June 4, 1935. T. K. CORLESS 2,003,500

MUFFLER

Filed Dec. 29, 1931 2 Sheets-Sheet 1

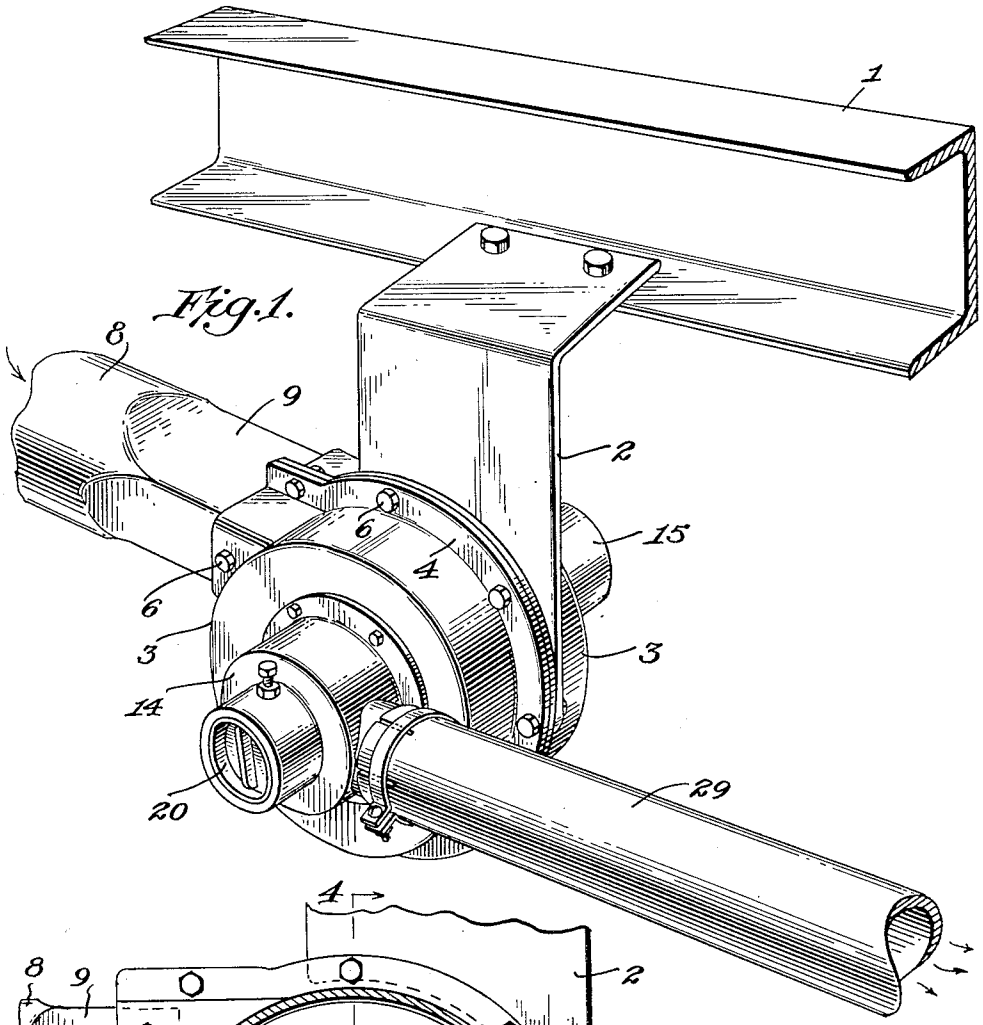


Fig. 1.

