United States Patent [19]

Francisoud et al.

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[54] **DEVICE FOR HOLDING A CATHETER IN AN EXTENDED CONDITION**

[75] Inventors: **Jacques Francisoud**, Oullins; **André Sausse**, Sceaux, both of France

[73] Assignee: **Rhone-Poulenc S.A.**, Paris, France

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[30] **Foreign Application Priority Data**

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[52] **U.S. Cl.** **128/348**

[51] **Int. Cl.²** **A61M 25/00**

[58] **Field of Search** 128/348–351, 128/DIG. 26

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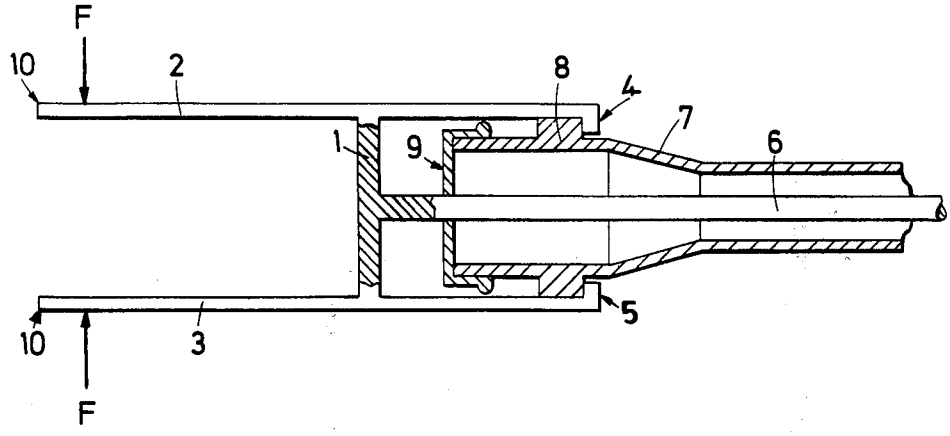
Primary Examiner—Lawrence W. Trapp

Attorney, Agent, or Firm—Stevens, Davis, Miller & Mosher

[57] **ABSTRACT**

A device for holding, in a longitudinally extended state, a catheter e.g. of the Malecot or Pezzer type, having an open proximal end, a closed distal end and an elastic bulge adjacent the distal end. The device comprises a mandrel which is insertable into the catheter to move the distal end of the catheter away from the proximal end and a bearing component for the mandrel having at least one latching member mounted thereon which is releasably connectable to the proximal end of the catheter to hold the mandrel in the catheter when the latter is in its extended position. An assembly is also described in which the bearing component is permanently secured to the proximal end of the catheter, the bearing component having a seat in which the proximal end of the mandrel can be releasably inserted.

15 Claims, 10 Drawing Figures



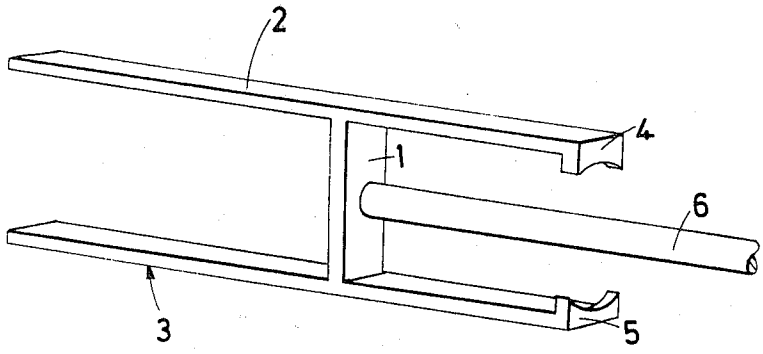


FIG. 1.

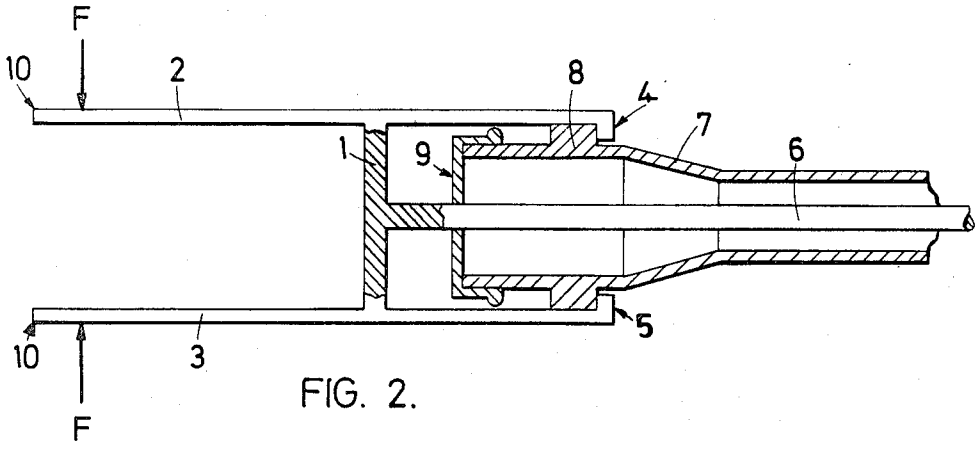


FIG. 2.

