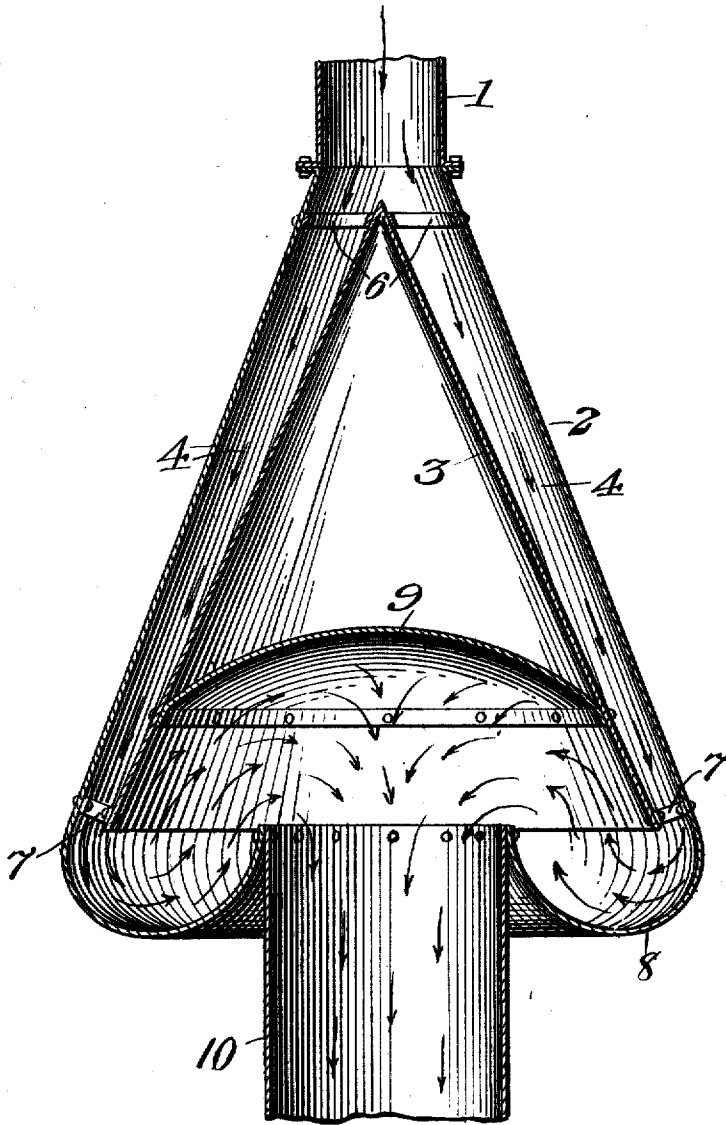


J. M. BROWN.  
MUFFLER.  
APPLICATION FILED JULY 10, 1918.

1,317,858.

Patented Oct. 7, 1919.



*Inventor:*

*J. M. Brown*  
By *Lemuel Eldborough Hill*  
*Atty*

# UNITED STATES PATENT OFFICE.

JAMES MILTON BROWN, OF GROVE CITY, PENNSYLVANIA; MARY C. BROWN  
ADMINISTRATRIX OF SAID JAMES M. BROWN, DECEASED.

## MUFFLER.

1,317,858.

Specification of Letters Patent.

Patented Oct. 7, 1919.

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*To all whom it may concern:*

Be it known that I, JAMES M. BROWN, a citizen of the United States, residing at Grove City, in the county of Mercer and State of Pennsylvania, have invented certain new and useful Improvements in Mufflers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to mufflers for exhaust gases, and has for its object to provide a simple, practical and efficient device of the character described, which practically eliminates the noises produced by exhaust gases under pressure, such as emanate from internal combustion engines and other motors employing gaseous pressure, without producing any back pressure in the motor. To these ends the invention comprises a chamber having an inlet adapted to be attached to the exhaust port or pipe of an engine or the like, and an outlet at the opposite end of the chamber, said chamber being formed of inner and outer walls, preferably conical in shape, so disposed that the cross sectional area of the chamber increases from the inlet to the outlet, and the walls of the chamber converge toward the outlet, with means adjacent the outlet to change the direction of flow of the escaping gases and deliver the same into a recess or chamber, which is preferably defined by a concave plate or septum, located within the inner wall or conical member, the parts being so constructed and arranged that the exhaust gases are gradually expanded and conducted in a gradually thinning layer in contact with the inner and outer walls, which produces a rapid diffusion and dispersion of the heat of the gases, said gases being turned backward and inward toward the center of the muffler, which may be termed the collision chamber, where the said gases entering from all directions collide and are thereby deprived of their kinetic energy and ultimately pass out of the muffler without noise and without the production of back pressure.

The invention illustrated in the accompanying drawing, shows the muffler in vertical cross section.

Referring to the drawing, 1 indicates the exhaust pipe of the internal combustion motor or other gas operated engine or apparatus, to the end of which the muffler is adapted to be attached by any suitable means. The body of the muffler comprises an outer conical member 2 and an inner conical member 3, which are in axial alignment with each other and which constitute inner and outer walls of an annular, generally conical chamber 4. The pitch of the inner cone 3 is made somewhat less than that of the outer cone 2, so that the walls of the two conical members gradually converge or approach each other and leave an annular opening between the lower marginal edge of cone 3 and the adjacent wall of cone 4. The conical members are so proportioned and arranged that the cross sectional area of the space inclosed by the walls is larger than the cross sectional area of the exhaust pipe 1, and gradually increases toward the lower or discharge end of the chamber 4, so that the opening constituting the discharge end of the chamber is several times as great as the opening constituting the inlet of said chamber adjacent the exhaust pipe 1. The conical members 2 and 3 are secured together in rigid relation by means of relatively thin metal spacing strips 6 and 7 at the top and bottom of the conical members, and which are attached to the walls of said conical members by any suitable means.

