C. EDEWAARD.

OPTOMETER.

APPLICATION FILED NOV. 21, 1906.

900,715.

Patented Oct. 13, 1908.

3 SHEETS—SHEET 1.

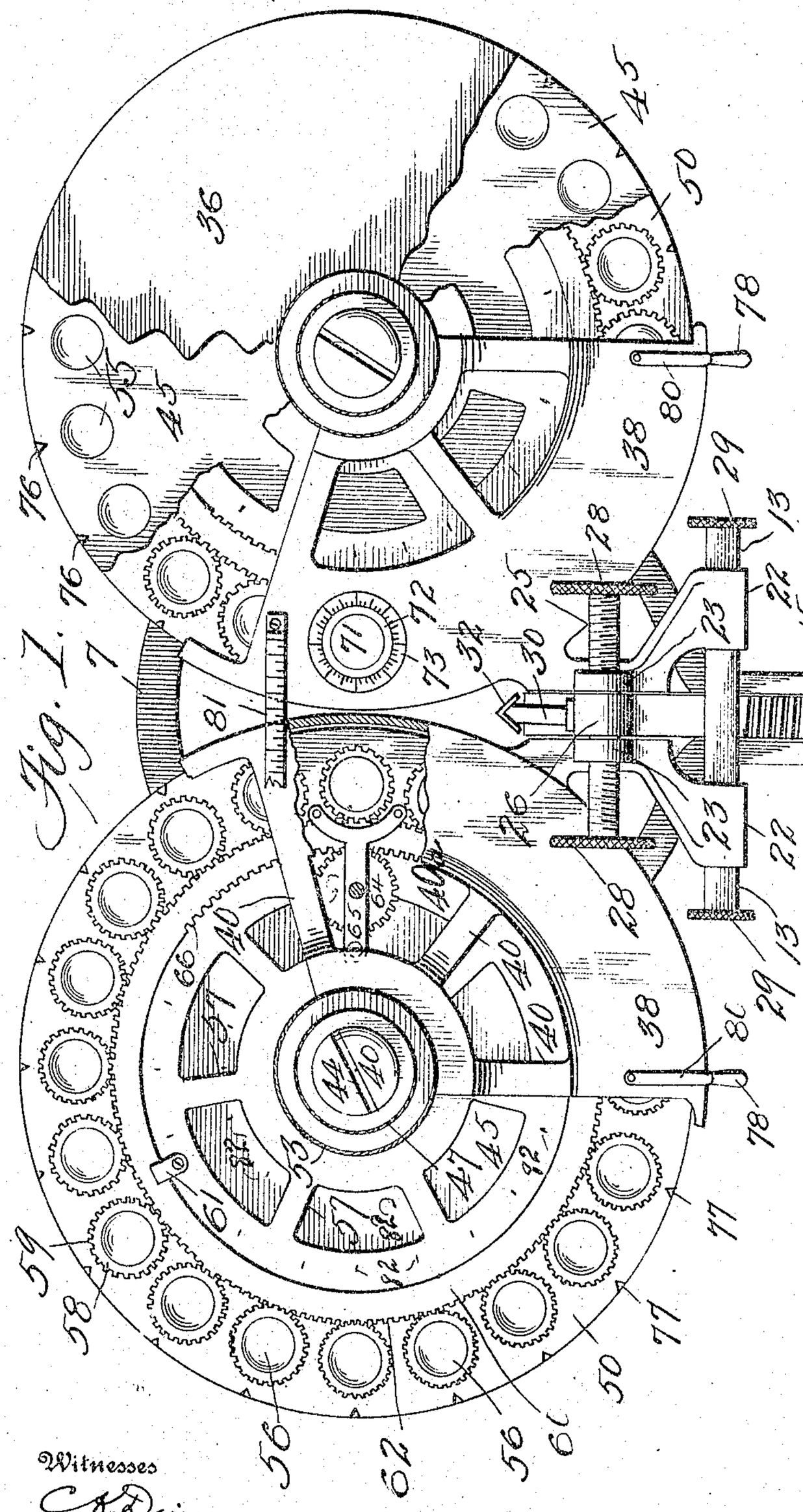

Fig. 1.

