

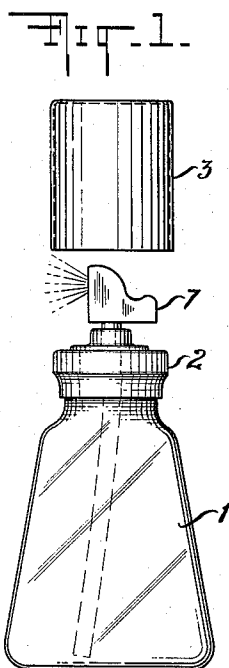
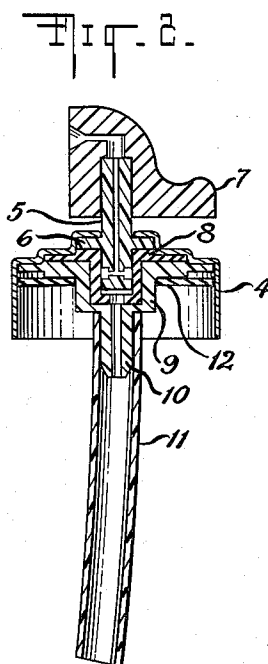
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AEROSOL GLASS CLEANER

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AEROSOL GLASS CLEANER

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The present invention relates to a glass cleansing composition, and more particularly to a spectacle cleaner packaged in a suitable container having a valve controlled discharge outlet for spraying by means of a propellant the composition which is held under pressure in the container.

In accordance with the present invention, the composition comprises an alcohol from the class of ethyl and propyl alcohols, a fully substituted fluorochlorohydrocarbon from the group consisting of methane and ethane and mixtures thereof, and a silicone (of the type used for application to glass and other ceramic surfaces) combined in suitable proportions, as more fully set forth hereinafter, to produce a substantially clear solution of satisfactory pressure and odor, either with or without a small amount of perfume. Preferably the composition is so proportioned as to be non-flammable by the tests prescribed by the Bureau of Explosives, and where it is to be used for cleaning spectacles it is preferred to use ingredients which in admixture do not dissolve the plastics used in making spectacle frames.

While any suitable container of the type employed for pressurized products may be employed, it is preferred for the spectacle cleaner to use a plastic coated glass bottle having a neck on which a cover cap provided with a suitable valve is secured in pressure tight relation. Preferably a valve is used which breaks the liquid being dispensed into very fine droplets since this reduces flammability (flash back), provides better distribution of the composition on the glass surface to be cleaned and more economic use thereof.

A suitable type of package for the spectacle cleaner is shown in the drawing in which:

FIG. 1 is an elevation of the package with the cover raised to show the valve; and

FIG. 2 is a section through the valve assemblage prior to crimping on the container.

Referring now to the drawing, reference numeral 1 represents a container which may be glass, plastic, metal or other suitable material to which a valve assemblage 2 is secured in pressure-tight relation. A cover 3 is adapted to slide down over the valve assemblage and be frictionally held in position thereon.

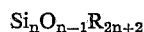
The valve assemblage comprises a cap 4, preferably made of metal which can be deformed to engage the neck of container 1 and hold the assemblage tightly thereon. A valve stem 5 is mounted through a central opening in cap 4 with a flange 6 limiting outward movement thereof. A nozzle 7 is frictionally held on the upper end of valve stem 5 and both are provided with communicating passageways. The passageway in valve stem 5 extends axially from the top to a transverse passageway near the bottom. Surrounding the lower end of the valve stem 5 is a flanged, open-ended, cylindrical rubber stopper 8. The rubber stopper 8 is held in a similarly shaped flanged plastic cylinder 9 having an extension 10 on which a dip tube 11 is secured. The extension 10 has an axial passageway communicating with the interior of the rubber stopper 8. In normal position of the valve stem the rubber stopper 8 closes the ends of the transverse passageway but when the valve stem is canted slightly by pressing on the thumb piece of the nozzle, the liquid in the con-

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tainer flows up the dip tube, through the passageway in extension 10 into the interior of the stopper 8, around the lower end of valve stem 5 into the transverse passageway and the axial passageway thereof and from there into the passageway in the nozzle 7 which acts as an expansion chamber for the liquid mixture where the propellant vaporizes and discharges the still liquid portion as a spray of tiny droplets. A rubber gasket 12 between the flange of plastic cylinder 9 and the neck of the container provides a pressure-tight seal when the cap is crimped on the container as shown in FIG. 1. It will be understood that the container and valve assembly are not part of the present invention, that the drawing and description thereof are merely illustrative of a preferred package for the spectacle cleaner and that any package of the types used for pressurized products may be used for the compositions of the present invention.

