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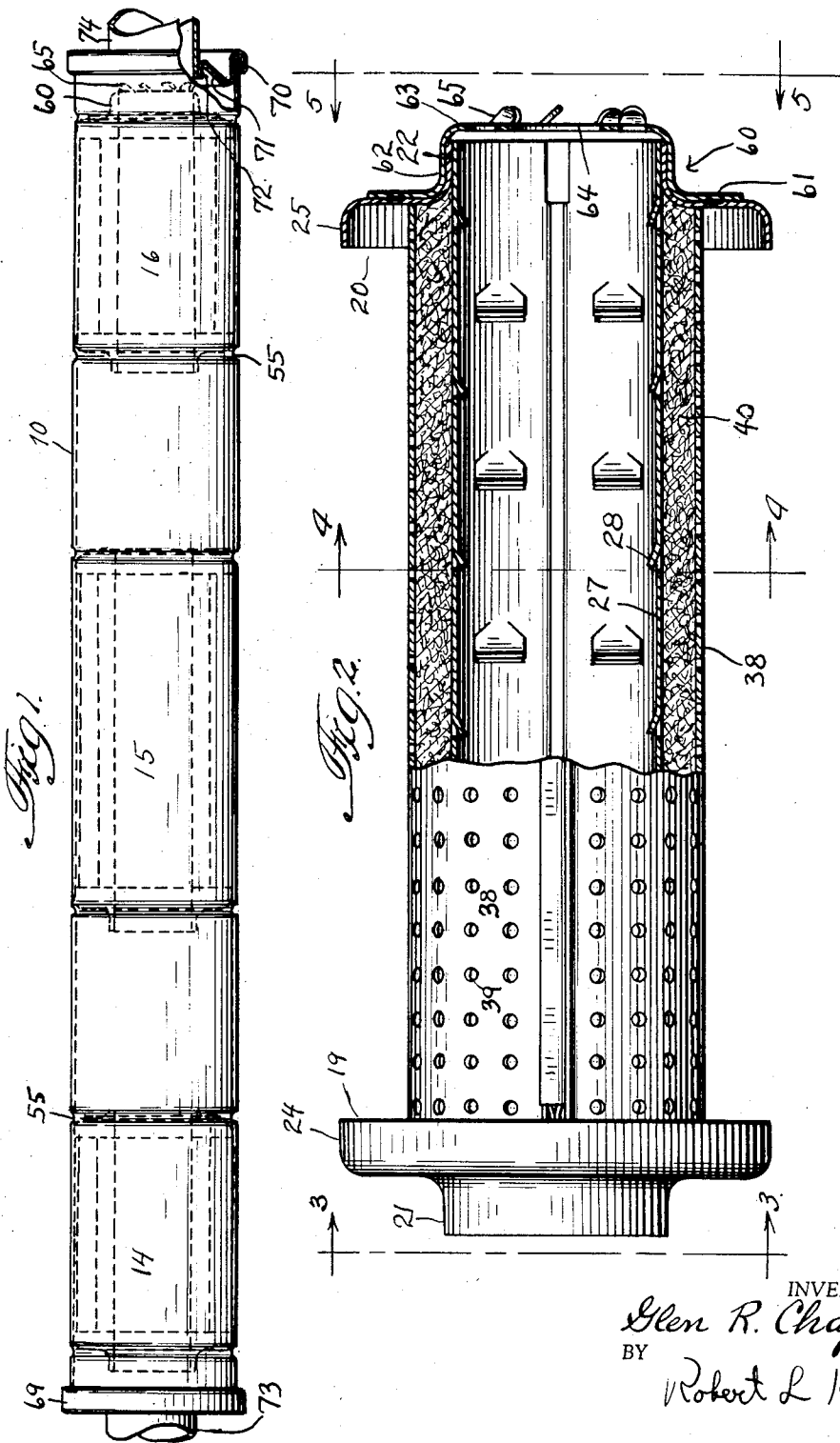
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MUFFLER

