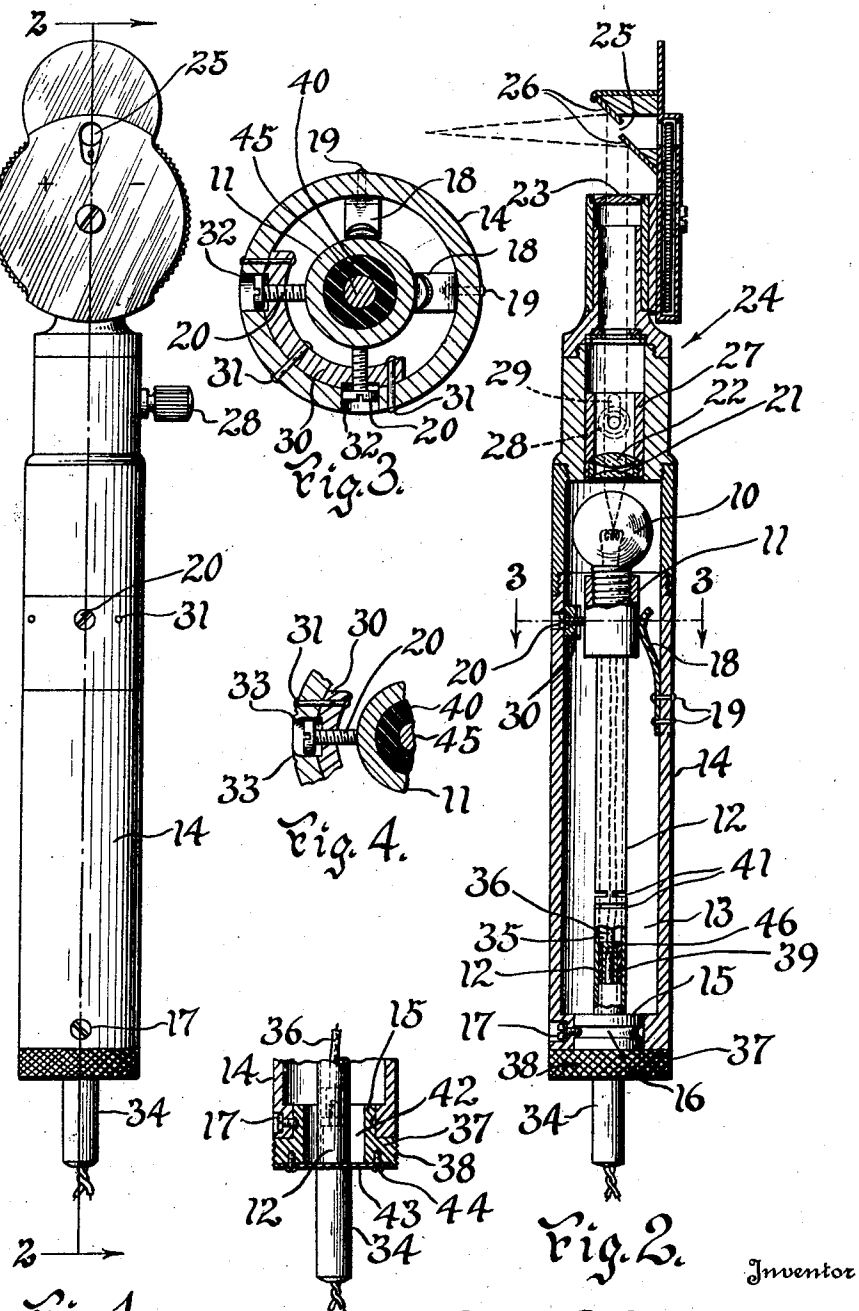
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DIAGNOSTIC INSTRUMENT

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DIAGNOSTIC INSTRUMENT

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The present invention relates to improvements in diagnostic instruments and has particular reference to self-contained adjustable illuminating means for projection of a beam of light through a lens system.

The primary object of the invention is to provide such a diagnostic instrument with an adjustable electric socket for holding an incandescent bulb, said socket being movable to compensate for variations in bulb manufacture.

Another object of the invention is to provide such an instrument having self-contained illuminating means so mounted that it may be selectively moved transversely in relation to the light passage way.

Another object of the invention is to provide such a device with a movable electric socket adjustably mounted in the handle whereby the center of the bulb filament may be positioned in alignment with the sight opening and the condensing lens system.

A further object is to provide such a device with a handle member having yieldable connecting means for receiving a detachable electric plug and supporting the electric socket.

A further object of the invention is to provide means for controlling the adjustment of the movable electric socket, said means allowing a fine and accurate adjustment to be obtained.

A further object is to provide such an instrument which will be simple in construction, strong and durable in service, economical to manufacture, and an improvement in the art.

With these and other objects in view, the invention resides in the novel features of construction, combination and arrangement of parts hereinafter fully described, illustrated in the accompanying drawing and specifically pointed out in the appended claims, the preferred form only having been shown and described by way of illustration.