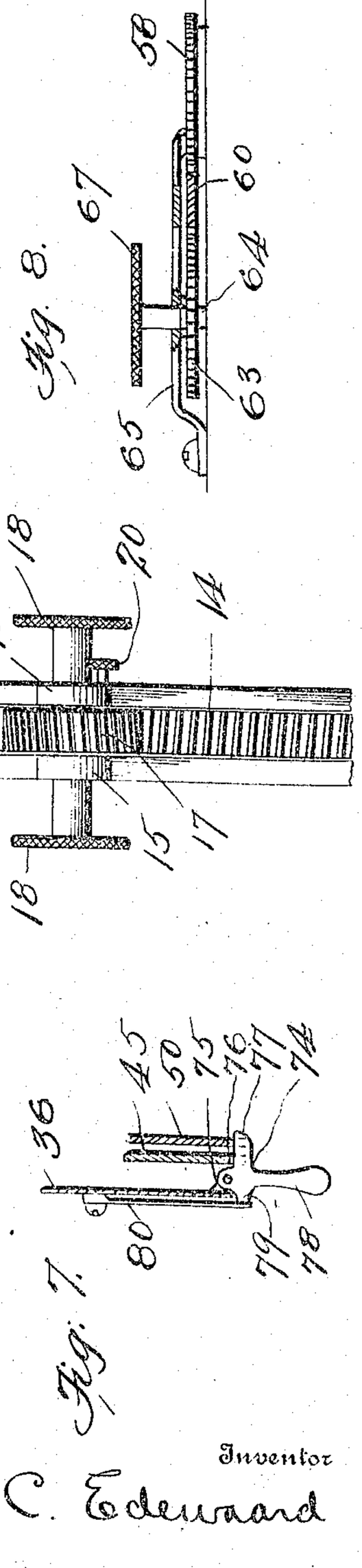

Fig. 8.

Fig. 7.

Witnesses

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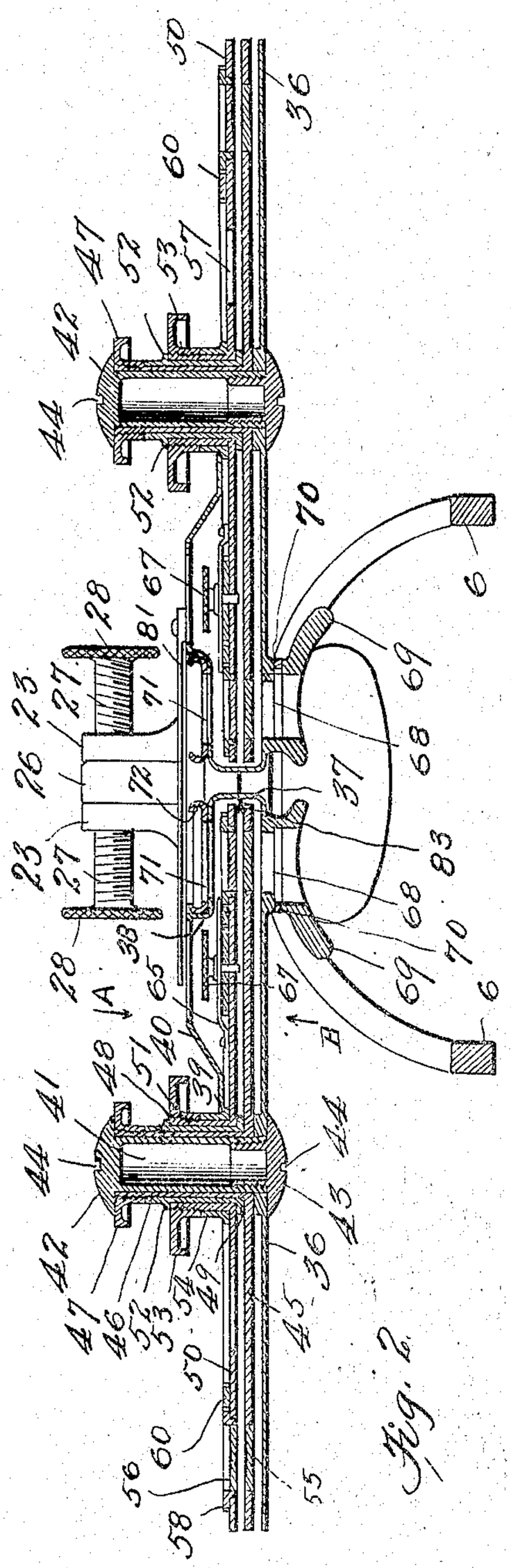

