No. 724,046. PATENTED MAR. 31, 1903.

F. E. SAMPSON.

INSTRUMENT FOR THE INTUBATION OF THE LARYNX.

APPLICATION FILED AUG. 15, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1

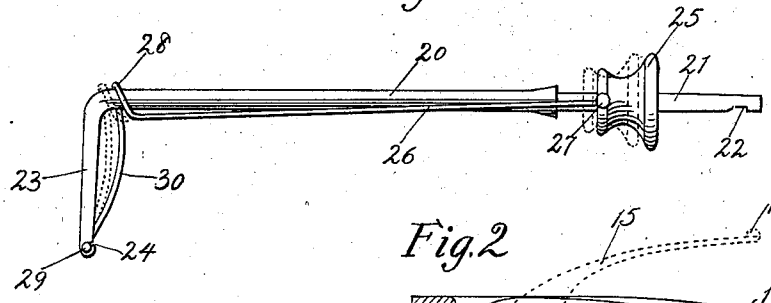



Fig. 2

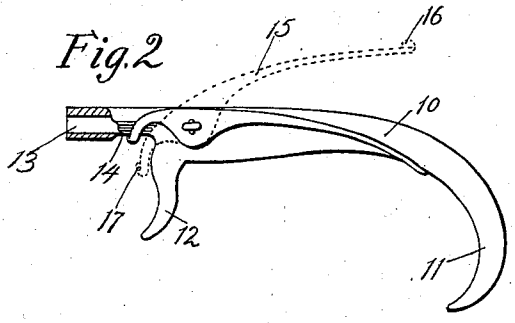



Fig. 3

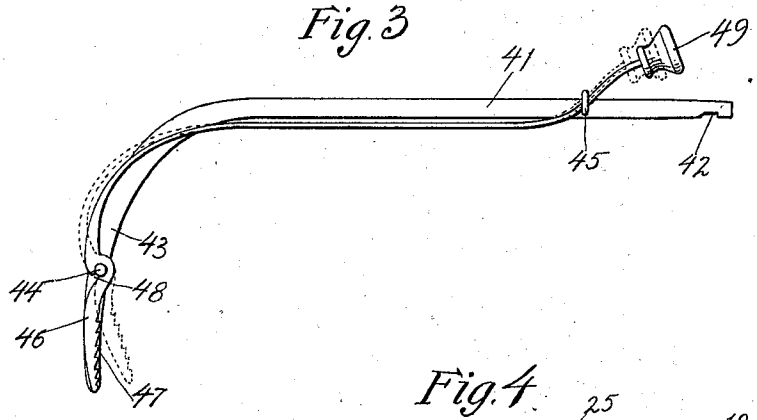
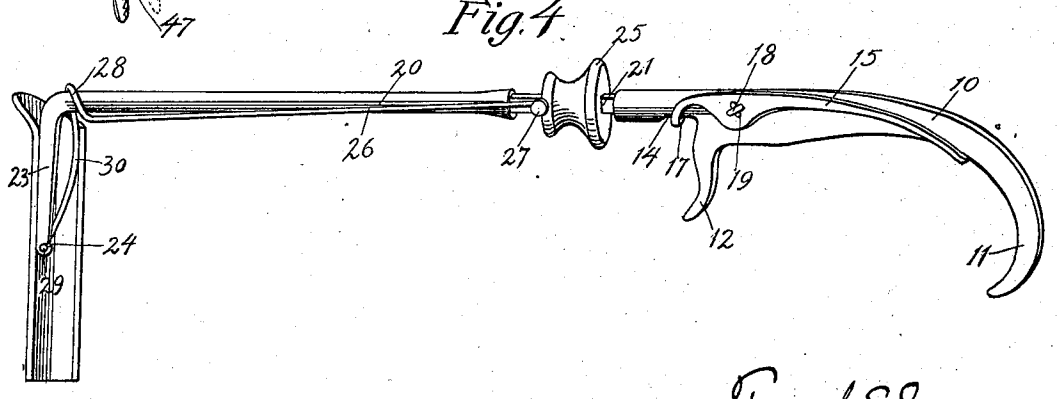



Fig. 4




Witnesses.

