

No. 632,778.

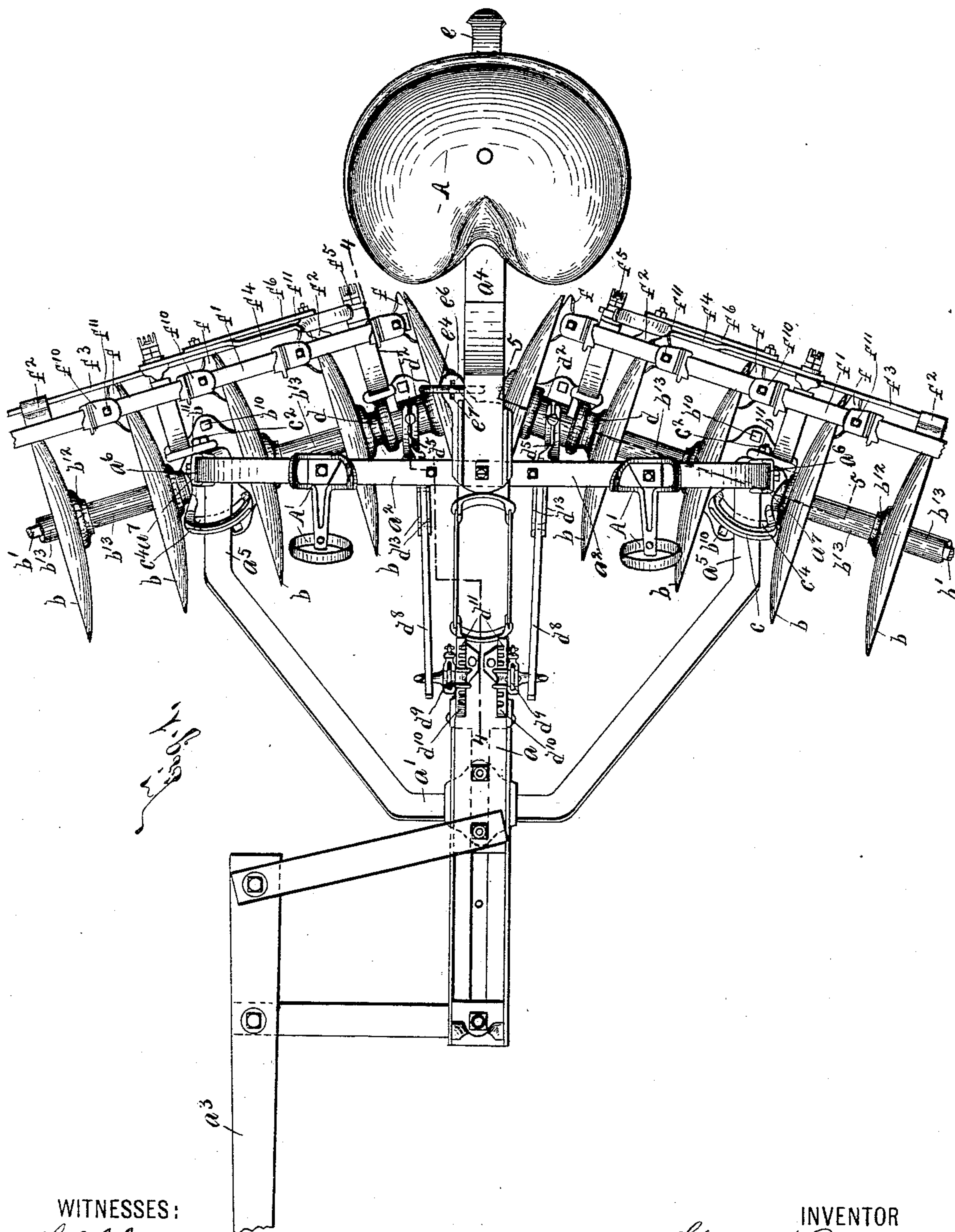
Patented Sept. 12, 1899.

H. M. BURDICK.  
HARROW.

(Application filed Oct. 8, 1895.)

(No Model.)

5 Sheets—Sheet 1.



WITNESSES:

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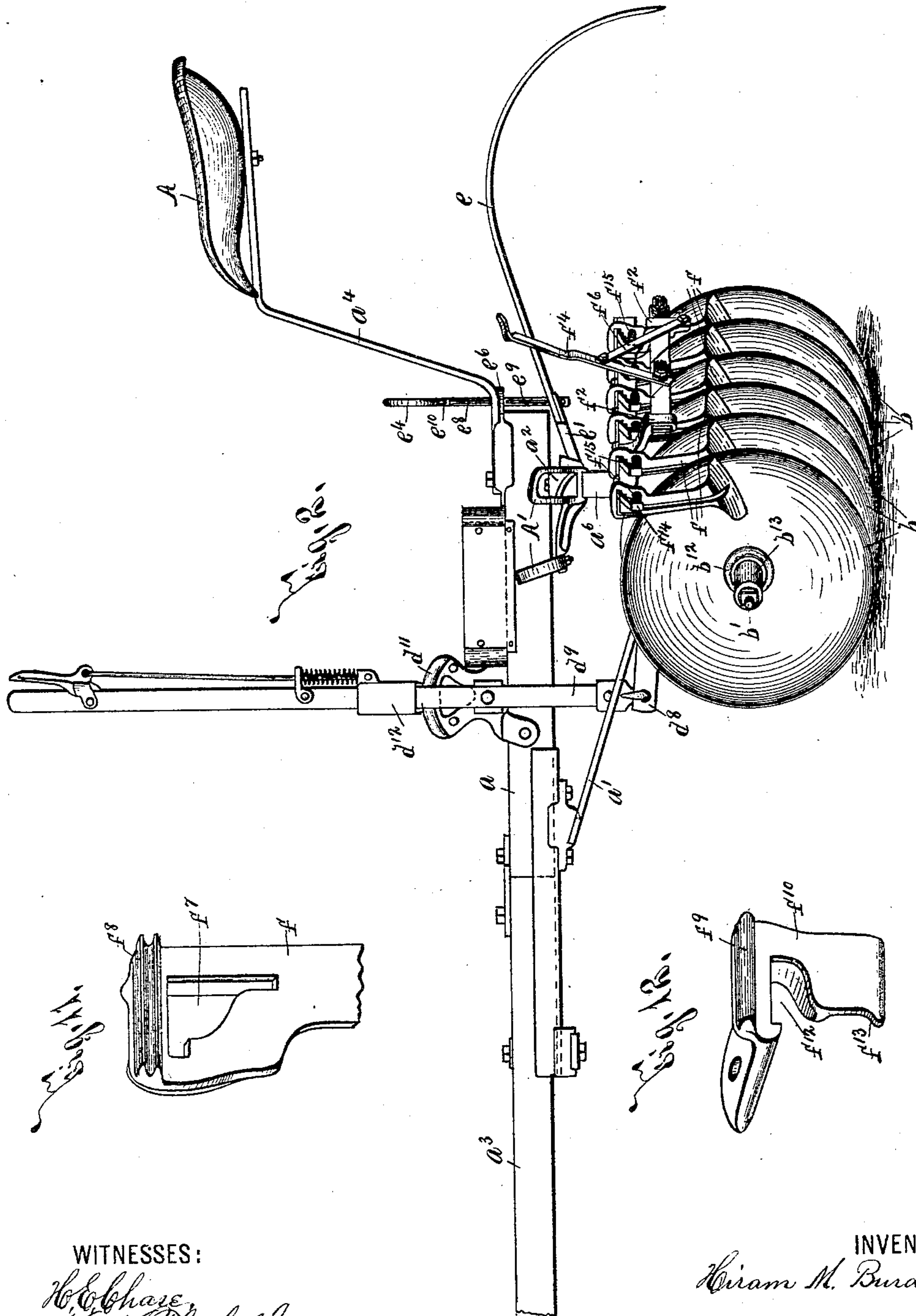
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5 Sheets—Sheet 2.



