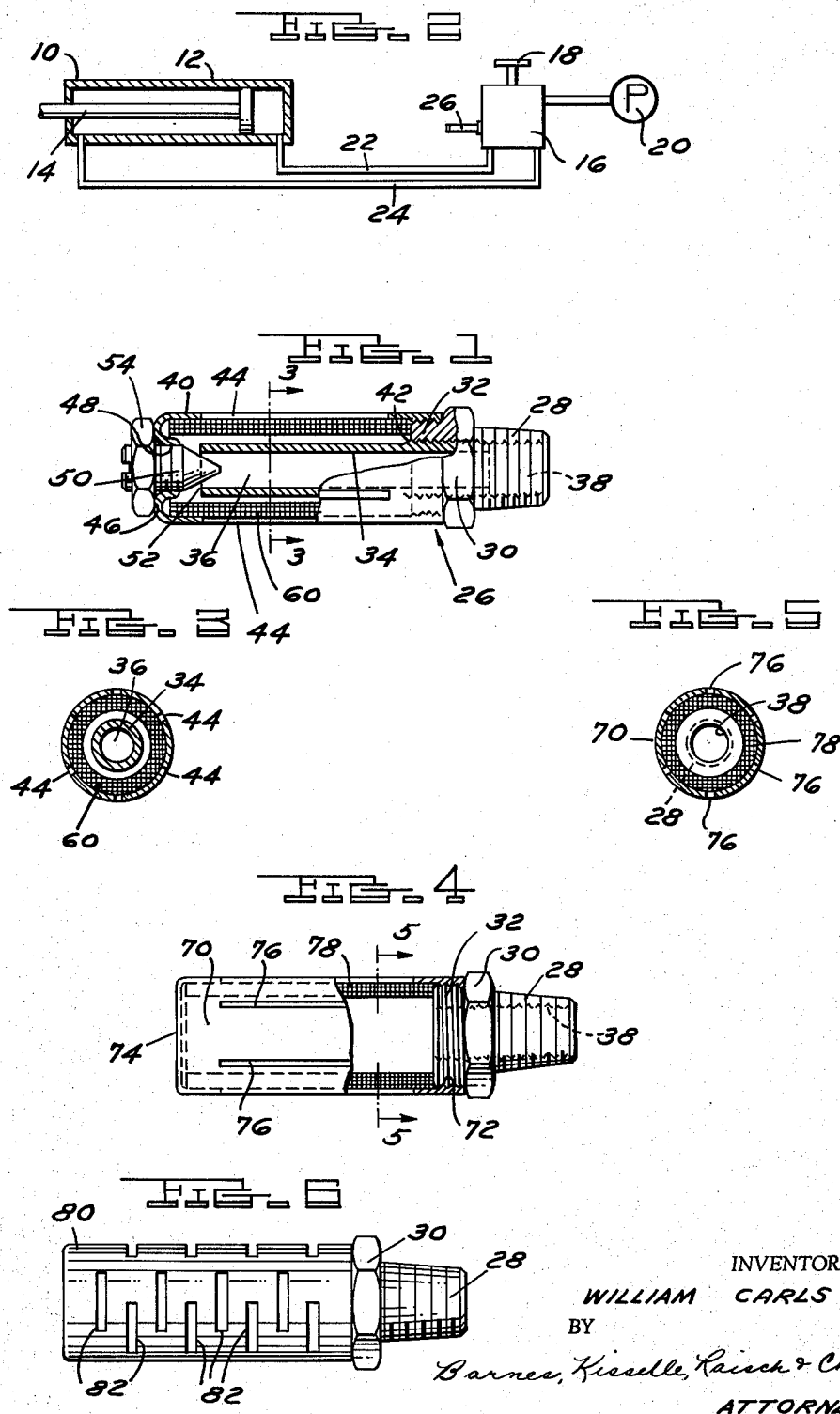


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W. CARLS
COMBINED AIR MUFFLER AND METERING VALVE WITH
REPLACEABLE CARTRIDGE
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INVENTOR

WILLIAM CARLS

BY

Barnes, Kisselle, Raich & Choate
ATTORNEYS

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3,208,551 COMBINED AIR MUFFLER AND METERING VALVE WITH REPLACEABLE CARTRIDGE

William Carls, Highland, Mich.
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This invention relates to a muffler device and more particularly to a muffler for use in air-operated equipment.

It is a peculiar characteristic of air-controlled equipment that the better the valve, that is, the sharper its operation, the more noise it may make when it exhausts a high pressure supply of air. Accordingly, in an area where there may be a lot of air valve controls, it is desirable to have a muffler device for reducing the noise which would otherwise be disturbing to those working in the area.

It is an object of the present invention to provide a compact, small, simple and economical muffler device so constructed that it may be adapted for use either as a straight muffler or as a muffler and metering device. Parts are so devised that they can be adapted for both purposes.

It is another object of the invention to provide a unit of this kind which can be easily assembled and disassembled and in which parts can be replaced if desired.

Other objects and features of the invention relating to details of construction and operation will be apparent in the following description and claims.

Drawings accompany the disclosure and the various views thereof may be briefly described as:

FIGURE 1, a view partially in section of the device showing the relation of the parts in connection with a combined muffler and metering device.

FIGURE 2, a circuit drawing in which the device is used.

FIGURE 3, a sectional view on line 3-3 of FIGURE 1.

FIGURE 4, a view partially in section showing a device used as a muffler only.

FIGURE 5, a sectional view on line 5-5 of FIGURE 4.

FIGURE 6, an elevation of a modified outer shell construction.

