

(No Model.)

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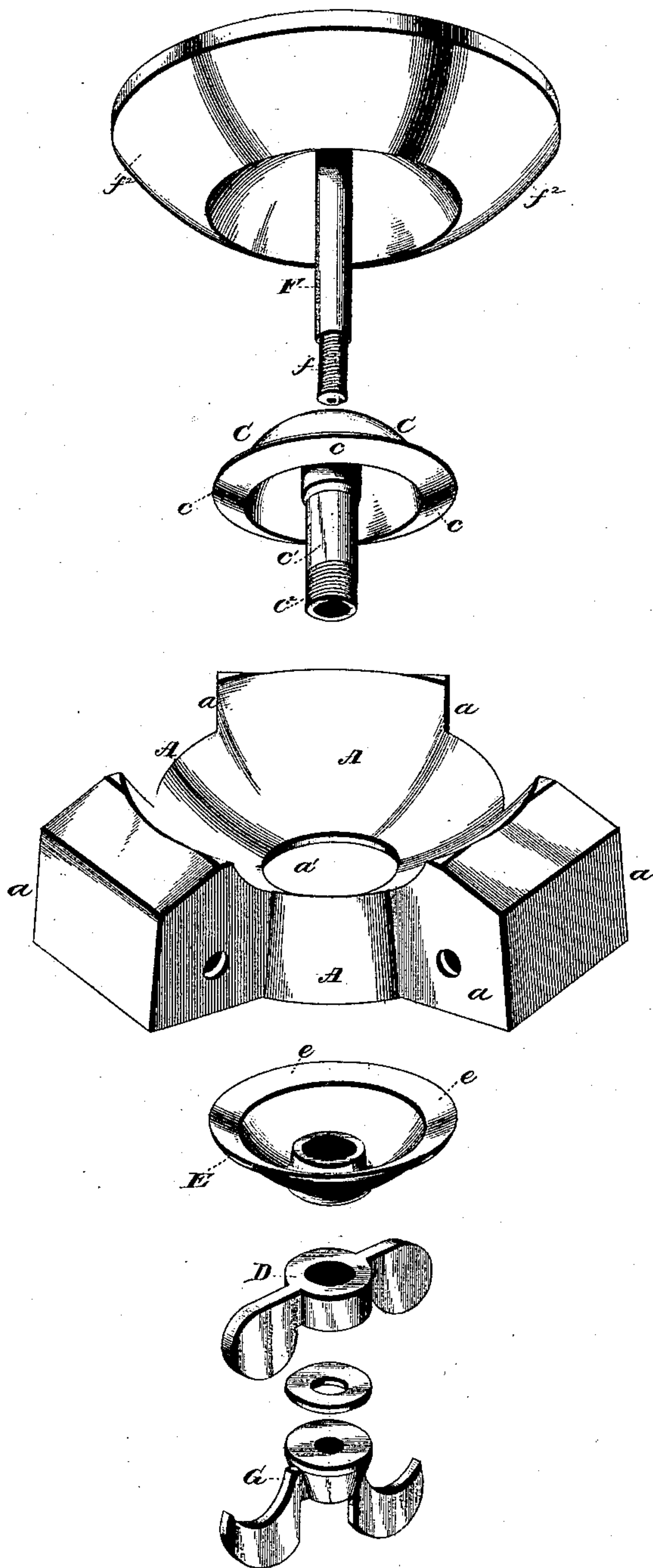
W. D. JOHNSON.

TRIPOD HEAD.

No. 362,384.

Patented May 3, 1887.

*Fig. 1.*



*Witnesses*  
*Chas. Williamson,*  
*Henry C. Hazard.*

*Inventor:*  
*William D. Johnson, by*  
*Charles Russell, his Attys*

(No Model.)