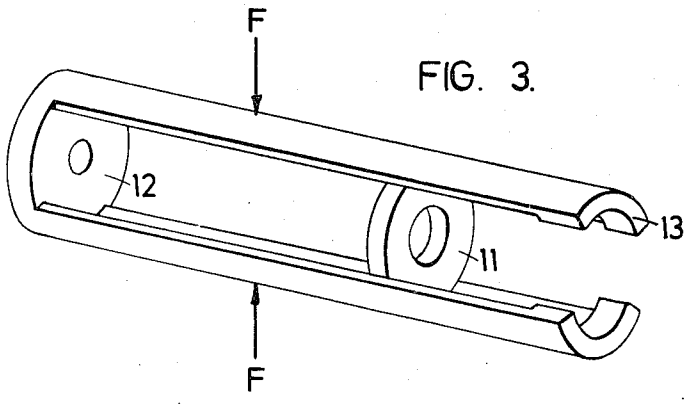


FIG. 3.

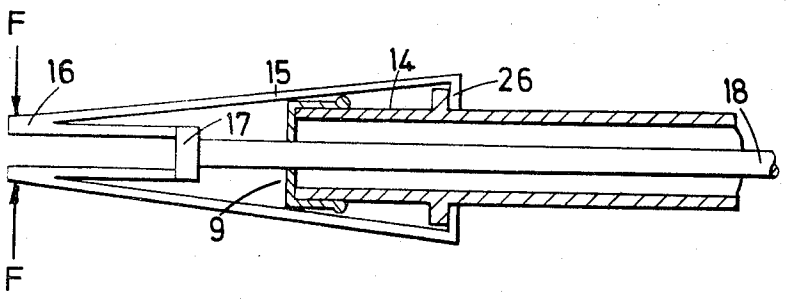


FIG. 4.

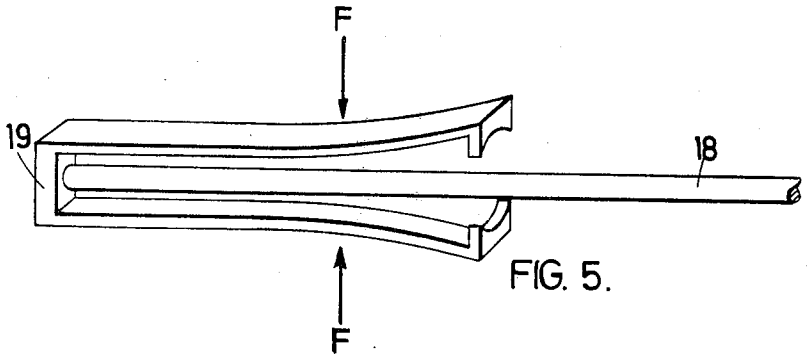
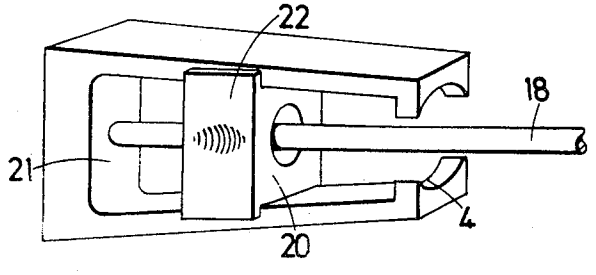


FIG. 5.

FIG. 6.



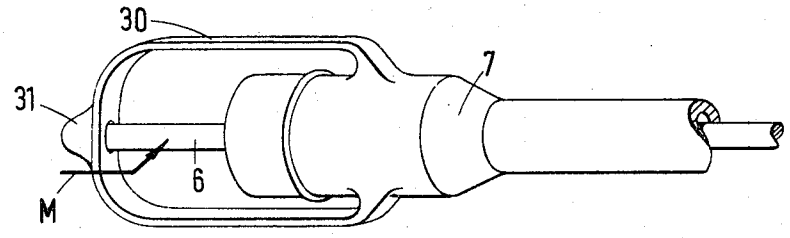


FIG. 7.

