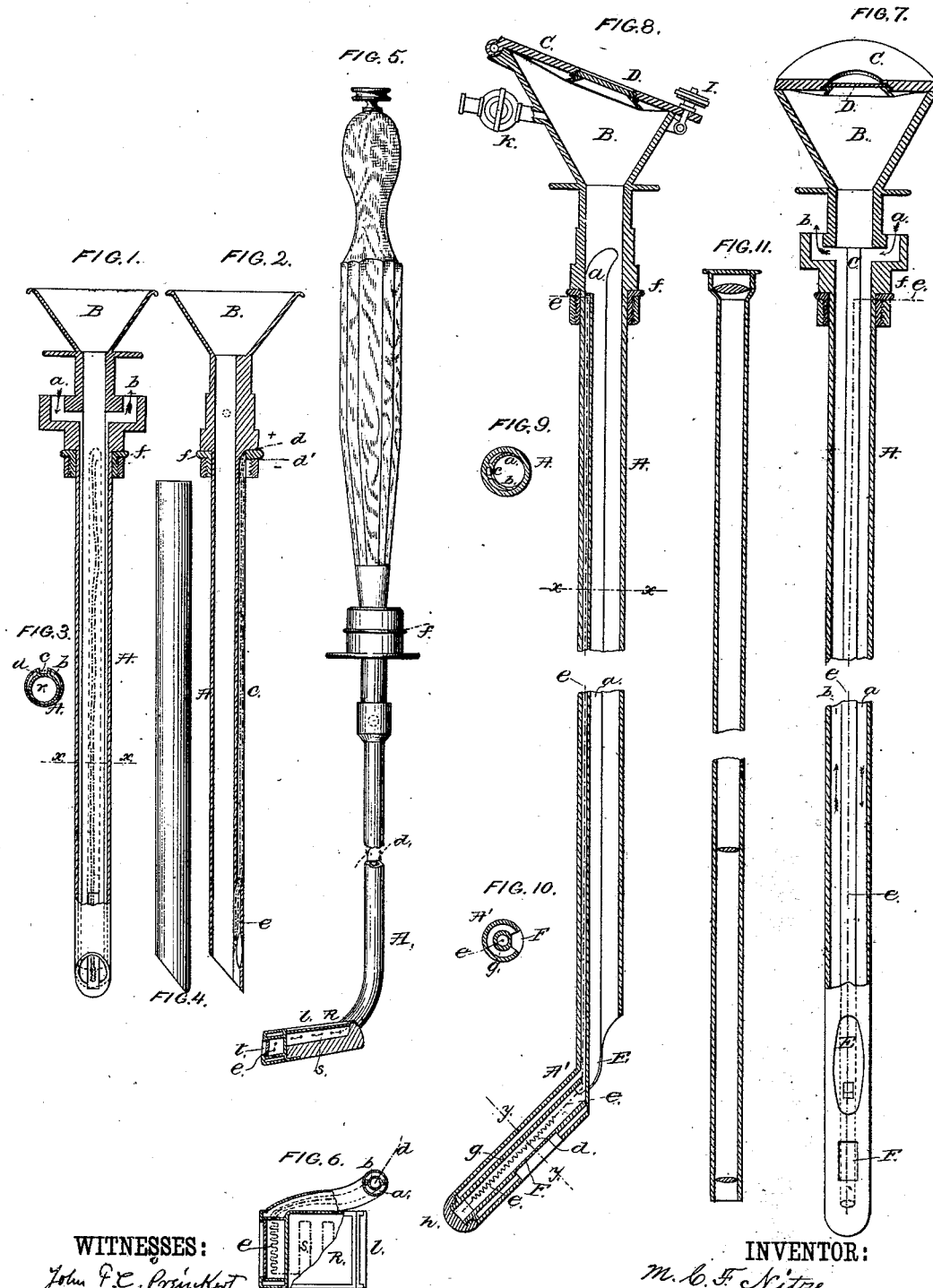


M. C. F. NITZE.  
Application of Electric Light to a Speculum.  
No. 218,055.  
Patented July 29, 1879.



WITNESSES:  
John F. C. Prinkert  
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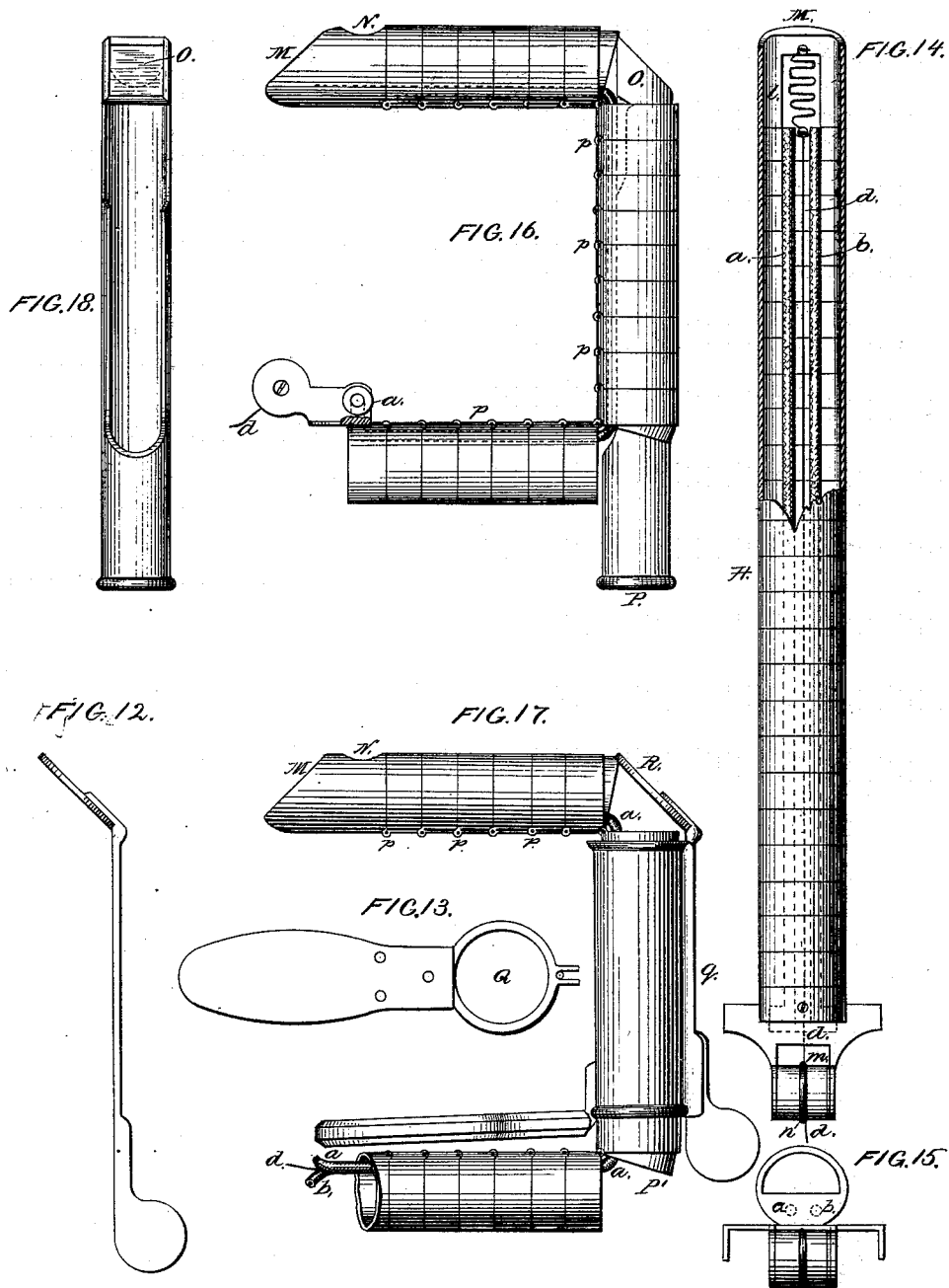
INVENTOR:  
M. C. F. Nitze  
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ATTORNEYS.

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INVENTOR:

M. G. F. Nitzze

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# UNITED STATES PATENT OFFICE.

MAXIMILIAN C. F. NITZE, OF DRESDEN, SAXONY, ASSIGNOR TO JOSEPH LEITER, OF VIENNA, AUSTRIA.

## IMPROVEMENT IN APPLICATION OF ELECTRIC LIGHT TO A SPECULUM.

Specification forming part of Letters Patent No. **218,055**, dated July 29, 1879; application filed April 21, 1879.

### *To all whom it may concern:*

Be it known that I, Dr. MAXIMILIAN CHARLES FREDERIC NITZE, of Dresden, Kingdom of Saxony, at present in Vienna, Empire of Austria, have invented a new and useful Improvement in Instruments for Illuminating and Examining Internal Parts or Cavities of the Human or Animal Body, which is fully set forth and described in the following specification.

The object of this invention is to provide a means for direct illumination and examination of internal parts or cavities of the human or animal body, as the urethra, the urinary bladder, the larynx, the esophagus, the stomach, the uterus, the outer auditory passage, &c.

