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(54) Title: A MODIFIED LARYNGOSCOPE DEVELOPED FOR THE PREVENTION OF COMPLICATIONS THAT CAN OCCUR DURING ENDOTRACHEAL INTUBATION

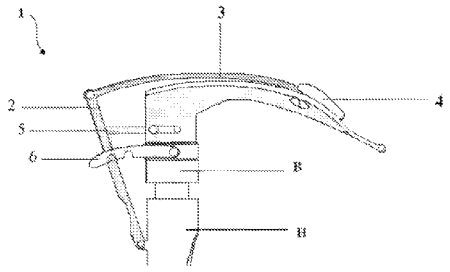

Figure 1 (A)

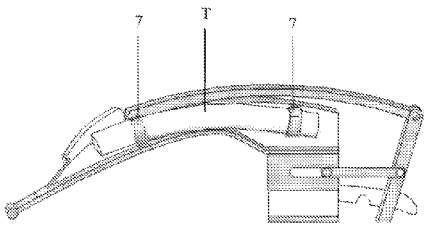

Figure 1 (B)

(57) Abstract: The present invention relates to a modified laryngoscope (1) developed for the prevention of complications that can occur during the process by modifying the laryngoscope used for endotracheal intubation. The objective of the present invention is to reduce the complications that occur during endotracheal intubation, to ensure safety of the patient and to reduce the rate of procedural failure. The present invention will provide a more reliable endotracheal intubation device by reducing the margin of error, especially in emergency situations, and will ensure safe use through closing the esophagus by maintaining a certain volume. The mechanism of the present invention is based on the fact that by narrowing the volume in the larynx, the esophagus is closed, thereby reducing the risk of faulty intubation and allowing faster and more successful access to the trachea.

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[Continued on next page]

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A MODIFIED LARYNGOSCOPE DEVELOPED FOR THE PREVENTION OF COMPLICATIONS THAT CAN OCCUR DURING ENDOTRACHEAL INTUBATION

Field of the Invention

The present invention relates to a modified laryngoscope developed for the prevention of complications that can occur during the intubation process by modifying the laryngoscope used for endotracheal intubation.

Background of the Invention

Laryngoscopy is the endoscopy of the larynx, an anatomical structure of the throat. ***Laryngoscopy*** is performed to image the other anatomical structures such as the vocal cords and the glottis, or to facilitate intubation during surgical operations performed on the larynx. "***Laryngoscope***", the device used for this purpose, consists of two parts, the handle and the blade. The handle is the part that allows the person performing the operation to hold the device and it is a fixed part. The blade, on the other hand, can be attached to and removed from the handle and can be of different sizes and shapes. Thus, the blade part can be changed depending on the patient. There are two types of blades known in the art: Macintosh (curved) and Miller (straight).

The laryngoscope device is now widely used all over the world due to the recent Coronavirus pandemic for endotracheal intubation. Endotracheal intubation is a vital procedure used to ensure and maintain airway patency. In the state of the art, the failure rate of the currently used laryngoscope devices is quite high. Therefore, it is of great importance to reduce the complications that occur during endotracheal intubation, to ensure safety of the patient and to reduce the rate of procedural failure.

While initial emergency interventions primarily aim to ensure ventilation and oxygenation without intubating the patient, these interventions may fail and endotracheal intubation may be required. Endotracheal intubation procedure is expected to be successfully performed by trained staff. In some emergency cases, complications may occur when the procedure is performed by inexperienced staff.

Summary of the Invention

The objective of the present invention is to reduce the complications that occur during endotracheal intubation, to ensure safety of the patient and to reduce the rate of procedural failure.

Another objective of the present invention is to reduce the margin of error even in emergency situations and provide a more reliable endotracheal intubation tool. Furthermore, safe intubation is to be ensured by covering the esophagus via the extension of the intubation tool to a certain volume.

Another objective of the invention is to reduce the risk of faulty intubation by both taking up a certain volume in the larynx, narrowing the available space down and covering the esophagus, thereby accessing the trachea more quickly and successfully.

Detailed Description of the Invention

"**A Modified Laryngoscope Developed for the Prevention of Complications That Can Occur During Endotracheal Intubation**", which is aimed to realize the achievement of the objective of the present invention, is illustrated in the accompanying drawings, in which:

Figure 1. is an illustration of the modified laryngoscope of the present invention in perspective.

