

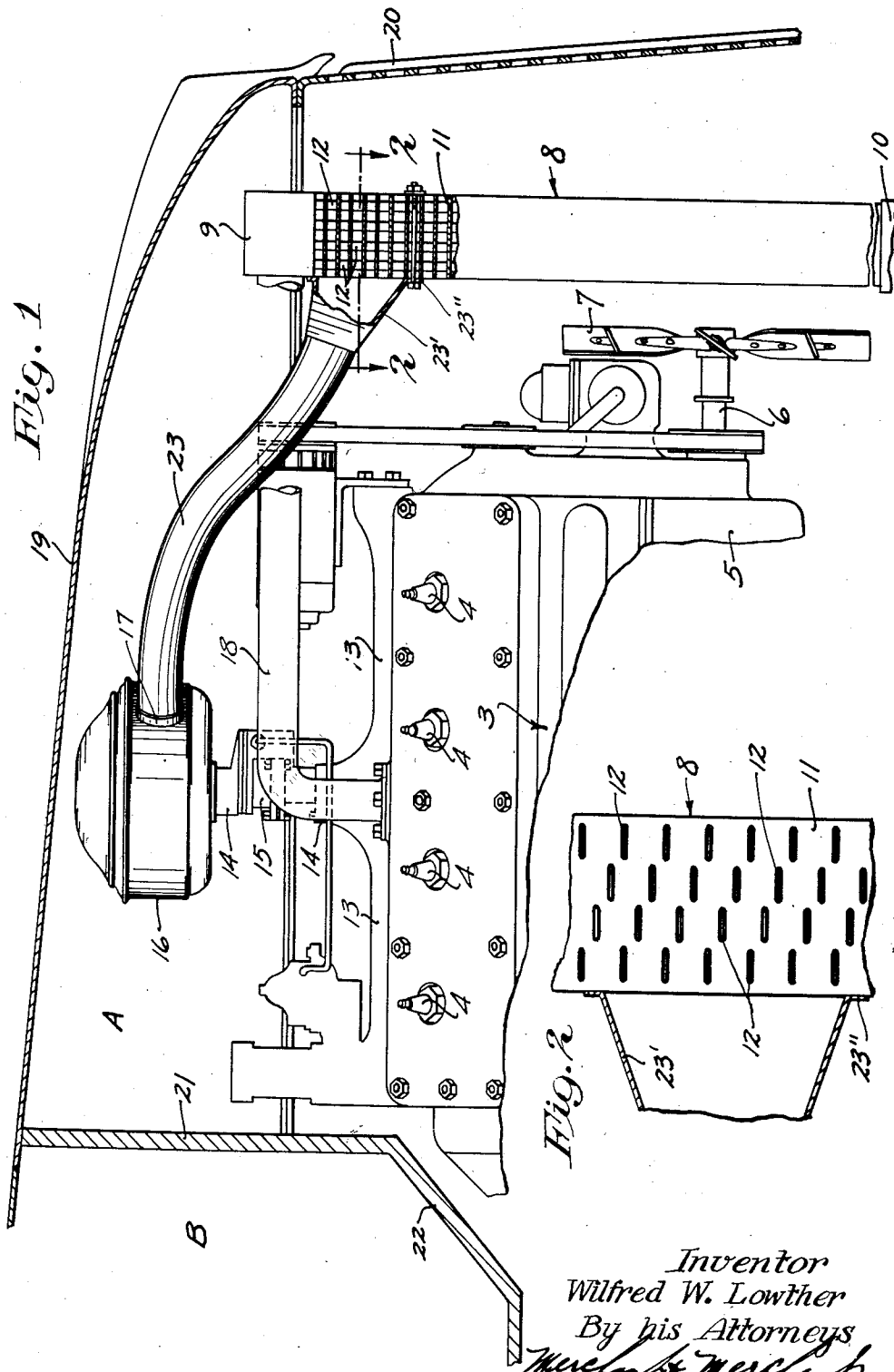
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W. W. LOWTHER

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APPARATUS FOR SILENCING AIR INTAKES OF INTERNAL COMBUSTION ENGINES

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APPARATUS FOR SILENCING AIR INTAKES
OF INTERNAL COMBUSTION ENGINES

Wilfred W. Lowther, Minneapolis, Minn., as-
signer to Donaldson Company, Inc., St. Paul,
Minn., a corporation of Delaware

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3 Claims. (Cl. 180—54)

My present invention relates to the silencing or effective silencing of air intakes of internal combustion engines.

