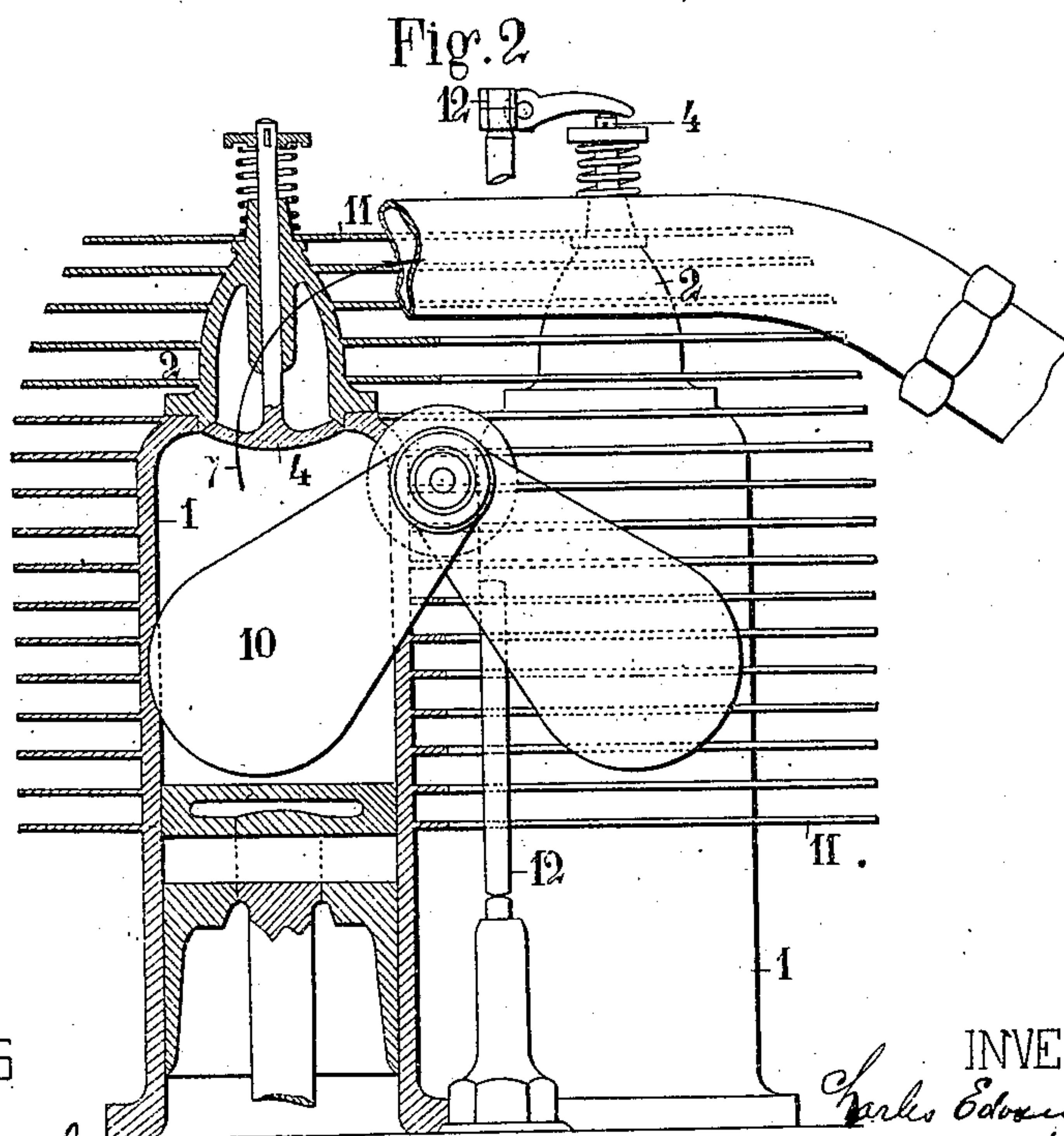
