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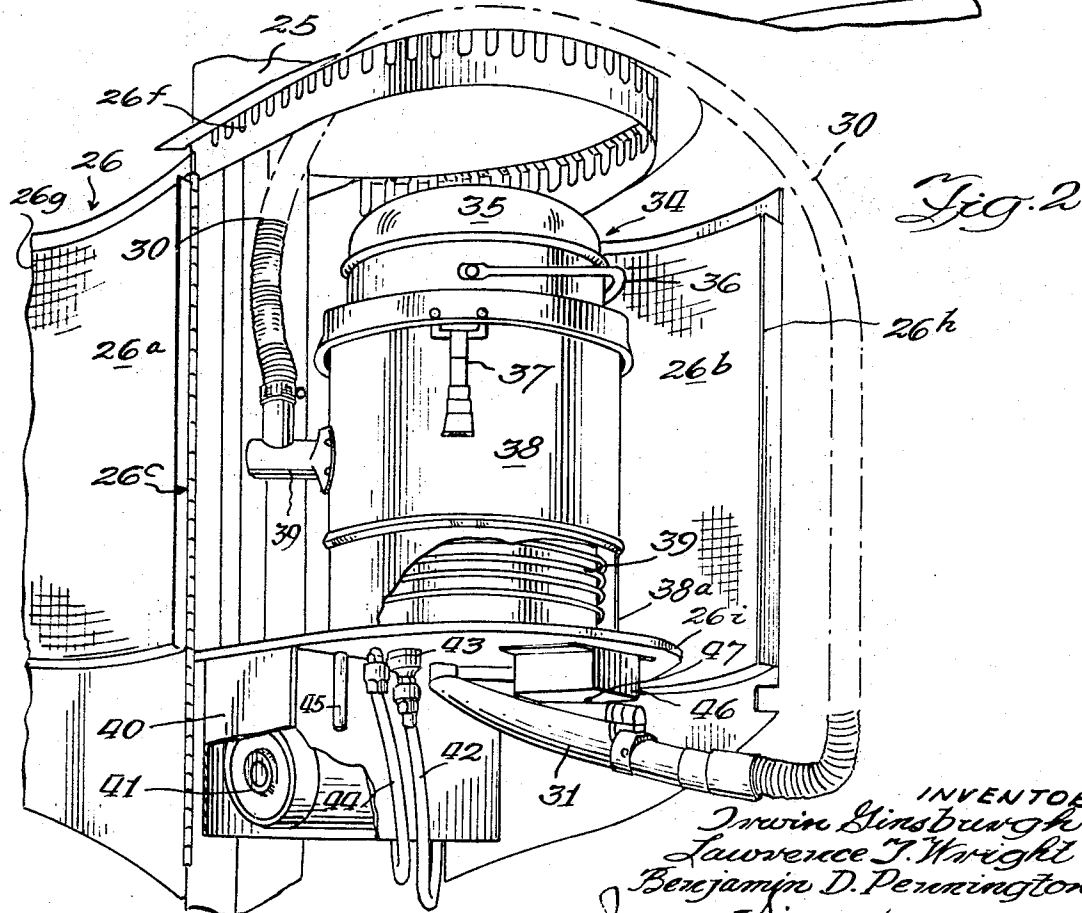
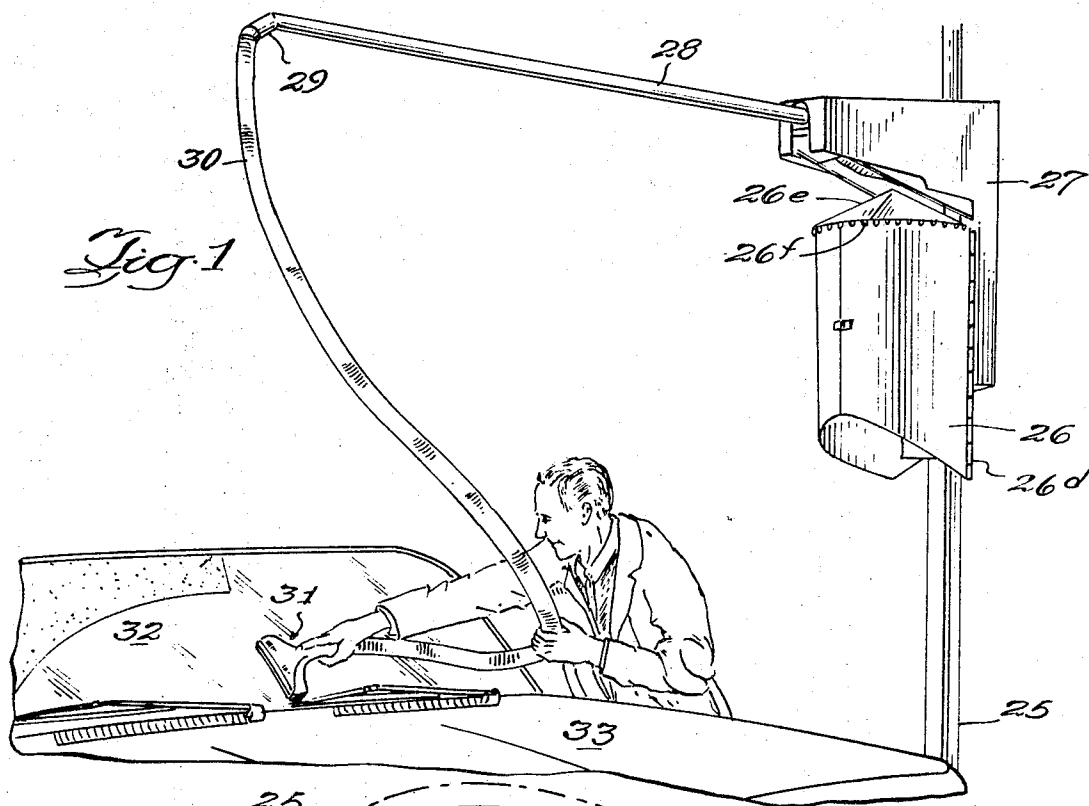
I. GINSBURGH ET AL