Figure 1 (A). is the view from the right side (face A).

Figure 1 (B). is the view from the left side (face B).

Figure 2. is an illustration of the modified laryngoscope of the present invention with the utility tool open. (Face A)

Figure 3. is an illustration of the modified laryngoscope of the present invention with the utility tool closed. (Face A)

Figure 4. is an illustration of the modified laryngoscope of the present invention with the magnetic clips open. (Face B)

Figure 5. is an illustration of the modified laryngoscope of the present invention with the magnetic clips closed. (Face B)

Figure 6. is an illustration of the modified laryngoscope of the present invention:

Figure 6 – (a). when viewed from face A with the utility tool open.

Figure 6 – (b). when viewed from face A with the utility tool closed.

Figure 7. is an illustration of the modified laryngoscope of the present invention:

Figure 7 – (b). when viewed from face B with the utility tool and the magnetic clips open.

Figure 7 – (b). when viewed from face B with the utility tool and the magnetic clips closed.

Figure 8. is an illustration of the modified laryngoscope of the present invention with the utility tool closed. (from face A and face B)

Figure 9. is an illustration of the modified laryngoscope of the present invention with the utility tool open. (from face A and face B)

Figure 10. is an illustration of the laryngoscope blade:

Figure 10 – (a) from face B,

Figure 10 – (b) from the top.

Figure 11. is an illustration of the laryngoscope handle (a) from the side; the blade-handle connecting piece (b) from the front/back, and (c) from the face A/B.

Figure 12. is an illustration of the push bar:

Figure 12 – (a) from the top,

Figure 12 – (b) from the side.

Figure 13. is an illustration of the advancement bar:

Figure 13 – (a) from the top,

Figure 13 – (b) from the side.

Figure 14. is an illustration of the utility tool.

Figure 15. is an illustration of the angle delimiter:

Figure 15 – (a) from the side,

Figure 15 – (b) from the top.

Figure 16. is an illustration of the lock mechanism:

Figure 16 – (a) from the side,

Figure 16 – (b) from the bottom.

Figure 17. is an illustration of the magnetic clip in perspective.

The components shown in the figures are each given reference numbers as follows:

1. Modified laryngoscope
2. Push bar
3. Advancement bar
4. Utility tool
5. Angle delimiter
   - **5.1.** Opening
   - **5.2.** Extension
6. Lock mechanism
   - **6.1.** Lock bolt
   - **6.2.** Slot
7. Magnetic clip

H. Laryngoscope handle

B: Laryngoscope blade

T. Intubation tube

A modified laryngoscope (1) developed for the prevention of complications that can occur during endotracheal intubation comprises

- at least one laryngoscope handle (H),
- at least one laryngoscope blade (B) which has L-form and which is detachably attached to the laryngoscope handle (H) at the end of the short side of this form,
- at least one advancement bar (3) which is placed on the upper surface of the laryngoscope blade (B), and is away from the patient's tongue during use and can move back and forth towards the patient's throat,
- at least one utility tool (4), which is rotatably fixed to the laryngoscope blade (B) on the side facing the patient's throat, on an axis perpendicular to its upper surface of the laryngoscope blade (B), and which elevates with the introduction of the tip of the advancement bar (3) under its non-fixed end and prevents sliding into the larynx by pressing against the wall of the throat opening,
- at least one push bar (2), which extends along the short edge of the L-form of the laryngoscope blade (B) that is outside the patient's mouth and which is fixed at one end to the advancement bar (3) so that the push-pull force applied by the operator, necessary for the reciprocating movement of the advancement bar (3), is directed to the advancement bar (3), which is rotatably attached to the laryngoscope handle (H) at the other end by means of a hinge,
- at least one angle delimiter (5), which is in the form of a rod and which is fixed to the push bar (2) at one end at a position between the two ends of the push bar (2), and at the other end, during the forward movement (into the patient's mouth) of the advancement bar, which restricts this movement by means of an extension (5.2) that can move back and forth within the opening (5.1) extending in the same direction as the advancement bar (3) on the laryngoscope blade (B), thereby enabling the utility tool (4), which it rotates by pushing, to rotate up to a certain angle,

- at least one lock mechanism (6), which is in the form of a plate fixed to the laryngoscope blade (B) at one end and free at the other end, and which restricts the movement of the push bar (2) by the insertion of at least one lock bolt (6.1) located at a position between the two ends of the push bar (2) into at least two slots (6.2) provided thereon,
- at least one magnetic clip (7), which is located in the part of the laryngoscope head (B) extending into the mouth and which allows the intubation tube (T) to be grasped or released by magnetically attaching the ends of the C-form to each other after the intubation tube (T) is positioned in the opening in the center of its C-form.

