April 10, 1951 L. COEL 2,548,775

DIAPHRAGM INTRODUCER

Filed March 22, 1949

FIG. 1.

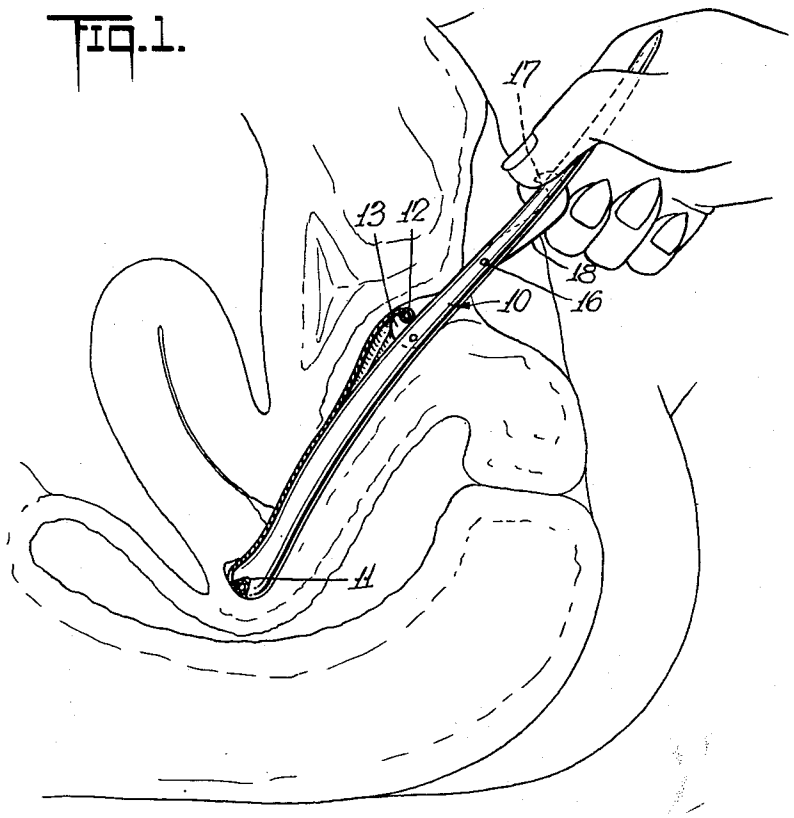


FIG. 2.

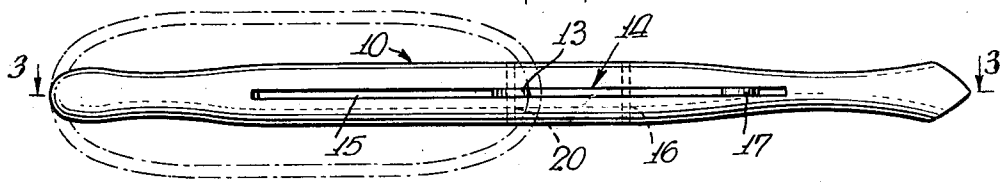
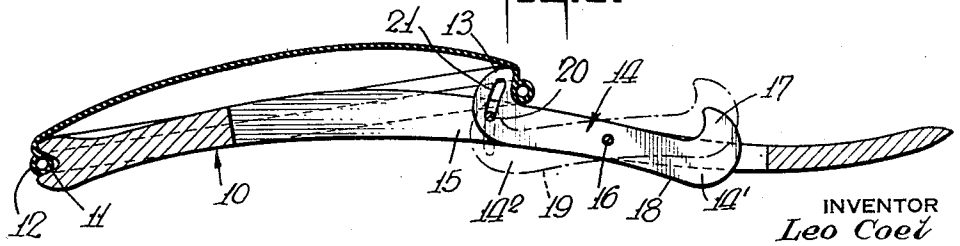


FIG. 3.



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DIAPHRAGM INTRODUCER

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10 Claims. (Cl. 128—127)

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The present invention relates to introducers of the type for facilitating insertion into the vaginal canal of a conventional flexible diaphragm to cover the cervix.

It is among the objects of the invention to provide an instrument of the above type, of simple and rugged construction that may readily be sterilized and by the use of which the diaphragm may be readily released from its tensed position on the instrument by operation wholly from the exterior, without the need for shifting or movement of the inserted instrument, so that the unskilled user, without assistance from a physician or nurse, incurs no danger of injury to the delicate tissues or to the diaphragm itself and is yet assured against malpositioning of such diaphragm.

In the accompanying drawings in which is shown one of various possible embodiments of the several features of the invention,

Fig. 1 is a perspective view of the instrument showing the same in introduced position prior to release of the diaphragm,

Fig. 2 is a plan view of the instrument with the diaphragm positioned thereon, and

Fig. 3 is a view in longitudinal cross section taken on line 3—3 of Fig. 2.

