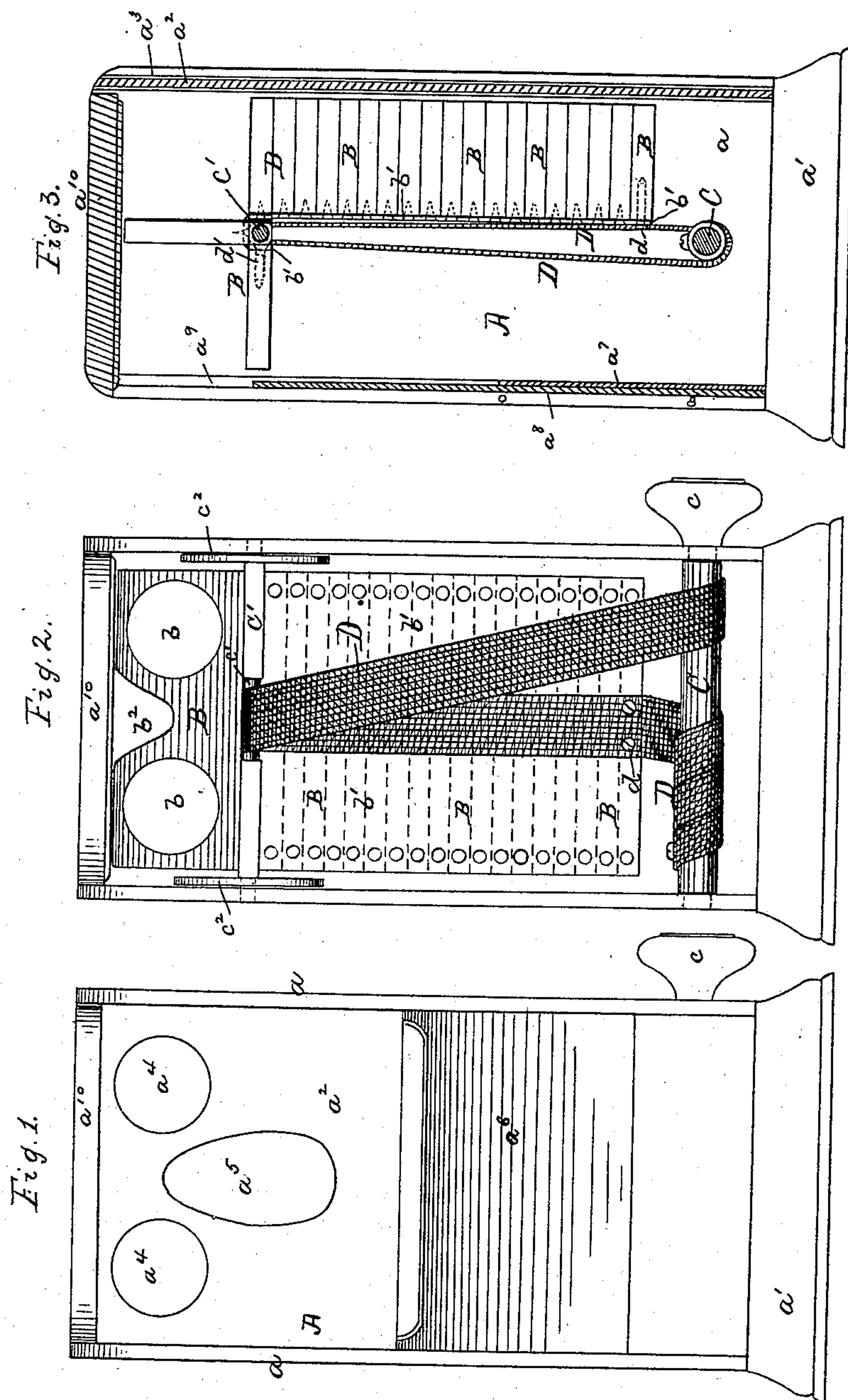


(No Model.)

J. LEE.  
OPTOMETER.

No. 267,088.

Patented Nov. 7, 1882.



Witnesses:  
A. J. McConville,  
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# UNITED STATES PATENT OFFICE.

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## OPTOMETER.

SPECIFICATION forming part of Letters Patent No. 267,088, dated November 7, 1882.

Application filed March 23, 1882. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES LEE, of New Brighton, Richmond county, State of New York, have invented certain new and useful Improvements in Optometers, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to an instrument known as an "optometer," and more particularly to that class in which the lenses of varying power are mounted in frames which are contained in a case, and are capable of being brought successively therein before the eyes of the person whose sight is being tested; and my invention consists in the devices hereinafter particularly described, and combined to operate as and for the purpose hereinafter set forth.

Figure 1 is a front elevation of an optometer containing my invention. Fig. 2 is a similar elevation, with the front side of the inclosing case removed and showing the interior mechanism, and Fig. 3 is a side vertical section on the line  $x x$ , Fig. 2.

Similar letters of reference indicate similar parts.

A is the inclosing case of the instrument, and is preferably constructed with the sides  $a$ , which are fixed in a base,  $a'$ , and with the front  $a^2$  in the form of a plate, slid into the grooves  $a^3$  in the sides, as shown. This front has the eye-openings  $a^4$ , and the opening  $a^5$  between and extending below the line of said eye-openings, through which opening  $a^5$  the nose of the person using the optometer may be projected, so that the eyes may be brought closely to the openings  $a^4$ . A slide, preferably of sheet metal, may be employed, as shown at  $a^6$ , working in the grooves  $a^3$  on the exterior of the plate  $a^2$ , to cover or close the openings  $a^4$  and  $a^5$  when the instrument is not in use. The back of the case is preferably in two pieces,  $a^7$  and  $a^8$ , working in grooves  $a^9$  in the sides  $a$ , as shown, the plate  $a^7$  being fixed, and the plate  $a^8$  being capable of being slid upward to entirely close the back, or downward to open a path of vision through the case from the eye-openings  $a^4$  on the front. A lid,  $a^{10}$ , which may be removable, is provided, as shown. I have described what

is a desirable form of case, but the structure thereof may be varied in its mechanical details.