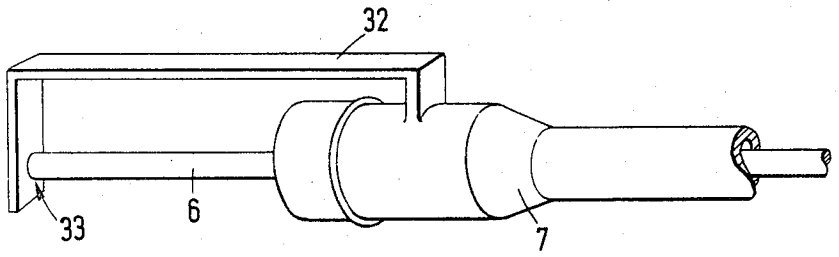


FIG. 8.

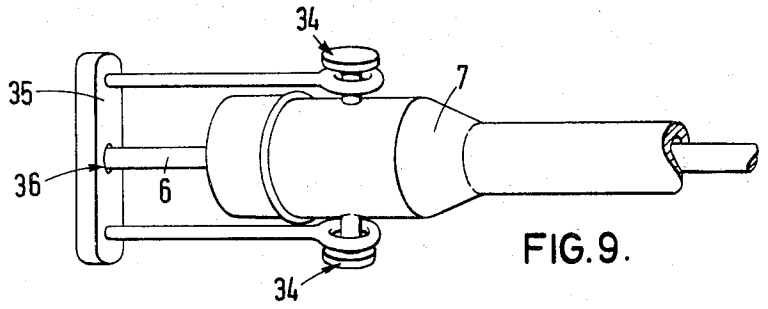


FIG. 9.

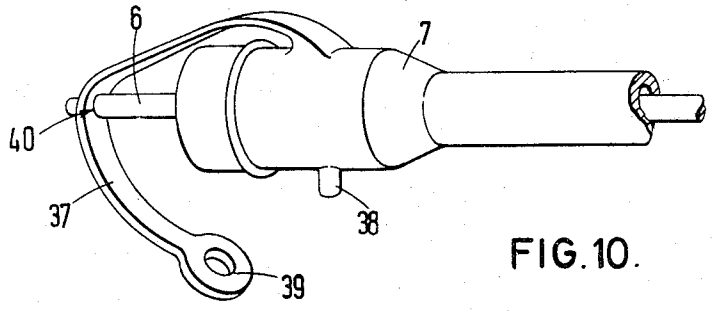


FIG. 10.

DEVICE FOR HOLDING A CATHETER IN AN EXTENDED CONDITION

The present invention relates to a device for holding a catheter in an extended condition.

When a catheter which, at rest, possesses one or more bulges, for example a catheter of the Malecot or Pezzer type, has to be placed in position or withdrawn, it is desirable to be able to smooth out this bulge or these bulges and to do this the distal end can be moved away from the proximal end by means of a non-rigid axial mandrel which rests at the distal end of the internal wall of the catheter. By pulling the proximal end of the catheter backwards relative to the mandrel, the catheter is stretched and the bulge or bulges are thus momentarily smoothed out. It is thus possible to move the catheter inside the body of the patient without running the risk of injuring the flesh, either in order to introduce the catheter or to withdraw it. Furthermore, it is necessary for the catheter to be kept in the extended condition all the time it is being moved.

According to the present invention we provide a device for holding, in a longitudinally extended state, a catheter having an open proximal end, a closed distal end and an elastic bulge adjacent the distal end, the said device comprising a mandrel insertable into the catheter, to move the distal end of the catheter away from its proximal end, a bearing component for the mandrel connected to the proximal end of the mandrel and at least one latching member mounted on the bearing component and releasably connectable to the proximal end of the catheter.

With such a device it is possible to maintain the relative positions of a catheter and the mandrel, with the catheter in the stretched condition.

According to another aspect of the invention there is provided an assembly comprising a catheter having an open proximal end, a closed distal end and an elastic bulge adjacent the distal end, a bearing component including an arm connected to the proximal end of the catheter, a mandrel insertable into the catheter to move the distal end of the catheter away from its proximal end and a seat on the bearing component for releasable insertion of the proximal end of the mandrel into the bearing component.

In order that the invention will more readily be understood, the following description is given, merely by way of example, reference being made to the accompanying drawings, in which:

FIG. 1 is a perspective view of one embodiment of device according to the invention;

FIG. 2 is a cross-section along an axial plane of a catheter which carries a leakproofing cap and is equipped with a device according to FIG. 1;

FIGS. 3 to 6 are each perspective views of four further embodiments of device according to the invention; and

FIGS. 7 to 10 are each perspective views of four embodiments of assembly according to the invention.

