

959,742.

Patented May 31, 1910.

Fig. 1.

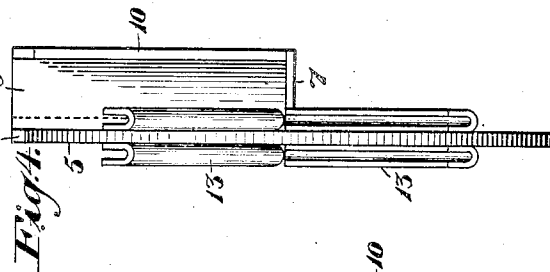
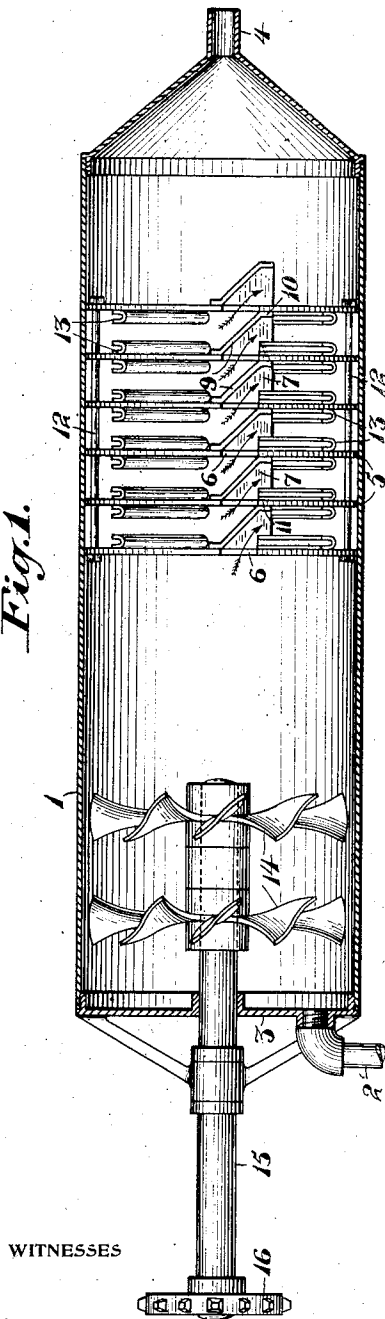


Fig. 3.

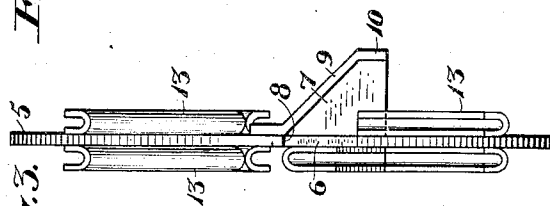
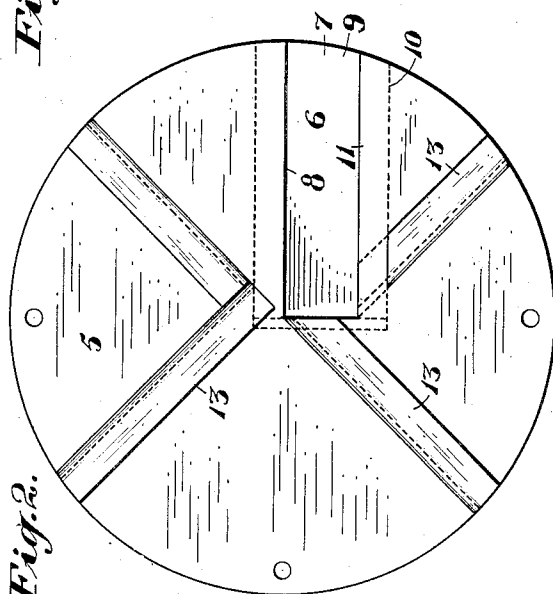


Fig. 2.



J. C. Fiedner
W. B. Keating

INVENTOR
W. J. Hewitt,
BY
J. M. Wright,
ATTORNEY

UNITED STATES PATENT OFFICE.

WILLIAM J. HEWITT, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR TO FRANK B. KEEVER, OF SAN FRANCISCO, CALIFORNIA.

MUFFLER.

959,742.