Filed Dec. 28, 1956

2 Sheets-Sheet 1



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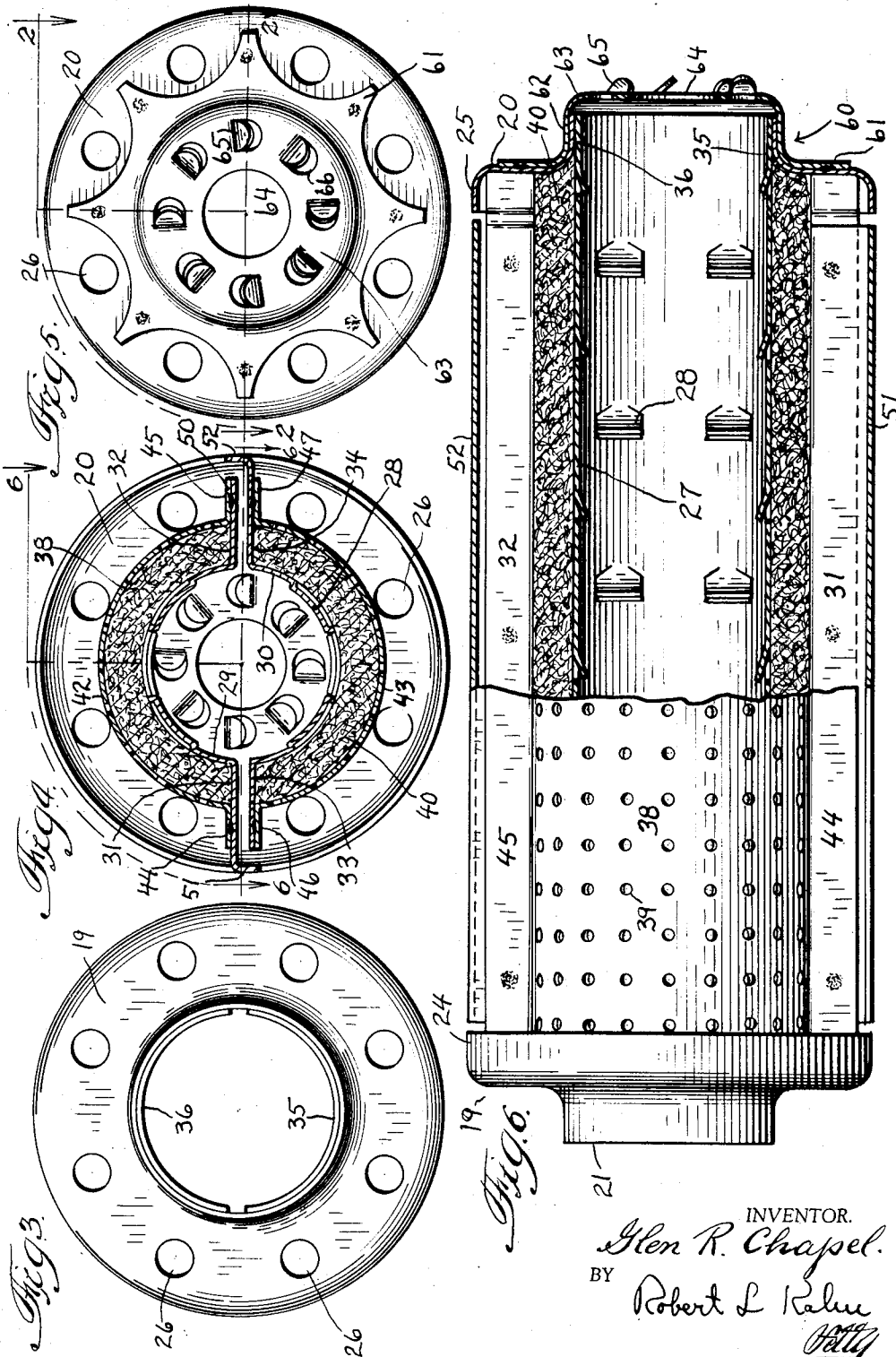
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## MUFFLER

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1 Claim. (Cl. 181—42)

This invention relates to a muffler for internal combustion engines and particularly for gasoline engines as used in automobiles, trucks and the like. This invention provides means which cooperate with a conventional muffler for increasing the efficiency and reducing exhaust noise. In order that the invention may be understood, it will be disclosed in connection with the drawings showing an exemplary embodiment. It is understood that variations may be made within the scope of the appended claim.

