June 17, 1930. P. E. M. J. SAUTAI 1,764,054

AUTOMATICALLY VARIABLE SPEED FAN FOR MOTOR CARS

Filed May 17, 1929

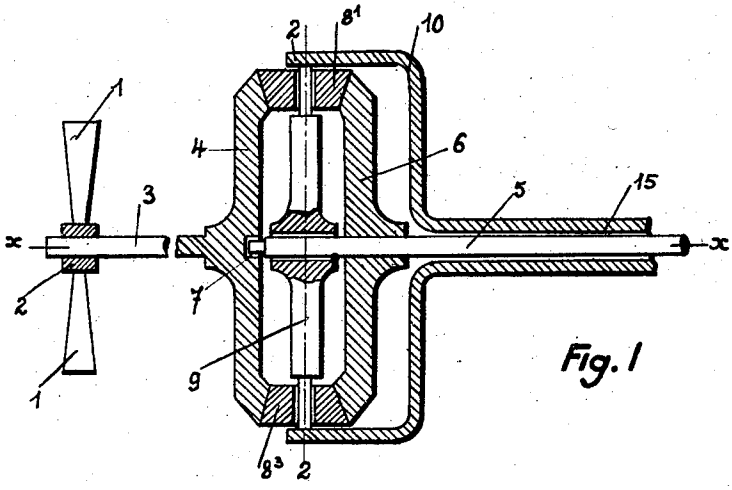


Fig. 1

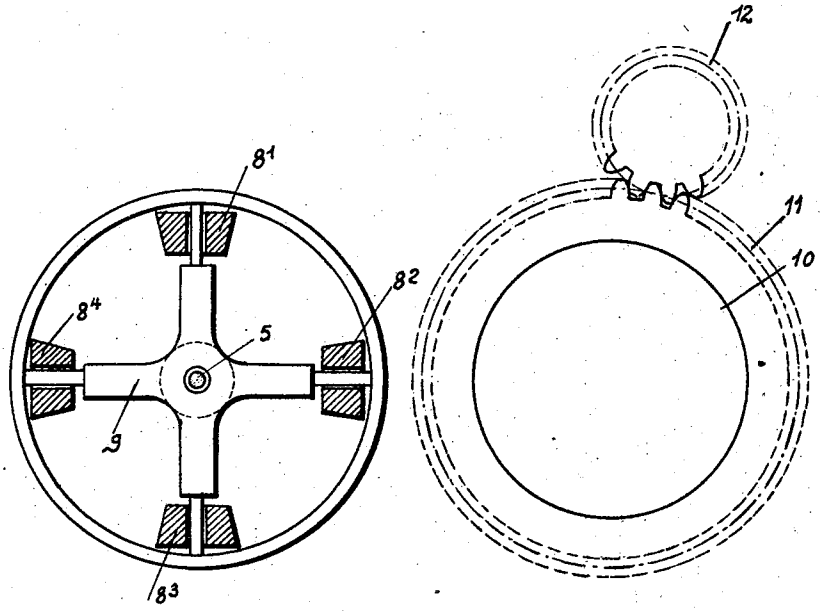


Fig. 2

Fig. 3

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Patented June 17, 1930 1,764,054

UNITED STATES PATENT OFFICE

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AUTOMATICALLY-VARIABLE-SPEED FAN FOR MOTOR-CARS

Application filed May 17, 1929, Serial No. 363,934, and in France June 28, 1928.

The primary object of the invention is to assure that the cooling of the engine of a motor-car shall be constant.

A further object is to provide a fan, for cooling the engine of a motor-car, the rotary speed of which varies automatically as the car puts on speed or slows down and as the engine turns at a quicker or slower rate in such a way that the degree of cooling will be continually the same.

A fan according to the invention possesses the characteristic features specified in the following description and especially in the claims annexed at the end thereof.

A fan according to the invention is shown, by way of example, in the accompanying drawings, wherein:—

Fig. 1 is a longitudinal section of the mechanism for driving the fan;

Fig. 2 is a transverse section taken on the line 2—2 of Fig. 1; and

Fig. 3 is a front view of the casing of the mechanism for driving the fan according to an embodiment of the invention.

The fan shown in Figs. 1 and 2 consists essentially of blades 1 fitted on a hub 2 carried by a shaft 3, the shaft being mechanically connected to a toothed plate 4. A shaft 5 connected to operate synchronously with the wheels of the vehicle (for example, through the agency of the transmission shaft between the gear box and the rear axle) is provided with a toothed plate 6 opposite plate 4. The end of shaft 5 turns in a bearing 7 situated in the centre of plate 4. Plates 4 and 6 mesh with the toothed pinions $8'$, 8^2, 8^3, 8^4 carried by a cross-piece 9 which is freely rotatable upon shaft 5, the rotary cross-piece being fitted in a casing 10 which rotates about the axis XX about which plates 4 and 6 rotate. The rotary motion of the cross-piece is mechanically transmitted thereto from the car engine, for example, by a sleeve 15 fixed to the casing 10, the said sleeve being connected by a toothed gear or chain to the engine, or by a crown wheel 11 on the casing 10 gearing with a pinion 12 rotatable with the engine. This differential gear is disposed in an oil-tight casing, not shown in the drawing, which is suitably filled with oil.

Evidently ball bearings can be used if necessary instead of the smooth bearings shown in the drawing.

The operation of the fan and its driving mechanism as thus constructed is as follows:—

The plate 6 and the rotary cross-piece 9 rotate in the same direction when the car runs forward. Consequently, when the car is travelling forward:—

(1) Plate 6 turns at a speed proportional to that of the wheels of the car and therefore proportional to the actual velocity of the car.

(2) The rotary cross-piece 9 rotates at a speed proportional to that of the engine (independent of the velocity of the car).

(3) The rotary speed of plate 4 and of the fan is therefore a function both of the rotary speed of the engine and of the actual velocity of the car.

Thus, the fan has as many speeds as there are different ratios between the rotary speed of the engine and the velocity of the car, viz, as many speeds as there are combinations in the gear box plus a speed corresponding to the idle running of the engine when the car is stationary. If, for example, the fan is fitted on a car having a four-speed gear box with a reversing gear, the fan will have six different rates of speed. It will rotate at its minimum speed when the car is running in its top or direct gear, when the cooling due to the actual velocity of the car is greatest. On the contrary, it will rotate at its maximum speed when the car is reversing, as at that time the actual movement of the vehicle does not cause any appreciable cooling. Between these two extremes there are different rates of speed for the fan according as the car runs in 3rd, 2nd, or 1st gear or as the engine runs idle.

The gear ratio between the differential, on the one hand, and the fan, the engine and the wheels, on the other hand, should be calculated for each type of car and engine. Likewise the dimensions and number of the fan blades. These features should prefer-

ably be calculated to assure sufficient cooling in the hottest summer weather. Associated with the fan there may be a shutter, trap or door for cutting off the flow of air in cold weather.

What I claim as my invention and desire to secure by Letters Patent is:—

1. In a motor car, a fan for cooling the engine, a first transmission connecting the fan with the car wheels, a second transmission connecting the fan with the car engine, this arrangement thus giving the fan a rotary speed automatically varying according as the car puts on speed or slows down and as the engine runs with decreased or increased speed the degree of cooling thus remaining constant.

2. In a motor car, a fan for cooling the engine, a first differential planet gear driving the fan, a rotary shaft driven by the transmission shaft between the gear box and the rear axle of the car, a second differential planet gear keyed to said rotary shaft, a rotary casing driven by the engine, satellites carried by said rotary casing and in mesh with said two differential planet gears, this arrangement giving the fan a rotary speed automatically varying as the car puts on speed or slows down and as the engine runs with decreased or increased speed, the degree of cooling remaining constant.

3. In a motor car, a fan for cooling the motor, a first differential planet gear for driving the fan, a rotary shaft driven by the transmission shaft between the gear box and the rear axle of the car, a second differential planet gear keyed to said rotary shaft, a rotary casing driven by the engine, a rotary cross-piece fixed on said rotary casing, satellites carried by the arms of said rotary cross-piece and meshing with said two differential planet gears, this arrangement giving the fan a rotary speed which automatically varying as the car puts on speed or slows down and as the engine runs with decreased or increased speed, the degree of cooling thus remaining constant.

4. In a motor car, a fan for cooling the engine, a first differential planet gear for driving the fan, a rotary shaft driven by the transmission shaft between the gear box and the rear axle of the motor car, a second differential planet gear keyed to said rotary shaft, a rotary sleeve surrounding said rotary shaft and driven by the engine, a casing fixed on said rotary sleeve, satellites carried by said rotary casing and meshing with said two differential planet gears, this arrangement giving the fan a rotary speed automatically varying as the car puts on speed or slows down and as the engine runs with decreased or increased speed the degree of cooling thus remaining constant.

5. In a motor car, a fan for cooling the engine, a first differential planet gear driving the fan, a rotary shaft driven by the transmission shaft between the gear box and the rear axle of the car, a second differential planet gear keyed to said rotary shaft, a toothed pinion driven by the engine, a casing with a toothed crown wheel meshing with said toothed pinion, satellites carried by said rotary casing and meshing with said two differential planet gears, this arrangement giving the fan a rotary speed varying automatically as the car puts on speed or slows down and as the engine runs with decreased or increased speed, the degree of cooling thus remaining constant.

In testimony whereof I have signed this specification.

PIERRE EDOUARD MARIE JOSEPH SAUTAI.