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RETROVERTED PASSAGE TYPE MUFFLER
WITH EXPANSION CHAMBERS
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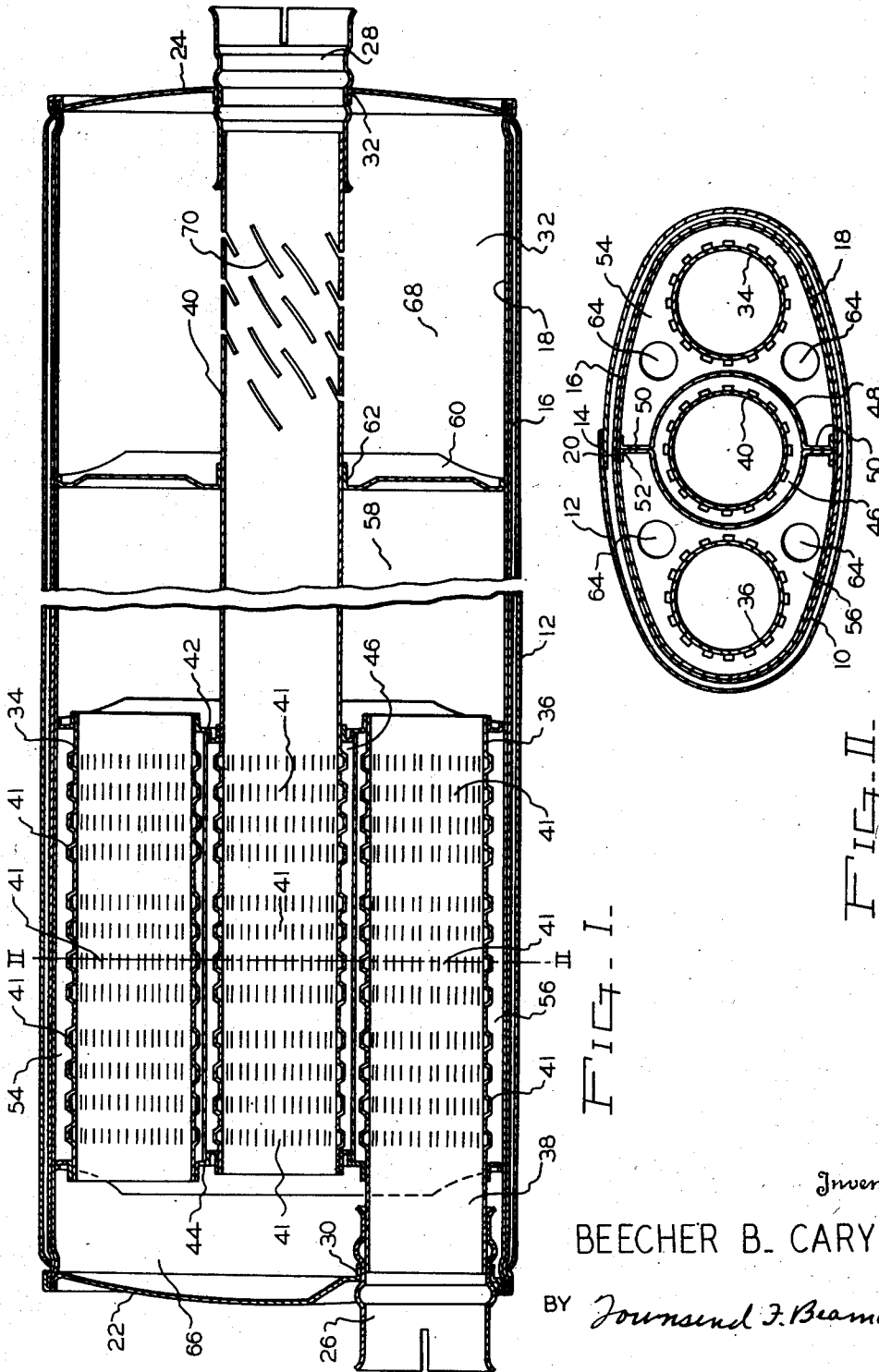


FIG. I

FIG. II

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RETROVERTED PASSAGE TYPE MUFFLER
WITH EXPANSION CHAMBERSBeecher B. Cary, Jackson, Mich., assignor to
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1 Claim. (Cl. 181-54)

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The present invention relates to improvements in mufflers for use on multiple cylinder, high speed, high compression engines of automobiles.

In the design of automobile mufflers maximum sound attenuation over a wide operating range is desired along with restricted limitation upon the size, and shape of the muffler due to frame and body construction.

