

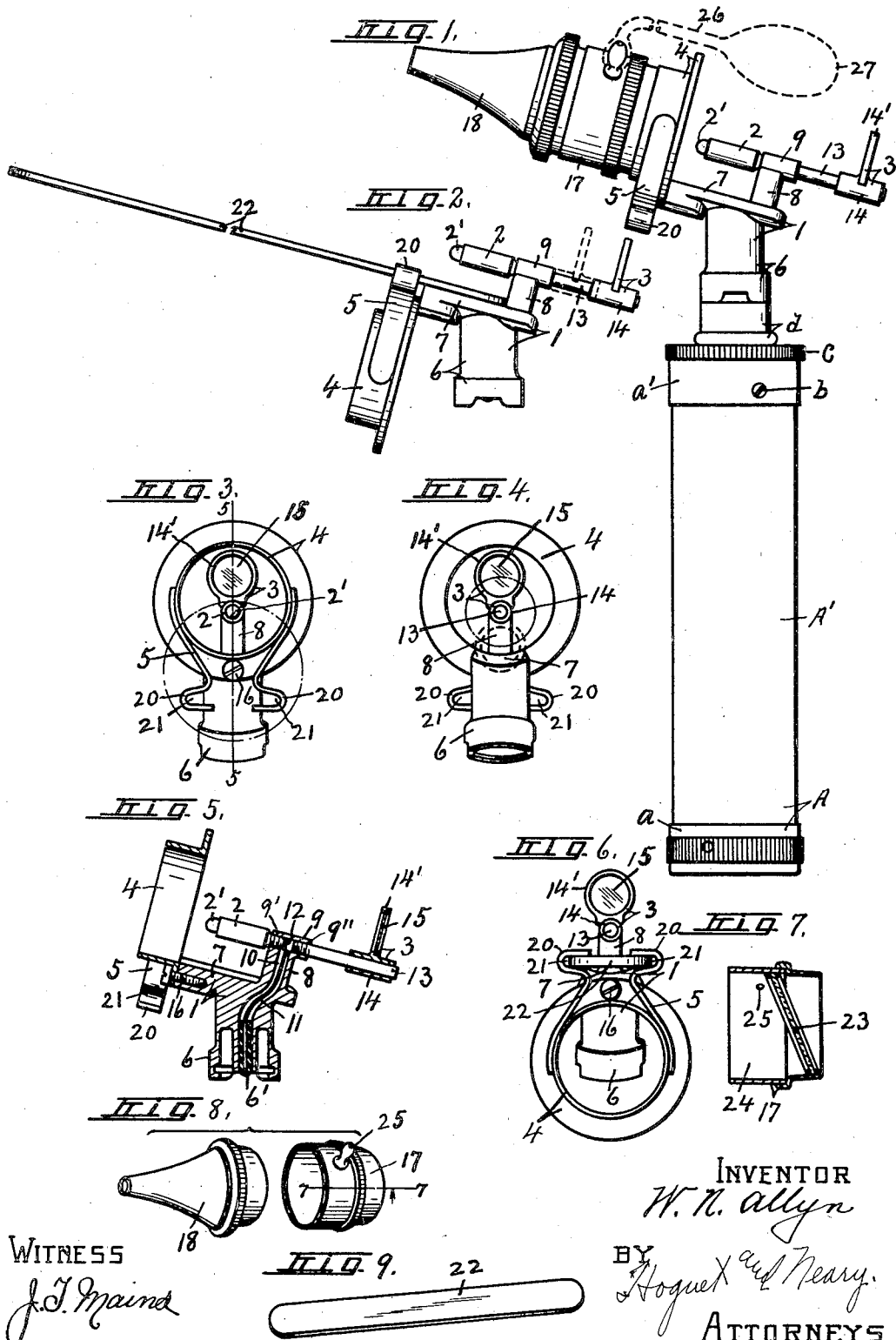
Dec. 10, 1935.

W. N. ALLYN

2,023,945

ENDOSCOPE

Filed Sept. 24, 1934



UNITED STATES PATENT OFFICE

2,023,945

ENDOSCOPE

William N. Allyn, Auburn, N. Y.

Application September 24, 1934, Serial No. 745,191

10 Claims. (Cl. 128—9)

This invention relates to surgical instruments of the class commonly known as endoscopes including otoscopes and analogous implements adapted to be used in the examination, diagnosis and treatment of the ear, nose, mouth and other internal parts of the body.

