Dec. 6, 1938. R. E. TYVAND 2,139,428

CATHETER FORCEPS

Filed July 26, 1937 2 Sheets-Sheet 1

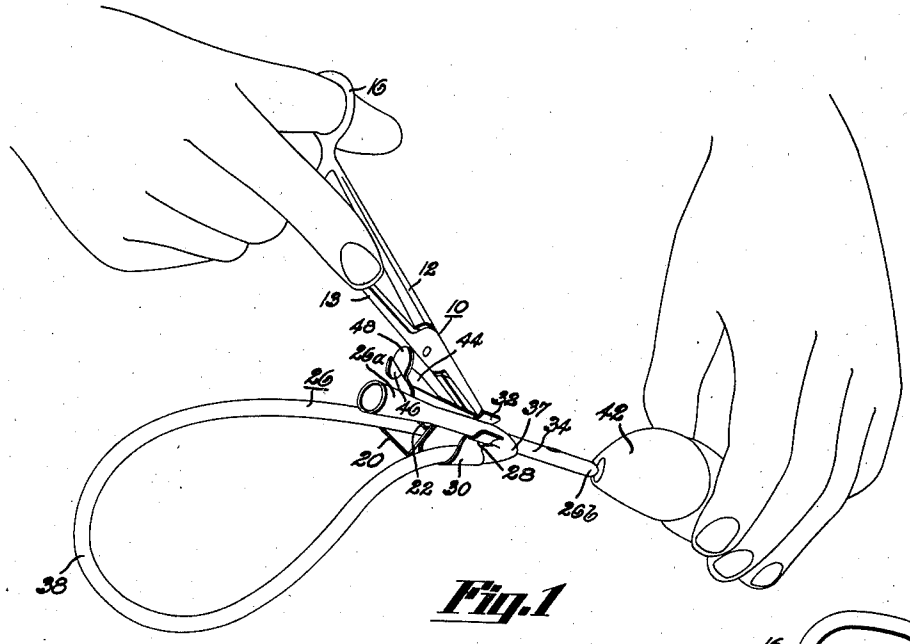


Fig. 1

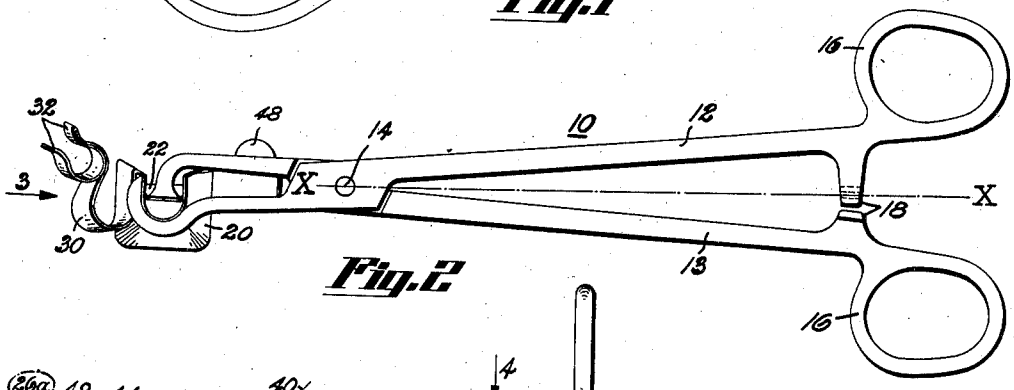


Fig. 2

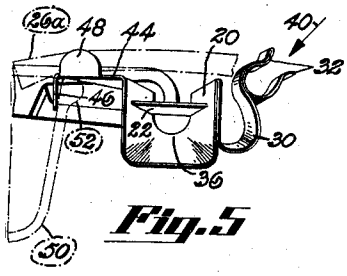


Fig. 5

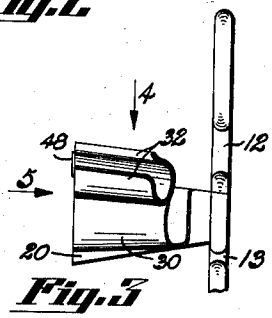


Fig. 3

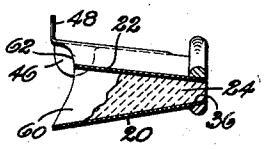


Fig. 6

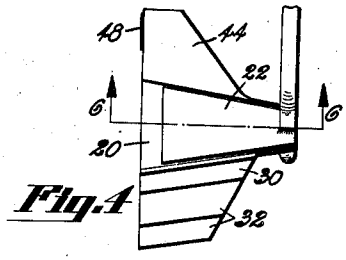


Fig. 4

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CATHETER FORCEPS

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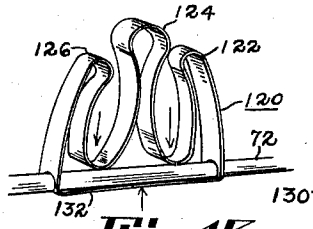


Fig. 13

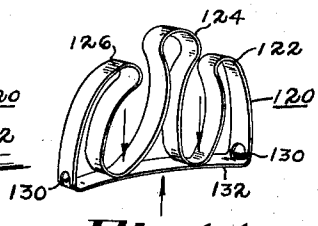


