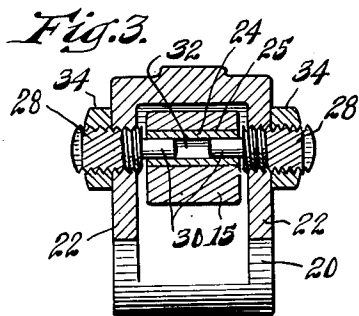
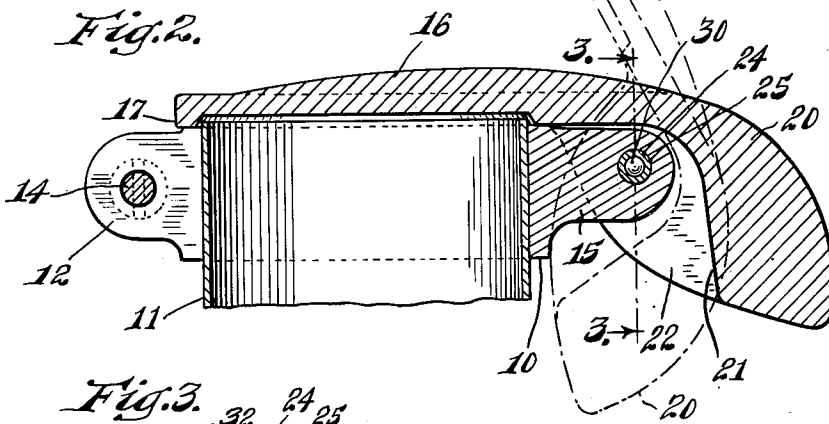
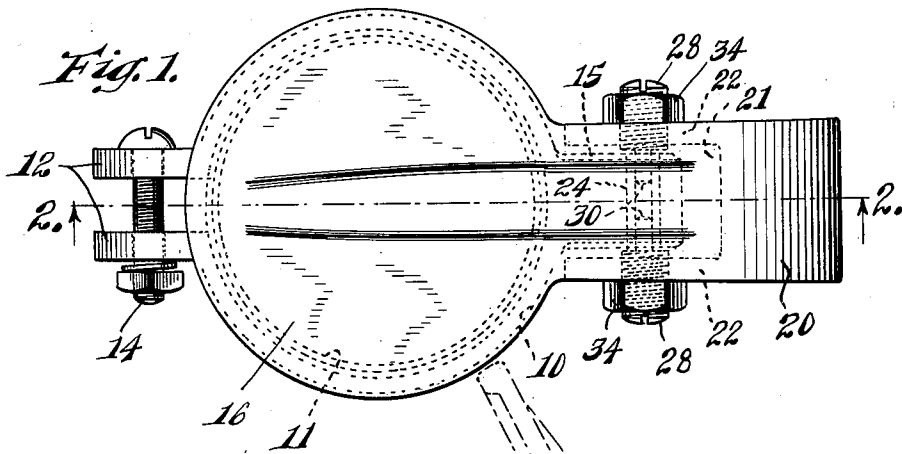


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CLOSURE FOR EXHAUST PIPES

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CLOSURE FOR EXHAUST PIPES

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The present invention relates to a closure device for protecting the open end of an upright terminal portion of an exhaust pipe of gasoline and diesel engines and the like. Devices of this general type serve to exclude rain, snow, dust, dirt and foreign matter from entering the exhaust pipe when the engine is not operating, and automatically exposes the end of said pipe when exhaust gases are discharged therethrough.

More specifically, the present invention is directed to improvements in closure devices of the general type disclosed in our issued United States Letters Patent No. 2,421,838, dated June 10, 1947, wherein said device includes a frame member in the form of a ring, provided with a laterally extending lug to which a counter-weighted closure flap is pivotally connected.

Desirably, such devices should be constructed and arranged so that the closure flap is free to move about its pivotal connection in response to the presence or absence of pressure of the exhaust gases in the exhaust pipe. It is recognized that devices of this general type, by reason of their position of use, are subject to relatively high temperatures by reason of the exhaust gases passing through the exhaust pipe, and hence the metal parts of the closure device are subject to substantial expansion and contraction over a period of time. By reason of such a condition, it sometimes happens that the pivotal connection of the closure flap becomes impaired to the extent that the closure flap does not readily move in response to the presence or absence of pressure of exhaust gases and thus fails to perform its intended function.

The main object of the present invention is to provide a novel form of pivotal connection or mounting for the closure flap which will insure satisfactory operation of the closure flap for long periods of time.

Another object is to provide an improved pivotal mounting for a closure device of the character indicated which will reduce wear and friction of the moving parts to a practical minimum.

A further object is to provide a novel pivotal mounting for a closure device of the character indicated which insures adequate lubricant present at the bearing surfaces of the pivotal mounting over long periods of time.

Other objects and advantages of this invention will be apparent from the following description, taken in connection with the accompanying drawing in which:

Figure 1 is a plan view of a closure device provided with the novel pivotal mounting embodying the present invention;

Figure 2 is a vertical sectional view through the device, shown mounted on the upper portion of an exhaust pipe, taken substantially as indicated at line 2—2 on Fig. 1; and

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Figure 3 is a transverse vertical section through the pivot axis of the device, taken substantially as indicated at line 3—3 on Figure 2.

The closure device comprises a frame 10, in the form of a split ring, adapted to surround the upper end of an exhaust pipe as indicated at 11, as clearly seen in Figure 2 of the drawing. The split ring includes a pair of laterally projecting, transversely spaced apart ears 12 adapted to be connected together by a bolt 14, the bolt serving to draw the ears together for firmly clamping the ring around the exhaust pipe.