The alcohol used in the composition must be ethanol or propanol or mixtures thereof. Ethyl alcohol is satisfactory for compositions used for cleaning glass such as window panes, mirrors and the like, but it is unsatisfactory for compositions used for cleaning spectacles having rims of cellulose acetate and like plastics which are soluble in it. The use of propyl alcohol in the spectacle cleaning composition, therefore, is critical. Either normal or isopropanol or mixtures thereof may be used but isopropanol is preferred because its solvent properties and cost make it more attractive commercially than normal propanol.

The silicone employed in the composition must be one which not only is capable of being used for treating glass but which also is soluble in the solvent system of the composition, at least to the extent to which it is used. Generally speaking, it is preferred to use a normally liquid silicone. Organo-polysiloxanes which function satisfactorily in the composition of the present invention have the formula



where n is any integral number and R is any single alkyl or aryl group or combination thereof. The alkyl groups may be saturated or unsaturated and examples thereof are methyl, ethyl, propyl, butyl, amyl, hexyl, heptyl, octyl, decyl, dodecyl, vinyl and allyl. Examples of the aryl group are phenyl, toluyl and naphthyl. A very satisfactory and preferred silicone is a dimethyl polysiloxane having a viscosity of about 200 centistokes. A phenylmethyl polysiloxane having a viscosity of about 10 to 30 centistokes, which is somewhat more soluble in alcohol than the preferred dimethyl polysiloxane having a viscosity of 200 centistokes, also gives satisfactory results but not quite as good as the said preferred silicone.

The fluorochlorohydrocarbon ingredient serves several important functions in the composition.

One function is that it cooperates with the alcohol to provide a solvent system in which the silicone is more soluble than in alcohol alone. Generally speaking, the silicones used for treating glass are not soluble in alcohol to a sufficient extent to function effectively as a glass cleansing composition. The preferred silicone 200 fluid, for example, is not soluble in isopropanol in the proportions given in Example I, infra, but forms a clear homogeneous solution when the fluorochlorohydrocarbon is added.

Another function is that it cooperates with the alcohol in the cleaning operation, particularly in dissolving organic soils such as fingerprints, fatty exudations from the skin and hairs around the eyes, and the like.

A further function is to control the wetness of the spray, i.e., the length of time the droplets of the composition will remain on the glass after being sprayed thereon. While this time varies with the particle or droplet

size, which in turn is a function of the spray nozzle structure, for any given nozzle the wetness increases with the alcohol content so that by varying the proportions of alcohol to fluorochlorohydrocarbon within the limits specified herein optimum wetness for any particular nozzle can be achieved.

The fluorochlorohydrocarbon also serves when properly proportioned to the alcohol content to impart non-flammability to the spray, as this term is used by the Bureau of Explosives in connection with flammability tests of products of this type. In general flammability increases with alcohol content and there is a critical proportion of the fluorochlorohydrocarbon to the alcohol dividing compositions which satisfy the non-flammability test from those which do not. While this critical proportion varies somewhat with the different alcohols and fluorochlorohydrocarbons which may be used in accordance with the invention, and to some extent also with the droplet size in the spray, for any particular nozzle a non-flammable blend of any alcohol and any fluorochlorohydrocarbon or mixture thereof can be made within the limits specified herein by properly proportioning these ingredients.

The fluorochlorohydrocarbon further serves to expel the composition as a spray of droplets from the container when the valve is operated. The pressure generated by the composition should be adequate to produce a good spray of fine droplets but should not exceed a safe pressure for the container used. For a spectacle cleaner it is preferred to use a plastic coated glass bottle in which the vapor pressure of the composition at 70° F. does not exceed about 25 pounds per square inch gauge. If a sheet metal container is used, a pressure below about 60 pounds per square inch gauge at 70° F. is satisfactory. Pressures within these limits can be obtained by proper selection of the fluorochlorohydrocarbon from the group specified as well as by blending a fluorochlorohydrocarbon having a relatively low vapor pressure with one having a higher vapor pressure. Thus monofluorotrichloromethane, monofluoropentachloro-, difluorotetrachloro- and trifluorotrichloroethane have vapor pressures too low to function as a propellant alone whereas difluorodichloromethane, trifluoromonochloromethane and pentafluoromonochloroethane have vapor pressures higher than permissible for glass and sheet metal containers but by properly blending one or more of the low pressure materials with one or more of the high pressure ones a composition can be produced having a vapor pressure within the specified range. Tetrafluorodichloroethane may be used satisfactorily with or without other fluorochlorohydrocarbons in the composition since its vapor pressure falls within the specified range.