The main object is to render these operations more convenient, expeditious and reliable than has heretofore been practised and at the same time to enlarge the range of use of a single instrument of this character.

In other words, I have sought to co-ordinate in one and the same instrument:—means for projecting a beam of light along an axis in any direction to the part under examination for illuminating the same; means adjustable lengthwise of and about said axis for focalizing and magnifying the illuminated part without interfering with the vision and treatment of such part; means for concentrating the rays of said beam within a relatively small area or field to reduce the liability of troublesome coronæ; and means for temporarily displacing the fleshy walls of the cavity in which the part to be treated is located, and to arrange all of said means so that they may be used simultaneously, individually or in different combinations at the will of the operator.

Another object is to enable the sight-tube and lamp to be relatively adjusted to different positions transversely of their respective axes or into and out of registration with each other as may be required for different examinations or treatment.

Other objects and uses will be brought out in the following description.

In the drawing:—

Figure 1 is a side elevation of a surgical instrument or endoscope embodying the various features of the invention ready for use except that the spatula is omitted.

Figure 2 is a side elevation of the detached head of the same instrument showing the sight tube in its neutral position with the spatula in place, the extension of the sight tube being removed.

Figures 3 and 4 are respectively, a front end view and a rear end view of the detached head and parts thereon as shown in Figure 1.

Figure 5 is a vertical sectional view taken on line 5—5, Figure 3.

Figure 6 is a front end view of the parts shown in Figure 2.

Figure 7 is a longitudinal sectional view of

the proximal extension of the sight tube with a diagonal window therein.

Figure 8 is a perspective view of the sight tube extensions detached one from the other.

Figure 9 is a perspective view of the detached spatula.

As illustrated, this instrument is adapted to be used in connection with a conventional type of battery-handle A and comprises a head or frame 1 upon which is mounted a lamp-holder 2, a lens-holder 3, and a sight tube 4 carrying a spatula-holder 5, all of which parts are assembled in a manner hereinafter described.

The battery handle is arranged to receive one or more of the usual dry-cells and preferably consists of a metal tube A' and opposite end cap-sections a and a', one of which as a is removably secured to the tube by means of a bayonet-lock joint to permit the removal and replacement of the cells when required.

The cap-section a is provided with the usual spring for maintaining electrical contact between the cells and switch terminals of the lamp-circuit and also for grounding the battery upon the metal handle.

The cap-section a' is fixedly secured to the tube A by means of screws b and serves to receive and support a rheostat-switch which is suitably insulated from the metal handle and is provided with an exposed operating member c co-axial with said handle and preferably of insulating material.

A coupling member d is rigidly secured to the cap-section a' in electrical connection therewith for attachment to a companion coupling member 6 on the frame 1 and serves to receive an axially yielding contact member which is in constant electrical connection with the movable member of the rheostatic switch and forms a part of the lamp circuit.

The battery handle A including the cap sections a and a' and rheostat-switch and the coupling members d and 6 are similar to those shown in my Patent No. 1,516,133 dated November 18th, 1924 and, therefore, it is unnecessary to further illustrate or describe these parts.

The head or frame 1 is preferably made of metal and is provided with the coupling member 6 having the usual internal contact member 6' rigidly secured therein and insulated therefrom for axial engagement with its companion contact member in the coupling member d when the frame 1 is coupled to the battery handle, thus forming a part of the lamp circuit.

A plate 7 is rigidly secured to the outer end

of the coupling member 6 to extend transversely to opposite sides of the axis thereof and at an obtuse angle thereto and is provided at the rear side of said axis with an outwardly projecting hollow post 8 terminating in a tubular hub 9 having its axis substantially parallel with the plane of the plate 7.

The post 8 is provided with an opening 10 leading from the interior of the hub 9 to the interior of the coupling member 6 for receiving an insulated conductor 11 having one end connected to the contact member within said coupling member and its other end connected to another contact member 12 which is yieldingly mounted within the opening 10 to form a part of the lamp circuit.

The opposite ends of the tubular hub 9 are preferably threaded internally to form co-axial sockets 9' and 9'' for receiving respectively the threaded ends of the metal lamp holder 2 and a supporting stem 13 for the lens-holder 3, whereby the lamp holder and stem may be removably secured in their respective sockets in co-axial relation to project in opposite directions from the hub.

