Sept. 16, 1969 H. M. HASSON 3,467,089

INTRAUTERINE CONTRACEPTIVE DEVICE (IUD)

Filed Feb. 14, 1967

Fig 1

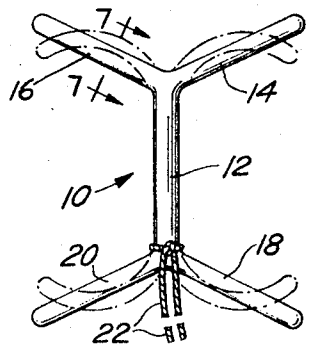


Fig. 2

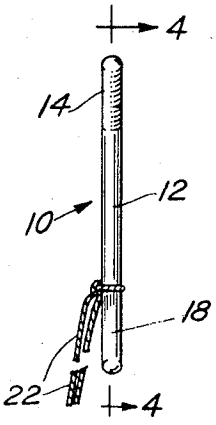


Fig. 3

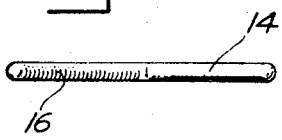


Fig. 4

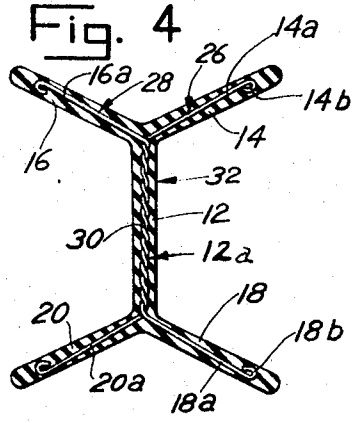


Fig. 5

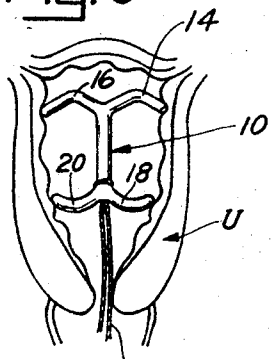


Fig. 6

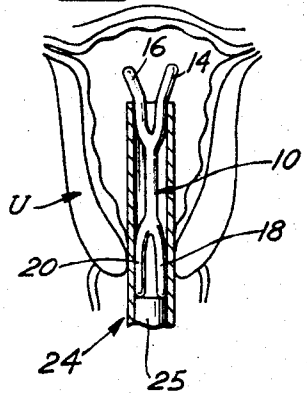


Fig. 7

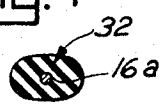
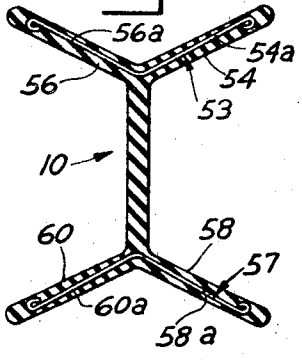


Fig. 8



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United States Patent Office 3,467,089
Patented Sept. 16, 1969

3,467,089

INTRAUTERINE CONTRACEPTIVE DEVICE (IUD)

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Filed Feb. 14, 1967, Ser. No. 616,023
Int. Cl. A61f 5/46
U.S. Cl. 128—130 7 Claims

ABSTRACT OF THE DISCLOSURE

A wing-type contraceptive intrauterine device (IUD) is provided with the improvement of a second pair of oppositely extending wings to prevent expulsion. The improved IUD is compatible with body tissues, is non-reactive and non-toxic by reason of an exterior surface of silicone rubber. A siliconized Dacron thread is attached for detection and removal of the device. A core of resilient, magnetic material provides improved means for assisting in locating and removing the IUD. The core provides both resilience, to maintain the wings extended, and deformability to permit pre-setting the contour of the wings, as desired.

Brief summary of the invention

This invention relates to an intrauterine contraceptive device (IUD) and more particularly to an IUD that is equipped with means for resisting undesired expulsion, and additionally with means to assist in locating and removing the same as desired.

Birth control has, in recent years, become a world-wide problem. The past use of IUD's has been controversial, but recent studies have tended to establish their usefulness, particularly in countries that lack a relatively high degree of economic development. The IUD method of birth control is particularly desirable as such a device is relatively inexpensive, it has a long life in situ, requires no forethought in use, and is not subject to failure of the patient to use. The ideal IUD has yet to be developed. Conflict still exists as to the most desirable among a variety of shapes including a ring (Von Grafenberg), a spiral loop (Lippes), and a wing pessary, and among a variety of materials including silver or stainless steel (rings), polyethylene, natural rubber, etc.

However, the biggest problems associated with IUD usage have been: first expulsion or loss of the device from the uterus; second, host intolerance; third, penetration, or migration, through tissues. A general problem exists in the selection of a material for the IUD which will be compatible with the body tissues as well as being non-reactive and non-toxic.

