April 27, 1937. G. M. WOOD 2,078,786

APPLICATOR AND CONTROL MEANS THEREFOR

Filed Dec. 17, 1934 2 Sheets-Sheet 1

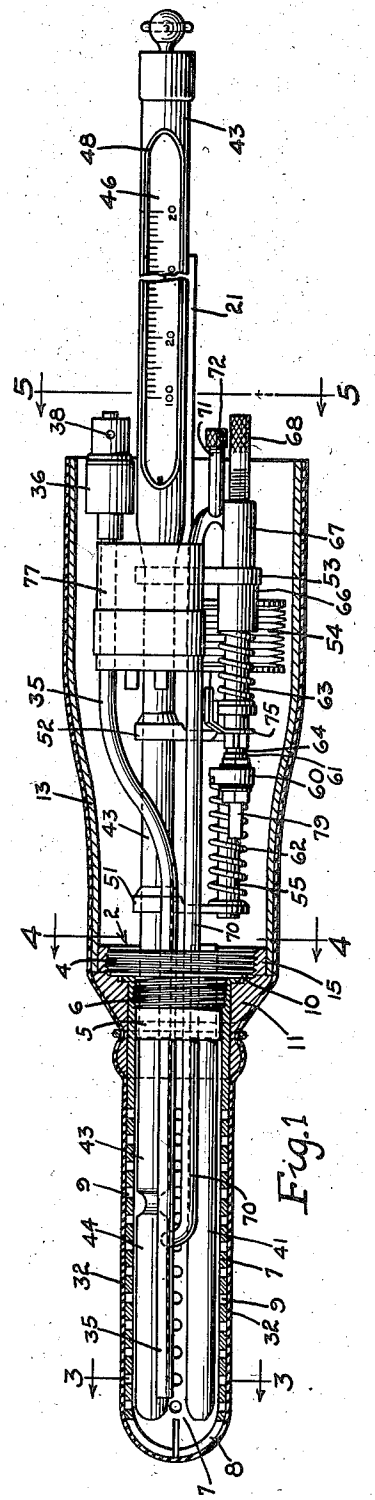

Fig. 1

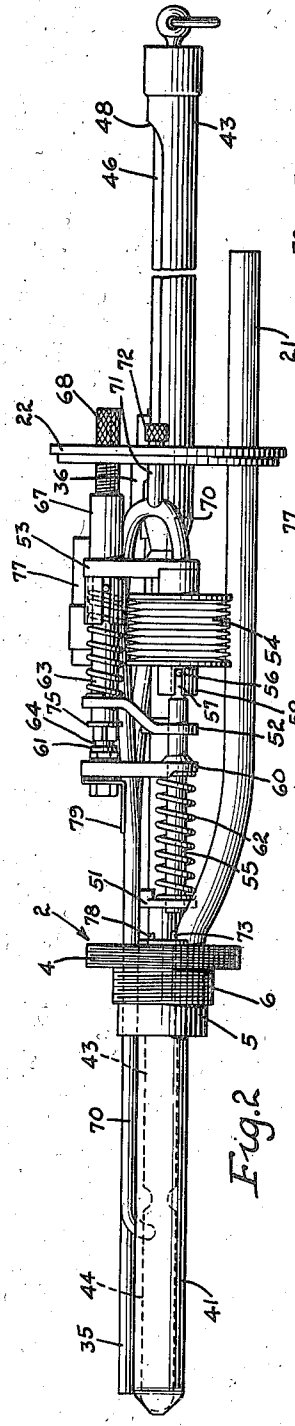

Fig. 2

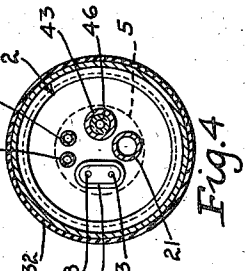

Fig. 4

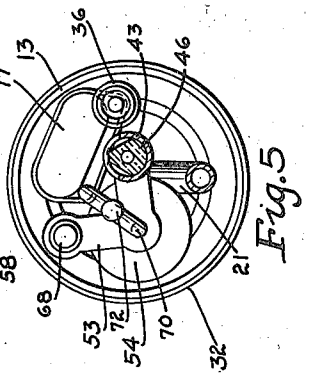

Fig. 5

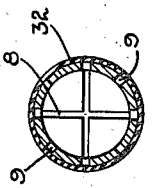

Fig. 3

INVENTOR
GLEN M. WOOD
BY Paul, Paul & Woods
ATTORNEYS

April 27, 1937. G. M. WOOD 2,078,786

APPLICATOR AND CONTROL MEANS THEREFOR

Filed Dec. 17, 1934 2 Sheets-Sheet 2

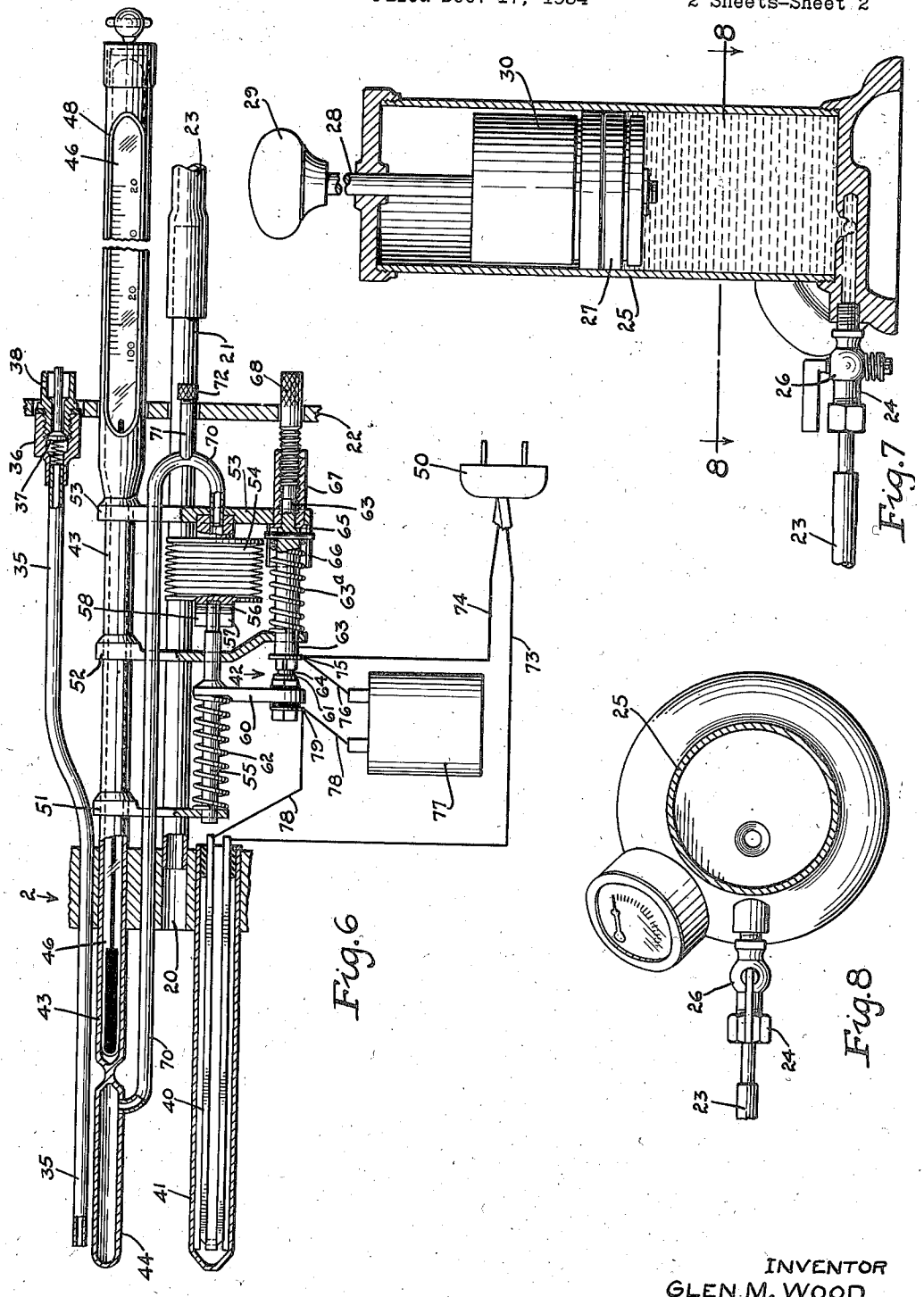

Fig. 6

Fig. 7

Fig. 8

INVENTOR
GLEN M. WOOD
BY Paul, Paul & Woodman
ATTORNEYS

Patented Apr. 27, 1937 2,078,786

UNITED STATES PATENT OFFICE

2,078,786

APPLICATOR AND CONTROL MEANS THEREFOR

Glen Mason Wood, Minneapolis, Minn.

Application December 17, 1934, Serial No. 757,907

6 Claims. (Cl. 128—401)

This invention relates to improvements in applicators, and to applicator control systems for applying dry heat to various cavities of the body, at any desired temperature and while dilating pressure is applied to the cavity wall. The general use of such devices for obtaining an even distribution of heat and creating hyperemic effects is well known.

