

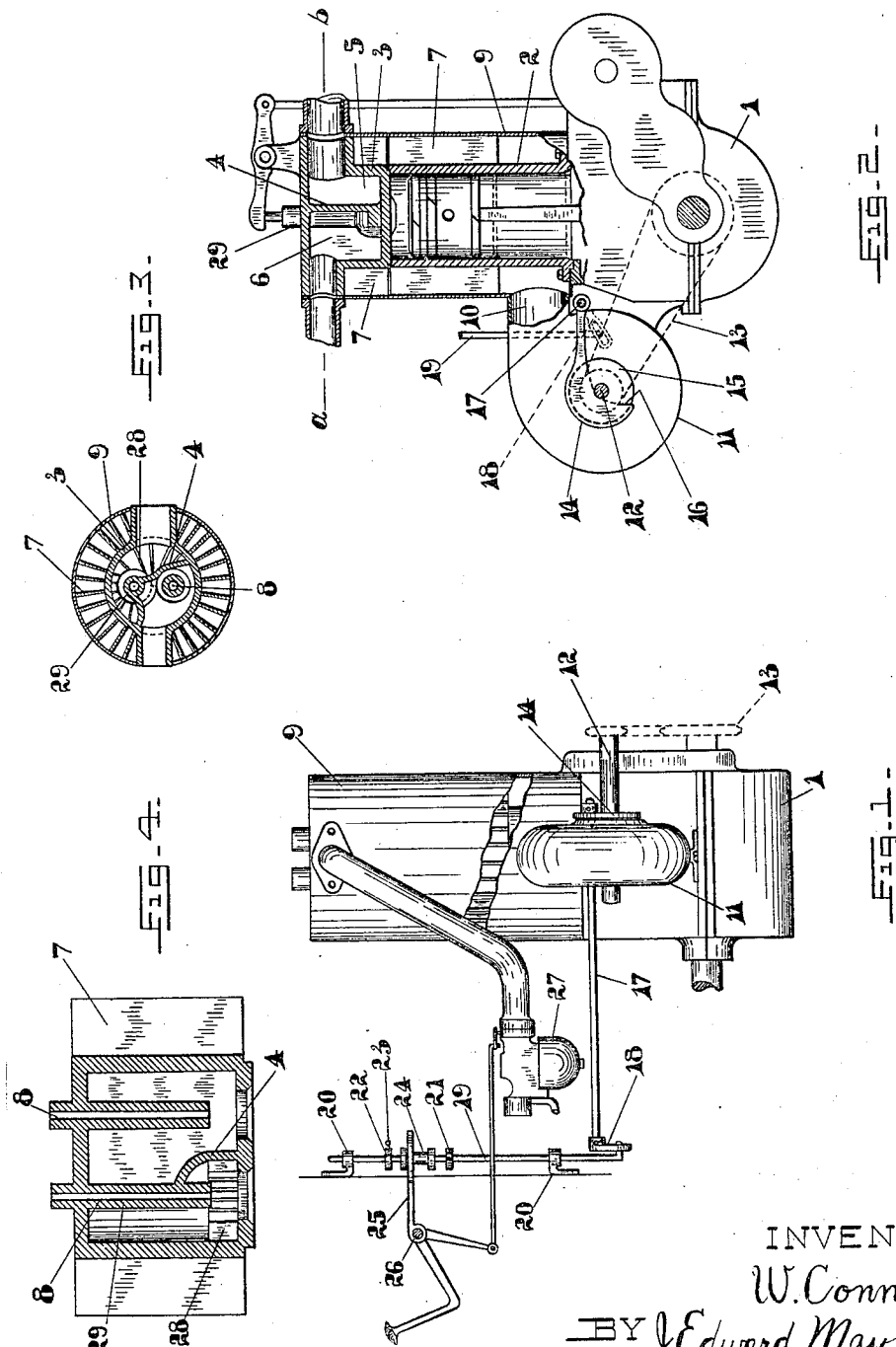
April 22, 1924.

1,491,584

W. CONNOR

AIR COOLED INTERNAL COMBUSTION MOTOR

Filed April 4, 1922



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AIR-COOLED INTERNAL-COMBUSTION MOTOR.

Application filed April 4, 1922. Serial No. 549,505.

To all who it may concern:

Be it known that I, WALTER CONNOR, of the city of Windsor, in the county of Essex, Province of Ontario, Canada, a subject of the King of Great Britain, have invented certain new and useful Improvements in Air-Cooled Internal-Combustion Motors, of which the following is a specification.

This invention relates to motors which are cooled by the passage of air over the surface of the parts thereof which become heated while the motor is in operation.

It is well recognized that it is desirable that the cooling should not be carried to such an extent as to lower the thermal efficiency of the motor, and also that the extent of the cooling should be regulable in accordance with the load and therefore the fuel consumption of the motor, and my object therefore is to devise efficient means for cooling the engine by air and to provide means for automatically regulating the degree of cooling in accordance with the fuel consumption.

I attain my object by means of the constructions hereinafter described and illustrated in the accompanying drawings in which—

Fig. 1 is a side elevation of an internal combustion motor constructed in accordance with my invention;

Fig. 2 an end view, partly in section of the same;

Fig. 3 a cross section on the line *a—b* in Fig. 2 of the cylinder of the motor; and

Fig. 4 a sectional detail on a larger scale of the cylinder taken in a plane at right angles to Fig. 1.

In the drawings like numerals of reference indicate corresponding parts in the different figures.

While the invention is shown in Fig. 1 as applied to a single cylinder motor, it will be understood, of course, that it is equally applicable to multi-cylinder motors.

1 is the crank case of the motor, to which the cylinder 2 is connected in any ordinary manner. To the upper end of the cylinder is connected a valve casing 3, which is divided by a partition 4 into an exhaust chamber 5 and an inlet chamber 6. With these chambers will connect the usual intake and exhaust manifolds.

Both the cylinder walls and the walls of the valve casings are provided with longitudinal radial fins or ribs 7. These may

either be cast integral with the walls and of the same material as the walls, but are preferably formed of sheet steel and have their inner edges cast into the walls of the cylinder and valve casings. The ribs of the valve casing will, of course, be separate from those of the cylinder as the valve casing is removable.

The valve casing is provided with long bearings 8 for the valve stems. Surrounding the cylinder, the valve casing and the ribs is a casing 9 which preferably fits close to the outer edges of the ribs. This casing is open at the upper end or is otherwise provided with an exit for air. The lower end of the casing is closed save for an inlet opening communicating with the discharge outlet 10 of a rotary air pump 11. This air pump is driven by a shaft 12 driven in any suitable manner from the crank shaft of the motor, as, for example, by the sprocket gearing 13. This air pump is provided with a shutter 14 adapted to regulate the inflow of air through the eye or inlet opening 15 of the air pump. This shutter is preferably formed as a plate with a concavely curved forward edge 16 and is pivoted at 17 to the fan casing or other stationary part. This shutter will never be entirely closed, preferably at any time leaving about half the area of the inlet opening 15 uncovered, while it may be swung to completely uncover said inlet opening. The pivot of this shutter is preferably formed as a spindle journaled in the fan casing and having a rock arm 18 secured thereto by means of which the shutter may be actuated from any part of any suitable mechanism adapted to control the throttle opening of the carburettor or other fuel supplying attachment of the motor.

I preferably employ to actuate the shutter a rod 19 slidably supported in lugs 20. On the rod is secured a fixed collar 21 and an adjustable collar 22, which may be moved along the rod and clamped in position by a set screw 23. Between these collars plays a sliding spool 24 which is movable by means of a rock arm 25 secured to a shaft 26 which is a shaft movable to control the throttle of the carburettor 27.

By adjusting the collar 22 any desired amount of lost motion may be provided in the shutter operating connections so that the movements of the shutter lag behind the movements of the throttle. It will be noted,

however, that if the throttle be opened widely, the shutter will be moved substantially to the wide open position, while when the throttle is moved towards the closed position the shutter will be moved to a predetermined position cutting down the air to a predetermined minimum.

By adjusting the collar 22, the opening of the shutter may be adjusted to suit differences in climatic conditions which may require the motor to be cooled to a greater or less degree.

It will be noted that the floor of the exhaust chamber is provided with ribs 28 which are in conducting contact or connection with the floor of the chamber and the outer wall thereof. These ribs are effective in conducting heat to the outer walls for radiation therefrom or for conduction to the fins or ribs. The exhaust valve stem guide 29 is exposed as will be seen on reference to Figs. 3 and 4 to the cooling action of the entering charge.

From the above description it will be seen that the combustion chamber of the cylinder is cooled first by the incoming charge, second by the expansion of the exhaust gases in the exhaust chamber, third by the division wall between the inlet and exhaust chambers and the ribs which conduct the heat to the outside wall of the exhaust chamber, and fourth, by the radiation from the external fins and ribs over which the current of air from the fan passes.

As there are no moving parts in the cylinder head requiring lubrication, and the walls of the combustion chamber, cylinder head and valve casing are practically of equal thickness, the motor may be run at a much higher cylinder temperature than would otherwise be practicable, and this temperature is not under normal conditions liable to be exceeded owing to the property of metals radiating heat very much faster at high temperature than at low, and also owing to the fact that the amount of cooling air passed over the fins or ribs is varied in accordance with the fuel consumption of the motor.

It will also be noted that the cooling air is forced in by the fan at the top of the crank case which is thus effectively cooled. This is a feature of considerable practical importance as in some air cooled engines much trouble is caused by the unequal heating of the crank case, overheating of the top

part having a tendency to warp the crank shaft bearings in the lower part. Another feature of importance in my construction is the arrangement whereby the exhaust valve stem guide is surrounded by the cool incoming charge. This prevents the overheating and consequently very considerable expansion of the valve stem which affects the time of opening and closing of the valve which in turn detrimentally affects the running of the engine.

What I claim as my invention is:—

1. In an internal combustion motor the combination of a cylinder; a valve casing at the end of the cylinder provided with an exhaust expansion chamber, a plurality of thin ribs connected with the cylinder and the valve casing; and ribs in conductive connection with the inner surface of the bottom of the exhaust expansion chamber and the inner surface of the outer wall thereof.

2. In an internal combustion motor, the combination of a cylinder; a valve casing at the end of the cylinder provided with an exhaust expansion chamber and a mixture inlet chamber side by side; valve stem guides each exposed to the interior of the inlet chamber; and a plurality of thin ribs connected with the cylinder and the valve casing.

3. In an internal combustion motor, the combination of a cylinder; a valve casing at the end of the cylinder containing inlet and exhaust chambers having a common inner wall; valve stem guides each exposed to the interior of the inlet chamber, the exhaust valve guide being formed in said common wall; and a plurality of thin ribs connected with the cylinder and the valve casing.

4. In an internal combustion motor, the combination of a cylinder; a valve casing at the end of the cylinder containing inlet and exhaust chambers having a common inner wall; valve stem guides each exposed to the interior of the inlet chamber, the exhaust valve guide being formed in said common wall; and a plurality of thin longitudinal ribs connected with the exterior walls of the valve casing and cylinder.

Signed at Windsor, Ontario, Canada, this 15th day of March, 1922.

WALTER CONNOR.

Witnesses:

YVONNE HAMEL,
MAUD LYONS.