June 24, 1930. C. W. BECK 1,766,973

MUFFLER

Filed April 4, 1927

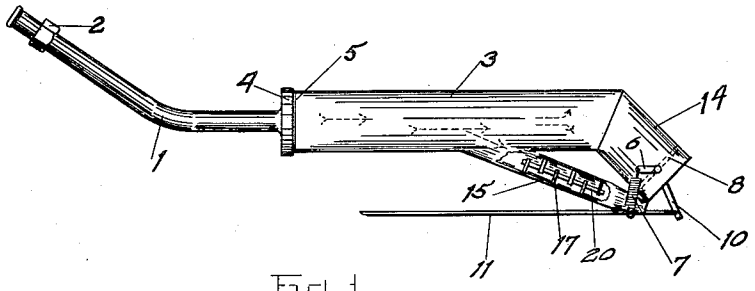


Fig 1

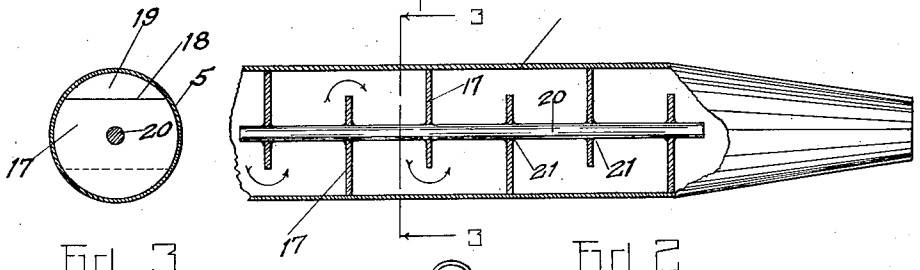


Fig 3

Fig 2

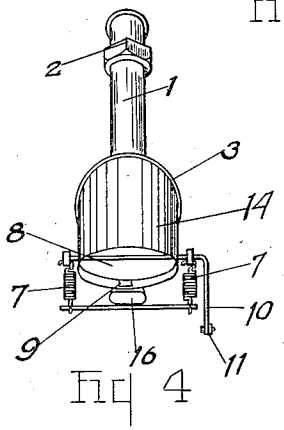


Fig 4

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UNITED STATES PATENT OFFICE

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MUFFLER

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My invention has for its object to provide an efficient muffler for muffling the exhaust of internal combustion engines. The invention provides a container of relatively large volume for receiving the exhaust gases from the exhaust pipe of the engine in order to greatly reduce the pressure of the exhaust gases as they leave the exhaust pipe and a pipe of reduced cross sectional area extending diagonally from the longitudinal axis of the container and in a general direction the same as that of the moving of the exhaust gases that enter the container to allow the immediate escape of a portion of the exhaust gases which are intermittently forced into the container, since a portion of each discharge from the engine will be readily diverted into the inclined passage-way when it has traveled a short distance in the container under the impulse of its discharge into the container. The diagonally narrowed and inclined passage-way subsequently allows the pressure within the container to be gradually reduced during the interim of the succeeding discharges or exhaust of the engine. The invention also provides baffle plates within the diagonally disposed narrowed passage-way in order to prevent the explosive effect of the discharge from the exhaust being delivered immediately to the atmosphere and in order to produce a gradual dissipation of the impact or force of the sudden expansion of the exhaust gases, and to maintain the gases within the container for substantially the periods of time between succeeding discharges from the engine and to maintain a substantially uniform movement of the gases from the interior of the container to the atmosphere. The outlet of the diagonally disposed pipe may also be formed oblong to reduce the cross sectional area at the outlet of the pipe and thereby reduce the effective area of the pipe at the point where the gases escape into the atmosphere. By reason of the change from the circular to the oblong form of the outlet, the escaping gases are caused to pass into the atmosphere in the form of a fan which also eliminates the pulsating effect due to the sudden rise of pressure when the exhaust gases enter the container.

The invention may be contained in structures of different forms and to illustrate a practical application of the invention, I have selected a muffler embodying the invention as an example of structures that contain the invention and shall describe it hereinafter. The muffler selected, for purposes of illustration, is shown in the accompanying drawings.

Fig. 1 illustrates a side view of the muffler and a part being shown in section. Fig. 2 illustrates an enlarged view of the diagonally disposed portion of the muffler shown in Fig. 1. Fig. 3 is a view of a section taken on the plane of the line 3—3 indicated in Fig. 2. Fig. 4 is a rear end view of the muffler.

