

May 16, 1933.

A. Y. DODGE

1,909,394

MUFFLER

Filed May 31, 1930

2 Sheets-Sheet 1

Fig. 1

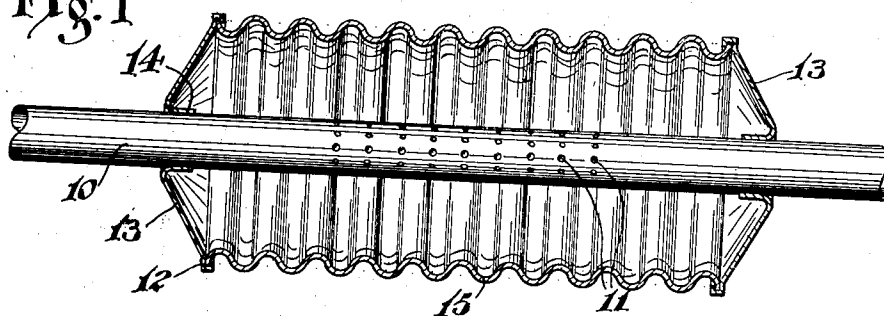


Fig. 2

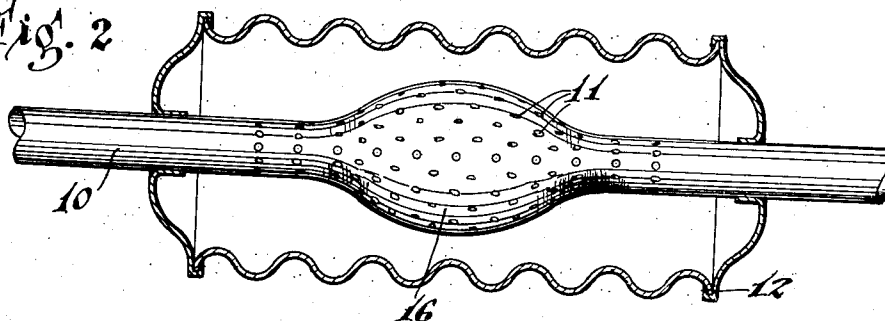
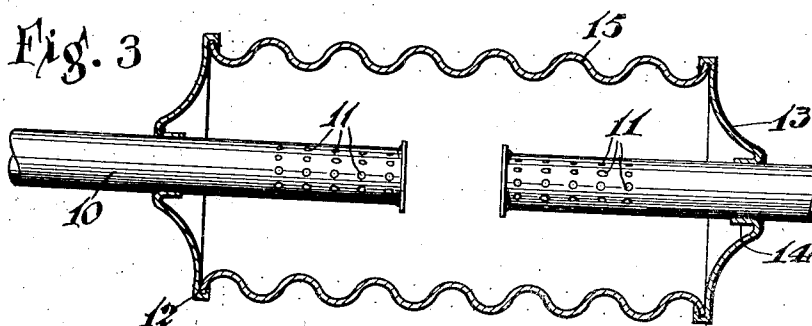


