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24th APRIL, 1996

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Today you receive a fax from your Japanese Associate reading as follows:-

**“British Patent Application No. 9452130.4
Hari Kari KK.**

I am enclosing herewith a copy of the specification of the above numbered application, and a copy of an official letter from your patent office together with a copy of each of the citations referred to. I wish you to take over the prosecution of this application forthwith since my present agent cannot continue to act, due to a conflict of interest.

You will see from the official letter that the due date for replying to the official letter is tomorrow and in view of this I wish you to prepare and file a reply and supporting argument in your patent office immediately. The Applicant wishes as full a response to be filed as possible with a view to placing the application in order for acceptance as soon as possible, since they are aware of a possible infringement by Messrs. Swift Wipe Limited of Southampton. When you have filed the response, please send me a copy of the amendment and argument that you have filed, together with your account.

Thank you for undertaking this case at such short notice.”

Prepare an amended set of claims for filing in the UK Patent Office, and an accompanying letter setting out any arguments that you may wish to submit in support of the amendments that you propose. You need not propose any amendments to the body of the specification.

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**WIPER APPARATUS FOR A VEHICLE AND
METHOD OF
WIPING A WINDSHIELD OF A VEHICLE**

Field of the Invention

The present invention relates to wiper apparatus and to a method of wiping a windshield of a vehicle. The wiper can be mounted, for example, on such vehicles as a passenger car, bus or truck.

Description of the Related Art

Such vehicles are usually provided with wiper apparatus for wiping their windshield surfaces. A conventional wiper apparatus is constructed so that its wiper arm is oscillated in a reciprocating manner. The sweep of the wiper arm is reversed at each extremity of its travel. This has been a problem since the impact and the noise of reversing at the time of such reversing cannot be eliminated.

SUMMARY OF THE INVENTION

Accordingly, the present invention has been made to provide an apparatus and method capable of eliminating these problems.

A first aspect of the present invention provides a wiper apparatus comprising: a slide bar having a wiper blade carried thereon; a housing for supporting the slide bar so that it can move longitudinally, each end of its travel being a wiping position for the wiper blade; a wiper motor for unidirectionally rotating the housing; and an actuating motor for moving the slide bar longitudinally to bring the wiper blade to a wiping position.

A wiper apparatus for a windshield of a vehicle according to a second aspect of the present invention comprises: a slide bar having a wiper blade integrally formed thereon; a housing for supporting the slide bar movably in a longitudinal direction thereof where each travel end portion thereof constitutes a wiping position of the wiper blade; a blade rotating motor provided on the body side to rotate the housing unidirectionally; a blade moving motor for forcibly moving the slide bar, to bring the wiper blade to a wiping position; angle detection means for detecting the angle of the wiper blade; a displacement position detection means for detecting the displacement position of the wiper blade in the longitudinal direction thereof; and a drive control unit connected to the rotation angle detection means and the displacement position detection means to output a drive control command to each of the motors on the basis of detection signals from these detection means; wherein

the drive control unit has a displacement control means for moving the slide bar to an opposite travel end position by providing a drive command to the blade moving motor upon detecting that the wiper blade has reached a non-wiping rotation range from a wiping rotation range based on the drive of the blade rotating motor.

In accordance with a third aspect of the present invention, a method of wiping a windshield of a vehicle is provided, which comprises the steps of:
providing a housing for supporting a slide bar having a wiper blade integrally formed thereon, in a direction automatically movable longitudinally thereof wherein the housing is unidirectionally rotated by a motor which is provided on the body side;
setting the housing such that it passes alternately through a wiping rotation range and a non-wiping rotation range two times each while the housing moves one full turn; and moving the slide bar toward one of the travel ends thereof during a period which the housing is rotated from the starting end to a finishing end of the rotation range to perform wiping of the windshield by the wiper blade while causing the slide bar positioned at one travel end to move toward the opposite travel end during the period through which the housing is rotated from a start end to a

completing end of the non-wiping rotation range to displace the wiper blade to a wiping position for the next cycle.

According to the construction as described above, the present invention makes possible wiping of the windshield without reversing the rotation of the wiper arm.

The invention will be described now by way of example only, with particular reference to the accompanying drawings.

In the drawings:

Fig. 1 is a block diagram showing a drive control mechanism in accordance with the present invention;

Fig. 3 is an explanatory view showing the movement of the wiper apparatus in operation

Fig. 5 is a perspective view of the above wiper apparatus.

DESCRIPTION OF THE PREFERRED EMBODIMENT.

A specific embodiment of the present invention will now be described by way of the accompanying drawings.

In the drawings, an output shaft 2a of a wiper motor 2 (corresponding to "blade rotating motor" of the present invention) of the wiper apparatus has a housing 3 integrally formed thereon so that the housing 3 is continually driven to be unidirectionally rotated by the drive shaft of the wiper motor 2. On a pair of support arms 3a which are provided on the housing 3 with a predetermined separation, a slide bar 4 is supported so as to be movable in its axial direction while rotation about the axis thereof is restricted. Known suitable methods such as a key-groove fitting method as shown in the embodiment, a spline fitting method or a method in which the slide bar itself is formed into the shape of a square column may naturally be employed as the means for restricting the rotation of the slide bar 4 about the axis thereof. An attaching pin 4a is caused to project at the longitudinal centre portion of the slide bar 4 and the lengthwise longitudinal center portion of the wiper blade 6 is attached to the attaching pin 4a with a biasing spring 5 sandwiched therebetween. The wiper blade 6 is thus forced against the windshield surface by the spring 5. It should be noted that each support arm 3a has a notch 3b to avoid interference with the movement of the attaching pin 4a.

