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TRACHEOTOMY INSTRUMENT

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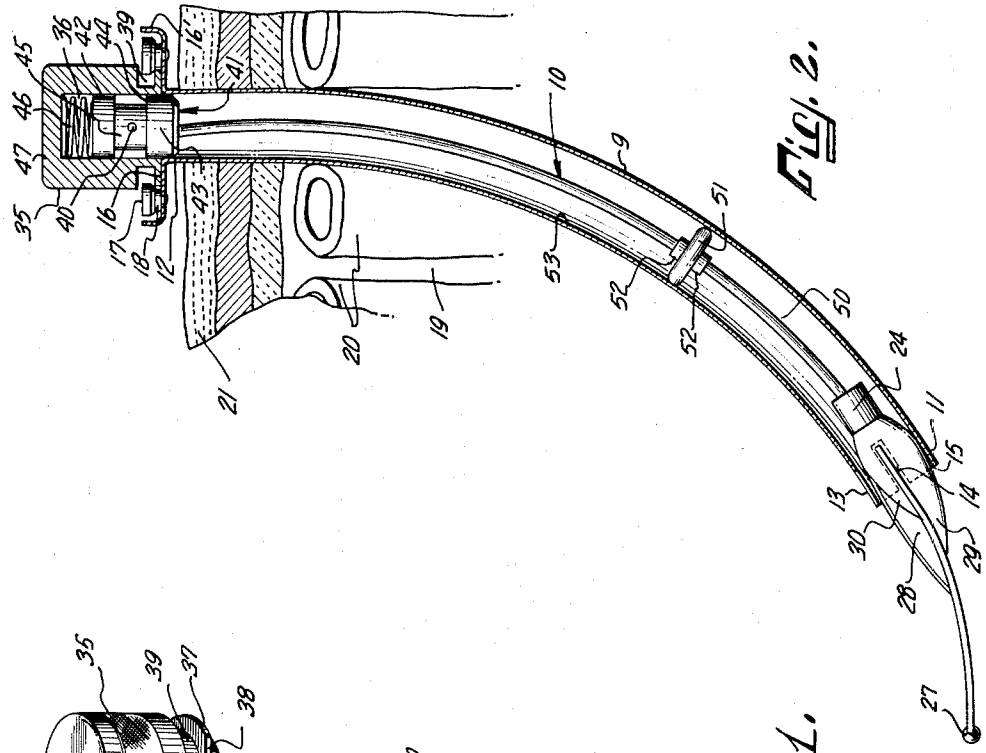

Fig. 2.

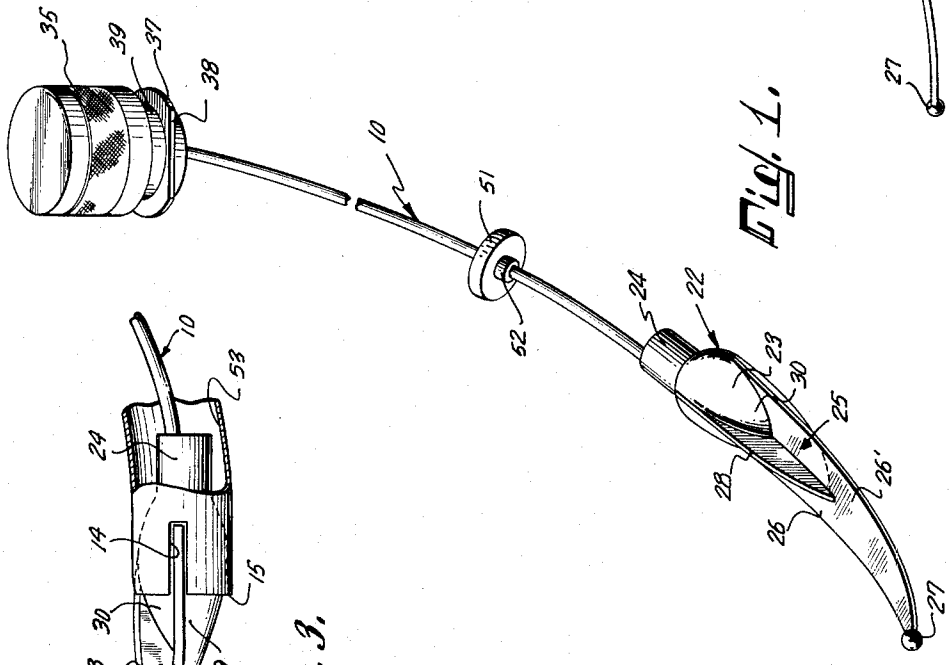

Fig. 1.

