April 14, 1959 L. M. MORRISH ET AL 2,881,852

EXHAUST MUFFLER MEANS

Filed June 14, 1956

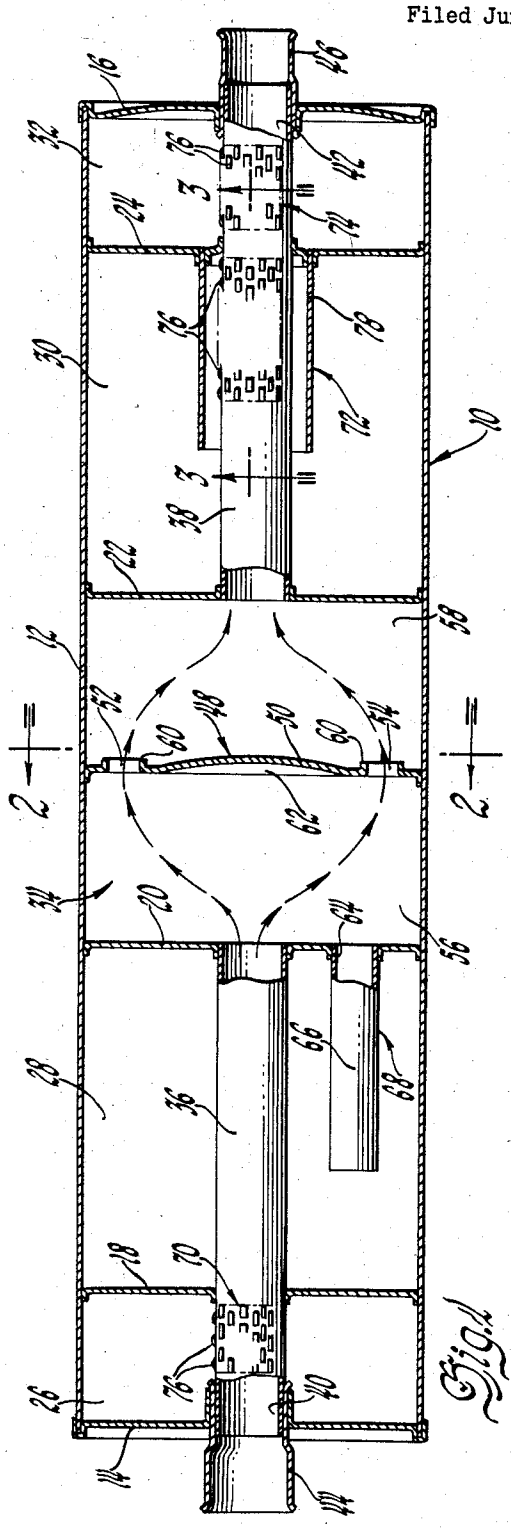


Fig. 4

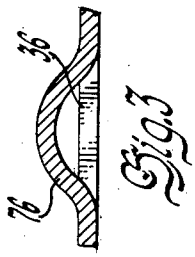


Fig. 3

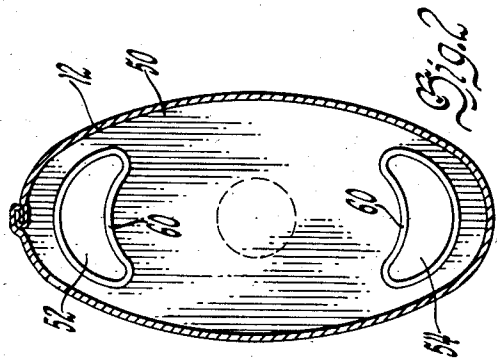


Fig. 2

INVENTORS.
Leonard M. Morrish
BY E. Lloyd E. Muller
L. D. Burch
ATTORNEY.

United States Patent Office 2,881,852
Patented Apr. 14, 1959

2,881,852

EXHAUST MUFFLER MEANS

Leonard M. Morrish and Lloyd E. Muller, Flint, Mich., assignors to General Motors Corporation, Detroit, Mich., a corporation of Delaware

Application June 14, 1956, Serial No. 591,328

1 Claim. (Cl. 181—57)

This invention relates to muffler means in general and more particularly to through-flow muffler means for silencing the noise of engine exhaust gases.

