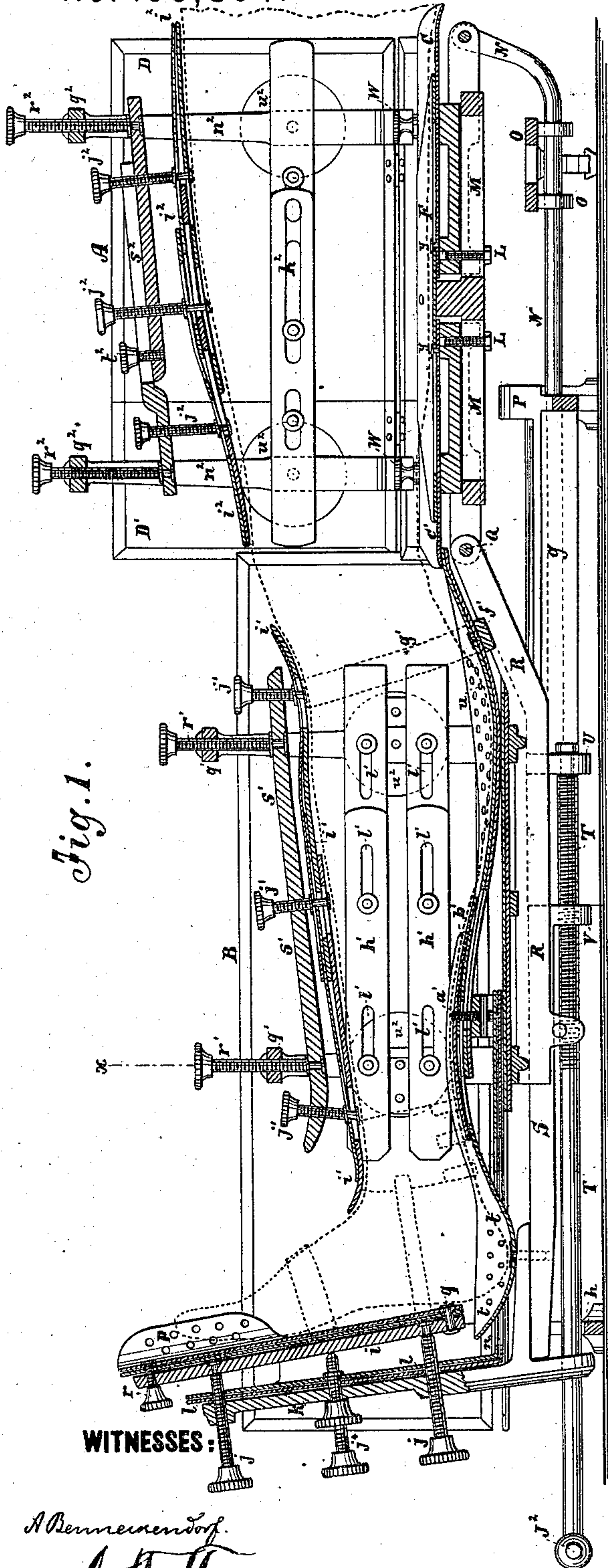


**D. BISSELL.**  
**Fracture-Boxes for Legs.**

No. 158,894.

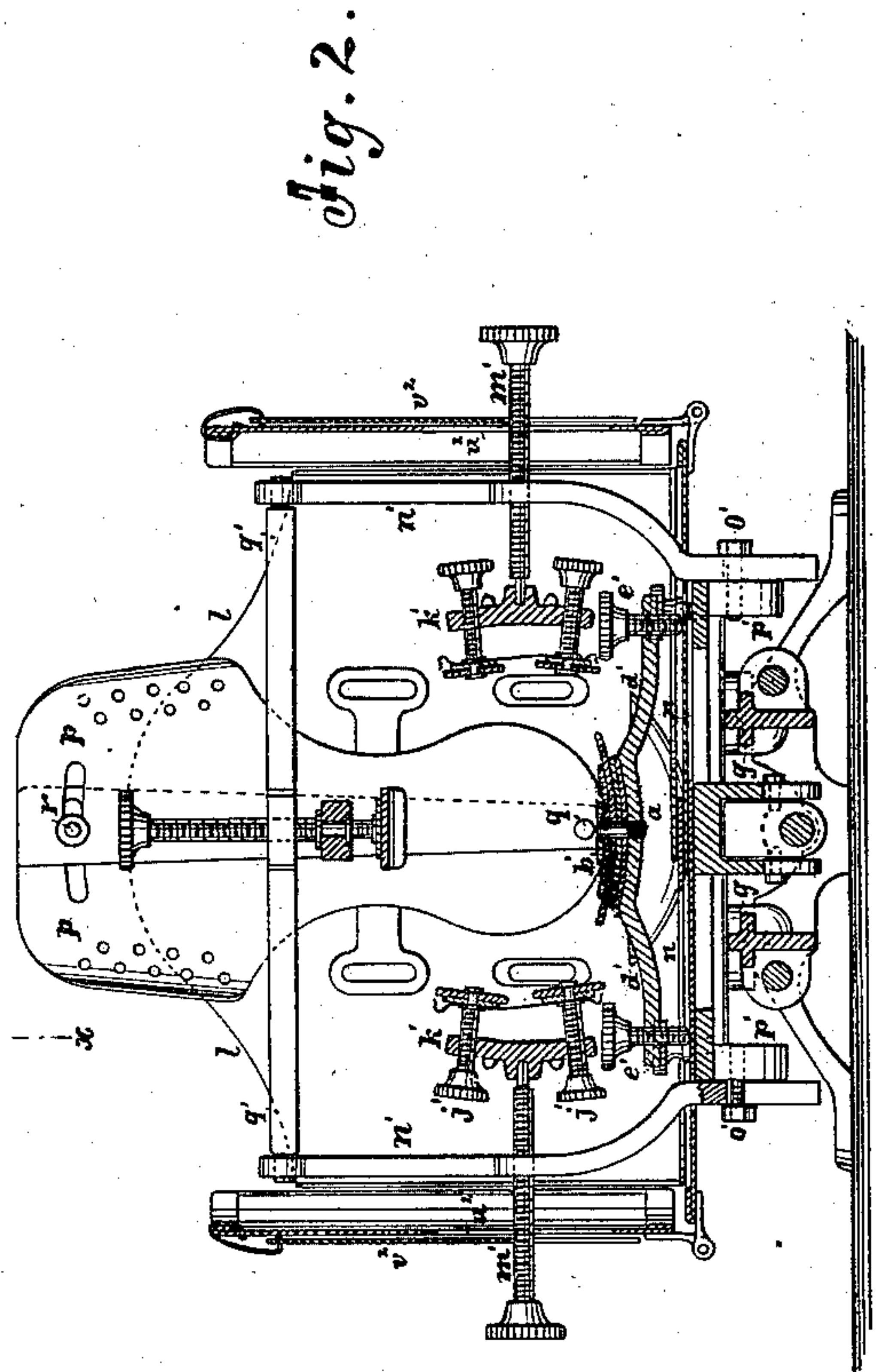
Patented Jan. 19, 1875.



*Fig. 1.*

WITNESSES:

*A. Berner & Co.*  
*A. F. Terry*



*Fig. 2.*

INVENTOR:

*Davis Bissell*

BY

*Wm. L.*  
ATTORNEYS.

