Dec. 24, 1929. C. H. BRICE 1,740,805

EXHAUST SILENCER FOR INTERNAL COMBUSTION ENGINES

Filed April 27, 1929 2 Sheets-Sheet 1

Fig. 1.

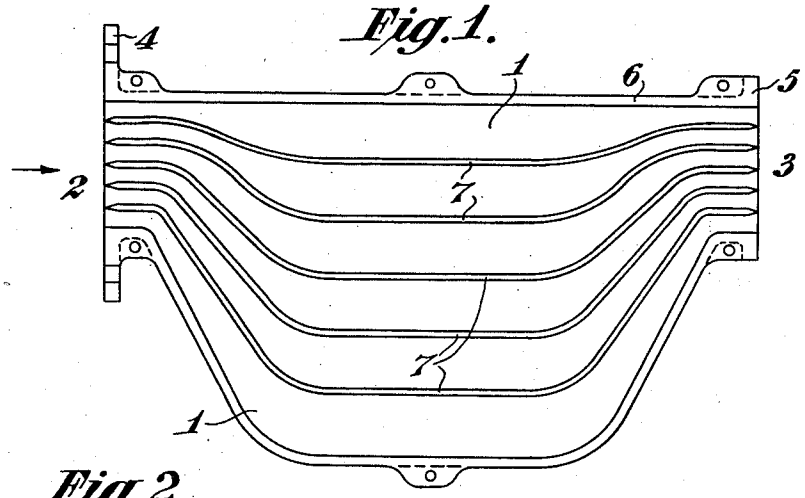


Fig. 2.

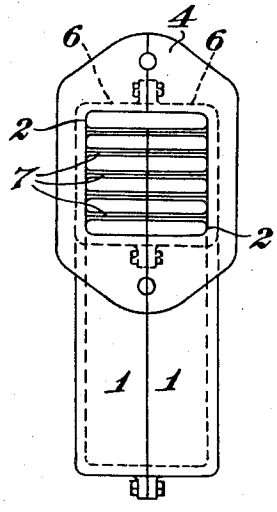


Fig. 3.

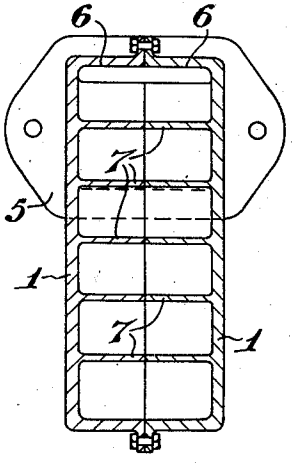


Fig. 4.

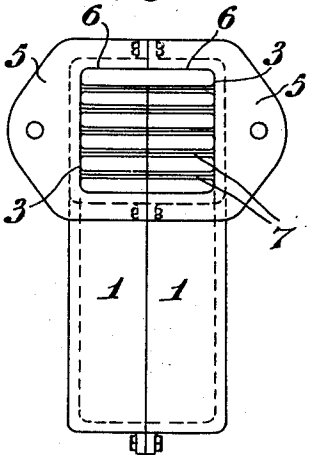
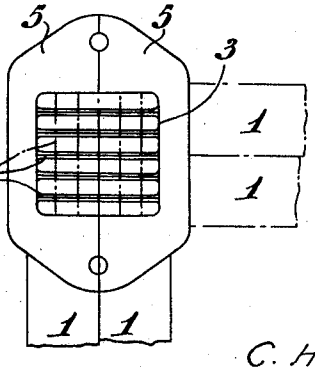


Fig. 7.



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EXHAUST SILENCER FOR INTERNAL COMBUSTION ENGINES

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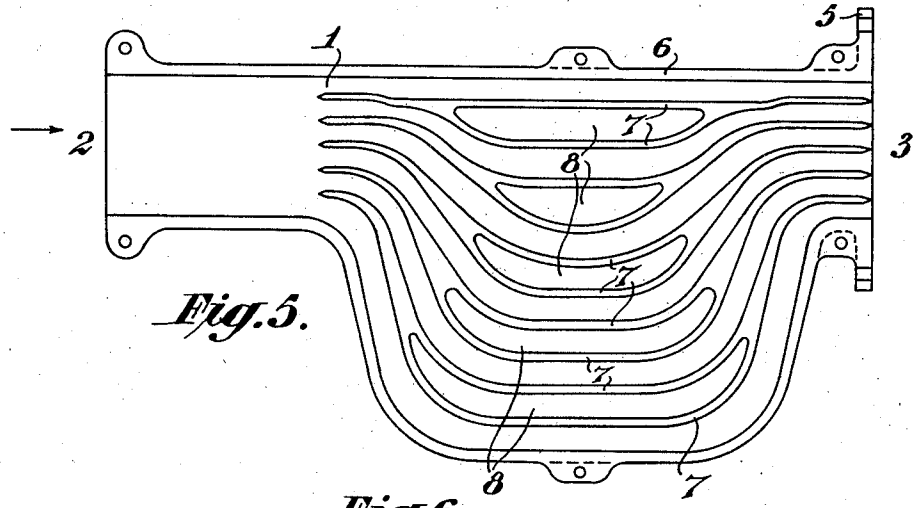


Fig. 5.

