United States Patent [19]

Ward

[11] **3,768,735**

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[54] **COMBINATION SPRAY AND AERATOR DEVICE**

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[52] **U.S. Cl.** **239/428.5**, 239/441, 239/460

[51] **Int. Cl.** **E03c 1/84**

[58] **Field of Search** 239/428.5, 460, 587, 239/439, 441

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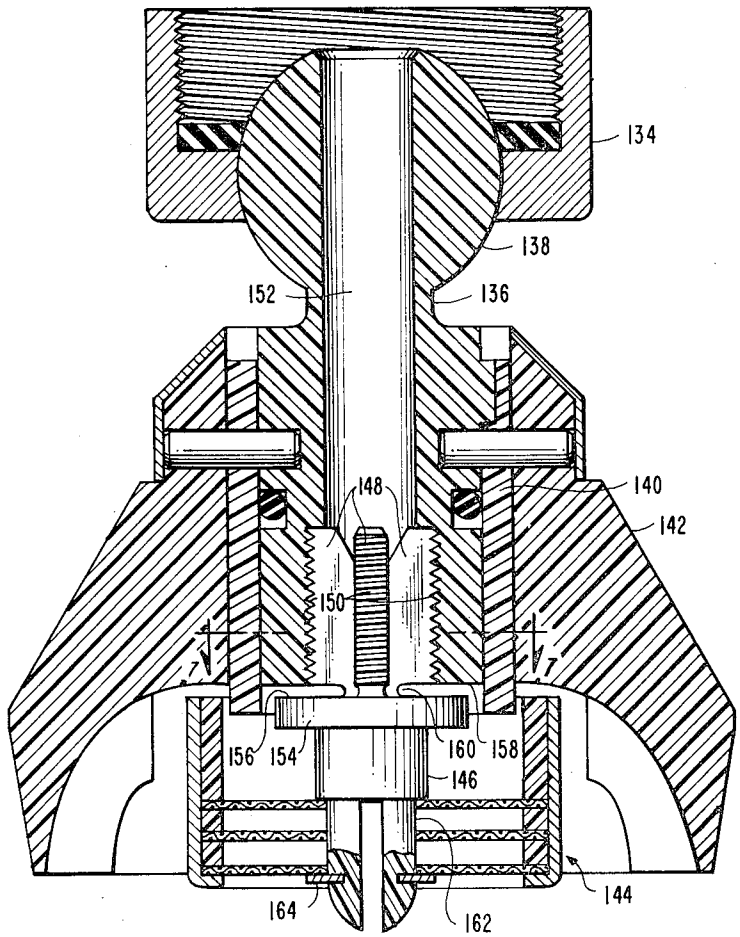
[57] **ABSTRACT**

A combination spray and aerator device is disclosed for attachment to a faucet and includes a deflector selectively movable between a stream deflecting position in which the water is caused to flow through an aerator assembly and a non-deflecting position in which the water flows unobstructed to a spray skirt. The deflector may comprise a sleeve axially displaceable between the deflecting and non-deflecting positions.

A filtering arrangement including a strainer cup positioned within a swivel ball at the upper extremity of the device prevents particles larger than a predetermined size from passing through the device.

To aid in providing a high quality aerated stream, the area of the flow passage is made progressively larger from the inlet to the discharge region of the device.

