

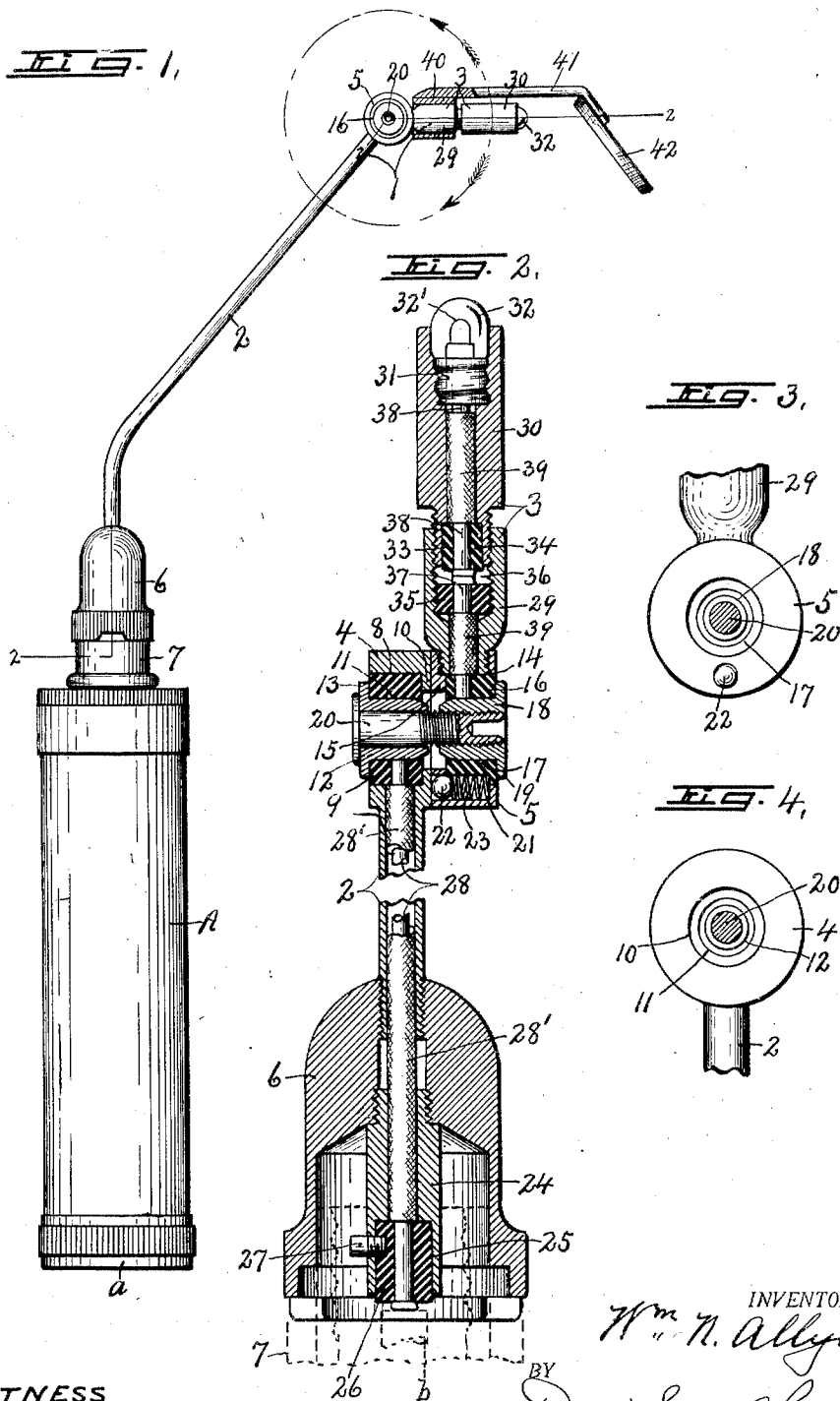
May 14, 1929.

W. N. ALLYN

1,712,865

LIGHT PROJECTING SURGICAL INSTRUMENT

Filed Sept. 19, 1927



WITNESS.
H. Hurst

INVENTOR.
Wm. N. Allyn
BY
Denison & Thompson
ATTORNEYS.

UNITED STATES PATENT OFFICE.

WILLIAM N. ALLYN, OF AUBURN, NEW YORK.