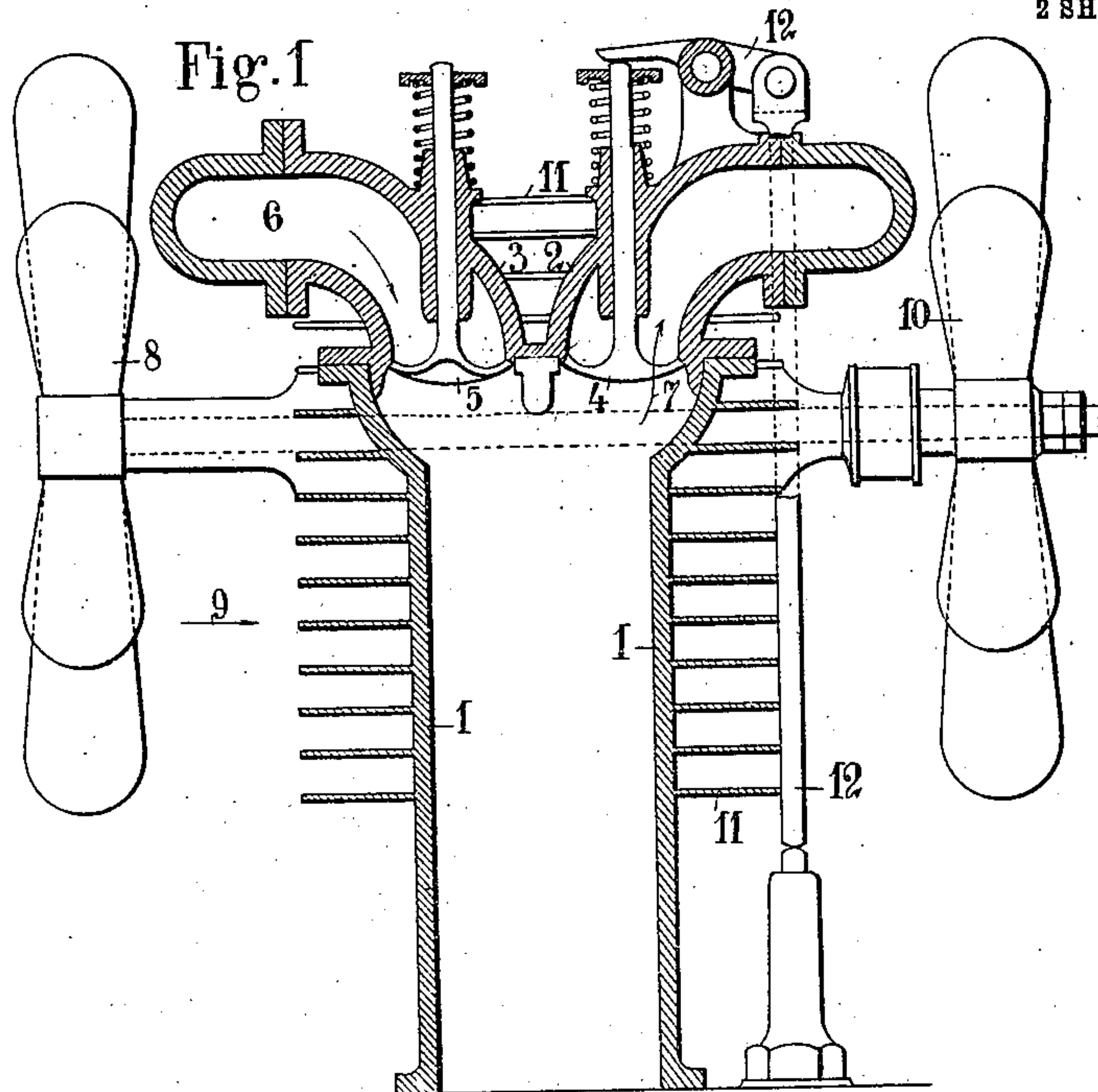


