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O. KRAEMER
SURGICAL DILATOR
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2,499,761

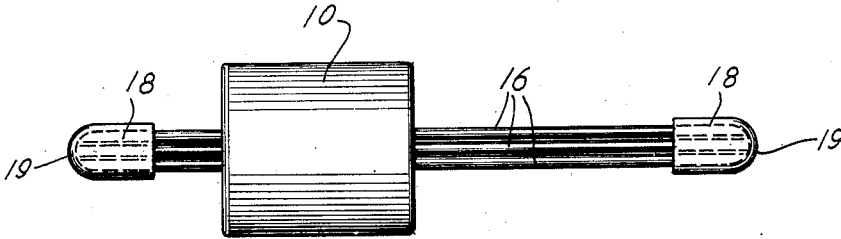


Fig. 1

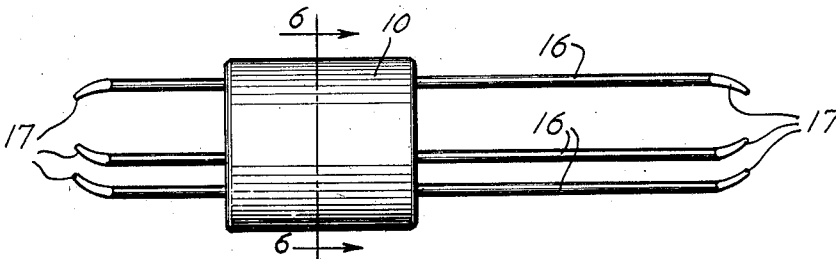


Fig. 2

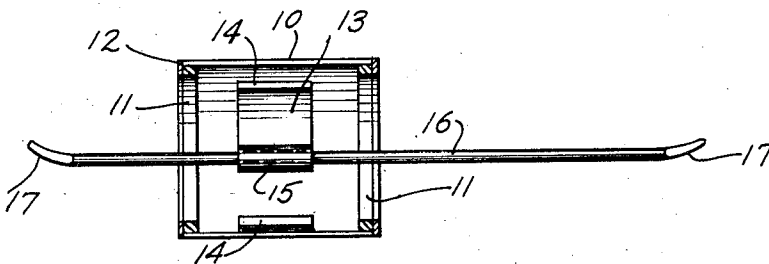


Fig. 3

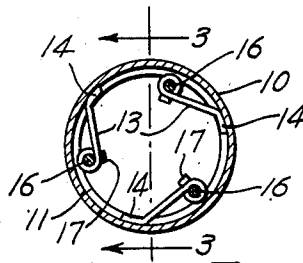
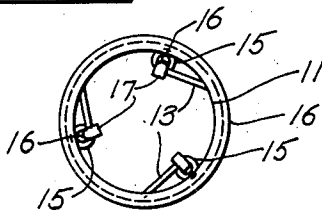
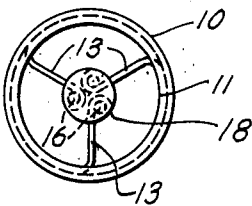


Fig. 4

Fig. 5

Fig. 6

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SURGICAL DILATOR

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4 Claims. (Cl. 128—341)

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My invention relates to surgical dilators, and more particularly to a dilator for the womb.

An important object is to provide a surgical dilator for insertion into the womb for expanding the same, the dilator being retracted or closed when inserted, and adapted to expand or open automatically after insertion.

A further object is to provide a surgical dilator or womb expander, including longitudinal expanding members which move radially when expanding and closing.

A further object is to provide a surgical dilator having parts to hold the dilator in a retracted position before insertion into the organ, said parts melting after insertion to permit the opening of the dilator.

A still further object of the invention is to provide a device of the above mentioned class which is simple and practical, and quite inexpensive to manufacture.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings, forming a part of this application, and in which like numerals are employed to designate like parts throughout the same,

Figure 1 is a side elevation of a surgical dilator embodying the invention, showing the same in the retracted or closed position.

Figure 2 is a side elevation of the dilator in the expanded or open position.

Figure 3 is a central vertical longitudinal section taken on line 3—3 of Figure 6.

Figure 4 is an end elevation of the closed dilator shown in Figure 1.

Figure 5 is an end elevation of the expanded dilator of Figure 2.

Figure 6 is a transverse vertical section taken on line 6—6 of Figure 2.

