

[54] **MULTIPURPOSE VAGINAL AND CERVICAL DEVICE**

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[51] Int. Cl. **A61b 1/06**

[58] Field of Search **128/2 R, 3, 4, 5, 6, 7, 128/8, 9, 350 R, 351, 341, 344, 345, 303.11**

[56] **References Cited**

UNITED STATES PATENTS

3,162,190	12/1964	DelGizzo	128/6
3,690,323	9/1972	Wortman et al.	128/350 R

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[57] ABSTRACT

A vaginal and cervical device comprising an elongated tubular member with an air tube connected to a pressure source at one end, a tubular extension structure at the distal end comprised of inner and outer sheets of flexible material which define an air chamber and which may be collapsed into the distal end of the tubular member or deployed therefrom into a fully extended position to provide an opening for observation of a cervix to aid in artificial insemination. Air from the pressure source maintains the tubular extension in the extended position. The outer sheet of the tubular extension may be stretchable to define an expander which is inflated by way of the pressure source or, alternatively, a separate expander may be mounted on the medial portion of the tubular member either of which press against the walls of the vagina to hold the device firmly in place.

7 Claims, 8 Drawing Figures

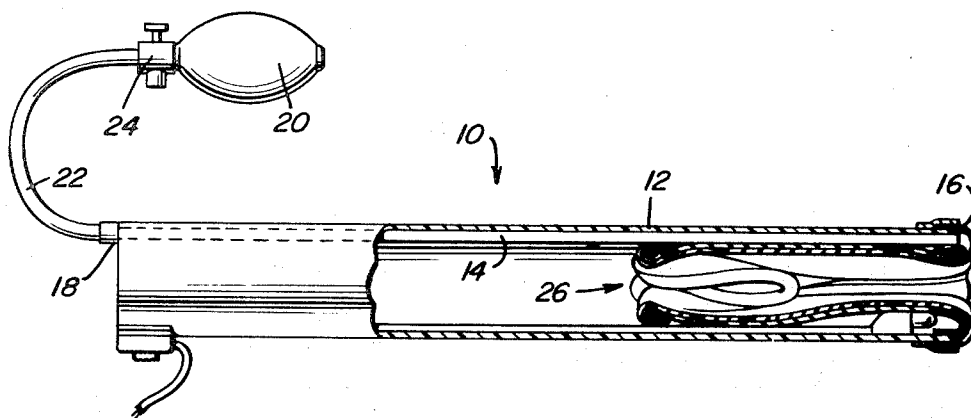


Fig. 1

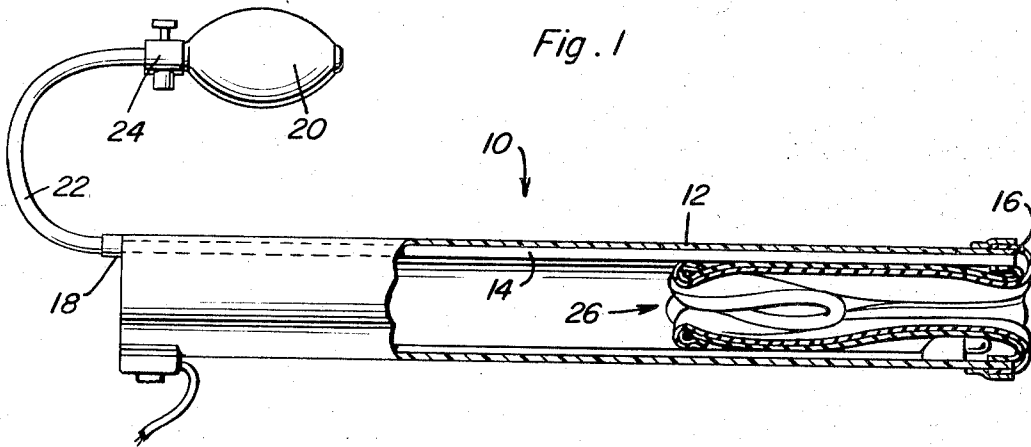


Fig. 2

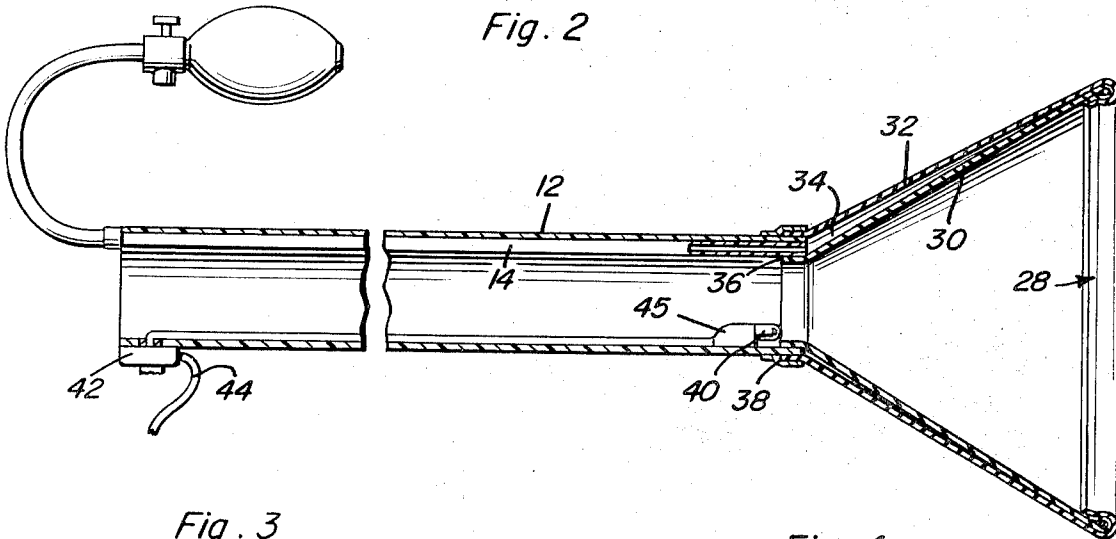


Fig. 3

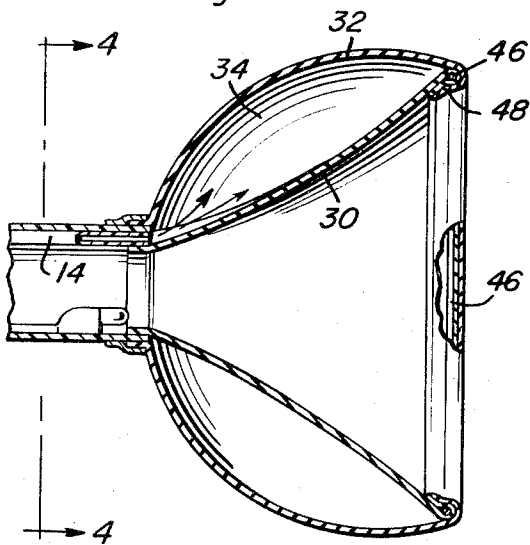
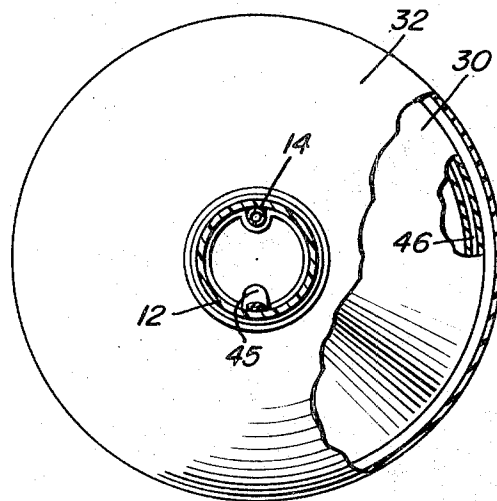
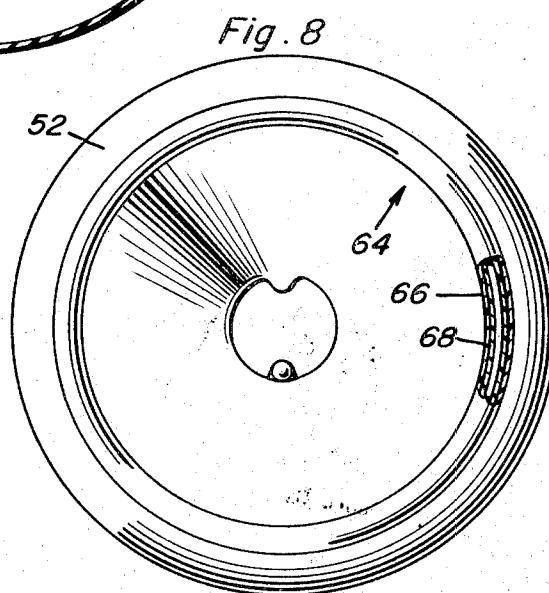
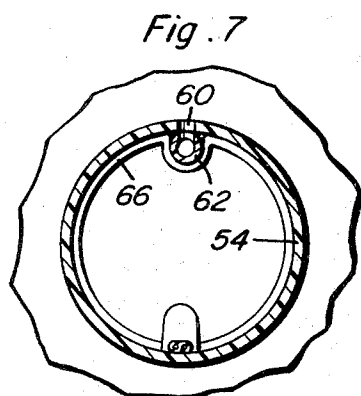
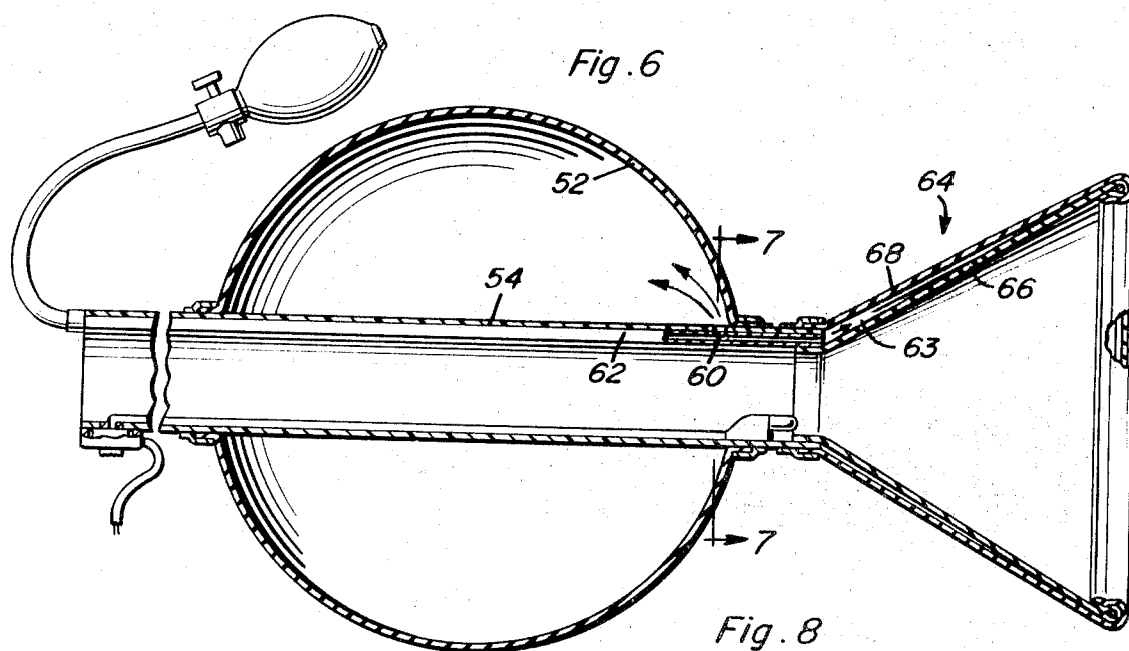
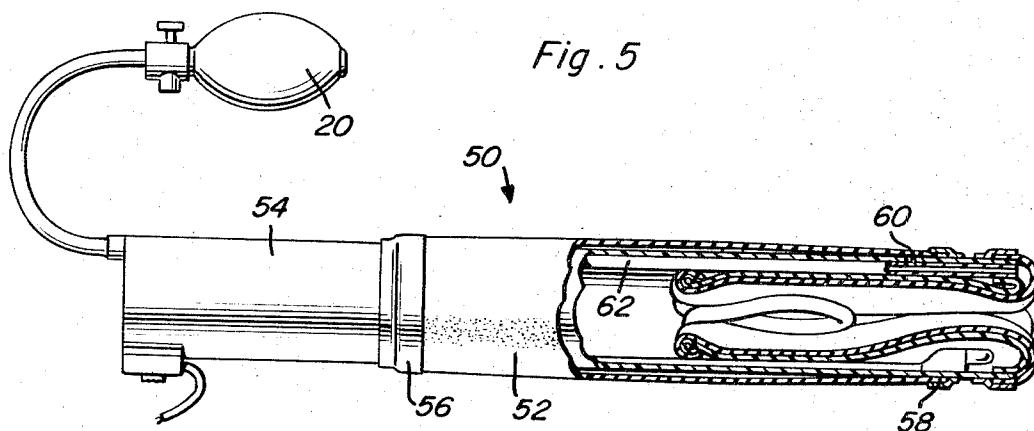


