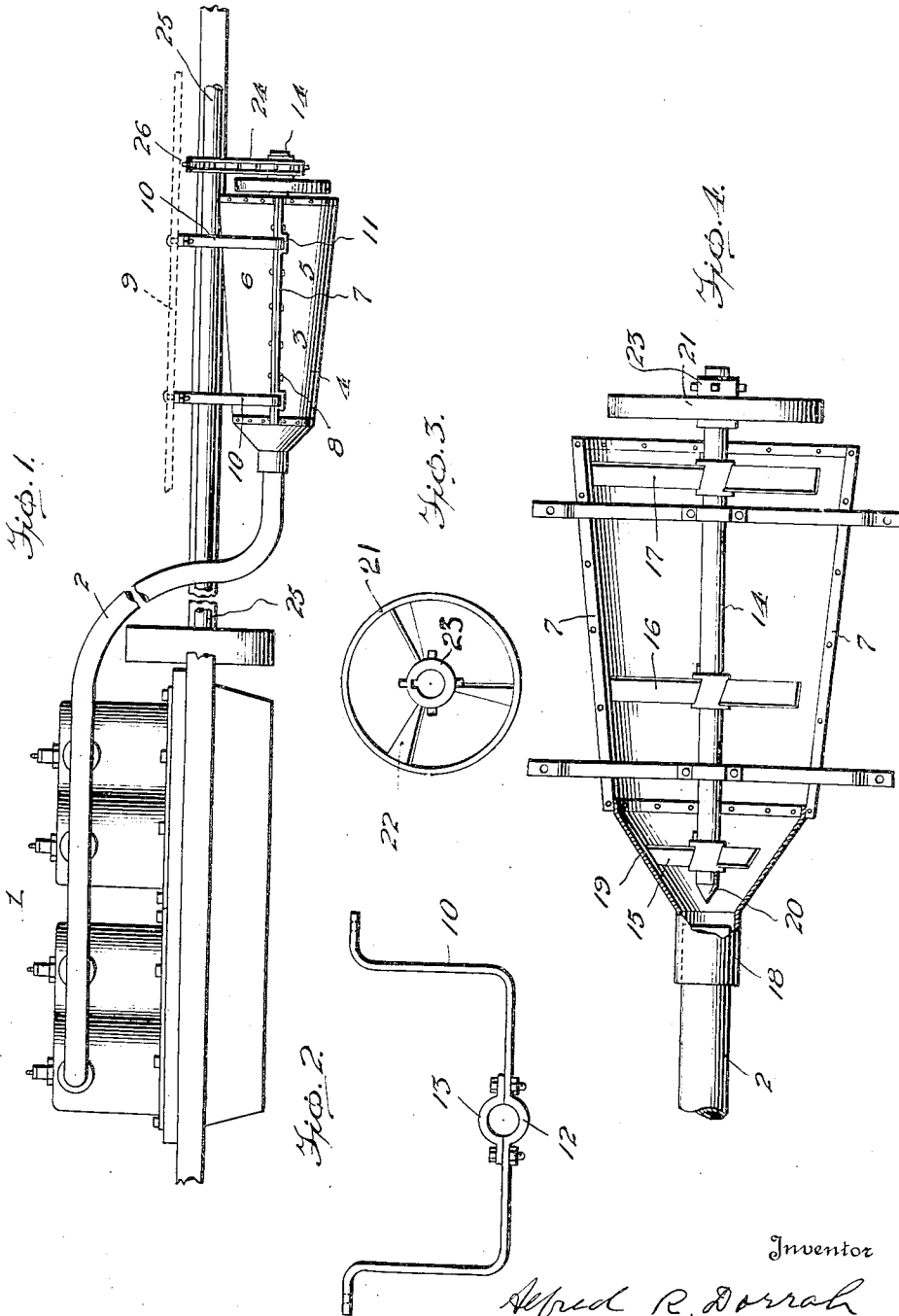


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MUFFLER.  
APPLICATION FILED OCT. 3, 1917.

1,273,159.

Patented July 23, 1918.



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# UNITED STATES PATENT OFFICE.

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## MUFFLER.

1,273,159.

Specification of Letters Patent.

