

March 13, 1951

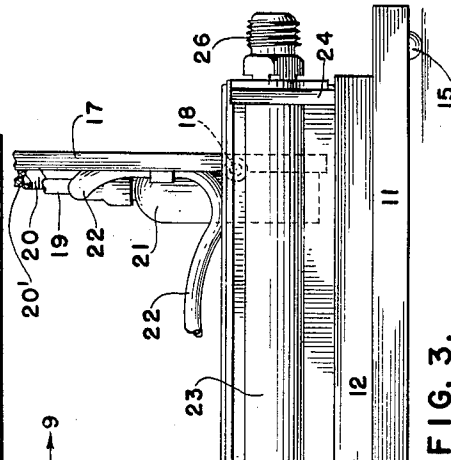
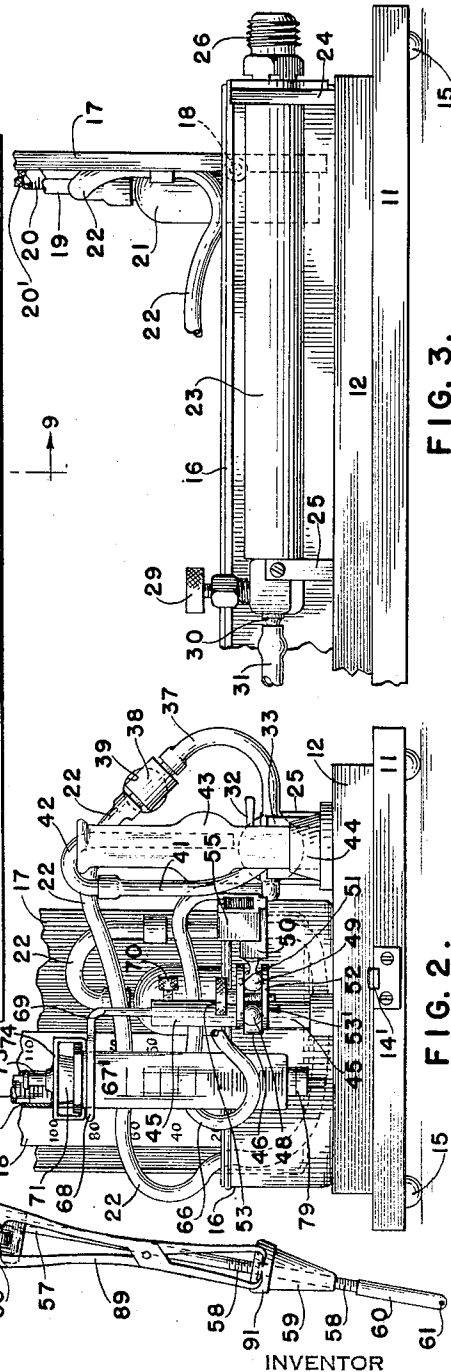
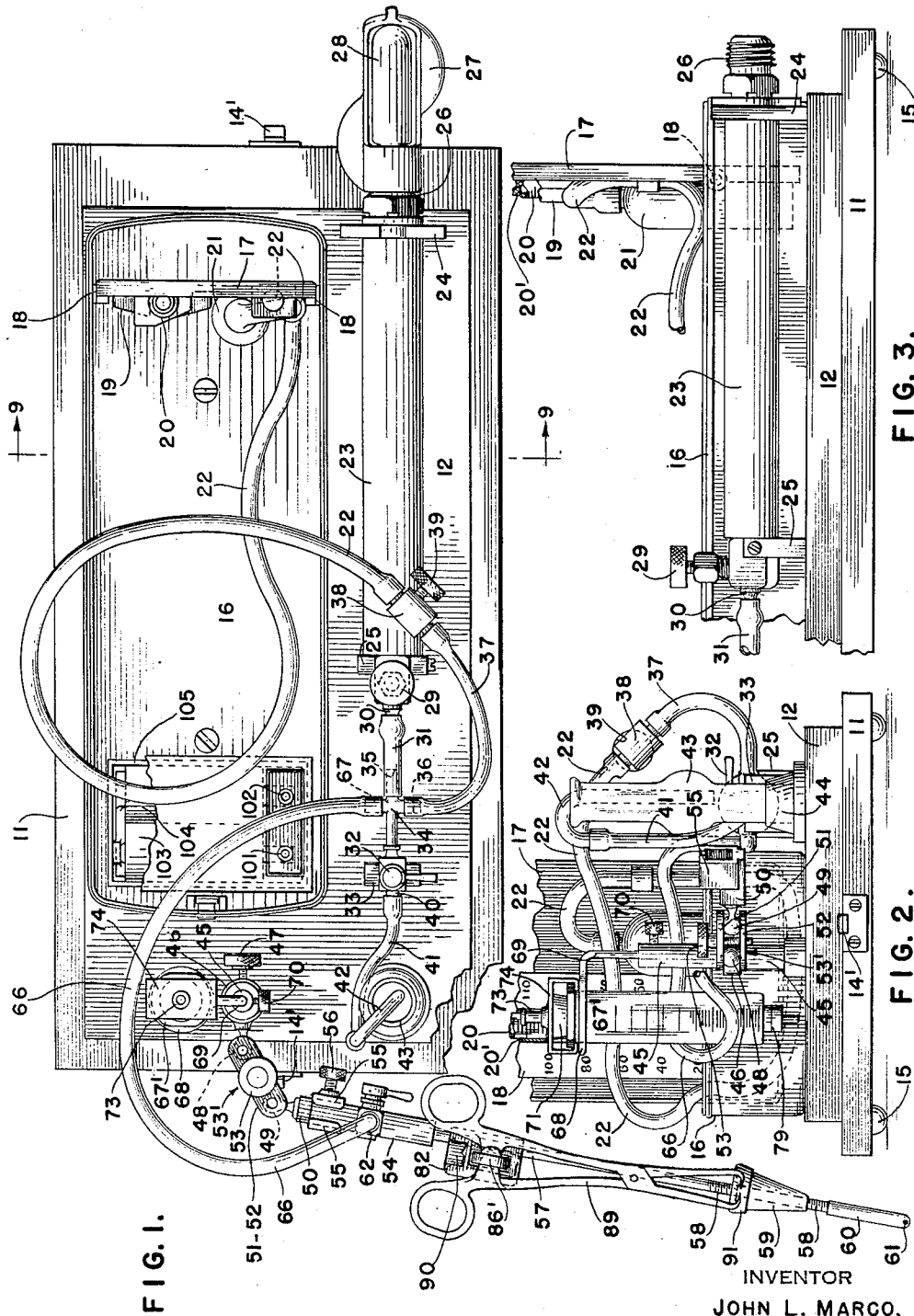
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2,544,931

