

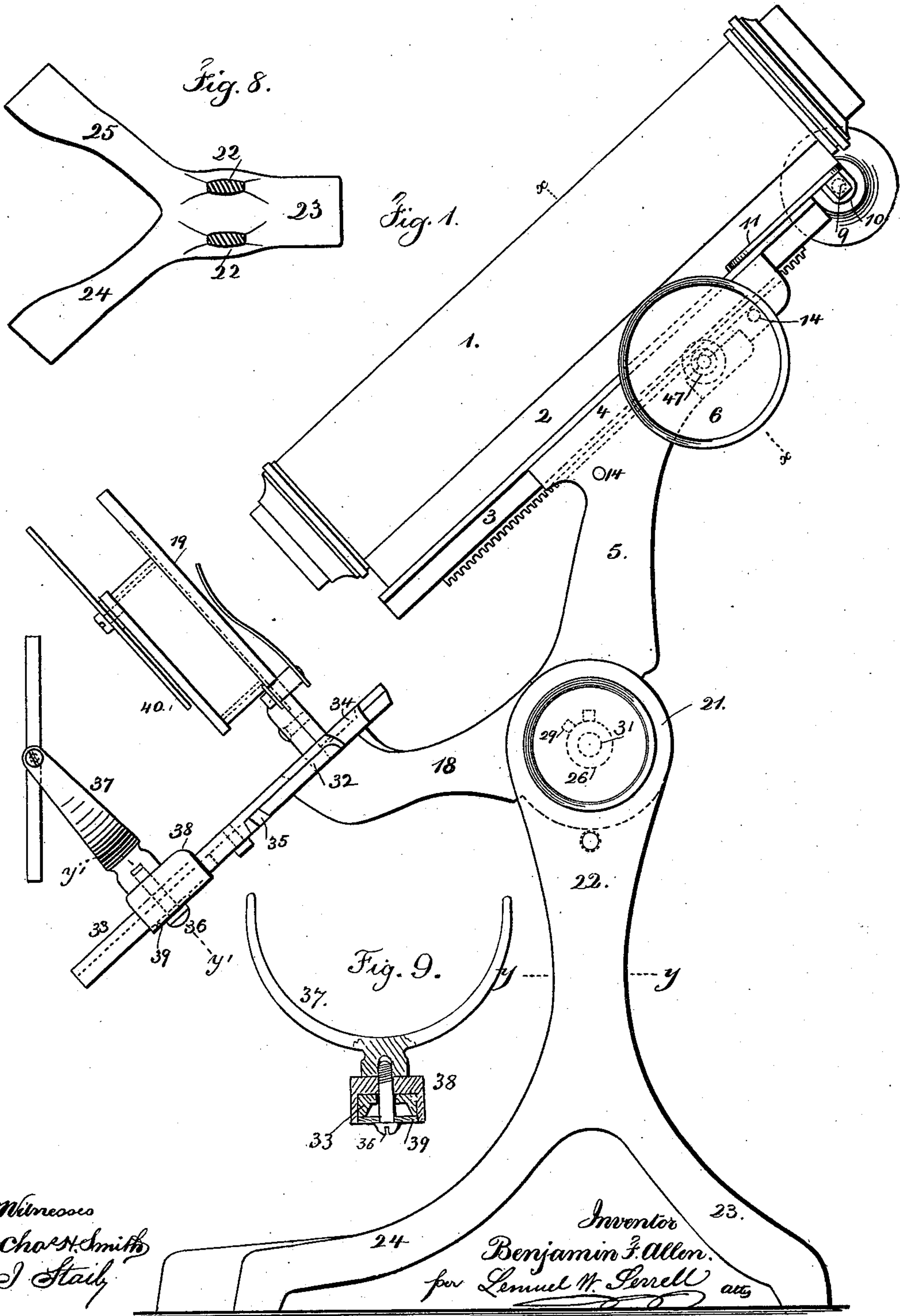
(No Model.)

2 Sheets—Sheet 1.

B. F. ALLEN.  
MICROSCOPE.

No. 352,639.

Patented Nov. 16, 1886.



(No Model.)

2 Sheets—Sheet 2.

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Fig. 3.