Fig. 2.

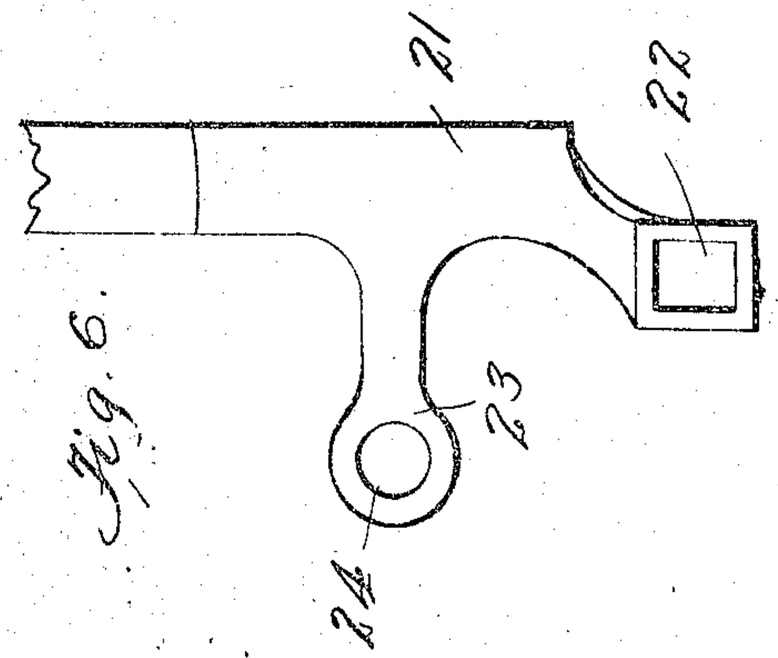

Fig. 6.