The use of the modified laryngoscope (1) of the present invention is as follows:

- The modified laryngoscope (1) of the present invention is used by holding the laryngoscope handle (H).
- The push bar (2) is pressed to move the advancement bar (3), which then pushes the utility tool (4) up 12 degrees. The upward movement of the utility tool (4) narrows the distance between the laryngoscope and the laryngeal wall, thus closing the esophagus. Hence, the intubation tube (T) can be easily applied to the trachea.
- The upward movement and angular placement of the utility tool (4) is restricted by the angle delimiter (5).
- The open position of the utility tool (4) is maintained by the lock mechanism (6). When the push bar (2) is pressed, the lock bolt (6.1) moves from the second slot (6.2-b) to the first slot (6.2-a) (Figure 2 and Figure 3). Thus, the utility tool (4) is ensured to remain in the open position.
- Restriction of the advancement bar (3) by the lock mechanism (6) and fixation of the utility tool (4), which are added to restrict the movement of the laryngoscope into the larynx.
- The lock mechanism (6), shown in open form in Figure 2 and in closed form in Figure 3, is designed such that the physician can easily open and close

the mechanism without applying constant force. The lock mechanism (6), which can operate in two positions, is placed in its slot (6.2) by being elevated according to the desired position.

- In Figure 3, when viewed from direction A, the components of the modified laryngoscope (1) of the present invention are shown in the disabled (closed) position.
- Magnetic clips (7) are used by easily being opened and closed manually to place and fix the intubation tube (T) on the modified laryngoscope (1). They are illustrated in the open position in Figure 4 and in the closed position in Figure 5.
- Before starting the procedure, the endotracheal intubation tube (T) is placed into the modified laryngoscope (1), after the modified laryngoscope (1) is inserted with the intubation tube (T) and the intubation tube (T) is correctly placed in the trachea, the modified laryngoscope (1) is removed from the patient's oral cavity, the magnetic clips (7) are opened and the modified laryngoscope (1) is easily separated from the intubation tube (T).

Within the scope of the invention, magnetic clips are placed on the part called spatula/tongue on the laryngoscope. With the help of these clips, the intubation tube is fixed, allowing easy and simultaneous placement of the tube during the process. Furthermore, the trachea can be accessed more quickly and successfully by reducing the risk of faulty intubation by both narrowing the volume in the larynx and closing the esophagus with the help of the tongue fixed with a mechanism installed on the horizontal flange of the laryngoscope. In addition, a design is realized that will enable even the medical personnel who are not sufficiently experienced to perform this procedure in emergency situations with minimal risk by placing a locking mechanism to permanently fix the position of the latch during the process.

The invention aims to provide easier and safer intubation and thus safer airway patency. Furthermore, safe use will be ensured through closing the esophagus by maintaining a certain volume.

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CLAIMS

1. A modified laryngoscope (1) developed for the prevention of complications that can occur during endotracheal intubation, **comprising**:

- at least one laryngoscope handle (H),
- at least one laryngoscope blade (B) which has L-form and which is detachably attached to the laryngoscope handle (H) at the end of the short side of this form, and **characterized in that** it comprises:
- at least one advancement bar (3) which is placed on the upper surface of the laryngoscope blade (B), and is away from the patient's tongue during use and can move back and forth towards the patient's throat,
- at least one utility tool (4), which is rotatably fixed to the laryngoscope blade (B) on the side facing the patient's throat, on an axis perpendicular to its upper surface of the laryngoscope blade (B), and which elevates with the introduction of the tip of the advancement bar (3) under its non-fixed end and prevents sliding into the larynx by pressing against the wall of the throat opening,
- at least one push bar (2), which extends along the short edge of the L-form of the laryngoscope blade (B) that is outside the patient's mouth and which is fixed at one end to the advancement bar (3) so that the push-pull force applied by the operator, necessary for the reciprocating movement of the advancement bar (3), is directed to the advancement bar (3) and which is rotatably attached to the laryngoscope handle (H) at the other end by means of a hinge,
- at least one angle delimiter (5), which is in the form of a rod and which is fixed to the push bar (2) at one end at a position between the two ends of the push bar (2), and at the other end, during the forward movement (into the patient's mouth) of the advancement bar, which restricts this movement by means of an extension (5.2) that can move back and forth within the opening (5.1) extending in the same direction as the

