

# UNITED STATES PATENT OFFICE

2,241,984

## GLASS WASHING COMPOSITION

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No Drawing. Application January 5, 1940,  
Serial No. 312,573

6 Claims. (Cl. 252—156)

This invention relates to washing compositions and solutions, and more particularly to a composition adapted for use in glass washing machines.

In machines to wash glass bottles, it has been common practice to use a caustic which will soak the dirt out of the bottles and leave them antiseptically clean. For this purpose a 3% to 6% solution of caustic soda (NaOH) has proved the most effective due to its relatively low cost. To this caustic solution one or more of the so-called mild alkalies has usually been added to facilitate rinsing.

It has been found that ordinary glass bottles are somewhat soluble in these solutions, and that as the bottles move in their carriers the solution softens the surfaces of the bottles permitting the metal parts of the machine to scratch the softened bottle surfaces, weakening the bottles and rendering them unsightly. Such bottles soon have to be discarded or burst while in use.

A further disadvantage of the solutions is found during rinsing of the bottles. The water used in rinsing usually contains a small amount of magnesium salts, and when the bottles are rinsed such salts combine with the caustic solution to form magnesium hydroxide [Mg(OH)<sub>2</sub>]. The magnesium hydroxide precipitates on the bottles in the form of a sticky white substance which is difficult to remove and which leaves the bottles cloudy and gray.

In order to try to prevent the formation of the magnesium hydroxide during rinsing, various mild alkalies such as phosphates have been added to the caustic or used in the final washing compartment. Such alkalies have proved unsatisfactory due to the fact that the glass is highly soluble therein and consequently is much more easily scratched and marred.

One object of the present invention is to devise a washing composition and solution which will reduce scratching of the bottles during washing.

Another object is to devise a washing composition and solution which will leave the bottles clear and clean after rinsing with hard water.

A further object is to devise a washing composition and solution which will give more effective wetting of the bottles.

A further object is to devise a washing composition and solution which will reduce marring of the bottles.

A further object is to devise a washing composition and solution which will reduce the amount of glass dissolved.

A further object is to devise a washing composition and solution which will be relatively economical to manufacture.

A further object is to devise a washing composition and solution which may be varied by the user to suit his particular conditions.

Other objects will become apparent from the following description.

It has been found, after extensive experiments, that scratching of glass bottles in mechanical bottle washing machines is due primarily to solubility of the glass in the washing solutions. To remedy this condition it has been found that if a small percentage of a soluble alkaline aluminate, such as sodium aluminate, (Na<sub>2</sub>AlO<sub>2</sub>, NaAlO<sub>2</sub> or Na<sub>2</sub>Al<sub>2</sub>O<sub>4</sub>), potassium aluminate (K<sub>3</sub>AlO<sub>3</sub>, KAlO<sub>2</sub> or K<sub>2</sub>Al<sub>2</sub>O<sub>4</sub>), or lithium aluminate (Li<sub>3</sub>AlO<sub>3</sub>, LiAlO<sub>2</sub> or Li<sub>2</sub>Al<sub>2</sub>O<sub>4</sub>) be added to the caustic solution that this aluminate reduces the solubility of the glass in the caustic solution and acts as a wetting agent to reduce the surface tension on the bottles and thus promote thorough washing thereof.

It has been found further that the addition of the soluble alkaline aluminate aids in rinsing the bottles by combining with the magnesium to form magnesium aluminate [Mg(AlO<sub>2</sub>)<sub>2</sub>] which is a light flocculent agent, and does not adhere to the glass and hence is readily flushed away to leave the bottles clear and clean.

In practice it has been found most economical to use sodium aluminate in the present washing solution due to its relatively small cost, but the other aluminates are equally effective in the composition.

The present washing solution comprises:

	Per cent
Caustic (such as NaOH, KOH, etc.)	2½ to 6
Soluble alkaline aluminate (such as NaAlO <sub>2</sub> , Na <sub>2</sub> AlO <sub>3</sub> , Na <sub>2</sub> Al <sub>2</sub> O <sub>4</sub> , KAlO <sub>2</sub> , K <sub>3</sub> AlO <sub>3</sub> , K <sub>2</sub> Al <sub>2</sub> O <sub>4</sub> , LiAlO <sub>2</sub> , Li <sub>2</sub> Al <sub>2</sub> O <sub>4</sub> or Li <sub>3</sub> AlO <sub>3</sub> )	¼ to 1
Water	93 to 97

The above percentages represent the amount of salts and water in the washing solution. The washing composition may be prepared by mixing the salts together previously to dissolving them in water or they may be added individually and separately to the water in the proportions indicated according to the composition of the water.

When the washing composition is to be prepared previously to dissolving in water the following proportions of salts should be used:

	Per cent
Caustic	70 to 95
Soluble alkaline aluminate	5 to 30

The mixed salt is then dissolved in water so that the water contains 3% to 7% by weight of the mixture.

It will be understood that the above proportions are more or less flexible. The proportions of caustic soda (NaOH) given represent the practical range which will give a clean, germ free bottle without serious scratching or abrasion

marks. The proportion of aluminate represents the amount which is effective in preventing scratching and abrasion of the bottle. Less than one quarter of one percent aluminate in solution does not act effectively to prevent abrasion and scratching in the caustic solution, while amounts in excess of one percent fail to give comparable increases in protection to the glass surface.

The proportion of caustic and aluminate which has been found to give the most satisfactory results in general is:

	Per cent
Caustic soda .....	2½
Soluble alkaline aluminate.....	½
Water .....	97

This solution renders bottles clean, clear and sterile and practically free from all scratching or marring.

In all proportions given above, the quantities indicated are by weight.

Having thus described the invention it will be realized that it is susceptible to various changes and modifications and that the salts and the proportions of salts may be varied as indicated without departing from the spirit of the invention.

What is claimed as new and desired to secure by Letters Patent is:

1. A glass washing solution comprising the following ingredients in substantially the indicated proportions by weight:

	Per cent
Caustic soda.....	2½ to 6
Water-soluble alkaline aluminate.....	¼ to 1
Water .....	93 to 97

2. A glass washing solution comprising the fol-

lowing ingredients in substantially the indicated proportions by weight:

	Per cent
Caustic soda.....	2½ to 6
Sodium aluminate.....	¼ to 1
Water .....	93 to 97

3. A glass washing solution comprising the following ingredients in substantially the indicated proportions by weight:

	Per cent
Caustic soda.....	2½ to 6
Potassium aluminate.....	¼ to 1
Water .....	93 to 97

4. A glass washing solution comprising the following ingredients in substantially the indicated proportions by weight:

	Per cent
Caustic soda.....	2½ to 6
Lithium aluminate.....	¼ to 1
Water .....	93 to 97

5. A glass washing solution comprising the following ingredients in substantially the indicated proportions by weight:

	Per cent
Caustic soda .....	2½
Water-soluble alkaline aluminate.....	½
Water .....	97

6. A glass washing solution comprising the following ingredients in substantially the indicated proportions by weight:

	Per cent
Caustic soda.....	2½
Sodium aluminate.....	½
Water .....	97

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