Referring to the drawings,

Figure 1 is a side view of a muffler embodying the present invention.

Figure 2 is a side view with certain parts broken away along line 2—2 of Figure 5 illustrating the core unit in the muffler, the core unit having the new diffuser.

Figure 3 is an end view along line 3—3 of Figure 2.

Figure 4 is a section along line 4—4 of Figure 2.

Figure 5 is an end view along line 5—5 of Figure 2.

Figure 6 is a view along line 6—6 of Figure 4.

The muffler to which the new diffuser may be applied comprises outer shell 10 of sheet steel or sheet iron. Shell 10 may be rolled from a flat strip of metal with the opposing edges folded to form a longitudinal seam. Disposed inside of shell 10 are a number of core units 14, 15 and 16 longitudinally spaced from each other. As illustrated here, three such core units are provided. This number is exemplary and there may be more or less core units as desired.

The core units are generally similar and only one need be described in detail. Each core unit has dished end members 19 and 20 both of similar construction. These end members have oppositely directed outwardly extending sleeve portions 21 and 22 and have flange portions 24 and 25 extending toward each other. Between the sleeve and flange on each end member there may be provided a series of apertures 26 to permit gas to pass through the end members.

Rigidly disposed within sleeve portions 21 and 22 of the end members is an inner tubular member 27. Tubular member 27 has ears 28 punched out at various points or regions. Ears 28 are oriented so that the ears, which are inwardly bent, tend to catch gas moving from sleeve portion 21 toward sleeve portion 22. Inner member 27 may be formed of one piece to provide a cylinder but is conveniently made from two separate flat strips of metal to form parts 29 and 30 of the inner complete member. Parts 29 and 30 have the side portions thereof bent outwardly to form flanges 31 and 32 for part 29, and 33 and 34 for part 30. As illustrated in Figure 2, parts 29 and 30 of tubular member 27 are shaped to form almost semi-cylindrical parts. Flanges 31 to 34 inclusive extend the full length of member 27 except for sleeve portions 35 and 36 at the two ends thereof. It will be noted that flanges 31 and 33 of parts 29 and 30 are opposite each other and spaced from each other. Similarly flanges 32 and 34 are spaced from each other.

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Sleeve portions 21 and 22 of the end members are spot welded or otherwise rigidly secured to sleeve portions 35 and 36 of tubular member 27. Thus the two halves 29 and 30 making up member 27 will be rigidly secured to the end members.

Disposed around tubular member 27 and spaced therefrom is outer member 38. This is made of sheet iron and may be provided with perforations 39 extending through the wall thereof. Between member 38 and member 27 is annular region 40 which may be left free or may be filled with sound deadening material such as fiber glass, glass wool or any other material which is resistant to heat and will tend to absorb sound.

Outer member 38 may be formed of two parts 42 and 43 in a manner generally similar to tubular member 27. Parts 42 and 43 have flange portions 44 to 47 inclusive. Outer member 38 extends as far as the end members. Flange portion 31 of member 27 extends far enough so that with flange portion 44 a double layer of metal is formed. This double layer of metal is spot welded at various points such as 50 along the length of the double layer of metal. Flange portion 41 extends far enough to provide bent edge portion 51 disposed against the inner surface of outer shell 10.

Flange portions 43 and 46 are similarly constructed and are also spot welded at various parts along the length of these two flanges. With respect to flange portions 43 and 46, the double layer of metal stops short of shell 10. It will be noted that a channel providing communication between the opposed spaced doubled layer of metal from outside of outer wall 38 to inside of inner member 27 is provided.