APPARATUS FOR INSUFFLATING THE FALLOPIAN TUBES

Filed Dec. 21, 1946

4 Sheets-Sheet 1



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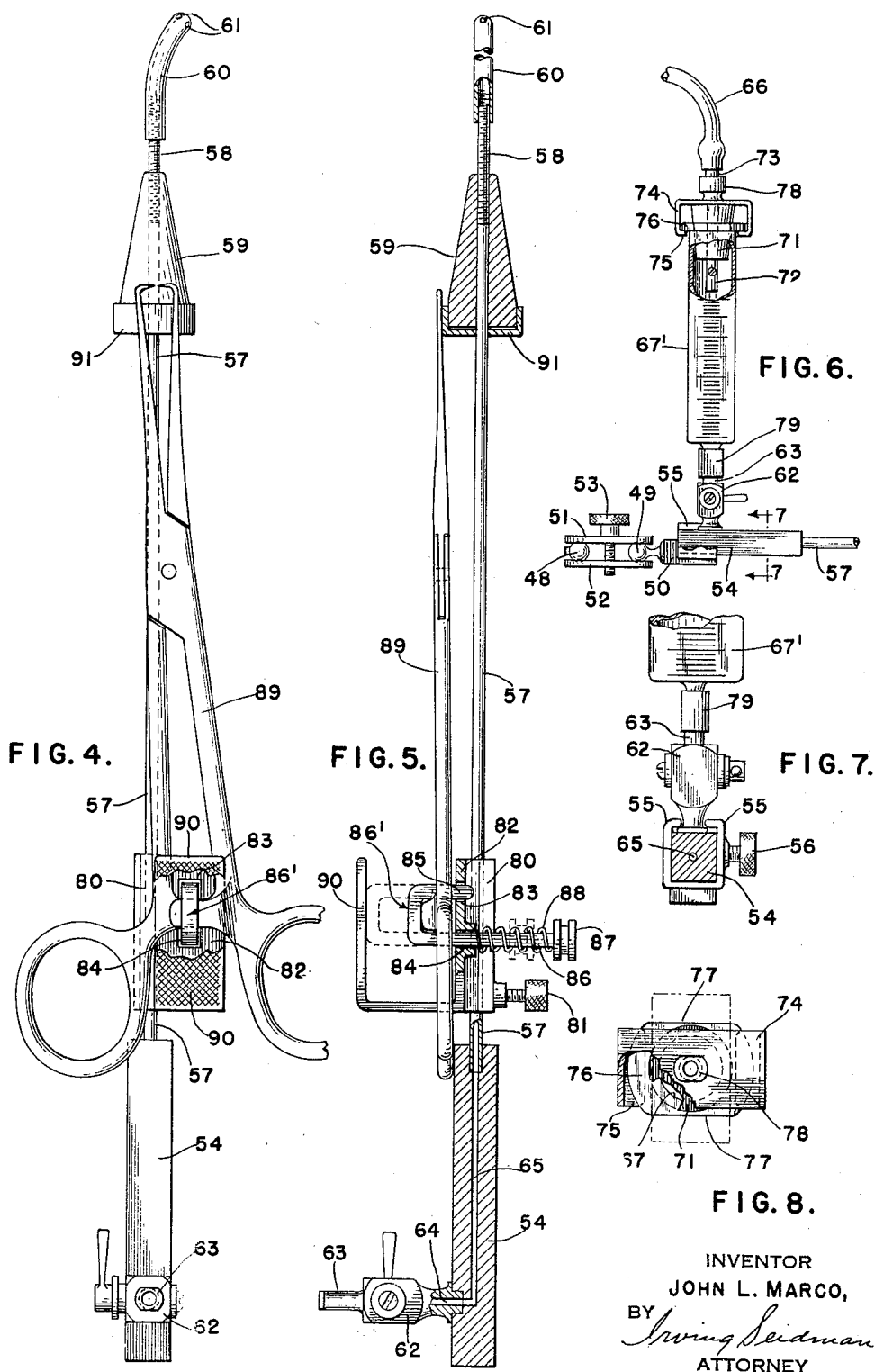
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APPARATUS FOR INSUFFLATING THE FALLOPIAN TUBES

