

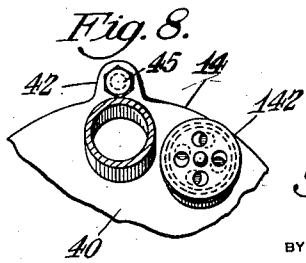
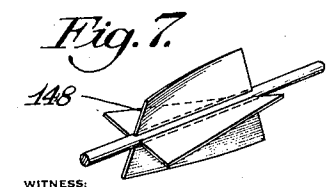
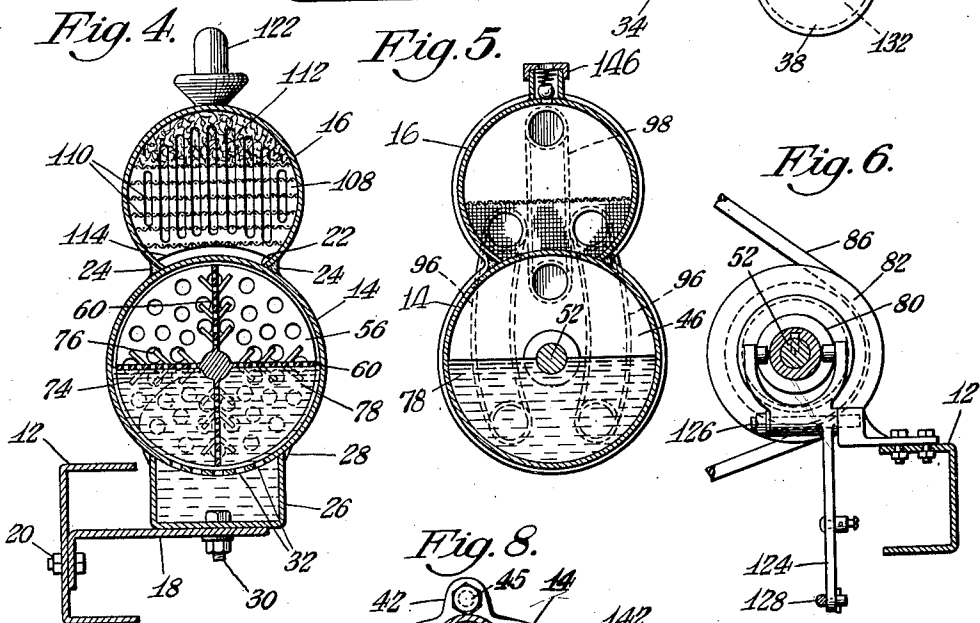
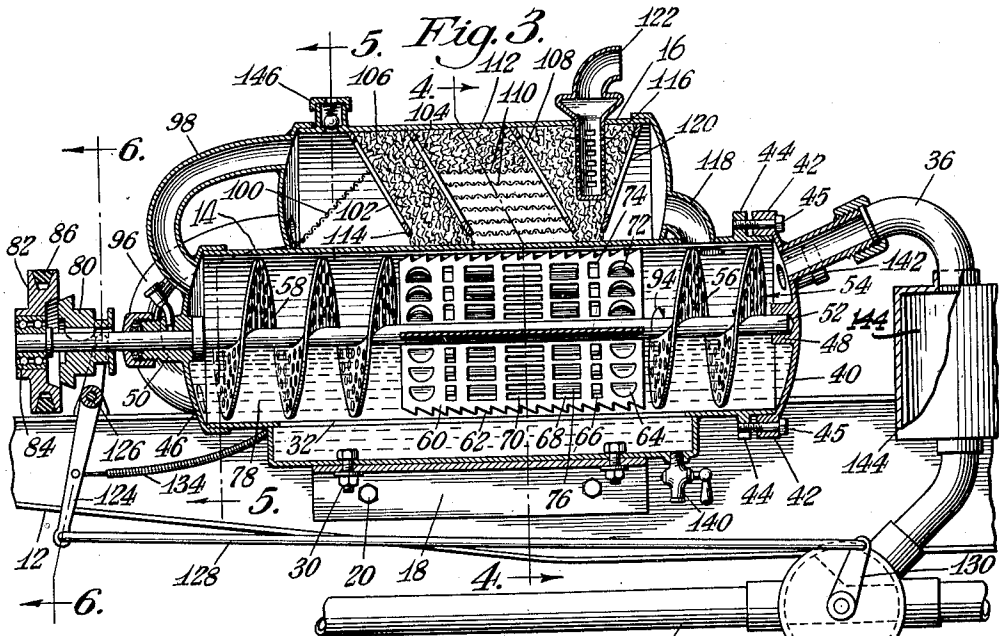
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EXHAUST GAS PURIFIER

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EXHAUST GAS PURIFIER

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4 Claims. (Cl. 60—30)

My invention relates to internal combustion engines, and has among its objects and advantages the provision of an improved exhaust gas purifier.

