

March 19, 1946.

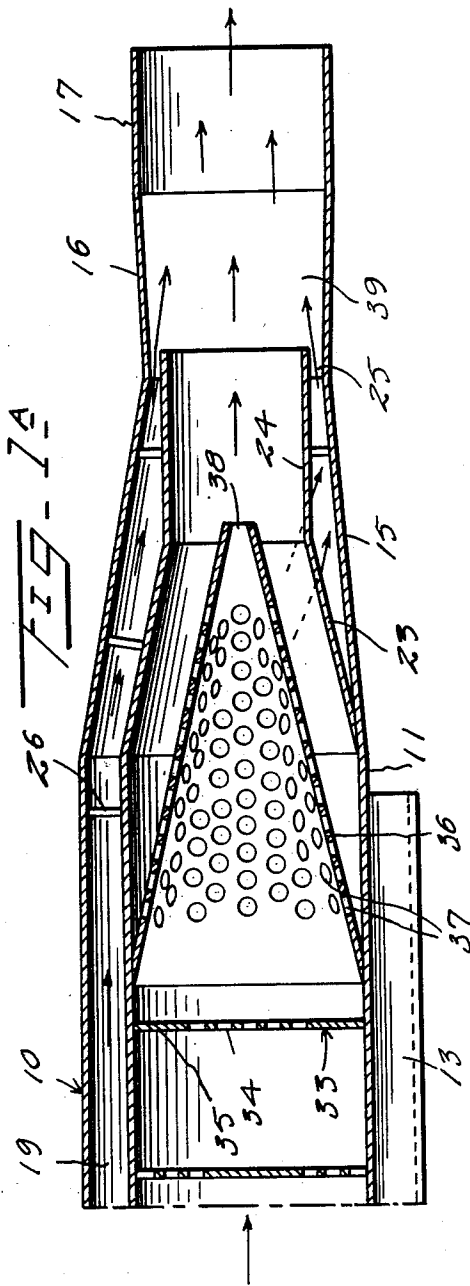
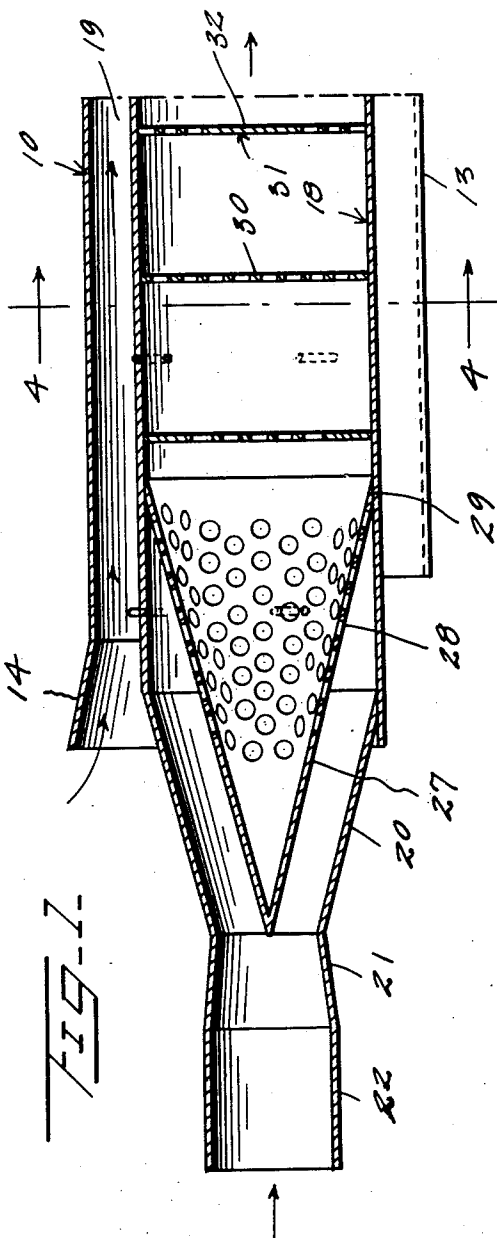
F. P. HUBER

2,396,952

MUFFLER

Filed July 11, 1944

2 Sheets-Sheet 1



Inventor  
**Frank P. Huber**

By **Kimmel & Crowell**  
Attorneys

March 19, 1946.

F. P. HUBER

2,396,952

MUFFLER

Filed July 11, 1944

2 Sheets-Sheet 2

Fig. 2.

