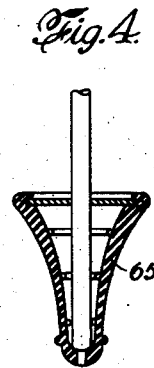
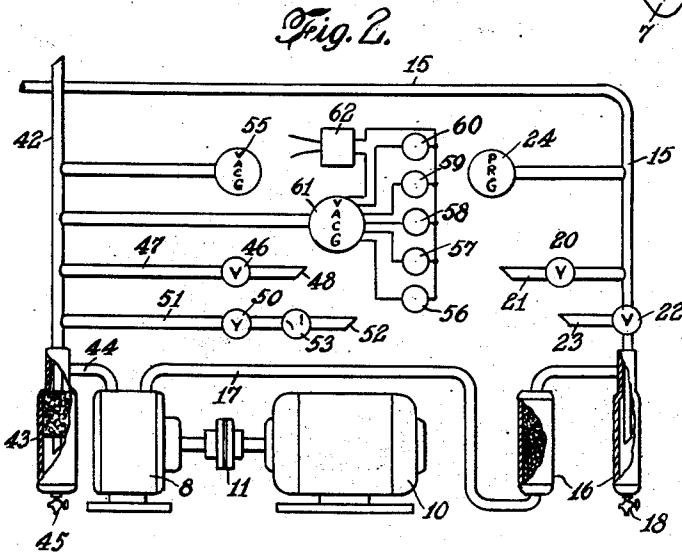
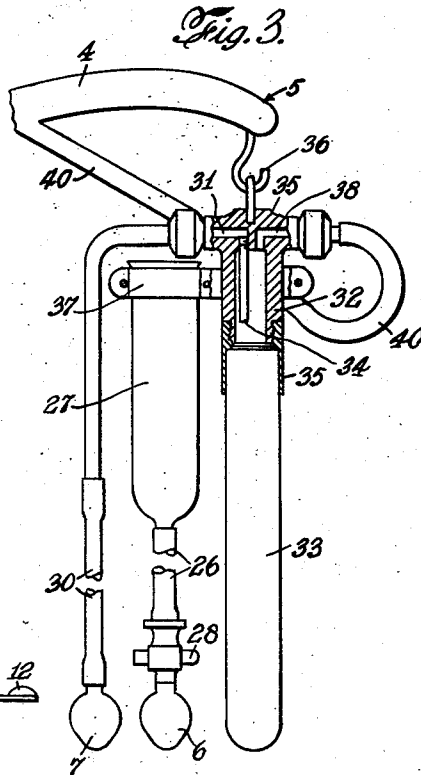
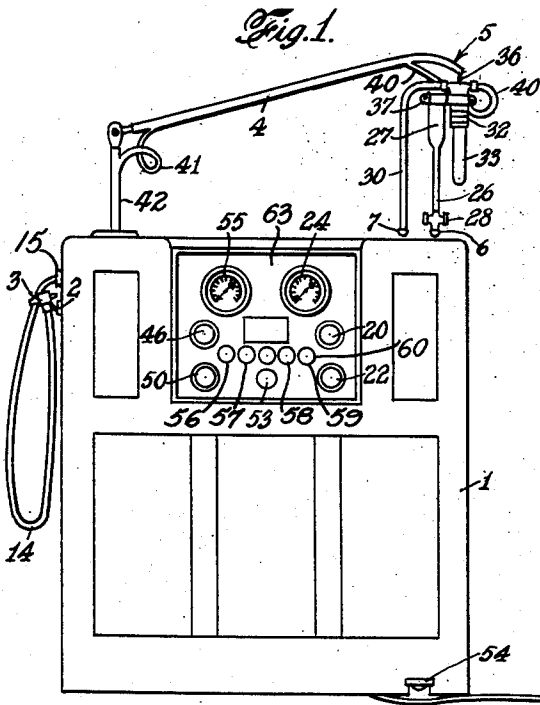


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APPARATUS FOR TREATMENT OF NASAL
AND RESPIRATORY CAVITIES
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APPARATUS FOR TREATMENT OF NASAL
AND RESPIRATORY CAVITIES

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1 Claim. (Cl. 128—278)

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This invention relates to a new and improved machine for treating nasal cavities with medicated fluids in a simple and practical manner. The patient is placed in a semi-recumbent position. The nasal cavities are first shrunk by means of an ephedrin spray and thereafter a controlled suction of one and one-half to three inches water column is maintained through a tube terminating in a tip that is inserted in one of the nares in order to hold the soft palate in a closed position. The medicated fluid is injected through a tube connected with another tip that is inserted in the other naris and fills and irrigates the sinal cavities. The fluid is prevented from flowing down the throat by means of the posterior palate which is maintained in a closed position by suction. The medicated fluid, having loosened all foreign substances such as mucous, pus and so forth, is drained out of the sinal cavities under a maximum suction of about seven to twelve inches of water column.

