with said bosses, whereby said bolts sustain no draft and are not subject to sheering strains or tendencies, said shovel gangs having their rear ends left free to swing toward and away from each other, and each gang being controllable for raising and lowering independently of the other.

27. In a cultivator, the combination of an axle composed of an upper horizontal tubular portion, and solid upright end portions telescoped within the ends thereof, castings on said tubular portion of the axle, collars on said solid sections of the axle, set screws for fastening the collar to the solid sections of the axle, wheels on the end portions of said axle, shovel gangs with suitable draft connections, hand levers mounted on said castings and suitably connected for raising and lowering said gangs, pivoted racks on said castings, means on the hand-levers for engaging said racks, lifting springs connected to said racks, and means carried by the said castings for engaging said collars, and thereby preventing endwise displacement of the solid end sections of the axle, said set screws permitting the collars to be loosened for the purpose of sliding the end sections of the axle within the tubular section thereof, and thereby changing the tread or distance between said wheels, without disturbing the pivoted connection of the racks, said shovel gangs having their rear ends left free to swing toward and away from each other, and each gang being controllable for raising and lowering independently of the other.

28. A cultivator comprising shovel gangs, coupling posts, couplings between the lower ends of said posts and the forward ends of said gangs, rocker arms having bifurcated lower ends adapted to straddle said posts,

- connections between said gangs and the said
bifurcated lower ends of the rocker arms,
hand levers, and connections between said
levers and the upper ends of said rocker
5 arms, said shovel gangs having their rear
ends left free to swing toward and away
from each other, and each gang being con-
trollable for raising and lowering inde-
pendently of the other.
- 10 29. A cultivator comprising shovel gangs,
a transverse support, coupling posts having
bifurcated upper end portions mounted upon
said support, rocker arms pivoted on said
support at points within the said bifurcated
15 upper ends of said posts, said rocker arms
having bifurcated lower ends, connections
between said gangs and the said bifurcated
lower ends of the rocker arms, and hand
levers connected with the upper ends of
said rocker arms, together with provisions 20
for shifting the two sets of coupling posts
and rocker arms toward and away from
each other on said support, said shovel gangs
having their rear ends left free to swing
toward and away from each other, and each 25
gang being controllable for raising and low-
ering independently of the other.
- Signed by me at Rock Island, Ill., this 9th
day Jan'y., 1906.

WILLIAM E. JOHNSON.

Witnesses:

A. B. FRENIER,
E. C. DEAN.