May 18, 1965 M. W. WELCH ETAL 3,184,156

SKIN STIMULATING AND CLEANING DEVICE AND PUMP THEREFOR

Original Filed Sept. 6, 1957 2 Sheets-Sheet 1

Fig-1

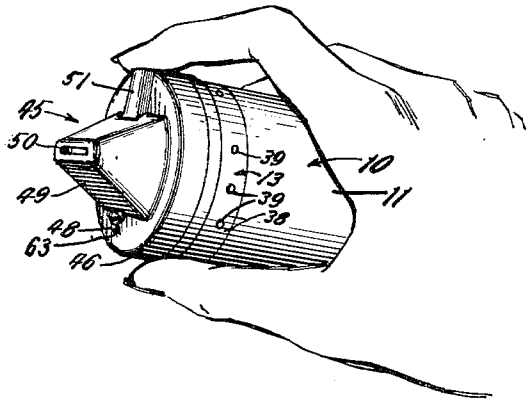


Fig-2

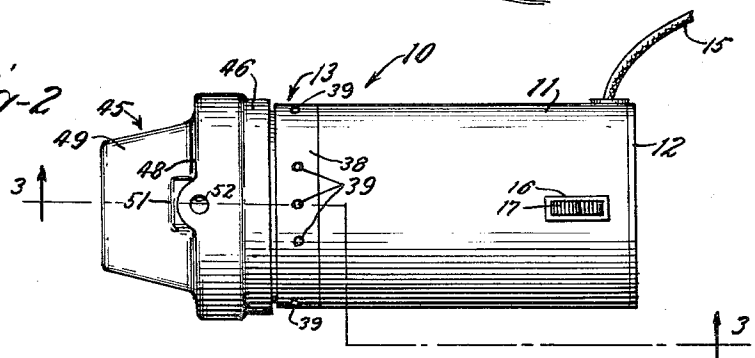
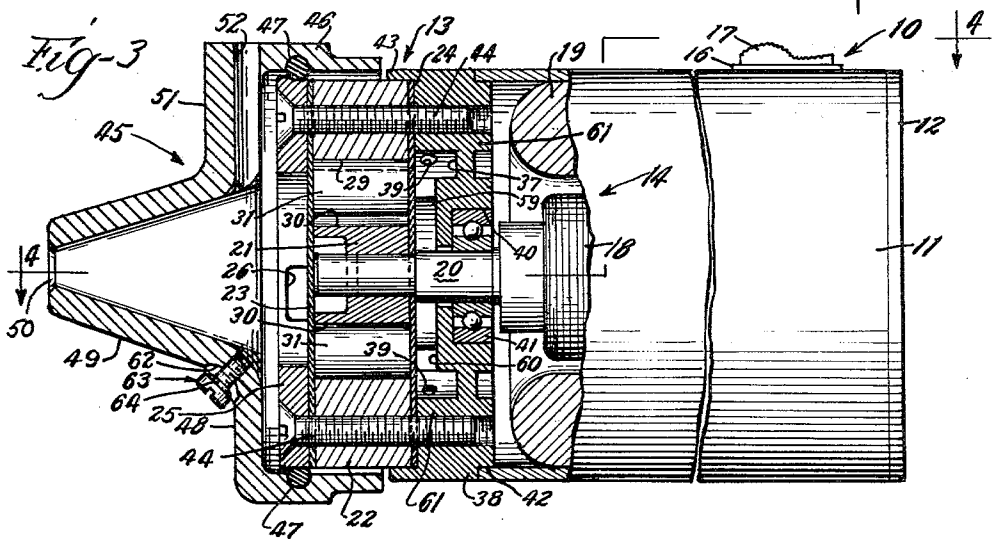