Fig. 3



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Fig. 4

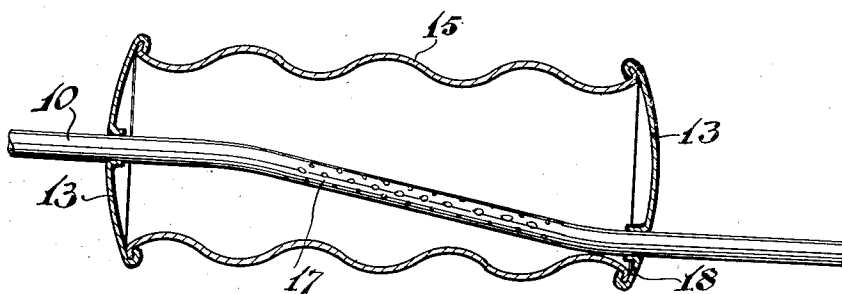


Fig. 5

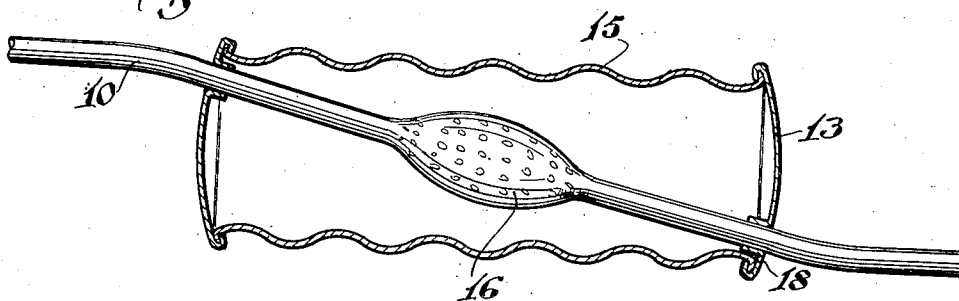


Fig. 6

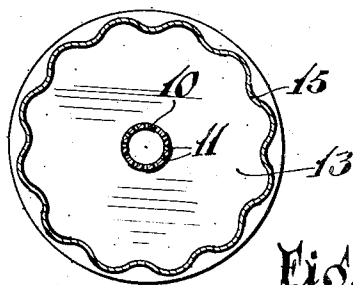


Fig. 7

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UNITED STATES PATENT OFFICE

ADIEL Y. DODGE, OF SOUTH BEND, INDIANA, ASSIGNOR TO BENDIX AVIATION CORPORATION, OF SOUTH BEND, INDIANA, A CORPORATION OF DELAWARE

MUFFLER

Application filed May 31, 1930. Serial No. 458,712.

This invention relates to mufflers and more particularly to mufflers for internal combustion engines.

An object of the invention is to provide a muffler for an internal combustion engine adapted to deaden the sound incident to discharge of the burnt gases and to eliminate back pressure in the cylinders of the engine.

Another object of the invention is to provide means, whereby some portion of the exhaust gases of an internal combustion engine may be ejected through a passage direct to the atmosphere.

Another object of the invention is to provide a muffler in which a portion of the exhaust gases of an internal combustion engine may be discharged into the atmosphere directly from the discharge end of the exhaust pipe and the remainder expanded so that the sound waves may be reflected in various directions to cause interference and thus dissipation.

Another object of the invention is to provide a muffler for an internal combustion engine in which the velocity of the sound waves and the exhaust gases is momentarily interrupted and must be accelerated again before discharging into the atmosphere.

A further object of the invention is to provide a muffler for an internal combustion engine in which a portion of the exhaust gases may be discharged into the atmosphere direct from the discharge end of the exhaust pipe and the remainder expanded and reflected to dissipate the sound waves.

A further object of the invention is to provide a comparatively light muffler casing having great strength and rigidity.

A further object of the invention is to provide a muffler having a casing adapted to reflect sound waves in various directions to cause interference and hence dissipation of the sound waves.

Yet a further object of the invention is to provide a muffler for an internal combustion engine having means for causing an interruption of the travel of the sound waves and gases and means associated therewith for reflecting the sound waves in various di-

rections to cause interference and hence dissipation thereof.

A still further object of the invention is to provide a muffler having a casing provided with a corrugated wall adapted to reflect sound waves in various directions to cause interference and dissipation of the sound waves.

Other objects of the invention will appear from the following description taken in connection with the drawings, which form a part of this specification, and in which:

Figure 1 is a sectional view of a muffler embodying the invention;

Figure 2 is a sectional view of a modification illustrating an exhaust pipe having an enlarged cross section centrally disposed within the muffler casing;

Figure 3 is a sectional view of another modification illustrating a muffler casing embodying the invention and a divided exhaust pipe on which the casing is positioned; and

Figures 4 and 5 are sectional views of modifications in the exhaust pipe.

Figure 6 is an elevation and Figure 7 is a sectional view of a further modification of the invention.

