Dec. 19, 1967 J. C. LESHER ETAL 3,358,747

HAND WASHING DEVICE

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FIG. 1

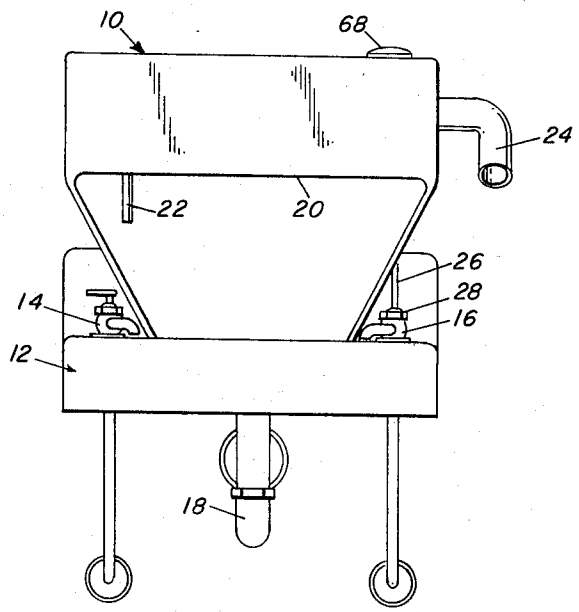
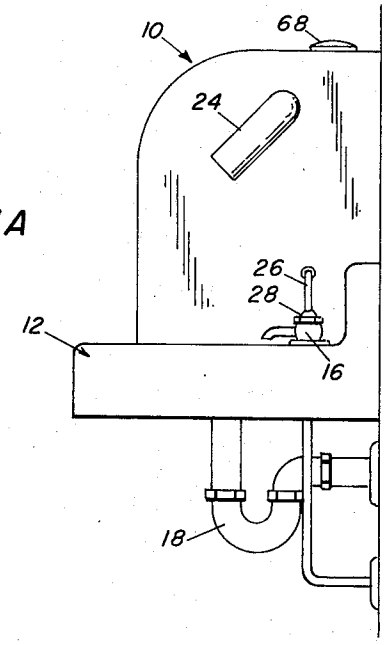