Fig-3



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SKIN STIMULATING AND CLEANING DEVICE AND PUMP THEREFOR

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Fig-4

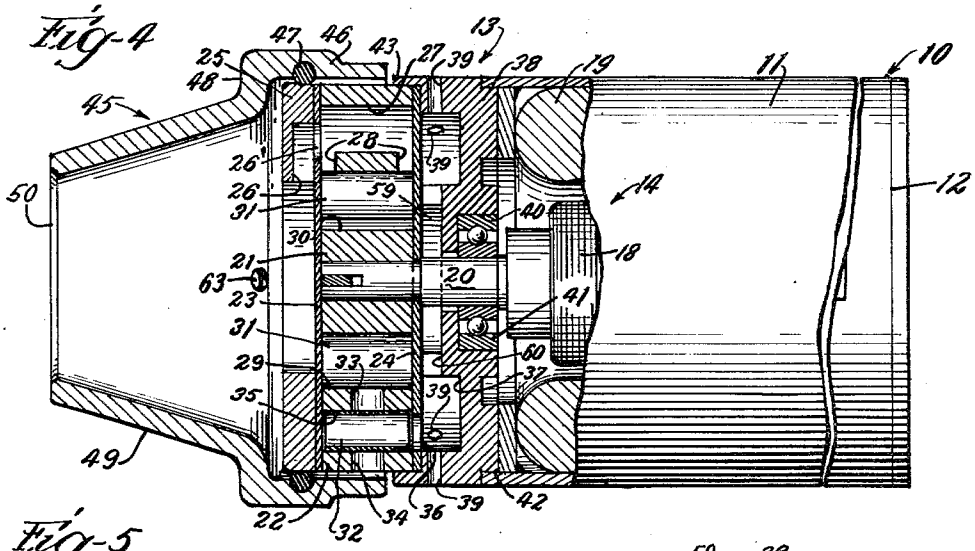


Fig-5

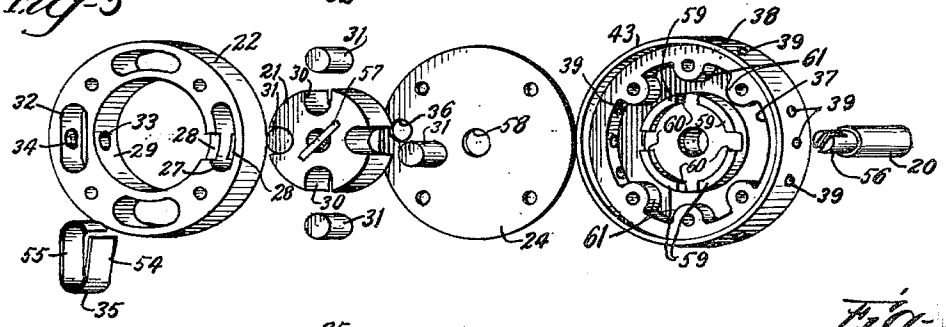


Fig-6

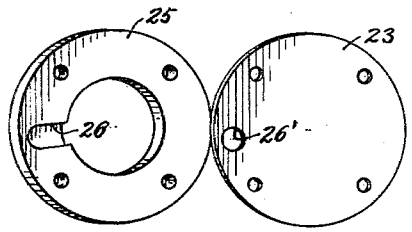


Fig-7

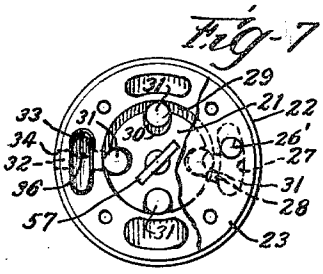
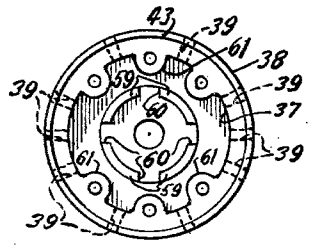


Fig-8



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3,184,156

SKIN STIMULATING AND CLEANING DEVICE AND PUMP THEREFOR

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Original application Sept. 6, 1957, Ser. No. 682,456. Divided and this application May 31, 1962, Ser. No. 208,161

7 Claims. (Cl. 230—152)

This is a division of our copending application Serial No. 682,456, filed September 6, 1957, now abandoned.

The present invention is directed to a new and improved vacuum device particularly adapted for skin stimulation and cleaning and incorporating therein a new and improved form of pump which is of light weight, compact design and capable of highly efficient operation; the design and arrangement of the device adapting itself for single hand operation and manipulation thus rendering the device completely and readily portable.

