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2,579,113

INSUFFLATOR

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Fig. 1.

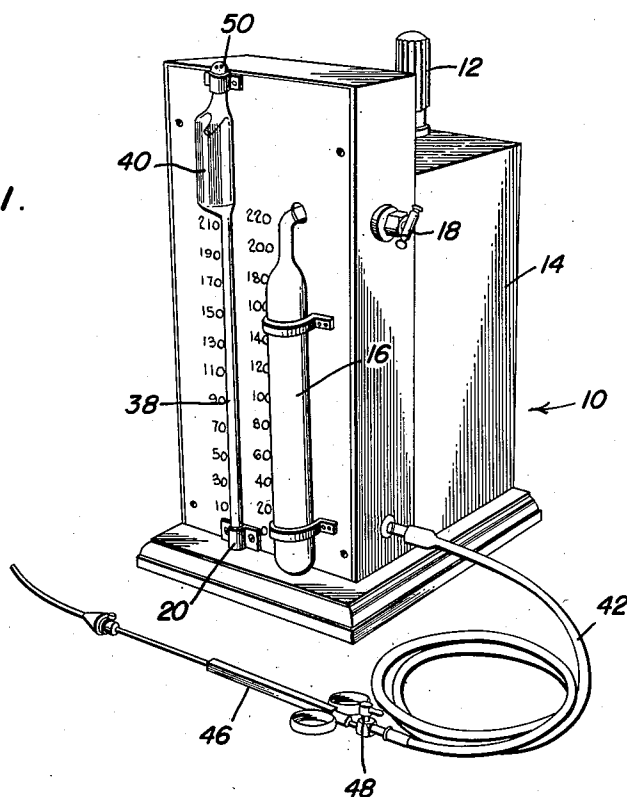
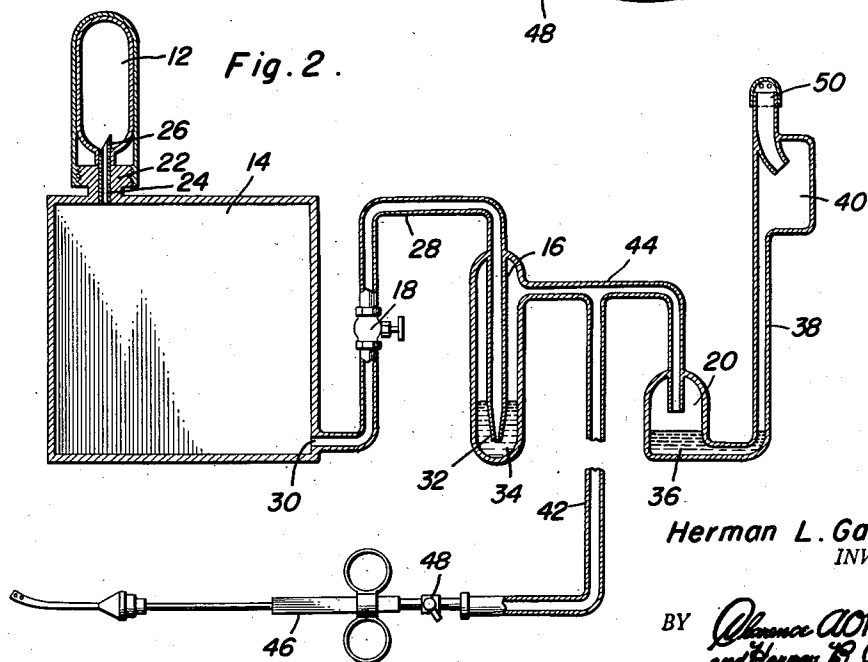


Fig. 2.



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INSUFFLATOR

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1 Claim. (Cl. 128-2)

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This invention relates to a medical device to be used for determination of patency or non-patency of human Fallopian tubes.

Another object of the invention is to provide a device that is adapted to make readily available a source of carbon dioxide.

Still another object of the invention is to eliminate danger of fatality occurring in the prior use of air as a source of gas, by the utilization of carbon dioxide.

Yet another object of the invention is to provide an even and controlled flow of gas, with a change in pressure quickly discernible by the operator.

And yet another object of the invention is to avoid wide fluctuations of pressure as are normally incurred when improvised office apparatuses are used.

And still another object of the invention is to provide a simple, compact and comparatively light device, with no complicated structures to adjust and in which no extremes of pressure are possible.

And it is a further object of the invention to provide a reservoir of sufficient capacity for the carbon dioxide whereby pressure can be reduced to the desired level without the use of a pressure reducing valve.

The invention accordingly comprises the features of construction, combination of elements and relations of parts, which are exemplified in the structure hereinafter in connection with the accompanying drawings, and in the scope of the application of which will be indicated in the following claim.

In the accompanying drawings, in which is illustrated one of the various possible embodiments of the invention:

Figure 1 is a perspective view of the device of the invention; and

Figure 2 is a diagrammatic showing of the device of Figure 1.

Referring to the figures, the device of the invention is generally indicated at 10 and consists of a gas-holding cartridge 12, a gas reservoir 14, a flow meter 16 controlled by means of a valve 18, and a manometer 20.

