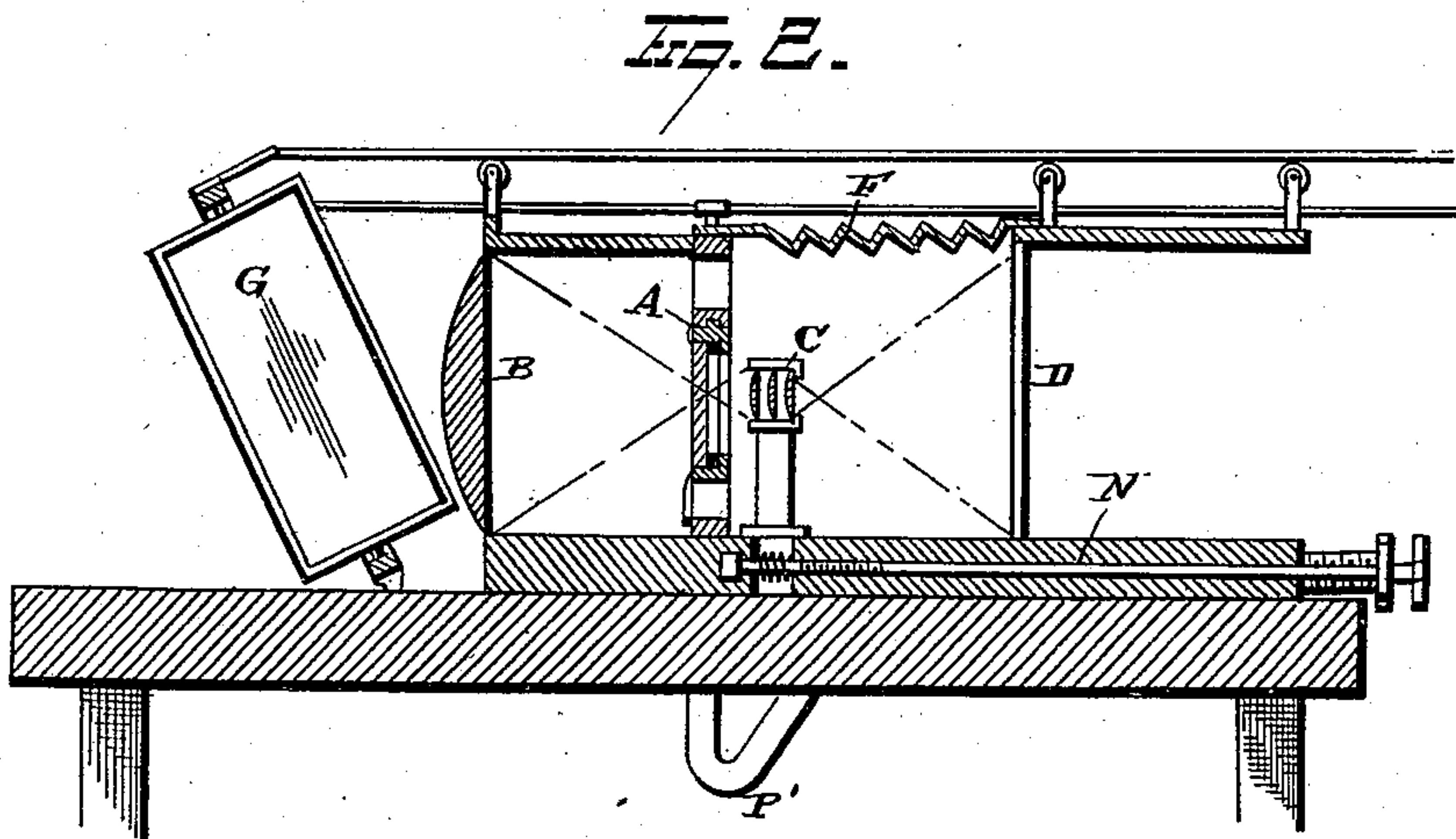
