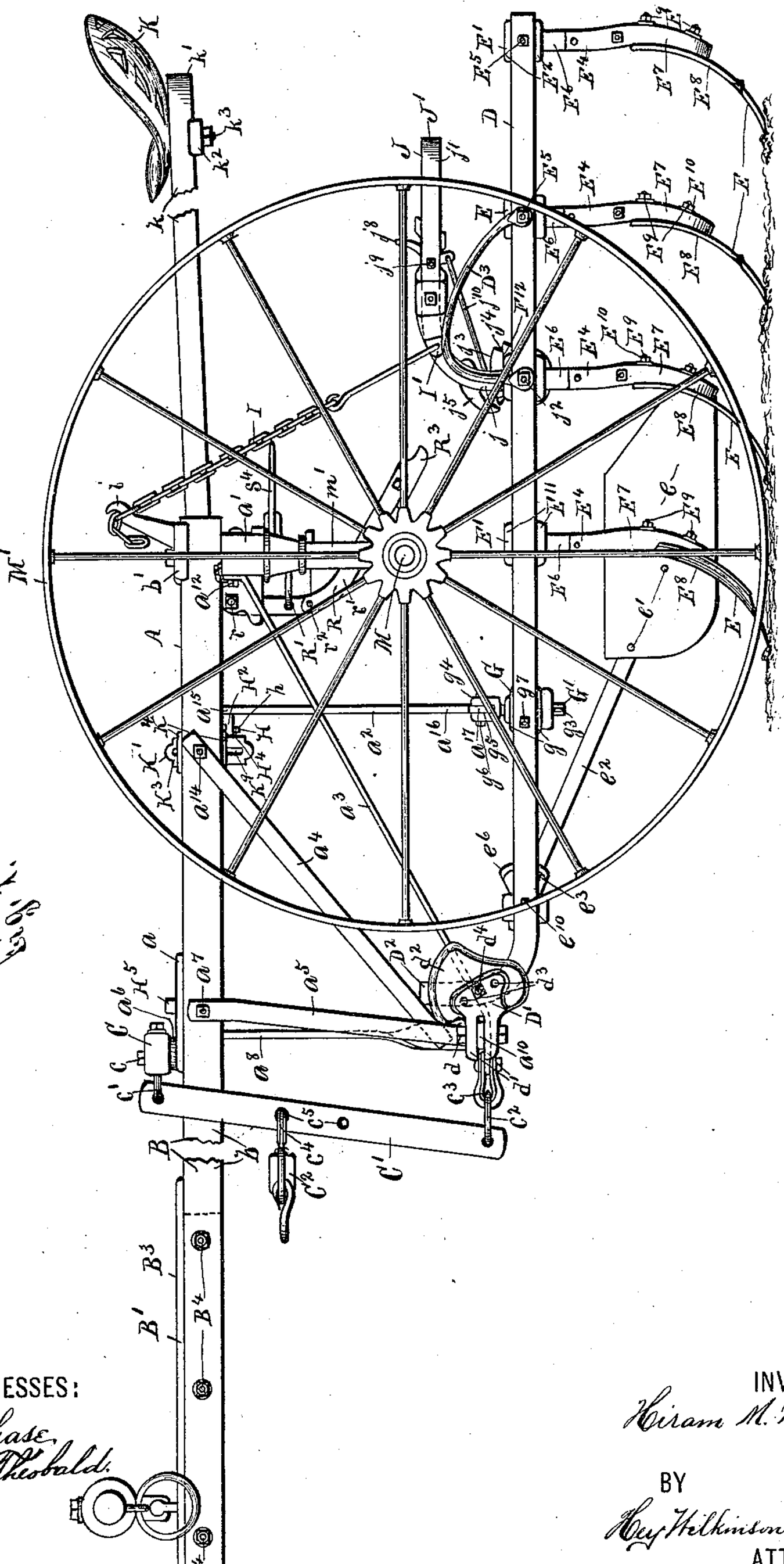
(No Model.)

10 Sheets—Sheet 1.

H. M. BURDICK.

CULTIVATOR.

No. 557,484. Patented Mar. 31, 1896.



WITNESSES:

H. E. Chase.

K. H. Theobald.

INVENTOR

Hiram M. Burdick

BY

Key Wilkinson & Parsons

ATTORNEYS.

(No Model.)

10 Sheets—Sheet 2.

H. M. BURDICK.

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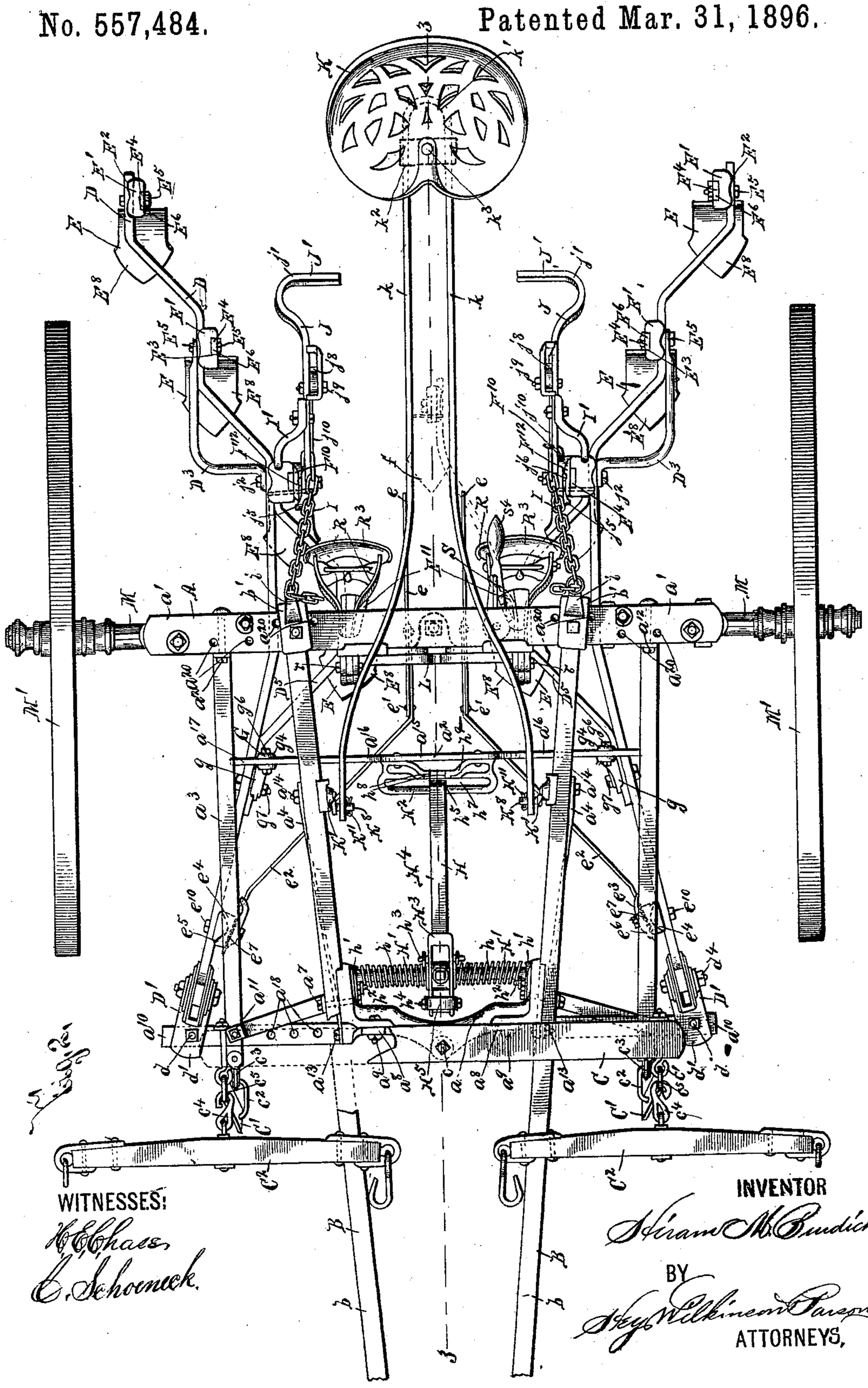

WITNESSES:

H. C. Chase.

C. Schoenick.

INVENTOR

Hiram M. Burdick

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ATTORNEYS.

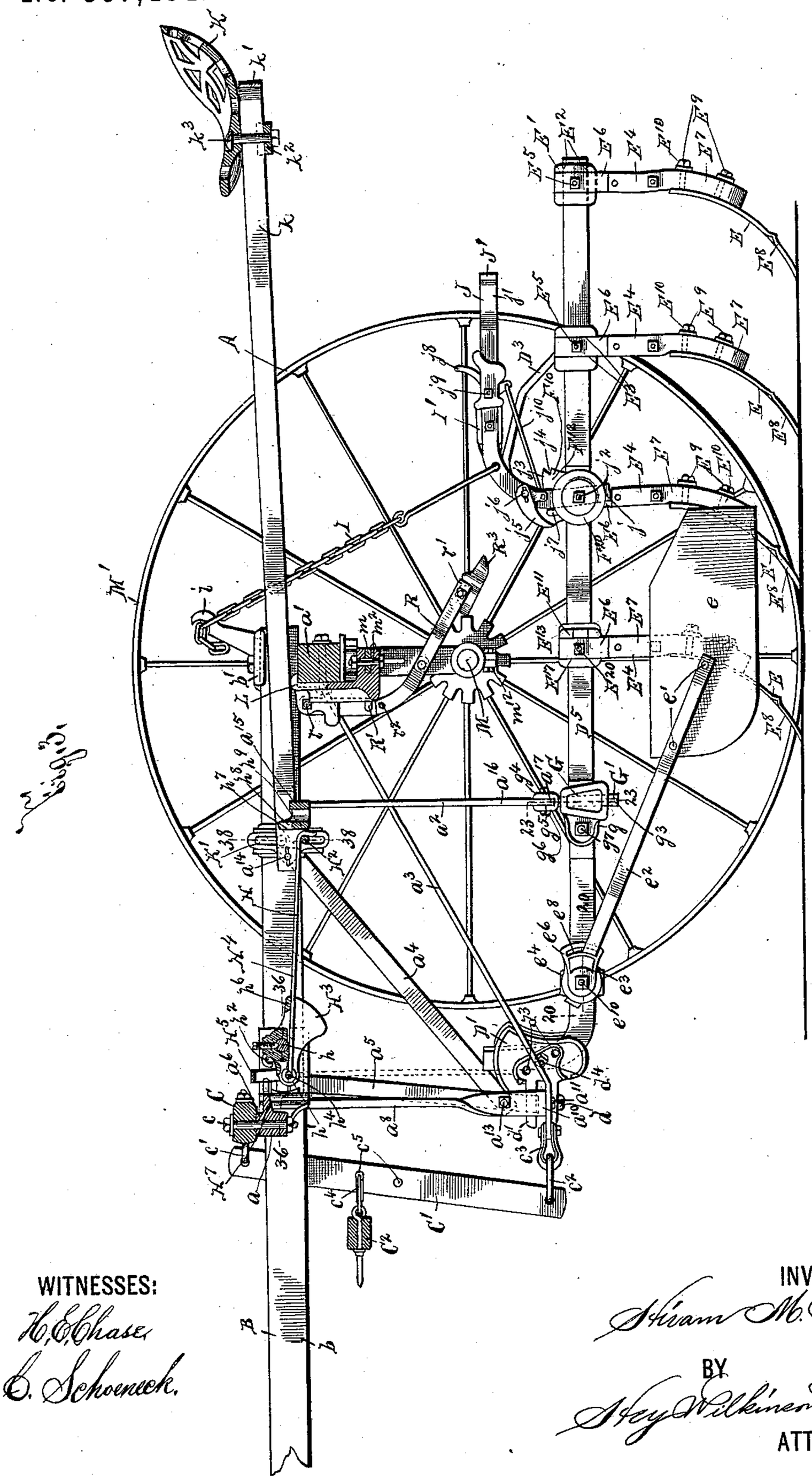
(No Model.)

10 Sheets—Sheet 3.

H. M. BURDICK.

CULTIVATOR.

No. 557,484. Patented Mar. 31, 1896.



WITNESSES:

H. E. Chase.

L. Schoeneck.

INVENTOR

Hiram M. Burdick

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ATTORNEYS

(No Model.)

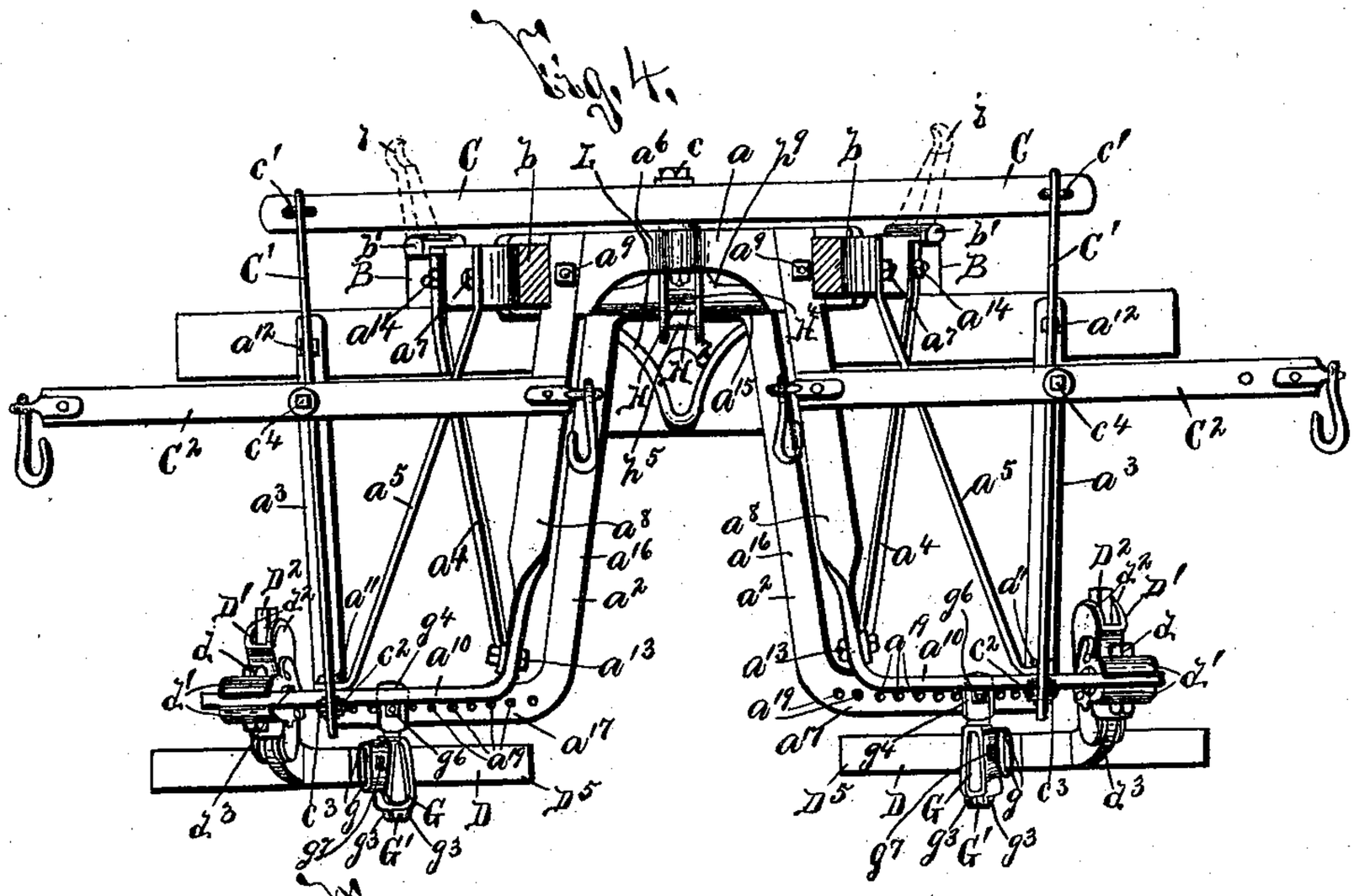
10 Sheets—Sheet 4.