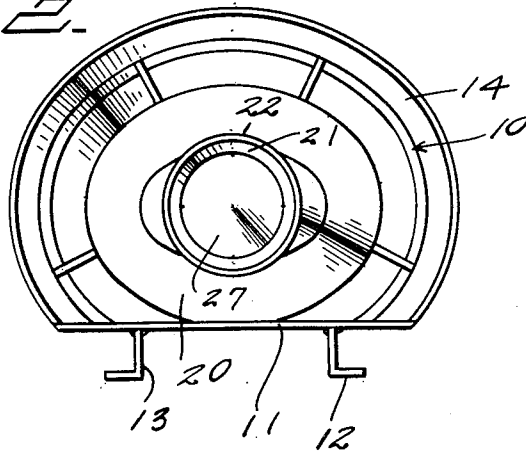


Fig. 3

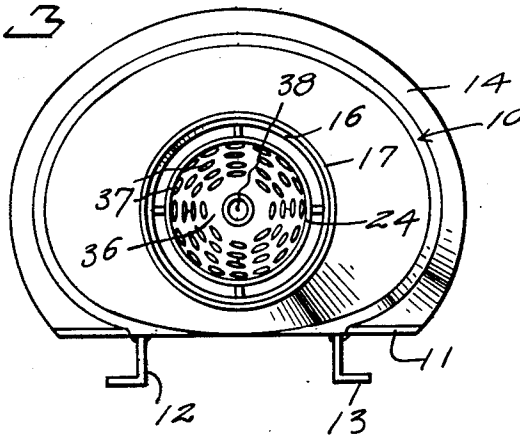
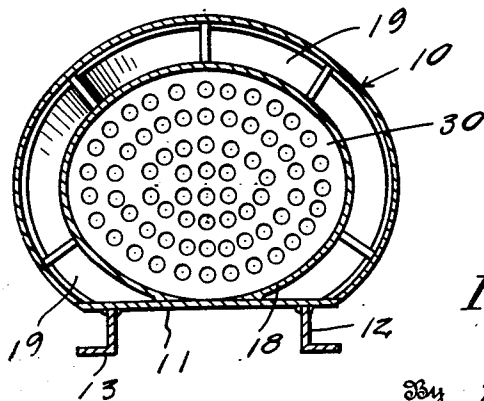


Fig. 4.



Inventor  
*Frank P. Huber*

By *Kimmel & Crowell*  
Attorneys

## UNITED STATES PATENT OFFICE

2,396,952

MUFFLER

Frank P. Huber, New Orleans, La.

Application July 11, 1944, Serial No. 544,367

1 Claim. (Cl. 181-51)

This invention relates to exhaust mufflers for internal combustion engines.

An object of this invention is to provide a muffler embodying the provision of a suction means for drawing the gases out of the interior thereof so as to eliminate back pressure in the engine.

Another object of this invention is to provide a muffler wherein the gases are mixed with air prior to the discharge of the gases into the atmosphere, the air mixing with the gases providing not only a suction for the removal of the gases, but also providing a cooling medium for cooling the gases prior to their discharge into the atmosphere, and the initial expansion of the gases before discharge so as to thereby eliminate the explosive noise when the gases are discharged into the atmosphere.

A further object of this invention is to provide a muffler of this type which is designed particularly for airplane engines in which the forward end of the muffler is formed as a scoop for drawing in air which will maintain the muffler walls cool so that the metal will not disintegrate under the heat of the gases.

With the foregoing objects and others which may hereinafter appear the invention consists of the novel construction, combination and arrangement of parts as will be more specifically referred to and illustrated in the accompanying drawings wherein is shown an embodiment of the invention, but it is to be understood that changes, modifications and variations may be resorted to which fall within the scope of the invention as claimed.

In the drawings:

Figures 1 and 1a show a longitudinal section of a muffler constructed according to an embodiment of this invention.

Figure 2 is a detail front elevation of the device,

Figure 3 is a detail rear elevation of the device, and

Figure 4 is a sectional view taken on the line 4-4 of Figure 1.

Referring to the drawings, the numeral 10 designates generally an outer jacket or shell which is substantially elliptical in transverse section and is provided with a flat bottom wall 11. The bottom wall 11 has secured thereto a pair of longitudinally extending spaced apart L-shaped bracket members 12 and 13 which provide a means whereby the muffler may be secured to a suitable support.

The front end of the jacket 10 is provided

with a flared scoop 14 for drawing air into the interior of the jacket and the rear portion of the jacket 10 is provided with a forwardly tapering member 15 having an oppositely flared tapered portion 16 secured to the reduced forward end thereof. The intermediate portion 16 has secured thereto a cylindrical nipple or discharge member 17. An inner shell 18 which is substantially elliptical in transverse section is disposed within the jacket 10 being substantially smaller in size than the jacket 10 so as to provide an air passage 19 between the outer surface of the inner member 18 and the jacket 10. The inner member or shell 18 is secured to the upper side of the flat wall 11 and extends throughout the length of the wall 11. The rear end of the inner shell or member 18 is formed with a truncated conical intake member 20 which has secured to the rear small end thereof a forwardly reducing member or nozzle 21. The rear or large end of the nozzle 21 has secured thereto or formed integral therewith a cylindrical nipple or intake member 22.