Geo. F. White

L. H. Orwig

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by Orwig & Lane Attorneys

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Fig. 5

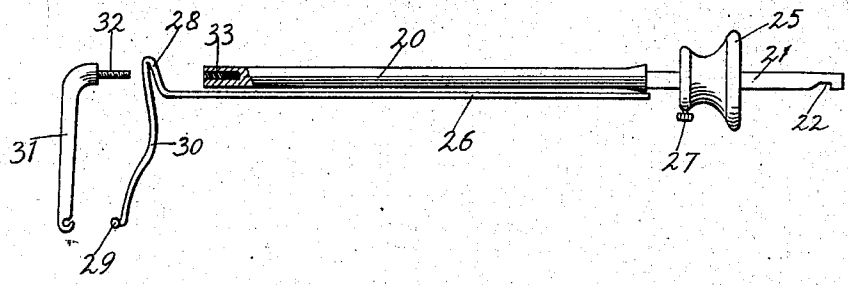



Fig. 6

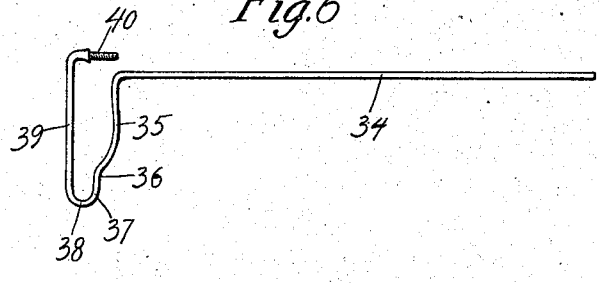



Fig. 7

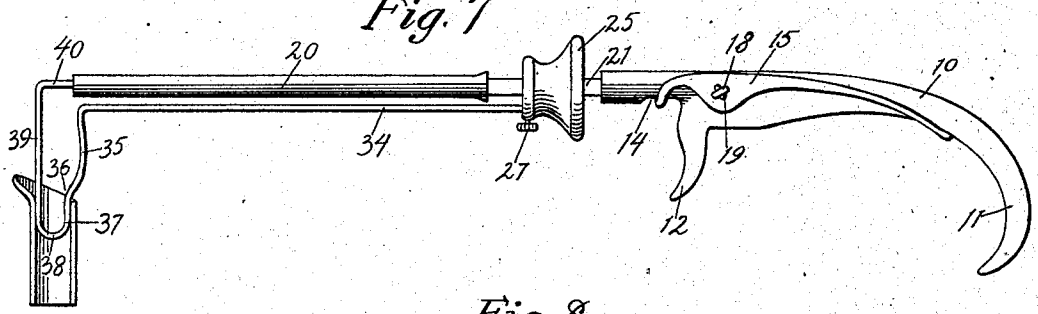
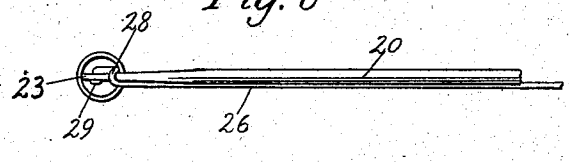



Fig. 8




Witnesses.
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# UNITED STATES PATENT OFFICE.

FRANK ERNEST SAMPSON, OF CRESTON, IOWA.

## INSTRUMENT FOR INTUBATION OF THE LARYNX.

SPECIFICATION forming part of Letters Patent No. 724,046, dated March 31, 1903.

Application filed August 15, 1902. Serial No. 119,817. (No model.)

*To all whom it may concern:*

Be it known that I, FRANK ERNEST SAMPSON, a citizen of the United States, residing at Creston, in the county of Union and State of Iowa, have invented a certain new and useful Instrument for Intubation of the Larynx, of which the following is a specification.

The surgical operation known as the "intubation of the larynx" consists in placing by way of the mouth an especially-designed tube in the larynx for the purpose of preventing death by suffocation when the larynx is obstructed by a swelling or false membrane. The great majority of patients requiring this operation are children, and the operation is attended with much difficulty when performed on infants on account of the small size of the structures through which the instrument and tube must be introduced. Furthermore, in performing the operation on adult patients it is sometimes necessary to use a tube of comparatively great length. Hence it is of prime importance that the instrument itself occupies the smallest possible space within the patient's mouth.

The objects of my invention are to provide an instrument of this class of simple, strong, durable, and inexpensive construction in which the parts may be readily, quickly, and easily taken apart to be cleaned or for the substitution of new parts.