LIGHT PROJECTING SURGICAL INSTRUMENT.

Application filed September 19, 1927. Serial No. 220,460.

This invention relates to a surgical instrument adapted to be used by physicians, surgeons, dentists and in analogous professions for diagnostic purposes and involves the use of a relatively small but powerful electric lamp carried by an articulated arm in such manner that the lamp-supporting member may be adjusted to any angle relatively to its adjacent member as may be most convenient for entrance into various anatomical cavities for thorough examination of the interior and walls thereof.

In devices of this character it is, of course, necessary to use conductors for completing the lamp circuit from the source of supply to the lamp and that these conductors shall be continuous through the joint or joints of the articulated lamp-supporting arm so as to provide the necessary continuous illumination from the lamp.

The members of the articulated arm including the joint and lamp must of necessity be extremely small and free from any possibility of short circuits or leakages, particularly when brought into contact with moistened parts of the anatomy.

The main object of the present invention is to, not only provide for the angular adjustment of the lamp-supporting member to any angle relatively to its adjacent member through the medium of the joint, but also to construct the joint in such manner that its relatively movable parts may form electric conducting parts of the lamp circuit and thereby to maintain a closed circuit through the joint in all positions of adjustment of the lamp-supporting member without extending the feed wire across the axis of the turning joint.

Another object is to connect the articulated lamp-supporting arm with a source of electric energy such as a dry battery mounted within a suitable container which serves as a handle by which the lamp-supporting member of the arm may be manipulated as desired in addition to its independent adjustment to different angles relatively to the axis of the handle and adjacent member of the arm.

A further object is to construct the members of the arm in the form of metal tubes which serve the double purpose of receiving and closing and concealing the feed wire from the battery to the lamp and also as a return conductor of the lamp circuit and at the same time to electrically connect the inclosed sec-

tions of the feed wire to corresponding parts of the coupling joint so as to avoid the extension of the feed wire across the turning axis of said joint while maintaining a closed circuit through the parts of the coupling thereby reducing to a minimum the liability of overstraining or breaking the feed wire sections in both members of the lamp-supporting arm.

Other objects and uses relating to specific parts of the instrument will be brought out in the following description.

In the drawings:—

Figure 1 is a side elevation of a surgical instrument embodying the various features of my invention.

Figure 2 is an enlarged longitudinal sectional view taken on line 2—2, Figure 1.

Figure 3 is an enlarged inner face view of one of the coupling members of the lamp-supporting arm.

Figure 4 is an inner face view of the other coupling member.

As illustrated, the surgical instrument comprises a lamp-supporting arm —1— composed of a plurality of, in this instance two, tubular members —2— and —3— and suitable coupling sections —4— and —5— which are rigidly secured to the adjacent ends of their respective members —2— and —3— to form portions thereof and are coupled together face to face in a manner presently described to permit relative turning movement of said members and coupling sections one upon the other.

The other end of the member —2— is screwed or otherwise secured in a co-axial opening in one end of a coupling section —6— which is detachably connected to a companion coupling section —7— on one end of a battery case —A— which is adapted to contain one or more dry battery cells, not necessary to herein illustrate or describe except that the lower end as —a— of the case is removable to permit the insertion and removal of the dry batteries when desired, it being understood that the bottom section —a— is attached to the main body of the case —A— by means of a bayonet lock connection and is also provided with a spring by which the batteries are pressed upwardly so as to bring the central terminal of the upper cell into contact with one of the electric conductors passing through the head —6— and arm —2—.

The battery case —A— and coupling sec-

tions —6— and —7— are quite similar to that shown in my Patent No. 1,516,133, November 18, 1924.

The present invention may be used in connection with any other suitable source of electric energy for supplying current to the lamp circuit.

As shown more clearly in Figure 2 the outer end of the tubular member —2— is integrally or otherwise secured rigidly to the periphery of the coupling section —4— which latter is provided in its outer end face with an annular recess or socket —8— in which is inserted a cylindrical bushing —9— of insulating material.

This bushing —9— is seated at its inner end against an inner annular flange —10— on the coupling section —4— while its outer end face is substantially flush with the corresponding end face of said section, said bushing being provided with a central opening —11— for receiving a metallic sleeve —12— having its outer end provided with an annular flange —13— seating against the adjacent end face of the bushing —9—.