3 Sheets—Sheet 2.

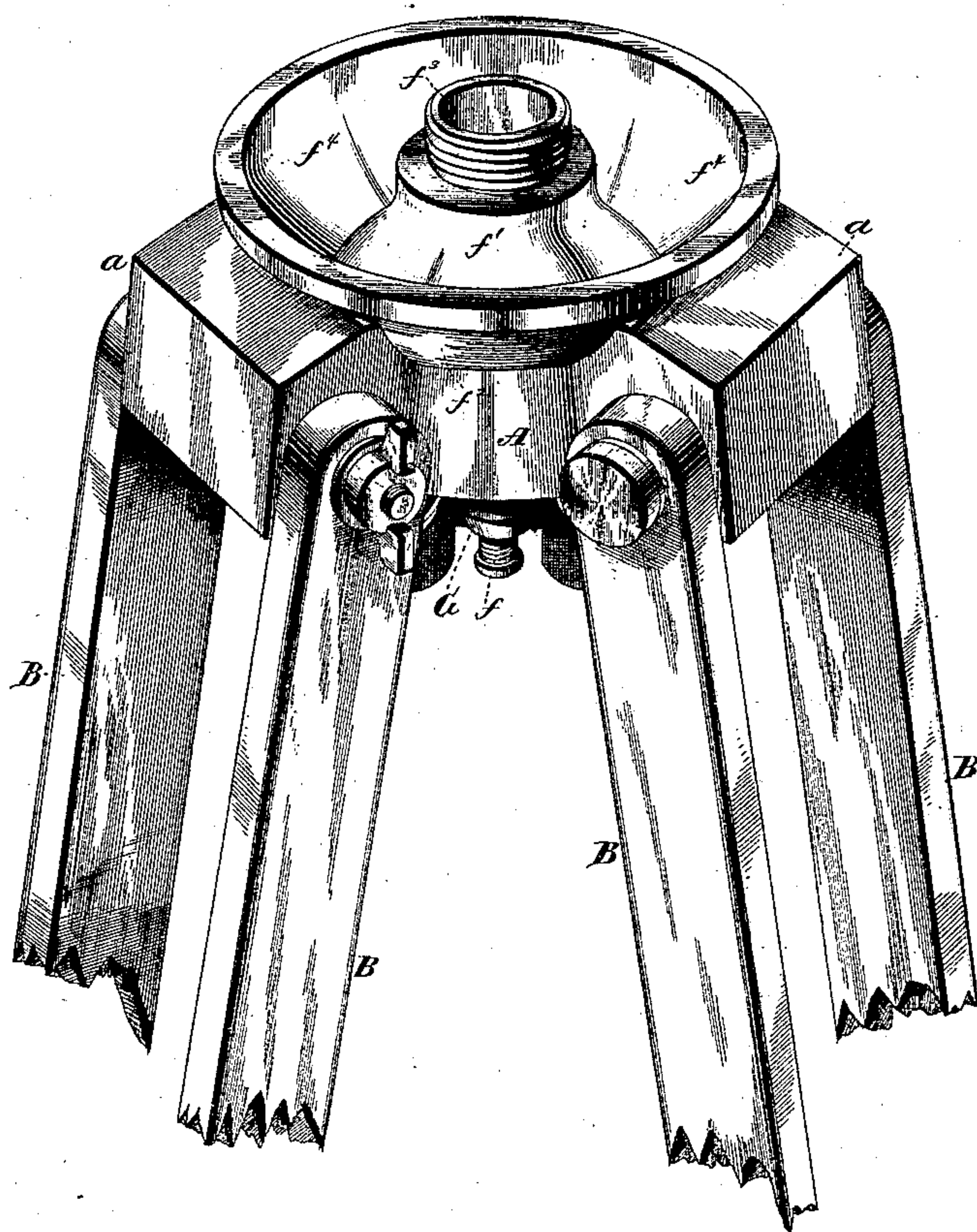
W. D. JOHNSON.

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Patented May 3, 1887.

*Fig. 2.*



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No Model.)

