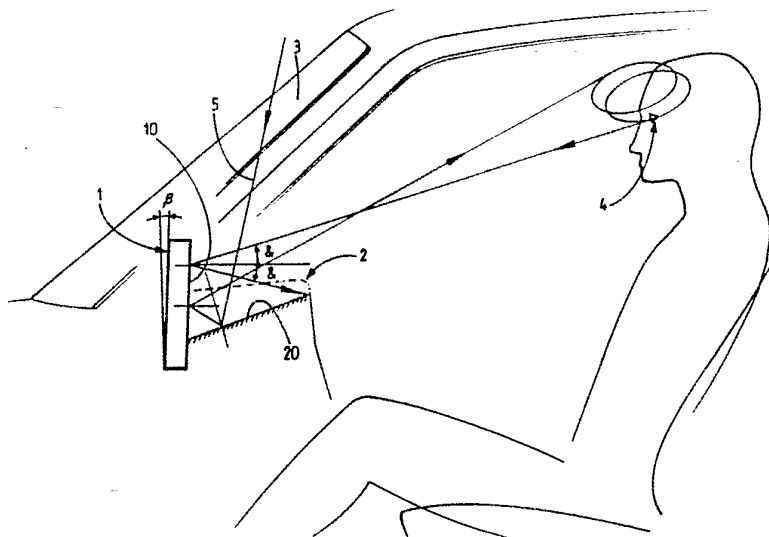




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(21) International Application Number: PCT/SE91/00561 (22) International Filing Date: 26 August 1991 (26.08.91) (30) Priority data: 9002766-5 30 August 1990 (30.08.90) SE (71) Applicant (for all designated States except US): AB VOLVO [SE/SE]; S-405 08 Göteborg (SE). (72) Inventors; and (75) Inventors/Applicants (for US only) : BILLIG, Jan [SE/SE]; Haga Nygata 16, S-413 01 Göteborg (SE). HALLÉN, Anders [SE/SE]; Emil Strandbergs väg 3, S-430 41 Kul-lavik (SE). (74) Agents: GRAUDUMS, Valdis et al.; Albihn West AB, Box 142, S-102 42 Göteborg (SE).		(81) Designated States: AT (European patent), BE (European patent), CH (European patent), DE (European patent), DK (European patent), ES (European patent), FR (European patent), GB (European patent), GR (European patent), IT (European patent), JP, LU (European patent), NL (European patent), SE (European patent), US. Published <i>With international search report.</i> <i>In English translation (filed in Swedish).</i>

(54) Title: METHOD AND DEVICE FOR MINIMIZING FIRST SURFACE REFLECTIONS IN A PICTURE SCREEN

**(57) Abstract**

The present invention relates to a device and method for minimizing initial surface reflections which can be reflected from the surroundings via the reflecting surface (10) of an electronic display screen (1) in the direction towards a given observation position (4), whereby the display screen (1) is arranged on a base (2), preferably mounted on the dashboard (2) of a vehicle, whereby at least a certain region (20) of, or adjoining, the base (2) to which the display screen is intended to be attached, is treated in such manner that a low reflecting surface is obtained.

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⁺ Any designation of "SU" has effect in the Russian Federation. It is not yet known whether any such designation has effect in other States of the former Soviet Union.

5 Title:
Method and device for minimizing first surface
reflections in a picture screen.

Technical field:

10 The present invention relates to a method and a device for
minimizing initial surface reflections which can be
reflected from the surroundings via a reflecting surface of
an electronic display screen in a direction towards a given
observation position. The invention is primarily intended
15 to be used to avoid those initial surface reflections which
are visible to the observer in the glass screen of an
electronic display screen mounted on the dashboard of a
vehicle.

20 Technical problem:

The use of electronic display screens is continuously
increasing. The use of such screens in vehicles has until
now been relatively limited, though it is generally seen to
have large potential. Particularly when used in vehicles,
25 it is important that the legibility is as good as possible.
The higher the legibility, the shorter the time that is
necessary to assimilate the information which is displayed
on the screen. Accordingly, the shorter the period of
distraction, the safer the driver is. One aspect which can
30 have a negative effect on the legibility is light
reflection on the surface of the display screen. This
problem has been recognized for a long time and a plurality
of measures have been suggested for its solution, such as
glare treatment and matting of the display screen's
35 surface.