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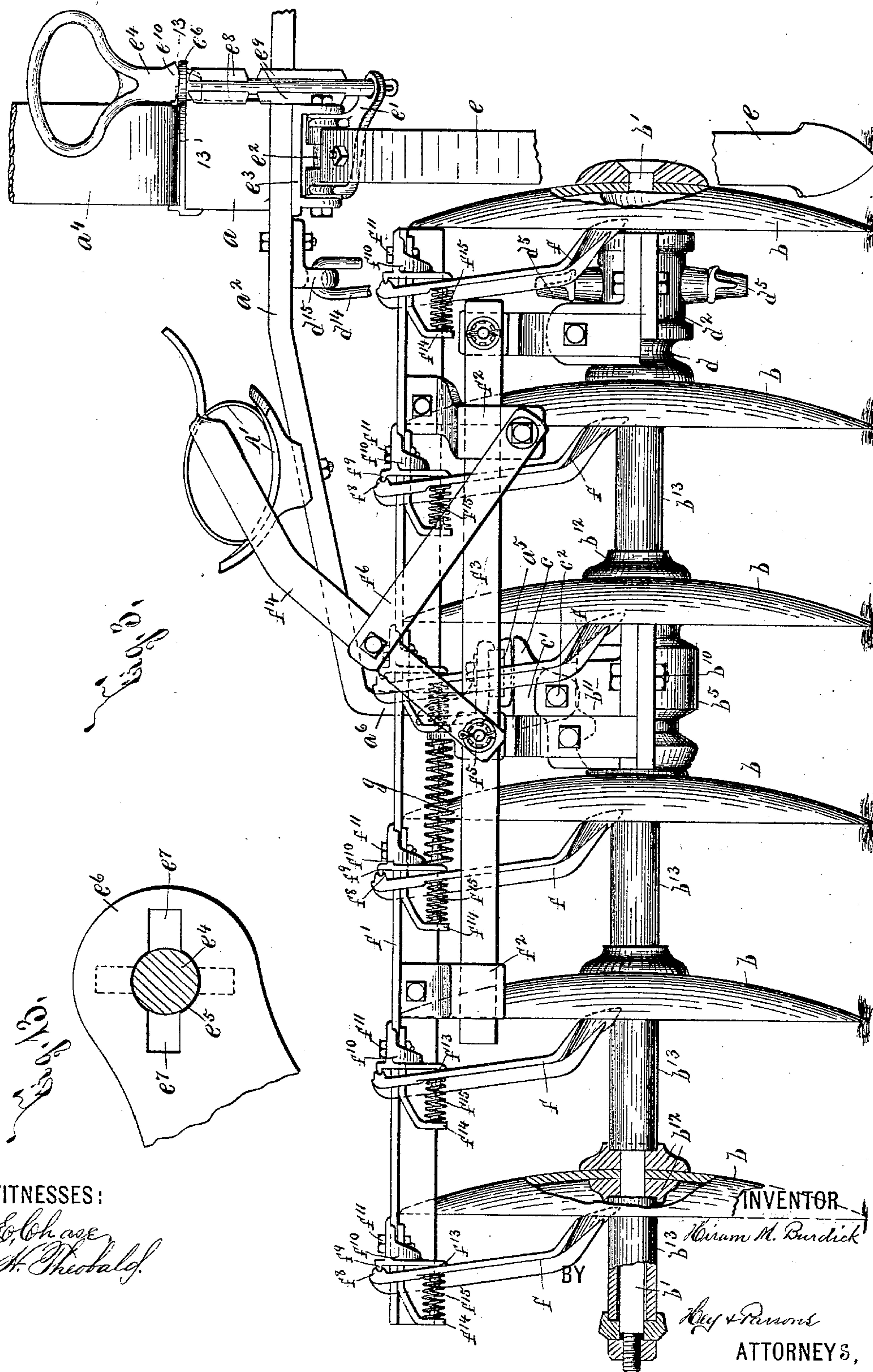
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5 Sheets—Sheet 3.



WITNESSES:

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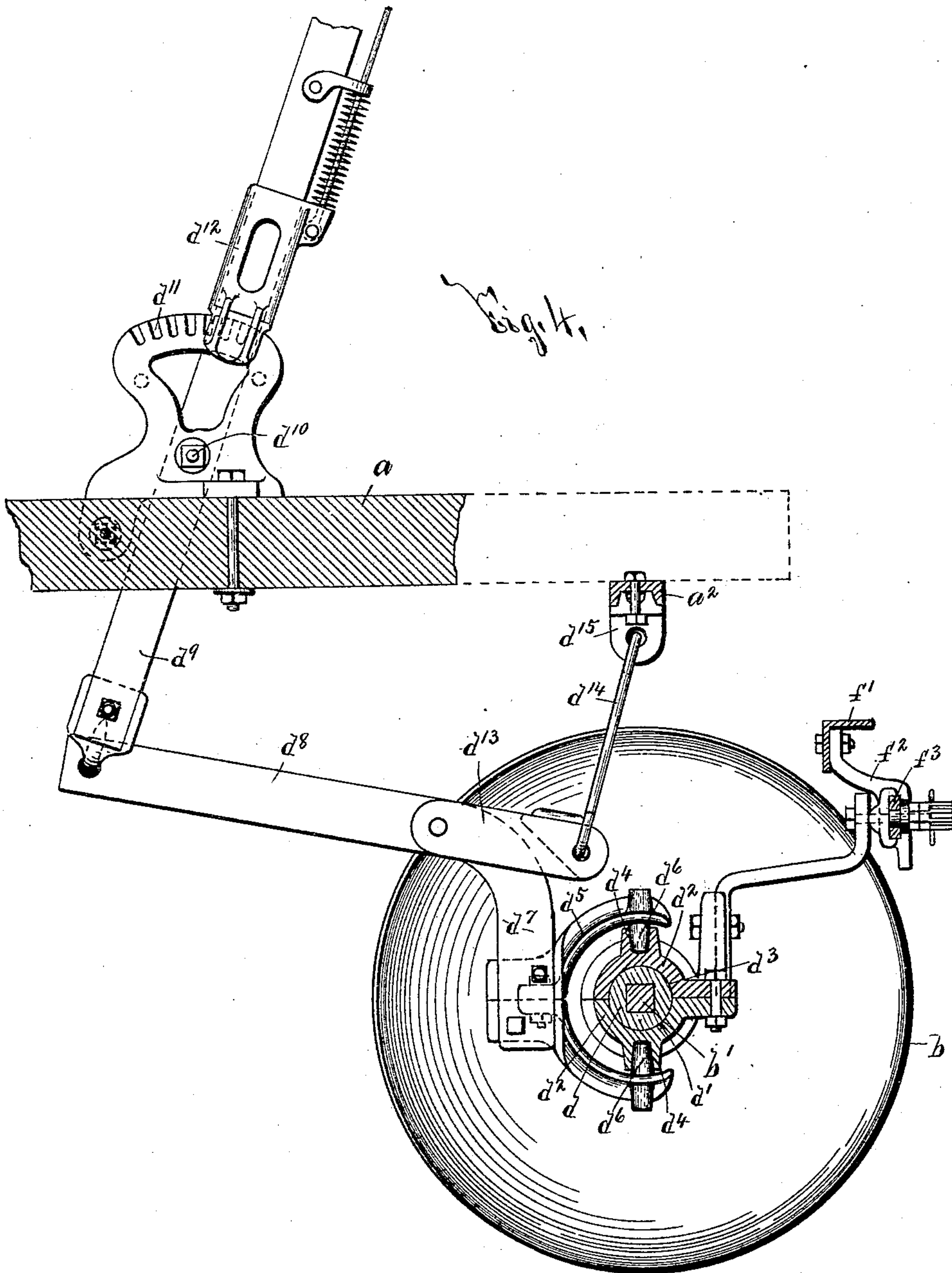
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5 Sheets—Sheet 4.



WITNESSES:

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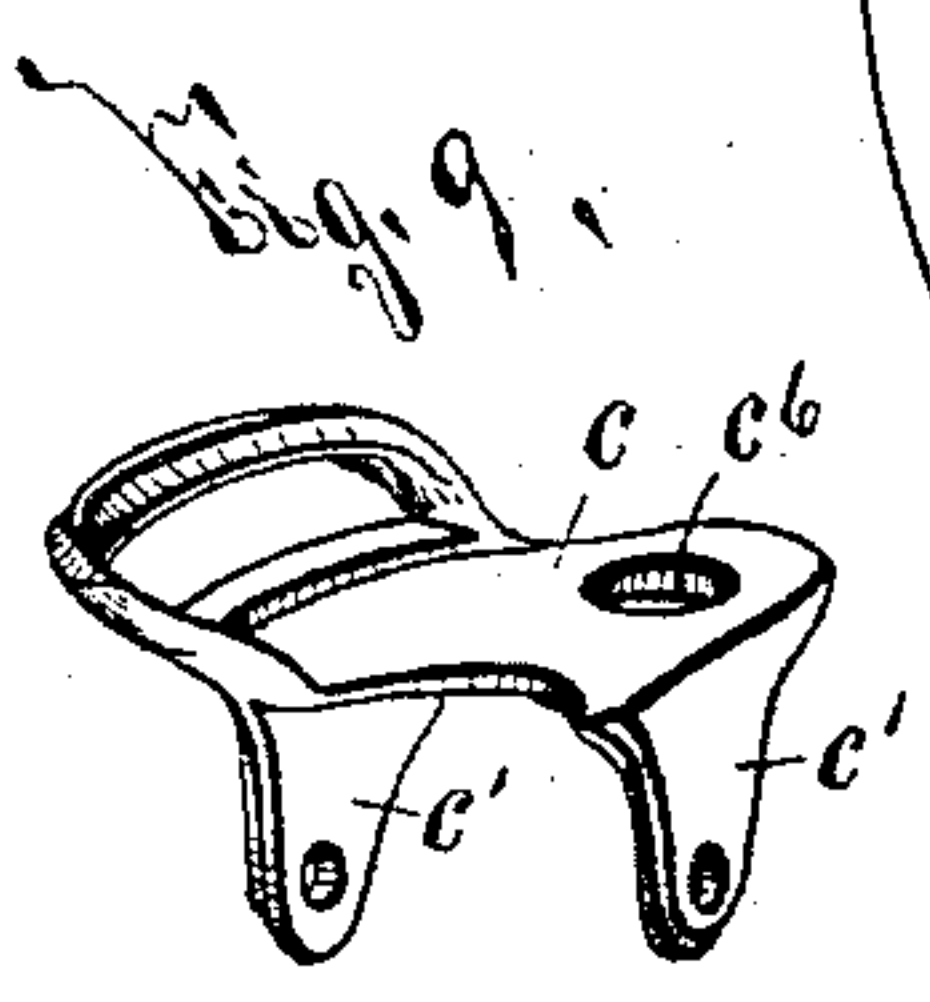
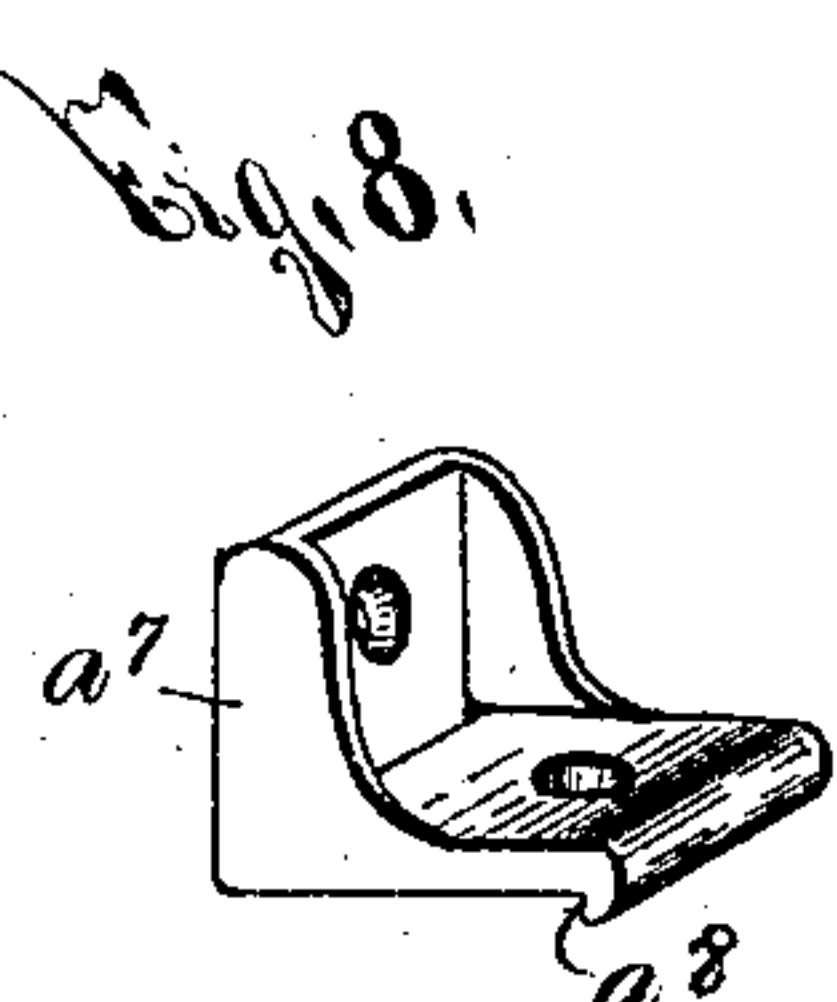
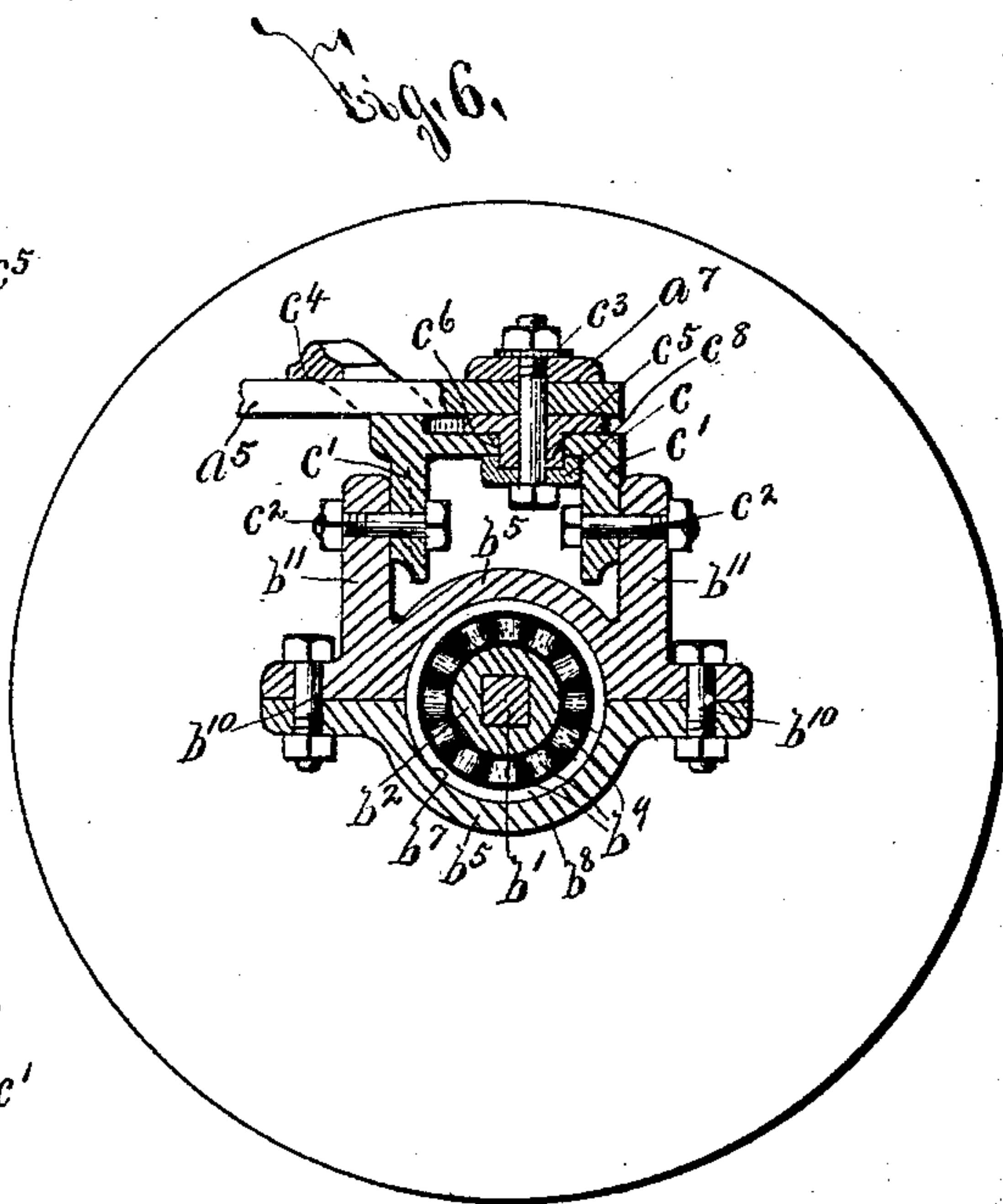