What is denoted by numeral 7 is an actuating motor (corresponding to "blade moving motor" of the present invention) internally provided on the housing 3. An output gear (pinion gear) 8 integrally provided on the output shaft 7a of the actuating motor 7 meshes with a rack gear 4b which is formed on the slide bar 4. The slide bar 4 is thus moved lengthwise of the bar together with the wiper blade 6 by forward and reverse drive of the actuating motor 7 while it is rotated about the axis of the motor shaft 2a by drive of the wiper motor 2.

A description will now be given with respect to the procedure of drive control of the wiper motor 2 and the actuating motor 7. Specifically, these motors are constructed to be driven on the basis of control commands from a drive control unit (CPU) 9 which comprises a microcomputer. The drive control unit 9 receives signals from various switches, sensors and setting units including a wiper switch 10; a rotation angle detection sensor 11 for detecting the rotation angle of the housing 3 (i.e. rotation angle of the wiper blade 6); a displacement position detection sensor 12 for detecting the longitudinal displacement of the slide bar 4 (i.e., displacement of the wiper blade 6); and a wiping speed setting unit 13. Necessary drive command signals are then provided to the motors 2, 7 on the basis of these input signals. In this connection, the rotation angle of the housing 3 is determined by the rotation of the motor output shaft 2a. The rotation angle detection sensor 11 may thus be achieved for example by a rotation angle detection sensor for the motor output shaft 2a. Further, while a stroke sensor for detecting a change in length may be used as the displacement position detection sensor 12 for

detecting the longitudinal displacement of the slide bar 4, the actuating motor 7 in the present embodiment is constructed to have a built-in encoder so that the displacement of the slide bar 4 is detected by the encoder. These detection means may be composed of any actual means as far as their respective object may be detected.

For ease of description, the center of rotation of the housing 3, i.e. the position of the motor output shaft 2a in the present embodiment is set to the exact center of the two support arms 3a. Further, the position of the motor output shaft 2a is set to the center of the lower portion of the windshield to be wiped. Based on the construction as described, it is thus convenient that a complete cycle of a geometrically congruent wiping operation is performed at each 180-degree rotation of the motor output shaft 2a. For convenience in the present embodiment, the turning range of 0°-150° of the above described 180-degree rotation range i.e. the wiping operation range and the turning range of 150° -180° thereof is the range over which wiping is not performed, i.e. non-wiping rotation range.

In the present embodiment, the system is started when an engine key switch (not shown) is turned ON, whereby an initial setting operation is performed. An investigation is then made on the basis of the detected values of the two sensors 11, 12 as to whether the wiper blade 6 is positioned at the wiping start position of the wiping rotation range and at the same time whether the slide bar is positioned at one of the travel end side positions. If the wiper blade is not at the wiping start position, and the slide bar is not at one of the travel end positions, the drive control of the motors 2, 7 operates to bring them to these positions. In this state, the system waits for turning ON of the wiper switch 10.

When the wiper switch 10 is turned ON, a motor drive command set by the wiping speed setting unit 13 is provided from the drive control unit 9 to the wiper motor 2. The drive control unit 9 then investigates as to whether the rotation angle detection sensor 11 is within the wiping rotation range of 0° -150° and, if judged to be within the wiping rotation range, it furthermore calculates the displacement position of the wiper blade 6 based on the detected rotation angle of the rotation angle detection sensor 11. Such displacement position is calculated in the present embodiment in order to make the wiping region (locus) of the wiper blade 6 as large as possible. In other words, in order to make the wiping region (locus) of the wiper blade 6 a wider area, namely the widest wiping region (area), the locus of the end portion of the wiper blade 6 is, in the wiping process of the wiper blade 6 rotated by the wiper motor 2, set to move as adjacent as possible to the edge of the windshield instead of executing a simple circular arc about the motor output shaft 2a. Accordingly the displacement of the wiper blade 6 by the actuating motor 7 is previously set to take the most preferable position (the position where the end portion of the wiper blade 6 as close as possible to the edge of the windshield, for example as shown in Fig. 3) corresponding to the rotating position of the wiper blade 6. The drive control unit 9 then makes a judgment as to whether or not the detected value of the displacement position detection sensor 12 coincides with the set displacement position and, if angled that there is no coincidence, it renders a forward and reverse drive control of the actuating motor 7 so that the wiper blade 6 is positioned at the set displacement position.

On the other hand, if it is judged that the wiper blade 6 has reached the non-wiping rotation range, the drive control unit 9 provides a drive control command to the actuating motor 7 so that the wiper blade moves to the travel end position which is opposite to the travel end at which the wiper blade 6 is currently positioned and, if it is judged then that it has been moved to the opposite travel end position, driving of the actuating motor 7 is terminated. In this construction, drive of the wiper motor 2 may be performed without causing any problem, if the movement of the wiper blade 6 toward the opposite travel end by drive of the actuating motor 7 can be set so that it is quickly performed during the period through which the wiper blade 6 is rotated from the starting end to the completing end of the non-wiping rotation range i.e., when the wiper blade 6 is rotated through the non-wiping rotation range from 150° to 180° (0°). If, however, the wiper motor 2 is continually driven for a period which is longer than the time period during which the wiper blade 6 is rotated through the non-wiping rotation range or where the non-wiping rotation range is very narrow, the wiper blade 6 may interfere with the windshield frame or it may extend beyond the windshield surface. In such a case, the wiper

motor 2 is stopped or slowed down as required and the wiper blade 6 is moved toward the opposite travel end position. Needless to say, it is then controlled to perform a wiping rotation of the next cycle.