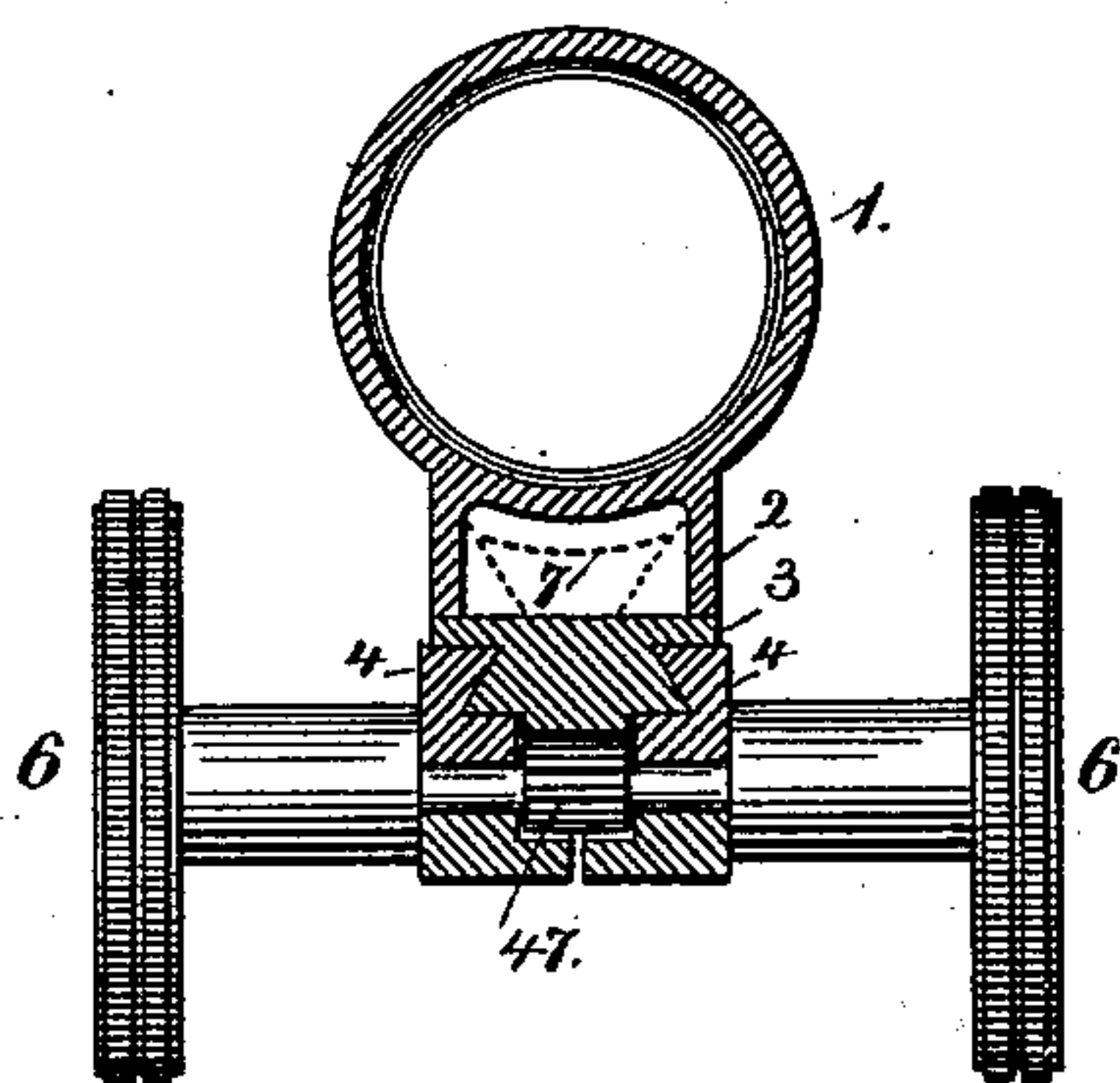


Fig. 6.