3 Sheets—Sheet 3.

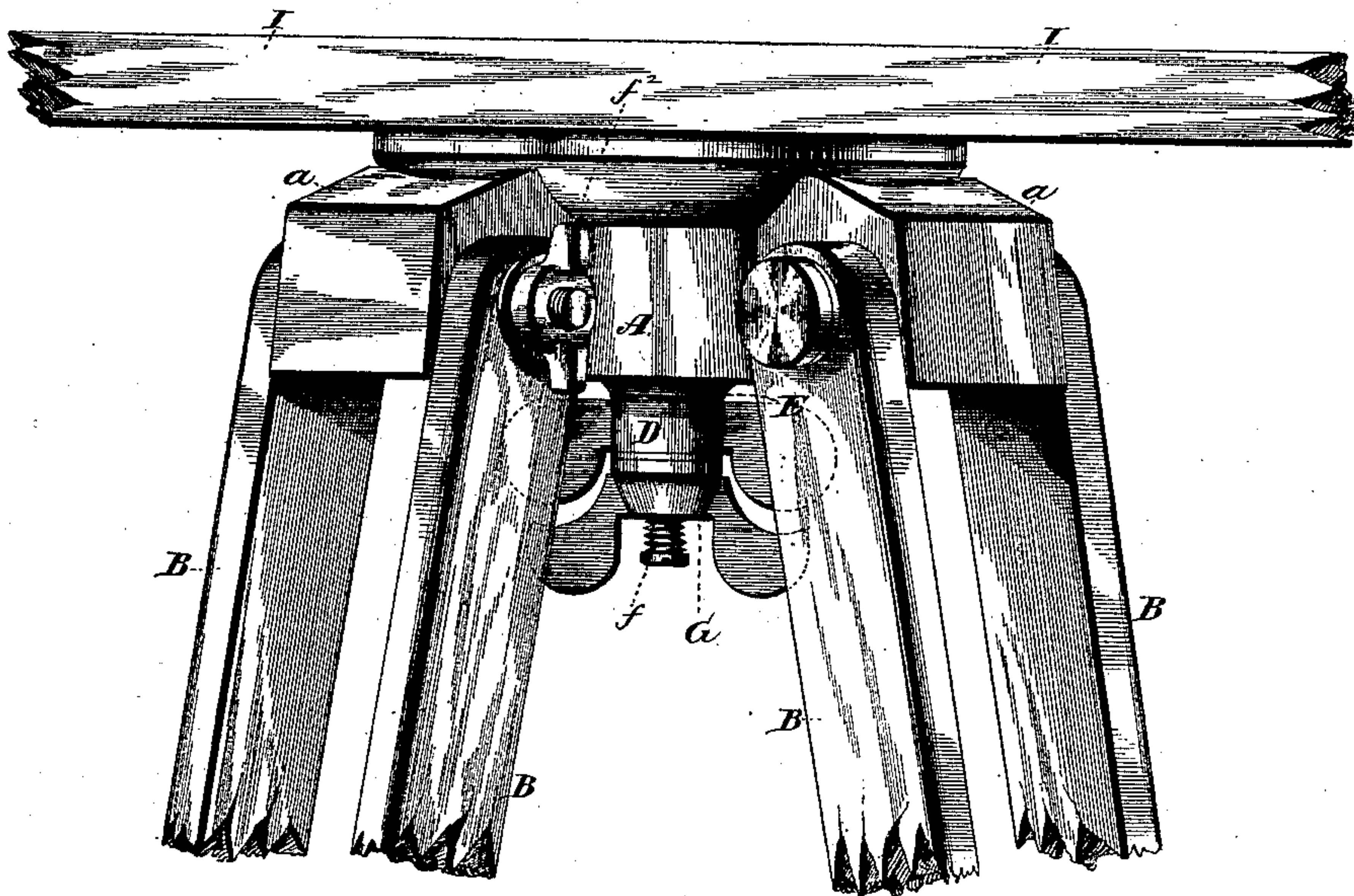
W. D. JOHNSON.