Witnesses

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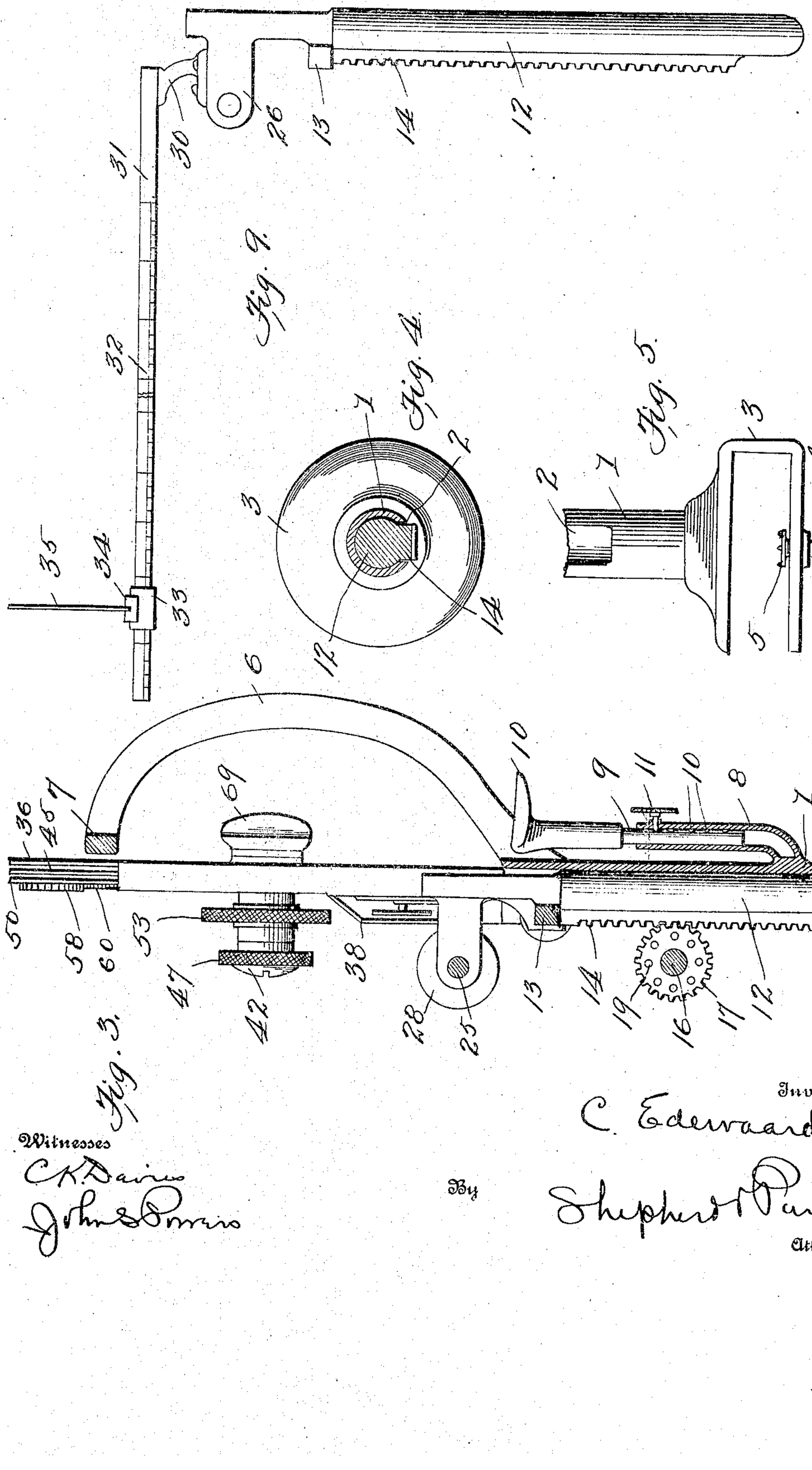
3 SHEETS—SHEET 3.



Witnesses

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UNITED STATES PATENT OFFICE.

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OPTOMETER.

No. 900,715. Specification of Letters Patent. Patented Oct. 13, 1908.

Application filed November 21, 1906. Serial No. 344,368.

To all whom it may concern:

Be it known that I, CORNELIUS EDEWAARD, who has announced his intention of becoming a citizen of the United States, residing at Paterson, in the county of Passaic and State of New Jersey, have invented certain new and useful Improvements in Optometers, of which the following is a specification.

This invention relates to new and useful improvements in optometers and it particularly pertains to an eye testing apparatus of the multiple lens type.

The invention embodies an apparatus of the above type in which various methods of testing and correcting the sight may be used, the chief of which are those known in the practice as the subjective method, the fogging method and the objective method, in combination with a retinoscope.

The invention in view of its adaptability to the methods above noted aims primarily to provide novel features of adjustment and of operation whereby the lenses of different strength may be brought systematically into focus, before the eye of the patient.

The invention aims generally to provide a sight testing apparatus which shall supplant the trial frame in view of the fact that the latter is heavy and cumbersome in use and renders the operation of testing the eyes unduly long and tedious for the patient.

