April 12, 1932. O. BODEN 1,853,892

COMBINED AIR HEATER AND CLEANER FOR INTERNAL COMBUSTION ENGINES

Filed Dec. 12, 1930 2 Sheets-Sheet 1

Fig. 1.

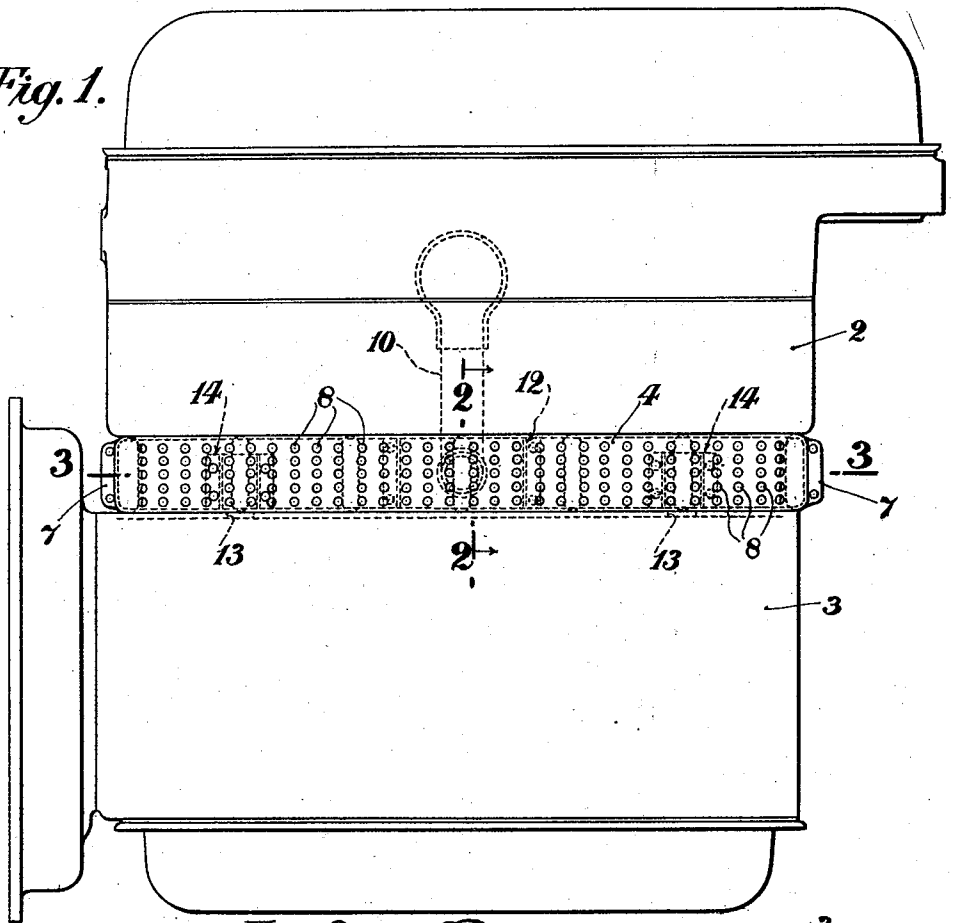

Fig. 3.