By the methods hitherto employed for similar purposes, cavities of the human or animal body are illuminated by means of reflectors throwing light, from an exterior source, into the hollow part or cavity, or the part of the body to be examined is made transparent by any sufficiently strong source of light, suitably arranged behind the part of the body, which in this wise is made suited for ocular examination, but very rarely with a satisfactory result.

The method hereinafter described, and the instruments constructed according to this method afford the possibility of introducing the source of light into the internal parts or cavities themselves for examining the so-illuminated part directly, or its reflected image. Lenses or lens systems for enlarging the field of view may be employed in combination with my instruments.

The source of light which I employ in all my instruments consists in a platinum wire made incandescent by an electric current. The white heat of the said wire is taken up and made harmless by means of a cold-water current flowing along the circuit-wire. It is evident that, instead of platinum wire, carbon or any other material of the required electric resistance may be employed.

The accompanying drawings show the arrangement and construction of several of my examining-instruments, which, of course, vary in their form according to the anatomical structure of the part of the body to be examined; but their construction is always based on the

same principle—viz., rendering possible the direct (not transparent) illumination of the part to be examined by electric light, and the direct or indirect examination of the part lighted up in this wise.

Those skilled in the art will understand that, according to the same principle, besides the instruments shown in the drawings, also instruments fitted or suited for other parts of the human or animal body may be constructed, or that the instruments shown can be varied or modified in details or in their form and size without, however, departing from the substance of this invention.

In all figures of the said drawings the same letters of reference denote corresponding or similar parts.

Sheet 1, Figure 1, is a longitudinal section, showing the arrangement and construction of a urethroscope, or an instrument for illuminating and examining the urethra. Fig. 2 is a section through the same at right angles to Fig. 1; Fig. 3, a cross-section through the line *xx* in Fig. 1.

The urethroscope consists of a tube, *A*, one end of which is cut oblique, the other end forming a funnel, *B*. Inside of this tube *A* another small tube, *r*, is fixed eccentrically, as shown in cross-section in Fig. 3. The outer tube, *A*, is provided with a groove, *c*, so that the crescent-shaped space between both tubes *A* and *r* is divided into two small channels, *a* and *b*, which communicate at the lower end of the instrument with each other, and serve as water-conduit pipes, water being allowed to enter at *a*, and so escape at *b*, or vice versa. The groove *c* contains the insulated circuit-wire *d*, which connects with the platinum wire *e*, forming a loop, the other end of which is in connection with the metal tube *A* itself, or with another insulated wire, *d'*, as shown in the drawings. *f* is a ferrule of insulating material, insulating the free ends of the circuit-wire from the metal body of the instrument. For use these free ends will be each connected with a pole of the electric apparatus. If the body of the instrument itself forms a part of the circuit, then one pole is to be connected with the end of the wire near *f*, while the other pole may be brought in contact with any point of the metal instrument to close the circuit.

Fig. 4 represents a tube which is to be pushed or slid over the tube A, and whose thickness must correspond to the diameter of the urethra.

With this instrument introduced into the urethra maladies of the latter can, in consequence of the intense but harmless illumination, not only be exactly examined, but by the peculiar construction of the instrument it is also possible to treat such maladies by cauterization or injection, which can be easily effected through the hollow tube A.

Sheet 1, Fig. 7 is a longitudinal section of an electric illuminator for illuminating and examining the urinary bladder. Fig. 8 is a section at right angles to Fig. 7. Fig. 9 is a cross-section through the line *x x*. Fig. 10 is a cross-section through the line *y y*, and Fig. 11 is a small perspective tube, which, if required, may be introduced into the tube of this instrument. The latter resembles substantially the before-described urethroscope. *a b* are the water-conduit pipes. *c* is the insulated tube for the metal wire *e*. *d* is the platinum spiral; B, the funnel-shaped enlargement. The small pipe *a b c* is fixed inside the tube A, which is bent as all bladder-examining instruments are, and is provided at the point of curvature with an opening, E. A plate, F, of glass, or any other suitable material, is inserted into the bent part of the tube, through which the incandescent platinum wire throws its light as soon as the circuit is closed.

The water-conduits *a b* of the tube A communicate with the half-annular space, Fig. 10, which space is formed in the bent part of the tube A' by an inner tube, *g*, concentrically arranged within the same. The water in flowing through this annular space absorbs the heat evolved from the platinum wire *d*.

If a larger field of view is desired to be overlooked at once, the optic apparatus shown in Fig. 11, or its equivalent, may be introduced into the tube A.

Sheet 1, Fig. 5 represent the electric laryngoscope. Fig. 6 is a front view of the same, partly in section.