Background of the invention:

A method is known from US-A-4 521 078 to avoid surface reflections which are visible to an observer on the surface of an electronic display which is mounted on the dashboard of a vehicle. This known method makes use of the fact that the windows of a vehicle are located relatively high up in relation to the dashboard and that the light which enters into the car can therefore be reflected in small quantities to the observer's position if the surface of the display screen is angled such that it forms an angle which is less than 90° in relation to the light path from the observer's eye to the surface of the information screen and further that it forms an angle less than 90° in relation to the longitudinal axis of the vehicle. The main part of the reflected light path is in such a case reflected to a region which is lower than the observation position. This known method accordingly minimizes the majority of the direct reflections which could bother the observer. In addition to this measure, the outer surface of the electronic display screen is provided with a polarizing filter to reduce to a certain extent indirect reflections in the display screen.

A polarizing filter reduces however only a small quantity of the indirect reflected light and is accordingly not a perfectly satisfactory solution. The risk thus remains that even with such a known device a reflection which is disturbing for the driver can arise in the surface of the electronic display screen.

A known method to totally avoid disturbing reflections, even indirect reflections, is shown in DE-C-32 25 362. In this method the display is placed in a shielded recess sunk into the dashboard. Such a solution is however not preferred due to size, difficulties of use and cost reasons.

The object to the present invention is to provide a method and a device to minimize initial surface reflections which can be reflected from the surroundings via the reflecting surface of an electronic display screen in the direction
5 towards a given observation position in which the display screen is arranged above a base, preferably mounted on the dashboard in a vehicle.

Solution:

10 A further object of the present invention is to provide a device according to the invention which is easy to use, demands a limited space and which meets certain aesthetic requirements.

15 Said object is achieved with a method according to the present invention which is characterized in that at least a certain region of, or adjoining, the base to which the display screen is intended to be arranged is treated in such a manner that a low reflecting surface is obtained.

20 Said object is also achieved by means of a device according to the present invention which is characterized in that at least substantial parts of the surface in front of and adjoining the display screen have a low reflecting
25 structure and/or in the preferred instance that substantial parts of a surface belonging to or arranged on the base which can coincide with a normal to said reflecting surface have a low reflecting structure.

30 Brief description of the drawings:

The invention will be described in more detail with help of embodiments with reference to the annexed drawings in which

35 Fig. 1 is a schematic view of a cross section through a vehicle which is equipped with a device according to the invention,

Fig. 2 shows a preferred embodiment of the invention in a stowed position and

Fig. 3 shows the same device as in Fig. 2 but in a folded out position.

5

Best mode of carrying out the invention:

Fig. 1 shows a longitudinal schematic cross section through a vehicle which is equipped with an electronic display screen 1. The display screen 1 is mounted on the dashboard 2 under the rearwardly angled windscreen 3. An observer's eye position (not shown) is indicated in principle with the aid of two overlapping ellipses 4. Each ellipse indicates for a certain body angle the region above and below respectively which 95% of drivers eyes, in a sitting position, are located in respect to a tangent which coincides with the line of sight to the object, in accordance to SAE J941. The schematically shown driver is therefore a borderline case.

20 The purpose of the present invention is, in addition to direct reflections, to also minimize indirect reflections which can reach the eyes of the observer, i.e. the ellipses 4, via the surface 10 of the display screen. Figure reference number 5 denotes a light beam which, if it is reflected in the upper surface of the dashboard 2 would give an indirect reflection via the surface 10 of the display screen to the observer position 4. Since, in accordance with the present invention, a certain region 20 of the dashboard 2 is provided with a low reflecting surface, it is however possible to minimize such an indirect reflection. The figure further shows that the display screen's surface 10 in the preferred case forms an acute angle β with the vertical and is directed downwardly. Furthermore, in the preferred embodiment, the display screen is foldably arranged upwards and downwards which will be further explained in the following.

A preferred embodiment to the invention is shown in Fig. 2 in a folded down position. A frame 21 is arranged in a sunken position in the upper surface of the dashboard 2. An electronic screen 10 is retractably arranged within this frame unit 21. During deployment of the unit, the information screen is swung upwardly (manually or automatically) less than 90° to the position which is shown in Fig. 3. The display screen is provided with means (not shown) for maintaining it in the active position. Said means can be chosen from a plurality of already known suitable applications, such as pivotable support legs, telescopic arms, pinion drive (pinion and electric motor), etc. The lower part 20 of the dashboard which is located underneath and in front of (in the direction towards the driver) the display screen surface 10 has a surface of low reflecting character, in accordance with the invention, i.e. a surface which when reflected in the display unit's front surface does not worsen the legibility for the driver of the information displayed on the screen.