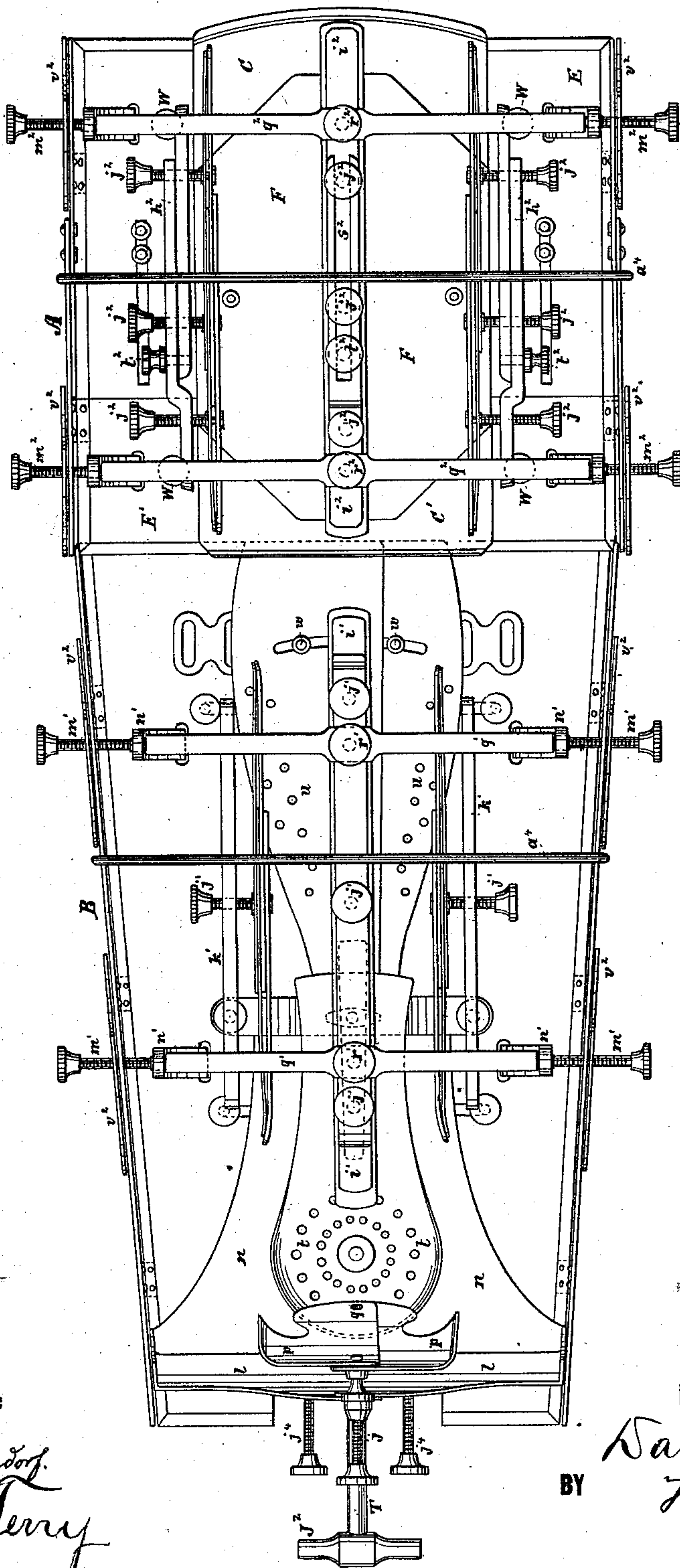


**D. BISSELL.**

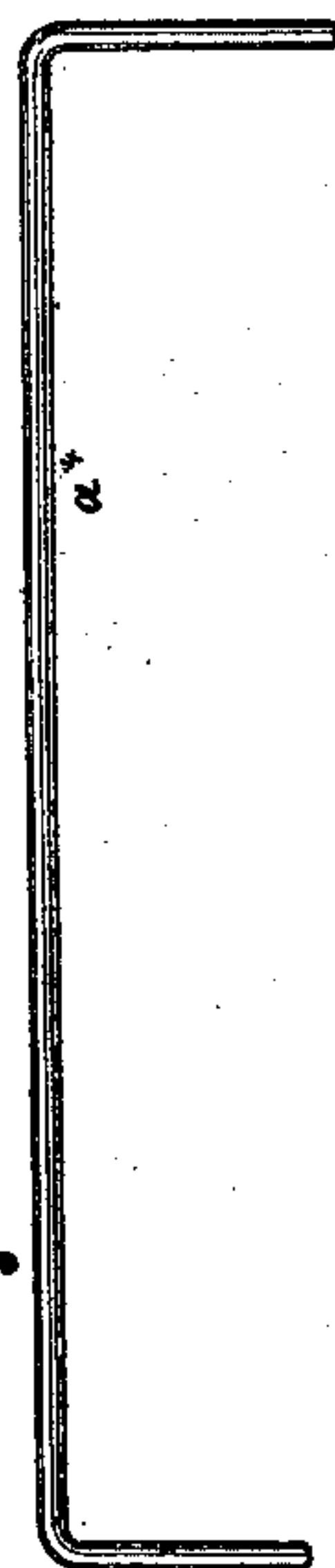
## Fracture-Boxes for Legs.

No. 158,894.

Patented Jan. 19, 1875.



*Fig. 4.*



**WITNESSES:**

A Benneken Dorf.

A. F. Terry

**INVENTOR:**

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**ATTORNEYS.**

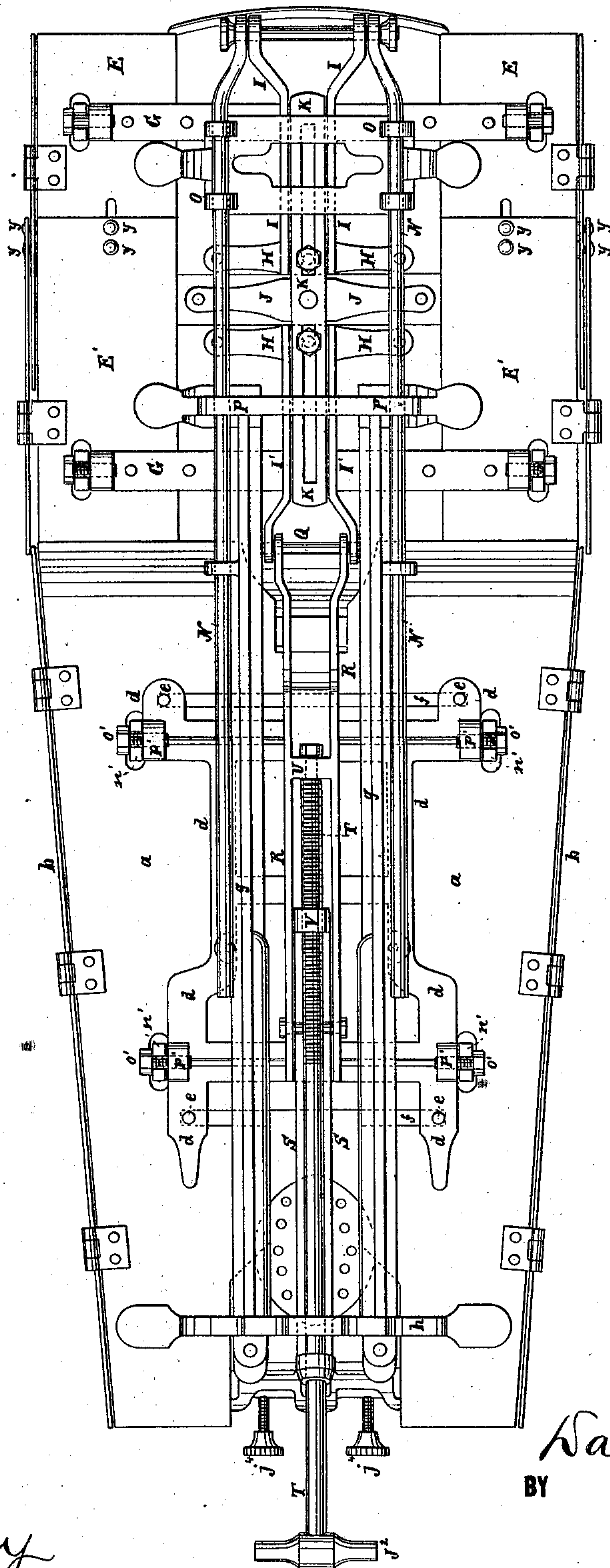
**ATTORNEYS.**

**D. BISSELL.**  
**Fracture-Boxes for Legs.**

No. 158,894.

