Jan. 7, 1936. E. W. RUBER 2,026,848

COOLING MEANS FOR INTERNAL COMBUSTION ENGINES

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Fig. 1.

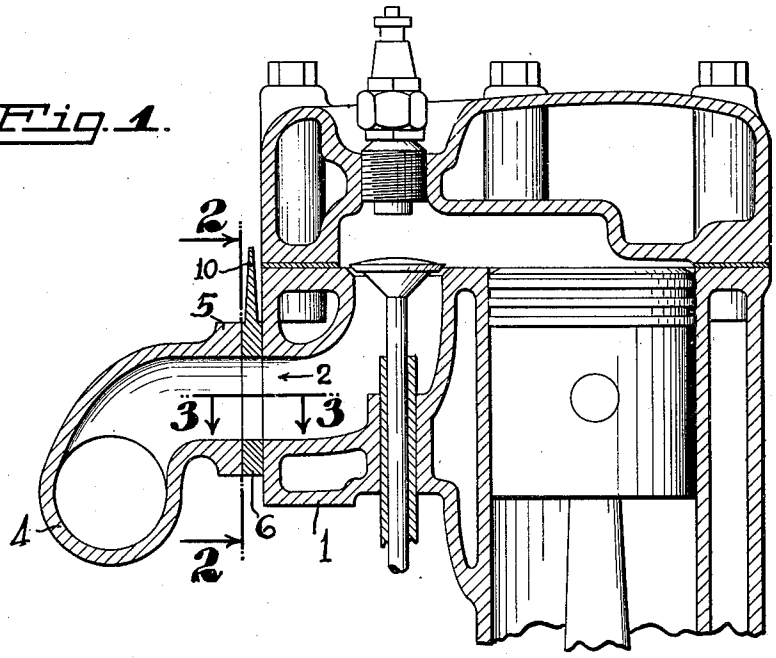



Fig. 2.

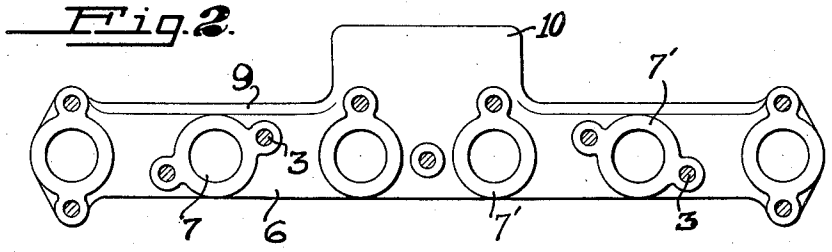
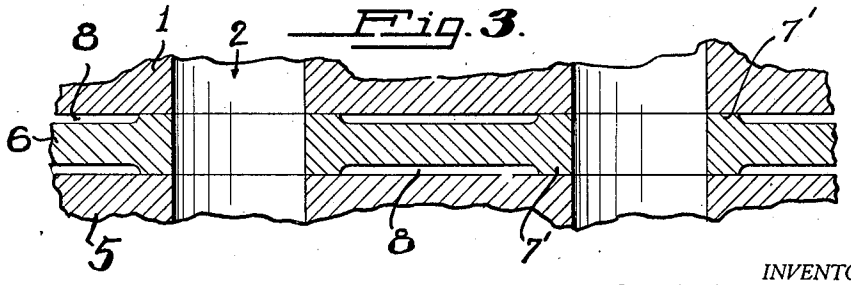



Fig. 3.




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## COOLING MEANS FOR INTERNAL COMBUSTION ENGINES

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8 Claims. (Cl. 123—171)

The present invention relates to improvements in internal combustion engines, and more particularly to improved cooling means therefor.

Considerable difficulty is now experienced in maintaining internal combustion engines of the types used in trucks or other vehicles, and especially the areas around their exhaust ports, at moderate temperatures. Owing to the fact that the constructions now commonly embodied in engines of the internal combustion type, fail to effectively dissipate the heat ordinarily passing with the exhaust gases to the exhaust manifold, excessive heat is built up around the exhaust ports of the cylinder block, thereby lessening the operating efficiency of the engine and the producing of contra stresses within the cylinder block due to the uneven expansion and contraction thereof, the damaging effect frequently being a cracked cylinder. I have found by experimentation that if heat dissipating means is interposed between the exhaust manifold and the cylinder block, the intense heat ordinarily accumulated in the exhaust manifold by the constant flow of exhaust gases is not carried back to the cylinder block where high and excessive temperatures would be built up were it not for the presence of said heat dissipating means. To enable the heat accumulated by the gases of combustion in the exhaust manifold to be readily dissipated without adding to the temperatures ordinarily present in areas in cylinder block around the exhaust ports, I have interposed a specially constructed and designed metal plate of high thermal conductivity, between the cylinder block and the exhaust manifold of an internal combustion engine. The heat present in the cylinder block and in the exhaust-manifold is readily taken up and dissipated by the metal plate, thereby causing the engine to operate more efficiently and without the usual resultant damage to the cylinder block due to overheating.

My invention therefore serves as a cooling means and temperature control for internal combustion motors, and not only prevents the cracking of cylinder blocks due to the uneven distribution of heat, but also permits a greater efficiency to be obtained with a decidedly less fuel consumption.

An object of my invention is to provide an improved construction for internal combustion engines which includes a specially designed thick metal plate of high thermal conductivity interposed between and in contact with the cylinder block of an engine and its exhaust manifold, the said plate constituting a temperature control adapted to readily receive and dissipate into the surrounding air excess heat which is accumulated in the exhaust manifold and in the cylinder block adjacent the exhaust ports.

Other objects more or less apparent will present themselves or will be specifically pointed out in the description to follow.

In the accompanying drawing:

Fig. 1 is a vertical sectional view of a portion of an internal combustion engine taken through one of the exhaust ports, showing a metal plate embodying my invention interposed between the cylinder block and the exhaust manifold;

Fig. 2 is a sectional view taken on the line 2—2 of Fig. 1, showing the plate in elevation; and

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 1.

Referring to the drawing the numeral 1 designates the cylinder block of an internal combustion engine having the usual exhaust ports 2 provided therein through which the burned gases of combustion may escape. Suitably secured as by studs or bolts 3 to the cylinder block, but spaced therefrom, is an exhaust manifold 4 having a number of extensions or manifold pipes 5 thereon which register with the exhaust ports 2. Interposed between and in contact with the exhaust pipes and the cylinder block is a thick metal plate 6 of high thermal conductivity, made preferably by casting copper, zinc, brass or other kinds of heat conducting metal in a suitably shaped mould. The metal plate is preferably made of from a quarter of an inch to one inch in thickness, with suitable port holes 7 being provided therein which register with the openings in the exhaust pipes 5 and the exhaust ports 2. The material in the plate 6 is built up at points around the holes 7 as at 7' so as to provide air channels or passages 8 through which the air may freely circulate for cooling purposes. The air channels 8 are positioned at each side of the plate 6, between the said plate and cylinder block 1 on the one side, and between the said plate and the exhaust manifold on the opposite side. The top edge of the plate is provided with a beveled extension 9 which normally extends outwardly and is spaced from the exhaust manifold 4 and the cylinder block 1. The extension 9 on the plate being normally in the line of travel of the air which is forced backwardly by the motor's fan, serves to quickly dissipate the heat received by the plate from the exhaust manifold and the cylinder block. So as to facilitate a rapid dissipation of the heat from areas near the occurrence of two adjacent exhaust ports,

the plate 6 is provided with an elongated cooling fin 10. At points adjacent the occurrence of two adjacent exhaust ports, whether it be a four, six or eight cylinder motor, the cylinder block and the exhaust manifold become extremely hot, thereby causing an uneven expansion and contraction of the cylinder block, the result frequently being a cracked cylinder. The positioning of the cooling fin 10 at points near the occurrence of two adjacent exhaust ports permits the rapid dissipation of heat from these areas, thereby maintaining the cylinder block and the exhaust manifold at fairly even temperatures. The operation of the motor is considerably more efficient when maintained in a comparatively cool state by the cooling means embodied in my invention, and the damage frequently resulting from the cracking of cylinder blocks is entirely eliminated. The intense heat ordinarily accumulated in the exhaust manifold is taken up and rapidly dissipated by the metal plate 6, thereby preventing additional heat units from being built up in certain areas within the cylinder block.

It is to be understood that my invention may be embodied in other forms or shapes within the spirit of the appended claims.

Having described my invention what I claim is:

1. In an engine of the internal combustion type, a cylinder block having exhaust ports therein, an exhaust manifold secured to the block in spaced relation thereto, an elongated metal plate of high thermal conductivity interposed between and in contact with said block and manifold and provided with openings registering with said exhaust ports.

2. In an engine of the internal combustion type, a cylinder block having exhaust ports therein, an exhaust manifold secured to the block in spaced relation thereto, a metal plate of high thermal conductivity interposed between and in contact with the block and manifold and provided with openings registering with said exhaust ports, the said plate having a projecting fin thereon and spaced from said block and manifold.

3. In an engine of the internal combustion type, a cylinder block having exhaust ports therein, an exhaust manifold secured to the block, and a thick metal plate of high thermal conductivity having openings therein registering with said exhaust ports interposed between the block and the exhaust manifold, the said plate having raised portions on opposite sides which form air channels between the plate and the block on one side and the plate and the exhaust manifold on the other side.

4. In an engine of the internal combustion type, a cylinder block having exhaust ports therein, an exhaust manifold secured to the block in spaced relation thereto, a metal plate of high thermal conductivity interposed between the block and manifold, the said plate having exhaust openings therein registering with said exhaust ports and raised portions on its side which form air channels for the circulation of air between said metal plate and cylinder block.

5. In an engine of the internal combustion type, a cylinder block having exhaust ports therein, an exhaust manifold secured to the block in spaced relation thereto and positioned to receive gases of combustion expelled through the exhaust ports in the block, an elongated metal plate of high thermal conductivity interposed between the block and manifold, the said plate having exhaust openings therein registering with the exhaust ports, and raised portions on a side of the plate at points around said exhaust openings therein, which raised portions provide air channels at the side of the plate for the circulation of air between said metal plate and cylinder block.

6. In an engine of the internal combustion type, a cylinder block having exhaust ports therein, an exhaust manifold secured to the block in spaced relation thereto and positioned to receive gases of combustion expelled through the exhaust ports in the block, an elongated metal plate of high thermal conductivity interposed between the block and manifold, the said plate having exhaust openings therein registering with the exhaust ports, raised portions on both sides of the plate at points around the exhaust openings, the said raised portions providing air channels at the sides of the plate and said block and manifold, and one or more cooling fins extending from a side edge of the plate.

7. In a cooling means to be interposed between the cylinder block and exhaust manifold of an internal combustion engine, consisting of a thick metal plate of high thermal conductivity having a plurality of openings therein, and raised portions on the sides of the plate at points near said openings.

8. In a cooling means to be interposed between the cylinder block and exhaust manifold of an internal combustion engine, consisting of an elongated thick metal plate of high thermal conductivity having a plurality of openings therein, raised portions on the sides of the plate at points around the openings, and cooling fins extending from an edge of the plate.

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