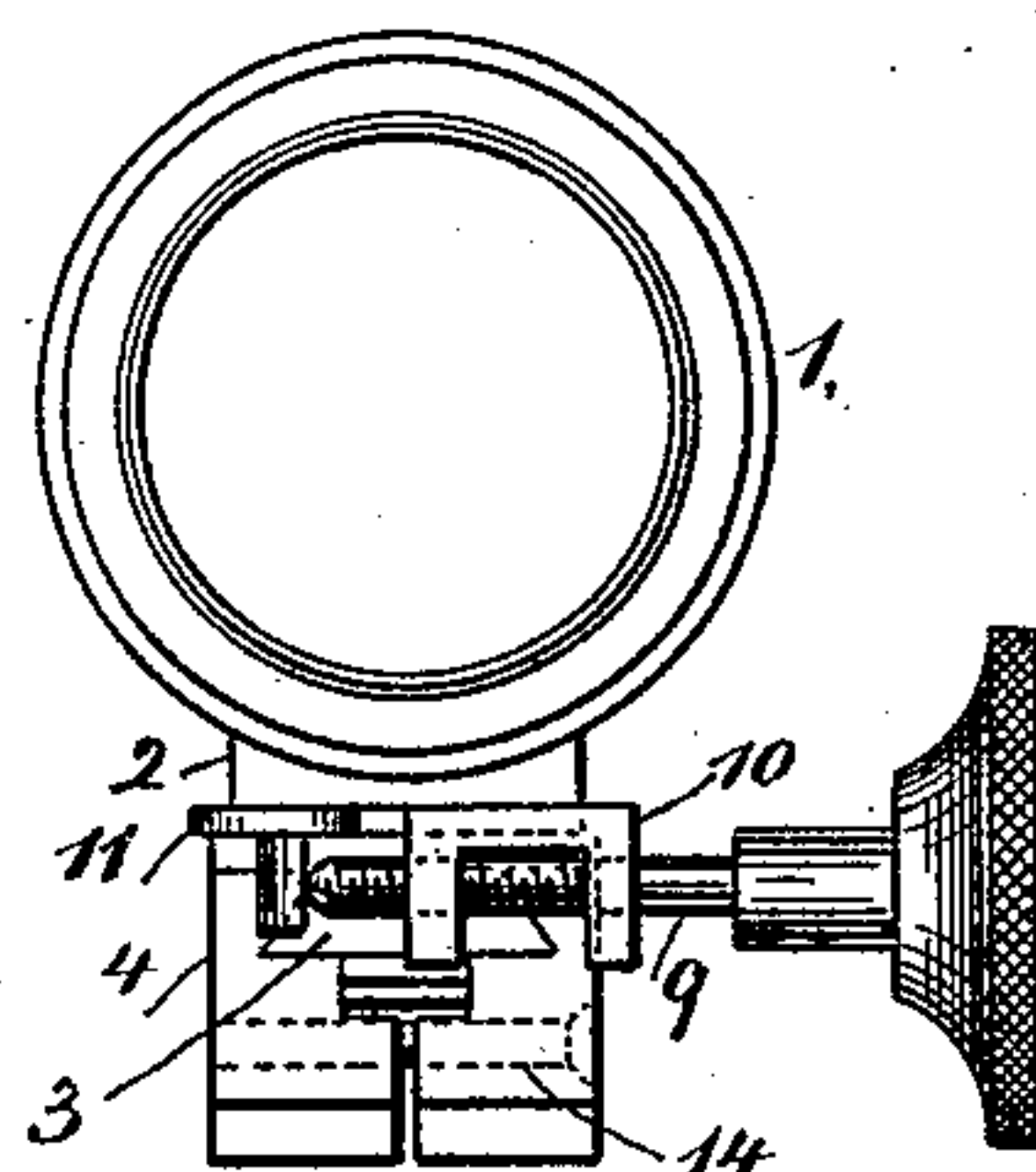


Fig. 4.