The exhaust pipe 1 is connected to the exhaust manifold of the engine by means of the union 2 in the manner well known in the art. A container 3 is connected to the outer end of the exhaust pipe by means of a suitable head 4 that is located on the end of the exhaust pipe 1. The container 3 is formed of sheet metal and may be connected to the head 4 by welding, such as indicated at 5. The diameter of the container 3 is very much larger than the diameter of the exhaust pipe 1. Its inner diameter is, approximately, 5 to 7 times that of the diameter of the inner diameter of the pipe 1. It has a length that is, approximately, 4 to 7 times its diameter. These dimensions are substantially as shown in Fig. 1 of the drawings. The outer end of the container 3 extends, preferably, diagonally downward as shown at 14. The end portion 14 has a diameter substantially the same as the diameter of the body portion of the container and a butterfly valve 8 is located in the end portion 14 whereby the container 3 may be opened and the exhaust gases permitted to escape directly to the atmosphere from the outer end of the container. The butterfly valve 8 is connected to a pair of arms 6 and a pair of springs 7 are connected to the ends of the arms 6 for maintaining the butterfly valve closed. The springs 7 operate to press one

edge of the butterfly valve 8 against a suitable stop, such as the lower edge of the butterfly valve 8 is yieldingly held against the stop 9 by means of the springs 7. The butterfly valve 8 may be operated by means of the arm 10 that is connected to the valve. A rod 11 may be connected to the end of the arm 10 and extend to a suitable lever or pedal for opening the valve 8 against the tension of the springs 7, the springs 7 operating to close the valve when the arm 10 is released.

A diagonally disposed pipe 15 is connected substantially to the central part of the body of the container 3. The pipe 15 extends from the body of the container 3 to the lower edge of the inclined end portion 14 of the container. The pipe 15 thus extends in the same general direction that the gases move when they are discharged into the container 3 from the pipe 1. The outer end of the pipe 15 is flared on two opposite sides and depressed on the remaining two sides to form a substantially oblong outlet 16 having one dimension much larger than the diameter of the pipe 15 and other dimension much smaller than the diameter of the pipe 15. The gases that escape through the pipe 15 will thus be caused to move in the form of a fan which will aid in eliminating the pulsating and explosive action of the escaping gases.

A plurality of baffle plates 17, located in spaced relation with respect to each other and substantially utilizing the entire interior of the body portion of the pipe 15, are so located as to baffle the gases that escape from the container through the pipe 15. The baffle plates 17 are made in the form of discs that form with the wall of the pipe 15 openings alternately at opposite sides of the pipe 15 so as to cause the gases to move sinuously through the pipe. The disc baffle plates 17 substantially fit the interior of the pipe except a portion located on the side of the chord which forms an opening 19 between the edge 18 of each disc and the wall of the pipe 15. The disc baffle plates 17 are connected together by means of the rod 20 to which the discs are welded as at 21. The disc at the outer end of the pipe will abut the wall that is shaped to form the oblong outlet and, since the pressure of the gases is from within, the baffle plates will be held in their relative positions by the rod 20. This forms a means for ready assembly of the baffle plates in the muffler and the baffle plates will cooperate to maintain a substantially uniform escape or movement of the exhaust gases to the atmosphere while the engine is running notwithstanding the changes of the pressure that are produced by the explosive and intermittent flow of the gases from the exhaust pipe 1 into the container 3.

I claim:

1. In a muffler, a container connected to the exhaust pipe and having a diameter much larger than the diameter of the exhaust pipe, an outlet pipe extending along and diagonally from approximately the central part of the container and away from the exhaust pipe, the diameter of the outlet pipe being considerably smaller than the diameter of the container, the outlet of the outlet pipe being oblong in form to spread fanwise the escaping gases, a plurality of baffle plates located in the outlet pipe for reducing the rate of movement of the gases through the outlet pipe, the baffle plates conforming to the shape of the outlet pipe and having edge portions located in spaced relation with respect to the walls of the baffle plates to form openings alternately at opposite edges of juxtaposed baffle plates, and a rod extending centrally through the outlet pipe for securing the baffle plates in position.

2. In a muffler, a container provided with a head having an exhaust pipe outward extension for connection to the exhaust manifold of an internal combustion engine, said container being closed in the vicinity of said head except for its connection to the exhaust manifold and having a diameter much larger than the diameter of the exhaust pipe, an outlet pipe extending diagonally with respect to the axis of and along the container and away from the exhaust pipe, the diameter of the outlet pipe being considerably smaller than the diameter of the container, said container remote from said head and in proximity to said outlet pipe having a downwardly offset portion and a valve in said portion.

3. In a muffler, a container provided with a head having an exhaust pipe outward extension for connection to the exhaust manifold of an internal combustion engine, said container being closed in the vicinity of said head except for its connection to the exhaust manifold and having a diameter much larger than the diameter of the exhaust pipe, an outlet pipe extending diagonally with respect to the axis of the container and remote from the exhaust pipe, the diameter of the outlet pipe being considerably smaller than the diameter of the container, a plurality of baffle plates located in the outlet pipe for reducing the rate of movement of the gases through the outlet pipe.

4. In a muffler, a container provided with a head having an exhaust pipe outward extension for connection to the exhaust manifold of an internal combustion engine, said container being closed in the vicinity of said head except for a connection to the exhaust pipe and having a diameter much larger than the diameter of the exhaust pipe, said container remote from said head having a diagonally extending portion, a normally

closed cut-out valve in said portion, an outlet pipe portion extending diagonally and projecting along the container away from the exhaust pipe, the diameter of the outlet pipe being considerably smaller than the diameter of the container.

In witness whereof I have hereunto signed my name to this specification.

CHARLES W. BECK.