Fig. 14

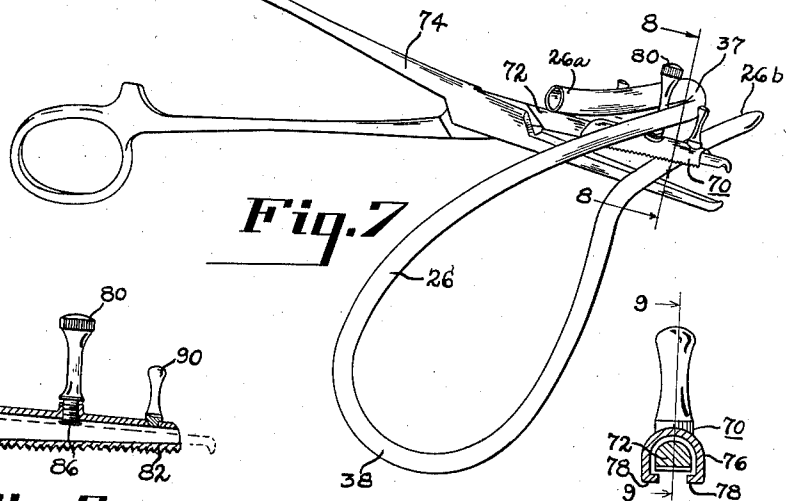


Fig. 7

Fig. 9

Fig. 8

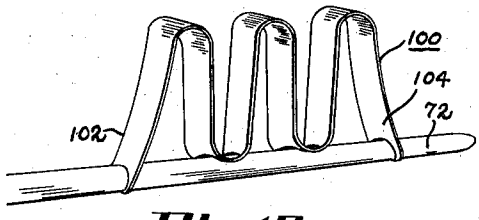


Fig. 10

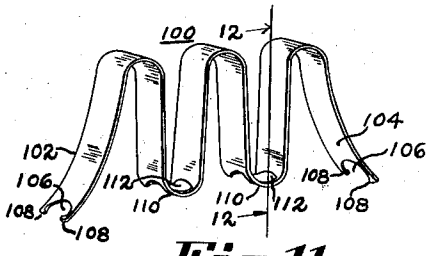


Fig. 11

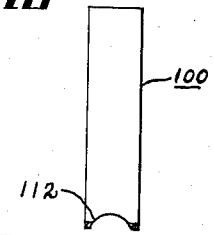


Fig. 12

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UNITED STATES PATENT OFFICE

2,139,428

CATHETER FORCEPS

Raymond E. Tyvand, Dayton, Ohio

Application July 26, 1937, Serial No. 155,748

19 Claims. (Cl. 128—351)

This invention relates to surgical instruments, and more particularly to an instrument for the sterile introduction of tubes or catheters into the human body.