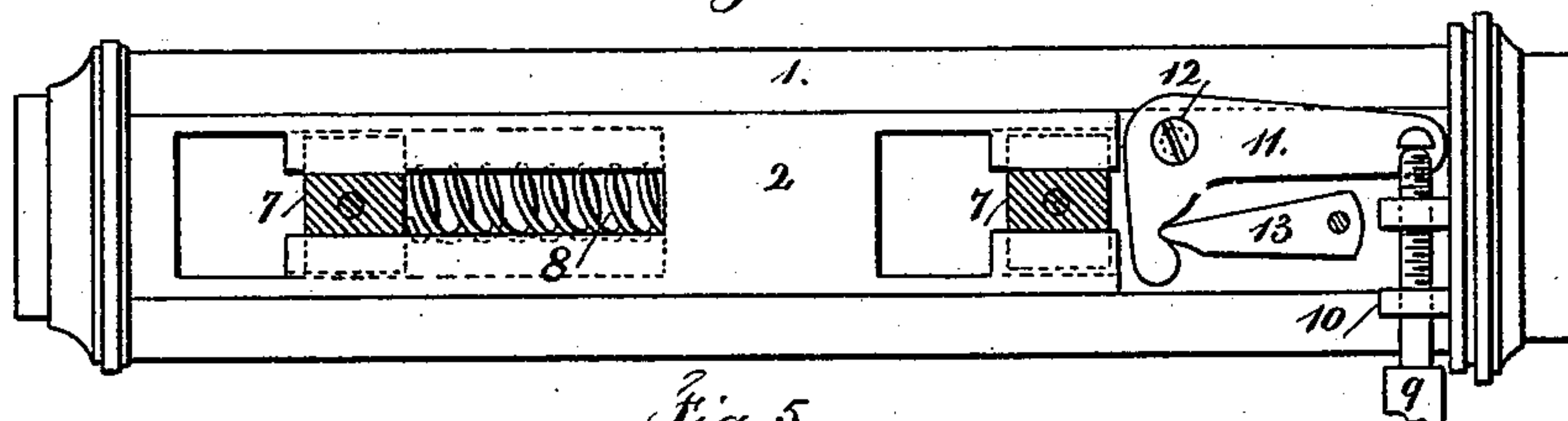


Fig. 5.

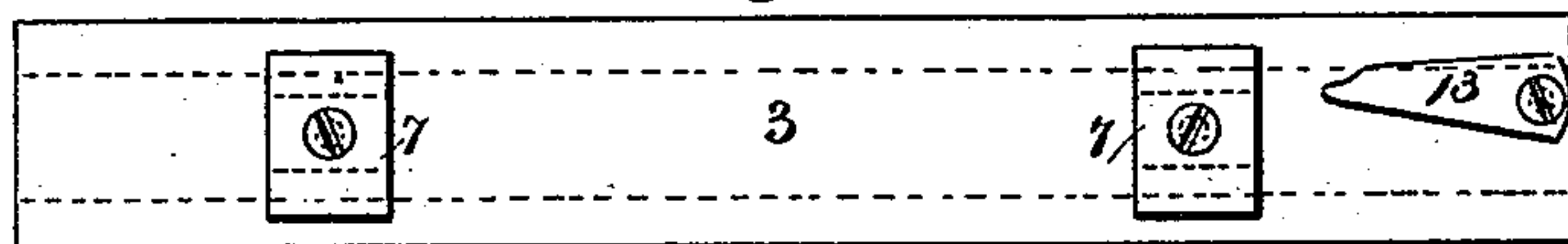


Fig. 7.