3,538,535

WINDOW CLEANING APPARATUS

Filed June 15, 1967

4 Sheets-Sheet 1



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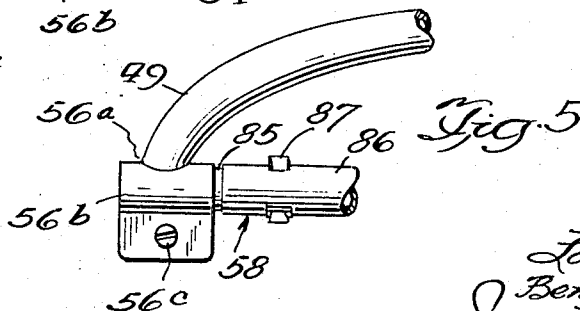
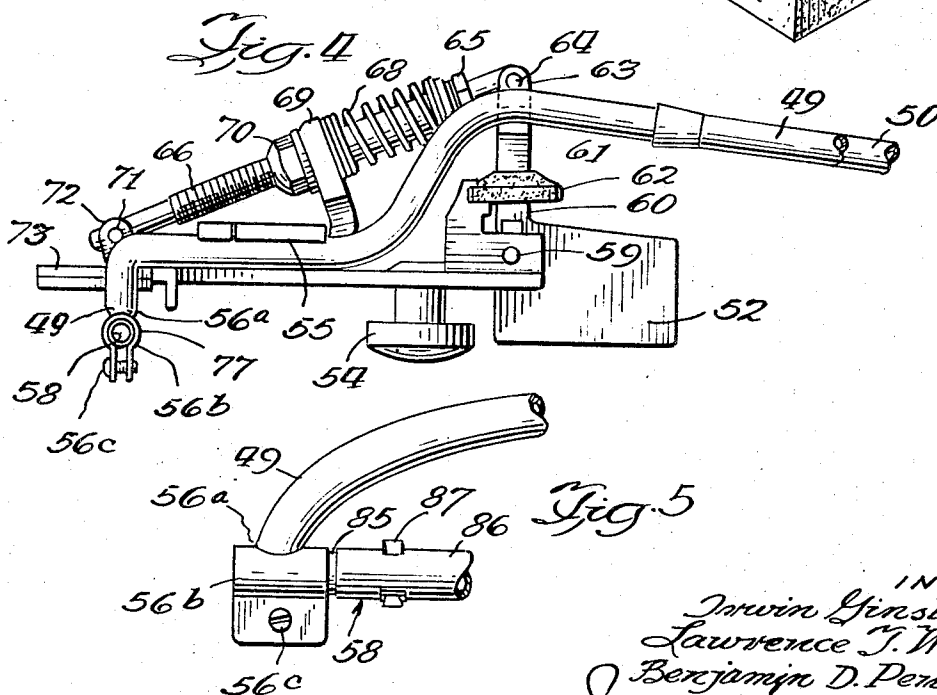
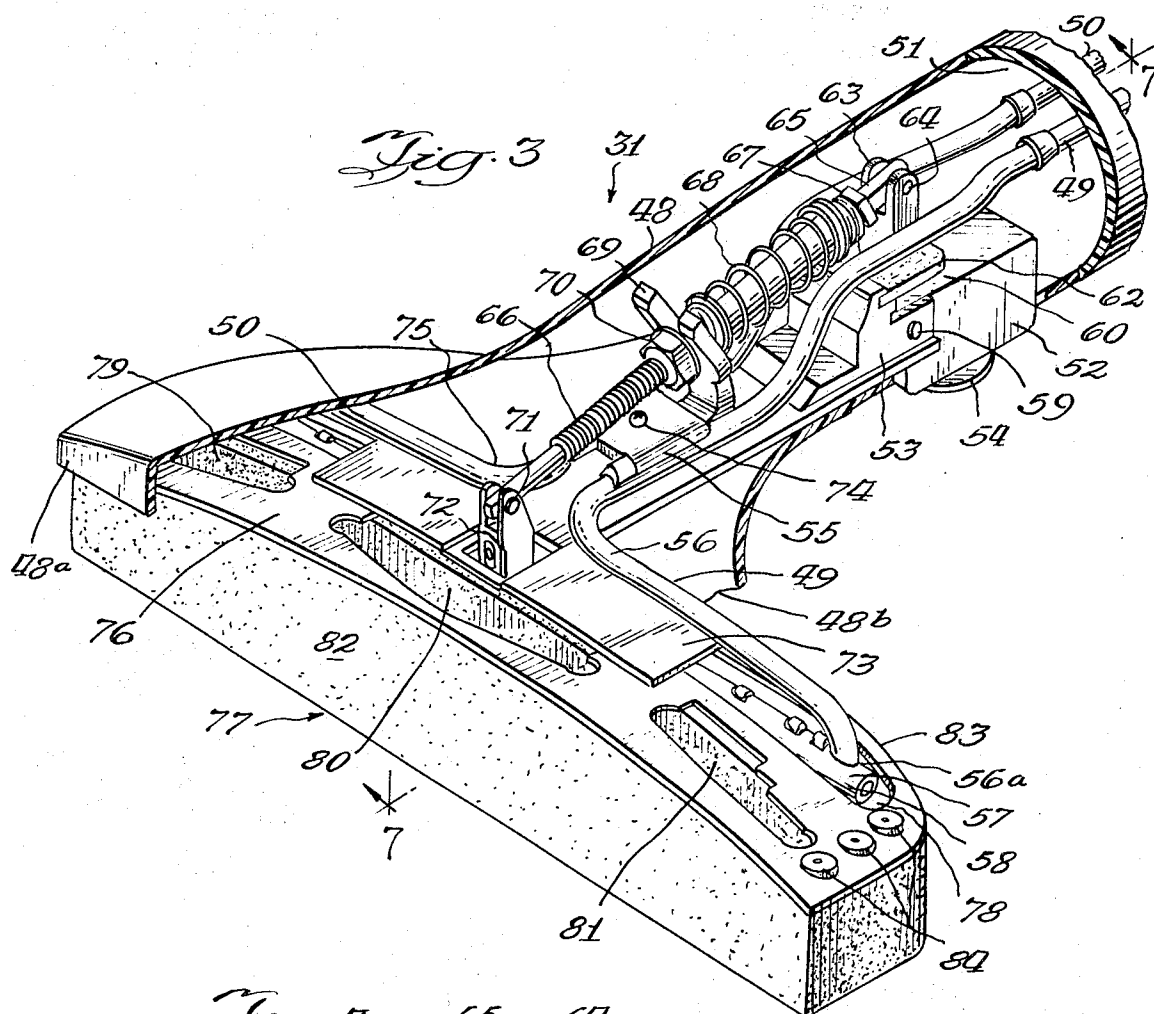
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WINDOW CLEANING APPARATUS