Features of the invention include: the heating of the liquid after introduction into the applicator and while the applicator is in the cavity, as distinguished from heating the liquid at some remote point and circulating it through the tubular elements of the inserted portion of the applicator by use of a rotary pump; the use of a stiff insertion-tube surrounded by an elastic insertion-tube which is expanded after insertion into the cavity; the regulation of pressure by means of a gravity acting device, as distinguished from a rotary pump; the use of a relatively large number of fine openings in the stiff insertion-tube of the apparatus for local agitation of the water as it is introduced into the expansible insertion-tube; the use of a thermostatic device for automatically stopping heater action at a predetermined high temperature to prevent over-heating; the use of a thermometer as a check on the thermostatic device; and all details of construction of the disclosure.

Objects, features and advantages of the invention will be set forth in the description of the drawings forming a part of this application, and in said drawings

Figure 1 is a plan section with the handle closure plate removed;

Figure 2 is a side elevation of Figure 1 with the casings and insertion tubes removed, but showing the handle closure plate in position;

Figure 3 is a cross-section of the insertion tubes on line 3—3 of Figure 1;

Figure 4 is a cross-section through the handle on line 4—4 of Figure 1;

Figure 5 is a cross-section on line 5—5 of Figure 1 with the closure plate removed;

Figure 6 is a schematic view of the system, partly in section;

Figure 7 is a vertical section of the gravity-operable liquid pressure-creating device; and

Figure 8 is a plan section on line 8—8 of Figure 7.

The applicator includes a mount or mounting member comprising in this instance a disk section 2 having exteriorly a left-hand thread 4, and a cylindrical section or extension 5 having exteriorly a right-hand thread 6. With the threads 6 are engaged the threads of the inner end of a stiff applicator tube 7 having a somewhat pointed outer end which is radially slitted as at 8. The tube 7 also has rows of perforations indicated at 9. The inner flanged end of the tube is sealingly engaged with a gasket 10. Fitting over the tube and in threaded engagement with the left-hand threads of the disk 2 is a cap sleeve 11 serving to clampingly secure the flange of the tube against the gasket. Fitted over the inner end of this cap sleeve is a sleeve 13 which forms a handle for the applicator. In assembly, the tube 7 is first screwed into place. Then the handle sleeve is introduced over the end of the perforated tube 7 and moved rearwardly to a position beyond the threads 4, then the cap sleeve 11 is screwed to position, and then the forward part of the handle of the sleeve is fitted over the reduced portion 15 of the cap sleeve. The tube 7 and handle sleeve serve to enclose and protect substantially all of the parts of the applicator.