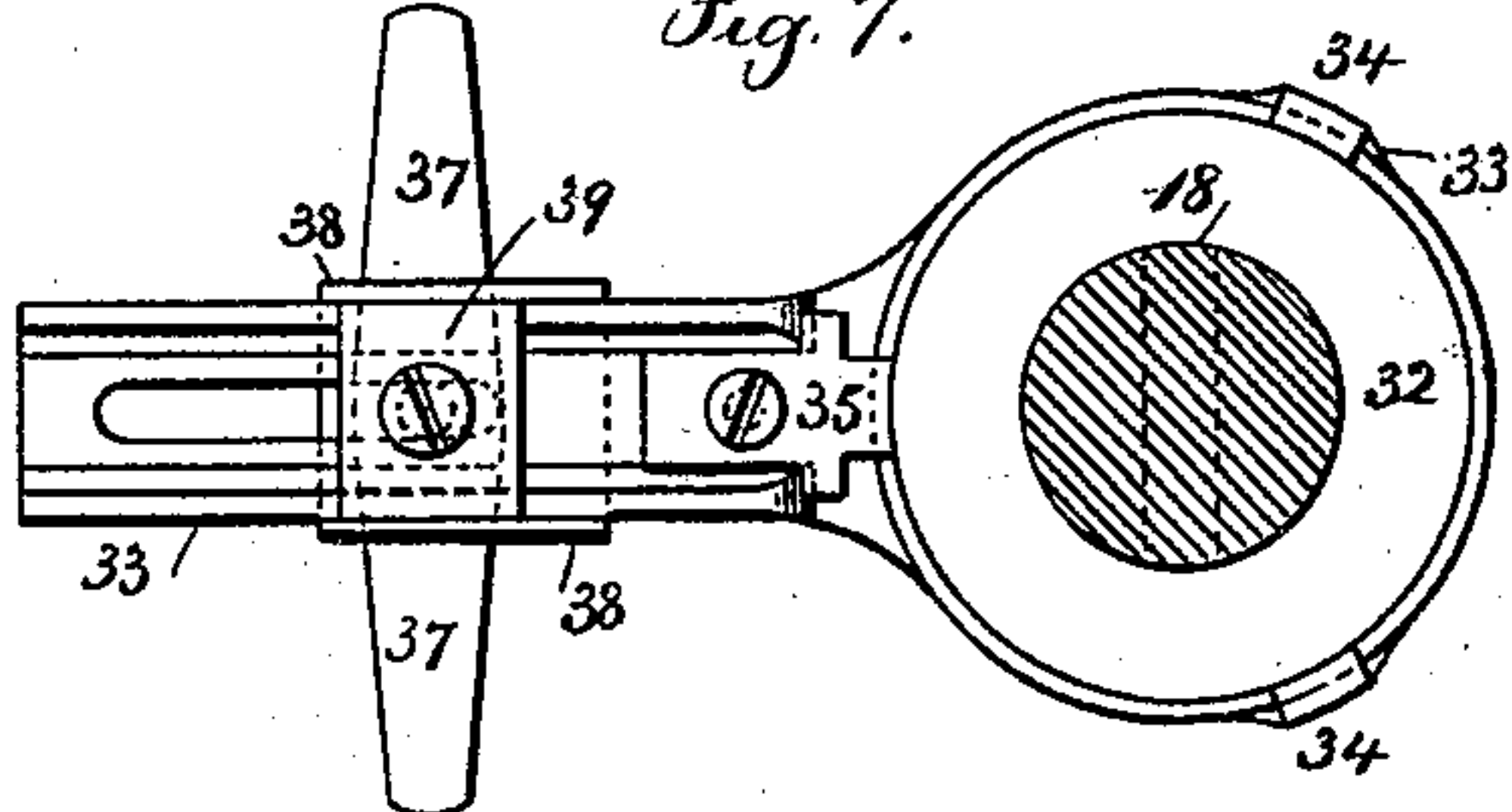
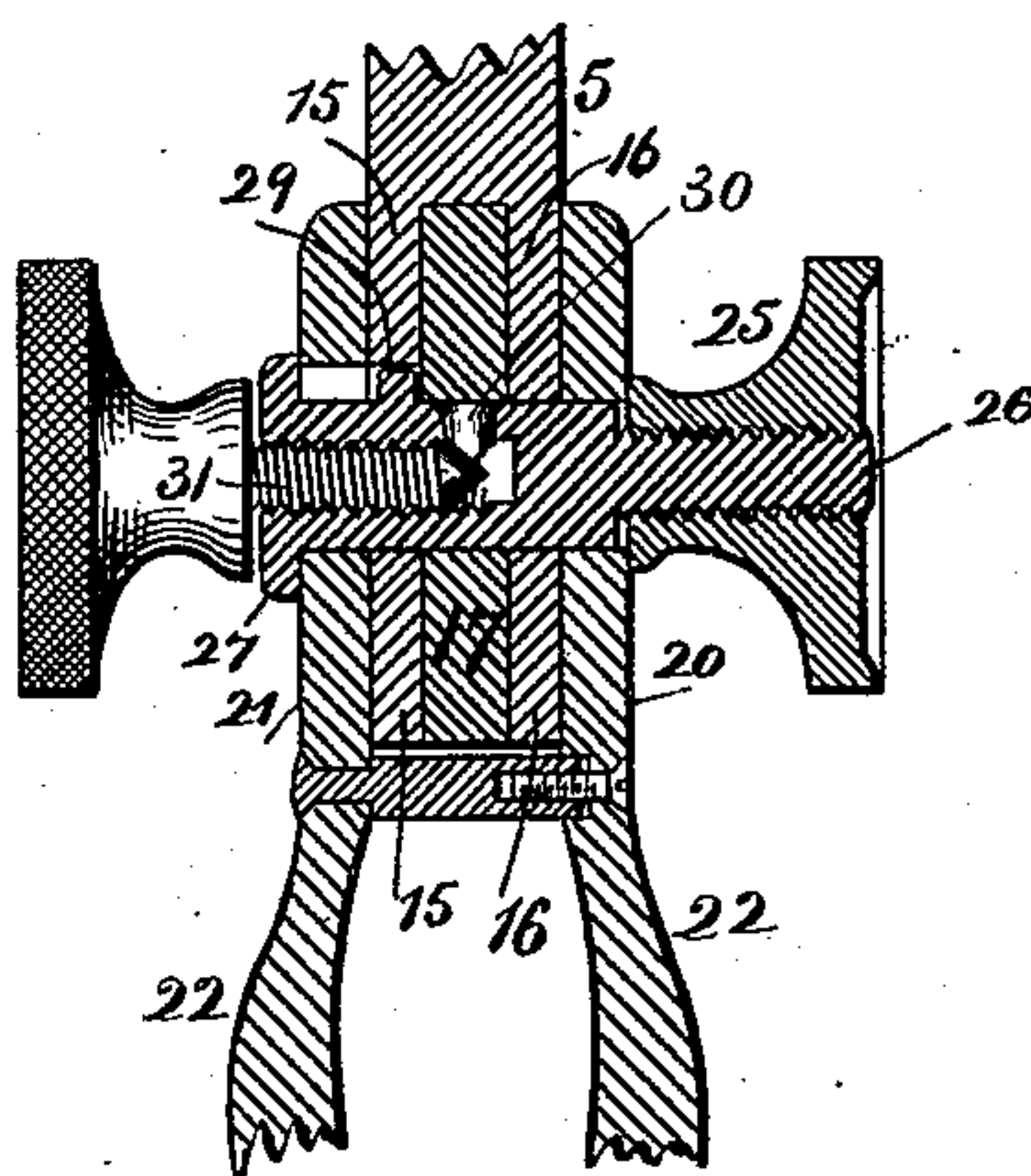