advancement bar (3) on the laryngoscope blade (B), thereby enabling the utility tool (4), which it rotates by pushing, to rotate up to a certain angle,

- at least one lock mechanism (6), which is in the form of a plate fixed to the laryngoscope blade (B) at one end and free at the other end, and which restricts the movement of the push bar (2) by the insertion of at least one lock bolt (6.1) located at a position between the two ends of the push bar (2) into at least two slots (6.2) provided thereon,
- at least one magnetic clip (7), which is located in the part of the laryngoscope blade (B) extending into the mouth, and which allows the intubation tube (T) to be grasped or released by magnetically attaching the ends of the C-form to each other after the intubation tube (T) is positioned in the opening in the center of its C-form.

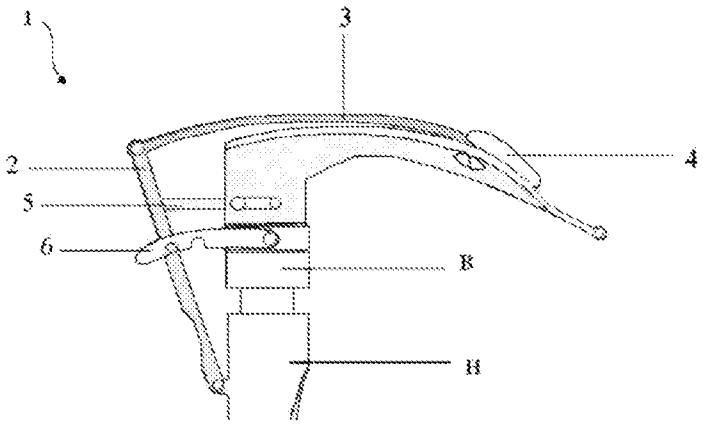

Figure 1 (A)

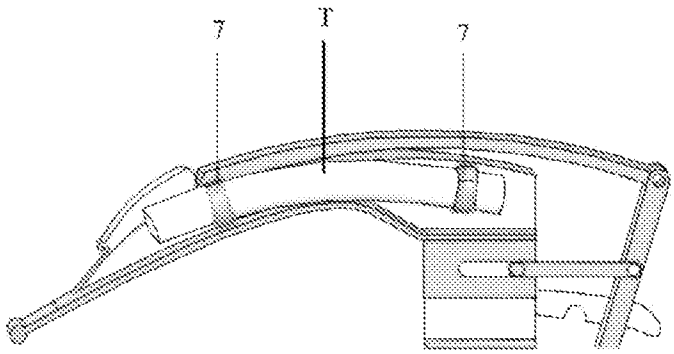

Figure 1 (B)