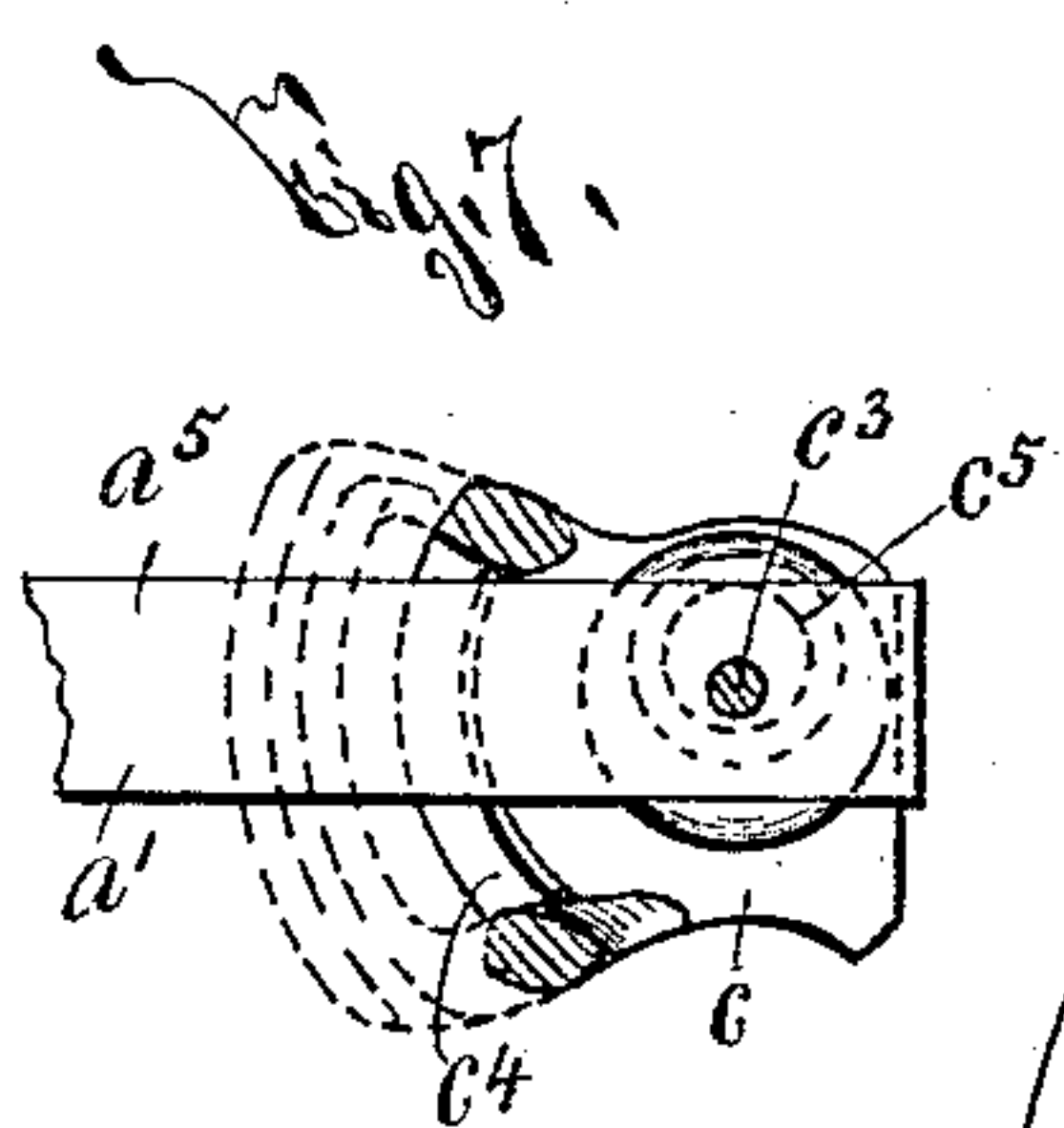
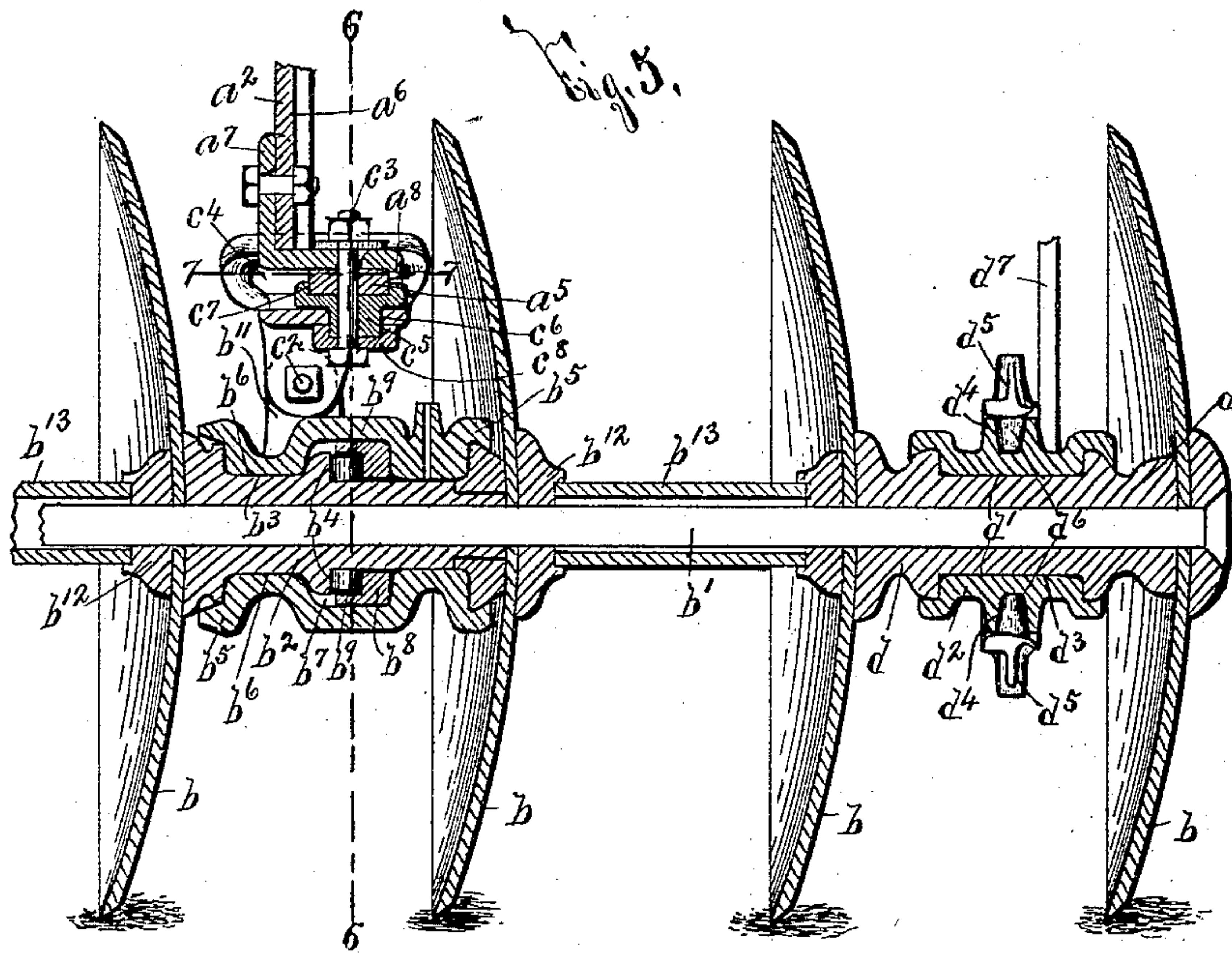
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(No Model.)