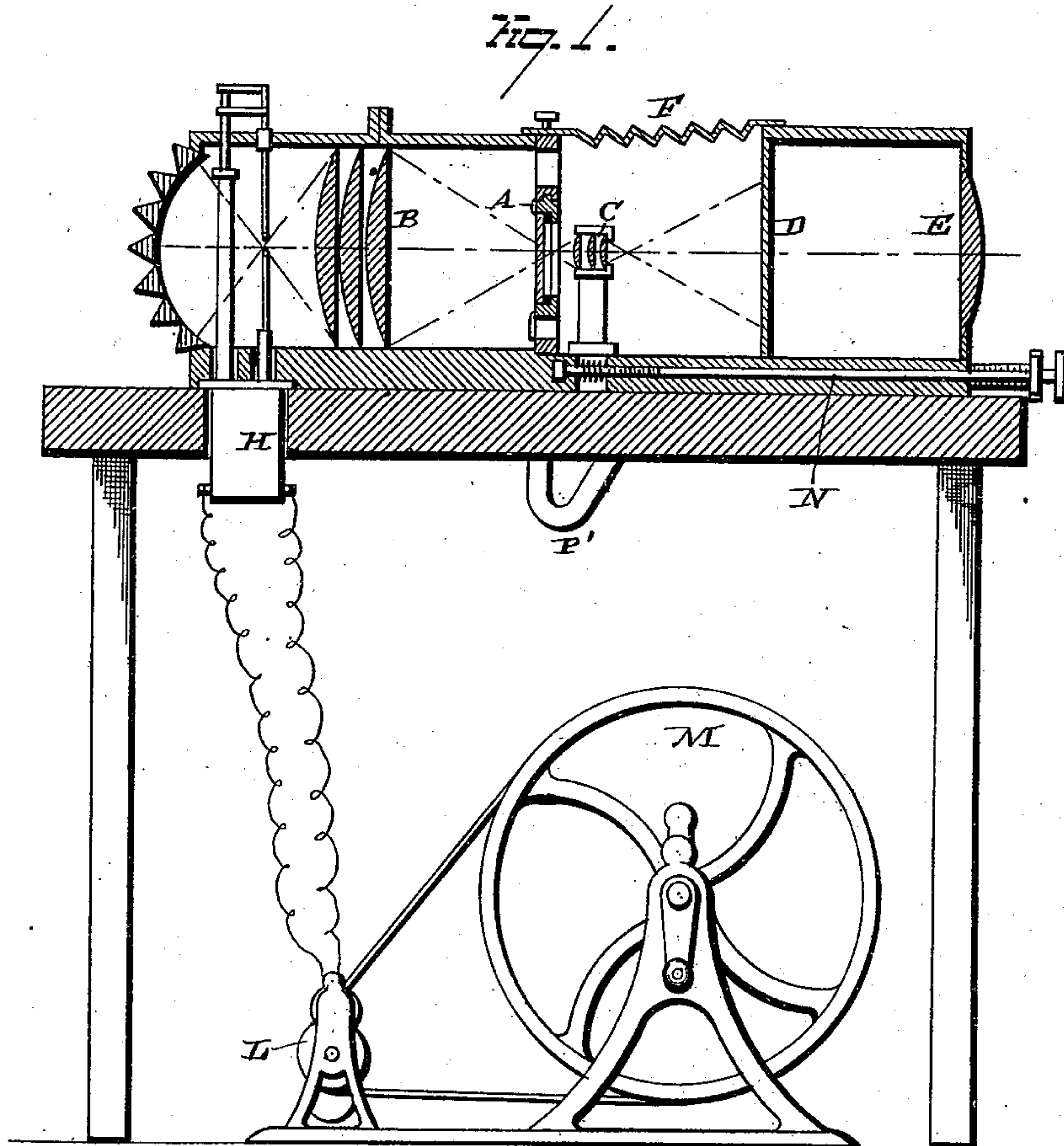