15 Claims, 7 Drawing Figures



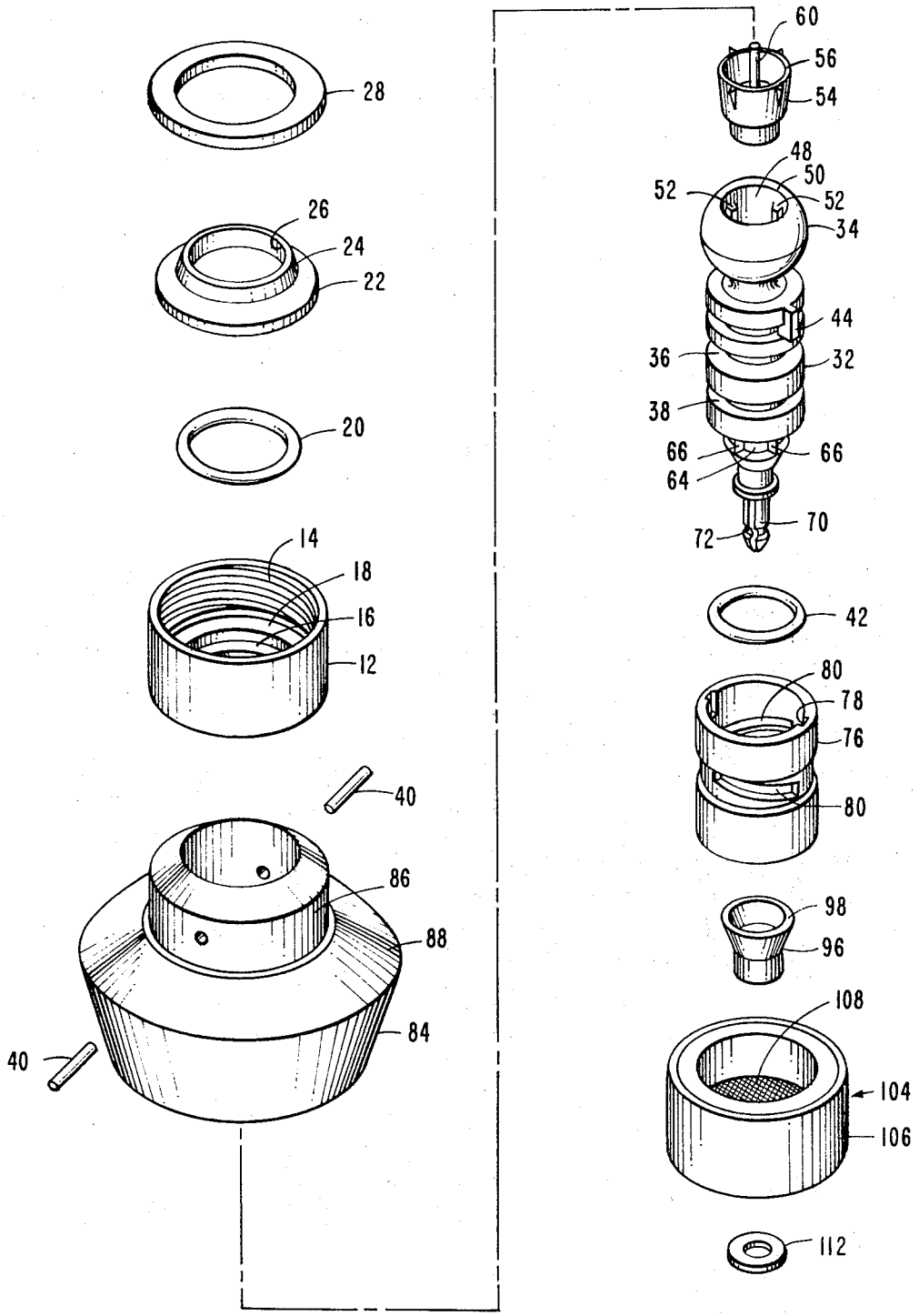


FIG.—1

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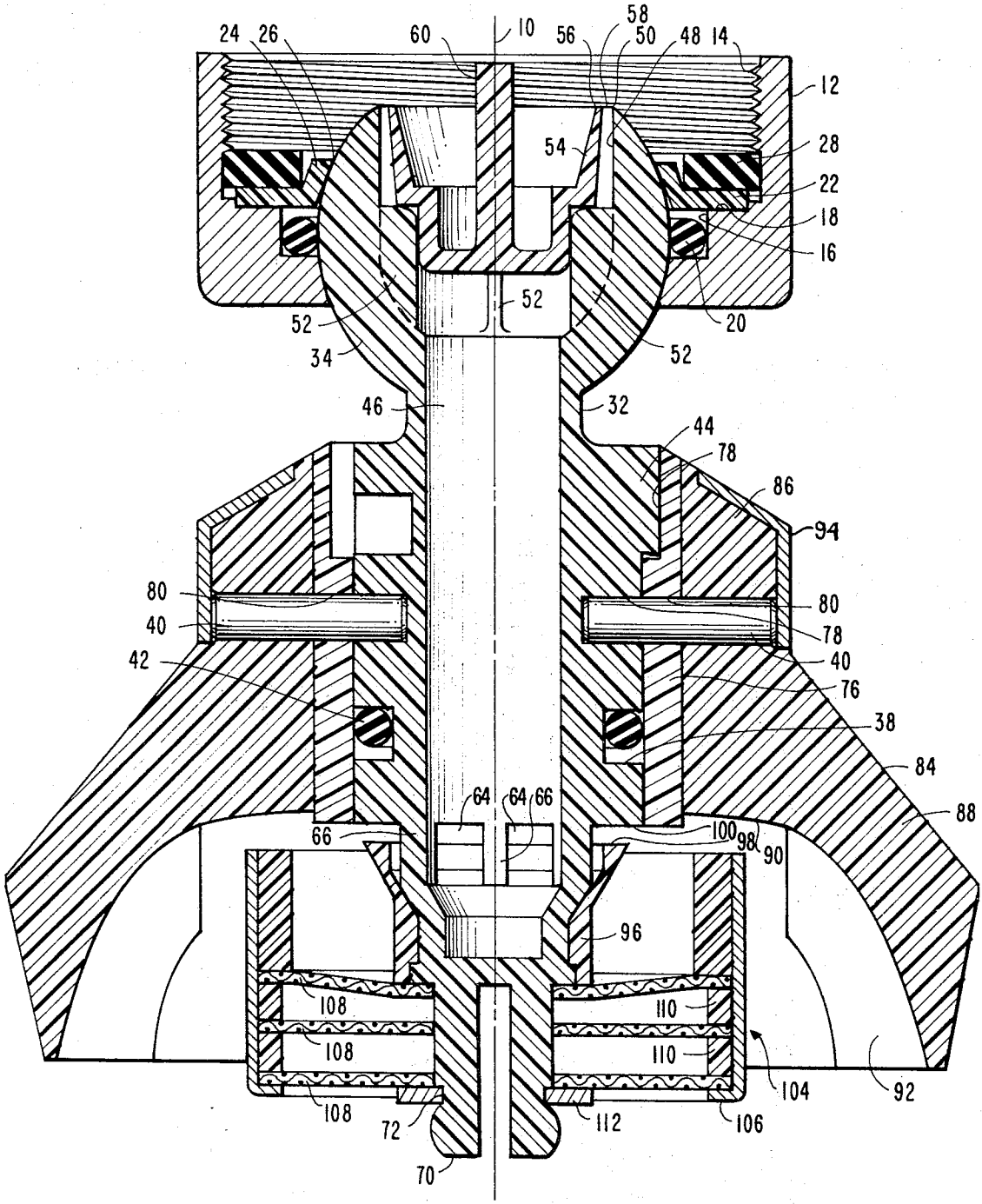