H. M. BURDICK.

CULTIVATOR.

No. 557,484. Patented Mar. 31, 1896.

Fig. 4.



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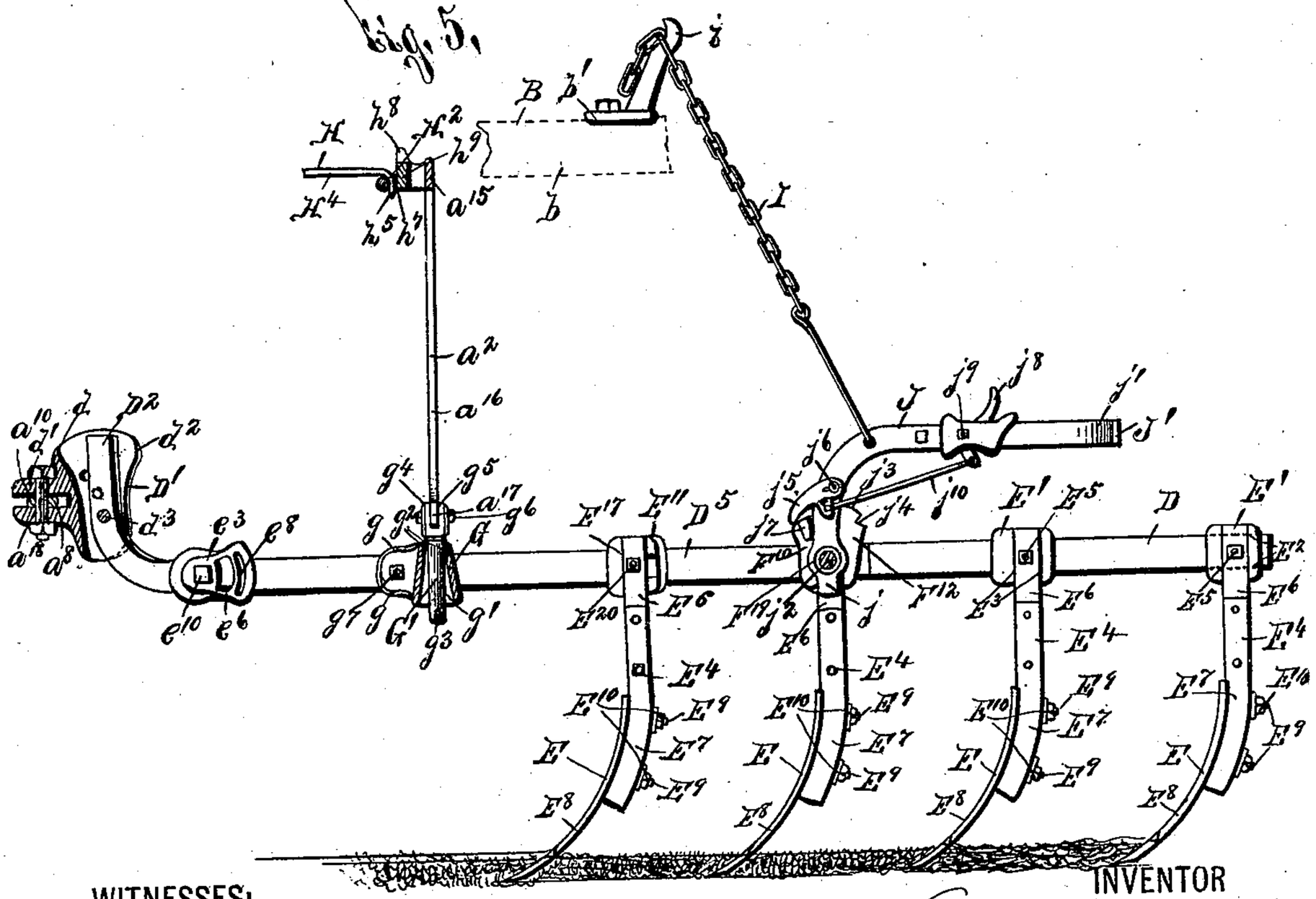

WITNESSES:

H. E. Chase,

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INVENTOR

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ATTORNEYS.

(No Model.)

10 Sheets—Sheet 5.

H. M. BURDICK.

CULTIVATOR.

No. 557,484. Patented Mar. 31, 1896.

Fig. 6.

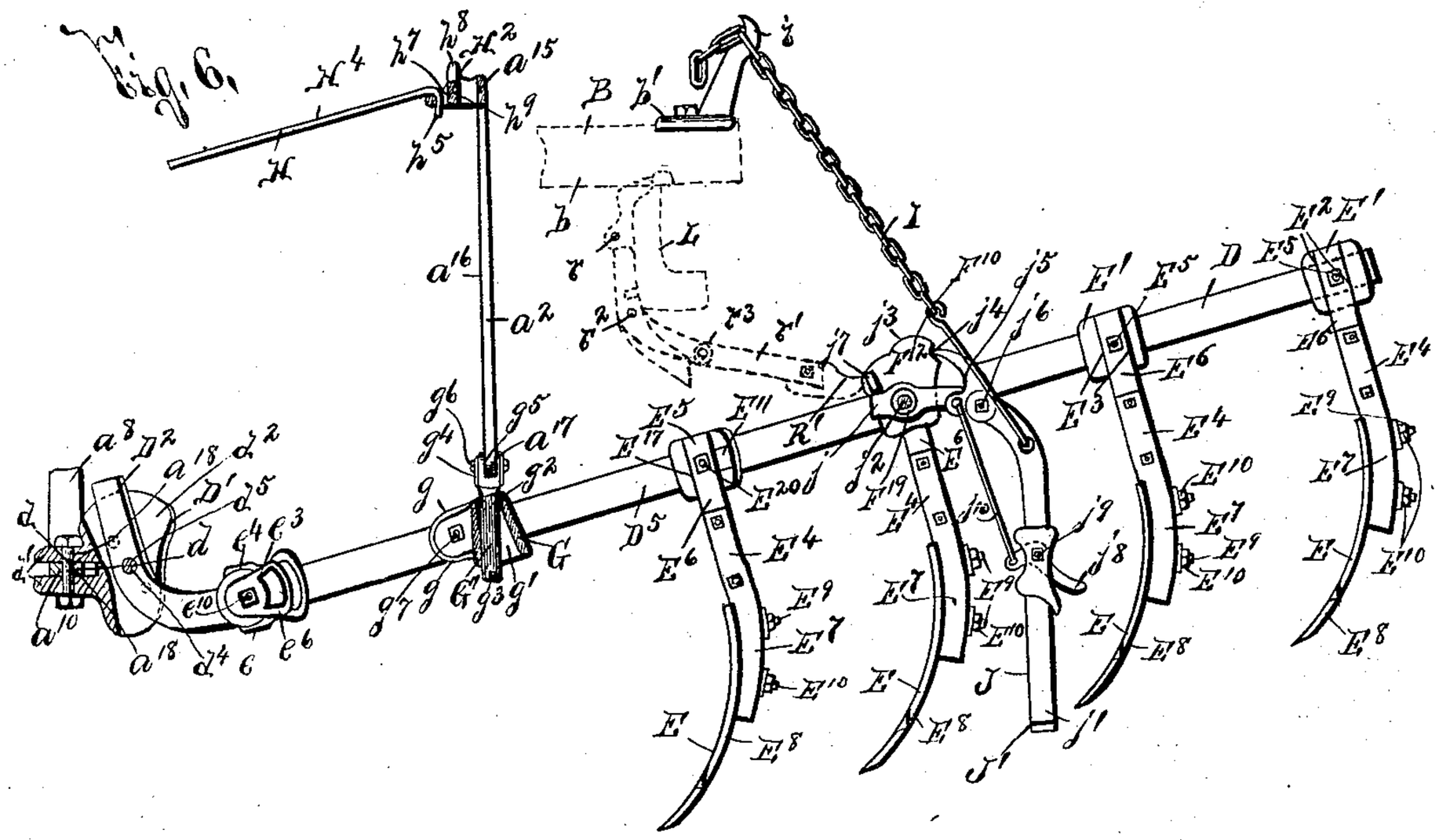
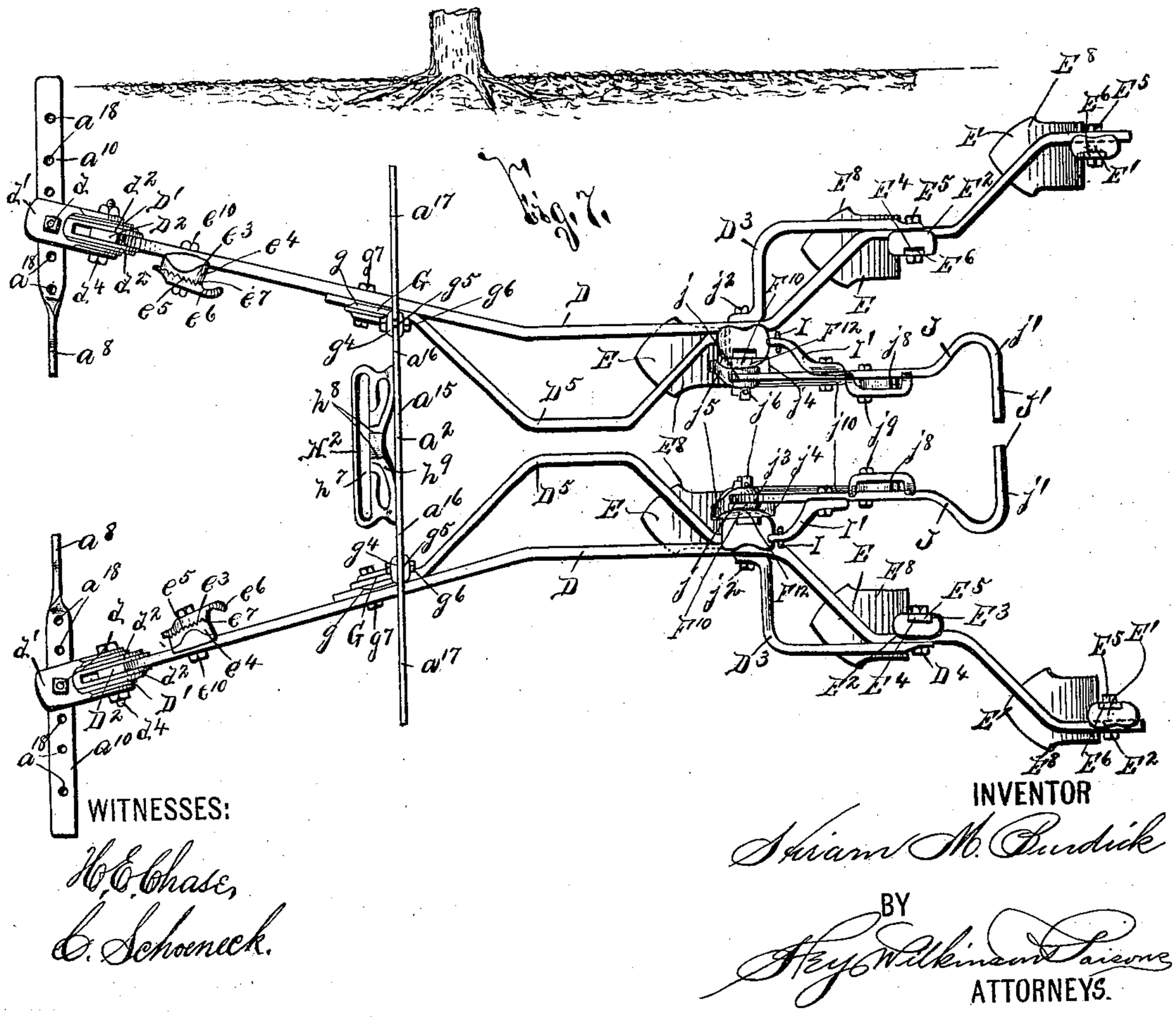


Fig. 7.



WITNESSES:

H. E. Chase,

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(No Model.)

