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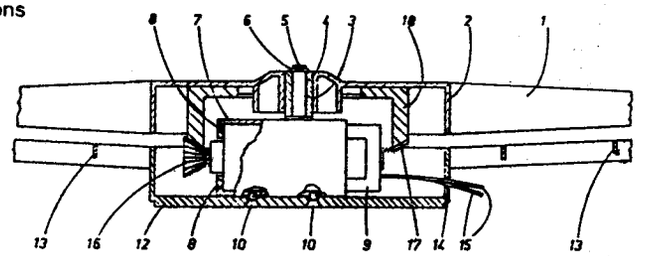
(54) **A fan unit of compact axial dimensions, for motor vehicles in particular.**

(57) The electric fan unit disclosed is intended for motor vehicles in particular, and features compact axial dimensions. The rotor (1) and its protective cowl (13), which constitutes the external casing of the unit, are embodied such as to create a central housing (2, 12) for accommodation of the entire fan rotor drive assembly, namely, a conventional d.c. motor (9) disposed transversely to the rotor's axis of rotation, and a speed-reducing gear pair (16, 17). Axial and radial dimensions of the fan unit as a whole can thus be limited to advantage.

FIG 2



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Description

A fan unit of compact axial dimensions, for motor vehicles in particular.

The invention described herein relates to a fan unit featuring markedly compact axial dimensions.

The art field of fan units, and in particular, fan units for motor vehicles, embraces axial flow types fitted with standard production d.c. electric motors that can be purchased readily through the trade. Such motors are coaxially aligned with and keyed direct to the fan rotor; thus, the overall axial dimensions of the assembled motor and fan rotor are relatively large, and difficulties are encountered in accommodating the unit comfortably inasmuch as space is generally at a premium inside the average motor vehicle.

This is a drawback which can be overcome utilizing special types of electric motor which are shorter through the axial dimension, but will generally have a larger diameter rotor-stator assembly, seeing that specifications are normally required to be the same as those of the motors they replace; consequently, the radial dimensions of the electric motor increase and the fan unit is rendered bulky just the same. What is more, the construction of special electric motors to customized dimensions signifies loss of the option of using standard components, hence an increase in production costs.

A further disadvantage deriving from the abundant radial dimensions of a special electric motor is that airflow through the fan becomes obstructed in part.

Accordingly, the object of the invention described herein is that of setting forth a simple, rational method of contruction for such fan units that will permit of overcoming the dawbacks outlined above, and of defeating the design problem in question by embodiment of a fan unit, using low cost and readily available materials and components, the axial and transverse dimensions of which are kept singularly compact.

The stated object is achieved, according to the invention, by adopting a fan geometry for the rotor, and the cowl in which this rotates, such as creates a central housing for accommodation both of the d.c. electric fan motor, mounted transversely in relation to the fan rotor's axis of rotation, and of a gear pair by means of which to obtain a singularly steep reduction in motor output speed.

The construction methods broadly outlined above are such as to permit of utilizing a standard production high speed electric motor, and reducing its output speed sharply so as to obtain extra torque.

Moreover, the motor itself is positioned centrally to optimum effect, well protected, and exhibits radial dimensions of an order that will not affect airflow through the unit. Also, the overall axial dimensions of a fan unit according to the invention are all but identical to the total thickness of the fan rotor and its protective cowl.

The central housing in a fan unit as disclosed is composed of two coaxial half-casings, hollow for example, that are integral with the cowl and with the rotor, respectively, one accommodating the d.c. motor, the other accommodating the larger diameter speed reduction gear, which in its turn accommodates the motor, at least in part. The speed reduction is a right angle drive type, whilst the d.c. motor not only constitutes the prime mover, but also, affords the stable support to which the fan rotor itself is mounted.

The invention will now be described in detail, by way of example, with the aid of the accompanying drawings, in which:

- fig 1 is an exploded view of the fan unit, seen in perspective;
- fig 2 is a longitudinal section through the assembled unit.

It will be observed from fig 1 that the fan rotor 1 has a hollow body 2 at centre, the bottom of which incorporates a central hub 3 turning on a friction bearing 4 and journalled concentrically to a fixed pivot 5; a circlip 6 holds the assembly in place. As fig 2 clearly demonstrates, the pivot 5 is made fast to the outside of a cylindrical sleeve 7 that houses a standard production d.c. motor 9, disposed at right angles to the axis about which the fan rotates and clamped in position by at least two screws 8. The side of the sleeve 7 opposite that occupied by the pivot 5 is provided with at least two through holes; these are tapped in order to receive respective securing screws 10 that are first inserted through corresponding holes 11 provided at the centre of the hollow body 12 of a protective cowl 13, which will be attached in conventional manner to a suitable support. 14 denotes a hole in the side of the hollow body 12 of the cowl, which affords passage to the wires 15 carrying electrical power to the motor 9.

Thus, the two hollow bodies 2 and 12 combine to create a chamber, or housing, that both accommodates and protects the electric motor 9.

