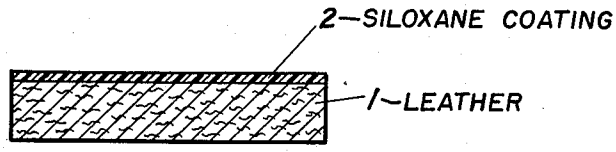
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LEATHER ARTICLE

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LEATHER ARTICLE

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This invention relates to a leather article coated with a siloxane.

In many machines such as automobiles it is necessary to lubricate rotating shafts of considerable length. This lubrication is generally accomplished by allowing oil to leak slowly from a reservoir through a porous seal onto the shaft which rotates in contact with the seal. The problem encountered with such a system is controlling the rate of flow so that there is enough oil on the shaft to properly lubricate it. If the amount of oil passing through the seal is too small, improper lubrication results. If the flow of oil is too rapid, the reservoir may be prematurely exhausted resulting in a lubrication failure. Furthermore, too rapid a passage of oil results in a waste of the lubricant.

To date the only satisfactory seals for such systems are those made from leather. When the leather is not impregnated with any resinous material the passage of oil through the seal is much more rapid than is desired. Previously in attempting to overcome this disadvantage the leather seals have been impregnated with organic materials such as phenolic resins and polysulfide rubbers. Whereas these materials retard the flow of oil they still allow too much flow for many applications and in addition the organic materials tend to make the leather seal too hard. This results in wear of the rotating shaft and thus can cause damage to the shaft. Because of these disadvantages a better treatment of the leather has long been sought.

It is the object of this invention to provide a leather article suitable for use as an oil seal which reduces the flow of oil below that obtained with heretofore employed leather seals. Another object is to provide an improved leather oil seal which has increased oil resistance, which remains flexible during use, which has increased water resistance and which does not cause wear of the shaft surface. Other objects and advantages will be apparent from the following description.

This invention relates to a leather article suitable for use as a semipermeable oil seal which comprises leather having a surface coating of a cured siloxane consisting essentially of from 5 to 20% by weight of a methylhydrogenpolysiloxane and from 80 to 95% by weight of a soluble polysiloxane gum of at least 1,000,000 cs. viscosity at 25° C., in which gum the organic radicals are selected from the group consisting of lower aliphatic hydrocarbon radicals of less than 4 carbon atoms and phenyl radicals.

It is essential for the purpose of this invention that the leather article have a surface coating of the cured siloxane. In order to better understand this invention reference may be had to the accompanying drawing which is a sectional view of a coated leather article. In the drawing 1 represents the leather and 2 the siloxane coating.

It should be understood, of course, that in addition to coating the surface, the siloxane composition may actually impregnate the leather. One of the best means for insuring that an actual coating of the surface will take

place is to apply a solution of the siloxane to the leather and then cure it. This tends to fill the pores of the leather and to insure that the second coating when applied will remain on the surface.

The thickness of coating 2 is not critical. The coating is of sufficient thickness when a visual inspection shows that a siloxane is present on the surface. It has been found that without this visual film the seal does not function properly.

The siloxanes employed in this invention are made by mixing the methylhydrogensiloxane and the polysiloxane gum in a suitable solvent. It has been found that the weight ratios shown above are critical. Proper functioning is not obtained with compositions outside the defined ranges.

The siloxane composition can be applied to the leather by any suitable means such as by spraying, dipping or brushing. It should be understood, of course, that the siloxane coating may be on one or both sides of the leather and in addition the leather may be thoroughly impregnated with the siloxane. In general it has been found that the best way of applying the siloxane is to employ a 10 to 15% by weight solution in an inert solvent such as toluene, xylene or petroleum ether.

The siloxanes may be cured by any of the known methods for curing siloxanes. It is, of course, necessary to employ a curing schedule which will not seriously degrade the leather. The preferred catalysts for curing the composition are carboxylic acid salts of metals. Specific examples of suitable catalysts are lead octoate, tin octoate, dibutyltindioctoate, dibutyltindiacetate, dibutyltindilaurate, cobalt naphthenate, zinc naphthenate and iron 2-ethylhexoate. It should be understood, of course, that this invention is not limited to any particular method for curing the siloxane.

The siloxane is considered cured when it is tack-free and no longer soluble in organic hydrocarbon solvents.

The methylhydrogenpolysiloxane which is employed in this invention can be of any viscosity. The siloxane can be a homopolymer in which each siloxane unit is of the formula MeHSiO or it can be copolymers of methylhydrogen-siloxane with trimethylsiloxane or dimethylhydrogensiloxane. Thus the methylhydrogenpolysiloxane can be cyclic or linear in its molecular structure.