As is well known, internal combustion engines consume large volumes of air which is drawn into the combustion chambers of the various cylinders, usually through a common air intake conduit, and due to the intermittency of the suction strokes and the closing of the intake valves of the engine, noise vibrations are set up and are emitted outwardly through the air intake, against the rapid flow of incoming air. In the automotive field, where silent operation of all parts of a vehicle has long been an important objective, the silencing of the engine's intakes has presented a problem particularly difficult of satisfactory solution but one that has been partially solved in various different ways, usually through the use of relatively expensive and cumbersome silencing devices interposed in the intake conduit. Another method which has hitherto been employed for obtaining some effective silencing of the air intakes involves the extending of the engine's air intake conduit to a point outwardly of the engine's cellular cooling radiator. The present invention may be said to be an improvement on this latter type of silencing means or method.

In accordance with the present invention I obtain a remarkably high degree of silencing or effective silencing of the air intakes of automobile internal combustion engines by extending the engine's air intake conduit toward the cellular core of the engine's cooling radiator and terminating the same within the engine compartment and with its open end facing directly into the strong blast of air entering the engine compartment through the cellular core of the radiator.

This method provides a very material improvement in silencing or effective silencing of the intake over and above that obtained by the hitherto described prior art method of projecting the intake to a point outside of the engine compartment and forwardly of the radiator. The reason for such an improvement appears to be that in the present scheme the sound waves are projected outwardly through the cellular core of the engine's radiator and which radiator, it is believed, serves as a baffling device to intercept and break up the sound waves during the outward travel of the sound waves therethrough, so that a very material degree of silencing is obtained during the outward travel of the sound waves through the cellular radiator and before the

sound waves reach a position forwardly or outwardly of the radiator.

The above and other highly important objects and advantages of the invention will be made clear from the following specification, claims, and the appended drawing.

In the accompanying drawing like characters indicate like parts throughout the several views.

Referring to the drawing:

Fig. 1 is a fragmentary longitudinal sectional view, with some parts broken away, through the engine compartment of a conventional automobile, the engine being shown in side elevation and being equipped for silencing with a preferred embodiment of the invention; and

Fig. 2 is an enlarged fragmentary detail view taken on the horizontal section line 2—2 of Fig. 1.

The engine illustrated may be assumed to be a Ford V-8 engine and, since the structure of these engines is well known, the same will be only very briefly described. One of two diagonally disposed cylinder blocks containing four cylinders is indicated by 3 and is shown as being provided with a spark plug 4 for each of its four cylinders. The cylinders of the block 3 and the cylinders of the opposite block 3, not shown, open into a common crank case or chamber 5. Projecting through the front end of the crank case 5 is the extended end of the engine's crank shaft 6 on the free end of which is mounted an air circulating fan 7. This fan 7 is located directly behind the air pervious core of the engine's cooling radiator 8. The radiator 8 is made up of a top tank 9, a similar lower tank 10 and vertically spaced series of horizontally disposed radiating fins 11 located in the space between the upper and lower tanks 9 and 10, and a plurality of rows of liquid conduits 12 extending between the radiator tanks 9 and 10 through the numerous fins 11. The fins 11 are spaced and disposed to form air passages leading forwardly from the engine, and the staggered rows of liquid conduits 12 extend through and interrupt these forwardly opening passages.

According to the present illustration, there are four rows of parallel tubes or conduits 12, each tube or conduit of each row being parallel to the others in a line transversely of the vehicle, and the tubes of each row are staggered with respect to the tubes of other rows.

The combustion chambers of the eight cylinders of the engine are connected to a fuel intake manifold 13 that terminates at the center of the engine in a common fuel intake conduit 14, in which conduit 14 is a conventional carburetor 15.

Mounted on what is normally the upper end of the fuel intake conduit 14, is an air cleaner 16 of the general character illustrated, for example, in my prior Patent No. 2,130,142, but which has been modified slightly to provide a tubular radial air inlet 17 in place of the annular air inlet shown in my prior patent.

The radiator 8 forms part of the engine's liquid circulating cooling system and is connected to the water jackets of the engine through fluid circulating conduit 18 and other fluid circulating conduits not shown.

The engine and radiator 8 are located within the engine compartment A of the vehicle and which engine compartment is located directly forwardly of the vehicle passenger compartment B. The engine compartment is formed in part by the conventional hood 19 and radiator grill 20, which grill is located at the front end of the engine compartment and directly forwardly of the radiator 8. The engine compartment A is separated from the passenger compartment B by a dashboard 21 and floorboards 22.

Extending forwardly from the air cleaner 16 and forming an extension of the air intake conduit 14 is an air intake conduit 23 that is flared at its front end and anchored directly to the inside of the air pervious portion of the radiator, preferably near the top thereof. The flared or funnel-shaped intake end portion of the extension 23 of the intake conduit is indicated by 23' and, as shown, this funnel-shaped end is provided with an anchoring flange 23'' that is anchored to the radiator by a suitable bolt, or the like, passed through the core between the tubes thereof. It will be obvious that in the present arrangement the air cleaner 16 forms an intermediate portion of the air intake conduit which may be said to be made up of the primary conduit section 23, the air cleaner 16 and the secondary conduit portion 14.

Operation

Under operating conditions of the engine, the preferred embodiment of the invention herein illustrated is believed to operate substantially as follows.

Air will be drawn into the engine combustion chambers on the downward suction strokes of the several cylinders at varying, but nevertheless usually quite high, velocity through the air intake conduit made up of sections 23, 16 and 14 and, due to the intermittency of the suction strokes of the several cylinders and the rapid closing of the several intake valves, bothersome sound waves, usually referred to as "noise," will be set up. These sound waves set up within the engine itself travel outwardly through the air intake conduit and are projected forwardly through the upper portion of the cellular or air pervious portion of the radiator 8 in a forward direction and directly against and into the high velocity blast of air entering the engine compartment through the radiator grill 20 and the air pervious core of the radiator. Upon being passed outwardly through the interrupted air passages of the radiator, these noise sound waves will be deflected about and mixed up to such an extent that the volume thereof will be materially reduced. Another factor believed to be responsible for some degree of silencing of the sound waves during their passage through the more or less obstructed and irregular passages of the radiator, is that of absorption, and in this respect it may be said that the radiator tubes or conduits and fins being made of very soft material such as soft cop-

per and the tubes being filled with water are relatively dead and have sound absorbing characteristics.

Of course, some of the sound waves emitted from the front of the radiator will be carried into the rush of air laterally outwardly of the vehicle where they will be practically inaudible to the occupants of the passenger compartment, but it is believed that a very large percentage of these sound waves are actually directed backwardly through the radiator with the rush of air entering the engine compartment and, of course, such sound waves as are projected through the radiator for a second time become further broken up and reduced in volume during their second passage through the radiator and become still further deflected about and reduced in volume by the cooling fan 7, and upon striking numerous other surfaces of the engine and vehicle parts within the engine compartment. Finally, of course, the sound waves that have entered the engine compartment rearwardly through the radiator are carried through the engine compartment and discharged under the vehicle where they are rapidly carried away and where they are scarcely, if at all, audible to the occupants of the vehicle.

It will, of course, be appreciated that the sound waves emitting from the air intake tube reach their greatest volume under maximum throttle conditions and that since this condition is most often arrived at at very high speeds, the volume and velocity of air entering the engine compartment will then be at maximum also.

The above described arrangement renders the sound waves emitted outwardly through the engine's intake substantially inaudible to the occupants of the passenger compartment of the vehicle and accomplishes this result without the use of cumbersome and expensive silencing equipment, the conduit extension 23 being very inexpensive and being the only part added to accomplish this remarkable result. Furthermore, the efficiency of the engine is actually increased by virtue of a supercharging effect brought about by directing the air intake tube directly into the high velocity air blast entering the engine compartment. Preferably, and as herein illustrated, the intake end of the air intake tube is maintained at a level above or as close as possible to the top of the engine.

In the present arrangement the radiator itself serves as a primary air cleaner to prevent large foreign particles, bugs and the like, from entering the air intake tube and air cleaner.

What I claim is:

1. The combination with an automotive vehicle having a passenger compartment, an engine compartment, a liquid cooled internal combustion engine located in the engine compartment and having an air intake equipped with an air cleaner, and an engine cooling radiator with liquid conduits and air passages surrounding said conduits, said radiator being located with one side thereof exposed to the front of the engine compartment and the other side thereof exposed to air outside of and in front of the engine and passenger compartments, of an air intake conduit spaced from the engine and extending from the air cleaner forwardly within the engine compartment and having its intake end forwardly directed and terminated against an air pervious portion of the radiator, the front side of which portion is directly exposed to the rearwardly directed air blast entering the en-

engine compartment through the radiator, whereby sound waves emitted from the intake end of the intake conduit will be projected forwardly and outwardly through the interrupted air passages of the radiator and become reduced in volume during such outward passage through the radiator and will thereafter be carried largely out of audible range of the vehicle passengers.

2. The structure defined in claim 1, in which the air pervious portion of the radiator is made up of radiating fins with staggered rows of liquid

conduits extending therethrough, said staggered conduits serving to interrupt the air passages between the spaced fins.

3. The structure defined in claim 1 in which the air pervious portion of the radiator is made up of spaced parallel radiating fins providing air passages opening forwardly from the engine compartment, and staggered rows of liquid conduits passing through said radiating fins and interrupting the forwardly opening air passages therethrough.

WILFRED W. LOWTHER.