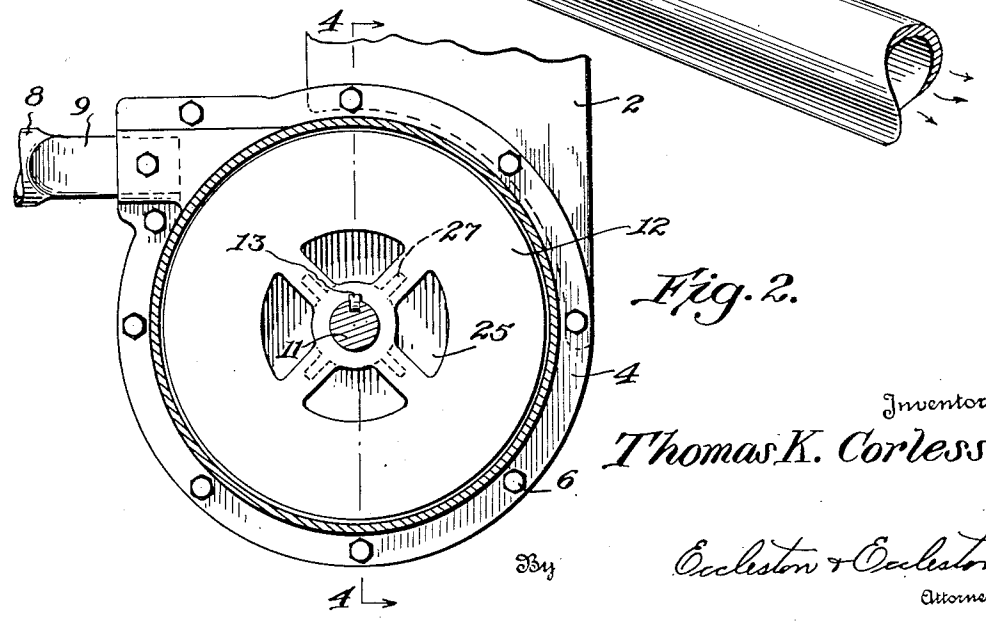


Fig. 2.

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Filed Dec. 29, 1931 2 Sheets-Sheet 2

Fig. 3.

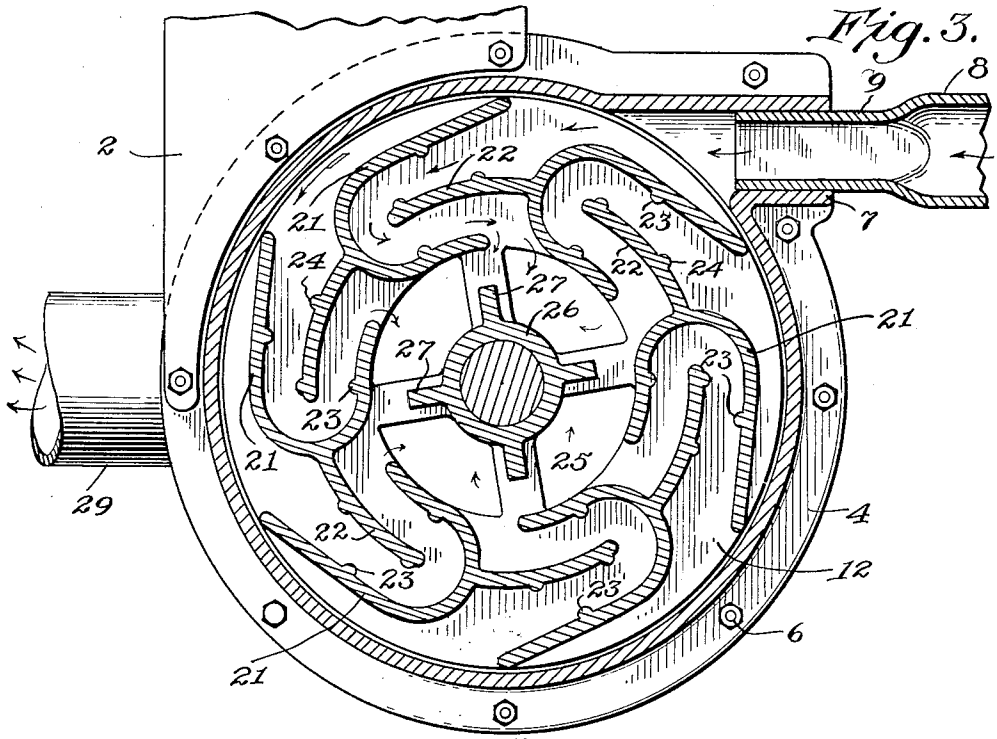
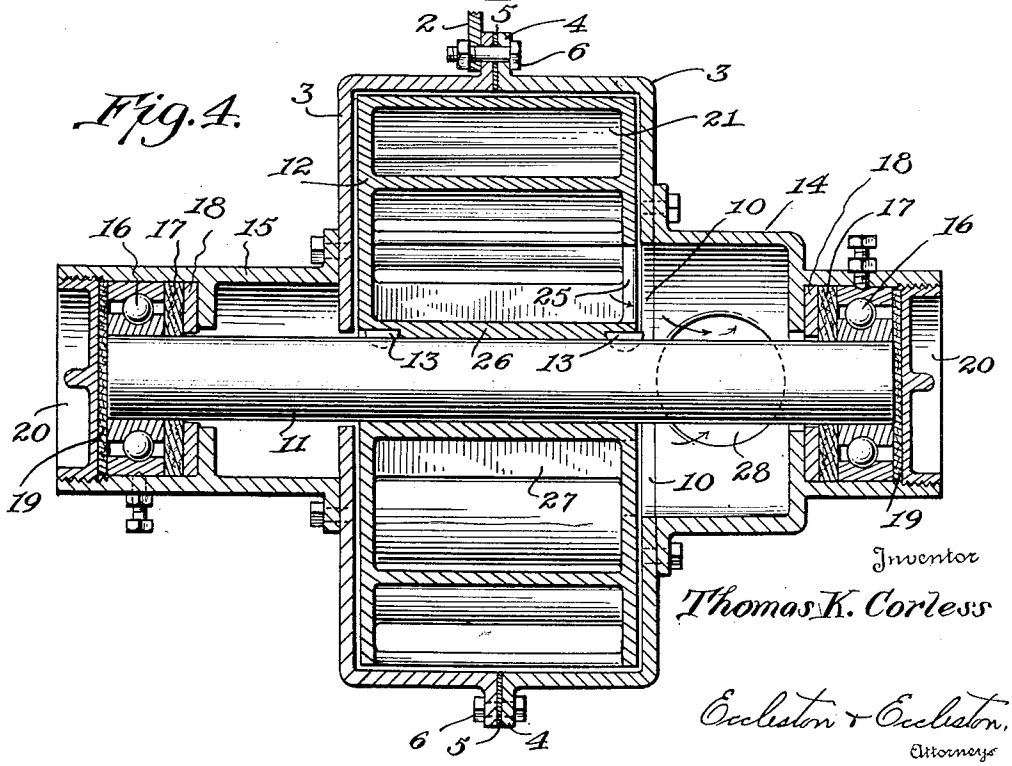