This application is filed in place of my former application Serial No. 45,626 filed Oct. 18, 1935, for Surgical instrument.

Catheterization is one of the most common surgical procedures, and is widely practiced by the medical profession, by the nursing profession, by lay attendants, and, in some instances, by patients themselves.

It is a well known fact that the introduction of surgical devices into the human body involves the dangers of infection due to neglected sterile technique, as well as of trauma due to insufficient lubrication. In order to comply with the requirements of sterile technique, it is almost imperative that sterile gloves be used for the introduction of surgical devices, such as catheters. Nevertheless, sterile gloves are in disfavor for various reasons, such as inconvenience in applying them, the ever-present danger of accidental contact contamination of the worn glove, et cetera.

To prevent trauma to the delicate tissue walls of the urethral channel, for instance, thorough lubrication is of the greatest importance. Heretofore, sterile lubricant has been deposited on the entrance to the channel, as well as on the catheter, but such lubrication is beyond complete control of the operator, and hence, open to criticism.

It is among the objects of the present invention to provide for a sterile and thoroughly lubricated introduction of surgical devices, such as catheters.

It is another object of the present invention to accomplish the assuredly sterile introduction of a catheter with bare hands.

It is another object of the present invention to provide for a thorough lubrication which is not only self-executing, but also, under the absolute control of the operator.

Another object of this invention is to provide an attachment for forceps for use in supporting sterilized surgical devices.

Another object of this invention is to provide an attachment removably attached to one of the prongs of the forceps, said attachment supporting a sterilized surgical device.

It is another object of the present invention to provide a simple, durable and readily sterilizable instrument, by which all preceding objects are accomplished in a surprisingly simply, yet highly efficient manner.

Other objects and advantages reside in the construction of parts, the combination thereof and the mode of operation, as will become more apparent from the following description.

In the drawings,

Fig. 1 is a perspective illustration of one form of application of an instrument embodying the present invention.

Fig. 2 is a front elevation of the instrument.

Fig. 3 is a fragmentary side elevation of the instrument as viewed in the direction of arrow 3 in Fig. 2.

Fig. 4 is a fragmentary plan view of the instrument as viewed in the direction of arrow 4 in Fig. 3.

Fig. 5 is a fragmentary rear elevation of the instrument as viewed in the direction of arrow 5 in Fig. 3.

Fig. 6 is a section taken on the line 6—6 of Fig. 4.

Fig. 7 is a perspective view of a modification showing a removably mounted attachment for conventional forceps.

Fig. 8 is a cross sectional view taken substantially on the section line 8—8 of Fig. 7.

Fig. 9 is a cross sectional view taken substantially on the section line 9—9 of Fig. 8.

Fig. 10 is a fragmentary perspective view of another modification.

Fig. 11 is a perspective view of the attachment shown in Fig. 10 removed from the prong of the forceps.

Fig. 12 is a sectional view taken on the line 12—12 of Fig. 11.

Fig. 13 shows another modification of an attachment similar to the modifications shown in Figs. 10 to 12.

Fig. 14 shows the attachment shown in Fig. 13 removed from the prong of the forceps.

Briefly, the instrument embodies three primary features, to wit; (a) an assuredly sterile introduction of the catheter, (b) thorough lubrication of the catheter while being introduced, and (c) a removable attachment for conventional forceps. The feature under (a) is accomplished by anchoring the syringe end of a catheter to the instrument, and progressively feeding the catheter into the desired body cavity by intermittently manipulating the instrument to feed the catheter while it is gripped by said instrument. The feature under (b) is accomplished by guiding the fed catheter through a sterile lubricant, which is contained in a chamber, walls of which are moved under the manipulation of the instrument to agitate the lubricant. In the feature under (c) the attachment may be removably attached to conventional forceps now in general use.