The lamp holder 2 extends forwardly from the hub 9 across the axis of the battery handle and is provided with an electric incandescent lamp 2' which together with the holder are of standard construction for instruments of this character in that the infed end of the filament is adapted to engage the contact member 12 while the other end is grounded upon the metal enclosing case or lamp socket to complete the lamp circuit when the switch is closed for projecting a beam of light forwardly along and around the axis of the lamp.

The lens holder 3 comprises a sleeve 14 adjustable axially and angularly upon the rearwardly projecting stem or spindle 13 and is provided with a radially offset bezel 14' in which is mounted a magnifying lens 15 facing in the direction of projection of the beam of light.

It is now clear that the lens may be adjusted at will along and around the axis of the stem 13 for changing its focus or for changing the line of vision to the object or part under examination or it may be moved to one side of said line or entirely removed from the stem when not in use.

The sight tube 4 preferably consists of a metal ring of considerably greater interior diameter than that of the lamp or beam and eccentrically pivoted at 16 to the front end of the plate 7 to swing transversely across the beam of light in a plane direction in front of the lamp so that different portions of its opening may be registered with said beam to allow the latter to illuminate the part under examination leaving ample space around the lamp and beam within the ring for a clear vision of the illuminated part with or without the aid of the magnifying lens.

When using the instrument for the examination of the interior parts of relatively small or deep cavities one or more extension tubes 17 or 18 may be telescopically fitted upon the ring 4 to project forwardly therefrom or both tubes may be telescopically assembled end to end and the rearmost tube fitted upon the ring 4 as shown in Figure 1, the outermost tube being preferably tapered forwardly to more closely concentrate and direct the beam of light upon the part under inspection.

The inner surfaces of the ring 4 and its extensions 17 and 18 are preferably provided with a non-reflective or black coating of any suitable material to assist in preventing excessive coronæ

effects and at the same time further concentrating the beam of light within a relatively small area or field to increase its power of penetration upon the object.

The spatula-holder 5 preferably consists of a pair of opposed spring jaws 20 which are brazed or otherwise secured to the ring 4 at opposite sides of the pivot 16 and are provided with slots 21 having their inner sides open for receiving one end of a forwardly projecting wooden spatula 22 adapted to be used for displacing fleshy parts of a cavity in which the part under examination may be located and thereby to render such part more easily accessible for treatment.

When the sight tube 4 is adjusted to its neutral position, as shown in Figures 2 and 6, the slots 21 in the jaws 20 will be brought into about the same plane as the outer face of the plate 7 so that when the spatula is inserted endwise in said slots its rear end will lie against the plate to cooperate with the jaws in firmly holding the spatula in operative position while permitting its longer forwardly projecting end to yield under pressure upon the part to be temporarily displaced.

As shown in Figure 7, one of the sight tube sections as 17 is provided with an internal transverse partition or closure 23 of plain glass or equivalent transparent material to form an air chamber 24 in which the air is adapted to be temporarily trapped when the front section 18 is inserted into the organ under examination, said section being provided with an air passage 25 which is connected by a flexible tube 26 to a pneumatic hand-bulb 27 whereby the air in the chamber 24 may be pulsated at will for pneumatically massaging the interior yielding parts of said organ, see Figure 1.

The transparent partition is suitably secured within the section 17 in a plane diagonal to and across the axis of said section and, therefore, diagonally across the beam of light to reduce the liability of reflection of the light-rays to the eyes of the operator.

Operation

When the instrument is to be used, the head 1 will first be coupled to the battery handle through the medium of the coupling members 6 and 7. Then, if the battery cells are properly placed within the battery handle A, the latter may be grasped in one hand and held in position for directing the beam of light to the object under treatment whereupon the switch operating member may be manipulated by the same hand to close or open the switch so that when closed the lamp 2' will be energized to project a beam of light through the sight tubes to said object for illuminating the same.

If it is desired to magnify the illuminated object the lens 15 may be adjusted axially to bring the object into proper focus, or it may be adjusted to different angles as may be required for different views of the object or it may be adjusted angularly to a neutral position behind the post 8 or removed from the stem 13 when not required, as shown by dotted lines in Figure 4.