E. J. MOLERA & J. C. CEBRIAN.
Optical Instrument.

No. 230,322.

Patented July 20, 1880.



WITNESSES

E. Stottingham
A. M. Bright

INVENTOR

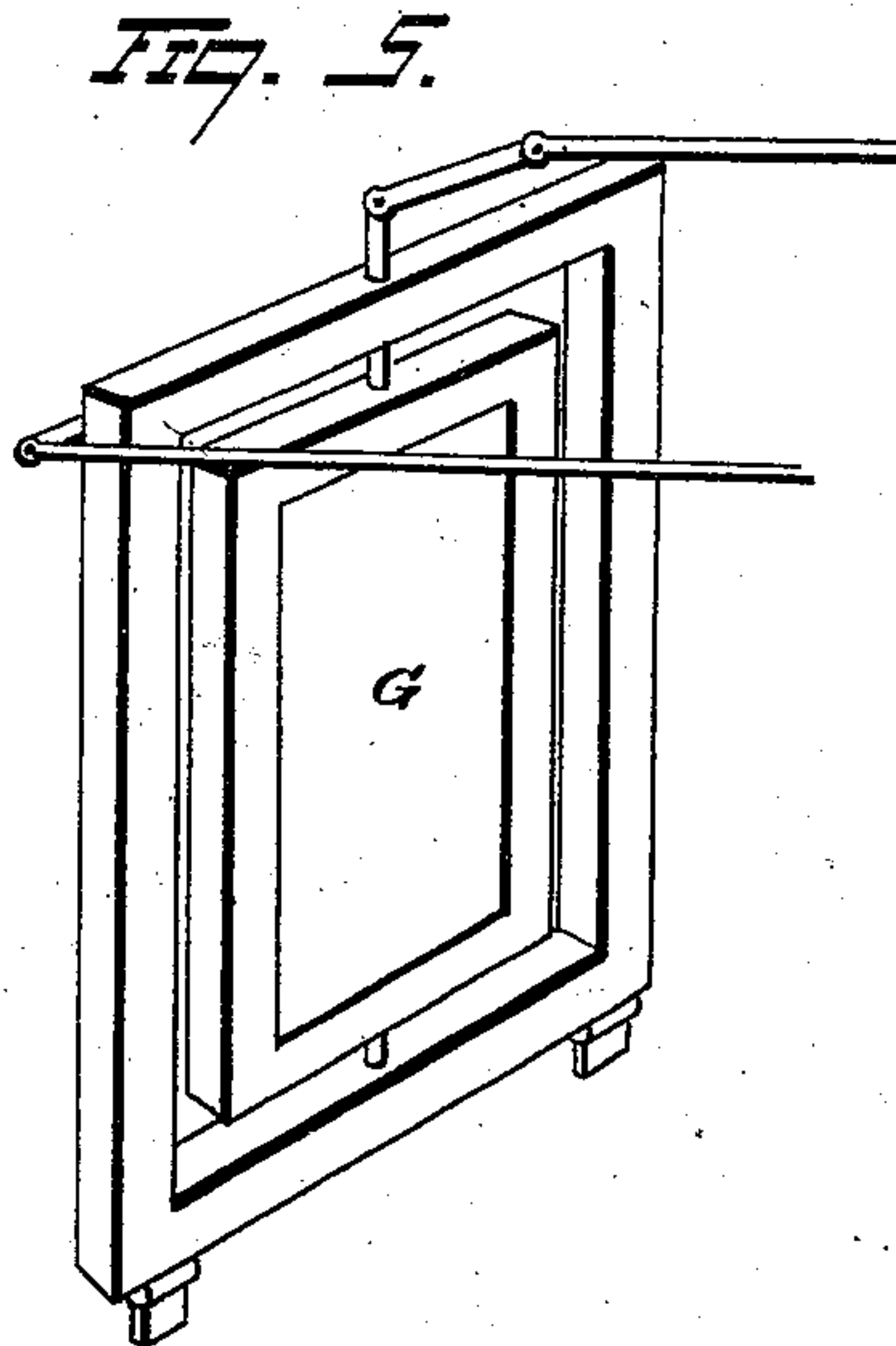
