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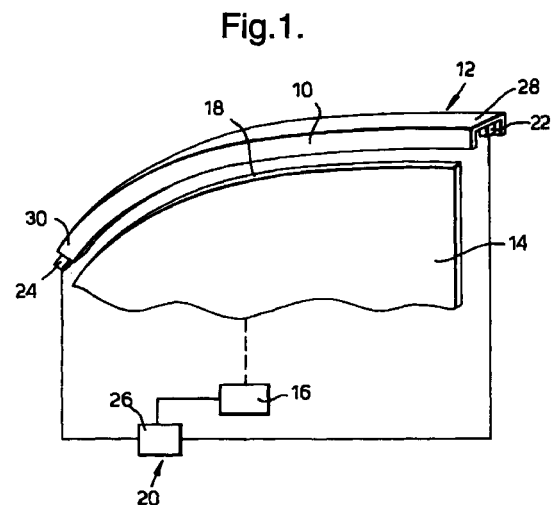
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(54) **Obstruction detection for a window**

(57) A system (20) for the detection of an obstruction in the path of a closing window (14) which is movable by an electric motor (16) and which has an edge (18) receivable in a portion (10) of a window frame (12) on closing of the window, the system comprising a high frequency transmitter (22) positionable at one end (28) of the portion of the window frame for transmitting a high frequency signal along the portion of the window frame; a high frequency receiver (24) positionable at the other end (30) of the portion of the window frame for receiving the high frequency signal transmitted along the portion of the window frame by the transmitter; and a control unit (26) for monitoring the high frequency signal received by the receiver, the control unit being connectable to the electric motor to control the operation of the motor dependent on the signal received by the receiver.



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DescriptionTechnical Field

[0001] The present invention relates to a system for an electrically operated window which can detect the presence of an obstruction in the path of the window during closing, and which can stop the window. The present invention has particular application for use with an electrically operated window in a motor vehicle.

Background of the Invention

[0002] Electrically operated windows, especially in motor vehicles, are well known. During closing of the window, there is a risk that an object, such as a person's hand, may become trapped between the window and the frame. A known obstruction detection system monitors the torque developed by the electric motor which drives the window, and, on detection of increased torque, assumes that an obstruction is preventing closing of the window. The system then stops the electric motor, and, in some cases, reverses the electric motor to open the window.

Summary of the Invention

[0003] It is an object of the present invention to provide an alternative system for obstruction detection for a closing window.

[0004] A system in accordance with the present invention for the detection of an obstruction in the path of a closing window which is movable by an electric motor and which has an edge receivable in a portion of a window frame on closing of the window, comprises a high frequency transmitter positionable at one end of the portion of the window frame for transmitting a high frequency signal along the portion of the window frame; a high frequency receiver positionable at the other end of the portion of the window frame for receiving the high frequency signal transmitted along the portion of the window frame by the transmitter; and a control unit for monitoring the high frequency signal received by the receiver, the control unit being connectable to the electric motor to control the operation of the motor dependent on the signal received by the receiver.

[0005] The present invention also includes a method of detecting an obstruction in the path of a closing window.

Brief Description of the Drawings

[0006] The present invention will now be described, by way of example, with reference to the accompanying drawings, in which:-

Figure 1 is a perspective view of a window and upper frame having an obstruction detection sys-

tem in accordance with the present invention.

Description of the Preferred Embodiment

[0007] Referring to the drawing, the upper portion 10 of a window frame 12 is shown, along with a window 14 which is moved by an electric motor 16. In general, the upper portion 10 of the window frame 12 is substantially U-shaped in cross-section. The window 14 is mounted on a support system (not shown) and can be raised and lowered by the electric motor 16. In the fully closed position of the window 14, the upper edge 18 of the window is positioned inside the upper portion 10 of the window frame 12. Such an arrangement is well known (and has particular use in motor vehicles) to those skilled in the art, and will not be described in further detail.

[0008] The obstruction detection system 20 in accordance with the present invention comprises a high frequency transmitter 22, a high frequency receiver 24, and a control unit 26. The transmitter 22 is positioned at one end 28 of the upper part 10 of the window frame 12. The receiver 24 is positioned at the other end 30 of the upper part 10 of the window frame 12. The transmitter 22 and the receiver 24 are connected to the control unit 26, which is also connected to the electric motor 16.

[0009] At least during closing of the window 14 by the electric motor 16, the transmitter 22 transmits a high frequency signal along the upper part 10 of the window frame 12, which acts as a waveguide, to the receiver 24. The control unit 26 monitors the receiver 24. If an obstruction is present between the upper edge 18 of the window 14 and the upper part 10 of the window frame 12, the high frequency signal transmitted by the transmitter 22 along the upper part is damped. If the receiver 24 indicates no damping of the high frequency signal, then the control unit 26 notes that there is no obstruction between the upper edge 18 of the window 14 and the upper part 10 of the window frame 12 and allows the window to close. If, however, the receiver 24 indicates that the high frequency signal has been damped, then the control unit 26 monitors that an obstruction is present, and stops operation of the electric motor 16 to prevent closing of the window 14. If required, in the latter case, the control unit 26 may cause the electric motor 16 to reverse to move the window 14 in an opening direction.