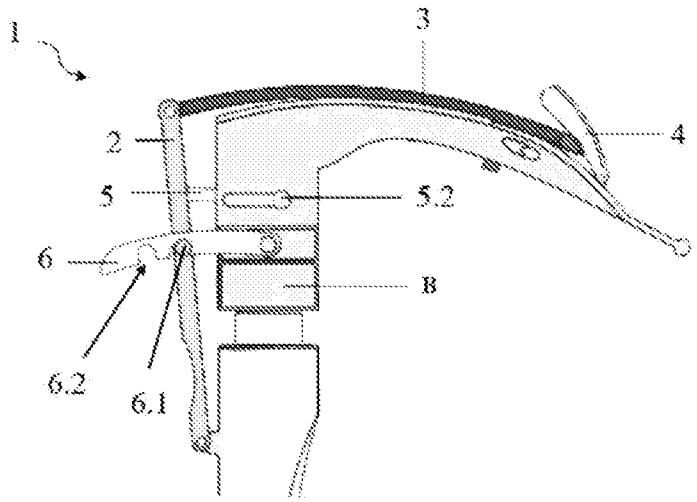

Figure 2

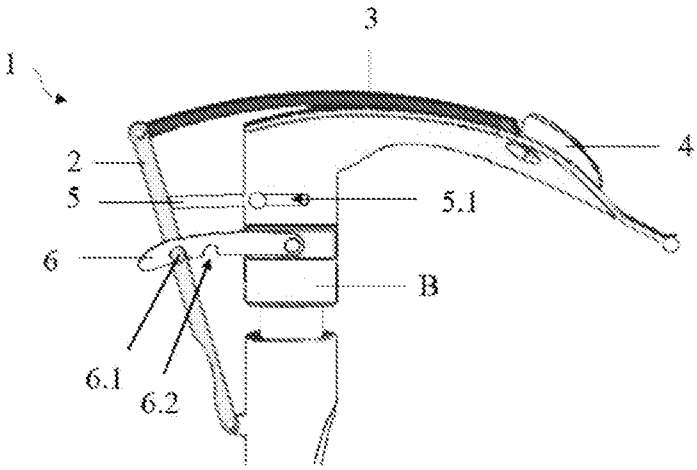

Figure 3

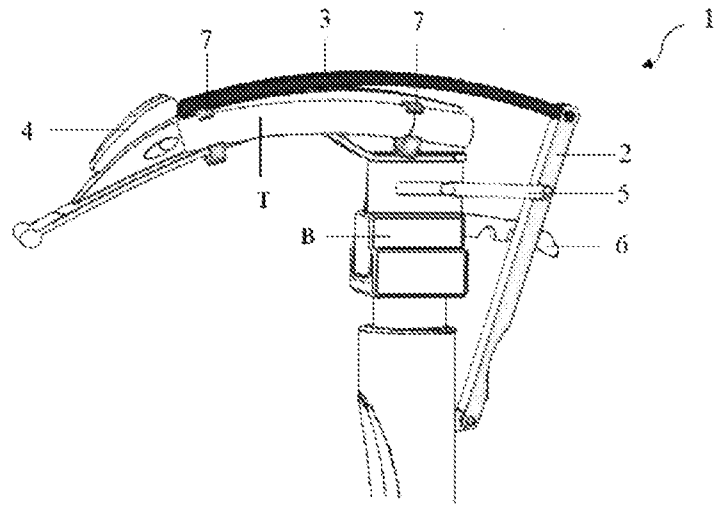

Figure 4