The low reflecting surface 20 can for example be achieved by means of serrations, matt black colouring, low reflecting material, etc. The skilled man will recognize that the low reflecting surface 20 can either be formed as an integral part of the dashboard in a vehicle, or as a separate element intended for subsequent fitting. The skilled man will also appreciate that the active position of the display screen 1 in the figures is shown by way of example only. Accordingly, a deviation from the shown active position with ca $\pm 30^\circ$ can be seen to be a reasonable degree of variation.

5 Claims:

1. Method for minimizing initial surface reflection
which can be reflected from the surroundings via the
reflecting surface (10) of an electronic display screen (1)
10 in a direction towards a given observation position (4),
whereby the display screen (1) is arranged on a support
(2), preferably mounted on the dashboard (2) of a vehicle,
c h a r a c t e r i z e d in that at least a certain
region (20) of, or adjoining, the support (2) to which the
15 display screen is intended to be mounted is treated in such
a manner that a low reflecting surface is obtained.

2. Method according to claim 1,
c h a r a c t e r i z e d in that said reflecting surface
20 (10) of the display screen (1), during deployment, and the
low reflecting surface (20) are arranged in such a manner
that the light path from a normal observation position (4),
preferably defined by at least a standardized "driver-eye
ellipse" (SAE J941), always intersects the low reflecting
25 surface (20) after direct reflection in the surface (10) of
the display screen.

3. Method according to claim 1,
c h a r a c t e r i z e d in that said treatment implies
30 that a means with a low reflecting surface is arranged at
least at said region.

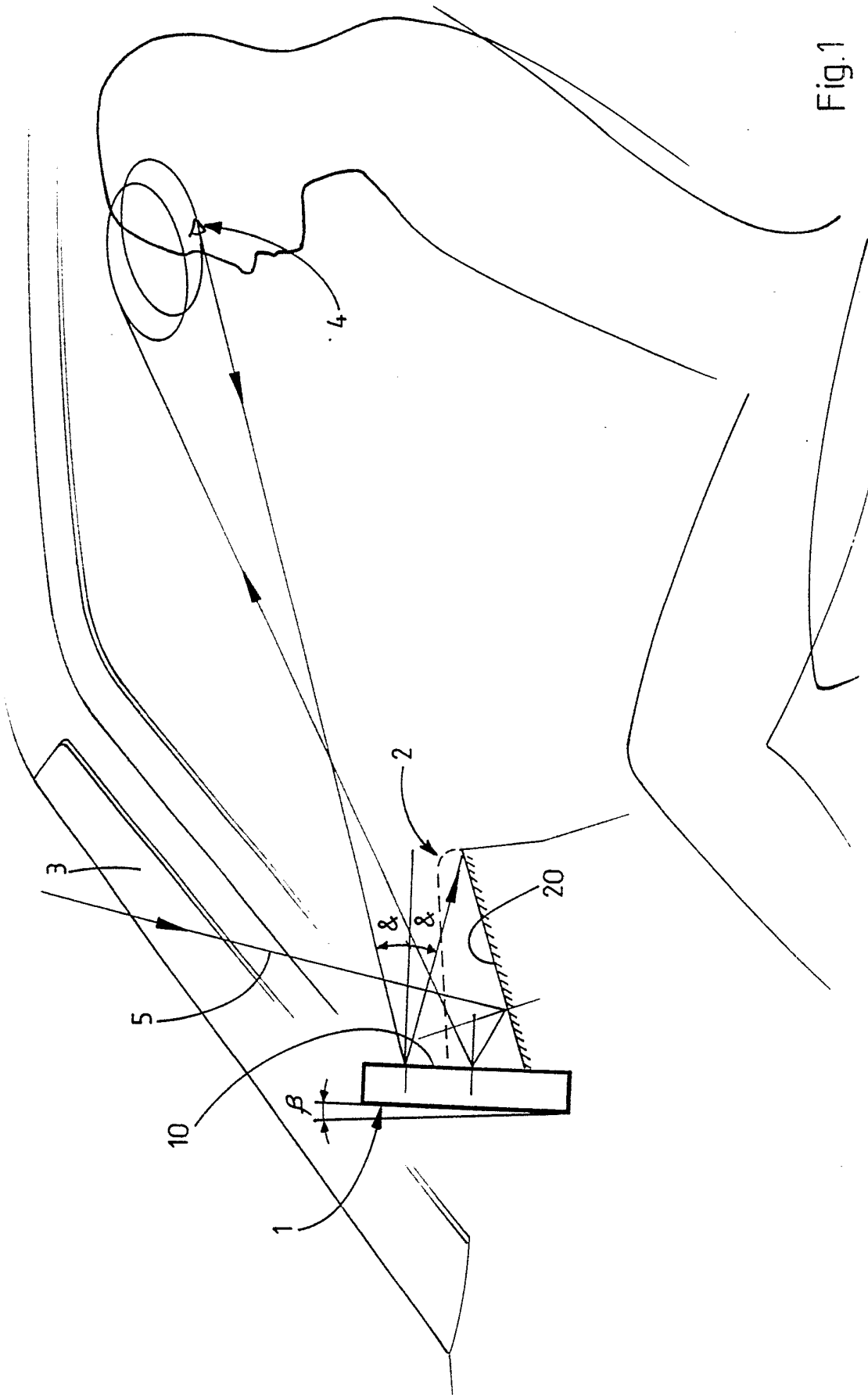
4. Method according to claim 3,
c h a r a c t e r i z e d in that said treatment is an
35 after-treatment.

