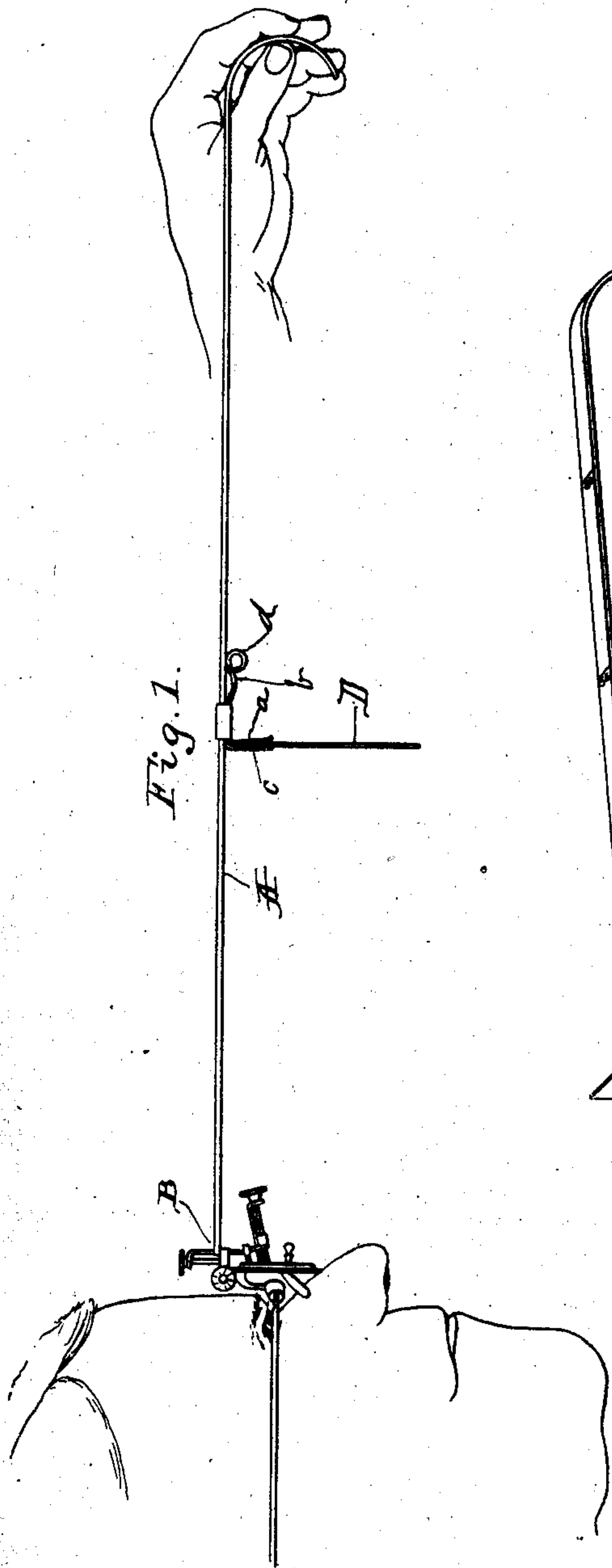


No. 854,093.