Referring to the drawings, the reference numeral 10 designates a forceps-like construction, comprising conventional arms 12 and 13, which are pivotally connected at 14, and provided with handles 16 and a lock 18. Integral with, or secured to, the short end, or prong, of arm 12 in any convenient manner, such as brazing, is a tapered trough 20. This trough 20 may be de-

tachably attached to the prong so as to permit removal of the trough when the forceps are required for other uses. Integral with, or secured to, the short end of arm 13 is a blade 22, which is moved within the trough by manipulation of the forceps 10, thereby agitating sterile lubricant 24, which is placed into the trough, and adapted to lubricate the catheter 26 as it is passed therethrough. The blade 22 and any parts carried thereby may also be removably attached to the arm 13. The syringe end 26a of the catheter is anchored at 28 to the instrument by means of a hook 30 and a clip 32. The trough and clip may be integral with the trough as illustrated in the drawings, or may be separately secured to the instrument in any conceivable manner.

In using the instrument thus far described, some lubricant is deposited in the trough of the sterile instrument, thereafter, the sterilized catheter is picked up by the syringe end, where no danger of contamination arises because it never contacts the body cavity, as well known by those versed in the art. The tip 26b of the catheter is then guided through the trough and the lubricant therein until a substantial lubricated length 34 of the catheter projects beyond the exit of the trough substantially as shown in Fig. 1. The catheter is then gripped between the bottom portion 36 of the trough and the blade 22 upon closing the forceps, and the syringe end of the gripped catheter is placed in the hook 30 and doubled back into the clip 32 in the manner shown in Fig. 1. The sharp bend 37 in the doubled back syringe end intercepts the free passage through the catheter, as can be readily understood from Fig. 1. Due to the gripping of the tip end and the anchorage of the syringe end of the catheter, by the instrument, the intervening length of the catheter forms a loop 38, which is not only safely out of the operating region of the hand which manipulates the instrument, but is also under full observation and control of the operator. The clip 32 is preferably so positioned relative to the trough that the syringe end of the catheter may be introduced therein in the direction of arrow 40 with the bare hand, without danger of touching the sterile loop 38.

In furtherance of this object, the clip 32 is furthermore so inclined relative to the trough that the clamped syringe end of the catheter projects upwardly away from the loop 38. After the catheter has thus been applied to the instrument, the tip end of the catheter is introduced into the penis 42, or other desired body cavity, by movement of the closed forceps toward the penis. After a substantial approach of the instrument to the penis, and corresponding advance of the catheter therein, the instrument is manipulated to release its grip on the catheter, and withdrawn a short distance, ready for a new feeding operation. Of course, the inserted portion of the catheter is prevented from being withdrawn with the preceding instrument by the operator, who then squeezes the penis against the inserted catheter. During such withdrawal of the instrument, and while the catheter is held stationary in the aforementioned manner, the lubricant in the trough is in sliding contact with the catheter, and thoroughly lubricates the entire periphery thereof.

The lubricant which spreads progressively upon the catheter as it is fed along is intermittently agitated by the gripping and releasing relative motion of the trough and cooperating blade, thus repeatedly forcing the gradually diminishing lubricant supply into contact with the catheter. The catheter is intermittently fed in the aforementioned manner until a sufficient length is introduced for accomplishing the object sought, such as drainage of a urinary bladder, for instance. The catheter being now sufficiently inserted for drainage, the operator opens the instrument to such an extent that he may free the catheter from within the trough by simply removing the instrument substantially in the direction of arrow 40 in Fig. 5. By subsequently twisting the instrument about the axis X—X in Fig. 2, the catheter is forced out of the hook 30, as can be readily understood. As soon as the catheter leaves the hook 30, the intercepting bend 37 straightens out, and drainage takes place immediately. The syringe end of the catheter may remain in the clip thereafter, in fact, this is desirable, because the operator may thus properly direct the draining stream into a suitably placed container without touching the catheter.