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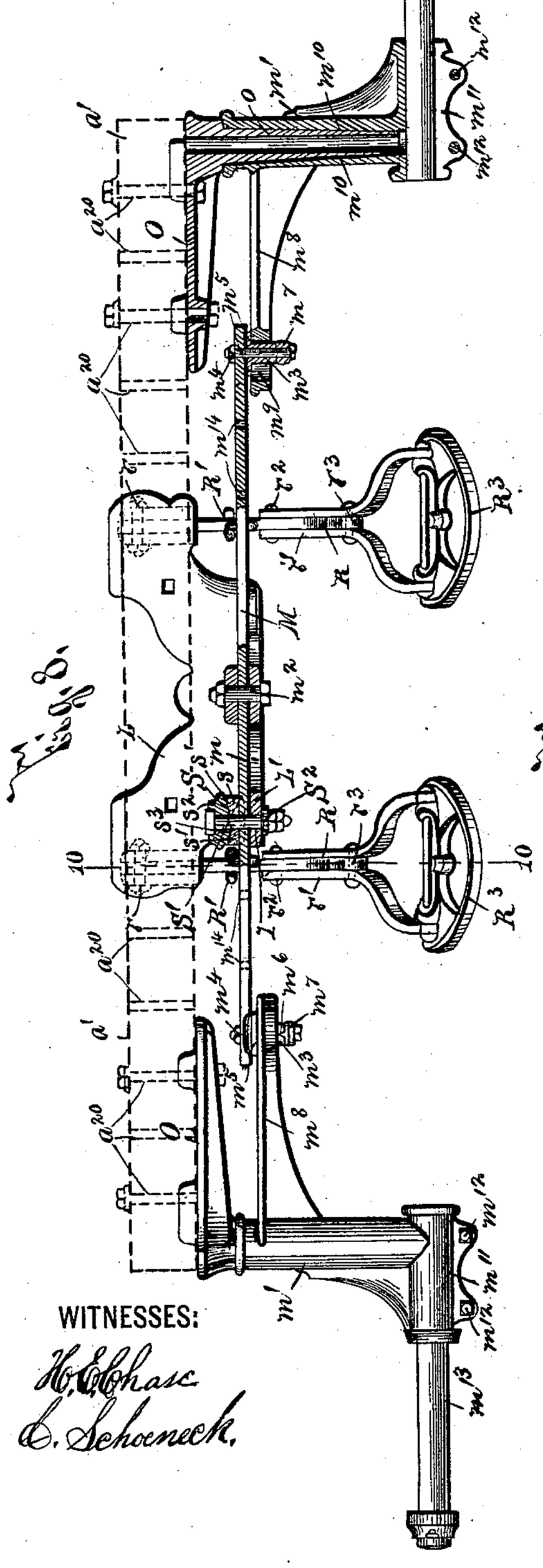
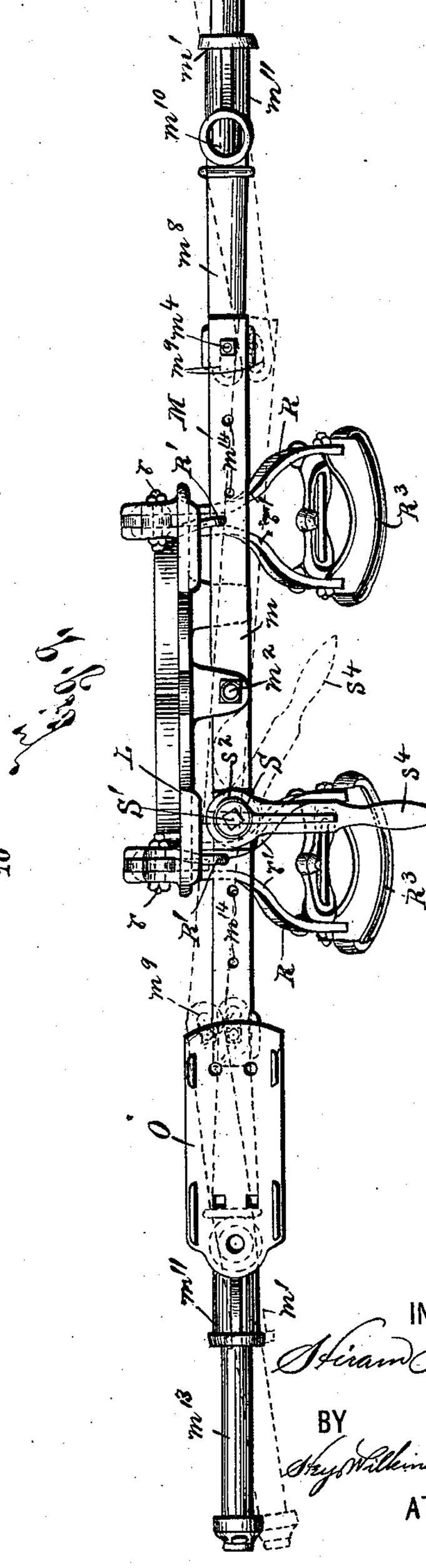
H. M. BURDICK.

CULTIVATOR.

No. 557,484.

Patented Mar. 31, 1896.





WITNESSES:

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(No Model.) 10 Sheets—Sheet 7.

H. M. BURDICK.

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No. 557,484. Patented Mar. 31, 1896.

Fig. 10.

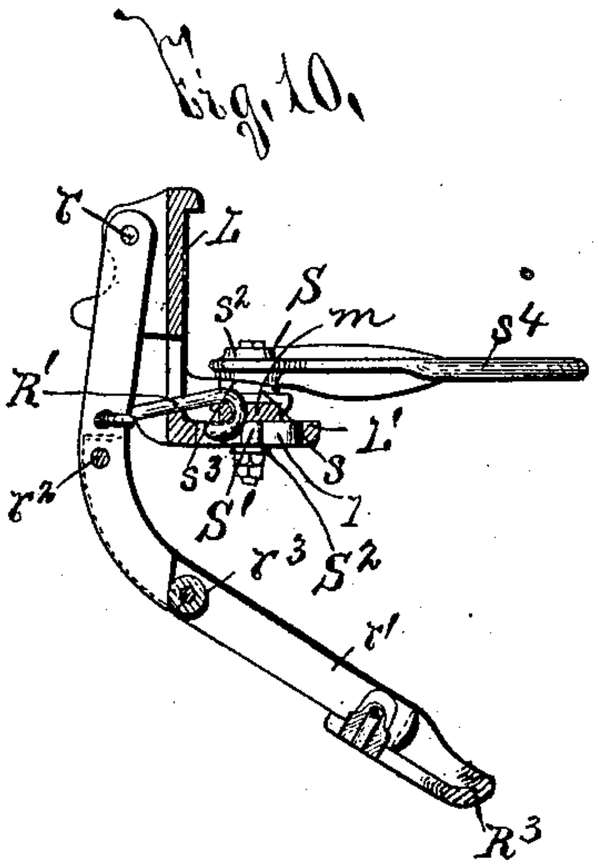


Fig. 13.

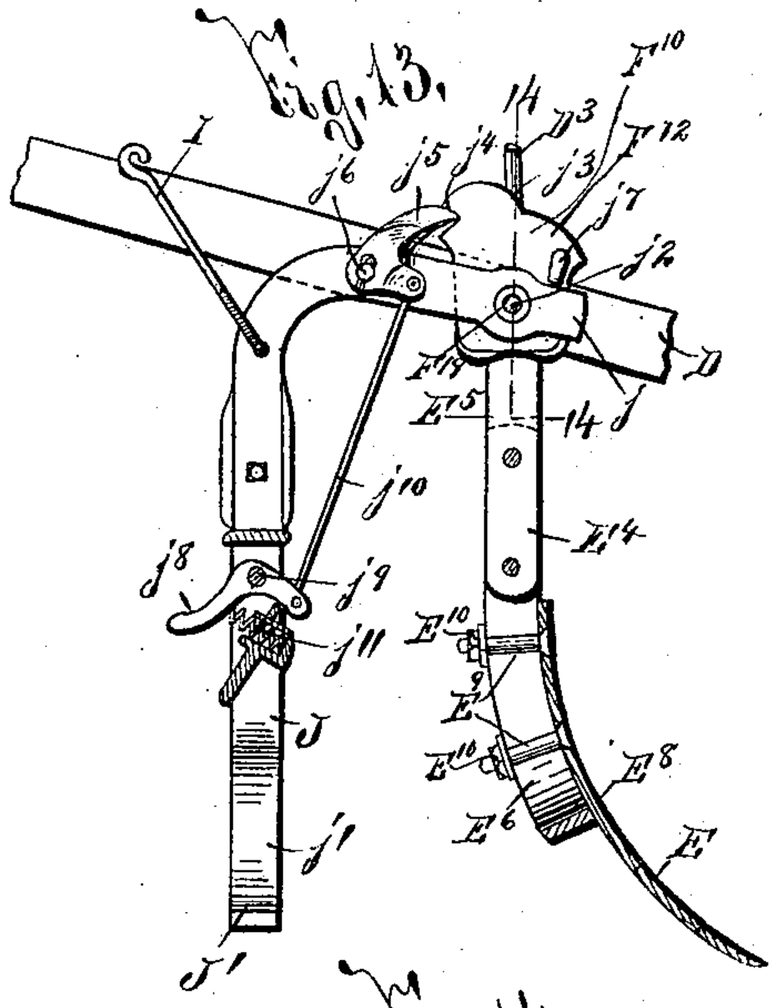
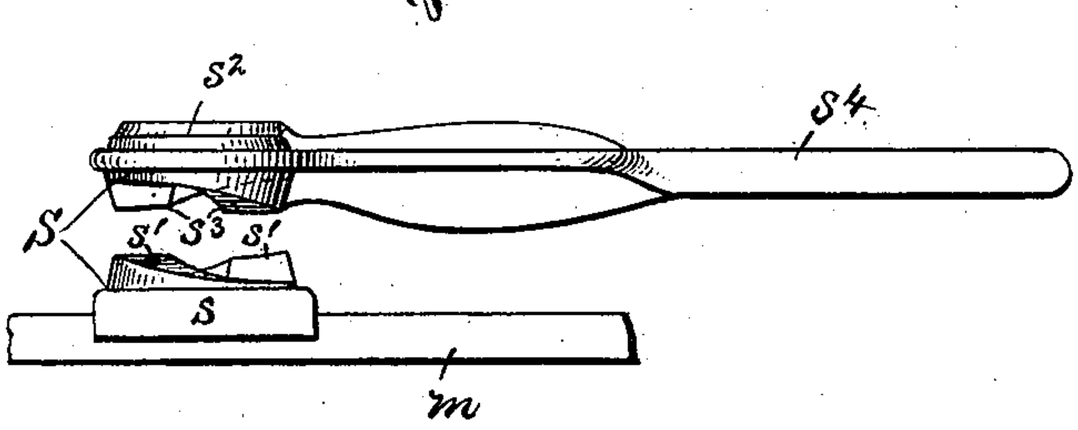


Fig. 11.



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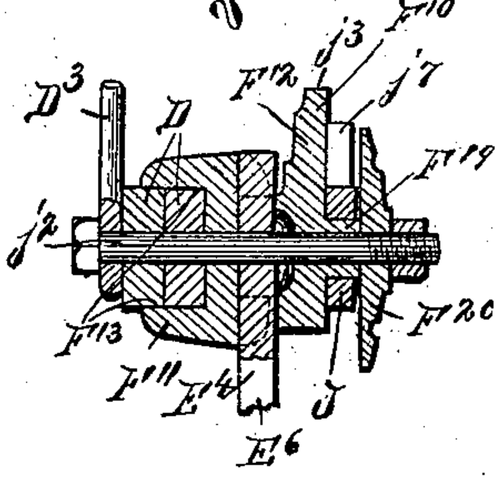


Fig. 12.

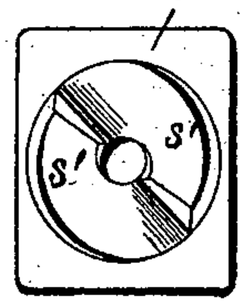
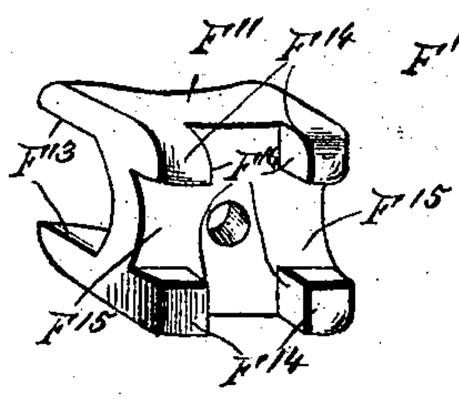


Fig. 15.



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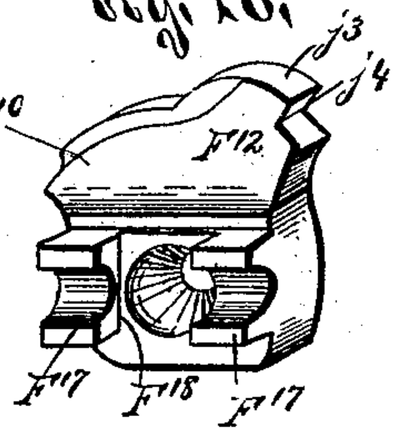
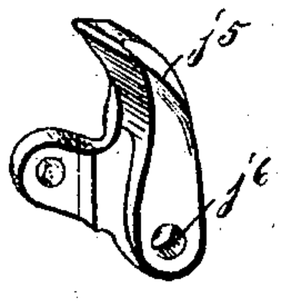


Fig. 17.



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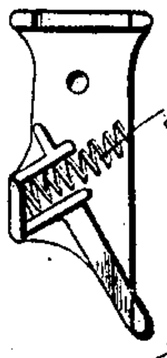

WITNESSES:
H. C. Chase,
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H. M. BURDICK.

CULTIVATOR.

No. 557,484. Patented Mar. 31, 1896.

Fig. 19.

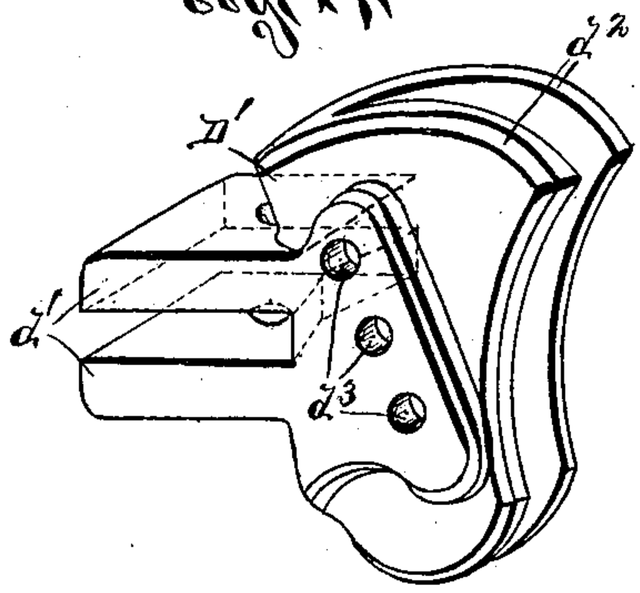
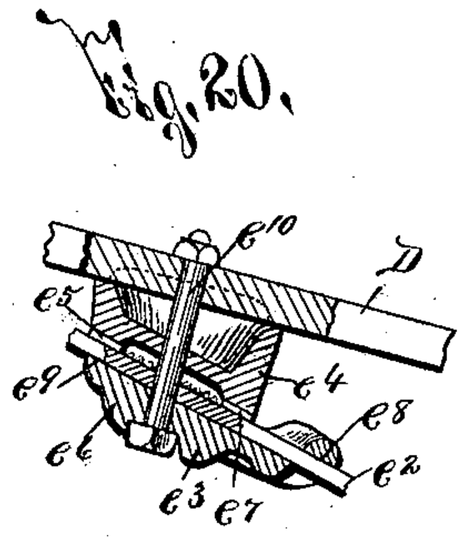


Fig. 20.



