

(21) Application No 8214287

(22) Date of filing
17 May 1982

(30) Priority data

(31) 3119726

(32) 18 May 1981

(33) Fed Rep of Germany
(DE)

(43) Application published
9 Feb 1983

(51) INT CL³ A61B 1/26

(52) Domestic classification
A5R EN

(56) Documents cited
None

(58) Field of search
A5R

(71) Applicant
Heine Optotechnik
GmbH and Co KG
(FR Germany)
Kientalstrasse 7
D-8036 Herrsching
Federal Republic of
Germany

(72) Inventors

Helmut A Heine

Dieter W Fottner

Helmut Rosenbusch

(74) Agents

J Y and G W Johnson

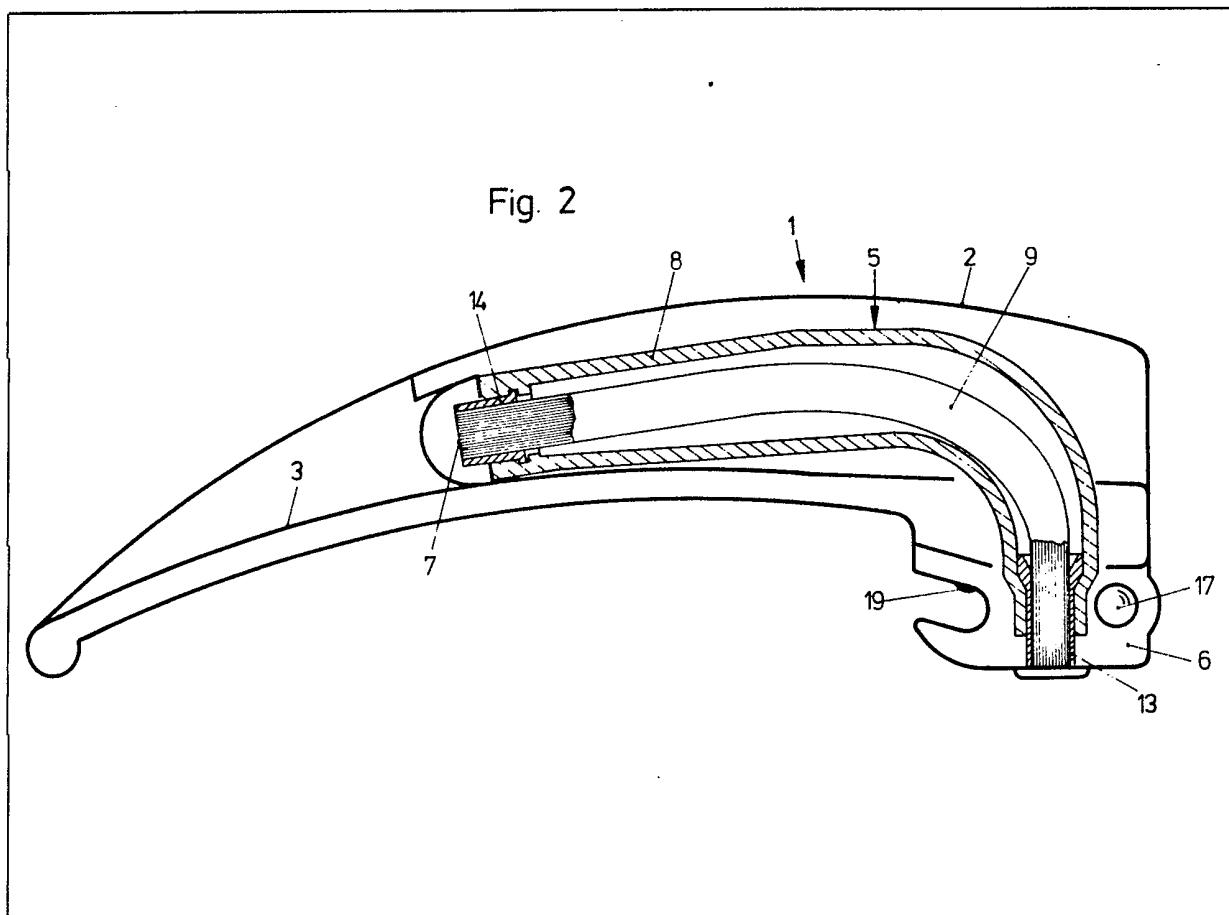
Furnival House

14-18 High Holborn

London WC1V 6DE

(54) Laryngoscope and improved
blade therefor

(57) A laryngoscope blade (1) is described with a light guide means (5) extending between heel (6) of the blade and an outlet point (7) located between the proximal and distal ends of the blade. To simplify manufacture, the blade with its heel is injection-molded from a plastics material, after the light guide means has been inserted in the injection mold.



