July 23, 1968 T. B. MONK 3,393,767

COMBUSTION ENGINE MUFFLER

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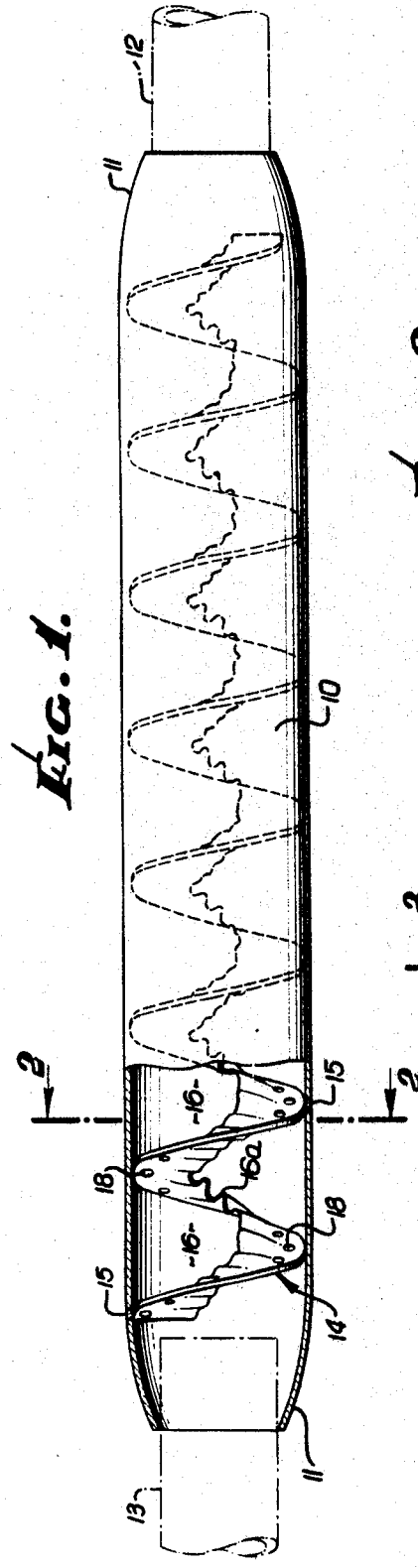


FIG. 1.

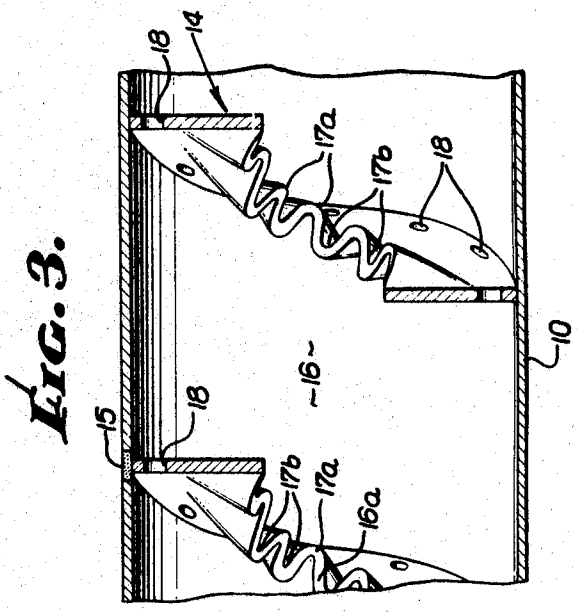


FIG. 3.

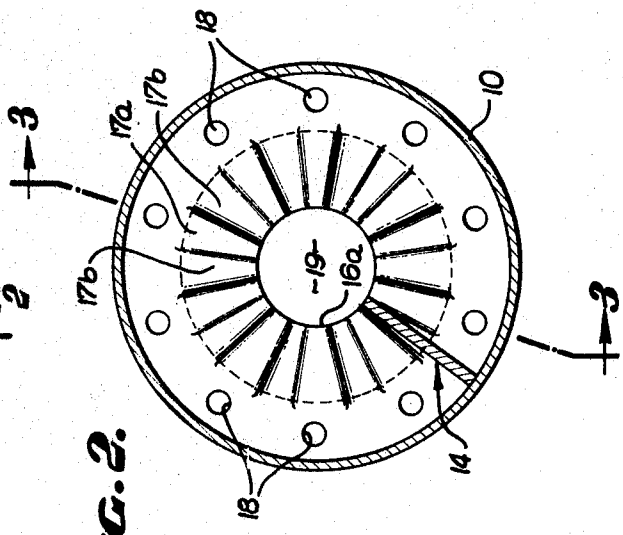


FIG. 2.

