

**Sept. 29, 1970**

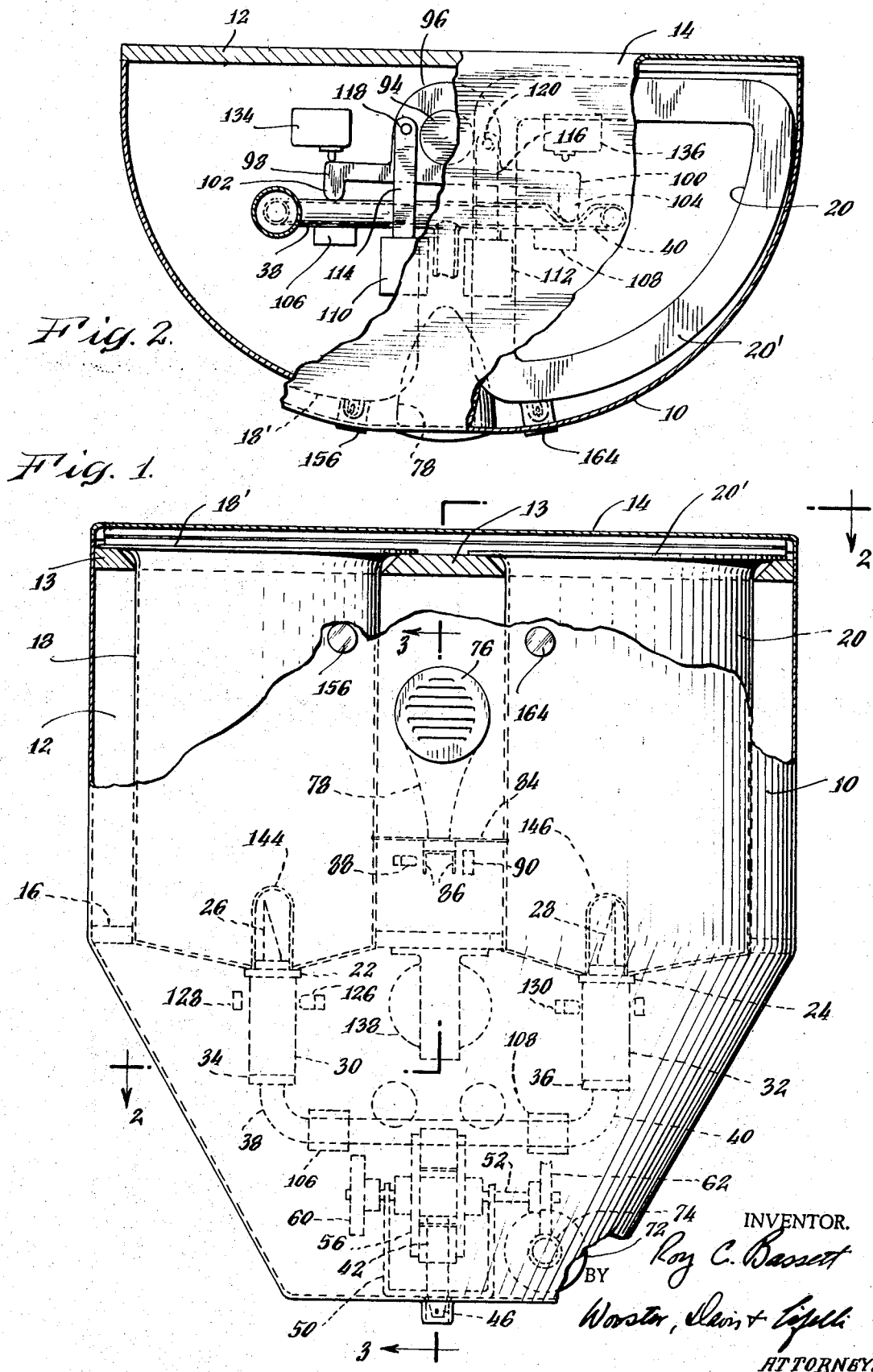
**R. C. BASSETT**

**3,531,021**

# BREATH-OPERATED LIQUID DISPENSER

Filed Sept. 25, 1968

