

[72] Inventor **Michel A. Moret**
Chene-Bourg, Geneva, Switzerland
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 [73] Assignee **Etablissements Sophindar**
Vaduz, Liechtenstein,
a company of Liechtenstein
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 [33] **Switzerland**
 [31] **14,718/67**

[56]

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Primary Examiner—L. W. Trapp

Attorney—Pennie, Edmonds, Morton, Taylor and Adams

[54] **APPARATUS FOR BODY CARE**
 11 Claims, 11 Drawing Figs.

[52] U.S. Cl. **128/50,**
 128/62, 128/66
 [51] Int. Cl. **A61b 7/00**
 [50] Field of Search 128/62, 66,
 24.2, 224, 230, 234, 50

ABSTRACT: A pump unit, including a water reservoir and a motor, supplies water under pressure through a flexible hose to a hand-held unit to which different types of appliance heads may be attached. The hand-held unit contains an hydraulic motor oscillating a shaft at the attachment end, and a separate conduit for supplying water under pressure to the attachment end. Control means actuate the hydraulic motor for driving appliance heads requiring an oscillating drive, such as a toothbrush attachment, or supplies water to the separate conduit for appliance heads such as a water jet or spray attachment. Advantageously the water is recirculated between the pump unit and hand-held unit during hydraulic motor operation, and a pulsating water supply is used.