Fig. 4





MULTIPURPOSE VAGINAL AND CERVICAL DEVICE

The present invention is generally related to vaginal speculums and, more particularly, to a multipurpose vaginal and cervical device for artificial insemination, inter-uterine therapy, surgery, research, and various other procedures.

In recent years, the use of artificial insemination for breeding purposes has become quite common, particularly for cattle breeding. Because of the peculiar bovine characteristic of a movable cervix, a high degree of expertise is normally required for artificial insemination procedures, necessitating the employment of a trained, highly skilled technician or inseminator. Not only is this an expensive procedure for cattle breeders, but such highly trained individuals are few in number and often difficult, it not impossible, to obtain during the brief conception periods during which the bovine may be bred.

The device of the present invention provides a means by which a relatively unskilled person may easily and successfully accomplish artificial insemination procedures, previously requiring a highly skilled inseminator. The device includes an inflatable expander which is inserted into the vagina of the animal to be bred and is subsequently inflated against the walls of the vagina to maintain the device stationary relative to the cervix, whereby artificial insemination or other procedures may be conducted with a minimum amount of interruption due to cervical movement. In addition, the device is provided with a light in an elongated tubular member which illuminates the cervix area, making it readily visible to the user. Once the device has been inserted and inflated, both of the user's hands are free to carry out various procedures, such as the insertion of an insemination pipette.

The device of the present invention is also readily adaptable for use with recently developed procedures for transferring a fertilized ovum from one bovine carrier to another through an intermediate carrier. These procedures are often utilized when it is desirable to provide an offspring with characteristics of animals normally bred in foreign countries but which, by law, may not be imported into this country for health reasons, or the like. Basically, the newly developed procedures include the removal of a fertilized ovum from a foreign cow, or other mammal, which is placed in the uterus of a female rabbit. The rabbit is transported to the desired location, where the fertilized ovum is then removed and inserted into the uterus of a cow of any breed. This provides an offspring which does not possess the characteristics of the cow hosting the ovum subsequent to its fertilization. The device of the present invention provides a means of conveniently accommodating the insertion of the fertilized ovum into the uterus of the hosting cow.

It is an object of the present invention to provide a novel multipurpose vaginal and cervical device for aiding in artificial insemination and other procedures.