16 denotes a bevel pinion keyed to the spindle of the motor 9 and paired in constant mesh with teeth 17 offered by the lip of a cupped crown wheel 18 that is made fast coaxially to the inside of the relative hollow body 2.

The application, operation and advantages of the invention will be clearly discernable to a person skilled in the art. It remains only to stress that the design adopted permits of obtaining a marked reduction in output speed of the d.c. motor; a ratio of 1 : 4 is envisaged in the embodiment illustrated.

Claims

1) Fan unit, for motor vehicles in particular, characterized:
in that it comprises a housing (2, 12) in which to accommodate a standard production, compact, high speed d.c. electric motor (9) driving a conventional speed-reducing train of gears (16, 18) coupled to the fan rotor (1); and
in that the motor (9) is disposed at right angles to the axis about which the fan rotor (1) rotates.

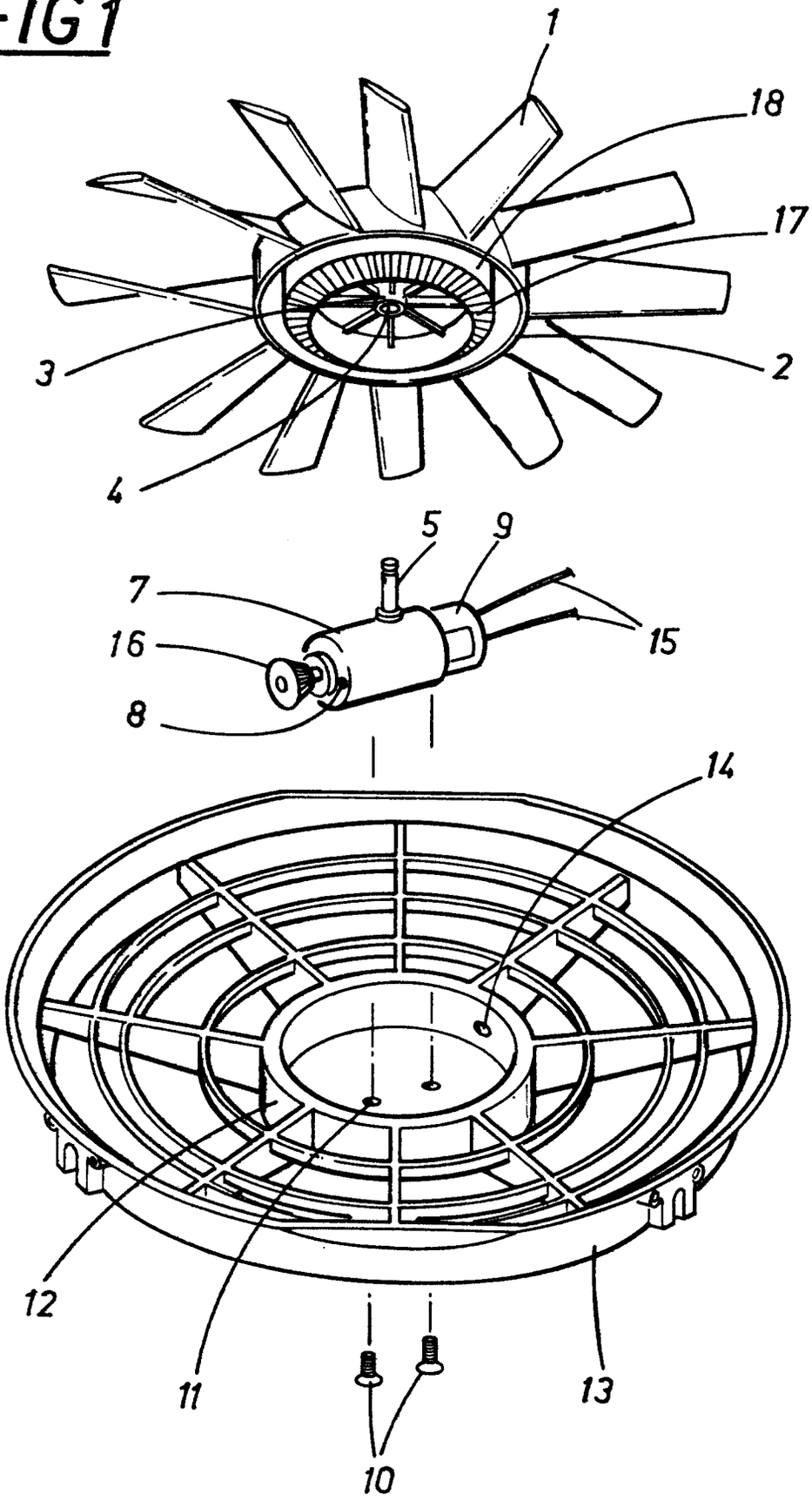
2) Fan unit, for motor vehicles in particular, characterized in that the housing consists in two matched coaxial half-casings embodied as two hollow bodies (2), (12), one of which is located at the centre of the fan rotor (1), and the other at the centre of the cowl (13).

3) Fan unit as in claim 1, wherein the conventional speed-reducing train of gears comprises a bevel pinion (16) keyed to the spindle of the electric motor (9) and meshing with the peripheral teeth (18) of a cupped crown wheel (18) that is coaxial and rotatable as one with the hollow body (2) of the fan rotor (1).

4) Fan unit, for motor vehicles in particular, characterized in that the casing of the electric motor (9) exhibits a pivot (5) projecting outwards at right angles to the axis of the motor spindle and serving to support the fan rotor (1).

5) Fan unit, for motor vehicles in particular, characterized in that the electric motor (9) is accommodated by, and separable from, a wrap-around mounting sleeve (7) provided with means (10) by which it may be fastened to the hollow body (12) of the cowl (13), and incorporating the pivot (5) which projects outward at right angles to the axis of the motor spindle.

FIG 1



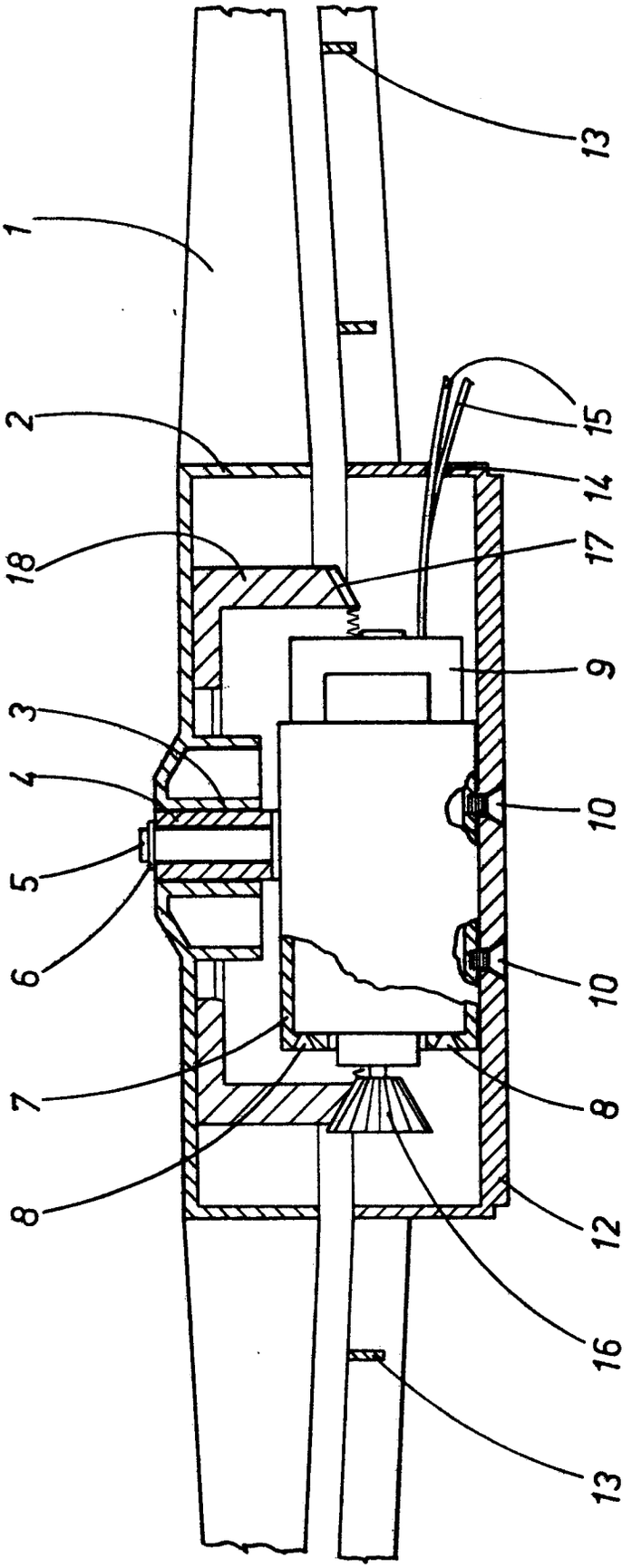


FIG2

European Patent Office

EUROPEAN SEARCH REPORT

Application number

EP 86 83 0343

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.4)
X	GB-A- 238 528 (BROWN BOVERI) * Page 1, lines 9-33,41-78; figures, especially figure 4 *	1-4	F 04 D 25/06
Y		5	
X	US-A-1 532 402 (HALL) * Page 1; page 2, left-hand column, lines 1-38; figures 1,2 *	1,3,4	
Y		5	
X	US-A-2 098 407 (SMITH) * Page 1, right-hand column, lines 21-46, line 54 - page 2, left-hand column, lines 35, figures *	1,2	
Y		5	F 04 D 25/00
A	US-A-3 093 189 (PANTHOFER) * Column 1, line 57 - column 2, line 5, figures *	2,5	

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	24-02-1987	KAPOULAS T.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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