Fig. 2.



Witnesses

Char. H. Smith  
J. Stail

Inventor.

Benjamin F. Allen  
per Lemuel W. Terrell atty



# UNITED STATES PATENT OFFICE.

BENJAMIN F. ALLEN, OF PLAINFIELD, NEW JERSEY.

## MICROSCOPE.

SPECIFICATION forming part of Letters Patent No. 352,639, dated November 16, 1886.

Application filed March 8, 1886. Serial No. 194,390. (No model.)

*To all whom it may concern:*

Be it known that I, BENJAMIN F. ALLEN, of Plainfield, in the county of Union and State of New Jersey, have invented an Improvement in Microscopes, of which the following is a specification.

This improvement is made for allowing the microscope to be packed into a small compass, and for facilitating the adjustment of the instrument at an inclination when opened out for use, and for adjusting the position of the mirror or reflector in a simple and efficient manner, and for adjusting the focus with delicacy and precision without interfering with the action of the more rapid end movement that can be given to the lens-tube.

In the drawings, Figure 1 is an elevation of the instrument in position for use. Fig. 2 is a cross-section through the pivotal bearing. Fig. 3 is a cross-section of the slide and the lens-holder at the line *xx*, Fig. 1. Fig. 4 represents the under side of the lens-tube and the micrometric adjusting device, with the lugs of the base-piece in section. Fig. 5 is a plan of the base-piece to the lens-tube. Fig. 6 is an elevation of the front of the lens-tube. Fig. 7 is an inverted plan of the object-table slide with its supporting-arm in section; Fig. 8 is a sectional plan at the line *yy*, Fig. 1, and Fig. 9 is an elevation of the mirror-holder without the mirror, the base being in section at the line *y'y'* of Fig. 1.

The lens-tube 1 is of any desired size or character, and within it are the lenses that may be adjustable, and the lens-tube may be extensible, as my improvement is available with any kind of lens-tube or lenses. Upon this lens-tube is a base-bar, 2. 3 is the rack-bar, sliding in the jaws 4 upon the arm. 5 and 6 are thumb-wheels for turning the pinion 47, that acts upon the rack-bar 3.