FIG. 1A



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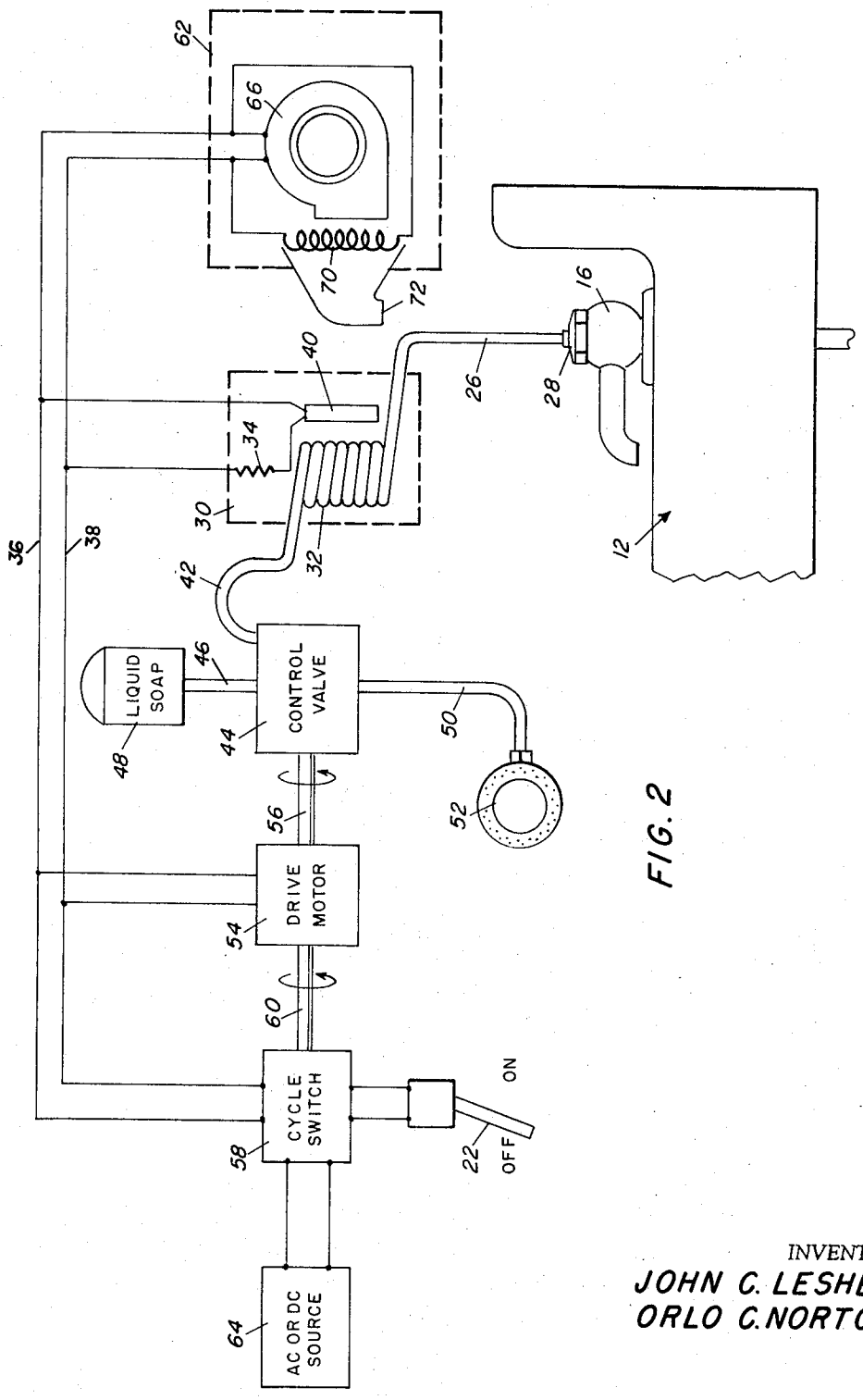


FIG. 2

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HAND WASHING DEVICE

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The present invention relates, in general, to automatic hand washing devices and, more particularly, to a device serving to dispense measured amounts of soap, water and hot air in a predetermined sequence for washing and drying hands.

Public washrooms, such as those provided by service stations, restaurants or other public places, present a real problem of maintenance and upkeep for those responsible for such places and, as a result of heavy and often careless use, sometimes become very dirty and unsanitary. This is particularly true of sinks and lavatories, which require constant care to prevent such conditions from occurring.

An additional problem is the waste of water and soap which results from carelessness, with water faucets often being left to run after the user has gone. In an attempt to control these conditions, many lavatories are provided with spring-loaded faucets which automatically turn off after a short period of time to prevent excess use of water. However, this type of arrangement merely aggravates the dirty and unsanitary conditions for the water usually must be turned back on midway through the hand washing procedure, thus spreading soap all over the faucet handles and the edges of the lavatory. Soap dispensers are usually located over or near the lavatory, and their careless use scatters soap around and detracts from the appearance of the washroom. Further, it is usually difficult to obtain a useable water temperature and the water runs either too cold or too hot, thus requiring several adjustments during the course of washing the hands, adding further to the unclean conditions.

The present device overcomes these problems by providing a hand washing device which will allow an individual to wash his hands without constantly having to adjust the water supply and without having to spread water and soap around, thus materially reducing the problems of upkeep and maintenance of a wash room. The present device can be connected to existing plumbing fixtures, is easily and quickly installed and is economical to purchase and operate. The hand washer of the present invention supplies its own soap or detergent and its own hot water at a temperature comfortable to an individual. The apparatus also contains a hot air dryer which performs during the entire time of the hand washing cycle and continues thereafter to permit drying of the hands. The washing device supplies the soap and water in such a manner that it will not splash outside its housing. The entire service is performed in a continuous cycle which first supplies warm water to wet the hands, then adds a measured amount of detergent and/or soap, then supplies a rinse spray to remove the soap and finally heated air to dry the hands.