Various skin stimulating and cleaning devices in the form of air inducing mechanisms have been proposed for use on facial or other skin areas for stimulation thereof and/or for cleansing thereof following a preliminary application of a coating of cold cream, cleansing cream, lotion or other skin conditioning cream or oil of the type well known. Such apparatus has been suggested for use in the promotion of skin health and beauty in connection with skin stimulation for the development of a healthy skin glow or appearance accompanied by the combating or minimizing of the occurrence of skin blemishes. Of the various forms of apparatus proposed, it has been found that in many instances the particular form is unwieldly, excessively expensive, unduly complicated in structural arrangement, and/or substantially incapable of providing efficient and comfortable stimulation and cleansing action by the provision of adequate vacuum control. It has been considered commercially desirable to provide an efficiently operating stimulating vacuum device which is entirely portable thus necessitating lightweight, compact design; inexpensively constructed for substantial trouble-free operation; and capable of effective skin stimulation as well as efficient skin cleansing for removing applied creams or lotions without damage to the sensitive skin areas or the occurrence of uncomfortable sensations.

It is the object of the present invention to provide a new and improved form of skin stimulating and cleaning device of compact design for single hand operation which utilizes a self-contained power source, vacuum pump and skin application head; the device being such that a relatively small vacuum drawn interiorly thereof provides for efficient stimulation and/or cleansing action without undesirable skin irritation or damage.

It is an object to provide a new and improved vacuum pump adapted for use in a skin stimulating and cleaning device wherein the vacuum pump is located to make full efficient utilization of the operational features thereof, an element of the pump providing a plurality of radially exposed discharge ports at least some of which are at all times unrestricted for air discharge from the pump regardless of the manner in which the device is grasped and manipulated by the user.

Still a further object is to provide a new and improved form of vacuum pump of general use which provides for highly efficient vacuum impressing operation, the pump being of lightweight and compact design particularly adapted for mounting in an area of limited dimensions, the pump being of uncomplicated structural arrangement thereby particularly adapting the same for use in low cost apparatus, the pump further including certain structural features providing for controlled intake and discharge of

fluid such as air without loss of lubricant in connection with a bearing carried thereby which journals a rotatable shaft used in operating the pump.

Other objects not specifically set forth will become apparent from the following detailed description made in conjunction with the drawings wherein:

FIG. 1 is a partial perspective of a skin stimulating and cleaning device using the pump of the present invention and illustrating single hand manipulation of the device;

FIG. 2 is a plan view of the device;

FIG. 3 is an enlarged fragmentary longitudinal vertical section of the device of FIG. 2 taken generally along line 3—3 in FIG. 2;

FIG. 4 is a fragmentary longitudinal horizontal section taken generally along line 4—4 in FIG. 3;

FIG. 5 is an exploded perspective of certain of the elements forming the new and improved vacuum pump of the present invention;

FIG. 6 is an exploded perspective of certain other elements of the vacuum pump of FIG. 5;

FIG. 7 is an end view of the pump with the inlet ring and end plate partially removed to illustrate the stator and rotor elements of the pump; and

FIG. 8 is an end view of the inner face of the outlet housing forming a part of the pump.

Referring to FIGS. 1–4, a relatively small, lightweight and compact stimulating and cleaning device 10 is illustrated, this device being particularly adapted for skin treating purposes and being readily manipulated for operation thereof by use of a single hand with fingertip vacuum control as particularly shown in FIG. 1. The device 10 includes a cylindrical casing 11 closed at the rear end thereof by a circular plate 12 and open at the forward end thereof to have received within the forward end a new and improved vacuum pump 13 which forms a part of the present invention. The pump 13 is partially telescopically received within the opened end of the casing 11 with the outer surface of a portion of the pump being positioned in coplanar relation with the outer surface of the casing 11 to, in effect, forwardly extend the same and define a compact, smooth surface body portion for the skin cleaning device 10.

As particularly shown in FIGS. 3 and 4, a known type of single speed electric motor 14 is suitably housed in the casing 11, a power lead 15 extending from the rear portion of the casing 11 for plug-in operation of the power source or motor 14 in the conventional manner such as is customary in connection with electric shavers. A motor operating switch structure 16, as shown in FIGS. 2 and 3, is suitably carried by the casing 11 and provided with a pivotally mounted control button 17 which forms a part of a known type of toggle switch used in energizing and de-energizing the electric motor 14.

