

May 3, 1938.

T. L. HOLLISTER

2,116,434

DEVICE FOR STORING EXHAUST GASES IN AUTOMOBILES

Filed July 29, 1937

2 Sheets-Sheet 1

Fig. 1.

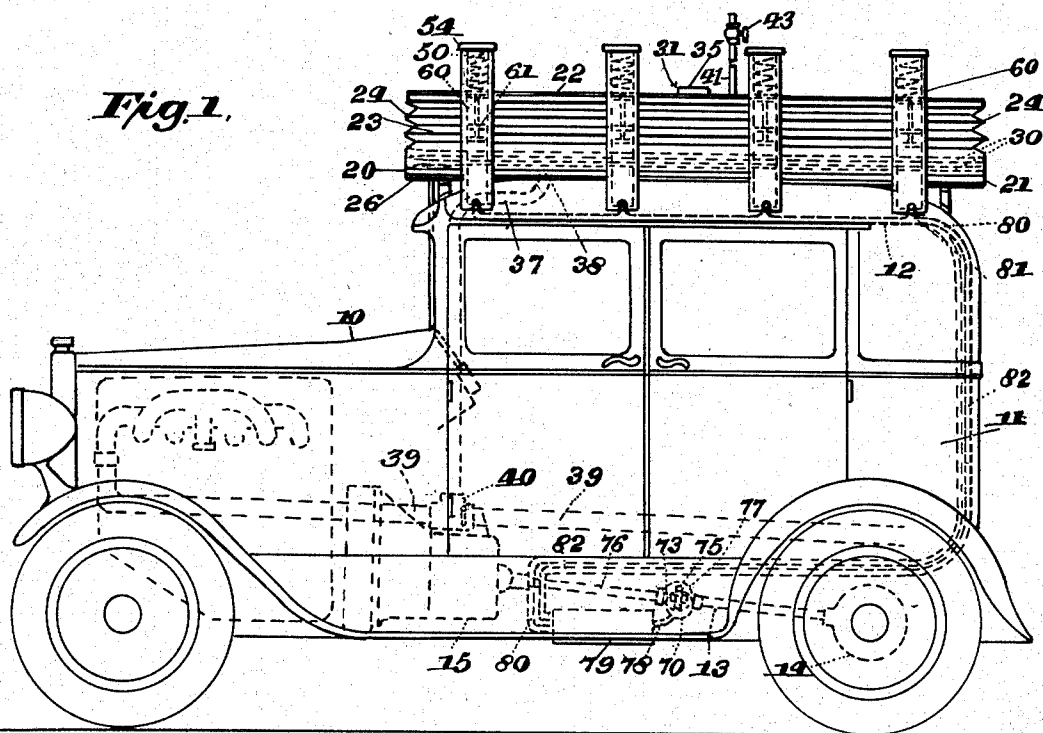
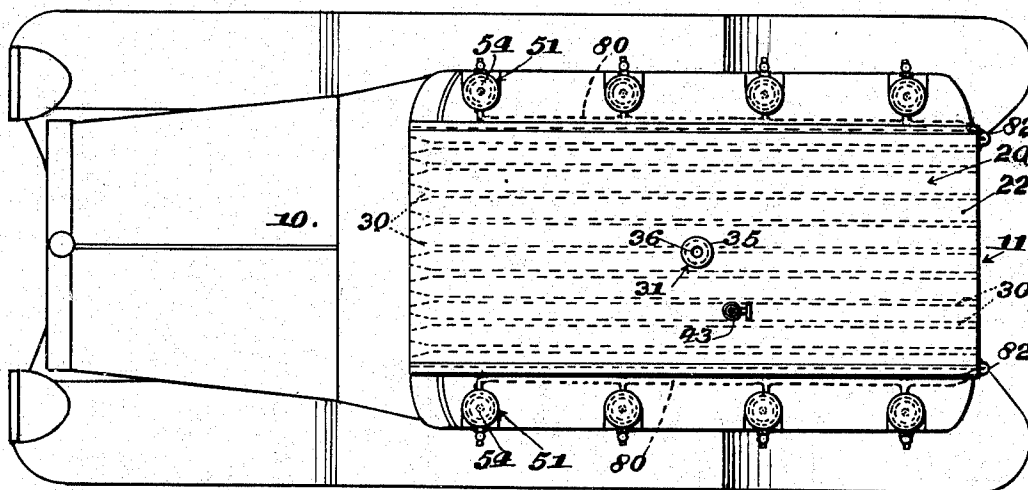


Fig. 2.



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Fig. 3.