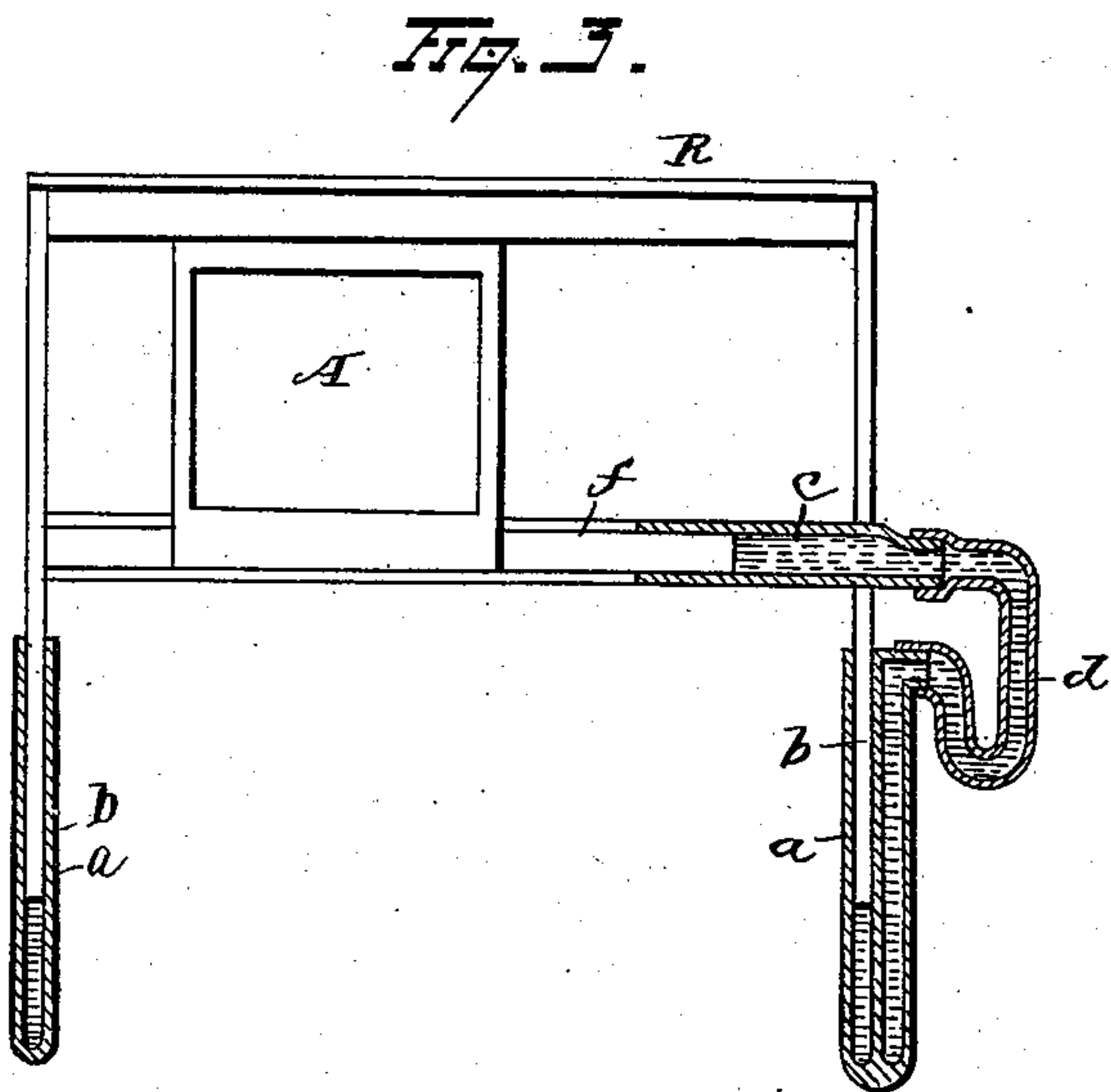
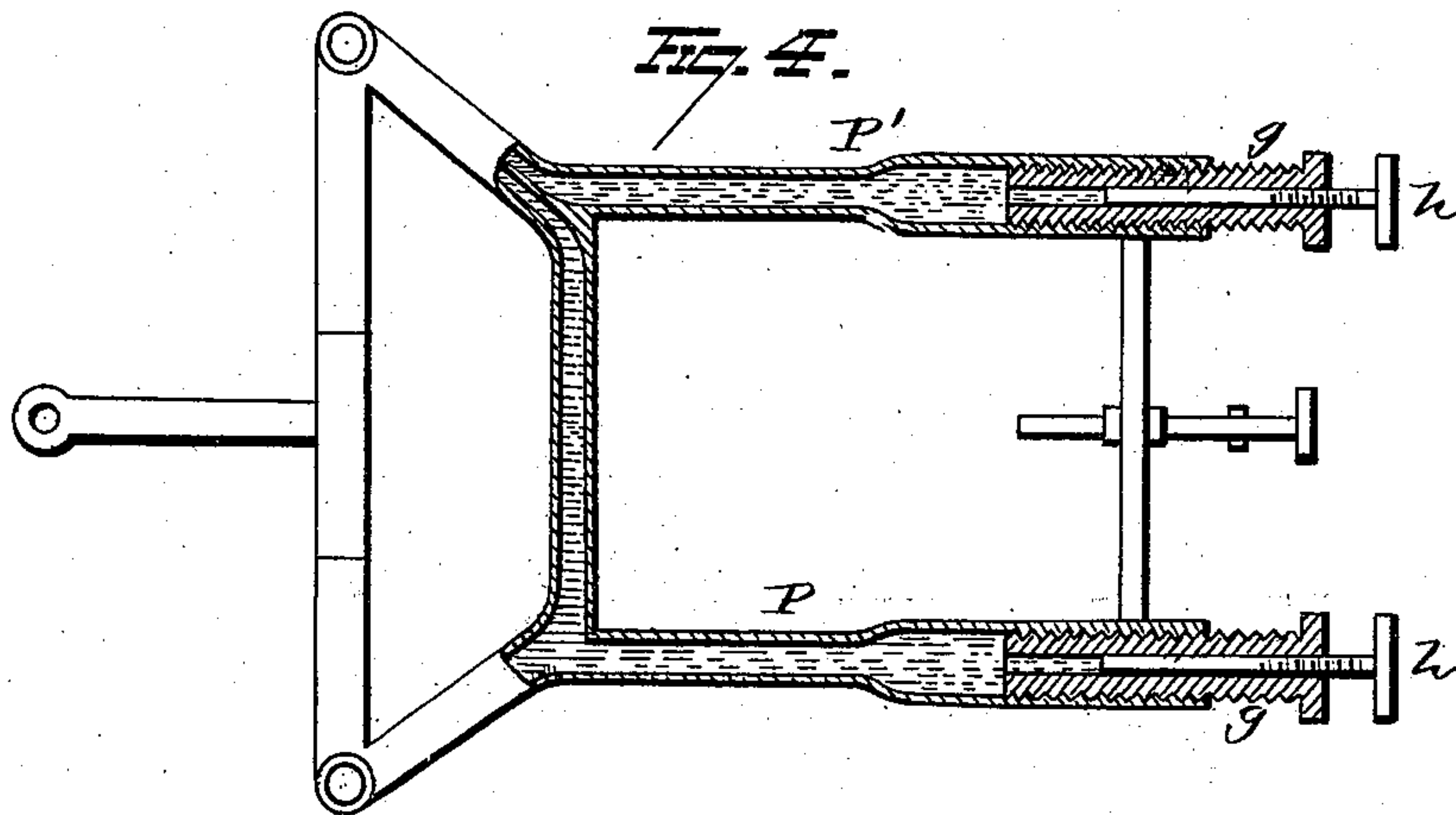
E. J. Molera.
J. C. Cebrian.

