April 12, 1955 F. H. CARROLL 2,706,014

EXHAUST MUFFLER

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Fig. 1

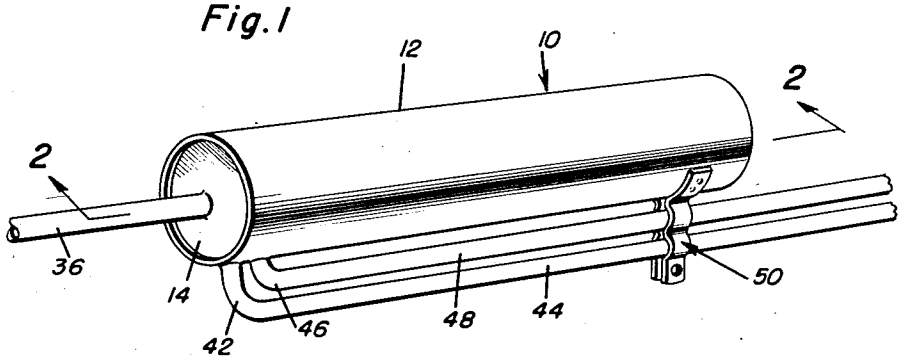


Fig. 2

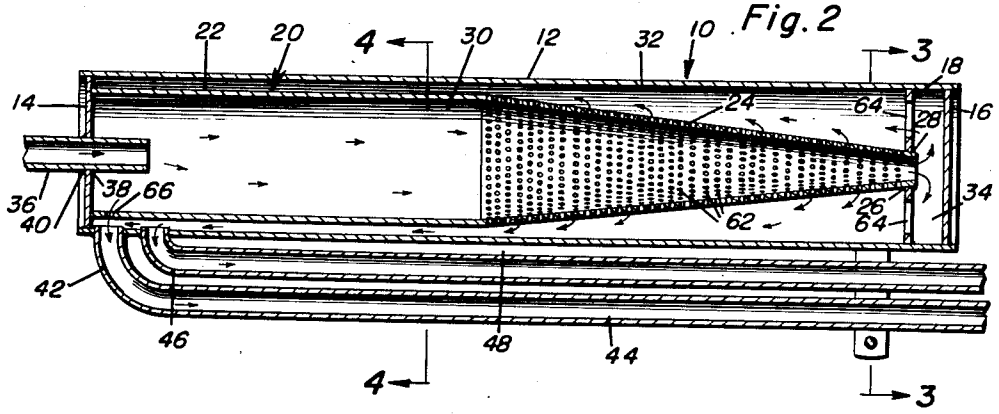


Fig. 3

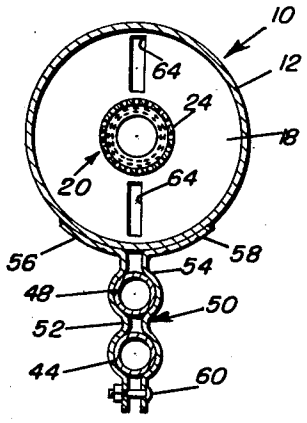
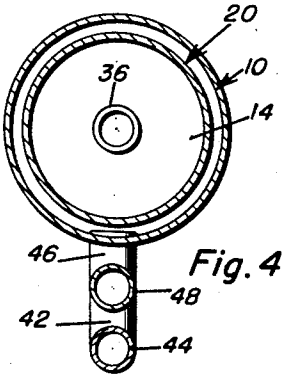


Fig. 4



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2,706,014

EXHAUST MUFFLER

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3 Claims. (Cl. 181—53)

This invention relates in general to improvements in exhaust mufflers, and more specifically to an exhaust muffler especially designed for use with internal combustion engines.

The primary object of this invention is to provide an improved exhaust muffler which is relatively simple in construction and at the same time is so designed whereby it will remove a maximum amount of sound from exhaust gases.

Another object of this invention is to provide an improved exhaust muffler which is highly effective in muffling exhaust gases and at the same time, is relatively unrestricted whereby a back pressure in an exhaust pipe of an internal combustion engine is practically eliminated.

A further object of this invention is to provide an improved exhaust muffler which is so efficient in operation and of such a nature whereby it may be conveniently attached to existing motor vehicles with a minimum of changes.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

Figure 1 is a perspective view of the exhaust muffler which is the subject of this invention, end portions of inlet and outlet pipes being broken away;

Figure 2 is an enlarged fragmentary longitudinal sectional view taken substantially upon the plane indicated by the section line 2—2 of Figure 1 and shows the general construction of the exhaust muffler;

Figure 3 is an enlarged transverse vertical sectional view taken substantially upon the plane indicated by the section line 3—3 of Figure 2 and shows the relationship of the casing with respect to a partition of the muffler, also being shown is the relative shape of openings through the partition; and

Figure 4 is an enlarged transverse vertical sectional view taken substantially upon the plane indicated by the section line 4—4 of Figure 2 and shows the general relationship of the housing, the casing and outlet pipes of the exhaust muffler.

Referring now to the drawings in detail, it will be seen that there is illustrated the exhaust muffler which is the subect of this invention. The exhaust muffler includes a housing which is referred to in general by the reference numeral **10**. The housing **10** is formed of an elongated cylindrical body member **12** which is closed at its opposite ends by end walls **14** and **16**.

Disposed adjacent the end wall **16** and mounted within the housing **10** is a partition **18**. The partition **18** is preferably welded to the inner surface of the body member **12**.

Also mounted within the housing **10** is a tubular casing which is referred to in general by the reference numeral **20**. The tubular casing **20** has a cylindrical forward portion **22** whose forward end is secured to the inner surface of the wall **14**. The casing **20** also includes a conical rear portion **24** which terminates at the partition **18**. The smaller end of the conical rear portion **24** passes through an opening **26** in the partition **18** and is rigidly secured to the partition **18** by fastening means, such as welding **28**.