[0010] By high frequency signal is meant a signal in the range 2.45 to 25 GHz, and preferably in the range 22 to 25 GHz.

[0011] The present invention provides a low cost obstruction detection system which has the benefits of easier installation when compared to previously known systems which monitor electric motor torque.

Claims

1. A system (20) for the detection of an obstruction in

the path of a closing window (14) which is movable by an electric motor (16) and which has an edge (18) receivable in a portion (10) of a window frame (12) on closing of the window, the system comprising a high frequency transmitter (22) positionable at one end (28) of the portion of the window frame for transmitting a high frequency signal along the portion of the window frame; a high frequency receiver (24) positionable at the other end (30) of the portion of the window frame for receiving the high frequency signal transmitted along the portion of the window frame by the transmitter; and a control unit (26) for monitoring the high frequency signal received by the receiver, the control unit being connectable to the electric motor to control the operation of the motor dependent on the signal received by the receiver.

2. A system as claimed in Claim 1, wherein the transmitter (22) transmits the high frequency signal along the portion (10) of the window frame (12) only during closing of the window (14).
3. A method of detecting an obstruction in the path of a closing window (14) comprising the steps of transmitting a high frequency signal along a portion (10) of a window frame (12) which receives an edge (18) of the window on closing of the window; monitoring the high frequency signal transmitted along the portion of the window frame; and stopping the closing of the window when the monitored high frequency signal is damped.
4. A method as claimed in Claim 3, comprising the additional step of moving the window in an opening direction on monitoring damping of the high frequency signal.

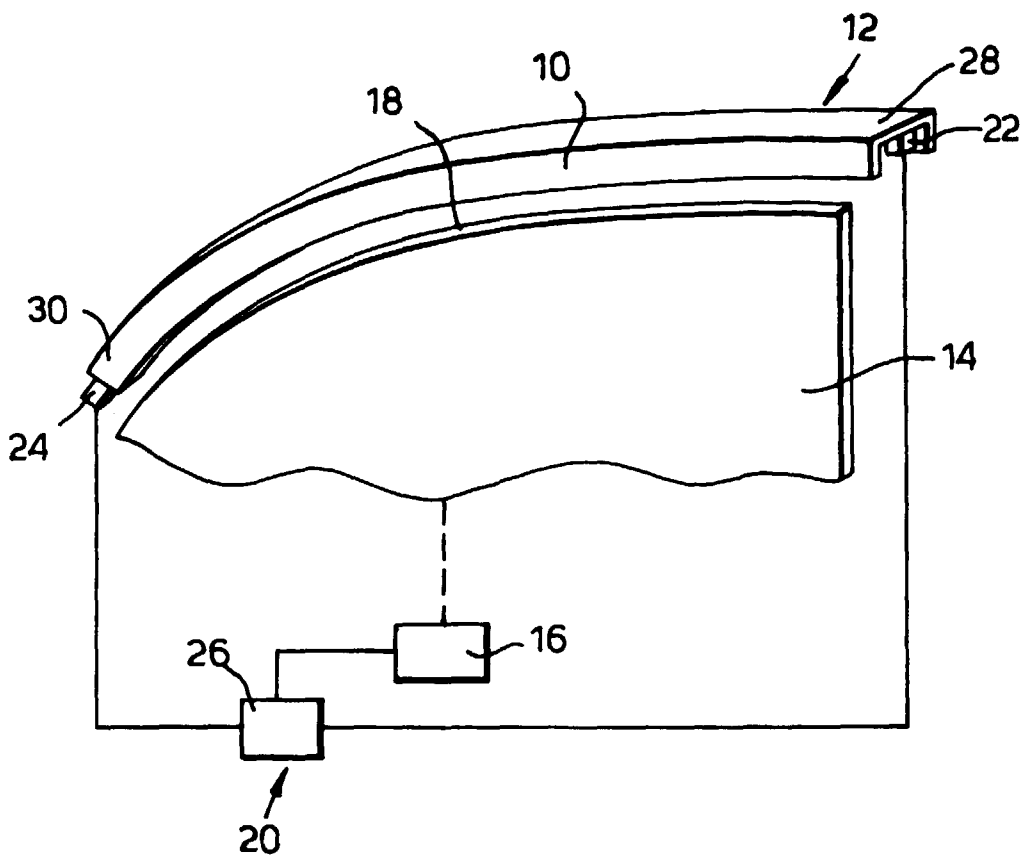
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Fig.1.





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EUROPEAN SEARCH REPORT

Application Number
EP 00 20 3485

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	DE 40 30 607 A (SIEMENS AG) 16 April 1992 (1992-04-16)	1,3,4	E05F15/00
Y	* abstract * * column 2, line 14 - line 39 * * column 2, line 58 - line 66; claim 1; figure 1 *	2	
X	DE 43 21 028 A (BROSE FAHRZEUGTEILE) 5 January 1995 (1995-01-05) * column 5, line 26 * * column 5, line 28 * * column 5, line 5 - line 47; figure 1 *	1,3,4	
Y	GB 2 288 014 A (STANDARD PROD LTD) 4 October 1995 (1995-10-04) * claim 19 *	2	
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
THE HAGUE		19 January 2001	Guillaume, G
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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 00 20 3485

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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