Patented Jan. 19, 1875.

*Fig. 5.*



**WITNESSES:**

*A. Benneken*  
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D. BISSELL.  
Fracture-Boxes for Legs.

No. 158,894.

Patented Jan. 19, 1875.

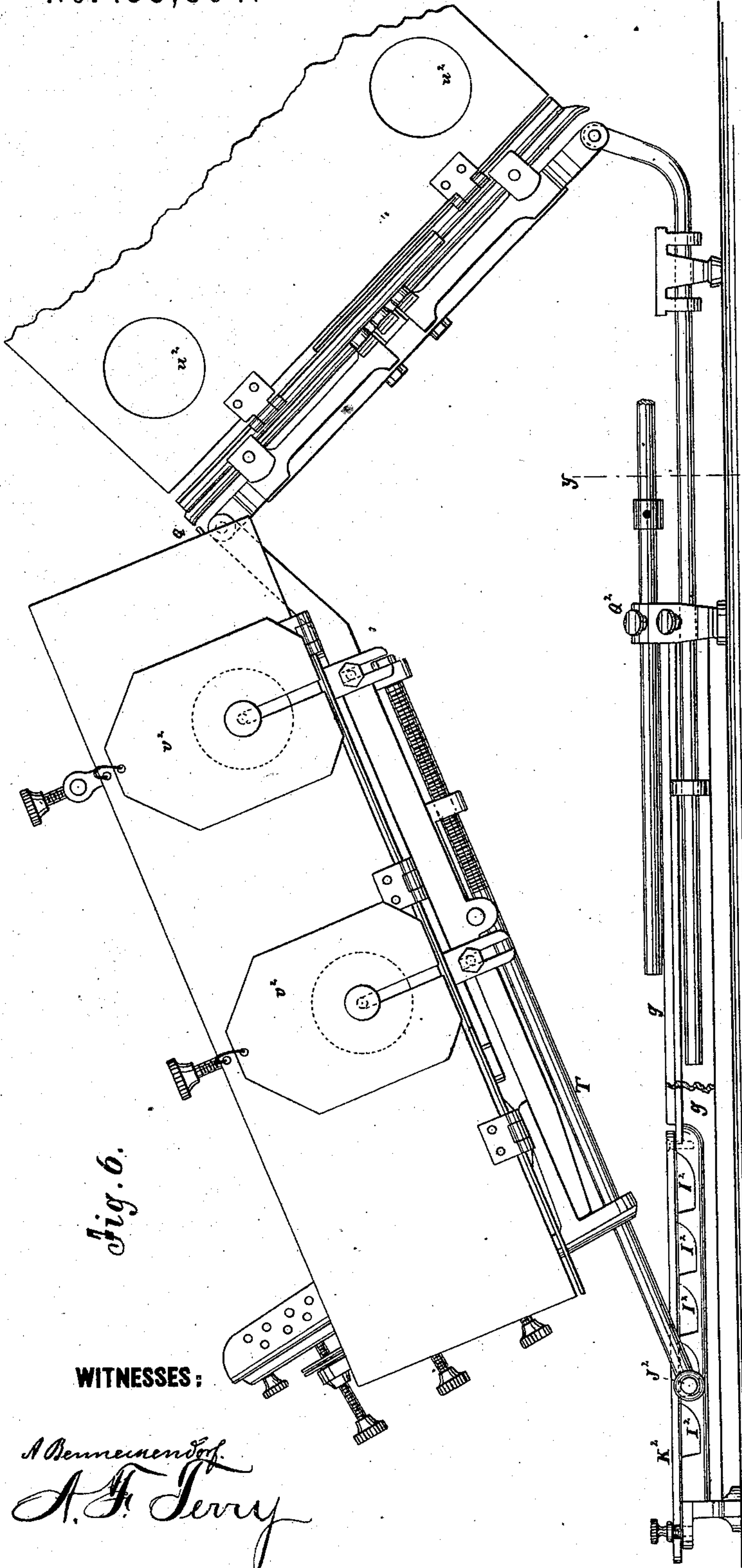


Fig. 6.

WITNESSES:

A. Benneken & Co.  
A. F. Terry

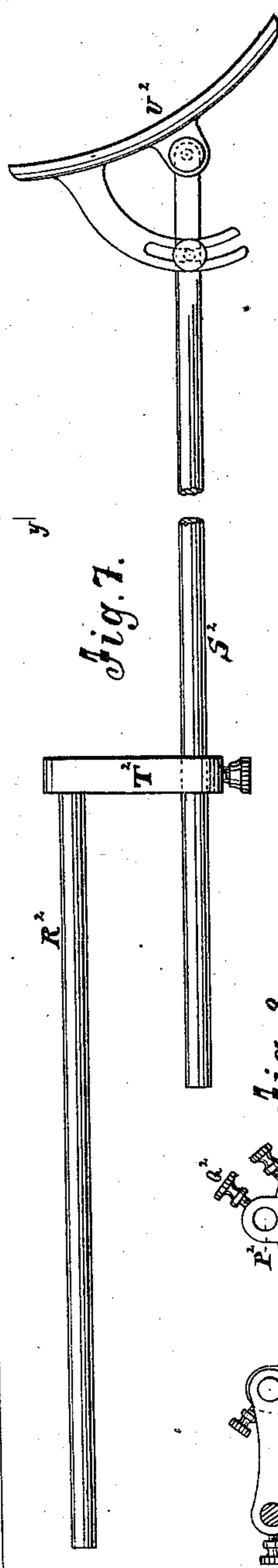


Fig. 7.

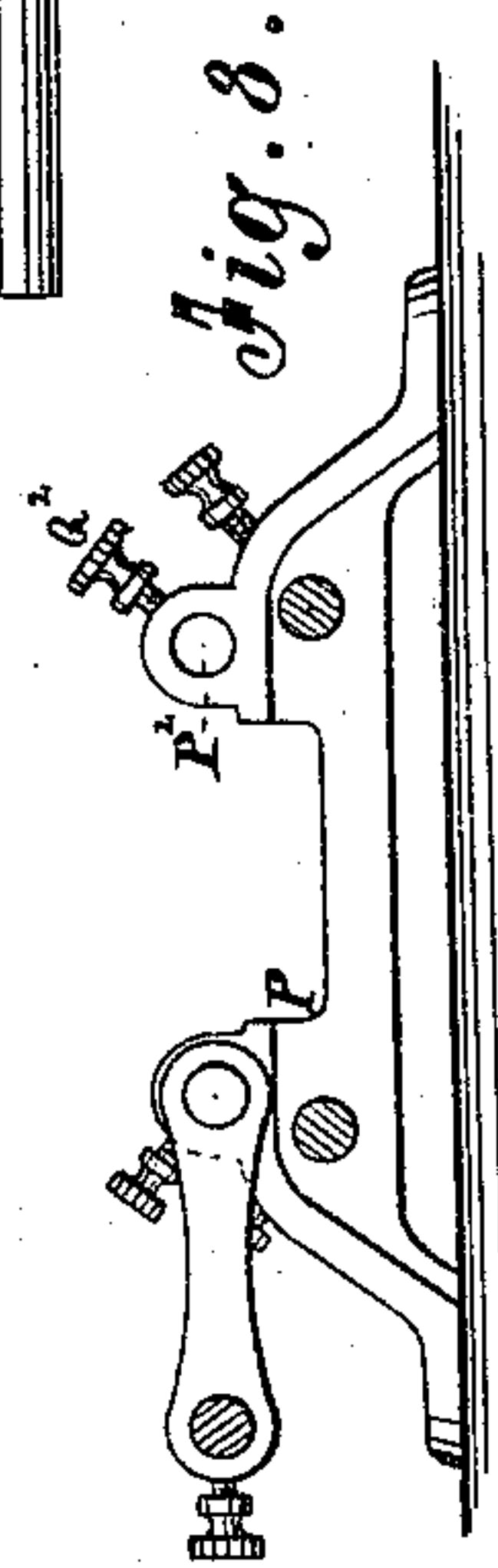


Fig. 8.

