

[54] CATHETER DEVICES

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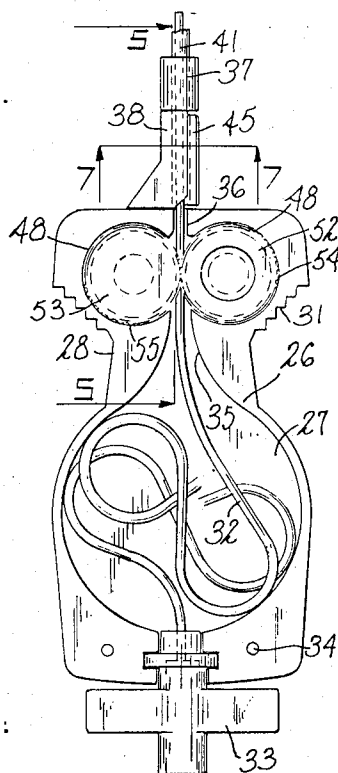
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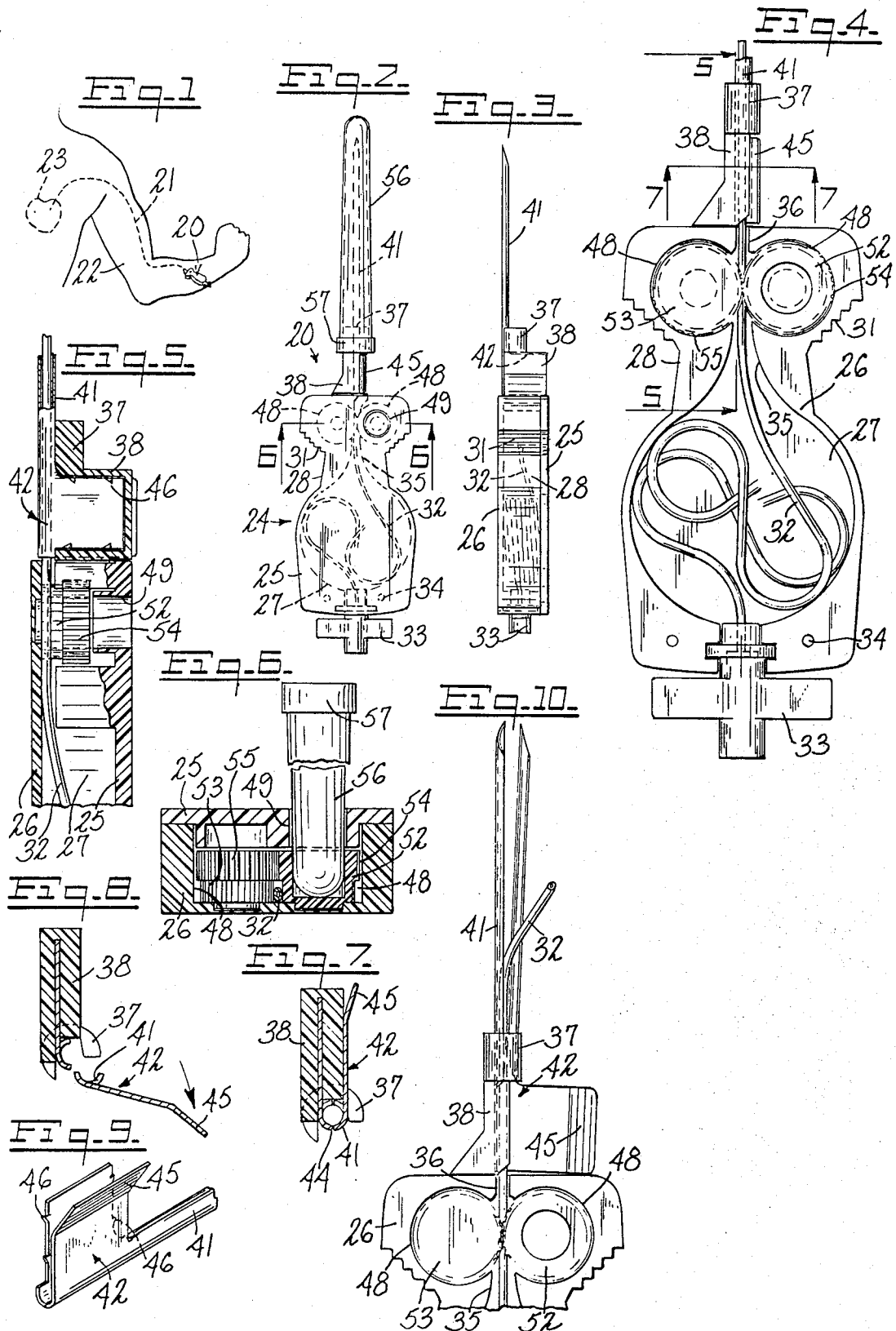
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[57] ABSTRACT