Another object of the present invention is to provide a unique vaginal and cervical device for the expeditious observation of internal vaginal and cervical areas, particularly in the bovine.

It is a further object of the present invention to provide a versatile vaginal and cervical device which may be quickly and conveniently inserted in the vagina and

anchored in place by way of an inflatable expander which retentively engages the wall of the vagina in such a manner as to render the cervix easily visible and stationary relative to the viewing area, allowing the operator to use both hands for artificial insemination, or other procedures.

Still another object of the present invention is to provide a novel vaginal and cervical device including a relatively rigid tubular member with a collapsible tubular extension at its distal end which may be selectively extended to provide an access opening in general alignment with the tubular member for observation of the cervix or for access thereto for artificial insemination and other various procedures.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout.

FIG. 1 is an elevational view of the device of the present invention with sections removed and with the tubular extension in a collapsed position.

FIG. 2 is a broken sectional view of the device shown in FIG. 1, but with the tubular extension in a fully extended position.

FIG. 3 is a sectional view of the tubular extension in an inflated condition.

FIG. 4 is a sectional view taken along section 4—4 of FIG. 3.

FIG. 5 is an elevational view of a second embodiment of the present invention with sections removed.

FIG. 6 is a broken sectional view of the device shown in FIG. 5, but with the tubular extension fully extended and the expander fully inflated.

FIG. 7 is a partial sectional view taken along section 7—7 of FIG. 6.

FIG. 8 is an end view of the device with the tubular extension fully extended.

Referring now, more particularly, to FIG. 1 of the drawings, the vaginal and cervical device of the present invention is generally indicated by the numeral 10 and includes an elongated tubular member 12 formed from relatively rigid materials, such as plastic, and provided with an elongated air tube 14 which is cemented or otherwise fastened to the interior walls of tubular member 12. Air tube 14 extends between distal end 16 of tubular member 12 and proximal end 18, where it is connected to a conventional squeeze bulb 20, or other pressure source, by way of a length of flexible tube 22. Preferably, a conventional pressure valve 24 is mounted between the outlet of bulb 20 and flexible tube 22 to permit the expander associated with the device to be deflated, as hereinafter explained. A tubular extension structure generally indicated by the numeral 26 is provided at the distal end of tubular member 12 and is collapsible in nature such that it may be disposed within the confines of the distal end portion, as illustrated in FIG. 1. This permits unimpeded insertion of the device into a bovine vagina and manipulation to the cervix.

Referring to FIG. 2, it will be observed that the tubular extension structure 26 may be deployed from its collapsed position shown in FIG. 1 to a fully extended position where it extends longitudinally beyond tubular member 12 and defines an opening, indicated at 28, which is in general alignment with the axis of tubular

member 12. The extension structure assumes a generally tubular configuration which, preferably, is substantially conical. This provides a relatively large area which confronts the cervix when the device is used for observation, artificial insemination, or other procedures.

The tubular extension structure is comprised of inner and outer sheets of flexible material 30 and 32, respectively, which are oppositely disposed of each other and spaced apart somewhat to define an air chamber as indicated at 34. The inner sheet 30 is cemented or otherwise fastened to the interior of the distal end of the tubular member 12, as indicated at 36, while outer sheet 32 is attached to the corresponding outer surfaces of the tubular member as indicated at 38. Inner sheet 30 is pressed around the distal end of air tube 14 to provide a seal therewith, such that air chamber 34 is in direct communication with air tube 14. Thus, the pressure within chamber 34 may be selectively increased or decreased by way of squeeze bulb 20. A mild increase in this pressure is effective to rigidify the tubular extension structure to maintain its shape and position as shown in FIG. 2. Once the device of the present invention has been inserted in place and the tubular extension deployed, an observation lamp 40 may be energized by way of a switch 42 located at the proximal end of the tubular member and appropriately connected to batteries or to an external source of power by way of a cord 44. The lamp and small fixture 45 are located near the distal end of the tubular member and are positioned such that they do not significantly block the field of vision through the tubular member, yet provide satisfactory illumination of the cervix.