It will be seen that the relationship of the housing **10**, the casing **20** and the partition **18** is such that the exhaust muffler includes a plurality of chambers. For purposes of identification, the inner chamber within the casing **20** is referred to as a first chamber **30**. A second chamber is disposed externally of the casing **20** and within the housing **10**, the second chamber being referred to by the reference numeral **32**. A third chamber **34** is disposed between the partition **18** and the end wall **16**.

The exhaust muffler also includes an inlet pipe **36** which passes through an opening **38** in the end wall **14** and ends within the first chamber **30**. The inlet pipe **36** is rigidly secured to the end wall **14** by suitable fastening means, such as welding **40**.

In order that exhaust gases may escape from within the housing **10**, there is secured to the underside of the housing immediately adjacent the end wall **14** a curved forward portion **42** of a longitudinally extending outlet pipe **44**. Also secured to the housing **10** just rearwardly of the connection of the curved portion **42** thereto is a curved portion **46** of a second outlet pipe **48**. The outlet pipes **44** and **48** extend rearwardly in spaced parallel relation to the housing **10** and open to the atmosphere. The rear portions of the outlet pipes **44** and **48** are supported relative to the housing **10** by a clamp which is referred to in general by the reference numeral **50**.

The clamp **50** includes first and second halves **52** and **54**, respectively, which have upper portions **56** and **58**, respectively, which are secured to the underside of the body portion **12** adjacent the partition **18**. The lower ends of the halves **52** and **54** are connected together by a fastener **60** which is adjustable. The halves **52** and **54** are drawn together by the fastener **60** to tightly clamp the rear end portions of the outlet pipes **44** and **48**.

In order that exhaust gases entering the first chamber **30** through the inlet pipe **36** may pass into the second chamber **32**, the conical portion **24** of the casing **20** is provided with a plurality of perforations **62**. Also, in order that exhaust gases may pass out of the third chamber **34** back into the second chamber **32**, the partition **18** is provided with a pair of diametrically opposed slots **64**.

In the normal operation of the exhaust muffler which is the subject of this invention, exhaust gases direct from an internal combustion engine move rearwardly through the inlet pipe **36** and enter the forward portion of the first chamber **30**. The exhaust gases then continue to move rearwardly through the first chamber **30** and pass out through the smaller rear end of the conical portion **24** of the casing **20** into the third chamber **34**. The exhaust gases then have their directions reversed and move forwardly out of the third chamber **34** into the second chamber **32** around the casing **20** through the slots **64** in the partition **18**. The exhaust gases next move rearwardly and enter into the curved forward portions **42** and **46** of the outlet pipes **44** and **48**, respectively. The exhaust gases are then exhausted into the atmosphere.

As pressure builds up within the housing **10**, particularly due to an increase in speed of the associated internal combustion engine, gases are forced through the perforations **62** in the conical portion **24** and moved directly from the first chamber **30** into the second chamber **32**. The gases passing through the perforations **62** join the gases passing through the slots **64** and are exhausted through the outlet pipes **44** and **48**.

The first chamber **30** is also communicated with the second chamber **32** by an opening **66** in the forward part of the cylindrical portion **22** of the casing **20**. It will be noted that the opening **66** is aligned with the entrance to the curved portion **42** of the outlet pipe **44**. When a low pressure exists within the housing **10**, the opening **66**, which is a by-pass hole, directs the gases into the outlet pipe **44** only, thus temporarily reducing the monoxide gas expelled to the atmosphere.

From the foregoing, the construction and operation of the device will be readily understood and further explanation is believed to be unnecessary. However, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction shown and described, and accordingly, all suitable modifications and equivalents may be resorted to, falling within the scope of the appended claims.

What is claimed as new is as follows:

1. An exhaust muffler comprising a housing having spaced end walls, a perforated casing mounted within said housing, one end of said casing being secured to one of said end walls, a partition in said housing adjacent the other of said end walls, the other end of said casing being secured to said partition, said casing having a first chamber therein, a second chamber between said casing and said housing, and a third chamber between said partition and said other end wall, an inlet pipe through said one end wall communicated with said first chamber, outlet pipes carried by said housing communicated with said second chamber, said casing opening through said partition to communicate said first and third chambers, said partition having at least one opening communicating said second and third chambers.

2. An exhaust muffler comprising a housing having spaced end walls, a casing mounted within said housing, one end of said casing being secured to one of said end walls, a partition in said housing adjacent the other of said end walls, the other end of said casing being secured to said partition, said casing having a first chamber therein, a second chamber between said casing and said housing, and a third chamber between said partition and said other end wall, an inlet pipe through said one end wall communicated with said first chamber, outlet pipes carried by said housing communicated with said second chamber, said casing opening through said partition to communicate said first and third chambers, said partition having at least one opening communicating said second and third chambers, an end portion of said casing adjacent said partition communicating said first and second chambers.

3. An exhaust muffler comprising a housing having spaced end walls, a casing mounted within said housing, one end of said casing being secured to one of said end walls, a partition in said housing adjacent the other of said end walls, the other end of said casing being secured to said partition, said casing having a first chamber therein, a second chamber between said casing and said housing, and a third chamber between said partition and said other end wall, an inlet pipe through said one end wall communicated with said first chamber, outlet pipes carried by said housing communicated with said second chamber, said casing opening through said partition to communicate said first and third chambers, said partition having at least one opening communicating said second and third chambers, an end portion of said casing adjacent said partition communicating said first and second chambers, said end portion being generally conical and tapering towards said partition.

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