When the engine is running in the above embodiment of the present invention, the wiper blade 6 is positioned at one of the travel ends and waits for turning on operation of the wiper switch 10. When the wiper switch 10 is turned ON in this state, the wiper motor 2 is driven to cause the housing to rotate unidirectionally. In the course of such unidirectional rotation, the wiper blade 6 positioned at one of the travel ends performs wiping of the windshield surface over the wiping rotation range, and, during the non-wiping rotation range, the actuating motor 7 is driven to cause the wiper blade 6 to move longitudinally to the opposite travel end to prepare for the next cycle of wiping rotation.

As described, in the construction to which the present invention is applied, the wiper blade 6, unlike that of a conventional construction, is not reversed and does not oscillate in a reciprocating manner. Wiping may be performed in the course of a unidirectional rotation of the housing 3 on which the wiper blade 6 is mounted as it is not necessary to overcome the inertia of the blade in order to reverse its motion. It is possible to perform a quiet and smooth wiping operation.

In addition, since, according to this construction, the wiper blade 6 is moved to the opposite travel end position during the non-wiping rotation range, wiping of the windshield surface may be performed twice during one full turn of the housing 3, so that it has a good wiping ability.

Moreover, since the wiper blade 6 is moved toward the opposite travel end to complete one wiping process and proceeds to the next wiping process during a 180-degree rotation, there is no need for the wiper motor 2 to be positioned at the center of the window surface and obstruct the view as is the case in a complete-turn type in which the blade 6 is rotated through 360° about the motor shaft without any linear displacement. For example, the wiper motor may be positioned below the windshield.

CLAIMS

1. Wiper apparatus comprising a wiper motor for rotating a slide bar, a wiper blade carried by said slide bar, and means for moving said slide bar relative to the axis of said rotation, the arrangement being such that in operation, wiping of the windshield is effected without reversing the rotation of the slide bar.

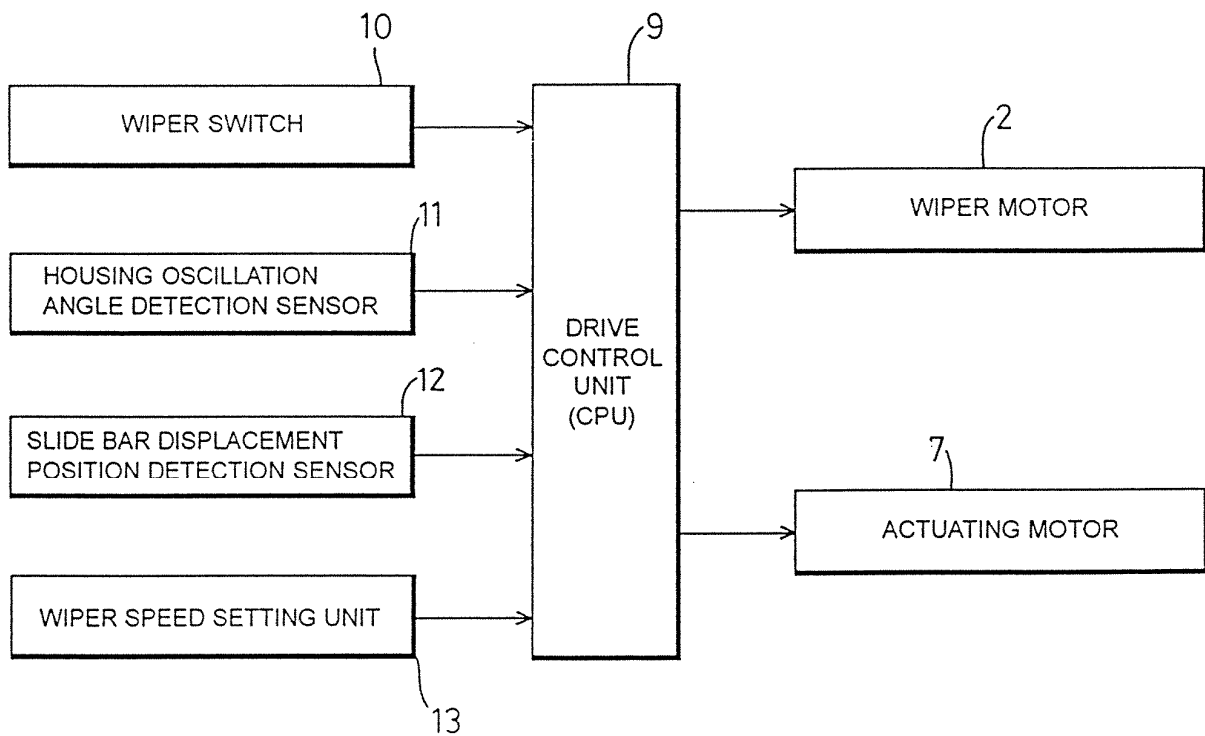
2. A wiper apparatus comprising: a slide bar having a wiper blade carried thereon; a housing for supporting the slide bar so that it can move longitudinally, each end of its travel being a wiping position for the wiper blade; a wiper motor for unidirectionally rotating the housing; and an actuating motor for moving the slide bar longitudinally to bring the wiper blade to a wiping position.