A device for inserting a catheter into a mammalian body, comprising a housing member for storing a flexible catheter, a hollow needle connected to the catheter and supported on the housing member so as to form an extension of a side of the housing member, and at least one driven roller within said housing member for engaging and moving the catheter through the needle. An end of a removable shield for the needle is inserted in an opening in the housing member for rotating the driven roller.

14 Claims, 10 Drawing Figures





CATHETER DEVICES

BACKGROUND OF THE INVENTION

This invention relates to a device for inserting a catheter into a mammalian body and more particularly to a device for moving a catheter through passageways, canals, or blood vessels of a mammalian body.

In applicant's co-pending application Ser. No. 15,039 filed Feb. 27, 1970, and now abandoned, a device for inserting a catheter is disclosed which comprises a housing member, a hollow needle supported in the housing member and drive means for engaging the catheter and moving the catheter through the needle, wherein the housing member defines a passage for moving a flexible catheter to the needle. The catheter is any flexible tube designed for insertion into a mammalian body for various medical purposes. The device of the copending application, as well as the device of the present invention, maintains the catheter in a sterile condition prior to and while it is being inserted, and includes as integral elements a hollow needle used to initially insert the catheter and drive means associated with the housing member for engaging and moving the catheter through the needle.

The present invention generally provides the benefits and advantages of the prior invention but is a significant improvement thereon in a number of respects. For example, the device disclosed in the prior application includes a needle with an end mounted within the housing member, thereby requiring opening of the housing member to remove the needle and the catheter from the needle. Moreover, in the prior application the preferred form of drive means includes a knob mounted on the housing member for rotating a gear attached to a roller within the housing for engaging and moving the catheter. In addition, the needle of the prior device is centrally mounted in one end of the housing member thereby presenting an abutment edge on the end of the housing member adjacent the needle, which edge reduces the facility with which the needle may be inserted into a mammalian body. Still further, the prior device and the device of the present invention differ with respect to the convenience and mode of removal of the catheter from the needle and housing member.

OBJECTS AND SUMMARY

Accordingly, an object of the invention is to provide a new and improved device while nevertheless generally retaining the benefits of the device of the prior application.

Another object is to provide a new and improved device for inserting a catheter wherein the catheter is thereafter quickly and conveniently removable from the housing member of the device.

Another object is to provide a new and improved device for inserting a catheter wherein the catheter is thereafter conveniently removable from the needle but without opening the housing member.

Still another object is to provide a new and improved device for quickly and conveniently inserting and moving a catheter into a mammalian body.

Another object is to provide a new and improved device for inserting a catheter, from which are eliminated surfaces which impede insertion of the needle of the device into a mammalian body.

These and other objects, features and advantages of the invention will in part be obvious and will in part be apparent from the specification which follows.

In summary outline, the invention is a device for inserting a catheter comprising a housing member, a hollow needle supported on the housing member so that the needle substantially forms an extension of a side of the housing member, the needle being openable along its length for removal of the catheter and the housing member defining a passage for moving the catheter to the hollow needle, and drive means comprising at least one driven roller for engaging and moving the catheter through the needle.