1/2

Fig. 1

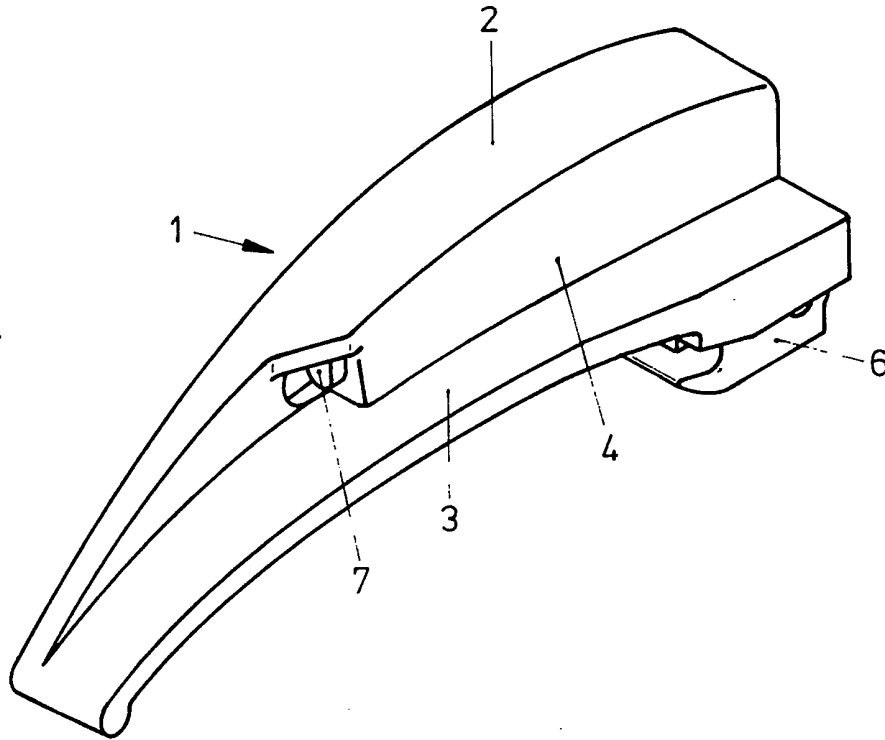


Fig. 4

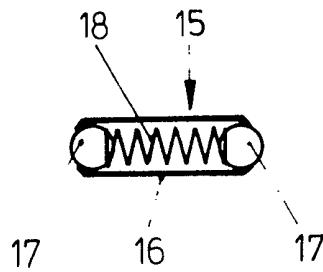
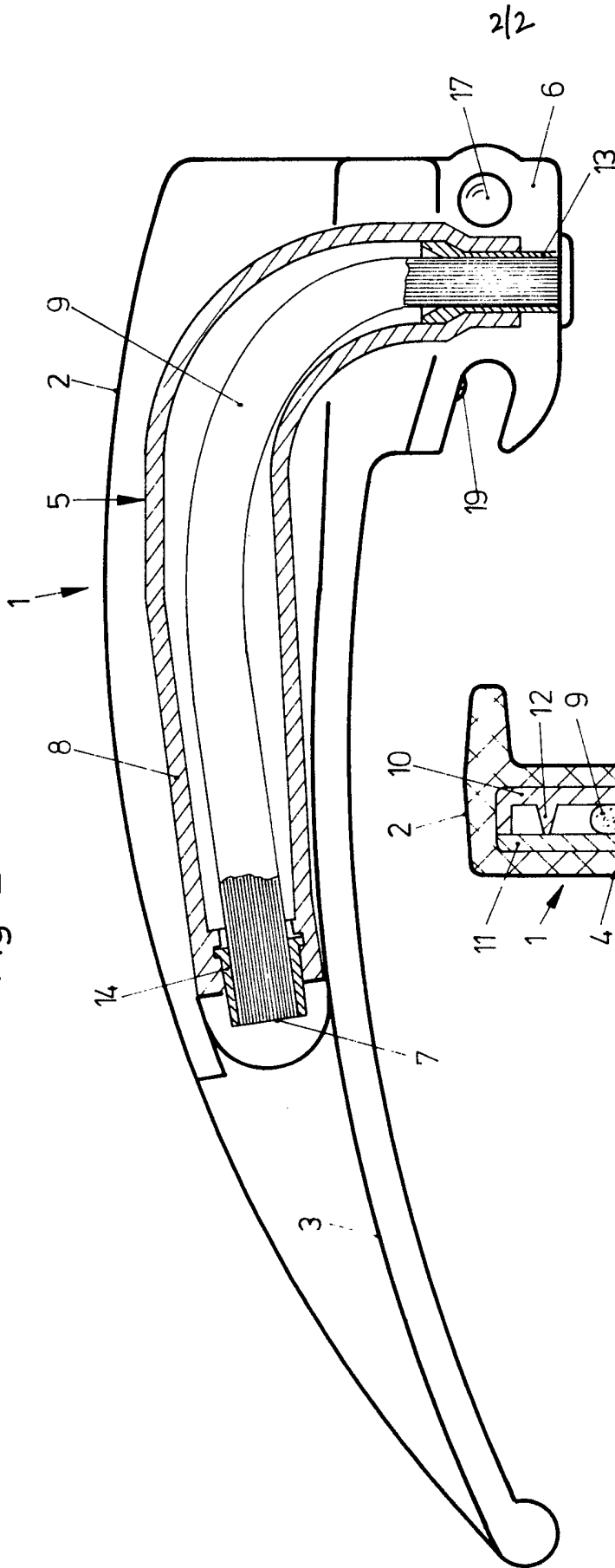
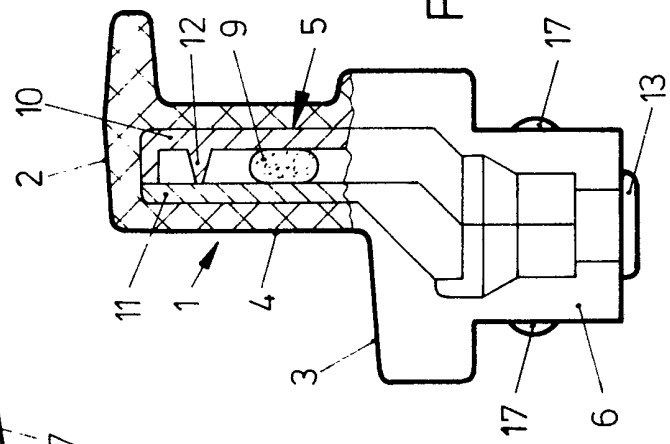


Fig. 2



2/2

Fig. 3



SPECIFICATION

Laryngoscope and improved blade therefor5 *Technical Field*

The invention relates to a laryngoscope, and in particular to a blade for a laryngoscope, which blade has a light guide means extending between a heel of the blade and an outlet point located between the proximal and distal ends of the blade.

Discussion of Prior Art

A laryngoscope, the blade of which consists of stainless steel and in which a connecting cable runs from the heel of the blade to a bulb holder which is located between the proximal and distal ends of the blade is already known from the pamphlet Med 0773 DE published by Heine Optotechnik GmbH & Co. KG. of Hersching, West Germany. The cable is contained in a channel which is drilled after the blade has been manufactured or which is made by soldering a U-shaped part forming the channel onto the remainder of the blade. The manufacture of this blade is relatively complicated and thus expensive.

A laryngoscope blade is also already known in which a light guide essentially consisting of a bundle of optical fibers is provided between the heel and an outlet point located between the proximal and distal ends of the blade. Admittedly, this blade avoids the risk of the patient suffering burns due to contact with the bulb and is easier to clean and to sterilize in an autoclave. However, it is relatively difficult, and hence, expensive to produce.

Laryngoscopes which are made completely or partially of a plastics material are also known but these are intended for use only once and are consequently of very simple construction and contain a light guide in the form of a solid rod and which, during examination, provides rather poor illumination of the area to be examined.

It is therefore an object of the present invention to provide a laryngoscope blade which can be easily produced and which permits the best possible illumination and cleaning, as well as sterilizing in an autoclave.

According to the invention, this object is achieved when the blade together with the heel intended for fixing the blade to a handle, is injection-molded from a plastics material after a light guide means has been inserted into the injection mold. In practice, a suitable light guide mean is first located in an empty injection mold in the desired position required in the final blade, the mold is closed and the plastics material, in flowable form, is injected into the closed mold. Since the light guide means can be supported in the injection mold by simple means, this results in simple and economical production of the laryngoscope blade and hence of the entire laryngoscope.

Preferably, the plastics material selected is a fiber-reinforced (e.g. glass or plastics fiber reinforced) material, the softening point of which is sufficiently high to withstand, without damage, the temperatures prevailing in a sterilizing autoclave.