A further object is to provide an instrument of this class adapted to firmly engage and hold intubation-tubes having different-sized openings, to provide an instrument occupying a minimum of space within the patient's mouth, and to provide a tube engaging and releasing device in which the parts that project through between the patient's teeth will occupy a minimum of space and will not be expanded at this point when operated to release from the tube, so the handle may be placed at any desirable position relative to the patient's teeth and may be operated to release the tube when in any position without being interfered with by the teeth.

A further object is to provide an instrument of this class occupying only a small part of the opening through a tube, so that the patient may be able to breathe through the tube as soon as it is placed in position and before the instrument is withdrawn, so that if difficulty or delay is met in "seating" the tube the patient may freely breathe while this is being done.

A further object is to provide an attachment for the instrument for the purpose of removing intubation-tubes, which attachment is simple, durable, and inexpensive in construction, composed of parts that may be readily and quickly operated and which is adaptable to tubes of any size or shape and also to patients of all ages and sizes.

My invention consists in certain details in the construction, arrangement, and combination of the various parts of the device whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims, and illustrated in the accompanying drawings, in which—

Figure 1 shows a side view of the tube-introducing attachment and by dotted lines showing the position that the movable member would assume when forced to position for detaching the instrument from the tube. Fig. 2 shows a side view of the instrument-handle, showing by dotted lines the position of the locking-lever when unlocked. Fig. 3 shows a side view of the extracting attachment and also showing by dotted lines the position of the movable member set to engage a tube. Fig. 4 shows in perspective the complete introducing instrument in position in engagement with a tube, being illustrated in sections. Fig. 5 shows a side view of a modified form of the introducing instrument, the detachable end of the body portion of the instrument being separated slightly from the body portion. Fig. 6 shows a side view of another modification susceptible of detachable connection with the body portion of the introducing instrument illustrated in Fig. 5. Fig. 7 shows a side view of the complete introducing instrument, the movable member being the same as illustrated in the modified form of Fig. 6, and also showing a short tube engaged by the said introducing instrument, the tube being shown in sections; and Fig. 8 shows a top view of the end portion of the form of introducing instrument illustrated in Fig. 1 in position engaging a tube, illustrating the feature by which the tube may be firmly held without obstructing a passageway through it.

Referring to the accompanying drawings, I have used the reference-numeral 10 to indicate the body portion of the handle. At the rear of the body portion is a downwardly-inclined projection 11, and at the front end portion of the handle is another downwardly-inclined portion 12, these parts being so shaped as to be conveniently and easily grasped in an operator's hand. At the extreme front end of the handle is an angular opening 13, and intersecting the opening 13 is an opening 14 in the bottom of the front extension of the handle. Pivoted to the body portion of the front extension of the handle is a spring-lever 15, having a laterally-extended arm 16 at its rear end, susceptible of passing over the body portion of the handle to the position shown in Fig. 2. At the other end of the spring-lever is a laterally-projecting arm 17, susceptible of entering the opening 13 when the rear end of the spring-lever is hooked under the body portion of the handle. The spring-lever is secured to the handle 10 by means of a pin 18, passed through the handle and lever and held in position by means of a small pin 19, passed through an opening in its end, whereby the parts may readily be detached to be cleaned.