INVENTOR:

Davis Bissell

BY

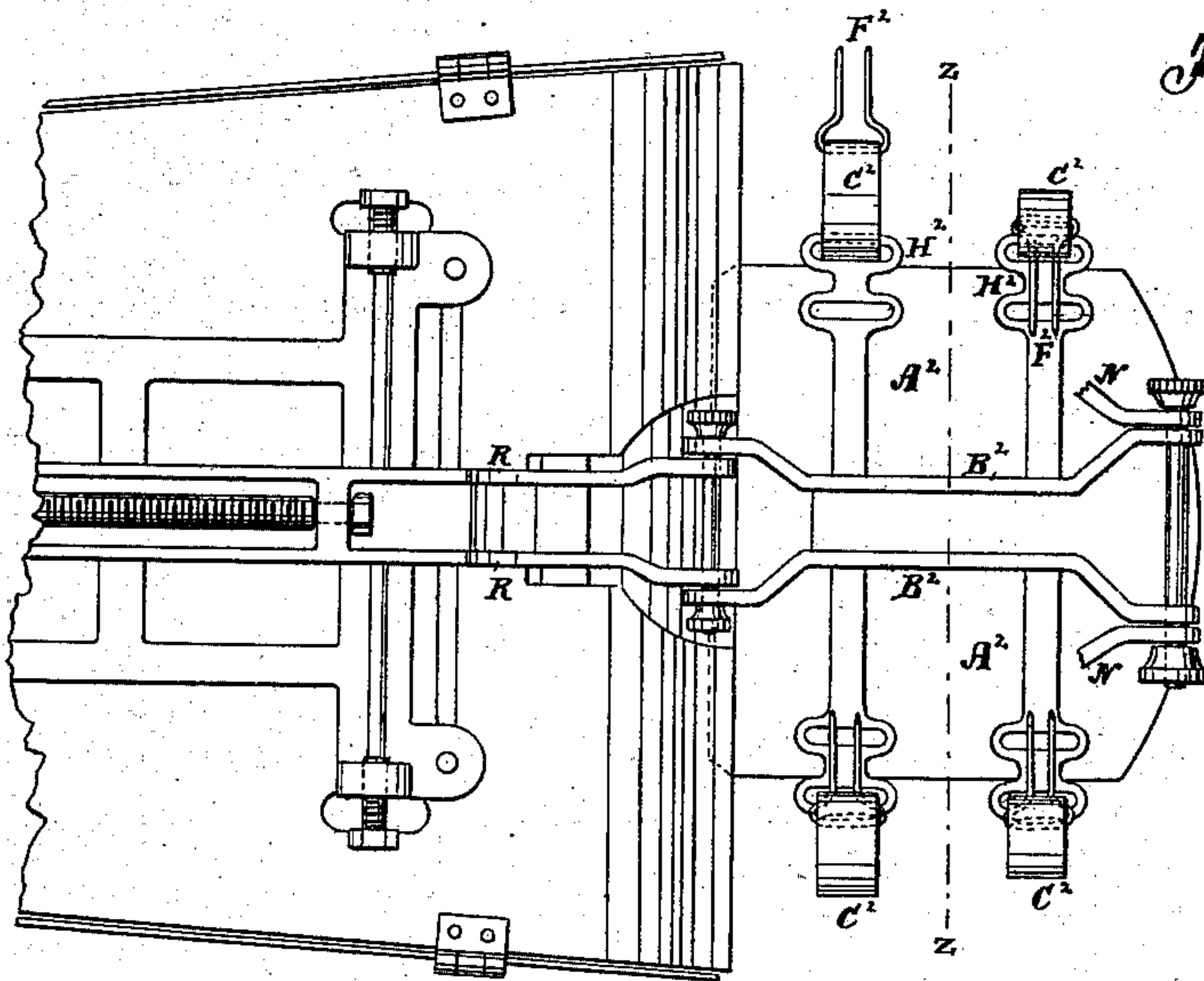
Munn & Co.  
ATTORNEYS.



**D. BISSELL.**  
**Fracture-Boxes for Legs.**

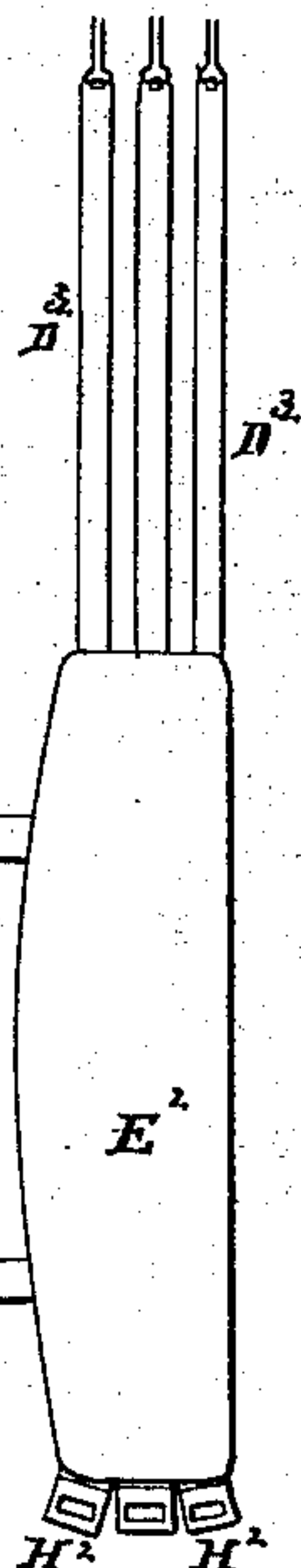
No. 158,894.

Patented Jan. 19, 1875.