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4 Sheets-Sheet 2



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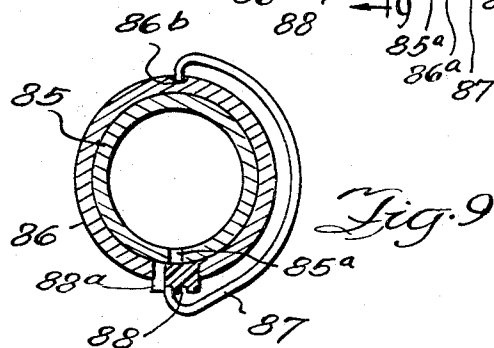
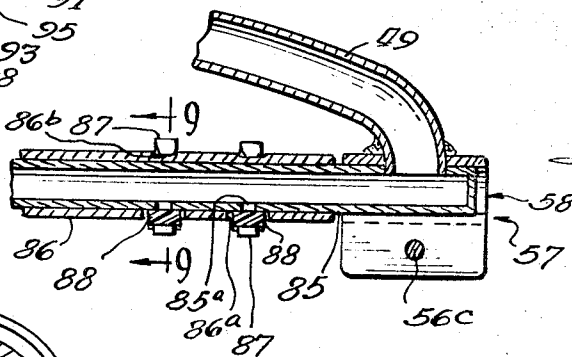
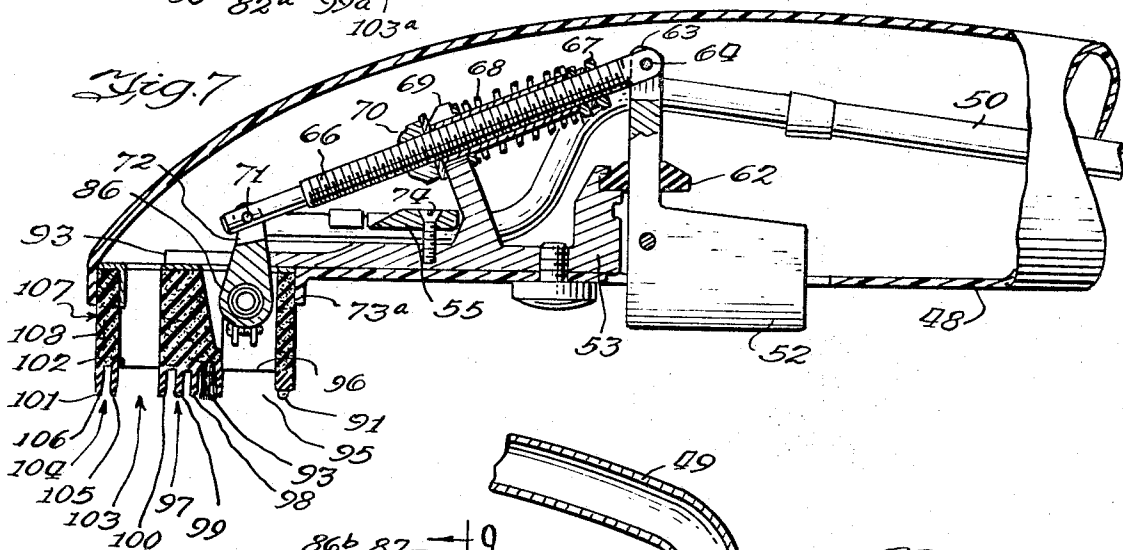
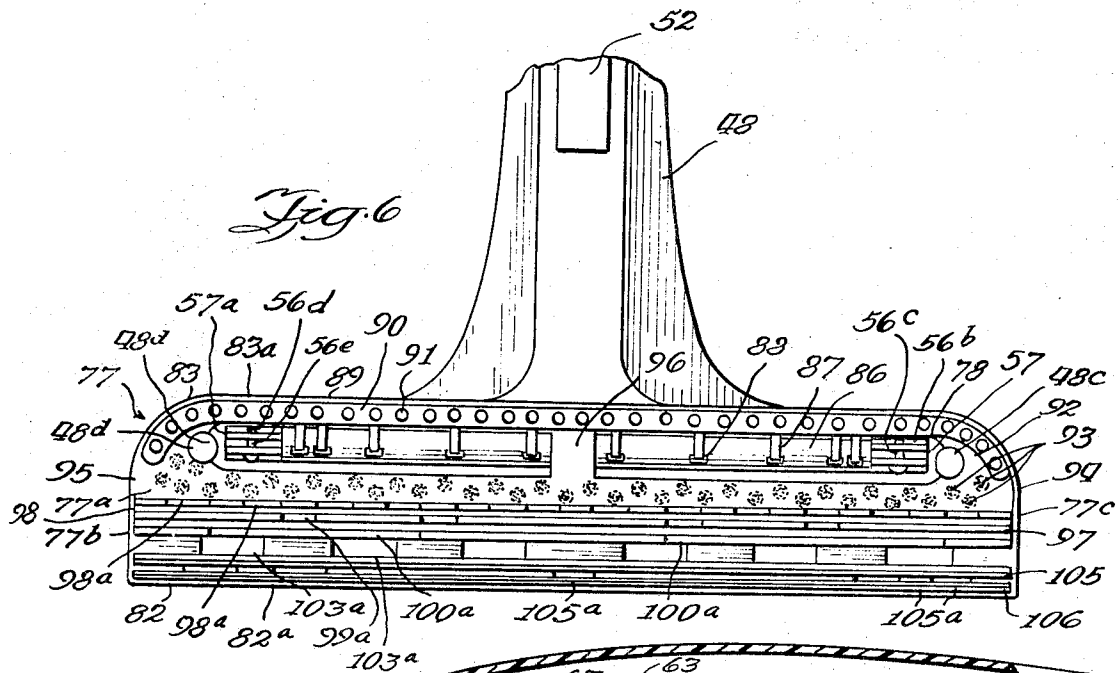
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WINDOW CLEANING APPARATUS