Patented July 23, 1918.

Application filed October 3, 1917. Serial No. 194,537.

*To all whom it may concern:*

Be it known that I, ALFRED R. DORROH, a citizen of the United States, residing at Washington, in the District of Columbia, 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.

My invention relates to mufflers for incrementally delivered or other exhaust fluid, such as emanate from steam and internal combustion engines, and the object thereof is to silence the delivery of said fluid without increasing the back pressure.

The noises produced by unmuffled discharges of exhaust fluids are largely due to the static condition of the air against which these exhaust fluids impinge, and also to the concussion produced by successive discharges which, at the moment of delivery, are still concentrated and moving at a high velocity.

It has been proposed to use mechanical baffles to blend these successive increments of exhaust fluid into a single retarded current, so that they will be delivered in a spent condition, but, in so far as I am aware, no one has heretofore attempted to mix and expand said increments prior to their final delivery to the atmosphere, or to prepare the atmosphere for the reception of the exhaust fluid, and especially not as I propose, by rotating or otherwise setting the air in motion adjacent the discharge outlet in order to lessen the resistance to, and soften the impact of the discharge fluid.

One embodiment of my invention consists of a mixing chamber of truncated conical form having an inlet at its smaller end, the larger end being freely open for the discharge of the exhaust; of power driven rotary fans of successively increased diameters, disposed within this chamber, and operating to mix the separate increments of the exhaust, and blend them into a single rotary current of large volume and relatively low velocity; and of a power driven air propeller for creating rotary air currents at the larger end of the mixing chamber, which parallel the aforesaid rotary exhaust current.

All of these elements, aforesaid, cooperate in silencing the engine, but the flaring mixing chamber and its fans are operative *per se*, inasmuch as the elimination of distinct

impulses and the delivery of an expanded and relatively sluggish rotary current, tend to reduce the force of the impact of the exhaust fluids against the outside air. The propeller for removing static air from the vicinity of the exhaust, is also operative *per se*, for its association with any of the known exhaust devices will greatly modify the noise of the exhaust.

The accompanying drawing shows one form of my invention, but it will be understood that I do not limit myself to that particular form, inasmuch as modifications falling within the scope of my invention may be employed.

Figure 1 represents a side elevation of an internal combustion engine equipped with my device.

Fig. 2 shows one form of supporting means for said device.

Fig. 3 represents the propeller for the air.

Fig. 4 represents a plan view of the device with the top removed.

1 is an internal combustion engine, 2 the exhaust pipe thereof, and 3 is my improved device. This device consists of a frusto-conical chamber 4 composed of two parts 5 and 6, each of which is flanged at 7, the flanges being provided with perforations through which securing bolts 8 are passed. The chamber may be supported from the floor 9, of an automobile or any other suitable support by means of hangers 10 set into coinciding notches 11 in the edges of the halves of the chamber.

Each hanger has a part 12 constituting a bearing for a shaft, and 13 is the upper member of this bearing.

Extending longitudinally through the chamber is a shaft 14 mounted in the bearings 12, 13 of the respective hangers, which bearings are to be provided with anti-friction balls and raceways for said balls.

The shaft 14 carries fans 15, 16 and 17, which are of successively larger diameters. These fans may be secured to the shaft 14 in any well known manner.

The chamber 4 is provided with a cylindrical portion 18 which telescopes over the exhaust pipe 2 with which it is connected, and the cylindrical portion 18 is connected to the chamber 4 by an intermediate tapering section 19. The end of the shaft proximate the exhaust pipe 2 has a conical end, which acts as a spreader for the exhaust current.

Mounted on the shaft 14 in proximity to the larger end of the chamber 4, which is freely open, is a propeller 21 having plates 22. This propeller is provided with sprockets 23 which intermesh with the links of the driving chain 24. 25 is a propeller shaft driven by the engine 1, and having thereon a sprocket wheel 26, with which the chain 24 engages.

The blades 22 of the propeller 21 are constructed and arranged to impart a rapid rotary motion to the body of air just outside of the freely open end of the chamber 4, so that the outflowing helical current of exhaust fluid will take a course that is substantially parallel with that of said body of air. This reduces or modifies impact to such an extent as to render the exhaust practically noiseless. It will furthermore be understood that the propeller 21 acts also to force the air away from the open end of the chamber 4 and this fact also contributes to the silencing of the exhaust.