Fig. 6.

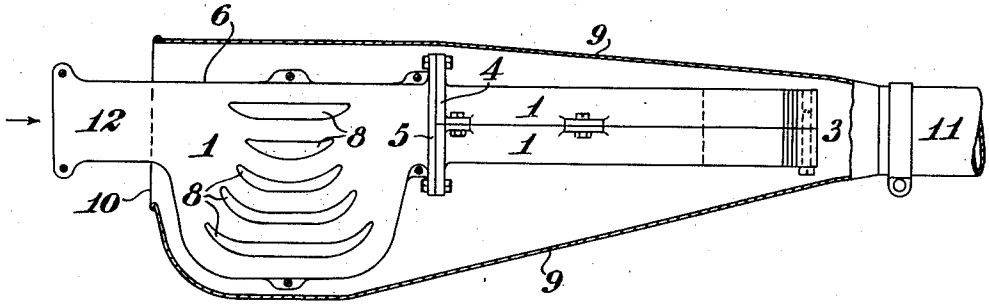
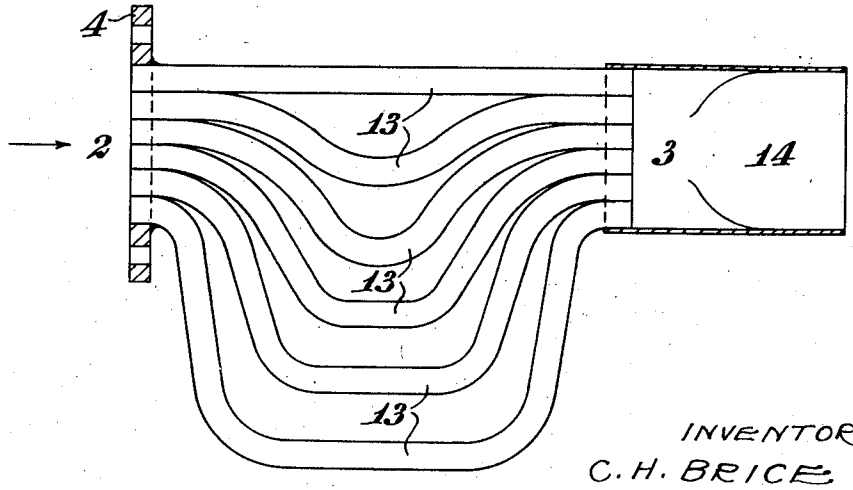


Fig. 8.



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UNITED STATES PATENT OFFICE

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EXHAUST SILENCER FOR INTERNAL-COMBUSTION ENGINES

Application filed April 27, 1929, Serial No. 358,647, and in Great Britain April 10, 1928.

This invention, of a new or improved exhaust silencer for internal combustion engines, has particular reference to the type of exhaust silencer having between its inlet and outlet ends a plurality of ducts or passages of varying lengths, so that exhaust gas entering the silencer is split up into a number of separate columns.

It forms a feature of the invention that the silencer may be constituted by a hollow one-piece casting, or by a two-part casting adapted to be screwed, bolted or otherwise secured together, and that the silencer may be formed with air spaces extending transversely therethrough, and that the silencer may be built-up unit, and that two or more silencer units may be connected together to provide for a prolongation of the delivery of the gases and that the silencer unit or units may be enclosed within an outer casing to provide for air circulation around the unit or units to assist in the delivery of said gases.

For a ready understanding of the said invention reference is to be had to the following description and accompanying sheets of drawings illustrative of practical embodiments of the invention, and wherein:—

Figure 1 is a vertical longitudinal view of one part of a two-part silencer.

Figure 2 is a view of the inlet end of said silencer.

Figure 3 is a vertical transverse sectional view of the silencer.

Figure 4 is a view illustrative of the outlet end thereof.

Figure 5 is a view similar to Figure 1, but illustrative of a modification thereof.

Figure 6 is a longitudinal view, partly in section, illustrative of two silencer units coupled together, and enclosed within an outer casing.

Figure 7 is a view, outlet port end, illustrative of the sub-dividing of the ports caused by the coupling together of the silencer units.

Figure 8 is a view, partly in section, of a built-up silencer unit.