It is, therefore, an object of the present invention to provide an automatic hand washing device which may be installed with a minimum of trouble on existing washroom lavatories without requiring changes in the existing plumbing.

It is a further object of the invention to provide a hand washing device that is safe, sanitary, economical and which will be easy to use and to maintain.

A further object of the invention is the provision of an automatic hand washer device that will clean and sanitize itself and thus will aid in maintaining a clean and neat appearance in a public washroom.

An additional object of the invention is the provision of an automatic hand washer that supplies warm water at a predetermined temperature from its own water heater to insure a continuous and comfortable water temperature, thus eliminating the problem of the user continuously having to adjust the water temperature setting.

Another object of the present invention is the provision of an automatic hand washer having a continuous cycle which dispenses predetermined amounts of water and soap, thus eliminating the waste of these materials which often occurs in publicly used facilities.

Briefly, the present invention comprises a housing for carrying the various parts of the assembly, the housing being attached to a sink or lavatory for use therewith. Enclosed within the housing is a sprinkler device connected through a control valve and a flash heater to an existing lavatory faucet. Water from the faucet is heated to the desired temperature in the flash heater, then passes through the control valve in its timed sequence to the sprayer. Also connected to the sprayer through the control valve is a source of soap or detergent. The control valve is motor-driven through a cycle which provides an initial spray of water, a spray of soap and then a second spray of water. Throughout the cycle, warmed air is circulated in the housing. Upon completion of the washing portion of the cycle, the water supply is turned off and warmed air is circulated within the housing for a predetermined time to dry the hands. An auxiliary warm air outlet may also be provided to supply air outside the housing. Convenient starting switch means are provided near or within the housing to operate a cycle switch which turns on the drive motor and operates the timing mechanism for the whole sequence.

The novel features which are characteristic of the invention are set forth with particularity in the appended claims, but the objects and features of the invention will be understood more clearly and fully from the following detailed description taken in connection with the accompanying drawings in which:

FIG. 1 and FIG. 1A are front and side plan views, respectively, of the installation of a hand washing device in accordance with the present invention; and

FIG. 2 is a diagrammatic illustration of the various components of the device.

Referring now to FIGS. 1 and 1A, there is illustrated at **10** a housing for the apparatus of the present invention. The housing is of suitable size and shape for mounting on a conventional lavatory, or sink **12** having hot and cold water supply faucets **14** and **16**, respectively, and a conventional drain pipe **18**. Housing **10** includes a front-facing opening **20** into which the user inserts his hands for the washing operation. The housing is open at the bottom to permit water from the hand washer to drain into lavatory **12**. A starting lever or switch **22** is conveniently located at or near the opening **20** to initiate operation of the device. An auxiliary hot air dryer nozzle **24** is located externally of the housing to permit one user to dry his hands while another is using the hand washing device. Housing **10** may be constructed of any suitable material such as metal or plastic, with the front portion of the housing preferably being of a transparent material to permit easy viewing of the interior of the device by a user during the hand washing operation. The device is installed by attaching the housing to the sink **12** and/or its supporting wall by means of conventional brackets and by attaching the hand washer water supply pipe **26** to the existing faucet **16** by means of a suitable coupler **28**. Coupler **28** is illustrated as fitting in faucet **12**, replacing the usual valve which is threaded therein, the connector **28** attaching itself to the valve seat of the faucet body to permit the flow of water into supply pipe **26**, but it will

be apparent that any suitable means for connecting the supply pipe to the faucet may be used.