Having thus described the invention, what is claimed as new is:—

1. The combination with a motor, of a chamber for receiving therefrom and expelling exhaust fluid, and means associated with said chamber for directly acting upon and moving air adjacent thereto, independently of the action of the exhaust fluid.

2. The combination with a motor, of a chamber for receiving therefrom and expelling exhaust fluid, and an air propeller associated with said chamber for directly acting upon and moving air adjacent thereto, independently of the action of the exhaust fluid.

3. The combination with a motor, of a chamber for receiving therefrom and expelling exhaust fluid, a fan within said chamber, and means associated with said chamber for directly acting upon and moving air adjacent thereto, independently of the action of the exhaust fluid.

4. The combination with a motor, of a chamber for receiving therefrom and expelling exhaust fluid, a fan within said chamber, and an air propeller associated with said chamber for directly acting upon and moving air adjacent thereto, independently of the action of the exhaust fluid.

5. The combination with a motor, a single continuous flaring chamber for receiving therefrom and expelling exhaust fluid, fans of successively increased diameters within said chamber, and additional means associated with said chamber for moving air adjacent thereto, independently of the action of the exhaust fluid.

6. The combination with a motor, a single continuous flaring chamber for receiving therefrom and expelling exhaust fluid, fans of successively increased diameters within said chamber, and an air propeller asso-

ciated with said chamber for moving air adjacent thereto, independently of the action of the exhaust fluid.

7. The combination with a fluid pressure motor, means for receiving therefrom and delivering exhaust fluid, and additional means for reducing the normal impact of the exhaust fluid against the adjacent air.

8. The combination of a fluid pressure motor, means for receiving therefrom and delivering exhaust fluid, and additional means for moving and thus reducing the normal impact of the exhaust fluid against the adjacent air.

9. The combination of means for receiving, mixing and delivering successive increments of exhaust fluid, and additional means for moving the air into which the exhaust fluid is delivered.

10. The combination of a fan for receiving, mixing and delivering successive increments of exhaust fluid, and additional means for moving the air into which the exhaust fluid is delivered.

11. The combination of fans of successively increasing diameters for receiving, mixing and delivering successive increments of exhaust fluid, and additional means for moving the air into which the exhaust fluid is delivered.

12. The combination of a flaring chamber, having an exhaust fluid inlet at its smaller end, and a free outlet at its larger end, of a series of fans of successively increasing diameters disposed within said chamber.

13. The combination of a flaring chamber, having an exhaust fluid inlet at its smaller end, and a free outlet at its larger end, of a series of fans of successively increasing diameters disposed within said chamber, and a propeller for air situated at the outlet of said chamber.

14. The combination of a mixer for increments of exhaust fluid, having a relatively large outlet opening, and additional means for propelling the air adjacent said outlet opening.

15. The combination of an engine, a mixer for the exhaust fluid delivered thereby, a propeller for the air adjacent the discharge opening of said mixer, and means for driving said mixer from said engine.

16. The combination of an engine, a mixer having fans of successively increasing diameters, a propeller for the air adjacent the discharge opening of said mixer, and means for driving said mixer from said engine.

17. The combination of an engine, having a shaft, a sprocket wheel on said shaft, a further shaft, a mixing device and an air propeller mounted on said further shaft, said air propeller being provided with sprockets, and a chain for engaging said sprockets.

18. The combination of a shaft having a

spreader at one end thereof and carrying an air propeller at the other end thereof, and an intermediate mixing device also carried by said shaft.

diameter for expanding and giving said fluid a progressive rotary movement, and means for rotating the air against which said exhaust fluid impinges.

5 19. The combination of a source of exhaust fluid, means for giving to said fluid a rotary motion, and means for rotating the air against which said exhaust fluid impinges.

21. The combination of a source of exhaust fluid, and means for moving the adjacent air in substantial parallelism with the exhaust fluid current.

10 20. The combination of a source of exhaust fluid, fans of gradually increased

In testimony whereof, I affix my signature. 21

ALFRED R. DORROH.