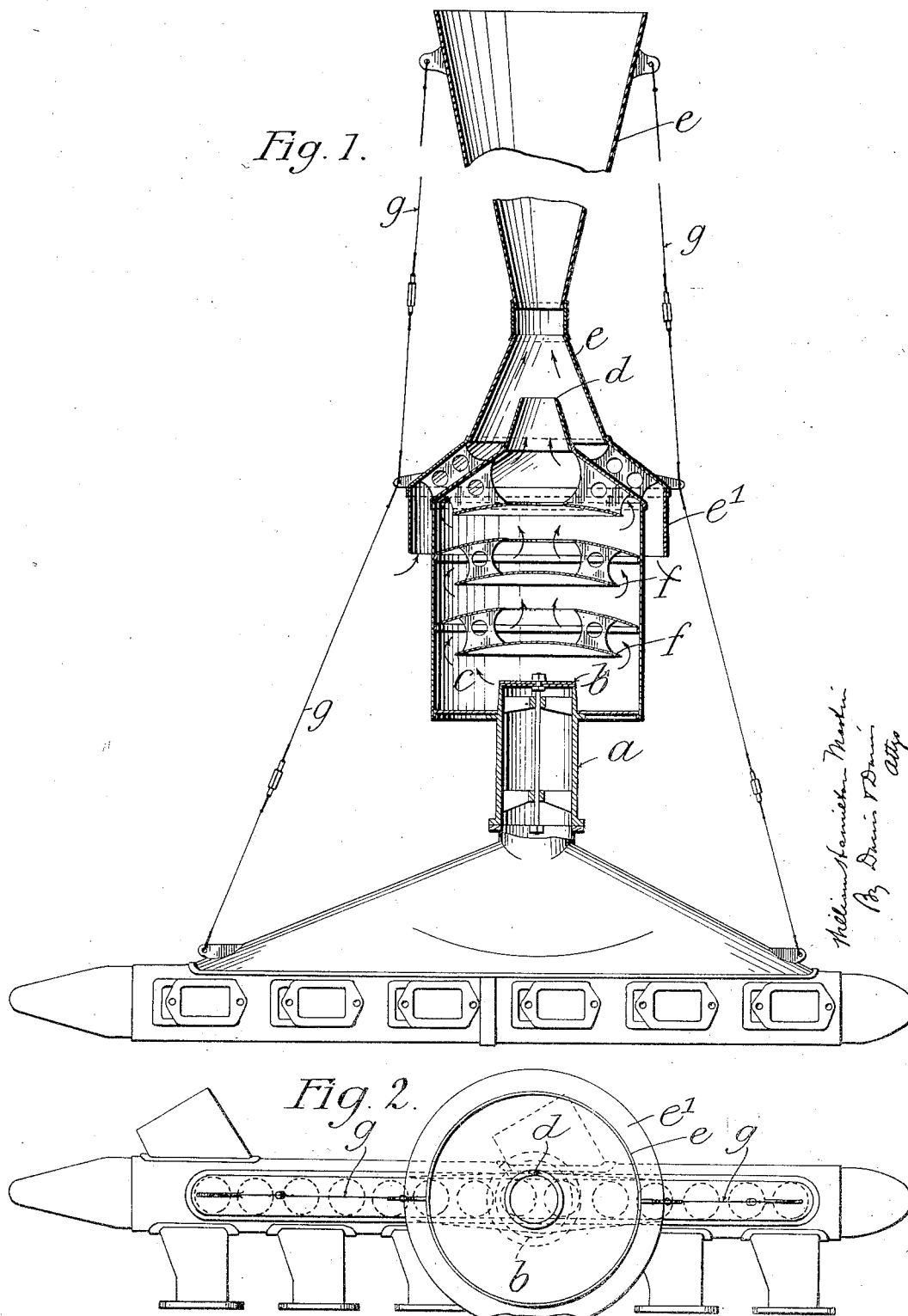


W. H. MARTIN.
EXHAUST SILENCER FOR INTERNAL COMBUSTION ENGINES.
APPLICATION FILED NOV. 5, 1919.

1,342,340.

Patented June 1, 1920.



UNITED STATES PATENT OFFICE.

WILLIAM HAMILTON MARTIN, OF FLUSHING, NETHERLANDS.

EXHAUST-SILENCER FOR INTERNAL-COMBUSTION ENGINES.

1,342,340.

Specification of Letters Patent.

Patented June 1, 1920.

Application filed November 5, 1919. Serial No. 335,858.

To all whom it may concern:

Be it known that I, WILLIAM HAMILTON MARTIN, a subject of the Queen of the Netherlands, residing at Flushing, Netherlands, have invented Improvements in Exhaust-Silencers for Internal-Combustion Engines, of which the following is a specification.

The usually employed types of exhaust silencers set up considerable back pressure and are therefore not used when the maximum power of an internal combustion engine is required, for instance in the case of an aeroplane engine.

Now the object of the present invention is to provide an exhaust silencer which, while being capable of being made of light weight, will enable the noise of the exhaust to be very much reduced without involving the above mentioned disadvantage.

