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(54) **WIPER BLADE WITH MODULAR MOUNTING BASE**

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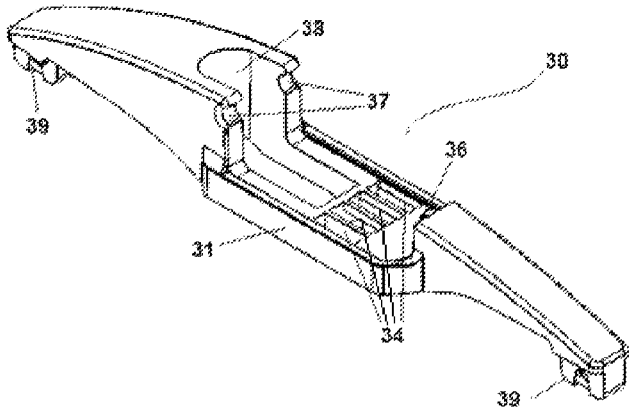
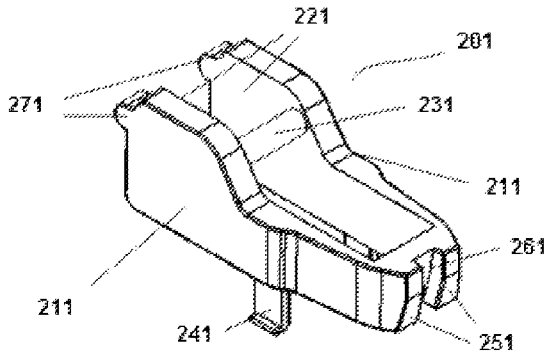
(57) **ABSTRACT**

A wiper blade with a modular mounting base, having a wiper strip and a primary frame. The primary frame may be provided with a recessed portion having a base portion, a proximal end and a distal end, and may further be provided with a projection disposed on the proximal end, and with receiving holes on the base portion. The primary frame is capable of securing a mounting base having a bottom, a proximal end and a distal end such that one or more locking legs descending from the bottom of the mounting base can engage the receiving holes in the bottom portion of the primary frame, and such that the projection on the proximal portion of the recessed portion engages a guiding channel on the proximal end of the mounting base.

6 Claims, 6 Drawing Sheets





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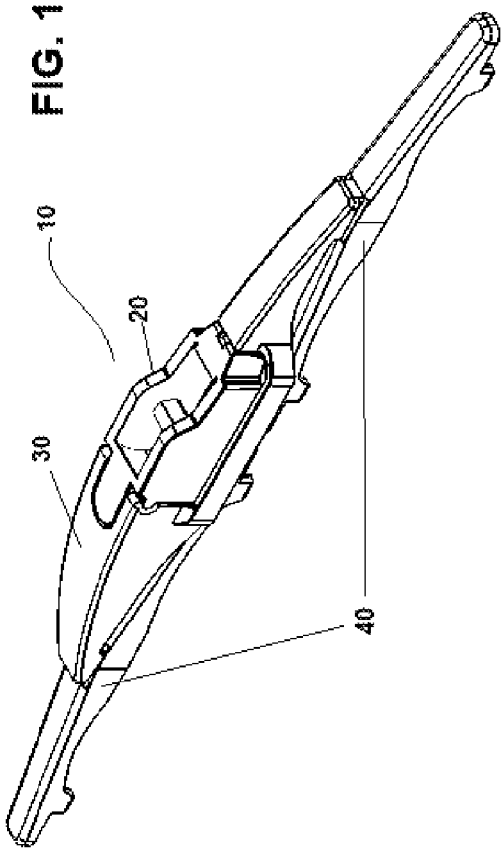


FIG. 1

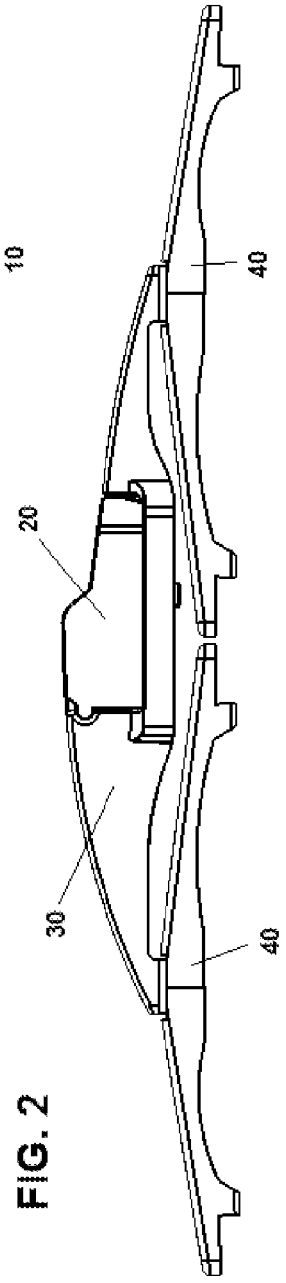
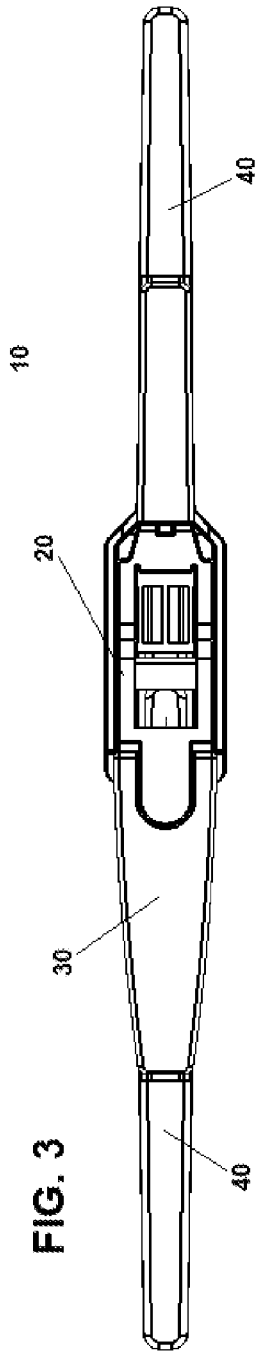


FIG. 2



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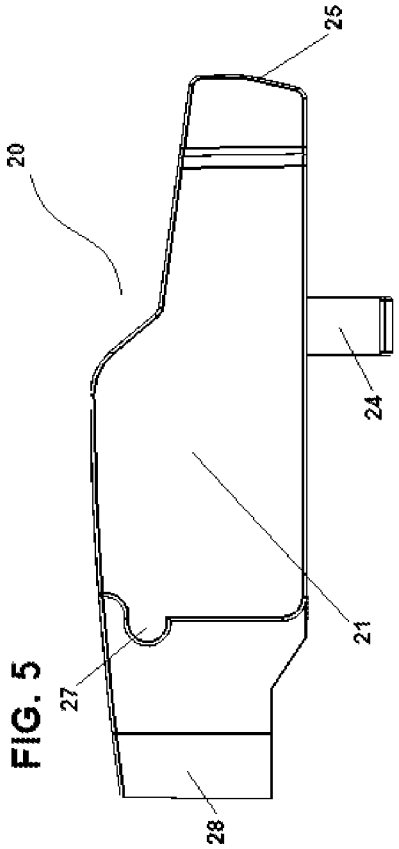

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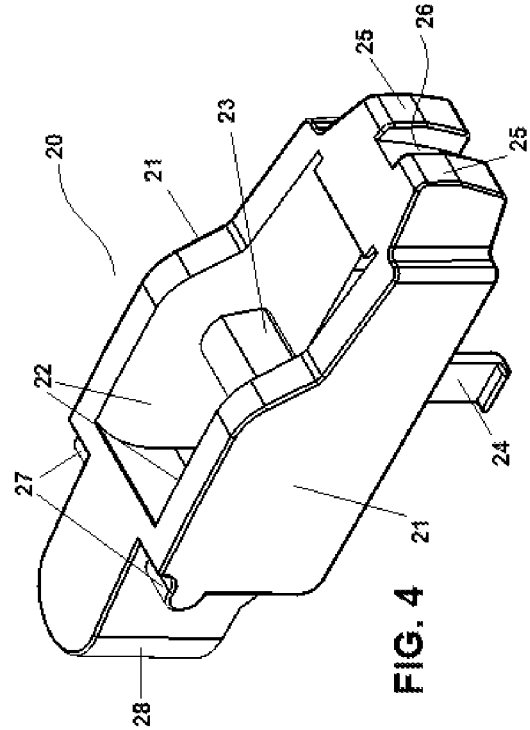

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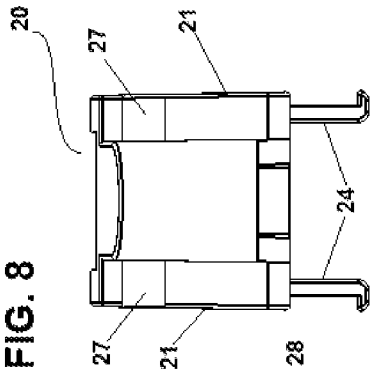


FIG. 8

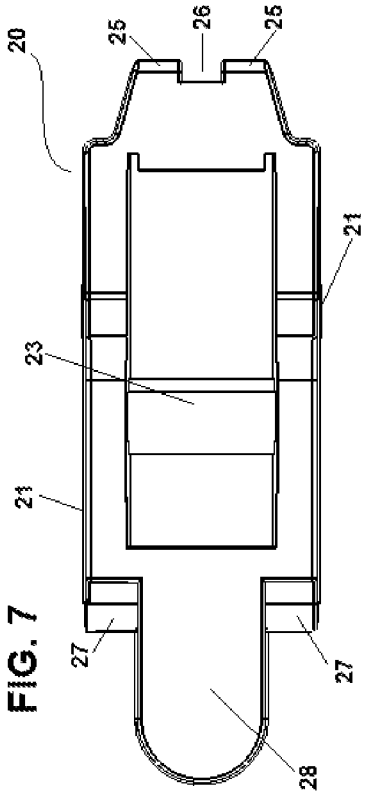


FIG. 7

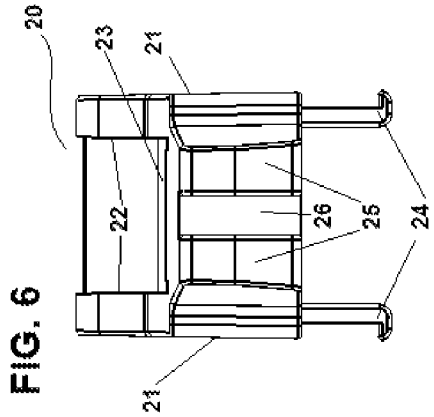


FIG. 6

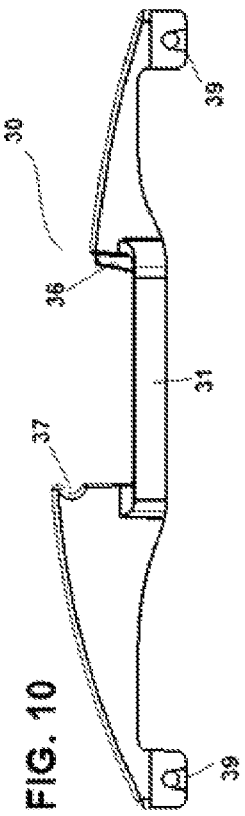
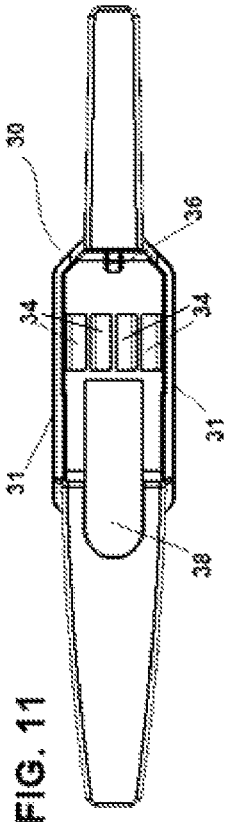


FIG. 10



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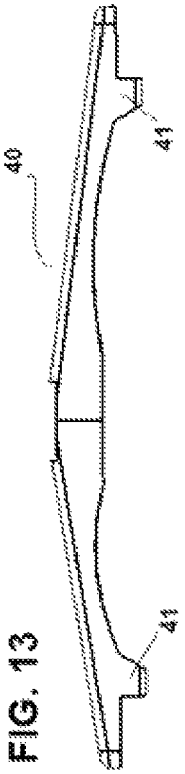
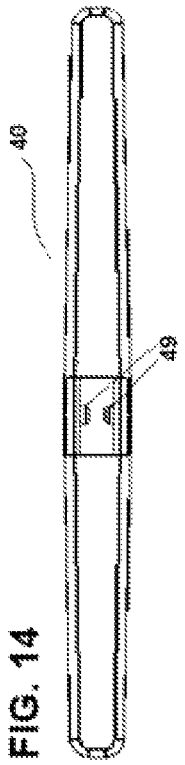


FIG. 13



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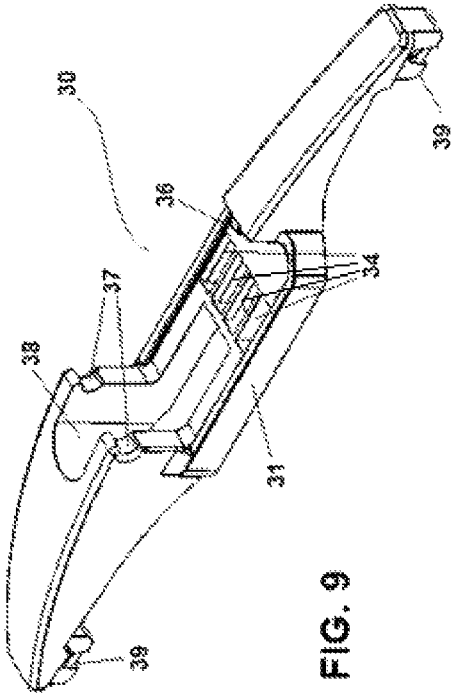


FIG. 9

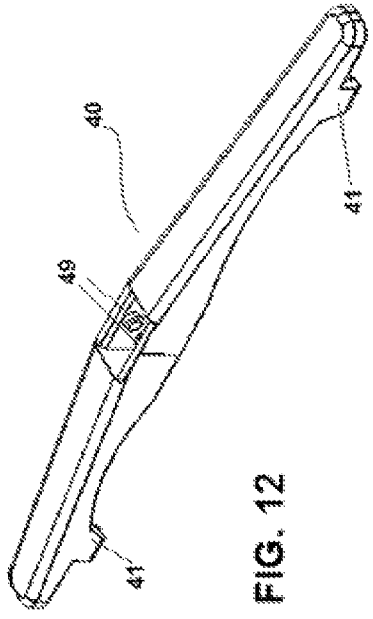


FIG. 12

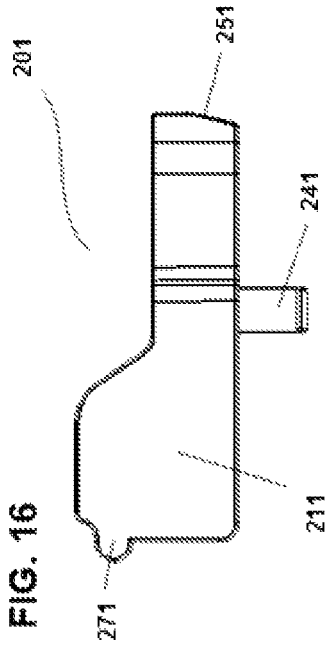


FIG. 16

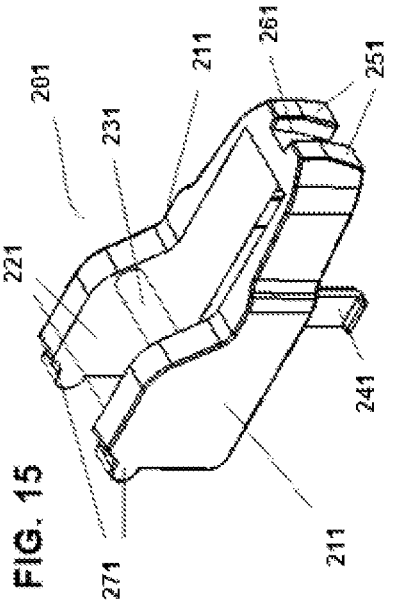


FIG. 15

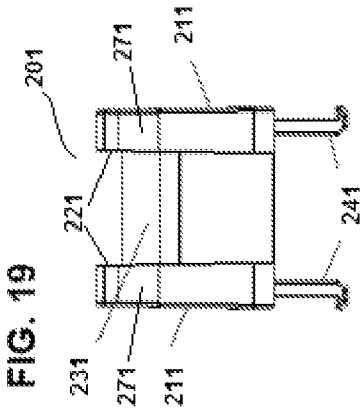


FIG. 19

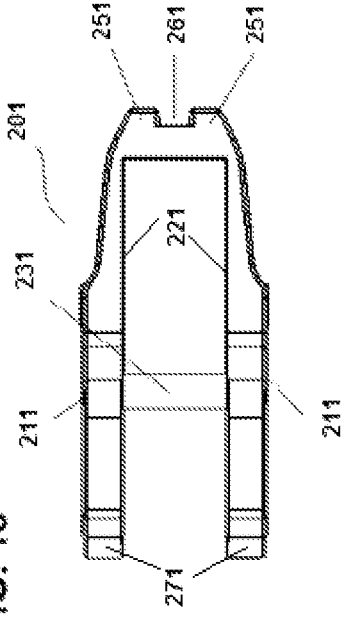


FIG. 18

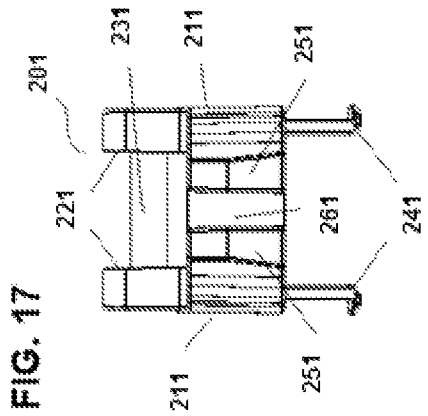
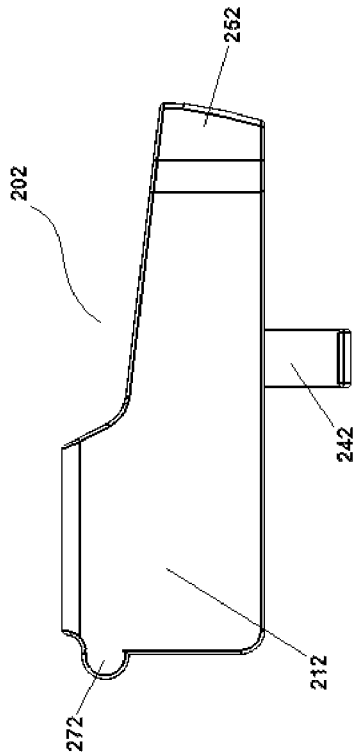


FIG. 17



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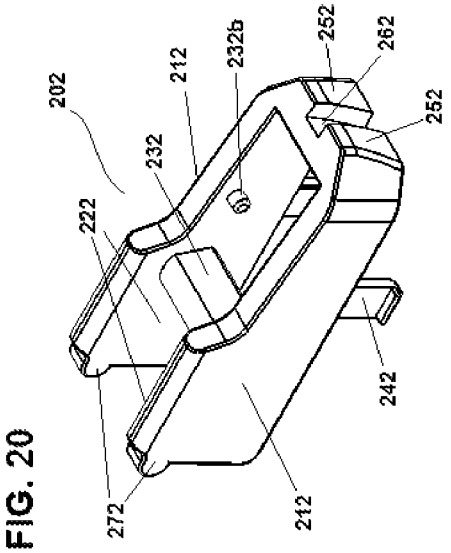


FIG. 20

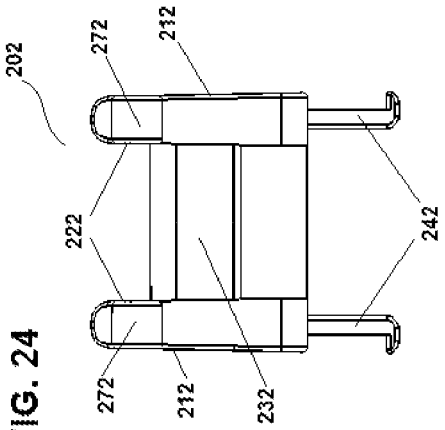


FIG. 24

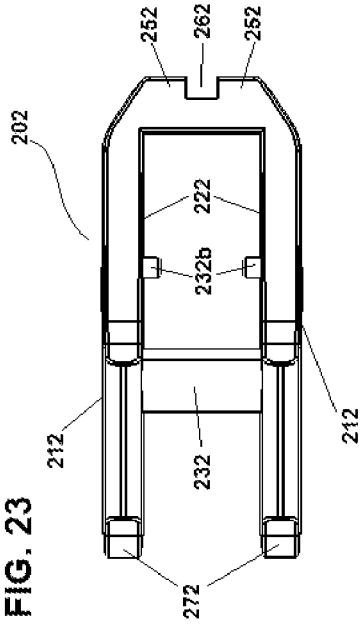


FIG. 23

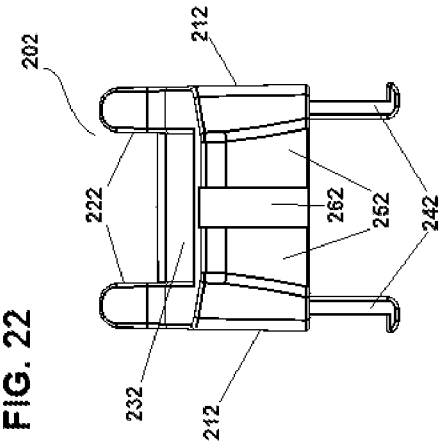


FIG. 22

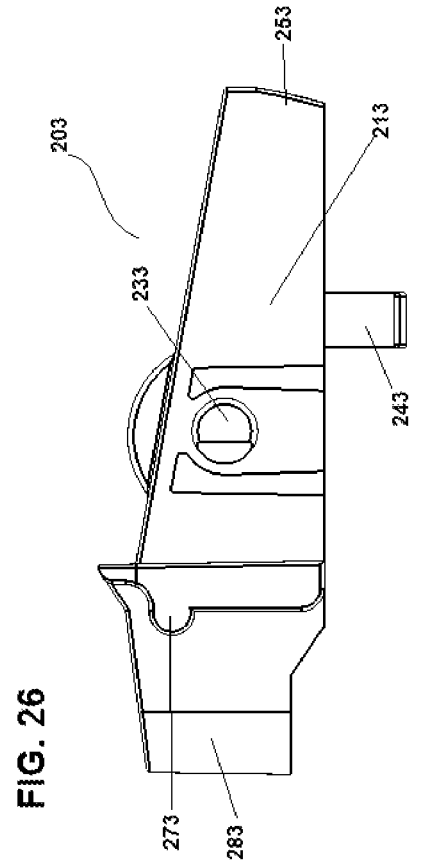
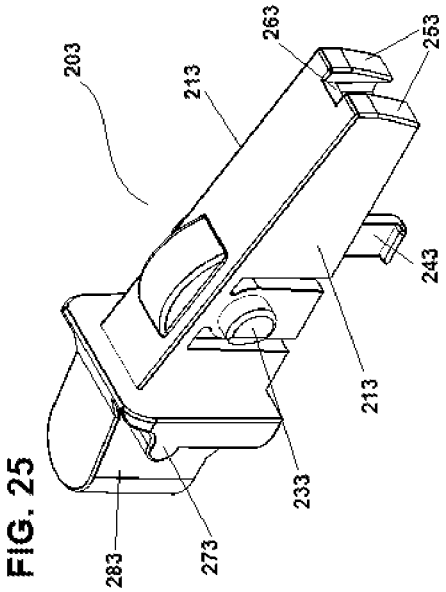


FIG. 26



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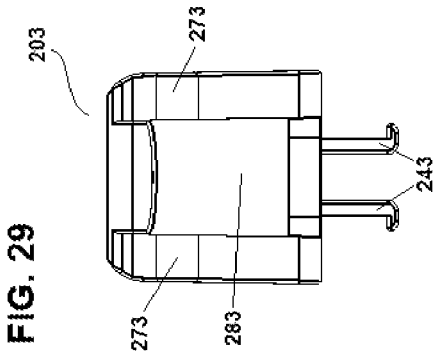

FIG. 29

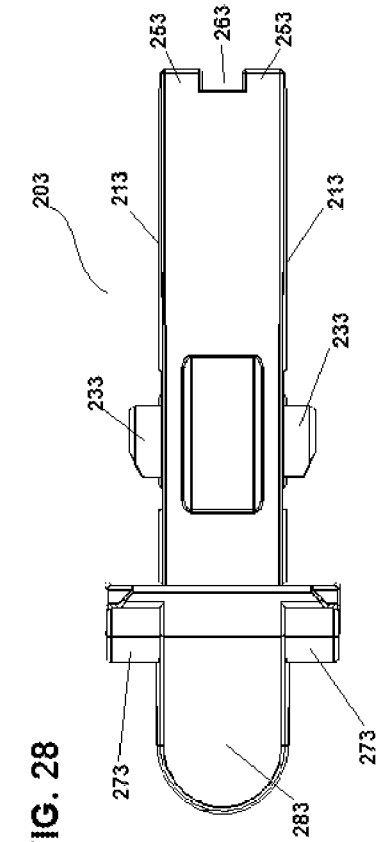

FIG. 28

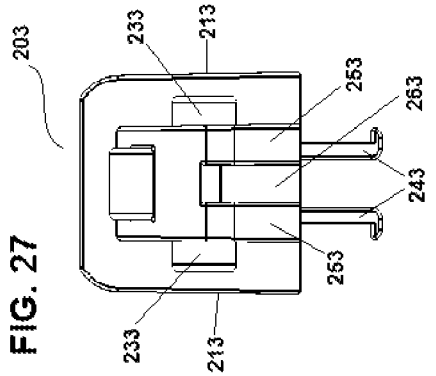

FIG. 27

WIPER BLADE WITH MODULAR MOUNTING BASE

CROSS REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of U.S. Provisional Application No. 61/704,855 filed Sep. 24, 2012, the disclosure of which is hereby incorporated herein by reference in its entirety.

BACKGROUND AND FIELD OF ART

The invention is generally directed to wiper blades, and in particular to rear wiper blades. Vehicles in the United States and abroad use a variety of different wiper arms to secure windshield wipers. The same is true for wiper arms designed for the rear windows of certain cars. Accordingly aftermarket manufacturers, who sell wiper blades that may be installed on a variety of different cars arms need to provide wiper blades that can connect to various types of wiper arms.

One solution to this problem is the use of multi-arm connectors, such as the one described and claimed in U.S. Pat. No. 6,640,380. Another solution more popular with rear wiper arms is to have a removable mounting base capable of connecting directly to a wiper arm without the use of a separate connector. The invention disclosed provides a novel wiper blade and detachable mounting base system providing a cost-efficient and reliable connection between a variety of wiper blade arms and the novel wiper blade.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** illustrates perspective view of a wiper assembly of a first exemplary embodiment of the invention.

FIG. **2** illustrates a frontal view of the wiper blade assembly depicted in FIG. **1**.

FIG. **3** illustrates a top view of the wiper blade assembly depicted in FIG. **1**.

FIG. **4** illustrates a perspective view of the mounting base depicted in FIG. **1**.

FIG. **5** illustrates a side view of the mounting base depicted in FIG. **4**.

FIG. **6** illustrates a view of the proximal end of the mounting base depicted in FIG. **4**.

FIG. **7** illustrates a top view of the mounting base depicted in FIG. **4**.

FIG. **8** illustrates a view of the distal end of the mounting base depicted in FIG. **4**.

FIG. **9** illustrates a perspective view of the primary frame depicted in FIG. **1**.

FIG. **10** illustrates a frontal view of the primary frame depicted in FIG. **9**.

FIG. **11** illustrates a top view of the primary frame depicted in FIG. **9**.

FIG. **12** illustrates a perspective view of a secondary frame depicted in FIG. **1**.

FIG. **13** illustrates a side view of the secondary frame depicted in FIG. **12**.

FIG. **14** illustrates a top view of the secondary frame depicted n FIG. **12**.

FIG. **15** illustrates a perspective view of a mounting base of a second exemplary embodiment of the invention.

FIG. **16** illustrates a side view of the mounting base depicted in FIG. **15**.

FIG. **17** illustrates a view of the proximal end of the mounting base depicted in FIG. **15**.

FIG. **18** illustrates a top view of the mounting base depicted in FIG. **15**.

FIG. **19** illustrates a view of the distal end of the mounting base depicted in FIG. **15**.

FIG. **20** illustrates a perspective view of a mounting base of a third exemplary embodiment of the invention.

FIG. **21** illustrates a side view of the mounting base depicted in FIG. **20**.

FIG. **22** illustrates a view of the proximal end of the mounting base depicted in FIG. **20**.

FIG. **23** illustrates a top view of the mounting base depicted in FIG. **20**.

FIG. **24** illustrates a view of the distal end of the mounting base depicted in FIG. **20**.

FIG. **25** illustrates a perspective view of a mounting base of a fourth exemplary embodiment of the invention.

FIG. **26** illustrates a side view of the mounting base depicted in FIG. **25**.

FIG. **27** illustrates a view of the proximal end of the mounting base depicted in FIG. **25**.

FIG. **28** illustrates a top view of the mounting base depicted in FIG. **25**.

FIG. **29** illustrates a view of the distal end of the mounting base depicted in FIG. **25**.

DETAILED DESCRIPTION

The following detailed description and the appended drawings describe and illustrate exemplary embodiments of the invention solely for the purpose of enabling one of ordinary skill in the relevant art to make and use the invention. As such, the detailed description and illustration of these embodiments are purely exemplary in nature and are in no way intended to limit the scope of the invention, or its protection, in any manner. It should also be understood that the drawings are not to scale and in certain instances details have been omitted, which are not necessary for an understanding of the present invention, such as conventional details of fabrication and assembly.

The invention is generally directed to a novel wiper blade designed so as to have modular mounting bases that can be attached as needed to connect to various types of wiper arms. Note that any particular embodiment may include one or more of such mounting bases which can interchangeably attach to the primary frame as described below. FIGS. **1-3** depict a wiper blade assembly **10** of a first exemplary embodiment of the invention. The wiper **10** has a mounting base **20**, a primary frame **30**, secondary frames **40** and a wiper strip (not shown). Optionally, one or more tertiary frames may further be attached to the secondary frames **40** between the secondary frame **40** and the wiper strip.

FIGS. **4-8** illustrate a first exemplary embodiment of a mounting base **20**. The mounting base **20** is preferably made of plastic, though any other suitable material known in the art may be used for same. The mounting base **20** has a proximal end having two retaining projections **25** with a guiding channel **26** therebetween. The guiding channel **26** receives a projection **36** from the primary frame **30**, and the retaining projections **25** sit on either side of the projection **36** when the mounting base **20** is attached. The retaining projections **25** may be chamfered, as shown in FIGS. **4** & **5** to facilitate the attachment of the mounting base **20** to the primary frame **30**. Additional retaining projections **25** and guiding channels may also be used. Indeed, in some embodiments the guiding channel and primary frame **30** may instead be located on the primary frame **30**, and projection

may be located on the mounting base **20** (and may be chamfered for ease of installation).

The mounting base **20** also has one or more locking legs **24** which descend from the bottom of the mounting base **20** to engage one or more receiving holes **34** in the primary frame **30** of the wiper blade **10**. Where more than one locking leg is used, the width between, and positioning of, the locking legs may vary and should be complementary to the positioning and spacing of the receiving holes **34** in the primary frame **30**. The mounting base **20** also has one or more locking projections **27** on its distal end which engage locking recesses **37** on the primary frame **30** of the wiper blade **10**.

The mounting base **20** further has outer side walls **21**. In some embodiments, such as the first exemplary embodiment, and the embodiments depicted in FIGS. **15-24**, the mounting base may also have inner side walls **22**. In order to connect to a wiper arm, the mounting base **20** may be provided with a connecting device which interfaces with structure on a wiper arm. As shown in FIGS. **4-8**, the connection device in mounting base **20** is a rivet **23**, extending between the two inner side walls **22**. The rivet is capable of engaging a rivet passage or clip in a wiper arm, thereby securing the wiper blade **10** to the wiper arm. Other types of connecting devices, such as rivets of various different sizes, projections, recesses, pegs, detents, and other such known methods of connecting to a wiper arm (some of which are described below) can be used within the scope of the disclosed concepts to secure a wiper arm to the wiper blade provided.

The mounting base **20** may further have a distal projection **28** as illustrated in FIGS. **4-8**. The distal projection **28** is received by a cutout **38**, which is preferably has a shape complementary to that of the distal projection. The distal projection **28** provides additional lateral and transverse support for the connection between the mounting base **20** and the primary frame **30**. In some embodiments the distal projection **28** and the cutout **38** may be swapped such that the mounting base **20** has a distal cutout **38**, and the primary frame **30** has a second projection which engages the cutout in the mounting base **20**.

FIGS. **9-11** illustrate a primary frame **30** of the wiper blade **10**. The primary frame has two legs, which may be symmetrical (not shown) or asymmetrical (as shown in FIGS. **9-11**). Each of the legs of the primary frame **30** have frame connection devices at or near their respective outer ends which engage complementary frame connection devices in the secondary frame. As shown in FIGS. **9** and **10**, the frame connection devices may be frame connection holes **39** which engage interior pegs **49** in the secondary frames **40**. In addition to pegs **49** and frame connection holes **39**, the frame connection devices and complementary frame connection devices can be any such structures known in the art, including rivets and rivet passages or clips, detents or projections and recesses or holes, etc. Alternatively, the primary frame may have claws or other such structures known in the art that are capable of securing a wiper strip directly without the need for secondary frames.

The primary frame also may have a base portion **31** which receives and supports the mounting base **20**. The base portion may have one or more receiving holes **34** located so as to receive the locking legs **24** of the mounting base **20**. The primary frame may also have a projection **36** which is located between the retaining projections **25** of the mounting base **20**. As discussed above, the retaining projections **25** and the projection **36** may be swapped onto the primary frame **30** and mounting base **20** respectively within the scope of the disclosed concept.

The primary frame **30** may also have one or more locking recesses **37** to receive and engage locking projections **27** on the mounting base **20**. The locking recesses **37** are preferably shaped to complement and receive the locking projections **27** snugly, but any suitable shape which engages the locking projections **27** would be suitable for the locking recesses **37**.

As discussed above, the primary frame **30** may also be provided with a cutout **38** which receives the distal projection **28** of a mounting base **20** when the mounting base **20** is secured to the primary frame **30**.

FIGS. **12-14** illustrate a secondary frame **40** for the wiper blade **10**. The secondary frames **40** may be symmetrical (not shown) or asymmetric, as shown in FIGS. **12-14**. The secondary frame may have a complementary frame connection device, such as the interior pegs **49** shown in FIGS. **12** and **14** in its central area in order to attach to the frame connection device in the primary frame **30**. For example, the interior pegs **49** engage the frame connection holes **39** in the primary frame. The secondary frame **40** may also have claws **41** or any other wiper strip securing device known in the industry to hold a wiper strip. Alternatively, the secondary frame may have frame connection devices on its ends that engage complementary frame connection devices in tertiary frames instead of directly securing the wiper strip. The secondary frame is preferably made from plastic, but can be made from metal or any other suitable material known in the art.

A second exemplary embodiment of the mounting base **201** is illustrated in FIGS. **15-19**. The mounting base **201** has a proximal end having two retaining projections **251** with a guiding channel **261** therebetween. The retaining projections **251** may be chamfered, as shown in FIGS. **15** & **16** to facilitate the attachment of the mounting base **201** to the primary frame **30**. The mounting base **201** also has to locking legs **241** which descend from the bottom of the mounting base **201** to engage receiving holes **34** in the primary frame **30** of the wiper blade **10**. The mounting base **201** also has locking projections **271** on its distal end which engage locking recesses **37** on the primary frame **30** of the wiper blade **10**. The mounting base **201** further has outer side walls **211**.

The connection device in mounting base **201** is also a rivet **231**, extending between the two inner side walls **221**. However the rivet **231** in the second exemplary embodiment has a smaller radius than the rivet **23** depicted in the first exemplary embodiment. Also, unlike the first exemplary embodiment, the mounting base **201** depicted in FIGS. **15-19** does not have the optional distal projection **28** present in the mounting base **20** depicted in FIGS. **4-8**.

A third exemplary embodiment of the mounting base **202** is illustrated in FIGS. **20-24**. The mounting base **202** has a proximal end having two retaining projections **252** with a guiding channel **262** therebetween. The retaining projections **252** may be chamfered, as shown in FIGS. **20** & **21** to facilitate the attachment of the mounting base **202** to the primary frame **30**. The mounting base **202** also has to locking legs **242** which descend from the bottom of the mounting base **202** to engage receiving holes **34** in the primary frame **30** of the wiper blade **10**. The mounting base **202** also has locking projections **272** on its distal end which engage locking recesses **37** on the primary frame **30** of the wiper blade **10**. The mounting base **202** further has outer side walls **212**.

The connection device in mounting base **202** comprises both a rivet **232** extending between the two inner side walls **222**, and interior projections **232***b* projecting from the inner side walls of **222**. However the rivet **232** in the second exemplary embodiment has a smaller radius than the rivet **23** depicted in the first exemplary embodiment. Also, unlike the first exemplary embodiment, the mounting base **202** depicted in FIGS. **20-24** does not have the optional distal projection **28** present in the mounting base **20** depicted in FIGS. **4-8**.

A fourth exemplary embodiment of the mounting base **203** is illustrated in FIGS. **25-29**. The mounting base **203** has a proximal end having two retaining projections **253** with a guiding channel **263** therebetween. The retaining projections **253** may be chamfered, as shown in FIGS. **25** & **26** to facilitate the attachment of the mounting base **203** to the primary frame **30**. The mounting base **203** also has to locking legs **243** which descend from the bottom of the mounting base **203** to engage receiving holes **34** in the primary frame **30** of the wiper blade **10**. As shown in FIGS. **27** and **29**, the mounting base **203** has a narrower distance between the locking legs, and engage the interior receiving holes **34** of the primary frame **30** (unlike mounting bases **20**, **201** & **202** in the previous exemplary embodiments, which engage the outer receiving holes **34** of the primary frame **30**). The mounting base **203** also has locking projections **273** on its distal end which engage locking recesses **37** on the primary frame **30** of the wiper blade **10**. Like the first exemplary embodiment, the mounting base **203** depicted in FIGS. **25-29** has not have the optional distal projection.

The mounting base **203** further has outer side walls **213**. Unlike the mounting bases **20**, **201** & **202** in the previous exemplary embodiments, the outer side walls **213** of the mounting base **203** in the fourth exemplary embodiment are recessed, such that the wiper arm connecting to the mounting base **203** will cover the outer walls **213** of the mounting base **203**. Accordingly, the connection device in mounting base **203** comprises both a peg projections **233** extending outwardly from the two outer side walls **213**. The pegs **233** may be located on cantilevered portions of the side walls, as shown in FIGS. **25** and **26**, and may further be chamfered in order to facilitate connection to a wiper arm (not shown). Accordingly, the pegs **233** are capable of interacting with and fitting inside holes or recesses in a wiper arm in order to secure the wiper blade to the wiper arm.

As discussed above, the descriptions of the exemplary embodiments set forth above are meant to be illustrative of the disclosed concepts, and are not intended to be limiting in any way. Any method of connecting a wiper arm to a mounting base, including the use of rivets, projections, recesses, clips, connectors and adaptors can be practiced together with the concepts disclosed in this application.

We claim:

1. A wiper blade comprising:

a wiper strip;

a primary frame coupled to at least one secondary frame, the primary frame having a recessed portion, wherein the recessed portion has a base portion, a proximal end and a distal end, a projection is disposed on the proximal end of the recessed portion, and at least one receiving hole is disposed in the base portion of the recessed portion; and

a mounting base having bottom, a proximal end and a distal end, wherein at least one locking leg descends from the bottom of the mounting base such that the at least one receiving hole in the base portion of the recessed portion of the primary frame is capable of receiving the at least one locking leg when the mounting base is attached to the primary frame, wherein the at least one locking leg each comprises a bottom edge comprising locking tabs extending laterally from the bottom edge, and

wherein the proximal end comprises two retaining projections and a guiding channel therebetween, wherein the guiding channel is capable of receiving the projection from the primary frame such that the retaining projections sit on either side of the projection on the primary frame when the mounting base is attached to the primary frame.

2. The wiper blade of claim **1**, wherein the retaining projections are chamfered.

3. The wiper blade of claim **1** wherein the primary frame further comprises at least one locking recess on the distal end of the recessed portion of the primary frame, and the mounting base has at least one locking projection on the distal end of the mounting base which is capable of engaging the at least one locking recess when the mounting base is attached to the primary frame.

4. The wiper blade of claim **1** wherein the primary frame further comprises a distal cutout disposed on the distal end of the recessed portion.

5. The wiper blade of claim **1**, wherein the mounting base further comprises inner and outer side walls, wherein the mounting base has a connecting structure that is capable of connecting to a wiper arm selected from the group consisting of: a rivet extending between the inner side walls, at least one interior projection extending from the inner side walls, a rivet extending between the inner side walls and at least one interior projection extending from the inner side walls, at least one peg extending from the inner side walls, at least one recess in the inner side walls, at least one hole in the inner side walls and at least one detent in the inner side walls.

6. The wiper blade of claim **1**, wherein the mounting base further comprises outer side walls wherein the mounting base has a connecting structure that is capable of connecting to a wiper arm selected from the group consisting of: at least one outer projection extending from the outer side walls, at least one peg extending from the outer side walls, at least one recess in the outer side walls, at least one hole in the outer side walls and at least one detent in the outer side walls.

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