The electric motor 14 is schematically illustrated as including the standard armature 18 received within field windings 19, the armature 18 having fixed thereto a forwardly projecting shaft 20 which is drivingly connected at its outermost end with a rotor 21 forming a part of the pump 13. The structural details of the pump 13 will be more specifically described but for purposes of initially describing the over-all arrangement of the skin treating device 10, the pump 13 consists generally of the rotor 21 received within a pump cavity defined by a ring-like stator 22, the pump cavity being closed by an inlet end plate 23 and an outlet end plate 24.

The inlet of the pump 13 is defined by an inlet ring 25 being provided on the inner surface thereof with a radially directed groove 26 which communicates with the center opening of the ring 25 and further is in register with a port 26' in the inlet end plate 23 as shown in FIG. 4. The port 26' communicates with an inlet chamber or cavity 27 formed in the stator 22 and provided with

spaced radially directed groove-like openings 28 in communication with the pump cavity 29. The rotor 21 is provided with a plurality of circumferentially spaced, radially outwardly opening, arcuate grooves 30 in which are received rollers 31 of the type used in roller bearings to provide the known type of centrifugal pump action, the pump cavity 29 being eccentrically formed relative to the true center of the stator 22.

The stator 22 further includes an outlet chamber 32 being provided with radially directed drilled openings 33 and 34, the inner opening 33 communicating with the pump cavity 29. A flexible, reversely folded leaf spring 35 is mounted in the outlet cavity 32 to allow discharge from the pump cavity 29 into the outlet cavity 32 while preventing discharge from the outlet cavity 32 through the outermost port 34 in a manner and for a purpose to be described. The outlet end plate 24 is provided with a port 36 which provides for discharge into an annular discharge cavity 37 formed in the inner surface of an outlet or shaft housing 38. A plurality of radially directed, circumferentially spaced discharge ports 39 extend through the outer wall of the housing 38 to discharge air radially outwardly of the side surface of the device 10 for a purpose to be described.

The housing 38 carries centrally thereof on the outer surface a bearing mounting portion or groove 40 having a ball bearing structure 41 carried thereby by which the shaft 20 is journalled. The outer end surface of the housing 38 is provided with a circumferential groove 42 which receives the forward end of the casing 11 therein to mount the pump 13 in the opened end of the casing 11. The housing 38 and bearing 41 support the shaft 29 and armature 18 of the motor 14 within the casing 11. In this manner the housing 38 not only functions to provide for a specific type of pump discharge but also carries the motor bearing which supports the armature 18 thereof in its operative position within the field windings 19.

The forward end of the housing 38 of the pump 13 is provided with a circumferentially continuous, axially directed lip or rim 43 which telescopically receives therein the stator 22, all of the larger elements of the pump being interconnected by bolts 44 which extend through the various elements and are threadedly received in tapped openings in the housing 38. The outer periphery of the inlet ring 25 and stator 22 receive thereabout a removable skin application head 45 which includes a rearwardly extending integral sleeve or collar portion 46 provided with a circumferential groove about the inner surface thereof which seats a resilient O-ring 47 for frictional gripping and sealing engagement with the outer surface of the inlet ring 25 when the head is mounted on the pump 13. The mounting arrangement of the head 45 provides for ready removal of the same from the pump 13 with the O-ring 47 functioning not only to frictionally retain the head on the pump 13 in its operative position but further providing a leak-proof seal between the head 45 and the pump 13 to prevent loss in efficient vacuum operation of the device 10.

As particularly shown in FIG. 1, the head 45 is provided with a generally flat top wall portion 48 formed integral at the outer edge thereof with the sleeve portion 46 and being integrally joined centrally thereof with an outwardly extending nozzle-like protrusion 49. The nozzle 49 is generally pyramid-shaped and is provided at the outermost end thereof with a slot-like opening 50, the edge of the nozzle 49 surrounding the slot 50 being smoothly formed in arcuate outline. One side wall of the nozzle 49 at the bottom thereof has integrally joined therewith a radially directed tunnel-like structure 51 which defines a radially directed vacuum control means in the form of a control opening or orifice 52 opening outwardly of the top wall 48 and side sleeve 46. The size of the orifice 52 is such that it can be readily blocked or closed off by the application of a single finger in covering relation thereto as shown in FIG. 1.