Specification of Letters Patent.

Patented May 31, 1910.

Application filed July 27, 1909. Serial No. 509,948.

To all whom it may concern:

Be it known that I, WILLIAM J. HEWITT, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented new and useful Improvements in Mufflers, of which the following is a specification.

The present invention relates to improvements in mufflers for the exhaust from engines and the like, being particularly adapted for use in connection with explosive engines.

The objects of the invention are to more effectually silence the noise of the exhaust and to change said exhaust from intermittent violent expulsions of the waste gases to a substantially continuous and uniform expulsion thereof.

A further object is to provide an apparatus of this character which will increase the efficiency of the engine by assisting the escape of the waste gases.

In the accompanying drawing, Figure 1 is a longitudinal section of the muffler; Fig. 2 is a side view of one of the muffler plates; Fig. 3 is an edge view thereof; Fig. 4 is a similar view taken at right angles to that of Fig. 3.

Referring to the drawing, 1 indicates the casing of the muffler preferably cylindrical in form. The waste gases enter at one end by an inlet pipe 2 passing through a transverse wall 3, and escape at the other end by a central outlet 4. Within the cylindrical casing, near said latter end, are arranged a longitudinal series of muffler plates 5, there being here shown six such plates, although the number may be varied to suit the size of the engine and other conditions. Each plate is circular in form so as to fit tightly within the cylinder 1 and is formed with a rectangular opening or slot 6 extending in a general radial direction to the circumference of the muffler from a point near the center. A deflector wall 7 is secured on the back of each plate along one edge 8 of the opening or slot 6, then extending from said edge obliquely rearward in a plane making an angle of about 45 degrees with the plane of the plate, as shown at 9, the free edge 10 of the wall being bent into a plane parallel with the plane of the plate and substantially opposite the other longitudinal edge 11 of the slot or opening 6. The plates of the series are placed in position so that the free

edge 11 of the slot of one plate is in contact with the rear side of the bent outer terminal portion 10 of the deflected wall of the plate in front of it, thereby closing the direct passage of the waste gases through the opening or slots 6, so that, in order for the waste gases to pass from the opening 6 in one plate to that in the succeeding plate, they must pass around the inner edge of the deflector wall 7 in the space between the two plates to the rear of said wall, and then enter and pass through the opening in the next plate of the series. This arrangement, therefore, compels the gases to travel in a helical path in passing through the series of plates. The muffler plates are bolted together by means of bolts 12 passing through all the plates.

Secured upon both the front and the rear faces of each plate are riffles 13. They are arranged in an approximately radial direction, and therefore transverse to the helical path of the gases. These riffles consist of channel-shaped strips of metal, one side of which is secured to the plate, so that the riffle not only obstructs and retards the passage of the gas which is traveling close to the surface of the plate, but imparts to said gas a rotary or eddying motion, which is gradually transmitted to the entire volume of gas passing through the muffler. The effect is to convert the violent intermittent expulsions of the gas into a substantially continuous and uniform escape thereof through the outlet passage.

Since each opening in the plates, and each space between the plates, is always larger than the inside measurement of the diameter of the exhaust pipe from the engine to the muffler, the gas is, at no point of its path, choked or confined in any degree. Although I may use these muffler plates alone, without any means other than the stroke of the piston in the engine to force the gases through the muffler, I prefer to use them in combination with suction fans such as are shown in the United States Letters Patent granted to me September 27, 1904, No. 771,070. In the drawing, these fans are shown at 14, mounted upon a shaft 15 driven by a sprocket wheel 16 in the manner described in said patent. The revolving fans reduce the back pressure, and cooperate with the mufflers in giving to the waste gas a helical motion, which it maintains in passing through the mufflers. These muffler plates give a de-

cided advantage, not only in silencing the noise of the exhaust, but also in reducing the back pressure, even without the use of the fans. This is shown by the following tests which I have made on an engine. When exhausting into the atmosphere the engine ran at 670 revolutions per minute; when exhausting through the muffler plates, but with the fans not revolving, the engine ran at 680 revolutions per minute; and when exhausted through the muffler plates with the fans revolving, the engine ran at 750 revolutions per minute. All other conditions were the same.