At B are shown the lens frames or holders, in the openings  $b$  of which are set the testing-lenses. These lens-frames are secured at one of their longitudinal edges upon a strip or sheet of flexible material—such as strong cloth—which is shown at  $b'$ , and are arranged closely together on said strip, with their flat sides adjacent to each other, as shown.

At C is shown a shaft mounted in bearings in the sides, at or near the bottom of the case, and at  $C'$  is another shaft mounted in bearings in the sides, at or about the upper part of the case. The strip or sheet  $b'$ , to which the lens-holders are fixed, as described, is of such a length as to extend from one shaft to the other, at one side thereof in the case, as shown, so that one end may be in line with the axis of one of the shafts, while the other end is in line with the axis of the other shaft.

At D is a belt, to one face of which, and about midway of its ends, is fixedly secured the strip  $b'$ , bearing the lens-frames. This may be accomplished, as shown in the drawings, by means of fastening-screws  $d$ , passing through the belt, and thence through the strip  $b'$  and into the material of the frames, which are at the ends of the strip. The belt D is passed around the upper shaft,  $C'$ , and its free ends, beyond the ends of the strip  $b'$ , are passed to and secured fixedly upon the shaft C, said free ends of the belt being of such a length beyond the ends of the strip  $b'$  that when said strip is extended from one shaft to the other, on one side thereof, one end of the belt will reach from the end of the strip  $b'$  which is contiguous to the shaft  $C'$  to the shaft C, and the opposite free end will be of substantially the same length beyond the opposite end of the strip  $b'$ , and will be wound or coiled upon the shaft C, as shown. The upper shaft,  $C'$ , is preferably squared to conform to the edges of the lens-frames, except at its middle, where it may be rounded to form a bearing for the belt D, as seen at  $c'$ , and said shaft may be provided with the broad washers  $c^2$  at its ends within the case to prevent the ends of the lens-frames from scraping on the inside of the case.



The shaft C has the knob or handle *c* outside the case, by means of which it may be operated.

The lens-frames are preferably formed with their outer longitudinal edges cut away or concaved, as at *b*<sup>2</sup>, between the lens-openings, to permit the frames, in their movement in the case, to pass the nose of the person using the instrument, that organ being projected through the opening *a*<sup>5</sup> in the case. By means of this opening *a*<sup>5</sup> and the concaves *b*<sup>2</sup>, I am enabled to have the user's eyes brought close to the eye-openings *a*<sup>4</sup>, and hence as near as possible in an instrument of this description to the lenses in the frames B.

It is evident that the lenses of varying power or grades may be arranged in succession in the frames mounted on the strip *b'*, and that by means of the said strip *b'*, the shafts C and C', and the belt D, constructed and arranged as specified, the lenses may be brought successively in range with the eye-openings *a*<sup>4</sup> by simply turning the handle or knob *c* of the shaft C; also, that the slipping or uncertain movement of the lens-frames on the shafts, which is liable to occur when the frames are attached to an endless belt simply passed around the shafts, is wholly avoided, the motion given to the strip *b'*, carrying the lens-frames in my device, being a positive motion through the belt D, and their appearance in succession above the shaft C' in the range of vision being secured with regularity and precision.

It is also evident that in arranging the instrument to test the sight it is not necessary to examine the lenses through the eye-openings *a*<sup>4</sup> in order to bring the lens of the lowest grade or power opposite to said openings as the initial lens to be used in the test, but that, the lenses being arranged in a regular order as regards power on the strip *b'*, by simply turning the shaft C in one direction until its motion reaches its limit on the belt D the lenses will all be upon one side of the shafts in the case, and the first of the series will be the initial one to appear in the range of the eye-openings *a*<sup>4</sup>.

The object to which the vision is directed

through the lenses, in using the instrument, may be held, in a suitable support, in line with the opening in the back of the case opposite to the eye-openings, which support may be wholly detached and distinct from the instrument.

I am aware that optometers have been made in which a series of lenses have been fixed to an endless belt mounted on shafts, so that by revolving the shafts the lenses are successively presented to the vision of the experimenter. I do not claim broadly such a construction and arrangement of parts.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In an optometer, the combination of the inclosing case A, the described lenses fixed on the flexible strip or apron *b'*, the shafts C and C', and the belt D, secured to said strip or apron, and having its opposite ends fixed to and adapted to coil upon said shaft C, all as and for the purpose specified.

2. In an optometer, the combination of the inclosing case A, having the nose-opening *a*<sup>5</sup> between the eye-openings *a*<sup>4</sup> on the front thereof, and the lens-frames B, capable of being passed flatwise successively around the shaft C', and having the notches or concaves *b*<sup>2</sup> in their outer longitudinal edges, between the lens-openings *b*, substantially as and for the purpose specified.

3. In an optometer composed of a case, A, containing a series of lenses, B, capable of being carried by a belt or apron successively into the range of vision through the instrument, the sides *a* of the case, fixed in the base *a'*, and having the bearings of the operating shafts, the front plate, *a*<sup>2</sup>, in which are the eye-openings, working in the grooves *a*<sup>3</sup>, together with the sliding cover, *a*<sup>6</sup> and the plate *a*<sup>7</sup>, fixed in grooves *a*<sup>9</sup>, and plate *a*<sup>8</sup>, sliding in said grooves and constituting the back, all as described.

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Witnesses:

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