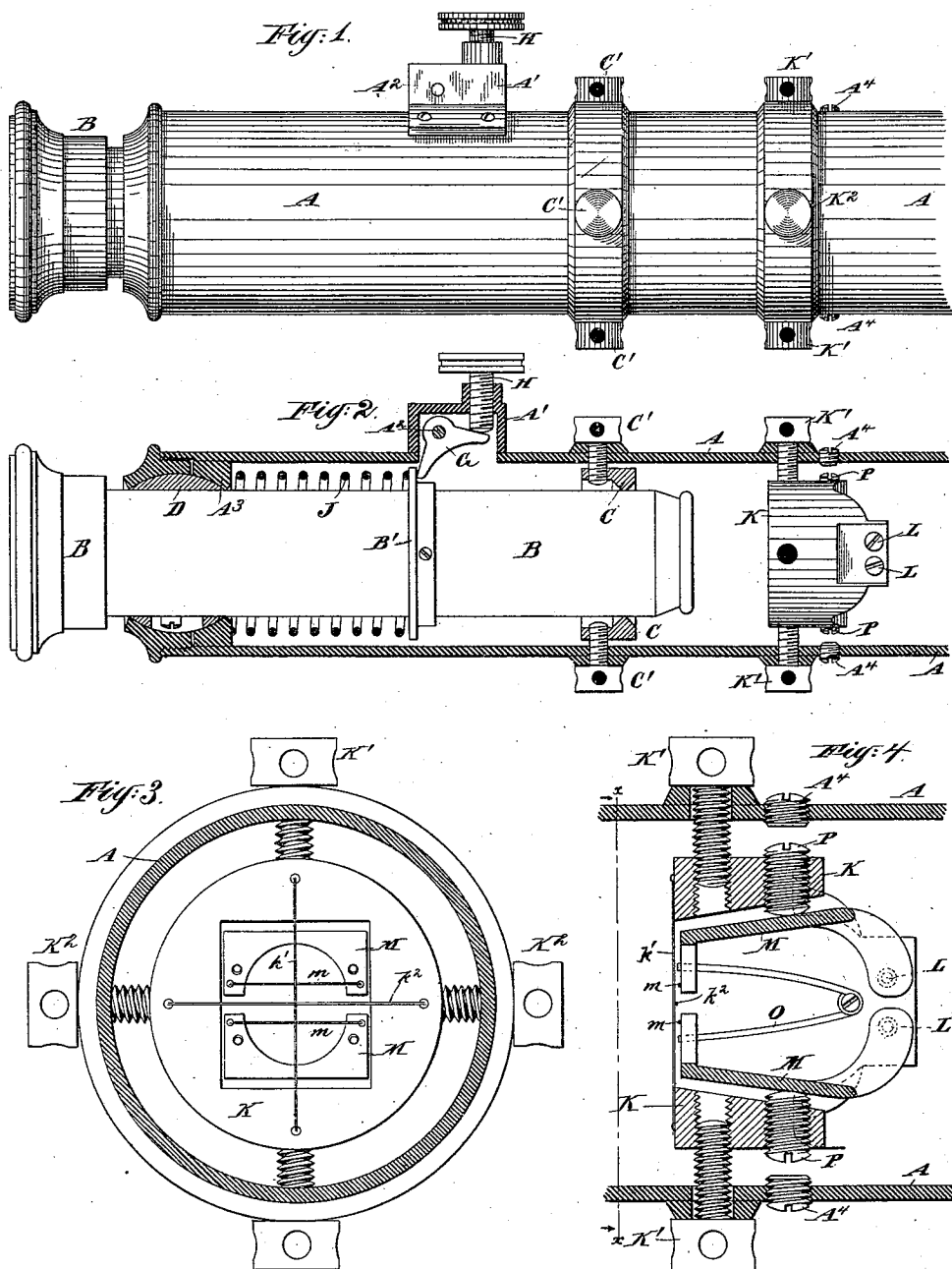


(No Model.)

J. PAOLI.
TELESCOPE.

No. 461,389.

Patented Oct. 13, 1891.



Witnesses:

Charles F. Seark.
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UNITED STATES PATENT OFFICE.

JOHN PAOLI, OF HOBOKEN, NEW JERSEY.

TELESCOPE.

SPECIFICATION forming part of Letters Patent No. 461,389, dated October 13, 1891.

Application filed February 25, 1891. Serial No. 382,751. (No model.)

To all whom it may concern:

Be it known that I, JOHN PAOLI, of Hoboken, Hudson county, in the State of New Jersey, have invented a certain new and useful Improvement in Telescopes, of which the following is a specification.

My improvement applies to all that class of telescopes which are employed in astronomical and surveying instruments of whatever name in which fine wires, spider-webs, or other slender filaments technically known as "hairs" are employed. I provide means for adjusting, with unusual nicety the eye-piece, sometimes termed the "ocular," and for holding it in position for any required period without interfering with its withdrawal or any required large adjustment rearward at any time by other means. It is common to provide two hairs crossing each other in the axial line of the telescope, one vertical and the other horizontal, which are termed "cross-hairs," and two others, both horizontal and capable of being adjusted in distance above and below the horizontal member of the cross-hairs and in nearly the same plane therewith. These are ordinarily termed "stadia-hairs." I provide improved means for supporting and adjusting the stadia-hairs.