Referring now to the diagrammatic showing of FIG. 2, the cold water supply pipe **26** is shown connected through coupler **28** to the cold water faucet **16**. Cold water from the faucet is supplied through pipe **26** to a flash heater **30** which includes a heat exchanger **32** surrounding an electrical heating element **34**. The heating element is connected across alternating current supply lines **36** and **38** by way of a thermostatic control element **40**. Thermostat **40** senses the temperature of the water in heat exchanger **32** and controls the flow of current through heating element **34** to maintain this temperature at a predetermined level.

Heated water from the flash heater **30** is fed through pipe line **42** to a control valve assembly **44**. Also applied to control valve **44** through a suitable orifice in the valve housing and through a pipe **46** is a supply of liquid soap, liquid detergent or other suitable cleansing medium **48**. The soap is supplied to the valve through gravity feed or by any suitable pressure means. The output orifice of the control valve supplies either soap from source **48** or water from flash heater, or both, through an outlet pipe **50** to a suitable sprayer head **52**. The sprayer is shown in FIG. 2 as being annular in shape and having a plurality of holes so arranged as to spray water downwardly and generally toward the axis of the sprayer so as to prevent liquid from being sprayed outside the housing **10**; however, it will be apparent that any suitable design of sprayer head may be used.

The control valve **44** is driven by a drive motor **54** through a shaft **56**, the speed of rotation of the shaft being geared to drive this valve through its predetermined cycle at an appropriate speed. Motor **54** also drives a cycle switch **58** through a second shaft **60**, the cycle switch controlling the energization of the drive motor, water heater and of a warm air blower **62**. The cycle switch is a conventional motor-driven switching mechanism which responds to energization from the on-off switch **22** to provide electric power to lines **36** and **38**, and thus to the drive motor **54**, the flash heater element **34** and to the motor and heating element of warm air blower **62**. Motor **54** then drives the cycle switch through gearing means (not shown) and by means of shaft **60** so that after a certain predetermined number of revolutions of shaft **60**, the switch will remove power from the system, shutting it down. The number of revolutions of shaft **60** required to effect this shut-down is dependent upon the length of time required to complete the washing and drying cycles of the system. Immediately upon shut-down the system is ready for reenergization to initiate another cycle. Alternating current power is applied to the system through the cycle switch from AC source **64**.

The warm air blower **62** includes a conventional motor driven blower **66** which brings air into the housing **10**, as through intake **68** (FIG. 1) and blows the air over heating coils **70** and through exhaust nozzle **72** to the interior of housing **10**. Coils **70**, which are connected across AC lines **36** and **38**, heat the exhausted air to the desired temperature for drying. As previously noted, an auxiliary nozzle **24** may be provided to exhaust a portion of the air from blower **66**. If desired, means may be provided to close off the flow of air to either nozzle, directing all the flow to the other nozzle.

Upon moving lever switch **22** to the "on" position, electrical energy is connected through cycle switch **58** to drive motor **54** and blower **66**. Energization of drive motor **54** initiates rotation of shafts **56** and **60** which, in turn, drive control valve **44** and cycle switch **58**. Energization of blower **66** and heating coil **70** starts warm air circulating within housing **10** and, if desired, through external nozzle **24**. The application of energy to lines **36** and **38** also causes heating element **34** to raise the temperature of the water in heat exchanger **32** to the desired level, as determined by thermostat **40**. The rotation of shaft **56** starts the wash cycle of the device, causing control valve **44** to rotate to a position where warm water from heat exchanger **32** is fed through pipe **42** to the sprayer head **52**, permitting the user to wet his hands. Continued rotation of valve **44** opens the valve orifice through which soap **48** is supplied and closes the orifice to which pipe **42** is connected, whereby a predetermined amount of soap is dispensed through the sprayer head. An alternative construction would permit a small amount of water to be sprayed with the soap during this portion of the cycle. The valve then continues the wash cycle to stop the dispensing of soap and resume the spraying of warm water for the rinse portion of the wash cycle. At the end of a predetermined length of time, the rinse water is turned off by control valve **44**, bringing an end to the wash cycle. During this sequence, the blower **66** is circulating warm air throughout the housing and this circulation continues after the completion of the wash cycle, this operation constituting the drying cycle of the device. After a predetermined period of circulating the drying air, cycle switch **58** deenergizes the system.