R. H. A. Symon. ATTORNEY

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UNITED STATES PATENT OFFICE.

EUSEBIUS J. MOLERA AND JOHN C. CEBRIAN, OF SAN FRANCISCO, CAL.

OPTICAL INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 230,322, dated July 20, 1880.

Application filed January 27, 1880.

To all whom it may concern:

Be it known that we, EUSEBIUS J. MOLERA and JOHN C. CEBRIAN, of San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Optical Instruments; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

Our invention is more especially intended to provide means for easily reading and examining matter previously reduced to a microscopic scale by photographic apparatus constituting separate application for patent.

The improvements relate to the optical construction of the instrument, and to the means employed in adjusting the holder which maintains in position the plate containing the microscopic matter.

The invention consists, first, in the combination, with one or more light-condensing lenses and a plate-holder, of one or more microscopic lenses and a transparent screen, said parts being inclosed in a tubular case and provided with a screw-shaft extending rearward, whereby the observer may adjust the plate-holder relative to the microscopic lens; second, in the combination, with one or more light-condensing lenses, a plate-holder, and one or more microscopic lenses, of a transparent screen and a magnifying-lens, said parts being connected together and inclosed in a tubular case; third, in the combination, with a frame having a horizontal cylinder and a plate-holder provided with a piston working in the cylinder, of a connecting-tube adapted to be filled with liquid and a liquid-adjusting device; fourth in the combination, with a vertically-adjustable frame having a horizontal cylinder and a plate-holder provided with a piston working in the cylinder, of a tube adapted to be filled with liquid, a liquid-adjusting device, and a flexible pipe which connects said tube with the cylinder; fifth, in the combination, with two tubes adapted to be filled with liquid, a horizontal cylinder connected with one of said tubes, upright cylinders formed in the bifurcated forward portion of the other tube,

and means for independently adjusting the liquid in said tubes, of a frame having depending pistons which work in the upright cylinders and a plate-holder having sliding movement in said frame and provided with a piston which works in the horizontal cylinder; sixth, in the combination, with a tube adapted to be filled with liquid and having its bifurcated forward portion formed with upright cylinders and a plate-holder frame provided with depending pistons which work in the cylinders, of a tubular screw-plug fitted in the rear portion of the tube and a small screw-plug fitted in said tubular plug, whereby the liquid in the tube may be adjusted slowly or quickly.

Referring to the drawings, Figure 1 is a vertical central section of one form of apparatus embodying our invention. Fig. 2 is a different form of apparatus embodying the same invention. Fig. 3 is a detail view, in front elevation, of the mechanism for adjusting the plate-holder. Fig. 4 is a view, partly in plan and partly in horizontal section, of said detail mechanism. Fig. 5 is a detail perspective view of the heliostat used in the apparatus of Fig. 2.

The transparent plate which contains the microscopic matter is placed in the plate-holder A. The light from any suitable source, condensed by a proper deflector—one or more condensing lenses, B—passes through the plate, and the pencils of light from the latter pass through one or more microscopic lenses, C. An enlarged image is thereby projected on a transparent screen, D, and said image is still further enlarged by one or more magnifying lenses, E.

A tubular casing, F, rigid or elastic, incloses the several parts of the instrument and protects them from exposure to exterior light, so that the image on the screen may be plainly seen. The observer is able to read the plate without placing his eyes up close to the instrument, and, without being obliged to look through a small hole or holes, he can look at the observing-glass with ease and comfort. In fact, it is not necessary to employ any lens E, and when it is omitted the observer looks directly at the transparent screen. An instrument of this construction is shown in Fig. 2,

together with a modified form of light-condensing apparatus, the heliostat G being provided with means which adapt it to be operated from the observer's seat.

5 When the plate is not transparent the light and light-condensing apparatus have to be placed in front of the plate-holder. In some cases natural daylight will be sufficient, and the light-condensing apparatus may be sup-
10 pressed.

In instance of using an electric light, H, the same may be connected with an electric machine, L, operated by a driving-wheel, M, which latter is actuated by the feet of the ob-
15 server.