The design of the blade as a plastics molding has the further advantage that the blade is virtually non-dazzling to the user and that damage to the teeth of a patient being examined, which can occur in the case of spasms, is avoided with certainty. These two disadvantages are virtually unavoidable in the case of the known laryngoscope blades made from stainless steel.

The light guide means preferably comprises a housing which is arranged between the heel and the light outlet point of the blade and into which housing a bundle of optical fibers has been inserted.

This results not only in a further simplification of the manufacturing process, since it is only necessary to insert the bundle of optical fibers into the housing, to seal the housing if necessary and then to insert the housing into the injection mold, but it also allows virtually any desired change in cross-sectional shape of the bundle between its two ends, without the bundle having to be performed in a separate operation.

Preferably, each end of the bundle of optical fibers is respectively mounted in a holder which holders are, in turn, located at the appropriate positions in the wall of the housing to protrude somewhat beyond the latter.

This gives secure and simple mounting of the bundle of optical fibers in the housing and allows the light guide means, comprising the housing and the bundle of fibers, to be fixed accurately and reliably in the injection mold.

To ensure secure and simpler mounting of the housing in the injection mold, it is possible to mold projections onto the outside of the housing for holding the housing in the correct position in the injection mold.

The housing receiving the bundle of optical fibers preferably comprises two parts cemented together. The holders for mounting the ends of the bundle can each be provided with a collar which locates in a respective groove in an appropriate orifice in one of the housing parts so that the holders can be securely mounted in the said one part of the housing before the other part is applied thereto.

To prevent the plastics material, which enters the injection mold during the injection molding of the blade, from penetrating into the housing and damaging the bundle of optical fibers, the voids in the housing, remaining after the bundle is located therein, are preferably filled (e.g. with a plastics material), so that it is a closed and fully filled housing which is embedded in the blade.

Alternatively, one or both parts of the housing can be provided with supports, for example

conical, pyramidal or rib-like supports, which coact with the other part in order to give the housing adequate strength to withstand the pressures exerted on it during the injection molding and thereby prevent damage to the bundle of fibers either during injection or during the subsequent curing of the injected plastics material.

The light guide means can also comprise a tubular member (e.g. a metallic tube) into which the bundle of optical fibers is inserted. In this cases the fibers of the bundle can be cemented at least to the opposite ends of the tubular member so that the latter act as the holders. Preferably, however, separate holders are provided one at each end of the bundle and these holders are in turn fixed (e.g. cemented or soldered) into the ends of the tubular member.

20 *Brief Description of the Drawings*

One embodiment of laryngoscope blade will now be described, by way of example, with reference to the accompanying drawings, in which:—

Figure 1 is a perspective view of the complete laryngoscope blade,

Figure 2 is a longitudinal section of the blade,

Figure 3 is a partially sectioned end view of the blade, and

Figure 4 is a schematic sectional view of a ball cage located in the heel of the blade.

35 *Description of Preferred Embodiment*

The laryngoscope blade 1 shown in Fig. 1 has an upper surface 2 which serves as a support for the teeth of a patient. The lower surface of a lower arm 3 of the blade serves to hold the tongue of the patient out of the way, and the arm 3 is connected via a web 4 to the upper surface 2. The proximal end of the web 4 houses a light guide means 5 (see Figs. 2 and 3).

When the blade 1 has been introduced into the mouth of a patient, the channel defined by the web 4, the lower arm 3 and the surrounding pharynx of the patient, serves as a guide for introducing an intubation catheter into the trachea of the patient. A heel 6, which permits an easy clip-on connection to a handle of the laryngoscope (not shown) is molded onto the blade 1 at the proximal end. As shown in greater detail in Fig. 2, the light guide means 5 extends from the lower surface of the heel 6 up to an outlet point 7 located between the proximal and distal ends of the blade 1. An opening is formed in the web 4 forwardly of the outlet point 7.

The light guide means 5 consists of a housing or box 8 and a bundle 9 of optical fibers. The box 8 is formed from a first part 10 and a lid 11. The first part 10 and the lid 11 are secured to one another by cement or by means of a suitable snap connection. One

or more supports 12, the or each consisting of a rib or stud of conical cross-section is/are molded integrally with the first part 10. At the proximal and distal ends of the box 8, the bundle 9 of fibers is secured in place by means of annular holders 13 and 14, respectively.

As shown in Figs. 2 and 3, the cross-section of the bundle 9 changes from circular at the proximal end (i.e. holder 13 is of circular cross-section) to oval at the distal end (i.e. holder 14 is of oval cross-section).

