June 6, 1939. A. N. MASSEY 2,161,182

SUPERCHARGER FOR INTERNAL COMBUSTION ENGINES

Filed Jan. 22, 1937

Fig. 1.

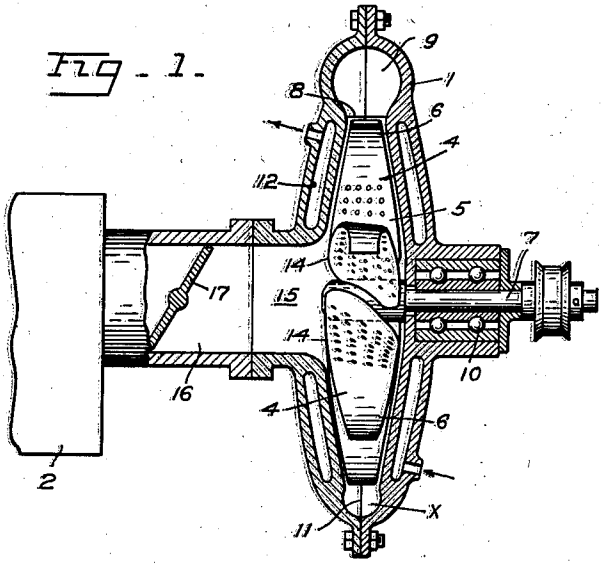
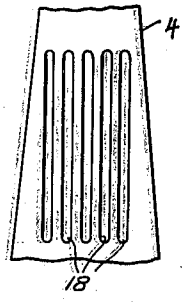
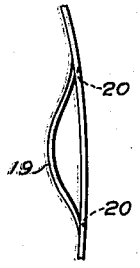


Fig. 3.





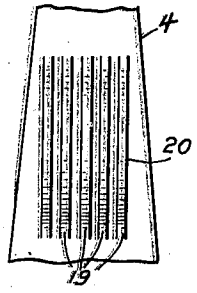
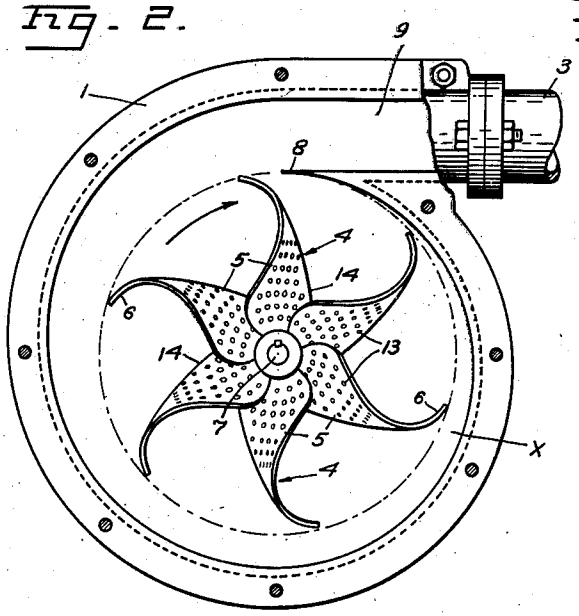


Fig. 5. Fig. 4.

Fig. 2.



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SUPERCHARGER FOR INTERNAL COMBUSTION ENGINES

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Application January 22, 1937, Serial No. 121,862

4 Claims. (Cl. 48—180)

This invention relates to internal combustion engines and has for its principal object an improved supercharger. Another object of the invention is to provide improved means for more completely vaporizing the fuel gases before injecting them into the engine manifold. A further object is to provide in one unit a vaporizer and a supercharger. Other objects are simplicity of construction, reliability, effectiveness, and ease of installation of such apparatus.

Other features and advantages of the invention will appear in the following specification and accompanying drawing.

In the drawing:

Figure 1 is a vertical section of my improved supercharger shown in relation to the carburetor of an internal combustion engine;

Figure 2 is a side elevation of my improved supercharger with the forward side of the casing removed to show the form of the apertured impeller blades;

Figure 3 is a fragmentary view of a modified form of apertured impeller blade;

Figure 4 is a view similar to that of Figure 3 showing a further modification of the impeller blade aperture construction;

Figure 5 is a side view of Figure 4.

Briefly described my improved supercharger consists of a somewhat circular casing 1 adapted to be positioned between a carburetor 2 and the intake manifold 3 of an internal combustion engine not shown, while rotatably positioned within the casing is a fan-type impeller formed with duplex blades 4 which are especially designed to embrace a vapor mixing area 5, and a supercharging or impelling area 6. The fan or impeller may have any number of blades and the wheel is securely mounted on a shaft 7 in eccentric relation to the casing 1 so that a wedge-shaped spiral clearance space X is formed beyond the outer ends of the blades which begins at the cut-off blade 8 of the casing and gradually increases in size until just before again reaching the point of cut-off the clearance is about equal to the size of the tangential discharge pipe 9 which connects to the intake manifold.

The impeller casing 1 may be either in horizontal or vertical position and used in connection with either up or down draft carburetors, and the shaft 7 is to be driven at a high rate of speed by any suitable pulleys and belting, chain or gearing to the engine shaft, cooling fan shaft, or cam shaft, whichever is most adaptable in the particular installation.

In more detail, the shaft 7 is here shown as supported in a ball bearing 10, though the type or number of bearings is optional, and the casing 1 is shown split at 11 for ease of insertion and removal of the impeller, though it may have one loose side if desired. Also the casing may have a hot water jacket 12 for connection in series with the engine and radiator circulatory system, that is the hot water returning from the engine water space on its way back to the radiator will pass through the water jacket space of the supercharger through the ports indicated.

The peculiar form of the impeller blades should be carefully noted, inasmuch as the main central area or vaporizing portion of each blade is perforated with a great number of holes 13 preferably from about $\frac{1}{16}$'' to $\frac{3}{16}$'' or more in diameter, while the outer or impelling portions 6 of the blades are solid or imperforate. The blades are firmly secured to the shaft or to a hub secured to the shaft in any desired way as by welding, riveting or any other way, and each blade is given a quarter-turn twist as well as being curved gently backward opposite to the direction of rotation indicated by the arrow, and with increasing angularity toward the extreme ends of the blades which pass very close and parallel to the cut off blade 8 of the casing.

The solid or impeller portion of each blade is preferably about ¼ to ⅓ the total length of the blade, and the plane of the blade at this portion is parallel to the axis of the shaft, while the remainder or perforate portion of the blade is gradually widened out and given a quarter twist so that its inner end adjacent the shaft extends approximately at 45 degrees to the axis of the shaft and with the edge 14 at the intake side, or carburetor side, of the fan leading when the fan is revolved.

The casing 1 is provided with a relatively large central opening 15 for admission of the carbureted vapors from the carburetor outlet connection pipe 16, and pipe 16 usually houses the conventional throttle valve 17 operated by any of the conventional hook-ups not involved in the present invention.

The opposite wall of the casing 1 through which the driving shaft 7 projects is solid and as the mixed vapors are drawn in by the suction created by the speed of the revolving impeller in operation of the device, the vapors are first forced over toward the closed wall and through the many holes in the blades and literally whipped to a homogeneous vapor while at the same time being carried outward under increasing pressure and forced by the solid impeller portions of the blades

past the cut off blade 8 under any desired positive pressure above atmospheric, depending on the size and speed of the impeller used.

For the average automobile engine, the impeller is preferably from about eight to twelve inches in diameter, and is revolved at a speed to produce from 1 to 5 pounds pressure per square foot above atmospheric in the intake engine manifold, the fuel and air being so thoroughly vaporized by the terrific whipping action as to yield remarkable increase in efficiency over the ordinary carburetor or vaporizer.

Instead of the apertures in the blades being round holes as indicated in Figures 1 and 2, they may take the form of slots as shown at 18 in Figure 3, or the slots may be simply pressed open to push a strip of metal corresponding to each slot back out of the plane of the blade as indicated in Figure 5 at 19. Figure 4 showing this form of blade in plan would show the still adhering but rearwardly displaced strips 19 in line with the slots 20 thus formed. The same or similar method of perforation may be applied to the round or other shaped small holes which may be used, that is the discs need not be entirely punched out of the holes, but simply bent back to any desired degree while adhering at one edge. Such a construction of the apertures aids in the whipping action of the gases.

It may also be noted that the apertured portion of the blades may be made of wire mesh.

In considering my invention as above described, I wish to say that I do not claim broadly the use of a fan in the gaseous fuel stream of an internal combustion engine, as such devices turned by the movement of the gases on their way to the engine are old in the art, and the same applies to impeller fans in superchargers, but the combination of whipping and impelling twisted blades driven under power at high speeds in the arrangement shown, with or without a heating jacket to the casing, and particularly the arrangement of perforations and eccentric mounting of the impeller in its casing to get a full volume discharge under pressure to the engine, I believe to be new, and I therefore claim:

1. A vaporizing device for an internal combustion engine comprising a substantially circular casing having a central inlet and a tangential outlet for vaporized fuel, a propeller fan-type bladed impeller rotatably mounted within said casing, means for applying power to said impeller for rotating the same, the blades of said impeller including a central perforated suction portion with relatively wide overlapping blades arranged and adapted to draw the vapors axially into the casing while whipping the vapors into a fine state of division, and an imperforate narrow outer pressure developing portion twisted substantially at right angles to the inner end of the blade and arranged and adapted to force the whipped vapors tangentially out of the casing under pressure, said impeller positioned eccentrically within said casing to provide a spiral gradually increasing clearance between the periphery of the impeller and the casing to the tangential outlet.

2. A fuel and air vaporizing device for an internal combustion engine, comprising a rotary fan casing provided with an axially disposed vapor inlet port and a tangentially arranged outlet port to form a continuous fuel vapor passage, and a power operated fan within said casing provided with blades slotted over their central areas only while preserving a substantial portion of the outer ends of the blades imperforate, all arranged and adapted to mechanically whip the fuel vapors into a fine state of division on their way through the casing, the slots of the blades extending longitudinally of the blades.

3. In a structure as specified in claim 2, the slots in said blades formed by displacing the material beyond the plane of the blades while remaining attached thereto.

4. A vaporizing device for an internal combustion engine comprising a substantially circular casing having a central inlet and a tangential outlet for vaporized fuel, a propeller fan-type bladed impeller rotatably mounted within said casing, means for applying power to said impeller for rotating the same, the blades of said impeller including a central perforated suction portion with relatively wide overlapping blades arranged and adapted to draw the vapors axially into the casing while whipping the vapors into a fine state of division, and an imperforate narrower outer pressure developing portion twisted substantially at right angles to the inner end of the blade and arranged and adapted to force the whipped vapors tangentially out of the casing under pressure.

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