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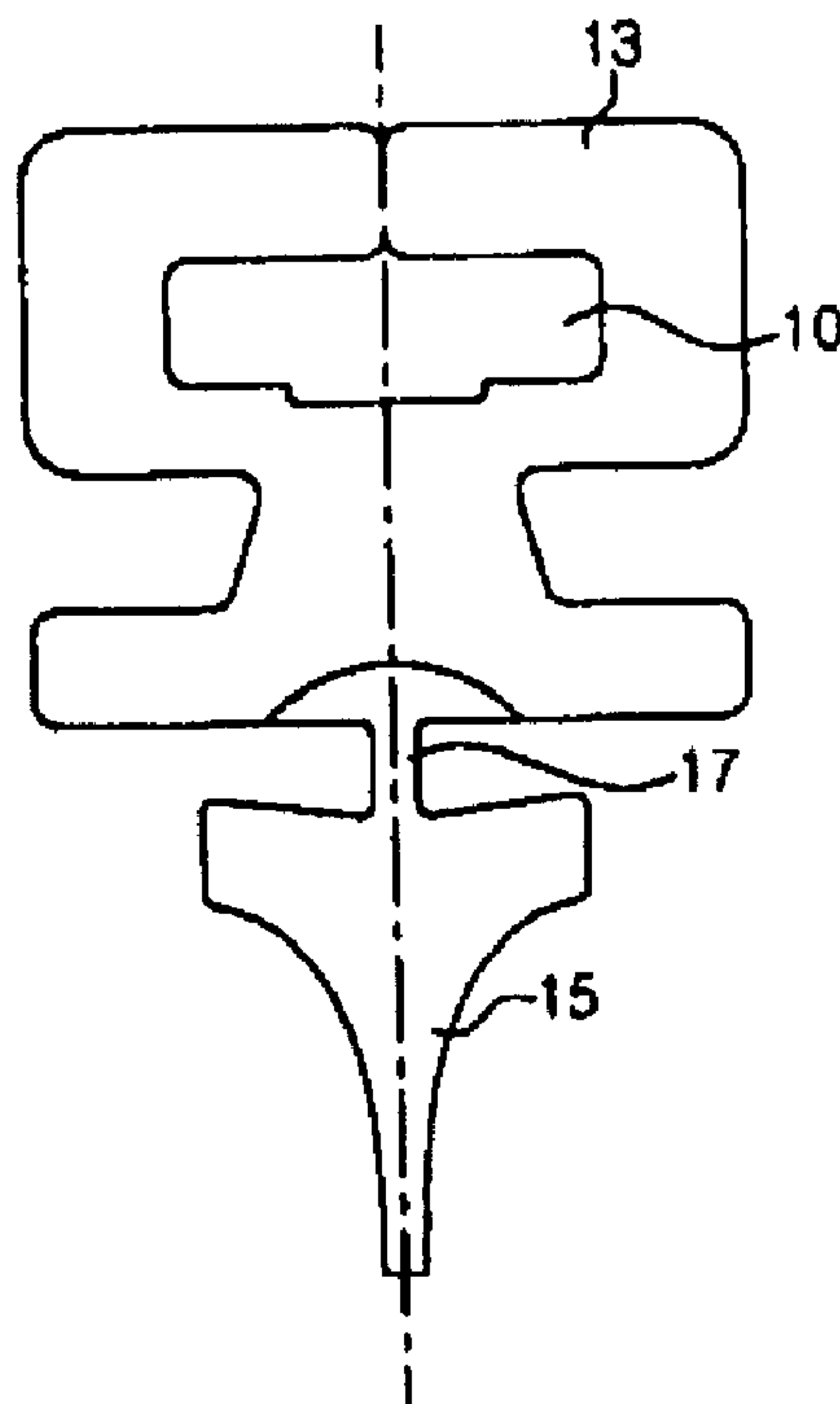
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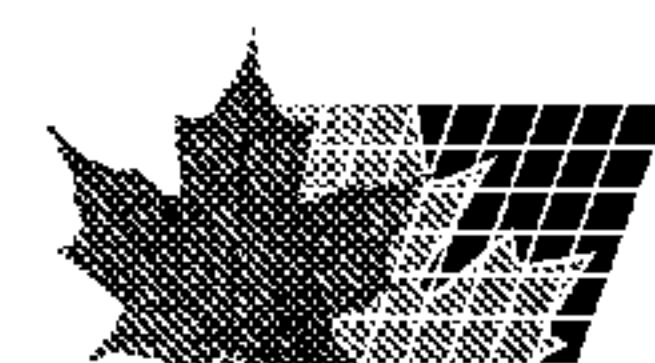
(54) Titre : COMPOSITION DE TEFLON SERVANT A REVETIR DES RACLOIRS DE BALAIS D'ESSUIE-GLACES ET
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(54) Title: TEFLON COMPOSITION FOR COATING WIPER BLADE RUBBERS AND COATING METHOD USING THE
SAME



(57) Abrégé/Abstract:

The present invention relates to a Teflon composition, which can be used for coating wiper-blade rubbers to improve endurance and resistance to frictional forces of the blade rubbers, and coating method using the same. The coating composition of the present invention comprises 3.5 to 15 wt% of Teflon, 3.2 to 9.6 wt% of urethane, 1.6 to 6.0 wt% of silicone resin, and 5.0 to 25.0 wt% of a water-based resin in the Teflon composition that can be used for coating wiper blade rubbers.



Abstract

The present invention relates to a Teflon composition, which can be used for coating wiper blade rubbers to improve endurance and resistance to frictional forces of the blade rubbers, and coating method using the same. The coating composition of the present invention comprises 3.5 to 15 wt% of Teflon, 3.2 to 9.6 wt% of urethane, 1.6 to 6.0 wt% of silicone resin, and 5.0 to 25.0 wt% of a water-based resin in the Teflon composition that can be used for coating wiper blade rubbers.

**TEFLON COMPOSITION FOR COATING WIPER BLADE RUBBERS AND
COATING METHOD USING THE SAME**

Detailed description of the invention

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Technical field

The present invention relates to a coating composition for wiper blade rubbers. More specifically, the present invention relates to a Teflon composition for coating wiper blade rubbers to improve endurance and resistance to frictional forces of the blade
10 rubbers and a coating method using the same.

Technical background

For an automobile in general, strip rubbers for a wiper, that are attached to a wiper blade, are run by wiper arm of the vehicle. With such drive apparatus, strip rubbers of
15 a wiper constantly slide over the windshield of a vehicle from side to side to remove any raindrops, snowflakes, and dust, etc., thus providing a car driver with a good visibility. Because the region of a wiper blade which contacts the windshield is generally strip-shaped, wiper blade rubbers are often called as strip rubbers for wiper blades, or more shortly wiper blade rubbers or wiper blades. Thus, said terms are
20 used herein interchangeably.

Wiper rubbers which are attached to a frame of wiper blade are made of elastic materials. Specifically, wiper rubbers are divided into a head part that is joined to a frame of wiper blade and a wedge part that contacts the windshield of a motor vehicle
25 (i.e., wiper blade part). The wiper head part and wedge part are assembled in a way that they can fold in an opposite direction compared to the direction of windshield glass washing, based on frictional forces occurring between the windshield and the wiper rubbers. As a result, the wiper rubbers can maintain its uniform cleaning ability, possibly without any slipping.

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Materials for preparing such wiper blade rubbers should have not only a good mechanical property but also should satisfy other complex requirements that are

related to the safety of a vehicle against any external influences. Wiper rubber materials should have flexibility and slide smoothly over the car windshield. Furthermore, they should have a resistance to external influences, especially to oxidation (ozone cleavage), mineral oil and chemicals that are contained, for example,
5 in washing fluid.

Materials used for preparing a wiper blade are generally rubbers, i.e., vulcanized natural rubbers or synthetic rubbers. However, in order to improve the sliding properties of the rubbers, additional treatments including coating the surface of the
10 wiper blade rubbers, chlorinating it, or coating it with a sliding powder agent such as molybdenum sulfide have been suggested.

The wiper rubber described in DE-C-35 27 093 is preponderantly consists of EPDM (Ethylene-Propylene-Dien-Monomer). Meanwhile, in EPDM, the unsaturation sites
15 are present outside the main ring of the polymer. As a result, EPDM has not been halogenated and has no endurance to mineral oil and chemicals contained in washing fluid. Therefore, according to DE-C-35 27 093, in order to improve the sliding properties and the endurance of wiper blades consisting preponderantly of EPDM, chlorinated diene-type rubber segments were placed on a matrix that is consisted of
20 EPDM, at least in the regions that slide over the car windshield during proper use. However, it is disadvantageous in that such wiper rubbers have a rather complex structure having layers of different rubber materials.

On the other hand, according to WO 1999/39948 (Corresponding Korean Laid-open
25 publication No. 10-2001-0015914), a wiper blade is disclosed in which different kinds of wiper rubber materials are used for a head part and a wedge, respectively. In this invention, since the head part made of a diene-type rubber can be halogenated, favorable sliding properties and smooth running can be obtained. Further, an easy access to the regions in which the wiper blade cooperates with the supporting strip
30 and the spring rail of the metallic support and a harder surface can be also obtained. In addition, for the flexing part and the wedge of the wiper blade, chloroprene rubber (CR) is used according to said invention. Meanwhile, chloroprene has excellent

mechanical properties with high resistance to the influences of weather, aging, chemicals, and temperature. Therefore, a favorable wiper quality can be achieved in a simple and inexpensive manner according to said invention. However, although chloroprene has a high resistance to the influences of weather, aging, chemicals, and temperature, it has a limitation including poor resistance to frictional forces, which occur between windshield glass and wiper rubbers, etc.

Brief description of the drawings

Figure 1 shows a cross-section of conventional wiper blade rubbers in which a head part having an internal spring rail is coupled to a wedge part contacting the surface of windshield glass via flexing bridge.

Figure 2 shows a cross-section of two wiper blade rubbers of the present invention in which two wiper blade rubbers, each comprising in one integrated body a head part with an external spring rail and a wedge part contacting the surface of the windshield glass, are loosely connected and facing each other via connection.

Technical problems to be solved

Object of the present invention is to provide a Teflon coating composition which has a high resistance to external influences such as bad weather, chemical agents, and temperature, etc. and can be used for coating wiper blade rubbers to improve endurance and resistance to frictional forces occurring between windshield glass and wiper blade rubbers, and a coating method using the same.

Means to solve the technical problems

The above-described object of the present invention is achieved by providing a Teflon composition for coating wiper blade rubbers, in which 3.5 to 15 wt% of Teflon, 3.2 to 9.6 wt% of urethane, 1.6 to 6.0 wt% of silicone resin, and 5.0 to 25.0 wt% of a water-based resin are comprised.

According to one embodiment of the present invention, the coating composition of the present invention may comprise 4.0 wt% or less of silver component, or 3.0 to 20.0 wt% of silicone oil, or both of the silver component and the silicone oil. According to

another embodiment of the present invention, the coating composition of the present invention may further comprise 3.5 to 15 wt% of graphite or carbon black.

5 The wiper rubbers used in the present invention are general rubbers, i.e., vulcanized natural rubbers or synthetic rubbers can be used. However, as it has been exemplified in said prior art invention, it is preferred to use diene-type rubber or chloroprene rubber. More preferably, said diene-type rubber is a natural rubber, butadiene rubber or styrene-butadiene rubber.

10 Meanwhile, said object of the present invention is also achieved by a method of coating wiper rubber blades with the above-described coating composition of the present invention. In particular, coating is preferably carried out by first pre-treating the wiper blade rubbers with an intermediate medium for their smooth coating, and then coating with said composition of the present invention by spray coating method.

15 Teflon, which is used as an essential component for the composition of the present invention, is a commercial name referring to polytetrafluoroethylene (PTFE), a typical example of synthetic fluororesin. As a crystalline resin, it has a heat-resistance enduring long-term use at 260 °C and is known as a special synthetic resin having a
20 favorable chemical-resistance, electric insulting property, non-stickiness, and low frictional coefficient, etc. Especially, PTFE is a crystalline polymer having melting temperature of 327°C and it has a continuous use temperature of 260°C. Furthermore, being stable from low (-268°C) to high temperature, it is known to be used in wide range of temperatures.

25 In addition, Teflon's resistance to a chemical is known to be the best among many organic materials. Especially, Teflon is not degraded at all by acid, alkali, and various solvents. It is only degraded under extreme conditions including special chemicals such as fluorine gas and molten alkaline metals, etc. Thus, it is widely used as a
30 material for preparing gasket, packing and various sealants. The most remarkable

mechanical property of Teflon is its low frictional coefficient. As such, it is used as a reinforce material for various fillers. With high non-stickiness, it is also known as the best synthetic resin for manufacturing frying pans and for coating various steel pipes.

5 Inventor of the present invention found that, when a composition containing Teflon is coated onto wiper blade rubbers, not only a high endurance to external influences including bad weather, aging, chemical agents, and temperature can be given to the wiper blade rubbers but also a resistance to frictional forces occurring between windshield glass and wiper blade rubbers can be improved, by taking an advantage of
10 the above-described favorable physicochemical and mechanical properties of Teflon. As a result, the present invention was completed.

Teflon can be used within a range of 3.5 to 15 wt% based on the total weight of the composition. If Teflon is used in an amount outside said range, desired coating effect
15 of the composition cannot be obtained. Preferably, constitutional ratio of Teflon in the composition is between 7 to 8 wt%.

Polyurethane used in the present invention is a synthetic polymer compound having urethane linkages inside main chains of the polymer, which is obtained by
20 polyaddition reaction by which urethane linkages are repeatedly formed between diisocyanate and dialcohol. Any kinds of commercially available, water-soluble polyurethane can be used in the present invention.

Urethane can be used within a range of 5 to 25 wt% based on the total weight of the
25 composition. If urethane is used in an amount outside said range, desired coating effect of the composition cannot be obtained. Preferably, constitutional ratio of urethane in the coating composition is between 10 to 15 wt%.

Silicone resin used in the present invention is a polymer of organic derivatives of
30 silicone compound. It is also referred to as silicon resin. Molecular structure of the silicone resin includes a silicon skeleton having siloxane linkage (Si-O linkage) wherein silicon atom alternates with oxygen atom and functional groups such as

methyle group, phenyl group, and hydroxy group are attached to the silicon atom. The silicone resin is a thermoplastic synthetic resin and has a defoaming activity in most of the solvents that are commonly used. It also has water-repellency (i.e., water-resisting activity) when it is applied to inorganic or organic materials. As such, 5 silicone resin is advantageously used for the composition of the present invention. It is believed that any kinds of commercially available silicone resins can be used in the present invention.

Silicone resin can be used within a range of 1.6 to 6.0 wt% based on the total weight 10 of the composition. If silicone resin is used in an amount outside said range, desired water-repelling effect of the composition cannot be obtained. Preferably, constitutional ratio of silicone resin in the coating composition is between 2 to 5 wt%.

Silicone oil is a silicone polymer product which has an oily appearance at room 15 temperature. Generally, dimethyl chlorosilane polymer is a colorless, transparent and tasteless liquid. Due to its structural characteristic, it is chemically inert and stable. Further, having a relatively low surface tension, it has water-repellency (i.e., water-resisting activity) and an excellent defoaming activity. As such, it is widely used as a defoming agent that is not soluble in water but can prevent the formation of foams. It 20 is believed that any kinds of commercially available silicone oils can be used in the present invention.

Silicone oil can be used within a range of 3.0 to 20.0 wt% based on the total weight of the composition. If the silicone oil is used in an amount outside said range, desired 25 water-repelling effect of the composition cannot be obtained. Preferably, constitutional ratio of silicone oil in the coating composition is within about 13 wt%.

Meanwhile, in addition to the silicone resin and the silicone oil that are used to enhance the water-repellency of the coating composition of the present invention, a 30 commercially available water-based resin can be further added to the composition of the present invention in order to provide wiper blades with additional favorable

physicochemical properties other than water-repellency. In this regard, a thermosetting water-based resin is preferable in the present invention.

Water-based resin can be used within a range of 5 to 25 wt% based on the total weight
5 of the composition. If water-based resin is used in an amount outside said range, desired effect of the composition cannot be obtained. Preferably, constitutional ratio of water-based resin in the composition is within about 20 wt%.

Moreover, in addition to said favorable mechanical properties, in order to give a high
10 endurance to the coating composition of the present invention against external influences, commercially available graphite or carbon black can be added to the composition.

The reason for further adding graphite or carbon black in addition to silicone oil to the
15 coating composition of the present invention is as follows. When a wiper glides over the windshield, water-repelling silicone component present in the coated wiper blade rubbers is first transferred to the windshield glass. As a result, the windshield glass can have a water-repellent activity. However, such water-repellent components contribute to the increase in frictional coefficients so that noise and/or shaking may
20 occur during wiping action of a wiper. Thus, in order to prevent such undesirable phenomena, graphite or carbon black, which can reduce frictional coefficient, are introduced for preparing the coating composition.

Furthermore, silver is known for its antibacterial, germ-killing and endurance-
25 increasing activity as well as the activity of enhancing favorable properties of chemicals. Since such properties of silver is also desirable for the wiper blades of the present invention, silver can be advantageously used for the coating composition of the present invention. Being effective even in a small amount, silver can be used within a range of 4.0 wt% or less based on the total weight of the coating
30 composition. If silver is used in an amount outside said range, desired effect of the composition cannot be obtained and/or it becomes economically unfavorable.

Preferably, constitutional ratio of silver in the coating composition is about 2 wt% or less.

5 Lastly, the coating composition of the present invention may further comprise additives such as a stabilizer, a drying agent, a thickening agent, and a defoaming agent for enhancing coating property as well as a dispersant which can actively promote the drying of the coating composition. Just a small amount of such additives and dispersants, etc. would be effective to obtain the desired effect. As such, they can be used in an amount of about 0.5 wt% or less, respectively, compared to the total
10 weight of the coating composition.

The wiper blade rubbers of the present invention can be produced in accordance with any conventional methods. Still, as it has been described in the above-described prior art invention, it is advantageously produced by means of coextrusion of diene-elastic
15 rubber and chloroprene-elastic rubber. In such case, an unvulcanized strip having a pre-determined cross-sectional form is produced first. The wiper blade rubbers are then preferably subjected to a vulcanization treatment and, if necessary, to a chloride treatment using hypochlorite salt or trichlorocyanuric acid.

20 The coating composition prepared according to the above-described method of the present invention can be coated onto wiper blades using any conventional methods that are used in the pertinent art, including graphite coating or silicone coating. However, as a pre-treatment step, it is preferable to treat the wiper blade with an intermediate medium which can promote smooth coating of the composition. Then,
25 the coating composition can be sprayed onto the wiper blade rubbers by spray method.

Because the coating composition of the present invention comprises simultaneously graphite or carbon black and silicone components, a single step of coating can be sufficient to obtain dual effects of a graphite coating and a subsequent silicone
30 coating.

Herein below, the preparation of the coating composition and the coating method using the same are briefly explained in view of specific examples.

Specific embodiments for carrying out the invention**Example 1**

Each component indicated in the following table is purchased as a material in powder
 5 form, and dispersed in a dispersing chamber (i.e., stirring chamber). After adding
 them to a blender to which resins and solvent are further added, the coating
 composition of the present invention is obtained.

Component	Constitutional ratio (wt%)
Carbon black	6.0
Water-based resin	20.0
Urethane	8.0
Silicone resin	5.0
PTFE	10.0
Dispersant	0.5
Silver	2
Coating additives	2
Water	48.5
Total	100.0

Figure 1 shows a cross-section of conventional wiper blade rubbers in which a head
 10 part (13) having an internal spring rail (10) is coupled to a wedge part (15) contacting
 the surface of windshield glass via flexing bridge (17). On the other hand, Figure 2
 shows a cross-section of two wiper blade rubbers of the present invention in which
 two wiper blade rubbers, comprising in one integrated body a head part (33) with an
 external spring rail (30) and a wedge part (35) contacting the surface of the
 15 windshield glass, are loosely connected and facing each other via connection (40).

According to the present invention, conventional wiper blade rubbers of Figure 1 can
 be coated with the coating composition of the present invention as prepared above.
 Although it is not illustrated, the coating composition of the present invention can be
 20 applied similarly to wiper strips for the conventional wiper blades in which a head

part having an external spring rail is coupled with a wedge part contacting the surface of the windshield glass via flexing bridge or for other conventional wiper blades in which a head part having an external spring rail is coupled with a wedge part in an integrated body.

5

Meanwhile, according to the present invention, two wiper blade rubbers are first formed as a single molded piece in which they are joined to each other at the middle region, e.g., connection (40). After cutting along the middle region, two separate wiper blade rubbers are produced. Specifically, instead of making a thorough cut, a slight dent is first formed over the connection region (40) and then a pre-treatment using an intermediate medium is carried out to obtain smooth coating. Then, the pre-prepared coating composition is coated over the entire surface of the wiper blade rubbers using spray coating method. After cutting with a knife along the connection region (40), two separate wiper blade rubbers are produced and then can be used, respectively.

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Example 2

Coating composition is prepared using the same method as described in above Example 1, except that silicone oil is used instead of silver.

Component	Constitutional ratio (wt%)
Carbon black	6.0
Water-based resin	20.0
Urethane	4.0
Silicone resin	2.0
PTFE	7.0
Dispersant	0.5
Silicone oil	13.0
Coating additives	0.5
Water	48.0
Total	100.0

Method for coating the coating composition obtained from Example 2 to wiper blade rubbers can be applied similarly to those explained in above Example 1.

Example 3

- 5 The silver component is excluded while all other components described in the following table having the same constitution and constitutional ratio as Example 1 are dispersed in a dispersing chamber (stirring chamber). After adding resins and solvents to them, all the components are blended in a blender to give a coating composition.

Component	Constitutional ratio (wt%)
Carbon black	6.0
Water-based resin	20.0
Urethane	8.0
Silicone resin	5.0
PTFE	8.0
Dispersant	0.5
Coating additives	2.5
Water	52.0
Total	100.0

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Method for coating the coating composition obtained from Example 3 to wiper blade rubbers can be applied similarly to those explained in above Example 1.

- 15 Meanwhile, in order to determine an improvement in wiping quality of the wiper blade rubbers that are produced according to the present invention, a wiping ability test was carried out. Specifically, the test method corresponds to a sensitivity measurement test in which water is poured over a car windshield and then wipers are run to evaluate the wiping quality of the wipers (e.g., 10 is the maximum score). With respect to frictional forces applied on the wipers, electric currents can be monitored to
- 20 determine the motor load that is required to run the wipers in wiper test bench.

Although such experimental data do not represent actual forces to run the wipers, they can be used for comparing relative strength of the forces.

For carrying the test, the coating composition prepared in above Example 1 was first selected. Then, 'EF Sonata', which is one of the automobile models manufactured by Hyundai Motor Company, was chosen as a test vehicle. The selected coating composition was applied to said test vehicle and wiping quality was evaluated under the weather conditions including temperature of 28.3°C and humidity of 74% (score 10 was given to the standard highest wiping quality). For the non-coated wiper blade rubbers (1), experimental results are given in the following Table 1. For the coated wiper blade rubbers (2), experimental results are given in the following Table 2.

Table 1 (Experimental results before rubber coating)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Mean value
Up	6	6	7	6	5	7	5	4	6	6	5	7	6	6	5.9
Down	7	7	7	6	5	6	4	5	5	6	5	5	5	6	5.6

Table 2 (Experimental results after rubber coating)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Mean value
Up	9	9	9	9	8	10	8	8	9	9	10	9	10	10	9.1
Down	9	9	9	9	9	9	8	8	9	9	10	8	9	10	8.9

Comparing the results given in the above Table 1 and Table 2, mean value of the wiping ability for the wiper blade rubbers before rubber coating was 5.9 and 5.6, for the up and down motions of the wiper blades, respectively. On the other hand, mean value of the wiping ability for the wiper blade rubbers after rubber coating was 9.1 and 8.9, for the up and down motions of the wiper blades, respectively. Therefore, according to the above-described sensitivity evaluation test, it is again confirmed that

the wiping ability of the wiper blade rubbers after rubber coating is about two times better than that of the wiper blade rubbers before rubber coating.

