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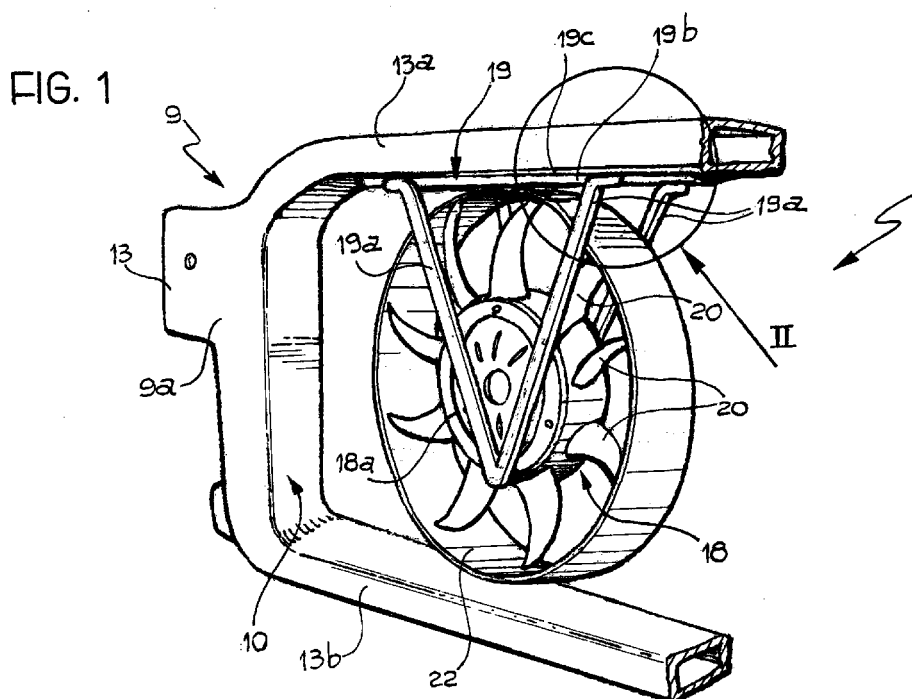
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(54) **Arrangement of a fan unit for the heat-exchange assembly of a motor vehicle**

(57) A fan unit for the heat-exchange assembly of a motor vehicle, in which the heat-exchange assembly is associated with a front cross-member (9) of the motor-vehicle frame, comprises a structure (19) for supporting at least one bladed rotor (18) for rotation on the front of the heat-exchange assembly, and an air duct (22) for guiding towards the heat-exchange assembly the air drawn along by the rotation of the at least one rotor (18).

The structure (19) is mounted releasably on longitudinal sliding guide means (14, 19c) associated with the front cross-member (9) so that the structure (19) can be connected to or separated from the cross-member (9) as a result of a longitudinal sliding movement along the guide means (14, 19c).



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Description

[0001] The present invention relates to an arrangement of a fan unit for the heat-exchange assembly of a motor vehicle.

[0002] The invention relates more specifically to a fan unit for the heat-exchange assembly of a motor vehicle in which the heat-exchange assembly is associated with a front cross-member of the motor-vehicle frame, comprising a structure for supporting at least one bladed rotor for rotation on the front of the heat-exchange assembly, and an air duct for guiding towards the heat-exchange assembly the air drawn along by the rotation of the at least one rotor.

[0003] In the most usual arrangement, the fan unit of the heat-exchange assembly of a motor vehicle is fixed to the heat-exchange assembly which in turn is fixed to a front cross-member of the frame. As a result of this arrangement, in order to perform maintenance operations on or to replace the fan unit, it is necessary first of all to separate the heat-exchange assembly, with the associated fan unit, from the cross-member, and then to separate the fan unit from the heat-exchange assembly in order to be able to operate easily on the fan unit. This sequence of steps makes operations on the fan unit complex and expensive.

