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EXHAUST RAIN PROTECTOR

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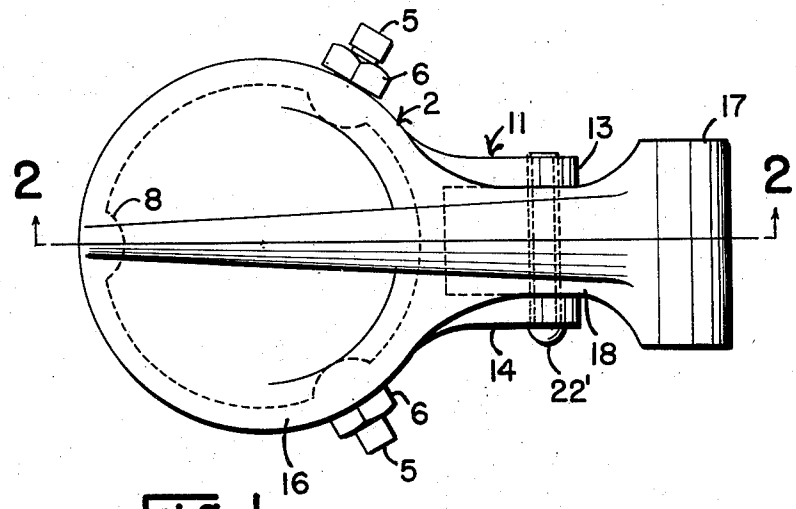


Fig. 1

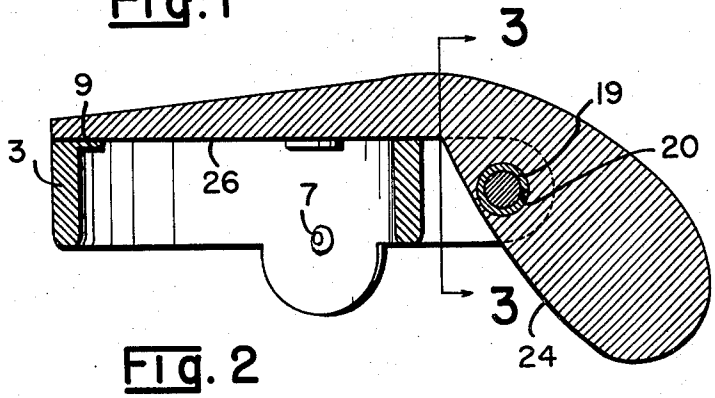


Fig. 2

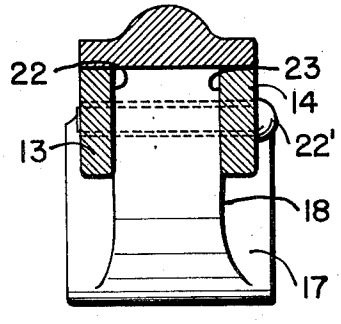


Fig. 3

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EXHAUST RAIN PROTECTOR

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3 Claims. (Cl. 98—59)

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The invention relates to a closure device for protecting the open end of a vertically arranged portion of an exhaust pipe of an internal combustion engine.

Generally internal combustion engines used on tractors, farm equipment, and on stationary engines for various industrial purposes are provided with substantially vertical exhaust pipes to discharge the exhaust gases from the engine. Therefore, it is necessary to provide a suitable means for covering the end of the exhaust pipe to afford protection thereto in order to prevent the entry of water, dust, or solid matter into the exhaust pipe. A device of this character presents a problem in that while the engine is in operation the exhaust pipe must, of course, be open to allow the discharge of gases therefrom but when not in use the device should be in a position to close the exhaust pipe. It is, of course, impractical to provide a device which can be removed during the operation of the engine and then replaced on the exhaust pipe when the engine is not in use. Another disadvantage with devices heretofore provided for exhaust pipes is that the corrosive action of the exhaust gases combined with the weather elements tends to rapidly corrode any automatic operable element so as to freeze it, thereby preventing the proper functioning thereof.

Also, due to the difference in the coefficient of expansion between the exhaust pipe metal and the closure device which is preferably of aluminum, the device generally slips out of position during the operation thereof.