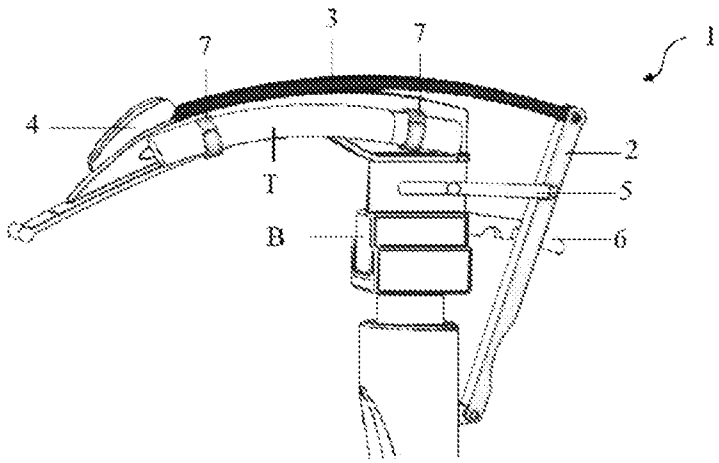

Figure 5

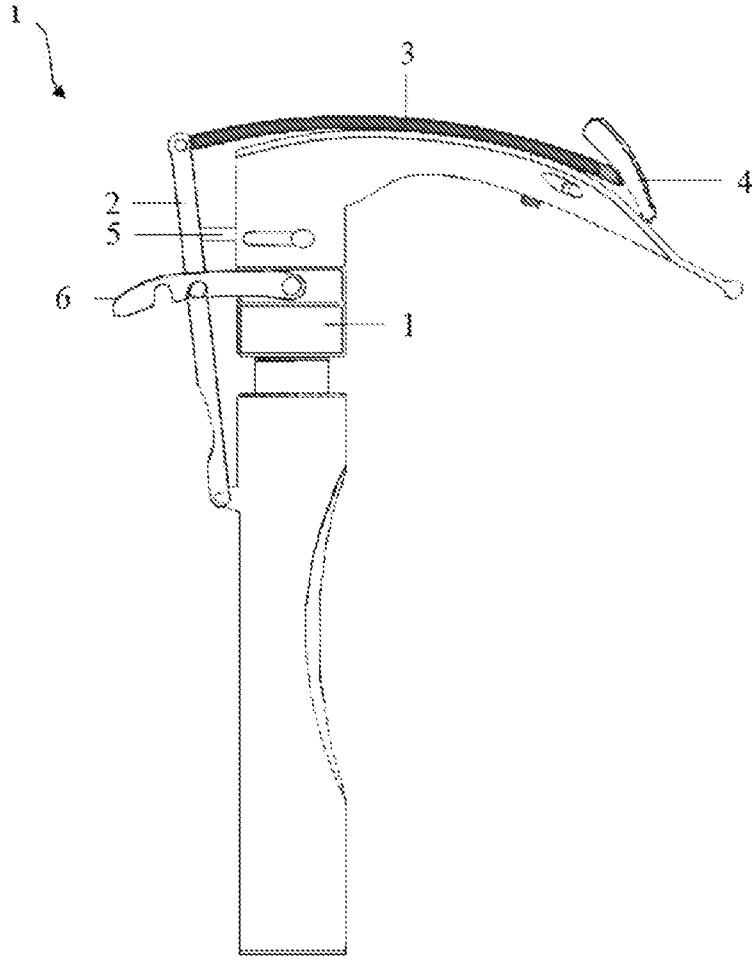

Figure 6 – (a)

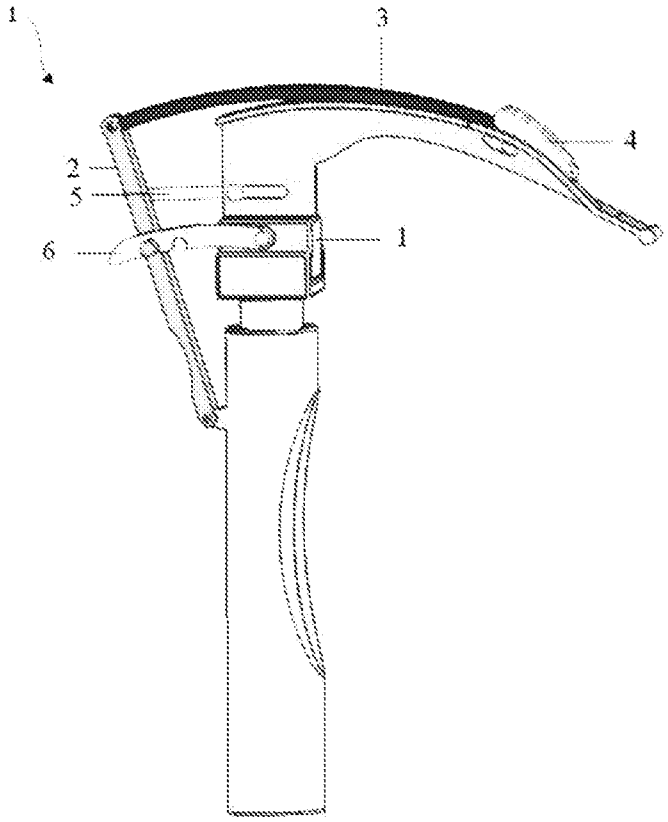

Figure 6 – (b)

