[54] ENVELOPE OF AN ENDOSCOPE

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[58] Field of Search ........... 128/3, 4, 347, DIG. 16,
                               128/DIG. 6, DIG. 26, 214.4

[56] References Cited

UNITED STATES PATENTS

1,087,845 2/1914 Stevens .................. 128/214.4 UX

2,990,830 7/1961 Hett............................... 128/4

[57] ABSTRACT

An envelope fitted to an endoscope provided with a flexible connection tube used in observing the stomach and liver, thereby enabling said flexible connection tube to have the same function as a rigid connection tube used in observing the abdominal and breast cavities.

3 Claims, 2 Drawing Figures
ENVELOPE OF AN ENDOSCOPE

BACKGROUND OF THE INVENTION

This invention relates to an envelope fitted to an endoscope provided with a flexible connection tube so as to attain the broader application of said endoscope. An endoscope provided with a flexible connection tube is mainly used in observing the stomach and liver. On the other hand, observation of the abdominal and breast cavities is effected by a special endoscope fitted with a rigid connection tube, generally known as a laparoscope or thoracoscope. With such a special type of endoscope, a connection tube is not allowed to be flexible due to requirements of application, but can only be linearly inserted into the abdominal or breast cavity, and is consequently accompanied with the drawback of obstructing the full observation of, for example, the lateral and back sides of the liver. Further, the abdominal and breast cavities readily present a strong physiological reaction to the insertion of an endoscope. Therefore, the aforesaid endoscope provided with a flexible connection tube, particularly a type fitted at the foremost end with a flexible bendable section presents difficulties in being inserted up to the point where a desired object of observation is located, when the above-mentioned physiological reaction is also taken into consideration.

SUMMARY OF THE INVENTION

This invention has been accomplished as a means for resolving such difficulties, and is intended to provide an envelope which enables an endoscope bearing a flexible connection tube to be smoothly conducted up to an object of observation such as the abdominal and breast cavities, thereby permitting an easy examination of any part of said cavities which has hitherto obstructed the application of the conventional laparoscope or thoracoscope.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a sectional view of an envelope embodying this invention, showing the condition in which said envelope is fitted to an endoscope; and FIG. 2 shows the flexed state of the bendable section of the connection tube of an endoscope.

DETAILED DESCRIPTION OF THE INVENTION

There will now be described by reference to the appended drawings an endoscope envelope according to this invention, together with a trocar.

Referring to FIG. 1, reference numeral 1 shows the abdominal wall of the human body. Reference numeral 2 denotes a trocar located outside of the abdominal wall 1 with the forward end of the cylindrical member 3 of said trocar 2 inserted into the abdominal cavity through the prescribed cut out portion of the abdominal wall 1. The trocar 2 has an O-ring 4 fitted to the inside of that rear end of the cylindrical member 3 which is disposed outside of the abdominal wall 1. To the side wall of the rear end of the cylindrical member 3 is fitted a stop screw 5 whose end projects through the cylindrical member 3. At the center of that periphery of the cylindrical member 3 which is disposed outside of the abdominal wall 1 is provided a piston holder 6 to project outward. In said holder 6 is received a slidable piston 8, which is always urged only in one radial direction by having its inner end contacted by a compression spring 7 disposed in the bottom portion of said holder 6. The outer end portion of said piston 8 constitutes a rod 9 of smaller diameter which projects outside of the holder 6 through an opening cut out in the end face thereof. The projecting end of the rod 9 is fitted with a grip 10. Depression of the grip 10 permits the sliding of the piston 8 against the force of the spring 7. The piston 8 has a through hole 11 bored crosswise, which, when the piston 8 is normally urged outward by the compression spring 7, does not communicate with the cylindrical member 3, but when the piston 8 is depressed inward from above against the force of the compression spring 7, communicates with said cylindrical member 3.