Engine exhaust noises are generally silenced within muffler means which include baffle members and tortuous passages for diverting the normal flow of exhaust gases in order to separate out such objectionable sounds. This in turn restricts the flow of exhaust gases through the muffler means and produces back pressures having an adverse effect upon the efficient operation of the engine means.

It is here proposed to provide a through-flow exhaust muffler for use with internal combustion engines, air compressors and the like, which includes means for dissipating or muffling exhaust gas noises without the normal resultant back pressures. It is proposed to provide a muffler member having a through-flow passage formed by separate inlet and outlet conduits joined together by an expansion chamber. This serves to break the flow conduit into components of smaller length and has an effect upon their resonant character. It is further proposed to provide resonator chambers about the flow conduits immediately preceding and following the expansion chamber. Such chambers may communicate with either or both the expansion chamber or the flow conduits by suitable acoustical coupling means. Nonetheless important is the provision of baffle means disposed across the expansion chamber between the inner ends of the flow conduits for diverting or baffling the normal flow of exhaust gases around the baffle means and through openings formed therein and axially offset from the normal flow path. The baffling of exhaust gases within the expansion chamber has little material effect as regards back pressure since the openings are greater in size than the flow passage within the conduits.

The proposed muffler means may be made so that it may be accommodated within less space and may be formed as a cylinder, oval or other shape, and may have the flow conduits aligned or offset without an appreciable sacrifice of acoustical benefits.

In the drawings:

Figure 1 is a cross-sectional view of the proposed muffler means.

Figure 2 is a cross-sectional view of the baffle plate within the proposed muffler means as seen in the plane of line 2—2 of Figure 1, looking in the direction of the arrows thereon.

Figure 3 is an enlarged fragmentary section of the communication means between the flow conduit and one of the chambers of the proposed muffler means as here taken in the plane of line 3—3 of Figure 1.

The embodiment of this invention as shown by the drawings comprises a muffler **10** having a casing or shell **12**, here oval in shape, closed by end plates **14** and **16** and having separator or divider walls **18**, **20**, **22** and **24** therein to form resonator chambers **26**, **28**, **30** and **32** as well as expansion chamber **34**. Flow conduits **36** and **38** are extended through the divider walls, which are flanged as shown to receive the conduits or tubes, and are in open

communication with the expansion chamber **34**. Conduit **36** provides an inlet passage **40** and conduit **38** an outlet passage **42** for the flow of exhaust gases through muffler **10**. Coupler or adapter members **44** and **46** are received over the outer ends of the conduits **36** and **38** to provide means for connecting the muffler within an exhaust system.

Baffle means **48** is provided within expansion chamber **34** in the path of exhaust gases which would otherwise flow across the chamber between conduits **36** and **38**. Such means includes a baffle plate **50** secured across the expansion chamber transversely of the flow conduits and having openings **52** and **54** formed therethrough near the side walls of the shell **12** and axially offset from the flow conduits **36** and **38**. The openings **52** and **54** are larger than the outlet of conduit **36** and do not restrict the flow of gases between the two parts **56** and **58** of the expansion chamber **34**. The edges of the baffle plate are turned over about the openings, in the direction of the flow of exhaust gases, as is shown at **60**, and the baffle plate is slightly concave as shown at **62** to better direct and handle gases received thereagainst.

An opening **64** is formed within wall **20** and a conduit **66** is secured therein to provide an acoustical coupling **68** connecting the expansion chamber **34** to the resonator chamber **28**.

Other acoustical couplings **70**, **72** and **74** are provided between the flow conduits **36** and **38** and the resonator chambers surrounding the conduits. The acoustical couplings include louvers **76** struck from the conduits as best shown by Figure 3. The coupling **72** further includes a shielding conduit **78** concentrically disposed about the louvered section of the outlet conduit **38** to change the character of such coupling.

