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GAS RECLAIMER OIL SAVER AND FILTER FOR INTERNAL COMBUSTION ENGINES

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Fig. 1.

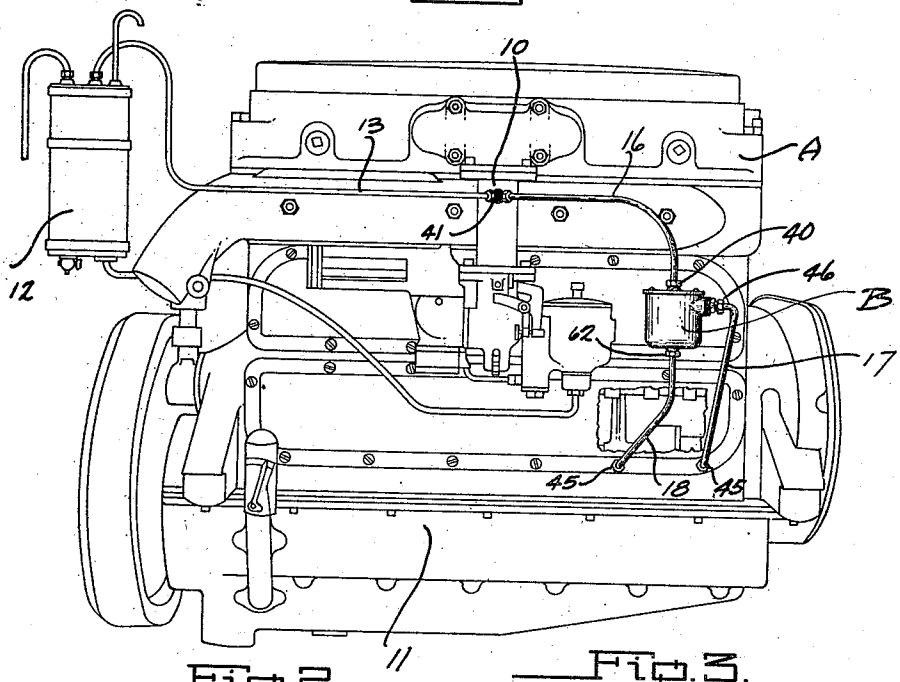


Fig. 2.

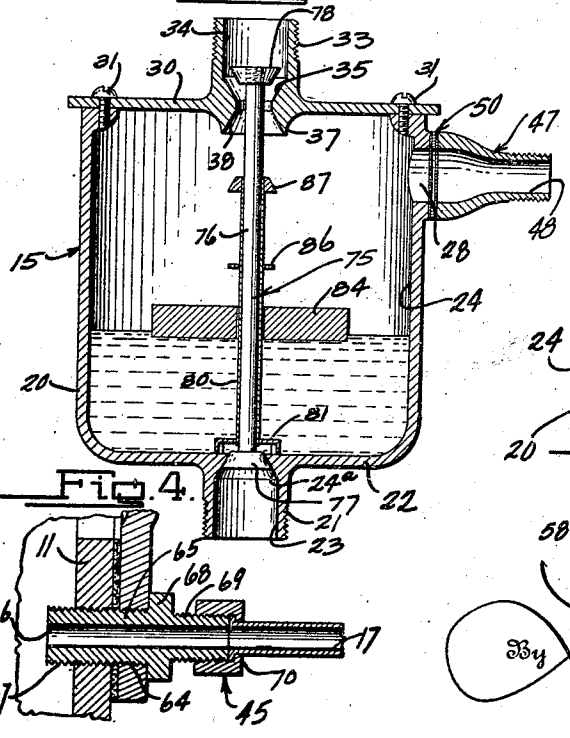


Fig. 3.

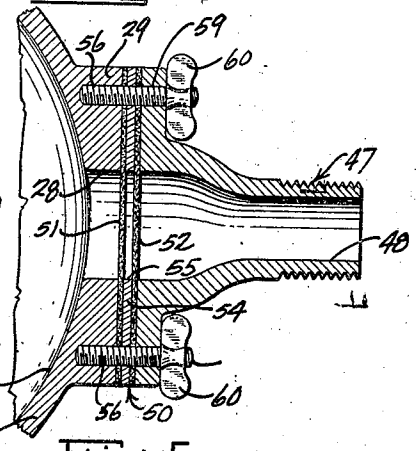


Fig. 4.