The invention accordingly comprises the features of construction, combination of elements and arrangements of parts which will be exemplified in the construction hereinafter set forth, and the scope of the invention will be indicated in the claims.

DETAILED DESCRIPTION

For a more complete understanding of the nature and objects of the invention, reference is made to the following description, taken with the accompanying drawing, in which:

FIG. 1 is a perspective view showing a device of the invention moving a catheter through a blood vessel into close proximity to the heart organ;

FIG. 2 is a front elevational view of a device of the invention;

FIG. 3 is a side elevational view of a device of the invention;

FIG. 4 is a front elevational view similar to FIG. 2 but somewhat enlarged and with the cover of the device removed to show underlying structure;

FIG. 5 is an enlargement of a vertical section along the line 5—5 of FIG. 4, partially cut away to show underlying structure;

FIG. 6 is a horizontal section along the line 6—6 of FIG. 2;

FIGS. 7 and 8 are enlarged horizontal sections along the line 7—7 of FIG. 4 with FIG. 8 showing a changed position of the upper portion of the member;

FIG. 9 is an enlarged perspective view of the lower portion of a needle comprising a portion of the device; and

FIG. 10 is an enlarged perspective view of the needle portion of the device showing features relating to removal of a catheter.

With reference to FIG. 1, a device 20 of the invention is shown with its needle inserted in a blood vessel 21 of an arm of a patient, for the purpose of providing access to a portion of the body such as the heart region 23. After insertion of the needle, the catheter is moved through the vessel 21 into the heart region 23 and the needle is then removed from the device and the catheter used in removing body fluids or for the administration of fluids, in accordance with known medical procedures. Similarly, the device may be inserted into a body canal, passageway or cavity in order to move a catheter therethrough.

With reference to FIGS. 2-10, a device 20 comprises a casing or housing member 24 having a removable top member or cover 25 and a bottom or base member 26. The cover and base member define therebetween a chamber 27. The housing member is contracted at one portion thereof to form a neck 28 having indented edges 31, together providing the housing member with

a shape for convenient holding and gripping of the device. A catheter 32 is storable within the chamber 27 and has at its distal end a member, such as a winged tip 33, adapted for epidermal fixing or taping of the distal end of the catheter to a patient. The winged tip 33 is normally held within the body of the housing member 24 but is removable therefrom upon detachment of the cover 25. The cover 25 preferably is press-fitted to base member 26 but optionally may be fitted thereto with pins 34.

The storage chamber 27 leads to a first channel 35 and then to a second channel 36, the catheter passing through these channels into a generally semi-tubular extension 37. A pair of projections such as posts 25a and 25b extend downwardly from the underside of cover 25 into channels 35 and 36, respectively. The posts 25a and 25b preferably are constructed unitary with cover 25 and their length is such as to provide just sufficient clearance between their ends and the bottom wall of housing member 24 so as to provide room for passage and alignment therein of the catheter. As a result, the catheter is guided and moved smoothly through each of channels 35 and 36 and no undue flexing or binding of the catheter occurs as it is moved continuously and positively into and through the hollow needle 41. The semi-tubular extension 37 preferably is unitary with a slotted, generally flattened extension 38 of base member 26 but may comprise a separate element. A hollow needle 41 of known construction has a clamping member 42 comprising two wing-like members mounted on the slotted extension 38. The needle 41 has a slot extending along one edge thereof parallel to a scored edge 44. An edge 45 of the clamping member 42 may be longer than the other edge and slightly angled away to provide finger room and leverage to separate the two wings of the clamp. The clamping member 42 optionally may be provided with barbs 46 to improve the grip on slotted extension 38.

With reference to FIGS. 7-10, the catheter 32 is easily removed from needle 41 by opening or splitting the needle into the two halves defined by the parallel slot and score line 44. The broken away half of the needle is removed through the aperture 40 in the semi-tubular member 37. The catheter may thus be freed of needle 41 at any time during use of the device but without having to open housing member 24. The catheter within housing member 24 thereby is preserved from contamination.