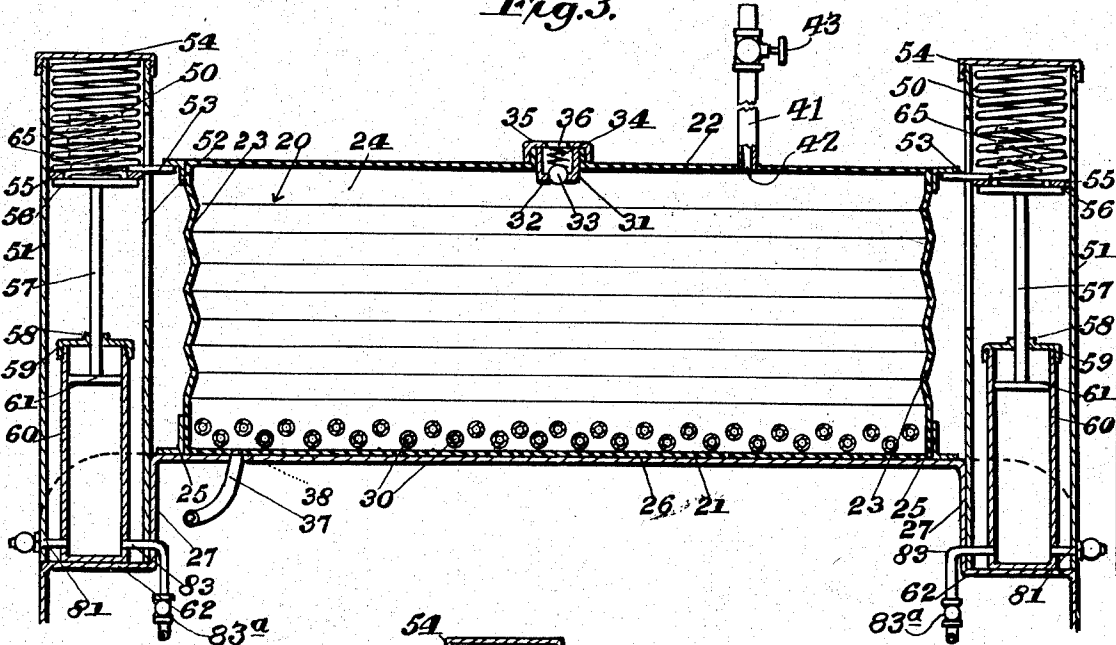


Fig. 5.

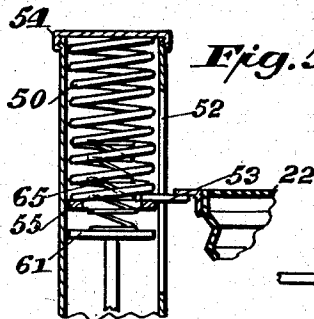


Fig. 6.

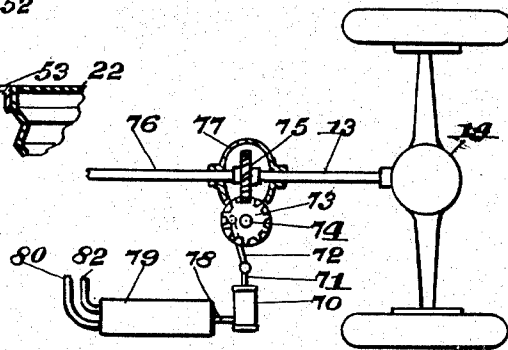


Fig. 4.

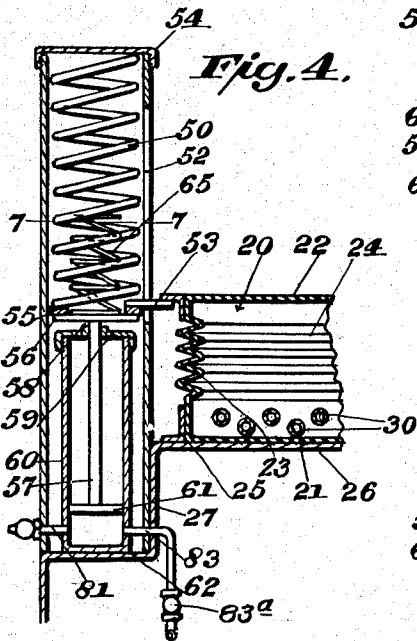


Fig. 7.