In like manner the coupling section —5— is provided with an annular recess —14— extending inwardly from its outer end face and forming an inner annular flange —15— which forms a seat for the inner end of a cylindrical bushing —16— of insulating material having its outer end face substantially flush with the adjacent end face of the section —5—.

This bushing —16— is also provided with a central opening —17— for receiving a metallic sleeve —18— similar to the sleeve —12— and having its outer end provided with an annular flange —19— abutting against the outer end face of the bushing —16—.

The central openings in the sleeves —12— and —18— serve to receive a pivotal bolt —20— having its outer end flanged and engaged with the outer end face of the sleeve —12— and its other end threaded and engaged with internal threads in the sleeve —18—.

The bushings —9— and —17— serve to insulate the corresponding sleeves —12— and —18— from their respective coupling sections —4— and —5—, said sleeves —12— and —18— being also spaced apart axially to allow the adjacent faces of the coupling sections —4— and —5— to be drawn tightly into electrical contact with each other by the tightening of the bolt —20— and sleeve nut —18— through the medium of the insulating bushings —9— and —17—.

In order to assure this electrical contact between the coupling sections —4— and —5— the coupling section —5— is provided at one side of its axis with an axially extending socket —21— in which is placed a metallic ball —22— and a coiled spring —23— which latter serves to yieldingly hold the ball con-

tact member —22— into electrical contact with the adjacent end face of the coupling section —4— while the outer end of the spring —23— is in electrical contact with the outer end wall of the socket —21— thereby establishing electrical connection between the coupling sections —4— and —5— in addition to the direct contact of said sections with each other.

The coupling head —6— is provided with a central downwardly projecting internal boss —24— having a socket —25— in its lower end for receiving an insulating bushing —26— which is held in place by a set screw —27—, said insulating bushing —26— being extended below the lower end of the boss —24— so as to prevent electrical contact of said boss with the underlying terminal as —b— as shown by dotted lines in Figure 2.

An electric conductor such as a feed wire —28— extends entirely through the tubular member —2—, boss —24— and insulating bushings —9— and —26— and has its lower end projected below the lower end of the bushing —26— and enlarged for contact with the battery terminal —b— of the battery, not shown, when the coupling head —6— is placed in operative position upon the case —A—.

It is evident, however, that when the coupling head —6— is detached from its companion member —7— the contact of the lower end of the conductor —28— with the battery —b— will be broken thereby breaking the circuit to the lamp hereinafter described.

The portion of the conductor —28— passing through the tubular member —2—, head —6— and boss —24— is insulated from those parts by a covering —28'— of insulating material to prevent leakage of the current to the surrounding metallic parts.

The extreme lower end of the conductor or feed wire —28— is, however, exposed for contact with the terminal —b— to establish electrical connection with the battery.

The upper end of the feed wire —28— is passed through a radial opening in the insulating bushing —9— in the coupling section —4— and contacts with the periphery of the metallic sleeve —12— to establish electrical connection therewith.

The lamp-supporting member —3— of the arm —1— is preferably composed of inner and outer tubular sections —29— and —30— of electric conducting metal, the section —29— being screwed or otherwise secured in an opening in the periphery of the coupling section —5— so as to project radially therefrom.

The inner end of the section —30— is screwed or otherwise removably secured in the outer end of the section —29— and has its outer end provided with a co-axial opening for receiving a lamp socket —31— and an electric incandescent lamp —32— which is re-

movably secured in the lamp socket —31— in any well-known manner but is partially inclosed by the outer end of the section —30— for protection against breakage.

5 The inner end of the section —30— is provided with a socket —33— in which is seated a bushing —34— of insulating material.

A similar bushing —35— of insulating material is secured in a socket —36— in the outer end of the section —29— in axially spaced relation relatively to the bushing —34—.

15 Separate electric conductors —37— and —38— are arranged lengthwise within and inclosed by their respective arm sections —29— and —30— and are insulated therefrom by covers —39— of insulating material.

The inner ends of the conducting wire section —37— is passed through a radial opening in the insulating section —19— to contact with the periphery of the adjacent sleeve —18— while the outer end of the same wire section extends slightly beyond the corresponding end of the insulating bushing —35— for electrical contact with the adjacent end of the opposed co-axial wire section —38— which also extends slightly beyond the inner end of the bushing —39—.

