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BINOCULAR VISION DIAGNOSTIC INSTRUMENT

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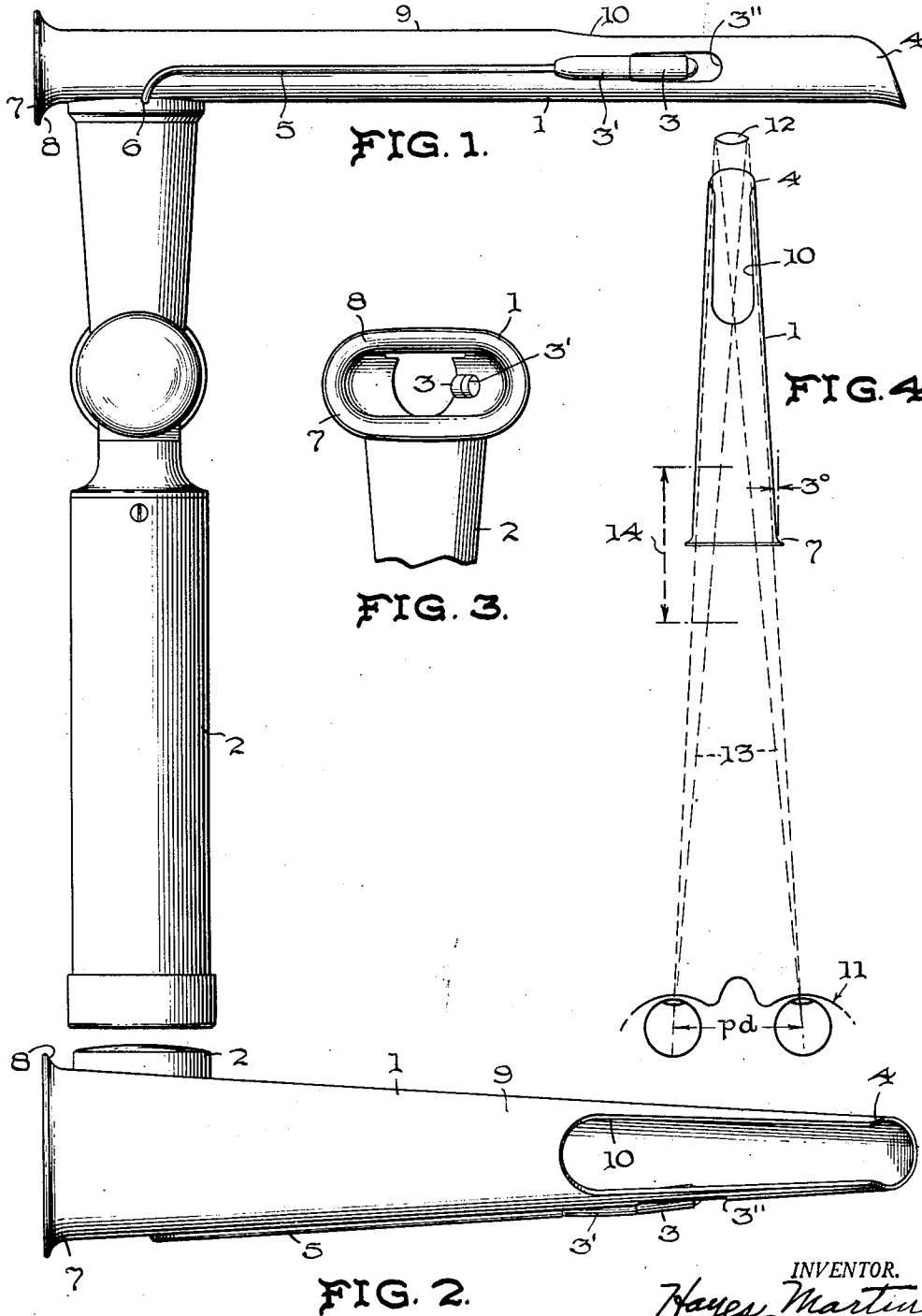


FIG. 1.

FIG. 3.

FIG. 4.

FIG. 2.

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UNITED STATES PATENT OFFICE

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BINOULAR VISION DIAGNOSTIC INSTRUMENT

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2 Claims. (Cl. 128-6)

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The present invention relates to diagnostic instruments, and more particularly to a diagnostic instrument of the type utilized for depressing the epiglottis at the base of the tongue for purposes of performing exploratory or diagnostic examinations of the larynx, pharynx, or elsewhere in the posterior oral cavity, or performing some types of medication and/or other therapeutic or operational procedures.

The laryngeal and pharyngeal speculums available heretofore are so constructed that the diagnostician or other user thereof can make only a monocular examination of the exposed larynx, pharynx or otherwise, as the case may be. This fact is due to the substantially straight sides of the prior art laryngoscope or pharyngoscope blades, one side of which is usually open. An open-sided blade of this general type is disclosed in Patent #2,289,226 to Von Foregger, dated July 7, 1942.