The device represented in FIG. 1 consists of a bearing component 1 carrying two latching members 2 and 3 equipped with jaws 4 and 5 at one of their ends; the latching members 2 and 3 are parallel to one another and substantially perpendicular to the bearing component and extend from the ends of the bearing component which is substantially centrally located with respect to the arms to form an H-shaped construction.

The mandrel 6 for extending the catheter is carried by the centre of the bearing component. The mandrel and the two jaws are situated on the same side relative to the bearing component, so that the entire construction is symmetrical relative to the axis of the mandrel.

FIG. 2 is an axial cross-section of a catheter with a device as described above, illustrated in elevation, placed at the proximal end of the catheter. The jaws 4 and 5 grip the proximal end of a catheter which also has an endpiece 7 carrying an annular bead 8 which has a substantially rectangular cross-section and makes it possible to latch the jaws thereon.

The proximal end of the catheter is equipped with a cap 9 which provides leakproofness between the catheter and the extension mandrel during operations involving the placing of the catheter in position and its withdrawal. It consists of a hollow cylindrical element closed at one of its ends by a wall having an orifice for the mandrel, the free end being terminated by a bead. The leakproofing cap is made of a thin flexible and elastic material.

The shape of the bearing component is not generally critical. The thickness of the bearing component is such that the mechanical strength is sufficiently great, the thickness being usually between 0.5 and 10 mm and preferably between 1 and 5 mm.

The number of latching members can be between one and five, and is advantageously two. The cross-section of the latching members can be a simple geometric shape, and is preferably rectangular.

The length of the latching members is such that it makes it possible, firstly, for the jaws to grip the proximal end of the catheter, the jaws locking over the annular bead carried by the end-piece, and secondly, for a force (F) applied perpendicular to the latching members at the ends opposite the jaws 10 to allow the proximal end to be freed by unclamping the jaws, the junction between the latching members and the bearing component serving as a fulcrum of a lever formed by the latching members.

The mandrel 6 has a cross-section of simple geometric shape and is preferably cylindrical; its diameter is usually equal to half the diameter of the internal passage of the unstretched catheter and its length is such that it makes it possible to stretch the catheter, by pressing against the distal end, in order to smooth out the bulges situated at the distal end. Advantageously, the diameter of the mandrel can be chosen so that it is substantially equal to the internal diameter of the catheter in the stretched position. Leakproofness between the mandrel and the catheter is then ensured by contact between the internal surface of the catheter and the mandrel. The use of a leakproofing cap as described above is then no longer necessary. The mandrel can fit into a recessed hole in the bearing component, the hole being centred on the axis of the latter, and the cross-section of this hole is suited to the cross-section of the mandrel. The combination consisting of the bearing component, the latching members and the jaws can then be suited to various sizes of catheter. It is also possible to produce the mandrel, the bearing zone, the latching members and the jaws in a single piece.

In the device represented in FIG. 3 the fulcrum can consist of an element in the form of a circular ring 11 which allows the mandrel to pass through it; the bearing component 12 and the jaws 13 are situated on either side of the circular ring. Pressure exerted on the latching members between the bearing component and

the circular ring, in the direction of the arrows F, frees the jaws. The mandrel and the device may or may not be in a single piece.

According to FIG. **4**, the catheter can optionally be fitted at its proximal end with a rigid nozzle **14** having a bead **26** which enables the jaws to grip. The latching members rest at **15** on the end of the rigid nozzle which thus serves as a fulcrum. A pinching movement at **16**, in the direction of the arrows F, frees the jaws. The mandrel **18** and the bearing component **17** are integral with the latching members and the jaws.

The device represented in FIG. **5** also uses a rigid nozzle situated at the proximal end of the catheter as the fulcrum; pressure exerted on the resilient latching member, in the direction of the arrows F, at a point situated between the bearing component **19** and the fulcrum situated on the rigid nozzle, makes it possible to free the jaws.

The device represented in FIG. **6** can comprise a movable element **20**, the longitudinal movement of which, parallel to the axis of the mandrel, in the direction from the bearing component **21** towards the jaws, makes it possible to move the latter apart; a movement in the opposite direction enables the jaws to grip the proximal end of the catheter. Flanges **22** prevent any lateral movement of the movable element.

The assembly illustrated in FIG. **7**, includes the endpiece **7** of a catheter having two integral arms which form a handle **10**, produced during the molding process, and a lateral movement in the direction of M of the proximal end of the extension mandrel **6** ensures that the catheter is placed in the stretched position by introducing the proximal end of the extension mandrel into a seal **31**, formed in the portion of the bearing component at the end of the handle.