The present invention is, therefore, directed to a closure device for an exhaust pipe in internal combustion engines which device may be semi-permanently positioned upon the exhaust pipe and which is operable while the engine is in operation to allow the discharge of exhaust gases therefrom but which moves towards a closed position on the exhaust pipe automatically when the exhaust pressure of the gases decreases, to form a protective cover for the open end of the exhaust pipe.

Another object of the invention is to provide a closure device for an exhaust pipe which includes a pivotally mounted closure flap, there being a wear-resistant bushing associated with such pivotal mounting to inhibit the corrosive action of the exhaust gases upon such pivotal connection whereby the life of the closure device is lengthened, and to prevent sticking of such pivotal connection so that the closure flap can

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move freely to and from a closed position on the exhaust pipe.

Another object of the invention is to provide a closure device having a closure flap to form a protective cover on the open end of an exhaust pipe, which closure flap is provided with a counterweight for counterbalancing the flap, there being a built-up area on the nether side of such counterweight which serves as stop means for limiting the opening movement of the closure flap so as to insure movement of the flap towards closed position upon reduction of pressure of the exhaust gases.

Another object of the invention is to provide a closure device which can be positioned on an upwardly extending exhaust pipe, there being means to positively position the device on the exhaust pipe without fear of its slipping out of position over a period of time.

Other objects and advantages of the invention will become more readily apparent from a consideration of the following description and drawings, in which:

Figure 1 is a top plan view of the closure device of the instant invention;

Fig. 2 is a vertical cross-sectional view taken on the line 2—2 of Fig. 1 showing the device mounted upon an exhaust pipe;

Fig. 3 is a vertical sectional view taken on the line 3—3 of Fig. 2, more clearly illustrating the construction of the pivotal connection.

The closure device of the instant invention is indicated generally by the numeral 2, and is shown as comprising a frame element or ring 3 which is adapted to be secured on the upper end of a substantially vertically arranged exhaust pipe. In order to removably retain the frame element or ring 3 in position on the exhaust pipe, set screws 5 are provided which extend through the ring 3, such screws having nuts 6 thereon whereby the inner ends 7 of the lock screws 5 will be locked in position against the outer surface of the exhaust pipe. Lips 8 are provided adjacent the top 9 of the ring to engage the top of the exhaust pipe to afford additional positioning means for the ring on the exhaust.

These lips extend laterally inwardly from the ring 3 and are adapted to rest on the top of the exhaust pipe. During the operation of an engine the exhaust pipe becomes hot, which heat is in turn transferred to the closure device. Heretofore there has been no device which would retain its proper position on the pipe, since it would slip because of the difference in the coefficient of expansion between the exhaust pipe metal and

the closure device metal. However, the lips 8 of the instant invention will prevent the closure device from slipping down on the exhaust pipe and out of operative position.

Integral with and extending laterally from the ring 3 is a bracket 11 comprising arms 13 and 14 spaced so that the closure cap 16 may be pivotally mounted therebetween. Integral with the closure cap 16 and extending laterally therefrom and rearwardly of the arms 13 and 14 is a counterweight 17 adapted to counterbalance the closure cap 16. It is to be noted that the counterweight 17 has a narrowed portion, as at 18, which fits between the arms 13 and 14. A wear-resistant bushing 19, such as bronze or the like, is arranged in an opening 20 extending through the narrowed portion 18 between the counterweight and the closure flap proper. The bushing 19 forms a seat and is adapted to receive a pin 22' which extends through the arms 13 and 14 whereby the closure flap is pivotally mounted on the ring 3 and the exhaust pipe therein.

It has been found that closure devices heretofore used become worn rapidly at the pivotal connection where the flap is mounted on the ring. This is due to the fact that the movement between the flap and the ring is almost constant as the exhaust pressure fluctuates while the engine is in operation. Additionally, the exhaust gases tend to corrode, as does water, the pivotal connection, which causes it to freeze, thereby inhibiting or preventing the operation of the device. It has been found that by placing a wear-resisting ring in accordance with the instant invention in the pivotal connection, this obstacle is overcome and a closure device is provided which not only lasts longer but is more positive in its action.

