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DRAWINGS ATTACHED



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(54) INTRAUTERINE DEVICES AND INSTRUMENTS FOR THEIR INSERTION

(71) We, G. D. SEARLE & Co., a corporation organised and existing under the laws of the State of Delaware, United States of America, of Chicago, Illinois, 60680, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to intrauterine contraceptive devices; to methods of contraception employing said devices; to combinations, suitable for sterile packaging, of an intrauterine contraceptive device and an instrument for the insertion thereof into the uterus; and to methods of inserting an intrauterine contraceptive device into the uterus.

It is known in the prior art that the presence of a foreign object in the uterus discourages conception. This phenomenon has been medically exploited for the intentional prevention of conception by insertion into the uterus of so-called intrauterine contraceptive devices, such as the well-known Lippes loop, commonly comprising a ring, spiral, or zigzag of a physiologically inert material, commonly plastics.

The employment of these devices for purposes of contraception has heretofore been subject to a number of disadvantages. First, the devices of the prior art have generally been of such dimensions as tend *in situ* to distort the uterus in the dorso-ventral and lateral directions, thereby causing discomfort, bleeding, and muscular spasms tending to eject the contraceptive device from the uterus. Further, the structure of such devices has heretofore not always been such as to discourage involuntary ejection thereof from the uterus. Also, the dimensions assumed by the prior art devices when in a form suitable for insertion into the uterus either prevent or make difficult their insertion into a nulliparous cervical canal. Dilatation is often necessitated and requires general anaesthesia. Finally the insertion of such intrauterine devices has heretofore been ac-

companied by a significant danger of puncturing the uterine wall because insertion involves pushing a device from a suitable carrier instrument into the uterus in the direction of the uterine fundus. By inadvertence or miscalculation, the physician inserting the device may unknowingly push the device into or through the uterine wall, thereby giving rise to serious medical complications. According to the present invention, intrauterine devices of such dorso-ventral and transverse dimensions as minimize rejection reactions have been devised. The novel structure of said devices, further, discourages inadvertent or involuntary discharge of the device from the uterus. Accordingly the present invention provides an intrauterine contraceptive device having the basic form of a figure '7', the upper, substantially transverse arm being arcuate with its free end bending towards the lower, substantially longitudinal arm, which lower arm is arcuate with its free end bending away from the upper arm. Also, instruments for the insertion of intrauterine contraceptive devices have been discovered, which instruments do not require pushing forces in the direction of the uterine fundus to deposit the devices in the uterus. The chances of inadvertent puncturing of the uterine wall are thereby minimized. The invention therefore also provides combinations of these instruments with the intrauterine devices of the invention which combinations particularly lend themselves to sterile packaging as an integral unit for immediate use by an attending physician and disposal after use. Thus, the invention also provides in combination an intrauterine contraceptive device as claimed in claims 1 to 7, and an instrument for the insertion thereof into the uterus, said instrument comprising not more than two barrels having external stopping means, at a distance from the anterior end thereof corresponding with a desired depth of insertion of one barrel into the uterus. The invention also provides in combination an intrauterine device as claimed in claims 1 to 7 and an instrument

for the insertion thereof into the uterus, the said instrument comprising a first barrel for accommodation of said intrauterine device, the first barrel having a first stopping means external to the first barrel and at a distance from the anterior end thereof corresponding with a desired depth of insertion of the first barrel into the uterus, a second barrel adjacent to the first barrel and extending to the first stop, the second barrel having a keyway therein, a bifurcate piston in said first and second barrels, the piston having a second stopping means at the anterior end thereof, the second stopping means being external to the second barrel and travelling in the said keyway therein. Finally, the invention also provides methods of preventing conception by inserting the intrauterine devices into the uterus.