Flange portions 32 and 45 are similar to flange portions 33 and 46 in construction. Flange portions 34 and 47 are similar in construction to flange portions 31 and 44. It will be noted that flange portion 34 has bent edge portion 52 corresponding to bent edge portion 51.

A complete core unit is maintained in position within shell 10 in any suitable manner. Thus shell 10 may have an annular pattern of inwardly directed bumps 55 or a continuous inwardly directed annular trough to cooperate with flanges 24 and 25 of the end members to lock a core unit longitudinally in position within shell 10. To prevent rattling, spot welding between shell 10 and flanges 24 and 25 may be provided.

In accordance with the present invention, the exhaust end of rear core unit 16 in the exhaust muffler is provided with diffusing member 60. Diffusing member 60 is of metal and has mounting portion 61 which is adapted to be disposed against the outer surface of end member 20 of a core unit. Mounting portion 61 of the diffuser is in the form of an outwardly directed flange which extends radially from the axis of the core unit. Diffusing member 60 has sleeve portion 62 and end portion 63. End portion 63 has central portion 64 cut out to leave an opening therethrough. The remaining wall portion 63 is punched out to provide an annular pattern of vanes 65 resembling the vanes of the rotor of a turbine.

Vanes 65 are bent out from wall 63 and thereby provide perforations 66 through which exhaust gases may pass. The vanes are disposed in a circular pattern with all the vanes similarly bent.

The diffuser is thus in the form of an end cap having a central aperture and a series of apertures around the central aperture. The series of apertures is formed by the vanes punched out therefrom.

It is important that the various core units be disposed within the ends of outer shell 10. The entire exhaust muffler consisting of shell 10 and the core units is provided with means for connecting the same. Shell 10 has end members 69 and 70 each having a dished end mem-

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ber 71. End member 71 has the outer edge thereof crimped to the edge of shell 10, the crimping providing a suitable thickness of metal for enhancing the strength of the structure. The end members may have any desirable shape and are curved as illustrated in Figure 1 so that sleeve portion 72 is provided. Sleeve portion 72 is suitably dimensioned to accommodate inlet pipe 73 or outlet pipe 74.

Diffuser 60 is disposed entirely within shell 10 and there is a separation of the opposite ends of diffuser unit 60 and sleeve portion 72 of end member 70. Thus a portion of the exhaust will be directed by vanes 65 to generate a whirling blast in the annular region between diffuser flange 61 and the body portion of end member 70. Exhaust gases passing through apertures 64 of the diffuser and outlet pipe 74 will also serve to suck gases from the whirling mass around the sleeve portion 62 of the diffuser.

It has been found that an exhaust muffler embodying the invention is efficient and provides generally more silencing than the same construction without the diffuser attached thereto.

If desired a diffuser may be attached to the exit end of the other core units. The increase in efficiency however is not sufficient generally to warrant added diffusers.

Having described the invention, what is claimed is:

An exhaust muffler comprising a generally cylindrical shell having inlet and outlet ends, at least two core units within said shell longitudinally spaced from each other, one core unit having its inlet end near the inlet end of

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the muffler, the other core unit having its outlet end opposite the outlet end of the muffler, each core unit comprising perforated end members having centrally disposed sleeve portions, said sleeve portions being alined to permit gas to pass through the end members, inner and outer tubular members disposed between said end members with sound absorbing material therebetween, means providing for the passage of gas from inside of the inner member to outside of the outer tubular member, and a diffusing member at the discharge end of the other core member only, said diffusing member comprising an end cap disposed over the sleeve portion of said core end member, said cap having a centrally disposed aperture and an annular series of apertures around said centrally disposed aperture with ears at each of said annular series of apertures to provide vanes for directing gas in a generally whirling path with respect to the muffler axis, said series of apertures being within the prolongation of the inner member of the other core unit and imparting a whirling motion to gases discharged into the exhaust pipe at the exhaust end of the muffler.

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