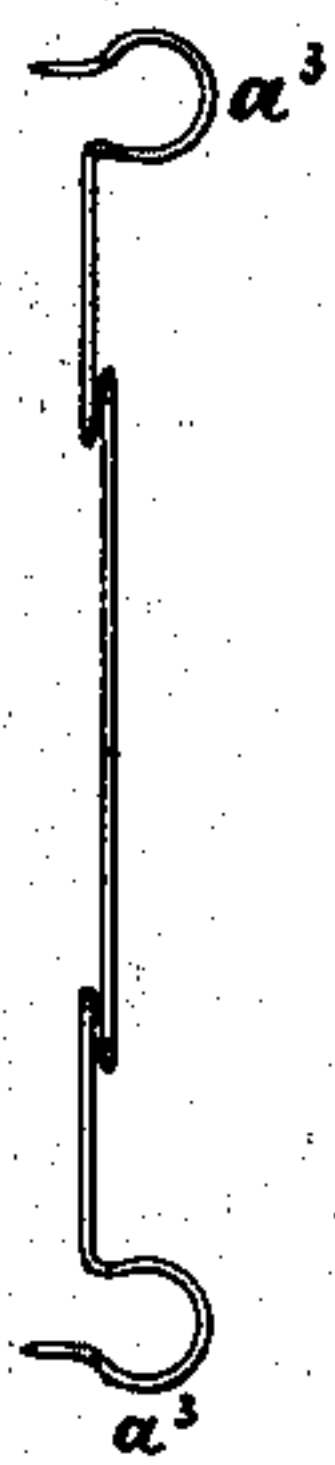


*Fig. 9.*

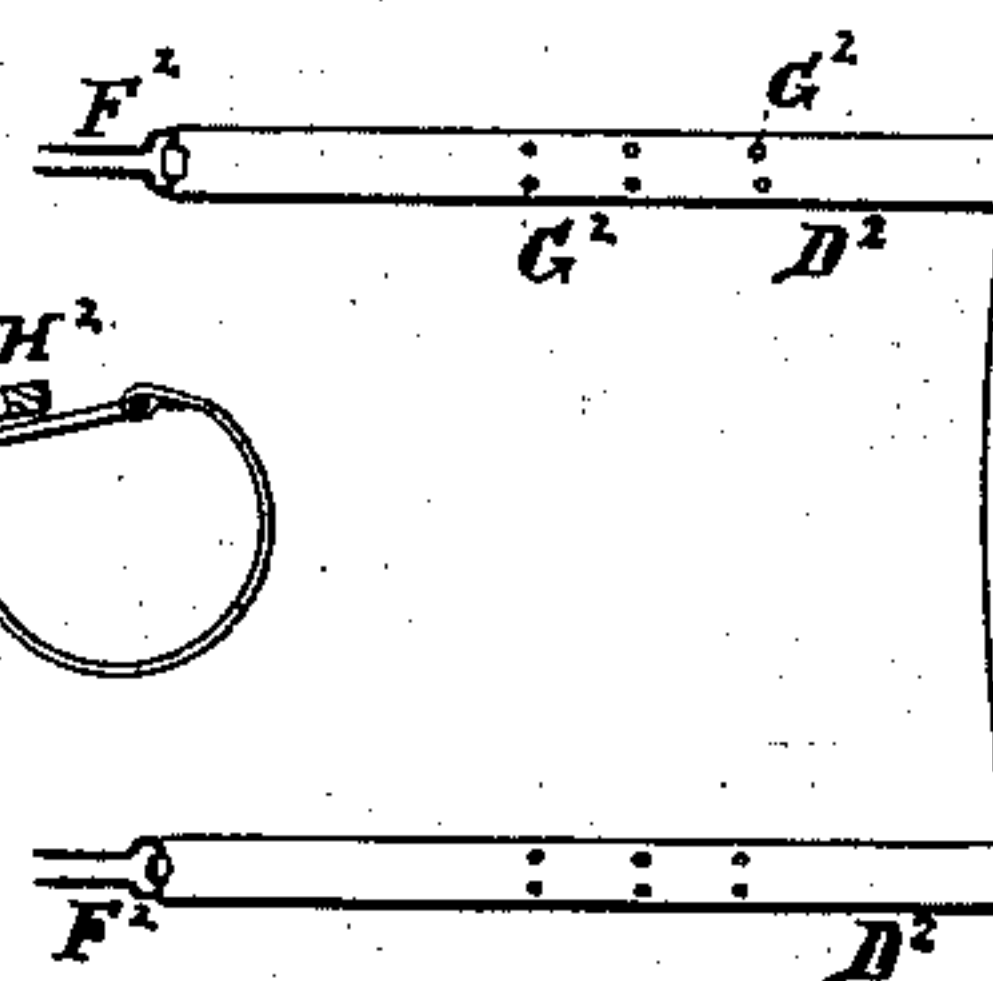
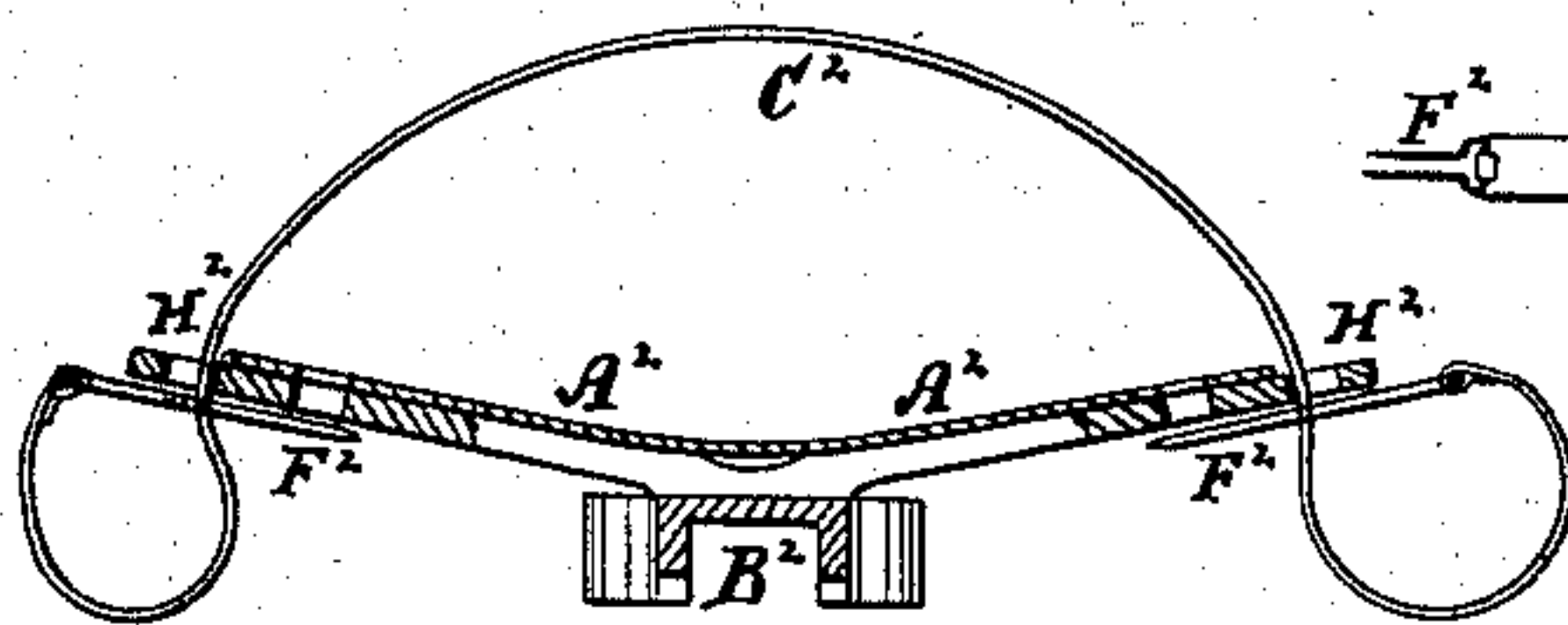
*Fig. 10.*