Fig. 4.



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UNITED STATES PATENT OFFICE

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MUFFLER

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Application December 29, 1931, Serial No. 583,723

5 Claims. (Cl. 137—160)

The present invention relates to muffler constructions for internal combustion engines such as used on automobiles, aeroplanes, etc., and has for its primary object to provide a simplified apparatus formed of comparatively few parts and yet which is strong and durable in operation and performs its prescribed functions in a highly efficient manner.

Another object of the invention resides in the provision of a muffler which serves not only to break up the exhaust gases to deaden the sound of the explosion and to reduce the visibility of the exhaust gases, but also to reduce back pressure to a minimum so as to increase the efficiency of the engine.

A further object of the invention consists in providing a muffler which is operated by the exhaust gases of the engine so as to produce a suction action in the exhaust passages to thereby aid in the evacuation of exhaust gases and consequently reduce to a minimum the deposit of carbon on the cylinder walls and pistons of the engine.

Other objects and advantages of the invention will be apparent from the following description when taken in connection with the accompanying drawings, in which,

Figure 1 is a perspective view of the complete apparatus suspended by a hanger from the framework of an automobile.

Figure 2 is a vertical sectional view through the muffler casing showing the rotary member in elevation.

Figure 3 is a vertical sectional view of the rotary member and its casing, and,

Figure 4 is a transverse sectional view taken on the line 4—4 of Figure 2.

Referring to the drawings in more detail the numeral 1 indicates a portion of the framework of a conventional automobile or other vehicle and depending from this frame is a hanger 2 on which the improved muffler is supported.

The muffler includes a casing composed of two half sections 3 each provided with a flange 4 by means of which the mating sections are secured together. Interposed between the flanges 4 is an asbestos gasket 5, and bolts 6 extending through apertures in the flanges serve to releasably hold the casing sections in operative position.