These prior art blades are especially well-suited, by virtue of their open side, for intranasal or intra-tracheal intubation, anaesthetization and other therapeutic or operational procedures where it is usually necessary to remove the laryngoscope or pharyngoscope blade from the oral cavity without disturbing the tube or other instrumentalities being used in the oral cavity. However, the tissue of the posterior oral cavity of a patient tends to project into the open side of this type of blade, thus sometimes hindering clear and unobstructed observation of the larynx, pharynx or elsewhere as is particularly necessary for effective diagnostic procedures.

It is well known that binocular vision, with attendant depth perception, is essential for a thorough and accurate examination for pathological or diagnostic purposes.

Accordingly, it is a primary object of the present invention to provide a blade for laryngoscopes, pharyngoscopes or the like which allows binocular observation of the object under examination.

Another object is to provide a blade for laryngoscopes, pharyngoscopes, and the like which prevents the tissue about the posterior oral cavity from projecting into the blade and blocking clear observation of the object under examination.

A further object is to provide a blade for laryngoscopes, pharyngoscopes, and the like which allows binocular vision of the object under examination, and which is provided with means for illuminating the object.

A still further object is to provide a blade for laryngoscopes, pharyngoscopes, and the like

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which converges from its proximal end to its distal end to a predetermined degree or angle relative to the line of vision of the user of the instrument to an object to be observed, when the object to be observed is within a predetermined range of vision.

Other objects and advantages of the invention will hereinafter become more apparent and the novel features thereof defined in the appended claims.

In the drawing:

Figure 1 is a view in side elevation of an instrument embodying the invention, the operating handle assembly being merely illustrative of one form of handle support for the blade with which this invention is primarily concerned;

Figure 2 is a view in top plan of the instrument shown in Figure 1;

Figure 3 is a fragmentary view in end elevation, looking from the proximal end to the distal end of the instrument blade; and

Figure 4 is a diagrammatic view of the blade showing the relative angular convergence of the blade with respect to the line of vision of a user of the instrument to an object to be observed.

Like reference characters designate corresponding parts in the several figures of the drawing, wherein 1 generally denotes an instrument blade made in accordance with the present invention. This blade 1 is carried by an operating handle 2, the handle assembly shown being purely illustrative and forming no part of the present invention, but being the subject matter of co-pending applications S. N. 169,918 filed June 23, 1950, and S. N. 210,598 filed February 12, 1951. The handle assembly includes means such as batteries (not shown) for energizing a small but powerful light bulb or lamp 3 which is disposed towards the distal end 4 of the blade 1, this lamp 3 being received in a longitudinally extended receptacle 3' disposed on one lateral side of the blade 1, the receptacle 3' being directed slightly angularly inward within an opening 3'' in one side of the blade to direct the light beam from the lamp 3 interiorly of the blade, as seen in Figure 2. The lamp 3 is connected with the energizing means in the handle 2 by an electrical conductor (not shown) which extends through a hollow conduit 5 extending longitudinally along the outside face of the blade and into the handle assembly 2 at the point of juncture between the handle assembly 2 and the blade 1, as at 6.

As is best seen in Figure 3, the blade 1 is substantially elliptical in transverse cross section adjacent to the proximal end 7 thereof, this

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proximal end 7 preferably being flared somewhat about its marginal edge, as at 8. Referring particularly to Figures 2 and 4, it will be seen that the upper side of the blade 1 is closed throughout a portion of its length, as at 9, and the distal portion of the blade is cut back, as at 10, to form a longitudinally inwardly extended and enlarged sight opening. It is to be understood, however, that the sight opening 10 may extend a lesser or greater distance in the direction of the proximal end 7 of the blade 1 or it may vary in its transverse dimension and/or form as may be required in different types of blades, without departing from the spirit of this invention.

The binocular vision feature of the blade will be most readily understood by reference to the diagrammatic illustration of Figure 4, wherein the eyes of a pathologist or other operator of the instrument are represented at 11, the object under observation is designated 12, the line of vision of the operator converging on the object 12 is represented by broken lines, as at 13, and the dimension 14 represents the range of allowable distance that the proximal end 7 of the blade 1 may be positioned from the eyes 11 of the operator or user for maintaining binocular vision of the object 12. However, the position of the blade 1 is governed by each individual user or operator according to his own individual pupillary distance or spacing, the relative positions of the eyes 11, the blade 1, and the object 12 shown in Figure 4 being illustrative of the positions assumed when the user or operator has a pupillary distance (p. d.) of 62 mm., i. e., the distance between the pupils of his eyes is 62 mm. Thus, it will be seen that the blade 7 can be moved within the range of allowable distance 14 to accommodate for variations of the pupillary distance of each individual user; i. e., if the pupillary distance is less than 62 mm. the blade should be positioned relatively closer to the eyes of the user, and, conversely, if the pupillary distance is greater than 62 mm. the blade should be positioned relatively farther away from the user.