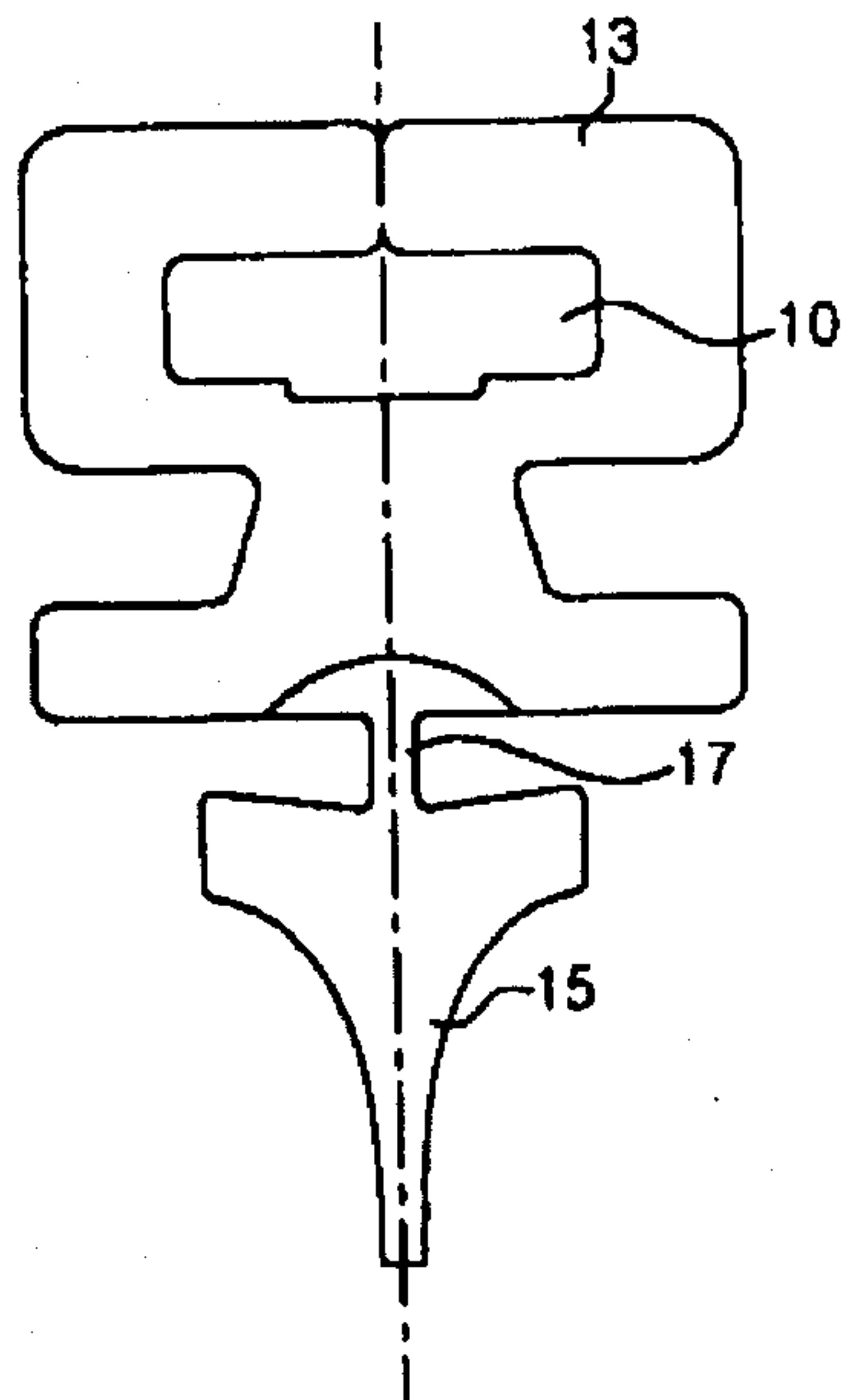
Moreover, similar results are obtained from the tests using the costing composition
5 that have been prepared from Example 2 and Example 3. Detailed comparative tables are not shown.

What is claimed is:

1. Teflon coating composition for coating wiper blade rubbers, comprising 3.5 to 15 wt% of Teflon, 3.2 to 9.6 wt% of urethane, 1.6 to 6.0 wt% of silicone resin, and 5.0 to 25.0 wt% of a water-based resin.
5
2. The coating composition according to Claim 1 comprising 0.16 to 0.24 wt% of silver component, 3 to 20 wt% of silicone oil or both of the silver component and the silicone oil.
3. The coating composition according to Claim 2, further comprising 3.5 to 15 wt% of graphite or carbon black.
10
4. The coating composition according to any one of Claims 1 to 3, characterized in that said rubbers are butadiene rubber, styrene-butadiene rubber or chloroprene rubber.
5. Method of coating wiper blade rubbers with the composition according to any one of Claims 1 to 3.
15
6. The method according to Claim 5, characterized in that said wiper blade rubbers are butadiene rubber, styrene-butadiene rubber or chloroprene rubber.
7. The method according to Claim 6, characterized in that said coating is carried out by pre-treating with an intermediate medium and then coating with the composition by spray method.
20

FIGURES

Figure 1



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FIGURE 2

