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Kotlarski

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(54) **WIPER BLADE FOR MOTOR VEHICLE WINDOWS**

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(52) **U.S. Cl.** **15/250.43**; 15/250.451
(58) **Field of Search** 15/250.43, 250.44, 15/250.361, 250.451, 250.48

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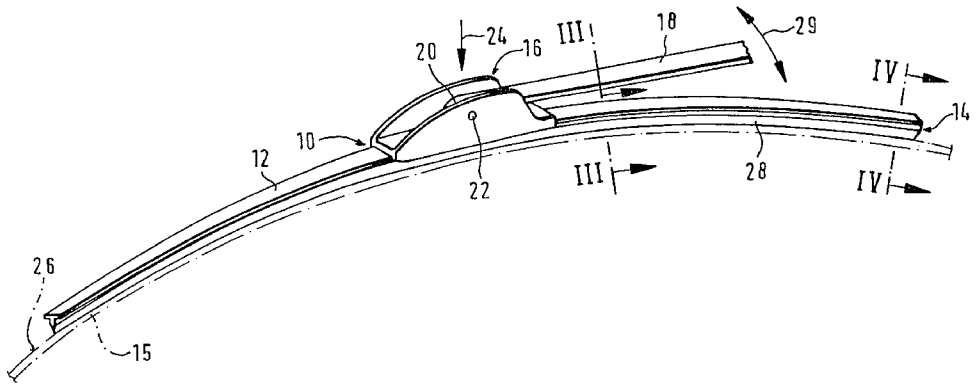
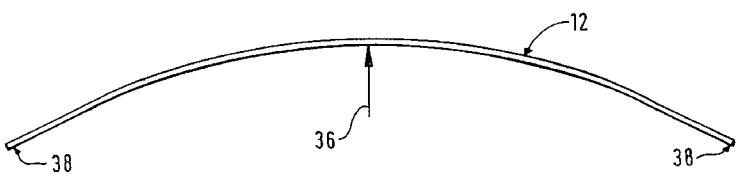
(57) **ABSTRACT**

A wiper device with a wiper blade for cleaning windows of motor vehicles, in which the wiper blade can be moved back and forth laterally to its longitudinal span by a driven wipe arm which can be connected to the wiper blade and loads the same against the window. The wiper blade has an elongated wiper strip that can be placed against the window and an elongated spring-elastic carrying element, which has a connecting unit for the wiper arm and is disposed parallel to the longitudinal axis of the wiper strip to distribute a contact force over the entire wiper strip length. A particularly effective and low-noise operation of the wiper system is achieved because the contact force of the wiper strip against the window is greater in its center section than in at least one of two end sections of the wiper strip.