The detailed construction will appear in the course of the following description in which reference is had to the accompanying drawings forming a part of this specification, like numerals designating like parts throughout the several views, wherein,

Figure 1 is a front elevation with parts broken away of an optometer constructed in accordance with my invention, and illustrating in detail the features of construction to be hereinafter specifically referred to. Fig. 2 is a horizontal section on a central line through the lens carrying disks. Fig. 3 is a central vertical section thereof. Fig. 4 is a section on line 4—4 of Fig. 3. Fig. 5 is a side elevation of the clamp by which the apparatus as an entirety is supported from a stationary object. Fig. 6 is a fragmentary side elevation of the brackets which carry the lens disks. Figs. 7 and 8 are detailed sectional views of mechanisms to be hereinafter specifically referred to, and Fig. 9 is a side elevation of a supporting arm for the reading card.

Referring specifically to the accompanying drawings and to Fig. 2 thereof the arrow A indicates the side of the apparatus which the operator faces and upon which the plan of Fig. 1 is taken and the arrow B indicates the side which the patient faces.

The invention comprises essentially a support 1 and a sight testing apparatus carried thereby and adjustably-movable with relation thereto. The support 1 is preferably a tubular upright formed with a vertical opening 2 extending from a point short of the bottom thereof to the upper edge thereof.

As shown in Fig. 5 the upright 1 is provided at its lower end with a U shaped horizontal clamp 3 designed to engage a stationary object as will be readily understood. For the purpose of maintaining the clamp 3 against displacement a thumb screw 4 is threaded through the base thereof, the screw 4 carrying a toothed gripping shoe 5. The upright 1 comprises in its upper portion an integral frame of substantially annular outlines within which the head of the patient is received. This frame is designated by the numeral 6 and the upper portion thereof indicated at 7 in Figs. 1 and 3 serves as a rest for the forehead. The upright 1 is provided rearwardly thereof with a tubular vertical extension 8 parallel thereto and offset therefrom. Within the extension 8 is received the shank 9 of a chin rest 10 which co-acts with the frame 6 in affording a rest for the patient's head. The shank 9 is provided with a series of vertically alined notches 10, with any selected one of which an adjusting set screw 11 threaded through the extension 8, is adapted to engage.

A vertical bar 12 is received within the upright 1 and is provided adjacent to its upper end with a horizontal cross arm 13 carrying the counterpart eye testing mechanisms on each side thereof. The bar 12 is conformable in cross sectional shape to the upright 1 and is provided on its front face with rack teeth 14 of such depth as to project through the opening 2. The upright 1 is provided adjacent to said opening with spaced horizontal apertured ears 15 within which is journaled a shaft 16 which carries a pinion 17 meshing with the teeth 14 and affording a means for raising the bar 12. The shaft 16 is provided at its ends with knurled handles 18 for rotating the same. The pinion 17 is provided in one of its side faces with annularly arranged recesses 19 and a set screw 20 is threaded through the adjacent ear 15 and engages in a selected one of said recesses so as to hold the bar 12 against displacement under

the weight of the apparatus from any position to which it may be moved.

The cross bar 13 is preferably rectangular in cross section in order that the brackets 21 carried on each side thereof may be held against angular displacement and may be further guided and steadied in their lateral adjustment. Said brackets are counterparts in construction and at their lower ends are formed with an integral sleeve 22 conformable to and surrounding the arm 13. The brackets 21 are likewise provided with forwardly extending ears 23 having therein threaded apertures 24 for the reception therethrough of an adjusting shaft 25 journaled in an ear 26 projecting forwardly from the bar 12 and disposed between the ears 23. The shaft 25 is oppositely threaded adjacent each end thereof as at 27, the threads 27 engaging within the threaded openings 24. For the purpose of rotating the shaft 25 knurled handles 28 are provided upon the ends thereof. The bar 13 carries at its ends detachable stop screws 29 for limiting the adjustable movement of the brackets 21 and preventing the accidental displacement thereof.

Mounted upon the ear 26 is a vertical post 30 which carries a forwardly extending arm 31 of triangular shape and calibrated as at 32 preferably for a length of thirty-six inches. A shoe 33 of inverted V shape to conform to the triangular shape of said arm is loosely slidable thereon and owing to its conformation is held from displacement without the provision of any positive holding or locking device. The shoe 33 carries a bracket or clip 34 to receive a reading card 35.