As more clearly shown in Fig. 3 of the drawings, the narrowed portion 18 fits adjacent the inner sides 22 and 23 of the laterally extending arms 13 and 14 which form the bracket 11. It seems obvious, of course, that a suitable clearance is provided between such narrowed portion and the inner surfaces 22 and 23 to allow free movement of the closure cap during the operation thereof.

The counterweight 17 is built up on its nether side, as at 24, whereby the opening movement of the closure cap 16 is limited so as to insure movement of the closure cap towards closed position upon reduction of the pressure of the exhaust gases. The counterweight 17 of the closure flap 16 is such as to counterbalance the flap so that so long as exhaust gases are exerting a pressure against the inner side 26 of the cap it will remain in an open position to allow the escape thereof but when the pressure of such exhaust gases decreases the counterweight permits the flap 16 to move to a closed position over the exhaust pipe.

The closure device comprising the instant invention may, of course, be made in varying sizes to fit exhaust pipes of varying diameter.

Broadly the invention contemplates a closure device for protecting the open end of a vertically arranged exhaust pipe of an internal combustion engine.

What is claimed is:

1. As an article of manufacture for use with a vertically arranged open exhaust pipe constituting a conduit element for the exhaust gases of an internal combustion engine, a closure device for protecting the open exhaust pipe including, a ring adapted to surround the upper end of said exhaust pipe, lips on said ring extending inwardly from the upper edge of said ring to engage the top of said exhaust pipe and position said ring thereat, set screws mounted on and extending through said ring to position it on said pipe, a bracket integral with and extending laterally from said ring, said bracket comprising a pair of spaced arms, a closure flap normally covering the open end of said pipe and movable to open position by the pressure of exhaust gases discharging through said exhaust pipe, a counterweight portion integral with and extending laterally from said flap for counterbalancing said flap, said counterweight having a narrowed portion adjacent said flap, said flap being mounted on said ring with said narrowed portion fitting between said arms, a wear-resistant bushing extending through said narrowed portion, and a pin extending through said brace arms and said bushing pivotally connecting said flap on said ring.

2. As an article of manufacture for use with a vertically arranged open exhaust pipe constituting a conduit element for the exhaust gases of an internal combustion engine, a closure device for protecting the open exhaust pipe including, a ring adapted to surround the upper end of said exhaust pipe, lips on said ring extending inwardly from the upper edge of said ring to engage the top of said exhaust pipe and position said ring thereat, set screws mounted on and extending through said ring to position it on said pipe, a bracket integral with and extending laterally from said ring, said bracket comprising a pair of spaced arms, a closure flap normally covering the open end of said pipe and movable to open position by the pressure of exhaust gases discharging through said exhaust pipe, a counterweight portion integral with and extending laterally from said flap for counterbalancing said flap, said counterweight having a narrowed portion adjacent said flap, said flap being mounted on said ring with said narrowed portion fitting between said arms, a wear-resisting bushing extending through said narrowed portion, and a pin extending through said brace arms and said bushing pivotally connecting said flap on said ring, and the nether side of said counterweight having a built-up portion constituting stop means adapted for limiting opening movement of said closure flap to a position for insuring movement of said flap toward closed position upon reduction of pressure of the exhaust gases.

3. As an article of manufacture for use with a vertically arranged open exhaust pipe constituting a conduit element for the exhaust gases of an internal combustion engine, a closure device for protecting the open exhaust pipe including, a ring adapted to surround the upper end of said exhaust pipe, lips on said ring extending inwardly from the upper edge of said ring to engage the top of said exhaust pipe and position said ring thereat, a bracket integral with and extending laterally from said ring, said bracket comprising a pair of spaced arms, set screws mounted on and extending through said ring to position it on said pipe, said set screws being mounted on said ring adjacent each of said arms, lock nuts on said screws to retain the closure device on the exhaust pipe, a closure flap normally covering the open end of said pipe and movable to open position by the pressure of exhaust gases discharging through said exhaust pipe, a counterweight portion integral with and extending laterally from said flap for counterbalancing said flap, said counterweight having a narrowed portion ad-

jacent said flap, said flap being mounted on said ring with said narrowed portion fitting between said arms, a wear-resistant bushing extending through said narrowed portion, and a pin extending through said arms and said bushing pivotally connecting said flap on said ring.

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