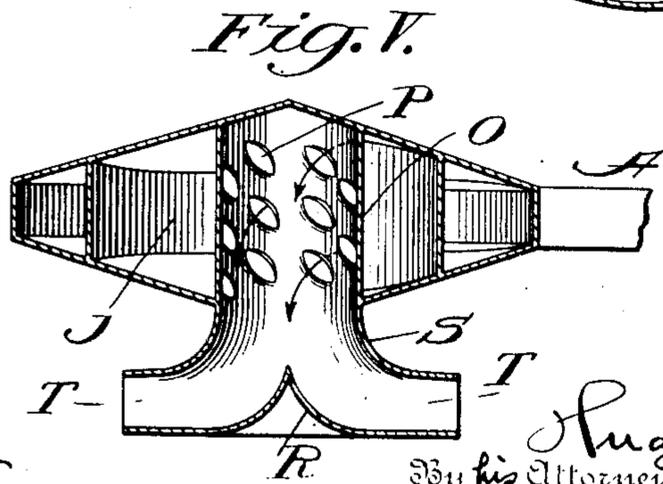
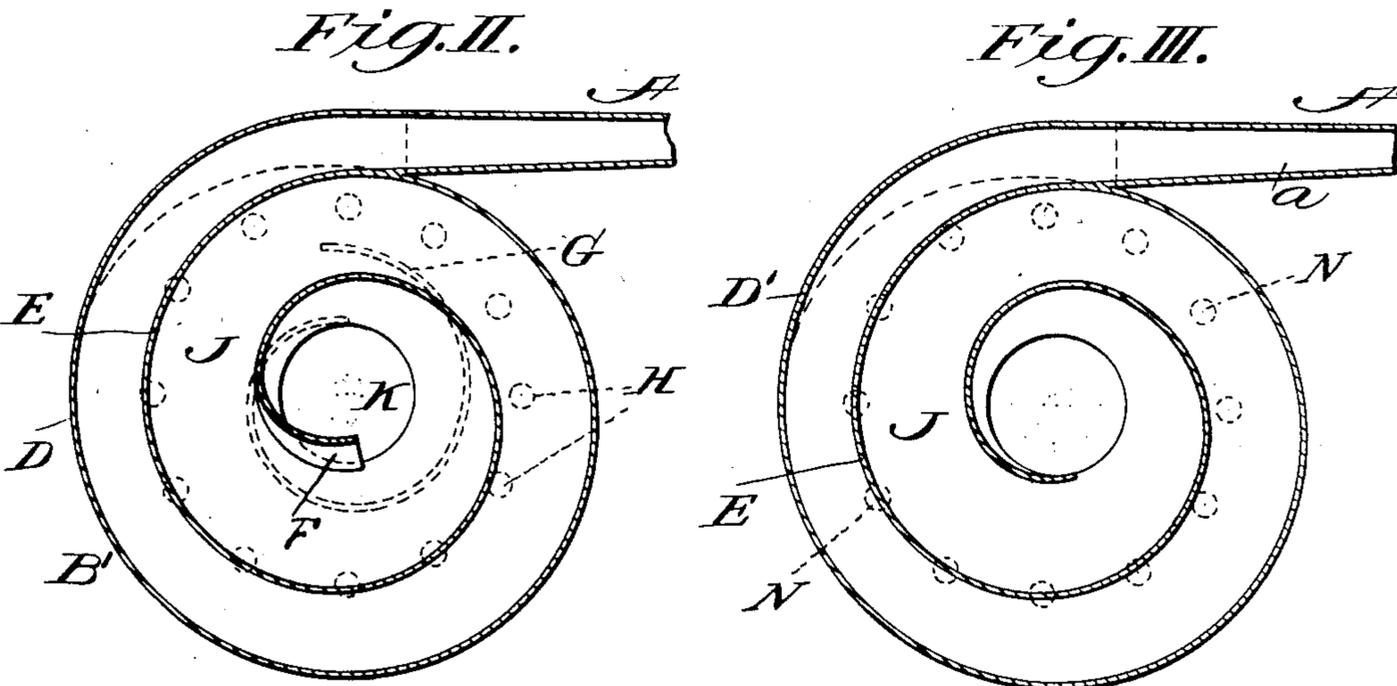
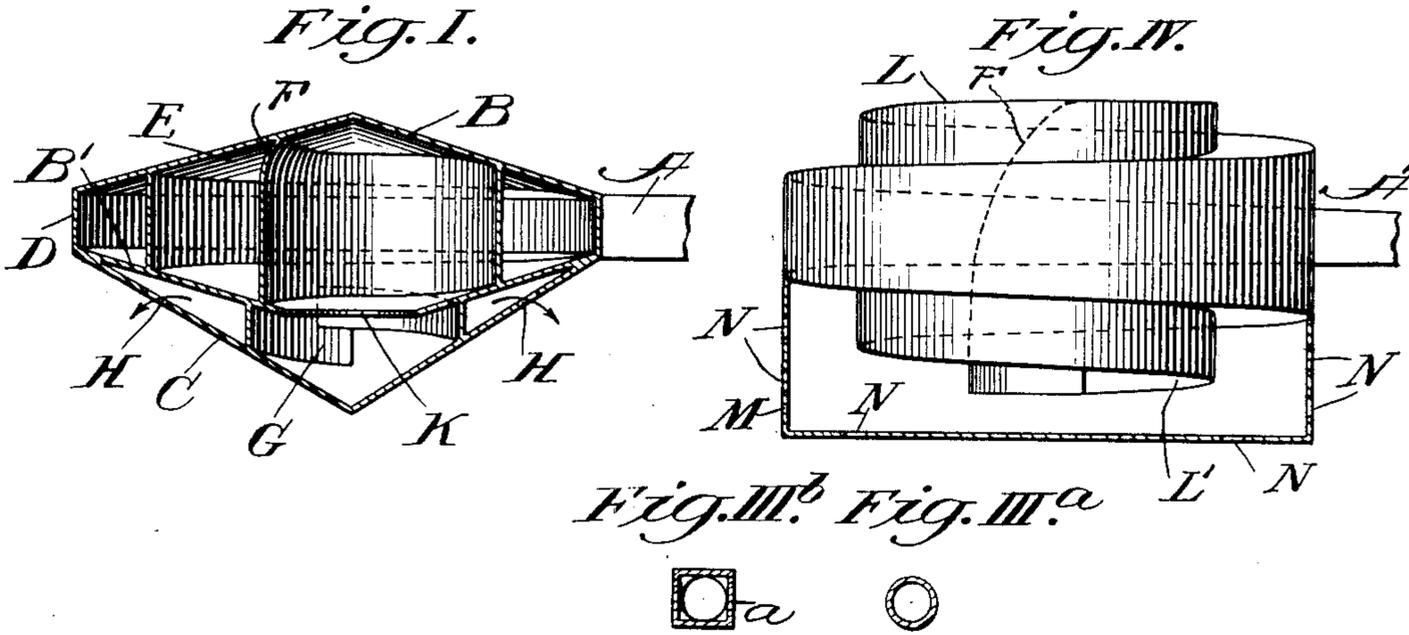


