

BOZEMAN - (N. G.)

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BY

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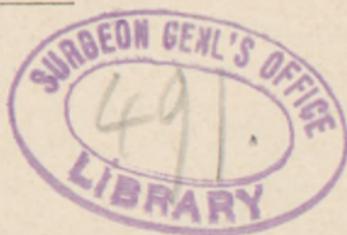
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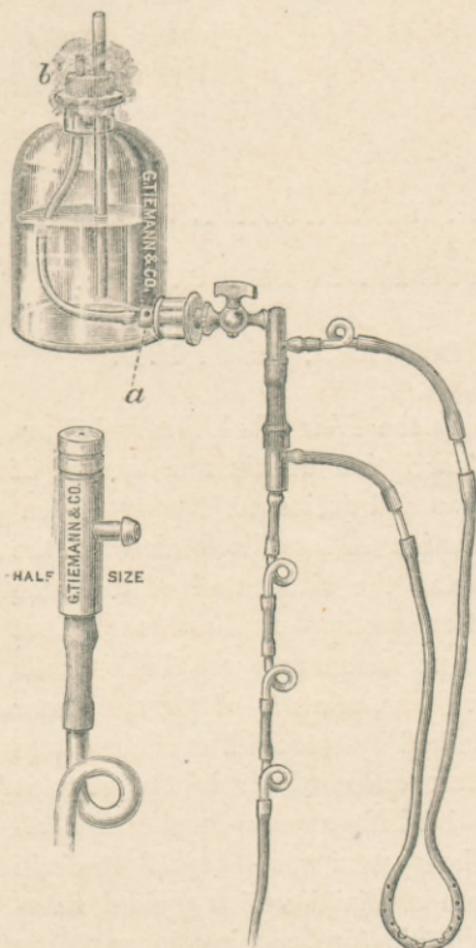
AN AIR AND WATER IRRIGATOR AND DRAIN
FOR PROLONGED DOUCHING IN DEEP CAVITIES.

BY NATHAN G. BOZEMAN, PH. B., M. D.

THE author published in the *New York Medical Journal* for June 1, 1889, a description of his new system of continuous vaginal irrigation and drainage. The main features of it are the introduction of sterilized air with the hot water into the vagina and the withdrawal of the same by slight suction before it can accumulate there in sufficient quantities to flow over the perinæum and wet the patient's clothing and the bedding. The mixture of air and water in the afferent tube is obtained by means of an intermittent siphon. The suction or rarefaction of air in the efferent tube is produced by a modified filter pump, which has already been described. The system was invented to drain off the escaping urine from artificial vesico-vaginal fistulæ, but it is equally applicable for douching in any deep cavity.

The perfected apparatus does not differ in principle from the original. It is simple and inexpensive and acts automatically. The quantity of flow from the reservoir for the irrigation and the production of suction is constant and is regulated by natural laws.

The reservoir is an ordinary glass filter bottle, having any desired capacity. A tightly fitting cork with two perforations is in the neck,



and into the nozzle a tube passes which extends to the neck and communicates there with the air; by its side is another open tube. The fluid escapes from the bottle by the circular aperture at *a*, when the stopcock is open; and the flow is constant, provided the level of the fluid is not below the end of the vertical tube. The quantity of efflux is proportional to the square root of the height between the end of the vertical tube and the circular opening, and is proportional to the area of the latter. Since this aperture is in the wall of a

large empty tube, the algebraic formula for the weight of water, W , which flows out of the bottle in a given time, t , is $W = A a t \sqrt{2gh}$. Practically, when one fluidounce of water, W , escapes in one minute, t , the area, A , of the circular aperture is 0.003316 square inch (diameter 0.0649 inch), and the height, h , between the latter and the lower end of

the vertical tube is half an inch; a is the coefficient of efflux. The reason why the flow from the bottle is constant has been explained by Mariotte, a celebrated French physicist. As the water flows out of the bottle, air enters by the vertical tube bubble by bubble and takes its place.

The suction tube is a series of glass coils suspended in a vertical position; it widens at its upper extremity and is closed by a thin disc with a central perforation. This is shown of half size in the illustration. The water which escapes from the reservoir fills the vertical tube beyond the stopcock up to the nipple in its side. This column of water has a constant level, because as fast as the fluid accumulates above the nipple it flows into the intermittent siphon, and the sudden emptying of this draws air down the tube which passes through the bottle. The height of this column for practical use is two inches, and the area of the circular aperture in the disc upon which it rests is 0.000829 square inch (diameter 0.0325 inch), and half an ounce of water for aspirating purposes flows through it into the suction tube in one minute. It will be seen that this is the half of the entire quantity; the rest supplies the intermittent siphon, and every time it empties itself air which has been sterilized by filtering through the antiseptic gauze wound about the neck of the bottle is drawn into the afferent tube.

For continuous irrigation the bottle is filled with hot sterilized water and placed on a table near the bed of the patient, the end of the suction tube falling into a vessel on the floor. The perforated loop of soft-rubber tubing, stiffened by a wire inside and shaped so as to be self-retaining, is introduced. The stopcock is then opened. The air in the drainage-tube being partially exhausted by the vertically falling water, the intermittent siphon empties itself; then short columns of water separated by air follow

one another in quick succession along the drainage-tube, the suction tube, and into the vessel on the floor. The tissues which come in contact with the drainage-tube are bathed in the irrigating fluid, and the secretions are carried off with it. There is no overflow, and the patient's clothes and bedding are kept dry. The apparatus may be obtained from the well-known firm of George Tiemann & Co.

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