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COMBUSTION ENGINE MUFFLER

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ABSTRACT OF THE DISCLOSURE

This invention improves upon prior proposed sound muffling devices of the essentially smooth helical baffle type, by providing a combustion engine muffler, the tubular shell of which contains an extended helical baffle specially formed to have radial corrugations of inwardly increasing depth, the effect of which is to increase the baffling and attenuation of the sound waves by deflecting some of the gas flow into a central through-passage defined by the inner baffle edge, reentry of turbulent gas from that passage into the helical passage between the baffle turns being permitted by the corrugated configuration. Preferably the baffle is perforated outwardly of the corrugations to cause additional attenuation of the gas flow.

Summary of the invention

Heretofore it has been proposed to effect muffling or silencing of audible gas stream pulsations by devices in the form of shells containing a helical baffle having essentially smooth surfaces contacted by the gas in traveling a helical path between the baffle turns, the effect of which has been largely to merely direct the gas flow in an extended helical course.

The present invention achieves additional baffling and gas attenuating effects in this same basic type of muffler by a new and different helical baffle configuration according to which the metallic helix is deformed to have radial and preferably sequentially continuous radial corrugations of inwardly increasing depth and presenting surfaces so irregularized that the gas flow becomes baffled or directed not only helically but generally radially in relation to a central through-passage defined by the inner edge of the baffle. Thus increased attenuation of the gas transmitted sound waves results from added turbulence in gas flow radially out of and into the helical passage, but without significant pressure drop through the muffler.

The later illustrated baffle configuration presents a further practical manufacturing advantage in that formation of the corrugations permits cold rolling or shaping of the baffle for outer edge conformance with a cylindrical shell.

As previously indicated additional gas attenuation may be achieved by perforating the baffle at spaced intervals, as by initially drilling the baffle sheet stock at locations such that when the sheet is helically deformed the perforations will be located outwardly of the corrugations.

These and various additional features and objects of the invention will more fully appear from the following detailed description of an illustrative embodiment shown by the accompanying drawing:

Brief description of the drawing

FIG. 1 is a view showing the muffler in side elevation, a portion of the shell being broken away to expose the baffle;

FIG. 2 is an enlarged cross section on line 2—2 of FIG. 1; and

FIG. 3 is a fragmentary sectional enlargement of the shell and baffle.

Description of the preferred embodiments

In reference first to the assembly appearing in FIG. 1, the muffler has an outer tubular shell **10**, the longitudinal extent of which may vary, e.g. as between 1 to 2 feet depending upon the requirements of dependent engines or installations. Preferably the ends of the muffler shell are swaged or reduced at **11**, one end being suitably connectable as by pipe or fitting indicated by the broken lines **12** with the engine exhaust manifold, and the outlet end with a tailpipe **13** although in some instances the tailpipe may be omitted.

The shell **10** contains a helical baffle **14** which, like the shell may be formed of heat resistive metal, the baffle extent being generally between and in terminal proximity to the swaged shell ends **11**. The baffle is shown to be peripherally bonded to the shell at spaced intervals by welding or brazing at **15** through openings in the shell. Entering from the inlet **12** the engine exhaust gas travels both a helical path through the continuous spaces **16** between the baffle turns and within a central through-passage **19**, see FIG. 2 defined by the inner edge of the baffle.

The invention is primarily concerned with the baffle configuration particularly illustrated in FIG. 3 wherein the baffle is shown to have uniformly spaced radial corrugations **17** produced by cold deformation of the baffle metal, the corrugations starting from radially outward locations along the helic strip and increasing as illustrated to a considerable depth at the inner edge **16***a* of the baffle as in the portions shown in FIG. 3. Thus the corrugations present baffling progressively projecting crests **17***a* and channels **17***b*, impinged against and swept by the gas stream throughout the course of its helical passage in the channel **16**.

As previously indicated, additional attenuation is given the gas flow by the formation of apertures **18** through the baffle outwardly from the corrugations **17**, with which the apertures may be radially alined.

During its passage through the muffler the gas stream has lateral sweeping impingement against the corrugations **17** resulting in localized baffling of the gas and deflection of a portion through the corrugation channel **17***b* into the through-passage **19**. Turbulence in the latter also tends to reversely displace some of the gas back into the helical space **16** and through the corrugation channels **17***b*. The total effect is productive of attenuation of the sound pulsations or waves in the gas stream, contributory to their elimination at audible level in the discharge gas. Presence of the apertures **18** through which the gas flow is restricted, further attenuates the gas flow so that the end result is a muffler performance eliminative of high efficiency of all audible sounds.

I claim:

1. An engine muffler comprising a tubular shell, an extended helical baffle of single sheet metal thickness within the shell and having its turns radially corrugated at increasing depth toward the inner edge of the baffle, said corrugations presenting deflective impingement surfaces about a central passage defined by the inner edge of the baffle to combustion gases being directed spirally between the baffle turns, said baffle having spirally spaced apertures radially outwardly beyond the corrugations.

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