The introducing instrument (illustrated in Figs. 1 and 4) comprises a straight round body portion 20, having at one end an angular shank 21, provided with a notch 22. The said shank 21 is designed to enter the opening 13, and the notch 22 is designed to be engaged by the end 17 of the spring-lever 15. The forward end of the body portion 22 is inclined downwardly at 23, substantially at right angles to the part 20, and this part 23 is flattened and tapered slightly toward its lower end, and in its lower end is a notch 24, for purposes hereinafter made clear. Slidingly mounted upon the angular portion 21 is a knob 25, and detachably connected with the knob is a spring-wire, forming one member of the introducing instrument. This wire comprises a straight body portion 26, detachably secured to the knob 25 by means of the set-screw 27 and extended to a point near the downturned end of the body 20. At this point a loop 28 is formed in the wire to pass upwardly over the body portion 20 and then downwardly on the opposite side thereof, and the extreme lower end of the wire is bent laterally at its end at 29. This end 29 is shaped to enter the notch 24 in the end 23, and the wire between the part 28 and the end 29 is bowed rearwardly at 30. The resiliency of this wire causes the rearwardly-bowed portion 30 to normally stand at its limit of movement away from the part 23, and hence in order to bring the parts 23 and 30 toward each other it is necessary for the operator to push the knob 25 forwardly on the shank 21. In practical use with this form of introducing instrument it is obvious that the introducer may be quickly and easily attached to or detached from the handle and when attached will be firmly held by the spring-lever. The instrument may readily be inserted in a tube by placing the knob 25 forwardly until the movable member is close enough to the stationary member to enter the upper end of an intubation-tube. Then the knob to which the movable member is attached will cause the instrument to firmly engage the interior of the tube, as shown in Fig. 4. The movable member of the instrument may readily and easily be detached therefrom by simply unscrewing the set-screw 27 and drawing the rear end of the movable member forwardly and upwardly and then unhooking the end 29 from the notch 24. Hence if at any time the bowed portion 30 of the movable member does not engage the tube with sufficient resistance the movable member may be detached and bent to such shape that it will effectually hold the tube in position.

The instrument is of course used for tubes of various sizes, and I prefer to have on hand a number of movable members with their bowed portions shaped or curved to positions that will adapt them to tubes of various sizes, and these parts are interchangeably used when tubes of different sizes are used.

In the modification illustrated in Fig. 5 I have shown the forward end of the stationary member detachably connected with the body portion thereof. This forward end is indicated by the reference-numeral 31. This part 31 has an integral screw-threaded part 32 to hold a screw-threaded opening 33 in the end of the body portion 20, and by this means the same body portion 20 may be used and different end portions 31 of various lengths may readily be substituted.

In performing the operation of intubation it is frequently necessary to employ a comparatively short tube and to place the tube into the larynx. For this purpose I have provided an attachment (shown in Fig. 6) which is made of a single piece of spring-wire comprising the body portion 34, which is straight, and its rear end is adapted to be detachably held in the knob 25 by means of the set-screw 27. At the forward end of the part 34 the wire is inclined straight downwardly at 35 and forwardly and downwardly at 36 to form a shoulder. Then beneath the shoulder 36 is a bowed or arched portion 37, at the lower end of which the wire inclines forwardly at 38, then straight upwardly at 39 to a point above the part 34, and then straight rearwardly at 40, this rearwardly-projecting end being screw-threaded and designed to enter the screw-threaded opening 33 in the body portion 20. (Illustrated in Fig. 5.) In practical operation with this portion of the instrument I insert the wires into the top of the tube until the tube engages the shoulder 36, as shown in Fig. 7. Then by removing pressure from the knob 25 the resiliency of the spring will force the bowed portion 37 and the straight portion 39 away from each other, so that they will bind against

the interior of the intubation-tube, thus firmly supporting the tube on the end of the instrument. In detaching the instrument from the tube it is only necessary to force the knob 25 forwardly until the bowed portion 37 is withdrawn from engagement with the tube.

In this connection, it should be remembered that it is necessary to use intubation-tubes of a given length and that in many instances the space within the patient's mouth and throat is so limited that there is just barely enough room to introduce the tube itself; hence the necessity for providing an introducing instrument that will have its tube-engaging members contained almost wholly within the tube, so that when the lower end of the tube is introduced in the larynx the introducing instrument will not strike upon the roof of the patient's mouth. Furthermore, in instruments of this class, where the tube-engaging members are operated to engage or release the tube by means of handles, they move to and from each other. The movement of the handles is often limited by the patient's teeth. Hence sometimes difficulty is found in disengaging the introducing instrument from the tube after the tube has been properly seated, because the movable handles could not be separated widely enough to permit the movable tube-engaging members to disengage. For this reason I have provided an instrument in which the movable tube-engaging member may be operated to its limit by simply moving the notch 25 longitudinally on the handle, so that after the instrument is introduced and the tube properly seated no additional room between the patient's teeth is necessary in order to work the movable member as required in detaching from the tube.