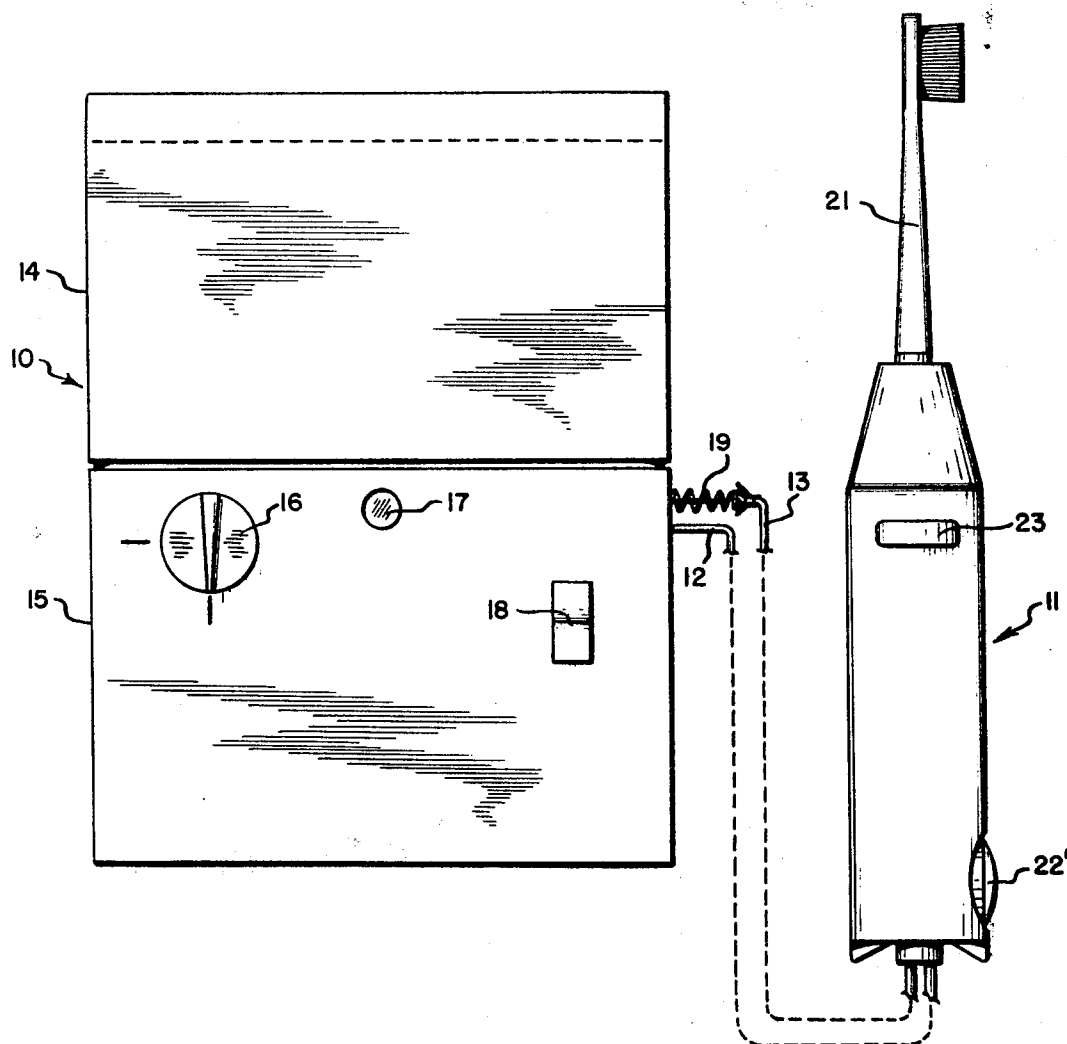


FIG. 2

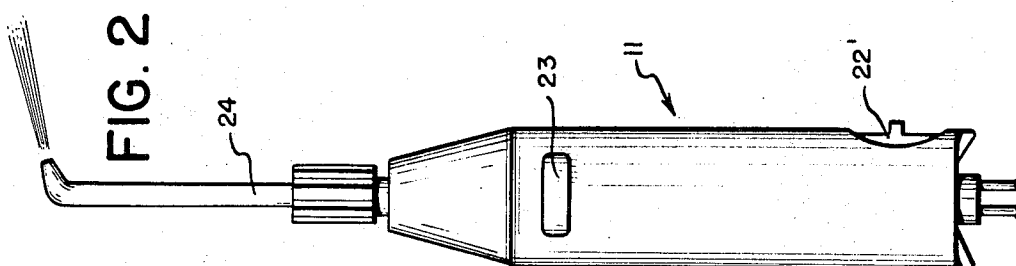


FIG. 1a

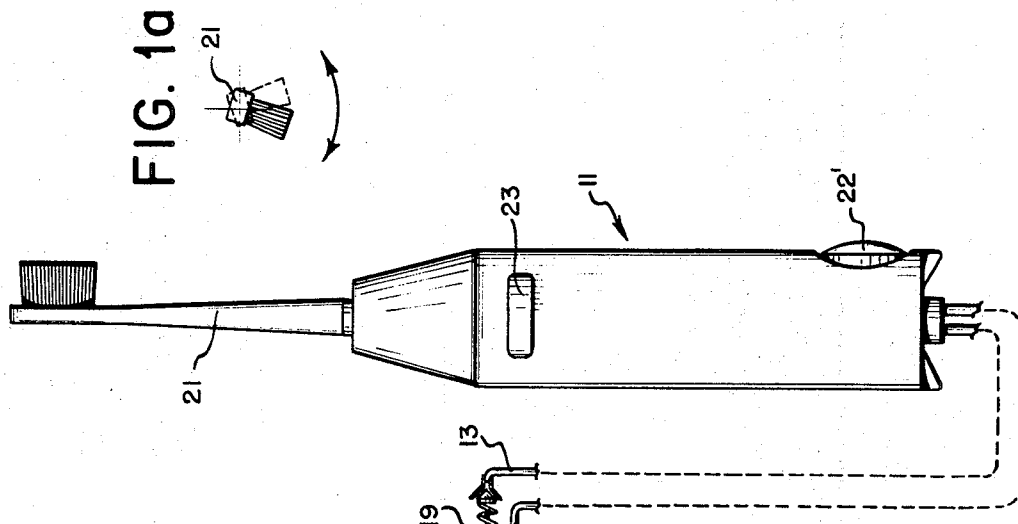