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4 Sheets-Sheet 2



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4 Sheets-Sheet 3

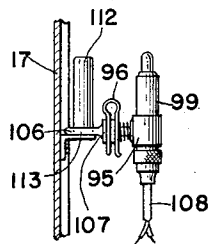


FIG. 12.

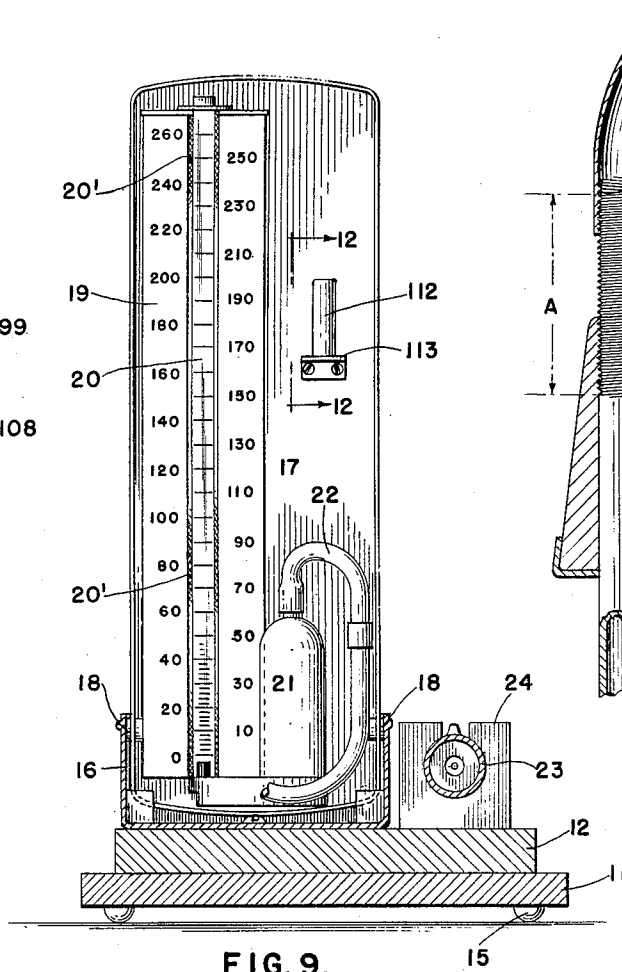


FIG. 9.

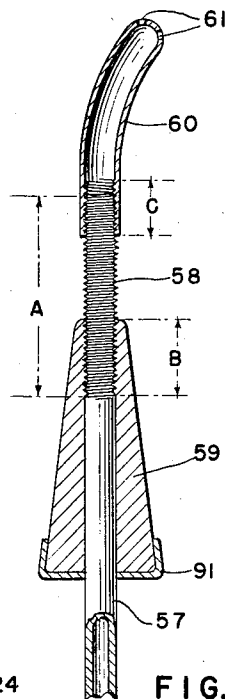


FIG. 10.

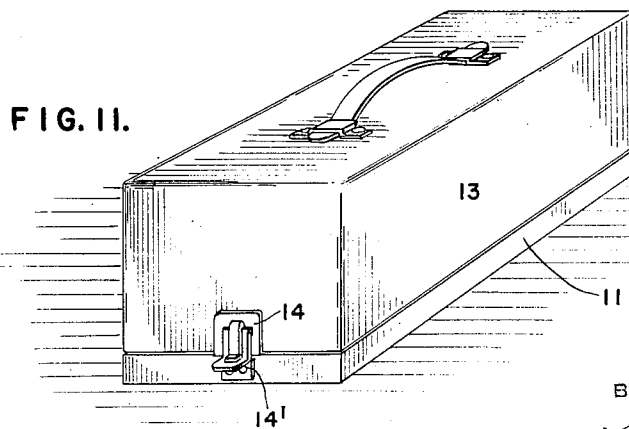


FIG. 11.