A silencer according to this invention comprises a chamber to which the exhaust gases are admitted through a light valve or valves of large area a single discharge nozzle from this chamber, and an unobstructed combining double cone surrounding the discharge nozzle and open at its rear to the atmosphere, the forward or discharge part of the cone extending with gradually increasing diameter for a considerable distance. The lift of the inlet valve to the chamber automatically adjusts itself to suit the volume of the gases being exhausted and thereby maintains the velocity of the latter substantially constant. In the chamber referred to baffle plates are preferably arranged so as to prevent direct flow from the valved inlet to the discharge nozzle but they should be so arranged that the gases have ample room to pass them.

With such an arrangement the energy of the exhaust gases is used up ejectorwise to put in motion a comparatively large quantity of air which acts to cool the gases, the combined stream of gas and air gradually expanding in the forward part of the combining tube to substantially atmospheric pressure.

As will be understood the construction and arrangement may be variously modified. Thus in the case of an aeroplane engine only the parts mentioned would be employed and would be constructed of light material.

The accompanying drawings illustrate such a silencer for an aeroplane engine,

Figure 1 being a section and Fig. 2 an end view.

In this arrangement the silencer is applied to an exhaust manifold by pipe *a* fitted with a light valve *b* and opening in to a chamber *c* the remote end of which is coned and formed with a discharge nozzle *d*. Surrounding the nozzle *d* is a combining double cone *e* the rear portion of which is enlarged as shown and provided with a curtain *e'* between which and the wall of the chamber *c* air gains free access to the double cone *e*, and the front portion is extended a considerable distance with gradually increasing area; in the example the larger end of the forward part of the cone is approximately of the same cross sectional area as the chamber *d*.

f, f are baffle plates so arranged as to direct the gases through the chamber *c* alternately toward the wall and toward the center as indicated by the arrows. *g, g* are wire stays holding the silencer in position.

The silencer of an aeroplane may be arranged horizontally and the exposed parts may be of such stream line formation as may be required.

In the case of a marine engine, the silencer might be arranged within the base of a funnel the top of which is provided with a series of annular louvers adapted to direct any water that may enter into a central vertical pipe passing through the silencer to the bilges, said pipe if desired, serving to carry the baffle plates *f* in the chamber *c* of the silencer, the base of which may rest upon the deck and be lagged with non-conducting material. The lower part of the cone may be extended down to the deck to serve as a casing to the chamber and be formed with suitable air inlet apertures, the said casing being preferably in communication with the engine room and the exhaust gases then assist in the ventilation of the engine room by drawing warm air therefrom. I am aware that it has been proposed to construct an exhaust silencer comprising a compartmental casing containing baffling devices and fitted with air admission openings, and to arrange between two of the compartments a dividing wall or partition provided with a number of tubes or nozzles for delivering exhaust gases from one compartment to the other the tubes or nozzles being adapted to retard back flow of the exhaust gases, and a flap valve

through which the exhaust gases are admitted, serving to prevent back flow of same. It has also been proposed to utilize the exhaust gases of internal combustion engines for inducing air currents through or over a radiator or the like by causing the said gases to flow through a nozzle into a chamber having converging sides and communicating with a shell or casing wholly or partially around the said cooling radiator or the like, and with a tube having diverging sides.

What I claim is:—

1. An exhaust silencer comprising a casing contracted at one end to form a sharply converging discharge nozzle, an unobstructed converging and diverging combining tube the converging portion whereof forms with the nozzle aforesaid an annular duct to which air has access uniformly around the casing, and valve means of large area at the end of the casing opposite to the nozzle adapted to open automatically to an extent to suit the volume of gases being exhausted and thereby maintain the velocity of the latter substantially constant.

2. An exhaust silencer comprising a casing contracted at one end to form a sharply converging discharge nozzle, a gas inlet at the opposite end of the casing, a system of baffles in the casing adapted to cause entering gases to pass alternately toward the wall and toward the center of the casing, and an unobstructed converging and diverging combining tube, the converging portion whereof forms with the nozzle aforesaid an annular duct to which air has access uniformly around the casing.

3. An exhaust silencer comprising a casing contracted at one end to form a sharply converging discharge nozzle, a gas inlet at the opposite end of the casing, a system of baffles in the casing adapted to cause entering gases to pass alternately toward the wall and toward the center of the casing, an unobstructed converging and diverging combining tube, the converging portion whereof forms with the nozzle aforesaid an annular duct to which air has access uniformly around the casing and valve means of large area at the gas inlet of the casing adapted to open automatically to an extent to suit the volume of gases being exhausted and thereby maintain the velocity of the latter substantially constant.

4. An exhaust silencer comprising a casing contracted at one end to form a sharply converging discharge nozzle, a gas inlet at the opposite end of the casing, a system of baffles in the casing adapted to cause entering gases to pass alternately toward the wall and toward the center of the casing, an unobstructed converging and diverging combining tube, the converging portion whereof forms with the nozzle aforesaid an annular duct to which air has access uniformly around the casing and a gravity closing lift valve of large area at the gas inlet of the casing adapted to open automatically to an extent to suit the volume of gases being exhausted and thereby maintain the velocity of the latter substantially constant.

Signed at London, England, this 17th day of October, 1919.

WILLIAM HAMILTON MARTIN.