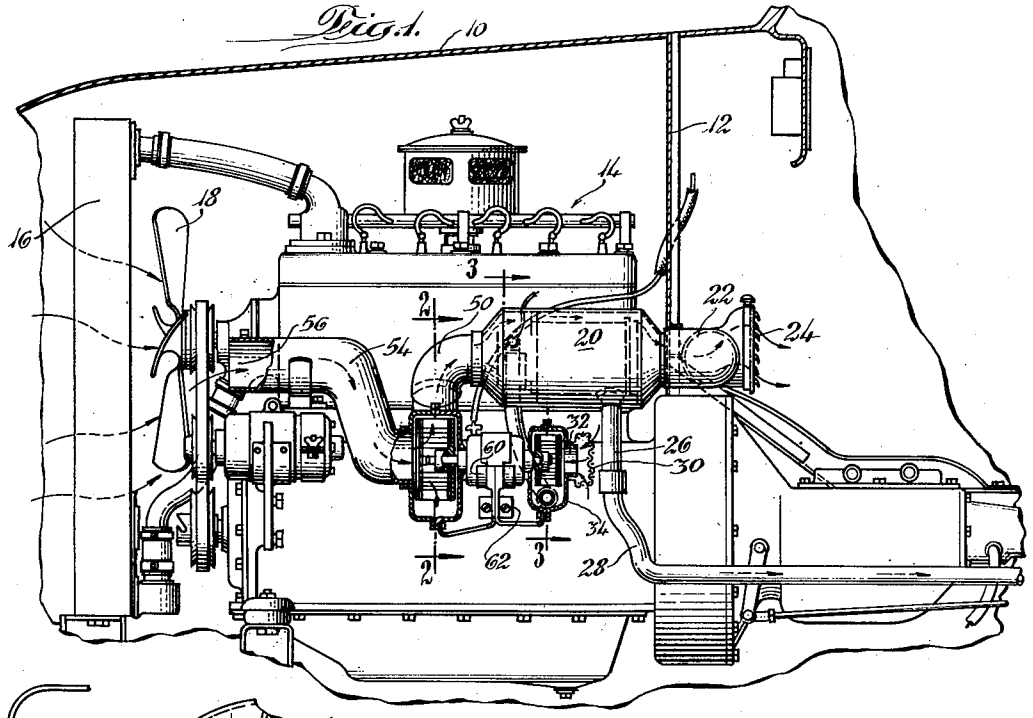
Nov. 7, 1950 G. W. ALLEN 2,529,362

BLOWER

Filed Jan. 25, 1946

Fig. 1.



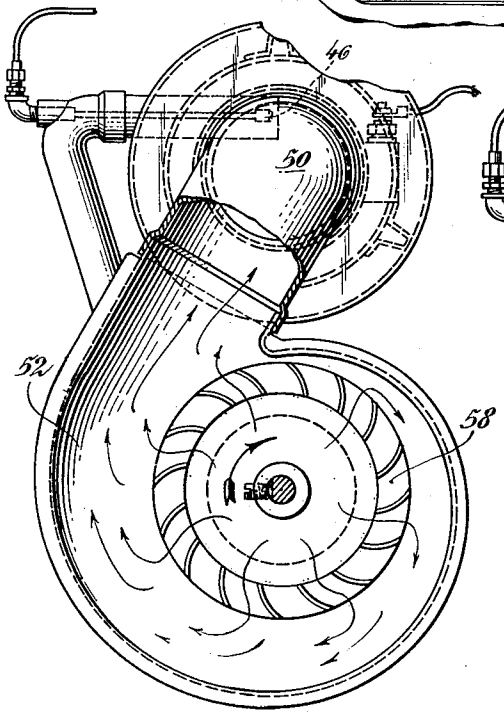
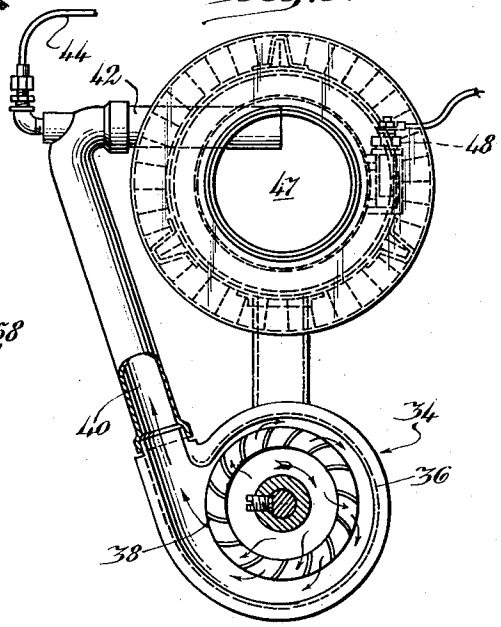


Fig. 2.

Fig. 3.



Inventor:
George W. Allen
By Williams, Bradbury & Hubbe
Attorneys.

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BLOWER

George W. Allen, Indianapolis, Ind., assignor to Stewart-Warner Corporation, Chicago, Ill., a corporation of Virginia

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3 Claims. (Cl. 230—117)

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The present invention relates to blower systems and more particularly to a blower arrangement useful for operating heaters on moving vehicles, such as automobiles, for instance.

An object of the present invention is to provide a novel blower system of the above type for supplying air to a heater or the like which requires less power for its operation as the vehicle speed increases.

An object of the present invention is to provide a novel blower system for supplying air to a heater or the like which requires less power for its operation as the vehicle speed increases and/or the vehicle motor speed increases.

An additional object of the present invention is to provide a novel blower system subject to variations in the inlet pressure, such that the driving motor for the blower acts as a speed control governor for the blower wheel.

Still another object of the present invention is to provide an improved blower system having the above objectives which can use a ram type air inlet pipe to particularly good advantage.

Other objects and advantages will become apparent from the following description of a preferred embodiment of my invention which is illustrated in the accompanying drawings.

In the drawings in which similar characters of reference refer to similar parts throughout the several views and in which I have illustrated a preferred embodiment of my invention:

Fig. 1 is a side elevation of an automobile engine and associated equipment showing the arrangement therewith of an automobile heater and blower system embodying the present invention;

Fig. 2 is a transverse sectional view which may be considered as taken in the direction of the arrows along the line 2—2 of Fig. 1; and

Fig. 3 is a transverse sectional view which may be considered as taken along the line 3—3 of Fig. 1 in the direction indicated by the arrows.

In Fig. 1, I have shown a portion of an automobile, including a hood 10, a fire wall 12 and engine 14. Beyond the front of the engine I have illustrated a conventionally placed radiator 16 through which air is circulated by an engine driven fan 18 and by the ramming effect produced by movement of the vehicle.

In a position in front of the fire wall 12, I have shown a heater 20 connected on its outlet side with a short duct 22 which leads through the fire wall to a hot air outlet grill 24 located within the space to be heated. This heater is

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of the combustion type in which air and gasoline vapor are mixed within the heater and are burned therein, the hot products of combustion passing through a heat exchanger in heat exchange relation to the air to be heated and thence to an exhaust fitting 26 leading to an exhaust pipe 28 which carries the products of combustion away from the region of the heated area.

Air for combustion is drawn from beneath the hood and through a screen 30 into an inlet opening 32 of a combustion air blower 34. This blower is of the Sirocco type and is made up of a scroll case 36 within which is positioned a Sirocco wheel 38 having conventionally forwardly pitched blades. Forwardly pitched blades of this type are used when it is desired to obtain a medium pressure with medium flow rates. From the blower outlet air passes through a conduit 40 to the air induction pipe 42 of the heater. Fuel to be burned is introduced through a fuel line 44 and issues from a jet 46 into the combustion chamber 47 where it is mixed with air, the mixture being lighted by an igniter 48 of the hot wire type.

Inasmuch as the present invention is not directed to the heater per se, further description of this portion of the apparatus is unnecessary, it being sufficient for the present purpose to understand that air to be heated passes longitudinally through the heater where it absorbs heat from a heat exchanger heated by the hot products of combustion produced within the combustion chamber 47.

Air to be heated is introduced into the heater by way of an elbow fitting 50 which is connected to the outlet of a scroll case 52 similar to the scroll case 36 excepting that it is larger. The inlet of this scroll case is connected by a duct 54 to a ram opening 56 positioned just behind the fan 18, so that action of the fan 18 or rapid movement of the automobile will produce a pressure within the duct 54 because of the dynamic effect at the ram opening 56.

Within the scroll case 52, I have used a Sirocco type wheel 58 similar to the wheel 38 excepting that it is larger and in addition the blades are pitched in the opposite direction, that is, they are rearwardly pitched, as will be seen from Fig. 2. A wheel of this type for any particular speed of rotation gives air at a lower pressure, but in larger quantity than a wheel with forwardly pitched blades of the type indicated by the numeral 38. As will be apparent presently, reversely pitched blades at this particular point in the system have a further advantage.

An electric motor 60 is mounted upon a bracket 62 in a position between the scroll cases 52 and 36, these two scroll cases being parallel and in alignment. Also, as indicated in Fig. 1, the two scroll cases may be supported by the same bracket 62 which supports the motor 60. The motor is equipped with shaft extensions at both ends, one of these shaft extensions being connected to the blower wheel 58 while the shaft at the other end of the motor is secured to the wheel 38 so that the two wheels are driven together whenever the motor shaft rotates.

For the present purpose, the motor 62 should be of the type having a tendency toward constant speed operation. In other words, it should be of the type that tends to run at some certain speed and which will, within limitations, draw whatever amount of electric power is necessary to run at that speed regardless of load. The motor type which exhibits this characteristic to the most pronounced degree is an alternating current synchronous motor. However, a direct circuit shunt-wound motor has similar characteristics, although not to quite the same degree. Inasmuch as only direct current is normally available on automobiles, I prefer to use a shunt-wound motor for driving automobile heater blowers.

The device operates in the following manner. If the automobile is standing with the engine idling and the heater is started, the motor will drive both blower wheels at a speed sufficient to operate the heater 20. That is, the combustion air blower will draw combustion air in through the opening 32 and force it upwardly through the tube 40 to the burner 47, thence through the heat exchanger and finally through the exhaust pipe 28 to the atmosphere. The ventilating air blower will draw air inwardly through the ram opening 56, through the duct 54 to the blower inlet, thence through the wheel 58 and scroll case 52 to the heater by way of the elbow 50. From the heater, the hot air passes through the duct 22 and grill 24 to the space to be heated. Under these conditions of operation, the motor will draw considerable electric power since the motor is doing all of the work of moving the air through both the combustion air side and the ventilating air side of the heater as well as the connected duct work and exhaust piping.

As the vehicle increases its speed or as the fan 18 turns at a higher rate because of increased engine speed, or both, the dynamic effect of the air impinging against the ram opening 56 will produce a successively higher pressure within the duct 54. At very high speeds, this pressure may be enough to operate the heater or under some conditions even more. Under these conditions, the air flowing inwardly at the center of the scroll 52 and thence outwardly will impart a considerable rotary component to the wheel 58 in the same direction as is produced by the motor 60 because of the forwardly pitched blades. It is apparent, therefore, that increased pressure in the inlet duct 54 will have a tendency to increase the speed of the blower wheel 58, motor 60, and blower wheel 38. With the electric motor having the constant speed characteristics pointed out above, this tendency toward higher speed of rotation will operate to increase the reactance of the motor so as to reduce the current drain. The result is that the motor speeds up only slightly even though the air pressure in the duct 54 may be considerable.

The motor and wheel 58, therefore, act to introduce a resistance to flow through the inlet duct work on the ventilating air side of the heater under high pressure inlet conditions while at the same time reducing the electric power required to drive the blower motor. At extremely high vehicle speeds, the motor 60 will act as a generator and will help to charge the automobile batteries.

It is apparent, therefore, that regardless of the speed of operation of the vehicle or speed of rotation of the fan 18, the motor 60 will draw only sufficient current to supply the excess energy necessary to produce a sufficient flow of air to the heater, both on the ventilating air side and the combustion air side. If the vehicle speed is slow, the motor will supply most of the power necessary for this purpose, while if the vehicle speed is high, the dynamic effect at the ram opening 36 will be the principal pressure producing source while the motor tends to idle and act as a governor to prevent the pressure at the heater inlet from becoming too high.

Having described by invention, what I claim as new and useful and desire to secure by Letters Patent of the United States is:

1. An air supply system adapted for connection on its inlet side to a duct leading to a source of air under positive but insufficient and variable pressure, said supply system being adapted to boost the supply pressure by substantially the required amount to maintain a substantially constant outlet pressure regardless of the inlet pressure, comprising a scroll case connected at its center to said inlet duct, a backwardly pitched centrifugal impeller positioned within said scroll case, and a shunt-wound electric motor connected for driving said impeller.

2. An air supply system adapted for connection on its inlet side to a duct leading to a source of air under positive but insufficient and variable pressure, said supply system being adapted to boost the supply pressure by substantially the required amount to maintain a substantially constant outlet pressure regardless of the inlet pressure, comprising a scroll case connected at its center to said inlet duct, a backwardly pitched centrifugal impeller positioned within said scroll case, and a prime mover having the characteristics of a shunt wound electric motor connected for driving said impeller.

3. An air supply system connected on its inlet side to a duct leading to a source of air under positive but insufficient and variable pressure, said supply system being adapted to boost the supply pressure by substantially the required amount to maintain a substantially constant outlet pressure regardless of the inlet pressure, comprising a scroll case connected at its center to said inlet duct, a backwardly pitched centrifugal impeller positioned within said scroll case, and a constant speed shunt wound electric motor connected for driving said impeller.

GEORGE W. ALLEN.

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