FIG. — 2

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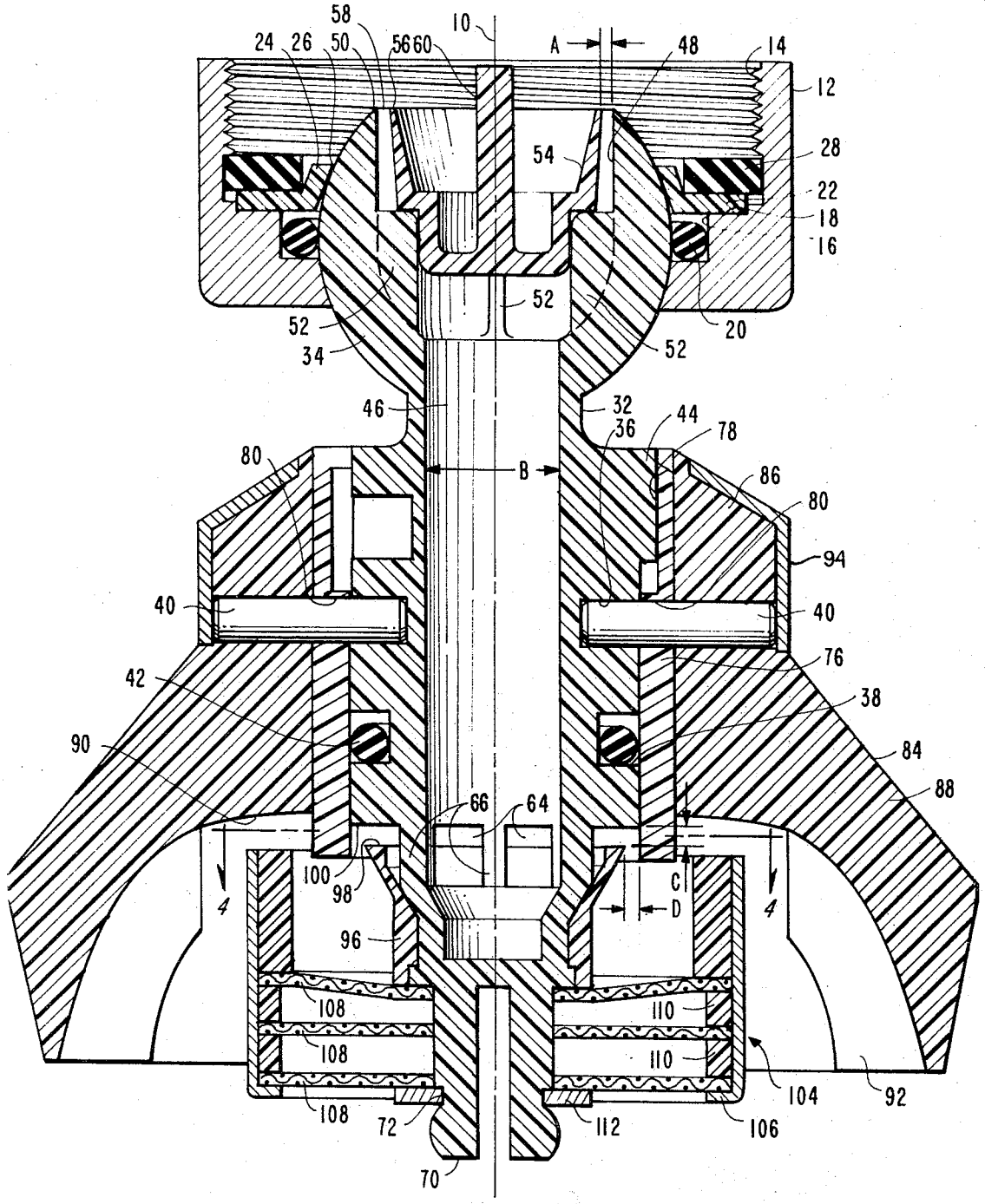

FIG. — 3

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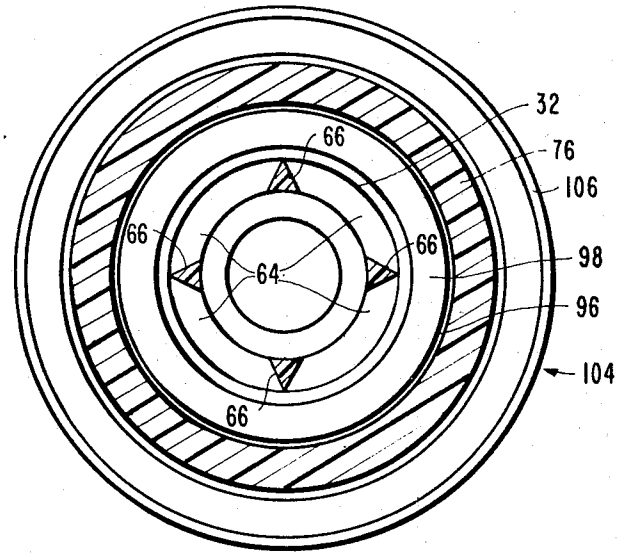
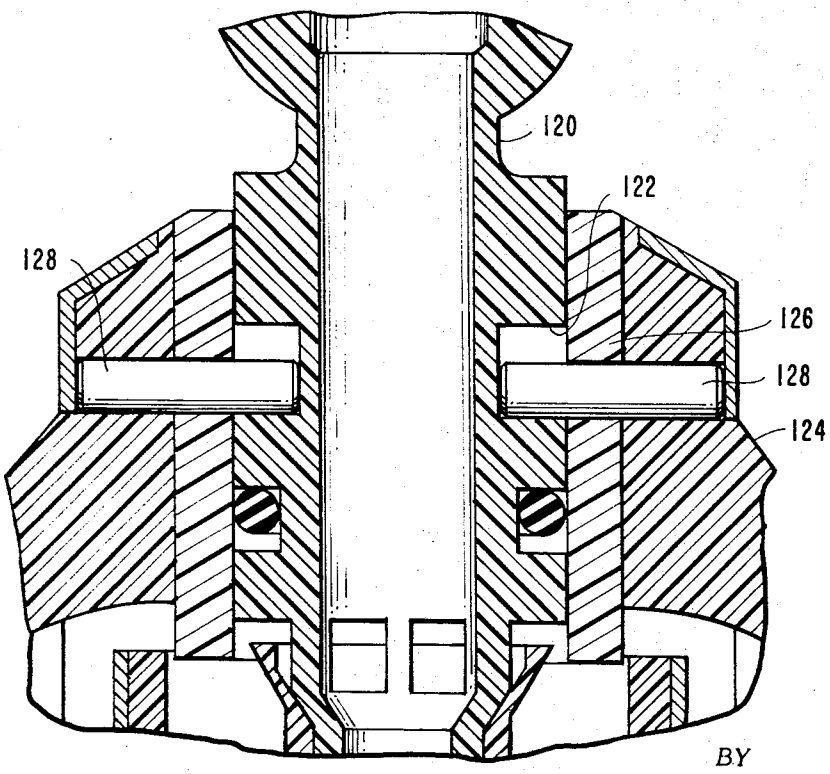