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4 Sheets-Sheet 3



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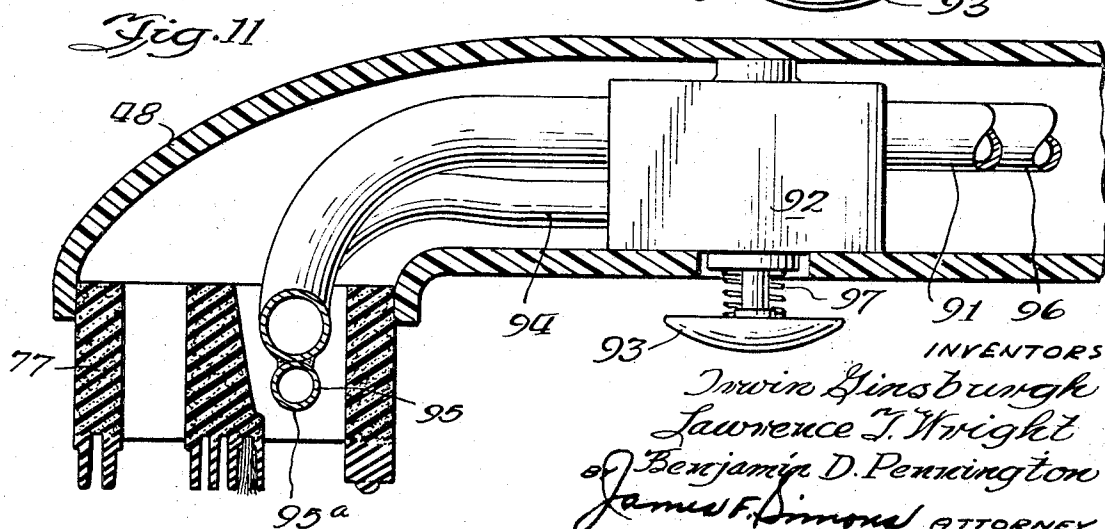
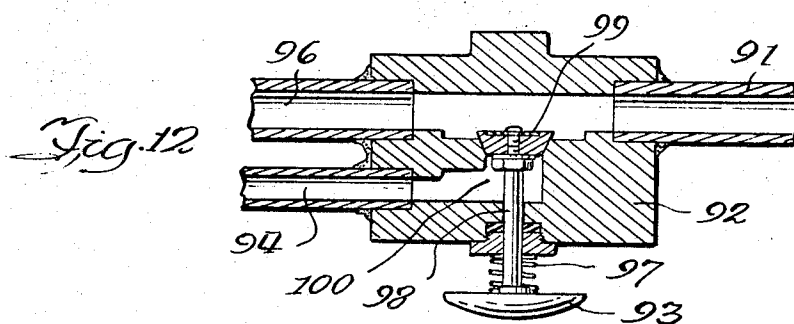
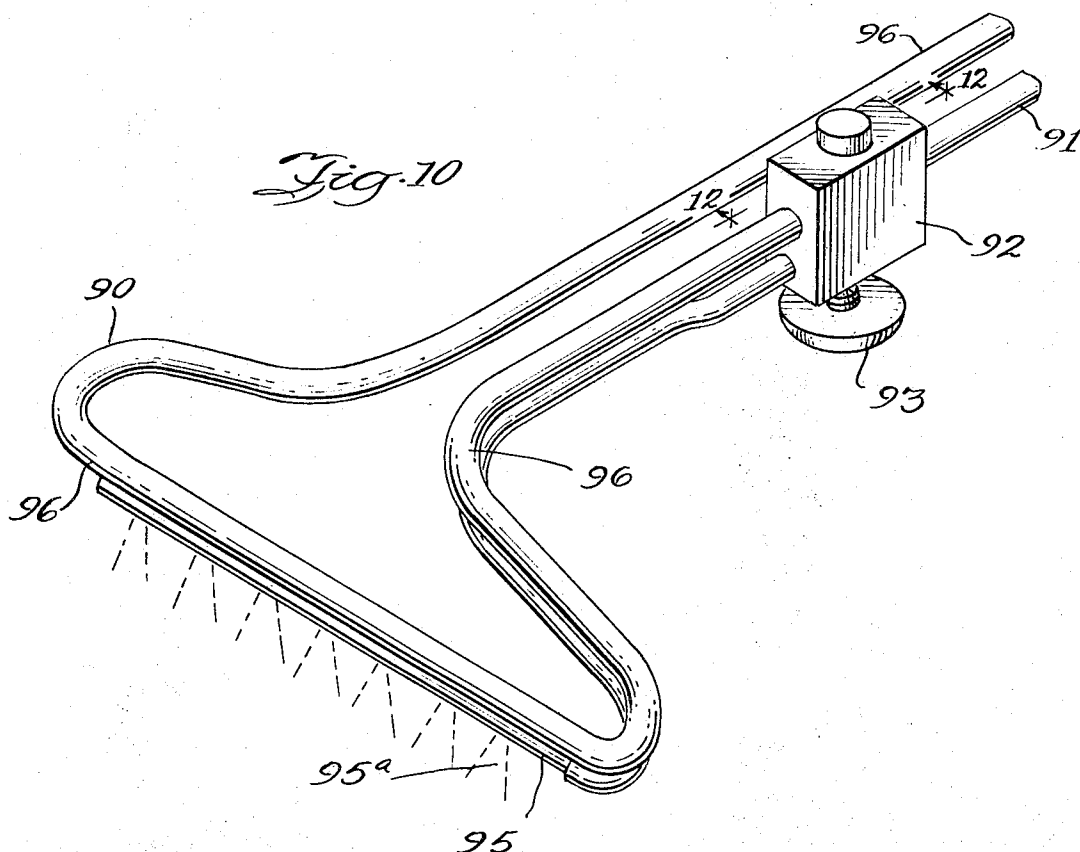
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4 Sheets-Sheet 4



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WINDOW CLEANING APPARATUS

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7 Claims

ABSTRACT OF THE DISCLOSURE

Apparatus for washing and drying window glass in a vehicle having a working end which includes a resilient rubber workpiece disposed below a valve means in a housing providing a handle. A plurality of conduit means for supplying and recycling a heated detergent and a vacuum, the conduits extending flexibly from the working end to a flexible rotating arm and therefrom to a central unit remotely located which produces the vacuum and supplies the heated detergent to the working end by means of a power source, a heated reservoir, a pump, and a turbine among others.

BACKGROUND OF THE INVENTION

The cleaning of windshields in automobiles and other vehicles in filling stations has for many years created problems for the merchandiser, the operator, and the consumer public who with frequency purchase gasoline and other vehicle services at filling stations. The cleaning of windshields and other window glass in vehicles includes washing, the removal of dust particles, road oils, bugs, and other accumulations, by the station attendant using a myriad of implements and fluids, even treated materials such as paper, fibers, etc., in an attempt to accomplish a customer-satisfying job with simplicity and with a minimum of effort and time to optimize the expense.

Because dirty, streaked, and improperly cleaned window glass impairs the vehicle driver's visibility, having properly cleaned vehicle glass is not only aesthetically desirable but it is demanded by standards of safety necessitated by high speed thoroughfares and highly powered vehicles. Furthermore, it is the desire of all purveyors of gasoline and other vehicle products to provide the purchasing public with improved services, particularly those services rendered which directly affect the safety of the motorist.

In the past, the conventional and well-known methods for cleaning the windshield and the window glass in vehicles has required the attendant to use a wet cloth or a sponge or other similar object to wash and clean the glass surface followed by drying with a squeegee in a time-consuming and frequently unsatisfactory operation. During periods of inclement weather, particularly when temperatures are below freezing, the conventional methods of cleaning glass in vehicles are generally entirely unsatisfactory because the wet sponges or cloths and the water sprayed upon the exterior glass surface tend to freeze in place. Consequently, fibrous materials such as paper, cloth, etc., impregnated with a cleaning agent have been used in an attempt to clean the glass surfaces of vehicles in what is generally known as a "dry" method which often results in streaking, and a retention of deposits on the glass surfaces and increases the danger of abrasion resulting in scratching of the window glass surface.