The mount has therethrough an opening 20 which communicates with a water pipe 21 suitably connected as by soldering to the mount. The pipe 21 passes through an opening in a closure piece 22, capping the end of the handle, and is connected by means of flexible tubing 23 with the outer end of a valve fitting 24 of pump cylinder 25. This fitting communicates with the lower end of the cylinder and has a valve 26. The cylinder, as a supply reservoir, is filled with the required amount of water. The cylinder has a piston 27 and rod 28 operable by knob 29. A weight 30 is detachably secured to the rod, over the piston, and acts by gravity to deliver water under pressure to the applicator tube. Weights of different sizes are provided to vary the pressure within a range of from two to four pounds, and an indicator gauge is provided so that the pressure may be known to the operator. When it is desired to empty the applicator tube, the operator pulls the piston upwardly and the water is sucked into the reservoir.

On the outer side of the applicator tube is arranged an elastic and therefore expansible container 32. A rubber tube having an outer closed end is used, and this tube is drawn over the stiff tube 7 and sealingly secured at the inner end as shown. When the valve 26 is opened, water can be forced into the tube 7 through its agitator openings and into the elastic container, to expand it, for smoothing out the mucosa, preparatory to the application of heat. After the treatment is completed, the water is withdrawn by suction action. For sanitary purposes, the tube 32 is extended rearwardly to cover the handle or sleeve 13, the tube being sealingly secured only at the circumferential depression of the cap sleeve 11.

Means is provided by which air can be displaced from the elastic walled container as the water is forced into it, and by which air can enter the container as water is sucked out of it. This is accomplished by providing a tube 35 which opens near the outer end of the stiff tube 7.

This tube 35 traverses the mount to project at the opposite side, and pass within the handle. A check valve casing 36 is attached to the end of the tube to project beyond the closure 22. The check valve 37 may be opened by the finger to allow air to escape through opening 38. During the filling operation the applicator is tilted so that the outer intake end of the air tube is at a higher level than that of the point of entry of the water from the piston controlled reservoir.

Means is also provided for applying heat to the liquid after introduction into the container, and while the container is in the cavity to be treated. I believe I am the first to heat the fluid after it is inside the cavity or orifice being treated. An electrical heating means 40, such as a coil, is employed and this means is arranged as shown in a copper tube 41 attached to and traversing the mount. A suitable circuit is provided including a switch generally designated 42.

To regulate the temperature of the liquid in the elastic container and to prevent over-heating, I employ a thermostatic device adapted to open the switch and cut off current to the heater at a predetermined upper limit of temperature.

I provide temperature regulating and temperature indicating systems, which include a tube 43 which passes through the mount. This tube extends within the stiff tube, and that end within the stiff tube is closed. To this closed end is attached another tube or bulb 44 which extends well toward the outer end of the stiff tube 7 and which contains ether as an expansion element forming part of the thermostatic regulating system. To safeguard against failure of the thermostatic device and therefore to guard against burning the tissue by over-heating, I mount a thermometer 46 in the tube 43. The thermometer bulb 47 is responsive to the temperature of the liquid in the stiff tube. The tube 43 has a cross-sectionally enlarged portion projecting beyond closure 22 of the handle, and this part is cut out as at 48. The scale of the thermometer is observable by the operator through the cut-out. Thus, if the thermometer reading indicates a higher temperature than desired, current to the heater may be interrupted by pulling a wall-plug 50 rather than by waiting for thermostatic action to open the switch.