Oftentimes, irrigation is to follow drainage immediately, in which case the operator would like to prepare for irrigation while drainage takes place. To relieve him of the burden of directing the draining stream into the container, the trough 20 may be provided with a flange 44, having a depending lug 46 and a raised shoulder 48. Before drainage starts, the operator conveniently places the container 50, and hooks the instrument over the rim 52 of said container, in the manner shown in Fig. 5, whereby the lug 46 prevents the instrument from sliding off said rim. After removal from the clip 32, the syringe end of the catheter is then placed on the flange 44 in alignment with the container 50. The shoulder 48, in conjunction with the blade carrying prong of the catheter, prevents the syringe end 26a (see Fig. 5) from rolling off said flange 44.

As already stated, the sterile catheter may be grasped at the syringe end only. It is, therefore, obvious that the introduction of the tip of the dangling catheter into the trough 20 requires a certain skill. In order to appreciably facilitate the introduction of the catheter tip into the trough, a side wall 60 of said trough may be notched, as at 62, (see Fig. 6). The operator may then draw the catheter over the notch 62 until the tip thereof clears said notch, and drops into the trough, as can be readily understood.

In the modification disclosed in Figs. 7, 8 and 9, a removable attachment 70 has been attached to one prong 72 of a conventional forceps 74. The attachment 70 includes a tapered member 76, substantially inverted U-shaped in cross sectional area, provided with a pair of inwardly extending flanges 78, adapted to engage the work engaging side of the prong 72 whenever the set screw 80 threadedly engaging the bight of saddle member 76 is tightened against the prong 72. The lower edges 82 of the flanges 78 are preferably serrated. These serrations are similar to the serrated work engaging surface of conventional forceps.

The set screw 80 is preferably provided with an upset end 86, or an enlargement, which prevents the removal of the screw 80 from the tapered member 76 whenever the attachment 70 is loosened and removed from the prong 72 of the forceps 74.

A pair of projections or studs 90, mounted in spaced relation from the set screw 80 and extending parallel thereto, are fixedly attached adjacent the ends of the U-shaped member 76. The studs 90 cooperate with the set screw 80 in sup-

porting the catheter 26 in a manner similar to that shown in Fig. 1, that is, the syringe 26a of the catheter is anchored to the forceps 74 by being passed in buckled relation between the studs 90 and the set screw 80. The tip 26b of the catheter is passed between the prongs of the forceps where the tip is firmly gripped and held while it is inserted into a cavity in the human body, in the same manner as described in connection with Fig. 1.

In the modification disclosed in Figs. 10 to 12 inclusive, only a portion of the forceps has been shown, that is, the prong 72 has been shown conventionally. In this modification a substantially M-shaped spring member 100 is removably attached to the prong 72. The ends 102 and 104 are provided with notches 106 terminating in wardly extending teeth 108, adapted to engage the under side of the prong 72 of the forceps, whenever the prong 72 is passed through the notches 106. The inherent resiliency of the spring member 100 causes the attachment to be firmly gripped in position on the prong 72. The lower bights 110 of the intermediary loops are provided with cut-out portions 112, so as to form a saddle-like structure straddling the prong 72, so as to maintain the entire assembly in aligned relation. This helps give rigidity to the assembly. The M-shaped spring member 100 may be inserted upon the prong 72 by manually gripping the end members 102 and 104, forcing these toward each other, so as to cause the notched portion to extend in a direction substantially normal to the longitudinal axis of the prong 72 while this is inserted. Upon the release of the end members these tend to spread, thereby gripping the prong 72. The catheter is passed between the upwardly projecting loops in a manner very much similar to that disclosed in Figs. 1 and 7.

Another modification of the attachment has been shown in Figs. 13 and 14. In this modification a spring member 120 has been shown that has been formed into three loops 122, 124 and 126, arranged in properly spaced relation to hold the syringe end of the catheter 26 in buckled relation. The extreme ends of the loop portions 122 and 126 have holes 130 adapted to receive the prong 72 of the forceps. These extreme ends of the loops 122 and 126 are interconnected through a bridge portion 132.