Referring to the drawings for more specific details of the invention, 10 represents an exhaust pipe having a plurality of apertures 11 arranged therein in spaced relation and positioned on the exhaust pipe is a casing 12. This casing encloses the perforated portion of the exhaust pipe.

As shown, the casing is provided with corresponding end portions 13 provided with flanges 14 which fit snugly on the pipe 10 and connecting the end portions 13 is a corrugated wall 15. This corrugated wall materially increases the strength and rigidity with but slight increase in the weight of the casing.

In this type of muffler, practically all of the back pressure created in the cylinders of an engine is eliminated because a portion of the exhaust gases of the engine is discharged into the atmosphere directly from the discharge end of the exhaust pipe and the remainder is expanded through the aper-

tures 11 and reflected together with the sound waves incident thereto by the corrugated wall 15 in various directions inside of the muffler, causing an interference between the sound waves, resulting in dissipation thereof.

In Figure 2, I have shown a modified form of the invention wherein the perforated portion of the exhaust pipe is enlarged, as shown at 16. This enlargement will cause an interruption in the travel of the sound waves and the gases. Due to the large cross sectional area of the exhaust pipe, the velocity of the gases and sound waves will be reduced momentarily and must again be accelerated in order to pass through the pipe and as the gases are expanded through the perforations 11, the sound waves accompanying the gases will be reflected by the corrugated wall 15 to cause interference and dissipation thereof.

In Figure 3, I have illustrated another modification of the invention wherein the exhaust pipe 10 is divided within the casing 12, so that the gases may be freely expanded within the casing and reflected by the corrugated wall to cause interference and dissipation of the sound waves. In this embodiment, the adjacent ends of the exhaust pipe are perforated as at 11 and the end portions are spread or rolled to strengthen the respective ends of the pipe and lend rigidity thereto.

In Figures 4 and 5, I have shown further modifications wherein the exhaust pipe is offset as indicated at 17, so that the perforated portion is inclined within the casing and the exhaust end extends through one of the ends 13 of the casing near the rim thereof, the casing being provided with a drain duct or opening 18 to permit the passage of products due to condensation in the casing. It is to be observed that in Figure 5 the exhaust pipe extends diagonally within the casing from one end to the other.

In Figures 6 and 7, I have shown a further modification of the invention. In this embodiment the casing is corrugated or fluted longitudinally or parallel to its axis.

The result is practically the same in each of the modifications shown, that is, the discharging of a portion of the exhaust gases of the engine directly into the atmosphere from the discharge end of the exhaust pipe with an interruption in the travel of the sound waves and gases and the reflection thereof in various directions inside of the muffler casing, so that an interference will be set up which will cause the sound to dissipate itself.

While preferred embodiments of the invention have been described, it is to be understood they are given merely as examples of the underlying principles of the invention and since these may be incorporated

in other specific mechanical structures, I do not intend to be limited to those shown, except as such limitations are clearly imposed by the appended claims.

Having thus described the various features of the invention, what I claim as new and desire to secure by Letters Patent is:

1. A muffler for exhaust gases comprising an exhaust pipe having an enlarged perforated portion oval in longitudinal section and a casing enclosing the enlarged perforated portion having a corrugated wall.

2. A muffler for exhaust gases comprising an unobstructed cylindrical exhaust pipe having its diameter enlarged at one portion to form a chamber for decreasing the velocity of the gases passing through the exhaust pipe, the walls of said chamber being perforated, and a corrugated casing enclosing the chamber.

3. A muffler for exhaust gases comprising an unobstructed pipe having its diameter enlarged at one portion to form a chamber for decreasing the velocity of the gases passing through the pipe, the walls of said chamber being provided throughout their area with perforations, and a transversely corrugated casing enclosing the chamber.

4. A muffler for exhaust gases comprising a corrugated casing, two aligned unobstructed pipe sections forming inlet and outlet conduits for the casing and an enlarged section forming an expansion chamber between the pipe sections having perforations maintaining communication between the chamber and the interior of the casing, the corrugations of the casing surrounding said enlarged section.

In testimony whereof, I have hereunto signed my name.

ADIEL Y. DODGE.