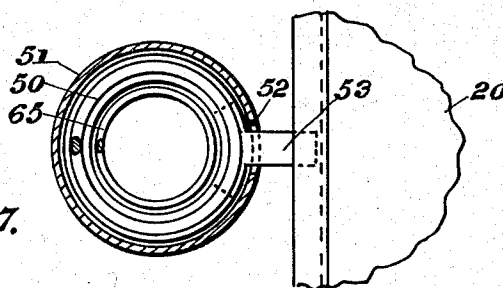
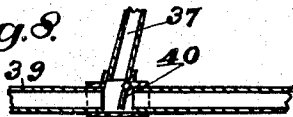


Fig. 8.



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UNITED STATES PATENT OFFICE

2,116,434

DEVICE FOR STORING EXHAUST GASES IN
AUTOMOBILES

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Application July 29, 1937, Serial No. 156,404

9 Claims. (Cl. 180—1)

This invention relates to a device for storing exhaust gases in automobiles.

An object of the invention is the provision of a device connected to an automobile for temporarily collecting and storing exhaust gases when passing through sections of a city or town so that such exhaust gases will not be distributed to the atmosphere where a great number of people are located, the exhaust gases being discharged to the atmosphere beyond the town limits or they are withdrawn by apparatus at stations especially equipped for the purpose.

Another object of the invention is the provision of a device in the form of a collapsible receiver which may be expanded at the time the gases are being collected for creating a vacuum in the exhaust pipe to relieve back pressure on the engine while drawing the gases into the receiver when the automobile is passing through crowded sections of towns or cities to prevent the discharge of the exhaust gases to the atmosphere, said gases being released at points beyond the crowded sections or they may be withdrawn by an apparatus at stations particularly equipped for the purpose.

A further object of the invention is the provision of a collapsible receiver which is normally maintained in collapsed condition by springs until the time when it is desired to withdraw the exhaust gases from the exhaust pipe and store them in the receiver, a device being connected with the moving part of the automobile for creating pressure on a fluid which will operate pistons for causing expansion of the receiver for not only creating a vacuum in the receiver but for drawing the exhaust gases from the exhaust pipe into the receiver and storing the same until said gases are discharged at the proper place.

This invention will be best understood from a consideration of the following detailed description, in view of the accompanying drawings forming a part of the specification; nevertheless, it is to be understood that the invention is not confined to the disclosure, being susceptible of such changes and modifications as define no material departure from the salient features of the invention as expressed in the appended claims.

In the drawings:

Figure 1 is a side view of an automobile showing my device applied thereto,

Figure 2 is a plan view of the automobile,

Figure 3 is a transverse vertical section of the collapsible receiver,

Figure 4 is an enlarged vertical section showing

the combined spring and piston for collapsing and expanding the receiver,

Figure 5 is a section similar to that shown in Figure 4 showing the springs partly compressed,

Figure 6 is a fragmentary view partly in section showing the compressor operatively connected with the drive shaft of the automobile,

Figure 7 is a horizontal section taken along the line 7—7 of Figure 4, and

Figure 8 is a fragmentary view of an exhaust pipe and a connection to the receiver showing the valve for closing one pipe and opening the other.

Referring more particularly to the drawings, 10 generally designates an automobile having a body portion 11 and top 12. This automobile has the usual drive shaft 13 extending between the differential 14 and transmission 15.

Mounted on the top 12 of the automobile is a collapsible receiver, generally designated by the numeral 20. This receiver has a rigid bottom member 21 and a rigid top member 22. The side walls 23 and end walls 24 are made of any suitable material which will prevent the leakage of gas therefrom and is in the form of a bellows so that the side and end walls may be collapsed when the top 22 is moved downwardly toward the bottom 21. The edges of the end and side walls are sealed to the bottom and top.

The bottom 21 is secured by means of angle irons 25 and rivets or bolts to a base plate 26 which is supported by standards 27 which are connected in any approved manner to the body and top of the automobile.

A plurality of pipes 30 extend entirely through the length of the collapsible receiver adjacent the bottom 21 and the opposite ends of these pipes are open to the atmosphere so that air can pass through these pipes and they act as a cooling means for the gases collected in the collapsible receiver 20 particularly when the automobile is traveling and the air is forced through said pipes.

A valve cage 31 is mounted on the top 22 of the receiver and is provided with a valve seat 32 at its inner end upon which is mounted a valve 33. A spring 34 located between the valve 33 and a top 35 maintains the valve normally on its seat and with sufficient pressure to prevent the discharge of exhaust gases to the atmosphere until the pressure in the receiver reaches a predetermined degree.

In other words the construction just defined is a safety valve. The top is provided with an opening 36 to permit the discharge of exhaust gases to the atmosphere.

A pipe 37 opens at 38 into the bottom of the

receiver 20 and extends downwardly and has a connection with the exhaust pipe 39 of the vehicle.