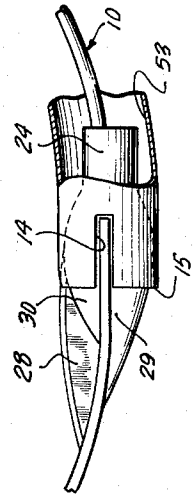

Fig. 3.

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TRACHEOTOMY INSTRUMENT

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4 Claims. (Cl. 128—305)

The invention relates to surgical instruments and has particular reference to an instrument generally identified as a tracheotomy instrument which is designed for injection into the trachea or windpipe in order to facilitate breathing in the event the breathing mechanism at a location above the trachea and in the mouth or throat prevents adequate breathing. The invention is an improvement upon co-pending application Serial No. 443,275, filed July 14, 1954.

In the construction of instruments of a surgical nature used in connection with the breathing organs of the human body, extreme care is needed and to make such care possible, instruments for use in that type of surgery must be easy to manipulate and positive in operation. More particularly where instruments are to be used to relieve a patient or afflicted person who is momentarily apt to strangle because of inability to breathe, the instrument must be one which enables performance of the operation with an extreme degree of rapidity since otherwise in a few brief moments the afflicted person might expire.

The performance of tracheotomy operations has been given considerable impetus within recent times as a result on some occasions of accidents where the surgical operation is performed as a first aid operation. Because of the operation being necessary of performance under those particular circumstances the skill of a surgical specialist is not always available and hence the instrument of necessity should be one such that it is incapable of improper use even though the administering physician might not be one of long experience in this particular field.

Certain improved tracheotomy instruments have recently been developed which have furthered to a great degree the effectiveness of an operation of the type herein made reference to. Even here, however, inadequacies have become apparent through continued use of the improved instruments which have rendered them less effective than they should be in satisfying the stringent need experienced in this field.

It is therefore among the objects of the invention to provide a new and improved tracheotomy instrument which is more positive in the handling thereby to improve the rapidity with which the operation can be performed under circumstances other than those which prevail in the operating room.

Another object of the invention is to provide a new and improved tracheotomy instrument which is simpler in its structure to the extent that it can be manufactured in an effective form without resort to close tolerances and critical manufacturing technique, thereby making the instrument one which is less expensive to manufacture.

Still another object of the invention is to provide a new and improved tracheotomy instrument which is so constructed that simplified means are employed to secure the different parts of the instrument in initial penetrating relationship and which moveover improves the ease of withdrawal of the knife from the tube after insertion of the tube in the trachea, such that the keen edge of the knife-like portions is not damaged during withdrawal.

It is also among the objects of the invention to provide a new and improved tracheotomy instrument of such design and construction that the operating physician is afforded a greater degree of confidence and assurance in the handling of the instrument so that the operation can be successfully and effectively performed with substantially the greatest degree of rapidity and assurance.

With these and other objects in view, the invention consists in the construction, arrangement and combination of the various parts of the device, whereby the objects contemplated are attained as hereinafter set forth and pointed out in the appended claims, and illustrated in the accompanying drawings.

In the drawings:

Fig. 1 is a perspective view of the interior portion of the tracheotomy instrument.

Fig. 2 is a longitudinal sectional view of the complete tracheotomy instrument.

Fig. 3 is a fragmentary longitudinal view partly broken away showing the operating end of the instrument.

In an embodiment of the invention chosen for the purpose of illustration there is shown a tracheotomy instrument which in assembled form ready for insertion in the trachea consists of two essential parts, namely, a curved tube **9** and an incisor assembly indicated generally by the reference character **10** and shown in Fig. 1.

The tube has an operating end **11** and a handle end **12**. At the operating end is a single slit **13** on the inside of the curve and a pair of lateral slits **14** diametrically opposite each other and at locations 90 degrees removed from the slit **13**. The operating end terminates in an edge **15** toward which the slits open.