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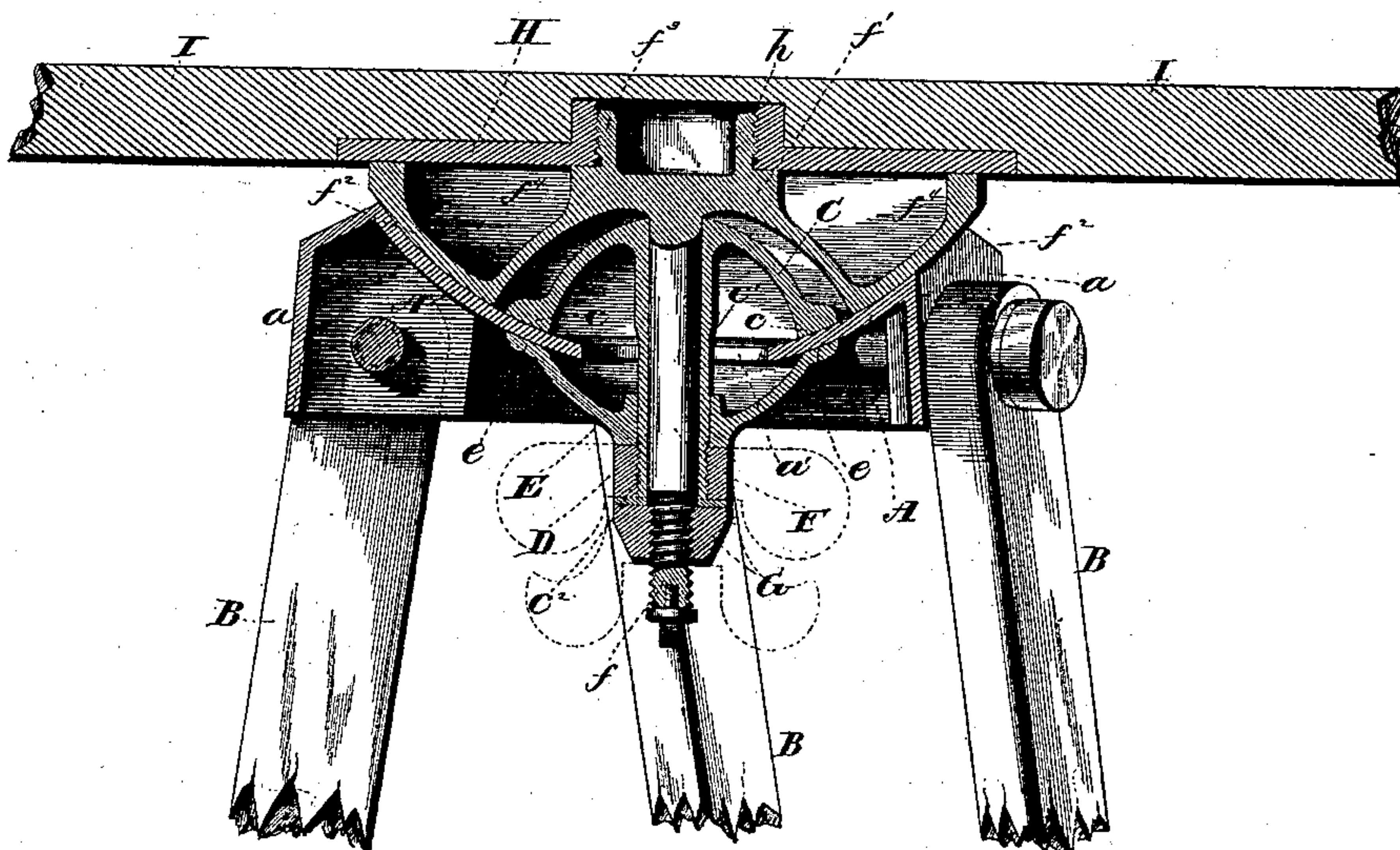
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*Fig. 5.*



*Fig. 4.*



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# UNITED STATES PATENT OFFICE.