H. C. GIBSON.  
MUFFLER.

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969,101.

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# UNITED STATES PATENT OFFICE.

HUGO C. GIBSON, OF NEW YORK, N. Y.

## MUFFLER.

989,101.

Specification of Letters Patent. Patented Aug. 30, 1910.

Application filed February 5, 1909. Serial No. 476,252.

*To all whom it may concern:*

Be it known that I, HUGO C. GIBSON, a British subject, residing in the borough of Manhattan, city and State of New York, have invented certain new and useful Improvements in Mufflers, of which the following is a full and clear description, reference being had to the accompanying drawings.

My invention pertains to devices usually used in conjunction with internal combustion engines, though having broader application, and are intended to afford a means for preventing back-pressure in the exhaust of gases from such an engine and at the same time muffle or silence the noise of exhausting gases. These and other advantages are incident to the use of my invention and among other desirable features, embodiments of my invention are susceptible of very cheap manufacture and at the same time insure durability, simplicity and compactness.

By the use of my invention complications of construction heretofore necessary in connection with the exhaust from internal combustion engines may be eliminated, while a direct and most important effect is increasing the efficiency and obtaining other marked advantages in the operation of engines when equipped with my improvements.

In the accompanying drawings I have illustrated a particular form or forms of my invention, which I will specifically describe, but the invention is not limited to these particular forms, various modifications of arrangement, construction, material and other features being within the scope of my invention.