Extending from the lower end of the outer wall 2 is an annular deflector plate 8, which is curved downwardly below and around the lower edge of the inner conical wall 3, and then upwardly toward the center of the inner cone, the radius of curvature of the deflector plate gradually increasing toward the center so as to provide a gradual change of direction or reversal of flow of the exhaust gases escaping from the chamber 4, to cause the said gases to move from all sides toward the vertical axis of the conical member 3 and to collide, whereby any residual,

kinetic energy or force remaining in the gases is neutralized and dissipated.

Secured within the inner conical member 3 is a concave plate or septum 9, which defines the upper wall of a recess or chamber and where the collision and admixture of the gases occurs, as indicated by the arrows in the drawing. Said plate also serves to prevent the gas entering the upper restricted end of the inner cone 3, thereby preventing any reverberation of the gases which might occur if the interior of the inner cone were left open. If desired, an escape pipe or conduit 10 may be attached to the inner rim of the deflector plate 8, to conduct the exhaust gases away.

As is well known, the detonations of the exhaust of an internal combustion engine or other gaseous pressure motor, are due to the sudden expansion of the gases as they are expelled from the vent or exhaust pipe. In the case of an internal combustion engine the gases derive their force from the quick combustion and explosion within the cylinders or working chambers of the engine. On escaping from the engine cylinders into the exhaust pipe, the hot gases set up straight lines of propulsive force along the path of least resistance, and should they be permitted to escape directly into the atmosphere, they expand rapidly in all directions, producing heavy concussions or detonations. If the gases be permitted to expand and also be cooled before they escape into the air, the noise of the exhaust will be reduced commensurately as the gases approximate atmospheric pressure and temperature. The present invention is designed essentially to produce a substantially complete dissipation of the forces in the exhaust gases and, therefore, an elimination of all noise, by providing for practically complete expansion and material reduction in temperature within the muffler, so that the gases, in effect, roll out into the atmosphere from the muffler without any appreciable propulsive force and at a greatly reduced temperature.

In the practical operation of the device, as hereinbefore described, the exhaust gases from the pipe 1 enter the annular conical chamber 4, defined by the walls 2 and 3, and gradually expand in said chamber, due to the gradually increasing cross sectional area of the latter, and are also gradually reduced to a relatively thin sheet or layer, defined by the converging walls of the chamber, which provides an ideal condition for the reduction of the temperature of the gases by diffusion and convection through the metal of the conical walls. As the gases escape from the lower end of the annular chamber 4, they are turned backward by the deflector plate 8 and directed toward the common center within

the enlarged chamber, defined by the concave plate or septum 9 and the lower walls of the inner conical member 3, and the collision of the various streams of escaping gas from all sides effects a practically complete neutralization of the inherent forces or kinetic energy in the gases, and the latter are transformed into a relatively loose mass in confused commotion without appreciable force, which rolls out quietly into the open air without producing any back pressure and without noise.

While the form of the device as illustrated and described has been found to be efficient and economical in all respects, it is nevertheless to be understood that the invention is not limited to the particular form or arrangement of various parts, but may be varied in many respects without departing from the essentials of the invention, so long as the latter provides for a rapid and constantly increasing expansion and diffusion of the escaping gases without in any way checking or obstructing their flow and for finally turning them back from all sides toward a common center within a recess of suitable size and construction, thereby serving to bring the gases into collision to dissipate and neutralize the propulsive force remaining in the same before they ultimately escape from the muffler.

What I claim is:—

1. A muffler for exhaust gases, comprising a chamber having an inlet an outlet and inner and outer walls so disposed that the cross sectional area of the gas passage increases from the inlet to the outlet while the said walls approach each other toward the outlet, and means adjacent the outlet to change the direction of flow of the gases.

2. A muffler for exhaust gases, comprising a chamber having an inlet an outlet and inner and outer walls so disposed that the cross sectional area of the gas passage increases from the inlet to the outlet while the said walls approach each other toward the outlet, and means adjacent the outlet to change the direction of flow of the gases, the inner wall being provided with means to cause the gases to collide after they leave the outlet.

3. A muffler for exhaust gases, comprising a chamber having an inlet an outlet and inner and outer conical walls converging toward the outlet to produce a gas passage of increasing cross sectional area and of gradually decreasing width, an inwardly curved deflector extending from the outer wall adjacent the outlet, and a septum located within the inner conical wall and forming with the latter and the deflector a chamber within which the escaping gases collide.

4. A muffler for exhaust gases, comprising

a chamber having an inlet an outlet and inner and outer conical walls converging toward the outlet to produce a gas passage of increasing cross sectional area and of gradually decreasing width, an inwardly curved deflector extending from the outer wall adjacent the outlet, and a concave septum located within the inner conical wall and forming with the latter and the deflector a chamber within which the escaping gases collide.

In testimony whereof I affix my signature.

JAMES MILTON BROWN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."