In Fig. 3 I have illustrated the attachment to my instrument for extracting intubation-tubes. This attachment comprises a straight body portion 41, having a squared shank at its rear end provided with a notch 42, the shank being adapted to enter the opening 13 of the handle and the notch 42 to be engaged by the spring-lever. The forward end of the body portion 41 is curved forwardly and downwardly at 43, and at some distance from its forward end is a pin 44, and secured to the body portion 41 near its rear end is a metal loop 45. The movable member of the extracting instrument is made of spring-wire, having its forward end flattened at 46 and shaped substantially the same as the lower end of the part 43. The rear edge thereof is toothed at 47, and a notch 48 is formed in the front edge thereof above the said teeth. From this point the wire extends upwardly and rearwardly and passes through the loop 45 and is provided with a knob 49 at its rear end. This knob is positioned relative to the handle, so that the operator may readily press upon it with his finger, thus forcing the body portion of the wire forwardly and causing the pin 44 to serve as a pivot, so that the lower end 46 of the wire moves rearwardly, as shown by dotted lines in Fig. 3, and the teeth on this rear end will then engage the interior of a tube and will be firmly held against it by the pressure of the operator's finger upon the knob 45, so that the tube may be inserted and withdrawn from the patient's larynx, and when pressure upon the knob 45 is removed the resiliency of the spring obviously operates to return the movable jaw to its starting position, thereby releasing its hold upon the tube. In use it frequently happens that the shapes of the patients' mouths and throats differ so widely that an extracting instrument of any given shape would not adapt itself to all cases. For this reason I preferably make the body portion 41 of short length, the outer end of which is of some metal that may easily be bent to any desired shape, and obviously the movable member of my device will work equally well, no matter how much the body portion 41 has been bent from its original position.

By thus providing an instrument for practicing the operation of intubation the instrument is composed of a number of parts, all of which are small, durable, and capable of attachment to the same handle. I have produced an instrument that may easily be contained in a pocket-case of very small dimensions, so that a practicing physician may conveniently carry it with him at all times and be ready for any emergency.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States therefor, is—

1. In an instrument of the class described, the combination of a handle, a stationary, tube-gripping, member disposed at an angle relative to the handle, a movable, tube-gripping, member connected with the stationary one, a knob movable longitudinally of the handle, a spring-wire connected with the knob extended parallel with the handle curved to about the angle of the stationary gripping member and fixed to the movable gripping member and exerting its resiliency to operate the movable gripping member in one direction.

2. In an instrument of the class described, the combination of a body portion, a part extending substantially at right angles to the body portion, a knob slidingly connected with the body portion, and a spring-wire connected with the knob at one end, extended substantially parallel with the body portion and connected with the forward end of the body portion and so shaped that the resiliency of the spring will tend to force the forward end of the spring-wire away from the outer end of the stationary member, and a movement of the knob toward the outer end of the stationary member will bring the forward end portion of the spring-wire toward the forward end portion of the stationary member.

3. In an instrument of the class described, the combination of a stationary body portion,

having a rigid extension at its forward end substantially at right angles to the body portion, a knob slidingly mounted on the body portion, and a spring-wire connected at one end with the knob extended substantially parallel with the body portion and connected at its end with the end of the extension on the body portion, and bowed rearwardly from said extension.

4. In an instrument of the class described, the combination of a straight body portion, an extension 23 at the forward end of the body portion having a notch in its lower end, a knob slidingly mounted upon the straight body portion, and a spring-wire detachably connected with the knob extended substantially parallel with the straight body portion arched over the forward end of the straight body portion, and extended downwardly in the rear of the extension, and having its downwardly-inclined portion arched rearwardly from the extension, for the purposes stated.

5. An intubation-tube introducer, comprising a straight body portion, an angular shank at its rear end having a notch 22 therein, an extension at its outer end substantially at right angles to the body portion, and having a notch in its lower end, a knob slidingly mounted upon the angular shank, a spring-wire detachably connected with the knob extended substantially parallel with the straight body portion, arched over the outer end of the straight body portion, detachably connected with the notch in the lower end of the extension, and arched rearwardly from the extension, a handle having an angular opening in its forward end to receive the angular shank, and also having a notch in its lower portion intersecting the said opening, and a spring-lever detachably pivoted to the handle having a hook on its rear end to pass under the body portion of the handle, and also having a hook on its forward end to pass through the notch in the handle and to enter the notch in the shank when its rear end is hooked under the handle, for the purposes stated.

FRANK ERNEST SAMPSON.

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