In the drawings Figure I. is a transverse section of a muffler; Fig. II. is a plan view of the same muffler; Fig. III. is a plan view of a similar muffler of modified construction, while Fig. III<sup>a</sup> is an end view of the intake pipe to the muffler, and Fig. III<sup>b</sup> is a section of the supplementary piece forming the intake extension. Fig. IV. is a side elevation of the muffler shown in Fig. III. Fig. V. is a transverse section of a muffler showing modified details of central exit.

My invention is intended in particular for use on automobiles in which the exhaust pipe from the engine would be led by suitable piping with the least possible abrupt turns to a position such as under the body and in the rear where the muffler would be

located, and in side elevation would appear as in Fig. I., in which A is the exhaust pipe from the engine, B is the top or roof of the muffler, B' is the muffler proper, C is the cover of the outlet side of the muffler, D is the side wall, E is the spiral partition or main passage wall, F is a terminal deflector, G is an outlet passage spiral partition, H are final outlet holes in the bottom cover C.

J designates generally the passage or pipe space in the main or body portion of the muffler and K the outlet.

In the modified form shown in Figs. III. and IV., A' is the inlet pipe to the muffler, while portion *a* is a tapered trough section piece used in forming the inlet. Generally the passage-way J is the same as in the form shown in Figs. I. and II., except that the top or roof L and the bottom L' are formed out of a spirally stamped sheet instead of being conical as shown in the first form. M is a bottom cover from which the gases find their way through holes N to the outer air.

Having designated the particular parts shown, the construction can be described as consisting of the inlet pipe A leading tangentially into the muffler as a whole, and having a sectional area at the inlet equal to the sectional area of the exhaust pipe from the engine. Following the passage-way J from the inlet it deflects gradually into a circle and progressively increases in sectional area, continuing in a decreasing spiral, whereby the gradual deflection is constantly increasing until in the center of the muffler the passage is very high, or deep, so that its sectional area is so large compared with the inlet that the gases have had an opportunity to expand. At the center the deflector F is so formed that the core of whirling gases is deflected downward by a gradual curvature of the deflector F, and passes out of the muffler at the outlet K. For different sized engines I construct the muffler of different sizes, which means substantially a size commensurate with the volume of exhaust gases to be disposed of. In addition to this a muffler for any particular engine must take care of a different volume of gases during any unit of time, depending upon the speed of the engine, and a most advantageous characteristic of my invention is that it will accommodate the varying conditions of operation of an engine.

For the very wide range of conditions for which a standard size of muffler might be

used, I prefer to add a bottom cover C forming a space between it and the bottom B' of the muffler proper, so that the gases passing out of opening K, in view of their momentum, will by their centrifugal force, guided preferably by a deflector G spirally outward, find their way into the bottom space and finally pass through the holes H, thus exhausting into the free air.

The simplicity of construction of my muffler is a great advantage as it consists of the spiral band E of sheet metal bent at its inner end to form the deflector F, the two covers, top and bottom B and B', which are dished sheet metal, and a side wall D which is a band of sheet metal. These parts I rivet together, or in preferred form use autogenous welding which secures the joints without the additional weight of rivets, bolts or screws. When completed, the interconnecting parts for proper functioning, in addition constitute a well-braced structure particularly adapted to withstand any usage or abuse to which it may be subjected, as, for instance, the accidental striking of stones thrown by the wheels of the automobile. The form lends itself admirably to the attachment of braces or suspender straps to secure to any part of the vehicle or structure where it may be used.

In the form shown in Figs. III. and IV., the top and bottom covers L L are made from a flat sheet which has a spiral cut in it leading almost to the middle. The outer wall D' in this form continues into the spiral partition wall, increasing in width to the center where a corner is turned over to form the deflector F', which gradually deflects the direction of motion of the gases downward and out through the bottom into the space formed by the bottom supplementary cover M, where they find their way out of the holes N to the free air.

In Fig. V. the central exit portion is shown in a modified form. In the cylindrical portion O, are the oblique deflecting openings P. These oblique slots P may be fashioned so that their edges project outwardly on one side and inwardly, from the shell O, on the other side of the slot, so as to cause a constant deflection of the gases, as indicated by the arrows. The deflection downwardly carries the exuding gases to the extension S below the spiral portion of the muffler, where a central deflecting cone or ridge R deflects them laterally to the final exits T T.