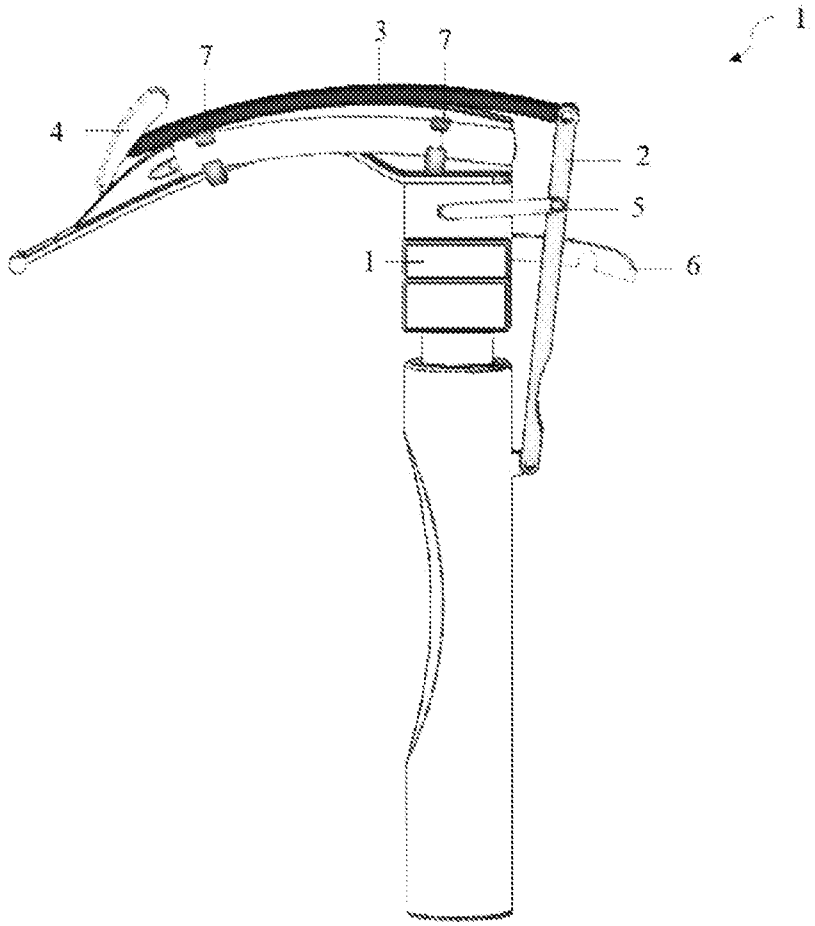

Figure 7 – (a)

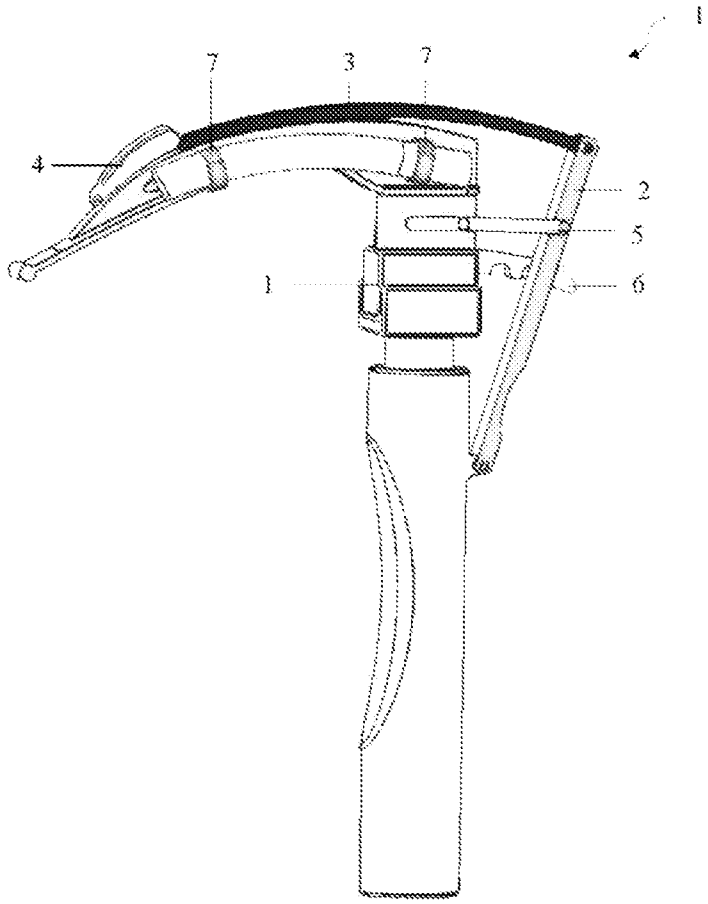

Figure 7 – (b)