Thus, one object of my invention is to render feasible, complete irrigation of the nasal cavities, which heretofore has been impractical because of drainage by gravity into the throat. Another object is to permit the entire operation, including handling of the patient and manipulation of the machine, to be entirely under the control of one operator.

These objects are attained by my invention as set forth in the following specification, and illustrated in the drawings, in which

Fig. 1 is a front elevation of apparatus in accordance with my invention.

Fig. 2 is a diagrammatic view of portions of the apparatus.

Fig. 3 is a front elevation on a larger scale of the treating assembly shown in Fig. 1, portions being broken away to show the internal construction.

Fig. 4 is an enlarged sectional view of a modified form of nasal tips.

The apparatus illustrated in the drawings comprises a cabinet 1 provided with a bracket 2 adapted to hold a spray nozzle 3 and with a movable arm or crane 4 which carries a treating assembly 5 having nasal tips 6 and 7. The nozzle 3 is for spraying the nasal cavities with ephedrin solution and other treating fluid. The nasal tip 6 is for admitting a medicinal fluid or solvent to fill or irrigate the naso-pharyngosinus cavities, and the tip 7 is connected to a suction line for drawing off the fluid admitted to the naso-pharyngosinus areas together with mucous, pus and foreign materials. In order to

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irrigate the cavities, fluid is admitted to one naris through tip 6 and drawn off through the other naris through tip 7.

Controlled pressure is supplied to the spray nozzle 3, and controlled suction is applied to the suction tip 7 by a combination pressure and vacuum system contained in the cabinet 1 and illustrated diagrammatically in Fig. 2.

Both air pressure and suction are provided by a combination pressure-suction pump 8 which is preferably a rotary pump, such as a Leimann No. 26 or other similar pump. The pump is driven by a quarter horse power, 1750 R. P. M. induction electric motor 10 to which the pump is connected by a rubber coupling 11, both the pump and motor being mounted on a rubber-cushioned base. The motor is started and stopped by means of a foot switch 12 (Fig. 1).

The spray nozzle 3 is connected by a flexible tube 14 with a pressure line 15 which is connected through a condenser-filter 16 and a conduit 17 with the pressure side of the pump 8. The condenser-filter 16 prevents oil from the pump or other liquid from entering into the pressure line 15 and is provided with a petcock 18 for discharging any fluid collected.

The pressure in line 15 is regulated at any value from zero to 25 lbs. per square inch by an adjustable valve 20 in a bleeder conduit 21 connected to the pressure line 15. The pressure in line 15 can be turned on or off by means of a valve 22. When in "off" position, the valve 22 by-passes the pressure from the line 15 to an exhaust line 23 which discharges inside of the cabinet of the machine in order to eliminate noise. A pressure gauge 24 which is visible on the front of the cabinet (Fig. 1) is connected with the pressure line 15 to indicate the amount of pressure in the line and hence the pressure supplied to the spray nozzle 3 which, as described above, is connected to the pressure line by the flexible hose 14.

The nasal tip 6 of the treating assembly 5 is connected by a flexible tube 26 with a liquid container 27 and is provided with an operator-controlled valve 28 for regulating the flow of liquid from the container 27 into the naris in which the tip 6 is inserted.

The suction tip 7 is connected by a flexible tube 30 with the inlet 31 of a treating head 32 which—as seen in Fig. 3—carries a removable receiver 33 for the liquid drawn off by the suction tip. The inlet passage 31 of the treating head 32 is connected with a tube 34 which projects downwardly inside the hollow treating head

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towards the receiver 33 to assure that any liquid is trapped in the receiver and is not drawn off into the suction line. The receiver 33 is preferably removable for emptying, for example by being provided with a screw threaded collar 35 which screws on to the correspondingly threaded lower end of the treating head 32.

The treating head 32 is removably hung on the crane 4 by means of a hook and eye 35 and is provided with a bracket 37 which carries the aforementioned container 27.

The discharge passage 38 of the treating head 32 is connected by means of a flexible tube 40 with a conduit inside the arm 4 which in turn is connected by a further flexible tube 41 with a suction line 42. The suction or vacuum line 42 (Fig. 2) is connected through a condenser-filter 43 and a conduit 44 with the suction side of the pump 8. The condenser-filter 43 traps and holds any liquid improperly brought into the suction line 42 and is provided with a petcock 45 for removing the trapped fluid.

In accordance with the invention, the suction applied to the suction tip 7 is accurately controlled and means is provided for effecting a quick switch-over from a pre-set minimum suction to a pre-set maximum suction.

The desired maximum value of suction, for example a suction of 7 to 12 inches of water, is pre-set and controlled by an adjustable valve 46 in a bleeder line 47 which is connected into the suction line 42 and is open to the atmosphere at its free end 48. The desired minimum suction of, for example, 1½ to 3 inches of water is pre-set and controlled by means of a second adjustable valve 50 in a second bleeder line 51 which is connected with the suction line 42 and is open to the atmosphere at its free end 52. The second bleeder line 51 also contains a quick-acting valve 53 by means of which the bleeder line 51 can be opened or closed. The valve 53 is operated by a foot pedal 54 (Fig. 1).