In the drawings, where for the purpose of illustration, is shown a preferred embodiment of the invention, the numeral 10 designates a cylindrical tubular casing or shell, which is smooth and polished on its external surface, and preferably formed of suitable metal such as a nickel alloy or surgical steel. The cylindrical shell 10 is provided with annular inserts 11 at its opposite ends, and these inserts have outer shoulders 12 which are rounded to provide smooth edges at the ends of the shell.

Mounted upon the inside surface of the shell 10, at the axial center of the same, and equidistantly spaced angularly about the shell are three expander springs 13. Each spring 13 is in the

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form of a strip of spring steel, or the like, rigidly secured at its outer end 14 to the wall of shell 10. Each spring is generally flat and is provided with an inner rolled end 15, forming a sleeve having its axis parallel to the axis of shell 10. The springs 13 are tensioned radially outwardly with respect to shell 10, and normally assume positions adjacent to the wall of the shell, as in Figure 5. The springs 13 are preferably capable of exerting a maximum radial expanding force of approximately $\frac{3}{4}$ pound.

Rigidly secured within the sleeves 15 and extending parallel to the axis of shell 10 are longitudinal expanding prongs or fingers 16, having radially inwardly curved blunt ends 17. The prongs 16 extend outwardly axially from both ends of shell 10, as shown. At one end, the prongs 16 project longitudinally for a greater distance from the shell than at the opposite end. The prongs preferably project longitudinally of the shell 10 for approximately $1\frac{3}{4}$ inches at one end, and for approximately $\frac{3}{4}$ of an inch at the opposite end.

The prongs 16 carried by springs 13 are adapted to move inwardly radially to closed or retracted positions, Figures 1 and 4. When in this retracted position, the springs 13 assume substantially radial positions, as shown in Figure 4. The prongs 16 are held in the retracted or closed position by plastic end caps 18, having spherically curved ends 19. These end caps are slipped over the ends 17 of the prongs, as shown in Figure 1. The end caps 18 are formed of material which is solid at normal atmospheric conditions, but which melts or dissolves gradually at body temperature and in the presence of the moisture in the body tissue. The path of movement of the prongs 16 is radial, with respect to shell 10, when going from the retracted to the open or expanded positions.

In use, the closed device is inserted bodily into the womb. The action of body heat and moisture causes the end caps 18 to gradually melt or dissolve. As this occurs, the end caps begin to yield, and the prongs 16 move slowly to the expanding or open positions, Figure 2. In this open position, the prongs 16 engage the walls of the womb and expand or dilate the same. The curved ends 17 engage the adjacent tissue of the body, and prevent the device from movement axially or longitudinally, after it is open.

It is to be understood that the form of the invention, herewith shown and described, is to be taken as a preferred example of the same, and that various changes in the shape, size and ar-

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range of parts may be resorted to, without departing from the spirit of the invention, or the scope of the appended claims.

Having thus described the invention, I claim:

1. A surgical dilator for the womb, comprising a cylindrical shell, springs disposed within the shell and secured to the wall of the same and tending to move outwardly radially with respect to the shell, prongs secured to the springs for movement therewith and extending longitudinally beyond the ends of the shell, the prongs having inwardly curved ends, and end caps to engage over the ends of the prongs to hold the same in a retracted position, said end caps being adapted to melt gradually when inserted into the body.

2. A surgical dilator for the womb, comprising a tubular substantially cylindrical shell, substantially equidistantly spaced spring strips disposed within the shell and secured thereto and having rolled ends forming sleeves, the axes of the sleeves being substantially parallel to the axis of the shell, longitudinal prongs secured within the sleeves and extending longitudinally beyond the ends of the shell, the prongs including curved ends which project radially inwardly with respect to the shell, and end caps to engage over the ends of the prongs to secure the same in a retracted position, the end caps melting upon insertion into the womb to permit the prongs to move radially outwardly to expanded positions.

3. A surgical dilator for the womb comprising a cylindrical shell open at the ends thereof, lon-

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gitudinally extending fingers extending through said shell and extending from the opposite ends thereof, spring means in said shell engaging said fingers for biasing said fingers radially outwardly from the center of said shell and a soluble member engageable on said fingers for restraining said fingers in the center of said shell against the spring tension.

4. A surgical dilator for the womb comprising a tubular shell, circumferentially spaced apart fingers in said shell and extending from the ends thereof, resilient members in said shell engaging said fingers for moving said fingers outwardly for engagement with the inner wall of said shell, and a soluble member engaging said fingers for restraining said fingers in the center of said shell.

OTTO KRAEMER.

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