4 Sheets-Sheet 1



Sept. 29, 1970

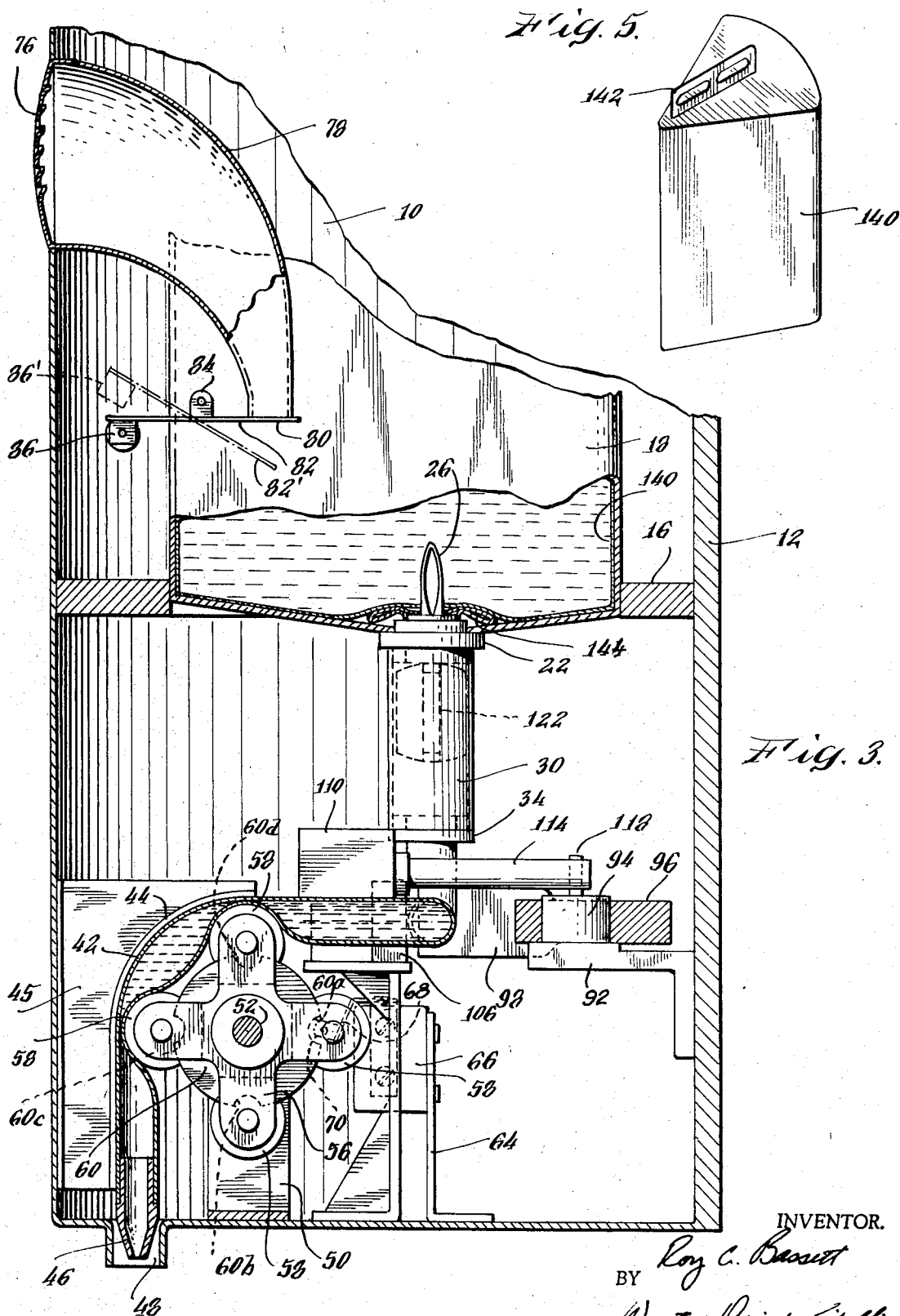
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BREATH-OPERATED LIQUID DISPENSER