A better understanding of the present invention and of its many advantages will be had by referring to the following drawings, in which

Fig. 1 is a perspective view of an intrauterine device and an instrument for the insertion of said device into the uterus;

Fig. 2 is a sectional view through the intrauterine device of Fig. 1 along the line 2—2 of Fig. 1;

Fig. 3 is an enlarged side view of the instrument of Fig. 1, partially in section, showing the intrauterine device of Fig. 1 folded in anterior portions thereof;

Fig. 4 is an enlarged end view of the instrument of Figs. 1 and 3, showing an intrauterine device present folded therein;

Fig. 5 is a front view, partly in section, showing the instrument of Fig. 1 inserted into the uterus and the contraceptive device of Fig. 1 partially emergent therefrom;

Fig. 6 is the same view as Fig. 5 showing the further emergence of the contraceptive device from the instrument for the insertion thereof;

Fig. 7 is the same view as in Figs. 5 and 6 showing the intrauterine device in position in the uterus after withdrawal of the instrument for insertion;

Fig. 8 is a side view of another embodiment of an instrument for the insertion of an intrauterine device into the uterus, showing an intrauterine device in combination therewith;

Fig. 9 is a plan view of the instrument and device of Fig. 8;

Fig. 10 is a sectional view of this same instrument taken along line 10—10 of Fig. 8;

Fig. 11 is a further sectional view of this instrument and device taken along line 11—11 of Fig. 8;

Fig. 12 is still another sectional view of this instrument taken along line 12—12 of Fig. 8;

Fig. 13 is a side view of the instrument and device of Figs. 8—12 showing the

manner in which the instrument is readied for insertion into the uterus for introduction of an intrauterine device thereinto;

Fig. 14 is a side view of the instrument, showing the instrument *in situ* in the uterus;

Fig. 15 is a side view like that in Fig. 14, showing a later stage in the insertion of an intrauterine device into the uterus;

Fig. 16 is the same view as in Figs. 14 and 15 showing a still later stage in the insertion process, and particularly showing an intrauterine device present in the uterus and withdrawal of the inserting instrument therefrom;

Fig. 17 is a front view, in section, taken along line 17—17 of Fig. 16 showing an intrauterine device present within the uterus after insertion thereof is complete;

Fig. 18 is a scale drawing of an embodiment of the intrauterine device of the present invention;

Fig. 19 is an enlarged plan view, in section, of the device of Fig. 13 taken along line 19—19 of Fig. 13;

Fig. 20 is an enlarged plan view, in section, taken along line 20—20 of Fig. 15;

Fig. 21 is a perspective view of a preferred embodiment of the intrauterine device of this invention, comprising a transverse arm and a longitudinal arm;

Fig. 22 is a sectional view through one section of the transverse arm of the intrauterine device of Fig. 21 along the line 22—22 of Fig. 21;

Fig. 23 is a sectional view through another section of the transverse arm of the intrauterine device of Fig. 21 along the line 23—23;

Fig. 24 is a sectional view through the midsection of the longitudinal arm of the intrauterine device of Fig. 21 along the line 24—24;

Fig. 25 is a sectional view through an end section of the longitudinal arm of the intrauterine device of Fig. 21 along the line 25—25;

Fig. 26 is an enlarged perspective view of the longitudinal arm of a preferred alternate embodiment of Fig. 21 having a copper wire wrapped around the arm;

Fig. 27 is a sectional view through a section of the intrauterine device of Fig. 26 along the line 27—27.

Referring to Figs. 1, 18, 21, and 26 of the accompanying drawings, it will be seen that the novel intrauterine contraceptive devices of the present invention have the general shape of the numeral '7', and comprise transverse arm 110 and longitudinal arm 120 dependent therefrom substantially at one end thereof.

The transverse and longitudinal arms of the device are proportioned to be comfortably accommodated within the uterine cavity. Transverse arm 110 suitably has an

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overall length of from 20 to 38 millimeters, whereas longitudinal arm 120 is of such dimensions that the overall length of the device is from 28 to 40 millimeters. The preferred dimensions depend on the size of the uterus which is primarily dependent on the degree of parity. The transverse and longitudinal arms of the devices are coplanar and suitably have a thickness of from about 1 millimeter to about 3 millimeters at the thickest part.

As shown in Figs. 1 and 18, transverse arm 110 can optionally have a flexure 130 substantially at the mid-point therein, flexed arm 110 being arcuate and bent in the direction of longitudinal arm 120. If a line is drawn connecting the end points of transverse arm 110 and a perpendicular to this connecting line is dropped from the mid-point thereof, the terminal portion of longitudinal arm 120 suitably lies on the perpendicular. Since longitudinal arm 120 is dependent from an end of arm 110, longitudinal arm 120 is generally arcuate.