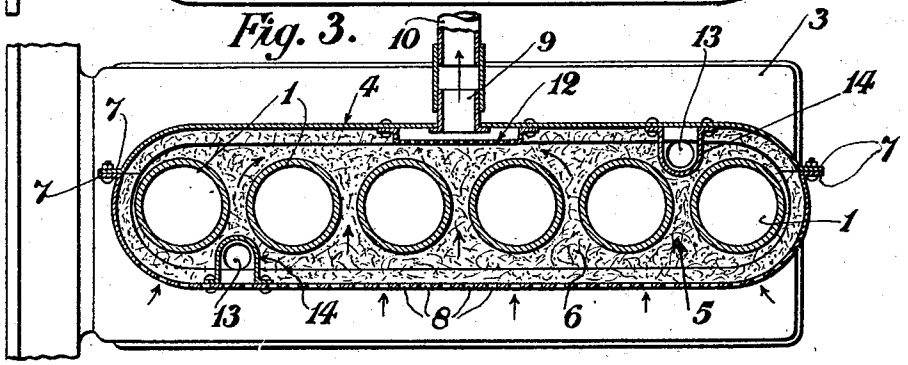

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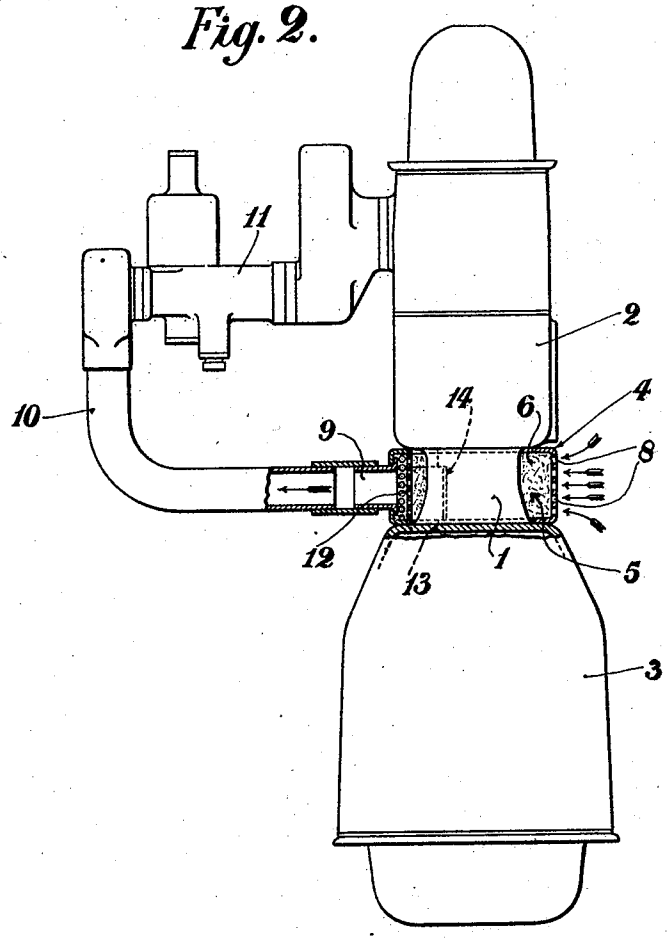
Fig. 2.



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UNITED STATES PATENT OFFICE

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COMBINED AIR HEATER AND CLEANER FOR INTERNAL COMBUSTION ENGINES

Application filed December 12, 1930, Serial No. 501,793, and in Great Britain October 21, 1930.

This invention relates to air cleaners or scrubbers for use in connection with internal combustion engines for the purpose of intercepting dust, dirt or other solid particles contained in the air which passes into the cylinder or cylinders. One of the objects of the present invention is to provide an improved form of air cleaner by means of which the air passing to the engine is warmed before reaching the carburetter and which ensures the engine cylinders being cooled by the passage of the air through the cleaner.

A further object, particularly in the case of automobile engines, is to utilize the air cleaner for preventing gases and oil vapour from the engine crankcase, from passing into the vehicle body.

Another object is to provide an air cleaner device which is fitted to the engine so as not to extend beyond the general outline of the engine, thereby forming a neat, compact and convenient arrangement.

According to the invention, the air cleaner comprises a perforated or apertured casing surrounding the cylinder barrel or barrels and enclosing suitable air filtering or cleaning material. Thus, the air, in passing through the cleaner, is warmed by the engine cylinders and cools the said cylinders by the exchange of heat. The engine crankcase may be arranged to communicate by suitable apertures or passages with the air cleaner, so that gases and oil vapour from the crankcase may pass into the cleaner and thence to the engine, being consumed therein or being ejected through the exhaust system.

Figure 1 of the accompanying drawings is a side elevation of an internal combustion engine showing the air cleaner applied thereto in accordance with the present invention.

Figure 2 is an end elevation of the engine with the air cleaner shown in transverse section on line 2—2, Figure 1.

Figure 3 is a horizontal section on line 3—3, Figure 1.

Referring to the drawings, the lower and unjacketed portions 1 of the engine cylinder barrels, between the water-jacket 2 and the crankcase 3, are enclosed by an encircling sheet-metal casing 4 fitting closely against the lower part of the water-jacket and the top of the crankcase respectively. A continuous chamber or space 5 is thus produced between the casing 4 and the cylinder barrels 1, and this space is filled or loosely packed with hair, metal wool or other suitable air-filtering material 6 which will allow of the free passage of air but which will intercept any dust, dirt or other solid material contained in the air.

The casing 4 may be made in two separate vertical halves adapted to be applied to the cylinder barrels from opposite sides and to be permanently or detachably secured together, when in place, by means of opposed flanges 7, 7, at the ends of the said halves, these flanges being secured together by bolts, rivets or other suitable means.

The outer wall of the cleaner casing is perforated at 8 to permit of the entrance of air, which, after flowing through the porous packing 6 and being cleaned thereby and warmed by the heat of the cylinder barrels, is drawn by the engine induction through an outlet 9 in the casing and through a suitable pipe or passage 10 leading to the carburetter 11. The said outlet 9 may be situated at the middle of one side of the casing, and may be covered by a wire gauze guard 12 located within the cleaner chamber and suitably secured to the wall thereof.

The upper part of the engine crankcase 3 may be provided with holes 13 which communicate with the interior of the air cleaner, so that gases or oil vapour can be drawn from the crankcase into the cleaner and thence through the engine, being consumed therein or being ejected through the exhaust system. Upstanding U-shaped guards 14 may be attached by their edges to the inside face of the wall of the casing 4 immediately over the holes 13 in the crankcase 3 to form vertical passages for the gas or vapour, said guards resting on the top of the crankcase and extending for a portion of the height of the cleaner chamber, being open at the top. These guards or passages 14 prevent the passage of excess oil from the crankcase into the cleaner and also prevent the entrance into the crankcase of any solid particles collected by the cleaning medium.

Alternative or additional passages may be formed between the crankcase and cleaner chamber by suitable external pipes.

As the cleaner is made to embrace the unjacketed portion of the cylinder barrels and fits between the bottom of the water-jacket and the top of the crankcase, it can be designed so as to be contained within or flush with the general outline of the engine, thus providing a neat and compact arrangement.

Instead of the whole of one side of the casing having perforations one or other number of holes or gaps may be provided.

Having fully described my invention, what I desire to claim and secure by Letters Patent is:—

1. In an internal combustion engine, a crank case, engine cylinders having a water-jacket spaced from the crank case by unjacketed parts of the cylinders, an air cleaner surrounding the said unjacketed parts of the cylinders and having an outlet leading to the carburetter, means for admitting air into the air cleaner, and an upstanding open topped passage extending from the interior of the crank case into the interior of the air cleaner for a portion of the height of said cleaner.

2. In an internal combustion engine having cylinders, a water-jacket and a crank chamber, an air cleaner and warmer comprising a casing formed separately from the engine and fitted and secured around the cylinder barrels, between said water-jacket and the crank chamber, to form a continuous compartment surrounding the lower portions of said engine cylinders, air cleaning material within the compartment, means for inserting and removing said air cleaning material, an opening formed in the casing and communicating with the atmosphere, and a pipe leading from the casing to the air-intake of the carburetter.

3. In an internal combustion engine having cylinders, a water-jacket and a crank chamber, an air cleaner and warmer comprising a two-part casing formed separately from the engine and fitted around the cylinder barrels between said water-jacket and the crank chamber, means for securing the two parts of the casing together to form a continuous compartment surrounding the engine cylinders, air cleaning material within the compartment, an opening formed in the casing, and a pipe leading from the casing to the air-intake of the carburetter.

4. An air cleaner and warmer for an internal combustion engine having cylinders, a water-jacket and a crank case, comprising a casing adapted to extend around the lower portions of said engine cylinders between said water-jacket and said crank case, said casing having an elongated opening to receive the cylinders and forming a continuous compartment around the latter, air cleaning material within said compartment, means for inserting and removing said air cleaning material, an opening formed in the casing, and a pipe leading from the casing to the air-intake of the engine.

5. An air cleaner for an internal combustion engine having cylinders, a water-jacket and a crank case, comprising a two-part casing adapted to extend around the lower portions of said engine cylinders between said water-jacket and said crank case, said casing having an elongated opening to receive the cylinders, flanges at the upper and lower edges of the casing opposed to the engine cylinders, means for securing the two parts of the casing together to provide a continuous compartment surrounding said engine cylinders, air cleaning material within the compartment, an opening formed in the casing, and a pipe leading from the casing to the air-intake of the engine.

6. In an internal combustion engine having cylinders, a water-jacket and a crank case, an air cleaner comprising a casing formed separately from the engine and fitted and secured around the cylinder barrels between said water-jacket and said crank case to form a continuous compartment surrounding the engine cylinders, said casing lying within the general contour of the upper water-jacketed part of the engine, upper and lower flanges on the casing opposed to the engine cylinders, air cleaning material within the compartment, an opening formed in the casing and communicating with the atmosphere, and a pipe leading from the casing to the air-intake of the engine.

7. In an internal combustion engine having cylinders, a water-jacket and a crank case, an air cleaner comprising a two-part casing formed separately from the engine and fitted around the cylinder barrels between said water-jacket and said crank case so as to be contained within the general outline of the engine, means for securing the two parts of the casing together to form a continuous chamber surrounding the engine cylinders, a flange at the upper edge of each part of the casing engaging said cylinders and said water-jacket, a flange at the lower edge of each part of the casing engaging said cylinders and said crank case, air cleaning material within the chamber, openings formed in the casing and communicating with the atmosphere, and a pipe leading from the casing to the air-intake of the engine.

8. In an internal combustion engine having cylinders, a water-jacket and a crank chamber, an air cleaner comprising a casing formed separately from the engine and fitted and secured around the cylinder barrels between said water-jacket and said crank chamber to form a continuous compartment surrounding the lower portions of the engine cylinders, air cleaning material within the compartment, an opening formed in the cas-

ing and communicating with the atmosphere, a pipe leading from the casing to the air-intake of the engine, and means for placing the compartment in communication with the interior of the crank case.

9. In an internal combustion engine having cylinders, a water-jacket and a crank case, an air cleaner comprising a two-part casing formed separately from the engine fitted around the cylinder barrels between said water-jacket and said crank case, so as to be contained within the general outline of the engine, means for securing the two parts of the casing together so as to form a continuous chamber surrounding the engine cylinders, flanges on the two parts of the casing opposed to said engine cylinders, air cleaning material within the chamber, perforations formed in the casing, a pipe leading from the casing to the air-intake of the engine, and a pipe leading from the crank case and communicating with the interior of the casing.

In testimony whereof I have affixed my signature.

OLIVER BODEN.