3. A wiper apparatus for a vehicle comprising
a slide bar having a wiper blade integrally formed thereon;
a housing for supporting the slide bar so that it can move in a longitudinal direction, each end of its travel being a wiping position of the wiper blade;
a blade rotating motor provided on the body for unidirectionally rotating the housing;
a blade moving motor for moving the slide bar longitudinally to bring the wiper blade to a wiping position; a rotation angle detection means for detecting a wiping rotation angle of the wiper blade; a displacement position detection means for detecting a longitudinal displacement position of the wiper blade; and {a drive control unit coupled to the rotation angle detection means and the displacement position detection means to output a drive control command to each of the motors on the basis of detection signals received from said detection means;
wherein the drive control unit has a displacement control means for moving the slide to an opposite travel end position by producing a drive command to the blade moving motor upon

detecting that the wiper blade has reached a non-wiping rotation range from a wiping rotation range based on the drive of the blade rotating motor.

4. Method of wiping a windshield of a vehicle comprising the steps of: providing a housing for supporting a slide bar having a wiper blade integrally formed thereon, in a manner automatically moveable in the longitudinal direction thereof where the housing is unidirectionally rotated by a motor which is provided on the body side; setting the housing such that it passes alternately through a wiping rotation range and a non-wiping rotation range two times each while it makes one full turn; and moving the slide bar toward one of the travel ends thereof during a period in which the housing is rotated from a starting end to a complete end of the wiping rotation range to perform wiping of the windshield by the wiper blade while causing the slide bar positioned at one travel end to move toward the opposite travel end during a period in which the housing is rotated from the starting end to a completing end of the non-wiping rotation range to displace the wiper blade to the wiping position for a subsequent wiping cycle

FIG. 1



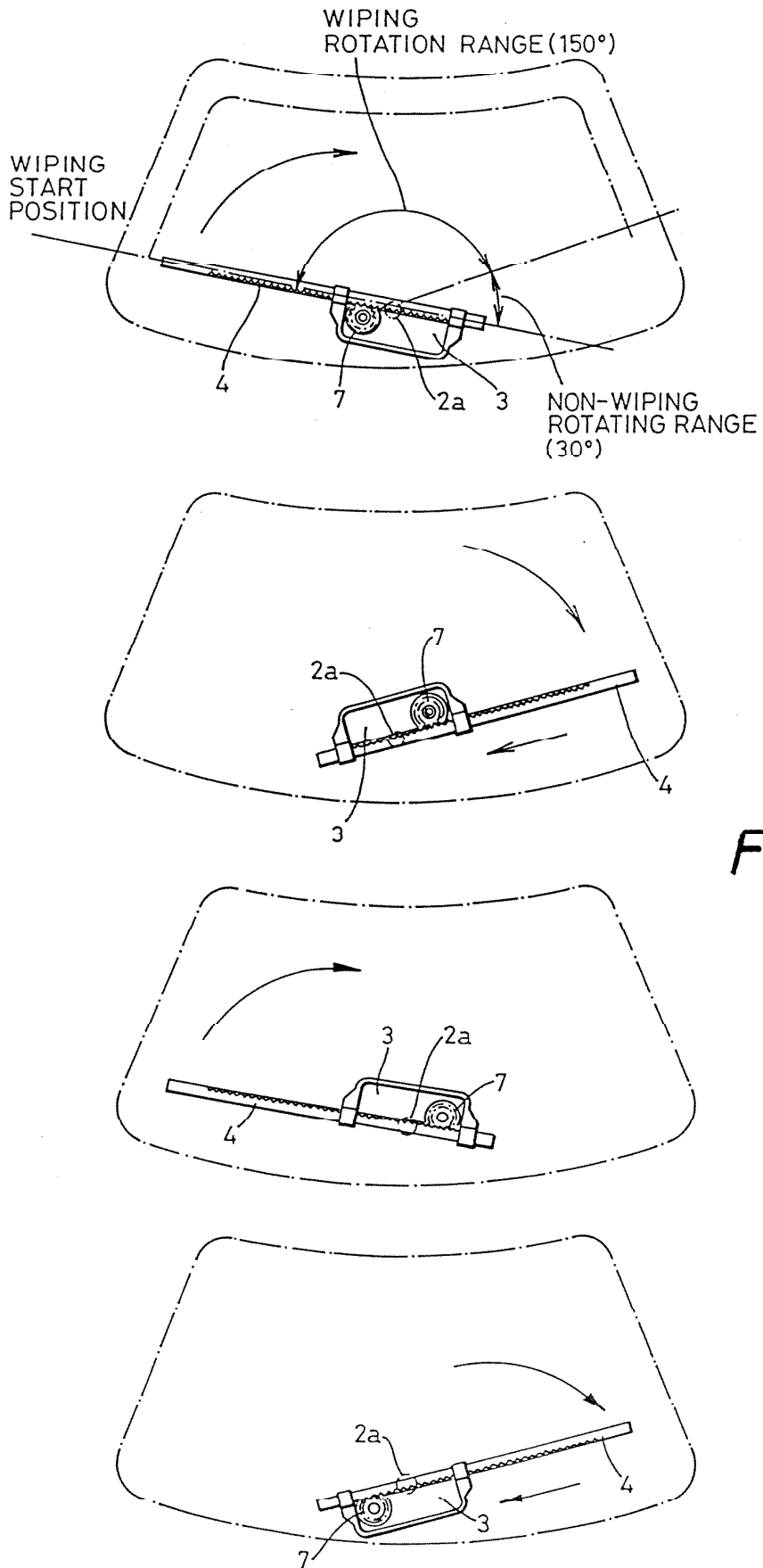
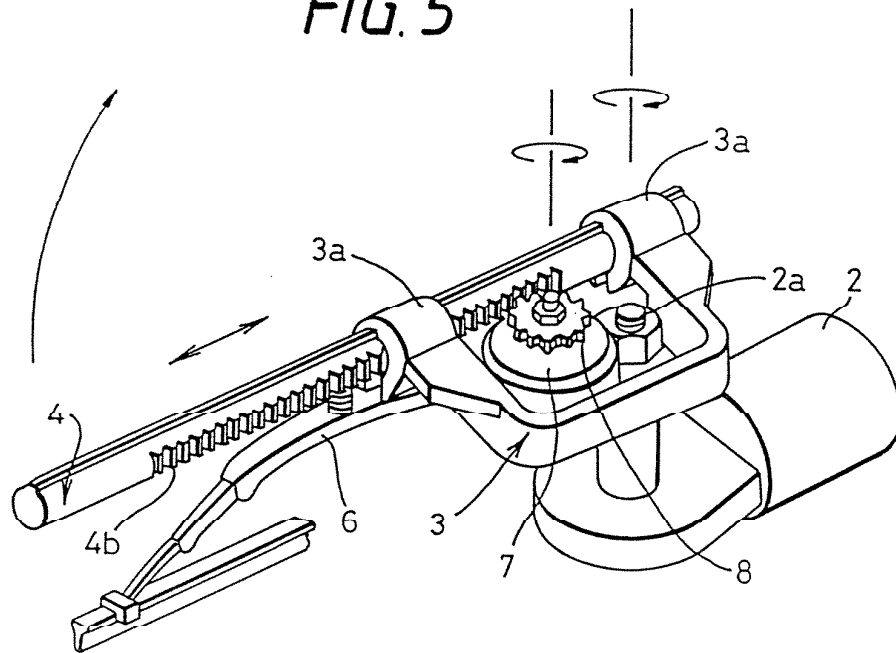