During manufacture, the bundle 9 of optical fibers is first threaded into the holders 13 and 14, which are then inserted into grooved recesses in the end walls of the first part 10, annular webs molded onto the holders locating in the grooves and ensuring a positive connection between the holders 13, 14 and the first part 10. Between the holders, the fibers of the bundle 9 are disposed freely, much in the manner of a curved strand of hair. The lid 11 of the box 8 is then placed upon the first part 10 and joined thereto, for example by cementing. The fibers of the bundle 9 which protrude beyond the holders 13 and 14 are then ground and polished to ensure good transmission properties for the light guide means and ensure that a high proportion of the light entering the heel 6 from the handle, exits from the outlet point 7. The lid 11 and the first part 10 of the light guide means 5 can be provided with outwardly extending projections or studs (not shown), which further improve the ease and accuracy of mounting the light guide means 5 in the injection mold.

After the light guide means 5 has been inserted into the injection mold, the latter is closed with the holders 13 and 14 serving to seal the injection mold. During injection of the plastics material into the mold, the support(s) 12 prevent(s) the box 8 collapsing, thereby preventing the plastics material from penetrating into the interior of the box 8 and damaging the fibers of the bundle 9 during or after the high pressure injection.

Apart from possible minor final treatments, the blade 1 is fully manufactured when it is removed from the mold after the plastics material has hardened.

In the preferred embodiment of the blade illustrated, the heel 6 of the blade 1 is provided with a ball cage 15 which passes through the heel transversely to the longitudinal axis of the blade 1. The ball cage 15 (see Fig. 4) consists of a sleeve 16 which, at its ends, is provided with constrictions, so that two balls 17, located in the sleeve 16 and each having an external diameter which is smaller than the internal diameter of the sleeve 16, are held in the sleeve 16 in such a way that they project somewhat beyond the ends of the sleeve 16. The balls 17 are urged apart by means of a helical spring 18. Prior to

the injection molding of the blade 1, the ball cage 15 is positioned in the mold in such a way that, when the blade is removed from the mold, the balls 17 project beyond the outer contour of the heel 6 (see Figs. 2 and 3).
 5 These balls 17 serve to removably lock the blade 1 on the handle of the laryngoscope.

As Fig. 2 also shows, the heel 6 of the blade 1 is provided with a recess, which serves to hook the blade 1 onto a pin (not shown) of the handle. In this recess, a stud 19 is provided, which is integrally formed on the heel 6 and which, when the blade 1 is pushed over the pin, snaps over the latter and then results in a secure mounting of the blade 1 on the handle. More than one stud 19 can be provided and these can be located side by side and/or on opposite sides of the recess.
 10
 15

20 CLAIMS

1. A laryngoscope blade having a heel at the proximal end and light guide means extending between the heel and an outlet point located between the proximal and distal ends of the blade, characterised in that the blade with its heel is an injection-molded mass of plastics material which encloses the light guide means.
 25

2. A laryngoscope blade according to claim 1, in which the light guide means comprises a housing containing a bundle of optical fibers, the housing being embedded in the mass of plastics material to leave the said bundle extending from the heel to said outlet point.
 30
 35

3. A laryngoscope blade according to claim 2, in which the ends of the bundle of optical fibers are mounted in holders which in turn are each mounted in a wall of the housing a protrude beyond the latter.
 40

4. A laryngoscope blade according to claim 2 or claim 3, in which the housing comprises a first part and a lid fixed to the first part.
 45

5. A laryngoscope blade according to claim 2, 3 or 4, in which the bundle of optical fibers is embedded in the housing by means of a further mass of plastics material.
 50

6. A laryngoscope blade according to claim 4, in which the lid and first part of the housing are held at the required relative dispositions by support means integrally formed in the housing.
 55

7. A laryngoscope blade according to claim 2, 3 or 4 in which projections for holding the housing in a desired position in an injection mold are provided on the outside of the housing.
 60

8. A laryngoscope blade according to claim 1, in which the light guide means includes a tubular member into which a bundle of optical fibers has been inserted.
 65

9. A laryngoscope blade according to claim 8, in which the ends of the bundle of optical fibers are mounted in holders which in

turn are fixed relative to the tubular member.

10. A laryngoscope blade substantially as hereinbefore described with reference to, and as illustrated in, Figs. 1, 2 or 3 of the accompanying drawings.
 70

11. A laryngoscope including a blade as claimed in any preceding claim.

Printed for Her Majesty's Stationery Office
 by Burgess & Son (Abingdon) Ltd.—1983.
 Published at The Patent Office, 25 Southampton Buildings,
 London, WC2A 1AY, from which copies may be obtained.