From the standpoint of minimum back pressure, straight through flow type of mufflers give the best performance. However, where maximum sound attenuation over a wide operating range is required, this type of muffler becomes of excessive length, shell noises are difficult to control and expansion and contraction problems are multiplied by the length of the component parts of the muffler.

It is the object of the present invention to provide a muffler in which the advantages of the retroverted type of construction has been combined with some of the chambering and conduit characteristics of the straight through type to provide a relative compact, structurally strong, high capacity muffler which will give substantial sound attenuation over the full operating use of the present day high speed, high compression automobile internal combustion engine with minimum back pressure. The invention is deemed to reside in details of construction and the arrangement and combination of parts.

In the accompanying drawings,

Fig. I is a vertical cross-sectional view of a muffler embodying the structural principles of the present invention, and

Fig. II is a cross-sectional view taken on line II-II of Fig. I.

The outer casing 10 of the muffler is of elliptical cross-section comprising an outer sheet metal shell 12 spot welded along the lap seam 14, a layer of asbestos 16 and a double wrapped inner sheet metal shell 18 spot welded along the lap seam 20. The heads 22 and 24 are rolled upon the inner shell 18 with deformation of the inner and outer shells 12 and 18 in the manner indicated in Fig. I. The inlet and outlet tubes 26 and 28, respectively, are spot welded in flanged apertures 30 and 32 of the heads 22 and 24.

The structure for providing retroverted flow of the exhaust gases entering the inlet 26 is in the form of a unit having a slip fit connection with the inner shell 18 and the inlet and outlet tubes 26 and 28. This unit comprises tubes 34 and 36 which may be of approximately the same size and length, except for the exterior portion 38 having a slip fit with the inlet tube 26, and a

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much longer tube 40 which extends practically the entire length of the muffler and has a slip fit with the outlet tube 28.

Between the heads 42 and 44 the tubes 34, 36 and 40 are perforated at 41, preferably in the manner disclosed in U. S. Patent No. 2,070,543. Through these perforations the interior of the tube 40 is in communication with the acoustic chamber 46 defined by the shell 48 provided with longitudinal flanges 50. The flanges 50 provide structural support across the minor axis of the casing 10 with respect to inwardly directed forces only as there is a slip fit between their outer edges 52 and the interior wall of the shell 18. The flanges 50 have the further function of forming a partition along with the shell 48 for the chambers 54 and 56 with which the interiors of the tubes 34 and 36, respectively, communicate through the perforations at 41.

The tube 36 discharges exhaust gases from the inlet tube 26 into the expansion and resonator chamber 58 defined between the head 42 and the baffle 60 with which the tube 40 has a slip fit at 62. Restricted openings 64 in the head 42 place the chamber 58 in compound arrangement with the chambers 54 and 56.

Expanded gases from the chamber 58 flow in the tube 34 in counterdirection to the gas flow in the tube 36 into the secondary expansion chamber 66 from which the expanded and sound attenuated gases are conducted by the tube 40 to the outlet 28. Further sound attenuation takes place as the gases flow through the tube 40 as a result of the embracing acoustic chamber 46 and the enlarged lower frequency chamber 68 defined between the baffle 60 and the head 24. Elongated slots 70 provide communication between the interior of the tube 40 and the chamber 68, being preferred to the arch type of perforation 41 at this particular point.

It will be understood that where reference is made to expansion of gases such expansion will also be accompanied by a contraction of volume due to cooling which will, likewise, assist in reducing back pressures. In practice the diameter of the tube 40 may be less than the tubes 34 and 36, if desired.

Having thus described my invention what I claim as new and desire to protect by Letters Patent is:

A muffler comprising an outer casing having heads at opposite ends including an inlet and an outlet, a pair of expansion chambers located in said casing, a retroverted gas flow unit disposed in said casing and located between said

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chambers, said unit including three tubes, one of which conducts gases from said inlet across one of said expansion chambers and discharges the gases into said other expansion chamber, another of said tubes conducting gases between said expansion chambers, and the third of said tubes conducting gases from the first of said expansion chambers across the second of said expansion chambers to said outlet, sound attenuation chambers embracing said tubes between said expansion chambers, openings defined in the wall of said tubes within the area embraced by said sound attenuation chambers to acoustically connect the interior of said tubes with the interior of said sound attenuation chambers, a transverse wall common to and constituting one of the end walls for each of said sound attenuation chambers and also defining one of the end walls of one of said expansion chambers, and openings de-

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fining in said transverse wall to bring said last mentioned expansion chamber and said sound attenuation chambers into compound acoustic arrangement with each other through said transverse wall.

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