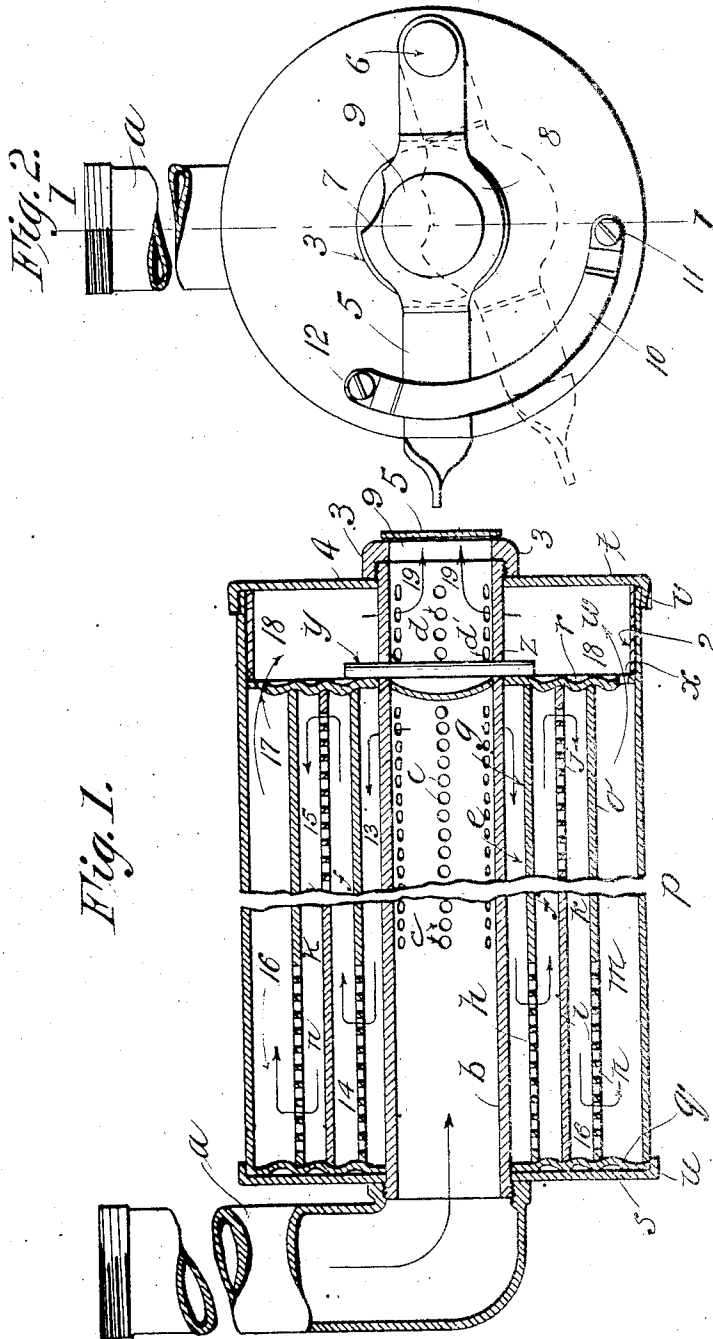


C. O. HEDSTROM.
MUFFLER.

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UNITED STATES PATENT OFFICE.

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MUFFLER.

No. 858,455.

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To all whom it may concern:

Be it known that I, CARL O. HEDSTROM, a citizen of the United States of America, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Mufflers, of which the following is a specification.

This invention relates to mufflers and particularly to the kind employed in connection with internal combustion engines for the purpose of reducing the noise caused by the exhaust of the products of combustion, and also to lessen as much as possible the back pressure caused by the exhaust.

One of the objects of the invention is to provide means for varying the amount of opening which communicates with the interior of the muffler and the external atmosphere; another object is to increase as much as possible the volume of the exhaust gases by allowing them to flow through a series of annular chambers or passage-ways whereby the back pressure is greatly reduced, and at the same time lessening the noise of the escaping gases.

With these objects in view, I have provided a structure that is simple and economical in construction and one that satisfactorily overcomes the objectionable features of the prior art.

In the drawings forming part of this application,—Figure 1 is a longitudinal, sectional view of the muffler on the line 1—1 of Fig. 2. Fig. 2 is an end elevation of Fig. 1 showing clearly the means for regulating the exhaust opening for varying the amount of back pressure and noise.