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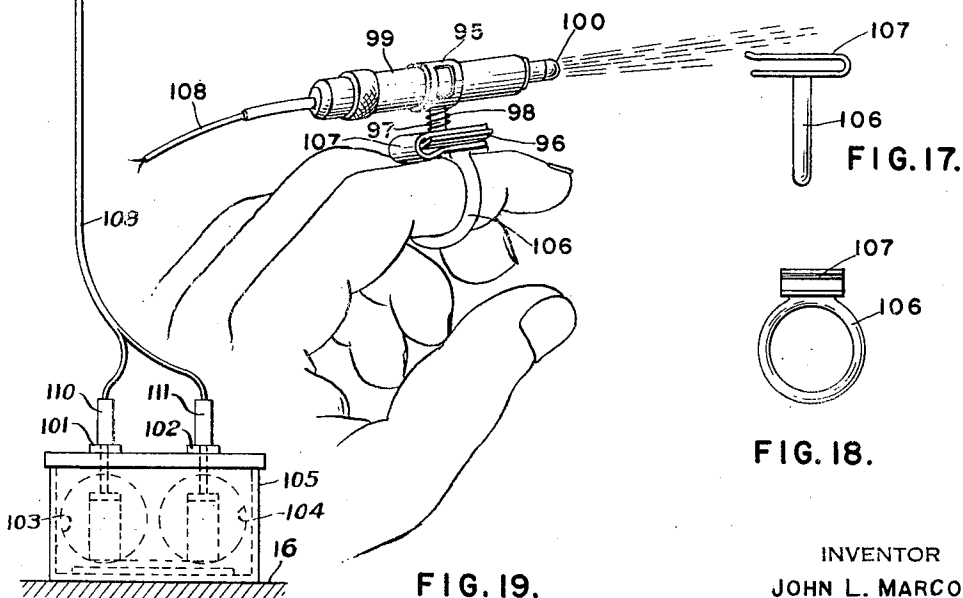
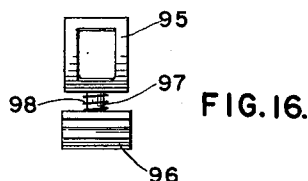
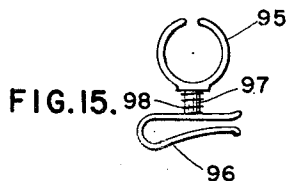
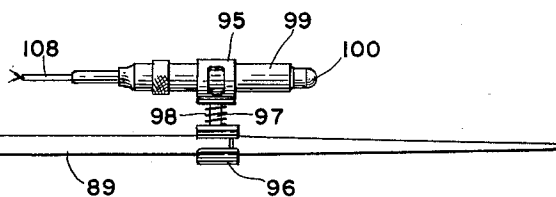
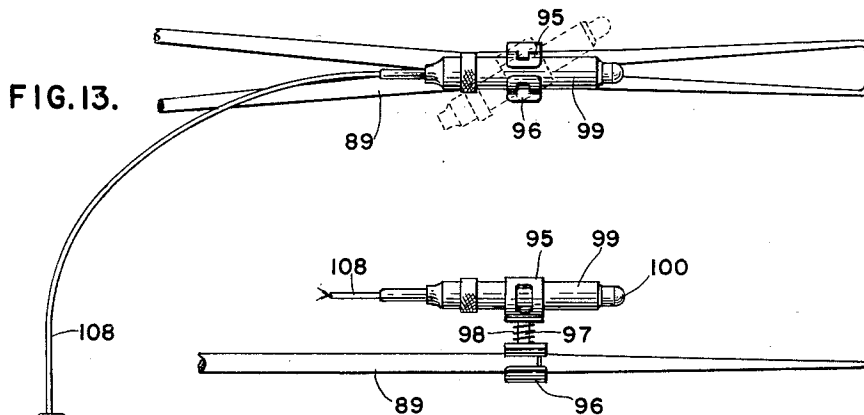
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2,544,931

APPARATUS FOR INSUFFLATING THE
FALLOPIAN TUBES

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Application December 21, 1946, Serial No. 717,711

2 Claims. (Cl. 128—2)

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This invention relates to an apparatus or device to be used by physicians to perform, (1) a carbon dioxide insufflation of the Fallopian tubes both diagnostically and therapeutically; (2) a hysterosalpingography with a radio-opaque substance; and (3) a combined pneumo-viscero-

graphy of the abdominal organs. The procedure at the present time with apparatus now commonly used during the process of insufflation requires the services of a physician and an assistant to apply and manipulate the apparatus and the accessory instruments necessary in connection with the operation of the apparatus. Further, the insufflating procedure requires at the present time the employment of two machines, (1) one for carbon dioxide insufflation; (2) one for insufflating iodized oil.