The brackets 21 are preferably integral with the casing which carries the lens disks. Said casing comprises an opaque plate 36 preferably of aluminum and of disk shape. It will of course be understood that the parts are duplicated on each side of the bar 12 and that a description of the parts on one side thereof will be applicable to corresponding parts on the other side thereof. The stationary plate 36 is provided with an extension 37 which is bent upon itself as at 38 into a plane substantially parallel with the plate 36. The bent portion 38 affords a front plate as is shown in Fig. 1 and is of an area somewhat greater than one fourth of the area of the plate 36. The plate 38 comprises a solid outer portion and a hub portion 39 united with said outer portion by radially extending raised webs 40, between which occur openings 40^a. The plates 36 and 38 are stationary as is apparent and in such relation serve to support a stationary axle 41 projected through the hub portion 39 of the plate 38 and through an opening central of said plate 36. The axle 41 comprises a tubular member formed with an integral solid head 42 at one end thereof and at its other end provided with a removable head 43 preferably threaded thereinto. The heads 42 and 43 are recessed transversely at 44 for the introduction of a screw driver or other instrument employed for assembling and disassembling the axle 41. Surrounding said axle adjacent to the plate 36 is a rotatable disk 45 provided with an elongated hub 46 which is concentric with the axle 41 and is threaded at its outer end to receive a knurled ring 47 which affords a grip for rotating said disk. A spacing ring 48 surrounds the hub 46 and at its outer end engages the inner edge of the ring 47. The ring 48 at its inner end is provided with an annular lateral flange 49 which serves to maintain a spaced relation between the disk 45 and a second disk 50 provided with an integral hub 51 which surrounds the ring 48. The latter is provided adjacent its outer end with an annular flange 52 which bears against the hub 51 and co-acts with the flange 49 in affording retaining means for said hub. The hub 51 is threaded at its upper end to receive a knurled ring 53 by which the disk 50 is rotated. A spacing ring 54 is interposed between the ring 53 and the disk 50.

The disks 45 and 50 are lens carrying disks, the former carrying concave spherical lenses 55 and the latter carrying concave cylindrical lenses 56. The disks 45 and 50 are provided with marked calibrations for indicating the strength of the successive lenses, the calibrations upon the disk 45 being arranged nearer the center than those on the disk 50 so that they may be read through openings 57 provided upon said disk 50. The lenses 56 are carried in rotatable annular frames 58 journaled in the disk 50. The annular frames 58 are formed with toothed edges 59. A ring 60 is loosely held by clips 61 upon the disk 50 and said ring is formed with peripheral teeth 52 which engage at all times the teeth 59. The ring 60 is rotated by a pinion 63 carried upon the shaft 64, said shaft being journaled in the disk 50 and in a T shaped bracket 65 having its end secured to said disk. The pinion 63 meshes with teeth 66 formed segmentally upon the inner edge of the ring 60. The pinion 63 is rotated by a knurled thumb piece 67, and together with its appurtenant elements is indicated in Fig. 8.

The plate 36 is formed at one side thereof with an opening 68, the openings 68 in each of said plates 36 being juxtaposed and in axial alinement with the lenses 55 and 56. Eye cups 69 are carried by each plate 36 adjacent the lens 68, and between said lens and said eye cup a clip 70 for holding an extra lens to be used in treatment of special diseases, such as hyperopia, is interposed. The plate 38 is also provided with an opening 71 in alinement with the openings 68 and adjacent said opening 71 with a suitably con-

structed clip 72 for holding an extra lens when such is needed for the testing operation. Surrounding the opening 71 is a calibrated annular scale 73 which serves as an axis indicator.