The forward end of the inner shell or member 18 has secured thereto a forwardly tapering discharge member 23 and a nipple 24 extends from the small end of the discharge member 23 and is positioned within the junction of the outer members 15 and 16 terminating at its forward end within the rear portion of the intermediate tapered member 16, as shown in Figure 1a.

The discharge member 24 forms a reduced air space 25 which will produce a venturi action so that when the air passes forwardly through the space 25 the burned gases in the discharge member 24 will be drawn out of this member and the air entering the forwardly enlarging member 16 will mix with the burned gases so that the gases can initially expand and thereby eliminate the major portion of the explosive noise before these gases are finally discharged from the discharge nipple 17. A plurality of radially arranged bracing or spacing bars 26 are interposed between the outer shell 10 and the inner shell 18 at spaced points along the length of these members.

The inner member 18 at its rear portion has mounted therein a conical member 27 provided with a plurality of openings 28 at a point rearwardly from the apex thereof. The smaller apex portion of the conical member 27 extends into the rearwardly reducing member 20, as shown in Figure 1, and the base or large end of the conical member 27 is secured as at 29 to the inner shell 18. The inner shell or member 18 has positioned therein a plurality of perforate baffle

members 30 and 31, the latter being formed with a solid central portion 32. These baffle members are spaced apart lengthwise of the interior of the inner member 18 and the rearmost baffle 33 is provided with central perforations 34 and a solid outer portion 35. The staggering of the openings or perforations in the several baffles will form a tortuous passage for the gases passing through the inner member 18. The inner member 18 at its forward portion has secured therein a conical member 36 which is formed with openings 37 and an open apex 38. The open apex 38 discharges centrally into the rear portion of the discharge member 24, as shown in Figure 1a.

In the use of this muffler the intake member 23 is adapted to be connected to the exhaust of an internal combustion engine, and preferably, this engine is an airplane engine with the bracket members 12 and 13 secured lengthwise of the airplane and in a position where the scoop 14 will draw in air as the propellers connected to the engine are rotating. The exhaust gases will pass about the imperforate rear end portion of the conical member 27 and will initially enter the interior of the conical member through the perforations or openings rearwardly of the apex thereof.

The burned gases will then pass through the openings in the baffles 30, 31 and 33 and will then enter the forward conical member 36. A portion of the gases will pass centrally through the conical member 36 and through the open apex thereof, whereas some of the burned gases will pass through the openings 37 in the conical member 36. The burned gases will enter the forward discharge member 24 and will then mix in the mixing chamber 39 formed in the intermediate member 16. The air flowing through the space 19 between the jacket 10 and the inner member 18 will pass through the space 25 and will form a suction in addition to providing an expansive medium where the burned gases can initially expand before being discharged through the forward discharge nipple 17 into the atmosphere.

The provision of the air space 19 and the space 25 about the inner shell 18 provides a cooling medium for maintaining the inner member 18 cool and this moving air also provides a means

for eliminating back pressure on the engine due to the venturi action at the discharge end of the discharge member 24. The several parts forming the muffler hereinbefore described are secured together by spot welding or other suitable fastening means. In the assembly of the device the inner tubular member 18 may initially have the baffles 31 and 33 welded or fixed therein after which the conical members can be inserted and welded and the tapered end portions 20 and 23 may then be electrically welded or the like to the ends of the tubular member 18. The bracing members 26 are welded or fixed to the tubular member 18 before insertion of this member 18 in the jacket and after insertion in the jacket 10, the latter may be spot welded or the like to the bracing members and associated parts.

What I claim is:

A muffler comprising an inner tubular member, tapered members extending from the opposite ends of said inner member, an intake nipple connected to the reduced end of one of said tapered members, a pair of oppositely extending apertured conical members disposed within said inner tubular member and having the bases thereof secured to the latter with the apices thereof outermost and with the bases thereof spaced apart, the apex of one of said conical members being formed with an opening, said conical members having the small ends thereof projecting into said tapered members, an outer jacket disposed in spaced relation about said inner tubular member, a flared scoop at one end of said jacket, a tapered jacket at the other end of said outer jacket and engaging loosely about an adjacent one of said first tapered members, a forwardly flared member extending from the small end of said tapered jacket, a forwardly extending discharge nipple extending from the forward small end of the other of said tapered members and disposed partly within said tapered jacket and partly within said forwardly flared member and a plurality of apertured baffles fixed in said inner tubular member between the bases of said conical members and having the apertures arranged to form a tortuous passage.

FRANK P. HUBER.