The prior art, such as U.S. Pat. Nos. 3,195,167 and 3,107,387 are illustrative of the present state of the art of cleaning various surfaces; however, it is apparent that

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none of the art anticipates nor renders obvious the novel combination of structural elements for producing the functional superior result described and claimed herein.

Accordingly, this invention provides a novel means for cleaning surfaces, particularly the exterior and interior surfaces of vehicle windshields and windows. This invention also provides a simple, self-contained unit for accomplishing the improved cleaning of vehicle glass at practically any temperatures without the spillage of liquids. Additionally, this novel apparatus eliminates the necessity for using several materials such as wet and dry cloths or sponges, additional water, and a drying piece because the functions of these objects used in the conventional practices are performed by the unitary workpiece described and claimed herein.

The simple novel apparatus of this invention is small, light, flexible, and easy to handle and operate, yet it supplies a heated detergent to the surface to be cleaned and a sheet of air to retrieve the liquid detergent and to pick up the dirt removed from the window. Consequently, the glass surface is left clean and dry. Finally, the invention provides a relatively inexpensive apparatus that is of such a construction that the supply means including the turbine producing a vacuum, the liquid reservoir and surrounding heater for providing hot detergent, the prime mover, pump, and other centrally located elements may be placed at a point remote from the working end.

SUMMARY OF THE INVENTION

This invention concerns apparatus for cleaning surfaces. The invention specifically concerns apparatus for cleaning the exterior and interior surfaces of windshields and window glass in the conventional, commercial and private motor vehicles.

Briefly, this invention includes a cleaning means including a handle terminating at one end in a housing containing a valve means, and a workpiece for applying a heated fluid such as a liquid detergent to a soiled surface, non-abrading edges and surfaces for cleaning, collecting, and drying through the employment of an airstream to provide a sheet of air to retrieve the liquid and to pick up dirt residues and to dry the cleaned surface. The housing at the working end is connected to a flexible conduit containing a plurality of conduits therein which are connected to the valve means within the housing for supply and returning the liquid. The plurality of conduits extend from the handle end of the housing of the work means to an end of a flexible, readily movable arm extending from a support. The plurality of conduits extend along the arm to a central supply means including a turbine for producing a vacuum, a liquid reservoir having a heater for supplying the heated detergent, a pump and prime mover for circulating the detergent, filter means, and valve and conduit means necessary for recirculation. The central supply means also includes a float within the reservoir and a signal means for giving an alarm at the high and low levels.

BRIEF DESCRIPTION OF THE DRAWINGS

A more complete understanding of the structural elements of this novel apparatus will be augmented by reference to the attached drawing wherein:

FIG. 1 is a perspective view of an embodiment of the apparatus being employed on a vehicle windshield;

FIG. 2 is a perspective partially broken view of the supply means having the cover open and showing the cleaning means when not in use;

FIG. 3 is a partially broken perspective view of the cleaning means portraying the conduits and linkage of the valve means positioned within the housing above the workpiece;

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FIG. 4 is an elevation view of the valve means;
 FIG. 5 is an exploded partial front view of FIG. 4;
 FIG. 6 is a bottom plan view of the workpiece;
 FIG. 7 is a sectional elevation view taken along line 7—7 of FIG. 3;

FIG. 8 is an exploded partial end view of the valve means in section;

FIG. 9 is a sectional view taken at 9—9 in FIG. 8;

FIG. 10 is a perspective view of an alternative embodiment of a valve means;

FIG. 11 is a sectional elevation view of the cleaning means having the alternative embodiment of the valve means; and

FIG. 12 is a sectional view of a part of the valve means taken along 12—12 of FIG. 10.

DESCRIPTION OF A PREFERRED EMBODIMENT

With reference to the perspective view of FIG. 1, the support member designated 25 holds the central supply means located within the hinged cover 26 located below shield means 27 through which extends arm 28 rotatably connected to support 25. Connected at its extended end 29 of arm 28 is flexible exterior conduit means 30 extending to the cleaning means 31 held by the man against the windshield 32 of a vehicle 33.

FIG. 2 is a perspective view of the central supply means 34 having the assembly cover 26 with doors 26a and 26b pivoted on hinges 26c and 26d to provide ready access to the central supply means 34 located therein. The cover 26 is equipped with a top 26e having openings to form ventilators 26f about the lower part of the periphery on top 26e. The doors 26a and 26b may be supplied with an interior installation 26g and 26h which extends from top 26e to the bottom plate 26i of the cover 26.

The central supply means 34 includes an upper housing 35 containing a turbine and a motor not shown for providing a vacuum or negative pressure to the exterior conduit 30. Upper housing 35 has a handle 36 and fastening means 37 for easy removal from reservoir 38. Reservoir 38 has connection means 39 to accommodate exterior conduit 30 and fluid circulatory conduits therein not shown in FIG. 2 for providing a heated liquid detergent to the cleaning means 31.

At the lower portion of reservoir 38 there is located a heating means 39 for supplying heat to the liquid detergent contained in reservoir 38. The upper housing 35 and the reservoir 38 of the central supply means 34 rest upon bottom plate 26i. Attached to the underside of bottom plate 26i is shield means 40 which covers a motor and pump 41.

Communicating with the bottom of reservoir 38 through plate 26i and connected to motor and pump 41 are recirculation line 42, filter 43, and liquid supply conduit 44. Drain 45 connects through plate 26i with the interior of reservoir 38 at its bottom portion 38a to provide a means for draining the liquid material from the reservoir 38. Cleaning means 31 is attached to the bottom side of switch housing 46 having manual switch 47.

Referring to FIG. 3 which provides a partially broken perspective view of the cleaning means generally designated 31, it is readily seen that the housing 48 is broken away to expose the liquid supply conduit 49, the recycle conduit 50, and the interior 51 of the exterior flexible vacuum line 30. Liquid supply line 49 passes through the housing above the trigger means 52, mounting means 53, and hanger 54. The liquid supply conduit 49 passes immediately below retaining means 55 and then passes outward and to the side by means of curved portion 56 and joins with the inlet end 57 of the distributor means 48 at junction 56a.

Trigger means 52 is pivotally connected at pivot 59 to push rod 60 having threaded portion 61 and sealing means 62 with a yoked terminus 63. Yoke 63 is pivotally connected at pivot 64 with a second push rod 65 having threads 66 extending essentially its full length. A first

movable retaining means 67 is located a short distance from yoke 63 and pivot 64 on rod 65 which holds a spring means 68 extends from retaining means 67 to stationary yoke 69 through which rod 65 passes. On the side of stationary yoke 69 opposite spring means 68 is movable stop means 70 threadably attached to rod 65 by means of exterior threads 66. At the other end of rod 65 is pivot 71 connecting the rod 65 to movable distributor lever 72.