As shown more particularly in Fig. 8 at the connection between the exhaust pipe and the inlet pipe 37 there is provided a valve 40 which may be manually operated and which is adapted to be moved across the opening of the pipe 37 to permit the exhaust to normally pass through the pipe 39 to the atmosphere or when the collapsible receiver is to be used for storing the exhaust gases the valve is placed in the position shown in full lines for closing the rear end of the exhaust pipe to the atmosphere so that the exhaust gases will pass through the pipe 37 to the receiver.

A pipe 41 is connected to the top of the receiver and has a port 42 in the top 22 for placing the pipe in communication with said receiver. This pipe is adapted to be used as a discharge pipe and is provided with a valve 43 for closing the pipe to maintain the gases in the receiver until the time arrives for the discharge of the gases to the atmosphere or for withdrawing the gases by a device at a station constructed for the purpose.

Stations at different points in a large city or town may be provided which will have a suction pump adapted to be attached to the pipe 41 for withdrawing the exhaust gases from the collapsible receiver 20 and these gases may be purified or in other words the inert gases may be removed from the inflammable gases. Other gases which may be utilized for commercial purposes may be specially treated so that revenue obtained from the gases which may be utilized will more than compensate for the cost of withdrawing the gases from the receivers and for purifying said gases.

The collapsible receiver is normally collapsed when not in use and is maintained in this position by a plurality of coil springs 50 located within the cylinders 51 at spaced points along opposite sides of the container. These cylinders are secured in any approved manner to the support or base member 26 and are disposed in a vertical position. Each cylinder is provided with a vertical slot 52 through which projects a lug 53 and it will be noted that there is a lug for each cylinder. These lugs are secured to the top 22 of the receiver 20 and are movable within the vertical slots 52. The coil springs 50 have their upper ends in engagement with a cap 54 on the upper end of each cylinder while the lower end of each spring rests upon a ring 55 slidably mounted within the cylinder.

The inner end of the lug may be secured to the ring 55 and this ring is mounted on a pusher disc 56 at the upper end of a piston rod 57. This piston rod is slidable within a bushing 58 formed in a head 59 of a cylinder 60. A piston 61 is mounted for reciprocation in each cylinder 60 and is connected with its associated rod 57. The lower end of each cylinder 60 is secured to an extension 62 of the base member 26.

An auxiliary spring 65 is secured to the disc 56 at its lower end while the upper end is secured to an intermediate portion of the compression spring 50. The auxiliary spring cooperates with its associated compression spring for forcing the lug 53 downwardly and for collapsing the receiver as the top 22 is forced towards the bottom 21.

A compressor, Fig. 6 all housed in, generally designated by the numeral 70, is in the form of a cylinder and a piston operating within the cylinder through a rod 71 which is connected with

a pitman 72 pivotally attached to a worm wheel 73 mounted on a shaft 74. This worm wheel is driven by a worm 75 secured to a drive shaft 76 of the automobile. The worm 75 is mounted within a housing 77. Fluid is compressed in the compressor 70 and is forced through a pipe 78 to a receiver 79. A pipe 80 connects the receiver 79 with the lower ends of the cylinders 60, as shown at 81, while a pipe 82 also connects the lower ends of the cylinders shown at 83 (fitted with automatic valve) with the reservoir or receiver 79 (Figs. 2, 3 and 4). One of these pipes acts as an outlet for the fluid while the other pipe acts as an inlet so that when the valve is opened fluid will flow into the cylinders 60 and raise their respective pistons 61 for expanding the expandable receiver 20. Each pipe 80 and 82 has short branch connections extending to the cylinders so that each pipe is directly connected with the bottom of the cylinders.

The operation of my device is as follows: When the automobile is running through sections not crowded with people the exhaust gases are normally discharged through the pipe 39 and the valve 40 (Fig. 8) will be in position to close the pipe 37 to the receiver 20. The receiver at this time is collapsed and the top 22 of said receiver will have been lowered by the springs 50 and be maintained in this lowered position by said springs. When, however, the automobile passes through crowded sections as through towns and cities the receiver will be opened up for creating a vacuum in the exhaust pipe 39 and the valve 40 will be in the position shown in Fig. 8, thereby closing the exhaust pipe to the atmosphere.

The top 22 of the receiver is elevated by the pistons 61 operating in the cylinders 60 and against the tension of the springs 50 and 55 (Fig. 3). In order to raise the top 22 of the receiver 20 a manually controlled valve (not shown) in the pipe 80 (Fig. 6) is opened and fluid under pressure from the reservoir 79 is admitted to the cylinders 60 beneath the piston 61 and these pistons are forced upwardly whereby the top 22 will be raised.

