March 1, 1938. R. C. CROSS 2,109,633

INSULATING INTERNAL COMBUSTION ENGINE

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Fig. 1.

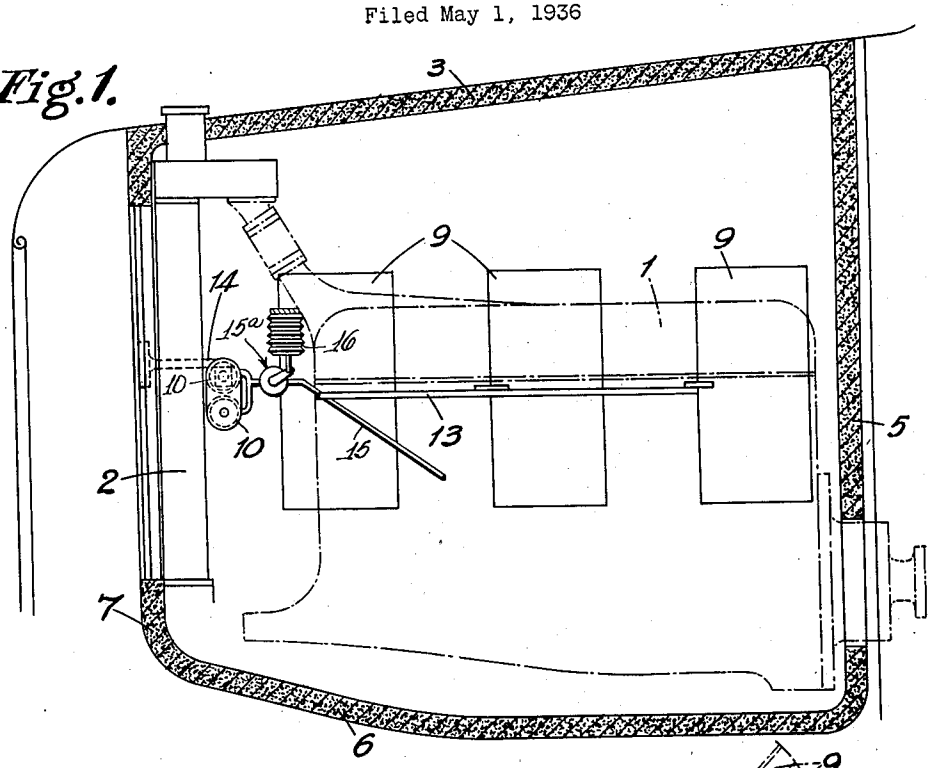
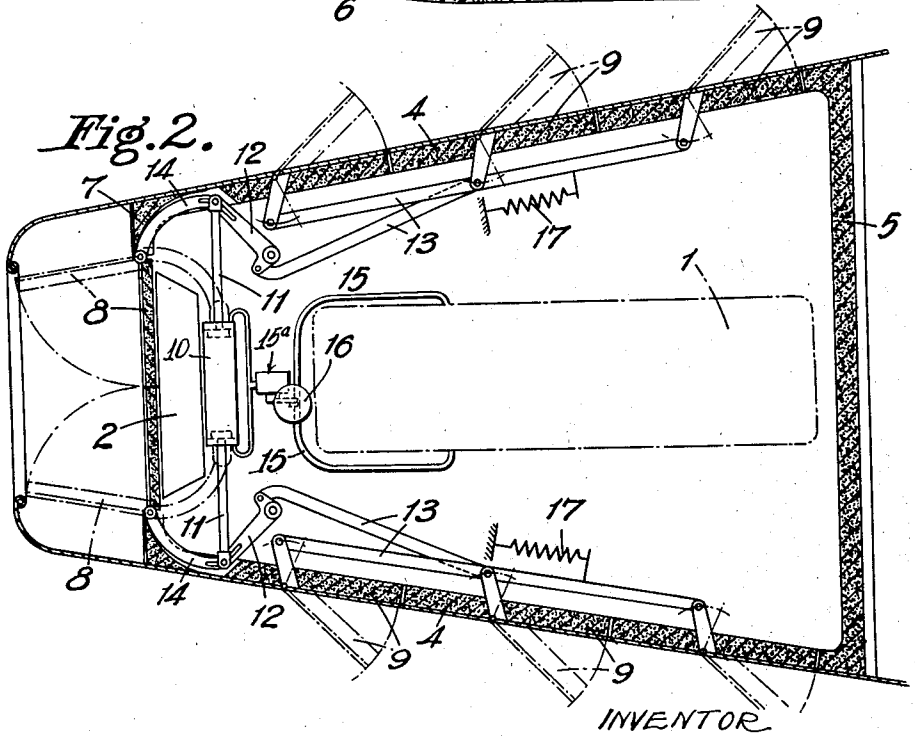