In the accompanying drawings:

Fig. 1 is a side view of an engine illustrating my invention applied thereto;

Fig. 2 is a sectional view taken along the line 2—2 of Fig. 1;

Fig. 3 is a sectional view taken along the line 3—3 of Fig. 2;

Fig. 4 is a sectional view taken along the line 4—4 of Fig. 3;

Fig. 5 is a sectional view taken along the line 5—5 of Fig. 3;

Fig. 6 is a sectional view taken along the line 6—6 of Fig. 3;

Fig. 7 is a diagrammatic view of a different form of agitator; and

Fig. 8 is a sectional view of an air inlet valve.

In the embodiment selected to illustrate my invention, I make use of an internal combustion engine 10 mounted upon the usual vehicle frame 12. Upon one of the frame members 12 I mount two drums 14 and 16 through the medium of a bracket 18 bolted to the member at 20. Referring to Fig. 4, the drum 16 has a wide slot 22 in its bottom wall and the edges of the slot welded to the drum 14 at 24. A collector box 26 is welded to the bottom side of the drum 14 at 28, and functions as a base for the two drums. The bottom of this box is bolted to the bracket 18 at 30. Communication between the drum 14 and the collector box 26 is established through the medium of a plurality of slots 32.

The drums 14 and 16, together with the purifying medium used therein, are designed to eliminate obnoxious or dangerous fumes from the exhaust gases passing from the engine 10. To this end, I connect the drum 14 with the exhaust pipe 34 through the medium of a branch pipe 36 and a valve 38 arranged to open and close the communication between the pipes 34 and 36. In Fig. 3, I illustrate the drum 14 as being provided with a removable head 40 having flanges 42 co-operating with flanges 44 through the medium of bolts 45 for holding the head to the drum. The opposite end of the drum is provided with a closure head 46 which may be welded to the drum. Both the heads 40 and 46 are provided with bearings 48 and 50, respectively, for supporting a shaft 52 upon which a screw agitator 54 is mounted.

Referring to Fig. 3, this agitator comprises two helically-shaped perforated blades 56 and 58 fastened to the shaft 52 and having their peripheral edges fitting snugly within the drum. Similarly, four blade agitating members 60 are mounted upon the shaft 52 and have their edges serrated at 62. These blades fit snugly within the drum.

Each blade is provided with a series of differently shaped openings 64, 66, 68, and 70. These openings agitate the purifying medium vigorously and cause intimate commingling of the fumes from the exhaust with the agitated purifying medium. The openings 64, 66, and 68 have deflectors 72, 74, and 76 associated therewith. These deflectors represent the material struck up from the blades to provide the openings. Referring to Figs. 3 and 4, it will be noted that the deflectors 72 and 76 project in the same direction from the same side of their respective blades, while the deflector 74 projects at a different angle from the opposite side of the blades.

In Fig. 4, I illustrate the drum 14 as containing liquid 78 which may be any suitable preparation capable of removing the dangerous fumes, such as carbon monoxide, smoke or the like. I find that water and glycerin is a good preparation during winter months, while water and peroxide of hydrogen make a good preparation for the summer months.

In operation, the shaft 52 is rotated through the medium of a clutch member 80 splined to the shaft and arranged to be thrown into frictional engagement with a sheave 82 mounted for rotation upon the bearing assembly 84 carried by the shaft. This sheave is grooved to receive a V-belt 86 passing around the fan pulley 88, the generator pulley 90, and the crank shaft pulley 92 (see Fig. 2).

Referring to Fig. 3, the shaft 52 is rotated in the direction indicated by the arrow 94. Such rotation makes the blades 56 and 58 operate as screws tending to move the exhaust gases entering the drum 14 and the liquid therein toward the end 46 of the drum. The rotation of the shaft 52 causes the liquid in the drum 14 to be highly agitated so that the exhaust gases from the engine is caused to become intimately mixed with the agitated liquid. The perforations in the blades 56 and 58 and the blades 60, together with the serrated edges 62, co-operate with the deflectors 72, 74, and 76, to intimately mix the gases with the treating fluid.

Two U-shaped tubes 96 and a U-shaped tube 98 place the drum 14 in communication with the drum 16. The tubes 96 establish communication between the lower side of the drums, while the tube 98 establishes communication between the upper part of the drums. The propelling action of the agitator causes the exhaust gases treated by the fluid to be passed into the drum 16 together with certain amounts of the treating fluid. Material discharged into the drum 16 passes through a screen 100 and a pair of slotted partitions 102 and 104, between which a cushion of copper or aluminum wool 106 is positioned. A third slotted partition 108 is arranged in spaced relation with the partition 104. A plurality of

screens 110 is positioned between the partitions 104 and 108 in addition to a quantity of copper or aluminum wool 112. The large number of screens 110 perform an efficient screening action.