A plate-like stop means 73 held in place by retaining means 55 and fastening means 74 extends below a portion of the liquid supply line 49 including a curved portion 56 and below the recycle line 50 and the curved portion 75 of recycle line 50. Stop means 73 is shaped to accommodate the extended portion of movable distributor lever 72 and stop means 73 is in contact with the curved and rigid plate-like top portion 76 of workpiece 77. The rigid top portion 76 of workpiece 77 is provided with an elongated opening 78 to accommodate the distributor means 58 and elongated openings 79, 80, and 81 through which the dispensed cleaning liquid and dirt are retrieved by the air currents moving up through these openings of the housing of cleaning means 31 and on through the interior 51 of exterior conduit 30.

For purposes of clarification of the nomenclature and the interrelationship of structural elements, cleaning means 31 generally include all of the elements illustrated in the broken away perspective view of FIG. 3. This includes the shaped housing 48 which forms a handle and extends over and around the mechanical linkage, the supply conduit 49, the return conduit 50, the stop means 73, and the curved rigid top portion 76 of workpiece 77. Housing 48 terminates at one end in a shape similar to the shape of the top of workpiece 77 and a lip of the housing designated 48a extends along the trailing side 82 of workpiece 77, and a lip 48b of housing 50 extends over the leading side 83 of workpiece 77. Workpiece 77 has rigid top plate 76 immediately joining its resilient mass at its top and the top plate is equipped with snap type fastening means 84 at each end to fasten workpiece 77 to housing 48.

FIG. 4 is an elevation view of the valve means including the mechanical linkage contained within the housing 48 of cleaning means 31 showing supply and return conduits 49 and 50 respectively. Supply conduit 49 joins distributor means 58 at its inlet end 57. Distributor means 58 is seen in an end view at its inlet end 57 in FIG. 4 and an end view of the plate-like supply means 73 is also shown.

FIG. 5 is a slightly exploded partial front view from FIG. 4 of supply conduit 49, a portion of distributor means 58 at its inlet end 57 and the juncture 56a of conduit 49 with the inlet end 57 of distributor means 58 through adapter sleeve 56b having adjusting means 56c. Retaining means 56b houses the inner rigid distributor conduit 85 over which is located a movable sleeve 86 having a plurality of clip type retaining means 87.

FIG. 6 is a bottom plan view of the workpiece 77 including a portion of the bottom of housing 48 and a portion of trigger means 52. Workpiece 77 has face 77a terminating in ends 77b and 77c and trailing edge 82a adjacent trailing side 82 and leading edge 83a adjacent leading side 83. Through elongated opening 78 in face 77a, the bottom of distributor means 58 is clearly visible including inlet end 57, and exit end 57a, each having adapter sleeves 56b and 56d respectively, and their respective adjusting means 56c and 56e. Extending between the inlet end 57 and the outlet end 57a of distributor means 58 is movable sleeve 86 having the plurality of clip type retaining means 87 holding plugs 88.

Face 77a of workpiece 77 has at its leading edge 83a a thin foam rubber wrapper 89 which extends from leading edge 83a across the entire thickness of workpiece 77 at the leading side 83. Bordering the leading edge of elongated opening 78 is a more durable and less resilient first rubber portion 90 having raised portions or knobs 91.

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Bordering elongated opening 78 on its other side, the trailing side, is a second rubber portion 92 countersunk into the face 77a of workpiece 77 having a surface below the surface of first rubber portion 90 from which surface extends a bank of brushes 93 in a continuous manner across the face 77a of workpiece 77. At each end 77b and 77c of face 77a are openings 94 and 95 respectively which have substantially the same depth as the second rubber portion 92 within the face 77a of workpiece 77, and openings 94 and 95 have essentially the same width as brush bank 93. Extending transversely across elongated opening 77 from the second rubber portion 92 and countersunk within face 77a is rubber reinforcing strip 96 attached to first rubber portion 90 and second rubber portion 92.

Adjacent the brush bank 93 along its trailing side is a third rubber portion 97 having a series of thin rubber projections extending upward out of the countersunk floor of the face 77a of workpiece 77. These thin rubber projections extend longitudinally across face 77a from end 77b to end 77c. The first projection 98 has regular indentations 98a. The second projection 99 has spaced indentations 99a along its length and the third projection 100 contains a plurality of indentations 100a which are substantially longer than any indentations on projections 98 and 99. The spaces between the projections 98, 99 and 100 are open to the atmosphere at each end 77b and 77c of face 77a and these openings have a depth of the distance between the face level 101 and the floor level 102 from which they project to form face 77a.

A fourth rubber portion 103 extending longitudinally across face 77a adjacent the third rubber portion 97 has openings 103a located at the floor level 102 of face 77a. A fifth rubber portion 104 has a plurality of spaced rails or projections 105 and 106 extending from the floor level 102 of face 77a. Spaced at intervals between the projections 105 and 106 are openings 105a.

FIG. 7 is a sectional elevation view taken along line 7-7 of FIG. 3 illustrating the structure of workpiece 77 which is set within a sponge rubber receiver 107, and the more stable rubber includes the first of fifth rubber portions of face 77a previously described. This more stable rubber extends for approximately 1/2" into the foam rubber receiver which forms a backing and has an apron 108 including wrapper 89 extending about the more stable rubber forming the face 77a of the workpiece 77. The foam rubber receiver further functions as a backing to allow the more stable rubber face to form a tight-fitting three dimensional configuration over a shaped surface to be cleaned.

FIG. 7 further illustrates the trigger means 52 including the resilient sealing member 62 which prevents the escape of negative air pressure, that is, the entry of air from the atmosphere as a result of the vacuum existing within housing 48 when the trigger is pulled. Resilient sealing member 62 is retained in place by the top portion of mounting means 53. Stop means 73 has a lip portion 73a fitted to hold workpiece 77 in position. Movable distributor lever 72 is rigidly mounted on outer movable distributor sleeve 86.

FIG. 8 is an exploded partial end view of the valve means in section wherein supply conduit 49 communicates with distributor means 58 at the inlet end 57 with the interior of the inner rigid distributor conduit 85 having a plurality of openings 85a. Openings 85a in the inner rigid distributor conduit 85 are each located in a transverse plain with companion openings 86a located in the outer movable sleeve 86. The outer surface of conduit 85 and the inner surface of conduit 86 are in contact; however, the fit is such that outer sleeve 86 can be rotated a small amount about the inner conduit 85 to bring the openings 85a and 86a into coincidence. Plug 88 is held in place by retaining means 87 which has a semicircular appearance in cross-section as seen in FIG. 9.