FIG. — 4

FIG. — 5



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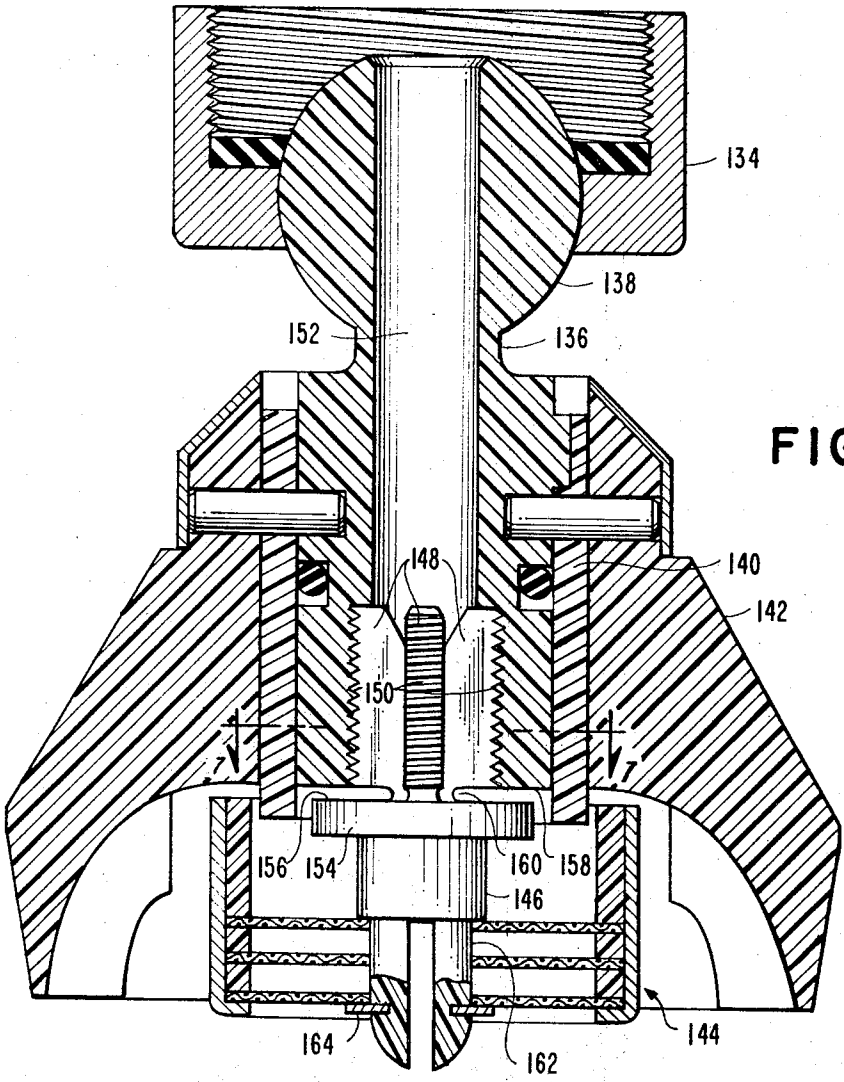

FIG. — 6

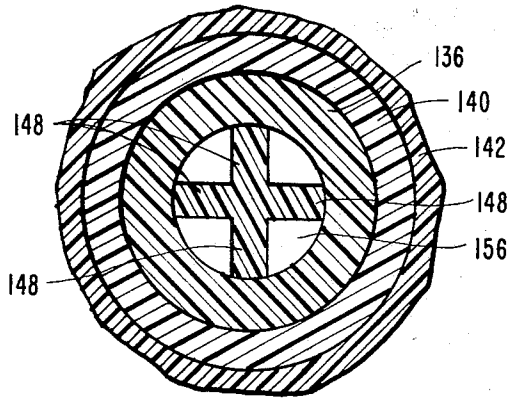

FIG. — 7

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COMBINATION SPRAY AND AERATOR DEVICE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to fluid devices having plural flow paths and particularly to spray-aerators adapted for attachment to water faucets or the like.

2. Description of the Prior Art

Presently known combination spray and aerator devices employ various types of valve mechanisms whereby the water is selectively directed through the spray-forming head or through the aerator. Several disadvantages inhere in such valve mechanisms which invariably involve the seating of a movable element against a stationary element to affect an appropriate seal between the passages leading to the spray head and those leading to the aerator. Thus, certain of the valve mechanisms of the prior art are subject to chatter at specific flow rates. Further, the typical utilization of the device, requiring frequent alternation between the spray and aerator modes, results in rapid wear of the valve elements with consequent deterioration of the ability of the valve to seal the aeration path from the spray path. It is not uncommon as a result of such wear for the water to emerge simultaneously from both the spray head and the aerator irrespective of the position of the valve. This, of course, contributes to the formation of a low quality aerated stream, that is, one which is non-uniform in cross-section and is subject to flutter, spin and "wild spots."