In the upper portion of housing member 24 is a pair of annular chambers 48, one chamber of which has an opening 49 through cover 25. Within the chamber having the opening 49 is a driven roller 52 and in the second annular chamber 48 is a second roller 53. At least an upper portion 54 of roller 52, which upper portion here comprises a spur gear, is hollowed or slotted, although the slot may also extend into roller 52 itself, as shown. Optionally, each of rollers 52 and 53 may be provided with upper portions 54 and 55 comprising meshing spur gears so that the driven roller 52 may in turn drive roller 53. Alternatively, no gearing is provided and roller 53 is an idler roller, the upper portions 54 and 55 then being in sliding contact.

The opening 49 provides access to slotted driven roller 52 for insertion of an actuating device such as a shaft connected to a knob, as in the prior application. Preferably, however, as illustrated in FIGS. 2, 4 and 6, the needle 41 is provided with a shield 56, an end of

which is structured to pass through opening 44 and to form a press-fit in the slot of roller 52. When so inserted, the shield 56 is used to rotate roller 52.

Roller 52 frictionally engages catheter 32 and advances the catheter from storage chamber 27 through lower channel 35, through upper channel 36 into hollow needle 41, and then into the body of a patient. As evident in FIG. 6, while catheter 32 is being advanced by the nip formed by rollers 52 and 53, second or upper portions 54 and 55 of the rollers, of slightly greater diameter than the portions of the rollers that engage and move the catheter, align the catheter between or under the second portions and the bottom wall or base member 26 of the housing, thus preventing any tendency of the catheter from unduly flexing, binding or moving out of alignment with channels 35 and 36. These second, greater diameter portions of the rollers thus cooperate with posts 25a and 25b and the bottom wall or base member 26 of the housing to confine the catheter into alignment for smooth movement through channels 35 and 36 into hollow needle 41. The collar 57 on shield 56 facilitates removal of the shield from the needle and gripping of the shield for actuating the roller 52. It will also be noted that the lower (collared) end of shield 56 is adapted to fit snugly over the semi-tubular extension 37 when providing its protective function.

The shield 56 when inserted in opening 49 also serves as a lever to facilitate removal of cover 25 from base member 26. When so employed, the cover 25 and base member 26 are separated and each may be discarded, thus completely removing the catheter from the housing member. The winged tip 33 may be taped or otherwise fastened to the epidermal surface of the patient for convenience of medical treatment, such as administration of a blood plasma or the like, during or after removal of housing member 24. Alternatively, the winged tip 33 may be replaced with a conical attachment, as in the device of the prior application, for similar medical treatment. For most medical treatments, however, it is preferred to remove the catheter and winged tip from the needle 41, the housing member 24 and the actuator shield 56.

Preferably, at least the cover 25 is transparent so that the feeding of the catheter 32 into the body may be observed and the extent of the feed determined. While the housing member 24 is shown as substantially rectangular in cross section, other shapes, such as spherical, conical or the like, may be employed provided the needle 41 is substantially an extension of one side of the housing, and preferably substantially coplanar therewith, so that an abutment edge between the lower end of the needle and base 26 is substantially eliminated. This offset mounting of the needle on the housing member is an important feature of the invention since it facilitates insertion of the needle 41 into the patient.

Various materials may be used for the construction of the needle, housing member and catheter, as set forth in the prior application, forming no significant aspect of the present invention, and the operation of the invention is in other respects substantially the same.

It may thus be seen that the objects of the invention set forth, as well as those made apparent from the preceding description, are efficiently attained. Since changes in the disclosed embodiments of the invention as well as other embodiments thereof which do not depart from the spirit and scope of the invention may occur to others skilled in the art, the appended claims

are intended to cover all embodiments and modification to the disclosed embodiments of the invention which do not depart from the spirit and scope thereof.