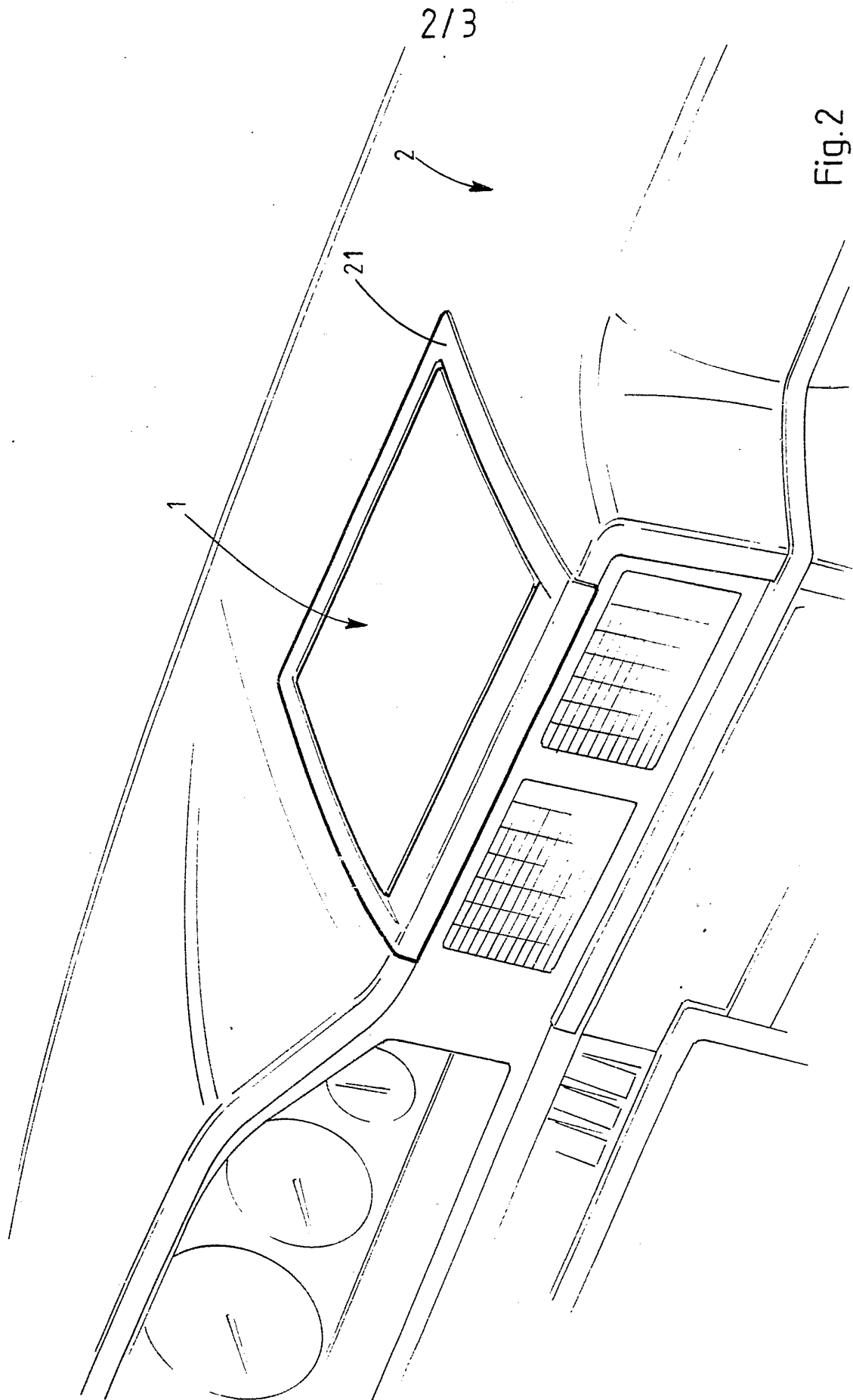
5. Method according to claim 4,
c h a r a c t e r i z e d in that said means is applied by
spraying, painting or similar.