Further drawbacks of existing devices are the relatively high levels of breakout and sliding friction between the moving and non-moving parts of the valve mechanism requiring the application of excessive force to actuate the mechanism between the spray and aerator positions. In some prior devices, this is due in part to the presence of large diameter seals that have large contact areas and that are under considerable pressure. When the faucet is in the open position, this problem is compounded by having to displace the movable part of the valve against the pressure of the water.

Many of the prior art devices also tend to trap particles at various points along the flow path and require complete disassembly to clean.

SUMMARY OF THE INVENTION

According to the present invention, there is provided a combination spray and aerator device overcoming the foregoing disadvantages. Pursuant to an important aspect of the invention, instead of a valve mechanism, a deflector is utilized which is displaceable between a stream deflecting position in which the water stream is broken up and caused to flow through an aerator assembly and a non-deflecting position in which the water stream flows unobstructed to a spray skirt to emerge therefrom in a predetermined spray pattern.

The displacement of the deflector may be accomplished directly or through a cam mechanism providing a mechanical advantage; in either case, the pressure of the water does not impede movement of the deflector. Further, the use of the deflector effectively eliminates pressurization of sealing elements and seal contact areas are small so as to minimize friction.

By breaking up the water in the deflecting position, the deflector contributes to the formation of a high quality aerated stream, that is, one which is full and has a uniform, circular shape and is devoid of flutter, spin or "wild spots." The formation of such a stream is further enhanced in devices of the present invention by progressivly increasing the flow passage area from inlet to discharge. The flow velocity is thereby progressively reduced and the stream broken up and widened during its passage through the device.

One specific, exemplary form of the invention includes a central post adapted to be attached to a faucet or similar water source and having an aerator assembly attached to its lower end. A bore extends from the upper end of the post to a plurality of circumferentially-spaced discharge ports in the lower portion of the post.

A sleeve, disposed about the post in slidable relation thereto, is axially displaceable between a first or upper position in which the water passes unobstructed from the discharge ports of the post radially outward to a spray skirt and a second or lower position in which the water issuing from the discharge ports is deflected through about 90° to flow downwardly through the aerator assembly. Water from the post discharge ports is constrained to flow outwardly in the form of a uniform, radial sheet between a pair of spaced, parallel surfaces defined by the post and a flow directing element carried by the post.

The spray skirt surrounds the aerator assembly and sleeve and is coupled to the post for rotation thereabout. The spray skirt has an internal surface for receiving the water from the discharge ports when the sleeve is in the upper position. The internal surface defines spray forming and directing flutes shaped and oriented to establish the above-mentioned predetermined spray pattern.

In one specific form, the sleeve has helical cam surfaces engaged by pins secured to the spray skirt and rotation of the spray skirt about the post in one direction causes the sleeve to move to the above-mentioned upper, non-deflecting position while rotation of the skirt in the other direction moves the sleeve to the lower, stream deflecting position.

The upper extremity of the post may typically include a swivel ball retained by a threaded nut member adapted to be connected to the faucet. The device may thereby be swivedled, in well known fashion, to various angular positions relative to the faucet.

According to another aspect of the invention, a particle filtering arrangement is provided including a strainer cup nested within the upper extremity of the post bore.

The upper edge of the strainer cup has a diameter slightly smaller than the diameter of the upper extremity of the post bore to define a small annular inlet opening limiting the size of particles that can enter the bore. Most particles that are unable to enter the narrow inlet opening are flushed to one side or the other of the opening, that is, into the strainer cup or into the interior of the nut member. Any particles that become lodged in the inlet are pushed into the strainer cup by the action of a wiper ring carried by the threaded nut member, the ring having an inner edge in engagement with the swivel ball.

As already mentioned, a high quality, aerated stream is in part achieved by progressively increasing the flow passage areas downstream of the annular inlet opening. Thus, the cross-sectional area of the post bore is considerably larger than the area of the inlet opening.

Next, the radial sheet of water issuing from the post discharge ports (which in total area are large enough so as not to introduce any flow restrictions) has a flow area larger than the post bore. Still larger is the flow passage bounded by the sleeve (in its lower position) and forming the entry to the aerator assembly.

The aerator assembly, which includes a series of spaced screens, further breaks up and slows the water and tends to even out the stream. A washer underneath the aerator assembly retains the assembly on the post and further functions to additionally spread the stream and dampen its velocity.

Cleaning of devices of the present invention is accomplished simply by removing the device from the faucet and rinsing the nut member and strainer cup. There is little or no tendency for particles to accumulate at any point downstream of the inlet opening, such particles as are able to pass through the inlet opening being of such size that they are flushed through the entire device.

BRIEF DESCRIPTION OF THE DRAWINGS

Further objects, features and advantages of the present invention will become apparent from a reading of the following detailed description taken in conjunction with the accompanying drawings in which:

FIG. 1 is an exploded, perspective view of a combination spray and aerator device in accordance with one form of the invention;

FIG. 2 is an axial cross-section of the device of FIG. 1 showing the device in the spray position;

FIG. 3 is an axial cross-section of the device of FIG. 1 in which the device is shown in the aerator position;

FIG. 4 is a transverse cross-section of the device in the aerator position as shown in FIG. 3, the section being taken along the plane 4—4;

FIG. 5 is an axial cross-section of a portion of a spray-aerator device comprising an alternative form of the present invention;

FIG. 6 is an axial cross-section of a spray-aerator device in accordance with another alternative form of the present invention; and

FIG. 7 is a transverse cross-section of the device of FIG. 6 taken along the plane 7—7.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIGS. 1–4 of the drawings, a first form of a spray-aerator device according to the present invention is shown. The spray-aerator has a central, longitudinal axis 10 and includes a mounting nut 12 having an internal thread 14 for attachment, in conventional fashion, directly to a faucet (not shown) or to an adapter (not shown) which in turn is connected to the faucet. The nut 12 includes an annular recess 16 and a shoulder 18, the recess 16 receiving a sealing O-ring 20 and the shoulder 18 supporting a plastic wiper ring 22. The ring 22, which is preferably fabricated of Delrin (trademark of E. I. du Pont de Nemours & Co. for thermoplastic resin [—(—OCH_2—)n]), has an inwardly directed lip 24 including an inner wiping edge 26. A flat rubber gasket 28 rests on the wiper ring 22.