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4 Sheets-Sheet 2



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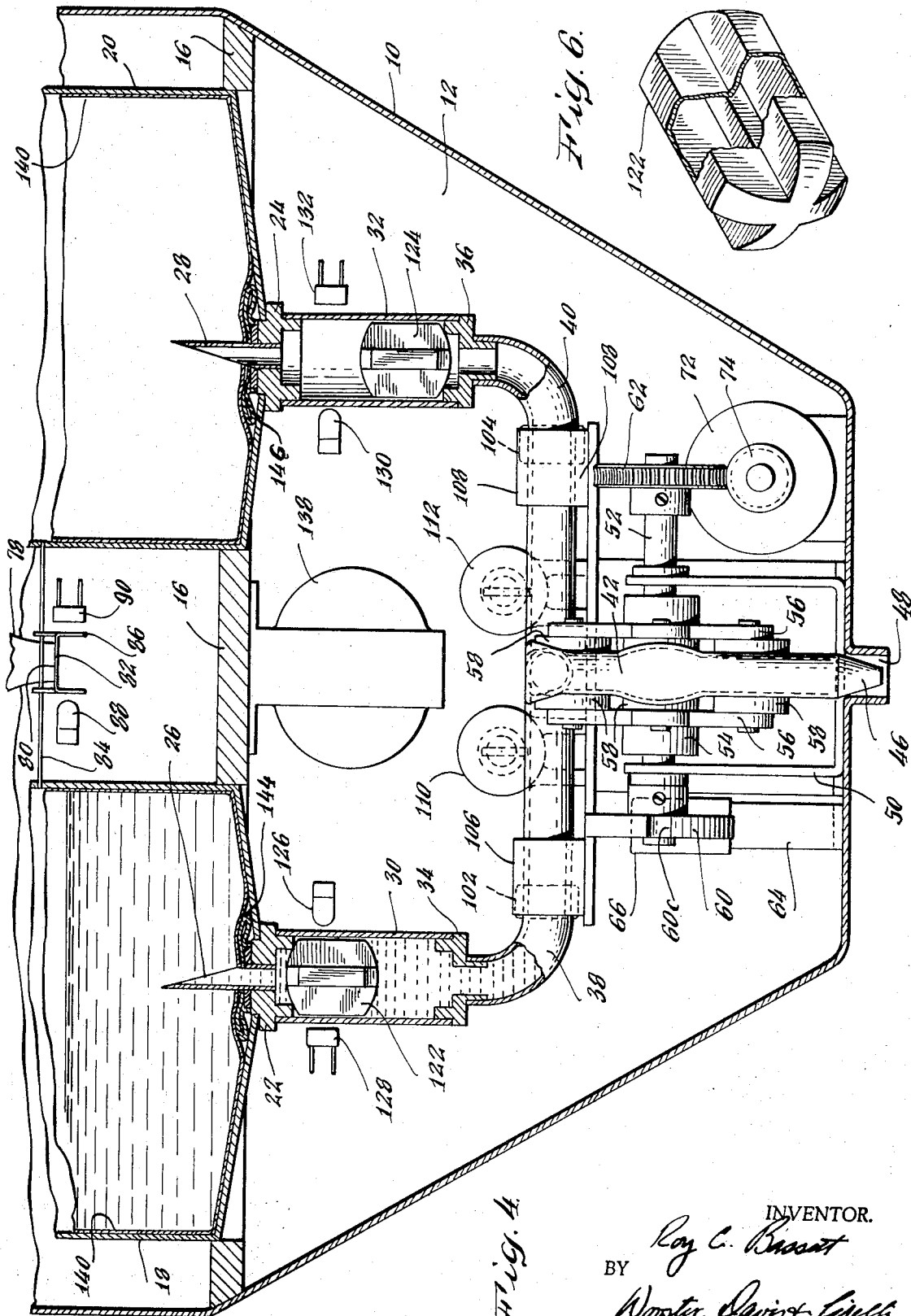


Fig. 4.

Fig. 6.

