June 3, 1930. C. S. WATKINS 1,760,924

MUFFLER FOR INTERNAL COMBUSTION ENGINES

Filed Oct. 19, 1928

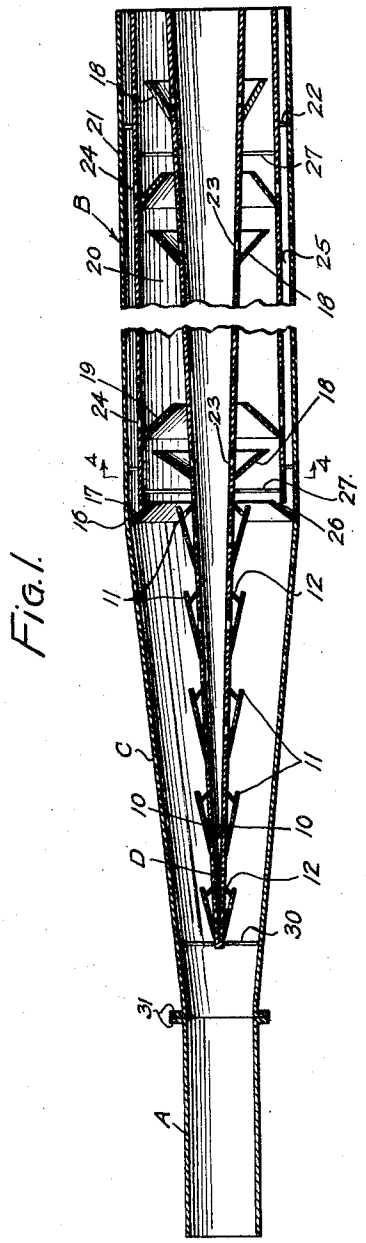

Fig. 1.

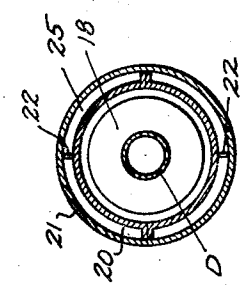

Fig. 4.

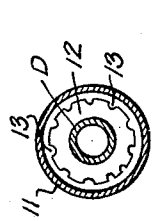

Fig. 3.

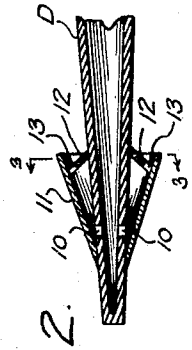

Fig. 2.

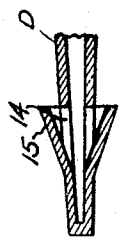

Fig. 5.

Inventor

CLAYTON S. WATKINS.

By Munson H. Lane

Attorney

Patented June 3, 1930 1,760,924

UNITED STATES PATENT OFFICE

CLAYTON S. WATKINS, OF AMARILLO, TEXAS

MUFFLER FOR INTERNAL-COMBUSTION ENGINES

Application filed October 19, 1923. Serial No. 313,559.

The invention relates to mufflers for internal combustion engines, and more particularly to a pressure release and extraction tube for mufflers, designed to eliminate back pressure and thereby increase the efficiency of the engine.

Attempts have been made to avoid back pressure, but so far as I am aware, all such attempts have resulted in decreased muffler efficiency, or have increased the fire hazard.

According to my invention I provide means for releasing pressure at a point or points substantially nearer the engine than the muffler proper, and also provide means for releasing pressure within the muffler as it occurs.

The invention will be more readily understood by reference to the accompanying drawings showing certain illustrative embodiments of the invention.

In the drawings:—

Fig. 1 is a horizontal sectional view showing a muffler equipped with the improved pressure release and extraction tube.

Fig. 2 is a detail view on an enlarged scale showing one end of the release tube.

Fig. 3 is a view taken on line 3—3 of Fig. 2 looking in the direction of the arrows.

Fig. 4 is a sectional view on line 4—4 of Fig. 1, and

Fig. 5 is a detail view similar to Fig. 2 but showing a modification.

As shown in the drawings, A denotes the exhaust pipe of an internal combustion engine; the portion designated by B denotes a suitable muffler, which, according to the broadest scope of my invention, may be of any desired construction, while the portion designated C denotes a flaring intermediate conduit connecting muffler B with the exhaust pipe.