Depending from the mounting nut 12 is a central post 32 having a spherical swivel head 34 nested within the nut 12 so that the spray aerator device may be swiveled relative to the faucet to direct the discharge stream as desired. The inner edge 26 of the lip 24 maintains contact with the outer surface of the swivel head 34 as the post is swiveled.

The post 32 has a generally cylindrical central section including a pair of axially spaced grooves 36 and 38 formed in the outer surface thereof. The groove 36 receives the inner ends of a pair of pins 40 whose function will be described below; the groove 38 retains a sealing O-ring 42. Projecting from the upper part of the central section of the post 32 and integral therewith is an axially oriented key 44.

Extending along the major portion of the length of the post concentric of the axis 10 is a longitudinal bore 46. At its upper end, within the swivel head 34, the bore 46 is enlarged to form a receptacle 48 having an upper edge 50. Projecting inwardly from the wall of the receptacle 46 are four narrow, axially oriented ribs 52 upon which is seated a strainer cup 54. The cup 54 has an upper edge 56 defining together with the edge 50 a narrow, annular inlet opening 58. A rod 60 projects upwardly from the bottom of the cup 54 and serves as a handle to facilitate removal and re-insertion of the cup.

Near the lower end of the central bore 46 are several circumferentially spaced discharge ports 64. In the embodiment under consideration four such ports are shown although more or less than this number may be employed. The ports 64 are equally spaced about the central axis 10 and separated by struts 66 having a triangular cross section as best shown in FIG. 4.

The lower extremity of the post consists of a generally cylindrical, bifurcated tip 70 having a circumferential groove 72. The tip 70 may be compressed to bring the lower edges of the tip halves together; when released, the tip 70 springs back to the original configuration shown in the drawings.

Surrounding the central section of the post 32 in slidable relation thereto is a sleeve 76. The sleeve 76 may be made of Delrin and has an axially directed keyway 78 for receiving the post key 44 and the sleeve is thereby restricted to axial, that is, vertical movement relative to the post. The sleeve 76 further has a pair of diametrically opposed, symmetrical slots 80 oriented in skew relation to the central axis 10. By way of example, the slots 80 may be helically oriented with respect to the axis 10. The pins 40 extend through the slots 80.

A spray skirt 84, positioned concentric of the axis 10, surrounds the sleeve 76 and is freely movable relative to the sleeve. The skirt 84 comprises an upper cylindrical portion 86 having an internal bore receiving the sleeve 76 and a lower, enlarged portion 88 defining a flared, internal surface of revolution 90 having flutes 92 for directing the discharging water in the desired spray pattern. The design of the flutes to achieve a particular spray pattern is well known in the art; in the example shown there are 24 equally spaced flutes whose exit surfaces are angularly oriented relative to the central axis 10 so as to provide a spray pattern consisting of four streams parallel to the axis 10, eight streams diverging from the axis at an angle of 5° and 12 streams diverging from the axis at 10°. The skirt 84 may be made of clear acrylic plastic.

The cylincrical portion 86 of the spray skirt 84 has a pair of diametrically opposed holes retaining the outer portions of the pins 40. The outer ends of the pins lie flush with the outer surface of the cylindrical portion 86 of the skirt 84. The pins 40 and holes in which they are received may be dimensioned for a sliding fit and held in place by an ornamental sheet metal ring 94

bonded about the upper portion of the skirt 84. The pins 40 and holes in which they are received may be dimensioned for an interference or force fit so that once installed the pins are not readily removable; alternatively, the pins 40 may be dimensioned for a sliding fit and held in place by an ornamental sheet metal ring 94 bonded about the upper portion of the skirt 84.

A flow control element 96 of Delrin is attached to the lower part of the post 32 for shaping and directing the flow of water issuing from the post discharge ports 64. The control element 96 has an upper, planar surface 98 which, in cooperation with an adjacent, parallel surface 100 on the post 32, confines the water discharging from the ports 64 to flow outwardly toward the spray skirt 84 as a uniform, radial sheet.

An aerator assembly 104, carried by the tip 70 of the post 32, comprises a ring-like, metallic housing 106 containing a series of brass screens 108 separated axially by annular, plastic spacers 110.

The screens 108, of which there may be three in a typical installation, have central apertures for receiving the tip 70 and the aerator assembly 104 is retained by a brass washer 112 snapped into the groove 72. The screens may have various mesh sizes. In one practical example, each screen is made of 24-mesh stock. The lower portion of the spray skirt 84 substantially completely surrounds the aerator assembly 104 and the upper surface 114 of the assembly 104 is disposed a small distance below the surface 98 of the control element 96.

The cooperation of the pins 40 and the groove 36 constrains the skirt 84 to rotational movement about the post 32 while the key 44 restricts the sleeve 76 to axial movement relative to the post. It will be apparent that rotation of the skirt 84 will cause axial displacement of the sleeve 76, the surfaces of the slots 80 functioning as cams acted upon by the pins 40. The lower portion of the sleeve 76 is thereby movable into a position in which water issuing from the ports 64 is blocked and deflected to flow downwardly (FIG. 3). In the upper position of the sleeve 76, the lower edge of the sleeve is clear of the water discharging from the ports so that the water passes unobstructed to the inner surface 90 of the spray skirt 84 (FIG. 2).

