July 12, 1932. F. GUIDETTI ET AL 1,866,930

SANITARY WATER CLOSET ATTACHMENT

Filed Sept. 30, 1930 2 Sheets-Sheet 1

Fig. 6.

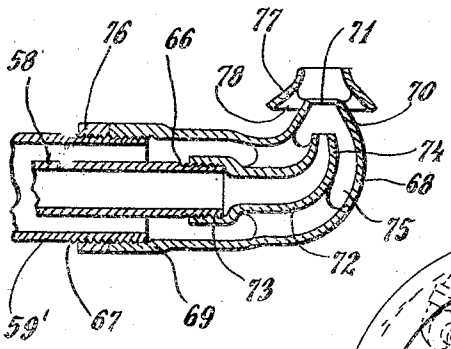
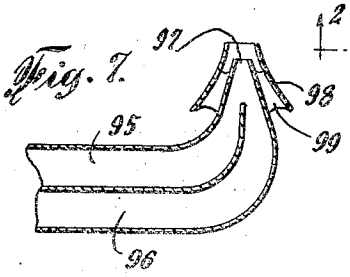


Fig. 7.



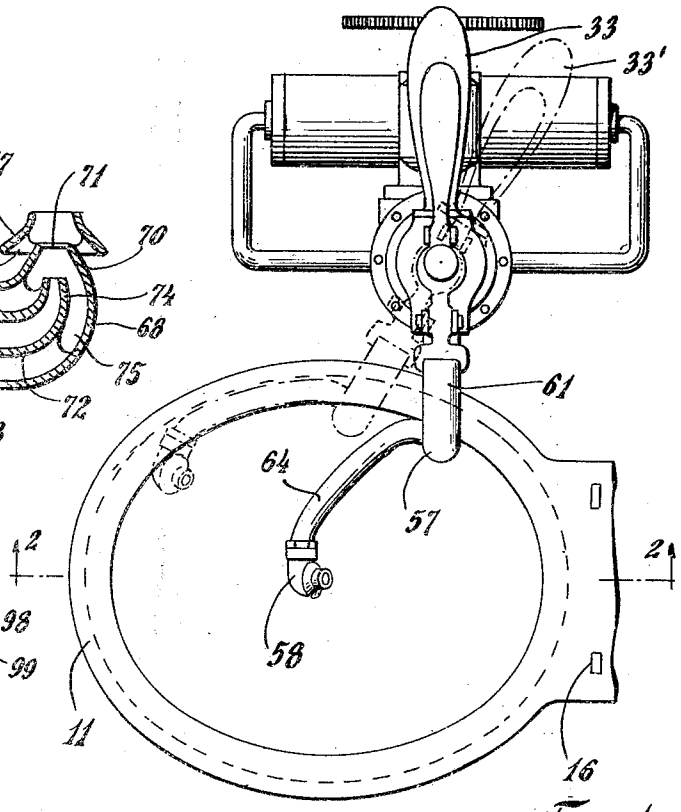


Fig. 1.

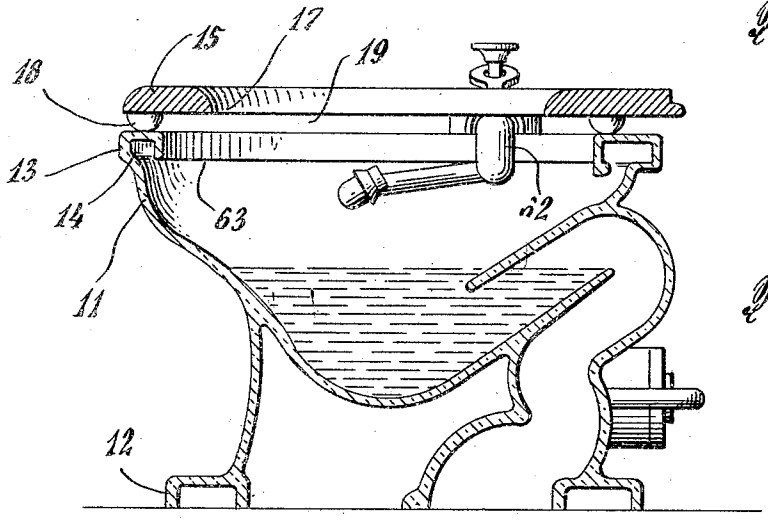


Fig. 2.