Fig. 5.



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GAS-RECLAIMER OIL SAVER AND FILTER FOR INTERNAL-COMBUSTION ENGINES.

Application filed April 3, 1922. Serial No. 549,371.

This invention relates to improved apparatus for reclaiming of waste fuel from the crank case of an internal combustion engine.

The primary object of the invention is the provision of a gas reclaiming device, adapted for use as an accessory upon internal combustion engines, whereby fuel vapors and liquids may be segregated from lubricating oil and foreign materials therein, for conduction to the intake manifold of the engine for use.

A further object of the invention is the provision of a reclamation device of the above character, including an automatic oil trap, whereby oil segragated from fuel and deposited therein may be controlled in a novel manner for return to a proper source, without any liability of oil or incidental foreign material entering the intake portion of the internal combustion engine.

A further object of the invention is the provision of an improved device of the above mentioned character, adapted for reclaiming of fuel from the crank case of an internal combustion engine, said device including a novel oil trap, having a float controlled apparatus therein, whereby drain of oil therefrom into the crank case may be automatic, preventing any liability of flow of any material other than fuel to the intake portion of the internal combustion engine.

A further object of the invention is the provision of a device of the above mentioned character, which cooperates in creating a partial vacuum in the crank case of an internal combustion engine, whereby lubricating oils may be effectively retained in proper place, against liability of loss through leaky joints and gaskets.

A further object of the invention is the provision of a reclaiming device of the above mentioned character, which includes a novel filtering and baffling arrangement for proper control of oil spray and fuel prior to entrance into an oil trap, and whereby foreign material is prevented from entering said oil trap.

Other objects and advantages will be apparent during the course of the following detailed description.

In the accompanying drawing, forming a part of this specification, and wherein similar reference characters designate corresponding parts through the several views,

Figure 1 is a side elevation of an internal combustion engine having the improved reclaiming device connected thereto.

Figure 2 is a cross sectional view of the oil trap arrangement embodied in the improved gas reclaiming device, showing the arrangement of details therein.

Figure 3 is an enlarged fragmentary cross sectional view, taken transversely of the oil trap and showing the novel type of baffle and filter arrangement as used therewith.

Figure 4 is a fragmentary cross sectional view, showing the manner in which the reclaimer is connected to the casing of the internal combustion engine, without the necessity of drilling, tapping or boring apertures in said casing, other than are provided for attaching bolts and the like.

Figure 5 is a plan view of a filtering member.

In the drawing, wherein for the purpose of illustration is shown the preferred embodiment of my invention, the letter A designates an internal combustion engine having the improved reclaiming device B mounted thereon.

The internal combustion engine A may be of any approved type, since the improved reclaimer B is adapted for use as an accessory upon standard makes of motors. However, the internal combustion engine A includes an intake pipe or manifold 10; crank case 11; and is preferably provided with a vacuum feed apparatus 12 of any approved type. As is well known, the vacuum feed apparatus 12 includes a tube 13, which has connection with the intake 10.

The improved reclaimer B preferably comprises an oil trap 15, having a tubular connection 16 leading into the intake portion 10 of the motor A which may be termed a suction tube or line; a tubular portion 17 leading into the crank case 11 which may be termed a supply tube or line; and a tubular portion or drain line 18 for oil draining purposes leading into the crank case 11.

The oil trap 15 is of novel construction, comprising a casing 20 of aluminum or similar material, being provided with an externally screw threaded extension 21 on the bottom 22 thereof, whereby a passageway 23 is provided, communicating with the interior 24 of the casing 20. This passageway 23 provides a tapered seat 24ª converging up-

