March 1, 1938. J. HAWLE 2,109,995

SILENCER FOR INTERNAL COMBUSTION ENGINES

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Fig.1.

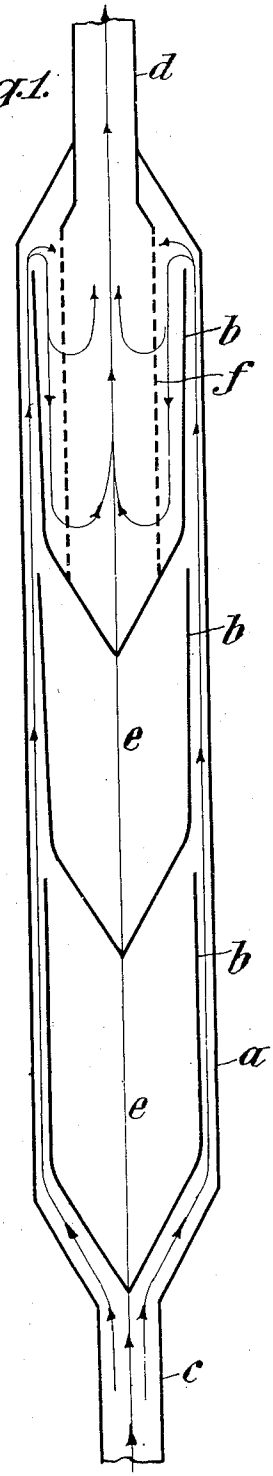
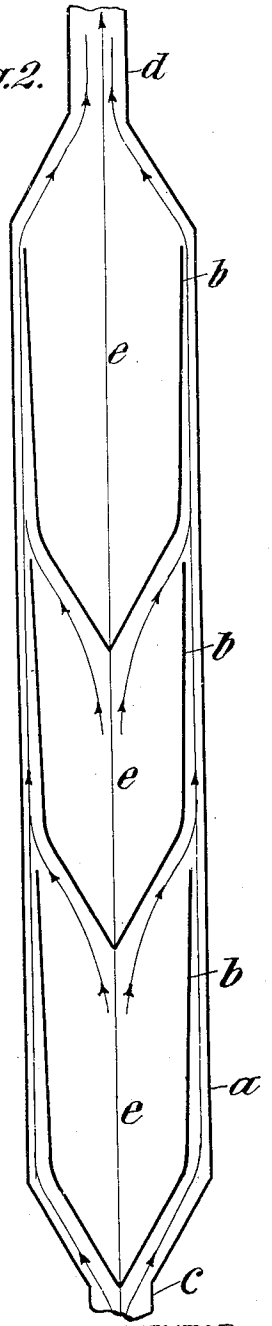


Fig.2.



INVENTOR
Josef Hawle

By J. Koral.

ATTORNEY

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SILENCER FOR INTERNAL COMBUSTION ENGINES

Josef Hawle, Vienna, Austria

Application July 23, 1936, Serial No. 92,111
In Austria August 1, 1935

2 Claims. (Cl. 181—48)

I have filed an application in Austria on August 1, 1935.

The present invention relates to silencers for internal combustion engines.

In order to obtain silent running in internal combustion engines, silencers have hitherto frequently been employed which whilst exercising their silencing action at the same time also throttle the output of the engine by approximately one-fifth. The said diminution of the output of the engine is also accompanied by further disadvantages inasmuch as the exhaust gases can only escape in part from the cylinder and the exhaust gas residue remaining in the cylinder becomes mixed with the incoming fresh air, as a result of which the combusion mixture is detrimentally affected. The charging mixture must therefore, in order to render it ignitable, be made richer in benzene which, however, necessitates a higher consumption of benzene. Furthermore, the exhaust gas residue remaining in the cylinder also contains soot which deposits in the form of scale on the piston and the cylinder and also on the valves, which fact results in a considerably greater wear of these parts.

According to the present invention, it is proposed to provide a silencer wherein, by means of insertion members, chambers are formed, which are so constructed, shaped and arranged that the exhaust gases which sweep over the individual chambers cause a suction action on the latter by nozzle-like action. By reason of this, the velocity of the exhaust gases is lowered, and moreover, the external housing of the silencer cools down the said gases whereby a strong diminution in volume is attained, so that the exhaust gases are discharged quite noiselessly from the silencer.