5 The screens are arranged in stacked relation and co-operate with the copper-aluminum wool to remove particles of carbon from the liquid circulating through the system. Each of the partitions 102, 104, and 108 has an edge 114 conforming to
10 the curvature of the drum 14, but arranged in spaced relation therewith to provide an easy flow path for some of the liquid passing through the drum. Much of the liquid entering the drum 16 flows over the top of the screens 110 and down-
15 wardly through the screens, through a third cushion 116 of copper or aluminum wool and back to the drum 14 through the medium of a pipe 118. The cushion 116 is arranged between the partition 108 and a slotted partition 120. The
20 purified exhaust gases pass from the drum 16 through a vent 122. The agitator 54 forces liquid through the conduits 96 and 98, after which the liquid passes through the drum 16 and is delivered to the mixing chamber or drum 14
25 through the medium of the conduit 118.

Referring to Fig. 4, particles of carbon entering the drum 14 will tend to pass through the slots 32 and accumulate in the collector box 26. In this connection, the serrated edges 62
30 tend to break large particles of carbon entering the drum.

Means for actuating the clutch 80 comprises a lever 124 pivotally mounted at 126 upon the frame member 12. This lever is connected with a link
35 128 connected with an arm 130 fastened to the valve plug 132 enclosed within the valve housing 38. Adjustment of the lever 124 is attained through the medium of Bowden wire 134 having an end passing through the instrument board 136
40 and provided with a grip 138. Thus, the valve 38 is open for directing the exhaust gases into the drums 14 and 16 simultaneously with the engagement of the clutch part 80 with its sheave 82.

The collector box 26 may be provided with a
45 drain valve 140, while the head 40 may be provided with an adjustable air inlet valve 142. This valve permits air to be drawn into the drum 14 so that it may commingle with the agitated contents of the exhaust gases. In Fig. 3, I illustrate
50 a drum 144 in association with the pipe 36, which drum functions as a cooling device for the exhaust gases passing to the purifying drums.

I provide a pressure relief valve 146 for the drum 16. This valve operates to provide a bleed
55 to the atmosphere in cases where the pressure in the drum exceeds a predetermined value. In certain cases, the pressure in the drum may be built up due to high engine speed or a slow filtering action due to the accumulation of foreign
60 matter in the treating fluid to a point where it would interfere with the efficient operation of the engine.

Under such conditions, the valve 146 will operate to relieve the pressure. Of course, a supply
65 of new treating fluid will remedy the situation in a large measure, while excessive pressure due to engine speeds is a rare occurrence.

In Fig. 7, I have illustrated an agitator of
70 slightly different construction in which the difference resides in the helical formation of the blades 148, which blades correspond to the blades

60. This helical formation tends to make the blades perform a propelling function in addition to its agitating action.

In Fig. 1, I illustrate the drum 14 as being provided with a removable plug 150, which may be
5 removed to permit liquid to be poured into the drum.

Without further elaboration the foregoing will so fully explain my invention that others may, by applying current knowledge, readily adapt the
10 same for use under various conditions of service.

I claim:

1. A device of the type described comprising a drum for containing an exhaust gas purifying fluid, means for connecting the drum with the
15 exhaust pipe of an internal combustion engine, an agitator arranged within said drum, said agitator comprising helical blades arranged in spaced apart relation and agitating blades positioned between the same, clutch means for operating said
20 agitator, a valve and conduit means connecting the exhaust pipe with said drum, and means operatively connecting said clutch means and said valve, to operate the two as a unit, whereby the clutch is engaged when the valve is open for di-
25 recting the exhaust gases to the drum.

2. A device of the type described comprising a drum for containing an exhaust gas purifying fluid, means for connecting the drum with the
30 exhaust pipe of an internal combustion engine, an agitator arranged within said drum, said agitator comprising helical blades arranged in spaced apart relation and agitating blades positioned between the same, clutch means for operating said agitator, a valve and conduit means
35 connecting the exhaust pipe with said drum, means operatively connecting said clutch means and said valve, to operate the two as a unit, whereby the clutch is engaged when the valve is open for directing the exhaust gases to the drum,
40 and a second drum having communication with said first-named drum and provided with filtering means.

3. A device of the type described comprising a drum for containing an exhaust gas purifying
45 fluid, said drum having a slotted area, means for connecting the drum with the exhaust pipe of an internal combustion engine, an agitator arranged within said drum, said agitator comprising helical blades arranged in spaced apart relation and
50 agitating blades positioned between the same, and a collector box associated with the slotted area of the drum for receiving foreign matter entering the same, said agitating blades having serrated edges co-operating with the slotted area of
55 the drum for grinding large particles of foreign matter, and the helical blades being provided with perforations.

4. A device of the type described comprising a drum for containing an exhaust gas purifying
60 fluid, means for connecting the drum with the exhaust pipe of an internal combustion engine, an agitator arranged within said drum, clutch means for operating said agitator, a valve and conduit means connecting the exhaust pipe with said
65 drum, and means operatively connecting said clutch means and said valve, to operate the two, whereby the clutch is engaged when the valve is opened for directing the exhaust gases to the
70 drum.

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