In FIGURE 2, a cylinder 10 has an operating piston 12 with a rod 14 operated by a valve 16 shown diagrammatically with an operating handle 18. Pressure from a source 20 is directed through conduits 22 and 24 to the respective ends of the cylinder. An exhaust port at valve block 16 has fitted therein a muffler unit 26 so that when the piston is to be reversed, any air load thereon will be exhausted through the muffler 26 and thus the noise of the exhaust is reduced to a minimum.

In FIGURE 1, a sectional view in approximately actual size of a combined muffler metering device is shown, this structure comprising a threaded nipple element 28 having an octagonal nut formation 30 thereon and an integral threaded body portion 32. A tube 34 threaded at one end is threadingly received in the nipple to form a reduced neck portion extending axially and forming a central bore 36 which connects to the opening 38 in the nipple portion 28, the nipple portion being suitably threaded exteriorly to be received in a tapped hole in the valve body or otherwise connected to a valve outlet.

Mounted on the threaded body portion 32 is a tubular shell 40 having at one end a threaded inner surface 42 which co-operates with the threads on the outside of body 32. The cylindrically shaped shell 40 has axial slits 44 spaced around the shell to provide air outlets. The outer end of the shell 40 is formed inwardly at 46 to create a

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threaded recess 48 concentric with the shell. This recess terminates short of the end of the tube 34. Threaded into the recess 48 is a cone-shaped screw 50 having a portion which can project into the end 52 of the tube 34 to close off this end or restrict it to any degree desired. The cone-shaped screw 50 has a lock nut 54 which bears against the end 46 to insure a fixed position of the screw.

Confined within the shell 40 is a cylindrical cartridge 60, this cartridge having a relatively large central opening of greater diameter than the outer diameter of the tube 34. The outer diameter of the cartridge is essentially the same as the inner diameter of the shell 40 so that the cartridge slips inside the shell and underlies the slits 44. The cartridge is then confined axially between the body portion 32 and the inturnd portion 46. This cartridge is formed of a porous material. One example may be a rolled screen material wherein the screen is of a very fine mesh. This cylinder may also be formed of a porous cellular material which will pass air.

It will readily be seen that the shell 40 can be removed to permit replacement of the cartridges 60 in the event they become clogged with dirt particles or oil. It will also be seen that the annular orifice formed by the screw 50 and the end of the tube 34 can be adjusted to create a metering effect in the event it is desirable to control the piston 12, for example, in moving in one direction or the other. The entire assembly is small, having an overall length of just over three inches and a diameter of less than one inch.

In FIGURE 4, a modified structure is shown wherein the nipple 28, the nut portion 30 and the body portion 32 are the same as shown in FIGURE 1. In this case, the tube 34 is omitted and a shell portion 70 forming the body of the muffler has an interior thread 72 at an opened end portion to co-operate with the thread 32. The other end 74 of the shell 70 is closed. This shell has slits 76 for air release and a cartridge 78 confined within the shell can be the same as cartridge 60 of FIGURE 1. The nipple 28 has an interior passage 38 as previously described. This device can be used also in the exhaust port of the valve 16 where no metering effect is desired.

In FIGURE 6, a modified shell 80 mounted in the usual manner on nipple 28 has staggered short circumferential slots 82 spaced along and around its length and circumference to serve as air outlets.

It will thus be seen that with a single nipple unit as a base, there can be provided either a metering muffler exhaust device with the use of the insertable tube 34 or a relatively unrestricted muffler exhaust device.

What I claim is:

1. An air muffler construction comprising:

- (a) a threaded nipple adapted to be connected to a valve outlet including a body having a central passage,
- (b) a threaded portion on the body of said nipple,
- (c) a cylindrical shell having an interior threaded portion at one open end thereof to cooperate with said threaded portion on the body of said nipple to join the nipple and the shell together,
- (d) an air restricting cartridge confined within said shell between one end thereof and said body portion of said nipple having its outer surface lying against the inner surface of the shell,
- (e) restricted air passages formed in said shell overlying spaced portions of the outer surface of said cartridge, the other end of said shell opposite the open end having a threaded recess concentric with said shell,
- (f) a tube extending axially into said shell from said central passage, and
- (g) a screw in said threaded recess having one end adjacent one end of said tube extending from the cen-

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tral passage of said nipple, said screw being adjustable to permit predetermined restriction of said passage.

2 An air muffler construction comprising:

- (a) a threaded nipple to be received in a tapped hole of a valve block and including a body, 5
- (b) a threaded portion on the body of said nipple, said body being extended axially in a tubular neck portion extending away from the threaded nipple, 10
- (c) a cylindrical shell having an open end threaded onto said threaded portion of said body and overlying said neck portion, said shell having a plurality of restricted openings through the wall thereof, 15
- (d) a metering cartridge concentric with said shell and said neck portion, spaced from said neck portion, and having its outer walls in proximity to the inner walls of said shell, and
- (e) a metering screw threaded in the other end of said shell opposite the open end having a portion concentric with and projectable into an end of said neck portion to create a metering restriction adjustable to a predetermined size depending on the axial position of said screw. 20

3. A small and compact air muffler construction comprising:

- (a) a nipple having an interior bore threaded at one end and a threaded exterior extension at each end, 25
- (b) a hollow shell open at one end and interiorly threaded at said open end to cooperate with one

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exteriorly threaded end of said nipple, and having spaced wall slits distributed around its surface,

- (c) an air restricting cartridge confined within said shell between one end thereof and said nipple having an outer surface underlying said wall slits,
- (d) an open-ended tube threaded into the said interior bore of said nipple within said shell, and
- (e) means on said shell adjustably positioned to control the size of the opening of said tube away from said nipple.

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LEO SMILOW, *Primary Examiner.*