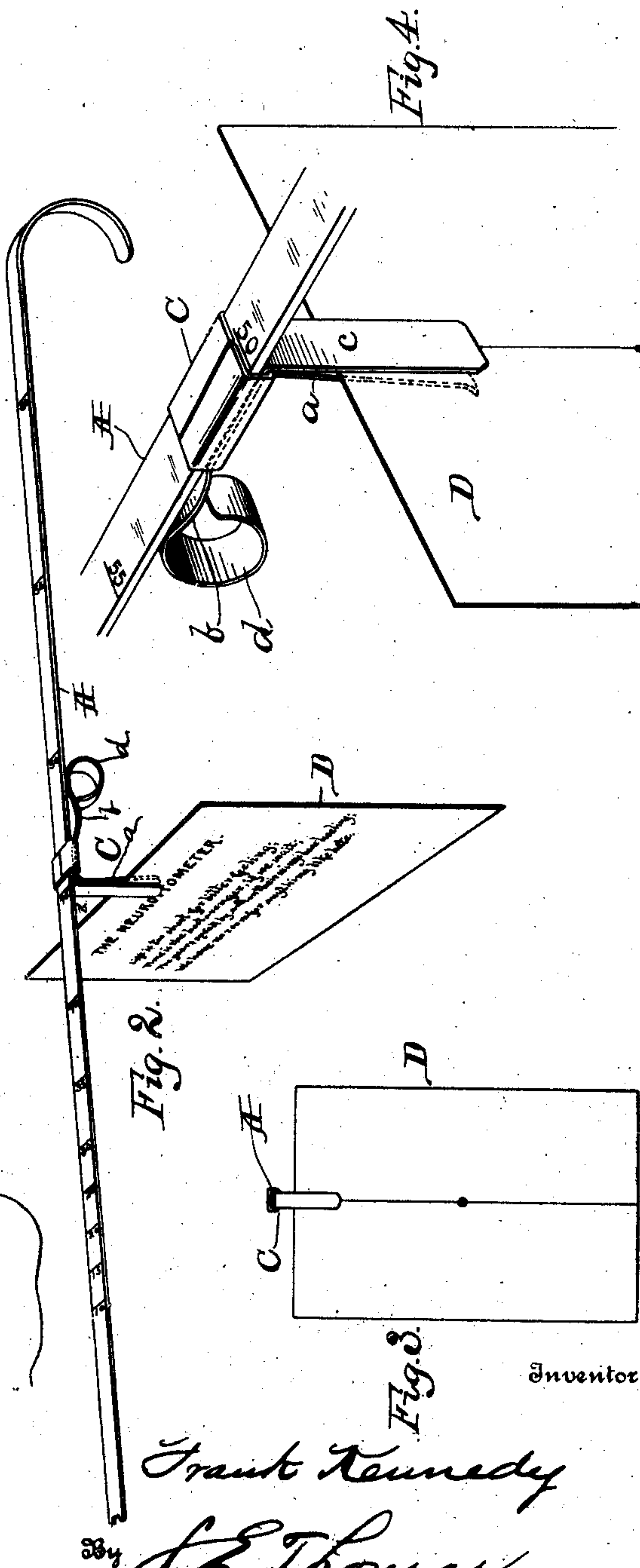
PATENTED MAY 21, 1907.

F. KENNEDY.
NEUROPTOMETER.

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NEUROPTOMETER.

No. 854,093.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, FRANK KENNEDY, a citizen of the United States, residing at Detroit, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in Neuroptometers; and I declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to an improvement in an instrument for measuring the accommodation and convergence of the muscles of the eye, shown in the accompanying drawings and more particularly set forth in the following specification and claims.

In the drawings: Figure 1 is a side elevation showing the instrument in position for use upon a trial frame. Fig. 2 is a perspective view showing the test card in position. Fig. 3 is a cross-sectional view through the bar, showing the slide in position supporting the test card. Fig. 4 is an enlarged detail fragmentary view of the instrument, illustrating my invention.

What is known among oculists as "accommodation" is the power of the eye to overcome divergent rays, by the action of the ciliary muscles upon the crystalline lens. With advancing age many changes take place in the eye. The accommodation gradually diminishes from a very early period, the near point slowly but steadily receding. This change in the accommodation occurs in all eyes whatever their refraction, and is due to an increased firmness of the lens, whereby its elasticity is lessened, and perhaps also in some slight degree to loss of power in the ciliary muscle due to advancing age.