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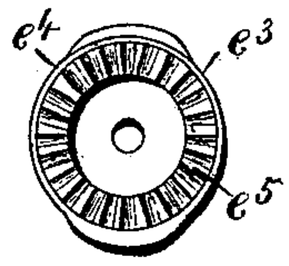

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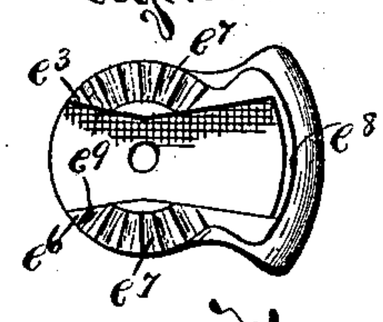

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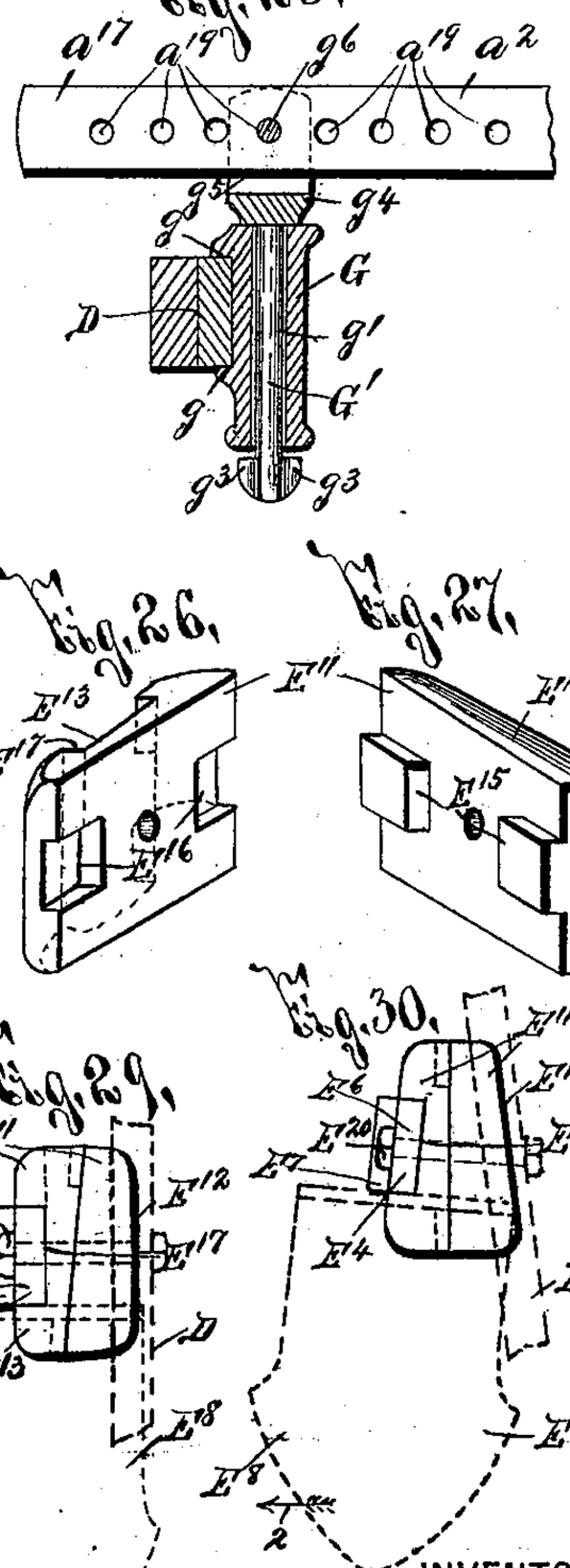

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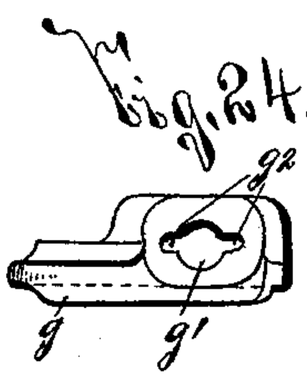

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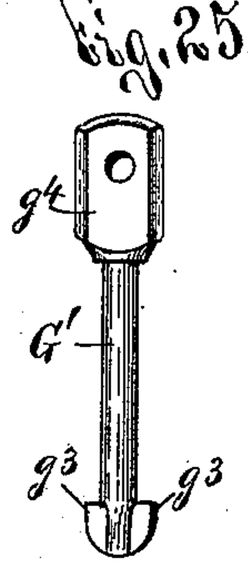
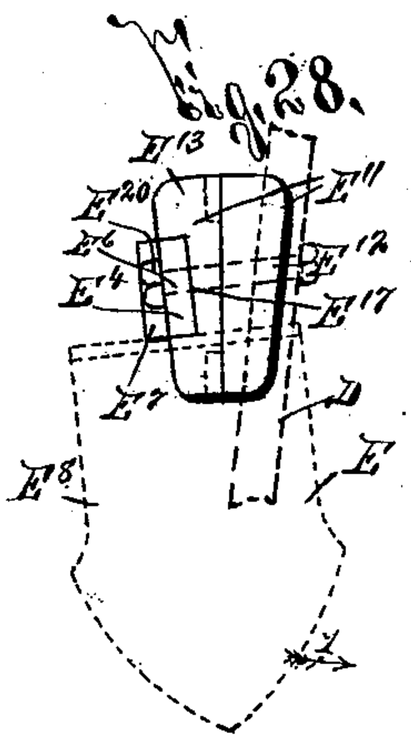


Fig. 26.

Fig. 27.

Fig. 28.



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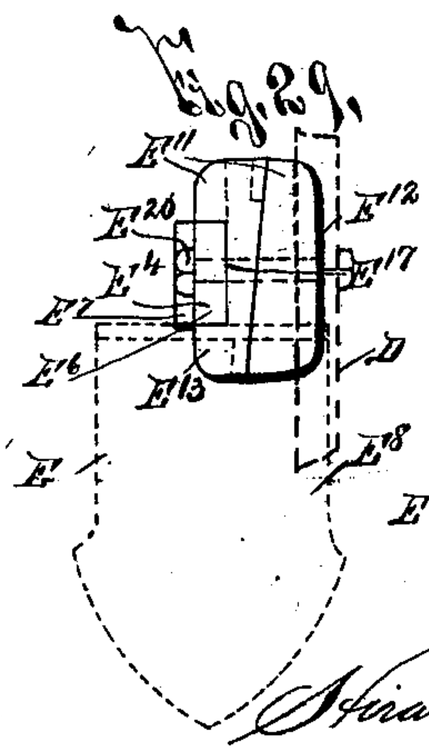

Fig. 30.

WITNESSES:

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INVENTOR

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H. M. BURDICK.

CULTIVATOR.

No. 557,484. Patented Mar. 31, 1896.

Fig. 31.

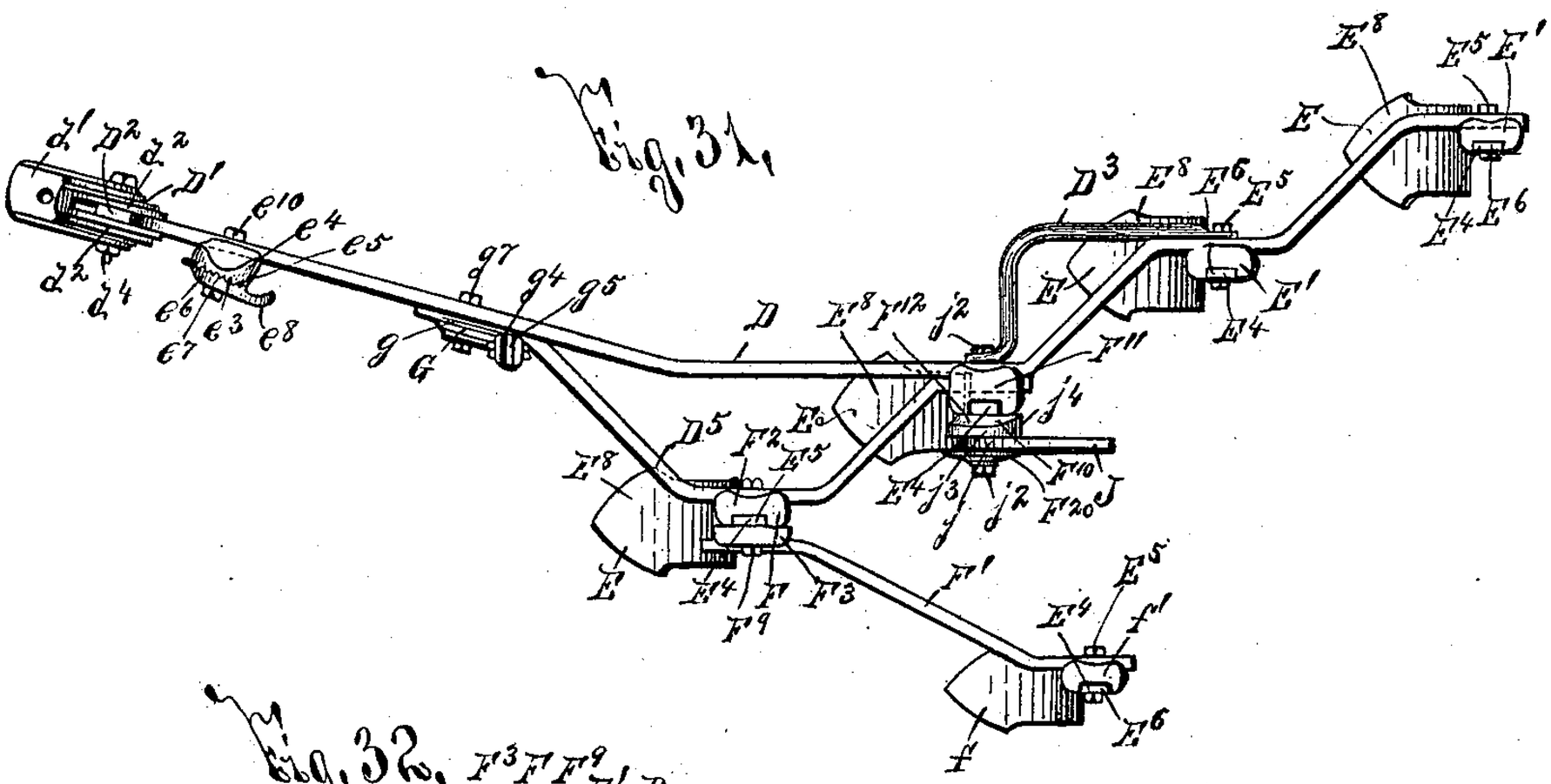


Fig. 32.

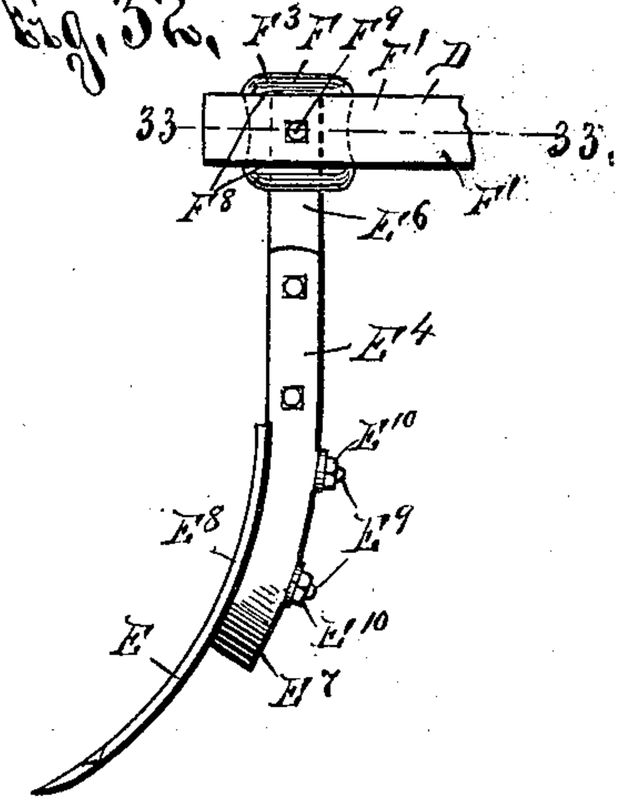


Fig. 33.

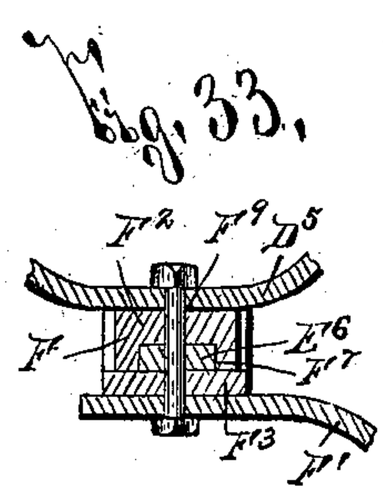


Fig. 34.

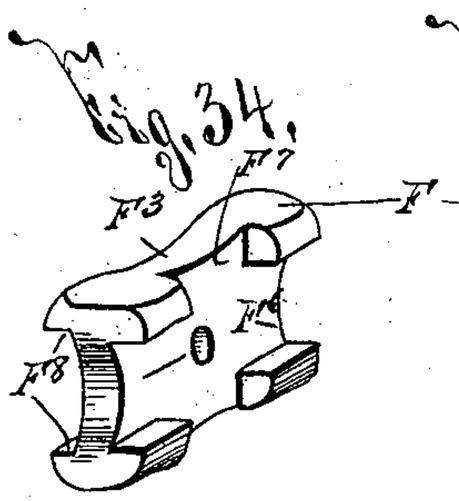
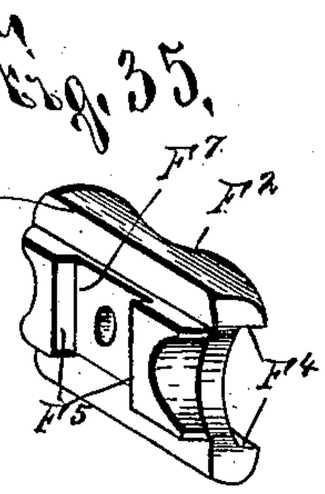


Fig. 35.



WITNESSES:

H. C. Chase,

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ATTORNEYS.

(No Model.)