1 Claim, 3 Drawing Sheets





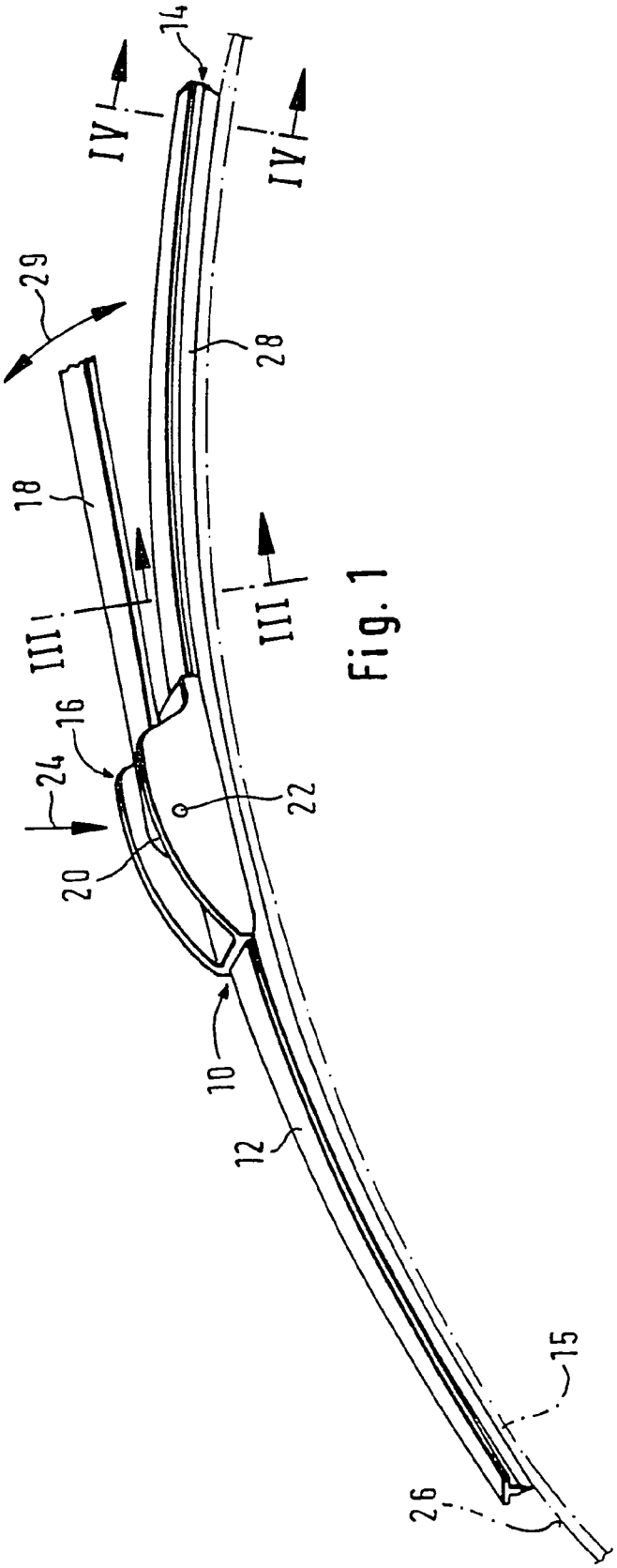


Fig. 1

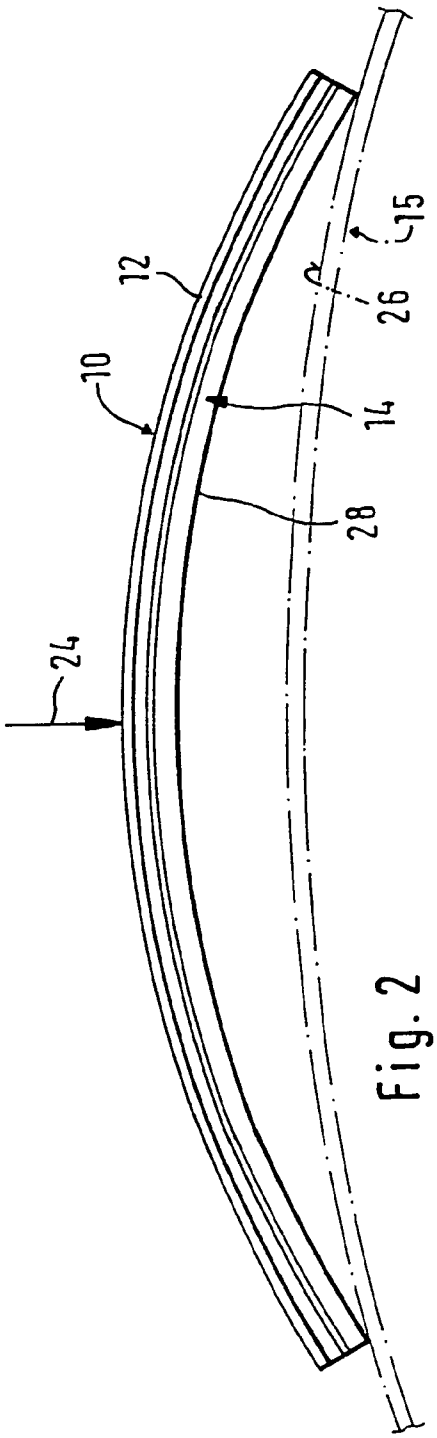


Fig. 2

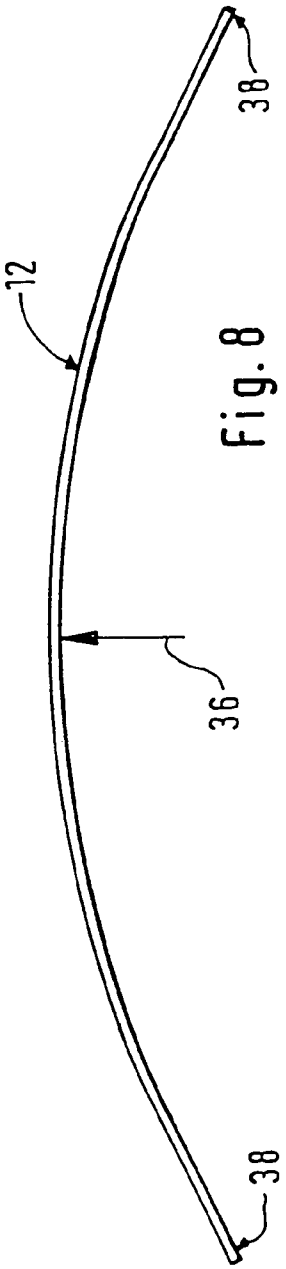


Fig. 8

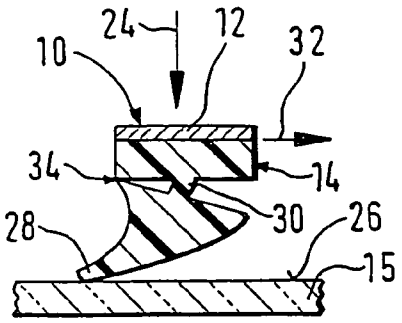


Fig. 3

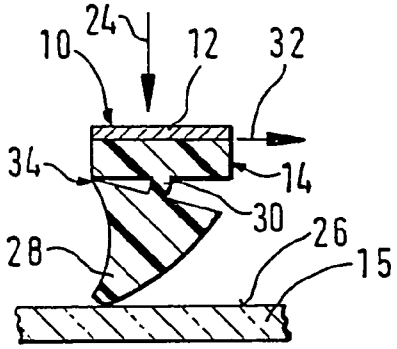