In carrying out the invention, and referring first to Figures 1 to 4 of the drawings, the silencer consists of a hollow two-part casting 1, 1 adapted to be screwed, bolted or otherwise clamped together, said silencer being, in effect, divided vertically along its longitudinal axis. The said hollow body 1, 1 is formed at its ends with inlet and outlet ports respectively, 2 and 3, preferably of rectangular section, with external flanges, respectively 4 and 5, for the attachment of conveying pipes, or for connecting two or more of the silencer units together as hereinafter described. One of the outer walls of the said hollow body 1, 1 is in the form of a straight wall 6 extending from inlet flange 4 to outlet flange 5.

Internally, the hollow body 1, 1 is formed with a number of deflector walls 7 cast integrally with said body 1, 1. Said deflector walls 7 may be of any convenient number, for example six, and each extends throughout the length of said body from its inlet 2 to its outlet port 3, said deflector walls 7 where they terminate at said ports, flush with the ends of the body, being regularly spaced apart parallel to one another; so as to divide said ports 2 and 3 into a number of ports.

Considering the first deflector wall 7 next to the straight outer wall 6 of the body aforesaid, said deflector wall 7 as it extends into the body from the inlet end thereof, is inclined away from said outer wall, said inclined portion extending into an approximately straight centre portion parallel with the aforesaid outer wall. As it approaches the outlet end of the body, said deflector wall 7 is inclined back again toward said outer wall 6 so as to form a narrow delivery neck. Thus, said deflector wall 7, between itself and the aforesaid outer wall 6 of the body forms a duct which has a narrow inlet port and a narrow outlet port, and a comparatively wide expansion space at its centre of length.

The next deflector wall 7 has inclined portions steeper than those of the first deflector wall aforesaid so that between said walls is formed a second duct having narrow inlet and outlet ends and a comparatively wide expansion space at its centre of length. Each consecutive deflector wall 7 thereafter has its inclined portions steeper than those of the previous adjacent deflector wall, so as to give

the duct between adjacent of said walls, a wide expansion space at its centre of length as compared with the area of its inlet and outlet openings.

It will be followed from the foregoing description that owing to the different extents of deflection of consecutive ducts, the latter have varying lengths, with the result that gas entering the various ducts simultaneously is delivered in a series of pulses, this giving a subdued prolonged sound instead of a sharp sudden sound.

Referring now to Figure 5, the silencer is similar to the silencer just described, but the deflector walls 7, with the exception of the lowermost one thereof, are formed with an opening therein so that, when the two parts 1 of the silencer are secured together, there is provided a series of air passages 8 extending transversely through said silencer.

As shown in Figure 6 two or more of the present silencer units may be connected together for dual operation, the outlet end of one unit being secured to the inlet end of the next unit, in which case one such unit is arranged with its deflector wall extremities at right angles to and abutting the deflector wall extremities of the adjacent unit so that each of the various columns of gas delivered from the ducts of the first unit is further split up by the second unit, as shown in Figure 7, and so on by any further units employed. Thus, prolongation of the delivery is afforded, with consequent further spreading out of subdued sound over a longer period.

The combined silencer units may, as shown in said Figure 6, be enclosed within an outer casing 9 which extends beyond the rear end of the rear silencer unit, said casing 9 being at its front end formed with an opening 10 for the admission of air into said casing 9, and at its rear end fitted with a pipe 11 to carry expanded gases, mixed with the passing air in the casing, to atmosphere, the front unit having a cylindrical portion 12 (which extends through opening 10) for pipe connection to engine exhaust.

Alternatively, the silencer may be constituted by a built-up unit, that is to say, a unit consisting of a number of tubes 13, Figure 8, of rectangular shape in cross-section, brazed together at their inlet ends and to the inlet flange 4 of the unit, said tubes 13, with the exception of the uppermost tube 13, being bent downwardly and then upwardly to form ducts of increasing length, and at their outlet ends brazed together and to the rectangular end of a tube 14 which communicates with the atmosphere, or into the outer casing aforesaid if such be employed.

As there is no direct obstacle to the free passage of gas, the silencers constructed according to the invention afford minimum waste of power and do not tend to harbour soot or deposit. Cleaning can be carried out expeditiously in the case where the body is made in two parts detachably clamped together, by separating said parts to give access to the interior.

In the case of the silencer units shown in Figures 5 and 8 it will be seen that one end only of the silencer has the divisions 7 terminating flush therewith, and should it be desired to use two of such units in conjunction with one another as above described, said units will be arranged reverse to one another, that is to say, with the ends which have the flush divisions, abutting one another.

I claim:—

An exhaust silencer comprising a hollow body having coaxial inlet and outlet ends, and a plurality of spaced deflector walls within said body having restricted inlet and outlet end portions cooperating to provide a plurality of ducts each having a portion between its ends of greater cross-sectional area than its relatively restricted inlet and outlet end portions.

In testimony whereof I have affixed my signature hereto this 16th day of April, 1929.

CECIL HENRY BRICE.