The thermostatic system, includes the switch 42 controlling current to the electric heater and the ether filled bulb 44. Mounted on the thermometer housing tube 43 are three brackets, respectively designated 51, 52 and 53. To the bracket 53 is attached one end of a bellows 54, the free end of which is adapted to abuttingly engage a rod 55 which slides in the bracket 51. Rotation of the rod is prevented by a cross-pin 56 engaged in the slot 57 in an extension 58 of the free end of the bellows. A switch arm 60 is attached to the sliding rod 55 and has thereon one contact 61 of a switch. The contact is suitably insulated from the bracket. A spring 62 is interposed between this arm and the bracket 51 to move the rod and arm toward the bellows to switch-closed position. The end of the rod 55 is initially slightly spaced from the bellows to allow expansion of the bellows before it engages the rod. Slidably mounted in the middle bracket 52 is a rod 63 carrying the other suitably insulated contact 64 of the switch. This rod 63 is slidable in a sleeve 66 attached to bracket 53 and has a cross-pin operating in slot 65, whereby rotation of the rod is prevented, and whereby it is properly held for translation. The rod is preferably made of insulating material. A sleeve extension 67 at the opposite side of the bracket 53 has a rod 68 in threaded engagement therewith, and the end of this rod 68 abuts the end of the contact rod 63. The rod 68 extends outwardly beyond the closure 22, so that the operator may manipulate it to adjust the switching system relatively to the bellows, to vary the spacing between the end of rod 55 and the free end of the bellows. This adjustment is made against the action of a spring 63a. A quarter turn of the rod will give variable regulation within a range, for example of 108° to 130° F.

To cause the thermostat to break circuit at a higher temperature, the rod is turned to move the switching elements, in this instance toward the left, against the action of the spring 62 to in turn move the end of the rod a greater distance away from the bellows so that the bellows will have to expand in greater degree to open the heater switch. The bellows is connected with the ether tube by means of a pipe 70 as shown. A filler opening for introduction of ether is indicated at 71 and is closed by a suitable cap 72.

The heater circuit includes line 73 connecting with plug 50. The return line from the plug is indicated at 74, and has a connection with one side of the switch as shown at 75 and also has a branch connection 76 which passes through a condenser 77. The opposite side of the condenser is connected by wire to the opposite switch contact as at 79. A wire 78 runs from 77 to the other side of the heater as shown. The condenser acts to reduce sparking at the switch to a minimum.

A feature of this invention is the pressure regulation by means of a gravity acting device. The pressure can be adjusted by changing the weights and a series of different weights is provided any one of which may be placed on the piston. In this way, the pressure can be definitely limited to the single one decided upon, and no over-pressure results. No expensive pumping apparatus is necessary. There are few adjustments, the only adjustment being that of the thermostat.

The piston operable liquid control device has in some claims been referred to as of the non-circulating type to distinguish it from the pump type in which a separate pressure line and a separate suction line are necessary.

It is noted that the applicator bag or elastic-walled container is filled or distended after it is in place, and that the fluid is heated by means which is also within the cavity or orifice being treated. A feature is, therefore, the heating of the liquid when in the container, as distinguished from heating it at a remote point and pumping it through tubular elements to the container.

Another feature is the arrangement of the openings in the metal tube of the applicator, the relatively large number of openings, and the fineness of the same.

In my device, a single rubber applicator can be used and re-used. All that it needs between uses is proper sterilization. The rubber stall or elastic-walled tube is easy to insert, after being coated with lubricant. It can be very cheaply made. Before inflation, the rubber tube hugs the metal tube closely, and thus insertion is facilitated. The application of heat is gradual, no over-heating can occur, and the opening temperature of the switch is easy to regulate according to needs. The thermostat will shut off within half a degree or less of the desired tem-

perature. The device is very compact. Most of the parts, with the exception of the pressure device and the connecting tube, are housed within the handle and stiff tube. The reading of the thermometer can be easily taken.

A check valve is provided which is manually operable to allow escape of air during filling and which is automatically operable to admit air during withdrawal of the liquid from the perforate tube and the elastic container.

It will be understood that there is no intention to limit the invention to the size of applicator. Although the device herein illustrated is designed for rectal and vaginal work, the invention is applicable to devices for treatment of ear, eye, nose, throat, palate, etc.