INVENTORS
Ferruccio Guidetti
BY Giuseppe Bontempi
Guido de Sacedoff
ATTORNEY

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SANITARY WATER CLOSET ATTACHMENT

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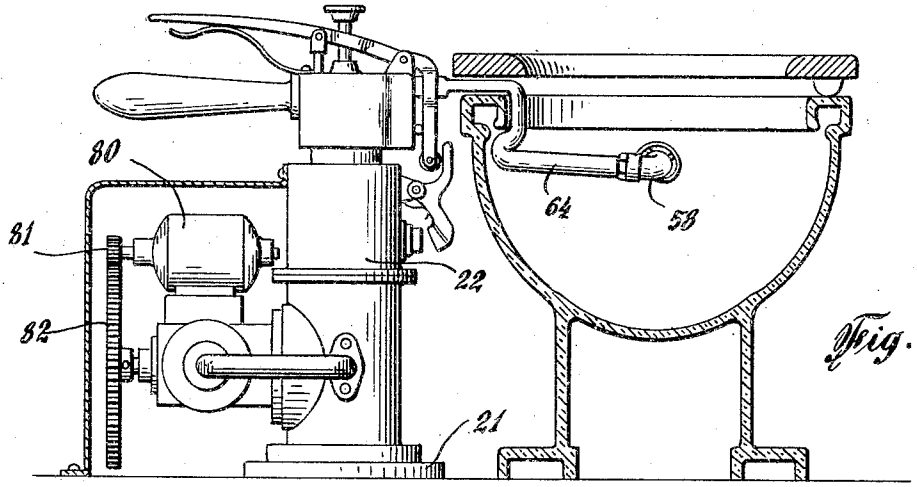


Fig. 3.