At the handle end is a flange **16** which extends laterally outwardly and preferably extends around all sides of the tube at the perimeter of which is an upturned edge **16'**.

Locking pegs **17** are provided on the flange, the pegs in each instance having an undercut portion **18**.

In Fig. 2 the tube is shown assembled with the incisor **10** in position inserted in the trachea **19** of a patient. As indicated, the tube, when inserted, extends between cartilage rings **20** after having pierced multiple layers of skin and tissue **21**.

The incisor as shown consists of a head **22** as indicated generally in Fig. 1, the head comprising a body **23** and a neck **24**. The neck is generally cylindrical in shape and joins the body at one end. The body in turn has a shape somewhat like an olive seed, by way of general description, and is equipped with a long knife or blade **25**, having portions **26** and **26'** on opposite sides of a center line, these portions being curved and terminating at the edges in a razor-like edge. A button **27** at the tip of the blade protects the muscles and tissues at the inside of the trachea from inadvertent knicking by the blade after the insertion has been made.

A transverse knife or knife-blade **28** is substantially shorter than the long blade and has a curved razor-like edge throughout its length. The transverse knife blade as shown extends for a substantial distance along the center line of the long blade and serves as a stiffening medium for the base portion of the long blade. Those portions of the head **22** which accommodate the blades may aptly be defined as comprising a long bowed portion **29** which extends along the outside of the curve of the long blade and a short bowed portion **30** which extends on opposite sides of the short transverse knife-blade and lies against the base of the long blade at the inside of the curve.

At the opposite end of the incisor is a knob **35** having

a knurled exterior for ease in gripping. Within the knob is an axial central pocket 36. At the end of the knob which may appropriately be referred to as the inside end is a lock flange 37, having cut away straight sides or flat edges 38, the edges being formed to permit the lock flange to pass to a position beneath the lock pegs 17 at the area of the undercut 18 whereby upon rotation of the knob the wider portions of the flange 37 are adapted to engage beneath the lock pegs, thereby to anchor the incisor in the tube.

A pin 40 is adapted to be inserted through the outer portion of the knob 35 into an annular recess in a plug 41, formed between an inner disc 42 and an outer disc 43 at the area of an intermediate portion 45, the annular recess being identified by the reference character 44.

By making the recess 44 substantially wider than the diameter of the pin 40 the plug 41 is permitted to move for a substantial distance axially without binding against the pin.

A coiled compression spring 46 is located at the bottom of the pocket 36 and acts between the bottom of the pocket and the plug 41 in a direction normally urging the plug outwardly.

A rod 50 interconnects the head 22 with the plug 41. This rod although it may be slightly resilient by reason of its length and the character of material from which it is made is preferably set in its curvature to the degree of curvature illustrated and tempered so as to substantially maintain that curvature during use. It will be noted that the curvature of the rod is substantially the same as the curvature of the axis of the tube 9. To facilitate movement of the rod within the tube and correspondingly to facilitate movement of the head 22 into and out of the tube there is provided a spacer disc 51 having collars 52 by means of which the spacer disc is anchored to the rod at some selected distance intermediate opposite ends of the rod. The exterior circumference of the spacer disc is made of such size that it slides somewhat snugly, but nevertheless freely, within the interior wall 53 of the tube.

When the device is ready for use the incisor is inserted into the tube and locked in position by engagement of the lock flange 37 with the lock pegs 17. In this position the plug 41 exerts a pressure against the spring 46, the recess 44 having such width greater than the diameter of the pin 40 to permit a degree of movement in an axial direction without disturbing the freedom of rotation of the knob 35 with respect to the plug 41.

In this assembled position the head 22 at the area adjacent the thickest cross-sectional area but on the outermost side thereof tends to bear against the end of the tube inside the edge 15. The end may be contracted very slightly inwardly in order to fix the limit of movement of the head. In this position the knife 30 lies opposite the slit 13 and the long knife portions 26 and 26' lie opposite the slits 14. By having the head fit snugly against the outer end no appreciable gap is left which otherwise might be prone to catch tissues as the razor-like edges of the knives are inserted through the tissues and between the cartilage rings during insertion of the instrument into the trachea.