5 6. Method according to claim 4,
c h a r a c t e r i z e d in that said means is a
prefabricated finished product which even before
application has a given surface structure, which product is
applied by means of a adhesive agent and/or at least a
10 mechanical fixation member, such as screws, press-studs,
etc.

7. Device for minimizing initial surface reflections
which can be reflected from the surroundings via the
15 reflecting surface (10) of an electronic display screen (1)
in a direction towards a given observation position (4),
wherein said screen (1) is mounted above a base (2),
preferably the dashboard (2) in a vehicle, in such a manner
that during deployment it is downwardly angled so that an
20 acute angle β between said surface (10) and the vertical
plane is formed, c h a r a c t e r i z e d in that at
least substantial parts of the surface (20) in front of and
adjoining the display screen have a low reflecting
structure, and/or in the preferred case, that substantial
25 parts of a surface (20) belonging to, or arranged on, the
base (2) which can coincide with a normal to said
reflecting surface (10) have a low reflecting structure.

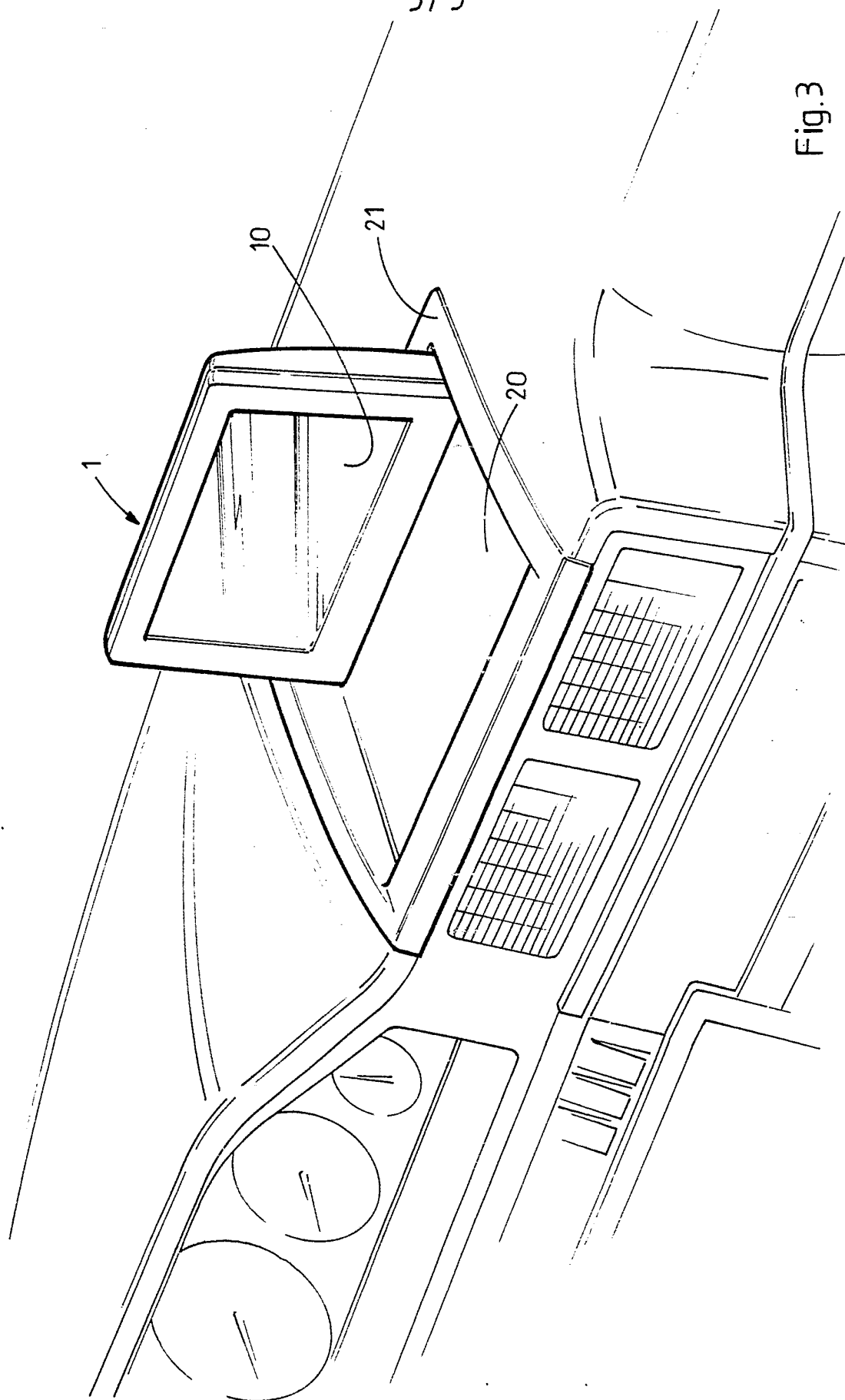
8. Device according to claim 7,
30 c h a r a c t e r i z e d in that said low reflecting
structure consists of serrations, matt black colour or low
reflecting material.