5 Sheets—Sheet 5.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

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

## HARROW.

SPECIFICATION forming part of Letters Patent No. 632,778, dated September 12, 1899.

Application filed October 8, 1895. Serial No. 565,014. (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  
5 useful Improvements in Harrows, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

My invention relates to improvements in  
10 disk-harrows, and has for its object the production of a device which is particularly applicable for the different kinds of work to which such implements are subjected; and, to this end, it consists, essentially, in the combination, construction, and arrangement of the  
15 component parts of a disk-harrow, as herein-after fully described, and pointed out in the claims.

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

Figures 1 and 2 are respectively top plan and side elevation of my improved harrow,  
25 the outer ends of the disk-gangs being shown as broken away in Fig. 1. Fig. 3 is a rear elevation, partly in section, of one of the disk-gangs, its scrapers, and adjacent parts of the frame. Figs. 4 and 5 are vertical sections,  
30 taken, respectively, on lines 4 4 and 5 5, Fig. 1. Fig. 6 is a vertical section taken on line 6 6, Fig. 5. Fig. 7 is a detailed horizontal section taken on line 7 7, Fig. 5. Fig. 8 is an isometric view of one of the angle-pieces for  
35 securing together two of the frame-bars. Figs. 9 and 10 are respectively isometric views of one of the connecting-pieces between the frame and the central portions of the disk-gangs and an eccentric-journal in said connecting-piece. Figs. 11 and 12 are respectively  
40 isometric views of the upper end of one of the scrapers and the supporting-piece therefor; and Fig. 13 is a detail horizontal section taken on line 13 13, Fig. 3.

The frame of my improved harrow may be  
45 of any desirable form, size, and construction, and, as here illustrated, is composed of a longitudinal bar  $a$  and cross-bar  $a'$   $a^2$ . (Best seen in Fig. 1.) The front end of the bar  $a$  is suitably connected to a pole  $a^3$  and its rear end  
50 is provided with an upwardly-projecting

spring-standard  $a^4$  for supporting a seat  $A$ . The central portions of the bars  $a'$   $a^2$  are considerably separated and are suitably secured to the bar  $a$ . The opposite ends of the bar  $a'$   
55 incline downwardly from its central portion, Fig. 2, and are formed at their extremities with rearwardly-extending lateral arms  $a^5$ , arranged substantially parallel with the bar  $a$  in a plane considerably beneath that of the  
60 central portion of the bar  $a^2$ . The central portion of the bar  $a^2$  is provided with stirrups  $A'$ , and its opposite ends are formed with downwardly-extending arms  $a^6$  and suitable angle-pieces  $a^7$ , Figs. 5 and 8, connect together  
65 the arms  $a^5$   $a^6$  and are provided with shoulders  $a^8$  for engaging the inner edges of the arms  $a^5$ .

I preferably use two disk-gangs, consisting of disks  $b$ , mounted on shafts  $b'$  and separated by sleeves, (presently described,) and  
70 connect the frame thereto by suitable means, which is interposed between the points of union of the frame-bars  $a'$   $a^2$  and substantially the central portions of the disk-gangs and is of such construction as to permit up-  
75 and-down movement of the opposite ends of said gangs. The inner ends of the disk-gangs are also connected to suitable mechanism which moves the same backwardly and forwardly, but does not restrain their up-and-  
80 down movement. The two disks on opposite sides of each of the points of union of the frame-bars  $a'$   $a^2$  are separated by fixed sleeves  $b^2$ , provided with annular grooves  $b^3$  and annular bearing-faces or fixed rings  $b^4$ . Sleeves  
85  $b^5$  are loosely mounted on the sleeves  $b^2$  and are provided with annular shoulders  $b^6$ , arranged in the grooves  $b^3$ , and annular grooves  $b^7$ , encircling the bearing-faces or fixed rings  $b^4$ . Suitable roller-bearing sections  $b^8$  are re-  
90 movably mounted in the grooves  $b^7$ , and anti-friction-rollers  $b^9$ , Figs. 5 and 6, are interposed between the faces or fixed rings  $b^4$  and the bearing-sections  $b^8$  for receiving the end strain and facilitating revoluble movement of  
95 the sleeves  $b^2$ .

The sleeves  $b^5$ , previously mentioned, preferably consist of upper and lower sections secured together by bolts or other clamps  $b^{10}$ , the upper sections having their top faces pro-  
100 vided with upwardly-projecting ears  $b^{11}$ , arranged one in advance of the other. A suit-



able connecting-piece  $c$ , Figs. 5, 6, 7, and 9, is interposed between each of the points of union of the frame-bars  $a'$   $a^2$  and the adjacent sleeve  $b^5$  and is provided with depending arms  $c'$ , pivoted to the ears  $b^{11}$  by pivots  $c^3$ , which extend at substantially right angles with the axis of the shaft  $b'$  and permit up-and-down movement of the opposite ends of the corresponding disk-gang. Each connecting-piece  $c$  is pivoted to the arm  $a^5$  of the adjacent bar  $a'$  and to the corresponding angle-piece  $a^7$  by an upright pivot-bolt  $c^3$ , which permits back-and-forward movement of the inner end of the corresponding disk-gang. The front ends of the connecting-pieces  $c$  are provided with slots  $c^4$ , through which the arms  $a^5$  are passed, and as the inner ends of the disk-gangs swing backwardly or forwardly, the connecting-pieces  $c$  are free to swing on the bolts  $c^3$  until the ends of the slots  $c^4$  engage the opposite edges of the arms  $a^5$ .

As it is sometimes advisable to permit of a slight endwise movement of the disk-gangs, each pivot  $c^3$  is passed through an eccentric  $c^5$ , Figs. 5 and 10, arranged in a journal opening or aperture  $c^6$  in the corresponding connecting-piece  $c$ . This eccentric is provided with shoulders  $c^7$  for engaging the opposite edges of the arm  $a^5$  of the adjacent bar  $a'$ , and the pivot-bolt  $c^3$  is passed through said arm  $a^5$  and the adjacent portion of the angle-piece  $a^7$  and is provided with a shoulder or washer  $c^8$ , engaged with the under face of the connecting-piece  $c$ . The pivot-bolts  $c^3$ , which permit back-and-forward movement of the inner ends of the disk-gangs, thus secure together the angle-pieces  $a^7$ , the adjacent ends of the frame-bars  $a'$ , the eccentrics for varying the position of said pivot-bolts, and the connecting-pieces for supporting the disk-gangs.