The rack-bar 3 is made separate from the base-bar 2, in order that the micrometric adjustment may be applied between the rack-bar 3 and the base-bar 2, and the rapid and more coarse adjustment by the thumb-wheels and rack-bar may be retained and operated with facility, and afterward the more delicate adjustment to focus, the object may be effected by moving the base-bar 2 upon the rack-bar 3. To effect this object, I connect the rack-bar

3 to the base-bar 2 by dovetailed lugs 7, upon the rack-bar passing into undercut grooves in the base-bar 2, and there is a spring, 8, that acts against one of the dovetailed lugs 7, and against a shoulder upon the base-bar 2 to give motion to such base-bar and lens-tube in one direction, and a screw is employed to move the parts in the other direction; but if this screw were applied in a position parallel with the axis of the lens-tube it would be difficult to grasp and move it. To facilitate the adjustment, the screw 9 is applied at right angles to the lens-tube, and supported by a holder, 10, on the base-bar 2, and a right-angle lever, 11, is pivoted at 12 upon the base-bar, and there is a swinging strut, 13, fastened at one end by a screw to the rack-bar 3, and the other end rests against the short arm of the lever 11, and the spring 8 tends to keep the strut 13 against this lever 11; hence when the screw 9 is moved it acts upon the lever 11, and moves the base-bar and lens-tube in one direction, the strut 13 becoming a resistance against which such lever 11 acts, and if the screw 9 is unscrewed the lever 11 swings as the spring 9 moves the lens-tube and base-bar 2 in the opposite direction.

The base-bar 2 is notched for the insertion or withdrawal of the dovetailed lugs 7, so that the parts can be put together or separated. This is done when the strut 13 is swung aside to allow the necessary end movement to be given to the lens-tube and base-bar for the openings in the base-bar to coincide with the dovetailed lugs 7.

By the aforesaid construction the thumb-wheel at the end of the screw 9 is at the right side of the lens-tube, and can be easily operated without the finger coming into contact with any part of the lens-tube, and this screw only gives a very gradual and accurate adjustment to the lens-holder to obtain the proper focus on the object.

The arm 5 is either made in two parts or slotted longitudinally, so that the jaws 4 may be tightened upon the rack-bar 3 by the screws 14, to prevent looseness at this part, and upon the lower end of the arm 5 are the circular joint-pieces 15 and 16, between which passes the circular joint-piece 17 of the arm 18, at the lower end of which is the table 19, for the



reception of the microscopic object. The joints 15, 16, and 17 are between the cheeks 20 and 21, upon the upper ends of the base-frame 22. This base-frame is by preference made with  
5 three legs, 23 24 25, so that the same will stand firmly upon a table or other support.

One of the peculiarities of my improvement is the joint-pin for the joint-pieces 15 16 17, the same being made so that the microscope  
10 can be inclined more or less, the joints 15, 16, and 17 being clamped so as to move together between the cheeks 20 and 21; or when the said joint is loosened the parts can be swung upon the joint-pin to bring the lens-tube ver-  
15 tical and adjacent to the leg 23, and the object-table 19 horizontal and above the legs 24 and 25, the arm 18 being close to the base-frame 22, so that the parts are compact and occupy but little space when introduced into  
20 a case for preservation or transportation.

The pivot-bolt 26 passes through the cheeks 20 21 and through the joint-pieces 15, 16, and 17. It has a flange, 27, to rest against the out-  
25 side of the cheek 21, and a screw at the other end for the reception of the thumb-nut 25, by the turning of which nut 25 the whole of the parts of the joint can be clamped between the cheeks 20 21, to hold the arms 5 and 18 and the parts carried by them in any position or  
30 inclination in which they may be placed, and I apply to this bolt 26 a stud, 29, that enters a notch in the eye of the joint-piece 15, so that the bolt 26 always turns with the joint-pieces 15 and 16 and arm 5. (There is a notch in the  
35 eye of the cheek 21 to allow this stud 29 to pass through when the parts are put together.) In this pivot-bolt 26 there is a clamp-block, 30, passing in laterally, and being within the joint-piece 17, and the inner end of this clamp-block  
40 is beveled, and there is an axial hole in the pivot-bolt 26 for the reception of the conical-pointed screw 31, having a thumb-wheel at its outer end. It is now to be understood that it is only necessary to screw in the screw 31 to  
45 firmly hold the joint-pieces 15, 16, and 17 together, and cause them to turn as one within the cheek-pieces 20 21, because the pivot-bolt 26 is connected to the joint-pieces 15 and 16 by the stud 29, and the clamping-block 30, being forced outwardly by the conical end of the screw 31, applies a clamping friction to the joint-piece 17, causing it to move also with the pivot-bolt 26; hence when the instrument is  
50 opened out for use and the lens-tube placed perpendicular to the object-table, the stops upon the joint-pieces 16 and 17 and arms 5 and 18 coming together like a rule-joint, all that is now necessary to retain the instrument in position for use is to screw in the screw 31  
60 and clamp the parts of the joint together, and the lens-tube and object-table as a whole can now be inclined more or less by swinging it and turning the pivot-bolt within the cheek-pieces of the base-frame, and the thumb-nut  
65 25 is availed of for holding the instrument at the desired inclination.