The assembly of FIG. **8** includes the end-piece **7** of a catheter having a semi-rigid arm **32**, and the catheter is placed in the stretched position by introducing the proximal end of the extension mandrel into a recessed hole **33** in the bearing component formed at the free end of the arm.

FIG. **9** shows an assembly having two arms forming a handle **35** hinged on two swivel-pins **34** carried by the endpiece **7** of the catheter. The extension mandrel is held in position by introducing its proximal end into an orifice **36** present in a reinforced bearing component of the handle, after pivoting the latter, the catheter being in the stretched condition.

According to FIG. **10**, the assembly includes the endpiece of the catheter, which carries an arm **37** which is anchored, by means of an orifice **39**, on a lug **38** carried by the end-piece. The extension mandrel **6** rests in a seat **40** carried by the arm. The arm **37** can be connected permanently to the end-piece or can be removable.

The catheter can be held in the extended position by the use of a pin which passes through the end-piece of the catheter and immobilises the mandrel at its proximal end. Advantageously, the pin is connected to the end-piece of the catheter by means of a tab.

In order to achieve leakproofness between the catheter and the extension mandrel, it is possible to use a mandrel of diameter equal to the internal diameter of the catheter in the stretched condition.

The materials used to produce the device or assembly are compatible with biological fluids and especially blood. Moreover, they possess sufficient elasticity to make it possible, for example, for the latching members or arms to play the role of a lever and possess the necessary rigidity for the jaws and the mandrel. Thermoplastic materials or elastomers, and preferably silicone elastomers, can be used as the material. The devices can be sterilised by radiation, and those made from polytetrafluoroethylene can advantageously be sterilised by means of dry heat.

The device for holding a catheter in the extended position, which is the subject of the invention, makes it possible to keep the bulges of a catheter of the Pezzer or Malecot type momentarily smoothed out.

The use of the device is particularly advantageous when the catheter is being placed in position or withdrawn and considerably facilitates these operations.

We claim:

1. A device for holding, in a longitudinally extended state, a catheter having an open proximal end, a closed distal end and an elastic bulge adjacent the distal end, the said device comprising a mandrel having a distal end and a proximal end insertable into the catheter, to move the distal end of the catheter away from its proximal end, a bearing component for the mandrel connected to the proximal end of the mandrel and at least one latching member mounted on the bearing component and releasably connectable to the proximal end of the catheter.

2. A device as claimed in claim **1**, and further comprising locking jaws on the latching member for gripping the proximal end of the catheter when the latter is in its stretched condition.

3. A device as claimed in claim **1**, wherein the latching member is pivotally mounted on the bearing component in the manner of a lever.

4. A device as claimed in claim **3**, wherein the bearing component includes a central member and two parallel latching members extending therefrom and carrying at their free ends locking jaws for gripping the proximal end of the catheter.

5. A device as claimed in claim **4**, wherein the bearing component is placed centrally of the two parallel arms to provide an H-shaped configuration.

6. A device as claimed in claim **4**, wherein the bearing component is arranged at the remote end of the latching members from the jaws and further comprising an element intermediate the bearing component and the jaws.

7. A device as claimed in claim **6**, wherein the element is slidable parallel to the latching members.

8. A device as claimed in claim **3**, wherein the latching member is controllable by pressure exerted perpendicularly to its length.

9. A device as claimed in claim **1**, wherein the bearing component is firmly fixed to the mandrel.

10. A catheter assembly comprising a catheter having an open proximal end, a closed distal end and an elastic bulge adjacent the distal end, a bearing component including an arm connected to the proximal end of the catheter, a mandrel having a distal end and a proximal end insertable into the catheter to move the distal end of the catheter away from its proximal end and a seat on the bearing component for releasable insertion of the proximal end of the mandrel into the bearing component.

11. An assembly as claimed in claim **10**, and further comprising a frame firmly fixed to the arm.

12. An assembly as claimed in claim **10**, wherein the bearing component is connected by two arms to the proximal end of the catheter and the arms are pivotally

mounted on the proximal end of the catheter.

13. An assembly as claimed in claim **10,** and comprising two arms, one permanently connected to the proximal end of the catheter and the other free, and further comprising a lug on the proximal end of the catheter and an orifice in said other arm securable over said lug.

14. An assembly as claimed in claim **10,** wherein the assembly is constructed of a silicone elastomer.

15. An assembly as claimed in claim **10,** wherein the assembly is constructed of a thermoplastic material.

* * * * *