As particularly shown in FIG. 3, the side wall of the nozzle 49 opposite the tunnel-like structure 51 at its junction with the top wall portion 48 is provided with a tapped hole extending therethrough and having a conical seat 62 at the outer end thereof. A vacuum control or by-pass means in the form of a stud screw 63 is received in the hole and is provided with a valve-like conical portion 64 below the head thereof for seating in sealed relation on the seat 62. Retraction of the screw 63 out of engagement with the seat 62 provides for vacuum by-pass past the engaged threads to reduce the amount of vacuum drawn on the nozzle 49. The head of the screw is knurled for ease of turning.

In using the skin stimulating and cleaning device 10 of the present invention, one handed operation as shown in FIG. 1 is relied upon in a manner similar to that of the operation of known types of electric shavers. The lead 15 is suitably connected to an electrical outlet and the switch 16 is operated to energize the motor 14. With rotation of the shaft 20, the rotor 21 draws air through the head 45 and this air is subsequently discharged through the ports 39 radially outwardly of the device 10 at points spaced axially rearwardly from the head 45. The tip of the nozzle 49 is applied against a skin surface and the index finger of the user's hand is passed over the outer end of the control orifice 52 to completely block the same. At this stage of the operation, the air drawn inwardly of the head 45 by the pump 13 is drawn exclusively through the slot 50 and upon proper pressure being applied to the device 10 in a direction toward the skin surface, a vacuum is created within the head 45. Suitable sliding movement of the tip of the nozzle 49 over the skin surface results in skin stimulation and/or cleansing by drawing into the head 45 any material such as cleansing cream or lotion which has previously been applied to the skin. Accumulation of the cleansing cream or lotion will occur within the head 45.

A primary function of the device 10 is stimulation of facial or other skin areas for healthful appearance and skin conditioning purposes. The vacuum formed in the head 45 draws the skin into the nozzle opening whereby the skin is slightly stretched and peripheral blood circulation is gorged. Any glandular exudate is removed from the skin and capillary rupture is prevented by proper vacuum control in the manner to be specifically described.

Following stimulation and/or cleansing of the skin surface, the tip of the nozzle 49 is moved out of contact with the skin by removal of the index finger from covering relation with the control orifice 52. With the uncovering of the orifice 52, air is immediately drawn into the interior of the head 45 to place the same under atmospheric condition and the skin drawing action of the vacuum is completely dissipated. Consequently, the tip of the nozzle 49 may be readily moved out of contact with the skin with complete control of the vacuum drawn by the device 10 being available to the user at all times. Accumulation of cleansing cream or the like within the head 45 during use of the device 10 will not interfere with the operation of the pump 13 by reason of the presence of the inlet ring 25. The air drawn inwardly through the inlet groove 26 travels in a radial direction and accumulated cleansing cream will not readily clog the inlet opening 26' or cannot be drawn into the pump 13. Following use of the device 10, the head 45 may readily be removed from the body portion of the device and accumulated cleansing cream or lotion carried ininternally thereof may be easily removed with the interior of the head 45 being cleaned for subsequent reuse.

Preferably, the vacuum pump 13 is designed to draw a vacuum of approximately 20 cm. of mercury which is the equivalent to about ⅓ atmosphere. It has generally been found that full use of such a vacuum provides for efficient skin stimulation and cleansing opera-

tion for the average skin without skin irritation or damage resulting. The mechanical by-pass constituting the seat 62 and screw 63 is provided especially for use with sensitive skin. Unseating of the screw 63 bypasses air through the threads and reduces the vacuum applied to the skin, as for example, to 15 cm. of mercury. Still further, the positioning of the index finger in covering relation with the control orifice 52 may be readily varied by the user to provide for slight movement of air into the interior of the head 45 thus providing for immediate control of vacuum established within the head 45. Slight movement or rolling of the covering finger to one side relative to the orifice 52 provides for substantial variation in vacuum control. It will further be recognized that the head 45 may be arranged relative to the body portion of the device 10 to position the nozzle 49 in angular relation relative to the longitudinal axis of the device 10. In this connection, the head 45 may be arranged to position the nozzle at 90° relative to the longitudinal axis.