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APPLICATION FILED JUNE 30, 1908.

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Patented Mar. 8, 1910.

2 SHEETS—SHEET 1.



WITNESSES

Frank H. Sweeney  
Joseph E. Cavanaugh

INVENTOR

Charles Edward  
Henriod

BY

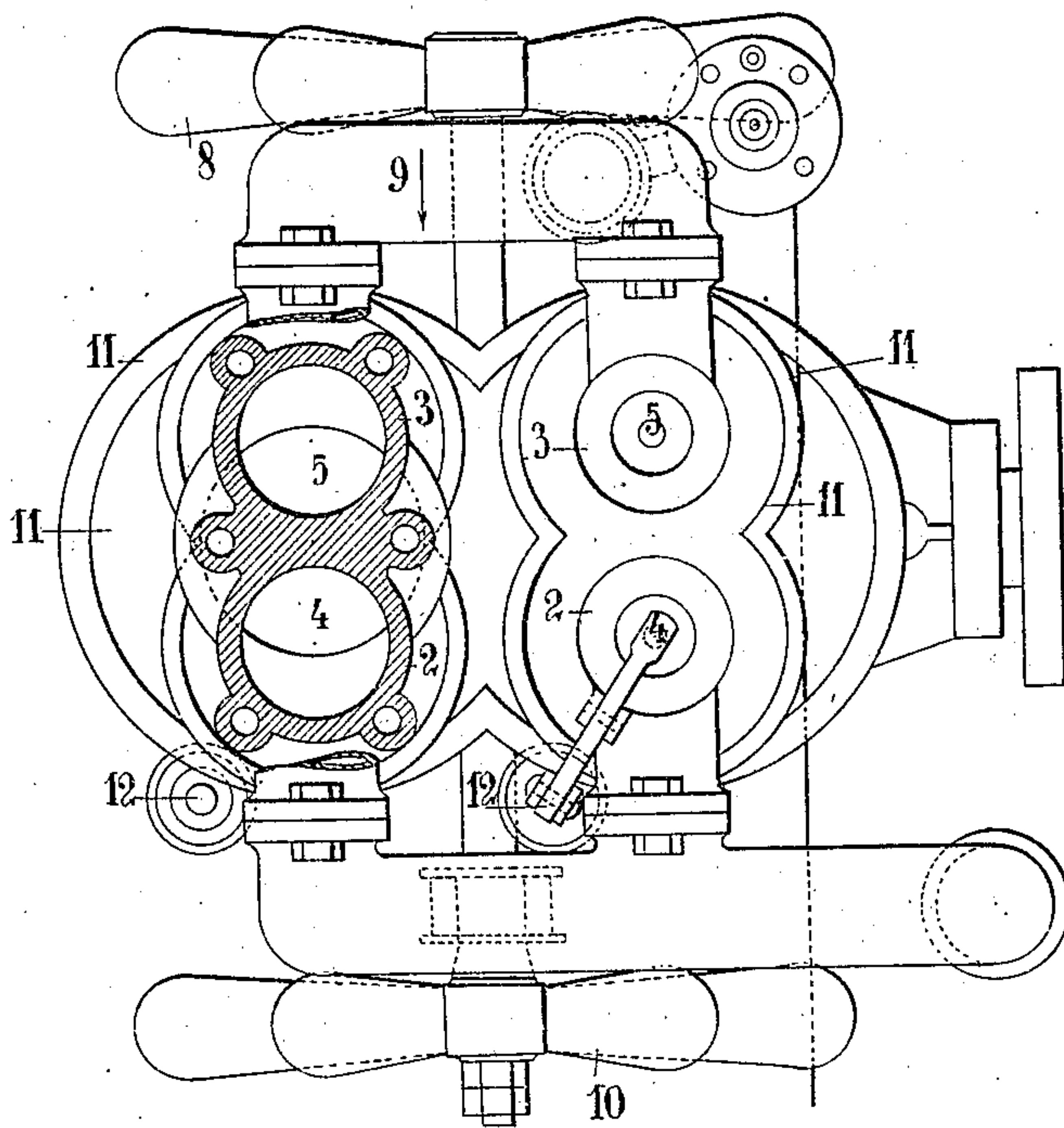
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Fig. 3



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# UNITED STATES PATENT OFFICE.

CHARLES EDOUARD HENRIOD, OF NEUILLY-SUR-SEINE, FRANCE.

COMBUSTION-ENGINE.

951,117.

Specification of Letters Patent.

Patented Mar. 8, 1910.

Application filed June 30, 1908. Serial No. 441,208.

*To all whom it may concern:*

Be it known that I, CHARLES EDOUARD HENRIOD, a citizen of the Swiss Republic, and resident of Neuilly-sur-Seine, France, have invented a new and useful Combustion-Engine, which is fully set forth in the following specification.

This invention has for its object to obviate the necessity for the use of water for cooling cylinders of internal combustion engines.

The characteristic feature of this invention consists in the arrangement of valves relatively to the cylinder.

For facilitating the control of the valves and the arrangement of water chambers in existing engines, the valves are always arranged at the side of the cylinders, and the result is that between the cylinders and the exhaust valve for the burned gases, there is a conduit in which the said gases are compressed at the moment of their escape. Heating results from this fact. In the new construction the two valves are in contact with the cylinder. Fresh gases are admitted through one of the valves, and the combustion gases escape through the other. The latter which necessarily becomes hot, takes advantage of the cooling of the inlet valve, as the said valves are connected together by metal cooled by a special arrangement of two fans arranged at each side of the cylinder or cylinders. One of the fans is more powerful than the other, in order to absorb the speed acquired by the current of air from the first, said current of air being stopped by contact with the cylinders.

The arrangement of the cylinder valves and of the two fans is illustrated, by way of example, in the accompanying drawings, in which:—

Figure 1 is a sectional end elevation of a cylinder of a two-cylinder engine for instance. Fig. 2 is an elevation of a group of two cylinders, the left hand one being shown in section. Fig. 3 is a plan, one of the cylinders having its valves removed.

1 represents the cylinder, 2 the portion of the casing for the exhaust valve, 3 the casing for the gas-inlet valve, 4 the controlled valve for the exhaust of the gases, 5 the automatic valve or a valve which can be controlled by the admission of the gases. These valves are made of a special shape, so as to do away with any resistance at the

inlet and at the outlet of the gases from the cylinder.

6 is an arrow indicating the admission of the gases. 7 an arrow indicating the direction of the escape of the combustion gases for the exhaust and their direct line.

8 is the first fan drawing in fresh air in order to force it through and against the metal parts constituting the cylinder and the valve seats, in the direction of the arrow 9.

10 is the second fan drawing in the heat produced by the heating of the metal walls and driving the said air away from the engine more quickly than if the fan 8 was used alone.

The air current discharged by the fan 8 is discharged against and exercises a cooling effect on the cylinder, but the said air having become heated and stopped in its movement, must be impelled afresh, that being the reason why a second fan is used which drives the said hot air away from the engine.

11 is a metal blade made in one piece with the cylinders and the valve supports, in order to increase the area in contact with the air-currents.

12 is the valve gear.

The operation will be clearly understood from the drawings. The gases are drawn through the valve conduit 5 behind the first fan and in front of the exhaust valve which is that which becomes hot.

Owing to the speed of the gases passing through the valve 5, all the metal parts surrounding the same are already cooled. A portion of the said temperature is, therefore, communicated, on the one hand, by the conductivity of the metals, to the metal walls of the exhaust valve chamber and cools them, and on the other hand the current of air from the fan 8 becomes cooled in contact with the metal which constitutes the inlet valve and valve chamber for the admission of the gases, this air being driven against the metal of the walls constituting the means required for the escape of the combustion gases. The fresh air current becomes heated by contact with the latter elements, but is drawn away by the second fan. On the other hand, by means of this arrangement, the combustion gases do not meet any obstacle to their escape from the cylinders and escape in a straight line in accordance with the arrow 7.

## Claim.

In a combustion engine, an admission valve and an exhaust valve arranged in direct contact with the cylinder and at the side of one another, metal ribs connecting their casings together to increase the area of contact between the two valves, and two fans having a common axis and supported from the cylinder so that one operates in front of the admission valve and the other

in front of the exhaust valve for the purpose set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

CHARLES EDOUARD HENRIOD.

Witnesses:

EMILE LEDRET,  
H. C. COXE.