The casing just described is provided with a substantially tangential inlet port 7 to which is connected a pipe 8 leading from the exhaust manifold of the engine. It will be noted that the end of this pipe 8 is squared as indicated by numeral 9 and the inlet port 7 is similarly formed so as to prevent any liability of relative rotary movement between the pipe 8 and the casing 3. The exhaust port of the casing 3 comprises four segmental openings 10 which are adapted to communicate with similar openings formed in a rotary wheel about to be described.

Extending through the casing 3 and having its ends projecting a substantial distance there beyond is a shaft 11 on which a wheel 12 is fixed as by means of keys 13. Mounted on opposite ends of the casing 3 and centrally thereof are bearing members 14 and 15. Each of these bearing members is provided with a ball race 16 to provide anti-friction bearings for the ends of the shaft 11. Disposed between the bearings 16 and the interior of the casing 3 are asbestos discs 17 and bronze discs 18 which serve to reduce the amount of heat passing to these bearings. Moreover it is to be noted that by reason of the length of the bearing members or sleeves 14 and 15 the bearings 16 are spaced a substantial distance from the hot gases passing through the muffler and consequently the tendency of the bearings to become overheated is greatly reduced. Asbestos discs 19 are also disposed on that side of each bearing which is remote from the muffler and the discs are held in position by threaded caps 20 which also provide ready access to the bearings when necessary.

The wheel 12 heretofore referred to is provided with a series of pockets 21 which are circumferentially arranged about the periphery of the wheel so that the mouth of each pocket is successively brought into communication with the inlet port 7 as the wheel is rotated. The mouths of the pockets are substantially rectangular to conform to the cross-sectional shape of the port 7. The base of each of the pockets 21 is provided with an integral extension 22 which extends to a point adjacent the bottom of the next succeeding pocket and thus serves as a partition or baffle plate for this latter pocket. It will be understood therefore that exhaust gases entering any particular pocket will first travel in the direction of rotation of the wheel and will then travel in the opposite direction as they pass beyond the end of the particular partition or baffle plate 22.

In order to further break up the gases projected from the cylinders of the engine the interior of each of the pockets is preferably provided with a plurality of transversely extending rounded ribs 23. Also the partitions 22 are provided with transversely extending rounded ribs 24 which co-

operate with the ridge 23 in breaking up the gases and deadening the sounds of the explosions.

From an inspection of Figures 2 and 4 it will be noted that one side of the wheel 12 is closed and that the other side is provided with a plurality of segmental openings 25 which correspond with similar openings 10 in the adjacent side of the casing 3. Moreover it will appear from an inspection of Figures 3 and 4 that the hub 26 of the wheel 12 is provided with a plurality of radially extending fins 27. These fins operate to further break up the gases as they pass from the mouths of the several pockets on their travel to the exhaust openings 25 and 10 of the wheel and casing respectively. The bearing member 14 is provided with an outlet 28 with which communicates an exhaust pipe 29 leading to the atmosphere. While I have shown the exhaust openings 25 and 10 as provided on only one side of the wheel 12 and casing 3 it will be obvious that if found desirable similar openings may be provided in each side of the wheel and casing and two exhaust pipes 29 provided for directing the gases to the atmosphere.

In the operation of the device the exhaust gases enter the casing 3 from the pipe 8 leading to the engine cylinder and are successively projected into the pockets 21 as the latter are brought into alignment with the pipe 8 and due to the shape of the mouth of the pipe and its angular relation to the wheel 12 the gases will continue to be projected into the mouth of a pocket for a substantial period while the pocket is moving in a direction away from the pipe 8. As the gases enter the series of pockets it will be obvious that they cause a rapid rotation of the wheel and that they are partly broken up while but slightly retarded by engagement by the rounded ribs 23 and 24. As the gases leave the bottom of each pocket their direction is reversed by reason of the baffle plates 22 and they then travel in a direction opposite to the direction of travel of the wheel 12. This change of direction of travel further breaks up the gases and since in leaving the pockets the gases impinge on the fins 27 they are still further broken up prior to engaging the walls of the openings 25 and 10, by which they are further broken up, on their way to the exhaust pipe 29. This circuitous path of the gases leaving the engine cylinders obviously reduces the sound of the explosions and moreover the rapid rotation of the wheel 12 serves to create a suction action in the pipe 8 thereby substantially relieving the system of back-pressure and also serving to some extent in removing residual spent gases from the cylinders and exhaust manifold.