Efficient operation of the skin stimulating and cleaning device 10 will occur at all times regardless of the manner in which the user grasps the same. In order to provide for continuous efficient operation, the discharge of air from the pump 13 is accomplished by the provision of a plurality of circumferentially spaced discharge ports 39. With this arrangement at least some of the discharge ports will be completely uncovered by the hand of the user and adequate means will be provided for continuous air discharge from the pump 13. As particularly shown in FIG. 1, the position of the thumb of the hand of the user may well cover one or more of the discharge ports 39. However, it will be recognized that a substantial number of these ports are completely uncovered and it is impossible to inadvertently close off all of the ports 39 to an extent that the pump 13 will not operate efficiently. With the provision of a plurailty of discharge ports 39, it is further impossible for back pressure to develop within the housing 38 to an extent that pump operation is adversely affected.

The elements of the pump 13 are shown in detail in FIGS. 5–8. Referring to FIG. 5 wherein the stator 22 is shown in detail, it will be noted that the drilled openings 33 and 34 are radially aligned, the outermost opening 34 being initially drilled for access into the outlet chamber 32 in order to drill the outlet opening 33 through the innermost wall portion thereof. With operation of the pump 13 as previously described, the innermost drilled opening 33 is used for the delivery of compressed air into the outlet chamber from which the air is delivered into the annular cavity 37 of the shaft housing 38 for discharge therefrom. The outer drilled opening 34 is not utilized in the operation of the pump and in order to completely close off the same, the reversely folded spring member 35 is received within the chamber 32 in compressed condition.

The spring member 35 is provided with oppositely positioned, resilient leg portions 54 and 55 which cover the openings 33 and 34, respectively. Air pressure in the pump cavity 29 flexes the leg portion 54 away from the opening 33 to allow passage of air into the outlet chamber 32, this air pressure forcing the leg portion 55 into close association with the side wall of the chamber 32 surrounding the outermost opening 34. In this manner air cannot escape through the opening 34 and efficient air delivery is attained from the pump cavity 29 into the outlet chamber 32.

The rotor 21 as shown in FIG. 5 is provided with four compression stages defined by the U-shaped grooves 30. Any number of stages can be used depending upon the desired capacity of the pump 13. The rollers 31 are freely movable into and out of their respective grooves 30 in response to centrifugal action to provide the requisite pumping action for drawing the vacuum. As shown in FIG. 7 and as previously described, the pump cavity 29 is eccentrically located relative to the dead center of the stator 22 and the rotor 21 is mounted in concentric relation with the stator 22 thus providing a peripheral space about the rotor 21 intermediate the inlet and outlet chambers for air moving purposes. As shown in FIG. 7, operation of the rotor 21 is in a counterclockwise direction and upon movement of the rollers 31 past the uppermost point of travel as viewed in FIG. 7, centrifugal force causes each roller 31 to move outwardly and remain in engagement with the inner surface of the pump cavity 29.

The rotor 21 is centrally provided with a drilled opening through which a reduced end of the shaft 20 is received, this end being identified by the numeral 56 in FIG. 5 and being illustrated as bifurcated. The outermost end surface of the rotor 21 as viewed in FIG. 5 is provided with a key receiving slot transversely thereof into which is received a key 57 the center portion of which is received through the bifurcated end 56 of the shaft 20. In this manner the shaft 20 is keyed to rotate the rotor 21 within the pump cavity. The outlet end plate 24 is centrally apertured at 58 to receive the shaft 20 therethrough. The inlet end plate 23 as shown in FIG. 6 is solid with the exception of the inlet port 26' and suitable drilled openings through which the bolts 44 previously described are received to hold the various elements in their operative positions.

The shaft journalling and pump discharge housing 38 includes structural features which are of particular importance. As previously described, the rear face of the housing 38 is provided with the bearing mounting groove 40 thus providing the housing 38 with a dual function, namely, journalling the shaft 20 and armature 18 of the motor 14 as well as controlling air discharge from the pump 13. The inner surface portion of the housing 38 is provided centrally thereof with a raised annular rim 59 which is circumferentially grooved as at 60 to provide a plurality of separate arcuate ridges which engage the rear face of the outlet end plate 24 to centrally reinforce the same. The rim 59 further performs an important function in providing for equalization of pressure on each side of the bearing 40 to prevent loss of lubricant. As particularly shown in FIGS. 3 and 4, the positioning of the bearing 41 subjects the same to atmospheric pressure on the motor side while the opposite side thereof is in communication with the pump discharge. By providing an annular discharge cavity 37 of substantial size and volumetric capacity while in addition providing a substantial number of discharge ports 39, the air discharged from the chamber 32 is immediately introduced into a relatively large area resulting in substantially instantaneous pressure dissipation. The air is allowed to immediately expand within the housing 38 and be discharged therefrom through the plurality of ports 39 at substantially atmospheric pressure. As a result, the discharge of air from the skin cleaning device 10 is not readily noticeable nor is it carried out under pressures which might cause an uncomfortable sensation in the event that the discharged air should contact the user.