By referring to Fig. 14 it may readily be seen that the bridge portion 132 is arched upwardly. The lower bights between the loops, as viewed in Fig. 14, are flexed downwardly either against or in close proximity to the bridge portion 132. As the prong 72 is inserted through the holes 130, the bridging portion 132 is straightened and the lower bights raised against the direction of the arrows shown between adjacent loops. From this it may readily be seen that the spring member 120 is clamped on the prong due to the inherent resiliency of the material used, which is preferably either high carbon steel or brass. The clamping action takes place in the direction of the arrows shown between the loops and the arrow pointing towards the bridge portion 132 shown in Fig. 13.

In order to facilitate the insertion of the syringe end of the catheter, the center loop preferably extends higher than the end loops. The spring member 120 may be formed either from a closed loop of material, or from a band of material having the ends joined either by welding or by riveting or by merely overlapping each other.

A lubrication compartment may be associated with the assembly. It may be carried by the attachment shown in Fig. 7, 10 or 13, it may be attached to the opposite prong, or to any other portion of the forceps. The lubrication compartment may be carried upon an attachment adapted to interlock one arm of the forceps on both sides of the pivot, this attachment being removably attached to permit the use of conventional forceps.

Obviously, this instrument may be constructed for either right or left-handed operators.

Although the preferred modification of the device has been described, it will be understood that within the purview of this invention various changes may be made in the form, details, proportion and arrangement of parts, which generally stated consist in a device capable of carrying out the objects set forth, in the novel parts, combination of parts and mode of operation as disclosed and defined in the appended claims.

Having thus described my invention, I claim:

1. An attachment for inserting a catheter with the aid of conventional forceps, said attachment including means removably attached to the forceps for releasably holding a short length of a catheter in doubled-back fashion to intercept the passage through the catheter while being advanced into position for use, and clamping means for removably securing said holding means to the forceps.

2. An attachment for introducing a catheter with the aid of conventional forceps, said attachment including a supporting member removably attached to one of the prongs of the forceps, said supporting member having a plurality of upwardly extending projections for releasably holding a short length of the catheter in doubled-back fashion to intercept the passage through the catheter while being advanced into position for use, and means for releasably holding said supporting member upon the prong of the forceps.

3. An attachment for introducing a catheter with the aid of conventional forceps, said attachment including a supporting member substantially U-shaped in cross sectional area having inwardly projecting flanges, said U-shaped supporting member straddling one of the prongs of the forceps, the inwardly projecting flanges engaging the work engaging side of the prong, and projections projecting in a direction substantially normal to the longitudinal axis of the prong, said projections being adapted to releasably hold a short length of the catheter in doubled-back fashion to intercept the passage through the catheter while being advanced into position for use.

4. A removable attachment for introducing a catheter with the aid of forceps, said attachment including a supporting structure removably attached to one of the prongs of the forceps, said supporting structure including a plurality of upwardly extending projections for releasably holding a short length of a catheter in doubled-back fashion to intercept the passage through the catheter, said supporting member having projections extending into overlapping relation with the work engaging surface of the prong to hold said supporting member upon the prong.

5. An attachment for introducing a catheter with the aid of forceps, said attachment including a resilient supporting member including a plurality of upwardly extending projections for releasably holding a short length of a catheter

in doubled-back fashion to intercept the passage through the catheter, the ends of the resilient supporting member being provided with notches engaging and gripping the end of the prong to resiliently hold the supporting member upon the prong.

6. An attachment for introducing a catheter with the aid of forceps, said attachment including a saddle member having inwardly extending projections, said saddle member straddling one of the prongs of the forceps, the inwardly extending projections engaging the work engaging side of the prong, projections projecting in a direction substantially normal to the longitudinal axis of the prong mounted upon said saddle member, said projections being adapted to releasably hold a short length catheter in doubled-back fashion to intercept the passage through the catheter, one of said projections threadedly engaging the saddle member and clamping the same against the prong of the forceps when said projection is tightened.