In operation, exhaust gases are received within the inlet passage **40** of conduit **36** and flow straight through to the expansion chamber **34**. Acoustical couplings **70** and **68** are disposed to receive exhaust gas noises and such noises are dissipated within resonator chambers **26** and **28**. The exhaust gas is diverted by baffle plate **50** towards the outer edges of the plate where it flows through openings **52** and **54** formed therein. Because of the size of the baffle plate openings the exhaust gas flow is not restricted but merely diverted to separate out the sound waves traveling therewith. The gases then converge towards the outlet passage **42** formed by conduit **38** to flow past the other resonator chambers **30** and **32** which further filter out objectionable noises by means of the acoustical couplings **72** and **74**.

While the illustrated muffler is oval in shape such shape does not contribute to the proposed muffler means to any great extent as would limit the muffler housing or casing **12** being other than oval. Likewise the conduits **36** and **38** while shown to be axially aligned might be offset without adverse effect.

We claim:

Vehicle engine exhaust muffler means comprising a housing having end walls, a plurality of intermediate walls transversely of said housing and in parallel spaced relation to said end walls, the first of said intermediate walls and one of said end walls defining a first resonator chamber therebetween and the second of said intermediate walls and said first intermediate wall defining a second resonator chamber therebetween, an expansion chamber formed by said second intermediate wall and the third of said intermediate walls and centrally of said housing, an inlet conduit extending through said end wall and said first and second resonator chambers and opening centrally into said expansion chamber, said conduit having a plurality of louvered accesses opening into said first resonator chamber, an acoustical coupling conduit secured to said second intermediate wall and offset from said inlet conduit and extending into said second resonator chamber for acous-

tically connecting said expansion chamber and said second resonator chamber, a baffle plate disposed in said expansion chamber and having a pair of openings therein, said openings being offset from said inlet conduit and each of sufficient size to permit unrestricted flow of gas therethrough, said baffle plate being concave in the direction of gas flow through said expansion chamber, the fourth of said intermediate walls and said third intermediate wall defining a third resonator chamber therebetween and said fourth intermediate wall and the other of said end walls defining a fourth resonator chamber therebetween, an outlet conduit extending through said third and fourth resonator chambers and through the other of said end walls and opening centrally of said expansion chamber and aligned with said inlet conduit, said outlet conduit having a plurality of louvered accesses formed therein and opening into said third and fourth resonator chambers, and an acoustical shielding conduit secured to said

fourth intermediate wall and extending into said third resonator chamber and concentrically disposed about said outlet conduit and about said louvered accesses opening into said third resonator chamber, said resonator chambers, said acoustical conduits, said louvered accesses and said concave baffle plate altering the acoustical character of the exhaust gases flowing therethough to muffle and dissipate any noises transmitted thereby from the vehicle engine.

References Cited in the file of this patent

UNITED STATES PATENTS

1,023,225	Shlosberg	Apr. 16, 1912
1,024,688	Lewis	Apr. 30, 1912
2,218,063	Munzer	Oct. 15, 1940
2,220,866	Jensen	Nov. 5, 1940

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 2,881,852 April 14, 1959

Leonard M. Morrish et al.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 4, list of references cited, under the heading, "UNITED STATES PATENTS", add the following:

2,717,048	Deremer	Sept. 6, 1955
2,337,299	Norblitt et al.	Dec. 21, 1943

Signed and sealed this 11th day of August 1959.

(SEAL)

Attest:

KARL H. AXLINE
Attesting Officer

ROBERT C. WATSON
Commissioner of Patents

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 2,881,852 April 14, 1959

Leonard M. Morrish et al.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 4, list of references cited, under the heading, "UNITED STATES PATENTS", add the following:

2,717,048	Deremer	Sept. 6, 1955
2,337,299	Norblitt et al.	Dec. 21, 1943

Signed and sealed this 11th day of August 1959.

(SEAL)

Attest:

KARL H. AXLINE
Attesting Officer

ROBERT C. WATSON
Commissioner of Patents