June 3, 1941. G. H. FUEHRER 2,244,060

SILENCER FOR ROCK DRILLS

Filed May 16, 1940

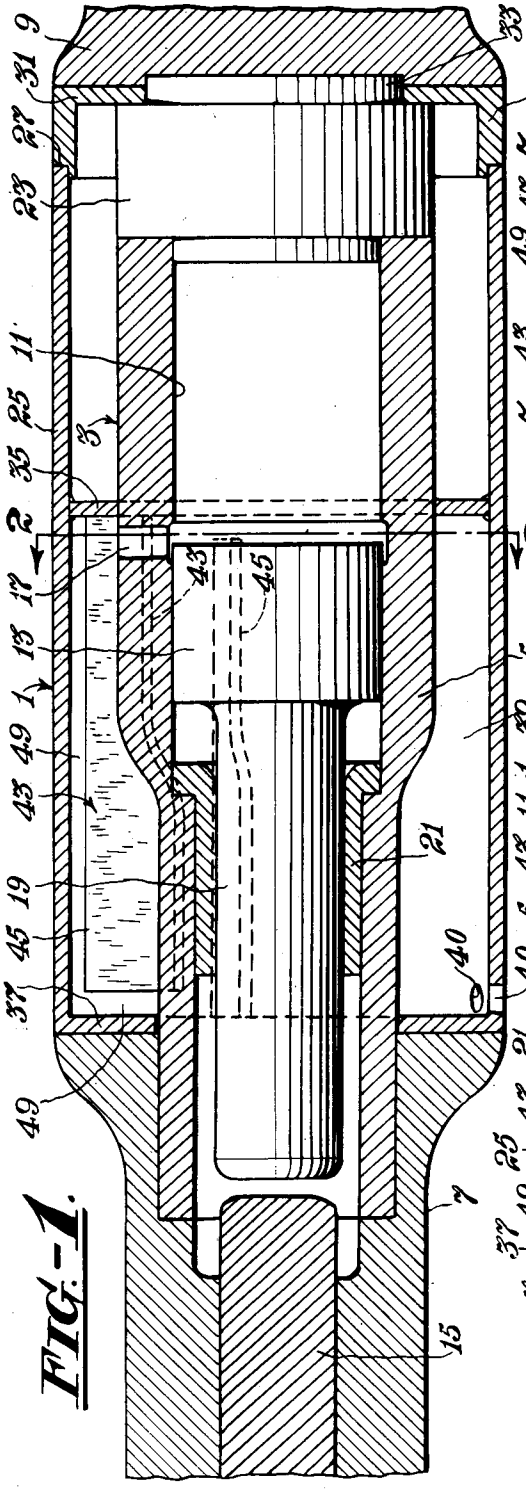


FIG.-1.

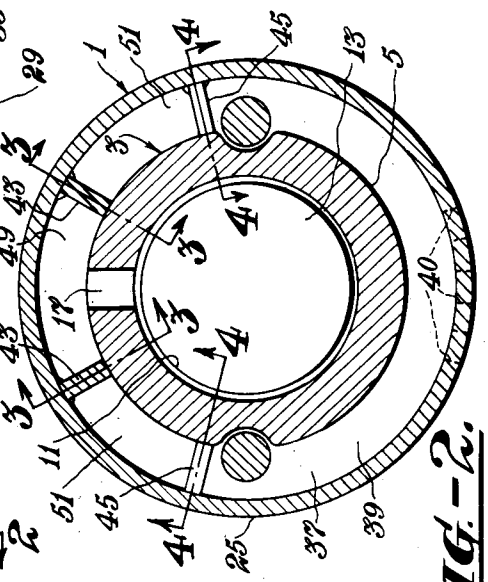


FIG.-2.