The accompanying drawings form a part of this specification and represent what I consider the best means of carrying out the invention.

Figure 1 is a side elevation. Fig. 2 is a central vertical section. Figs. 3 and 4 are on a larger scale. Fig. 3 is a cross-section on the line xx in Fig. 4, and Fig. 4 is a central longitudinal section.

Similar letters of reference indicate corresponding parts in all the figures where they appear.

A is the ordinary cylindrical case, of brass or other suitable material, and B is the eye-piece or ocular mounted in the inner end and equipped with adjusting means C C' near its front end and with a spherical bearing D near its back end, adapted to allow the direction of this important member of the apparatus to be adjusted with nicety. The exterior of the eye-piece B is cylindrical and smooth, and the bearings therefor afforded by the rings C and D match accurately, so

that it is held steadily, but with liberty to be adjusted endwise.

G is a bell-crank lever adapted to turn easily on its center A², supported in a housing A', formed on the upper portion of the case A. The horizontal arm of the lever G is acted on by a screw H, having a milled head conveniently presented on the exterior of the apparatus. If the operator turns the screw H in one direction and thereby depresses it, the bell-crank lever G acts on the ring B', carried on the ocular B, to move it proportionately rearward through the rings C D. If it is desired to adjust the ocular forward, the attendant turns the screw H in the opposite direction, giving proportional liberty to the lever G, and the ocular is then thrust forward proportionately, either by the force of the hand or by the helical spring J, urging the ocular forward by acting between a collar B' and an offset A³ near the rear end of the case A.

The housing A' is formed separately from the case A and secured by screws, on removing which the lever G and its adjusting means may be removed. The arrangement allows for very nice adjustment without interfering with the partial or complete withdrawal of the eye-piece at any moment.

K is the stadia-case, of brass or other suitable material, having an external diameter a little less than the interior of the case A and formed with ears extending forward, as shown. This stadia-case is held in position within the main case A and adjusted up and down and to the right and left therein, as required, by means of vertical screws K' K' and horizontal screws K² K². The cross-bars k' k² are fixed to the stadia-case in the position represented and are adjusted vertically and laterally therewith. The ears support pivot-screws L, tapped therein, as shown, their ends serving as bearings for levers M, which carry the stadia-hairs m . Each lever M is subject to the force of a spring O, which urges it away from the horizontal center line, restrained by a screw P, tapped through the stadia-case K and pressing against the outer face of the lever—that is to say, the upper stadia-lever M is lifted by the spring O and is restrained in its lifting movement by the upper screw P,

which acts against its upper face, while the lower stadia-lever M is pressed downward, and is restrained in its downward movement by the lower screw P. Holes are provided in the outer case A in the position to allow the screws P each to receive a small screw-driver inserted from the outside. These holes in the case A are screw-threaded, and when the adjustment of the stadia is complete the holes are stopped by the insertion of the screws A⁴.

The invention provides a firm and reliable support for all these adjustable parts with great ease of manufacture. The stadia-levers and their adjusting means, being all mounted in the rigid case K, are moved with it in any adjustment effected by the screws K' K².

I claim as my invention—

1. In the telescope of a surveying-instrument, the case A, eye-piece B, and suitable guiding means C D, in combination with each other and with the bell-crank G, turning on a pivot supported by the main case, and the adjusting-screw H, arranged to serve as herein specified.

2. In the telescope of a surveying-instrument, the case A, eye-piece B, and suitable guiding means C D, in combination with each other and with the spring J, exerting a force to urge the eye-piece forward, the bell-crank lever G, turning on the pivot A², supported in a removable housing A' on the main case, and the adjusting-screw H, mounted in such hous-

ing and operating said lever, all arranged for joint operation, as herein specified.

3. In the telescope of a surveying-instrument, the case A, eye-piece B, and suitable guiding means C D, in combination with each other and with the stadia-hairs *m m*, fixed in the levers M M, turning on pivots L L and adjusted by screws P, all mounted in an internal adjustable stadia-case K by means K' K² for holding and adjusting such case, all substantially as herein specified.

4. In the telescope of a surveying-instrument, the case A, eye-piece B, and suitable guiding means C D, in combination with each other and with the stadia-hairs *m m*, fixed in the levers M M, turning on pivots L L and adjusted by screws P, all mounted in an internal adjustable stadia-case K, with means K' K² for holding and adjusting such case and with the removable-screws A⁴ in the case A opposite the screws P to allow the adjustment and provide for completely inclosing and protecting the whole from dust and injury, as herein specified.

In testimony that I claim the invention above set forth I affix my signature in presence of two witnesses.

JOHN PAOLI.

Witnesses:

H. A. JOHNSTONE,
M. F. BOYLE.