FIG. 9 is a sectional view taken along line 9-9 in FIG. 8 to illustrate the interrelation of structural ele-

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ments in the distributor means 58. The retaining means 87 contacts the exterior surface of outer distributor conduit 86 at one end and urges the plug 88 into the opening 86a in the outer distributor conduit 86 so that the inner surface of plug 88 is forced against the exterior surface of inner rigid conduit 85. Plug 88 has opening 88a which can coincide with opening 86a. One end of retaining means 87 fits in indentation 86b in the exterior surface of movable conduit 86.

FIG. 10 is an alternative embodiment of a distributor means designated generally 90 including an inlet line 91 passing through a valve housing 92 having a trigger means 93 and a bypass line 94 which connects with a rigid distributor conduit 95. Bypass conduit 94 and distributor conduit 95 are connected to recirculation line 96. Distributor conduit 95 has a plurality of openings 95a through which the hot detergent fluid may pass.

FIG. 11 is a sectional elevation view of the embodiment of the distributor means 90 within the housing 48 having the workpiece 77 attached thereto. FIG. 11 illustrates the disposition of inlet conduit 91, recirculation conduit 96 valve, housing 92, bypass conduit 94, and distributor conduit 95 having openings 95a.

FIG. 12 is a cross-sectional view of the valve housing 92 in section illustrating inlet conduit 91, recirculation conduit 96, bypass conduit 94, and trigger means 93 also in section. Trigger means 93 includes spring means 97 and shaft 98 which terminates in a closure means 99 which results in bypass chamber 100.

In operation, when a vehicle requiring the services of the conventional service station moves into position along an island having gas pumps for gasoline or other conventional products and services including the cleaning of the windshield and window glass, the operator removes the cleaning means 31 from switch housing 46 which automatically commences the operation of the turbine which creates a vacuum within the exterior conduit 30 and means 31. Alternatively, manual switch 47 can be thrown to commence the operation of the turbine located in the upper housing 35 of the central supply means 34 as illustrated in FIG. 2. As the operator moves the cleaning means toward a vehicle, arm 28 rotating on support 25 is pulled out over the vehicle for easy access to the surface 32 to be cleaned.

To commence the flow of detergent the operator presses the trigger means 52 on the apparatus shown in FIG. 3. If the surfaces to be cleaned are particularly dirty, the operator may wet the surface by pressing trigger means 52 while holding the face 77a of workpiece 77 a short distance from the glass to permit the heated detergent solution to penetrate the dirt on the surface of the glass. When the operator commences the cleaning of the surfaces by placing face 77a against the surface to be cleaned he reaches forward with the cleaning means 31 in a controlled position by resting the trailing edge 82a firmly against the surface with nylon feet 48c and 48d against the glass surface and the cleaning means 31 is pulled steadily toward the operator. A single pass taking a swath about equal to the distance from end 77b to end 77c of the cleaning means 31 is sufficient to thoroughly clean that width of the glass surface. Before the operator removes cleaning means 31 from switch housing 46, although the turbine located in upper housing 35 in central supply means 34 is not operating, the circulation system is functioning and the heated detergent solution is continually being moved from reservoir 38 through supply line 44 into the supply conduit 49 and through the closed distributor means 58 and back through recirculation conduit 50, line 42, and filter 43 to the reservoir.

When the operator removes the cleaning means 31 from its hanger position below switch housing 47 and presses trigger means 52 of FIG. 4, rigid pushrod 60 being an integral part of trigger means 52 moves forward deforming resilient seal means 62 which provides a seal for the interior of the housing and pushrod 65 is moved forward against spring 68 through the rigid guide

means or stationary yoke 69 which transmits a circular motion in the same direction to movable distributor lever 72 which is rigidly connected to the rotatably movable exterior conduit 86 of distributor means 58. As the exterior conduit 86 rotates about its longitudinal axis over the interior rigid conduit 85 of distributor means 58, opening in plug 88 set into conduit 86 and held by retaining means 87 moves into a position of coincidence with the port located in the inner conduit 85 so that communication to the atmosphere is established and the small coincidental openings allow part of the heated detergent solution to flow from the interior conduit 85.

Only a portion of the solution being passed through the interior conduit of the distributor means flows through the coincidental openings and the remainder is recirculated through conduit 50 to reservoir 38. The plug 88 held in place against the exterior surface of inner conduit 85 by retaining means 87 may be made of any suitable material such as plastic, substantially non-deformable rubber or any other similarly suitable artificial material so long as the mating face of plug 88 will form a seal over the opening 85a in conduit 85 and yet bring into coincidence opening 88a of plug 88 with opening 85a when the outer movable conduit 86 is rotated about its longitudinal axis by actuation of the trigger means 52 and the attendant movement of the linkages affixed thereto.

With reference to FIG. 6 during the operation of cleaning means 31, the operator places the face 77a of workpiece 77 against the glass surface and presses trigger means 52 so that a heated detergent solution is expelled from plug opening 88a through elongated opening 78 in workpiece 77 and trailing edge 82a forms a seal against the passage of air. Feet 48c and 48d ride on the glass surface as the operator pulls the cleaning means 31 toward his body causing edge 83a and side 83 to be the leading edge and side respectively. With the cleaning means in this position knobs 91 of first portion 90 permit the entry of a sheet of air. This sheet of air prevents splash and guides the liquid detergent solution and the air and solution aided by the brush bank 93 and the plurality of thin plate-like projects forming squeegees of the third rubber portion of face 77a combine to function continuously in heating, wetting, and removing the dirt from the surface of the glass which is then pulled into housing 48 through suction ports 103a in the fourth rubber portion of the face. Larger projections forming rails of the fifth rubber portion have smaller suction ports 105a therebetween which combine to function to remove any remaining dirt and liquid and to dry the surface by pulling the remaining material through suction ports 105a.

The operation of the cleaning means 31 provides a single pass operation. The continuous influx of a sheet of air from between the leading edge 83a and the glass surface while a heated detergent is being emitted from the elongated opening 78 and these materials are pulled under and through the brush bank 93 and across the series of rubber projections of the third portion 97 where the dirt and detergent solution is removed from the glass surface by the projections 98, 99, and 100 having indentations which allow the air, detergent solution, and dirt to be pulled through the projections and into the vacuum ports 103a and any remaining material is pulled through the vacuum ports 105a of the fifth rubber section of face 77a and carried through housing 48 and exterior conduit 30 to reservoir 38.