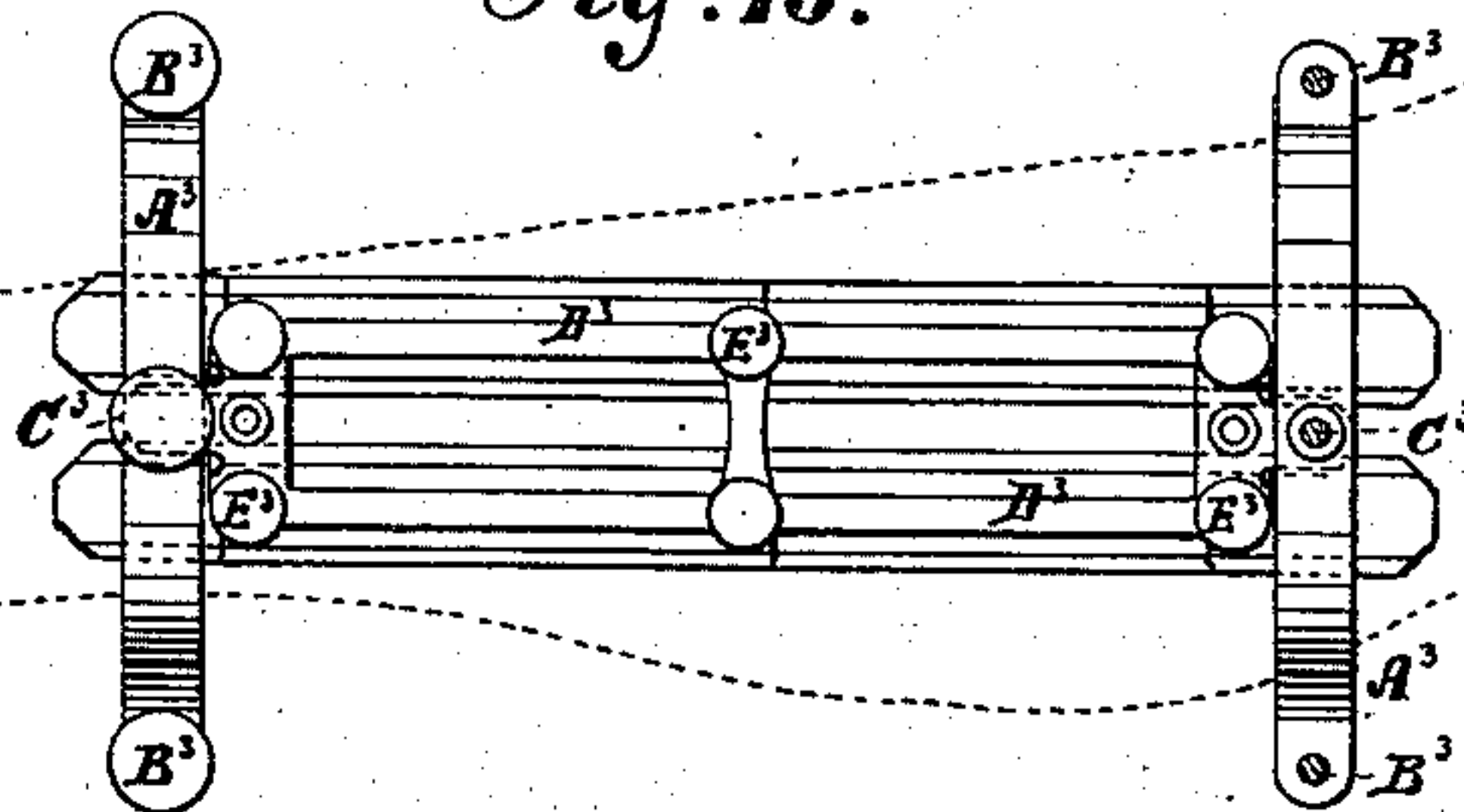
*Fig. 12.*



*Fig. 11.*



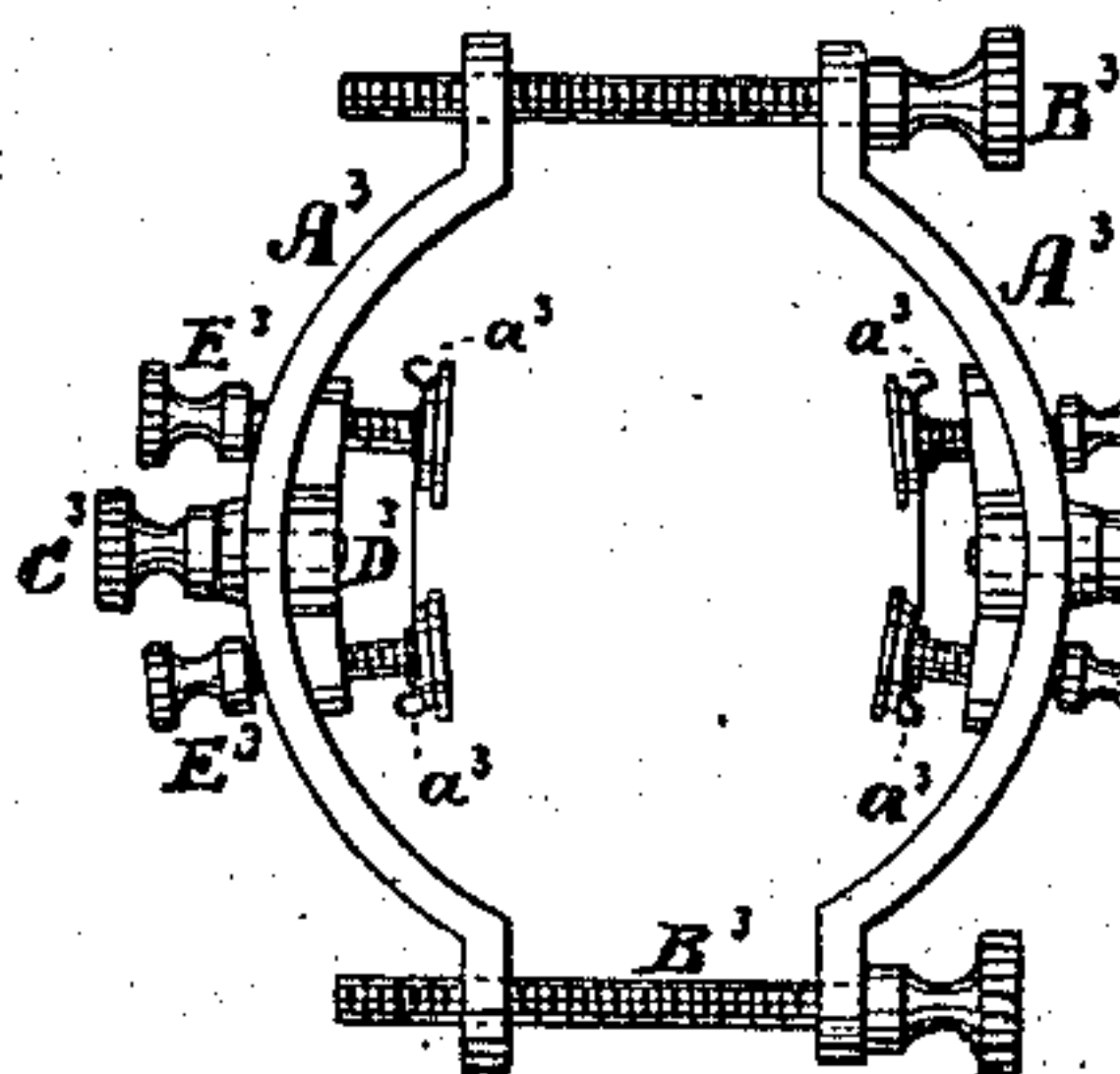
*Fig. 13.*



WITNESSES:

*A. Benneken*  
*A. F. Terry*

*Fig. 14.*



INVENTOR:

*David Bissell*  
*Mumford*  
ATTORNEYS.



# UNITED STATES PATENT OFFICE.

DAVID BISSELL, OF DETROIT, MICHIGAN.

## IMPROVEMENT IN FRACTURE-BOXES FOR LEGS.

Specification forming part of Letters Patent No. 158,894, dated January 19, 1875; application filed December 5, 1874.

### CASE B.

*To all whom it may concern:*

Be it known that I, DAVID BISSELL, of Detroit, in the county of Wayne and State of Michigan, have invented a new and Improved Leg-Splint, of which the following is a specification:

My improved leg-splint is composed essentially of two fracture-boxes for the leg and thigh, respectively, with an adjustable and extensible bed in the leg-box for the leg to rest on; also, adjustable extensible and removable pressure-pads for the sides and top of the leg and thigh; also, means for extending the limb; also, means for adjusting them to crook the leg at the knee; also, means for effecting extension from the shoulder, and certain other contrivances, all of which will be particularly described in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 is a longitudinal sectional elevation of my improved splint. Fig. 2 is a transverse section taken on the line  $x x$  of Fig. 1. Fig. 3 is a plan view. Fig. 4 is a side elevation of a yoke for holding the box closed. Fig. 5 is a plan view of the splint inverted. Fig. 6 is a side elevation of the splint as adjusted to crook the knee. Fig. 7 is a side elevation of the attachment for effecting the extension from the shoulder. Fig. 8 is a cross-section of Fig. 6, on the line  $y y$  of Fig. 6. Fig. 9 is a plan of a portion of the bottom of the part of the splint for the leg, with a rest attachment for the thigh, to be used when the fracture-box is not needed. Fig. 10 is a plan view of bandage, with straps for fastening the foot to the foot-piece, to hold it for extending the leg. Fig. 11 is a transverse section of Fig. 9, on the line  $z z$  through the thigh-rest. Fig. 12 is a side elevation of hooks for attaching cloth bandages to the pressure-pads. Fig. 13 is a side elevation of pressure-pads clamped to the leg, for supporting it in the early stages of use after recovery. Fig. 14 is an end elevation of the pressure-pads and clamps for supporting the leg in use.

Similar letters of reference indicate corresponding parts.

The fracture-box A for the thigh is repre-

sented at the right hand of Fig. 1, and the box B for the leg at the left hand. The bottom of box A, also the sides, are made in two parts,  $C C^1$  and  $D D^1$ , respectively, for extending and shortening it as may be required. The parts  $C C^1$  are also provided with additional pieces  $E E^1$ , to extend the breadth of the box when the limb is to be packed in sand, wheat-bran, or the like. These pieces are also extensible lengthwise with the plates  $C C^1$  and the sides, and they are removable together with the sides, which are hinged to them when it is not desirable to pack the limb, leaving the middle bottom pieces  $C C^1$  to rest the thigh on. Over these middle bottom pieces  $C C^1$  is another plate, F, to cover the gap between plates  $C C^1$  when extended. The plates  $C C^1$  are attached to the arms G H of independent supports I I<sup>1</sup>. The plate F is attached to the arms J of the slotted bar K, along which the supports I I<sup>1</sup> slide in extending and contracting the plates  $C C^1$ , the bar K being fitted in a groove in the bottom of each of said supports, and it is confined in them by screws L passing through its slots M, which hold the middle of the box up level with the ends. The supports I are pivoted at the outer end to the rods N, which support them, and slide in the stands O and P. The supports I<sup>1</sup> are pivoted at Q to the support R, which extends along under the box B toward the front, and receives the front support S thereof in its grooved under side. It also has the extension-screw T swiveled in its lug U, and screwing in a nut, V, on support S for extending the limb. The side bottom plates  $E E^1$  are fastened on the bars G by thumb-screws W, which pass through slots in the plates, to allow the plates to be put in and taken away without wholly removing the screws. These plates, and also the plates C,  $C^1$ , and F, and the sides  $D D^1$ , are connected by rivets Y in slots to hold them snugly together, and at the same time allow them to slide freely. The fracture-box for the leg is composed of two bottom plates,  $a$ , and two side plates,  $b$ . The bottom plates are secured to the supporting-frame  $d$  by screws  $e$  passing through slots  $f$ , which allow the plates to be put in and taken out readily; also, to be ad-



justed to widen and narrow the box as may be wanted, and the frame  $d$  is attached to the support  $R$ , so that the main portion of this box moves forward and backward with the thigh-box for extending and contracting the limb. The frame  $d$  also rests on the bars  $g$  of the standards  $P$  and  $h$ , so as to slide forward and backward on them. The extension is effected by the foot-piece  $i$ , to which the foot and ankle are strapped, and which is connected by screws  $j$  to the upright  $k$ , which is supported on the bar  $S$ , having the nut  $V$ , in which the extension-screw  $T$  works. This upright also supports end plates  $l$ , having bottom extensions  $n$ , which overlap, so as to widen and narrow with the box. The foot-piece  $i$  has adjustable foot-plates  $p$ , pivoted at  $q$ , to swing laterally to line the great toe with the leg, so as to set it in the proper relation to the leg when fixing it in place; also, to open and close the plates in the upper part, as demanded by the size of the foot.

This foot-piece  $i$  is swiveled on the screws  $j$  to shift it forward and backward, and it has a fastening-screw,  $r$ , to make the foot-plates firm. Two screws,  $j^4$ , are used for adjusting the foot-piece in the plane transverse to the leg. The bed for the leg consists of the single plate  $t$  for the heel and ankle, and the two plates  $u$  for the calf, which are suitably curved transversely and lengthwise to conform to the shape. The plates  $u$  are adjustable on the stud  $w$ , to widen and narrow the bed, and both the foot-piece and the plates  $u$  are adjustable lengthwise along the stud  $a^1$ . The slots for this stud are covered, and they are held fast by a spring-plate,  $b'$ . This bed is mounted at the middle of the arch, or thereabout, on the bar  $d'$ , which is adjustable vertically to the leg by the thumb-screws  $e'$ , and near the upper end it rests on the bar  $f'$ , which has a bandage or strap,  $g'$ , by which to hold the end up to the leg. In the leg-box I have two double extensible side spring-pressure pads,  $h^1$ , and a similar top pad,  $i^1$ . These pads are composed of flat steel springs, with front plates of zinc, held together by the screws  $j^1$ , by which they are also attached to the supporting-plates  $k'$ , the screws being swiveled to them in slots  $l'$ , so that they can be shifted along the screws for extending and shortening them, as required by the nature of the case. Each pad has two springs and two zinc plates, which overlap along one end portion, and are connected by the middle screw,  $j^1$ , so as to allow them to be shifted readily either way. The supporting-plates  $k'$  for the pads are supported on the screws  $m^1$ , to which they are swiveled, and which are supported in the uprights  $n^1$ . These uprights  $n^1$  are attached to the frame  $d$  by bolts  $o'$  at their lower ends screwing into the ears  $b'$  of said frame through slots in the bars, which allow them to be put in and taken out readily. These uprights support cross-bars  $q^1$  at the top, from which the top pressure-pad  $i^1$  is sus-

pending by means of the screws  $r^1$ , bar  $s^1$ , and the pad-screws  $j^1$ , said pad being arranged and provided with adjusting-screws, the same as the side pads, except that it is single. The thigh-box has similar side and top pressure-pads  $h^2$  and  $i^2$ , except that the side pads are single, and they are supported by adjusting-screws  $j^2$ , supporting-bars  $h^2$  and  $s^2$ , screws  $m^2$  and  $r^2$ , uprights  $n^2$ , and cross-bars  $q^2$ ; but, as this box is adjustable lengthwise, the bars  $h^2$  are also made extensible, being contrived in two parts, which lap each other, and are connected by screws  $t^2$  and some of the adjusting-screws  $j^2$ , so as to allow them to extend and shorten. The supporting-screws  $m^1$  and  $m^2$  pass through large holes  $n^2$  in the box sides, to allow them to be put up and taken down when the screws are in place, and closing-plates  $u^2$  are employed to close said holes to hold the packing in.