The two inner disks of each gang are separated by fixed sleeves  $d$ , provided with annular grooves  $d'$ , and said sleeves are encircled by sleeves  $d^2$ , loose thereon and provided with annular shoulders  $d^3$ , arranged in the grooves  $d'$ . Each of the sleeves  $d^2$  is formed with opposite sockets  $d^4$  and is embraced by a yoke  $d^5$ , Figs. 4 and 5, provided with opposite pivot projections  $d^6$ , arranged in the sockets  $d^4$ . Each yoke  $d^5$  is provided with an arm  $d^7$ , extending upwardly therefrom and formed with a forwardly-extending end  $d^8$ , pivoted at its front extremity to the lower end of a suitable actuating-lever  $d^9$ . The actuating-levers  $d^9$  are pivoted at  $d^{10}$  to brackets secured to the frame-bar  $a$  and provided with racks  $d^{11}$ , which are engaged by movable dogs  $d^{12}$ , carried by the levers  $d^9$ . A link  $d^{13}$  is arranged above each yoke  $d^5$ , and a second link  $d^{14}$  projects upwardly from the former link. The adjacent ends of said links are pivoted together, the front end of the link  $d^{13}$  being pivoted to the arm  $d^8$  and the upper end of the link  $d^{14}$  pivoted to a bracket  $d^{15}$ , depending from the frame-bar  $a^2$  at the rear of the corresponding actuating-lever. The actuating-levers thus move the inner ends of the

disk-gang backwardly or forwardly and the links  $d^{13}$   $d^{14}$  permit up-and-down movement of said ends. I have previously described the sleeves  $b^2$   $d$ , interposed between the two central disks and the two inner disks, and it will be understood that the remaining disks may be separated by any suitable means, as collars  $b^{12}$  and sleeves  $b^{13}$ .

In order that the portion of the earth interposed between the adjacent gangs may be well cultivated, I preferably provide my harrow with a spring digging-tooth  $e$ , having its front end suitably secured to a support  $e'$ , which is pivoted at  $e^2$  to a bracket  $e^3$ , depending from the central portion of the frame-bar  $a^2$ . The rear end of the support  $e'$  is provided with a projecting arm, to which a handpiece  $e^4$  is suitably secured. The handpiece  $e^4$  is arranged in an upright plane and is movable through an aperture  $e^5$ , formed in a laterally-extending arm  $e^6$ , secured to the frame-bar  $a$ . Suitable slots  $e^7$  extend outwardly from the aperture  $e^5$ , and shoulders  $e^8$   $e^9$  are provided upon the handpiece  $e^4$  and are movable through the slots  $e^7$ . The handpiece  $e^4$  is also provided with upper shoulders  $e^{10}$ , which normally rest upon the arm  $e^6$  when the tooth  $e$  is in operative position, as illustrated in Fig. 3, and are arranged out of alinement with the slots  $e^7$ . When it is desired to elevate the tooth  $e$ , the handpiece  $e^4$  is partially revolved until the shoulders  $e^8$  are alined with the slots  $e^7$  and is then elevated and again partially revolved until the shoulders  $e^8$  are out of alinement with the slots  $e^7$ .

$f$  are suitable scrapers carried by longitudinally-movable bars  $f'$ , provided with depending guides  $f^2$ , movable lengthwise of fixed bars  $f^3$ . The means for moving the bars  $f'$  preferably consists of levers  $f^4$ , pivoted at  $f^5$  to the bars  $f^3$  and pivoted to the upper ends of links  $f^6$ , having their opposite ends pivoted to adjacent guides  $f^2$ . Suitable springs  $g$  are interposed between shoulders fixed to the bars  $f^3$  and adjacent scraper-supporting pieces, presently described, and operate to normally retract the longitudinally-movable bars  $f'$  and disengage the scrapers from the disks  $b$ . Each of the scrapers  $f$  is provided at its upper end with a slot  $f^7$  for receiving the corresponding bar  $f'$  and a groove or cut-out  $f^8$  for receiving a projecting shoulder  $f^9$ , which is arranged above the bar  $f'$  and is formed upon a supporting-piece  $f^{10}$ , suitably secured to said bar  $f'$  by a bolt or other clamping means  $f^{11}$ . The supporting-pieces  $f^{10}$  are provided with slots or grooves  $f^{12}$  for receiving said bars  $f'$ , and stop-faces  $f^{13}$ , arranged beneath the top faces of the bars  $f'$  and adapted to normally engage the adjacent scrapers. Suitable spring-supporting pieces  $f^{14}$  are passed through the slots  $f^7$   $f^{12}$  in the scrapers  $f$  and the supporting-pieces  $f^{10}$  and are secured to the bars  $f'$  by the bolts  $f^{11}$ , previously described, and the opposite ends of said spring-supporting pieces are extended downwardly and considerably



separated from the adjacent faces of said scrapers. Springs  $f^{15}$  are interposed between each of the scrapers and the downturned ends of the spring-supporting pieces  $f^{14}$  and force the scrapers with a yielding pressure against the disks  $b$ .

The operation of my improved harrow will be readily understood upon reference to the foregoing description and the accompanying drawings, and as it is obvious that the exact detail, construction, and arrangement of its component parts may be somewhat varied without departing from the spirit of my invention, I do not herein specifically limit myself to such exact detail, construction, and arrangement.

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

1. The combination of a supporting-frame, a disk-gang provided with a loosely-mounted sleeve, a yoke connected to the sleeve, an actuating-lever connected to the yoke for varying its position, and flexible connections between the frame and the yoke connected to the frame at the rear of the actuating-lever, substantially as and for the purpose described.

2. The combination of a supporting-frame, a disk-gang provided with a loosely-mounted sleeve formed with opposite sockets, a yoke having pivot projections mounted in the sockets, an actuating-lever connected to the yoke for varying its position, and flexible connections between the frame and the yoke, connected to the frame at the rear of the lever, substantially as and for the purpose specified.

3. The combination of a supporting-frame, a disk-gang provided with a loosely-mounted sleeve, a movable actuating-lever, an arm connected to the sleeve and having a forwardly-extending end pivoted to the actuating-lever, and flexible connections between the frame and the arm connected to the frame at the rear of the actuating-lever, substantially as and for the purpose specified.