What is claimed is:

1. A device for inserting a catheter into a mammalian body, comprising:

a housing member for antiseptic storage of said catheter, a hollow needle supported on said housing member so as to form an extension of a side thereof, said needle being openable along its length for removal of said catheter, said housing member defining a passage for antiseptically moving a flexible catheter to said hollow needle, said passage being adjacent the entrance to said hollow needle, drive means interiorly adjacent said housing side for engaging and moving said catheter through said passage and said needle;

said drive means comprising a pair of rollers positioned to rotate on parallel, spaced apart axes and to form a nip for said catheter between the rims of said rollers, at least one of said rollers having a second portion opposite said housing side of diameter greater than the diameter of the portion of the roller that engages and moves said catheter; and wherein a catheter receiving space is defined by said nip, said second portion and said housing side aligned with said passage and said needle, whereby said catheter is prevented from binding therein, said catheter is maintained adjacent said nip and said catheter is guided smoothly to said needle.

2. The device of claim 1 wherein said housing member defines a first chamber adapted to receive said flexible catheter and a second chamber adapted to antiseptically enclose said pair of rollers.

3. The device of claim 1 wherein one of said rollers is an idler roller and the other of said rollers is a driven roller, said rollers being positioned in said housing such that said catheter is receivable between said rollers to form said nip.

4. The device of claim 1 wherein each said roller has a said second portion, and wherein said drive means includes a pair of gears in meshing engagement, said rollers being connected to said gears for rotation therewith.

5. The device of claim 4 further including means for rotating one of said gears.

6. The device of claim 3 wherein said housing member has a base member and a removable cover, said cover having an opening therein adapted to receive means for actuating said driven roller.

7. The device of claim 6 wherein said driven roller has a recess therein adjacent said opening, and said means for actuating said driven roller comprises a removable shield for said needle, said shield having a tip complementary in shape to the shape of said recess, whereby said shield is adapted for a press-fit into said recess through said opening.

8. The device of claim 1 wherein said housing member has a base member and a removable cover, wherein said needle has a clamping member thereon, and wherein said base member has an extension adapted to receive said clamping member.

9. The device of claim 8 wherein said needle is slot-

ted and scored parallel along its length to thereby define two halves of said needle, and wherein said clamping member comprises a pair of wing-like members which are unitary one with each of said halves, whereby said needle may be opened into said halves for removal of said catheter therefrom.

10. The device of claim 9 including a removable shield for said needle, and wherein said extension of said base member includes a portion adapted to support said shield.

11. The device of claim 8 wherein said housing is adapted to hold a member which is adapted for epidermal fixing of the distal end of a catheter to a patient, said member being removable from said housing member together with said catheter upon removal of said cover.

12. The device of claim 4 wherein said second portions are defined by said gears.

13. The device of claim 6 including a pair of projections mounted on said cover and positioned to extend into said base member, the lengths of said projections being such as to align said catheter between the ends of said projections and said base member so as to guide said catheter to said needle.

14. A device for inserting a catheter into a mammalian body, comprising:

a housing member for antiseptic storage of said catheter, a hollow needle supported on said housing member so as to form an extension of a side thereof, said needle being openable along its length for removal of said catheter, said housing member having a base member and a removable cover therefor and defining a passage for antiseptically moving a flexible catheter to said hollow needle, said passage being adjacent the entrance to said hollow needle, said housing member further defining a first chamber adapted to receive said flexible catheter and a second chamber adapted to antiseptically enclose said pair of rollers, and drive means for engaging and moving said catheter through said passage and said needle;

said drive means comprising a pair of rollers positioned to rotate on parallel, spaced apart axes to form a nip for said catheter between the rims of said rollers, said drive means further including a pair of gears in meshing engagement, said rollers being connected to said gears for rotation therewith, said gears being defined by a second portion on each said roller of diameter greater than the diameter of the portion of the rollers that engage and move said catheter, said second portions being positioned to align said catheter between said second portions and the base member of said housing, whereby said catheter is guided smoothly to said needle;

said device further including a pair of projections mounted on said cover and positioned to extend into said base member, the lengths of said projections being such as to align said catheter between the ends of said projections and said base member so as to guide said catheter to said needle.

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