With the described air discharge arrangement, the inner or forward side of the bearing 41 is subjected to at least substantial atmospheric pressure, what little pressure being exerted thereagainst being totally inadequate to force lubricant therefrom toward the armature 18 of the motor 14. This particular arrangement provides long-life operation of the skin stimulating and cleaning device 10 without the necessity of lubrication, prevents depositing of lubricant on the armature 18 to interfere with efficient motor operation, and further prevents flow of lubricant either into the pump structure 13 or loss of lubricant outwardly thereof through the discharge ports 39. The provision of the circumferentially spaced grooves 60 further aids in equalizing pressure with respect to the inner portion of the bearing 41. The structural features

of the housing 38 are completed with the provision of integrally formed mounting flanges 61 being provided with tapped holes therethrough which threadedly receive the holding bolts 44.

While the vacuum pump has been described with respect to a specific use thereof, it will be understood that the pump is adapted for other uses.

Obviously many modifications and variations of the invention as hereinbefore set forth may be made without departing from the spirit and scope thereof, and therefore only such limitations should be imposed as are indicated in the appended claims.

We claim:

1. A vacuum pump of lightweight compact arrangement including a stator ring defining internally thereof a pump cavity which is enclosed by inlet and outlet end plates, a rotor in said cavity drivingly carried by a rotatable shaft received through said outlet end plate, inlet and outlet circumferentially spaced chambers formed in said stator and in communication with said pump cavity, ports in said inlet and outlet end plates in communication with said inlet and outlet chambers respectively, and a pump discharge and shaft journalling housing attached to said outlet end plate and including an end surface portion spaced from said outlet end plate and through which said shaft extends, said housing being provided with at least one discharge port which is in communicfation with the port of said outlet end plate through said housing, the end surface portion of said housing being provided centrally thereof with a recess in communication with the interior of said housing and in which is mounted a bearing journalling said shaft.

2. A vacuum pump of lightweight compact arrangement including a stator ring of block-like cross section defining internally thereof a pump cavity which is enclosed by inlet and outlet end plates, a rotor in said cavity drivingly carried by a rotatable shaft received through said outlet end plate, inlet and outlet circumferentially spaced chambers formed in said stator and in communication with said pump cavity, ports in said inlet and outlet end plates in communication with said inlet and outlet chambers respectively, means in said outlet chamber to provide for one-way flow from said outlet chamber through said outlet end plate, and a pump discharge and shaft journalling housing attached to said outlet end plate and including an end surface portion spaced from said outlet end plate and through which said shaft extends, said housing being provided with a plurality of circumferentially spaced and radially extending discharge ports which are in communication with the port of said outlet end plate through said housing, the end surface portion of said housing being provided centrally thereof with a recess in communication with the interior of said housing and in which is mounted a bearing journalling said shaft.

3. The vacuum pump of claim 2 wherein said outlet chamber is radially confined in said stator and includes aligned ports in opposite wall portions thereof placing said outlet chamber in communication with said cavity and the exterior of said stator ring, said one-way flow means being in the form of a one-piece reversely folded leaf spring having separate leg portions thereof in resilient covering relation with said aligned ports.

4. A vacuum pump of lightweight compact arrangement including a stator ring defining internally thereof of pump cavity which is enclosed by inlet and outlet end plates, a rotor in said cavity drivingly carried by a rotatable shaft received through said outlet end plate, inlet and outlet circumferentially spaced chambers formed in said stator and in communication with said pump cavity, ports in said inlet and outlet end plates in communication with said inlet and outlet chambers respectively, and a pump discharge and shaft journalling housing attached to said outlet end plate and including an end surface portion spaced from said outlet end plate and through which said shaft extends, said housing being provided with at least one discharge port which is in communication with the port of said outlet end plate through said housing, the end surface portion of said housing being provided centrally thereof with a recess in communication with the interior of said housing and in which is mounted a bearing journalling said shaft, said end surface of said housing having formed thereon an axially projecting annular rim spaced about said shaft and which is circumferentially apertured for communication between said recess and the interior of said housing, said rim being in reinforcing engagement with said outlet end plate.

