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B. A. GRAMM.

MUFFLER.

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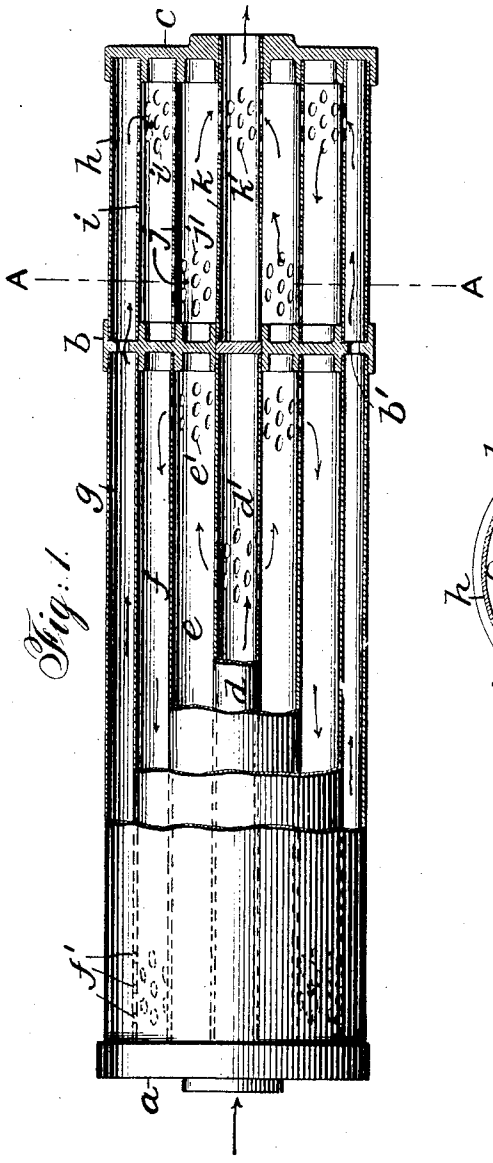


Fig. 1.

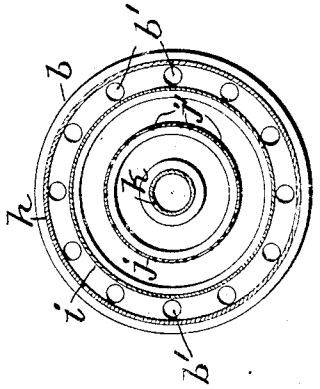


Fig. 2.

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UNITED STATES PATENT OFFICE.

BENJAMIN A. GRAMM, OF CHILLICOTHE, OHIO.

MUFFLER.

No. 822,115. Specification of Letters Patent. Patented June 12, 1906.

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To all whom it may concern:

Be it known that I, BENJAMIN A. GRAMM, a citizen of the United States, residing in Chillicothe, in the county of Ross and State of Ohio, have invented certain new and useful Improvements in Mufflers, of which the following is a description, reference being had to the accompanying drawings.

My invention relates to improvements in mufflers used particularly in engines of automobiles to deaden the sound of the exhaust as it escapes into the outer air; and the object of my invention is to provide a muffler which shall be simple in construction, cheap in manufacture, and very efficient in operation.

In the drawings illustrating the principle of my invention and the best mode now known to me of applying that principle, Figure 1 is a side elevation, the outer shell being broken away to show clearly the interior construction; and Fig. 2 is a sectional view on the line A A of Fig. 1.

My new muffler consists, essentially, of two parts or sections of different sizes, the part designed to be connected with the engine-cylinder being of greater volume than the part designed to discharge the exhaust-gases into the outer air.

The two end pieces *a* and *c* are preferably made of cast-iron, as are also the partition *b* and the central pipes *d* and *k*. Between the end piece *a* and the partition *b* are mounted, as is clearly shown in Fig. 1, the concentric cylinders *d*, *e*, *f*, and *g*. These cylinders, except the central one, *d*, are preferably made of the same material as that of which ordinary stove-pipes are made—that is, sheet metal. Between the end piece *c* and the partition *b* are mounted the cylinders *h*, *i*, *j*, and *k*. These cylinders, except the central one, *k*, are made of the same material as the cylinders *e*, *f*, and *g*.

The gases from the engine-cylinder are led through an opening in the end piece *a* into the cylinder *d*, from which they pass by their own expansion through the apertures *d'* near the center thereof into the cylinder *e*. The apertures *d'* are upon all sides of the cylindrical surface of the pipe *d*. The gases now pass through the apertures *e'* from the cylinder *e* into the cylinder *f*. The apertures *e'* are near the inner end of the cylinder *e* and extend around its cylindrical surface at this point. The gases traverse the entire length of the cylinder *f* and pass through the apertures *f'* near the front end of the said cylinder *f* out into the outer cylinder or shell *g*. From this outer shell *g* the gases pass through the apertures *b'*, Fig. 2, into the outer cylinder or shell *h* of the second or rear compartment of the device, and thence through the apertures *i'* into the pipe *i*. It is to be noticed that the gases are made to traverse the entire length of the two outer shells *g* and *h* before escaping into the inner cylinder *i*, and are thereby cooled, resulting in a contraction in volume and a fall in pressure. The gases are made to traverse the entire length of the pipe *i* before escaping therefrom through the apertures *j'* into the next inner cylinder *j*. The gases escape from the cylinder *j* through the holes *k'* in the innermost or central pipe *k*, the holes *k'* being located in the outer end of the pipe *k*. From the pipe *k* the gases escape without noise into the open air.

It will be obvious to all skilled in the art that the size of the first compartment, made up of the pipes *d*, *e*, *f*, and *g*, allows of free expansion of the gases, as the volume of the compartment is twice the volume of the engine-cylinder. The volume of the second or rear compartment, made up of the pipes *h*, *i*, *j*, and *k*, is the same as that of the cylinder of the engine. The relative size of the two compartments or sections is such that the gases flow freely from the cylinder without the production of any back pressure, and this freedom of flow of the exhaust is greatly enhanced by the arrangement of the apertures in the several pipes; which while permitting the free escape of the gases therefrom yet force them to traverse the length of the pipes in escaping from one into the other, thereby cooling the gases. The smaller size and length of the pipes of the rear section of the muffler accommodate the muffler to the reduced pressure and volume of the gases in this section and serves to keep the gases moving freely, preventing the formation of any back pressure.

My new muffler is adapted to be used with any kind of engine, whether used as a stationary engine or as an automobile-engine. In operation it is absolutely free from noise and back pressure, forming a perfect muffler.

I am aware of the patent to M. O. and M. T. Reeves, No. 582,485, and disclaim all therein shown.

What I claim is—

A muffler made up of two compartments of unequal volume, the inlet-compartment being of substantially twice the volume of the outlet-compartment; each of said compartments comprising an end piece and a series of concentric cylindrical shells one end of each of which is mounted in one of said end pieces and the other end of each of which is mounted in a partition which separates said compartments from each other; the outer shell of each compartment being imperforate and the other shells thereof being perforated; and said partition being formed with apertures extending entirely around its outer edge between the walls of the outer and the next to outer shells.

BENJAMIN A. GRAMM.

Witnesses:
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