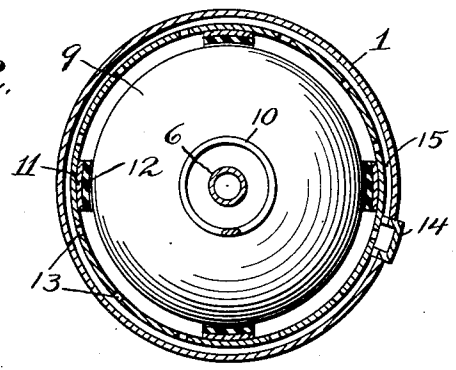
July 1, 1924. 1,499,683

A. NASHLUND

MUFFLER

Filed May 23, 1921

Fig. 2.



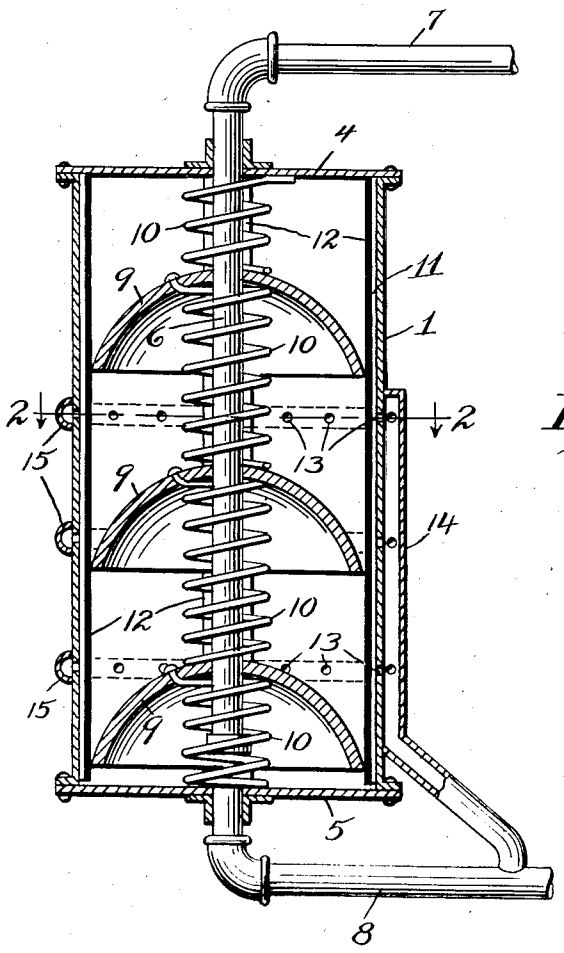


Fig. 1.

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Patented July 1, 1924. 1,499,683

UNITED STATES PATENT OFFICE.

AXEL NASHLUND, OF MARQUETTE, MICHIGAN, ASSIGNOR OF ONE-HALF TO HARVEY B. HATCH, OF MARQUETTE, MICHIGAN.

MUFFLER.

Application filed May 23, 1921. Serial No. 471,860.

To all whom it may concern:

Be it known that I, AXEL NASHLUND, a subject of the King of Sweden, residing at Marquette, State of Michigan, 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.

The invention relates to mufflers for gas engine exhausts and has for its object to provide a simple and effective device for silencing the exhaust, said device comprising an expansion chamber having a series of spring pressed cups disposed in spaced relation on an inlet pipe which extends into the chamber to a point substantially adjacent the outlet pipe leading from the chamber, and a series of rows of openings entering annular channels disposed in spaced relation about the chamber and having a common connection with the outlet pipe, the parts being so arranged that the expansion of the exhaust gases will move the cups successively longitudinally of the chamber to uncover the respective rows of openings, so that the aggregate area of the openings to effect the escape of the gases from the chamber will be substantially commensurate with the pressure of the exhaust gases entering the chamber. In order to reduce the extent of movement of the several cups and to permit the rapid operation of the muffler to accommodate any possible speed of the engine, the cups are made of slightly less diameter than the interior of the chamber and the peripheral edges of the cups are spaced from the inner wall of the chamber by guide strips, thereby providing passages between the peripheral edges of the cups and the wall of the chamber to permit the expanding gases to pass quickly into the spaces between the cups and lift the latter successively to uncover the auxiliary outlet openings in the wall of the chamber.

The invention is illustrated in the accompanying drawings, in which—

Fig. 1 is a sectional elevation of a muffler.

Fig. 2 is a section on the line 2—2 of Fig. 1.