5. A vacuum pump of lightweight compact arrangement including a stator in the form of a ring the center portion of which defines a pump cavity, circumferentially spaced inlet and outlet chambers formed in said ring and extending axially through said stator, said inlet chamber having radially inwardly directed port means communicating with said pump cavity, said outlet chamber having inner and outer wall portions through which aligned openings extend with the inner wall portion opening being in communication with said pump cavity, a one-piece reversely folded leaf spring received in said outlet chamber and having separate leg portions in resilient covering relation with said openings, and inlet end plate covering one end of said stator and enclosing one end of said pump cavity, an outlet end plate covering the other end of said stator and enclosing the other end of said pump cavity, said inlet and outlet end plates each being provided with a port in communication with said inlet and outlet chambers respectively, a rotor in said pump cavity, an outlet housing received against said outlet end plate and being provided with an enlarged circumferential expansion chamber in communication with the port of said outlet plate, a plurality of circumferentially spaced and radially directed discharge ports formed in said outlet housing and in communication with said expansion chamber, a centrally located bearing mounting portion forming a part of said outlet housing spaced from said outlet end plate, and a drive shaft received through a bearing carried by said mounting portion, said shaft extending through said outlet housing and outlet end plate and having an end thereof engaged with said rotor, said housing having formed therein an axially projecting annular rim spaced about said shaft and which is circumferentially apertured for communication between said bearing mounting portion and said expansion chamber, said rim being in reinforcing engagement with said outlet end plate.

6. A vacuum device operable by single hand manipulation for skin stimulating and cleaning purposes, said device including a casing open at one end and having received thereon a skin application head in register with said open end, said head including a nozzle-like protruding portion for skin application, vacuum control means forming a part of said head, a power source including a driven shaft in said casing, and a vacuum pump drivingly connected to said shaft within said casing intermediate said power source and said head, the inlet of said pump communicating with the interior of said head and the outlet of said pump being arranged in a plane along a side wall of said casing to discharge air outwardly therefrom in spaced relation to said head, said pump including a stator ring defining internally thereof a pump cavity with is enclosed by inlet and outlet end plates, a rotor in said cavity drivingly carried by said shaft which is received through said outlet end plate, inlet and outlet circumferentially spaced chambers formed in said stator in communication with said pump cavity, ports in said inlet and outlet end plates in communication with said inlet and outlet chambers respectively, and a pump discharge and shaft journalling housing attached to said outlet end plate, said housing being provided with a plurality of circumferentially spaced radially directed dis-

charge ports constituting the outlet of said pump, the outer end surface of said housing being provided centrally thereof with a recess in which is mounted a bearing for journalling said shaft.

7. A vacuum device operable by single hand manipulation for skin stimulating and cleaning purposes, said device including a casing open at one end and having received thereon a skin application head in register with said open end, said head including a nozzle-like protruding portion for skin application, vacuum control means forming a part of said head, a power source including a driven shaft in said casing, and a vacuum pump drivingly connected to said shaft within said casing intermediate said power source and said head, the inlet of said pump communicating with the interior of said head and the outlet of said pump being arranged in a plane along a side wall of said casing to discharge air outwardly therefrom in spaced relation to said head, said pump including a stator ring defining internally thereof a pump cavity which is enclosed by inlet and outlet end plates, a rotor in said cavity drivingly carried by said shaft which is received through said outlet end plate, inlet and outlet circumferentially spaced chambers formed in said stator in communication with said pump cavity, ports in said inlet and outlet end plates in communication with said inlet and outlet chambers respectively, a pump discharge and shaft journalling housing attached to said outlet end plate, said housing being provided with a plurality of circumferentially spaced radially directed discharge ports constituting the outlet of said pump, the outer end surface of said housing being provided centrally thereof with a recess in which is mounted a bearing for journalling said shaft, and a flat ring in engagement with the outer surface of said inlet end plate in covering relation with the outer peripheral portion thereof including the port therein, the inner surface portion covering said port being grooved from the inner periphery of said ring to define a radially directed inlet passageway in communication with the interior of said head.

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LAURENCE V. EFNER, *Primary Examiner.*