FIG. 3

FIG. 5



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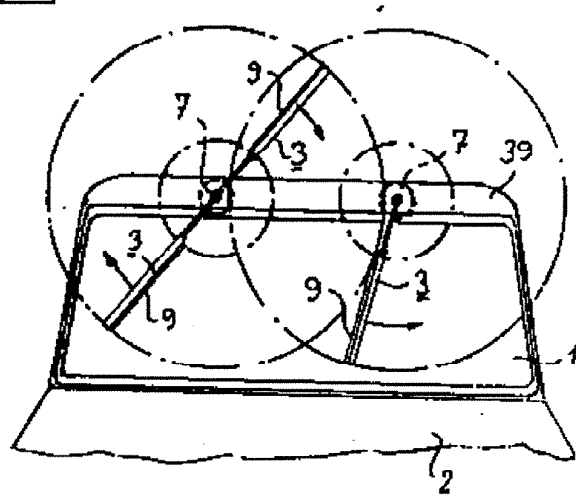
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FIG. 11




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

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
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
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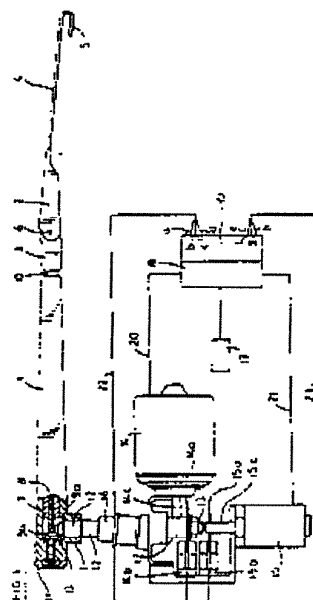
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 Driving mechanism for wiper blades.

 Two motors (14, 15, 53, 63) impart to the wiper arm, or to at least one of its elements, not only a oscillating, but also a translational (radial) movement. The oscillating movement is imparted to the wiper arm by means of a drive shaft (12) actuated by a first motor (14) and the radial movement is imparted to the wiper arm by means of the drive shaft (13, 53b, 63b) of a second motor (15, 53, 63) and by means of gearing (9a, 9b, 7, 8, 32a, 33, 42a, 43, 44, 57, 58, 67, 68, 72a, 73) wherein an element (7, 32a, 42a, 58, 68, 72a) moves radially when the drive shaft (13, 53b, 63b) of the second motor (15, 53, 63) is rotating. The two movements of the wiper arm are controlled and regulated by an opto-electronical system comprising two slotted discs (14a, 15a), and two reading heads (14b, 15b) or a potentiometrical system (12a, 55, 56, 65, 66) and a micro-processor (18). Several embodiments of the invention are possible.