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H. M. BURDICK.

CULTIVATOR.

No. 557,484. Patented Mar. 31, 1896.

Fig. 36.

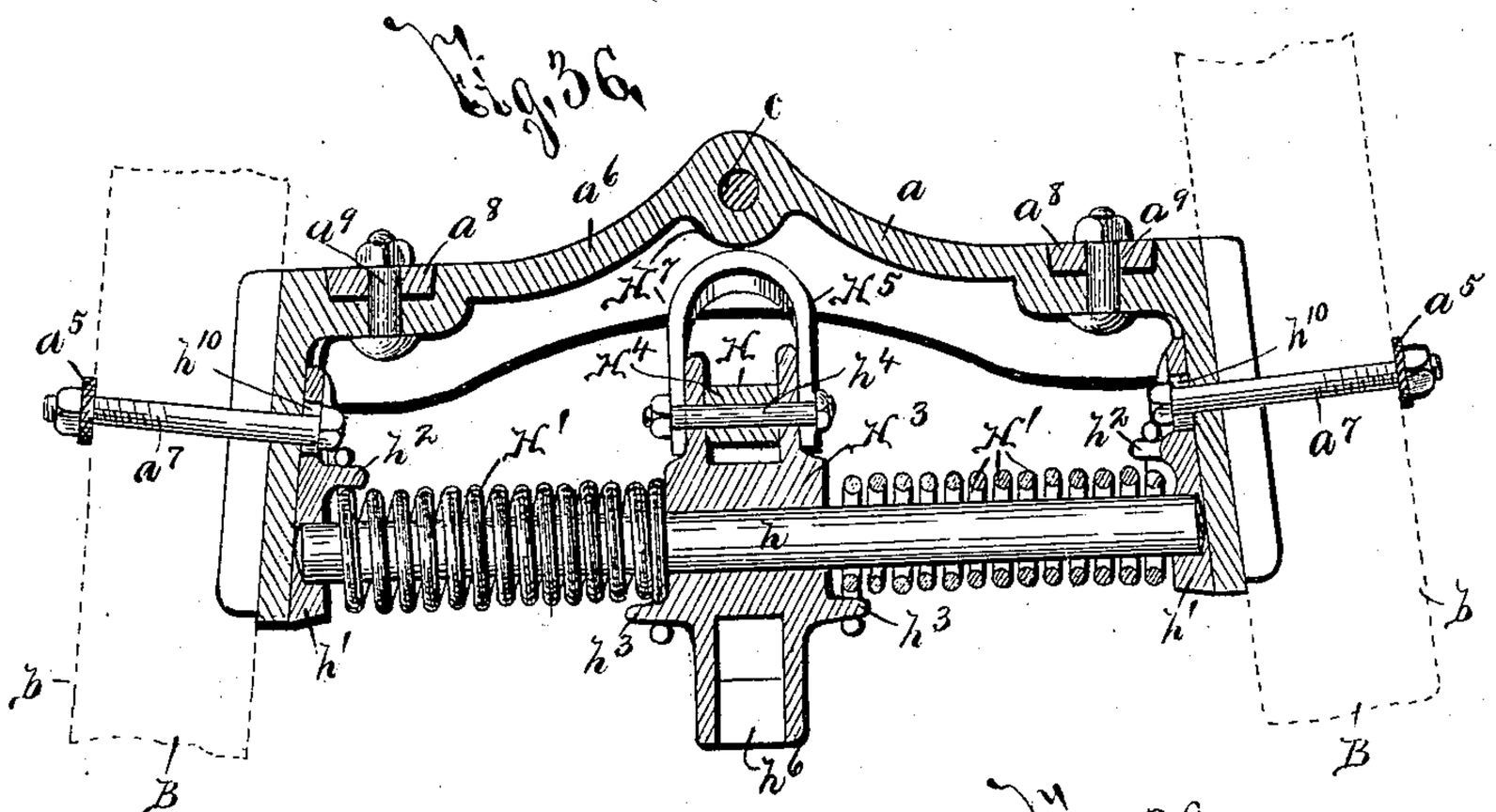
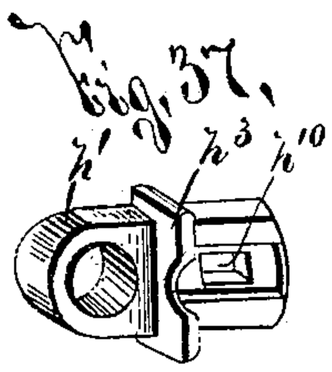


Fig. 37.



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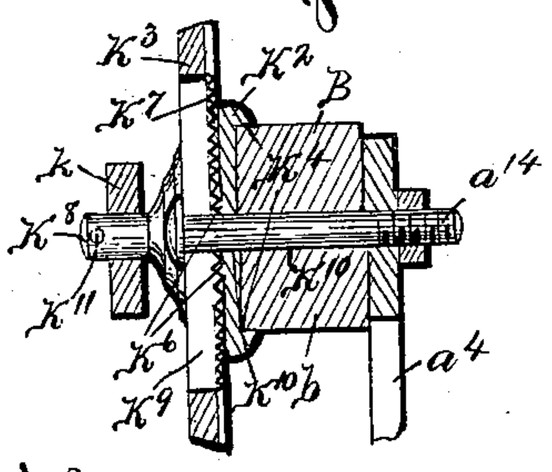


Fig. 39.

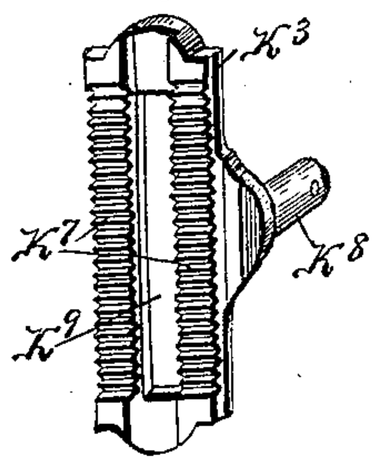


Fig. 40.

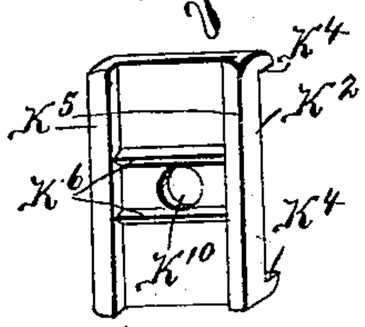
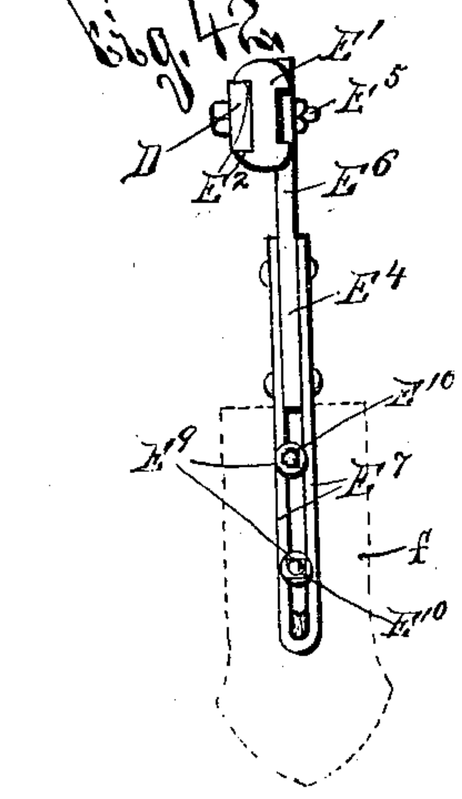


Fig. 41.

Fig. 42.



WITNESSES:

H. E. Chase,

L. Schoeneck.

INVENTOR

Hiram M. Burdick

BY

Wilkinson & Parsons

ATTORNEYS.

UNITED STATES PATENT OFFICE.

HIRAM M. BURDICK, OF SYRACUSE, NEW YORK, ASSIGNOR TO THE SYRACUSE CHILLED PLOW COMPANY, OF SAME PLACE.

CULTIVATOR.

SPECIFICATION forming part of Letters Patent No. 557,484, dated March 31, 1896.

Application filed December 29, 1892. Serial No. 456,618. (No model.)

To all whom it may concern:

Be it known that I, HIRAM M. BURDICK, of Syracuse, in the county of Onondaga, in the State of New York, have invented new and useful Improvements in Cultivators, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

My invention relates to improvements in cultivators of the class termed "wheel-cultivators," and has for its object the production of a simple, practical, and efficient device which is strong and light, pleasing in appearance, and capable of accommodation to varying conditions of soil; and it consists, essentially, in the general construction and arrangement of the parts of the cultivator, all as hereinafter more fully described, and pointed out in the claims.

In describing this invention reference is had to the accompanying drawings, forming a part of this specification, in which like letters indicate corresponding parts in all the views.

Figure 1 is a side elevation of my improved cultivator. Fig. 2 is an enlarged top plan view, partly in section, of the parts as shown at Fig. 1, the front end of the pole being broken away. Fig. 3 is a longitudinal vertical sectional view taken on line 3 3, Fig. 2. Fig. 4 is a front elevation of the detached frame of the cultivator and the drag-bars operatively secured thereto. Fig. 5 is a detail elevation, partly in section, of detached portions of the frame and one of the drag-bars shown as operatively secured thereto and as arranged with the points of its teeth entering the ground. Fig. 6 is a similar view to Fig. 5, the rear end of the drag-bar being illustrated as swung upwardly out of operative position. Fig. 7 is a top plan view of the drag-bars and the detached lower extremities of the frame-bars to which their forward ends are hinged, the drag-bars being shown as adjusted laterally into closer proximity to each other than at Fig. 2. Fig. 8 is a rear elevation, partly in section, of the detached flexible axle, its supporting-bracket and actuating-levers, and the clamp for holding the sections of the axle in their normal position, the clamp being shown as in its inoperative position. Fig. 9 is a top plan view of the parts as shown at Fig. 8, the axle being also shown by dotted lines as shifted from its normal position. Fig. 10 is a transverse vertical sectional view taken on line 10 10, Fig. 8. Fig. 11 is an enlarged elevation of the detached portions of the clamp for holding the flexible axle in its adjusted position. Fig. 12 is a top plan view of the under plate of said clamp. Fig. 13 is a vertical sectional view of a portion of one of the drag-bars shown in its elevated position and the elevating-lever for raising said drag-bar. Fig. 14 is a vertical sectional view taken on line 14 14, Fig. 13. Figs. 15 and 16 are isometric views of the detached clip-plates secured to the drag-bars for securing the tooth-shanks to said bars and engaging locking-dogs carried upon the elevating-levers for said drag-bars. Fig. 17 is an isometric view of the detached dog carried by each of said elevating-levers. Fig. 18 is a detail elevation of one of the plates mounted on the actuating-levers and forming supports for the engaging pieces or levers connected to the locking-dogs, also mounted on said elevating-levers. Fig. 19 is an isometric view of the detached clip or support for the forward end of one of the drag-bars. Fig. 20 is a horizontal sectional view taken on line 20 20, Fig. 3, illustrating clearly the clip for securing one of the fenders or guide-teeth to the drag-bars. Figs. 21 and 22 are elevations, respectively, of the inner faces of the inner and outer plates of the clip or support shown at Fig. 20. Fig. 23 is a detail vertical sectional view taken on line 23 23, Fig. 3, representing the connection for flexibly securing to one of the drag-bars one extremity of the straddle-bar between said drag-bars. Fig. 24 is a top plan view of the detached plate or socket secured to said drag-bar. Fig. 25 is an elevation of the detached pin or bar having one end mounted in the plate or socket shown at Fig. 24 and the other end adapted to support the adjacent extremity of the straddle-bar shown at Fig. 23. Figs. 26 and 27 are respectively isometric views of the outer and inner plates of a clip secured to one of the drag-bars for securing the tooth-shanks thereto, as clearly seen at Figs. 2 and 7. Figs. 28, 29, and 30 are top plan views representing the reversible outer plate of said clip or support as in its different positions for varying the

action of the tooth carried thereby. Fig. 31 is a top plan view of one of the detached drag-bars for illustrating a peculiar construction of clip adapted to secure to said bar an inner branch bar provided at its rear end with a digging-tooth. Fig. 32 is a side elevation of the clip shown at Fig. 31 for securing together said inner branch bar and drag-bar. Fig. 33 is an enlarged horizontal sectional view taken on line 33 33, Fig. 32. Figs. 34 and 35 are isometric views of the detached plates of said clip or support shown at Figs. 31, 32, and 33. Fig. 36 is an inverted horizontal sectional view taken on line 36 36, Fig. 3. Fig. 37 is an isometric view of one of the detached supports for the spring-carrying spindle shown at Fig. 36. Fig. 38 is a vertical sectional view taken on line 38 38, Fig. 3. Figs. 39 and 40 are isometric views of the detached plates of the clip for the seat-supporting bar shown at Fig. 38. Fig. 41 is a top plan view of the detached counterweight for the forward end of the cultivator-pole, and Fig. 42 is a rear view of one of the tooth-shanks and a clip for securing the same to the drag-bar.

The frame A of my improved cultivator consists of front and rear cross-bars a a', braces a^3 a^3 a^4 a^4 a^5 a^5, and a pole B composed of a pair of longitudinal side bars b b having their front ends approximated and their rear ends considerably separated and secured to the front and rear bars a a'. The front frame-bar a is formed with a central elevated portion a^6 disposed in a plane slightly above the corresponding portion of the rear bar a' and arranged with its opposite extremities secured by bolts a^7 a^7 to the adjacent surfaces of the separated pole-bars b b. The rear ends of the pole-bars b b are secured to the rear frame-bar a' on opposite sides of its center by suitable clip-plates b' b'. The outer or end sections a^8 a^8 of the front bar a are formed of metallic bars having, as shown at Fig. 4, upturned flatwise arms secured at their upper ends by bolts a^9 a^9 to the opposite ends of the central section a^6 of said front bar a and having lower arms a^{10} a^{10} arranged edgewise and extended laterally from the lower ends of the former arms in a substantially horizontal plane beneath the section a^6.

