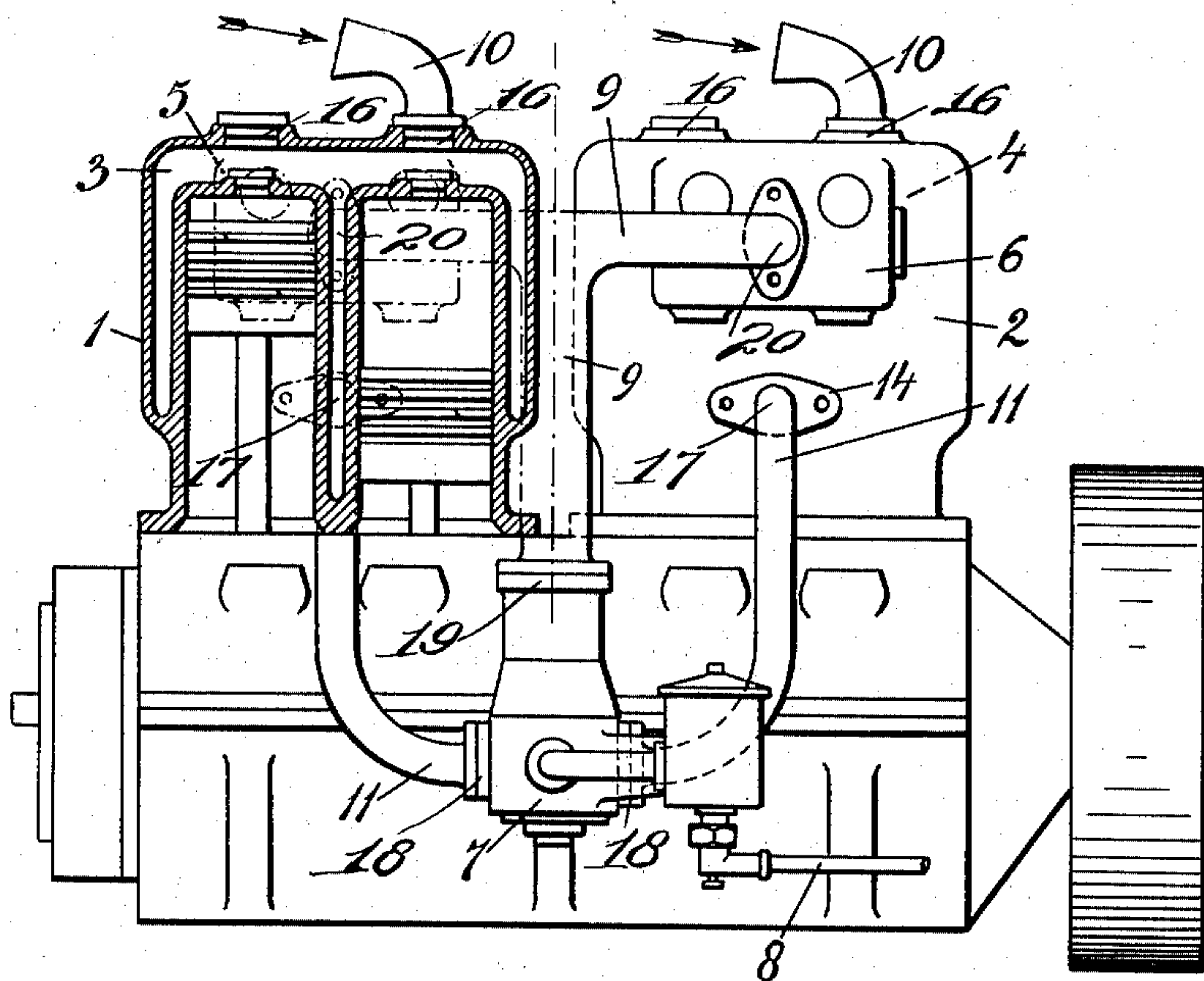


L. DURAND.  
 MEANS FOR COOLING THE CYLINDERS OF INTERNAL COMBUSTION ENGINES.  
 APPLICATION FILED SEPT. 23, 1907.

967,117.

Patented Aug. 9, 1910.



Witnesses

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# UNITED STATES PATENT OFFICE.

LEOPOLD DURAND, OF PARIS, FRANCE, ASSIGNOR OF ONE-HALF TO RUDOLF AUGUST LOUIS LEHMANN, OF LONDON, ENGLAND.

MEANS FOR COOLING THE CYLINDERS OF INTERNAL-COMBUSTION ENGINES.

967,117.

Specification of Letters Patent.

Patented Aug. 9, 1910.

Application filed September 23, 1907. Serial No. 394,172.

*To all whom it may concern:*

Be it known that I, LEOPOLD DURAND, a citizen of the French Republic, residing at No. 25 Rue Quersant, Paris, in the Republic of France, have invented certain new and useful Improved Means for Cooling the Cylinders of Internal-Combustion Engines, of which the following is a specification.

The present invention relates to means for cooling the cylinders of internal combustion engines, and it comprehends a construction wherein the cylinders are cooled by passing the air required for the carbureting first through the cylinder jacket and then to the carbureter.

A structural embodiment of the invention is illustrated in the accompanying drawing, wherein the figure is a side elevation, with parts in section, of the improved engine.

The engine shown is of the four-cylinder type, and consists of two groups or sets 1, 2 of cylinders, the cylinders being cast in pairs. These groups are provided with separate cooling jackets 3, 4 and with separate admission valve casings 5, 6. A single carbureter 7 is employed for both groups, and is shown as mounted on or attached to the base or crank casing, 8 being the supply pipe for the petrol or other liquid. From the carbureter, there extends an admission pipe 9 which divides into branches leading to the admission valve casings, the outer ends of the branches being fitted in inlet apertures 20 provided in said casings. The cylinder jackets are each provided with a pair of admission apertures 16, one aperture of each pair being closed, while the other has a bent funnel-shaped air inlet pipe 10 fitted therein. The carbureter is provided with an exhaust aperture 19 to which the lower end of the stem of pipe 9 connects, and, in addition, with a pair of lateral admission apertures 18, the last-mentioned apertures having connected thereto the lower ends of a pair of upwardly bent air pipes 11. Each pipe 11 connects at its upper end with a lower admission aperture 17 of the adjacent cooling jacket, and is provided for that purpose with a flange 14.

In operation, air is drawn into the two

cooling jackets through the pipes 10, and after circulating through said jackets is lead from the same to the carbureter by way of the pipes 11, the air cooling the jackets during its passage therethrough, and being itself heated at such time. The gaseous mixture passes up from the carbureter through the admission pipe 9 to the two valve casings 5, 6, whence it is conveyed to the cylinders in the usual manner.

It has been found that with pipes of sufficient sectional area, no overheating of the cylinder heads takes place, but it is advisable in applying the above-described arrangement to engines for motor cars or the like to dispose the sloping funnel-shaped air inlet pipes in the direction of motion, and to provide them with a strainer. The suction effect of the pistons will obviously cause a uniform flow of the air through the cooling jackets, *i. e.*, in the same manner as the cooling water in an ordinary circulation pump arrangement, and the movement of the volume of air will be the more regular as the speed of the pistons increases. It is also evident that by baffling the interior of the jackets in some manner, the air will be compelled to traverse a longer course, whereby the cooling effect will be increased.

While the drawing, as above stated, shows a four-cylinder engine, the connections for a lesser number of cylinders will be obvious, and a greater number may, of course, be equally well arranged for.

I claim as my invention:—

In a combustion engine, the combination of a plurality of groups of cylinders; a separate cooling jacket for each group having an air admission device leading directly thereinto, and having also an outlet aperture; a valve casing connected to each jacket and provided with an inlet aperture, each cylinder of each group having an admission valve for the charge arranged within the corresponding casing; a single carbureter for all of said groups provided with inlet and outlet apertures; a plurality of separate pipes located exteriorly of said jackets and connecting the outlet apertures of the same with the inlet apertures of the carbureter,



for supplying air to the latter after it has circulated through said jackets; and a branch pipe having its stem opening into the outlet aperture of said carbureter and its  
5 branches opening into the inlet apertures in said casings, for supplying the charge to said valves.

In testimony whereof I have hereunto set

my hand in presence of the subscribing witnesses.

LEOPOLD DURAND.

Witnesses:

DEAN B. MASON,  
GEORGE E. LIGHT,  
RUDOLF A. L. LEHMANN.