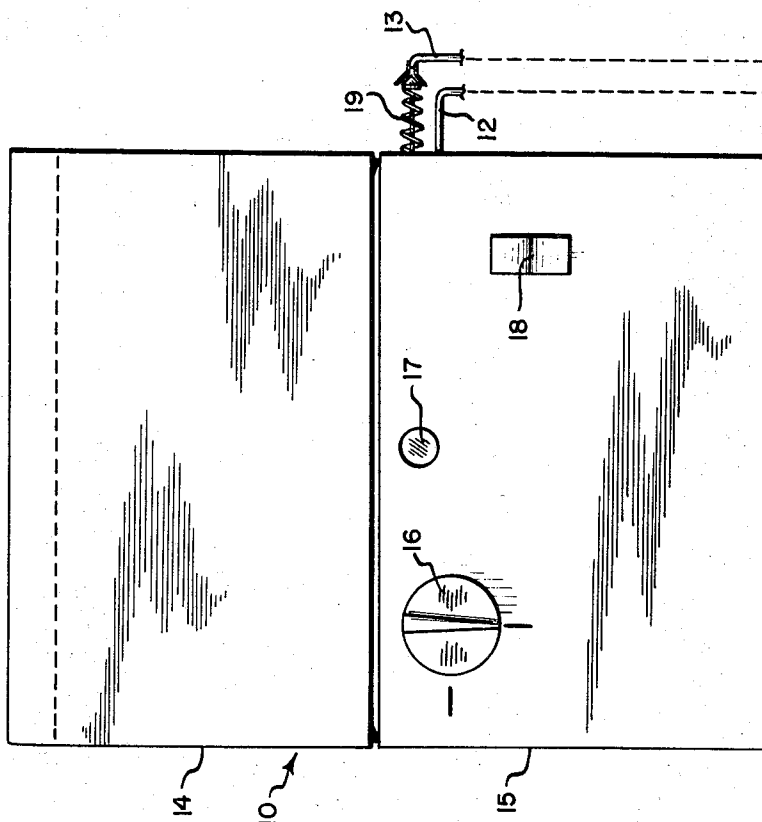
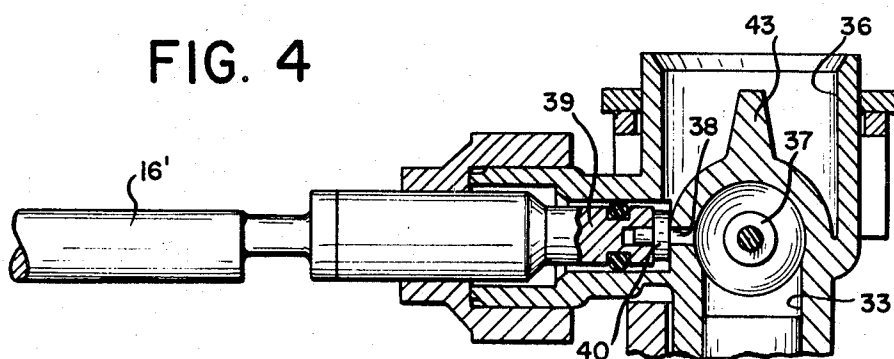
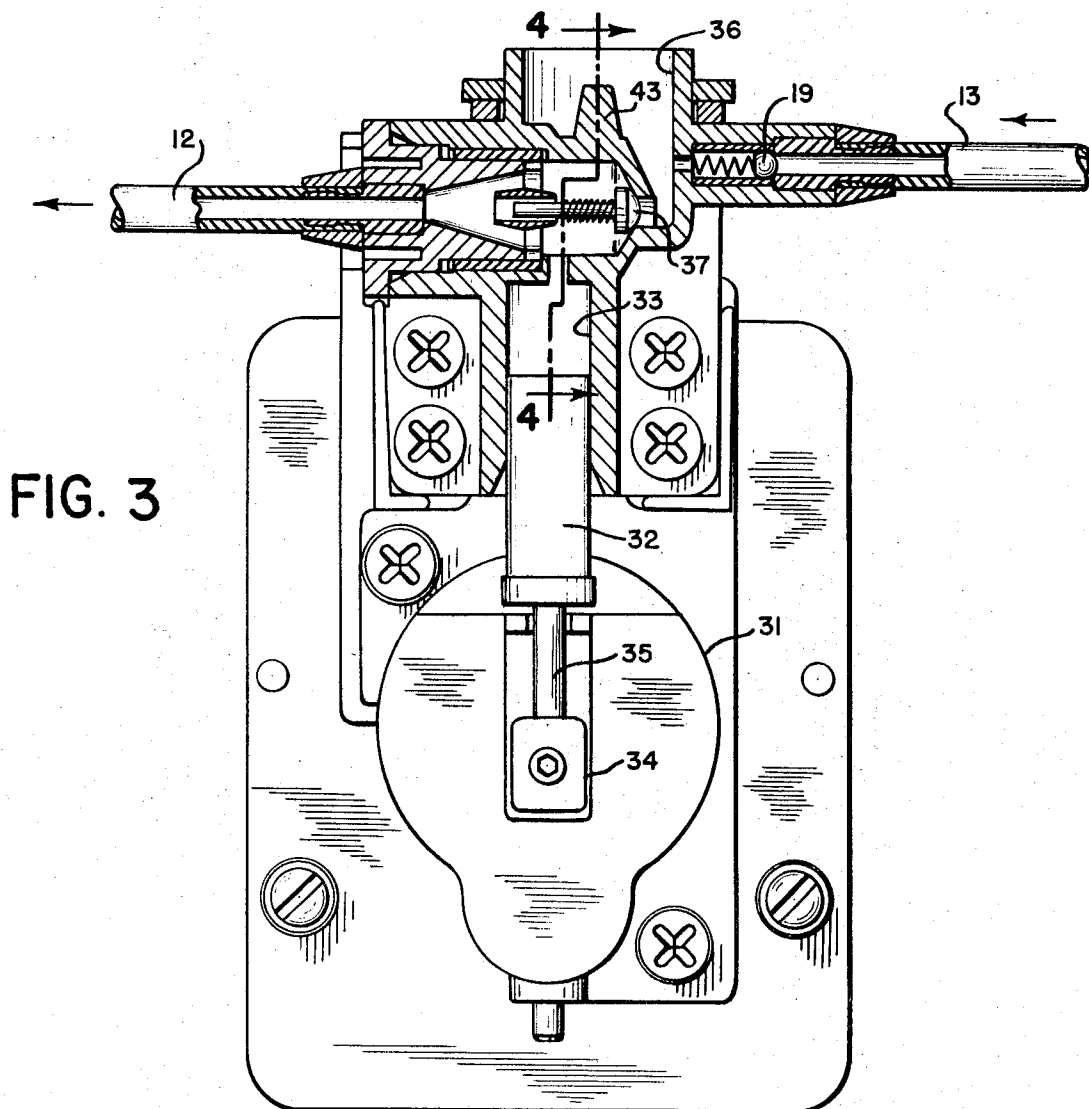