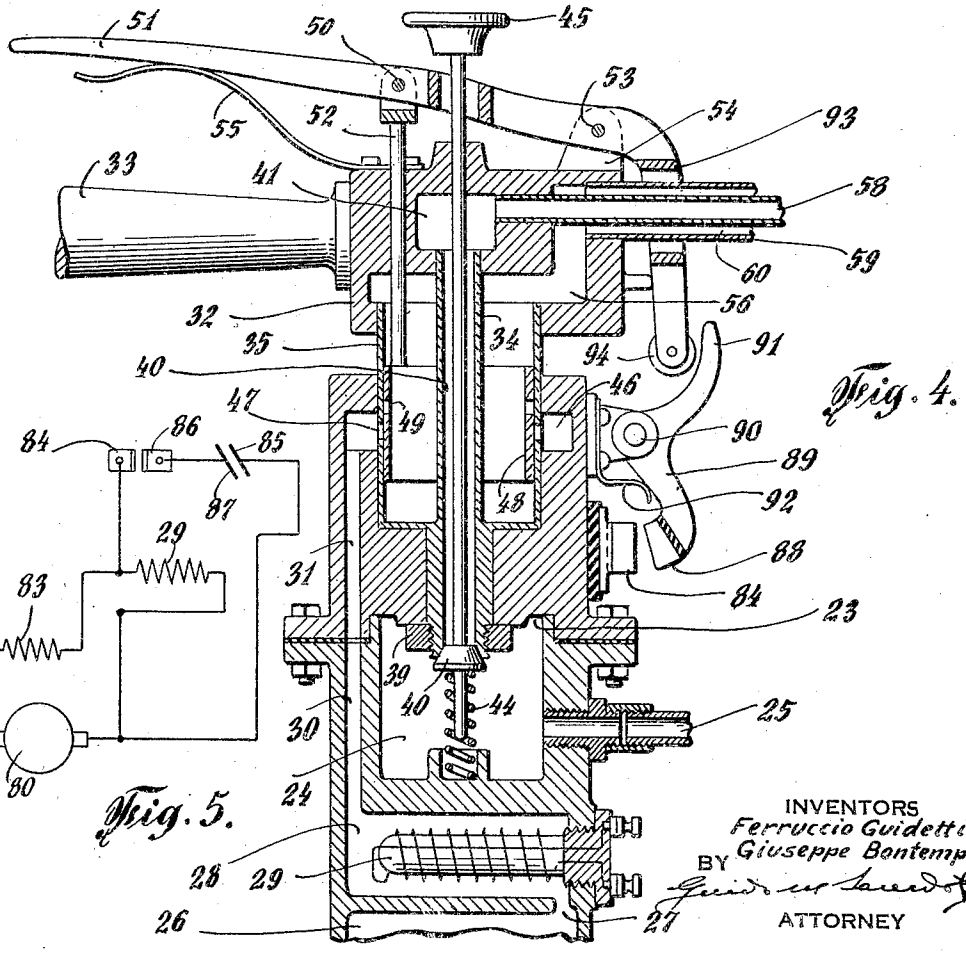


Fig. 4.

Fig. 5.

INVENTORS
Ferruccio Guidetti
Giuseppe Bontempi
BY
ATTORNEY

Patented July 12, 1932 1,866,930

UNITED STATES PATENT OFFICE

FERRUCCIO GUIDETTI, OF ELMHURST, AND GIUSEPPE BONTEMPI, OF NEW YORK, N. Y., ASSIGNORS TO THE WATAIRWAY MANUFACTURING CORPORATION, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK

SANITARY WATER-CLOSET ATTACHMENT

Application filed September 30, 1930. Serial No. 485,440.

This invention relates to plumbing appliances and more particularly refers to improvements in devices for directing a stream of water and a jet of air against exposed portions of the body of the user in water closets or bidets of the type where the cleansing operation is performed by fluid means in substitution of paper as now ordinarily employed.

In another patent application entitled Method of and apparatus for sanitary cleansing, filed simultaneously herewith, we have pointed out the advantages deriving from the use of a stream or jet of water directed at a slant against the particular spot in which it is needed, as well as from the use of a jet of air under pressure directed so as to reach substantially the same spot from a point in relatively close proximity thereof.

The two fluid streams thus employed may issue from two different nozzles in streams converging towards the spot to be cleansed or dried, or else they may be caused to flow from a specially constructed nozzle, in substantially the same direction.

In appliances of the type to which this invention refers, the two fluid streams are not used simultaneously, the water being used first for the purpose of cleansing and the air being used subsequently for the purpose of drying the wet surfaces. For the sake of simplicity and convenience therefore, we prefer to insure an identical direction of flow of the two fluids so that the same spot will be reached thereby, by causing the same to issue from a single nozzle having a common outlet for a water conduit and an air conduit surrounding the same.

The nozzle is preferably carried at the end of an arm in a manner permitting of effecting angular adjustments of the nozzle with respect to the axis of the arm so as to determine and set the nozzle at the proper angle with respect to the plane of the closet or bidet seat.

Accordingly, the primary object of the present invention is to provide a novel and improved type of nozzle and nozzle carrying arm adapted for use in a device of the class specified, insuring the proper direction of flow for the streams or jets of water or air issuing therefrom.

Another object is to provide in a device of the class specified, a nozzle and nozzle carrying arm comprising two adjoining or concentrical tubular chambers or passages adapted to respectively supply water or air under pressure to the nozzle outlet, and means for controlling the fluid supply to said chambers.

Other objects and advantages of the present invention will more fully appear as the description proceeds and will be set forth and claimed in the appended claims.

Our invention is illustrated by way of example in the accompanying drawings, in which:

Fig. 1 is a plan view of a water closet bowl associated with a cleansing and drying device embodying our invention;

Fig. 2 is a vertical longitudinal section of said bowl through line 2—2 of Fig. 1;

Fig. 3 is a vertical cross section of said bowl showing the cleansing and drying device in elevation;

Fig. 4 is a vertical cross section of the upper part of the stand carrying the cleansing and drying device and the controlling parts therefor;

Fig. 5 is a diagram of the wiring connections;

Fig. 6 is a fragmentary longitudinal section of the tip end of the preferred form of nozzle used in connection with our invention; and

Fig. 7 is a fragmentary longitudinal section of the tip end of a nozzle embodying our invention in a different form.

In sanitary water closets and bidets of the type to which the present invention refers, a fluid delivery arm preferably movable from an inoperative to an operative position, is provided within the bowl, said arm being provided with a nozzle or tip end causing a jet of cleansing liquid to be directed against the body of the occupant of the seat when the arm is in its operative position.

The arm may be pivotally mounted upon the bowl itself, or else it may be mounted upon a separate stand, in which are also

housed the various valves and controls needed for the operation of the device.

In all the arrangements of this type known to us, either the cleansing operation is limited to projecting a stream of water or other cleansing liquid against the spot to be cleaned, or else if a jet of air is subsequently used for drying purposes, means are provided whereby air supplied by a rotary fan is admitted to the inside of the bowl either at the front or at the rear thereof.

As explained in our other patent application above referred to, we have found that air admitted to the bowl in this manner may assist in the drying of the wet surface, but is not effective enough in this respect, because its action is strictly limited to inducing evaporation of the liquid adhering to the surface. The drying action therefore requires an exceptionally long time, and this constitutes a drawback seriously interfering with the practical usefulness of these devices.

We have found that in order to produce a quick drying action, it is necessary to project a jet of air directly against the spot to be dried, and we have also found that for the drying action to be effective, it is necessary that this air be delivered under a material pressure, preferably under a pressure sufficient to produce an air jet of considerable velocity, capable not only of assisting the evaporation of the liquid but also to actually blow off liquid particles adhering to the wet surface.

This result can be obtained by employing a nozzle projecting a jet of air against the spot to be dried from a point in close proximity thereof, and by using means capable of producing an adequate pressure for supplying air to said nozzle.

An ordinary rotary fan usually works efficiently only at pressures of not more than one-quarter of a pound per square inch, whereas we have found that the pressure used should be at least three-quarters of a pound per square inch and should preferably be from four to six pounds per square inch or more.

Means other than a rotary fan should therefore be used for supplying air to the nozzle at the required pressure.

We have also found that for the cleansing operation to be effective, the jet of water used should preferably be directed at a slant against the surface to be cleaned, so as to avoid splashing, this making it possible also for it to actually carry away particles of foreign matter adhering to the spot to be cleaned, by impact or mechanical action.

In order to fully utilize the drying action of the jet of air, it is preferable that the same be projected in a direction substantially identical to that of the cleansing jet. It is also, of course, preferable that the air thus used be heated in order to further enhance its drying action. We have therefore devised an arrangement comprising a fluid delivery arm and a nozzle associated therewith, making it possible to direct a jet of air under the proper pressure directly against the spot reached by the cleansing liquid.

In the preferred form of our invention the nozzle is upwardly inclined towards the rear of the bowl in order to enable both fluid jets to reach the surface to be cleaned and dried at a slant, and to work also by mechanical action, said nozzle being preferably adjustable in a vertical plane so as to permit of its being set at the proper angle.

Referring to the drawings, Figs. 1 to 6, 11 designates a toilet bowl of usual construction comprising a base 12 and a rim 13 formed with a passage 14 through which water flows from a suitable source of supply in order to flush the bowl in the customary manner.

The bowl is provided with a seat 15 on top which is hinged at 16 to the rear of the bowl; the lower surface 17 of the seat is usually provided with rubber spacing heads 18 resting upon the top of rim 13, causing a clearance 19 to remain between the top of the bowl and the lower surface of the seat.

The cleansing and drying device proper preferably comprises a stand 20 upon which all the operating parts are mounted, said stand having a base 21 adapted to be placed upon the floor alongside the toilet bowl. At the upper end of said stand is mounted a head 22, the bottom part of which 23 forms with a cavity 24 at the upper end of stand 20, a chamber to which cleansing liquid such as water under pressure for instance, can be admitted through pipe 25.

The lower portion of stand 20 is hollow, forming a narrow chamber 26 connected by an opening 27 at the top to a passage or chamber 28 within which projects an electric heating element 29, adapted to heat the air on its way from chamber 26 to the nozzle through delivery passage 30 at the upper end of the stand and delivery passage 31 registering therewith, provided in head 22.

A nozzle supporting member 32 operable by means of a handle 33 is rotatably mounted on head 22 so as to be angularly movable about a vertical axis. Said supporting member is carried by a tubular shaft 34 which is formed integral with an outer shell portion 35 forming an annular chamber 36 surrounding said hollow shaft.

The lower surface 37 of shell 35 forms a seat determining the depth at which the shaft and shell can be inserted within head 22 and the lower end of hollow shaft 34 is threaded as shown at 38 to receive nut 39 restraining shaft 34 against axial displacements while permitting angular movements thereof. Hollow shaft 34 forms a tubular passage 40

leading from cavity or chamber 24 to another chamber 41 within supporting member 32.

Said passage is normally closed by a valve 42 carried by a stem 43, said valve being retained in its closing position by a spring 44. Stem 43 projects through the upper part of supporting member 32 and is equipped at its upper end with a knob 45.

It will therefore be seen that by virtue of this arrangement when knob 45 is depressed against the action of spring 44 the cleansing liquid which is generally water under pressure will flow from chamber 24 to chamber 41. Air passage 31 leads to a chamber 46 surrounding a tract of shell portion 35 which is provided in correspondence of said chamber with circumferential openings such as 47 through which air may be admitted to annular chamber 36.

Said openings however are normally closed by a sliding valve 48 which is provided with similar openings 49, normally out of register with openings 47. Sliding valve 48 is connected at 50 to a lever 51 by means of a stem 52. Lever 51 is pivotally mounted at 53 upon lugs 54 upwardly extending from supporting member 32 so as to be depressible against the action of a leaf spring 55.

As the drawings show the action of said spring is to normally hold lever 51 in its raised position where sliding valve 48 prevents the passage of air from chamber 46 to chamber 36. When lever 51 is depressed, opening 49 will be brought in register with openings 47 and air can then flow into chamber 36 and from there into another chamber 56 formed within supporting member 32.

Supporting member 32 carries a fluid delivery arm 37 which terminates in a nozzle portion 58. In its preferred form the fluid delivery arm comprises an inner tubular member 58 forming an outlet for chamber 41 and an outer tubular member 59 forming with tubular member 58 an annular chamber 60 constituting an outlet for chamber 56.

Said two tubular members 58, 59 together form the fluid delivery arm. Said delivery arm preferably comprises a horizontal tract 61 which is flattened so as to permit it to pass through clearance 19 between the seat and the top of the bowl, a substantially vertical tract 62 bent downwardly from the outer end of horizontal tract 61 so as to reach a point somewhat below the level of the lower surface 63 of rim 13 and a substantially horizontal tract 64 bent underneath the rim and then extending close to the side surface of the bowl as shown in dotted lines at 64′ in Fig. 1.

The device is normally inoperative and in this condition supporting member 32 is in the angular position in which handle 33 and horizontal tract 64 of the delivery arm occupy the position shown in dotted lines at 33′, 64′ in Fig. 1.

When from this position 33′ the handle is moved to the position 33 shown in full lines in Fig. 1, nozzle 58 carried by tract 64 comes to occupy a position within the bowl in which its axis remains on a vertical longitudinal plane passing through the center of the bowl and is upwardly inclined towards the rear of the bowl as shown in Fig. 2.

Fluid under pressure issuing from the nozzle will therefore be projected in an upwardly inclined direction towards the rear of the bowl. More particularly the direction of the fluid jet issuing from the nozzle will be so arranged that the fluid under pressure will strike directly against the body outlet of the occupant of the seat in connection with which the cleansing operation is to be performed.

The nozzle proper is preferably screwed onto the outer end of tract 64, the axis of said outer end being preferably directed at right angles to the central longitudinal plane of the bowl when the fluid delivery arm 57 is moved to its operative position shown in full lines in Fig. 1. The nozzle proper can therefore be elbow-shaped and can have its tip end at right angles to the axis of its attaching end.

A typical construction of nozzle designed along these lines is shown in Fig. 6, in which the outer end 58′ of tubular member 58 is threaded as shown at 66 and projects beyond the outer end 59′ of tubular member 59 which is also threaded as shown at 67.

The nozzle proper comprises an outer shell 68 bent at a 90° angle forming an internally threaded sleeve portion 69 which may be screwed upon the outer end 59′ and a tip end 70 directed at right angles thereto, said tip end being preferably inwardly tapering towards the nozzle outlet 71. Said nozzle furthermore, comprises an inner tubular portion 72 which is also bent at a 90° angle forming an internally threaded sleeve portion 43 which may be screwed onto end 58′ and a tip portion 74 coaxial with tip portion 70 forming therewith an annular passage 75.

It will be seen that by virtue of this arrangement, the inclination of the axis of the tip end of the nozzle with respect to a longitudinal vertical plane passing through said axis and through the center of the closet bowl can be adjusted at will, the nozzle being retained in its adjusted position by means of a check nut 76.

The tip end 70 of the nozzle is preferably provided with an inwardly flaring sleeve 77 forming therewith an annular passage 78 through which air may be drawn by the suction created through said passage by the jet of fluid under pressure issuing through outlet 71.

Air is supplied to chamber 26 within stand 20 by any suitable means capable of producing an adequate pressure. As stated in the premises a rotary fan is not suitable for this purpose because this type of device does not

work efficiently for pressures above one-quarter of a pound per square inch; furthermore, the noise produced by a fan is also objectionable from the user's standpoint.

On the other hand, a rotary blower could be used if desired, this class of machines being capable of producing pressures up to three pounds per square inch and in some cases more.

In the drawings we illustrate for this purpose the use of a double cylinder pump 79 mounted on a stand 20, said pump being actuated by an electric motor 80 connected thereto by a pinion and gear transmission 81, 82. The electric motor which may be of any suitable type may be connected in parallel with the heating element 29 so as to be controllable by the same switch.

In Fig. 5, the motor 80 is shown of the series type comprising a field 83 connected to a switch terminal 84 while the opposite pole of the armature is connected to a wire 85 of an electric source of supply. The switch also comprises another terminal 86 which is connected to the other wire 87 of the electric source of supply. The circuit which is normally interrupted at the switch can be closed by inserting a switch blade between terminals 84, 86 as will be understood. The heating element 29 is inserted in the same circuit in parallel as shown.

Referring to Fig. 4, 88 designates the switch blade adapted to close the circuit at the switch and 89 designates a lever carrying said switch plate, said lever being pivotally mounted at 90 and having an upward extension 91. Lever 89 is normally held in its inoperative position by a leaf spring 92.

Lever 51 is formed with an arm 93 extending beyond pivot 53, said arm being bent downwardly and carrying a roller 94 which will come to abut against extension 91 of lever 89 when supporting member 32 is moved to its operative position shown in full lines in Fig. 1.

When lever 51 is depressed the circuit of the motor and of the heating element will therefore be automatically closed due to the angular movement of lever 89 caused by roller 94 forcing extension 91 outwardly with respect to pivot 90.

After the occupant of the seat has finished using the toilet, he moves the operating handle from the position 33′ to the position 33 shown in Fig. 1, thus bringing the nozzle directly to the position where it points towards the particular spot to be cleaned. By then depressing knob 45, water is caused to flow through passage 40 and tubular member 58 and to issue in the form of a thin stream from the nozzle outlet, its velocity being such as to strike with considerable force the surface to be cleaned.

Due to the fact that the nozzle is directed at a slant with respect to said surface, the cleansing action will be very effective because the water will not only dissolve but actually remove and carry away solid particles by mechanical action.

At the same time, the action of the cleansing jet being practically free of direct impact, there will be no splashing and no wetting of clothing in proximity of the spot against which the jet is directed.

The user will then release knob 45 and depress lever 51, thus setting in operation the electric motor and pump actuated thereby, and also establishing communication between the air chamber and annular chamber 36. The air under pressure supplied by the pump will therefore reach annular passage 60 and will eventually issue through the nozzle outlet 71 in the form of an air stream having considerable velocity and pressure, said air stream flowing practically in the same direction as the cleansing jet previously delivered through tubular passage 58.

The air being delivered as stated, under considerable pressure, it will cause a rapid evaporation of the wet surface against which it is directed and will furthermore assist the drying action by actually blowing off said surface liquid particles adhering thereto.

As a result, the drying action will be quick and efficient and will be completed in an exceedingly short time. The air thus delivered is preferably heated, the heating operation being preferably accomplished by the heating element 29 which is energized simultaneously with the motor. As soon as lever 51 is released the air flow ceases and the electric circuit is interrupted by arm 89 which will be forced outwardly by spring 92.

It will be observed that as a result of the arrangement described, a very thorough cleansing action takes place without splashing of liquid particles due to the rearwardly and upwardly inclined direction of the nozzle. Furthermore, the drying action is also very thoroughly accomplished due to the fact that the air is delivered under considerable pressure from a point in relatively close proximity of the spot to be dried and is projected directly against said spot. The drying action is further assisted by the mechanical action of the air under pressure, blowing off liquid particles from the surface against which it is directed.