The following table indicates a normal accommodation at the ages given:

Age 10—Total accommodation 13 diopter:					
45	"	15	"	"	12
	"	20	"	"	11
	"	25	"	"	10
	"	30	"	"	9
	"	35	"	"	8
50	"	40	"	"	7
	"	45	"	"	6
	"	50	"	"	5
	"	55	"	"	4
55	"	60	"	"	3

By the foregoing table it will be seen that a

child 10 years of age with normal vision has a total of 13 diopters of accommodation. The near point at which a child 10 years of age should be able to read the test type is three inches, not being able to do so indicates lack of accommodation. The same child may have normal vision for distance but lack accommodation at the near point which should be supplied with artificial accommodation by the use of convex lenses.

Convergence is the power of the eyes to maintain central near vision by the action of the internal recti muscles. The nearer an object the more convergence is necessary, and usually for every increase of the convergence there is a certain increase in accommodation, the internal recti and ciliary muscles acting in unison.

Referring to the letters of reference shown in the drawings, A is a bar of suitable length which may be shaped at one end to form a handle, the other end being adapted to engage the bridge of a trial frame B.

C is a slide sleeved on the bar A and provided with a spring clamping member a.

The character b indicates a curved shank adapted to project through the sleeve and secured tightly therein with the projecting end c arranged to aline with the clamping member a of the slide and cooperate therewith to clamp the test card D between them. By reason of the curvature of said shank b the slide is held yieldably against the bar A and tightly in its adjusted positions. The outer end of the curved shank b is formed into a finger piece d whereby the slide and clamping members may be readily adjusted along the bar.

Stamped or otherwise secured to the bar A is a series of numbers or graduations indicating normal vision at the age denoted by the numbers on the bar when viewed from the trial frame end of the instrument.

Having thus indicated the several parts of the instrument, I will now explain how the same is employed.

To measure accommodation, I first correct all errors of refraction, then with the full correction before the eyes, measure each eye separately by placing the end of the instrument against the bridge of the trial frame, holding the instrument in a parallel position in front of the eye, adjust the slide C holding the test type at the number on the bar indicated by the age of the patient. If the patient is able to distinguish the words on the test type, he

has normal accommodation. If not able to distinguish the words, the weakest convex lens should be added that will enable him to distinguish a word or words and add this to distance vision for reading.

To measure convergence; I first correct all other errors, then with the full correction before the eyes a 10 degree prism base down before one eye, then place the instrument in the same position as for measuring the accommodation with the dotted line in a vertical position before the eyes, using both eyes at the same time in the test, adjust the slide C on the bar A at the number indicated by the age of the patient. If both dots are on one line convergence is normal, if two lines appear sufficient prisms should be added to fuse the lines, the power of the prism indicated is necessary to supply artificial convergence for near work, this is to be added to the other findings for reading only.

Having thus described my invention, what I claim is:—

1. An instrument of the character described comprising a graduated bar, a slide mounted thereon provided with a clamping member, and a curved shank projecting through the slide and having one end arranged to form a clamping member for co-operation with the aforesaid clamping member to hold a test card.

2. An instrument of the character described comprising a graduated bar, a slide mounted thereon provided with a clamping member, and a curved shank projecting

through the slide and having one end arranged to form a clamping member for co-operation with the aforesaid clamping member to hold a test card, the opposite end of the shank being formed into a finger piece.

3. An instrument of the character described comprising a graduated bar, a slide mounted thereon provided with a clamping member, and a shank projecting through the slide and having one end arranged to form a clamping member for co-operation with the aforesaid clamping member to hold a test card, the shank being constructed and arranged to hold the slide yieldably in engagement with the bar.

4. An instrument of the character described, comprising a bar graduated by a series of ages, said bar being bent at one end to provide a handle, a slide mounted upon the bar and provided with an integral clamping member, and a shank projecting through the slide and engaging one face of said bar, the shank having a clamping member co-operating with the aforesaid clamping member to hold a test card, and having one end formed into a finger piece, the slide co-operating with said age graduations for the purposes set forth.

In testimony whereof, I sign this specification in the presence of two witnesses.

FRANK KENNEDY.

Witnesses:

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HENRY E. VILLEROT.