FIG. 1



INVENTOR
Michel A. Moret

BY *René Edouard Martin Taylor & Co.*
ATTORNEYS



INVENTOR
Michel A. Moret

BY *Pennic Edwards*
ATTORNEYS

FIG. 5

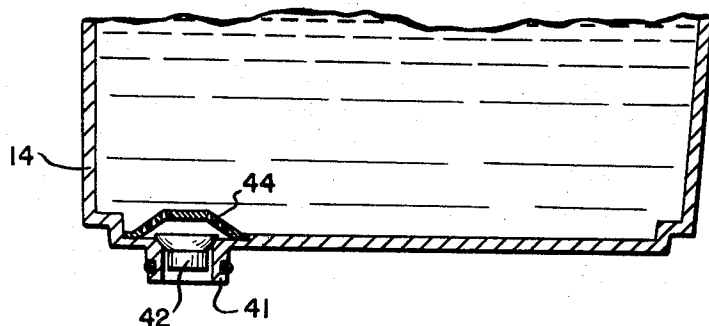


FIG. 9

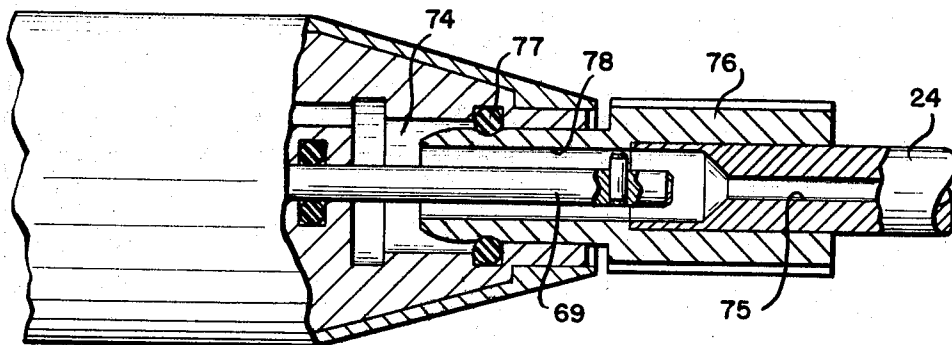
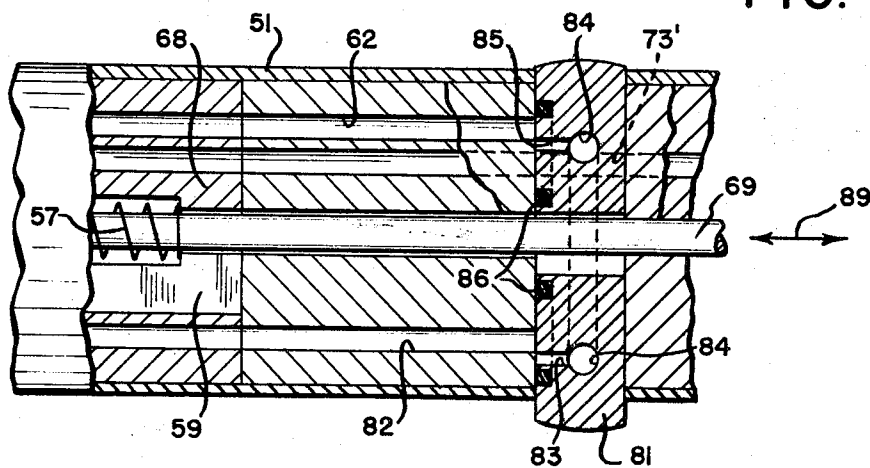