It will be noted that the rinse and detergent sprays serve thoroughly to clean the inside of housing **10** and lavatory **12** of any dirt or foreign particles that would normally accumulate during a hand washing operation, thus maintaining a clean and sanitary apparatus. Since the amounts of water and detergent are predetermined, there will be no wastage due to careless use. The automatic cutoff features insure that a user will not walk away and leave water running, and the automatic drier eliminates the problem of scattered paper towels.

It will be apparent to those skilled in the art that many variations and modifications of the basic concept can be devised. For example, the particular shape and design of the housing can be changed to suit various installation requirements, or an additional switch can be provided for the warm air blower to permit use of drying cycle independently of the washing cycle.

Thus, there has been provided a novel and useful hand washing apparatus which may be installed with ease on existing lavatory and sink fixtures, providing an economical and clean means for washing hands, and which materially assists in the maintenance of sanitary conditions in public or other heavily used washrooms. Therefore, it is desired that the foregoing description be taken as illustrative, and that the scope and extent of the invention be limited only by the following claims.

We claim:

1. In combination with a lavatory having a water faucet, an automatic hand washing device, comprising: a housing, means for mounting said housing on a lavatory, driven control valve means having a predetermined sequence mounted in said housing, means within said housing for heating and supplying water from said faucet to said control valve means, means for supplying a cleansing medium to said control valve means, dispensing means connected to said control valve means, and motor means for driving said control valve means through its sequence, whereby said heated water and said cleansing medium are applied to said dispensing means in a predetermined sequence to effect a washing cycle of operation.

2. The apparatus of claim **1**, further including air heating and circulating means for supplying warm air to said housing.

3. The apparatus of claim **1**, further including a source of electrical power, cycle switching means, means including said cycle switching means for connecting said motor means to said source of electrical power for energization thereby, and mechanical means for connecting said cycle switching means to said motor means in driven relationship, whereby motion of said motor means is initiated by closure of said cycle switching means, said cycle switching means serving to deenergize said motor means after a predetermined period of time.

4. The apparatus of claim **1**, wherein said means for

heating and supplying water from said faucet to said control valve means includes a flash heater having a heat exchanger and a first heating element, means for connecting said heat exchanger between said faucet and said control valve means, and a thermostat for sensing the temperature of water in said heat exchanger and controlling said heating element in response to variations in said temperature from a preset valve.

5. The apparatus of claim 4, further including air heating and circulating means for supplying warm air to said housing.

6. The apparatus of claim 4, further including a source of electrical power, cycle switching means, and means including said cycle switching means for connecting said motor means and said first heating element to said source of electrical power for energization thereby, said motor means including a drive shaft for operating said cycle switching means, whereby motion of said motor means and energization of said first heating element is initiated by closure of said cycle switching means, said cycle switching means serving to deenergize said motor means and said first heating element after a predetermined period of time.

7. The apparatus of claim 6, further including air heating and circulating means for supplying warm air to said housing.

8. The apparatus of claim 7, wherein said air heating and circulating means includes a motor-driven blower having air intake and air outlet means, a second heating element located at the air outlet of said blower for warming

the air from said blower, and nozzle means for directing said warmed air for circulation within said housing to effect a drying cycle of operation.

9. The apparatus of claim 8, wherein said first and second heating elements and said motor-driven blower are electrically connected in parallel for energization and deenergization by said cycle switching means.

10. The apparatus of claim 9, wherein said means for connecting said motor means and said first heating element to said source of electrical power includes a switch associated with said cycle switching means for starting the operation of said apparatus, closure of said switch energizing said drive motor, said first and second heating elements and said motor-driven blower, whereby said cycle switching means and said control valve are driven to operate said apparatus through said washing and drying cycles and to shut down said apparatus upon completion of said drying cycle.

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