It is an object of this invention to provide a single machine which embodies all of the features of the two machines hereinabove mentioned into a single unit, which, by its use, simplifies the operation of insufflation.

Another object of this invention is the inclusion therein of a particular arrangement of adjustable, supporting and holding elements for carrying and fixing the position of a tenaculum upon a cannula; of parts which are adjustable to the patient; and of means for setting the adjustable parts in fixed position with relation to the patient; the whole being self-retaining.

Carbon dioxide for use by physicians during the insufflating process is commonly supplied in small cartridges wherein the gas is sealed under high pressure, usually about 900 lbs. to the square inch. The pressure of this gas must necessarily be considerably reduced before the insufflating process begins, and it is the practice, at the present time, to bring about this reduction of pressure by the use of specially constructed reducing valves. It is an object of this invention to provide a means to simplify the reduction of the gas pressure by the elimination of reducing valves and the employment of a novel method for effecting this reduction.

A further object of this invention is the inclusion therein of novel clamping means, slideably adjustable upon a cannula, for adjusting and holding a tenaculum thereon.

A further object of this invention is the inclusion therein of an acorn, or plug, which is adjustably mounted upon one end of the cannula.

A further object of this invention is the inclusion therein of a curved, rotating tip upon the extreme end of the cannula, which may be rotated to conform with the position of the uterus into which it is introduced.

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Another object of this invention is the inclusion therein of a manually actuated safety valve, which is adapted to instantly release the pressure of a carbon dioxide flow in the apparatus when this becomes necessary.

Another object of this invention is the inclusion therein of a sealing means upon the plug of the cannula to prevent any leakage at the point where the cannula enters the plug.

Another object of this invention is the inclusion therein of an oil container having a simple cork-clamping means to hold a cork tightly and securely in the oil-container opening.

Another object of this invention is the inclusion therein of a pivotal clamping means for attaching a light bulb and its holding unit upon a tenaculum.

A further object of this invention is the provision therein of a means with which a light bulb may be carried upon a finger of the hand of an operator and means upon the apparatus connected with the light bulb for supplying electric current to the said light bulb.

A further object of this invention is the inclusion therein of a supporting pin attached upon the apparatus and adapted to hold the said light bulb unit within convenient reach of the operator when the same is not attached to the tenaculum.

A still further object of this invention is the inclusion therein of a manometer having a luminous paint-covered reflecting plate behind the graduated mercury-containing glass tube to provide illumination to the mercury column in the darkness of the fluoroscopy, or X-ray room.

A still further object of this invention is the provision of an organization in which the constituent elements are so arranged structurally and functionally as to assure improved results with materials and members which may be manufactured at reasonable cost, may be easily assembled and which will be efficient in operation with minimum wear to the parts.

The invention possesses other objects and features of advantage, some of which, with the foregoing, will be set forth in the following description and in the claims, wherein parts will be identified by specific names for convenience, but they are intended to be generic in their application to similar parts. In the accompanying drawings there has been illustrated the best embodiment of the invention known to me, but such embodiment is to be regarded as typical only of many possible embodiments, and the invention is not to be limited thereto.

The novel features considered characteristic of my invention are set forth with particularity

in the appended claims. The invention itself, however, both as to its organization and its method of operation, together with additional objects and advantages thereof, will best be understood from the following description of a specific embodiment when read in connection with the accompanying drawings, in which:

Figure 1 is a top view, or plan of the apparatus set up and ready for use.

Figure 2 is an end view of same looking toward the front end, and having portions broken away.

Figure 3 is a side elevation of a portion of the apparatus.

Figure 4 is an enlarged detail view showing the method of attaching the tenaculum upon the cannula.

Figure 5 is a side view of Figure 4, showing parts in section.

Figure 6 is a detail, in elevation, of a portion of the device.

Figure 7 is an enlarged detail view, in section, and taken along the line 7—7 of Figure 6.

Figure 8 is an enlarged top view of a cork-clamping means shown in Figure 6, and has parts broken away.

Figure 9 is a sectional view, in elevation, taken along the line 9—9 of Figure 1, and shows the manometer holding member in raised or open position.

Figure 10 is an enlarged sectional detail view showing a rotating tip and adjustable plug upon the end of the cannula.

Figure 11 is a perspective view, showing an enclosing cover attached to the base of the apparatus to form a carrying case.

Figure 12 is a detail view of a part taken along the line 12—12 of Figure 9, and shows a light bulb unit supported upon a pin which is attached to the apparatus.

Figure 13 is a top view showing a portion of a tenaculum having a light attachment thereon.

Figure 14 is an elevational side view of Figure 13.