The cleansing jet is preferably obtained by connecting the device to the water supply system, said water being used cold or being mixed with hot water if desired, before it reaches the nozzle. The water thus supplied can be medicated or soap may be dissolved into it if desired, in order to increase its cleansing action, as will be understood.

Our invention can be carried out in many ways and the apparatus shown and described must therefore be considered as being intended for illustrative purposes only and not in

a limiting sense. For instance, for the purposes of our invention it is not strictly necessary that the outlet through which the cleansing jet is delivered be coaxial with the outlet through which the drying jet is delivered, as long as the two jets are so regulated that they will reach substantially the same spot.

To illustrate this idea, in Fig. 7, we show a nozzle in which one of the fluid passages 95 is arranged side by side with the other fluid passages 96, the two meeting at a common nozzle outlet 97, which determines the final direction of the fluid jet issuing from either passage.

Also in this case, the tip of the nozzle is shown provided with an inwardly flaring sleeve 98 forming therewith an annular passage 99. The use of a sleeve such as shown at 77, 98 is not absolutely essential, but is desirable because due to the injector effect produced thereby the volume of air delivered by the nozzle against the surface to be dried will be considerably increased.

Various changes may be made in the construction of our improved device without departing from the inventive idea; the drawings will therefore be understood as being intended for illustrative purposes only and not in a limiting sense. We accordingly reserve the right to carry our invention into practice in all those ways and means which may enter, fairly, into the scope of the appended claims.

We claim:

1. In apparatus of the class described comprising a bowl adapted to support a human body in a sitting posture, a nozzle within said bowl, directed against the portion of the body of the occupant thereof exposed within said bowl, said nozzle comprising two adjoining tubular passages and an outlet common to both passages, insuring substantially the same direction of flow for a jet of cleansing liquid and a jet of air respectively supplied to said outlet through said passages.

2. In apparatus of the class described comprising a bowl adapted to support a human body in a sitting posture, a nozzle within said bowl, directed against the portion of the body of the occupant thereof exposed within said bowl, said nozzle comprising an outer annular passage having an outlet, and a central tubular passage having its tip end leading to and coaxial with said outlet, so as to insure substantially the same direction of flow for a jet of cleansing liquid and a jet of air respectively supplied to said outlet through said passages.

3. In apparatus of the class described comprising a bowl adapted to support a human body in a sitting posture, a nozzle within said bowl, directed against the portion of the body of the occupant thereof exposed within said bowl, said nozzle comprising two adjoining tubular passages and an outlet common to both passages, insuring substantially the same direction of flow for a jet of cleansing liquid and a jet of air respectively supplied to said outlet through said passages, said outlet having its axis directed centrally and longitudinally of said bowl, and upwardly inclined towards the rear end of said bowl.

4. In apparatus of the class described comprising a bowl adapted to support a human body in a sitting posture, a nozzle within said bowl, directed against the portion of the body of the occupant thereof exposed within said bowl, said nozzle comprising an outer annular passage having an outlet, and a central tubular passage having its tip end leading to and coaxial with said outlet, so as to insure substantially the same direction of flow for a jet of cleansing liquid and a jet of air respectively supplied to said outlet through said passages, said outlet having its axis directed centrally and longitudinally of said bowl, and upwardly inclined towards the rear end of said bowl.

5. In apparatus of the class described comprising a bowl adapted to support a human body in a sitting posture, a nozzle within said bowl, directed against the portion of the body of the occupant thereof exposed within said bowl, said nozzle comprising an outer annular passage having an outlet, and a central tubular passage having its tip end leading to and coaxial with said outlet, so as to insure substantially the same direction of flow for a jet of cleansing liquid and a jet of air respectively supplied to said outlet through said passages, said outlet having its axis directed centrally and longitudinally of said bowl, said nozzle being angularly adjustable in a vertical plane passing through said axis.

6. In apparatus of the class described comprising a bowl adapted to support a human body in a sitting posture, a pivotally mounted fluid delivery arm movable to and from an operative position within said bowl, said arm comprising two adjoining tubular passages and a nozzle outlet common to both passages, said nozzle outlet insuring substantially the same direction of flow for a jet of cleansing liquid and a jet of air respectively supplied thereto through said passages, said outlet having its axis directed centrally and longitudinally of said bowl, and upwardly inclined towards the rear end of said bowl, when said arm is set in its operative position.