Referring to the drawings, 1 indicates the casing of the muffler proper, which is preferably formed of a cylindrical hollow casting having its ends closed by head sections 4 and 5, the whole constituting the expansion chamber of the muffler. Mounted in a central opening in the head 4 and extending axially of the chamber is an inlet pipe 6, which is connected with the exhaust pipe 7 leading to the engine, said pipe 6 extending downwardly into the chamber to a point near the bottom thereof and preferably in axial alignment with the main outlet pipe 8, which is secured centrally within the head member 5. Slidably mounted on the axially disposed pipe 6 is a series of inverted cup-shaped members 9, which are resiliently spaced from the respective ends of the chamber and from each other by helical springs 10. The several cup-shaped members 9 have a diameter slightly less than the inside diameter of the chamber 1 and the peripheral edges of the several cups are spaced from the interior wall of the chamber by means of longitudinal strips 11 secured to the chamber wall and provided on their inner faces with sound deadening and anti-friction material 12 for the purpose of eliminating any sound that might result from the reciprocatory movement of the cup-shaped members and at the same time permit the latter to freely reciprocate in the chamber. The purpose of spacing the peripheral edges of the cups 9 from the wall of the chamber is to provide passages for the expanding exhaust gases into the spaces between the several cups, so that the expanding gases will act successively on the cups, as hereinafter explained.

Piercing the wall of the chamber 1 are several peripheral series of openings 13, which communicate with annular channels 15 which severally discharge into an auxiliary outlet pipe or conduit 14 which communicates at its lower end with the main outlet pipe 8. In the normal operation of the muffler, the exhaust gases entering the expansion chamber, formed by the casing 1 and the closing heads 4 and 5, are discharged from the axial pipe 6 at a point near the bottom of the chamber and in substantial alignment with the discharge pipe 8 connected with the bottom of the chamber. Immediately upon entering the chamber, the exhaust gases expand and lift the cup members 9 against the tension of the springs 10, successively, thereby uncovering the several peripheral series of auxiliary outlets 13 through which the expanding

gases escape into the channels 15, thence into the conduit 14 and ultimately into the main discharge pipe 8. In order to effect a rapid movement of all of the cup-like members, the expanding gases pass through the passages between the peripheral edges of the cups and the inner wall of the chamber, into the spaces between the successive cups, so that the latter are successively but quickly raised to uncover the auxiliary openings 13 and permit the exhaust gases to pass rapidly out of the chamber without noise. As soon as the pressure within the chamber has been reduced, due to the escape of the exhaust gases, the several springs 10 return the cups to normal position and the muffler is ready to receive the next discharge of burnt gases from the exhaust pipe 7. It will be particularly noted that the pressure of the exhaust gases entering the chamber of the muffler will effect an upward movement of the cup-like members substantially proportional to the extent of the pressure and the several springs interposed between the cup-like members will exercise a differential cushioning effect, without, however, interposing any substantial resistance to the upward movement of the cup-like members to uncover the several series of auxiliary exhaust openings 13.

What I claim is:

1. An exhaust muffler comprising an expansion chamber, an exhaust pipe extending through one end of said chamber to a point adjacent the opposite end thereof, a series of spaced cup-shaped members slidably mounted on said pipe, a main outlet pipe opening in the opposite end of the expansion chamber adjacent the discharge end of the exhaust pipe, auxiliary outlet openings disposed in spaced series in the wall of said chamber, and a common means for connecting said auxiliary openings with the main outlet pipe.

2. An exhaust muffler comprising an expansion chamber, an exhaust pipe extending through one end of said chamber to a point adjacent the opposite end thereof, a series of spaced cup-shaped members slidably mounted on said pipe, cushioning elements interposed between the cup-shaped members and between the ends of the expansion chamber and the adjacent cup-shaped members, a main outlet pipe opening in the opposite end of the expansion chamber adjacent the discharge end of the exhaust pipe, auxiliary outlet openings disposed in spaced series in the wall of said chamber, and a common means for connecting said auxiliary openings with the main outlet pipe.

3. An exhaust muffler comprising an expansion chamber, an exhaust pipe extending through one end of said chamber to a point adjacent the opposite end thereof, a series of spaced cup-shaped members slidably mounted on said pipe, spring cushioning elements interposed between the cup-shaped members and between the ends of the expansion chamber and the adjacent cup-shaped members, spacing and cushioning strips interposed between the peripheral edges of said cup-shaped members and the wall of the expansion chamber, a main outlet pipe opening in the opposite end of the expansion chamber adjacent the discharge end of the exhaust pipe, auxiliary outlet openings disposed in spaced series in the wall of said chamber, and a common means for connecting said auxiliary openings with the main outlet pipe.

In testimony whereof I affix my signature.

AXEL NASHLUND.