Figure 15 is an enlarged end view of a clamp employed to attach an electric light bulb unit to a tenaculum.

Figure 16 is a side view of same.

Figure 17 is a side view showing a means employed for carrying an electric light unit upon a finger of the hand.

Figure 18 is a view taken at right angles to the view shown in Figure 17.

Figure 19 is a perspective view showing an electric light unit carried upon the hand.

Referring in detail to the parts, 11 designates a member or element which functions as a primary base to which there is attached a secondary base 12, upon which the various elements comprising the apparatus are mounted. The primary base 11, also acts as a bottom member to which a cover 13 (Figure 11), is attached to form a carrying case for the apparatus. The said cover 13, is secured to the primary base 11, by means of clasps 14—14'. Resilient buttons 15, preferably of rubber, may be attached to the bottom of the primary base member.

Suitably attached upon the secondary base 12, is a shallow box or receptacle 16, having an upwardly swinging cover 17, which is pivotally attached to the receptacle 16, at 18. The said cover 17, is adapted to swing upwardly and rearwardly, approximately at a right angle to the base members. A face view of the said cover, raised to the said position, is shown in Figure 9. In Figures 2 and 3, the upper portion of the said cover is

broken away. To the inside of the said cover 17, there is attached, in any suitable manner, a manometer 19, having the usual graduated transparent mercury tube 20, mercury reservoir 21, and flexible connecting tube 22. The said graduated mercury tube 20, is provided with a back shield 20', which is coated with any suitable luminous paint to produce visibility in the darkness of the fluoroscopy or X-ray room.

A pressure-reducing chamber 23, is mounted upon the secondary base member 12, by means of standards 24 and 25, and is provided at one end with a threaded attachment means 26, over which a carrier or cage 27 (Figure 1), containing a cartridge 28, may be threaded. The opposite end of the said reducing chamber 23, is provided with a needle valve element 29, having a nipple 30, to which a flexible connecting tube 31, may be attached. In line with the tube 31, there is a valve unit 32, carried upon a standard 33, and having a three-way coupling unit 34, to the outlet 35 of which the flexible connecting tube 31, is attached. To a second outlet 36, on the said three-way coupling unit 34, there is attached a flexible connecting tube 37. The said flexible connecting tube 37, forms a continuation of the flexible connecting tube 22, and has, interposed therebetween, a safety valve unit 38, which is manually operated by means of a turnable knob 39. The valve unit 32, is further provided with a nipple 40, to which there is attached a flexible connecting tube 41.

The said flexible connecting tube 41, leads to and is connected with a goose-neck or U-shaped tube 42, extending into and supported upon the upper edge of a transparent gauge tube 43, which is attached to and held securely upon the secondary base 12, by means of a flanged socket 44. An upright supporting rod 45, is secured to the secondary base 12 (Figures 1 and 2), and carries upon it a ring 46, which is adjustable upon the said rod and held thereon at any desired elevation by means of a set screw 47. Integrally formed upon the said ring 46, is a ball pointed arm 48, which, in conjunction with a ball point 49 of the supporting block 50, upper and lower flat rods 51 and 52 respectively, and tightening screw 53, forms a knuckle-type joint 53', which is adapted to support the broadened end portion 54, of a cannula.

The said supporting block 50, is formed with side clamps 55, between which the said broadened end portion 54, of the cannula rests, and a set screw 56, provides a means for securing the said cannula end in place. A tubular stem 57, forming a part of the cannula, projects from and is attached to the broadened end 54, and is threaded at its outer end, as at 58, over which threaded end there is attached an acorn or plug 59. The threaded portion of the said tubular stem 57, projects through the said plug 59, and upon the extreme end of the said stem there is attached a curved tubular tip member 60, which is adapted to rotate about its connection with the said tubular stem of the cannula. Perforations or orifices 61, are formed in the end of the said curved rotating tip 60 (Figures 1, 4, 5 and 10).

A valve element 62, having a nipple 63, and a channel 64 therethrough, is attached to the aforesaid broadened end portion 54 of the cannula, and the said channel 64, connects with a channel 65, formed in the broadened end 54 (Figure 5), and extends from the channel 64, in the valve 62, to the attached tubular stem 57, and through the said tubular stem to, and

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through the said attached rotating tip 60. The said nipple 63, upon the valve element 62, provides a means for attaching a connecting tube 66, which leads to, and is connected with a third outlet 67, upon the three-way coupling unit 34.

As thus far described, the apparatus is set up for use with a carbon dioxide gas. It becomes necessary at times, however, to provide a means usable with this apparatus, to make it adaptable for use with an iodized oil, and for this purpose there is provided a graduated oil-containing vessel 67', which, when not in use, is held upon an annular bracket 68, formed upon and extending from a stem 69, which engages within the aforementioned upright supporting rod 45, and which may be adjustable therein, a set screw 70, being provided to lock the said stem 69, at any required elevation.