With the apparatus as thus far described, a limb broken both above and below the knee may be set and arranged so as to be kept in the right positions.

To set the limb, the side pads and top pads and their supports will all be removed, the limb dressed and arranged on the bed-pieces, and the uprights and cross-bars set up, the pressure-pads attached, and adjusted just as required by the shape and the state of the limb. But, first, the pattern of the well leg will be taken by adjusting one of the pads to its shape, in order to restore the broken leg to the corresponding shape. This pattern-pad will then be put in place, and the leg will be adjusted to it by the other pad. The side pads are contrived so that they can be used alike on either side, thus making it simple and easy to so adjust the broken limb to the well one. By the flexibility of the pads and their adjusting-screws the requisite pressure can be applied to any part, and any part can be at once relieved, if subject to too much pressure, or in case it swells so as to increase the pressure after the pad has been adjusted.

If the limb is to be packed in bran or other substance, the sides of the fracture-box may then be applied; and they can be taken off, when no longer wanted, without disturbing the other parts. Thus the limb can be held in the requisite shape and with the needed pressure without employing the bandages commonly used, which are unyielding when the limb swells unless readjusted, which is very laborious and painful to the patient, and causes much disturbance of the limb.

If a fracture of the thigh only is to be treated, the leg-box and the leg-pad will be dispensed with; but the bed and the foot-piece, together with the extension apparatus, will be retained.

Likewise the thigh-box will be dispensed with if it is a fracture of the leg that is to be treated; but in some cases it may be desirable to use a rest or support,  $A^2$ , for the thigh,



which is connected, by supports  $B^2$ , to the supports  $R$  and the rods  $N$ , being pivoted to both, so as to adjust it and the leg-box to crook the knee, if wanted to do so; and it is provided with straps  $C^2$ , for binding it fast to the thigh. These straps, and also the straps  $D^2$  and  $D^3$  of the foot-bandage  $E^2$ , are provided with staples  $F^2$ , which are to fasten the straps by passing through the holes  $C^2$  behind the loops  $H^2$ , as in Fig. 11, the object being to prevent having to draw the straps so as to increase the compression for buckling and unbuckling, as must be done when the common buckles are used. This will be a great relief to the patient, particularly when the limb swells after the straps have been fastened. This foot-bandage is attached to the ankle by the straps  $D^2$ , and the straps  $D^3$  are employed for attaching the foot to the foot-piece, so as to pull it down to effect the extension. The bars  $g$  of the supporting-frame are provided with a series of notches,  $I^2$ , in which the handles  $J^2$  of the screw  $T$  are placed, as shown in Fig. 6, when it is desired to raise the middle joint  $Q$  to crook the knee, and guards  $K^2$  are applied to fasten the handles in the notches. The stand  $P$  has a hole,  $P^2$ , with an appropriate binding-screw,  $Q^2$ , on each side, and the extension-bar  $R^2 S^2 T^2$  and shoulder-piece  $U^2$  are provided to fit therein, for the purpose of effecting the counter extension from the shoulder in case of necessity. This contrivance can be put on either side, as may be desired. The shoulder-piece may be shifted either side up to adapt it for either side.  $A^3$  represents clamping-bars,  $B^3$  clamping-screws, and  $D^3$  attaching-bars, by which the side pads  $h^1$  are to be rigged upon the leg for strengthening it in the first efforts to walk after the limb has sufficiently recovered for the purpose. The attaching-bars are connected to the clamping-bars by the screws  $C^3$ , and the presser-pads are connected to the bars  $D^3$  by adjusting-screws  $E^3$ , which are arranged and operated the same as the screws  $j^1$ .

The quality of these pads which enables the taking of the pattern of the sound limb, or counterpart of the broken one, and also enables the broken limb to be set to the pattern, I consider of great importance, and believe it is possessed by no other splint known or used. By it the misshapen and crooked limbs not corresponding in form and shape with the others, so often the result of the faulty means now in use, may be wholly avoided.

The object of the zinc plates is to utilize the cooling properties of zinc to allay inflammation and heat. The zinc is also of a softer and smoother nature than other metal, and it generates electric effects, which are beneficial, and it facilitates the application of electricity. Ample space is left between the top and side pressure-pads, also between the latter and the leg-rest, for the escape of heat and

other matters emanating from the wound, and for the inspection of it, or application of remedies; but any one of the pads can be withdrawn readily at any time by turning back the screws.

$a^3$  represents hooks, combined with the pressure-pads, for temporarily attaching the bandages, to hold them until the pressure-pads are screwed up.  $a^4$  represents rods for holding the side bars up when packed.

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

1. The combination of the extensible and adjustable leg-rest  $t u$  and the foot-rest  $i$  and  $p$ , the leg-rest being itself extensible, and the foot-rest being extensible relatively to the leg-rest, substantially as specified.

2. The foot-plates  $p$ , adjustable laterally together, and to and from each other on the pivot  $q$ , having a fastening-screw,  $q^2$ .

3. The foot-rest  $i p$ , connected to the upright  $k$  by the swiveled adjusting-screws  $j$ , and provided with the binding-screw  $r$ , substantially as specified.

4. The combination of the bar  $d'$  and adjusting-screws  $e'$  with the leg-rest  $t u$ , substantially as specified.

5. The combination of the side spring-pressure pads  $h^1$  with the leg-rest  $t u$ , substantially as specified.

6. The combination of the top spring-pressure pad  $i^1$  with the leg-rest  $t u$ , substantially as specified.

7. The combination of springs, adjusting-screws  $j$ , and a support for the screws, forming a spring-pressure pad for a splint, substantially as specified.

8. The combination of detachable bars  $n^1$ , supporting cross-bars  $q^1$ , and screws  $m^1 r^1$ , for supporting the spring-pressure pads, substantially as specified.

9. The combination of the detachable bottom and sides with the leg-rest and pressure-pads, substantially as specified.

10. The combination of the leg-rest and pressure-pads, thigh-rest and pressure-pads, and jointed supports  $R$  and  $I^1$ , substantially as specified.

11. The combination of supports  $R I^1 I^1$ , rods  $N$ , and adjusting-screw  $T$  with the leg-rest and thigh-rest and their pads, substantially as specified.

12. The extensible thigh-box composed of bottom plates  $C C^1 E E^1 F$ , side plates  $D D^1$ , adjusting-rests  $I^1 I$ , bar  $R$ , and screws  $L$ , combined and arranged substantially as specified.

13. The combination of adjustable bed-plate  $F$  with extensible plates  $c c'$ , substantially as specified.

14. The supporting-bars  $g$ , having notches  $I^2$ , in combination with the jointed supports  $R I^1$  and the adjusting-screw  $F$ , substantially as specified.



15. The combination of a shoulder - extension device,  $U^2$ ,  $S^2$ ,  $T^2$ , and  $R^2$ , with the stand  $P$  and the leg and thigh splint, substantially as specified.

16. The combination of thigh-rest  $A^2$  with the leg-rest and its pressure-pads, substantially as specified.

17. The improved strap - fastening, consisting of the staple  $F^2$ , holes  $G^2$ , and the loop  $H^2$ , substantially as specified.

18. The combination of clamping-bars  $A^3$ , screws  $B^3$ , and attaching - bars  $D^3$  with the

side pressure-pads  $h^1$ , substantially as specified.

19. The combination of the foot-bandage  $E^2$  and straps  $D^2$  and  $G^2$  with the foot-rest  $i$   $h$ , substantially as specified.

20. The combination of hooks  $a^3$  with the pressure-pads, substantially as specified.

DAVID BISSELL.

Witnesses:

T. B. MOSHER,

ALEX. F. ROBERTS.