By the above described arrangement of muffler plates with the rifles thereon, there are obtained two advantages. In the first place, the rifles intercept and obstruct the flow of the gases between the muffler plates and, by their curved edges, produce eddies in said gases. These eddying portions of the gases, distributed throughout their entire helical path, between the muffler plates, appear to act as buffers or cushions, and prevent excessively violent or explosive ejections of the gases. In other words, they convert the intermittent explosive and violent expulsions of the gases into a substantially continuous and uniform expulsion thereof, thus eliminating the noise caused by such expulsions.

The above described arrangement of the apertured muffler plates and the rifles secured thereon not only muffles the expulsion of the gases, but also reduces the back pressure caused by the escape of said gases, and to a corresponding extent increases the power of the engine. This reduction in back pressure appears to be due to the fact that the gases, instead of being expelled into the atmosphere through a comparatively short path, are caused to travel a much longer path, namely, the helical path between the muffler plates, while, at the same time, this path does not occupy more longitudinal space than an ordinary muffler. This long tortuous path causes the gas to emerge into the atmosphere with a substantially uniform pressure, instead of by a series of violent explosions, and the resistance offered by the atmosphere to the gases when so escaping is less in the former case than in the latter.

I am aware that it is not new in mufflers to cause the gas to pass through a tortuous or circuitous path, but in prior forms of mufflers in which this has been done, the gas has been compelled to make sharp turns back upon itself, which cause great friction and loss of power. With my improved muffler, on the contrary, this extended and tortuous path is obtained without the use of any sharp turns or reversals of direction, and consequently, there is no loss of power in this respect. The advantage in the reduc-

tion of loss of power from back pressure is therefore due, primarily, to the fact that the waste gases can escape into the atmosphere more easily when escaping under constant pressure than when escaping at greatly varying pressures, and, secondarily, to the means for producing this escape at a substantial, constant pressure without loss of power, which means are, first the arrangement of the rifle plates which cause the gas to travel in a long and tortuous path and without any sharp turns or rapid reversal of direction, and, second, the use of the rifles which produce internal eddies in the gases, which eddies act as cushions or buffers to equalize the pressure in the gases in point of time.

I claim:—

1. A muffler comprising a casing having an inlet and an outlet, means within the casing for guiding gases in a helical path between the inlet and the outlet, and devices extending transversely from said means for producing eddies in said gases, substantially as described.

2. A muffler comprising a casing having an inlet and an outlet, a series of apertured muffler plates between the inlet and the outlet, said muffler plates being provided with deflecting walls compelling the gases to pass in a circuitous path from the aperture of one muffler plate to that of the next, and a rifle on each muffler plate, substantially as described.

3. A muffler comprising a casing having an inlet and an outlet, a series of apertured muffler plates between the inlet and the outlet, said muffler plates being provided with deflecting walls compelling the gases to pass in a circuitous path from the aperture of one muffler plate to that of the next, and a rifle with a curved edge on each muffler plate, substantially as described.

4. A muffler comprising a casing having an inlet and an outlet, a suction fan in said casing, means within the casing for guiding gases in a helical path between the inlet and the outlet, and devices disposed transversely to said means for producing eddies in said gases, substantially as described.

5. A muffler comprising a casing having an inlet and an outlet, a suction fan in said casing, and a series of apertured muffler plates between the inlet and the outlet, said muffler plates being provided with deflecting walls compelling the gases to pass in a circuitous path from the aperture of one muffler plate to that of the next, substantially as described.

6. A muffler comprising a casing having an inlet and an outlet, a suction fan in said casing, a series of apertured muffler plates between the inlet and the outlet, said muffler plates being provided with deflecting walls compelling the gases to pass in a circuitous

path from the aperture of one muffler plate to that of the next, and a series of riffles on each muffler plate, substantially as described.

to that of the next, and a series of riffles with curved edges on each muffler plate, substantially as described.

7. A muffler comprising a casing having an inlet and an outlet, a suction fan in said casing, a series of apertured muffler plates between the inlet and the outlet, said muffler plates being provided with deflecting walls compelling the gases to pass in a circuitous path from the aperture of one muffler plate

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

WILLIAM J. HEWITT.

Witnesses:

F. M. WRIGHT,
D. B. RICHARDS.