Thus, one object of this invention is to provide an improved IUD with means to prevent expulsion or loss thereof from the uterus.

Another object of this invention is to provide an IUD with an improved core structure which achieves resilience where desired while permitting pre-setting of the contour of the IUD's wings as desired.

A further object seeks the provision of an IUD which substantially reduces likelihood of host intolerance and of the device embedding and migration through the surrounding tissue and which is provided with adequate means to facilitate its location and removal as desired.

In the improved device of this application, basically a wing-type IUD is improved by providing means in the form of opposite extending arms or wings to prevent inadvertent expulsion even under unusual conditions encountered in some situations of uterine contractions or cervical dilations which would tend to encourage expulsion or loss of other types of IUD's. The additional arms

or wings may also inhibit any tendency of migration of the device through tissues. The core of the IUD is a magnetic spring stainless steel material which provides an efficient alternative telltale means for locating and removing the device as desired. The outer surfaces of the IUD are preferably of silicone rubber, such as sold under the trademark "Silastic," as such material has been determined to have the desired characteristics and qualities sought of long life, compatibility with surrounding tissues and body fluids, non-reactiveness and non-toxicity.

In a preferred embodiment, the core of the IUD is defined by two elongated strips helically entwined to provide a fairly rigid core for the stem portion of the IUD which provides the resilience to cause the wings to be maintained extended, while the ends of the strips serving as cores of the wings permit of pre-setting the contour of the wings, as desired.

Further objects and advantages of this invention will become apparent as the following description proceeds and the features of novelty which characterize this invention will be pointed out with particularity in the claims annexed to and forming part of this specification.

Preferred embodiments of the invention are shown in the accompanying drawing.

Brief description of the views of the drawing

FIG. 1 is a side elevational view of one form of wings type IUD that embodies the features of this invention.

FIG. 2 is an edge elevational view of the IUD taken looking from the right of FIG. 1.

FIG. 3 is another edge elevational view of the IUD taken looking from above of FIG. 1.

FIG. 4 is a cross-sectional view of the IUD taken through the median plane as indicated by section line 4—4 of FIG. 2.

FIG. 5 is a break-away view allustrating generally the IUD in position within a uterus.

FIG. 6 is a view similar to FIG. 5 showing a typical method and means for introducing in the uterus the IUD of FIGS. 1–4.

FIG. 7 is a greatly enlarged cross-sectional view taken on line 7—7 of FIG. 1 and illustrating a typical section of one of the IUD's arms.

FIG. 8 is a view similar to FIG. 4 showing a modified form of the invention.

Detailed description

Referring now to the drawing, there is shown in FIG. 1 an intrauterine device (IUD) **10** shaped and pre-formed to provide an elongated stem **12**, upper wings **14** and **16**, and lower wings **18** and **20**. Tied around the lower portion of stem **12**, adjacent the point of junction with the lower wings **18** and **20**, is an elongated thread **22** of Dacron or the like that is coated with silicone rubber and which is provided in a length to extend through the cervix of the uterus and to provide for the user an indication that the IUD is properly in position, and may also be used to remove the device.

FIG. 5 illustrates in a diagrammatic view, that is partially broken away, an attitude that the IUD of FIG. 1 may take when it is properly lodged in the uterus U. FIG. 6, on the other hand, illustrates the means for introducing the IUD to the interior of the uterus. In FIG. 6, the IUD is shown with its wings **14–16** and **18–20** folded or disposed so as to be fitted within an elongated tubular inserter **24** whose upper end is adapted to be entered into the cervix as shown. The inserter **24** includes a plunger **25** whose action operates to discharge the IUD into position within the uterus U, after which the inserter **24** with plunger **25** therein may be withdrawn from the cervix and the IUD will stay in position as illustrated in FIG. 5.

Turning now to the details of construction of the improved IUD **10**, the stem **12** includes a relatively stiff core **12***a* defined by the central portions of two elongated wires **26** and **28** that are intertwined at **30**. The ends of the wires **26** and **28** extend beyond the axial ends of core **12***a* to serve as the cores of the respective wings, thus providing wing cores **14***a*, **16***a*, **18***a* and **20***a*. The outermost ends of the respective wing cores are bent backwardly or curled in a direction axially inwardly or toward an opposite wing as shown at **14***b*, for example, and so as to insure that the outermost tip of each wing core is blunted so as to eliminate, to as great an extent as possible, the possibility of piercing of the wall of the uterus in the event that the cores of the wings are inadvertently exposed.

The respective wings **14** and **16** are inclined radially outwardly and axially upwardly relative to the upper end of stem **12**, and the second pair of wings **18** and **20** are inclined and project oppositely, namely outwardly and axially downwardly of the lower end of the stem **12**.

All portions of the two wires **26** and **28** which define the stem core **12***a* and their respective wing cores are completely encased within a formed jacket or coating of silicone rubber **32**. FIG. 7 illustrates a typical cross section through one of the wings **14** and shows the elongated run of the wing core **14***a* located substantially centrally of the coating and completely encased within the formed coating of silicone rubber **32**, and with the exterior periphery of the cross section of the formed coating, desirably, being generally elliptical.

The uppermost pair of wings **14** and **16**, prior to insertion of the IUD within the uterus, are settable by manual pressure and bending and preferably are to be bent or sprung to the curved position as shown in dotted lines in FIG. 1, so that the extended ends of the wings **14** and **16** are curved slightly in the direction as seen in FIG. 5, where the tips of the wings extend generally slightly downwardly, or toward the other end of the stem **12**, as compared to the direction of projection of the wings **14** and **16** as they originate from the stem **12**. Normally, both pairs of resilient wings **14–16**, and **18–20** extend in their unrestrained state in opposite diametric directions relative to the longitudinal axis of the stem, and each of the wings is inclined axially outwardly of the respective ends of the stem. However, it is believed preferable to spring or bend the upper wings **14–16** to the dotted line position of FIG. 1. In some instances it will be desirable to also bend the lower wings **18–20** in the opposite direction, but to a lesser extent, as shown in dotted lines in FIG. 1.

The two wires **26** and **28** preferably are formed of a magnetic spring steel, such as stainless steel, which is resistant to corrosion of body fluids. The magnetic feature is desirable since it provides an adequate alternative means for locating and removing the IUD should the thread **22** prove insufficient or should it get lost. If future studies disclose objections to use of the thread **22**, it may be eliminated without impairing the utility of the device disclosed.

FIG. 8 illustrates a modified form of construction in which the core members of the wings are in the form of elongated leaf springs rather than in the form of intertwined wires as shown in the device of FIGS. 1–4. In the form of device of FIG. 8, the IUD has a stem **52** that is formed solely of silicone rubber, and the device is provided with two pairs of wings **54–56** and **58–60**. Two lazy-V wire core members are provided at **53** and **57**. The first core member **53** extends into the wings **54** and **56** to provide core members **54***a* and **56***a*. The second core member **57** similarly extends into wings **58** and **60** to define core members **58***a* and **60***a*. The spring characteristics of core members **53** and **57** are selected to provide sufficient resilience to bias the wings toward the unrestrained positions similar to FIG. 5 after the IUD has been introduced into the uterus. Again, the characteristics of the material is such that the upper wings **54** and **56**, and also the lower wings **58** and **60**, may be pre-formed by the physician toward the arched conditions shown by dotted lines in FIG. 1.

It is contemplated producing such devices as here disclosed in four different sizes, although more or less sizes may be produced as circumstances require. The typical variable dimensions which define the sizes are (a) the length of the stem **12**, (b) the length of each wing (e.g. **14**), (c) the maximum spread between the tips of a pair of wings (e.g. **14** and **16**), and (d) the size (diameter) of the core wires (e.g. **26**). The following table discloses the sizes presently selected:

Size	Wire Size (in.)	Stem Length (mm.)	Wing Length (mm.)	Maximum Wing Spread (mm.)
A	.010	10	10	20
B	.012	15	13.5	27
C	.013	18	17	34
D	.014	21	21	42

Additional typical dimensions are, for example, in the *b* size, the major diameter of the elliptic section of FIG. 7 is about 2.2–2.4 mm. and the minor diameter of said section is about 1.7–1.8 mm.

While there has been shown and described a particular embodiment of this invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the invention and, therefore, it is intended in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. An intrauterine contraceptive device comprising, in combination, an elongated stem, a first pair of elongated resilient wings extending from one end of said stem, and a second pair of elongated resilient wings at the other end of said elongated stem for preventing inadvertent expulsion of said device.

2. A device as in claim **1** wherein each of said two pairs of resilient wings extend in their unrestrained state in opposite diametric directions of the axis of said stem and inclined axially outwardly of the respective ends of said stem.

3. A device as in claim **1** wherein each pair of elongated resilient wings included a core member of magnectic spring steel that is encased in a body of silicone rubber.

4. A device as in claim **1** wherein the periphery of the cross-section of each of the resilient wings is generally elliptic.

5. A device as in claim **1** wherein the ends of the resilient wings that are spaced from the stem are, in their unstressed condition, curved slightly in a direction generally toward the other end of said stem.

6. A device as in claim **1** wherein each wing is provided with an encased core member of spring steel whose outermost end is bent back on itself so that the outermost reach of the core member within the wing is blunted.

7. A device as in claim **1** wherein the stem and wings are provided with a silicone rubber-encased core member of magnetic spring steel defined by two elongated wires whose central portions are entwined to define the core of the stem and whose ends assist in defining the four wings of the device.

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ADELE M. EAGER, Primary Examiner