The lower ends of the braces a^3 a^3, Figs. 3 and 4, are secured by bolts a^{11} a^{11} to the outer ends of the depressed extremities or arms a^{10} a^{10} of the front frame-bar a, and the upper ends of said braces are secured by bolts a^{12} a^{12} to the opposite ends of the rear frame-bar a'. The braces a^4 a^4 are arranged in upwardly-inclining planes with their lower ends secured by bolts a^{13} a^{13} to the lower ends of the upturned arms of the front-frame-bar sections a^8 a^8 and their upper ends secured to the pole-bars b b by bolts a^{14} a^{14} at points between the front and rear frame-bars a a'. The braces a^5 a^5 are also arranged in upwardly-inclining planes with their lower ends secured by the bolts a^{11} a^{11}, previously described, to the depressed extremities or arms a^{10} a^{10} and their upper ends secured by the bolts a^7 a^7, also previously described, to the pole-bars b b. Interposed between the cross-bars a a' is an intermediate straddle-bar a^2, Figs. 1, 2, 3, 4, 5, 6, and 7, which is composed of a single metallic strip and is formed with an elevated central portion a^{15}, downwardly-extending arms a^{16} a^{16}, and laterally-extending extremities or arms a^{17} a^{17} adapted to be adjustably secured to the drag-bars, as presently described. This peculiar construction of frame is very light, is strong and durable, and presents a pleasing and neat appearance. Moreover, the elevated central portions of the front and intermediate cross-bars a a^2 permit the cultivator to ride over rows of vegetables or plants of considerable height without injury thereto, and the depressed extremities of said bars form a practical and convenient connection between the drag-bars.

The evener C, Figs. 1, 2, 3, and 4, is pivoted by a bolt c to the central section a^6 of the front cross-bar a, and is provided at its opposite ends with suitable eyes c' c'.

C′ C′ are upright bars having their upper ends flexibly secured to the eyes c' c' and their lower ends secured by links c^2 c^2 to eyes c^3 c^3 hinged to the depressed extremities or arms a^{10} a^{10} of the front cross-bar a.

C^2 C^2 are whiffletrees flexibly and adjustably connected by links c^4 c^4 to perforations c^5 c^5 provided one above the other in the central portions of the upright bars C′ C′. This peculiar connection of the whiffletrees to the frame, consisting of the links c^4 c^4 and the flexibly-supported bars C′ C′, permits the greatest possible freedom of the horses or animals hitched to my improved cultivator without impairing its easy action.

D D, Figs. 1, 2, 3, 5, 6, 7, and 30, are the drag-bars, which are so mounted upon the frame A that both their front and rear ends are adjustable laterally and vertically. As best seen at Fig. 7, the arms a^{10} a^{10} of the front frame-bar a are formed with a series of perforations a^{18} for receiving bolts d d, passed also through ears d' d' formed upon clips or supports D′ D′ secured to the front ends of the drag-bars D D. These ears d' d' bear against the upper and lower faces of the arms a^{10} a^{10}, and, as the bolt d is vertically disposed, the clips or supports are free to swing in a horizontal plane, thus permitting lateral movement of the rear ends of the drag-bars.

At the rear ends of each of the clips or supports D′ D′ are separated upright ears d^2 d^2, which are of considerable height and width and are provided with a series of apertures d^3 d^3 arranged one above the other. Interposed between said ears d^2 d^2 are upturned ends or arms D^2 D^2, which are of substantially the same length as the height of said ears d^2 d^2 and are formed upon the drag-bars D D.

Suitable bolts d^4 d^4 are passed through openings d^5 d^5 in the arms D^2 D^2 and through the openings d^3 d^3 in the ears d^2 d^2, thus hinging the upturned ends D^2 D^2 to the clips or sup-

ports D′ D′ for permitting vertical adjustment of the rear ends of the drag-bars. The forward ends of said drag-bars may be adjusted vertically by removing the bolts d^4 d^4 and replacing them in perforations d^3 d^3 above or below the ones in which they were previously supported. This peculiar form of the clips or supports and the upturned ends on the forward extremities of the drag-bars greatly facilitates an easy and practical movement of the drag-bars, and owing to the height and width of the ears d^2 d^2 of the clips or supports D′ D′ and the length of the upturned ends or arms D^2 D^2 of the drag-bars D D the front ends of said bars are not liable to rock laterally between the ears d^2 d^2, and consequently the strain upon the bolts d^4 d^4 is reduced to a minimum.

The teeth carried by the drag-bars D D may be of any desirable construction to operate in any required and practical manner upon the soil, and, as here illustrated, I have shown ordinary cultivator-teeth E E, fenders or guards e e, and central cultivating or harrowing teeth f f.

G, Figs. 1, 2, 3, 4, 5, 6, and 23, represents oppositely-arranged clips or supports formed with shoulders g g for engaging the drag-bars D D and with upright lengthwise sockets g' g' having their lower ends formed of greater width than their upper ends and provided with outwardly-extending grooves g^2 g^2.

G′ G′ are pins or bars mounted within the sockets g' g' and provided at their lower ends with wings g^3 g^3, which register with the grooves g^2 g^2 when said pins or bars are entering the sockets g' g' and are moved out of registration with said grooves when said pins or bars are in their normal position, as clearly shown at Fig. 23.

Upon the upper end of each of the pins or bars G′ G′ is a head g^4 provided with an upright slot g^5 extending downwardly from the upper edge of said head, and mounted in said slot is the adjacent extremity or arm a^{17} of the intermediate straddle-bar a^2. A bolt g^6 is passed through one of a series of perforations a^{19} in said depressed extremity or arm a^{17} and through the head g^4, and serves to firmly and adjustably secure said extremity of the straddle-bar a^2 to said pin or bar G′, and consequently serves to secure the straddle-bar a^2 to the drag-bar D, to which said pin or bar G′ is flexibly secured by the corresponding clip or support G. The intermediate straddle-bar a^2 is thus adjustably and flexibly connected at its opposite depressed extremities a^{17} a^{17} to corresponding portions of the separated drag-bars D D, and consequently the drag-bars are free to move upwardly, as shown at Fig. 6, without rocking the intermediate straddle-bar a^2 from a vertical plane.

As the drag-bars D D are forced laterally, as presently described, the intermediate straddle-bar a^2 holds said drag-bars at the required separation, and if desired to separate or approximate the rear ends of the drag-bars the bolts g^6 g^6 are readily removed and registered with apertures a^{19} a^{19} on either side of the apertures in which they were previously supported.

The drag-bars D D are constructed so as to move laterally in order that the teeth may be shifted out of their ordinary path for escaping stones, stumps, &c., and for preventing injury to the vegetables or plants, for the cultivation of which my invention is being used.

To facilitate the ready lateral movement of the drag-bars, they are each provided with stirrups D^3 D^3 adapted to support the rider's feet, and each consisting of metallic bars suitably secured to the drag-bars by the bolts E^5 E^5, which, as presently described, secure the two adjacent cultivator-teeth to said drag-bars.

In order that the cultivator may operate efficiently, I force the drag-bars D D downwardly by a spring-actuated lever or pivoted bar H, which is so connected to the bar a^2 that it either permits the lateral movement of said bar when the drag-bars move laterally or locks the bar a^2 from sidewise movement, and thus prevents lateral movement of the drag-bars, or else permits of its disengagement from the bar a^2 for enabling the cultivator-teeth to operate without a constant spring-pressure to force them into the earth.

The front end of the lever H, as best seen at Figs. 2, 3, and 36, is mounted upon a spindle h having its opposite ends supported in plates h' h', Figs. 36 and 37, which are adjustably secured to the elevated central section a^6 of the front bar a by the bolts a^7 a^7 previously described, the inner ends of which pass through slots h^{10} in the forward ends of said plates. Surrounding the opposite ends of the spindle or pivotal pin h are springs H′ H′ having their outer ends engaged with shoulders h^2 h^2, Figs. 36 and 37, on the supporting-plates h' h' and their inner ends engaged with similar shoulders h^3 h^3 upon the lever H. The springs H′ H′ tend constantly to force the free or rear end of the lever H downwardly, and, as clearly seen at Figs. 2 and 3, this end of the lever H engages a bracket H^2 extending forwardly from the central elevated portion a^{15} of the intermediary straddle-bar a^2.

The lever H is preferably composed of the front section H^3, which is mounted directly upon the spindle or pivotal bar h, and the rear section H^4 having one extremity pivoted at h^4 to the adjacent end of the section H^3 and the other extremity formed with a downturned end h^6 for engaging the bracket H^2 on the intermediary straddle-bar a^2. The central portion of the rear section H^4 bears against the under face of a cross-bar h^6 upon the section H^3. The bracket H^2 is formed at its front edge with an elongated bearing or slot h^7, Fig. 7, and with separated upright shoulders h^8 h^8 at the rear of the slot h^7. At

Figs. 2, 3, and 6 the downturned end h^5 of the lever H is shown as registered with the bearing or slot h^7, and consequently the drag-bars D D and the straddle-bar a^2 are free to move laterally.

If desired to register the rear end of the lever H with the shoulders h^8 h^8, the downturned end h^5 of the lever H is slightly elevated against the action of the springs H′ H′, and the elevated central portion a^{15} of the straddle-bar a^2 is swung forwardly until the cross-bar h^9 of the bracket H^2 carrying the shoulders h^8 h^8 is in advance of the front face of the downturned end h^5 of the lever H, whereupon the rear end of the lever H is permitted to descend slightly by the action of the springs H′ H′ until it rests upon the cross-bar h^9 between the shoulders h^8 h^8, and thus firmly locks the drag-bars D D and the straddle-bar a^2 from lateral movement. When desired to entirely release the lever H from the straddle-bar a^2, the rear end of said lever is rocked upwardly and disengaged from the bracket H^2, which is rocked backwardly, and the rear end of said section H^4 swings downwardly on the pivot h^4.

In order to release the rear section H^4 of the lever H from the strain of the springs H′ H′ when said section is disengaged from the bracket H^2, I hinge an arm H^5 to the front end of the lever H by the bolt h^4 previously described. The lower end of this arm H^5, which is illustrated in its normal position at Fig. 3, is swung downwardly beneath a shoulder H^7 on the elevated section a^6 of the frame-bar a as the rear end of the lever H is rocked upwardly to disengage the same from the bracket H^2, and the arm H^5 is then rocked forwardly beneath the shoulder H^7, as shown by dotted lines at Fig. 3 and by full lines at Fig. 36, until its upper edge bears against the under face of said shoulder and prevents the action of the springs H′ H′, whereupon the section H^4 is free to swing upon its pivot h^4 when desired to use the drag-bars D D without the downward action caused by the engagement of the lever H with the bracket H^2.

It is evident that the described construction for yieldingly forcing the drag-bars downwardly with considerable force, and at the same time locking said bars from lateral movement, or permitting them to move laterally, or for permitting said bars to operate without a downward pressure, is particularly simple, practical, and efficient, and that it is compact, is in convenient position, and is pleasing in appearance.

I I are supports for the rear ends of the drag-bars D D. As preferably constructed these supports are flexible, and consist of metallic chains having their upper ends provided with a series of links, which removably engage arms or engaging-shoulders i i upon the clip-plates b' b' for securing the rear ends of the pole-bars b b to the rear frame-bar a'. The lower ends of said supports are attached indirectly to the rear ends of the drag-bars D D by elevating-levers J J connected to said bars for raising their rear extremities.

The length of the supports I I is readily adjusted at will by disengaging their upper ends from the arms or shoulders i i and engaging with said arms links of said chain above or below the former links engaged therewith, and by adjusting the length of said supports the amount of projection of the cultivator-teeth within the soil is easily regulated.

As previously stated, the front ends of the drag-levers D D are adjusted laterally upon the depressed extremities or arms a^{10} a^{10} of the front frame-bar a, and when the front ends of said drag-bars are in their inner position the lower ends of the supports I I are, as shown at Fig. 7, attached to outwardly-projecting arms I′ I′ formed or provided upon the outer faces of the central portions of the levers J J.

The levers J J, Figs. 1, 2, 3, 5, 6, 7, and 13, are each formed with a downturned forward end j and a rearwardly-extending extremity j' normally disposed in a plane substantially parallel with the plane of the adjacent drag-bar when in its inoperative low-down position. The lower end of the adjacent support I is attached to the lever J at a point slightly at the rear of its forward downturned end j.

j^2 j^2 are bolts for hinging the lower ends of the elevating-levers J J to the drag-bars D D, and F^{12}, Figs. 14 and 16, is a clip-plate formed along its upper edge with a cam-face j^3 and with a locking-shoulder j^4, and formed also with shoulders projecting from one side face for engaging a tooth-shank adapted to be secured to the drag-bar at this point and engaging and interlocking with the clip-plate F^{11} of the clip F^{10}, presently described, for securing the tooth-shank and said plate F^{12} to the drag-bar.

j^5 j^5 are locking dogs or levers having their upper ends hinged at j^6 j^6 to the lower ends of the levers J J at points above the cam-face j^3 and having their lower ends adapted to ride upon said cam-faces and engage the locking-shoulders j^4 j^4 when the levers J J are rocked to their operative position and the drag-bars D D are elevated out of operative position.

The levers J J are formed at their rear ends with foot-engaging portions J′ J′ in suitable proximity to the seat K, presently described, and as the operator depresses the rear ends of the levers J J said levers swing upon the lower ends of the supports I I as pivots and force upwardly by the elevation of their forward ends the drag-bars D D. The rear ends of the drag-bars D D and the normally-depressed ends of the levers J J continue their upward movement until the extremities of the levers J J encounter stop-shoulders j^7 j^7 upon the outer faces of the clip-plates F^{12} F^{12}, as shown at Figs. 6 and 13.

As the stop-shoulders j^7 j^7 are encountered by the extremities of the levers J J the free ends of the locking-dogs j^5 j^5, which have been

elevated by the cams j^3 j^3, immediately drop into engagement with the locking-shoulders j^4 j^4, as shown at Figs. 6 and 13. This downward movement of the free ends of the dogs j^5 j^5 is facilitated by springs j^{11} j^{11}, presently described.

Upon each of the levers J J is a lever or disengaging-piece j^8, which is pivoted to said lever at j^9, is connected by a link j^{10} with the locking-dog j^5 carried by said lever, and is forced to its normal position by a suitable spring j^{11} bearing thereagainst.

As best seen at Figs. 6 and 13, the outer ends of the disengaging-levers j^8 j^8 extend beyond the normal upper face of the levers J J and are in convenient access to the operator's feet, and as he depresses the outer ends of said levers j^8 j^8 the links j^{10} j^{10} rock the dogs j^5 j^5 out of engagement with the shoulders j^4 j^4 and the drag-bars D D and levers J J assume their normal position, as clearly seen at Fig. 3.

The drag-bars D D may be elevated and depressed simultaneously or singly, as may be desired, and when in their elevated position are firmly supported and not liable to be prematurely dropped to their operative position. This construction of mechanism for raising and lowering the drag-bars D D is very simple and efficient and is evidently practical, since thereby the height and operation of the drag-bars are entirely under the control of the operator.