4. The combination of a supporting-frame, a disk-gang provided with a loosely-mounted sleeve, a movable actuating-lever, an arm connected to the sleeve and extending upwardly above the sleeve, said arm having a forwardly-extending end pivoted to the actuating-lever, a link arranged above the sleeve and having its front end pivoted to said arm, and a second link extending upwardly from the first link and having its upper end pivoted to the frame and its lower end flexibly connected to the rear end of the first link, substantially as and for the purpose set forth.

5. The combination of a supporting-frame, a disk-gang provided with a loosely-mounted sleeve formed with opposite sockets, a yoke having pivot projections mounted in the sockets, a pivoted actuating-lever, an arm fixed to the yoke and extending upwardly above the same, said arm having a forwardly-ex-

tending end pivoted to the actuating-lever, a link arranged above the yoke and having its front end pivoted to said arm, and a second link extending upwardly from the first link and having its upper end pivoted to the frame and its lower end flexibly connected to the rear end of the first link, substantially as and for the purpose set forth.

6. The combination of a disk-gang provided with a fixed sleeve on its shaft formed with an annular bearing-face or fixed ring, a sleeve loosely mounted on the former sleeve and provided with an annular bearing-face, and anti-friction-rollers interposed between said bearing-faces, substantially as and for the purpose specified.

7. The combination of a disk-gang provided with a fixed sleeve  $b^2$  on its shaft formed with an annular groove  $b^3$  and an annular bearing-face or fixed ring  $b^4$ , a sleeve  $b^5$  loosely mounted on the sleeve  $b^2$  and provided with an annular shoulder  $b^6$  arranged in the groove  $b^3$ , and an annular groove  $b^7$  surrounding the face or fixed ring  $b^4$ , a bearing-section  $b^8$  arranged in the groove  $b^7$ , and rollers  $b^9$  interposed between the bearing-face or fixed ring  $b^4$  and the section  $b^8$ , substantially as and for the purpose described.

8. In a bearing for disk-harrows and analogous devices, the combination of an axle, a sleeve, a second sleeve about the first sleeve, rings located about the first sleeve between said sleeves, and rollers located between said rings to receive the end strain, substantially as and for the purpose set forth.

9. The combination of a disk-gang provided with a loosely-mounted sleeve, a frame-bar, and a connecting-piece secured to the frame-bar by a substantially upright pivot and secured to the sleeve by a substantially horizontal pivot, said connecting-piece being provided with means for engaging the frame-bar and limiting its movement independently of the frame-bar, substantially as and for the purpose described.

10. The combination of a disk-gang provided with a loosely-mounted sleeve  $b^5$  formed with upwardly-projecting ears  $b^{11}$  arranged one in front of the other, a frame-bar, a connecting-piece  $c$  secured to the frame-bar by a substantially horizontal pivot  $c^3$ , said connecting-piece being provided with downwardly-extending arms  $c'$  arranged one in front of the other and with means for engaging the frame-bar and limiting its movement independently of the frame-bar, and pivots  $c^2$  for connecting the ears  $b^{11}$  and the arms  $c'$  extending substantially crosswise of the disk-gang, substantially as and for the purpose set forth.

11. The combination of a disk-gang provided with a revoluble sleeve, a frame-bar, a connecting-piece loosely connected to the sleeve and detachably secured to the frame-bar, and a cam carried by the frame-bar, for varying the position of the connecting-piece



and thereby moving the disk-gang endwise, substantially as and for the purpose specified.

12. The combination of a disk-gang provided with a revoluble sleeve, a frame-bar, a connecting-piece  $c$  provided with a journal-opening  $c^6$ , an eccentric  $c^5$  movable in the journal-opening  $c^6$  and having its pivotal pin  $c^3$  secured to said frame-bar, substantially as and for the purpose set forth.

13. The combination with a disk-gang provided with a revoluble sleeve, frame-bars  $a'$   $a^2$  having their adjacent ends arranged at an angle with each other, an angle-piece  $a^7$  secured to said frame-bars and provided with a shoulder  $a^8$  for engaging the frame-bar  $a'$ , a connecting-piece  $c$  provided with a journal-opening  $c^6$  and a slot  $c^4$  for receiving the frame-bar  $a'$ , an eccentric  $c^5$  arranged in the opening  $c^6$  and provided with shoulders  $c^7$  for engaging the frame-bars  $a'$  and a pivotal pin  $c^3$  passed through the frame-bar  $a'$ , angle-piece  $a^7$ , and eccentric  $c^5$  and provided with a shoulder  $c^8$  engaged with the under face of the connecting-piece, substantially as and for the purpose described.

14. The combination of a disk-gang, a fixed frame-bar, a series of scrapers for engaging the respective disks, a bar guided lengthwise of the fixed frame-bar for supporting the scrapers, and a spring for returning the latter bar to its normal position, substantially as and for the purpose specified.

15. The combination of a disk-gang, a fixed frame-bar, a series of scrapers for engaging the respective disks, a longitudinally-movable bar provided with depending guides movable lengthwise of the fixed frame-bar, an actuating-lever pivoted to the fixed frame-bar, and a link having one end hinged to the lever and its opposite end hinged to one of said

guides, substantially as and for the purpose set forth.

16. The combination of a disk-gang, a longitudinally-movable bar  $f'$ , a supporting-piece  $f^{10}$  formed with a slot or groove  $f^{12}$  for receiving the bar  $f'$  and provided with a projecting shoulder  $f^9$ , and a stop-face  $f^{13}$  arranged respectively above and below the top face of said bar, a spring-supporting piece  $f^{14}$  having one end passed through the slot or groove  $f^{12}$  and its opposite end separated from said stop-face, a scraper  $f$  interposed between the face  $f^{13}$ , and the adjacent end of the spring-supporting piece  $f^{14}$  and provided with an eye  $f^7$  and a groove  $f^8$  for respectively receiving the bar  $f'$  and the projecting shoulder  $f^9$ , and a spring  $f^{15}$  interposed between the spring-supporting piece  $f^{14}$  and the scraper  $f$ , substantially as and for the purpose described.

17. The combination of a frame provided with an aperture and slots projecting therefrom, opposite disk-gangs, a tooth interposed between the adjacent end disks, a tooth-support hinged to the frame and secured to the tooth, and a handpiece secured to the tooth-support and movable longitudinally in the aperture and provided with projecting shoulders movable into and out of registration with said slots, substantially as and for the purpose set forth.

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 5th day of July, 1895.

HIRAM M. BURDICK.

Witnesses:

W. S. SANFORD,  
M. J. LEE.