Prior to the invention diagnostic instruments having self-contained illuminating means have been in general use, but most of them have embodied certain inherent defects. The principal defect has been due to the fact that in the manufacture of incandescent bulbs used in such devices variations occur in the position of the filament so that the filament is not centered in the center of the lamp bulb. The result is that when a bulb with these inaccuracies is positioned in an electric socket the filament will not be in line with the usual light passage way extending from the socket. Since most of such instruments have their light passage way provided with a condensing lens system, and since the efficiency of the bulb is greatest at the center of the filament, it is very desirable that the center of the filament should be in line with the axis of the lens system. This has been impossible in most of the prior art instruments and as a result the light coming from the condensing lens system has not been uniform throughout its area.

Attention is also called to the fact that a great many diagnostic instruments, particularly ophthalmoscopes, are provided with a reflecting surface having an elongated sight opening. Usually the reflector is made from two pieces slightly spaced apart, and the operator in using the instrument sights through the space so formed. It has been found that the utility of such an instrument is greatly improved by providing means whereby the bulb filament may be positioned so that the greatest width of the filament may be in line with the solid portion of the reflector rather than in line with the elongated opening in the reflector. It is with this and the aforementioned objects in view that the present invention has been designed.

In the accompanying drawing forming a part of this application:

Figure 1 is a front elevation of an ophthalmoscope embodying the invention;

Figure 2 is a vertical longitudinal sectional view on line 2—2 of Figure 1;

Figure 3 is a transverse sectional view on line 3—3 of Figure 2;

Figure 4 shows a slight modification of a detail of construction;

Figure 5 is a fragmentary view of a further modification of the invention.

Referring more particularly to the drawing, I preferably position the incandescent

bulb 10 in a movable socket 11 carried by the yieldable connecting rod 12, which is supported in the longitudinal bore 13 of the tubular handle 14 by its enlarged end 15 rotatably positioned in the base of said handle to permit adjustment of the rod 12 and socket 11. The enlarged end 15 having the outwardly extending flange portion 37 is formed with the circumferential groove 16 and is held in adjusted position and against longitudinal displacement by means of the set screws or the like 17, the ends of which extend within and engage the inner surface of the circumferential groove 16. The flange portion 37 having the knurled face 38 formed thereon provides a finger piece by which the enlarged end 15 may be rotatably adjusted.

The leaf springs 18 attached within the handle 14 by the rivets or the like 19 are adapted to engage the sides of the socket 11 and cooperate with the adjusting screws 20 to facilitate the positing of the bulb 10 in alignment with the axis of the lenses 21, 22 and 23, respectively, forming the lens system contained within the head 24 and the sight opening 25 formed on said head. The lenses 21 and 22 are mounted in a slide 27 so that they may be adjusted longitudinally of the instrument by means of the thumb piece 28 operating in the slot 29 to regulate the focal point of the light beams.

The sight opening 25 is formed between two spaced offset mirrors 26 positioned substantially parallel to each other so as to form a transverse slot through which the operator may look into the eye of the patient. The mirrors are adapted to deflect the light beams so that the operator may illuminate and examine the interior portion of the patient's eye.

As aforementioned, it has been found that the utility of such an instrument is greatly improved by positioning the bulb filament so that the greatest amount of light is thrown on the solid part of the reflector. To accomplish this adjustment the screws 17 are loosened after which the supporting rod 12 and the socket 11 may be rotated until the filament is properly positioned relative to the sight opening. The screws 17 are then retightened to hold the bulb filament in fixed adjustment.

It has also been found that there is a great deficiency in the utility of such instruments due to the lateral displacement of the bulb filament with respect to the axis of the condensing lens system and the sight opening 25 so it is, therefore, essential to align these elements. To accomplish this adjustment the springs 18 co-acting with the adjusting screws 20 are used. The springs 18 tend to hold the movable socket 11 in constant engagement with the ends of the adjusting screws 20 so as to respond to the slightest inward or outward adjustment, thereby facilitating lateral movement of the bulb filament to any desired position. The screws 20 are mounted in an arcuate plate member 30 which is held within the handle 14 by the rivets or the like 31 and suitable counterbores or recesses 32 are formed in the handle 14 and said plate member to receive the heads of the screws 20 so that they will at no time extend outwardly beyond the outer surface of the handle 14.

A slight modification of the counter bore or recess 32 is shown in Figure 4, in which the edge 33 is spun over so that the screws 20 can not be removed and lost. The rod 12 is formed with a longitudinal bore 35 in which the insulated flexible wire or the like 36 is positioned adapted to form the connection between the central metallic portion 45 of the socket 11 and the metallic plug receiving tip 46 mounted in the lower portion of the rod 12. This forms the connection for the current flow of one circuit and the metallic rod 12 the connection for the current flow of the other circuit. The bushing 39 of insulating material is adapted to hold the plug receiving tip 46 and rod 12 in fixed spaced relation, and the bushing 40 of insulating material positioned in the socket 11 is likewise used to hold the metallic portion 45 in spaced relation with said socket. Suitable saw cuts or the like 41 formed substantially at right angles to each other in the lower portion of the rod 12 render said rod yieldable to the lateral adjustments of the socket 11.

A suitable plug 34 may be positioned in the base of the yieldable rod 12 to transmit electrical energy to the incandescent bulb.

Referring more particularly to the modification shown in Figure 5 in which the rod 12 is flexibly supported in the enlarged end 15, I preferably form the said enlarged end with the longitudinal bore 42 adapted to receive the lower end of the rod 12, which in this instance has mounted thereon the thin resilient disc or the like 43 adapted to contact with and be secured to the lower face of the enlarged end 15 by the screws or the like 44. This forms a flexible support for the rod 12 whereby it may respond to the slightest lateral adjustment of the socket 11 and with which said socket may be rotated to position the bulb filament with respect to the sight opening as aforementioned.

From the foregoing description it should be apparent that I have provided an instrument accomplishing all of its objects and with which the adjustments may be selectively controlled in minimum time and maintained throughout the use of the incandescent bulb.

Having described my invention, what I claim is:

1. In a device of the character described, an annular tube, a second annular tube extending into the first tube and having a weakened section intermediate its ends, a lamp on the end of the second tube that lies within the first

tube, and adjustable means adapted to deflect the inner tube from its longitudinal axial line about the weakened portion as a center of deflection.

2. In a device of the character described, an annular tube, a second annular tube extending into the first tube and having a weakened section intermediate its ends, a lamp on the end of the second tube that lies within the first tube, and screw means adapted to deflect the inner tube from its longitudinal axial line about the weakened portion as a center of deflection.

3. In a device of the character described, an annular tube, a second annular tube extending into the first tube and having a weakened section intermediate its ends, a lamp on the end of the second tube that lies within the first tube, screw means adapted to deflect the inner tube from its longitudinal axial line about the weakened portion as a center of deflection, and spring means adapted to resist the deflecting movement of the screw means.

4. In a device of the character described, an annular tube, a second annular tube extending into the first tube, said second tube being flexible to an extent that a portion of the tube may be deflected from its longitudinal axial line without deflecting the remaining portion, a lamp on the end of the second tube that lies within the first tube, and adjustable means adapted to deflect a portion of the inner tube from its longitudinal axial line without deflecting the remaining portion of the inner tube therefrom.

5. In a device of the character described, a tube, a staff extending into the tube, a lamp carried by the staff that lies within the tube, a resilient member surrounding the staff adjacent the end opposite the lamp, adjustable means adapted to deflect the staff from its longitudinal axial line about the resilient member as a center of deflection by means of the resiliency of said member and an end cap secured to the resilient member and rotatable in the tube.

6. In a diagnostic instrument of the character described, a casing, a lamp-socket, a staff supporting the socket in the casing and having a weakened integral portion to permit of its lateral deflection, and means for lateral adjustment of the lamp-socket.

7. In a device of the character described, a tube, a staff extending into the tube, a lamp carried by the staff that lies within the tube, said staff being resiliently mounted in the tube so that the lamp carried thereby may be adjusted laterally relative to the longitudinal axis of the tube, adjustable means adapted to deflect the staff from its longitudinal axial line about the point of resiliency as the center of deflection and rotatable means securing said resiliently mounted staff in the tube whereby the said resiliently mounted staff and lamp are held against movement longitudinally of the tube.

8. In a device of the character described, a tube, a staff extending into the tube, a lamp carried by the staff that lies within the tube, a shouldered member rotatably mounted in the tube adjacent the end opposite the lamp adapted to support the staff in the tube, a resilient connection between the staff and shouldered member whereby the staff may be adjusted laterally relative to the longitudinal axis of the tube, means adapted to deflect the staff from its longitudinal axial line about the resilient connection as a center of deflection and means for securing the rotatable shouldered member in the tube whereby the said shouldered member, staff and lamp are held against movement longitudinally of the tube.

9. In a device of the character described, a tube, a staff extending into the tube, a lamp carried by the staff that lies within the tube, a resilient member surrounding the staff adjacent the end opposite the lamp, adjustable means adapted to deflect the staff from its longitudinal axial line about the resilient member as the center of deflection by means of the resiliency of said member and means securing the resilient member and staff in the tube whereby the lamp is held against longitudinal movement in said tube.

10. In a device of the character described, a tube, a staff extending into the tube, a lamp carried by the staff that lies within the tube, a resilient member surrounding the staff adjacent the end opposite the lamp, adjustable means adapted to deflect the staff from its longitudinal axial line about the resilient member as the center of deflection by means of the resiliency of said member and rotatable means securing the resilient member and staff in the tube whereby the lamp may be rotated relative to the tube and held against longitudinal movement in the tube.

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