In the device of Fig. 21, transverse arm 110 has the shape of an arc and longitudinal arm 120 has an arched upper portion 132 and a generally straight lower portion 134. If the line of the longitudinal arm 120 is extended upwardly, it will intersect the transverse arm 110 at the uppermost portion of the arcuate transverse arm 110. Such construction enables the arms to be folded with minimum stress, i.e., the transverse arm and the longitudinal arm can be folded in such a manner that the folded transverse diameter will not be greater than the two transverse arms and it will retain its shape.

The devices of Figs. 18 and 21 are suitably made in whole or in part of a rigid but flexible physiologically inert material, commonly a plastics material such as polyethylene, polypropylene, nylon, "Silastic" or "Dacron" ("Silastic" and "Dacron" being Registered Trade Marks). Polypropylene is particularly preferred. The device can also be constructed in whole or in part of a metal such as silver, gold, platinum or preferably copper or zinc.

Because of the device's small size and high retentive properties, the device is an excellent carrier for more active fertility regulating materials, especially elemental copper or zinc or both. For example, as shown in Fig. 27, zinc wire, copper wire, or copper tubing 136 can be wound around the arms. Other means of applying the metals are vapour deposition, partial impregnation of metallic granules, and the use of one or more shaped forms such as a chain or wire dependent from an arm.

Although the intrauterine device of the present invention can have cylindrical arms as shown in Figs. 1 and 18, the arms of

the device can also be in the shape of semi-cylinders as shown in Figs. 22 and 24 and these meet at a cylindrical apex 144, as shown in Fig. 23, the arms being designed in such a manner that when the device is folded, the flat portions come in contact and the folded device takes up a smaller amount of space, as shown in Figs. 21-24.

The device of Fig. 1, shown in section in Fig. 2, comprises resilient core 150 made of material such as spring wire (e.g. piano wire) having coating 160 thereover. Coating 160 is suitably of a physiologically inert substance such as those mentioned just above. Additional resilience and ease of flexion is achieved in the device of Fig. 1 by forming coils 170 at flexure 130 of transverse arm 120 and at the point at which longitudinal arm 120 is attached thereto.

Physiologically inert filament 180 is suitably attached to terminal portions 140 of the devices of Figs. 1 and 18 to facilitate their removal from the uterus and, as will be seen, in some cases to aid in their insertion into the uterine cavity. As shown in Figs. 21 and 25, the filament can be emplaced in aperture 148.

Fig. 1 further shows tubular instrument 190 comprising barrel 200 for accommodation of an intrauterine device. Stopping means 21 is located on the exterior portions of instrument 190 at a distance from anterior end 22 thereof corresponding with a depth to which it is desired to insert barrel 20 into the uterine cavity. Means 23 are provided at the posterior end of instrument 190 to facilitate grasping and manipulation of the instrument.

Figs. 3 and 4 show the intrauterine device of Fig. 1 and Fig. 21 mounted within barrel 200 of instrument 190 of Fig. 1. As is best seen from Fig. 3, transverse arm 110 of the device is bent downward from the point of attachment to longitudinal arm 120 to lie along an axis substantially parallel to that of the longitudinal arm, which position also requires some straightening of arm 110 at flexure 130 in the case of the intrauterine device of Fig. 1. Distortion of the device in this manner is possible because of the inherent resiliency of the material of core 150 as well as structural features such as coils 170. The device is loaded within instrument 190 such that terminal portion 140 of longitudinal arm 120 is farthest from anterior orifice 22. Filament 180 extends from terminal portion 140 out of orifice 22.

As is best seen from Fig. 4, barrel 200 is suitably elliptic in shape, whereby the folded device is constrained within a plane fixed with respect to inserting instrument 190.