It will be seen in the manufacture of these forms of mufflers, flat sheet metal in the form of a long tapered strip constitutes one member, while two substantially circular flat sheets with a spiral cut, requiring no dishing or pressing into any complicated form, constitute the essential elements, affording a very inexpensive means of con-

struction. In this latter form it will also be seen that the joints between the spiral walls and the top and bottom cover can be seen from the outside, and afford every facility for autogenous welding. The outer wall or strip D' is turned tangentially at the inlet and a supplementary piece *a* is then fitted to this extension of the band forming in a very simple manner the inlet pipe A', the extremity of the wall and the supplementary piece *a* being readily stamped so that they together form a cylindrical end to fit the usual round exhaust pipe.

In order that my improved muffler may be adapted more conveniently, it is desirable in some cases to vary its dimensions and still maintain substantially the same length of passage-way, without unduly varying the gradual increase of passage-way section. Many modifications in dimension and arrangement may be made to suit these varying conditions, and among them I have designed an oval or elongated form, by means of which I get an elongated central space particularly well adapted to accommodate the deflector, corresponding to the deflectors F F', but running lengthwise of the elongated central opening and thereby giving a still more downward or outward deflection of the gases from the passage proper.

In all the forms it will be seen that there is no baffling, that is direct obstruction to the passage of the gases which are intermittently exhausted from the engine into the muffler but they are gradually deflected, without hindrance to their momentum, and finally after being permitted to expand they are again gradually deflected out of the casing without losing their momentum, and their outlet or exhaust from the muffler, having maintained their momentum, result in their sucking the following gases out of the muffler. By this construction and arrangement the noise of the exhaust is substantially muffled, and at the same time there is no part of the device to impede the gases, and on the contrary the outlet from the muffler is such, in its coöperation with the other parts, that an actual suction is produced.

As a practical and concrete result I am able to get an appreciable vacuum at the outlet of my muffler, which means that the condition in the exhaust pipe from the engine is such as to draw the exhausting or inert gases from the engine cylinder when the exhaust valve of the engine opens. Heretofore devices intended for muffling the exhaust of gas engines have invariably caused an appreciable back-pressure in the exhaust pipe from the engine, thereby retarding the expulsion of the gases and proportionately decreasing the useful work or power of the engine. It will therefore be seen that a remarkable advantage is incident to the use of my device in that it not alone eliminates

back-pressure on the exhaust stroke of the engine, but gives a decided vacuum in the exhaust pipe insuring a clean charge and permitting increased range of speed of the engine, also permitting an increase of power by eliminating the work otherwise lost owing to the back-pressure.

In actual practice my device shows that the exhausting from a gas engine into the open air involves an appreciable pressure owing to the resistance of the air, whereas the passage of the exhaust gases through a device containing my invention cause a continuous suction while their momentum is being spent.

Manifold further advantages result from the use of my invention, and in its various adaptations structures embodying it may vary from what I have specifically shown and described. I therefore do not limit myself to the particular forms herein shown, but

What I claim and desire to secure by Letters Patent is:

1. A muffler for internal combustion engines comprising a spiral passage-way with an inlet at its larger diameter and an outlet at or near its center, said passageway increasing in sectional area from inlet to outlet.

2. A muffler for internal combustion engines consisting of a box generally of a form approximating two flat cones, base to base, having an inlet tangential to the base, a spiral passage-way leading to an outlet at the center.

3. A device for preventing back-pressure

in the exhaust pipe of internal combustion engines, including a substantially circular box with inlet near its periphery and passage-ways gradually deflecting gases through a spiral passage-way of constantly decreasing radius, means for gradually deflecting gases from a space centrally located in said spiral.

4. A device for preventing back-pressure in the exhaust pipe of internal combustion engines comprising a box with top and bottom covers, a band secured spirally between said covers, an inlet tangential to the casing and an outlet near the middle of said casing affording a continuous unobstructed passage of gases substantially for the purpose described.

5. In combination in the exhaust passage from an internal combustion engine, a spiral passageway of increasing section, from inlet to exit and having an outlet at its center to permit the free exit of gases in the direction of their deflection.

6. In combination with a spiral passage-way for exit of products of combustion, an inlet farther from the center than the outlet, means cooperating with the outlet to gradually deflect the products of combustion in direction of the outlet for the purpose described.

Signed at New York, this 3rd day of February, 1909.

HUGO C. GIBSON.

Witnesses:

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