In Fig. 7 I have illustrated a means for holding the disks 45 and 50 against rotation from any position to which they may be moved. This means comprises a pawl 74 pivoted at 75 to the plate 36 and engaging in notches 76 and 77 provided upon the respective disks 45 and 50. The pawl 74 comprises a handle 78 adjacent to which a shoulder 79 is provided. A leaf spring 80 is secured to the plate 36 and bears against the shoulder 79 so as to maintain the pawl 74 in engagement with the notches 76 and 77.

A distance gage 81 is rigidly secured to one of the plates 38 and spans the other of said plates. This distance gage is for use in determining the space between the eyes of the patient which is called the pupillary distance and in making a corresponding adjustment of the lens carrying disks.

In operation the disks 45 and 50 are rotated so as to bring a desired lens upon each of said disks in axial alinement with the openings 71 on plate 38 and with the opening 68 on the plate 36 or in axial alinement with any extra lenses which may be held in the clip 70 or 72. The marked calibrations 82 on the disks 45 and 50 indicate the strength of each lens. Rotation of the ring 60 to correspond with the degree of rotation of the disk 50 insure that the relative axial disposition of the lenses 56 is maintained.

By moving the bar 12 the apparatus can be raised or lowered as desired to correspond to the distance of the eyes from the chin, and the adjustment is had with respect to the distance between the eyes by rotating the threaded shaft 25 to spread apart or bring together the brackets 21 by which the lens carrying disks are supported. The disks 45 and 50 are rotated independently by the knurled handles 47 and 53. For the purpose of preventing any play between the disks 45 and 50 and of insuring the axial alinement of the lenses carried thereby, a clip spring 83 is employed, which is carried by the extension 37 and which projects between said plates as is shown in Fig. 2.

While the elements herein shown and described are well adapted to serve the functions set forth, it is obvious that various minor changes may be made in the proportions, shape and arrangement of the several parts without departing from the spirit and scope of the invention as defined in the appended claims.

Having fully described my invention I claim:

1. An optometer comprising a stationary support, a bar supported therefrom, a head frame carried by said support, an arm carried by said bar, brackets having apertured portions slidable upon said arm, and provided with alined threaded openings, a threaded shaft mounted through said bar, and engaging within said openings to simultaneously move said brackets, sight testing apparatuses carried by said brackets, and a chin rest mounted adjacent said testing apparatuses, substantially as described.

2. An optometer comprising a stationary support, a bar supported therefrom, an arm carried by said bar, brackets having apertured portions slidable upon said arm and provided with alined threaded openings, a threaded shaft mounted through said bar and engaging within said openings to simultaneously move said brackets, and sight testing apparatuses carried by said brackets, substantially as described.

3. An optometer comprising a stationary support, a bar supported therefrom and having a rack formed longitudinally thereof, a shaft journaled in portions of said support having a pinion meshing with said rack, an arm carried by said bar, brackets having apertured portions slidable upon said arm and provided with alined threaded openings, a threaded shaft mounted through said bar and engaging within said openings to simultaneously move said brackets, and sight testing apparatuses carried by said brackets, substantially as described.

4. An optometer comprising a stationary support, a bar supported therefrom and having a rack formed longitudinally thereof, a shaft journaled in portions of said support having a pinion meshing with said rack, a head rest carried by said support, an arm carried by said bar, brackets having apertured ears slidable upon said arm and provided with alined threaded openings, a threaded shaft mounted through said bar, and engaging within said openings to simultaneously move said brackets, and sight-testing apparatuses carried by said brackets, substantially as described.

5. An optometer comprising a stationary support having a tubular extension, a bar supported therefrom, an arm carried by said bar, brackets having apertured portions slidable upon said arm, and provided with alined threaded openings, a threaded shaft mounted through said bar and engaging within said openings to simultaneously move said brackets, sight testing apparatuses carried by said brackets, and a shank adjustably carried within said tubular extension and provided with a chin rest adjacent said apparatuses substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

CORNELIUS EDEWAARD.

Witnesses:

JOHN VERMEULEN,

NICHOLAS VEENBOER.