7. An attachment for introducing a catheter with the aid of forceps, said attachment including a saddle member having inwardly extending projections, said saddle member straddling one of the prongs of the forceps, the inwardly extending projections engaging the work engaging side of the prong, projections projecting in a direction substantially normal to the longitudinal axis of the prong mounted upon said saddle member, said projections being adapted to releasably hold a short length catheter in doubled-back fashion to intercept the passage through the catheter, one of said projections threadedly engaging the saddle member to clamp the same upon the prong when said projection is tightened, said projection having a head between the saddle member and the prong to prevent the unscrewing of said projection from the saddle member.

8. An attachment for introducing a catheter with the aid of forceps, said attachment including a supporting saddle member having inwardly projecting serrated flanges, said saddle member straddling one of the prongs of the forceps, the inwardly projecting flanges engaging the work engaging side of the prong, and studs projecting in a direction substantially normal to the longitudinal axis of the prong, said studs being adapted to releasably hold a short length of the catheter in doubled-back fashion to intercept the passage through the catheter.

9. In combination with a conventional forceps for applying a catheter, of means for releasably holding upon the forceps a short length of the catheter in a buckled relation to intercept the passage through the catheter while being advanced into position for use.

10. In combination with a conventional forceps having gripping prongs for applying a catheter, of means on one of the prongs for releasably holding on the forceps a short length of the catheter in a buckled relation to intercept the passage through the catheter while being advanced into position for use.

11. In combination with a forceps for applying a catheter, of means on the forceps for releasably holding a short length of the catheter, and other means on the forceps for releasably holding another length of the catheter adjacent said short length so relative to the latter length that the intermediate length is bent sufficiently to intercept the passage through the catheter.

12. In combination with a forceps for applying a catheter, of means on the forceps for releasably holding a short length of the catheter in doubled-back fashion to intercept the passage through the catheter, said means including a hook.

13. In combination with a forceps for applying a catheter, of means on the forceps for releasably holding a short length of the catheter in doubled-back fashion to intercept the passage through the catheter, said means comprising a hook and a clip.

14. In combination with a forceps having gripping prongs for feeding a catheter, of a member depending from one of the prongs, transversely thereof, for guiding the catheter between the prongs, and containing lubricant which the catheter contacts while being guided and means associated with said member for releasably holding a short length of the catheter in doubled-back fashion to intercept the passage through the catheter while being advanced into position for use.

15. In combination with a forceps having gripping prongs for feeding a catheter, of a trough-like member depending from one of the prongs for guiding the catheter between the prongs, and containing lubricant, a blade carried by the other prong, said prong being movable into the trough for agitating the lubricant and means associated with said member for releasably holding a short length of the catheter in doubled-back fashion to intercept the passage through the catheter while being advanced into position for use.

16. In combination with a forceps having gripping prongs for feeding a catheter, of cooperating means on the forceps, forming a funnel, containing lubricant through which the catheter is moved while fed and supporting means having a plurality of upwardly extending portions for releasably holding a short length of the catheter in doubled-back fashion to intercept the passage through the catheter while being advanced into position for use.

17. In combination with a forceps having gripping prongs for feeding a catheter, of cooperating means on the prongs forming a tapering funnel with the narrower end adjacent the prongs, said funnel containing lubricant through which the catheter is moved while fed and a supporting device including a pair of portions each substantially U-shaped and interconnected for releasably holding a short length of the catheter in doubled-back fashion to intercept the passage through the catheter while being advanced into position for use.

18. In combination with a forceps having gripping prongs for feeding a catheter, of a member on the forceps for guiding the catheter between the prongs, and containing lubricant which the catheter contacts while being guided, and means on the member for releasably holding a short length of the catheter in doubled-back fashion forming a bight intercepting the passage through the catheter while the remainder of the catheter is advanced into position for use.

19. In combination with a forceps having gripping prongs for feeding a catheter, of a member on one of the prongs for guiding the catheter between the prongs and containing lubricant which the catheter contacts while being guided, means on the member for releasably holding a short length of the catheter, and means on the other prong for agitating the lubricant in said member.

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