7. In apparatus of the class described comprising a bowl adapted to support a human body in a sitting posture, a pivotally mounted fluid delivery arm movable to and from an operative position within said bowl, said arm comprising two adjoining tubular passages and a nozzle outlet common to both passages, said nozzle outlet insuring substantially the same direction of flow for a jet of cleansing liquid and a jet of air respectively supplied

thereto through said passages, said outlet having its axis directed centrally and longitudinally of said bowl, and upwardly inclined towards the rear end of said bowl, when said arm is set in its operative position, means for connecting one of said passages to a source of supply of a cleansing liquid under pressure, and means for connecting the other passage to a source of supply of air under pressure.

8. In apparatus of the class described comprising a bowl adapted to support a human body in a sitting posture a vertically pivoted fluid delivery arm movable to and from an operative position within said bowl, said arm comprising an outer annular passage and an inner tubular passage, and a nozzle carried by said arm having nozzle passages adapted to register with said arm passages and having an outlet common thereto, said outlet having its axis directed centrally and longitudinally of said bowl, said nozzle being angularly adjustable in a vertical plane passing through said axis.

9. In apparatus of the class described comprising a bowl adapted to support a human body in a sitting posture, a vertically pivoted fluid delivery arm movable to and from an operative position within said bowl, said arm comprising an outer annular passage and an inner tubular passage, a nozzle carried by said arm having nozzle passages adapted to reigster with said arm passages and having an outlet common thereto, said outlet having its axis directed centrally and longitudinally of said bowl, said nozzle being angularly adjustable in a vertical plane passing through said axis, means for connecting one of said arm passages to a source of supply of a cleansing liquid under pressure, and means for connecting the other arm passage to a source of supply of air under pressure.

10. In apparatus of the class described comprising a bowl adapted to support a human body in a sitting posture, a vertically pivoted fluid delivery arm movable to and from an operative position within said bowl, said arm comprising an outer annular passage and an inner tubular passage, a nozzle carried by said arm having nozzle passages adapted to register with said arm passages and having an outlet common thereto, said outlet having its axis directed centrally and longitudinally of said bowl, said nozzle being angularly adjustable in a vertical plane passing through said axis, means for connecting one of said arm passages to a source of supply of a cleansing liquid under pressure and means under the control of the occupant of the bowl for compressing and delivering air under pressure to the other passage.

11. In apparatus of the class described comprising a bowl adapted to support a human body in a sitting posture, a nozzle within said bowl, directed against the exposed portion of the body of the occupant thereof, said nozzle comprising two adjoining tubular passages and an outlet common to both passages, insuring substantially the same direction of flow for a jet of cleansing liquid and a jet of air respectively supplied to said outlet through said passages, and a sleeve surrounding said outlet, forming an annular injector passage therewith.

12. In apparatus of the class described comprising a bowl adapted to support a human body in a sitting posture, of a vertically pivoted fluid delivery arm movable to and from an operative position within said bowl, said arm comprising an outer annular passage and an inner tubular passage, a nozzle carried by said arm having nozzle passages adapted to register with said arm passages and having an outlet common thereto, said outlet having its axis directed centrally and longitudinally of said bowl, said nozzle being angularly adjustable in a vertical plane passing through said axis, and a sleeve surrounding said outlet, forming an annular injector passage therewith.

13. In apparatus of the class described comprising a bowl adapted to support a human body in a sitting posture, a vertically pivoted fluid delivery arm movable to and from an operative position within said bowl, said arm comprising an outer annular passage and an inner tubular passage, a nozzle carried by said arm having nozzle passages adapted to register with said arm passages and having an outlet common thereto, said outlet having its axis directed centrally and longitudinally of said bowl, said nozzle being angularly adjustable in a vertical plane passing through said axis, a sleeve surrounding said outlet, forming an annular injector passage therewith, means for connecting one of said arm passages to a source of supply of a cleansing liquid under pressure, and means for connecting the other arm passage to a source of supply of air under pressure.

FERRUCCIO GUIDETTI.
GIUSEPPE BONTEMPI.