Fig. 4

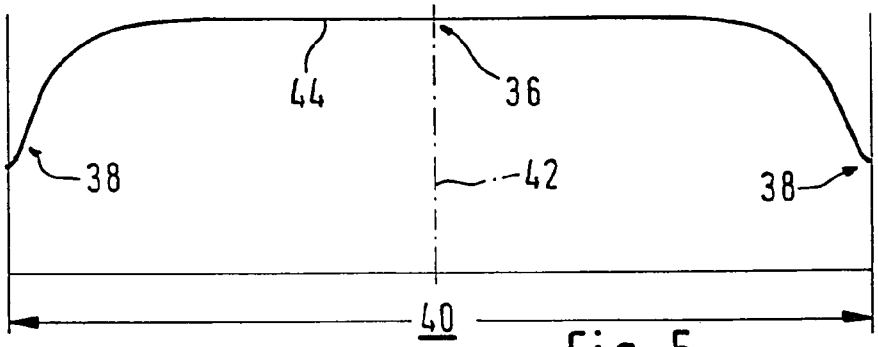


Fig. 5

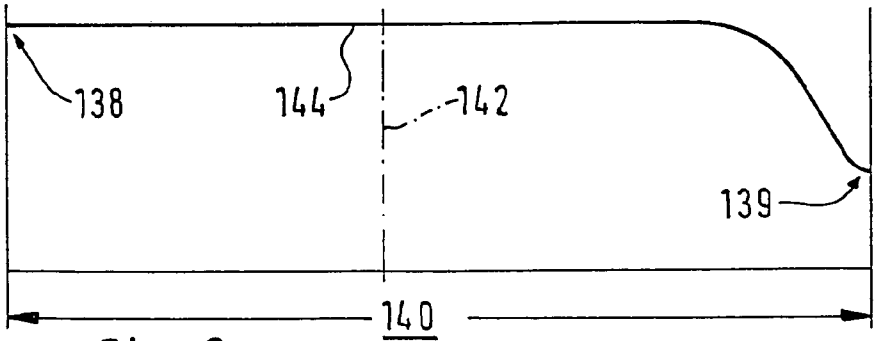


Fig. 6

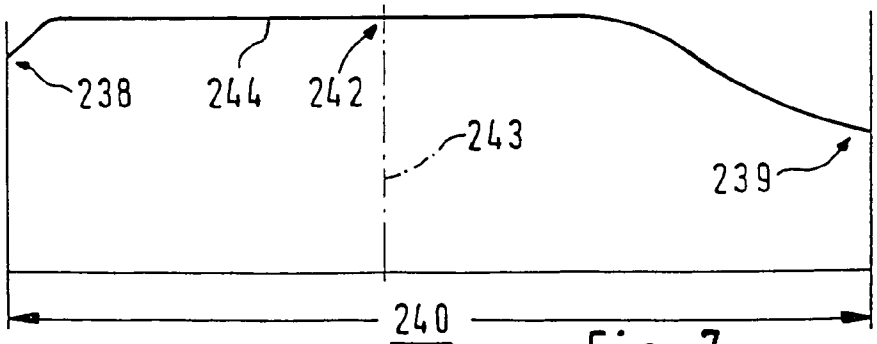


Fig. 7

WIPER BLADE FOR MOTOR VEHICLE WINDOWS

This application is a 371 of PCT/DE98/03721 filed Dec. 18, 1998.

