Dec. 31, 1957 R. T. DOUGHTY 2,818,131

MUFFLER

Filed May 7, 1954

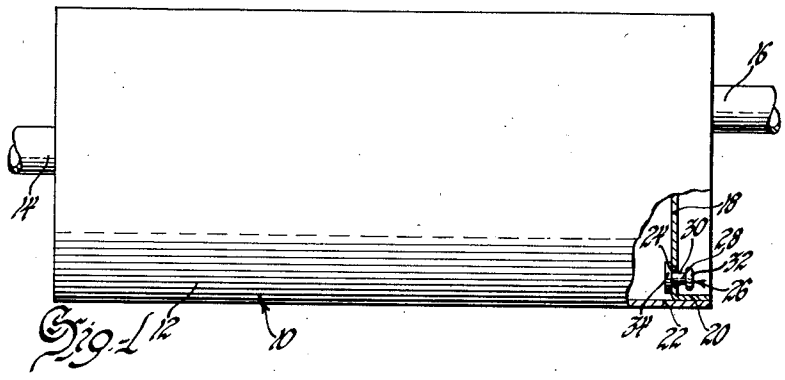


Fig. 1

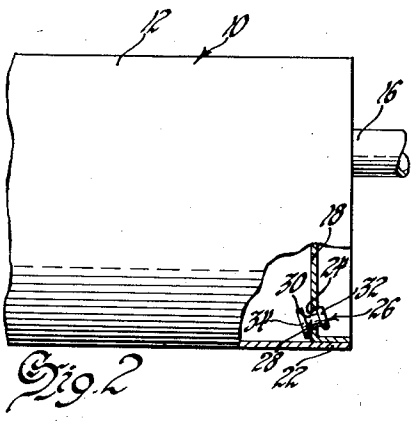


Fig. 2

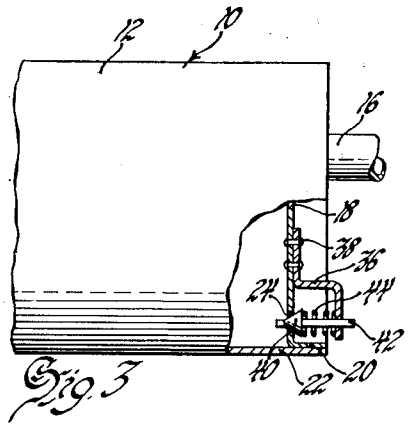


Fig. 3

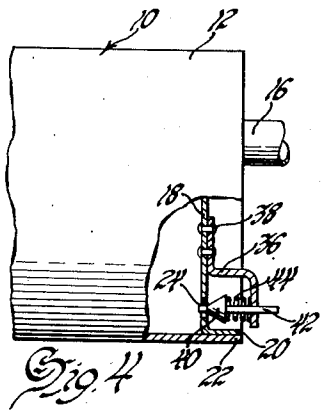


Fig. 4

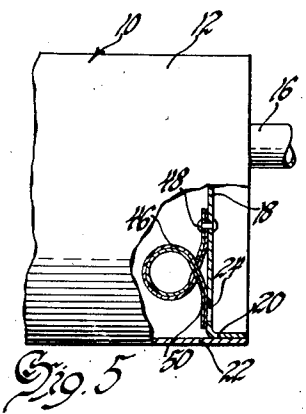


Fig. 5

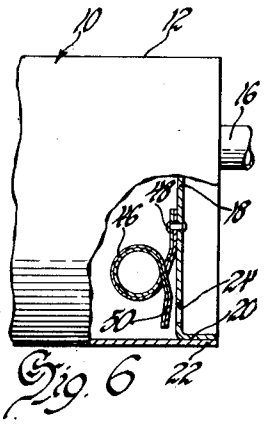


Fig. 6

INVENTOR
Robert T. Doughty
BY
L. D. Burch
ATTORNEY

United States Patent Office 2,818,131
Patented Dec. 31, 1957

2,818,131

MUFFLER

Robert T. Doughty, Detroit, Mich., assignor to General Motors Corporation, Detroit, Mich., a corporation of Delaware

Application May 7, 1954, Serial No. 428,232

11 Claims. (Cl. 181—36)

This invention relates to muffling devices, and more particularly to muffling devices having automatic means for draining condensates therefrom.

Mufflers, such as those employed to reduce the objectionable noises produced by the exhaust of an internal combustion engine, corrode at an excessive rate. This corrosion is due, to a great extent, to the collection of corrosive condensates in the muffler, especially during the warm up period of the engine when vapors in the exhaust gases condense on cold engine parts and drain along the exhaust conduit ahead of the muffler and into the muffler. These condensates, provided the engine is operated for a sufficient period of time to heat the exhaust system and the muffler, eventually revaporize and pass harmlessly out into the atmosphere with the exhaust gases. However, as is frequently the case, the engine is operated for a short period only so that the condensates which collect in the muffler cannot revaporize and therefore remain in the muffler to corrode the same.