Figs. 5-7 show the insertion of a contraceptive intrauterine device according to the present invention into the uterus employing instrument 190 of Fig. 1. In par-

4 ticular, Fig. 5 shows instrument 190 *in situ* with barrel 200 inserted into uterus 24 until stopping means 21 abuts exterior cervical os 25. By pulling on filament 180 downwards in the direction of the arrow, said filament extending from anterior orifice 22 backwards along barrel 200 into the vagina 26, the contraceptive device lodged in barrel 200 is pulled therefrom until emergence from anterior orifice 22 of coil 170 at the junction of transverse arm 110 and longitudinal arm 120. The arcuate shape of longitudinal arm 120 and the resilience of folded transverse arm 110 tend to embed the juncture (coil 170) firmly into the uterine wall at point 27. Because of this embedment at point 27, further pulling on filament 180 exerts a downward force on the rim of barrel 200 at anterior orifice 22 tending to retract barrel 200 from the uterus.

This stage is shown in Fig. 6 of the accompanying drawings in which barrel 200 is shown sufficiently retracted from uterus 24, and from the intrauterine device therein, to permit escape of entire transverse arm 110. Lateral pressure exerted by the resilient material of the device around flexure 130 tends to embed the free end of transverse arm 110 into the uterine wall at point 28.

Finally, Fig. 7 shows the intrauterine device *in situ* in the uterus after complete withdrawal of the inserting instrument. It will be evident from Fig. 7 that the device is firmly anchored in the uterine cavity at points 27 and 28 already discussed, as well as at point 29 at which terminal portion 140 of longitudinal arm 120 makes contact with the uterine wall. This three-point contact is highly effective in preventing inadvertent dislodgement or expulsion of the device from the uterus.

As will further be seen from Figs. 5—7, it is evident that deposition of the intrauterine device within uterine cavity 24¹ has been accomplished without pushing forces tending to move the device in the direction of uterine fundus 30. Once the device has been sufficiently expelled from barrel 200 for one end of transverse arm 110 to make contact with the uterine wall (cf. point 27 of Fig. 5), further tension on filament 180 repels barrel 200 from uterus 24, rather than propelling the intrauterine device from the barrel. In this manner, the danger of puncturing uterine fundus 30 due to the propulsion of an intrauterine device into the uterus by pushing forces is greatly reduced.

Figs. 8—12, in which the reference numbers respectively refer to the same structural features, show a preferred embodiment of an instrument for the insertion of an intrauterine contraceptive device into the uterus.

The device shown in these Figures comprises first barrel 31 having exterior stopping

means 32 positioned therealong at a distance from anterior orifice 33 of barrel 31 corresponding to a desired depth to which barrel 31 is to be inserted into the uterus.

The device shown in these figures similarly has second barrel 34 adjacent said first barrel and having a slot or keyway 35 (best seen in Figs. 11 and 12) therein. Bifurcate piston 36 slides within barrels 31 and 34, and has first fork 37 in barrel 31 and second fork 38 in barrel 34. Second fork 38 of piston 36 is provided with stopping means 39 external to barrel 34 and movable within keyway 35 therein, as is best seen from Fig. 10.

First and second barrels 31 and 34 suitably have common grip means 40, advantageously fashioned to engage with the index and middle finger of the hand. Similarly, piston 36 is provided with handle means 41 which, when actuated (for example by thumb pressure), cause simultaneous movement of piston forks 37 and 38 within barrels 31 and 34 respectively.

The instrument of Figs. 8—12 is there shown in combination with an intrauterine device like that of Fig. 18 comprising transverse arm 110, longitudinal arm 120, and filament 180 attached thereto. The intrauterine device is suitably loaded into the instrument of Figs. 8—12 by insertion into transverse slot 42 in barrel 31 posterior to stop means 32. Longitudinal arm 120 lies axially within barrel 31, which is advantageously further slotted in an axial direction. Suitably, one or two axial slots are provided to accommodate a transverse arm or arms of an intrauterine device. These axial slots and their function can best be seen and understood by referring to Figs. 13, 14, and 19, and to Figs. 15 and 20.

In particular, Figs. 13, 14, and 19 show an intrauterine contraceptive device positioned within barrel 31 of the instrument shown in Figs. 8—12. Transverse arm 110 of the device extends from barrel 31 in one direction through axial slot 43 and, in the other direction, through somewhat longer axial slot 44. Longitudinal arm 120 of the device is within barrel 31 and extends axially therealong. This "start" or "rest" position of the intrauterine device is shown in Fig. 19 in dashed lines and represents the preferred position of the intrauterine device in the inserting instrument at the time of sterile packaging. In this position, no forces are exerted on the flexible intrauterine device which might tend to distort or deform it.

When the physician intends to insert an intrauterine device using the combination shown in Fig. 13, he opens the sterile package in which the device and inserting instrument are packed. As shown in Figs. 13 and 14, barrels 31 and 34 are conveniently grasped with one hand and movable piston 36 with the other. The device is then in-

serted uterus 24, as in Fig. 14, until stop 32 on barrel 31 makes contact with exterior cervical os 25. Then, as shown in Fig. 15, pressure is applied to the handle 41 against counterpressure applied to grip 40 to advance piston 36 forwards in barrels 34 and 31 until stopping means 39, external to barrel 34 and travelling in the keyway therein, also make contact with external cervical os 25.

As is best seen from Fig. 19, advancement of piston fork 37 within barrel 31 causes the intrauterine device therein to fold itself within barrel 31 into the position shown in solid lines in Fig. 19. To distinguish the rest position and the folded position in Fig. 19, the reference numerals referring to the position have been primed.

Thus, upward pressure on piston 37 of Fig. 19 causes arm 110 of the intrauterine device to pivot counterclockwise around a pivot point at the upper end 45 of shorter axial slot 43. As further upward pressure is exerted on the device by piston 37, transverse arm 110 ascends, enters longer axial slot 44 in barrel 31, and folds back on longitudinal arm 120 until the arms assume the positions 110' and 120' shown in solid lines in Fig. 19. The folding of the device within barrel 31 also causes some advancement of the device within the barrel, e.g. such that terminal portion 140 moves to a new position 140'.

When stop 39 external to barrel 34 contacts exterior cervical os 25, as shown in Fig. 15, because of upward pressure on piston fork 38, piston fork 37 will have accomplished the folding of the intrauterine device within barrel 31 and caused advancement of the device substantially to anterior orifice 33 of barrel 31, as shown in Fig. 15 and, particularly, in Fig. 20. At this time, the device is in position in the uterus, but is still sheathed within barrel 31. In the region of orifice 33, interior 31' of barrel 31 is preferably elliptic to maintain the device in a fixed plane with respect to the instrument (cf. Fig. 12).

As shown in Fig. 16, further pressure on handle 41 cannot cause further forward movement of piston 36 because of the impedance of the forward movement of piston fork 38 by contact of stop means 39 thereon with exterior cervical os 25. Rather, the instrument, comprising barrels 34 and 31, will tend to retract from the uterus in the direction of the arrow shown in Fig. 16, permitting the escape of the folded intrauterine device from anterior orifice 33. Piston fork 37 within barrel 31 retains a fixed position relative to the uterus during this stage. It is the retrograde movement of barrel 31 downwards along piston fork 37 which causes unsheathing of the device within the uterus. The instrument is withdrawn from around

the intrauterine device when the device is *in situ* in the uterus. There is no propulsion of the device from the instrument by any pushing forces in the direction of uterine fundus 30. Proper planarity of the device with respect to the uterus is assured by elliptic interior 31' of barrel 31 and by the proper orientation of barrel 31 (and the instrument) to the uterine cavity.

Fig. 17 shows the device *in situ* in uterus 24 after insertion. As in Fig. 7, lateral and longitudinal arms 110 and 120 of the device make a three-point contact with the uterine wall at points 27, 28, 29, imparting particular stability to the device against accidental dislodgement from the uterus.

The material from which the instruments contemplated according to the present invention can be fashioned is not critical. However, the use of plastics is particularly convenient because the devices can be cheaply manufactured and then disposed of after use. The manufacture of the barrel from transparent or semi-transparent plastic materials permits the physician to observe the proper functioning of the device.