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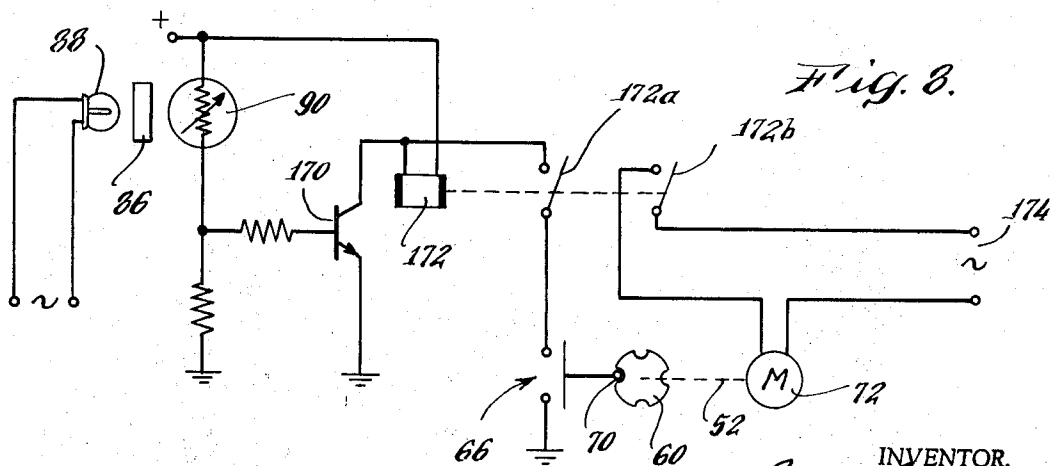
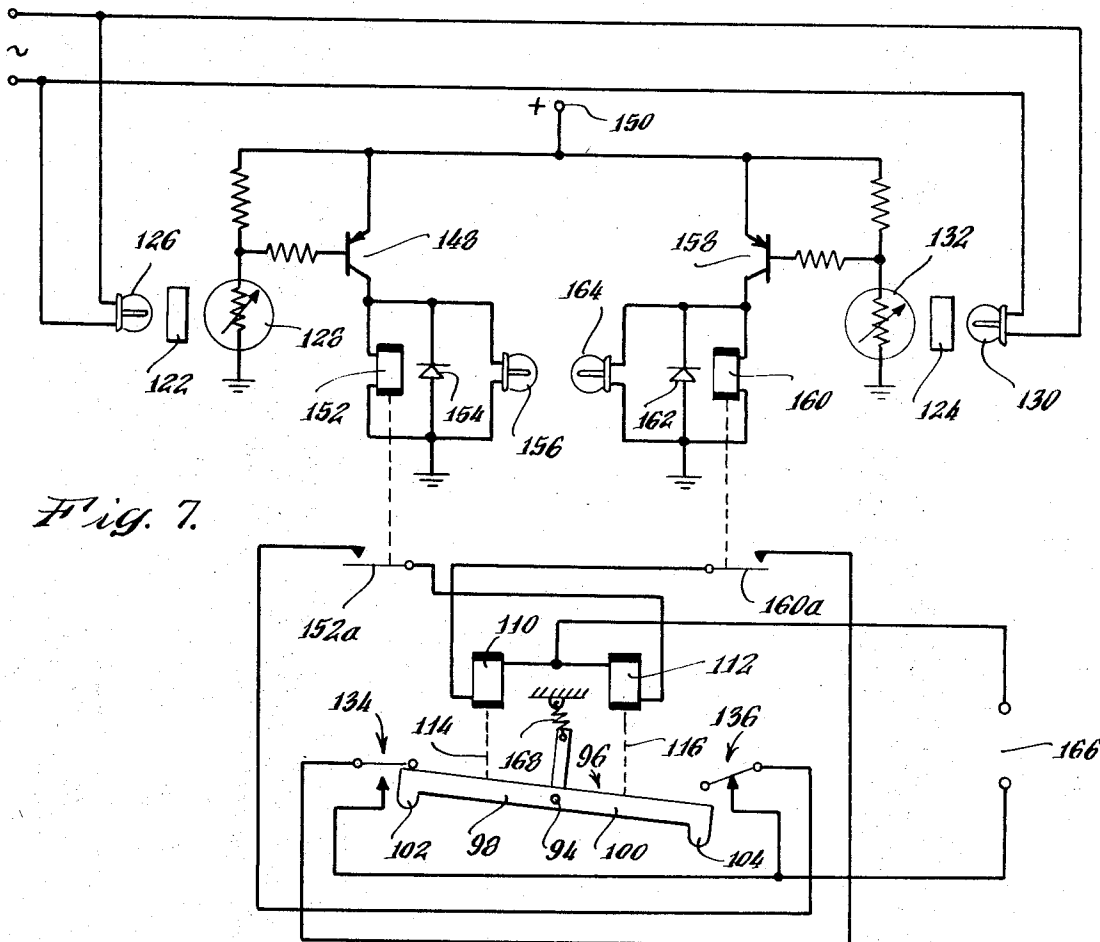
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**3,531,021**