30 The outer end of the wire section —38— is electrically connected to one side of the filament —32'— of the lamp —32—.

The other side of said filament —32'— is electrically connected to the metallic portion of the lamp socket —31— which, in turn, is in electrical connection with the metallic section —30—.

40 The metallic sections —29— and —30— are in electrical connection with each other and with the coupling section —5— which in turn is in electrical connection with the coupling section —4— and thence through the tubular member —2— and head —6— with the metallic battery case —A— and thence through said case to the metallic shell of the battery in a manner well understood by those skilled in the art and as illustrated in my patent previously referred to.

55 The arm section —3— may be turned to any angle about the axis of the pivotal bolt —20— as indicated by the dotted circle in Figure 1 as may be required for various diagnostic purposes and, by mounting the arm —1— directly upon the battery case in the manner described, it is evident that the lamp-supporting member may be turned laterally in any direction as may be required in various operations.

Operation.

60 When the various parts of the instrument are assembled in the manner shown in Figure 1 the current from the battery will pass through the wires —28— parts —12—, —18— and —20— and wires —37— and —38— to one side of the lamp filament and re-

turn through the metallic parts —31—, —30—, —29—, —5—, —4—, —2— and —6— to the battery case —A— and thence to the other pole of the battery through the metallic shell of the battery which is then in electrical connection with the metallic case or handle —A—.

70 It is also evident from the foregoing description that when the members —2— and —3— of the arm —1— are turned one upon the other the electrical connection through the coupling connecting said sections will be maintained by the contact of the adjacent ends of the metal sections —4— and —5— and also by the ball contact —22— with the adjacent face of the section —4— thereby avoiding the necessity of carrying the feed wire for the lamp circuit across the turning axis which not only avoids breakages of the feed wire and resultant short circuits but also assures a uniform light without overstraining any of the parts of the instrument when the lamp-supporting member is adjusted to various angles.

90 When no current is required the lamp —32— may be removed from its socket —31— or the section —30— may be loosened or removed from its companion section —29— by simply un-screwing it and thereby breaking electrical contact between the adjacent ends of the wire sections —38— and —37—.

Or, if desired, the entire arm —1— may be disconnected from the battery case by simply uncoupling the section —6— from its companion section —7—.

What I claim is:—

1. In a light-projecting surgical instrument, tubular members pivotally connected for relative turning movement one upon the other and having their pivoted ends provided with cooperative electric contacts engaging each other in all positions of relative adjustment, an electric lamp on one of the members and separate electric conductors within said tubular members and electrically connected to their respective contacts, said conductors and contacts forming parts of the lamp-circuit.

2. In a light projecting instrument of the character described, an articulated lamp-supporting arm having coupling members at the joint pivotally connected for relative turning movement one upon the other and provided with electric contacts engaging each other in all positions of adjustment, said contacts forming parts of the lamp-circuit.

3. In a light projecting instrument of the character described, an articulated lamp-supporting arm comprising tubular members having coupling sections pivoted to each other to permit relative adjustment of said members to different angles about the axis of the pivot, said tubular members and coupling sections being made of electric conducting material and forming part of the lamp-circuit.

cuit, the coupling members being provided with cooperative electric contacts engaging each other in all positions of relative adjustment of said members, and separate electric
5 conductors within the tubular members and electrically connected to the contacts of their respective coupling sections and forming parts of the lamp-circuit.

4. In a light projecting instrument of the
10 character described, an articulated lamp-supporting arm comprising tubular members of electric conducting material having coupling sections pivotally connected to each other for relative turning movement about the axis of
15 the pivot and provided with cooperative contacts in electrical connection with the tubular members, and separate electric conductors within and insulated from the tubular members and electrically connected to the con-
20 tacts of their respective coupling sections.

5. A light projecting instrument as in claim 4 in which one of the cooperative contacts are yieldingly held in engagement with the other contact.

6. A light projecting instrument as in
25 claim 4 in which one of the tubular members is provided with a detachable lamp-supporting section.

7. A light projecting instrument as in
30 claim 4 in which one of the tubular members is made of separable parts, having separable conductors therein adapted to make contact with each other when the parts are connected and to break said contact when the parts are
35 separated, one of the parts having means for supporting a lamp thereon.

In witness whereof I have hereunto set my hand this 13th day of September 1927.

WILLIAM N. ALLYN.