Fig. 2.



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INSULATING INTERNAL COMBUSTION ENGINE

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1 Claim. (Cl. 123—178)

This invention has reference to a means for increasing the efficiency of internal combustion engines, particularly those employed for propelling vehicles.

The average motor car engine is built as a complete unit with the gear box, and the average working temperature of an internal combustion engine is about 80° C. When started from cold it normally takes an engine about 15 minutes to warm up to a temperature suitable for efficient and economical running. Until this temperature is reached the engine will not give full power and will use considerably more fuel than is required for normal running.

The majority of journeys done by a motor car are of a relatively short distance and the engine immediately starts to cool down as soon as it is stopped. On a cold windy day the engine frequently cools off much more quickly than it warms up. This is the main reason why short journeys cause very high fuel consumption.

A further disadvantage to this cooling off is that the engine will not run on the normal carburetter jet setting and some rich mixture device has to be incorporated. As this has to be sufficiently rich to enable the engine to start from cold on a very cold morning, it is usually much richer than necessary even for the warming up period during the first few minutes. This additional richness of the mixture is one of the main contributory causes of cylinder bore wear. Another disadvantage to the exposure of engines to the cooling elements in frosty weather is that the water in the jackets can freeze up and cause great damage to the engine unless some special low freezing point compounds are added to the cooling water. The same problems apply to aero engines in a lesser degree due to the lighter weight for the horse power developed. In war time however the problem of keeping engines warm so as to be ready for sudden attack is a very difficult one.

The difficulty of controlling the temperature of the engine during running has been overcome to some extent by the use of thermostatically controlled shutters on the radiator, which open as the heating of the engine increases, but there is no certain regulation maintaining an optimum temperature for all phases of working, owing to the engine being generally accessible to the atmosphere at other points.

The object of this invention is to overcome the disadvantages above referred to by so insulating the engine from the cooling elements that when not working very little heat is allowed to escape so that the engine will continue to remain warm and be ready for developing full power when started up, whereas when the engine is running, excess heat is dissipated to an extent that a controlled cooling is effected which enables the temperature to be maintained much nearer the optimum during all the working phases.

In carrying out this object the said invention resides essentially in a means for improving the efficiency of internal combustion or other engines by controlling the working temperature which consists in completely insulating the engine so that it is wholly encased within a heat retaining chamber, and in introducing a stream of air to dissipate any heat generated within the chamber during engine running, exceeding a predetermined working temperature.

The particular adaptation of the invention provides an internal combustion engine wherein the engine unit is completely enclosed top, bottom and sides within a heat insulating jacket having shutter controlled air inlets and outlets by which a controlled stream of air can pass continuously through the jacket when the engine is running.

In order to insulate the engine however it must be done so as not to interfere with its accessibility, and the insulating material—which may, for example, consist of silica wool—will be so arranged as to be very readily removable and in the case of a motor car engine it can be so arranged that some insulating material is fastened to the interior of the bonnet so that when the bonnet is lifted the insulating material is automatically removed. The radiator of the car would be similarly insulated and only exposed to air flow when the vehicle is in motion or when otherwise developing power. For example, the radiator shutters may be made from a heat insulating material and adapted to open under thermostatic control when the predetermined temperature is attained and/or when the accelerator pedal is depressed.

At a suitable position in the other parts of the insulating jacket—which will include a heat insulated wall underneath the sump, at the sides, and vertically in rear of the engine with an opening for the propeller shaft—will be the shutter controlled outlets which will be connected to work in unison with the heat insulated radiator shutters so that the draft of cooling air can be regulated to give the required degree of heat dissipation.

The invention also applies to direct air cooled engines or to liquid cooled engines of a type wherein the jacket is provided with cooling fins or other projections. The insulating jacket can sur-

round the engine in the same way as with a water cooled engine, allowing air to pass between the insulating jacket and the engine when the vehicle is in motion.

In order that the invention may be readily understood, reference will now be made to the accompanying diagrammatic drawing, showing by way of example, one embodiment as applied to a motor car engine.

In the drawing:

Figure 1 is a side elevation in section, and

Figure 2 is a sectional plan.

In effect, according to the invention, the engine 1 is placed in a box of insulating material which also encloses the radiator 2. This box comprises a top 3, side walls 4, which may be hinged to lift after the manner of an ordinary bonnet, a rear side wall 5, a bottom or floor 6, and a front wall 7 having an air inlet which is controlled by heat insulating radiator shutters 8 which open when the engine is performing.

Air is permitted to flow out from the heat insulating chamber thus formed by means of further insulated shutters 9 which operate in sympathy with the front shutters; such controlled outlets are shown formed in the side walls 4 but instead of or in addition to these side shutters, one or more heat insulated shutters may be provided in the floor 6 which comes underneath the sump.

In utilizing a thermostatic control for the opening and closing of the shutters, it is preferred to employ the thermostat as a relay controlling the operation of power means which effect the actual movement of the shutters. To this end the invention may employ a power means actuated by a fluid medium the supply of which is controlled by a valve operable by the thermostat. In the drawing the oil pressure of the engine is utilized for this purpose and there is provided a pair of oil cylinders 10, 10 in which work a pair of pistons having their rods 11 connected by bell cranks 12 and linkage 13 to the side shutters 9 and by levers 14 to the radiator shutters 8, so that when the oil is supplied to the rear of the pistons they are forced inwardly and thereby cause the shutters to open as indicated by the chain dot lines. Oil from the lubricating system is supplied through pipes 15 via a valve 15a which is opened and closed by a thermostat 16 which at a predetermined temperature after a certain amount of air heating has occurred after starting, will open the valve to allow the oil pressure to act, the degree of opening being varied by the thermostat altering the amount of opening of the valve according to the amount of excess heat generated so that an optimum temperature of the air in the jacket is maintained during all working conditions. When the engine stops and the oil pressure sinks to zero, the shutters will be closed by springs 17 normally acting against the oil pressure.

Among the many advantages of the present invention may be mentioned that it provides a satisfactory means of insulating the engine's heat from the seating compartment during summer conditions, whilst in winter the heat generated in the jacket can be easily utilized to warm the interior of the vehicle.

As a modification, to improve the heat insulating of the engine it would be possible to put additional insulating panels on various parts of the engine itself as there are numerous surfaces which can dissipate heat but which if covered would not interfere with accessibility or running adjustments.

I claim:

In combination with an internal combustion engine having a pressure lubricating system, a thermal insulating jacket completely enclosing said engine, said jacket having openings for the inlet and the outlet of engine cooling air into and from said jacket, shutters adjustable to regulate the effective sizes of said openings, operating means for said shutters including a cylinder and a piston reciprocable therein a connection between the lubricating system of the engine and said cylinder, a valve in said connection, and a thermostat within said jacket and connected with said valve for opening and closing same responsive to changes in temperature of air within the jacket, thereby to control operation of said shutter operating means.

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