Referring now to the drawings, the introducer comprises a unitary rod 10 of generally familiar form which may be of metal but is preferably of plastic such as Lucite and has the usual rounded contour with a rounded upper side and a rounded lower side, the forward portion being generally convex on its upper side and concave on its lower, and the rear half being concave on its upper side and convex on its lower. The forward end of the rod is preferably provided with a groove 11 across its width for accommodating the forward portion of the rim 12 of the stretched diaphragm to be introduced.

According to the invention, the rear portion of the stretched diaphragm positioned on the introducer, is anchored by a hook 13 which is the upwardly extending hooked end of a lever 14 of relatively flat stock preferably of the same material as the rod, such as Lucite. That lever is accommodated in an elongated slot 15 longitudinally through the thickness of the rod 10. The lever has a fulcrum which is preferably a pin 16 extending through the mid-section of the lever across the width of the rod 10 and the slot 15 as shown.

The rear arm 14' of the lever is preferably curved as shown, with an upwardly extending toe 17 and the lower edge of said rear arm is curved as at 18, the width of the lever from the

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curved edge 18 to the tip of toe 17 being considerably greater than the thickness of the rod 10.

The lever 14 is preferably concave at its lower edge in such manner that when it is depressed about its pivot pin 16 to the position shown in full lines in Fig. 3, the lower edge 19 of the forward arm 14² thereof extends substantially wholly within the contour of the rod, in which position the major if not the entire length of the curved lower edge 18 of the rear arm 14' protrudes below the underside of the rod 10.

Means is desirably provided for limiting the pivoting movement of the lever between one extreme shown in full lines in Fig. 3, in which its hooked forward end 13 protrudes, for anchoring the diaphragm rim 12, and the other extreme shown in broken lines in which the hooked end 13 is shown wholly withdrawn to lie within the contour of the rod. The stop means is preferably wholly within the contour of the rod to avoid possible injury to the user. Preferably this stop is in the form of a pin 20 in the rod across the slot 15 thereof and similar to fulcrum pin 16. Pin 20 may extend across and through an arcuate slot 21 in the lever, engagement of the upper end of which by the pin determines the lowermost or release position of the lever and engagement of the lower end of which determines the upper or diaphragm-hooking position of the lever. While the arcuate slot 21 described may be disposed in the rear part of the lever for coaction with a limiting pin at that region, it is generally preferred to dispose said element at the forward part of the lever, as shown in the drawings.

In use of the instrument the upwardly protruding toe 17 at the rear of the lever is depressed by the thumb and the diaphragm rim 12 stretched from the groove 11 at the forward end of the rod over the now protruding hook end 13 of the lever, as best shown in Fig. 3. After insertion of the diaphragm to the limiting position as shown in Fig. 1, the user need merely press against the lower protruding edge 18 of the rear arm of the lever or more simply need merely draw her finger rearward along said protruding edge to cam the rear end of the lever upward into the slot 15 and thereby depress the forward hook end 13 thereof to the dotted line position shown in Fig. 3, with consequent release of the diaphragm from said hook so that said diaphragm pressed in place by the forward end of the rod 10 will contract to its unstressed position in correct emplacement over the cervix. The introducer thus disengaged from

the emplaced diaphragm may then readily be withdrawn.

It will thus be seen that the introduction of the diaphragm is effected by a simple thrust of the rod 10 into the body and the release of the diaphragm is effected without the need for raising, lowering, rocking or effecting any other movement of any character whatsoever of the rod, the forward end of which has been pushed to limiting position. The simple diaphragm release movement of the lever occurs by operation near the outer end of the vaginal canal and cannot possibly cause any injury since the hook end 13 is thereby drawn into the contour of the rod and the lower now protruding edge 19 of the forward end of the lever is effectively rounded and therefore entirely safe.

In a preferred embodiment shown, the rod 10, lever 14 and its pivot pin 16 as well as stop pin 20 are of universal applicability to be assembled for an instrument to introduce a diaphragm of any selected size within the ranges commonly manufactured. To this end the slot 15 is made at least twice the length of the lever as shown, and the positioning of the fulcrum pin 16 in assembly of the parts determines the distance between the groove 11 and the lever hooking end 13. Thus the device would be made in various models that differ from one another merely in the position of the fulcrum pin 16 and the associated stop pin 20.

If desired, the device could be initially fabricated with a series of transverse holes so that the initial assembly could be effected to produce an introducer for the selected size of diaphragm by selection of the appropriate hole for accommodating the fulcrum pin. It is preferred, however, as shown, in the interest of sterilization, to provide each rod 10 with only the two transverse pin holes shown, viz., a hole for the fulcrum pin 16 and a hole for the stop pin 20.

As many changes could made in the above construction, and many apparently widely different embodiments of this invention could be made without departing from the scope of the claims, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. In a diaphragm introducer, the combination of a rod having a diaphragm engaging groove at its forward end and having a lever fulcrumed and accommodated in a longitudinal slot through the thickness of said rod, said lever having a forward upstanding diaphragm engaging hook end protruding above the rod, said lever having means near the rear end thereof engageable by the hand of the user to pivot the lever about its fulcrum and thereby withdraw the forward protruding hook end thereof into the slot of the rod.