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DRIVING MECHANISM FOR WIPER BLADES

The present invention relates to a driving mechanism for wiper blades of for example motor vehicles, comprising an oscillating wiper arm of which at least one element is capable of moving radially with respect to a first drive shaft, first drive shaft which imparts the oscillating movement to said wiper arm and which is actuated by a first motor located beneath the hood of the vehicle.

Wiper driving mechanisms of this type, i.e. wiper driving mechanisms of which at least one of the elements of the wiper arm is capable of moving radially with respect to the drive shaft of the wiper arm, are known in prior art. In the known systems it is generally, if not always, the motor which imparts the oscillating movement to the wiper arm that also imparts the radial movement to at least one element of the arm, said radial movement being obtained by means of a gear, generally a planet gear, and/or by means of rod systems.

A first disadvantage of the known systems is the fact that the planet gears and the rods must be located in a relatively large housing which is located at the level of the wiper arm itself and which consequently give a non aesthetic aspect to said arm.

A second disadvantage of the known systems is the fact that the planet gears and the rods must be designed especially for each type of vehicle, or, more exactly, for each type of windshield. In other words, in the known systems given gears/rods can only be used on one single type of vehicle or on one single type of windshield.

A first object of the invention is to eliminate the above mentioned disadvantages. A second object of the invention is to provide a driving mechanism and wiper system of which the wiper blade is capable of wiping the largest possible surface on a given windshield. A third object of the invention is to provide a wiper mechanism which can be used without modification on the largest possible types of windshields.

It is to be noted that the principle of the driving mechanism according to the invention can be used on all types of windshields, but that for relatively small or relatively large windshields the dimensions of the mechanism must possibly be adapted.

The driving mechanism according to the invention is substantially characterized by the fact that a second motor imparts the radial movement to the element capable of moving radially with respect to the first drive shaft.

Depending on the different embodiments the driving mechanism according to the invention is also particularized either by the fact that the second motor is located beneath the hood of the vehicle, or by the fact that the second motor is located above the hood of the vehicle, i.e. for example inside the wiper arm.

Another feature of the driving mechanism according to the invention is the fact that the radial movement of said element or elements of the wiper arm is controlled as a function of the angular position of said arm either by an optoelectronic/micro-processor system, or by a potentiometrical/micro-processor system.

Further features of the driving mechanism according to the invention will be better understood when reading the following description of several embodiments in conjunction with the appended drawings, wherein:

-Fig. 1 is an elevational view, schematic and partially in section, of the driving mechanism according to the first embodiment of the invention;

-Fig. 2 is a schematic plan view of a detail of figure 1;

-Fig. 3 is an elevational view, at a larger scale, of certain elements of fig. 1;

-Fig. 4 is a plan view, at a larger scale, of one of the elements of fig. 3;

It is to be noted that the terms "oscillating wiper arm", "wiper arm" and "arm" designate all the elements to which the drive shaft 12 (Fig. 1, 3, 6, 7, etc.) imparts an oscillating movement. Thus the wiper arm of the first embodiment (Fig. 1) of the invention comprises the following elements: a housing 1, a housing 2, a mounting head 3, an extension rod 4, a hook 5, a rivet 6, a nut 7, a screw 8, a conical gear 9b, an extension rod 10 and a cap 11.

Fig. 1 furthermore shows the control and regulating system of this arm. Said control and regulating system comprises the following parts or elements: the first drive shaft 12, the second drive shaft 13, the gear 9a, the first motor 14 and its shaft 14c, the second motor 15 and its shaft 15c, the housing 16, the battery 17, the power circuits 18, the micro-processor 19 with its entries a, b, c, d, e, f, g, h, the electric cables 20, 21, 22, 23, the slotted discs 14a, 15a (Fig. 1, 2, 3) and the optoelectrical reading heads 14b, 15b.

The shaft 14c of the first motor 14 imparts an oscillating movement to the first drive shaft 12 to which the slotted disc 14a is rigidly attached. Thus the disc 14a oscillates with the shaft 12. The oscillating movement of the shaft 12 and of the disc 14a is transmitted to the wiper arm via the housing 1 which is rigidly attached to the shaft 12, shaft 12 which moreover is hollow and through which passes the second drive shaft 13.

The shaft 15c of the second motor 15 imparts a rotational movement (in both directions) to the second drive shaft 13. The shaft 15c of the motor 15 also imparts a rotational movement to the slotted disc 15a via a reducing gear. The disc 15a thus always rotates in the opposite direction of the motor 15, but at a reduced speed. The reducing gear is not represented on the drawings. It is however to be noted that the relative location of the slotted discs 14a, 15a is shown on Fig. 2 and that in Fig. 1 the slotted disc 15a is located behind the shaft 15c of the motor 15.

As an example one of the slotted discs 14a, 14b is shown at an enlarged scale in Fig. 4. Each slotted disc is provided with a series of elongate openings which are disposed on four concentric circles. The optoelectrical reading heads 14b, 15b, which each comprise an upper portion and a lower portion 14b" 15b" (Fig. 3), read the discs along their radius. Thus at B-A (Fig. 4) the reading head reads for example 1001 and at C-D it reads 0111. Each reading head 14b, 15b thus can transmit, for each position of the respective disc and via the electrical cables 22, 23, an information of four bits to the micro-processor 19.