The bent pipe A carries at one end a case, *l*, through which the two small water-conduit pipes *a* and *b* communicate with each other. Within the case *l*, in its lowest part, is arranged the platinum wire *e*, one end of which is in metallic contact with the insulated circuit-wire *d*, while the other end is connected with an insulated wire, *s*, of German silver, or of any other suitable material, which is at one end in metallic contact with the case *l* itself. R is a plain mirror reflecting the image of the illuminated part of the larynx toward the eye of the examiner. *t* is an opening covered by a glass, through which the light of the incandescent platinum wire is shown. The object of the German-silver wire *s* is to heat the mirror R, which is cooled by the water-current, so that the mirror is prevented

from being clouded by the condensations of the breath.

Sheet 2, Figs. 14 to 20 represent the instrument for illuminating and examining the esophagus and the stomach. Fig. 14 is a top view, partly in section. Fig. 15 is a rear end view. Fig. 16 shows the instrument when used in combination with the prism, Fig. 18. Fig. 17 shows the instrument when used in combination with mirror-holder, Fig. 13, and the mirror, Fig. 12.

The instrument for illuminating and examining the esophagus consists of a flexible articulated metal tube, A, inside which are arranged the water-pipes *a b* and the insulated circuit-wire *d*. *l* is the water-casing, through which the pipes *a* and *b* communicate with each other. The platinum wire *e* lies in a recess of the water-casing *l*, and is connected in the same manner as in the before-described instruments at one end with the metal body of the tube A, while its other end is in metallic connection with the insulated circuit-wire *d*. The second end of this latter leaves the instrument near *m*, and is insulated from the metal body of the instrument by the two disks *n* and *o*, and is for use put in connection with one pole of the electric apparatus, the other pole of which is connected with the metal tube itself.

The water-pipes *a b* may be made of india-rubber or any of other suitable material. The tube A is composed of metal rings hinged together at *p p p*. The tube is open at the lower end, M, and cut oblique.

For examining the esophagus or the ground of the stomach the flexible tube A is introduced through the mouth, and when arrived at the desired depth it is brought into the position shown in Fig. 16. The light evolved from the incandescent platinum wire *e* escapes through the openings M and N, and illuminates the part to be examined.

For observing the image the prism O, Figs. 16 and 18, is pushed into the tube A, whereby the image is reflected into the eye of the examiner at P; or the tube Q, Figs. 17 and 13, may be used, which for this purpose is pushed over the tube A, as shown. The said tube Q is provided with a groove, *g*, into which the mirror R, Figs. 17 and 12, is placed. The mirror-plane is inclined, and forms, with the axis of the tube, an angle of forty-five degrees, so that the beams of light falling on the mirror-plane are reflected at an angle of ninety degrees and reach the eye at P'.

For examining the side walls of the stomach a mirror, (not shown,) forming an angle of forty-five degrees with the axis of the tube A, may be arranged on the lower end of the said tube, by which mirror the image will be reflected upon the above-mentioned mirror R or upon the prism Q. To enlarge the field of view—that is, to enable the examiner to overlook at once a larger part of the stomach-walls—an optic apparatus may be inserted into the flexible tube A.

What I claim is—

1. An instrument for illuminating and examining the internal parts or cavities of the human or animal body, which consists of the following combination of parts: a tube suitably constructed for insertion into said cavity, an electric circuit extending along the tube, and a platinum wire, or its equivalent, made capable of incandescence by the electric current, and located in the tube, as described, so as to illuminate directly the parts to be examined, substantially as herein shown and described.

2. An instrument for illuminating and examining the internal parts or cavities of the human or animal body, which consists of a tube suitably constructed for insertion into said cavity, an electric circuit extending along the tube, and a platinum wire, or its equivalent, capable of being made incandescent by electric current, and located in the tube so as to illuminate the part direct, and a water-conduit extending to the said incandescent wire, for the purpose of admitting a current of water to remove the heat of the incandescent wire, all combined substantially as shown and described.

3. An instrument for illuminating and ex-

amining the internal parts or cavities of the human or animal body, consisting of a tube suitably constructed for insertion into said cavity, an electric circuit extending along the tube, and a platinum wire, or its equivalent, capable of being made incandescent by the electric current, and located in the tube so as to illuminate the part directly, and a mirror for reflecting the image into the range of vision of the operator, all combined substantially as shown and described.

4. An instrument for illuminating and examining the internal parts or cavities of the human or animal body, which consists of a tube suitably constructed for insertion into said cavity, an electric circuit extending along the tube, and a platinum wire capable of being made incandescent by the electric current, a water-conduit, and an opening or reflecting-surface located at or near the inner end of the tube, all combined substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

Dr. MAXIMILIAN CHARLES FREDERIC NITZE.

Witnesses:

HENRY PALM,  
ANTON COFFMANN.