A stopper 71, of any suitable material (Figures 6 and 7), is provided to close the opening of the oil-containing vessel 67', and has extending therethrough a tubular stem 72, which depends part way into the oil-containing vessel and projects upwardly above the stopper 71, to form a nipple 73. Engaging over the said nipple 73, there is a flat spring clamping element 74, which is formed with inwardly extending lips 75, adapted to engage under a projecting flange 76, upon the oil-containing vessel to hold the stopper thereon and prevent its displacement. The said flange 76, is partially cut away on its opposite sides, as at 77, to permit the passage of the said lips 75, when the clamping element 74, is to be attached or removed. When attaching the stopper, the clamping element is held in the position shown by the dot and dash lines indicated in Figure 8. By turning the clamping element 74, to a position at right angles to the aforesaid dot and dash indication, the lips 75, will engage under the projecting portion of the flange 76.

A short shank 78, is formed upon the said clamping element 74, and is adapted to engage around the nipple 73.

The lower end of the said oil-containing vessel 67', is formed with a connection nipple 79, which is adapted to engage within and around the nipple 63, upon the aforesaid valve 62, formed upon the broadened end 54, of the cannula. When iodized oil, in the operation of the apparatus, is to be used, the connecting tube 66 is detached from the nipple 63, and the oil-containing vessel 67', is attached to the cannula at the said nipple 63, and the tube 66, is connected to the iodized oil-containing vessel 67', at the nipple 73.

A supporting member 80, is slideably mounted upon the stem 57, of the cannula and is held in any adjusted position thereon by means of a set screw 81. A platform, or ledge 82, is integrally formed upon the said supporting member 80, and is formed with perforations or orifices 83 and 84, through which two legs 85 and 86, of an inverted U-shaped clamp 86', engage. The longer leg 86, is provided with a button end 87, to form a fingerhold for pressing the clamp upwardly against the resistive force of a compression spring 88, which acts to normally keep the said clamp in the closed position shown in Figure 5. The said clamp 86', provides a means for holding a tenaculum 89, securely upon the cannula. An L-shaped member 90, is integrally formed upon the platform 82, and acts as a fingerhold when pressing the said clamp upwardly against the resistive force of afore-

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said compression spring 88, to open same and remove the tenaculum from the cannula.

The enlarged detail view in Figure 10, shows the arrangement of the plug 59, and rotating tip 60, upon the cannula stem 57. The cannula stem is externally threaded for a distance corresponding approximately to the distance indicated by the line A, and the plug 59 may be moved to any position upon the cannula stem 57, within the distance indicated. The plug 59, is internally threaded for a distance equal to that indicated by the line B. The rotating tip 60, is internally threaded for a distance approximately indicated by the line C. When the apparatus is in use, however, the rotating tip is not attached along its entire threaded length but is left free by a few turns of threads to allow same freedom to rotate as may be required.

A cup-shaped gasket 91, is fitted over the end of the plug 59, and affords a seal around the cannula stem 57, to prevent any leakage at that point.

This apparatus is intended for use by a physician to introduce either carbon dioxide or an iodized oil into the uterus in order to take X-rays to determine the patency of the Fallopian tubes. In preparing the apparatus for use for a carbon dioxide insufflation, a cartridge 28, containing carbon dioxide under a high pressure and held within a carrier or cage 27, is attached to the threaded end 26 of the pressure-reducing chamber 23 (Figure 1), but not tightly enough to puncture the seal of the cartridge. The flexible connecting tube 37, is then attached at one end to the outlet 36, of the three-way coupling unit 34; the safety valve unit 38 is attached to the other end of the said flexible connecting tube 37, and to one end of the flexible connecting tube 22, which, in turn, connects with the mercury reservoir 21; the tube 41, is connected to the U-shaped tube 42 leading into the transparent gauge tube 43, which has been partially filled with water; and the tube 66, is attached to the outlet 67 of the three-way coupling unit 34, and to the nipple 63, upon the valve 62, which, in turn, connects with the channel 64, upon the valve 62, thence into the channel 65, in the broadened end 54 of the cannula.

With all of the valves closed, particularly the needle valve 29, the carbon dioxide containing cartridge 28 is screwed tightly upon the threaded projecting end of the pressure reducing chamber 23, puncturing the cartridge to permit the gas to enter the pressure reducing chamber wherein the said pressure is reduced to approximately 100-150 lbs. per square inch.

Thus, the apparatus is made ready for the insufflation process.

The rotating tip 60, upon the cannula simplifies the method of inserting the cannula in cases of inversion of the uterus. The metal plug 59, on the cannula, permits quick adjustment to the size of the os, and the cup-shaped gasket 91, upon the end of the plug and engaging around the cannula stem 57, provides a leak-proof attachment at that point. The clamp 86', provides a simple and quickly manipulated means for locking the cannula and tenaculum together, and the slideable platform 82, carrying the said clamping means, permits a longitudinal and rotating movement of the tenaculum upon the cannula when the said cannula and tenaculum are being adjusted in position upon the patient. The combination of the tenaculum and cannula as de-

scribed reduces to a minimum the pain experienced by the patient during examination.