Two preferred constructional forms of a silencer according to the invention are illustrated by way of example in the accompanying drawing in which:

Fig. 1 is a diagrammatic section of one constructional form, and

Fig. 2 is a similar diagrammatic section of the second constructional form.

Referring to the drawing:

The exhaust gases coming from the cylinder pass through the inlet conduit *c* into the silencer, strike on the conically pointed end of the insertion member *b*, (which is the first of a series of such insertion members) and are distributed around the said insertion member.

The annular space between the insertion members *b* and the silencer housing *a* is made somewhat larger in cross section than the cross section of the inlet conduit *c* and as a result of this fact and the fact that the outer wall of the housing exercises a strong cooling action on the exhaust gases, which results in a corresponding diminution of volume of the latter, a very efficient diminution of the pressure of the exhaust gases is obtained. The insertion members *b* are arranged in a row one behind the other in such manner that between any two successive insertion members an annular nozzle-like space is formed. When the exhaust gases pass over these nozzle-like spaces they exert a suction action on the chambers *e* forming the interiors of the insertion members, whereby a further diminution of pressure of the exhaust gases is produced.

It will, of course, be understood that the number of insertion members employed will be such as is necessary for causing the necessary diminution of pressure of the exhaust gases or for giving the necessary complete silencing action.

A cylindrical sieve member *f* formed in one piece with an outlet conduit *d* is employed in the constructional form shown in Fig. 1. The provision of this sieve member is advantageous in order to render the silencing action more complete. The sieve member operates still more favourably when it is employed in conjunction with a fish-tail shaped hollow end piece. In this case the sieve member consists of a highly coned perforated tubular member having only a small terminal hole, which tubular member is inserted in the hollow fish-tail end piece provided with the outlet passage. Inasmuch as the volume of the exhaust gases on leaving the silencer amounts only to about one-third of the volume of the exhaust gases entering at the inlet, the cross section of the discharge slot or conduit can in accordance therewith be made considerably smaller.

Any back-fire of the exhaust gases which may arise is taken up by the individual chambers subjected to suction action, as a result of which the transmission of the counter-pressure of the exhaust gases to the discharge valve is rendered impossible.

Fig. 2 shows a modified constructional form which is similar to that shown in Fig. 1, wherein the sieve members above referred to are omitted and the outlet *d* from the housing of the silencer is formed integral therewith. Although the silencer is shown in the constructional forms above described and illustrated by way of example as being of cylindrical form, it will be understood that this form may be modified in various ways without departing from the scope of the in-

vention. For example, when the silencer is employed on aircraft, it is preferable to construct it of stream-line shape. In this case the insertion members will diminish in cross section towards their ends.

I claim:

1. A silencer for internal combustion engines, comprising in combination: a housing; an inlet for exhaust gases arranged at one of said housing; an outlet for exhaust gases arranged at the other end of said housing; and hollow insertion members arranged one behind the other within said housing and spaced away therefrom, each of said insertion members terminating in a point at the end directed towards said inlet and being open at the other end, substantially annular nozzle-like spaces connecting the interior of an insertion member with the space between said insertion members and said housing being formed between the open ends of each one of said insertion members and the pointed end of the next following insertion member, substantially as described.

2. A silencer for internal combustion engines, comprising in combination: a housing; an inlet for exhaust gases associated with said housing; hollow insertion members arranged one behind the other within said housing, each of said insertion members being coned-off to a point at the end directed towards said inlet and being open at the other end; whereby annular nozzle-like spaces are formed between the open end of each one of said insertion members and the pointed end of the next following insertion member; and an annular space being formed between said insertion members and said housing, each of said nozzle-like annular spaces connecting the interior of an insertion member with said last named annular space, whereby the interiors of said insertion members are subjected to the suction action of the exhaust gases flowing through said last named annular space over said nozzle-like annular spaces; and an outlet for exhaust gases associated with said housing, substantially as described.

JOSEF HAWLE.