The detergent solution may be any of the conventional and well-known detergent mixtures suitable for cleaning glass surfaces without harmful effects to soft metal trim, paint, wax, and other materials in a vehicle to which subjection might occur. The temperature of the heated detergent solution in reservoir 38 may be within the range of about 100–165° F., preferably about 140° F., and a temperature suitable for conducting a satisfactory cleaning job at the ambient temperature conditions

existing. The heating means 39 requires about 1400 watts of power. The pressure of the heated detergent solution provided should be within the range of about 10–40 p.s.i.g., preferably about 20 p.s.i.g. or any other reasonably suitable pressure necessary to provide satisfactory cleaning in this particular structural environment. The cleaning means including the housing 48 and the workpiece 77 can have a length of approximately 8½", a width from leading edge to trailing edge of approximately 1¾", and the depth of the leading and trailing sides 83 and 82 respectively can be about 1½" at the center and about 1" at each end. Face 77a is constructed from a more sturdy rubber or other similarly suitable resilient material having a depth of approximately ½" inlaid in a soft highly resilient sponge rubber material having an apron substantially wrapping the workpiece 77 between face 77a and the plate-like top portion 76. This construction provides a maximum of three dimensional deformational ability so that face 77a will substantially conform to the shaped surface to be cleaned.

The dimensions of some of the various elements of the novel embodiments of this invention may vary in accordance with the capacities of the central supply system which must provide a practical and realistic liquid detergent pressure and temperature so that effective cleaning conditions exist at the remotely located cleaning means 31. Accordingly, it has been found that the interior conduits 49 and 50 may have a diameter of about ¼" and the exterior conduit 30 may have a diameter within the range of about 1 to 2", preferably about 1½" when about ¼–½ gallon per minute of liquid is circulated while the turbine moved by a 1½ H.P. motor produces a vacuum sufficient to lift about 96" of water with a volumetric rate of air flow capacity of about 115 cubic feet per minute at the location of the central supply system. The workpiece 77 with face 77a and housing 48 are so constructed to allow the passage of about 35 cubic feet per minute of air. The distributor means 58 within the housing 48 of cleaning means 31 can deliver about 600 cubic centimeters per minute of the heated liquid detergent to the surface to be cleaned. It is apparent that the pressure and temperature of the liquid at the remotely located cleaning means 31 along with the amount of vacuum or negative pressure are important characteristics in the successful operation of this invention and that the design of the system within the confines of engineering knowledge may vary substantially.

In the operation of the alternative embodiment of the distributor means 90 shown in FIGS. 10, 11 and 12, the operating specifications remain essentially the same despite the fact that this embodiment may be substituted within housing 48 and workpiece 77 of cleaning means 31 previously described. When trigger means 93 is pressed against spring means 97 the rigidly connected shaft 98 having closure means 99 terminally located move upward to provide communication between bypass chamber 100 and supply conduit 91. Only a part of the fluid from supply conduit 91 passes into the bypass chamber 100 and bypass conduit 94 to be dispersed through ports 95a of distributor conduit 95 rigidly connected to return line 96 by means of brazing, welding, or any other suitable method. The adjacent location and contact of bypass conduit 94 and distributor conduit 95 permits the transfer of heat from the circulating fluid in return line 96 to the fluid being transmitted and dispersed in conduit 94 and conduit 95 respectively to prevent the freezing during operation in reduced temperatures. The ports 95a located in distributor conduit 95 are of a size and location to allow a uniform dispersal of detergent solution through workpiece 77 to the surface being cleaned at a rate of about 600 cubic centimeters per minute while the remainder of fluid supplied to the distributor means 90 is being returned to reservoir 38 through return conduit 96. Essentially, the operation of the cleaning means having the alternative embodiment of the distributor means 90 is the same as

previously described and no essential structural changes of any of the other elements are necessitated.

The novel subject matter of this invention provides a new and useful apparatus for performing a necessary service and results in the superior rendition of the service. The surprising and superior result accomplished through the use of the instant apparatus improves the motorist's visibility and promotes motoring safety.

The invention is described by reference to specific embodiments; however, it is understood that the embodiments are not intended to limit the scope of the invention, and they are presented only to teach the best modes contemplated for practicing this invention.

Having described the invention, what is claimed is:

1. Apparatus adapted to wash windows or the like comprising:
 - container means to hold a supply of cleaning liquid; hose means having a first end in communication with a vacuum source and the container means; cleaning means connected to the second end of the hose means and including
 - (a) a housing,
 - (b) means within the housing for distributing the cleaning liquid onto said window or the like, said distributing means having at least one opening, movable closure means for the opening which in a first position blocks said opening preventing cleaning liquid from flowing there-through and in a second position permits the liquid to flow through the opening onto said window or the like, and manually operable means for moving the closure means between the first and second position, and
 - (c) a cleaning member adapted to be brought into contact with the window or the like having at least one passageway extending through the cleaning member and disposed to receive the cleaning liquid passing from the distributing means, said passageway providing communication between the window or the like and the vacuum source;
- first and second conduit means, having first extensions within the hose means and second extensions within the housing, said first conduit means communicating between the container means and one end of the distributing means, and said second conduit means communicating between the other end of the distributing means and the container means, such that when the closure means is in the first position liquid flows from the container means through the first conduit means then along the distributing means, through the second conduit means and then back into the container means, and when the closure means is in the second position liquid flows through the opening in the distributor means onto the window or the like and is then returned to the container means through the passageway and the hose means.

2. The apparatus of claim 1 additionally including a means for heating the cleaning liquid.

3. The apparatus of claim 1 wherein the cleaning member has an elongated face with a plurality of longitudinally disposed squeegee blade means, said face being surrounded by a readily deformable support means.

4. The apparatus of claim 3 wherein said deformable support means is constructed of sponge rubber.

5. The apparatus of claim 3 wherein one of the squeegee blade means is adjacent a first side of the cleaning member and has a plurality of spaced protrusions such that when the protrusions rest upon the window or the like, the first side of the cleaning member is slightly elevated permitting air to be drawn under the deformable support means at the first side and through the passageway.

6. The apparatus of claim 5 wherein the cleaning member has two passageways, the first passageway being between the first side of the cleaning member and a first set of squeegee blade means, said first passageway being disposed to receive cleaning liquid passing from the distributing means, the second passageway being between the first set of squeegee blade means and a second and opposite side of the cleaning member, said second passageway providing communication between the window surface or the like and the vacuum source.

7. The apparatus of claim 1 wherein the opening in the distribution means is in a third conduit and the closure means consists of an outer conduit disposed concentrically to and in rotating arrangement with the third conduit, said outer conduit having at least one opening, said opening being larger than the opening of the third conduit and being in the same transverse plane with it, said outer conduit opening having seated therein an apertured plug substantially filling said opening and retained in slidable engagement with the face of the third conduit.

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