FIG. 10



INVENTOR
Michel A. Moret

BY *Perreni Edwards, Martin Taylor & Co. Inc.*
ATTORNEYS

FIG. 6

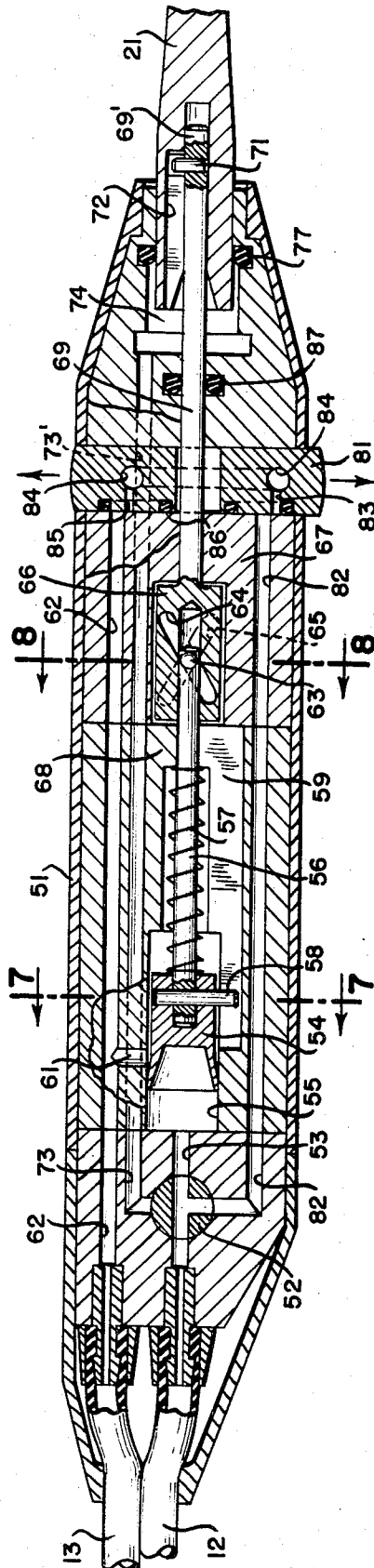


FIG. 8

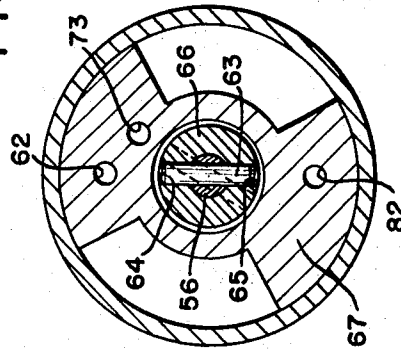
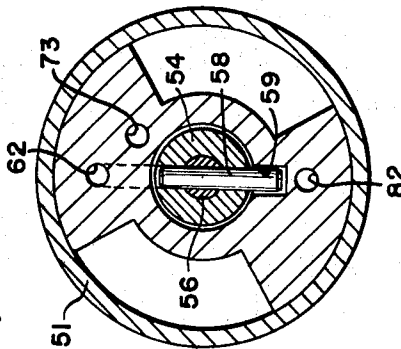


FIG. 7



INVENTOR
Michel A. Moret

BY *René Etienne Martin Taylor & Co.*
ATTORNEYS

APPARATUS FOR BODY CARE

BACKGROUND OF THE INVENTION

Many power driven devices are now known for body care and some are in widespread use. Some are driven by electric motors and others by water under pressure from the bathroom tap, etc. Usually a given device is capable of only one form of body care, consequently requiring several different devices for the various types of use, each having its own power drive. This tends to be expensive, and to require excessive space in a bathroom which may already be overcrowded.

For example, electrically driven toothbrushes are now well known and water driven toothbrushes have been proposed. The latter use water from the mains, and discharge into a sink, etc. Water jet devices for eliminating food residues from the interdental spaces and for massaging the gums are also well known. One type uses a pump unit with a water reservoir and electrically driven pump to supply pulses of liquid to a nozzle. Other types have been proposed using water under pressure from a household tap. Electric shavers and massage devices are also well known.

Although water from a household tap is an inexpensive source of water under pressure, there are important disadvantages. Attachments to taps may be cumbersome or otherwise unsatisfactory, and in any event commonly involve attachment and removal for each use. Differences in pressure at different locations and variation in pressure at a given location may be troublesome, particularly in devices employing a motor drive. Further, disposal of water from the motor into a sink is inconvenient and requires suitable attachment to prevent accidental discharge other than into the sink.

It is an object of the present invention to provide apparatus capable of use for various types of body care, including brushing the teeth, oral lavage, massage, etc., in a convenient and effective manner.

SUMMARY OF THE INVENTION

The present invention provides apparatus for body care capable of use with different types of appliance heads for different types of body care.

Some types of appliance heads require an oscillating drive. Examples are toothbrush attachments, massage attachments, shaving attachments, etc. Others require water under pressure, such as a water jet cleaning attachment, spray attachment, etc.

In accordance with the invention, a pump unit including a water reservoir and motor is employed to supply water under pressure through a flexible hose to a hand-held unit. The hand-held unit includes an hydraulic motor actuated by the water under pressure from the pump unit. The motor drives a shaft which is accessible for attachment of various appliance heads requiring an oscillating drive. The hand-held unit also contains a separate conduit for delivering water under pressure to appliance heads such as a water jet attachment, spray nozzle, etc. Control means are provided for alternatively providing water under pressure to the hydraulic motor and to the separate conduit. Thus, various types of appliance heads may be attached and the control actuated accordingly.

In this manner a single power unit suffices for many different types of appliance heads. Also, since the pump unit is separately supported and driven, the hydraulic motor in the handle unit may be designed to deliver a considerable amount of power without requiring an excessively large or heavy handle.

Advantageously, when using the hydraulic motor, the water is recirculated between the pump unit and the handle unit. This avoids excessive filling of the reservoir in the pump unit and also eliminates the need for providing a separate connection to a water basin, etc. Also, advantageously the pump unit is designed to provide pressure pulses of water. This enables a simple type of hydraulic motor to be employed and is also advantageous for cleaning interdental spaces and massaging the gums by a water jet appliance head, as well as producing a

massage action when a spray head is used. The specific embodiment shows an hydraulic motor of simple construction with provision for synchronizing the motor operation with the pressure pulses.