The polysiloxane gums employed in this invention should have a viscosity of at least 1,000,000. The upper limit of the viscosity is not critical but the gum should be soluble in an organic solvent. The ratio of hydrocarbon groups to silicon atoms in the gum is not critical. Preferably, however, the ratio of organic groups to silicon should range from 1.99 to 2. Specific examples of siloxanes which may be employed as the gum are dimethylsiloxane, phenylmethylsiloxane, vinylmethylsiloxane, diethylsiloxane, ethylmethylsiloxane, phenylmethylsiloxane, a copolymer of 90 mol percent dimethylsiloxane and 10 mol percent diphenylsiloxane, a copolymer of 90 mol percent dimethylsiloxane, 9.9 mol percent phenylmethylsiloxane and .1 mol percent vinylmethylsiloxane and a copolymer of 99.99 mol percent dimethylsiloxane and .01 mol percent monomethylsiloxane.

The following examples are illustrative only and should not be construed as limiting the invention which is properly delineated in the appended claims.

Example 1

A composition comprising 15% by weight of a trimethyl endblocked methylhydrogensiloxane and 85% by weight of a dimethylpolysiloxane gum was dissolved in petroleum ether to give a 10% by weight solution of the siloxane. Lead octoate was added to the solution in amount to give 2% by weight lead based on the total weight of the siloxane. A leather plug was immersed

in this solution for 2 minutes. The leather was then removed and dried at 50° C. for 10 to 15 minutes. The leather was again immersed in the solution for 2 minutes and thereafter removed and dried in the same manner. A visible film of the siloxane was on the leather surface. A drop of oil placed on the treated leather plug was absorbed in 6 hours. By contrast an untreated plug of the same leather absorbed a drop of oil in 1 to 2 minutes. This test shows the suitability of this treated leather for use as an oil seal.

Example 2

A mixture of 10% by weight of a trimethyl endblocked methylhydrogenpolysiloxane and 90% by weight of a dimethylpolysiloxane gum was dissolved in petroleum ether to give a 10% by weight solution. Lead octoate was added to the solution in amount to give 2% by weight lead based on the weight of the total siloxane. Leather plugs were dipped into the solution and cured in the manner of Example 1. The absorption of oil into the seal was equivalent to that of Example 1.

An identical formulation was dissolved in petroleum ether to give a 12.5% by weight solution of the siloxane. 2% by weight lead was added in the form of lead octoate and the catalyzed solution was brushed on the grain side of a leather plug. The leather was then dried for 10 to 15 minutes at 50° C. and a second coating of the solution was applied by brushing. This coating was cured leaving a visible film of the siloxane on the leather surface. The oil absorption of the leather was equivalent to that of Example 1.

Example 3

An oil seal was cut from the leather plug treated in accordance with paragraph 2 of Example 2. This seal was placed on an axle and the passage of oil through the seal for 24 hour periods was found to be as follows:

	G.
1st day	16.1
2nd day	14.7
3rd day	11.5
4th day	12.3

By comparison a presently employed commercial grade leather seal of the same size impregnated with a polysulfide rubber, was tested under identical conditions. About 100 g. of oil per day passed through the seal.

This test shows the superiority of the siloxane treated leather seals of this invention.

Leather seals treated with the composition of Example 2 have operated satisfactorily in commercial machines.

Example 4

Equivalent results are obtained when a mixture of 10% by weight of methylhydrogenpolysiloxane and 90% by weight of a copolymer gum composed of 90 mol percent dimethylpolysiloxane, 9.9 mol percent phenylmethylsiloxane and .1 mol percent methylvinylsiloxane is employed in the procedure of Example 1.

That which is claimed is:

1. A leather article suitable for use as a semipermeable oil seal which comprises leather having a surface coating of a cured siloxane consisting essentially of from 5 to 20% by weight of a methylhydrogenpolysiloxane and from 80 to 95% by weight of a polysiloxane gum in which the organic radicals are selected from the group consisting of lower aliphatic hydrocarbon radicals of less than 4 carbon atoms and phenyl radicals, said gum having a viscosity of at least 1,000,000 cs. at 25° C.

2. A leather article suitable for use as a semipermeable oil seal comprising leather having a surface coating of a cured siloxane consisting essentially of from 5 to 20% by weight of a methylhydrogenpolysiloxane and from 80 to 95% by weight of a dimethylpolysiloxane gum of at least 1,000,000 cs. viscosity at 25° C.

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