I claim as my invention:

1. An applicator comprising, an expandible elastic container adapted to contact and smooth out the tissue of a body orifice when inserted therein and expanded, means within the container and to which said container is attached and through which liquid can be forced to expand said elastic container, electrically operable means surrounded by the container for heating said liquid including a circuit having a switch, thermostatic means responsive to the temperature of fluid in the expandible container, to automatically open said switch when the liquid reaches a predetermined temperature, a thermometer in part within the container and responsive to the temperature of the liquid therein and having a scale visible to the operator while the applicator is in use, means by which displacement of air is permitted from the expandible container during filling thereof, means for adjusting the thermostatic means to vary the opening temperature of the switch.

2. An applicator comprising, a stiff perforate tube adapted for insertion in an orificial opening, an expansible elastic container surrounding said tube and adapted to retain liquid, means by which liquid can be introduced under pressure into said tube for expanding it, an electrical heater in said tube and a circuit for the heater including a switch, thermostatic means for controlling the switch to open it at a predetermined temperature including a temperature responsive part within said tube, means allowing displacement of air from said tube as the liquid enters it, a thermometer having a bulb in said tube and having a scale visible to the operator while the applicator is in use.

3. An applicator comprising, a stiff perforate tube adapted for insertion in an orificial opening, an expansible elastic container surrounding said tube, means detachably securing said container to said tube to adapt said elastic container to retain liquid, means by which liquid can be introduced under pressure into said tube for expansion of said elastic container and withdrawn by suction action, an electrical heater for heating the liquid after introduction into the tubular element and a circuit for the heater including a switch, thermostatic means for controlling the switch to open it at a predetermined temperature including a part responsive to the temperature of the liquid within the tube, means including a check valve manually operable for allowing displacement of air during filling of the tube while liquid is being withdrawn by suction, a thermometer responsive to temperature of the liquid in the container and having a scale visible to the operator while the applicator is in use.

4. An applicator comprising a stiff perforate tube adapted for insertion in an orificial opening, an expansible elastic container surrounding said tube and adapted to retain liquid, means by which liquid can be introduced under pressure into said tube for expansion of said elastic container, including a pipe in said tube, means for heating the fluid including a heater in said tube, thermostatic means for limiting the heating temperature of the heating means, a thermometer responsive to the temperature of the liquid in the container including a bulb in said tube and having a scale visible to the operator while the applicator is being used, means by which air can be released from and admitted to said tube respectively during filling and withdrawal of the liquid including a pipe in said tube, a common mounting element for said stiff tube, heater, pipes and bulb, and a handle for the applicator detachably secured to said mounting element.

5. An applicator comprising, a mounting element, a stiff perforate tube adapted for insertion in an orificial opening, a sleeve operatively and detachably securing the tube to the mounting element, an expansible elastic container surrounding said tube and adapted to retain liquid, means detachably securing said container to said stiff tube, a hollow handle for the applicator detachably secured to said sleeve, means by which liquid can be introduced under pressure into said tube for expansion of said elastic container, means within the tube for heating the fluid, thermostatic means within the handle responsive to the liquid within the tube for limiting the heating temperature of said liquid, a thermometer passing through the handle and responsive to the temperature of the liquid in the container and having a scale visible to the operator while the applicator is being used, means by which air can be released from and admitted to said container respectively during filling and withdrawal of the liquid, and means within the handle for adjusting the thermostatic means to cause the heating means to stop heating at different temperatures.

6. An applicator comprising a mounting element, a stiff perforate tube adapted for insertion in an orificial opening and detachably secured to said mounting element, a sleeve operatively and detachably securing the tube to the mounting element, an expansible elastic container surrounding said tube and adapted to retain liquid, detachable means pressing a part of said elastic container against the sleeve to make a watertight connection, a hollow handle for the applicator detachably secured to said sleeve, means by which liquid can be introduced through said mounting and into said tube for expanding the elastic container, means for heating the fluid including electrical resistance means within the stiff tube, thermostatic means within the handle for regulating the heating action of said resistance heater, a thermometer having a bulb within the stiff tube and responsive to the temperature of the liquid and passing through the handle and having a scale visible to the operator while the applicator is being used, means including a passage in the mounting and a tube connected with the passage by which air can be released from and admitted to the container respectively during filling and withdrawal of the liquid.

GLEN MASON WOOD.