The receiver 79 (Fig. 6) is always maintained full of fluid under pressure by the compressor 70 and a clutch may be employed for disconnecting the operating mechanism between the piston of the compressor 70 and the drive shaft 76 since it will not be necessary to compress the fluid at all times when a compressible fluid is employed for the purpose. However, a liquid such as oil may be used and the compressor 70 is only employed at the time it is necessary to put said liquid under pressure for raising the pistons 61. The pipe 82 in that instance acts as a drain for conveying the fluid away from the cylinder 60 back to the compressor 70.

I claim:

1. In an automobile having an exhaust pipe and a top, a compressible casing mounted on the top, resilient means tending to collapse the casing, fluid-operated means for expanding said casing, a drive shaft of the automobile, means actuated by the drive shaft for supplying the fluid-operated means with a fluid under pressure, and means connecting the exhaust pipe with the casing.

2. In an automobile having an exhaust pipe and a top, a drive shaft, a collapsible casing mounted on the top, resilient means tending to collapse the casing, fluid operated means for causing expansion of the casing, means actuated by the drive shaft for supplying the fluid-oper-

ated means with a fluid under pressure, means connecting the exhaust pipe with the casing, and a plurality of tubes located in the bottom of the casing and having the opposite ends open to the atmosphere to permit cooling air to pass there-through.

3. In an automobile having an exhaust pipe and a top, a compressible casing mounted on the top for housing temporarily exhaust gases discharged from the engine, a pipe connecting the casing with the exhaust pipe, springs for collapsing the housing, fluid-operated means for expanding the casing and for creating suction in the exhaust pipe for drawing exhaust gases into the casing, and means operated by a moving part of the automobile for supplying the fluid-operated means with fluid under pressure.

4. In an automobile having an exhaust pipe, a collapsible casing carried by the automobile, a plurality of frames disposed adjacent the casing, lugs on the casing and projecting into the frames, springs in the frames acting on the lugs to cause collapsing of said casing, fluid-operated means for compressing the springs and expanding the casing, a conduit connecting the exhaust pipe with the casing, a discharge conduit connected with the casing, and means actuated by a driven part of the automobile for supplying fluid under pressure to the fluid-operated means.

5. In an automobile having an exhaust pipe, a collapsible casing for housing temporarily exhaust gases from the exhaust pipe, said casing having a movable top and a bottom fixed to the automobile, a plurality of frames associated with the casing, a spring in each frame tending to collapse said casing, means connecting the spring with the top of the casing, a piston and cylinder in each frame, means for supplying the cylinders with fluid under pressure, means connecting the springs with the pistons so that when the pistons are moved in one direction the springs will be compressed and the casing will be expanded, a conduit connecting the exhaust pipe with the interior of the casing, and a discharge pipe for the casing.

6. In an automobile having an exhaust pipe, a collapsible casing for housing temporarily exhaust gases from the exhaust pipe, said casing

having a movable top and a bottom fixed to the automobile, a plurality of frames associated with the casing, a spring in each frame tending to collapse said casing, means connecting the springs with the top of the casing, a piston and cylinder in each frame, means for supplying the cylinder with fluid under pressure, means connecting the springs with the pistons so that when the pistons are moved in one direction the springs will be compressed and the casing will be expanded, a conduit connecting the exhaust pipe with the interior of the casing, a discharge pipe for the casing, and an auxiliary spring connecting each piston with a compressible spring.

7. In an automobile having an exhaust pipe and a top, a compressible casing mounted on the top, resilient means tending to collapse the casing, fluid-operated means for expanding said casing, a drive shaft of the automobile, means actuated by the drive shaft for supplying the fluid-operated means with a fluid under pressure, means connecting the exhaust pipe with the casing, and a valved conduit in communication with the casing for conducting the exhaust gases away from the casing when said casing is being collapsed.

8. In an automobile having an exhaust pipe, a compressible casing carried by the automobile, a plurality of resilient means for causing collapsing of the casing, a conduit connecting the exhaust pipe with the interior of said casing, means for causing expansion of the casing against the tension of the resilient means for drawing the exhaust gases into the casing, and a discharge pipe connected with the casing.

9. In an automobile or trailer having an exhaust pipe, a compressible casing carried by the automobile, a plurality of resilient means for causing collapsing of the casing, a conduit connecting the exhaust pipe with the interior of the said casing, means for causing expansion of the casing against the tension of the resilient means for drawing the exhaust gases into the casing, a discharge pipe connected with the casing, and means actuated by a moving part of the automobile for causing operation of the means for expanding said casing.

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