Gas container 12 is of the pierceable cartridge type and in this preferred embodiment contains carbon dioxide rather than the usual air. Cartridge 12 is removably replaceable on a threaded nipple 22 on reservoir 14, nipple 22 being axially bored at 24 and containing therein a piercing pin 26. Piercing pin 26 punctures the end of the cartridge 12 and allows carbon dioxide to

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pass into reservoir 14. The reservoir is of metal construction, corrosion resistant and is preferably of a capacity of 4900 cc. and contains carbon dioxide at a pressure of 520 mm. of mercury. Conduit 28 extends from a suitable aperture 30 at the lower end of reservoir 14 and includes regulating valve 18 therein. Conduit 28 is bent as illustrated and terminates in flow meter 16 below the water level therein. To obtain a maximum efficiency in operation, conduit 28 is drawn out to taper to a fine point at 32 and thereby produce a fine stream of gas through the water 34 within the flow meter. Manometer 20 includes the usual mercury indicating means 36 as well as the upwardly extending leg 38. Leg 38 terminates in an enlarged emergency reservoir 40 to act as an escape should the pressure rise exceed a predetermined upper limit. Flexible hose 42 connects with passage 44 extending from flow meter 16 and terminating in manometer 20 as the source of supply of gas to the patient. A cervical cannula 46 is connected to the open end of conduit 42 and fluid flow is regulated by means of a suitable valve 48. Since the cervical cannula is not a part of the invention, it is believed that it is not necessary to describe the function thereof in greater detail.

The operation of the device is as follows: The device is preferably used after menstruation has ceased for about 3 to 7 days. The patient is prepared by introducing a small uterine sound in order to ascertain the direction and the patency of the cervical canal. The position of the uterus should already have been determined by manual examination. By knowing the position of the uterine cavity and the direction of the cervical canal the cervical cannula is easily inserted with little pain, and there is less likelihood of forcing the end of the cannula into the wall of the uterus or cervix. The cervix should be prepared after the introduction of a bivalve speculum by drying and applying an antiseptic solution.

The cannula 46 is inserted into the tubing 42. Carbon dioxide has been supplied to reservoir 14 and some of it is now allowed to flow through the apparatus for a few seconds to eliminate any air and water that may be present in the cannula. The cannula is then inserted into the cervical canal with the rubber olive having already been adjusted at a predetermined distance. The olive should fit snugly into the external cervical os. Of course, it is understood that occasionally it is necessary to dilate the cervix slightly before introducing the cannula or, if

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the cervix is high and the uterus is anteflexed, it may be necessary to grasp the anterior cervical lip with a tenaculum. When the cannula is in proper position, valve 18 is slowly opened to allow a steady flow of gas. This flow of gas is observed through the water 34 in meter 16 and the manometer indicates a gradual increase in pressure. The rate of flow should be regulated to permit a pressure not in excess of 50 mm. of mercury in 30 seconds, as too rapid an introduction of the carbon dioxide causes spasm which will cause manometer 20 to indicate a false reading. It is important not to exceed a pressure of 200 mm. of mercury.

As the pressure is slowly built up, the gas will usually pass through the normally open tubes of the patient at a pressure between 50 and 120 mm. of mercury. Disregarding leakage around cannula 46, a sudden drop in pressure indicates gas passing through the tube and if gas is steadily injected the pressure generally fluctuates between 30 to 80 mm. However, if the tubes are occluded, pressure rises steadily to 200 mm. of mercury without a drop. Pressure should be maintained at this point for a few seconds. If gas flows through the tubes only after a pressure of 120 mm. or more, it serves to indicate that a partial occlusion or spasm, has been present. Thus, it is readily apparent that a sudden fall in pressure indicates normalcy whereas a slow and steady decline in pressure generally means that there is partial occlusion. If tubal patency is indicated according to pressure of manometer 20, the gas is permitted to flow an additional 30 to 45 seconds. This is done in order to assure a sufficient pneumo-peritoneum for production of shoulder pain.

If no flow of gas occurs with the first test, the examination should be repeated after the next menstrual period, and preferably after the patient has taken atropine about one hour before the test, since occlusion from spasm will be eliminated thereby. Occasionally, patency is established after several insufflations.

By this particular device, many of the disadvantages of the apparatuses now in use are avoided. With the use of carbon dioxide rather than air, the danger of fatal gas embolus is largely eliminated and the pain resulting from pneumo-peritoneum disappears within a few minutes, whereas such pain persists for several hours or days in the use of air. The control of the flow of gas in an even and regulated manner is now possible and the drop in pressure is quickly discernable in the manometer. The wide fluctuations of intra-uterine pressure, always present with the

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use of a sphygmomanometer bulb is eliminated. The use of a safety mercury trap 40 is an additional safety measure against high pressures of gas being inadvertently introduced into the body of the patient. When pressures go above 220 mm., all of the mercury in manometer 20 is forced into the emergency reservoir 40 and gas escapes from the open end 50.

Thus, it is readily apparent that the object of the invention has been sufficiently and simply attained. As many modifications with respect to the embodiment above illustrated might be made without departing from the spirit and scope of the present invention, it is intended that the above description and accompanying drawings and claim shall be interpreted as illustrative and not in a limited sense.

Having described the invention, what is claimed as new is:

20 An insufflator comprising a relatively large carbon dioxide supply tank, a carbon dioxide cartridge, means for removably retaining said cartridge on said tank, means carried by said retaining means for piercing said cartridge, a bubble-type flow meter, a valved conduit interconnecting said flow meter with said tank, a second conduit leading from said flow meter, a manometer tube operatively connected to said second conduit, and a branch conduit connected to said second conduit between said flow meter and said manometer tube and adapted to secure a cannula, said manometer tube including an enlarged reservoir having an escape aperture.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,611,272	Hill	Dec. 21, 1926
1,614,215	Summers	Jan. 11, 1927
2,441,237	Davies	May 11, 1948

OTHER REFERENCES

Page 1034 of the British Medical Journal for June 9, 1934.

Page 143 of the American Journal of Surgery for January 1943.

Page 328 of "Diseases of Women" by Crossen & Crossen, 8th edition, published in 1940 by C. V. Mosby Co., St. Louis, Mo.

Pages 169, 170 and 171 of the American Journal of Surgery, for 1937.