The fenders or teeth *e e* previously mentioned, Figs. 1, 2, and 3, are supported on opposite sides of the central longitudinal vertical plane of the cultivator and are designed for preventing injury to the vegetables or plants being cultivated by the piling or forcing of the earth thereagainst by the inner cultivator-teeth E E. These fenders or guard-teeth *e e* are attached at *e′ e′* to shanks e^2 e^2, Fig. 2, the forward ends of which are secured by clips e^3 e^3 to the forward ends of the drag-bars D D. Each of the clips e^3 e^3, as best seen at Figs. 2, 3, 5, 6, 7, 21, and 22, consists of an inner plate e^4, formed on its inner face with shoulders for engaging the upper and lower edges of the corresponding drag-bar and on its outer face with a circular series of engaging-teeth e^5 e^5, and an outer plate e^6 formed on its inner face with a similar series of teeth e^7 e^7 adapted to engage the teeth e^5 e^5. At the rear ends of the outer clip-plates e^6 e^6 of the clips or supports e^3 e^3 are upright slots e^8 e^8, and extending forwardly from said slots on the inner faces of the plates e^6 e^6 are grooves e^9 e^9. The forward ends of the shanks e^2 e^2 are passed through the slots e^8 e^8 into the grooves e^9 e^9, and are thus interposed between the outer and inner plates of said clips or supports e^3 e^3. Bolts or other similar clamps e^{10} e^{10} are passed through the separated plates of the clips e^3 e^3 and through the fender-shanks e^2 e^2 and the drag-bars D D, thus firmly securing said clips or supports to the drag-bars and the shanks e^2 e^2 to said clips. The shanks e^2 e^2 are thus free to oscillate upon the bolts e^{10} e^{10}, but their movement is limited by the length of the slots e^8 e^8.

If desired to adjust the fenders or teeth *e e*, the bolts e^{10} are loosened and the rear ends of the outer clip-plates are rocked upwardly or downwardly, and, when desired, the fenders or teeth *e e* may be entirely removed.

The ordinary form of clip E′ for securing the cultivator-teeth E E to the drag-bars D D is best seen at Figs. 2, 3, 5, 6, and 7, and consists of a single plate having substantially horizontal shoulders E^2 E^2 on its inner face for engaging the upper and lower edges of one of the drag-bars and substantially vertical shoulders E^3 E^3 on its outer face, between which is interposed the tooth-shank E^4 of said cultivator-teeth. Bolts E^5 E^5 are passed through said shank, clip-plate, and drag-bar and firmly secure said parts together, and, as previously stated, the bolts E^5 E^5 for securing to the drag-bars the cultivator-teeth adjacent to the ends of the bars forming the stirrups D^3 D^3 also secure the ends of said bars in position.

As best seen at Fig. 42, the shanks E^4 E^4 of the ordinary cultivator-teeth consist of a central bar E^6, having its upper extremity interposed between the shoulders E^3 E^3, and a folded bar E^7 having its opposite ends arranged on opposite sides of the lower end of the upper bar E^6. Secured to the blade E^8 of said ordinary cultivator-teeth are bolts or studs E^9, which are passed through the lower end of the cultivator-shank E^4, between the folds of the bar E^7, and are each provided with a nut E^{10} for engaging the rear edges of said bar E^7 and firmly securing the blade in position. This is a particularly simple, practical, and efficient construction of tooth-shank, since it is economically manufactured, permits of a ready adjustment of the tooth-blade, and is strong and durable in use.

The drag-bars D D are each formed with the inner branches D^5 D^5, Figs. 2, 3, 4, 5, 6, and 7, having their opposite ends secured to the bars D D by the bolts g^7 g^7 and j^2 j^2, and, as best shown at Figs. 2, 3, and 5, the central portion of each of said branches D^5 D^5 forms a support for the front or inner cultivator-tooth when my invention is used for cultivating on opposite sides of a row. The teeth are secured to these branches by clips E^{11} E^{11}, and, as it is sometimes desirable in the practical use of my invention to cultivate the earth without throwing more of the soil at one side of the tooth than at the other and sometimes to cultivate by throwing the earth against or from the row, the clips E^{11} E^{11} are of peculiar construction, being formed of separable sections E^{12} E^{13}, as best seen at Figs. 26, 27, 28, 29, and 30. The section E^{12} is formed on one face with shoulders E^{14} E^{14}, adapted to engage the upper and lower edges of the frame-bar branch D^5, and on its opposite face with projecting shoulders E^{15} E^{15} having their adjacent edges separated one

from the other. The face of the clip-plate E^{13} adjacent to the clip-plate E^{12} is formed with separated notches or grooves E^{16} E^{16} for receiving and interlocking with the projections E^{15} E^{15}, and the opposite face of said clip-plate is formed with an upright groove E^{17} for receiving the shank E^4 of the adjacent cultivator-tooth E. The bolt E^{20}, which secures this tooth in position, is passed through the clip-sections E^{12} E^{13} and the bar D, and thereby firmly secures the clip E^{11} in operative position.

As clearly seen at Figs. 26, 27, 28, 29, and 30, the adjacent faces of the clip-plates E^{12} E^{13} are inclined, and the opposite extremities of said plates are of unequal width.

As shown at Fig. 28, the clip-plates E^{12} E^{13} are so arranged that their narrow extremities are in advance of their opposite extremities, and consequently the tooth E is so supported as to throw the earth inwardly, as indicated by arrow 1.

At Fig. 30 the clip-plates E^{12} E^{13} are shown as reversed, their narrow extremities being at the rear, and consequently the tooth throws the soil outwardly, as indicated by arrow 2.

At Fig. 29 the clip-plate E^{12} is shown in the same position as at Fig. 30 and the outer plate E^{13} as at Fig. 28, and it will be readily perceived that the tooth E is therefore held in a plane at substantially right angles to the line of draft and throws the earth equally from its opposite edges.

It is frequently desirable, especially when my cultivator is designed to act as a harrow, to support harrow or digging teeth in the center of the cultivator, and consequently the clips E^{11} E^{11} are removed and replaced by the clips F F, (best seen at Figs. 31, 32, 33, 34, and 35,) which consist of separable plates F^2 F^3. These clips are so constructed as to support cultivator-teeth E E and the forward extremities of inwardly-extending branch bars F′ F′, provided at their rear ends with the harrow-teeth *f f*.

The clip-plates F^2 are provided on one face with shoulders F^4 F^4 for engaging the upper and lower edges of the adjacent drag-bars, and on the other face with a substantially horizontal rib or shoulder F^5, formed with a substantially vertical groove F^7. The clip-plates F^3 are provided on one face with a substantially horizontal groove F^6 for receiving the rib or shoulder F^5 on the adjacent face of the plate F^2, and with a substantially vertical groove F^7, registering with the correspondingly-lettered groove F^7 on said adjacent face of the clip-plate F^2, and said plate F^3 is provided on its opposite face with shoulders F^8 F^8, adapted to engage the upper and lower edges of the front or outer end of the harrow-tooth-carrying bar or trailer F′.

A suitable bolt F^9 is passed through the bar F′, the plates F^2 F^3, and a cultivator-tooth shank E^4 passed between the plates F^2 F^3, through the grooves F^7 F^7. The harrow-tooth *f* is secured to the rear or inner end of the bar or trailer F′ by a clip *f*′ of any desirable form, size, and construction. (Here shown as the same form of clip E′ used for securing the ordinary cultivator-teeth to the drag-bars D D.)

The clips F^{10} F^{10}, Figs. 2, 3, 5, 6, 7, 13, 14, 15, 16, and 31, for securing the levers J J to the drag-bars D D and for supporting cultivator-teeth E E at the point of securement of said levers J J consist, essentially, of the plates F^{11} F^{12}, previously described. Each of the plates F^{11} F^{11} is formed on one face with shoulders F^{13} F^{13} adapted to engage the under and lower faces of the adjacent drag-bar D and the rear end of its branch D^5, previously mentioned, and is formed on its opposite face with the rectangularly-arranged separated shoulders F^{14} F^{14}, forming grooves F^{15} F^{16}, crossing each other at an angle. The plate F^{12} is formed on its inner face with a hub F^{19} and on its opposite face with a rib F^{17}, which is adapted to enter the groove F^{15} and to engage the shoulders F^{14} of the plate F^{11}, and is formed with a substantially vertical groove F^{18} alined with the groove F^{16} of the plate F^{11}.

The shanks E^4 of the cultivator-teeth E, supported by the clips F^{10}, are passed within the grooves F^{16} F^{18}, the levers J are journaled on the hubs F^{19}, suitable washers F^{20} are placed at the outside of these levers, and said parts are firmly secured together by the bolt j^2 previously described.

The constructions of clips, previously described, for securing the cultivator-teeth and the branches of the tooth-supporting bars to the drag-bars are particularly economical in manufacture, simple and efficient in operation, and are strong and durable in use, and greatly add to the efficiency and practicability of my improved cultivator.

The seat K, Figs. 1, 2, and 3, is of any desirable construction, and is mounted on a suitable support or standard, which preferably consists of a pair of metallic bars *k k*, having their front extremities considerably separated and secured by clips K′ K′ to the pole-bars *b b*, and having their rear extremities connected together by an integral bar *k*′, thereby forming a longitudinal slot beneath the seat. Movable along the rear or outer ends of the bars *k k* is a cross-bar k^2, to which is secured one end of a bolt k^3, passed between the bars *k k* and having its opposite end secured to the seat K. The seat K is thus readily adjustable along its supporting-bars *k k* by loosening the bolt k^3 and sliding the seat and its clamping cross-bar k^2 lengthwise of the bars *k k*. As best seen at Fig. 3, the forward ends of the bars *k k*, in addition to their support by the clips K′ K′, rest upon the top edge of a bracket L, secured to the central portion of the rear frame-bar *a*′. The clips K′ K′, as best seen at Figs. 2, 3, 38, 39, and 40, consist of the plates K^2 K^3, adjustable lengthwise of each other. Each of the plates K^2 is formed

on one face with shoulders K^4 K^4, adapted to bear against the top and bottom edges of the adjacent pole-bar *b*, and on the other face with upright or lengthwise ribs K^5 K^5, and with locking ribs or teeth K^6 K^6, extending transversely across the plate K^2 between said ribs K^5 K^5. The adjacent plate K^3 is movable between the ribs K^5 K^5, is formed on one face with cross-ribs or teeth K^7 K^7 for engaging the teeth K^6 K^6 of the corresponding plate K^2, and is formed on the other face with a projecting stud or arm K^8.

The central portions of the plates K^3 K^3 are formed with slots K^9 K^9, through which are passed bolts a^{14} a^{14}, previously described, which secure the braces a^4 a^4 to the pole-bars *b b*. The heads of the bolts a^{14} a^{14} bear against the outer faces of the plates K^3 K^3, and said bolts are passed through perforations K^{10} K^{10} in the plates K^2 K^2 and through the pole-bars *b b* and the adjacent ends of the braces a^4 a^4 and firmly secure said clips K′ K′ in position.

The ends of the seat-supporting bars *k k* are journaled on the studs or arms K^8 K^8, and are held from disengagement by suitable cotter keys or shoulders K^{11} K^{11}. When desired to adjust the elevation of the seat to the rider, in order that his feet may be supported conveniently near the stirrups D^3 D^3 of the drag-bars D D and the foot-engaging portions J′ J′ of the levers J J, the bolts a^{14} a^{14} are loosened, the clip-plates K^3 K^3 are moved upwardly or downwardly the desired distance, and the bolts a^{14} a^{14} are then tightened. It is thus evident that the seat-supporting bars *k k* are supported essentially upon the frame-bar *a′* as a fulcrum, and are hinged to the rear ends of the pole-bars *b b*.

The forward ends of the pole-bars *b b* are so arranged as to be in close proximity, and a suitable counterbalance B′, Figs. 1 and 41, is secured to said forward extremities for balancing the weight of the rider upon the seat K. In order that the counterbalance may have the greatest possible force with the least amount of weight and may present a pleasing appearance, it is secured at the extreme ends of the pole-bars *b b*, and consists of a lengthwise narrow body portion or rib B^2 interposed between the ends of the pole-bars *b b* and lengthwise shoulders B^3 B^3 along the top edges of the body portion or rib B^2 for resting upon the top edges of the front extremities of said pole-bars *b b*. Suitable bolts or screws B^4 B^4 securely clamp the forward ends of the pole-bars against the opposite sides of the counterweight and firmly fasten said counterweight in position.

In order that my improved cultivator may be more entirely under the control of the operator, the axle M for the wheels M′ M′ is flexible and is composed of the central section *m* and the outer sections *m′ m′*, as best seen at Figs. 8 and 9. The central section is pivoted at m^2 to the bracket L, and is provided at its opposite extremities with depending studs or projections m^3 m^3 secured thereto by bolts m^4 m^4. The studs m^3 m^3 are formed at their upper extremities with annular shoulders m^5 m^5 and at their lower extremities with V-shaped grooves m^6 m^6. Beneath the lower ends of these studs or projections m^3 m^3 are shoulders m^7 m^7 of greater length than width, movably mounted upon and supported by the bolts m^4 m^4. The outer axle-sections *m′ m′* are formed with inwardly-extending arms m^8 m^8, and these arms are provided with elongated slots m^9 m^9 adapted to receive the studs m^3 m^3.

In assembling the axle-sections the movable shoulders m^7 m^7 are arranged so as to extend lengthwise of the arms m^8 m^8, and after the shoulders are forced through the slots m^9 m^9 the said shoulders are swung to their operative position out of alinement with the slots m^9 m^9, and V-shaped projections on the upper faces of said shoulders engage the grooves m^6 m^6, as clearly illustrated at Fig. 8. The outer axle-sections *m′ m′* are formed with upright slightly-tapering sockets m^{10} m^{10} adapted to receive similarly-shaped spindles *o o* formed upon brackets O O secured by bolts *o′* or other suitable fastening means to the opposite ends of the rear frame-bar *a′*.

It is frequently desirable to adjust the length of the axle, and consequently the ends of the rear frame-bar *a′* are formed with a series of apertures a^{20} for receiving the bolts *o′ o′*, and the ends of the central axle-section *m* are formed with a series of apertures m^{14} for receiving the bolts m^4. The outer axle-sections *m′ m′* are also formed beneath the sockets m^{10} m^{10} with substantially horizontal bearings m^{11} m^{11}, which are split and drawn together by bolts m^{12} m^{12}.

m^{13} m^{13} represent suitable cylindrical rods, having their inner ends arranged within the bearings m^{11} m^{11} and their outer ends projecting beyond said bearings and adapted to support the wheels M′ M′. It will be readily understood that as the central axle-section *m* is rocked in either direction the outer axle-sections *m′ m′* are suitably rocked upon the spindles *o o* and the wheels M′ M′ thereby forced out of their normal planes.