From the foregoing description taken with the accompanying drawings it will be apparent that I have prepared a relatively simple construction of muffler composed of a very few parts; that the rotary element employed serves to reduce back-pressure in the system as well as to reduce carbon deposit in the cylinder; that the circuitous passages provided by the pockets, baffle-plates, ribs, fins and cooperating movable and immovable segmental openings cause a very substantial breaking up and burning of the gases prior to their entrance into the exhaust pipe 29, thereby reducing to a minimum the sounds of the explosion in the cylinder and without unduly obstructing the gases; and that the bearings on which the rotary element is supported are disposed beyond the range of the intense heat of the exhaust gases passing through the muffler with a consequent elimination liability of burning out the bearings.

In accordance with the patent statutes I have described what I now believe to be the preferred embodiment of the invention but obviously various changes may be made in the construction without departing from the spirit of the invention, and all such changes are intended to be included within the scope of the appended claims.

What I claim is:

1. A muffler for internal combustion engines, including a substantially cylindrical casing provided with a tangential inlet port and an axial exhaust port, a wheel rotatably mounted within said casing, a plurality of pockets arranged circumferentially about said wheel and adapted to be brought successively into communication with said inlet port, said pockets shaped to reverse the direction of the gases while in the pockets, and a plurality of fins carried by the hub of the wheel and revolving therewith, said fins being in the path of the gases flowing from the pockets to the axial exhaust port.

2. A muffler for internal combustion engines including a casing provided with a tangential inlet port and an axial exhaust port, a shaft extending through said casing and having its ends projecting a substantial distance beyond the same the gases exhausting around said shaft from the axial exhaust port, bearing members supported on each end of said casing and receiving the ends of said shaft, the casing supporting the bearing members being exposed to the atmosphere, asbestos discs disposed between said bearings and the interior of the casing, a pocketed wheel mounted on said shaft, and the pockets of said wheel shaped to reverse the direction of the gases while in the pockets.

3. A muffler for internal combustion engines including a casing having a tangential inlet port and an axial exhaust port, a wheel rotatably mounted within said casing, a plurality of pockets arranged circumferentially about said wheel and adapted to be brought successively into communication with said inlet port, a relatively large mixing chamber arranged centrally of the wheel, the gases passing from said pockets into the mixing chamber, and then passing axially from the mixing chamber, the wheel having openings to permit the gases to pass axially from the mixing chamber, the portions of the wheel between said openings functioning to further break up the gases as they are discharged axially from the mixing chamber.

4. A muffler for internal combustion engines including a casing having a tangential inlet port and an axial exhaust port, a wheel rotatably mounted within said casing, a plurality of pockets arranged circumferentially about said wheel and adapted to be brought successively into communication with said inlet port, a relatively large mixing chamber arranged centrally of the wheel, the gases passing from said pockets into the mixing chamber, and then passing axially from the mixing chamber, the wheel having openings to permit the gases to pass axially from the mixing chamber, the portions of the wheel between said openings functioning to further break up the gases as they are discharged axially from the mixing chamber, and means arranged within the mixing chamber for breaking up the gases before they pass from the mixing chamber.

5. A muffler for internal combustion engines including a casing having a tangential inlet port and an axial exhaust port, a wheel rotatably mounted within said casing, a plurality of pockets arranged circumferentially about said wheel and

adapted to be brought successively into communication with said inlet port, a relatively large mixing chamber arranged centrally of the wheel, the gases passing from said pockets into the mixing chamber, and then passing axially from the mixing chamber, the wheel having openings to permit the gases to pass axially from the mixing chamber, the portions of the wheel between said openings functioning to further break up the gases as they are discharged axially from the mixing chamber, and a second chamber receiving the axially discharged gases, said chamber having an exhaust port.

THOMAS K. CORLESS.