3/3

Fig.3



INTERNATIONAL SEARCH REPORT

International Application No PCT/SE 91/00561

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶ According to International Patent Classification (IPC) or to both National Classification and IPC IPC5: B 60 K 37/04											
II. FIELDS SEARCHED Minimum Documentation Searched⁷ <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 25%; border-bottom: 1px solid black;">Classification System</th> <th style="border-bottom: 1px solid black;">Classification Symbols</th> </tr> <tr> <td style="height: 40px; vertical-align: bottom; border-right: 1px solid black;">IPC5</td> <td>B 60 K</td> </tr> </table> Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in Fields Searched⁸ SE,DK,FI,NO classes as above			Classification System	Classification Symbols	IPC5	B 60 K					
Classification System	Classification Symbols										
IPC5	B 60 K										
III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹ <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%; border-bottom: 1px solid black;">Category *</th> <th style="border-bottom: 1px solid black;">Citation of Document,¹¹ with indication, where appropriate, of the relevant passages¹²</th> <th style="border-bottom: 1px solid black;">Relevant to Claim No.¹³</th> </tr> </thead> <tbody> <tr> <td style="text-align: center; vertical-align: top;">X</td> <td>EP, A1, 0344968 (UNITED TECHNOLOGIES AUTOMOTIVE, INC.) 6 December 1989, see the whole document --</td> <td style="text-align: center; vertical-align: top;">1,2,3</td> </tr> <tr> <td style="text-align: center; vertical-align: top;">X</td> <td>US, A, 4225005 (OKABAYASHI) 30 September 1980, see the whole document -- -----</td> <td style="text-align: center; vertical-align: top;">1,2,3</td> </tr> </tbody> </table>			Category *	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³	X	EP, A1, 0344968 (UNITED TECHNOLOGIES AUTOMOTIVE, INC.) 6 December 1989, see the whole document --	1,2,3	X	US, A, 4225005 (OKABAYASHI) 30 September 1980, see the whole document -- -----	1,2,3
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X	US, A, 4225005 (OKABAYASHI) 30 September 1980, see the whole document -- -----	1,2,3									
* Special categories of cited documents: ¹⁰ "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step "Y" document of particular relevance, the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. "&" document member of the same patent family											
IV. CERTIFICATION <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; border-bottom: 1px solid black; vertical-align: top;"> Date of the Actual Completion of the International Search 28th November 1991 </td> <td style="width: 50%; border-bottom: 1px solid black; vertical-align: top;"> Date of Mailing of this International Search Report 1991 -12- 02 </td> </tr> <tr> <td style="border-bottom: 1px solid black; vertical-align: top;"> International Searching Authority SWEDISH PATENT OFFICE </td> <td style="border-bottom: 1px solid black; vertical-align: top;"> Signature of Authorized Officer Göran Carlström </td> </tr> </table>			Date of the Actual Completion of the International Search 28th November 1991	Date of Mailing of this International Search Report 1991 -12- 02	International Searching Authority SWEDISH PATENT OFFICE	Signature of Authorized Officer Göran Carlström					
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**ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO.PCT/SE 91/00561**

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP-A1- 0344968	89-12-06	US-A- 4874224	89-10-17
US-A- 4225005	80-09-30	DE-A- 2910489	79-10-25
		GB-A-B- 2019627	79-10-31
		JP-A- 54146794	79-11-16