Extending laterally from the frame or ring 10, at substantially diametrically opposite relation to the ears 12, is a lug 15, to which a closure flap 16 is pivotally connected. The closure flap is generally of circular contour, and provided with a marginal depending flange 17, adapted to surround the upper portion of the exhaust pipe 11, and seats upon the upper end of the split ring 10. As may be seen in the drawing, the split ring is mounted on the exhaust pipe so that the upper end of the pipe projects slightly above the upper surface of the ring and in such relation that the closure flap will at no time engage the upper end of said pipe.

Formed integrally with the closure flap is a rearwardly extending tail portion 20, constituting a counter-weight, the undersurface of which is recessed, as indicated at 21, for accommodating therein the mounting lug 15 of the split ring, as clearly seen in Figure 2 of the drawing. The side walls 22 of said tail portion, constituting the walls of said cavity 21, are spaced apart a proper distance so as to provide adequate clearance for the lug 15, as may be seen in Figure 3 of the drawing.

The pivotal connection constituting the present invention includes a split type tubular bushing 24, mounted by a press-fit in an aperture 25, extending transversely of said lug 15. Said bushing is preferably hardened so as to insure minimum friction and reduced wear. Threaded into the side walls 22 of the tail portion, forming the sides of the cavity 21, are headless screws 28, the inner ends of which include extensions in the form of cylindrical trunnions 30, adapted to be projected into the ends of the bushing 24 as seen in Figure 3 of the drawing. The trunnions are dimensioned with respect to the internal diameter of said bushings 24 so as to insure a relatively snug fit while at the same time providing adequate clearance to insure free movement of said trunnions within the bushing. The trunnions are so dimensioned as to provide a space or chamber as indicated at 32, between the ends thereof, as seen in Figure 3 of the drawing, for the reception of a supply of high temperature lubricant, so as to insure adequate lubrication between the trunnions and the bearing sleeve over long periods of use.

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The screws 28, when adjusted so that their trunnions project a proper distance into the bearing sleeve, are adapted to be firmly secured in such position of adjustment by means of lock nut 34, and which provide ready adjustment for said screws to insure proper working relation of the parts, such as may be necessary due to wear caused by vibration of the engine.

It will now be apparent that by virtue of the construction herein disclosed, the counter-weight of the tail portion 20 of the flap serves to counter-balance a substantial portion of the overhanging weight of the flap so that said flap is free to move about its pivot axis of the trunnions 30, within the tubular bearing 24, in response to the presence or absence of pressure of the exhaust gas within the exhaust pipe 11. When the exhaust gas is passing through the pipe, the closure flap is caused to assume a position substantially as indicated in dot and dash outline in Figure 2 of the drawing, and said flap being stopped at such position by the lower edges of said walls 22 of the tail piece abutting against the ring 10. It will be apparent that when the pressure of the exhaust gas is discontinued, the overhanging weight of the closure flap will cause said flap to automatically return to closed position.

The pivotal construction constituting the present invention thus insures free operation of the closure flap with minimum frictional resistance, and with minimum wear on the bearing parts and permits quick and easy adjustment to take up any excess side play of the parts.

Although we have herein shown and described a preferred embodiment of our invention, manifestly it is capable of modification and rearrangement of parts without departing from the spirit and scope thereof. We do not, therefore, wish to be understood as limiting this invention to the precise form herein disclosed, except as we may be so limited by the appended claims.

We claim as our invention:

1. In a closure device of the character described, comprising a frame element adapted to surround the terminal portion of an exhaust pipe, a lug carried by and extending laterally from said frame element, and a closure flap pivotally connected to said lug and adapted to normally cover the open end of the exhaust pipe and movable to an open position by the pressure of the exhaust gases discharging through said pipe, said flap having a laterally extending counterweight for counter-balancing a portion of the overhanging weight of said flap, said counter-weight having a cavity formed in its underside between a pair of laterally spaced apart walls, said flap being mounted on the frame with said lug projecting into said cavity, between said walls; the improvement wherein said pivotal connection comprises a pair of elements threaded into said walls, defining a part of the cavity, and the inner ends

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of said threaded elements being formed as cylindrical trunnions projecting into a cylindrical opening formed in and extending entirely through said lug, said threaded elements each being provided with a transverse shoulder at the inner end of the trunnion, disposed in close, spaced relation to said lug for limiting transverse movement of the flap relatively to the lug, said trunnions terminating in spaced apart relation to form a chamber therebetween for the reception of lubricant.

2. In a closure device of the character described, comprising a frame element adapted to surround the terminal portion of an exhaust pipe, a lug carried by and extending laterally from said frame element, and a closure flap pivotally connected to said lug and adapted to normally cover the open end of the exhaust pipe and movable to an open position by the pressure of the exhaust gases discharging through said pipe, said flap having a laterally extending counterweight for counter-balancing a portion of the overhanging weight of said flap, said counter-weight having a cavity formed in its underside between a pair of laterally spaced apart walls, said flap being mounted on the frame with said lug projecting into said cavity, between said walls; the improvement wherein said pivotal connection comprises a hardened cylindrical bushing fitted into and extending substantially the length of an aperture formed in and extending entirely through said lug, and a pair of screws threaded into said walls, defining a part of the cavity, and having their terminal portions formed as cylindrical trunnions projecting into the end portions of said bushing, said threaded elements each being provided with a transverse shoulder at the inner end of the trunnion, disposed in close, spaced relation to said lug for limiting transverse movement of the flap relatively to the lug, said trunnions being dimensioned so that their ends terminate in spaced apart relation to form a chamber in said bushing for the storage of a supply of lubricant therein.

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