

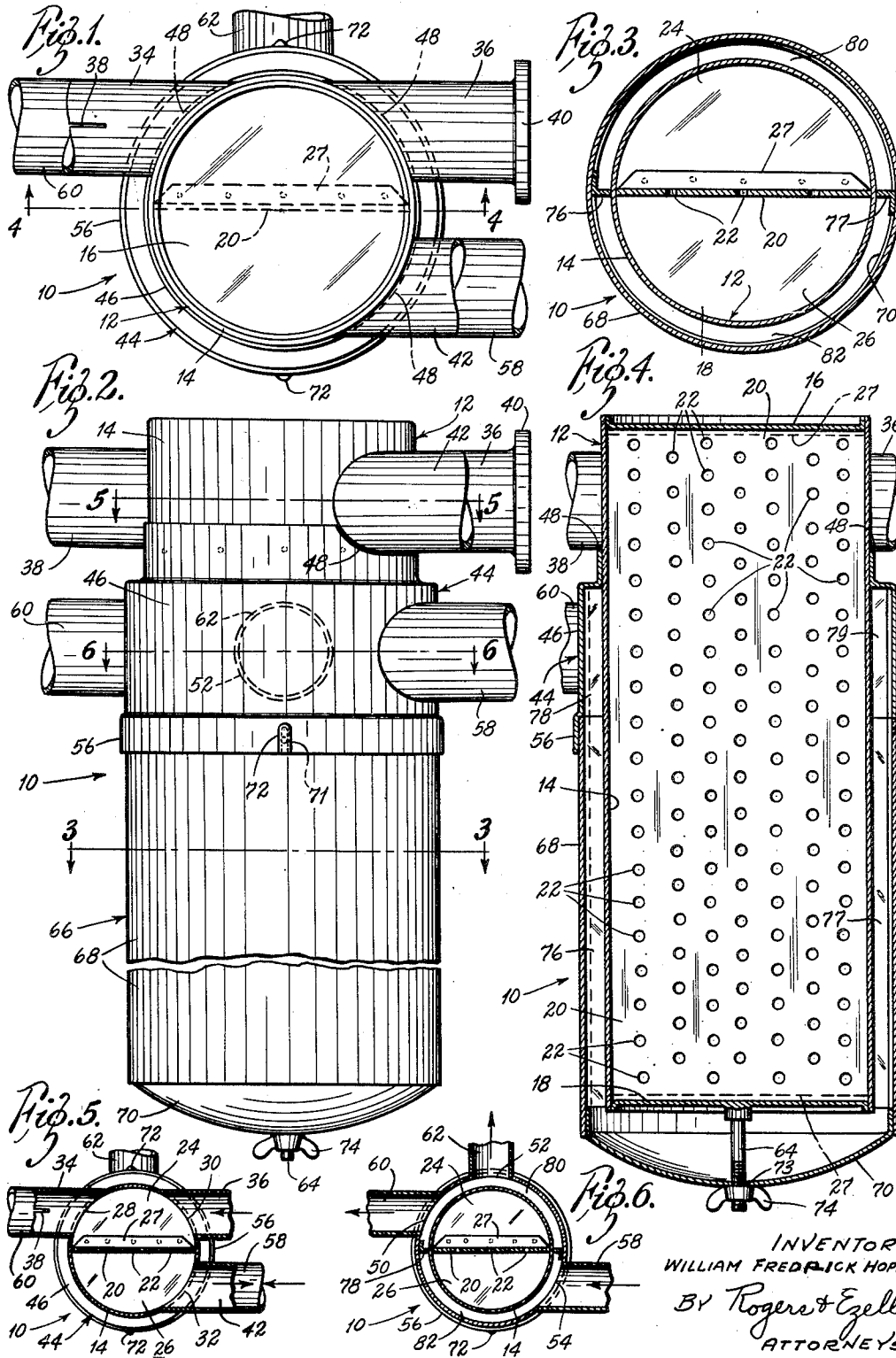
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COMBINATION MUFFLER AND HEAT EXCHANGER

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COMBINATION MUFFLER AND HEAT EXCHANGER

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1 Claim. (Cl. 257-16)

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The present invention relates generally to the internal combustion engine art, and more particularly to a novel combination muffler and heat exchanger which can be easily and quickly assembled for inspection and repair.

In its preferred form, the device comprises an inner casing which acts as a muffler and a removable casing which is disposed about a portion of the inner casing and spaced therefrom so as to provide a chamber therebetween which is used for heating the air going to the carburetor or to the cabin of the airplane.

The passageways leading to the inner casing and to the chamber between the casings are located at one end of the device so that the outer casing can be easily and quickly slipped off after a single wing nut has been removed, thereby exposing the muffler portion of the device for inspection and repair.

When using a combination muffler and heat exchanger, for heating the air going to the cabin of an airplane or the interior of an automobile, there is always the hazard of having carbon monoxide pass from the muffler over into the air chamber through holes in the muffler casing which are produced by corrosion.

In order to completely inspect the known types of combination mufflers and heat exchangers, the entire unit has to be removed and disassembled, an operation which is both tedious and time consuming. Consequently, the known units are not inspected as frequently as they should be in order to afford maximum protection.

Another disadvantage of the known types of units is that, when used with airplanes, the exhaust from only one-half of the cylinders can be used for carburetor heat and the other half for cabin heat. Consequently, when no carburetor heat is required, one half of the available heat is lost to the atmosphere.

Therefore, it is an object of the present invention to provide a novel combination muffler and heat exchanger which can be easily and quickly inspected for cracks and openings which would permit the passage of carbon monoxide gas into the air heating chambers.

Another object is to provide a combination muffler and heat exchanger which contains heat outlets for both carburetor heat and cabin heat.

Another object is to provide a combination muffler and heat exchanger which contains an outer casing which is held in place by a single wing nut and which, when removed, exposes the exterior surfaces of the muffler portion for complete inspection.

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Another object is to provide a single combination muffler and heat exchanger whereby the exhaust heat from all of the cylinders can be used for carburetor heat or all of it can be used for cabin heat.

Another object is to provide a combination muffler and heat exchanger which can be mounted to the rear of the airplane engine adjacent the center of gravity of the ship and away from the carburetor so as to reduce the fire hazard and provide a cooler running engine. Positioning the device to the rear of the engine also makes the latter more accessible for inspection and repair.

Another object is to provide a combination muffler and heat exchanger which can be easily and quickly installed in a rigid position so that there will be no excessive vibration.

Other objects are to provide a combination muffler and heat exchanger which is of rugged construction, which is light in weight and which is simple in design and relatively inexpensive to manufacture.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawing wherein a preferred embodiment of the present invention is shown, in which:

Fig. 1 is a top plan view of a combination muffler and heat exchanger constructed in accordance with the teachings of the present invention;

Fig. 2 is an elevational view of the device;

Fig. 3 is a horizontal transverse sectional view taken on the line 3-3 in Fig. 2;

Fig. 4 is a vertical diametrical sectional view taken on the line 4-4 in Fig. 1; and

Figs. 5 and 6 are reduced horizontal transverse sectional views taken on the lines 5-5 and 6-6 respectively, in Fig. 2.

Referring to the drawing more particularly by reference numerals, 10 indicates generally a combination muffler and heat exchanger embodying the teachings of the present invention.

It includes a cylindrical inner casing 12 having a vertical side wall 14 and top and bottom walls 16 and 18, respectively.

A vertically extending baffle plate 20 containing a series of transverse openings 22 there-through is secured within the casing 12 so as to divide the casing into two chambers 24 and 26. The baffle plate 20 contains flange portions 27 at the top and bottom ends thereof which are spot welded to the top and bottom walls 16 and 18.

Openings 28, 30 and 32 (Fig. 5) are contained in the side wall 14 adjacent the upper end of the casing 12, the openings 28 and 30 leading into the

chamber 24 and the opening 32 leading into the chamber 26.

A pair of opposed inlet pipes 34 and 36 (Fig. 5) are secured to the casing wall 14 in alignment with the openings 28 and 30, respectively. The free end of the pipe 34 contains a pair of opposed longitudinally extending slots 38 for a purpose to appear, and the free end of the pipe 36 contains a flange-like portion 40.

An outlet pipe 42 (Fig. 5) is secured to the casing wall 14 in alignment with the opening 32, as by welding.

An annular flange member 44 having a lower wall portion 46 is secured to the side wall 14 below the pipes 34, 36 and 42. The upper edge of the flange member 44 contains arcuate notches 48 which fit against the bottom surfaces of the pipes 34, 36 and 42 whereby the flange member 44 can be accurately and quickly positioned prior to its being welded to the side wall 14. Openings 50, 52 and 54 (Fig. 6) are contained in the lower wall portion 46, and the lower edge thereof is expanded outwardly so as to form an offset portion 56.

An inlet pipe 58 (Fig. 6) is fastened to the side wall 46 in alignment with the opening 54; and outlet pipes 60 and 62 are also fastened thereto in alignment with the openings 50 and 52, respectively.

A depending threaded stud-like member 64 (Figs. 2 and 4) is secured to the bottom wall 18 of the casing 12.

A cup-like outer casing 66 having a vertical side wall 68 and a concave bottom wall 70 welded thereto, is disposed about the lower portion of the casing 12 and spaced therefrom. The upper portion of the side wall 68 is in frictional engagement with the inner surface of the offset portion 56. Diametrically opposed detents 71 are contained in the side wall 68 of the casing 66 and complementary longitudinally extending recesses 72 are contained in the offset portion 56 of the flange member 44 so as to properly align the outer casing 66 with the flange member 44.

An opening 73 is contained in the bottom wall 70 to receive the stud-like member 64, and a wing nut 74 is removably disposed on the free end of the member 64.

A pair of diametrically opposed, vertically extending lower angles 76 and 77 (Fig. 4) are welded to the inner surface of the wall 68 below the flange member 44 and upper angles 78 and 79 are welded to the inner surface of the lower wall portion 46 of the flange member 44 so as to form extensions thereof. These angles divide the space between the inner casing 12 and the outer casing 66 into two equal chambers 80 and 82 which are in communication at their lower ends. The detents 71 and cooperating recesses 72 assure that the lower angles 76 and 77 will always be in alignment with the upper angles 78 and 79.

The device 10 is shown and will be described as used with an airplane, but it is to be understood that it can be used equally as well with automobiles, trucks, and the like.

Operation

When installing the device 10 on an airplane having a pair of opposed exhaust stacks or pipes (not shown), the inlet pipe 34 which contains the slots 38 in the end thereof is slipped over the end of one of said exhaust pipes. The slots 38 permit the pipe 34 to expand slightly so that the said exhaust pipe can be slipped into the inlet pipe 34 until the flange portion 40 clears

the end of the other exhaust pipe, which contains a complementary flange-like portion (not shown). The device 10 is then moved toward said other exhaust pipe until the flange-like portion 40 abuts the other flange-like portion and the two are then bolted together, thereby providing a rigid support.

The airplane exhaust pipe (not shown) is fastened to the outlet pipe 42.

The cold air inlet pipe (not shown) is fastened to the pipe 58, and the pipe for cabin heat (not shown) and the pipe for carburetor heat (not shown) are fastened to the pipes 60 and 62, respectively. A control valve (not shown) for controlling the flow of heated air into the airplane cabin and the carburetor, is installed on the fire-wall of the airplane.

When the airplane engine is in operation, the hot exhaust gas passes through the pipes 34 and 36 into the chamber 24, through the openings 22 in the baffle plate 20 and into the chamber 26. In this manner, the noise is muffled and a large portion of the heat contained in the gas is transferred to the walls of the casing 12. The gas then leaves the chamber 26 through the pipe 42.

The cold air coming in through the pipe 58 enters the chamber 82. It is prevented from flowing around the casing 12 directly to the chamber 80 because of the angles 76—79, inclusive, so that it flows down one side of the casing 12, under the bottom wall 18 and up the opposite side of the casing to the outlet pipes 60 and 62. In traveling this circuitous route, the incoming air absorbs a large percentage of the heat from the inner casing 12.

The control valve (not shown) can be set so that all of the heated air goes to the airplane cabin or so that all goes to the carburetor, or, if desirable, it can be set so that a portion of the heated air goes to the cabin and the remainder goes to the carburetor.

When neither cabin heat nor carburetor heat is desired, the heated air is exhausted to the atmosphere. Consequently, air is always passing through the device so as to cool the muffler portion thereof, thereby assuring longer life for that portion of the device.

To inspect the device 10 to make certain that there are no cracks or openings in the casing 14 through which carbon monoxide gas could pass, it is merely necessary to remove the wing nut 74 from the stud-like member 64, and slip off the casing 66, an operation which can be completed in a matter of seconds. Consequently, by having a combination muffler and heat exchanger which can be inspected easily and quickly, the pilot or his mechanic will be more apt to inspect it at frequent intervals.

Thus it is apparent that there has been provided a novel combination muffler and heat exchanger which fulfills all of the objects and advantages sought therefor.

It is to be understood that the foregoing description and the accompanying drawings have been given only by way of illustration and example, and that changes and alterations in the present disclosure, which will be readily apparent to one skilled in the art, are contemplated as within the scope of the present invention which is limited only by the claim which follows.

I claim:

A combination muffler and heat exchanger comprising an elongated vertically extending cylindrical casing; a longitudinally extending perforated plate dividing the casing into two cham-

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bers; at least one passageway adjacent the upper end of the casing leading into one of said chambers; at least one passageway adjacent the upper end of the casing leading from the other of said chambers; an annular flange like member having a downwardly extending skirt-like portion fastened to and spaced therefrom to the casing below said passageway; a cup-like casing disposed about the bottom portion of the cylindrical casing and spaced from the bottom and sides thereof; the upper end of the cup-like casing being in telescopic engagement with the skirt-like portion so as to provide a chamber between the two casings; means maintaining the cup-like casing in telescopic engagement with the skirt-like portion; said means comprising a bolt extending vertically through the cup-like casing and abutting the bottom portion of the cylindrical casing; a wing nut threadedly secured to the bolt exteriorly of the cup-like casing whereby upon loosening of the wing nut the cup-like casing is slipped off; a pair of diametrically opposed vertically extending partitions secured to the cup-like casing and extending upwardly under the flange-like member so as to divide the chamber between the casings into two compartments which are in communication adjacent their lower ends; at

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least one passageway at the skirt-like portion leading into one of said compartments; at least one passageway at the skirt-like portion leading from the other compartment.

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