If the spatula 22 is not required, it may be readily withdrawn endwise from the jaws 21 and 70 laid aside or destroyed if necessary to prevent reuse and possible infection of other patients.

It will also be noted that when the sight tube 4 and its extensions 17 and 18 are not needed they may be rocked about the pivot 16 to a neutral

position, as shown in Figure 6, or, if adjusted for use, either of the extensions 17 or 18 may be separately applied to the ring 4.

It is, of course, understood that in case it should become necessary or desirable to treat the affected organ through the sight tube 4, the section 17 containing the partition 23 may be removed and replaced by the section 18 or both sections may be removed so that the remaining section may be used or adjusted to its neutral position at the will of the operator.

This instrument is particularly simple, compact and efficient and has a wide range of uses in the examination and treatment of the ear, nose, mouth and other parts of the body and may be easily and thoroughly sterilized and kept in a sanitary condition without deterioration or injury, but it is evident that various changes may be made in the structural details without departing from the spirit of the invention.

I claim:

1. A surgical instrument comprising a frame, a lamp on the frame arranged to project a beam of light along an axis, and a spatula holder pivotally mounted on the frame to swing about an axis at one side of and parallel with the first axis.

2. An endoscope comprising a frame, a lamp socket mounted on the frame and adapted to project a beam of light along an axis, and a spatula-holder pivotally mounted on the frame to swing about an axis parallel with the axis of the lamp-socket.

3. An endoscope comprising a frame, a lamp mounted on the frame to project a beam of light along an axis and a sight-tube pivotally mounted on the frame to swing about an axis parallel with and at one side of the first axis to and from a position in line with said beam.

4. In a surgical instrument of the character described the combination with a handle and a coupling member adapted to be detachably secured to the handle, of a plate secured to the outer end of the coupling member and provided with an outwardly projecting post, a hub secured to the outer end of the post, a lamp holder secured to one end of the hub, and a sight-tube hinged to said plate to swing to and from a position in front of the lamp-holder.

5. In a surgical instrument of the character described the combination with a handle and a coupling member adapted to be detachably secured to the handle, of a plate secured to the outer end of the coupling member to extend forwardly therefrom and provided with an outwardly projecting post, a hub secured to the outer end of

the post in a plane parallel with the outer face of the plate, a lamp-holder secured to the front end of the hub, and a sight-tube hingedly mounted on the front end of the plate to swing to and from a position across the front end of the lamp-holder.

6. In a surgical instrument of the character described the combination with a handle and a coupling member adapted to be detachably secured to the handle, of a plate secured to the outer end of the coupling member to extend forwardly therefrom and provided with an outwardly projecting post, a hub secured to the outer end of the post in a plane parallel with the outer face of the plate, a lamp-holder secured to the front end of the hub, a spindle secured to the rear end of the hub co-axial with the lamp-holder, a sleeve adjustable along and upon said spindle, a lens mounted on the sleeve, and a sight-tube mounted on the front end of the plate in front of the lamp-holder.

7. A surgical instrument as in claim 6 in which the sleeve with the lens thereon is adjustable about the axis of the spindle.

8. An endoscope comprising in combination, a frame having a forwardly and rearwardly extending plate, a post secured to and projecting outwardly from the plate, a hub secured to the outer end of the post to extend lengthwise of the plate, a lamp mounted on the front end of the hub, a lens-holder mounted on the rear end of the hub, and a sight-tube mounted on the front end of the plate.

9. An endoscope comprising in combination, a frame having a forwardly and rearwardly extending plate, a post secured to and projecting outwardly from the plate, a hub secured to the outer end of the post to extend lengthwise of the plate, a lamp mounted on the front end of the hub, a spindle secured to and projecting rearwardly from the hub, a sleeve movable axially of and angularly upon said spindle, a lens mounted on the sleeve, and a sight-tube hingedly mounted on the front end of the plate to swing about an axis parallel with the spindle to and from a position in front of the lamp.

10. An endoscope comprising a forwardly and rearwardly extending plate, lamp-supporting means mounted on the plate, a lamp carried by said means to project its rays forwardly, a sight-tube hingedly secured to the plate to swing to and from a position in front of the lamp and provided with a spatula holder, and a spatula movable into and out of the holder.

WILLIAM N. ALLYN.