An endoscope envelope 14 according to this invention is fitted to the distal end portion 12a of the connection tube 13 of the endoscope 12. The envelope 14 includes a rigid cylindrical tube member or pipe 15 having a slightly larger inner diameter than the outer diameter of the distal end portion 12a so as to permit its slideable insertion and obstructing the flexibility of the connection tube 13, and a flange 16 having an appreciably larger diameter than that of said rigid cylindrical tube member 15 and integrally constituting the rear end thereof. Said flange 16 has a round cylindrical cavity 17 so as to surround the connection tube 13. In said cavity 17 is received a ring packing 18 made of rubber or flexible synthetic resin, the inner wall of said packing 18 surrounding the connection tube 13 in close contact therewith. Outside of the packing 18 is disposed a tightening plate spring 19. Against the outer surface of said plate spring 19 abuts the end of a tightening screw 20 inserted into the cylindrical cavity 17 of the flange 16. Accordingly, operation of said tightening screw 20 enables the seal of the connection tube 13 by the packing 18 to be controlled through the action of the plate spring 19, offering convenience in attaining the harmless seal of the connection tube. Further, the seal between the envelope 14 and connection tube 13 is effected by an O-ring 21 received in the flange 16 so as to surround the connection tube 13.

The envelope 14 constructed as described above is fitted, as shown in FIG. 1, to the endoscope 12. For observation of the abdominal cavity, the connection tube 13 and the outermost end of the cylindrical tube member 15 of the envelope 14 firmly supporting said connection tube 13 are inserted into the abdominal cavity through the cylindrical member 3 of the trocar 2 and the through hole 11 of the piston 8. When the distal end portion 12a of the endoscope 12 approaches an object of observation, for example, a liver 22, then the stop screw 5 of the trocar 2 is tightened to fix the envelope 14 to the trocar 2. Thereafter, the tightening screw 20 of the envelope 14 is loosened to release the connection tube 13 from the envelope 14. At this time, the distal end portion 12a of the endoscope 12 and that portion of the connection tube 13 which follows said distal end portion 12a are drawn nearer to the liver 22. When the distal end portion 12a reaches a desired position, then the screw 20 is tightened to fix the connection tube 13 to the envelope 14. Under such condition, the bendable section of the connection tube 13 is flexed, as shown in FIG. 2, by external operation so as to bring the distal end portion 12a to the back of the liver 22 for observation.

As mentioned above, that portion of the connection tube 13 of the endoscope 12 which is surrounded by the rigid cylindrical tube member 15 can be as easily
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introduced up to an object of observation in the ab-
dominal cavity as the conventional rigid laparoscope
with the bendable section of said connection tube
still prevented from being flexed. Accordingly, applica-
tion of the envelope 14 of this invention enables an en-
doscope provided with a flexible connection tube and
hitherto used only in the observation of the stomach to
be available for all internal examination without using
any special observation means like the prior art laparo-
scope or thoracoscope.

With the conventional endoscope, the trocar is pro-
vided with a piston to prevent the leakage of internal
air or carbon dioxide when the distal end portion of the
endoscope is inserted into or pulled off from the ab-
dominal cavity, said piston directly applying pressure to
the connection tube. However, the envelope of this in-
vention absorbs said piston pressure fully to prevent the
internal organs from being damaged thereby. It will be
obvious that the envelope of this invention may be
safely inserted into the abdominal cavity without using
the aforementioned trocar depending on the condition
of an object of observation.

What is claimed is:

1. An endoscope envelope for attaining the insertion
of an endoscope having a flexible connection tube,
comprising:
a rigid pipe into which said connection tube is slid-
able inserted and which supports at least that por-
tion of said connection tube which is to be intro-
duced into the human body so as to obstruct the
flexibility of said portion, said rigid pipe including
a first portion adapted to be inserted into the
human body, said first and second portions being
concentrically connected; and
fixing means disposed outside of the human body to
removably attach said rigid pipe to said connection
tube.

2. The endoscope envelope according to claim 1
wherein said fixing means comprises a flange having a
hollow portion and abutting against said second por-
tion; a seal member received in said hollow portion to
surround said connection tube; and a tightening screw
inserted into the flange from the outside to control the
condition of the seal member and to also fix the flange
to said connection tube.

3. The endoscope envelope according to claim 2
wherein said fixing means includes a plate spring dis-
posed between the seal member and tightening screw.
UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,822,697 Dated July 9, 1974

Inventor(s) Osamu KOMIYA

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 4, line 8, after "human body" insert --and a second portion adapted to remain outside of the human body--.

Signed and sealed this 5th day of November 1974

(SEAL)

Attest:

McCoy M. GIBSON JR. C. MARSHALL DANN
Attesting Officer Commissioner of Patents