When the valve 53 is open, both bleeder lines 47 and 51 bleed into the suction line 42—the ends of these bleeder lines being open to the atmosphere. When the valve 53 is closed, bleeding occurs only through bleeder line 47 as controlled by the adjustable valve 46. The adjustable valves 46 and 50 are pre-set so that when valve 53 is closed the bleeding through valve 46 provides the desired maximum value of suction applied to the nasal tip 7. When valve 53 is opened, the bleeding through adjustable valve 50, in addition to that through valve 46, provides the desired minimum value of suction. The valve 53 operated by foot pedal 54 thus provides a quick change-over between pre-set minimum and maximum values of suction while leaving the operator's hands free.

The degree of vacuum in the suction line 42 is indicated by a vacuum gauge 55. It is also indicated by a series of signal lights 56, 57, 58, 59 and 60 which are blue, green, yellow, orange, and red, respectively, and are controlled by electrical contact connections in a vacuum gauge 61 connected to the suction line 42. Electric current is provided by a transformer 62 or other suitable source. The connections are such that as the vacuum is increased from one to 15 inches of water, the blue, green, yellow, orange and red lights are lighted successively so that the operator is able to observe and recognize the different degrees of suction by observing the color of light in his secondary field of vision, thus per-

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mitting the primary or focal vision to be upon the patient.

The control valves 20, 22, 46 and 50, the pressure gauge 24, vacuum gauge 55 and the colored lights 56, 57, 58, 59 and 60 which indicate the degree of suction in the suction line are all mounted on a control panel 63 on the front of cabinet 1, as illustrated in Fig. 1.

Fig. 4 illustrates an improved form of nasal tip 65 which has the property that it is automatically held in the naris by the expansion of the contracted rubber ring at the tip.

The operation of the apparatus is as follows. With the patient in a semi-recumbent position, the nasal cavities are sprayed with a solution of ephedrin by means of spray nozzle 3 in order to shrink the congested membranes and obtain a more open passage through the cavities. The nasal tips 6 and 7 are inserted into the external nares of the patient, being held firmly by the operator's finger tips if ordinary nares tips are used, or being retained automatically if the improved tips shown in Fig. 4 are used. The motor 10 is started by means of foot switch 12, thereby operating the pump 8 and providing a suction of from 1½ to 3 inches of water, the valve 53 (Fig. 2) being open. This suction is sufficient to lift the soft palate upward against the posterior wall of the nasal pharynx and to hold it there. At least minimum suction is maintained throughout the treatment.

Valve 28 is then opened by the operator to permit treating fluid from the container 27 to flow by gravity and atmospheric pressure to fill the naso-pharyngo-sinus area. When the cavities have been filled, as observed by the operator, valve 53 is closed by depressing the foot pedal 54. The closing of valve 53 switches over the suction system from a pre-set minimum to a pre-set maximum suction, as described above, and thereby provides a suction of from 7 to 12 inches of water in the suction line leading to the nasal tip 7. This increased suction draws the fluid and all debris, such as mucous, pus and foreign materials, from the naso-pharyngo-sinus area into the receiver 33. As container 27 is open to the atmosphere, the atmospheric pressure will tend to push fluid from the container into the nasal cavities. When the entire fluid mass has been removed from the naso-pharyngo-sinus area, the suction is automatically reduced to the minimum value as predetermined by the setting of valves 46 and 50 and a free flow of air is maintained through the system, all the way from the open chamber or container 27 to the pump. The motor is stopped by foot switch 12 and the cycle is thereby completed, the nasal tips 6 and 7 being removed from the nares.

The apparatus in accordance with the invention not only provided for a quick change-over from minimum to maximum suction while leaving the operator's hands free, but has the further advantage that it automatically releases all suction above the minimum when the obstruction presented by the fluid in the nasal cavities is removed, thereby providing perfect safety in the pressure treatment.

What is claimed is:

An apparatus for the treatment of nasal cavities, comprising a suction pump, a system of piping connected with said pump, a nasal tip adapted to be inserted in one of the nares and connected with said piping system so that suction may be applied to said tip, means for regulating the flow of atmospheric air into said piping system to maintain a set maximum suction

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therein, second means for simultaneously regulating the flow of atmospheric air into said piping system to maintain a set minimum suction therein, and a valve in said piping system in series with said second means and adapted to shut off the flow of atmospheric air through said second means, whereby when said valve is open atmospheric air flows through said second means and the set minimum suction is applied to the nasal cavity to hold the soft palate against the posterior wall of the nasal pharynx, and when said valve is closed atmospheric air does not flow through said second means and maximum suc-

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tion is applied by said first means to draw a treatment fluid, applied to the second naris, through the nasal cavity, and out through said nasal tip.
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