The following examples are given for the purpose of illustrating compositions which are satisfactory, all percentages being by weight:

Example 1

	Percent
Isopropanol (99%)	24.6
Silicone fluid, 200 centistokes	0.4
Trifluorotrichloroethane	10.0
Tetrafluorodichloroethane	65.0

If desired, a small amount of perfume, e.g. 0.05%, may be added in place of a similar amount of the isopropanol.

In preparing this composition the isopropanol, silicone fluid and trifluorotrichloroethane, with perfume where used, are combined at room temperature and introduced into a suitable container which is then sealed with the cap and valve mechanism. The tetrafluorodichloroethane is then introduced through the valve into the container. The composition forms a clear sparkling liquid which cleans spectacles very satisfactorily by spraying onto the lenses and wiping with a tissue,

Other satisfactory spectacle cleaners include the following:

Example No.	Percent Silicone	Percent Isopropanol	Percent Fluorochlorohydrocarbon			
			A	B	C	D
2	.4	24.6			60	15
3	.4	24.6			37.5	37.5
4	.4	30	10	Bal		
5	.4	35	10	Bal		
6	.4	15	10	Bal		
7	.4	20	5	Bal		
8	4.0	15	10	Bal		
9	.4	40		Bal		

- 15 A = Trifluorotrichloroethane (Freon 113).
 B = Tetrafluorodichloroethane (Freon 114).
 C = Monofluorotrichloromethane (Freon 11).
 D = Difluorodichloromethane (Freon 12).
 Bal. = Balance to make 100%.

All the above examples meet the non-flammability test when a nozzle is used which gives a very fine droplet size whereas with a nozzle giving a somewhat larger droplet size, Examples 4, 5 and 9 fail the test while Examples 1, 2, 3, 6, 7 and 8 are safely under the limit. The spray obtained with Examples 4, 5 and 9 is above the optimum for wetness represented by Example 1 while the sprays from Examples 2, 3, 6, 7 and 8 are somewhat drier. Example 8 tends to be greasy and represents about the maximum permissible silicone percentage.

Glass cleaning compositions which are not intended for use on spectacles having plastic frames may be formulated satisfactorily within the following ranges:

	Percent
Silicone	0.1-4
Alcohol	12-40
Fluorochlorohydrocarbon	Balance

where these ingredients are selected from the groups specified hereinabove.

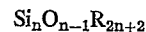
Spectacle cleaning compositions may be formulated within said ranges where the alcohol is propanol, preferably isopropanol. In general, spectacle cleaning compositions preferably are formulated within the following ranges:

	Percent
Silicone	0.1-4
Isopropanol	12-35
Trifluorotrichloroethane	5-25
Tetrafluorodichloroethane	Balance

Although the present invention has been described and illustrated in connection with certain specific ingredients, it is understood that modifications and variations may be made without departing from the spirit and scope of the invention as defined in the appended claims.

Having thus described the invention, what is claimed is:

1. A packaged glass cleaner comprising a valved container containing a clear non-flammable solution of 0.1% to 4% by weight of a normally liquid silicone having a viscosity in the ranges of about 10 to 200 centistokes of the formula:



in which R is selected from the group consisting of methyl, ethyl, propyl, butyl, amyl, hexyl, heptyl, octyl, decyl, dodecyl, vinyl, allyl, phenyl, tolyl and naphthyl and n is any integral number, 12 to 35% by weight of an alcohol from the group consisting of ethanol and propanol, 5-25% by weight of a low vapor pressure fluorochlorohydrocarbon selected from the group consisting of trifluorotrichloroethane and monofluorotrichloromethane, and a higher pressure propellant selected from the group consisting of tetrafluorodichloroethane and difluorodichloromethane constituting substantially the balance of the composition, the pressure in said container being below about 60 lbs. per square inch gauge at 70° F.

2. A packaged glass cleanser as set forth in claim 1 which is adapted for cleaning spectacles having rims of cellulose acetate and like plastics in which the alcohol is isopropanol.

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