The eight bits thus received "at each instant" by the micro-processor 19 inform it of the instant position of the two slotted discs 14a, 14b and thus respectively on the instant angular position of the first (12) and of the second (13) drive shaft. Moreover, the angular position of the first drive shaft 12 determines the angular position of the wiper arm and, as will be explained hereunder, the angular position of the second drive shaft 13 determines the position of the element or elements of the wiper arm which are capable of moving radially with respect to the first drive shaft 12.

In other words, the micro-processor 19 knows at each instant the exact position on the windshield of the element or elements of the wiper arm which are capable of moving radially with respect to the first drive shaft 12 and in particular the position of the element (3, 58, 68, 78) of the wiper arm to which the wiper blade (not shown) is attached.

The micro-processor 19 is programmed not only as a function of the configuration of the windshield, but also as a function of the form of the wiping pattern which is desired on the windshield. When the driving mechanism according to the invention is working the micro-processor 19 treats the information he receives in accordance with a pre-established programme and it gives instructions to the two motors 14, 15 via the power circuits 18 and, respectively, via the electrical cables 20, 21.

The instructions which the micro-processor 19 sends to the first motor 14 are essentially instructions for changing the direction of rotation, i.e. for obtaining the oscillating movement of the wiper arm. The instructions which the micro-processor sends to the second motor 15 are essentially instructions for starting, slowing down and stopping said motor 15, i.e. for moving radially with respect to the first drive shaft 12 an element or several elements of the wiper arm, as will be explained hereunder.

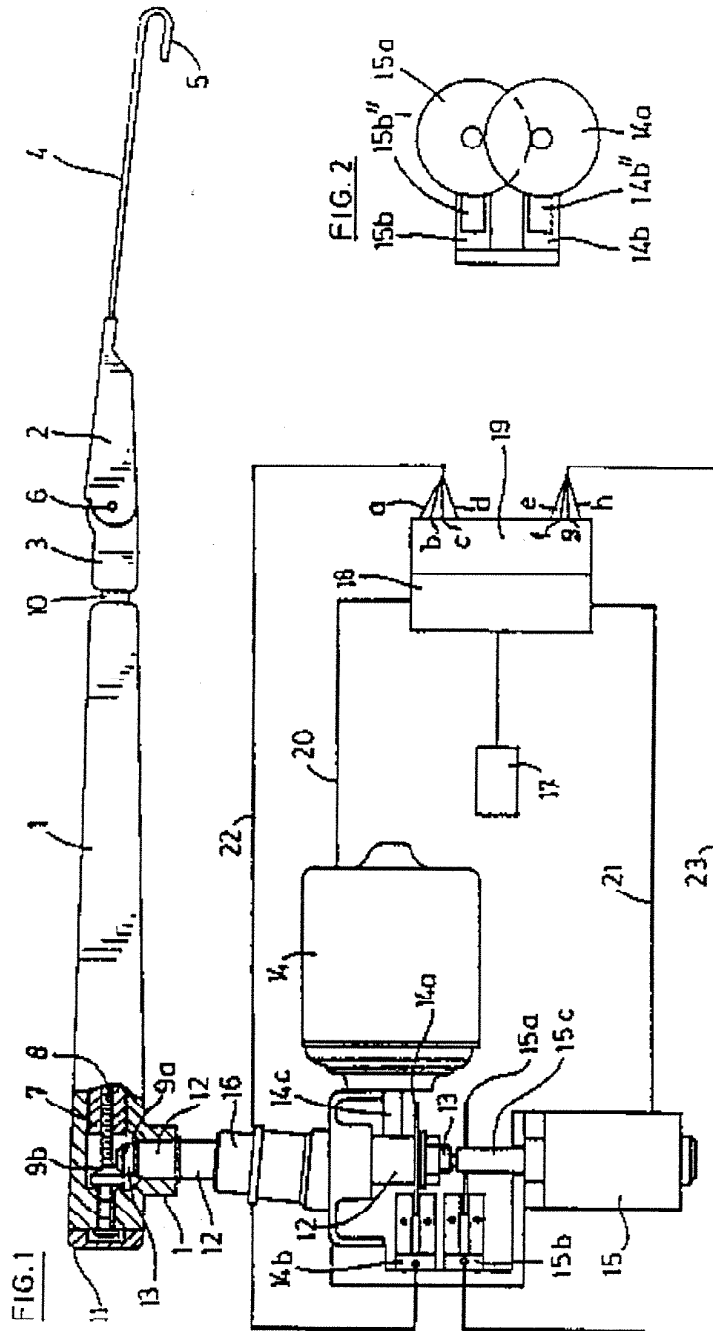
The thus described electrical system allows a given driving mechanism to be used not only on windshields of different configurations, but also to obtain on each windshield the optimal wiping pattern by just adequately programming the micro-processor.

In the first embodiment (Fig. 1) of the invention the rotational movement of the second drive shaft 13 is transmitted to the screw 8 via the conical gear 9a, 9b. The screw 8 rotates inside the elongate nut 7 which, because of its external form and because of the internal form of the housing 1 is locked rotationally. Thus the nut 7 moves radially with respect to the drive shaft 12 when the drive shaft 13 rotates, the direction of the radial movement depending on the direction of the rotational movement of the drive shaft 13. The nut 7 transmits its radial movement to the extension rod 10 and consequently to the mounting head 3, to the housing 2, to the extension rod 4 and to the hook 5.