[0004] To overcome this disadvantage, the subject of the invention is a heat-exchange unit of the type mentioned above, characterized in that the support structure is mounted releasably on longitudinal sliding guide means associated with the front cross-member so that the structure can be connected to or separated from the cross-member as a result of a longitudinal sliding movement along the guide means.

[0005] By virtue of this concept, the fan unit, which is no longer connected directly to the heat-exchange assembly but to a frame element, can be separated from or connected to the motor vehicle easily without the need for operations to release and to mount the heat-exchange assembly, and hence with considerably reduced costs and without involving the risk of adversely affecting the operation of the heat-exchange assembly and of the systems connected thereto. In particular, the fan unit is accessible easily and quickly from the exterior and the structure of the heat-exchange assembly can be made simpler since it is completely independent of the presence of the fan unit and does not therefore require devices for supporting the fan unit.

[0006] Further characteristics and advantages of the invention will become clearer from the following detailed description, given purely by way of non-limiting example with reference to the appended drawings, in which:

Figure 1 is a schematic, perspective view of a portion of a front cross-member of a motor-vehicle frame with which a fan unit according to the invention is associated, and

Figure 2 is an enlarged front elevational view of a detail indicated by the arrow II in Figure 1.

[0007] With reference to the drawings, these show a fan unit, generally indicated 1, for a motor-vehicle heat-exchange assembly (which is not shown in the drawings since it does not fall directly within the scope of the invention) which, in the most usual case, includes the radiator for the cooling liquid of the power unit and possibly the condenser of the air-conditioning system and a radiator of the intercooler, arranged in a group, that is, side by side.

[0008] In the embodiment illustrated, the unit 1 is housed in a main opening 10 in a front cross-member 9 of the motor vehicle which preferably acts as a fairing for directing the air towards the heat-exchange assembly 1. A cross-member of this type forms the subject of the Applicant's Italian application TO98A000704 and, in summary, comprises an integral structure having two symmetrically opposed fork-shaped portions 9a, 9b each of which defines one half of the main opening 10. The two arms of each portion 9a, 9b form two generally parallel branches 13a, 13b, that is, an upper branch and a lower branch, respectively, to the rear face (with reference to the drawings) of which the heat-exchange assembly is fixed in known manner.

[0009] A pair of lateral appendages 13 extending from the fork-shaped portions 9a, 9b can be used for fixing the cross-member 9 to the lower ends of a pair of side members (not shown in the drawings) of the motor-vehicle frame, and for the anchorage of a front bumper of the motor vehicle.

[0010] The fan unit 1 comprises a support structure, generally indicated 19, including a plurality of arms 19a which, for example, are arranged in pairs in a V-shaped configuration, and which support for rotation a hub 18a of a rotor 18 having a set of blades 20 arranged in a ring. According to a solution known in the art, an electric motor (not visible in the drawings) is disposed in the region of the hub 18a for rotating the rotor 18. The arms 19a also support a tubular fairing 22 in which the rotor 18 is mounted coaxially and which has the function of a duct for guiding towards the heat-exchange assembly the air drawn along as a result of the rotation of the rotor (18).

[0011] One end of each arm 19a is connected to a main support element 19c, for example, a plate-shaped element, mounted for sliding relative to the upper branch 13a of the cross-member 9. For this purpose, a pair of opposed bracket-like retaining members 14 is fixed to the branch 13a, each member 14 being able to support for sliding a respective end of the element 19c.

[0012] Releasable fixing members 26 are provided for anchoring the main support element 19c to the branch 13a. The fixing members 26, which are constituted, for example, by socket-head screws, engage respective cylindrical through-holes 26a formed in the element 19c transversely, and hence in a direction per-

pendicular to the sliding guides defined by the brackets 14, and respective corresponding threaded holes formed in the branch 13a. In the absence of the fixing members 26, it is therefore possible to cause the support structure 19 to slide relative to the brackets 14 until the fan unit 1 is separated from the cross-member 9 and from the respective heat-exchange assembly, without any need to remove this assembly and by operating conveniently from the front of the cross-member 9.

[0013] The shape and/or the material of the fixing members 26 are preferably such that the members 26 have a low resistance to shear stresses in comparison with that of the material constituting the element 19c and the cross-member 9. For example, they may be formed with a narrow cross-section at least in one portion, or they may be made of a relatively weak or fragile material so that they shear as a result of the application, to the fan unit 1, of an external stress directed substantially parallel to the guides 14, leaving the element 19c, and hence the unit 1, free to slide longitudinally relative to the guides 14 and to the cross-member 9. It is thus possible to limit the damage to which the fan unit 1 may be subjected as a result of a frontal impact of the motor vehicle since the unit 1, which is usually disposed adjacent the heat-exchange assembly but spaced axially therefrom by a few centimetres of empty space, can withdraw, occupying this empty space, until it is disposed in abutment with the heat-exchange assembly, so as to limit the damage undergone during the impact.

[0014] Advantageously, an auxiliary support element 19b, for example, also in the form of a plate, is interposed between the support element 19c and the ends of the arms 19a and is connected to the element 19c by means of resilient pads 24 for damping the vibrations generated by the rotation of the rotor 18 so that they are not transmitted to the cross-member 9 or are transmitted only to a small extent. In particular, the pads 24 are ring-shaped and are fitted coaxially on pins 23 which have considerably greater resistance to shear stresses than the members 26, and which engage both holes 21a formed at the ends of the arms 19a and holes 21b of the element 19b and are thus anchored to the element 19c by means of a male-and-female screw coupling.

Claims

1. A fan unit for the heat-exchange assembly of a motor vehicle, in which the heat-exchange assembly is associated with a front cross-member (9) of the motor-vehicle frame, comprising a structure (19) for supporting at least one bladed rotor (18) for rotation on the front of the heat-exchange assembly, and an air duct (22) for guiding, towards the heat-exchange assembly, the air drawn along by the rotation of the at least one rotor (18), characterized in that the structure (19) is mounted releasably on longitudinal sliding guide means (14, 19c) asso-

ciated with the front cross-member (9) so that the structure (19) can be connected to or separated from the cross-member (9) as a result of a longitudinal sliding movement along the guide means (14, 19c).

2. A unit according to Claim 1, characterized in that the support structure (19) comprises arms (19a) for supporting the hub (18a) of the at least one rotor (18), the support arms being connected to a main support element (19c) mounted for sliding between a pair of bracket-like retaining members (14) fixed to the cross-member (9).
3. A unit according to Claim 2, characterized in that the front cross-member (9) has a pair of opposed fork-shaped portions (9a, 9b) each of which includes two arms connected to corresponding arms of the other fork-shaped portion so as to define between them a main opening (10) in the cross-member (9), the opening housing the fan unit (1) and being defined vertically by an upper branch (13a) and by a lower branch (13b) of the cross-member (9), the bracket-like retaining members (14) being fixed to the upper branch (13a) of the cross-member (9).
4. A unit according to Claim 2 or Claim 3, characterized in that the main support element (19c) can be anchored to the cross-member (9) by means of releasable fixing members (26) arranged substantially transversely relative to the direction of sliding of the fan unit (1) defined by the guide means (14, 19c).
5. A unit according to Claim 4, characterized in that the releasable fixing members (26) are formed in a manner such that they can shear as a result of the application to the fan unit (1) of an external stress directed substantially parallel to the guide means (14, 19c).
6. A unit according to Claim 5, characterized in that an auxiliary support element (19b) is disposed between the arms (19a) and the main support element (19c) with the interposition, in the connection between the auxiliary element (19b) and the main support element (19c), of means (24) for damping the vibrations generated by the rotation of the at least one rotor (18).

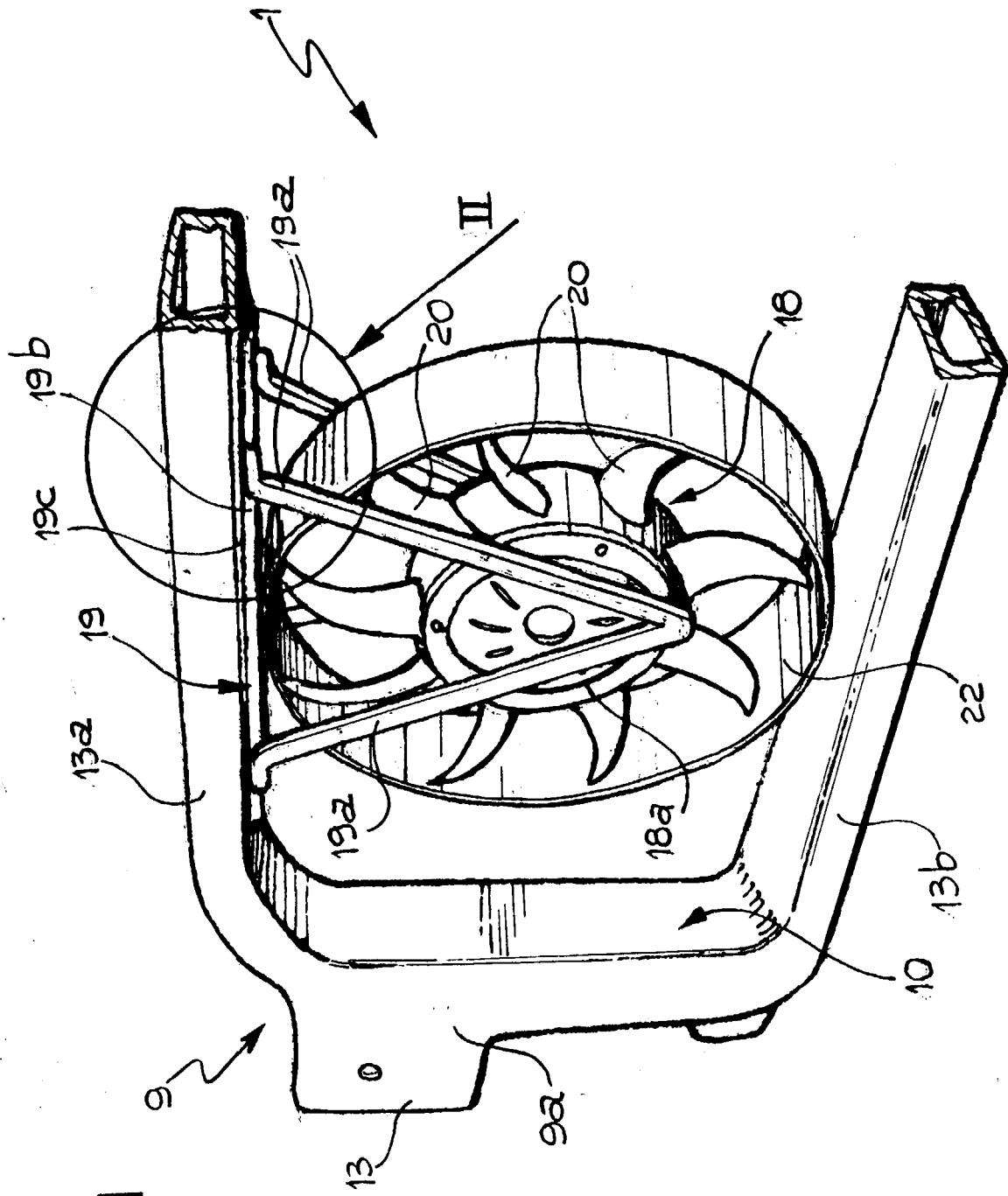


FIG. 1

FIG. 2