Various means have been employed to remove moisture from the exhaust gases prior to the entry thereof into the muffler. Such devices, however, have usually been of a complicated structure such that their use is expensive and therefore prohibitive. There are also disclosed in the art various cut out devices for by-passing the muffler, which devices could be employed for the draining off of condensates prior to their entry into the muffler. These latter devices are objectionable because they must be intermittently hand operated and because they do not drain any condensates which therefore collect in the muffler when they are not operated. Furthermore, they are too noisy for present day use.

It is now proposed to provide means for draining the condensates from mufflers of this kind which avoid the above named objections in that these means are provided in the muffler itself, and preferably at the discharge end thereof. Thus, any condensates that do collect in the muffler may be drained directly therefrom. It is further proposed to provide such means which are automatic in operation in that they are operable in response to the operating conditions of the muffler itself. Thus, the operator of the vehicle need not concern himself with the fact that after a short period of operation the muffler should be drained of condensates that may have collected therein.

In the several embodiments of the invention proposed, an aperture is provided near the bottom edge of the discharge end wall of the muffler. In one embodiment of the invention a pin is disposed within the aperture, the pin being of such construction that the force of the exhaust gases will cause the pin to seal the aperture. When the engine is not in operation so that the pin is no longer acted upon by exhaust gases, the aperture is opened and condensates can drain therethrough. In another embodiment of the invention a spring loaded tapered plug is provided. When the exhaust gas pressure is sufficient to overcome the spring, the plug is removed from the aperture and the condensates may drain from the muffler. In a third embodiment of the invention a bimetal strip responsive to muffler temperatures is provided to close the aperture when the engine is operating and to open the aperture when the engine is not operating to permit the condensates to drain from the muffler.

In the drawings:

Figure 1 is a side elevational view, with portions thereof broken away, of a muffler embodying one form of the invention. In Figure 1 the valve is closed so that condensates may not drain from the muffler.

Figure 2 is a side elevational view of the right hand portion of Figure 1, but with the valve in the open position.

Figure 3 is a view similar to Figure 2, but illustrating a modification of the invention with the valve in the closed position.

Figure 4 illustrates the modification of the invention shown by Figure 3, but with the valve in the open position.

Figure 5 illustrates another modification of the invention, but with a different valve in the closed position.

Figure 6 illustrates the modification of the invention shown by Figure 5, but with the valve in the open position.

Referring to the drawings in greater detail, a muffler **10** embodying the invention may comprise an outer tubular shell **12**, an inlet **14**, an outlet **16** and an end wall **18** having a flange **20** suitably secured to the end **22** of the outer tubular shell **12** at the inner periphery thereof. The end wall **18** is provided with an aperture **24** adjacent the lower edge thereof through which condensates in the muffler are to be drained.

In the form of the invention illustrated by Figures 1 and 2, there is provided in the aperture **24** what is commonly known as a "jiggle pin" **26** having a middle portion **28** of sufficiently smaller diameter than the aperture so that liquid may pass through the clearance **30** therebetween and head portions **32** and **34** at either end thereof. The head portion **32** on the outside of the end wall **18** is of sufficient diameter so that the head cannot pass through the aperture **24**, while the head portion **34** on the inside of the muffler is of sufficient size to be heavier than the head portion **32** and to cover the aperture **24**. Thus, when the exhaust gases are passing through the muffler during operation of the engine, these gases will act upon the larger head **34** and force the head **34** against the end wall **18** of the muffler to seal the aperture **24** against the escape of exhaust gases therethrough. However, when the pressure within the muffler is not sufficient to force the head **34** against the end wall **18**, the head **34**, being heavier, will cause the pin **26** to tilt as shown in Figure 2 and to open the aperture **24** so that when the engine is not operating the condensates may drain from the muffler through the aperture **24**.

Figures 3 and 4 illustrate a second modification of the invention in which there is provided a bracket **36** suitably secured to the end wall **18** by any suitable means such as rivets **38** and supporting at the other end thereof a conical plug **40** mounted on a shaft **42** passing through the bracket **36** and biased in the closed position of the aperture by means of a spring **44**. In this modification of the invention, the aperture **24** is closed when the engine is not in operation, and condensates may drain from the muffler only when the engine is operating so that the exhaust gas pressure may force the conical plug **40** backwardly against the tension of the spring **44**. In this modification, since the condensates drain when the engine is operating, it is preferable that the aperture **24** be at the discharge end of the muffler to reduce the noise that may result from the escaping exhaust.