At the junction of the object-table 19 with

the arm 18 is a circular holder, 32, with a beveled edge, and upon this rests the eye of the arm 33, that holds the mirror, and there are  
70 beveled claws 34 and a bevel-ended clamp, 35, held to the arm 33 by a screw, so that this arm 33 can be revolved around the holder 32, and placed in any desired position relatively to the object-table, and this arm 33 is slotted for  
75 the passage of the pivot 36 of the mirror-holder 37, and there is a slide-block, 38, above the arm 33, and a clamp-block, 39, below such arm 33, the pivot 36 passing through said blocks and being made in the form of a screw.  
80 The slide-block 38, clamp-block 39, and mirror-holder 37 are clamped in place by means of the pivot-screw 36, after being adjusted. By this construction of mirror-holder the light  
85 can be directed upon the object under examination from any direction by turning the arm 33 around upon the circular holder 32, and by sliding the mirror-holder and its clamping-blocks in or out, and by revolving the mirror-holder upon its pivot.  
90

There may be a movable septum, 40, applied beneath the object-table, with holes of different sizes to admit more or less light to the object, as usual in microscopes.

I do not claim an adjusting-screw acting  
95 to move the lens-tube, the rack-bar, the pinion, and the base carrying the pinion. By my improvement the pinion and its base are not moved by the adjusting-screw; but such screw acts between the lens-tube and the rack-bar  
100 to move only the lens-tube and the parts thereon.

I claim as my invention—

1. The combination, with the base-tube and base-bar 2, of a rack-bar, 3, an adjusting-  
105 screw for regulating the position of the base-bar upon the rack-bar, and the jaws 4, thumb-wheel 6, and pinion for adjusting the rack-bar within the jaws, substantially as set forth.

2. The combination, with the lens and base-  
110 bar 2, of the rack-bar 3, the spring 8, screw 9, right-angle lever 11, and swinging strut 13, for adjusting the lens-tube endwise of the rack-bar, substantially as set forth.

3. The combination, with the lens-tube and  
115 its base-bar, of the rack-bar 3, having dovetailed lugs 7, passing into undercut grooves in the base-bar 2, the spring 8, to give motion to the parts in one direction, the right-angle lever 11 and the screw 9, acting against the  
120 same, and the swinging strut 13 between the right-angle lever and the rack-bar, substantially as set forth.

4. The combination, with the lens-holder and object-table, of the arms 5 and 18, the  
125 joint-pieces upon the respective arms, a base-frame with cheeks for the reception of the joint-pieces, a pivot-bolt passing through the joint-pieces and cheeks, a clamping-nut for holding the parts, and a clamping-block and  
130 screw for stiffening the joint between the arms 5 and 18, substantially as set forth.

5. The joint-pieces 15 16 17 and the cheeks 20 21, in combination with the flanged pivot-bolt



26, thumb-nut 25, stud 29, clamping-block 30, and screw 31, for actuating the clamping-block, substantially as set forth.

5 6. The combination, with the object-table and the arm for holding the same, of the circular holder 32, arm 33, claws 34 35, and mirror-holder supported by the arm, substantially as set forth.

10 7. The mirror-holder 37 and its pivot-screw 36, in combination with the slotted arm 33, slide-block 38, and clamp-block 39, substantially as set forth.

15 8. The combination, with the object-table and the arm supporting the same, of a mirror-holder, an arm for carrying the same, hav-

ing a circular eye surrounding the arm that supports the object-table, and a circular holder for the said eye and its arm, and claws for grasping the edge of the holder, substantially as set forth, whereby the mirror-holder and 20 its arm can be adjusted into any desired position relatively to the object-table, substantially as set forth.

Signed by me this 13th day of February, A. D. 1886.

BENJAMIN F. ALLEN.

Witnesses:

JAMES C. POPE,  
DAVID S. POPE.