The plate-holder is adapted to be adjusted relative to the microscopic lens or lenses by a screw-shaft, N, which extends rearward, to be operated from the observer's stand. The plate-
20 holder is also adapted to be operated by the observer without leaving his position, and two rates of movement are provided, one being for a quick and the other for a slow adjustment of the plate-holder. Two tubes, P, adapted to be
25 filled with liquid, extend lengthwise of the instrument, and have their forward portions formed as upright cylinders *a*. In the latter work pistons *b*, which depend from a vertical frame, R, the lower longitudinal portion of
30 which is formed with a horizontal cylinder, *c*. This latter cylinder connects with one of the liquid-tubes by a flexible pipe, *d*, which permits of the independent vertical adjustment of the frame which supports the plate-holder.

35 The upper and lower portions of this plate-holder slide in grooved ways formed in the corresponding portions of said frame, and the lower portion of the plate-holder is provided with a piston, *f*, which works in the horizontal
40 cylinder. The rear extremities of the liquid-tubes are, respectively, provided with tubular screw-plugs *g*, in which latter fit smaller screw-plugs, *h*. The small screw-plugs are adapted for slight and gradual adjustments of the plate-
45 holder, while the tubular screw-plugs are used when the adjustment is to be considerable or to be accomplished rapidly.

By turning the screw-plugs in the liquid is forced up against the respective pistons of the
50 several cylinders and the plate-holder is correspondingly moved. By turning the screw-plugs out the gravity of the plate-holder frame causes its pistons to move the water from its former position, and the desired adjustment
55 follows.

In the preceding description we have shown a complete apparatus embodying all specific elements necessary to illustrate our improve-
60 ments. It is evident, however, that certain relatively distinct parts of the invention may be employed independently of the other parts. It is also apparent that changes, substitutions, and omissions may be made as regards the detail mechanism previously described, provided
65 the essential features of invention set forth in the following claims are employed.

Having fully described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. The combination, with one or more light- 70
condensing lenses and a plate-holder, of one or more microscopic lenses and a transparent screen, said parts being inclosed in a screw-shaft extending rearward, whereby the ob-
server may adjust the plate-holder relative to 75
the microscopic lens, substantially as set forth.

2. The combination, with one or more light-
condensing lenses, a plate-holder, and one or
more microscopic lenses, of a transparent screen
and a magnifying-lens, said parts being con- 80
nected together and inclosed in a tubular case, substantially as set forth.

3. The combination, with a frame having a
horizontal cylinder and a plate-holder pro-
vided with a piston working in the cylinder, 85
of a connecting-tube adapted to be filled with liquid and a liquid-adjusting device, substan-
tially as set forth.

4. The combination, with a vertically-ad-
justable frame having a horizontal cylinder 90
and a plate-holder provided with a piston work-
ing in the cylinder, of a tube adapted to be
filled with liquid, a liquid-adjusting device,
and a flexible pipe which connects said tube
with the cylinder, substantially as set forth. 95

5. The combination, with two tubes adapted
to be filled with liquid, a horizontal cylinder
connected with one of said tubes, upright cyl-
inders formed in the bifurcated forward por-
tion of the other tube, and means for inde- 100
pendently adjusting the liquid in said tubes,
of a frame having depending pistons which
work in the upright cylinders and a plate-
holder having sliding movement in said frame
and provided with a piston which works in the 105
horizontal cylinder, substantially as set forth.

6. The combination, with a tube adapted to
be filled with liquid and having its bifurcated
forward portion formed with upright cylinders
and a plate-holder frame provided with de- 110
pending pistons which work in the cylinders,
of a tubular screw-plug fitted in the rear por-
tion of the tube and a small screw-plug fitted
in said tubular plug, whereby the liquid in the
tube may be adjusted slowly or quickly, sub- 115
stantially as set forth.

In testimony that we claim the foregoing—

I, EUSEBIUS J. MOLERA, do hereunto set my
hand this 16th day of January, A. D. 1880.

EUSEBIUS J. MOLERA.

Witnesses:

THOMAS D. GRAHAM,
F. O. WEGENER.

And I, JOHN C. CEBRIAN, do hereunto set
my hand this 15th day of December, A. D.
1879.

JOHN C. CEBRIAN.

Witnesses:

T. P. HALL,
A. W. BRIGHT.