PRIOR ART

In wiper blades of the type under consideration, the carrying element is intended to assure a predetermined distribution of the wiper arm-induced wiper blade pressing force—often also called pressure—against the window over the entire wiping field swept across by the wiper blade. Through a corresponding curvature of the unstressed carrying element—i.e. when the wiper blade is not resting against the window—the ends of the wiper strip, which is placed completely against the window during the operation of the wiper blade, are loaded toward the window by the carrying element which is then stressed, even when the curvature radii of spherically curved vehicle windows change with each wiper blade position. The curvature of the wiper blade must therefore be slightly sharper than the sharpest curvature measured in the wiping field on the window to be wiped. The carrying element consequently replaces the expensive support bracket construction with two spring rails disposed in the wiper strip, as is the practice in conventional wiper blades (published, non-examined German patent application 15 05 357).

In a known wiper blade of this type (German patent 12 47 161), in order to produce as uniform as possible a pressure loading of the wiper blade against a flat window over its entire length, a number of embodiments of the carrying element are provided.

In another known wiper blade according to the preamble to claim **1** (EP 05 28 643 B1), in order to produce a uniform pressure loading of the wiper blade against spherically curved windows, the pressure loading at the two end sections increases significantly when the wiper blade is pressed against a flat window.

The uniform pressure distribution over the entire wiper blade length desired in both instances, however, causes the wiper lip, which belongs to the wiper blade and does the actual wiping work, to abruptly flip over along its entire length from its one drag position into the other when the wiper blade reverses its working direction. This drag position is essential for an effective and low-noise operation of the wiper system. However, the abrupt flipping over of the wiper lip—which is inevitably connected with a back and forth movement of the wiper blade—produces undesirable knocking noises. Also, the matching of the carrying element stress to the desired pressure distribution, which is different from case to case, is problematic in the case of spherically curved windows.

SUMMARY OF THE INVENTION

According to the present invention, a wiper blade which can be moved back and forth across the window comprises an elongated wiper strip, and a spring-elastic carrying element wherein a contact force of the wiper strip against the window is greater in its center section then in at least one of two end sections thereof. In the wiper blade according to the present invention, in the vicinity of the reduced contact force, a steeper drag position of the wiper lip is produced in comparison to the region with the greater contact force. This

wiper blade, which is initiated there and then continued in the region that has the greater contact force. This prevents the abrupt snapping over of the entire wiper lip and the unpleasant knocking noise connected with it. This also eliminates the problems in the design of the carrying element with regard to the contact pressure distribution in spherically curved windows. Namely, it has turned out that the reduction of the contact pressure at the end section of the wiper blade does not inevitably also attend a reduction in the wiping quality.

It is particularly advantageous if the contact pressure of the wiper strip against the window is lower at its two end sections than in its center section because the tilting-over process of the wiper lip then takes place starting from both ends and is therefore finished more quickly.

With particularly problematic window curvatures, it can be useful if the contact pressure of the wiper strip against a window in its center section is at least almost uniform in magnitude and decreases at the end section(s).

A preferred embodiment of the carrying elements for achieving the desired distribution of the contact pressure provides that the carrying element has a concave curvature on its side oriented toward the window which is sharper than the sharpest curvature of the spherically curved window in the vicinity of the wiping field that can be swept across by the wiper blade and that the concave curvature in the center section of the carrying element is sharper than that of its end section(s).

Other advantageous embodiments and updates of the invention are disclosed in the following description of an exemplary embodiment shown in the respective drawings.

DRAWINGS

FIG. **1** is a perspective depiction of a wiper blade that is resting against the window and is connected to a wiper arm that is loaded in the direction of the window,

FIG. **2** is a schematic representation of a side view of an unloaded wiper blade placed against the window, shown at a reduced scale in comparison to FIG. **1**,

FIG. **3** shows the sectional plane of the section through the wiper blade according to FIG. **1**, along the line III—III in an enlarged depiction,

FIG. **4** shows the sectional plane of a section through the wiper blade according to FIG. **1** along the line IV—IV in an enlarged depiction,

FIG. **5** is a graphic representation of the wiper blade contact pressure over the wiper blade length according to a first possible embodiment of the invention,

FIG. **6** is a graphic representation of the wiper blade contact pressure over the wiper blade length according to a different possible embodiment of the invention,

FIG. **7** is a graphic representation of the wiper blade contact pressure over the wiper blade length according to another possible embodiment of the invention, and

FIG. **8** is a schematic representation, not to scale, of a side view of a carrying element belonging to the wiper blade.

DESCRIPTION OF THE EXEMPLARY EMBODIMENT

A wiper blade **10** shown in FIG. **1** has an elongated, spring-elastic carrying element **12** for a wiper strip **14**, and this carrying element **12** is shown separately in FIG. **8**. As can be seen from FIGS. **1**, **3**, and **4**, the carrying element **12**

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