Although water will commonly be referred to hereinafter, it will be understood that other liquids such as antiseptic solutions could be employed if desired.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 illustrates the overall apparatus with a toothbrush appliance head, and FIG. 1a illustrates rotational oscillation thereof;

FIG. 2 illustrates the handle unit with a water jet attachment in place;

FIGS. 3 and 4 show details of the pump unit, FIG. 4 being taken along line 4-4 of FIG. 3;

FIG. 5 shows a portion of the water reservoir;

FIG. 6 is a longitudinal cross section of the handle unit, and FIGS. 7 and 8 are cross sections along lines 7-7 and 8-8 of FIG. 6;

FIG. 9 is a detail showing the coupling of the handle unit and a water jet attachment; and

FIG. 10 is a detail showing a modification of the handle unit of FIG. 6 for longitudinal to-and-fro oscillation.

DESCRIPTION OF THE SPECIFIC EMBODIMENTS

Referring to FIG. 1, a pump unit generally designated as 10 is shown, connected to a handle unit generally designated as 11 by a pair of flexible conduits 12 and 13. The pump unit has a water reservoir 14 on top of the unit and the lower section 15 contains a pump and drive motor. The lower section may be provided with a knob 16 for regulating the water pressure, an opening 17 for visual inspection of the interior, and a power switch 18.

Conduits 12 and 13 are here shown separate for convenience of illustration, but in practice will commonly be two tubes joined together over their length, or a single composite tube with two passages therethrough, or other convenient hose arrangement. Conduit 12 is the supply conduit for supplying water under pressure to handle 11, and conduit 13 is a return conduit. A check valve 19 is illustrated diagrammatically to allow passage of water only in the return direction. It is actually contained within the pump unit, as will be described.

Handle 11 is shown with a toothbrush appliance head 21 attached thereto. A control valve within the casing is actuable by knob 22' to alternative positions in one of which the motor is actuated and in another of which the motor is stopped and the water under pressure supplied to the outlet of the handle. A sliding valve 23 permits turning water on or off in either mode of operation.

The motor unit may be designed to produce rotational oscillation as described hereinafter in connection with FIG. 6. Thus, the toothbrush head will oscillate as indicated in FIG. 1a. The motor may also be designed to produce a longitudinal to-and-fro motion as will be described hereinafter in connection with FIG. 10. Other types of movement such as lateral oscillation may also be employed if desired.

FIG. 2 shows the handle 11 with a water jet appliance head 24 affixed thereon. It will be noted that knob 22' is turned 90° with respect to that shown in FIG. 1.

Referring now to FIG. 3, the pump and driving motor portion of the pump unit is illustrated. An electric motor 31 drives a reciprocating piston 32 located in a cylindrical chamber 33. An eccentric pin on a disc (not shown) driven by motor 31 may be used to drive slide 34 to which the piston rod 35 is attached. Such mechanisms are conventional and need not be shown in detail.

Water from the reservoir is admitted to chamber 36, and is admitted to the cylinder 33 through a check valve 37. A downward movement of piston 32 allows water to flow by the check valve into cylinder 33. Upon upward movement of the cylinder the check valve closes and the water is delivered

under pressure to the supply conduit 12. Water returning to the pump unit through conduit 13 passes check valve 19 and returns to chamber 36.

FIG. 4 shows the manner in which the pressure may be regulated. An orifice 38 allows water under pressure from cylinder 33 to return to chamber 36 under the control of a plunger 39 faced with a resilient insert 40. By moving the plunger outward, a small bypass passage is opened and a lower pressure obtained. The handle 16' of the plunger may be coupled to knob 16 (FIG. 1) in any desired manner for convenient actuation.

The mechanical details of the pump unit may follow conventional practice and it is believed unnecessary to describe FIGS. 3 and 4 in more detail. Other suitable types of pump units may be used if desired.

Referring to FIG. 5, the lower portion of reservoir 14 is shown with an outlet 41. This fits into chamber 36 of FIG. 3. A check valve 42 closes the outlet when the reservoir is removed for refilling. Upon placing the reservoir over the pump, the projection 43 (FIG. 3) raises check valve 42. A perforated screen 44 prevents the valve from falling out during transport.

Referring to FIG. 6, a casing 51 forms a handle and conduits 12 and 13 are connected thereto. The appliance heads are attached at the opposite end as shown by a portion of a toothbrush attachment 21.

A two-way valve 52, in the position shown, supplies water under pressure from supply conduit 12 to the inlet port 53 of an hydraulic motor. The motor includes a piston 54 slidable within cylinder 55. The piston is mounted on a shaft 56 and is resiliently biased toward the inlet port by compression spring 57. The piston is prevented from rotating by a pin 58 moving in slot 59 (see also FIG. 7). An outlet port 61 in the wall of cylinder 55 leads to the return conduit 13 through conduit 62.