# BREATH-OPERATED LIQUID DISPENSER

Filed Sept. 25, 1968

4 Sheets-Sheet 4



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3,531,021

## BREATH-OPERATED LIQUID DISPENSER

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Int. Cl. B67h 7/24

U.S. Cl. 222-81

9 Claims

### ABSTRACT OF THE DISCLOSURE

There is disclosed a surgical soap dispenser which may be operated by a surgeon without physical contact. A cabinet includes two compartments, each of which contains a disposable plastic bag of soap. Upon insertion, the bags are punctured by sharpened tubes in the bottoms of the compartments. The soap from each bag passes through a transparent chamber containing an opaque float. The chambers are connected by a flexible tube having a central T connecting to a flexible dispensing tube. A cam operated roller assembly forces preselected amounts of soap from the dispensing tube when actuated. The roller assembly, in turn, is actuated by a motor controlled from a pivoted vane against which the breath of the user may be blown. When the vane pivots, it permits a light beam to energize a photoelectric cell to actuate the motor. Each of the float chambers is provided with a light and photoelectric sensor. When the chambers are full, light passage is blocked by the float. When any bag becomes empty, the float drops and the photoelectric beam actuates a selector which closes off the compartment containing the empty bag, permitting flow to continue from the full bag.

### BACKGROUND OF THE INVENTION

This invention relates to a dispenser and, more particularly, to a surgical soap dispenser. While a number of uses may be found for apparatus embodying the present invention, its primary utility is in the field of surgical soap dispensing. It is, of course, vital that sterility be maintained from factory to user and thereafter. Accordingly, a number of surgical soap dispensers have been proposed in which the dispenser may be actuated without contact from the surgeon's hand. However, many of these units do require contact by some other part of the surgeon's body employing, for example, foot pedals, switches controlled by the elbow, or the like. Other devices are photoelectrically operated when the surgeon's hands interrupt a light beam. Furthermore, many of the prior art devices employ a single soap reservoir which may become depleted at a crucial moment. In addition, many such prior art devices are designed in such a manner that sterility may be compromised by the manner in which soap is added to the dispenser.

Accordingly, it is a primary object of the present invention to provide a surgical soap dispenser which may be actuated at will by the surgeon without requiring the intervention of any part of the surgeon's body.

Other objects are to provide such a dispenser wherein two separate soap reservoirs are provided; wherein said reservoirs may be loaded with prepackaged sterile soap solutions; and wherein an automatic changeover is provided to switch from an empty reservoir to a full reservoir.

Other objects, features and advantages will be apparent from the following description, the appended claims, and the figures of the attached drawings.

### SUMMARY OF THE INVENTION

In accordance with the present invention, there is provided a liquid dispenser including a cabinet defining at least one liquid storage compartment communicating with the outlet passage for dispensing preselected quantities of

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liquid. Pivoted breath-operated switching means is provided which actuates the dispensing means when operated by the user's blowing thereon.

### BRIEF DESCRIPTION OF THE DRAWINGS

For an understanding of this invention, reference may be had to the drawings wherein:

FIG. 1 is a front view of apparatus constructed in accordance with this invention, partially broken away to illustrate its internal construction;

FIG. 2 is a cross section taken substantially along the line 2-2 of FIG. 1;

FIG. 3 is an enlarged cross section taken substantially along the line 3-3 of FIG. 1;

FIG. 4 is an enlarged front view, partially in cross section, of the operating mechanism of the invention;

FIG. 5 is a perspective view, on a reduced scale, of a plastic soap usable with the present invention;

FIG. 6 is an enlarged perspective view, partially broken away, of a float element usable with this invention;

FIG. 7 is a schematic diagram of the switchover circuit of this invention; and

FIG. 8 is a schematic diagram of the dispensing circuit of this invention.