By attaching the cannula to the upright supporting rod 45, by means of a knuckle joint 53', the cannula becomes self-retaining and thereby aids in reducing the pain to the patient occasioned by the unsteady traction exerted when the cannula and tenaculum are manually held.

To change from gas to oil, it is necessary to remove the flexible connecting tube 66, from the nipple 63, and insert therein the connection nipple 79, upon the lower end of the oil containing vessel 67', and then attach the said connecting tube 66 to the nipple 73, at the upper end of the said oil containing vessel 67'. The connecting tube 37—22 makes connection with the manometer as already described.

The use of the pressure reducing chamber 23 as shown and described requires a simple needle valve to control the flow of gas through the tubes of the apparatus. When the pressure of the gas flow has been properly adjusted through the medium of the transparent gauge tube 43, the valve 32, is closed. If the mercury column in the manometer rises slowly, the pressure is sufficiently low in the apparatus for safe insufflation. The safety valve 38, is now opened to reduce the pressure to zero and the valve 62, on the cannula is opened, after which the safety valve 38, is closed, whereupon the pressure may enter the utero-tubal area.

The entire apparatus is easily contained and set up within a compact case, which makes it simple to carry.

Preliminary to packing the apparatus in the carrying case, the procedure is as follows: the connecting tube 22, is disconnected at the safety valve 38, and folded into the receptacle 16, the cover of which is then closed; the connecting tube 37, is conveniently laid within the confines of the secondary base member 12, and the connecting tube 66, is removed from the nipple 63, on the cannula and folded over the base member 12; the oil container 67', the cannula 54—57, the tenaculum 89, and the cartridge 28, with its cage or carrier 27, are removed from their supports and placed in pockets inside the cover 13, which is then attached to the primary base 11, and held thereon by means of clamps 14—14'.

In Figures 15 and 16, there is shown a dual clamping unit comprising an upper split clamping and holding member 95, which is pivotally attached to a lower flat clamping member 96, both of which are connected by a pivotally attached shank 97, having a tension spring 98, engaging around the said shank and between the said clamping elements 95 and 96. The upper clamp 95, is adapted to hold any suitable member 99, carrying a light bulb 100 thereon and which is provided with an electric conductor 108, having terminal plugs 110 and 111, which are, in turn, adapted to engage in sockets 101 and 102, connected with the terminals of batteries 103 and 104. The said batteries are mounted within a casing 105, which is secured within the receptacle 16, and which provides an electrical current source to energize the said light bulb. The casing 105 in which the batteries 103 and 104 are housed, as shown in Fig. 13, is mounted in the receptacle 16 shown in Fig. 1.

The lower clamping unit 96, is employed to attach the said light bulb member to the tenaculum 89 (Figures 13 and 14), and by its pivotal connection may swing about to throw the light ray in any direction—the tension of the spring 98, acting to hold the turned clamp in position. It is sometimes desirable for the operator to have the light ray close to his hand while working, and for this reason a ring 106, formed with a clamping member 107, is provided (Figures 17, 18 and 19). The lower clamp 96, is fixed to the ring 106, by slipping one prong of the said lower clamp into the clamp 107, upon the said ring, and the ring then slipped over the finger of the hand. In the form just described and shown in Figs. 17, 18 and 19, the member 99 with its attached ring 106, when not in use, may be held upon an upright pin or rod 112 which is secured to the said cover 17 (Figs. 9 and 12), of the receptacle 16, by means of a supporting bracket 113 thus providing a means for holding the said member 99 conveniently within reach of the operator. The said conductor 108, is provided with a switch 109, and the connecting plug ends 110 and 111, which engage the battery sockets 101 and 102.

I claim:

1. In an insufflating apparatus comprising a receptacle, a chamber upon said receptacle containing carbon dioxide at a low workable pressure, a cartridge containing carbon dioxide connected to the said chamber and supplying carbon dioxide thereto, a manometer upon the said receptacle having tubular connection with the said chamber, a cannula tubularly connected with the said manometer and a tenaculum secured to the said cannula, the combination therewith, of a light unit comprising a light-bulb carrier pivotally attached upon the said tenaculum by means of a dual clamping unit consisting of upper and lower pivotally connected clamping members, the said upper clamping member engageable with the said light bulb carrier and the said lower clamping member being attachable to the said tenaculum, a light bulb engageable in said light bulb carrier, and dry batteries in said receptacle having electrical connection with the said light bulb in the said carrier.

2. The insufflating apparatus as outlined in claim 1, including means upon said receptacle for holding said light element in place upon the said receptacle.

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