WILLARD D. JOHNSON, OF WASHINGTON, DISTRICT OF COLUMBIA.

## TRIPOD-HEAD.

SPECIFICATION forming part of Letters Patent No. 362,384, dated May 3, 1887.

Application filed March 23, 1887. Serial No. 232,168. (No model.)

*To all whom it may concern:*

Be it known that I, WILLARD D. JOHNSON, of Washington, in the District of Columbia, have invented certain new and useful Improvements in Tripod-Heads for Surveying-Instruments; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which—

10 Figure 1 is a perspective view of the parts of my apparatus separated from each other. Fig. 2 is a like view of the same combined for use. Fig. 3 is a side elevation of my apparatus having attached thereto a plane board, and  
15 Fig. 4 is a vertical central section of the same.

Letters of like name and kind refer to like parts in each of the figures.

My invention is designed, mainly, for use in connection with plane-table surveying-instruments, but is equally applicable for other forms of surveying and engineering instruments, photographic cameras, &c., and has for its object the ready and accurate horizontal adjustment of such instruments and the rotation  
25 of the same without change of such adjustment; to which end said invention consists, principally, in a tripod-head for surveying-instruments in which is combined a leveling mechanism and a mechanism for circumferential adjustment that act independently and the  
30 axes of whose motions intersect at a point within or above the instrument-supporting table, substantially as and for the purpose hereinafter specified.

35 It consists, further, in a tripod-head for surveying-instruments in which the axial bearing for the supporting-table is in part formed by a spindle that is journaled within a bearing which is fitted to and adapted to be moved  
40 upon or over the face of a relatively-fixed concave plate, and is in part formed by the direct bearing of a convex boss upon the face of said concave plate, substantially as and for the purpose hereinafter shown.

45 It consists, further, in a tripod-head for surveying-instruments in which the supporting-table is independently journaled within a convex plate and a concave plate that are combined and adapted to bear upon and move over  
50 the opposite sides of a stationary concavo-convex plate, and by a relatively-inward pressure

to be engaged with and locked upon the same, substantially as and for the purpose hereinafter set forth.

It consists, further, in a tripod-head for surveying-instruments in which the supporting-table is independently journaled within a movable convex plate that rests upon the concave face of a stationary concavo-convex annular plate, is provided with a hollow axial spindle  
60 which extends through a central opening in the same, and is combined with a movable concave plate that fits over said spindle and bears upon the convex face of said stationary plate, and a nut which fits upon a threaded portion  
65 of said spindle and is adapted to press said movable plates by a relatively-inward movement firmly against and lock the same upon the faces of said stationary plate, substantially as and for the purpose hereinafter shown and  
70 described.

It consists, further, as an improvement in tripod-heads for surveying-instruments, in the combination, in one organization of the following elements, viz: a stationary annular concavo-convex plate that is adapted to be connected with and supported by pivoted legs, a movable convex plate provided with a hollow axial spindle, a movable concave plate which is fitted over and upon said spindle, means,  
80 substantially as shown, whereby said movable plates may be pressed toward each other and caused to bear upon the opposite faces of said stationary plate, and an axial spindle that is adapted to pass into and rotate independently  
85 within said hollow spindle, and at its upper end is adapted to be attached to an instrument-supporting table, substantially as and for the purpose hereinafter specified.

It consists, further, as an improvement in tripod-heads for surveying-instruments, in the combination of the following elements, viz: a stationary annular concavo-convex plate, a movable convex plate and a movable concave plate that are adapted to bear upon the opposite faces of said stationary plate and are combined by means of a hollow axial spindle having a peripheral thread and an encircling-nut, and a spindle which is journaled within said hollow spindle and has its upper end adapted  
90 to receive an instrument-supporting table, and at said end is provided with an annular con-  
100



vex boss that conforms to and rests upon the upper concave face of said plate, substantially as and for the purpose hereinafter shown.