### DESCRIPTION OF THE PREFERRED EMBODIMENT

With particular reference to FIGS. 1-4 there is illustrated a surgical soap dispenser comprising a cabinet 10 having a rounded front and a straight back 12 for mounting against a wall or similar supporting surface. The top of cabinet 10 is closed by a cover 14 and the cabinet is divided into upper and lower compartments by a horizontal partition 16.

Mounted in the upper portion of the cabinet 10 are a pair of liquid reservoirs 18, 20 supported by means of radial flanges 18', 20' on upper wall 13. The bottoms of reservoirs 18, 20 are sloped downward to permit drainage into respective discharge fittings 22, 24 (FIG. 4). Each discharge fitting includes a sharpened piercing tube 26, 28 extending upward into the respective reservoirs. Depending downwardly from each of the discharge fittings is a float cylinder 30, 32 formed of a suitable transparent material, such as glass or plastic. The bottom of each cylinder is closed by a plug fitting 34, 36. Connected to the plug fittings 34, 36 are two arms 38, 40 of a resilient plastic T. The third arm 42 of the T extends forward and downward and is positioned against a curved flange 44 of a bracket 45. The end of the arm 42 is provided with a nozzle 46 which terminates in a discharge opening 48 in the bottom wall of cabinet 10.

A U-shaped bracket 50, mounted within the cabinet 10, supports a horizontal shaft 52, upon which is mounted an assembly including a central hub 54 and two spaced, X-shaped support members 56 between which are mounted four spaced rollers 58 which bear against the flexible arm 42 as shown in FIG. 3. One end of shaft 52 carries a cam 60 having four spaced notches 60a-d. The opposite end of shaft 52 carries a pinion gear 62. A suitable bracket 64 supports a switch 66 having an operating arm 68 with a cam rider engaging cam 60. In the illustrated position, cam rider 70 is positioned in notch 60a. The shaft 52 is driven through pinion gear 62 by means of a motor 72 and worm gear 74. The motor 72 constitutes the prime mover for the dispensing function. It is actuated by the breath of the user in a manner to be more fully described below.

There is provided on the front of cabinet 10 a circular louvered opening 76 to which is connected a downwardly extending air guide 78 having an open end 80. A light weight vane 82 is loosely mounted upon a pivot pin 84

in such a manner that, when the vane is at rest, it closes the open end 80 of the air guide 78. The opposite end of vane 82 is provided with a pair of light blocking shutters 86 which are normally positioned between a lamp 88 and a photocell 90.

The apparatus of this invention is provided with a switchover mechanism for automatically changing from an empty reservoir to a full reservoir. To this end there is mounted against cabinet back 12 a bracket 92 carrying a pivot 94. A selector 96 is rotatably mounted on pivot 94 and includes arms 98, 100 extending therefrom. The end of each of arms 98, 100 terminates in a nose 102, 104 arranged to bear against one of the arms 38, 40 of the resilient T. Blocks 106, 108 on the opposite side of the resilient arms from nose portions 102, 104 permit the arms to be alternatively pinched shut upon rotation of the selector 96. Selector rotation is achieved by means of solenoids 110, 112 having reciprocating plungers 114, 116 connected to selector 96 by means of pins 118, 120.

Operation of the switchover mechanism is initiated in a manner to be more fully described by means of floats 122, 124 loosely contained in float cylinders 30, 32. These floats are opaque, hollow members of cruciform cross section, as illustrated in FIG. 6. On opposite sides of cylinder 30 are a lamp 126 and a photocell 128. A similar lamp 130 and photocell 132 are mounted on opposite sides of cylinder 32. These lamp-photocell pairs are mounted near the top of each float cylinder so that, when the cylinder is full of soap, the corresponding float will block the passage of light therebetween. A pair of normally closed switches 134, 136 are also mounted within the cabinet 10 to be operated by arms 98, 100 when in their retracted positions. A reduced voltage power source for the various electrical elements of this invention is provided by means of a transformer 138 mounted within the unit against partition 16.