Referring to the drawings, *a* designates a pipe connected with the exhaust ports of an internal combustion engine; *b* designates an inner tube or pipe secured to the pipe *a* in any suitable manner, as shown; this pipe *b* is provided with two series of perforations *c* and *d* which communicate with an annular chamber *e* external of the pipe *b*. This chamber is separated from the succeeding annular chamber *f* by means of the circular partition or wall *g* and is provided with a series of perforations *h* in one end thereof.

Surrounding and exterior to the annular chamber *f* is a circular partition or wall *i* provided with a series of perforations *j* near one end thereof, and surrounding the circular wall or partition *i* is the chamber *k* that communicates with an annular chamber *m* exterior thereto, by means of the perforations *n*,—the chambers *k* and *m* being separated by means of the circular wall or partition *o*. Surrounding the annular chamber *m* is the circular outer wall or casing *p*.

The circular walls *g*, *i*, *o* and *p* are secured or retained in place by means of the two crimped disk-shaped pieces *q* and *r* which are, in turn, secured to the pipe *b* by means of the flanged heads *s* and *t* that have the turned tight fitting flanges *u* and *v*. Located between the piece *r* and the flanged head *t* is an annular cham-

ber *w* that communicates with the annular chamber *m* by means of the perforations *x* in the piece *r*. The chamber *w* communicates with the outer end of the pipe *b* by means of the perforations *d* in the crimped disk *r* heretofore referred to. The disk *r* is secured in place on the pipe *b* by means of a pin *y* that is driven through the openings *z* near the outer end of the pipe *b*.

3 designates a cap-piece secured on the end of the pipe *b* by means of threads and engages the flanged head *t* at the point 4, as shown.

5 designates an exhaust gate pivoted at the point 6 to the flanged head *t* and is provided with a cut-out part 7, the center of the gate being slightly enlarged, as shown at 8, for completely covering the opening 9 in the end of the cap-piece. The outer end of the gate 5 operates beneath the spring arch-shaped piece 10 that is secured to the head *t* by means of the screws 11 and 12 so that the gate 5 can be retained in any desired position for varying the amount of opening 9. The full line position of the gate 5 in Fig. 2 shows this opening completely covered by the gate 5, while the dotted line position shows the opening 9 partially uncovered.

13 designates the path followed by the products of combustion after they leave the pipe *b* by means of the openings *c*. It will be noticed that these openings are located at the outer end of the pipe and permit the products of combustion to flow inward through the annular chamber *e* and through the openings *h* into the chamber *f*, as designated by the arrows 14. From this point the products of combustion flow toward the outer end of the annular chamber *f* and through the openings *j* into the annular chamber *k*, as designated by the arrows 15. From this point the products of combustion flow inward along the passage or annular chamber *k* to the opening *n* in the circular partition *o* to the outer annular chamber *m*, as designated by the arrows 16. From this point the products of combustion flow outward in the annular chamber *m* and through the openings 17 in the crimped head *r* and into the annular chamber *w*, as designated by the arrow 18. From the annular chamber *w* the products of combustion pass through the perforations *d* and outward through the opening 9 to the atmosphere, as designated by the arrows 19.

It will be seen that by means of this construction the products of combustion are permitted to continuously expand from one chamber to the succeeding chamber thus lowering the pressure, and by means of the circuitous passage-ways the noise is greatly reduced and the rate of discharge through the opening 9 can be suitably varied by means of the exhaust gate 5, as readily understood.

It is understood that the gate 5 can, if occasion requires, be opened and closed by the operator when the machine is running, by providing attaching connecting means to the free end of the gate 5, and also the operator can, if necessary, by opening the gate, permit full

width of the burned-gases to pass directly through the pipe b.

What I claim, is:—

5 In a device of the class described, an exhaust pipe secured to the same, and provided with two sets of perforations, head-pieces secured to the inner pipe and carrying a series of partitions, said partitions being provided with openings, the openings in one partition being diagonally disposed with relation to the openings in the succeeding partition, a flanged head-piece secured to the outermost wall of the device, a spacing piece located between said head-piece and one of the head-pieces, said head-piece being provided with openings for forming a
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15 communication between the outermost chamber and the

series of openings in the outer end of the inner pipe whereby the products of combustion are successively expanded and permitted to pass to the outermost chamber in the chamber located between the cap-piece and one of the heads, and means for varying the flow of the products of combustion to the external air, said means comprising a gate pivoted to the flanged head-piece and having an enlarged portion midway between its ends and adapted to close the outer end of the inner pipe, and spring means for retaining the gate in different adjusted positions whereby the products of combustion which pass through the inner pipe may be varied, as described. 20
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