2. In a diaphragm introducer, the combination of unitary rod having a diaphragm engaging notch at its forward end, said rod having a lever accommodated in a longitudinal slot through the thickness of said rod, a fulcrum pin extending across said rod and through said lever between the ends of the latter, said lever having an upstanding diaphragm engaging hook at its forward end and having portions thereof at its rear end protruding both below and above the rod when the diaphragm engaging hook is protruding above the rod.

3. In a diaphragm introducer, the combination of a unitary rod having a diaphragm engaging groove at its forward end, a diaphragm engaging hook protruding from the upper side of said rod and spaced from said groove by the distance of the stretched diaphragm rim for which the introducer is designed, said hook being the forward end of a lever, said lever being accommodated in a longitudinal slot through the thickness of said rod, the fulcrum of said lever being a pin therethrough across the slot and mounted at its ends in the rod, said lever having near its rear portion an upwardly extending part depressible by the user to bring the diaphragm-engaging hook into active position above the upper side of the rod and having a portion near its rear projecting from the lower side of the rod for displacement by the user to pivot the forward end of the lever downward for disengaging the hook end of said lever from the diaphragm.

4. A diaphragm introducer comprising a unitary rod having a diaphragm-anchoring groove at its forward end, a diaphragm-engaging hook protruding from the upper side of said rod and spaced from said groove by the distance of the stretched diaphragm rim for which the introducer is designed, said hook being the forward end of a lever of relatively flat stock accommodated in a corresponding longitudinal slot through the thickness of said rod, said lever having a fulcrum comprising a pin through the width of said rod across said slot and through the thickness of said lever, said lever having a manually controlled rear end protruding above the upper side of said rod to effect by depression thereof, a pivotal movement of the lever to dispose the diaphragm hooking end thereof in operative position above the upper side of the rod, and having means protruding below the under side of the rod to permit manual lifting of said end for withdrawal of the diaphragm hooking end of the lever for diaphragm release.

5. The combination recited in claim 4 in which the main length of the forward arm of the lever is substantially completely within the contour of the rod when the hook end thereof is in elevated or diaphragm-holding position and the rear arm of the lever protrudes well below the under side of the rod.

6. The combination recited in claim 4 in which the main length of the forward arm of the lever extends substantially wholly within the contour of the rod when the hook end thereof is in protruding or operative position and the rear arm of the lever protrudes well below the under side of the rod and presents an arcuate lower edge to admit of camming movement of the lever for release of the diaphragm by pressing and sliding the index finger rearwardly therealong to press said protruding lever arm upwardly into the slot of the rod.

7. A diaphragm introducer comprising a rod having a diaphragm engaging groove at its forward end, a lever accommodated along its entire length in a slot through the thickness of said rod and having a fulcrum pin anchored in the rod, extending across the width of the slot and through the lever, said lever having a diaphragm engaging hook at its forward end, said rod having stop means coacting with said lever to limit the range of pivotal movement thereof between diaphragm-engaging and diaphragm-release positions thereof.

8. A diaphragm introducer comprising a rod having a diaphragm engaging groove at its for-

ward end, a lever accommodated along its entire length in a slot through the thickness of said rod and having a fulcrum pin anchored in the rod extending across the width of the slot and through the lever, said lever having a diaphragm engaging hook at its forward end, said rod having stop means coacting with said lever to limit the range of pivotal movement thereof between diaphragm-engaging and diaphragm-release positions thereof, said stop means being wholly within the contour of the rod.

9. A diaphragm introducer comprising a rod having a diaphragm engaging groove at its forward end, a lever accommodated in a slot through the thickness of said rod and having a fulcrum pin anchored in the rod, extending across the width of the slot and through the lever, said lever having a diaphragm engaging hook at its forward end, said rod having stop means coacting with said lever to limit the range of pivotal movement thereof between diaphragm-engaging and diaphragm-release positions thereof, said stop means being a pin across the slot of said rod and extending through a corresponding slot in the lever near one end of the latter.

10. A diaphragm introducer comprising a rod having a diaphragm engaging groove at its forward end, a lever accommodated in a slot through

the thickness of said rod and having a fulcrum pin anchored in the rod, extending across the width of the slot and through the lever, said lever having a diaphragm engaging hook at its forward end, said rod having stop means coacting with said lever to limit the range of pivotal movement thereof between diaphragm-engaging and diaphragm-release positions thereof, said stop means comprising a pin through the width of the rod extending across the slot thereof near the forward hook end of the lever, said pin extending through an arcuate slot in said hook end, the under end of said slot defining the upper limit of movement of the hook end of the lever and the upper end of said slot limiting the withdrawal movement of said hook end of the lever.

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