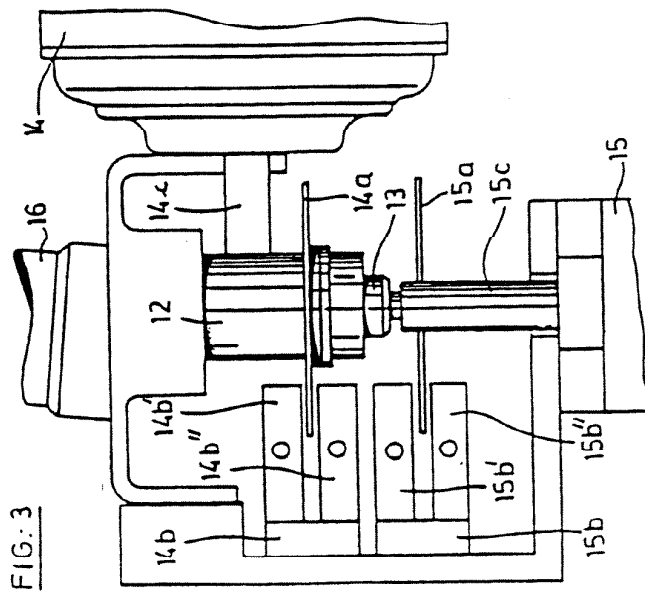
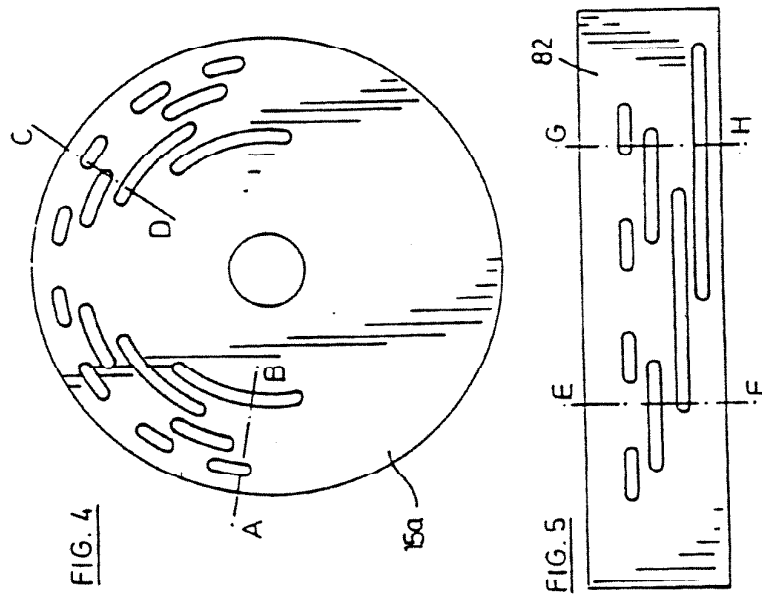
It is to be noted that the elements 2, 3, 4, 5, 6 form in fact a conventional wiper arm wherein the housing 2 comprises a spring capable of pushing the hook 2, and consequently the wiper blade (not shown), towards the windshield of the vehicle.

The embodiments of the invention have in common the feature that the total length of the wiper arm varies as a function of time, or in other words, as a function of the angular position of the wiper arm.

0 223 390



0 223 390





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October 1995

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Cardiff Road
Newport
Gwent NP9 1RH

Switchboard
01633-814000

Dear Sirs

PATENTS ACT 1977

REPORT UNDER SECTION 18(3) on Application No GB

Period for reply: 6 months from the date of this letter

The examiner (Mr F K Allnutt) has reported that your application does not comply with the requirements of the Act and Rules made thereunder for the reasons set out below. A reply to this letter setting out your observations and/or any amendments to overcome the objections to the application should be filed within the period specified above. Any amendments to the application should be effected by filing replacement pages which comply with Rule 20. The Comptroller may refuse your application, after giving you an opportunity to be heard, if you do not make an attempt, within the period specified above, either to satisfy him that these requirements are complied with, or to amend the application so as to comply with them.

2. It appears to the examiner, as a result of a search under Section 17, that your application does not comply with the requirements of Section 1(1)(a) in that the invention, so far as claimed in Claims 1 to 4 of the application, is not new having regard to the matter contained in the patent specifications or other documents cited below:-

DE-A-2 640 919 (HASSE) see Figure 11

EP-A-0 233 390 (CHAMPION) Whole document.

3 It would further appear that it is already known from EP-A-0 233 390 to provide a windshield wiping apparatus characterised by a slide bar adapted to move longitudinally so that each end of its travel constitutes a wiping position for the wiper blade, a wiper motor (14) for rotating the housing (1), and an actuating motor (15) for moving the slide

bar (8) longitudinally between each end of its travel to bring the wiper blade to a wiping position. Furthermore, DE-A-2 640 919, Figure 11, discloses a wiper motor for unidirectionally rotating the housing, i.e. adapted to impart to the housing a continuous rotation without reversing its direction, ~~then~~^{so that} such a wiper motor for unidirectionally rotating a wiper is already employed for the same purpose of performing a quiet wiping operation in a related windshield wiping apparatus.

4. It therefore appears to the Examiner, that the subject-matter of claims 1 to 4 do^s not involve an inventive step in accordance with Section 3.

Yours faithfully