In order that the central axle-section *m* may be rocked practically and effectively, I provide the levers R R, (best seen in Figs. 1, 2, 3, 6, 8, 9, and 10,) which are of similar construction and are arranged on opposite sides of the pivotal pin m^2 of said axle-section *m*. The upper ends of the levers R R are hinged at *r r* to the opposite extremities of the bracket L, previously mentioned as the support or fulcrum for the seat-supporting bars *k k*, and the central portions of said levers are connected by links R′ R′ of suitable construction to points of the central axle-section *m* on opposite sides of the pivotal pin m^2. The lower extremities *r′ r′* of the levers R R are hinged to the upper extremities thereof by pivotal pins r^2 r^2, and are provided with shoulders r^3 r^3 for engaging the lower end of said upper extremities and preventing the downward movement of the lower extremities of

the levers R R. These levers R R are each formed at the lower ends of their lower extremities with suitable foot-engaging portions R^3 R^3, in order that the operator mounted upon the seat K may conveniently rock the levers. The lower extremities of said levers R R are hinged to the upper extremities thereof, as described, in order that the drag-bars D D may be elevated a greater distance than would otherwise be possible, since said bars are directly beneath the foot-engaging portions of said levers R R and readily rock the lower extremities thereof upwardly by engagement therewith as said drag-bars are elevated to their position. (Shown at Figs. 6 and 13.) As the left-hand lever R^3 is rocked forwardly, the corresponding end of the central axle-section is similarly rocked, as shown by dotted lines at Fig. 9, thus rocking the wheels M' M' in one direction and rocking the right-hand bar or lever R^3 backwardly. As the right-hand lever R^3 is brought to its normal position, the axle M is caused to assume its normal plane, and when said lever R^3 is forced forwardly beyond its normal position the central axle-section *m* and the wheels M' M' are rocked in opposite directions and may be brought to their normal position by rocking the left-hand lever to its position. (Illustrated by full lines at Figs. 8 and 9.)

It is frequently desirable to secure the axle-sections firmly together and prevent flexibility of the axle, and consequently I provide a clamp S for said purpose, Figs. 1, 2, 8, 9, 10, 11, and 12. This clamp consists of a plate *s*, mounted upon the central axle-section *m* and formed on its upper face with cam-faces *s' s'*, and a top plate s^2, arranged above the plate *s* and formed on its lower face with cam-faces s^3 s^3 and provided with an outwardly-extending arm or handle s^4. A suitable bolt or clamp *s'* is passed through said plates s^2 s^3 and through an elongated slot *l* in the shoulder or flange L directly beneath the axle-section *m*, and is provided at its lower end with a washer S^2. As the central axle-section *m* is rocked from its normal position the bolt S' moves to and fro within the slot *l*, and when desired to secure said central axle-section from movement the lever s^4 is forced from its inoperative position (shown by full lines at Fig. 9) to its operative position, (shown by dotted lines at Fig. 9,) whereupon the adjacent cam-faces of the plates *s* s^2 firmly draw or clamp the under face of the plate *s* against the top face of the axle-section *m* and the top face of the shoulder S^2 on the bolt S' against the under face of the flange L' upon the bracket L, and thus firmly secure said central axle-section *m* to the bracket L' and lock the same from movement.

The operation of my invention will be readily perceived from the foregoing description and upon reference to the drawings, and it will be particularly noted that the frame is light, strong, compact, and pleasing in appearance; that the drag-bars may be readily adjusted transversely of the frame, operated to dig or cultivate any desired depth of soil, forced into the soil with or without any pressure, readily rocked laterally after the required transverse adjustment, and may be quickly and easily elevated out of operative position and firmly held until released from engagement; that the clips provided upon the drag-bars render my cultivator applicable for a great number of uses and enable the operator to perfectly control the action of the teeth; that the seat is easily and practically adjusted to the length of the operator's legs and the operator counterbalanced by a weight at the forward end of the cultivator-pole, and that the direction of the cultivator may be quickly and practically governed. It is therefore evident that my improved cultivator is particularly compact, pleasing in appearance, simple and practical in construction, economical in manufacture, and strong, durable, and efficient in use.

The detail construction and arrangement of the parts of my improved cultivator may, however, be greatly varied without departing from the spirit of my invention. Hence I do not herein limit myself to the precise detail construction and arrangement of the parts thereof.

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

1. In a cultivator, the combination with an axle and a frame provided with a pole, a seat-support having its front end supported by the frame and its rear end extending rearwardly beyond the axle, a seat mounted on the rear end of said support, and a counterbalance fixed to the front end of the pole, substantially as and for the purpose described.

2. In a cultivator, the combination of a frame, a seat-support mounted on the frame and formed with separated bars, a seat arranged above the separated bars of said support, a clamping-bar beneath said separated bars and a clamping-bolt movable between said separated bars, and secured to said seat and clamping-bar, for securing the seat to the support, substantially as and for the purpose set forth.

3. In a cultivator, the combination of a frame, a clip-plate fixed to the frame, a second clip-plate movable lengthwise of the former clip-plate and provided with a projecting stud, and a seat-support having one end pivoted on said stud and its other end provided with a seat, substantially as described.

4. In a cultivator, the combination of drag-bars, a frame-bar for supporting the drag-bars having an elevated central portion arranged above the former bars, an evener pivoted to the elevated central portion of the frame-bar, upright bars having their extremi-

ties loosely connected to the depressed extremities of the frame-bar and to the extremities of the evener, and whiffletrees secured to said upright bars, substantially as and for the purpose specified.

5. In a cultivator, the combination of a frame-bar having an elevated central portion, and depressed extremities, a pole consisting of a pair of bars secured to said central portion of the frame-bar and having their rear ends separated and extended rearwardly beyond the frame-bar, and rearwardly-extending braces interposed between the rear ends of said pole-bars and the depressed extremities of said frame-bar, substantially as and for the purpose described.

6. In a cultivator, the combination of a frame-bar, a clip flexibly secured to the frame-bar and provided with an upright slot, and a drag-bar having an upturned extremity pivoted to said clip, and arranged in said slot, substantially as and for the purpose set forth.

7. In a cultivator, the combination of a frame, drag-bars having their front ends separated and hinged to the frame, and a straddle-bar having its opposite ends adjustably secured to the central portions of the drag-bars, substantially as and for the purpose described.

8. In a cultivator, the combination of a frame, movable drag-bars, a straddle-bar supported on the drag-bars, a lever hinged to the frame for engaging the straddle-bar and forcing the drag-bars downwardly, and a spring for actuating said lever, substantially as and for the purpose specified.

9. In a cultivator, the combination of a frame, a pair of drag-bars hinged to the frame, a straddle-bar having its opposite ends connected to the drag-bars, a lever hinged to the frame and having one end engaged with said straddle-bar for forcing the same downwardly, a spring for actuating the lever, and an arm at the opposite end of the lever for engaging the frame and preventing the operation of the spring, substantially as and for the purpose set forth.

10. In a cultivator, the combination of a frame, a pair of drag-bars hinged to the frame, pins or bars flexibly connected to the drag-bars, a straddle-bar having its opposite extremities connected to said pins or bars, a lever hinged to the frame for engaging the straddle-bar and forcing the drag-bars downwardly, and a spring for actuating said lever, substantially as and for the purpose described.

11. In a cultivator, the combination of a frame, a drag-bar hinged to the frame, a straddle-bar secured to the drag-bar and formed with a lengthwise bearing, a lever having one end hinged to the frame and its other end engaged with said lengthwise bearing for forcing the drag-bar downwardly and permitting the same to move laterally, and a spring for actuating said lever, substantially as and for the purpose described.

12. The combination of a frame-bar, a spindle supported by said frame-bar, a lever journaled on said spindle, and a spring encircling the spindle with one end engaged with the frame-bar and the other end with said lever, and a drag-bar connected, substantially as described, to said lever, substantially as and for the purpose specified.

13. In a cultivator, the combination of a pole consisting of two bars having their rear ends separated; with a frame-bar formed with a central division interposed between the rear ends of the pole-bars and provided with depressed extremities, drag-bars having their forward ends hinged to the depressed extremities of the frame-bar, a straddle-bar having its opposite extremities secured to the drag-bars and having an elevated central portion, a spindle supported by said central division of the frame-bar, a lever journaled on the spindle and having one end movable into engagement with the elevated central portion of the straddle-bar, and a spring for forcing said end of the lever downwardly, substantially as and for the purpose described.

14. In a cultivator, the combination of a frame, drag-bars having their front ends hinged to the frame and their rear ends movable laterally, a straddle-bar secured to said drag-bars and formed with stop-shoulders h^8, and a lever secured to the frame and having an engaging end interposed between said stop-shoulders for preventing lateral movement of the drag-bars, substantially as and for the purpose specified.

15. In a cultivator, the combination of a frame, a movable drag-bar, a lever having one end secured to the drag-bar for elevating the same, and a flexible support I having one end secured to the lever and its other end adjustably secured to the frame, substantially as and for the purpose specified.

16. In a cultivator, the combination of a frame, a movable drag-bar provided with a cam-face and a shoulder j^4, a lever having one end hinged to the drag-bar for elevating the same, and provided with a locking-dog or lever for engaging said cam-face and shoulder, and a movable support having one end secured to the lever and its other end secured to the frame, substantially as set forth.

17. The combination of a frame formed with an engaging shoulder i, a drag-bar having its front end adjustable transversely of the frame, a support having its upper end adjustably secured to the engaging-shoulder i, and an elevating-lever having one end hinged to the drag-bar and provided with laterally-separated points of attachment for securement to the lower end of said support, substantially as and for the purpose described.

18. In a cultivator, the combination of a frame, a drag-bar hinged to the frame and provided with a locking-shoulder j^4, a support secured to the frame, an elevating-lever hinged to said drag-bar and support, a dog on

the elevating-lever for engaging said locking-shoulder, and an actuating-piece connected to said dog, substantially as described, for throwing the same out of operative position, substantially as and for the purpose specified.

19. In a cultivator, the combination of a frame, a drag-bar hinged to the frame and provided with a stop-shoulder j^7 and a locking-shoulder j^4, a support secured to the frame, an elevating-lever hinged to said drag-bar and support and engaged with said stop-shoulder, and a locking-dog on the lever for engaging with the locking-shoulder, substantially as and for the purpose set forth.

20. The combination with a drag-bar; of a clip-plate formed on one face with shoulders F^{13} for engaging the bar and on the other face with engaging-shoulders F^{14}, a second clip-plate arranged at one side of the former plate and provided on its adjacent face with shoulders F^{17} for engaging the shoulders F^{14}, a tooth-shank passed between the shoulders F^{14} and F^{17}, and a bolt passed through said plates, substantially as and for the purpose described.

21. The combination with a drag-bar; of a clip-plate formed on one face with shoulders F^{13} for engaging the bar and on the other face with an upright groove F^{16} and a second groove F^{15} arranged at an angle with the former groove, a second clip-plate arranged at one side of the former plate and provided with a groove F^{18} registered with the groove F^{16} and formed also with a rib registered with the groove F^{15} and provided also with a cam-face and a locking-shoulder j^4 on its edge, a tooth-shank passed through the grooves F^{16} and F^{18}, a bolt for clamping said plates together, a lever supported at the side of the latter clip-plate, and a locking-dog mounted on said lever and movable over said cam-face into engagement with the locking-shoulder j^4, substantially as specified.

22. The combination with a drag-bar and a clip-plate e^4 on said bar; of a second clip-plate e^6 adjustably engaged with the former clip-plate and provided with an upright slot e^8, and a shank adjustably mounted in said slot, substantially as and for the purpose described.

23. The combination with a tooth-supporting bar; of a clip consisting of separable sections E^{11} having their adjacent faces inclined and formed with interlocking shoulders, one of said sections being reversible upon the other and provided with a groove E^{17} in its outer face, a tooth-shank arranged in the groove E^{17}, and a clamp for securing together said tooth-shank and sections, substantially as and for the purpose specified.

24. In a cultivator, the combination with a frame; of an axle for supporting the frame composed of rocking sections hinged together, and a lever hinged to said frame and connected, substantially as described, to one of said sections, for rocking the same from its normal position, substantially as set forth.

25. In a cultivator, the combination with a frame; of an axle for supporting the frame composed of rocking central and outer sections hinged together, a lever hinged to said frame and connected to the central section for rocking the same from its normal position, and a second lever hinged to said frame and connected to one of said sections for retracting the axle-sections to their normal position, substantially as described.

26. In a cultivator, the combination with a frame; of separate spindles secured to the frame, outer axle-sections hinged to said spindles and formed with inwardly-extending arms, a central axle-section having its central portion pivoted to the frame and its opposite extremities hinged to said inwardly-extending arms, and a foot-support connected, substantially as described, to rock said central axle-section, substantially as described.

27. In a flexible axle for a cultivator, the combination of a spindle provided with a foot secured to the frame of the cultivator, an axle-section formed with a socket for receiving said spindle and provided with an inwardly-extending arm and with a split bearing arranged beneath said socket, and a wheel-spindle having one end fixed in said bearing and the other end provided with a wheel, substantially as set forth.

28. In a cultivator, the combination with a frame; of the herein-described flexible axle, the same comprising a spindle provided with a foot secured to the frame of the cultivator, an outer axle-section formed with a socket for receiving said spindle and provided with an inwardly-extending arm having an elongated slot, a central axle-section pivoted to the frame and provided at its end with a lug movable longitudinally in said slot and formed at its outer end with a shoulder bearing against the top face of said inwardly-extending arm of the outer axle-section, substantially as specified.

29. The combination with a frame, a movable drag-bar secured to the frame, and means for elevating the drag-bar; of a flexible axle secured to the frame, and an actuating-lever for varying the position of the flexible axle having its lower end pivoted to the upper portion thereof and movable upwardly for permitting the elevation of the drag-bars without affecting the position of the axle, substantially as and for the purpose set forth.

30. In a cultivator, the combination of a supporting-bar and a clip-plate on the supporting-bar; with a tooth-shank consisting of a central bar having its upper end secured to the clip-plate and a folded bar having its opposite extremities arranged on opposite sides of the central bar and fixed thereto, a tooth ar-

ranged in front of the lower end of the latter bar, and clamping-bolts secured to the tooth and passed between the extremities of the latter bar beneath the lower end of the central bar, substantially as described.

In testimony whereof I have hereunto signed my name, in the presence of two attesting witnesses, at Syracuse, in the county of Onondaga, in the State of New York, this 24th day of September, 1892.

HIRAM M. BURDICK.

Witnesses:
W. S. SANFORD,
E. A. WEISBURG.