According to another aspect of the invention, a high quality aerated stream is in part obtained by observing certain area relationships along the flow path. Generally, the area of the flow passage becomes progressively larger along the flow path thereby progressively reducing the stream velocity and breaking up the flow stream. With reference to FIG. 3, in one practical example of the invention, the area A of the annular inlet opening 58 is 0.0177 sq. in., the cross-section area B of the post bore 46 is 0.0314 sq. in., the flow area C of the space between the surfaces 98 and 100 is approximately 0.0365 sq. in. and the annular area D defined by the outer edge of the flow control element 96 and the inner wall of the sleeve 76 is 0.041 sq. in. The total area of the ports 64 is large enough to preclude any restrictions from being introduced thereby and as a result the water flows outwardly between the surfaces 98 and 100 as an essentially solid sheet that is substantially uniform about the axis 10.

The quality of the aerated stream is further enhanced by the presence of the deflecting sleeve 76 against which the water breaks up and is provided with an inwardly directed component. The screens 108 further break up and slow the water and even out the flow. The washer 112 further dampens, that is, reduces the water velocity and also helps spread or "fatten" the stream thereby additionally compensating for the inward component introduced upon deflection from the sleeve 76. The size of the washer 112 determines its effectiveness for this purpose and according to the example under consideration, the washer has a diameter of five/sixteenth inch.

It will be appreciated that little or no back pressure is introduced by the deflecting sleeve 76 and as a consequence, there is no tendency for the water to infiltrate the interface between the sleeve 76 and the post 32 other than a minor amount due to splashing. Thus, as an alternative, with a small amount of oil or other water resistant lubricant applied to the outer surface of the post 32, the O-ring 42 may be eliminated. Even with the O-ring 42 present however, friction is minimized because the O-ring is not under pressure and is of a relatively small diameter thereby reducing the contact area. The mechanical advantage provided by the helical slots 80, of course, decreases even further the effort required to select the operating mode.

Devices according to the invention also incorporate a simple yet effective filtering arrangement. Basically, the narrow, annular inlet opening 58 is dimensioned to prevent particles above a minimum acceptable size from entering the device.

Most of the particles that are unable to enter the narrow inlet opening 58 are flushed to one side or the other of the opening, that is, into the strainer cup 54 or into the interior of the mounting nut 12, the relatively sharp edges 50 and 56 of the receptacle 48 and strainer cup 54, respectively, preventing accumulation of particles thereon. Any particles that become lodged in the annular inlet opening 58 will almost invariably have portions projecting upwardly from the inlet opening and may be removed by swiveling the device through a sufficent angular displacement so that the wiping edge 26 of the wiper ring 22 passes over the inlet opening 58 and pushes the particles into the strainer cup 54.

Cleaning of the device of the present invention is accomplished simply be removing the device from the faucet and rinsing the removable strainer cup 54 and the mounting nut 12.

Turning now to FIG. 5, there is shown an alternative form of the present invention including a central post 120 identical to the post 32 already described except that it has a pin-receiving upper groove 122 that is enlarged in the axial direction. The device includes a spray skirt 124 and sleeve 126 bonded together or otherwise joined so that these elements move as a single unit. Opposed pins 128 are secured to the skirt and sleeve and project into the groove 122. Because the axial length of the groove 122 is considerably larger than the diameter of the pins 128, the skirt and sleeve combination may be displaced vertically to the extent permitted by the groove to move the lower portion of the sleeve into, or out of, the water deflecting position.

The version of FIG. 5 does not incorporate the cam action furnished by the helical slots in the device of FIGS. 1–4; nevertheless, because there is little resistance to displacement of the sleeve, the force required to change the position of the sleeve is minimal.

FIGS. 6 and 7 show another version of the invention including a mounting nut 134, a central post 136 having a swivel head 138 coupled to the nut 134, a sleeve

140, a spray skirt 142 and an aerator assembly 144. All of these elements cooperate in the manners already described, and although this version does not include the strainer cup feature of the previously discussed forms of the invention, it will be understood that such feature may be utilized herein.

At its lower end, the post 136 includes a Delrin flow plug 146 having a series of axially-oriented flanges 148 whose outer extremities 150 are threadedly received within an expanded portion of the post bore 152. Although four flanges 148 are shown, it will be understood that more or less may be utilized. The plug 146 also includes a radial shoulder 154 having an upper surface 156 that cooperates with a radial surface 158 on the post 136 to constrain the water discharging from between the flanges 148 to flow outwardly as a relatively thin radial sheet. To facilitate the early formation of such water sheet, the axial flanges 148 may be undercut as shown at 160.

The lower extremity 162 of the flow plug 146 is bifurcated and grooved as described in connection with the tip 70 of the device of FIGS. 1–4 and in like fashion supports the aerator assembly 144 with a brass retaining and flow spreading washer 164.

It will be obvious to those skilled in the art that various modifications may be made to the examples of the invention described. While particular examples have been discussed, it will be understood that the invention is not limited thereto.

What is claimed is:

1. In a spray-aerator device including a conduit-defining means adapted to be connected to a faucet and conduct a flow of water therefrom, a spray-forming element attached to said conduit-defining means, an aerator assembly attached to said conduit-defining means and means coupled to said conduit-defining means for selectively directing said flow of water to emerge from said spray-forming element or from said aerator assembly, the improvement in which said flow-directing means includes a substantially smooth, continuous surface and is selectively movable between a first position in which said flow of water passes unobstructed to said spray-forming element and a second position in which said flow of water impinges upon said smooth, continuous surface of said flow-directing means and is broken up and deflected thereby to pass through said aerator assembly.

2. In a spray-aerator device, the combination including:

threaded nut means for attaching said device to a water source;

means coupled to said nut means for conducting water from said water source, said conducting means including water discharge ports;

spray-forming means coupled to said water-conducting means and having an internal, spray-forming surface;

aerator means coupled to said water-conducting means;

means operatively associated with said water-conducting means for directing said water flowing from said discharge ports, said water-directing means having a substantially smooth continuous surface extending generally perpendicular to the direction of water flowing from said ports, said water-directing means being movable relative to said ports and having a first position in which said water flows to said internal, spray-forming surface and a second position in which said water-directing means breaks up said water flowing from said ports and constrains said water to flow through said aerator means.