Piston 54 is shown in a midposition for clarity of illustration. With valve 52 in the position shown, a pressure pulse of liquid entering cylinder 55 will drive piston 54 to the right, against the force of spring 57. During the initial portion of the travel, outlet port 61 is covered by the piston. When the piston travels far enough to uncover the port, the water flows through the outlet port to the return conduit 13 until the pressure in cylinder 55 is reduced at the end of the pressure cycle in the pump unit. Spring 57 thereupon urges the piston to the left, ready for the next pressure pulse of liquid. In this manner a predetermined length of travel of piston 54 is obtained, depending on the position of outlet port 61, and synchronization of the motor with the pulses and the pump unit is obtained.

The pressure pulses of liquid may be discrete slugs of water, or may be a more or less continuous stream of water with the pressure varying cyclically between maximum and minimum values. The force of spring 57 and other parameters may be selected for the existing conditions.

As will be understood, when the hydraulic motor is operating a recirculating connection is established with the pump unit via flexible conduits 12, 13.

In this embodiment rotational oscillation of an appliance head is desired. Accordingly a motion converter is employed. To this end the output end of shaft 56 carries a pin 63 affixed thereto. See also FIG. 8. Opposite ends of pin 63 move in respective helical slots 64 and 65 formed in a cylindrical member 66. Member 66 is retained by blocks 67 and 68 so that it cannot move longitudinally but can rotate. Accordingly the reciprocating motion of shaft 56 causes member 66 to rotationally oscillate. Member 66 is attached to shaft 69 whose end 69' is accessible from the outside of the casing. The shaft is arranged in any suitable manner for coupling of an appliance head 21 thereto in driving relationship. As here shown, a lateral pin 71 is affixed to the end of shaft 69 and is engaged by a longitudinal slot 72 in appliance head 21.

For water jet and spray appliance heads, valve 52 is rotated 90° clockwise. The valve will then deliver water under pressure from supply conduit 12 to conduit 73 which extends longitudinally of the casing to chamber 74.

Referring to FIG. 9, a water jet appliance head 21 is shown having a central passage 75. The head is provided with an enlarged section 76 for convenient handling, and the end engages O-ring 77 in fluid-tight relationship. Passage 75 is connected with an enlarged passage 78 which communicates with chamber 74. Chamber 74 is open at the end of the casing around the end of shaft 69, but ring 77 prevents water from issuing around the inner end of the attachment. Consequently fluid under pressure will be delivered to the central passage of the water jet appliance head.

Returning to FIG. 6, a separate sliding valve 81 is provided for turning the operation on and off while the pump unit remains running. In the position shown for valve 52, supply conduit 12 is connected to bypass conduit 82. If valve 52 is rotated 90° clockwise to its alternative position, supply conduit 12 is still connected to bypass conduit 82. With valve 81 in the position shown, bypass conduit 82 is blocked. If valve 81 is moved upwards, conduit 82 is connected to the input portion 83 of a conduit 84 in the valve 81. The other end of conduit 84 is connected to an outlet portion 85 which will then be in alignment with conduit 62. Consequently, when slide valve 81 is moved upwards, water under pressure from supply line 12 is bypassed to the return line 13. In the position of valve 52 shown, this will cause the hydraulic motor to stop. Slide valve 81 includes a hole 73' forming part of conduit 73 in the position shown. Thus when it is moved upward the conduit is broken. This cuts off the supply of water to chamber 74 when valve 52 is in its alternative 90° position.

Ring seals are provided as required to insure water tightness, such as shown at 86, 87 and 77. The latter engages the end of an appliance head as illustrated.

FIG. 10 shows a modification of FIG. 6 which provides longitudinal to-and-fro oscillation of shaft 69 as illustrated by the double headed arrow 89. To this end, the motion converter is eliminated and the rod 56 of the hydraulic motor extended to form the output shaft 69. Further explanation is believed unnecessary.

It will be understood that other types of appliance heads may be used in place of the toothbrush head and water jet nozzle specifically illustrated. Those requiring a motor drive may have their driven members arranged for attachment to the drive shaft 69 as illustrated in FIG. 6. Those requiring only water under pressure may be attached as illustrated in FIG. 9. For appliance heads requiring a motor drive other than rotational oscillation or longitudinal to-and-fro oscillation, a suitable motion converter may be built into the appliance head or into the handle unit, as desired. Also, the control valve may be modified to supply water to the appliance head along with motor drive, if desired.

As mentioned above, recirculation of water during hydraulic motor operation is particularly advantageous to avoid water consumption from the reservoir and the need for providing other means for its disposal. The loop recirculation provides for this when there is a continuous flow of water, with or without pressure variations, or, in the specific embodiment described, where a given slug of water would more than fill the hydraulic cylinder. If a pump unit is used which has alternate pressure and vacuum cycles, the hydraulic motor may be arranged to oscillate without requiring an outlet port, in which case the return flexible conduit may be eliminated.

