

Optical Department.

In charge of W. E. HAMILL, M.D., Principal of the Canadian College of Optics.

Convexo-Prismatic Spectacles.

(A recent article by Dr. J. Spence, of Harriman, Tenn., on convexo-prismatic spectacles, is of such practical importance to opticians that I feel the readers of this column should have it *in toto*.—W. E. HAMILL.)

Having experimented very satisfactorily with the convexo-prismatic spectacles used by Prof. Sandolt, of Paris, and recommended by W. Booth Pearsall, of Dublin, in the *British Dental Journal*, I am pleased to lay before the profession the results of my investigation.

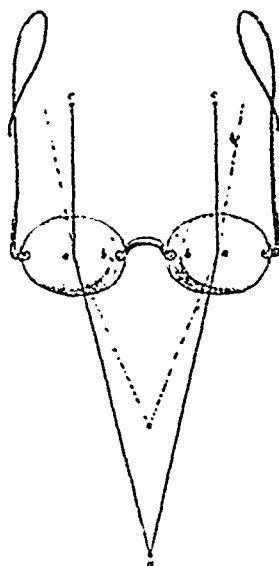
Some of the readers of the items of interest may remember that, in the March number of last year, I advocated the use of the watchmaker's eyeglass in dentistry. But, excellent though that form of magnifying glass is for the purposes of the dentist, it is surpassed very considerably by the convexo-prismatic spectacles.

The superiority of the latter lies partly in the fact that *when both eyes are employed, you get the rounded appearance of objects which is obtained by seeing partly around them* (and which, by the way, is produced artificially by the stereoscope), and partly in that when both eyes are employed an object appears larger than when seen by only one; and partly in that it is vastly easier to hold a glass to the eye by means of spectacle frames than by the strained compression of the orbicular muscles.

The uninitiated may inquire, "But why, might not two magnifying lenses be fitted with spectacle frames and worn as are ordinary spectacles?" The answer is, they would necessitate the eyes being brought so near to the object as to require a fatiguing strain of the muscles which control the motions of the eyeballs. The eyes would be drawn to an unusual squint. To demonstrate this, hold a small object at about six inches from your eyes and look fixedly at it for a few minutes, when the sense of strain in the eye will become painfully evident. At a distance of twelve inches, the strain is ordinarily not appreciable.

Now, it is for the purpose of obviating this strain of the recti muscles that the prism is added to the magnifying lens. A ray of light passed through a prism, as

we all know, is deflected from a straight line and turned off at an angle proportionate to the angle of the prism. So that if you should wear a pair of spectacles composed of prisms, and then look at an object six inches from your eyes the rays of light leaving the object and entering your eyes via the prisms will be refracted (if the prisms be of the proper degree of angle) so as to enter your eyes in parallel lines. This is roughly depicted in the figure, where *o* is the object and *e e* the eyes.



The bases of the prisms point towards each other. Thus their thickest portions are those proximate to the nose. Should one of them be shifted around half an inch or so, you would see double. Prisms are used by opticians for the correction of strabismus.

But a pair of spectacles composed of prisms only, while allowing you to hold your eyes close to an object without strain, give no magnifying effect. Therefore, for dentists' use, the lens must be added. While experimenting with my optician I had the use of his lenses and prisms in separate forms, but in the crystals made to our order in Chicago, the lens and prism is but one piece, one side of the glass being plane and the other convex, thus producing a crystal which at once deflects the rays and magnifies the object.

There seems to be no law, except that of convenience, to restrict the use of high magnifying powers. But convenience re-

quires that the operator's face be about six inches from the tooth, and a lens of this focal distance is perhaps best for dentistry. The ordinary watchmaker's eyeglass is of higher power than this, having a focal distance of about four inches. Allowing one and one-half inches between the eye and lens, this would give but five and one half inches from eye to tooth—rather too little when working on the molars. Besides, any slight change of position of the patient or operator throws the tooth out of focus more readily with a lens of short focal distance than with a longer one.

The glasses I have are of this six-inch focal distance, and make an object seem about double the size it appears to the naked eye. This may not impress the reader as a great gain, but he must remember that the object is seen at six inches instead of twelve, which adds largely to its conspicuousness, and the gain is, in fact, simply immense.

COMBINATION OF THE SPECTACLES.

The prism must be proportioned to the lens. As a lens of high magnifying power has a short focal distance, a prism of proportionally high refractive power is required. With a prism too weak for the lens, the rays of light would not enter the eyes in parallel lines, but as shown in the dotted lines of the figure. Opticians have lenses and prisms proportioned to each other, and so numbered.

For some reason the pair of glasses which I had made for myself give a clearer image when the line of vision travels through the thickest portions of the crystals, about *b b* in the figure. When I received them the crystals were scarcely an inch separated from each other, but by expanding the bridge I parted them by one and three eighth inches, thus causing the lines of vision to pass them at about *b b*, greatly improving the clearness of the image. I mention this because this may, and should, be adjusted on the trial frames of the optician before the spectacles are made, and it were better if the line of vision be made to travel through the crystals at about *a a*.

Another error occurred with mine, the crystals were made full orbled, which made it difficult to look over them. This was very troublesome when reaching for an instrument, or when for any reason desiring to look away at a distance, for the instruments appeared in a blur, and the eye is strained by looking through these powerful glasses at anything beyond their focal point. However, I remedied