As mentioned above, it is most desirable to anchor the device firmly in position such that it is maintained stationary relative to the cervix, particularly the bovine cervix which has a tendency to move. This is achieved by way of inflating the tubular extension structure to a position such as illustrated in FIG. 3. Inflation is achieved by way of air pressure generated by squeeze bulb 20 which forces outer sheet 32 to assume a configuration which presses against the walls of the vagina, not illustrated. It should be noted that while both the inner and outer sheets are made of flexible material, the stretchability of the outer sheet is considerably greater than that of the inner sheet, such that the outer expansion significantly exceeds any inward movement of the inner sheet during inflation. This may be achieved in various ways. For example, the inner and outer sheets may be made of identical materials, with the outer sheet being considerably thinner than the inner sheet and, thus, more stretchable under the influence of the increased air pressure. Or, if desired, the inner sheet may be provided with a fabric type reinforcement, such as nylon mesh or cord, which prevents it from being stretched under the influence of the pressure. Other various arrangements may be provided utilizing well known rubber and synthetic materials to provide the desired results of effecting significantly greater outward deformation of outer sheet 32 than inward displacement of inner sheet 30.

Preferably, the tubular extension structure is provided with a circular reinforcement member 46 preferably of plastic or metal wire, which is flexible and resilient in nature, such that it assumes a circular configuration subsequent to deployment of the structure from its collapsed position illustrated in FIG. 1. Preferably, re-

inforcement member 46 is surrounded by the distal peripheral edge portions of inner and outer sheets 30 and 32 such that the sheets are wrapped around reinforcement member 46 and are cemented, or otherwise fastened together at 48, as best illustrated in FIG. 3.

Referring now, to FIGS. 5-8, a second embodiment of the vaginal and cervical device of the present invention is generally indicated by the numeral 50. Basically, the second embodiment is similar in construction and purpose to that illustrated in FIGS. 1-4, but is provided with a separate expander which is mounted at the medial portion of the tubular member and defined by a generally cylindrical member 52 of flexible, stretchable material, such as rubber. A pair of circular mounting collars or sleeves 56 and 58 serve to clamp the opposite ends of member 52 against tubular member 54. In addition, tubular member 54 includes an air passageway 60 which provides a path of communication between air tube 62 and the interior of expander member 52. Squeeze bulb 20 is connected to air tube 62 in a manner similar to the first embodiment and the distal end of air tube 62 is open and in communication with an air chamber 63 defined by a tubular extension structure 64 which is similar in configuration to that of the first embodiment. The tubular extension structure 64 of the second embodiment includes inner and outer sheets of flexible material 66 and 68, respectively. However, while these sheets are flexible in nature, they are intentionally made of relatively non-stretchable material, such as fabric reinforced rubber, such that increased air pressure will not cause inflation of the structure as is the case with the first embodiment.

It will be appreciated that mild pressure within air chamber 63 tends to rigidify the tubular extension structure of the second embodiment to maintain the position and configuration thereof, as illustrated in FIG. 6. However, since the sheets 66 and 68 are substantially non-stretchable, increased pressure within chamber 63 will have little or no effect upon the configuration of the extension structure. Increased air pressures will be effective, however, to cause expansion of member 52 in an outward direction, as illustrated in FIG. 6. After the device has been inserted through the vagina, expander member 52 is inflated, such that it presses against the walls of the vagina and provides a firm anchor for the device. At the same time, the air pressure helps to rigidify the extension structure.