WHAT WE CLAIM IS:—

1. An intrauterine contraceptive device having the basic form of a figure '7', the upper, substantially transverse arm being arcuate with its free end bending towards the lower, substantially longitudinal arm, which lower arm is arcuate with its free end bending away from the upper arm.
2. An intrauterine device as claimed in claim 1 wherein the upper and lower arms are formed wholly or partially from a physiologically inert material.
3. An intrauterine device as claimed in claim 1 wherein the upper and lower arms are formed from a continuous length of spring wire having a physiologically inert coating thereon.
4. An intrauterine device as claimed in claim 3 wherein the physiologically inert coating is polypropylene.
5. An intrauterine device as in claim 2 or 3 wherein metallic copper or zinc has been applied to the whole, or to a part, of the surface of the said device.
6. An intrauterine device as claimed in any of claims 2 or 3 wherein copper wire is wound around at least one of the arms.
7. An intrauterine device as in any one of claims 1 to 6, wherein a physiologically inert filament is attached to the independent end of the second arm.
8. In combination an intrauterine contraceptive device as claimed in claims 1 to 7, and an instrument for the insertion thereof into the uterus, said instrument comprising not more than two barrels having external stopping means, at a distance from the anterior end thereof corresponding with a de-

serted uterus 24, as in Fig. 14, until stop 32 on barrel 31 makes contact with exterior cervical os 25. Then, as shown in Fig. 15, pressure is applied to the handle 41 against counterpressure applied to grip 40 to advance piston 36 forwards in barrels 34 and 31 until stopping means 39, external to barrel 34 and travelling in the keyway therein, also make contact with external cervical os 25.

As is best seen from Fig. 19, advancement of piston fork 37 within barrel 31 causes the intrauterine device therein to fold itself within barrel 31 into the position shown in solid lines in Fig. 19. To distinguish the rest position and the folded position in Fig. 19, the reference numerals referring to the position have been primed.

Thus, upward pressure on piston 37 of Fig. 19 causes arm 110 of the intrauterine device to pivot counterclockwise around a pivot point at the upper end 45 of shorter axial slot 43. As further upward pressure is exerted on the device by piston 37, transverse arm 110 ascends, enters longer axial slot 44 in barrel 31, and folds back on longitudinal arm 120 until the arms assume the positions 110' and 120' shown in solid lines in Fig. 19. The folding of the device within barrel 31 also causes some advancement of the device within the barrel, e.g. such that terminal portion 140 moves to a new position 140'.

When stop 39 external to barrel 34 contacts exterior cervical os 25, as shown in Fig. 15, because of upward pressure on piston fork 38, piston fork 37 will have accomplished the folding of the intrauterine device within barrel 31 and caused advancement of the device substantially to anterior orifice 33 of barrel 31, as shown in Fig. 15 and, particularly, in Fig. 20. At this time, the device is in position in the uterus, but is still sheathed within barrel 31. In the region of orifice 33, interior 31' of barrel 31 is preferably elliptic to maintain the device in a fixed plane with respect to the instrument (cf. Fig. 12).

As shown in Fig. 16, further pressure on handle 41 cannot cause further forward movement of piston 36 because of the impedance of the forward movement of piston fork 38 by contact of stop means 39 thereon with exterior cervical os 25. Rather, the instrument, comprising barrels 34 and 31, will tend to retract from the uterus in the direction of the arrow shown in Fig. 16, permitting the escape of the folded intrauterine device from anterior orifice 33. Piston fork 37 within barrel 31 retains a fixed position relative to the uterus during this stage. It is the retrograde movement of barrel 31 downwards along piston fork 37 which causes unsheathing of the device within the uterus. The instrument is withdrawn from around

the intrauterine device when the device is *in situ* in the uterus. There is no propulsion of the device from the instrument by any pushing forces in the direction of uterine fundus 30. Proper planarity of the device with respect to the uterus is assured by elliptic interior 31' of barrel 31 and by the proper orientation of barrel 31 (and the instrument) to the uterine cavity.

Fig. 17 shows the device *in situ* in uterus 24 after insertion. As in Fig. 7, lateral and longitudinal arms 110 and 120 of the device make a three-point contact with the uterine wall at points 27, 28, 29, imparting particular stability to the device against accidental dislodgement from the uterus.

The material from which the instruments contemplated according to the present invention can be fashioned is not critical. However, the use of plastics is particularly convenient because the devices can be cheaply manufactured and then disposed of after use. The manufacture of the barrel from transparent or semi-transparent plastic materials permits the physician to observe the proper functioning of the device.

WHAT WE CLAIM IS:—

1. An intrauterine contraceptive device having the basic form of a figure '7', the upper, substantially transverse arm being arcuate with its free end bending towards the lower, substantially longitudinal arm, which lower arm is arcuate with its free end bending away from the upper arm.