It has been found that an ideal and completely satisfactory blade is produced when the transverse dimension across the proximal end 7 of the blade 1 is approximately 3.81 cm., the degree of convergence of the blade 1 in its longitudinal direction from the proximal end is approximately 3°, and the blade is held approximately 25 cm. from the eyes of a user having a pupillary distance of 62 mm.

It is to be understood that the foregoing description of distance and dimensions is not to be construed as limiting the invention to such specific dimensions and distances, but is purely illustrative of one operative form, and these distances and dimensions may be varied as may be desired or required without departing from the spirit thereof.

Furthermore, while the instrument blade of this invention has been hereinbefore described as being primarily intended for use in diagnostic or in exploratory work, it is not confined to this type of work alone, since it may be readily utilized, in some instances, for purposes of exposing the larynx, pharynx or other portion of the posterior oral cavity for purposes of medication and/or treatment with certain types of instruments which may be inserted into and removed from the instrument blade 1 without necessitating removal of the blade itself until the treatment is completed.

In use, the blade 1 is inserted into the pa-

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tient's mouth, with the patient lying in a prone position, and the pathologist or other operator facing the top of the patient's head, while pulling the handle 2 toward himself and upwardly until the larynx, pharynx or other portion of the posterior oral cavity being examined and/or treated is exposed at the distal end 4 of the blade 1, the lamp 3 projecting its beam through the blade 1 to brightly illuminate this area. Now, when the operator assumes a position relative to the blade 1 with his eyes spaced within the range of approximately 20 to 30 cm. from the proximal end of the blade, depending upon his individual pupillary distance, his line of vision will converge and focus with a binocular effect on the object to be observed. It is highly desirable that he be able to view the object with both eyes, since in this manner he has the advantage of depth perception which is unattainable with the conventional forms of instruments of this type. Due to the substantially closed construction of the blade 1, none of the soft fleshy tissue of the posterior oral cavity can project into the blade and thus block the vision of the observer.

From the foregoing, it will be apparent to those skilled in the art that I have produced a substantially improved instrument which affords binocular observation of an object under examination, while at the same time, illuminating the object and rendering the same free for certain types of operational or therapeutical operations.

While the foregoing detailed description and accompanying drawing set forth a typically illustrative embodiment embracing the improved features of the invention, it will be apparent that the structural details may be modified from those specifically shown and described without departing from the inventive concept; and accordingly, it will be understood that it is intended and desired to embrace within the scope of the invention such modifications and changes as may be necessary to adapt the construction to varying conditions and uses as defined in the appended claims.

I claim:

1. An instrument blade of the class described, having a proximal and a distal end and being adapted to allow binocular vision by the user thereof of a portion of the posterior oral cavity when the distal end of said blade is inserted into said oral cavity and the user looks through said blade with his eyes within a predetermined range of distance from the proximal end of said blade, said blade converging toward the distal end of said blade, and all of said walls together defining a sight passage extended through said blade, said side walls converging at an angle of approximately 3°, and the distance between said side walls at the proximal end of said blade being equal to approximately 1.21 cm. per 1° of the angle of convergence of said side walls.

2. An instrument blade of the class described, comprising a longitudinally extended, hollow body, said body being substantially elliptical in transverse cross-section and having a proximal end and a distal end, said body also having opposed side and top and bottom walls defining a sight passage therethrough, said opposed side walls converging toward said distal end at such an angle as to allow binocular observation of an object being observed through said passage when the blade is within a predetermined range of position intermediate said object and the eyes of the user thereof, and said body having an en-

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larged sight opening formed in one of said walls and extending longitudinally inward from said distal end, an electric lamp receptacle carried by one of said walls and laterally disposed adjacent said distal end, said receptacle being disposed at an angle to the wall by which it is carried and projecting slightly into said sight passage towards said distal end of the body, and an electric conductor-receiving conduit extending from said receptacle to said proximal end of said blade.

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References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,165,232	De Zeng -----	Dec. 21, 1915

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Number	Name	Date
1,551,114	Parson -----	Aug. 25, 1925
2,070,820	Allyn -----	Feb. 16, 1937

FOREIGN PATENTS

Number	Country	Date
375,491	Great Britain -----	June 30, 1932

OTHER REFERENCES

10 1889 Catalog of Geo. Tiemann & Co., New York, p. 205. Pye's Surgical Handicraft, a book issued by The Williams and Wilkin's Co., Baltimore, in 1950, pp. 367 and 467. (Copies of these publications in Div. 55.)

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