From the foregoing description, it will be appreciated that the two embodiments of the present invention provide a versatile means of gaining access to the cervix, particularly in the bovine with a minimum amount of effort. The expander associated with either form of the invention is effective to anchor the device firmly in place against the walls of the vagina, such that the opening defined at the remote end of the tubular extension structure is held substantially stationary relative to the cervix. This is of considerable assistance when performing artificial insemination, or other procedures, and allows the operator to use both hands, if necessary. When working with bovine animals, this eliminates the necessity of entering through the rectum to locate the cervix which, in most cases, is time consuming, less effective and less sanitary. Furthermore, the device of the present invention is relatively simple to use, such that artificial insemination and other procedures may be conducted without the assistance of highly trained personnel.

It will be appreciated that it is not intended that the present invention be limited to the specific uses described above. Furthermore, the device may be modified in size, configuration, or materials and may be used for various procedures such as intra-uterine therapy and surgery, as well as for research, hystological study and abortive measures for all mammals, especially bovine, equine, porcine, ovine, caprine, canine, feline and primate.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention.

What is claimed as new is as follows:

1. A device comprising an elongated tubular member with a proximal end and a distal end, an air passageway extending between said proximal and distal ends, a pressure source connected to said passageway, and an extension structure mounted to said distal end, said extension structure being selectively movable between a collapsed position and an extended position, said extension structure being longitudinally disposed beyond said distal end when in said extended position, said extension structure including an air chamber in communication with said passageway for receiving air from said pressure source to maintain said extension structure is a generally tubular configuration when in said extended position to define an opening at the outer end thereof in general longitudinal alignment with the distal end of said tubular member, said extension structure comprising inner and outer sheets of flexible material oppositely disposed of each other and defining said air chamber and being disposed substantially within the tubular member near the distal end when in collapsed condition, said inner and outer sheets being of substantially non-stretchable material such that they are influenced laterally a negligible amount under the influence of pressure from said source.

2. The device set forth in claim 1 including a sleeve of flexible, stretchable material attached to said tubular member intermediate said distal and proximal ends thereof and in communication with said pressure source to define an inflatable expander for holding said device in place during use.

3. A device for enabling observation of and access to

a body cavity through a body passageway comprising an elongated, substantially rigid tubular member adapted to be inserted into a body passageway and defining a bore enabling observation and access therethrough to the body cavity, a collapsible and extendible extension on one end of said tubular member, said extension being connected with said tubular member and having an open end remote from the tubular member to enable observation and access therethrough, said open end of the extension being larger than the tubular member and disposed axially beyond the end of the tubular member to which the extension is connected, illumination means carried by said device for illuminating the area of the body cavity encompassed by the open end of the extension, and means extending and collapsing said extension from the end portion of the tubular member remote from the extension for anchoring the extension in the body cavity and the tubular member in the body passageway.

4. The structure as defined in claim 3 wherein said extension includes inner and outer panels of flexible material having outer ends connected together to define the open end of the extension, said panels having inner ends connected to said tubular member to define a closed space between said panels, said means extending and collapsing said extension including fluid pressure means communicated with the closed space between the panels to extend the extension when fluid pressure enters the space and permit collapse thereof when fluid pressure is exhausted therefrom.

5. The structure as defined in claim 4 wherein said outer panel is extended into anchoring engagement with the body cavity when extended and being constructed of resilient material to enable enlargement thereof outwardly.

6. The structure as defined in claim 5 wherein said fluid pressure means includes an air tube extending along the tubular member, said illumination means including a small light mounted interiorly of the tubular member adjacent the extension.

7. The structure as defined in claim 3 wherein said extension is flexible and capable of assuming a dimension not greater than the tubular member when collapsed to facilitate insertion of the device into a bovine vagina with the open end of the extension adapted to confront the cervix to enable location and observation thereof and to facilitate insertion of a pipette for artificial insemination.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,831,587

Dated August 27, 1974

Inventor(s) Herman L. Boyd

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Page 1, column 1, line 7, after "Memphis;" insert

-- Pu Ning Sun, Memphis; --

Signed and sealed this 10th day of December 1974.

(SEAL)
Attest:

McCOY M. GIBSON JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents