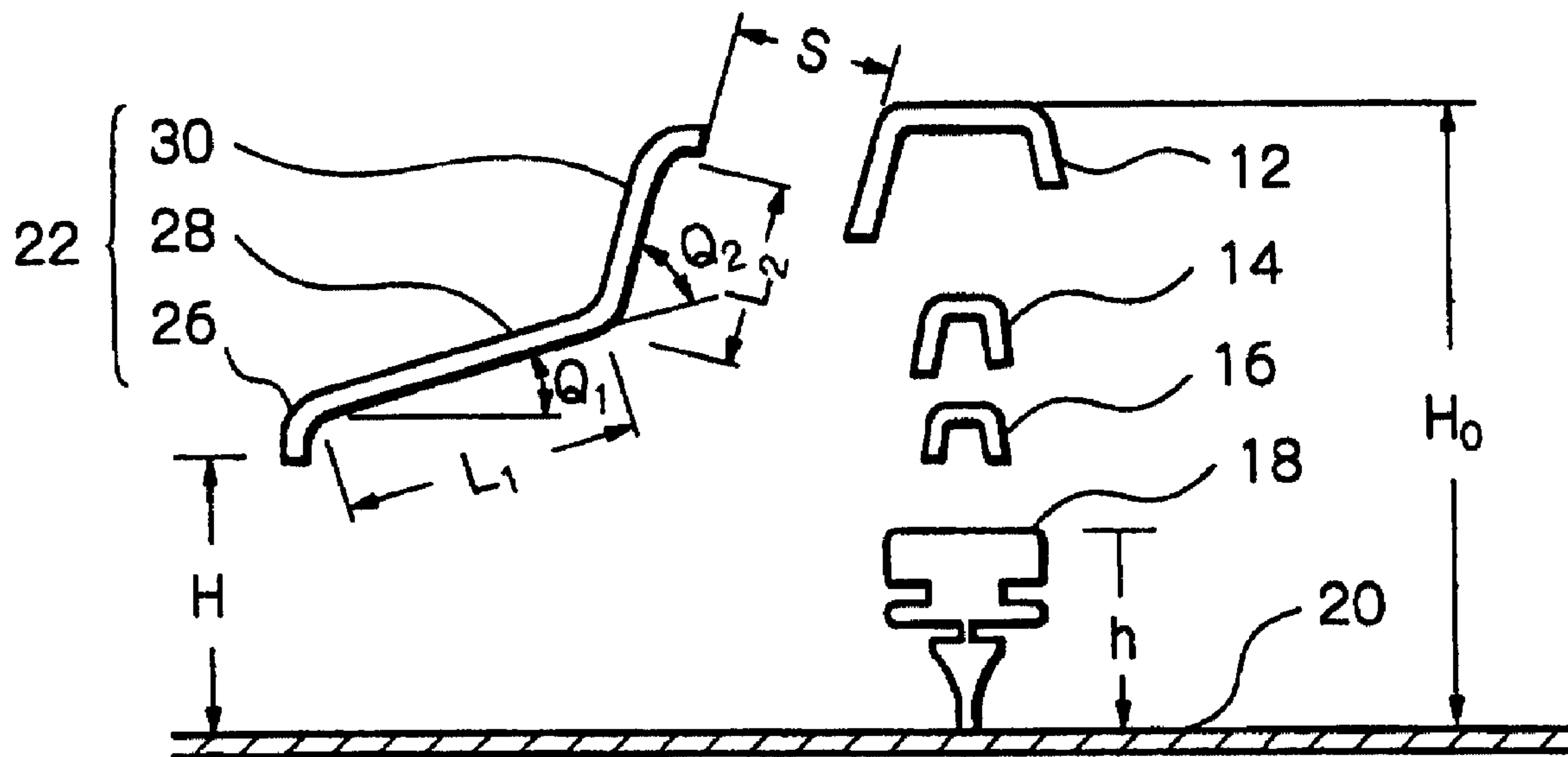




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(54) Title: WIPER BLADE WITH WIND DEFLECTOR



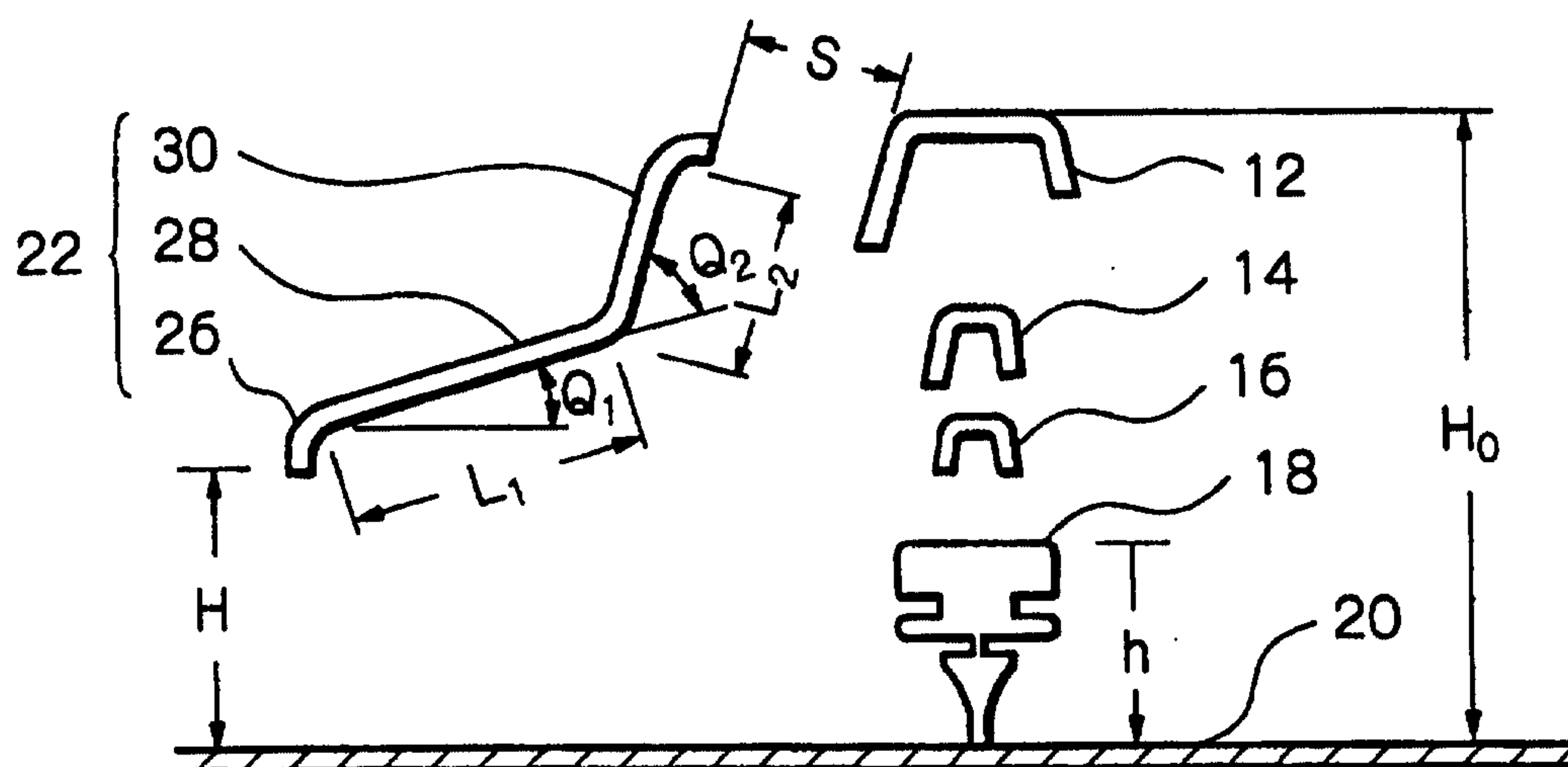
(57) **Abrégé/Abstract:**

A wiper blade (10) for use in motor vehicles is provided, which comprises a wind deflector (22) which is provided in front of an air stream and supported in position on a main yoke through a support of reduced width support, wherein the wiper blade comprises said wind deflector which has been formed to have such a configuration in its cross section in which it consists of a plate-like pressure-receiving surface section (28) which is provided along the air stream so as to generate downward forces, an air stream-weir section (30) which is provided to extend from the rear end of the pressure-receiving surface section so as to reduce a velocity of the air stream, and an air stream-splitting section (26) which extends downwardly from the end of the pressure-receiving surface section so as to form a water-weir section below the pressure-receiving surface section, and a distance (H) between the lower edge of said air stream-splitting section (26) of the wind deflector (22) and the shield glass (20) is greater than the height (h) of the blade rubber (18), whereas there may be such a relationship between this height (H) and a clearance (S) to be formed between the upper end of said air stream-weir (30) of the wind deflector (22) and the main yoke (12) as; $1 > (S/H) \geq (1/5)$.

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(54) Title: WIPER BLADE WITH WIND DEFLECTOR**(57) Abstract**

A wiper blade (10) for use in motor vehicles is provided, which comprises a wind deflector (22) which is provided in front of an air stream and supported in position on a main yoke through a support of reduced width support, wherein the wiper blade comprises said wind deflector which has been formed to have such a configuration in its cross section in which it consists of a plate-like pressure-receiving surface section (28) which is provided along the air stream so as to generate downward forces, an air stream-weir section (

DESCRIPTION

WIPER BLADE WITH WIND DEFLECTOR

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TECHNICAL FIELD

The present invention relates to a wiper blade for use in motor vehicles, and more particularly to means for effectively suppressing a possible reduction of wiper blade performance characteristics which may otherwise occur due to
10 wind pressure etc., while a vehicle runs at a high-speed, and more particularly to means for substantially improving aerodynamic characteristics of a wiper blade.