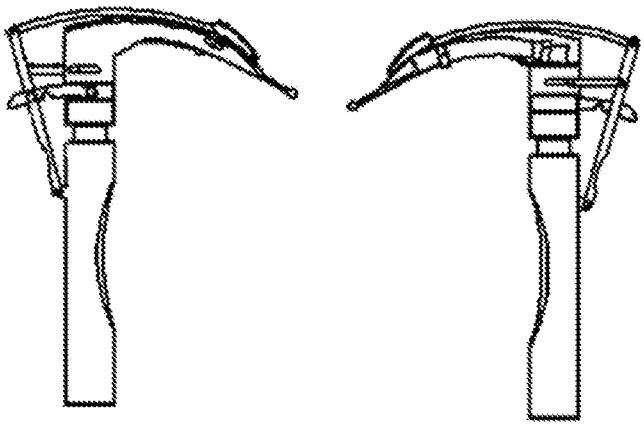

Figure 8

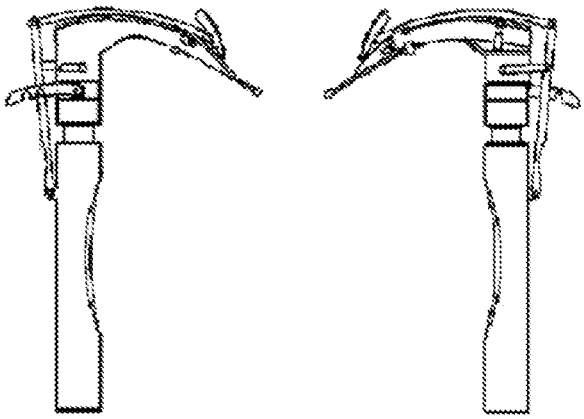

Figure 9

Figure 10 – (a)

Figure 10 – (b)

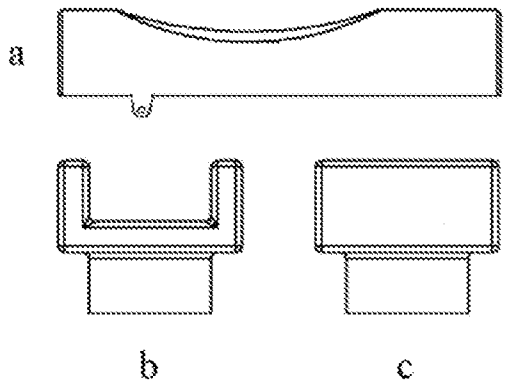

Figure 11

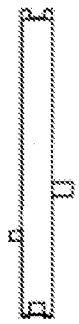

Figure 12 – (a)

Figure 12 – (b)

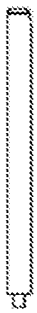

Figure 13 – (a)

Figure 13 – (b)

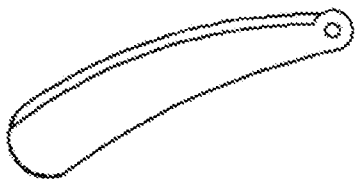

Figure 14

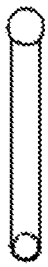

Figure 15 – (a)

Figure 15 – (b)

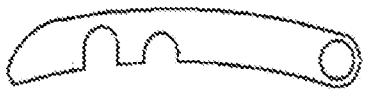

Figure 16 – (a)

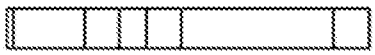

Figure 16 – (b)

Figure 17

INTERNATIONAL SEARCH REPORT

International application No.
PCT/TR2022/050687

A. CLASSIFICATION OF SUBJECT MATTER

A61B 1/267 (2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A61B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 7153260 B1 (GIRGIS MAGDY S [US]) 26 December 2006 (2006-12-26) Abstract; Figure 5; Column 5 Line 20-50	1
Y	TR 202008459 A2 (MEHMET FATIH DEMIRCI [TR]) 22 June 2020 (2020-06-22) The whole document	1
A	US 2014128681 A1 (COOK MEDICAL TECHNOLOGIES LLC [US]) 08 May 2014 (2014-05-08) Figures 1-5, Paragraph 26	1
A	CN 202739968 U (HE PEILIN [CN]) 20 February 2013 (2013-02-20) Figures 1, 2	1
A	CN 210446975 U (WANG YI [CN]) 05 May 2020 (2020-05-05) The whole document	1

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