The liquid soap for the apparatus of this invention is supplied in pre-packaged sterile bags 140 as shown in FIG. 5. The bags are plastic and shaped to fit the reservoirs 18, 20. They are sealed and include a convenient carrying handle 142. The reservoirs 18, 20 are loaded by merely dropping a bag into each. The bottom of the bag is punctured by the corresponding piercing tube 26, 28 permitting liquid soap to flow into the distribution system. The tubes 26, 28 are maintained in a sterile condition when initially shipped by means of thin rubber or plastic diaphragms 144, 146. Upon first loading with liquid soap, these diaphragms are punctured and compressed as shown in FIGS. 3 and 4 and thereafter serve as seals against soap leakage when new bags are added.

FIG. 7 illustrates in schematic and partially pictorial form the switchover circuitry of this invention. A switching transistor 148 is connected in series between the positive terminal 150 of a 24 volt D.C. power supply and ground through a parallel circuit comprising relay coil 152, diode 154, and indicator lamp 156. The photocell 128 is connected across the base-collector circuit of transistor 148. Another transistor 158 is connected in a similar circuit with relay coil 160, diode 162, and lamp 164. The lamps 126 and 130 are connected in parallel across a suitable power supply as indicated. Under normal conditions, with both reservoirs full, the floats 122, 124 are positioned so that they interrupt the light between the lamps and the respective photocells, thus maintaining both transistors in a non-conductive state. The contacts 152a of relay coil 152 are connected in series with solenoid 112 and switch 136 across a power supply 166. Similarly the contacts 160a of relay coil 160 are connected in series with solenoid 110 and switch 134 across the power supply 166. The plungers 114, 116 of the solenoids are connected to the selector 96 in the manner previously described and the selector is provided with a suitable overcenter spring 168 which provides sufficient force to cause the nose 104 of the selector arm to pinch tubular arm 40 closed to prevent the flow of soap from

reservoir 20. Tubular arm 38 communicating with reservoir 18, however is open.

Assume now that the soap supply in reservoir 18 is exhausted. As the liquid level in float cylinder 30 drops, float 122 also drops permitting light to pass from lamp 126 to photocell 128. The resistance of this photocell decreases, causing transistor 148 to go into conduction. This energizes lamp 156 mounted on the front of cabinet 10 to indicate that the reservoir is empty and should be refilled. Simultaneously, relay coil 152 is energized closing contact 152a. This completes the circuit from power supply 166 through solenoid 112 and switch 136. Plunger 116 is thus retracted, causing selector 96 to pivot across its spring loaded center position, thereby opening tubular arm 40 and pinching off tubular arm 38 connected to the empty reservoir. Switch 136 is thereupon opened, deenergizing solenoid 112. The empty reservoir 18 may now be refilled by simply removing the depleted plastic bag 140 by means of its handle 142 and dropping a full bag into the reservoir. Float 122 then rises to its original position, causing transistor 148 to once more become nonconductive and extinguishing light 156.

The dispensing circuit of the apparatus of the invention is illustrated in FIG. 8 wherein it will be noted that the emitter-collector circuit of the transistor 170 is connected in series with a relay coil 172 across a D.C. power supply. Relay coil 172 controls two sets of normally open contacts. Contacts 172a are connected in series with switch 66 across transistor 170. Contacts 172b are connected in series with motor 72 across power supply 174.

To operate the dispenser, the surgeon positions his hands below discharge opening 48 and blows into louvered opening 76. This causes the vane 82 to pivot about pivot pin 84 to position 82' shown in FIG. 3 and lifts shutter 86 to position 86'. Light from lamp 88 thereupon impinges upon photocell 90. The lowered resistance of photocell 90 causes transistor 170 to go into conduction, thus completing a circuit through relay coil 172 and closing contacts 172a and 172b. Motor 72 thereupon begins to turn, rotating shaft 52. Cam 60, which is mounted on shaft 52, also begins to revolve, causing cam rider 70 to move out of notch 60a, thereby closing switch 66. From FIG. 8 it will be noted that switch 66 thereupon completes a holding circuit for relay coil 172, causing the coil to remain energized even though shutter 86 returns to its original position. Also connected to shaft 52 is the assembly including rollers 58. This assembly moves in a counter-clockwise direction, as seen in FIG. 3, causing the quantity of soap trapped in arm 42 between the upper and left hand rollers to be dispensed from nozzle 46. This rotation continues through 90° until cam rider 70 drops into notch 60b, allowing switch 66 to open and thereby deenergizing coil 172, opening contacts 172a and 172b and deenergizing motor 72.