2. An intrauterine device as claimed in claim 1 wherein the upper and lower arms are formed wholly or partially from a physiologically inert material.

3. An intrauterine device as claimed in claim 1 wherein the upper and lower arms are formed from a continuous length of spring wire having a physiologically inert coating thereon.

4. An intrauterine device as claimed in claim 3 wherein the physiologically inert coating is polypropylene.

5. An intrauterine device as in claim 2 or 3 wherein metallic copper or zinc has been applied to the whole, or to a part, of the surface of the said device.

6. An intrauterine device as claimed in any of claims 2 or 3 wherein copper wire is wound around at least one of the arms.

7. An intrauterine device as in any one of claims 1 to 6, wherein a physiologically inert filament is attached to the independent end of the second arm.

8. In combination an intrauterine contraceptive device as claimed in claims 1 to 7, and an instrument for the insertion thereof into the uterus, said instrument comprising not more than two barrels having external stopping means, at a distance from the anterior end thereof corresponding with a de-



sired depth of insertion of one barrel into the uterus.

9. In combination, an intrauterine device as claimed in claim 7 and an instrument for the insertion thereof into the uterus, said instrument comprising not more than one barrel having an external stopping means at a distance from the anterior end thereof corresponding with the desired depth of insertion of the barrel into the uterus.

10. In combination an intrauterine device as claimed in claims 1 to 7 and an instrument for the insertion thereof into the uterus, the said instrument comprising a first barrel for accommodation of said intrauterine device, the first barrel having a first stopping means external to the first barrel and at a distance from the anterior end thereof corresponding with a desired depth of insertion of the first barrel into the uterus, a second barrel adjacent to the first barrel and extending to the first stop, the second barrel having a keyway therein, a bifurcate piston in said first and second barrels, the piston having a second stopping means at the anterior end thereof, the second stopping means being external to the second barrel and travelling in the said keyway therein.

11. A combination as claimed in claim 10, wherein the first barrel is transversely slotted proximally to the first stopping means.

12. A combination as claimed in claim 10, wherein the first barrel is axially slotted proximally to the first stopping means.

13. A combination as claimed in claim 9, wherein said intrauterine device is folded in the barrel.

14. A combination as claimed in claim 10, wherein said intrauterine device is folded in the first barrel.

15. A combination as claimed in claim 11, wherein the lower, substantially longitudinal arm of the intrauterine device is lying axially within the first barrel of the instrument and the upper, substantially transverse arm is extending outwardly from the transversely slotted portion of the first barrel.

16. A combination as claimed in claim 12, wherein the lower, substantially longitudinal arm of the intrauterine device is lying axially within the first barrel of the instrument, and the upper, substantially

transverse arm is extending outwardly from the axially slotted portion of the first barrel.

17. A method of inserting an intrauterine device into the uterus, using the combination as claimed in claim 13, which comprises inserting the barrel into the uterus until the stopping means contacts the cervical os and then withdrawing the folded intrauterine device from the barrel by pulling on the filament attached to the intrauterine device and extending from the anterior mouth of the barrel backwards to the vagina, outside the barrel.

18. A method of inserting an intrauterine device into the uterus using the combination claimed in claim 14, which comprises inserting the first barrel into the uterus, until the first stopping means contacts the exterior cervical os; advancing the bifurcate piston in the keyway until the second stopping means contacts the exterior cervical os, the intrauterine device being within the first barrel, forward of the first stopping means and within the uterine cavity; and then withdrawing the first barrel from the uterus by retraction of the first and second barrels along the bifurcate piston, whereby the device is deposited in the uterus.

19. A method of inserting an intrauterine device into the uterus using the combination as claimed in claim 15 or 16, which comprises inserting the first barrel into the uterus until the first stopping means contacts the exterior cervical os; advancing the bifurcate piston in the keyway until the second stopping means contacts the cervical os, folding the intrauterine device in the first barrel and advancing the folded intrauterine device to a position in the first barrel forward of the first stopping means and within the uterine cavity; and then withdrawing the first barrel from the uterus by retraction of the first and second barrel along the bifurcated piston, whereby the intrauterine device is deposited in the uterus.

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