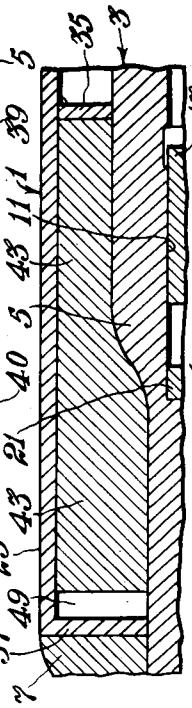


FIG.-3.

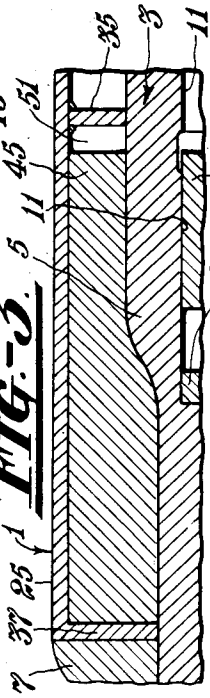


FIG.-4.

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SILENCER FOR ROCK DRILLS

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Application May 16, 1940, Serial No. 335,516

2 Claims. (Cl. 121—35)

This invention relates to a silencer and, more particularly, it relates to a device for silencing the exhaust fluid of a pneumatic tool such as a rock drill.

The exhaust of pressure fluid from a percussion tool does not flow in a steady stream but occurs in impulses. When these impulses expand into the atmosphere, sound waves are set up which result in considerable noise.

One object of the invention is, therefore, to silence the exhaust of a percussion tool by transforming the impulse of the fluid exhaust from the tool into a substantially constant stream and thus suppressing the customary attendant noise.

Another object is to provide a silencer which is simple, efficient, easy to install and repair, and inexpensive.

A further object is to prevent the exposure of the distributing valve mechanism of a pneumatic tool to the low temperature resulting from the expansion of the exhaust fluid issuing from the cylinder of such pneumatic tool.

These and further objects will be apparent as the invention is described in connection with the drawing, wherein

Figure 1 is an elevational, sectional view of a silencer constructed in accordance with the principles of the present invention, as applied to a rock drill, the latter being shown only in part.

Figure 2 is a sectional view along line 2—2 of Fig. 1.

Figure 3 is a sectional view along line 3—3 of Fig. 2.

Figure 4 is a sectional view along line 4—4 of Fig. 2.

With reference to Fig. 1, the silencer, generally indicated at 1, is shown applied to a rock drill tool 3. The tool 3 comprises a cylinder, or casing, 5 having a front head 7 and a back head 9. The cylinder 5 is bored to provide a piston chamber 11 for the piston 13 which reciprocates therein and actuates the working implement 15 extending through the front head 7. The piston 13 also controls the free exhaust port 17 for the piston chamber 11.

The piston 13 has a shank 19 extending into and slidably engaging the bushing 21 in the front end of the piston chamber 11, which contacts the working implement 15. Pressure fluid to actuate the piston is supplied through ports and passages (not shown) to the distributing valve 23, of which only the outer casing is shown. This valve is disposed at the rear end of the cylinder and serves to distribute the fluid through other ports and passages (not shown) to the ends of the piston chamber 11.

The silencer 1 comprises a tubular sleeve 25 surrounding the cylinder 5 and the distributing valve 23. The upper end of the sleeve 25 bears against a shoulder 27 formed on the annular extension 29 of a plate 31 seating against the back head 9. The tubular sleeve 25 is centralized with respect to the back head 9 by the projection 33 formed on the distributing valve 23 which extends through the plate 31 into the back head 9. Extending between the sleeve 25 and the cylinder 5, above the exhaust port 17, is an upper horizontal partition 35 secured to the tubular sleeve by welding, or in any other suitable manner. The partition 35 is preferably located immediately adjacent the exhaust port 17 and has a slide fit on the casing 5 to prevent the flow of exhaust fluid in the direction of the valve 23 and thereby protect the valve against exposure to the low temperature of the fluid flowing from the exhaust port 17 into the sleeve 25. Another, or lower, partition 37 rests on the front head 7 and is formed by bending the end of the tubular sleeve 25 so that it extends inwardly to the cylinder 5. This partition, of course, may be formed separately from tubular sleeve 25 in a manner similar to partition 35.