The speed of the pump unit may be selected to give the desired frequency of oscillation of the hydraulic motor and desired water jet pulsations, and a variable speed motor in the pump unit may be employed if desired.

It will be understood that many modifications and changes may be made in the specific embodiments described, within the spirit and scope of the invention. In particular, different types of pump units and different types of hydraulic motors may be employed, and the control valves changed.

I claim:

1. Apparatus for body care, for use with appliance heads requiring alternatively an oscillating drive and liquid under pressure, comprising:

- a. a pump unit including a liquid reservoir and a motor for supplying liquid under pressure;
 - b. a casing forming a handle;
 - c. flexible conduit means connecting said pump unit and casing;
 - d. a shaft mounted in said casing and accessible from the outside of the casing for driving an appliance head adapted to be attached thereto;
 - e. an hydraulic motor in said casing having means for oscillating said shaft;
 - f. a conduit in said casing for delivering liquid under pressure to an appliance head adapted to be attached thereto;
 - g. control means for establishing a recirculating liquid connection between said pump unit and said hydraulic motor through said flexible conduit means to actuate the motor; and
 - h. said control means being actuatable alternatively to establish a connection between said pump unit and said conduit in the casing to deliver liquid under pressure thereto.
2. Apparatus according to claim 1 in which:
- a. said pump unit has supply and return lines connected to said casing by respective supply and return conduits in said flexible conduit means;
 - b. said hydraulic motor has inlet and outlet ports;
 - c. said casing includes means for connecting said motor outlet port to said return conduit; and
 - d. said control means is mounted in said casing and includes means for alternatively connecting said supply conduit to said motor inlet port and to said conduit in the casing.
3. Apparatus according to claim 2 in which said control means includes bypass means for connecting said supply conduit to said return conduit internally of said casing to bypass said motor and said conduit in the casing.
4. Apparatus according to claim 3 in which:
- a. said control means includes a first valve actuatable to alternative positions to connect said supply conduit alternatively to said motor inlet port and to said conduit in the casing;
 - b. said bypass means includes a separate valve and a bypass conduit;
 - c. said first valve including means for connecting said supply conduit to said bypass conduit in both of said alternative positions thereof; and
 - d. said separate valve being movable to alternatively close said bypass conduit and connect the bypass conduit to said return conduit.
5. Apparatus according to claim 4 in which said separate valve includes means for alternatively establishing and breaking said conduit for delivering liquid under pressure to an appliance head.
6. Apparatus according to claim 4 including:
- a. an opening in said casing around the portion of said shaft

- accessible from the outside of the casing and spaced therefrom;
 - b. said conduit in the casing communicating with said opening; and
 - c. means at said opening for providing a liquid seal around an appliance head inserted therein.
7. Apparatus according to claim 1 in which said pump unit is adapted to supply pressure pulses of liquid through said flexible conduit means to said casing.
8. Apparatus according to claim 2 in which:
- a. said pump unit is adapted to supply pressure pulses of liquid through said flexible conduit means to said casing;
 - b. said hydraulic motor includes a cylinder, a piston movable longitudinally in said cylinder and resilient means for biasing the piston toward one end of the cylinder;
 - c. said inlet port being at said one end of the cylinder whereby pulses of liquid supplied thereto produce longitudinal oscillation of said piston; and
 - d. said outlet port being in the wall of the cylinder in position to be covered and uncovered by the piston during oscillation thereof.
9. Apparatus for body care, for use with different appliance heads requiring alternatively an oscillating drive and liquid under pressure, comprising:
- a. a pump unit including a liquid reservoir and a motor for producing pressure pulses of liquid;
 - b. a casing forming a handle;
 - c. flexible conduit means connecting said pump unit and casing;
 - d. a shaft mounted in said casing and accessible from the outside of the casing for driving an appliance head adapted to be attached thereto;
 - e. an hydraulic motor in said casing actuatable by pressure pulses of liquid and having means for oscillating said shaft;
 - f. a conduit in said casing for delivering pressure pulses of liquid to a separate water jet appliance head adapted to be attached thereto; and
 - g. control means in said casing for supplying pressure pulses of liquid from said pump unit through said flexible conduit means alternatively to actuate said hydraulic motor and to supply the pressure pulses to said conduit in the casing.
10. Apparatus for body care in accordance with claim 9 in which said control means has alternative self-maintaining positions for said supplying of pressure pulses of liquid alternatively to actuate the hydraulic motor and to said conduit.
11. Apparatus for body care in accordance with claim 9 in which said flexible conduit means includes a supply conduit for delivering pressure pulses of liquid from said pump unit to said casing and a return conduit for returning liquid from said casing to said pump unit, and said control means includes bypass means for connecting said supply conduit to said return conduit internally of said casing to bypass said motor and said conduit in the casing.