It consists, further, as an improvement in tripod-heads for surveying-instruments, in the combination of the following elements, viz: a stationary annular concavo-convex plate, a movable convex plate and a movable concave plate that are adapted to bear upon the relatively-opposite faces of said stationary plate, and are combined by means of a hollow axial spindle provided with a peripheral thread and encircling-nut, a spindle which has its upper end adapted to receive an instrument-supporting table, and is journaled within said hollow spindle, and means, substantially as shown, whereby said journaled spindle may be locked in place and prevented from rotating, when desired, substantially as and for the purpose hereinafter set forth.

It consists, finally, as an improvement in tripod-heads for surveying-instruments, in the combination of the stationary annular concavo-convex plate, the movable convex plate provided with the hollow peripherally-threaded spindle and encircling-nut, the movable concave plate adapted to fit over said spindle, and the table supporting and journaling spindle, which has a threaded lower end and an encircling-nut and at its upper end is provided with an annular boss that has a convex lower side and at its upper side is adapted to be connected with an instrument-supporting table, substantially as and for the purpose hereinafter shown and described.

In the carrying of my invention into practice I employ an annular concavo-convex plate, A, that at suitable points around its periphery is provided with lugs  $a$ , which are each adapted to have pivoted thereon the upper ends of a bifurcated supporting-leg, B. Within the upper concave side of the plate A is placed a plate, C, which preferably has a hemispherical form, with its convex side up-  
 45 permost, and its edge  $c$ , which is considerably broadened, resting upon and conforming to the curvature of the upper face of said plate A. From the center of said plate C a hollow spindle,  $c'$ , extends downward through the central opening,  $a'$ , of said plate A, and upon its lower portion is provided with an external thread,  $c^2$ , and wing-nut D.

Fitted closely over the spindle  $c'$ , and against the lower face of the plate A, is a second plate, E, which preferably has a hemispherical form, and has its edge  $e$  conformed to the curvature of said plate, said part being substantially the same as the plate C. The nut D operates to move said plates C and E together, so as  
 60 to cause their engaging faces  $c$  and  $e$  to bear upon the faces of plate A with any desired force. When said nut is sufficiently loosened, said plates C and E may be moved laterally in either direction, within the limits of motion permitted the spindle  $c'$  by the opening  $a'$ , and as the faces of said plate A are concentric, it will be seen that such movements will be

smooth and with the same friction of parts at one point as at any other point within the field of motion.

Journaled within the hollow spindle  $c'$  is a spindle, F, that closely fills the same, and upon its lower projecting end,  $f$ , is threaded and provided with a wing-nut, G. The upper end of said spindle is provided with a circular head,  $f'$ , which, upon its lower side, forms an annular boss,  $f^2$ , that conforms to the curvature of the upper face of the plate A, and bears upon the same outside of the plate C, such bearing furnishing the entire support for said spindle and leaving said plate C free from any downward pressure, except such as is produced by its own weight, the weight of the lower plate, E, and the operation of the nut D.

The upper side of the head  $f'$  is provided with a central peripherally-threaded hub,  $f^3$ , upon which is fitted a plate, H, that has a corresponding interiorly-threaded opening,  $h$ . Said plate extends outward to or slightly beyond said head and has a firm bearing upon the upper surface of the same. For the purpose of lessening the weight of said head it is provided with an annular groove,  $f^4$ , which extends from a point near its hub nearly to its outer edge, as shown, and leaves a bearing for said plate H only at the inner and outer portions of said head. Said plate H receives and has secured to its upper side a plane table, I, or equivalent part, for the support of the instruments which are to be employed.

In the use of my apparatus the legs of the tripod are firmly seated upon the ground, the confining-nuts loosened, and the table adjusted to a perfectly horizontal position, by such movement as may be necessary of the engaging parts over or upon the concavo-convex plate, after which, by tightening the upper nut, the plates C and E will be caused to firmly grasp said plate A and operate to preserve the adjustment thus effected. While the table is thus held in a horizontal position, it is free to be turned upon its axis, and may be readily locked in or released from any desired circumferential position by tightening or loosening the lower nut, without in any manner affecting the horizontal adjustment.