3. The combination, as defined in claim 2, including means adjacent said discharge ports for constraining the water issuing from said ports to flow as a substantialy uniform sheet outwardly toward said water-directing means.

4. The combination, as defined in claim 3, in which said spray-forming means is coupled to move said water-directing means between said first and second positions.

5. The combination, as defined in claim 2, in which the water-conducting means includes an inlet opening, the area of the flow passages of said device increasing progressively from that of said inlet opening.

6. A combination spray and aerator device adapted to be coupled to a faucet in swivable relation thereto, comprising:

means for attaching said device to said faucet;

a post having on the upper end thereof a swivel ball coupled to said faucet attaching means, said post including in the lower portion thereof a plurality of discharge ports, said post further having a longitudinal bore for conducting water from said faucet to said discharge ports;

means adjacent said discharge ports for confining the water issuing from said discharge ports to flow outwardly from said ports as a substantially uniform sheet transverse to said longitudinal bore;

a spray skirt coupled to said post and having an internal, spray-forming surface;

an aerator attached to the lower portion of said post; and,

a sleeve interposed between said post and said spray skirt, said sleeve being movable longitudinally relative to said post, said sleeve having a lower end portion and being coupled to said spray skirt for actuation thereby, said sleeve having an upper position in which said water flows unobstructed from said water-confining means to said internal, spray-forming surface, and a lower position in which said lower end portion of said sleeve deflects said water from said water-confining means to flow through said aerator.

7. A combination spray and aerator device, according to claim 6, in which:

said device includes a water inlet opening defined by said longitudinal bore at the upper end thereof; and,

the area of the flow passage increases progressivly from that of said inlet opening.

8. A combination spray and aerator device, according to claim 6, in which:

said sleeve is constrained to longitudinal movement relative to said post and includes skew cam surfaces;

said spray skirt is constrained to rotational movement relative to said post; and

which device includes:

sleeve actuating means secured to said spray skirt for rotation therewith and bearing against said cam surfaces, rotation of said skirt in one direction moving said sleeve upwardly to said upper position and rotation of said skirt in the other direction

moving said sleeve downwardly to said lower position.

9. A combination spray and aerator device, according to claim 6, in which:

said spray skirt and said sleeve are joined for movement as a single element and include means operatively associated with said post allowing longitudinal movement of said skirt and sleeve between limits defining said upper and lower positions.

10. A combination spray and aerator device, according to claim 6, in which:

a strainer cup having an upper, circular edge is seated within the upper portion of said longitudinal bore, the upper edge of said cup and the upper edge of said bore being concentric and in close approximation to form a narrow, annular inlet opening; and,

a wiper ring disposed within said faucet-attaching means, said ring having an inner edge maintained in wiping contact with the outer surface of said swivel ball, said inner edge being thereby adapted to push into said strainer cup any particles trapped in said annular inlet opening upon swiveling of said post.

11. A combination spray and aerator device, according to claim 6, in which:

said aerator is retained on said post by a washer coupled to the lower tip of said post, said washer having an overall diameter sufficient to spread and dampen the velocity of the water flowing through said aerator.

12. In a swivel-type flow control device for attachment to a water faucet, the combination including:

a post having an upper end including a swivel ball, said post including a longitudinal, central bore for conducting water from said faucet, said bore and the outer surface of said swivel ball intersecting along a circular edge;

a generally cylindrical strainer cup seated within said bore, said cup having an upper edge adjacent to and concentric with said circular edge, said upper edge of said cup and said circular edge being spaced apart to define a narrow annular inlet opening preventing particles larger than a minimum size from passing therethrough;

a threaded nut disposed about said swivel ball for attaching said device to said faucet; and

a wiper ring seated within said nut, said ring having an inner wiping edge in contact with said swivel ball, said wiping edge being thereby adapted to push into said cup any particles trapped in said annular inlet opening upon swiveling of said swivel member.

13. In a spray-aerator device, the combination including:

threaded nut means for attaching said device to a water source;

means coupled to said nut means for conducting water from said water source, said conducting means including water discharge ports;

spray-forming means coupled to said water-conducting means and having an internal, spray-forming surface;

aerator means coupled to said water-conducting means;

means operatively associated with said water-conducting means for directing said water flowing from said discharge ports, said water-directing means being movable relative to said ports and having a first position in which said water flows to said internal, spray-forming surface and a second position in which said water-directing means deflects said water to flow through said aerator means, said device including means adjacent said discharge ports for constraining the water issuing from said ports to flow as a substantially uniform sheet outwardly toward said water-directing means.

14. The combination, as defined in claim 13, in which said spray-forming means is coupled to move said water-directing means between said first and second positions.

15. The combination, as defined in claim 13, in which the water-conducting means includes an inlet opening, the area of the flow passages of said device increasing progressively from that of said inlet opening.

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PO-1050
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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,768,735 Dated October 30, 1973

Inventor(s) Irving A. Ward

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

Column 2, line 4, for "progressivly" read --progressively--; line 45, for "swivedled" read --swiveled--. Column 4, line 61, for "cylincrical" read --cylindrical--; lines 65, 66 and 67, after "skirt 84." delete "The pins 40 and holes in which they are received may be dimensioned for a sliding fit and held in place by an ornamental sheet metal ring 94". Column 5, line 1, before "The" delete "bonded about the upper portion of the skirt 84." Column 7, line 63, after "smooth" and before "continuous" insert a comma --,--. Column 8, line 53, for "progressivly" read --progressively--.

Signed and sealed this 23rd day of April 1974.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents