

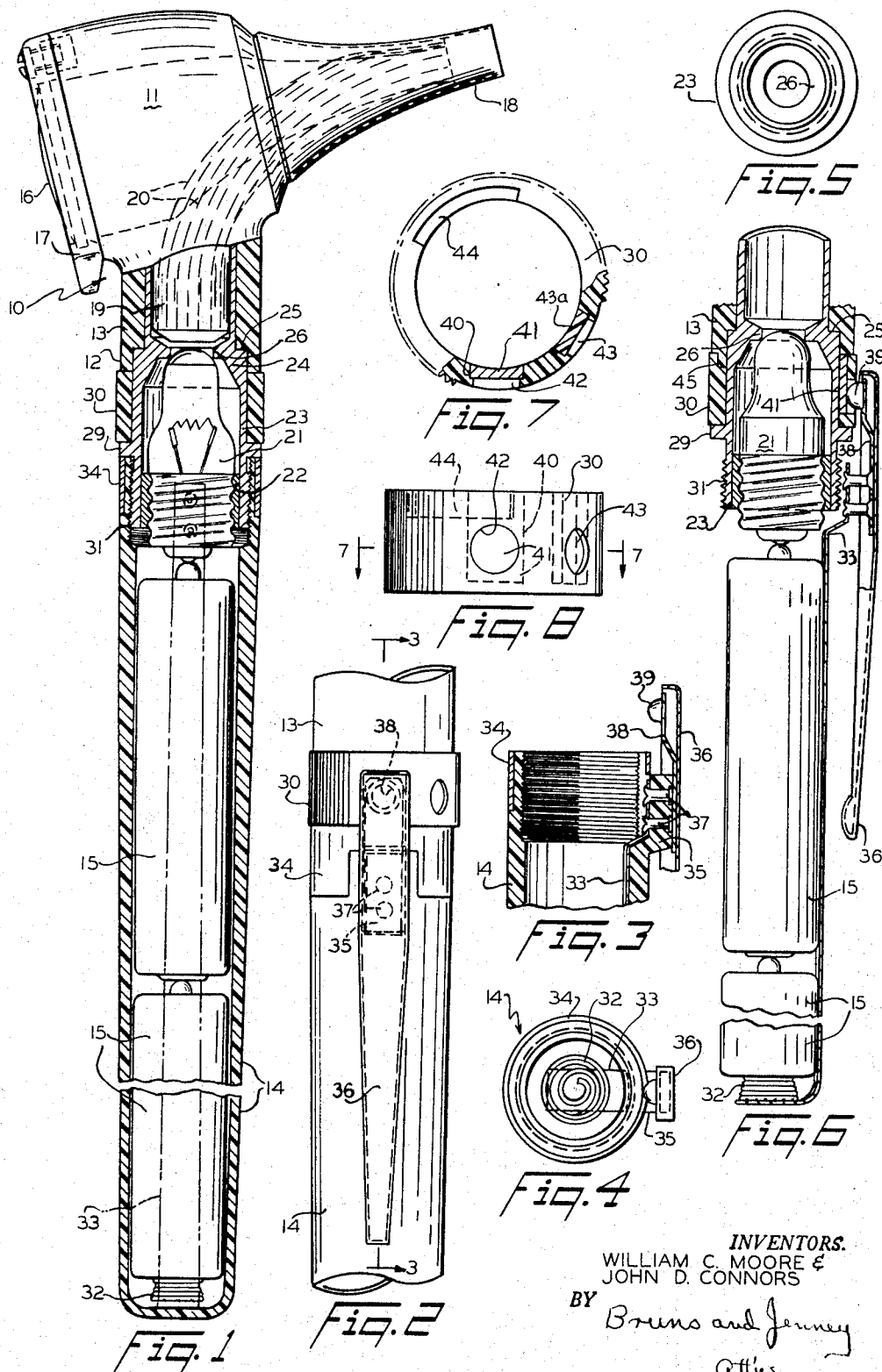
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LIGHT CONTROL FOR DIAGNOSTIC INSTRUMENTS

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LIGHT CONTROL FOR DIAGNOSTIC
INSTRUMENTS

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ABSTRACT OF THE DISCLOSURE

A diagnostic instrument has a tubular light socket in a hollow housing connected as one terminal of a lamp-battery series and a metal spring contact member mounted on the housing is connected as the other terminal. A switch ring of insulating material is rotatably mounted on the socket and a brush element in contact with the socket is carried in a slot in the ring. A hole in the ring communicating with the slot is registerable in "on" position with one end of the spring member which is biased toward the brush element. A depression in the ring is also registerable with the spring end for locking the ring in "off" position.

This invention relates to pocket-size diagnostic instruments employing a beam of light adapted to be directed at a particular area of the human body, and relates more particularly to a light-source system and a control switch therefor.

Otosopes, ophthalmoscopes, and other diagnostic instruments for examining patients' ears, eyes, etc., may conveniently be made in miniature size so that they can be carried in the physician's pocket like a fountain pen. These instruments are usually battery-powered and must be provided with a control switch having positive locking means for securing the light source system in illuminated condition while in use so as to leave the user's fingers free for manipulating the instrument. Provision also must be made for securing the system in unilluminated condition to prevent accidental exhausting of the batteries when the instrument remains in the physician's pocket.

The principal object of the invention, accordingly, is to provide a light-source system which may be quickly and easily locked in either illuminated or unilluminated condition.

Another important object is to provide an easily operated and economically constructed switch for a light source which is reliable in operation and which may be locked in its light-producing position.

A further object is to provide such a switch for pocket-carried instruments having lock means for insuring that the source is not accidentally illuminated when the instrument is not in use.

Other objects and advantages will become apparent from the following description in conjunction with the accompanying drawing, in which:

FIGURE 1 is a side-elevational view, partly in section, of a miniature otoscope embodying the invention;

FIGURE 2 is a fragmentary side-elevational view of a portion thereof;

FIGURE 3 is a fragmentary sectional view of the handle portion thereof on the line 3—3 of FIGURE 2;

FIGURE 4 is a plan view of the handle portion of FIGURE 3;

FIGURE 5 is a top plan view of the tubular lamp socket shown in FIGURE 1;

FIGURE 6 is a diagrammatic side elevational view, partly in section, of the light-source system portions of the otoscope, the parts being rotated ninety degrees from position shown in FIGURE 1;

FIGURE 7 is an enlarged plan view of the control ring

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member and its associated brush member, shown partly in section on the line 7—7 of FIGURE 8; and
FIGURE 8 is an enlarged elevational view thereof.

The otoscope 10, shown in FIGURE 1, has a head portion 11, a body portion 12, including a sleeve portion 13 of electrically non-conductive material secured by adhesive to the head 11, and a housing portion 14, in which the batteries 15—15 are carried.

The head 11 is hollow, providing a passage, from left to right in FIGURE 1, through which the physician can see. A lens 16, secured in a holder 17, is provided at the proximal end of the head and a removable tip 18 is provided at the distal end for insertion in the patient's ear as more fully described in Patent 3,146,775 issued Sept. 1, 1964, to the applicants herein.

Molded in head 11, and in a pendant cylindrical boss 19 thereon, is a bundle of light-transmitting glass filaments 20 for transmitting light from the miniature lamp 21 to the distal end of the head as indicated in broken lines.

Lamp 21 has its negative terminal threaded into an adapter 22 and the adapter may be secured thereon by soldering. Adapter 22 is electrically connected to a tubular metal socket 23 by a slide fit in the lower end of the socket.

The upper end of socket 23 fits freely around the boss 19 of the head and has an enlarged portion 24 providing a shoulder abutting against the shoulder 25 in sleeve 13. The portion 24 has an axially-extending constricted central passage therethrough providing an internally projecting flange 26 against which the end of lamp 21 is engaged so as to secure the lamp in spaced relation to the ends of the fibers 20 in boss 19.

An outwardly projecting flange 29 on the socket 23 supports a control ring 30, hereinafter described, for rotational movement on the socket, the upper edge of the ring abutting against the lower end of sleeve 13. Socket 23 is permanently secured in the upper portion of body 12 by adhesive.

The lower end of the socket member 23 is threaded at 31 to engage internal threads in the battery housing 14. The batteries 15—15 are in series, as shown, preferably with the positive terminal of the series in contact with the positive terminal of lamp 21. Alternatively, the batteries may be reversed, end for end. One terminal of the series is in contact with the central terminal of lamp 21 and the other terminal of the series is in contact with the usual coil spring 32 which forces the batteries into contact with the lamp.

Spring 32 is secured, as by welding, to the lower end of a metal contact strip 33 recessed in the wall of housing 14, as indicated in FIGURE 3. The upper end of housing 14 has a metal reinforcing band 34 therearound, as best seen in FIGURE 2, and a rectangular boss 35 projects through a slot or cut-out portion of the band to support a metal pocket clip 36, as best seen in FIGURE 3. Clip 36 is secured to the housing 14 by rivets 37 which are attached, as by welding, to the clip 36 and pass through suitable holes through the boss 35 and strip 33.

A metal contact spring 38 is also secured by the rivets 37 between the boss 35 and clip 36. The spring 38 extends upward from boss 35, over the body 12 and underneath the upper end of clip 36. The upper free end of the contact spring 38 has secured thereto, as by welding, a metal semi-spherical contact button 39 which is biased inwardly by the spring 38 against the control ring 30 when the parts are assembled.

Referring to FIGURES 7 and 8, there is an internally opening rectangular slot 40 in control ring 30 and a metal brush member 41 is carried in this slot. There is a hole 42 through the ring 30 in communication with slot

40 and the ring 30 may be turned so that the hole 42 registers with button 38 and the button is admitted to contact the brush 41.

Another hole or depression 43 in the outer surface of ring 30 is spaced from the hole 42 and the ring 30 may be turned to register this recess with button 39. Underlying the recess 43 there may be another slot 43a similar to the slot 40 filled with colored nonconductive plastic material to give a visual indication when viewed through the recess 43 that this is the "off" position for the button. When the button rests in the recess 43 it is not in contact with socket 23 but is separated therefrom by the plastic material in the slot 43a. The hole 42 and recess 43 are both shallow enough so that the curvature of the button 39 allows it to be cammed out of either by forcefully turning the ring.

The upper edge of ring 30 is provided with an internal arcuate slot 44, as shown, and, as shown in FIGURE 6, the lower end of the sleeve 13 is provided with a pendant tongue 45 which extends into slot 44 to substantially limit rotation of ring 30 from an "on" position wherein button 39 is engaged in hole 42 and is in contact with brush 41 to an "off" position wherein the button is engaged in recess 43.

In operation, the battery housing 14 is unscrewed from engagement with the threaded portion 31 of socket 23 and batteries 15—15 inserted. When the housing is again screwed on to the remainder of body 12, the battery series upper terminal is spring-biased into contact with the positive terminal of lamp 21 and the lower terminal is in electrical connection with strip 33 through the coil spring 32. The negative lamp terminal is electrically connected through adapter 22 and the socket 23 to the rotatable brush 41, and strip 33 is electrically connected through rivets 37 and spring 38 to the button 39.

Ring 30 is a comparatively large member which may be easily grasped by the fingers, although the instrument is small, and when the ring is rotated to admit button 39 into hole 42 and into contact with the brush 41, the circuit through lamp 21 is completed and illumination is supplied through the fiber bundle 20 to the otoscope head 11.

To turn the instrument off, ring 30 is rotated in the opposite direction until button 38 engages the recess 43 in which the button is separated from any contact with brush 41 or socket 23 by the electrically non-conductive material in slot 43a. Since a substantial manual rotative force is required to cam the button out of the recess, accidental illumination of the lamp is prevented.

Since the ring 30 rotates on the socket 23, these parts may be machined to fit smoothly and the brush 40 engages a broad area of the socket which is, with use, continuously wiped free of any corrosion by the passage of the brush over the socket surface. Moreover, when the

button 38 engages brush 41, the spring bias of button 39 is transmitted also the brush to urge it into good electrical contact with the socket 23.

As will be apparent to those familiar with the art, the invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The embodiment disclosed is, therefore, to be considered in all respects as illustrative rather than restrictive, the scope of the invention being indicated by the appended claims.

What is claimed is:

1. A pocket-sized diagnostic instrument having an elongated body including a hollow housing of electrically non-conductive material, a lamp and battery means connected in series in the housing, a tubular metal lamp socket in the housing electrically connected as one terminal of the lamp-battery series, and a metal spring contact member secured on the housing and electrically connected as the other terminal of the lamp battery series, wherein the improvement comprises: a control ring of nonconductive material rotatably secured on the housing around the socket, the ring having an interiorly opening slot therein, a metal brush element carried in the slot in continual electrical contact with the socket, the ring having a shallow hole therethrough communicating with the slot and having an exterior depression circumferentially spaced from the hole, the spring contact member having a rounded contact button at one end overlying the ring and biased by the member radially inward of the housing, the button being selectively engageable in the hole and the depression by rotating the ring for contacting the brush element in an "on" position and for engagement in the depression in a "locked off" position.

2. The diagnostic instrument switch defined in claim 1 characterized by having a pocket clip secured on the housing, a portion of the clip overlying the spring contact member for shielding the member from accidental distortion.

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