The two partitions 35 and 37 cooperate with the tubular sleeve 25 and casing 5 to form an exhaust chamber 39 designed to receive the exhaust fluid escaping from the piston chamber 11 through the free exhaust port 17. Escape of pressure fluid from the exhaust chamber 39 is permitted through one or more of the outlet ports 40 provided in the sleeve 25. Within the exhaust chamber 39 are a series of baffle plates. As will be seen from Fig. 2, these baffle plates are secured to the tubular sleeve by any appropriate means, such as welding.

On either side of the exhaust port 17 is a primary baffle 43 extending from the partition 35 to a point near the lower partition 37, or bottom of the chamber 39 as is apparent from Fig. 3. Spaced from the primary baffles are secondary, or outlet port, baffles 45 secured to the tubular sleeve which extend from the bottom of the chamber toward the upper partition 35 but terminating below the partition 35, as will be seen from Fig. 4.

With this arrangement, the pressure fluid exhausting from the piston chamber 11 passes through the free exhaust port 17 and enters the primary chamber 49 defined by the baffles 43. From this space there is no path of escape for

the fluid except through the passage provided between the bottom of the primary baffles **43** and the partition **37** at the bottom of chamber **39** to the secondary chambers **51** defined by baffles **43** and **45** within the exhaust chamber **39**. Escape from the secondary chambers will be through the space between the partition **35** and the top of the secondary baffles **45**. Thereafter the pressure fluid is free to exhaust to the atmosphere through the ports **40**.

Any number of baffle plates and chambers formed thereby within the exhaust chamber **39** may, of course, be employed. The object of the baffles is to reduce the speed of the pressure fluid flowing therethrough and, in that way, provide a substantially constant flow of exhaust pressure fluid to the outer atmosphere to prevent the sudden expansion of a large quantity of pressure fluid at regular intermittent periods.

Thus, by requiring the exhaust fluid to travel a path of maximum length, a maximum dampening effect is secured and, consequently, there is very little noise attending the discharge of the exhaust fluid through the exhaust ports **40**.

A further highly desirable advantage of the present invention is that the expanded fluid in a sleeve clamped in assembled position by the back and front heads of a pneumatic tool can not reach the vicinity of the distributing valve mechanism and the temperature of the valve mechanism will, therefore, remain sufficiently high at all times to preclude the freezing of moisture entrained in the pressure fluid passing through the valve mechanism and the consequent erratic action of the valve.

I claim:

1. In a silencer for a pressure fluid actuated percussion tool, the combination of a casing having a piston chamber and an exhaust port for the piston chamber, valve means in the casing for effecting the distribution of pressure fluid to the piston chamber, a sleeve encircling and spaced from the casing and the valve means and cooperating with the casing to define an expansion chamber for the exhaust fluid issuing from the exhaust port, said sleeve having an outlet port for conveying fluid from the expansion chamber to the atmosphere, and means in the sleeve to prevent the flow of exhaust fluid through the sleeve in the direction of the valve means.

2. In a silencer for a pressure fluid actuated percussion tool, the combination of a casing having a piston chamber and an exhaust port for the piston chamber, valve means in the casing for effecting the distribution of pressure fluid to the piston chamber, a sleeve encircling and spaced from the casing and the valve means and cooperating with the casing to define an expansion chamber for the exhaust fluid issuing from the exhaust port, said sleeve having an outlet port for conveying fluid from the expansion chamber to the atmosphere, a plate in the sleeve immediately adjacent the exhaust port cooperating with the surface of the casing to prevent the flow of exhaust fluid through the sleeve in the direction of the valve means, and baffles in the expansion chamber to form a tortuous path for the exhaust fluid between the exhaust port and the outlet port.

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