Figures 5 and 6 illustrate a third embodiment of the invention in which the valve means comprises a bimetallic element **46** looped intermediate the ends thereof and connected at one end thereof to the end wall **18** by any suitable means such as a rivet **48**. The other end **50** of the bimetallic element **46** is disposed adjacent the aperture **24** to normally close the aperture when the engine is operating and the muffler temperature is relatively high. When the engine is not operating and the temperature inside the muffler decreases, the bimetallic element **46** will react to open the aperture as shown in Figure 6 during which time the condensates may drain from the muffler.

It is apparent from the above specification and drawings that there has been provided a muffler having valve means operable in response to normal operating conditions of the muffler to permit automatic drainage of condensates from the muffler without the necessity of the operator of the vehicle on which the muffler is provided being conscious of the same. The muffler, therefore, will be less subject to corrosion and deterioration due to condensates collecting therein and will have a longer useful life.

What is claimed is:

1. In a muffler structure having an end wall an exhaust outlet conduit extending therefrom, valve means disposed in said end wall and being separate from said outlet conduit for draining condensates from said muffler, said valve means being opened and closed automatically in response to the normal operation of the muffler.

2. A muffler comprising a tubular body having a transverse wall at the outlet end thereof, said wall being formed to provide an aperture therein adjacent the lower edge thereof, and valve means responsive to operating conditions of said muffler in opening and closing said aperture.

3. A muffler comprising a tubular body having an end wall, said end wall being formed to provide an aperture therein, and valve means responsive to operating conditions of said muffler in opening or completely closing said aperture.

4. A muffler comprising a tubular body having an end wall at the discharge end thereof, said wall being formed to provide an aperture adjacent the lower edge of said end wall and a valve responsive to exhaust gases passing through said muffler and adapted to completely close said aperture.

5. A muffler for quieting the exhaust of an internal combustion engine, said muffler comprising a body having an outer tubular shell, an end wall at the discharge end of said tubular shell, an inlet passage at one end of said muffler and an outlet passage in the discharge end of said muffler, and valve means in said end wall and completely separate from said outlet passage for draining condensates from said muffler, said valve means being disposed at the lower edge of said end wall and being operable in response to normal operating conditions of said muffler.

6. A muffler comprising a hollow body having an end wall at the outlet end thereof, said wall being formed to provide an aperture adjacent the lower edge thereof, and a valve adapted to open and close said aperture, said valve comprising a bimetallic element secured at one end thereof to said end wall and having the other end thereof

adjacent said aperture and adapted to open and close said aperture in response to temperatures within said muffler.

7. A muffler comprising a tubular body having an end wall at the outlet end thereof, said end wall being formed to provide an aperture adjacent the lower edge thereof, and a spring loaded conical plug aligned with said aperture externally of said muffler, said plug being adapted to normally close said aperture and said plug being further adapted to be displaced axially when acted upon by the force of exhaust gases passing through the muffler to open said aperture and to permit condensate in said muffler to drain therethrough.

8. A muffler comprising a tubular body having an end wall at the outlet end thereof, said wall being formed to provide an aperture adjacent the lower edge thereof, and a resiliently biased member aligned with said aperture externally of said muffler, said member being adapted to normally completely close said aperture and said member being further adapted to be displaced axially when acted upon by the force of exhaust gases passing through the muffler to open said aperture and to permit condensates in said muffler to drain therethrough.

9. A muffler comprising a tubular body having a rear end wall, said end wall being formed to provide an aperture at the lower edge thereof, and a loose-fitting pin disposed within said aperture, said pin having an enlarged head portion at either end thereof to prevent said pin from passing completely through and out of said aperture, said head on the inside of said muffler being heavier than said other head and having the surface thereof adjacent said end wall adapted to seal said aperture when acted upon by the exhaust gases passing through said muffler to prevent the escape of said gases through said aperture, said heavier head being further adapted to cause said pin to assume a cocked position in said aperture when no exhaust gases are passing through said muffler to open said aperture and to permit condensates to drain from said muffler through said aperture.

10. In a muffler structure having an end wall and an exhaust outlet conduit extending therefrom, with said wall being formed to provide an aperture below and separate from said exhaust outlet, valve means disposed in said aperture in said end wall for draining condensates from said muffler, said valve means including a loose pin in said aperture and having an enlarged head disposed inside said muffler and being responsive to exhaust pressure to close said aperture.

11. A muffler comprising a tubular body having an end wall, said end wall being formed to provide an aperture adjacent the lower edge thereof, and a valve responsive to exhaust gases passing through said muffler in opening and closing the same, said valve including a loose pin having enlarged heads and extending through said aperture.

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