Moreover, by reason of having the rod 50 of fixed curvature and due to the presence in part of the spacer disc 51, as the head is withdrawn upon release of the knob from the locking pegs, the knife edges will pass smoothly into the operating end of the tube 9 and will be prevented from catching upon adjacent portions of the tube in a manner which would nick or damage the razor-like edges of the blade. Furthermore, by providing a rod 50 of substantial stiffness and fixed curvature there is afforded to the instrument a firm feel in that there is no appreciable movement of one part with respect to the other. The effectiveness of the spring 46 may be very easily and readily controlled sufficient to have it press firmly outwardly against the plug 41 and the rod 50, thereby to firmly fix the head 22 in its proper assembled position while the incision is taking place.

Locking of the locking flange with respect to the locking pegs assists in creating a firmness of the inter-relationship of the parts sot that it has a sure and positive feel in the hands of the physician.

As previously suggested also when the incisor is to be withdrawn the withdrawal motion is smooth, rapid and positive, thereby greatly improving the high degree of insurance which the combination effects. The positive character of the instrument is such that those critical seconds which are so important in an operation of this type are saved, the saving of which may often prove the difference between a re-establishment of necessary breathing and complete cessation.

Having described the invention, what is claimed and sought to be secured by Letters Patent is:

1. A tracheotomy instrument comprising a hollow arcuate tube having an open operating end and an open handle end, a flange at said handle end having lock means thereon, a piercing assembly comprising a streamlined head having a pressure fit in said operating end and knife means on the head extendable beyond the tube, a knob having a lock means engageable with said first identified lock means, means forming an axially extending pocket in said knob, a plug slidably and rotatably secured in said pocket, an arcuate relatively stiff rod interconnecting said plug and said head, said rod in assembled position lying substantially along the axis of said tube, and a spacer disc fixed on said rod intermediate opposite ends thereof and having a sliding fit in said tube.

2. A tracheotomy instrument comprising a hollow arcuate tube having an open operating end and an open handle end, a flange at said handle end having lock pegs thereon, a piercing assembly comprising a streamlined head having a pressure fit in said operating end and knife means on the head extendable beyond the tube, a knob having a lock means engageable with said first identified lock means, means forming an axially extending pocket in said knob, a plug slidably and rotatably mounted in said pocket, an arcuate relatively stiff rod interconnecting said plug and said head, said rod in assembled position lying substantially along the axis of said tube, a spacer disc fixed on said rod intermediate opposite ends thereof and having a sliding fit in said tube, and a coiled spring between the bottom of said pocket and the plug biased in a direction pressing said plug, said rod and said head to a position wherein said head is pressed into the outermost end of said tube.

3. A tracheotomy instrument comprising a hollow arcuate tube having an open operating end and an open handle end, and a flange at said handle end having lock means thereon, a piercing assembly comprising a streamlined head having a pressure fit in said operating end and knife edges on the head extendable beyond the end of the tube, a knob having a lock means engageable with said first identified means, means forming an axially extending pocket in said knob, a plug slidably and rotatably mounted in said pocket, and cooperating means respectively in said knob and said plug retaining said plug rotatably in said pocket, an arcuate relatively stiff rod interconnecting said plug and said head, said rod in assembled position lying substantially along the axis of said tube, and a coiled spring between the bottom of said pocket and the plug biased in a direction pressing said plug, said rod and said head to a position wherein said head is pressed into the outermost end of said tube.

4. A tracheotomy instrument comprising a hollow arcuate tube having an open operating end and an open handle end, said operating end having a plurality of slits therein, and a flange at said handle end having lock pegs thereon, a piercing assembly comprising a streamlined head having a pressure fit in said operating end and knife edges on the head extendable through said slits,

a knob having a lock flange engageable with said pegs, means forming an axially extending pocket in said knob, a plug slidably and rotatably mounted in said pocket, and cooperating means respectively in said knob and said plug retaining said plug rotatably in said pocket, said means comprising an annular recess in the plug and a pin in the knob extending into said recess and of diameter substantially less than the breadth of the recess, an arcuate relatively stiff rod interconnecting said plug and said head, said rod in assembled position lying substantially along the axis of said tube, a spacer disc fixed

on said rod intermediate opposite ends thereof and having a sliding fit in said tube, and a coiled spring between the bottom of said pocket and the plug biased in a direction pressing said plug, said rod and said head to a position wherein said head is pressed into the outermost end of said tube.

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