With mufflers as now constructed, a back pressure is accumulated within the exhaust pipe prior to the first baffle of the muffler, which pressure seriously impairs the efficiency of the engine. In order to eliminate this back pressure I have provided a pressure release tube D tapering from a point E located substantially prior to the muffler, to the outlet end of the muffler. The tube D is closed at the smaller end toward the exhaust pipe, but open at the end F, and is provided with a plurality of openings 10 which are protected from the direct force of exploding gases by means of cones 11, suitably secured to the tube D as by welding. These cones are set at an angle substantially equal to the flare of the outer casing C, and are small enough so that no obstruction is offered to the passage of gases prior to their entrance into the muffler proper. The flaring of the casing C compensates for the pressure of the cones 11, so that there is no restriction in area. Preferably cone shaped members 12, flared oppositely to the cones 11, and provided with apertures 13, serve to further protect the openings 11 against the direct force of exploding gases. A modification is shown in Fig. 5 in which openings 14 are formed in the tube D, which are protected by struck up portions 15 integral with the tube. The function of the cones 11 or the struck up portions 15 is to deflect the explosive gases from the openings in the tube D so that no pulsations are transmitted through the tube, while still permitting any excess pressure existing above the muffler to be gradually released into the tube D opening at F.

While I do not wish to be limited to details of construction of the muffler, or of the pressure release tube, I have shown a form of device which may be made at small cost, which is efficient in its operation and which may be readily applied to the exhaust pipe of an internal combustion engine. As shown, the outer shell B of the muffler and the flaring connecting portion C are made welded together at 16, there being provided an inner ring or baffle 17 secured to either the shell B or C prior to the welding together of these two members. The ring 17 forms the first baffle of the muffler proper. The remaining baffles of the muffler consist of cones 18 located at intervals along the tube D beyond the cones 11, while between adjacent cones 18 are located rings 19 extending inwardly from a sleeve 20, located within an outer shell 21 and spaced therefrom by any suitable means, as spiders 22. The cones 18 and rings 19 cause the explosion gases to flow by a zig zag path,

thereby breaking the force of the explosion and muffling the sound. The cones 18 incline outwardly from the tube D at a much greater angle than the cones 11 and extend a greater distance from the tube D than the cones 11, so that while the cones produce no muffling action whatever, the cones 18 in combination with the rings 19 produce a very efficient muffling action.

While perforations 10 in the portion of the tube D nearer to the engine than the muffler provide for the release of back pressure produced by the first baffles of the muffler, it is desirable to provide further means for releasing any pressure which may exist within the muffler. Consequently, apertures 23 in the tube are provided beneath the cones 18, while similar perforations 24 are provided beneath the rings 19. The perforations 23 allow the pressure to release into the tube D while the perforations 24 release into the annular chamber 25 between the inner sleeve 20 and the outer shell 21. A small annular passage is left between the first baffle 17 and the end of the sleeve 20, which performs the same function as the apertures 24.

In order to permit of assembling the device the sleeve 20 may be made in two semi-cylindrical parts, the two parts carrying complementary halves of the baffle rings 19. The two halves of the sleeve are then fitted together over the lower end of the tube D, which tube is provided with the cones 11 and 19, and apertures 10 and 23. The halves of the sleeves may be secured together by welding as at 28 or by bolting together complementary flanged portions. Suitable spacers 27 are provided between the sleeve 20 and the tube D.

The sleeve 20 and tube D having been assembled, they are now inserted and secured in place within the outer shell 21 and the connecting member C, spacing members 22 and 30 respectively being provided to space the sleeve 20 from the shell 21 and the tube D from the outer member C. The combined muffler, pressure release tube and connecting member form a detachable unit which may be secured to the exhaust pipe A in any suitable manner, as by flanges 31.

Operation

When the device has been assembled and secured to the exhaust pipe, as above described, an explosion from the engine coming through the exhaust pipe A passes through the tapered pipe C without increasing the pressure until the first baffle 17 is met with. The baffles 17, 18 and 19 which accomplish the muffling operation normally tend to produce a back pressure. This pressure, however, is released through the apertures 10 into the pressure release tube D, the cones 11 and 12 preventing the pulsations of the explosion from being transmitted into the tube D. Any excess pressure which tends to be produced within the muffler itself is released almost as rapidly as it is formed through the apertures 23 into the tube D and through apertures 24 and 26 into the annular chamber 25 between the sleeve 20 and the shell 21. The force of the explosion is largely dissipated in passing between the baffles 17, 18 and 19, but such force as it still possesses as it leaves the muffler outlet tends to reduce the pressure within the tube D and the chamber 25, the exhaust gases from the muffler exerting a sort of sucking or extracting action. This reduced pressure within the tube D renders the tube even more efficient in releasing any back pressure tending to form either above or within the muffler.

What I claim is:—

In combination with a muffler for internal combustion engines, means for releasing pressure prior to the muffler, comprising a flaring tube extending longitudinally through said muffler, having an open end at the muffler outlet, and having a portion extending beyond the muffler toward the engine, said portion being apertured to permit pressure to release into the tube, and cones secured to said tube for protecting the apertures from the direct force of an explosion.

In testimony whereof I affix my signature.

CLAYTON S. WATKINS.