It is believed that the many advantages of this invention will now be apparent to those skilled in the art. It will also be apparent that a number of variations and modifications may be made therein without departing from its spirit and scope. Accordingly, the foregoing description is to be construed as illustrative only, rather than limiting. This invention is limited only by the scope of the following claims.

What is claimed is:

1. A liquid soap dispenser which comprises: cabinet means defining at least one liquid soap storage compartment therein and an outlet passage communicating therewith; a piercing tube in said storage compartment communicating with said outlet passage; a disposable plastic bag of liquid soap shaped to substantially conform to the shape of said compartment and pierceable by said piercing tube; dispensing means associated with said outlet passage for dispensing preselected quantities of liquid soap therefrom; and pivoted, breath-operated switching means connected to actuate said dispensing means when activated by the user's blowing thereon.

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2. The dispenser of claim 1 wherein said dispensing means comprises: a motor; pump means driven by said motor; and a dispensing circuit connected to actuate said motor.

3. A liquid dispenser which comprises: cabinet means defining at least one liquid storage compartment therein and an outlet passage communicating therewith; a motor; dispensing pump means driven by said motor; a dispensing circuit connected to actuate said motor and including a photocell; a light source directing a light beam toward said photocell; and a shutter normally blocking said light beam but displaceable by a user blowing therein.

4. The dispenser of claim 2 wherein said outlet passage comprises a resilient tube and said pump means comprises a plurality of spaced rollers engageable with a portion of said tube to force liquid therethrough.

5. A liquid dispenser which comprises: cabinet means defining at least one liquid storage compartment therein and an outlet passage communicating therewith; a piercing tube in said storage compartment communicating with said outlet passage; a disposable container of the liquid to be dispensed, pierceable by said piercing tube; a resilient diaphragm enclosing said piercing tube for maintaining sterility and puncturable upon the first loading of the compartment with said container; dispensing means associated with said outlet passage for dispensing preselected quantities of liquid therefrom; and pivoted, breath-operated switching means connected to actuate said dispensing means when activated by the user's blowing thereon.

6. A liquid dispenser which comprises: cabinet means defining two liquid storage compartments therein and an outlet passage communicating with both of said compartments; dispensing means associated with said outlet passage for dispensing preselected quantities of liquid therefrom and including automatic switchover means for shutting off flow from a depleted compartment and permitting flow from a filled compartment; and pivoted, breath-

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operated switching means connected to actuate said dispensing means when activated by the user's blowing thereon.

7. The dispenser of claim 6 wherein said automatic switchover means comprises: a transparent float chamber intermediate each storage compartment and said outlet passage; a photocell on one side of each float chamber; a light source on the opposite side of each float chamber directing a light beam through its respective float chamber toward its respective photocell, a float in each float chamber normally blocking said light beam when said chamber is filled with liquid and passing said beam when said chamber is empty; valving means intermediate each float chamber and said outlet passage; and circuit means including said photocells connected to actuate said valving means.

8. The dispenser of claim 7 wherein said switchover means further comprises: a resilient tube interconnecting said float chambers and including a central T communicating with said outlet passage; and a pivoted selector arm alternatively positionable between a first position pinching said resilient tube intermediate one float chamber and said T and a second position pinching said resilient tube intermediate the other float chamber and said T.

9. The dispenser of claim 8 wherein said circuit means includes first and second solenoids having plungers connected to actuate said selector arm to either of its first and second positions.

#### References Cited

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STANLEY TOLLBERG, Primary Examiner

U.S. Cl. X.R.

200—81.9; 222—105, 214

**UNITED STATES PATENT OFFICE**  
**CERTIFICATE OF CORRECTION**

Patent No. 3,531,021 Dated September 29, 1970

Inventor(s) Roy C. Bassett

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 1, line 72, "outlet passage for dispensing preselected quantities of" should read -- an outlet passage. Dispensing means is associated with the outlet passage for dispensing preselected quantities of --. Column 2, line 18, after "soap" insert -- bag --.

Signed and sealed this 22nd day of December 1970.

(SEAL)

Attest:

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