BACKGROUND ART

Many means have been used for the purpose of
15 suppressing a possible reduction in the wiping performance of the wiper blade for motor vehicles, which may otherwise occur due to wind pressure at a high-speed. Various means may be listed for illustrative purpose as follows; a device with plate-like blades, one adapted to provide a downward
20 partial wind pressure force by forming a part of lever in a blade-like configuration, one comprising a wind deflector for shielding an air stream which strikes the blade rubber, and an article in which a distance between the undersurface of the wind deflector and the glass surface is determined to
25 be greater at the front of the air stream than at the rearward portion so as to generate a negative pressure between the undersurface of the wind deflector and the glass surface.

Such devices as those illustrated in Fig. 14 (DE.3139444), Fig. 15 (DE.3532536) and Fig. 16 (FR.262128) and the like can be cited as typical known arts, all of which may operate satisfactorily to some degree when
5 vehicles run at a speed of around 150 km/h which is a conventional speed requirement for achieving a high-speed drive, but it may be difficult for prior devices to provide a satisfactory operation when the vehicles run at the speed of around 200 km/h which is a today's common running
10 velocity.

The device in Fig. 14 is designed to deflect an air stream which strikes the blade rubber 1 by means of wind deflector 2 which is provided at a position where it may shield the blade rubber 1, but it may not shield the blade
15 rubber 1 due to a reduced area of the wind deflector 2. Besides, an air stream which has passed through a space between levers may cause a disturbance, resulting in a lack of effective urging forces, and thereby creating problems that it may not achieve a substantial improvement during
20 high-speed running.

The device shown in Fig. 15 is configured such that a lower edge 3 of the main yoke side wall extends in a spoiler design providing a particular inclined angle, but it also causes a problem that sufficient urging forces may not be
25 produced since the air stream over the upper surface of the spoiler collides against the side wall of the main yoke, and thus the flow velocity is reduced, while simultaneously the air stream flowing over the undersurface of the spoiler is

interfered with a lever etc., to prevent a smooth flow of the air stream.

The device in Fig. 16 is designed to have a configuration in which a distance between the undersurface of the wind deflector 4 and the glass surface 5 is made greater at the back of the air stream than at the front side, thereby creating a negative pressure between the undersurface of the wind deflector 4 and the glass surface 5. This approach entails, however, a problem that it may not be effective unless the wind deflector 4 is provided at a lower position, and if the wind deflector is made to be wider to provide an effective result, the wind deflector 4 may interfere with the curved glass surface or the wind frame.

DISCLOSURE OF INVENTION

In the conventional devices as above-described, provision was made for means for improving wiper blade performance while a vehicle runs at high-speed, taking aerodynamic characteristics into consideration which may occur either at the front side (upper surface in the drawing) or at a back side (lower surface in the drawing) of a wind deflector or a spoiler, based on a presumption that the air stream strikes the glass surface in a parallel manner. In contrast, the present invention is made with a presumption that an air stream is deflected upwardly as it interferes with the wiper blade, taking an air stream into consideration which acts against opposite surfaces of the wind deflector from the viewpoint of aero-dynamic behavior. As a result, a most effective aero-dynamic design has been

realized.

In summary, in the wiper blade for use in motor vehicles including a wind deflector at a front side of the air stream which is supported on the main yoke via narrow supports, the cross-section of the wind deflector being placed such that its side surface lying in front of the air stream may consist of an air stream-splitting section which may form a water-weir area at the rear-side of the air stream, a pressure-receiving surface section along the air stream which may create downward forces, and an air-stream weir section which may cause the air stream to flow at a reduced speed, as shown in Fig. 3. A distance H between the lower edge of the air stream-splitting section in front of the air stream and the wind shield is made to be greater than the height h of the blade rubber, and besides there may be a relation between H and a distance S which is defined between the upper edge of the above-described air stream-weir section in the wind deflector and the main yoke as $1 > (S/H) \geq 1/5$ or preferably $1 > (S/H) \geq (1/4)$, and there may be a relationship between the length L 1 of the pressure-receiving surface section and the length L 2 of the air-stream weir section in the cross-section of the wind deflector as; $L 1 \geq L 2$, and further, and angle $\theta 1$ to be made between the pressure-receiving surface section and the glass surface is in a range of; $0' \leq \theta 1 \leq 30'$, and a relative angle $\theta 2$ to be made between the air-stream weir section and the pressure-receiving surface section in a range of; $30' \leq \theta 2 \leq 90'$.

The air stream which flows along a wind screen is split into upper and lower flow components by means of air stream-splitting section at the tip of the wind deflector. An upper air stream component flows along the pressure-receiving surface section, and rises upwardly while having its flow velocity reduced by means of the weir section, whereas the lower flow component partially forms a virtual blade surface at a lower portion of the pressure-receiving surface section utilizing a water-weir area which is created backwardly of the air stream-splitting section. Most of the lower flow component is caused to vary its flow direction

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