Having thus described my invention, what I claim is—

1. A tripod-head for surveying-instruments, in which is combined a leveling mechanism and a mechanism for circumferential adjustment that act independently and the axes of whose motions intersect at a point within or above the instrument-supporting table, substantially as and for the purpose specified.

2. A tripod-head for surveying-instruments, in which the axial bearing for the supporting-table is in part formed by a spindle that is journaled within a bearing which is fitted to and adapted to be moved upon or over the face of a relatively-fixed concave plate and is in part formed by the direct bearing of a convex boss upon the face of said concave plate, substantially as and for the purpose shown.



3. A tripod-head for surveying-instruments, in which the supporting-table is independently journaled within a convex plate and a concave plate, that are combined and adapted to bear upon and move over the opposite sides of a stationary concavo-convex plate, and by a relatively-inward pressure to be engaged with and locked upon the same, substantially as and for the purpose set forth.

4. A tripod-head for surveying-instruments, in which the supporting-table is independently journaled within a movable convex plate that rests upon the concave face of a stationary concavo-convex annular plate, is provided with a hollow axial spindle which extends through a central opening in the same, and is combined with a movable concave plate that fits over said spindle and bears upon the convex face of said stationary plate, and a nut which fits upon a threaded portion of said spindle and is adapted to press said movable plates by a relatively-inward movement firmly against and lock the same upon the faces of said stationary plate, substantially as and for the purpose shown and described.

5. As an improvement in tripod heads for surveying-instruments, the combination, in one organization, of the following elements, viz: a stationary annular concavo-convex plate that is adapted to be connected with and supported by pivoted legs, a movable convex plate provided with a hollow axial spindle, a movable concave plate which is fitted over and upon said spindle, means, substantially as shown, whereby said movable plates may be pressed toward each other and caused to bear upon the opposite faces of said stationary plate, and an axial spindle that is adapted to pass into and rotate independently within said hollow spindle and at its upper end is adapted to be attached to an instrument-supporting table, substantially as and for the purpose specified.

6. As an improvement in tripod-heads for surveying-instruments, the combination of the following elements, viz: a stationary annular concavo-convex plate, a movable convex plate and a movable concave plate that are adapted to bear upon the opposite faces of said sta-

tionary plate and are combined by means of a hollow axial spindle having a peripheral thread and an encircling-nut, and a spindle which is journaled within said hollow spindle and has its upper end adapted to receive an instrument-supporting table, and at said end is provided with an annular convex boss that conforms to and rests upon the upper concave face of said plate, substantially as and for the purpose shown.

7. As an improvement in tripod-heads for surveying-instruments, the combination of the following elements, viz: a stationary annular concavo-convex plate, a movable convex plate and a movable concave plate that are adapted to bear upon the relatively-opposite faces of said stationary plate, and are combined by means of a hollow axial spindle provided with a peripheral thread and encircling-nut, a spindle which has its upper end adapted to receive an instrument-supporting table and is journaled within said hollow spindle, and means, substantially as shown, whereby said journaled spindle may be locked in place and prevented from rotating, when desired, substantially as and for the purpose set forth.

8. As an improvement in tripod-heads for surveying-instruments, the combination of the stationary annular concavo-convex plate, the movable convex plate provided with the hollow peripherally-threaded spindle and encircling-nut, the movable concave plate adapted to fit over said spindle, and the table supporting and journaling spindle, which has a threaded lower end and an encircling-nut, and at its upper end is provided with an annular boss that has a convex lower side and at its upper side is adapted to be connected with an instrument-supporting table, substantially as and for the purpose shown and described.

In testimony that I claim the foregoing I have hereunto set my hand this 22d day of March, A. D. 1887.

WILLARD D. JOHNSON.

Witnesses:

GEO. S. PRINDLE,  
HENRY C. HAZARD.