wardly towards the inside surface of the bottom 22. The casing 20 is open at the top, and is provided with an aperture 28 radially through the side thereof adjacent the top opening; a boss 29 being provided extending outwardly from the sides of the casing 20 and about the opening 28. This opening 28 is provided for cooperating with the tubular portion 17, in a manner to be subsequently described. A cover 30 is provided for the open top of the casing 20, being preferably formed of material similar to that of which the casing is constructed, the cover 30 having openings therein for receiving a screw element 31 or the like, whereby said cover may be attached in definite relation to the casing 20. An externally screw threaded extension 33 is provided upon the outside surface of the cover 30, having a passageway 34 therein, which extends at right angles to the plane defined by the cover 30. This passageway 34 is preferably constricted, adjacent the connection of the extension 33 with the cover 30 to provide a tapered seat 35 which converges toward the inside 24 of the casing 20 when the cover 30 is affixed thereon. It is preferred that an extension 37 be provided upon the inside of the cover 30 in order to provide a tapered seat 38, formed axially of the passageway 34 and immediately below the tapered seat 35; said seat 38, however, being so formed as to diverge inwardly of the chamber 24, and in this respect being formed so that the constricted ends of the seats 35 and 38 are in adjacent relation.

The oil trap 15 is attached, at its screw threaded extension 33 to the tube 16 as by a packing nut 40. The opposite end of the tube 16, is preferably attached in one passageway of a two way plug 41. This plug 41 is preferably utilized, because thereby the vacuum tube 13 and the reclaimer tube 16 may be connected through a single opening in the intake portion 10 of the motor A. Thus, the intake pipe or manifold 10 has direct communication with the interior 24 of the oil trap 20.

Referring to the tubular portion 17, one end thereof is connected by a connection 45 to the crank case 11 for communication therein. The opposite end of the tubular portion 17 is provided with a packing nut 46, which is adapted for engagement over the externally screw threaded end of a clamping connection 47. This clamping connection 47 is provided with a longitudinal passageway 48 therein, and is adapted for cooperation upon the boss 29, whereby the opening 28 of the casing 20 may be aligned with the passageway 48. For a purpose which will be hereinafter more fully explained in describing the operation of the improved reclaimer, it is preferred that a baffle and filter arrangement 50 be clamped intermediate the connection 47 and the boss 29. This arrangement 50 is relatively simple, including a pair of filter or baffle elements 51 and 52, which may be of any approved material, capable of permitting fuel vapors and liquids to pass therethrough. It is preferred that the same be of some durable absorbing material, similar to blotting paper, so that the same is clearly distinguishable from screens and like structures, which will, in all liability be undesirable as not giving sufficient baffle action to material passing therethrough. A spacer element, 54, preferably of metal is disposed intermediate the filter elements 51 and 52; said spacer, of course, having an opening 55 therethrough of the same size as the opening 28. In order that the filter arrangement 50 and the connection 47 may be properly attached to the boss 29, it is preferred that screw threaded studs 56 extend outwardly from the face of the boss 29 to receive the filter arrangement 50 through apertures 58 therein, whereby the spacing member 54 and its aperture 55 is properly aligned with the opening 28 as clearly illustrated in Figure 3 of the drawings. The attaching flanges of the connection 47 are similarly provided with aperture 59, which are adapted for engagement over the screw threaded studs 56. Clamping nuts 60, preferably of the wing type, are provided for engaging the extreme outer ends of the projecting studs 56, and whereby the baffle and filtering arrangement 50, as well as the connection 47, may be securely clamped to the casing 20 as is illustrated in Figures 2 and 3 of the drawing. Thus, it can be seen that the oil trap 15 is connected for communication with the inside of the crank case through the tube 17.

The tube 18, is connected at one end to the screw threaded extension 21, hereinbefore mentioned, by means of a packing nut 62. The opposite end of the tube 18 is connected as by means of a joint 45 to the crank case 11. Thus, the tube 18 directly connects the bottom 22 of the oil crank case with the inside of the crank case 11.

The connections 45, which are adapted for attaching the tubes 17 and 18 to the crank case 11 are of novel formation, and provided in order that they may be attached to ordinary bolt apertures 64, in the crank case 11, without necessity of tapping additional openings in the crank case. These connections 45 primarily include a bolt 65, having the longitudinal passageway 66 therethrough. One screw threaded end 67 of said bolt 65 is provided engaging into the opening 64, whereby a flange 68 formed peripherally about the bolt 65, may engage the outside of the crank case, as is illustrated in Figure 4. An externally extending screw threaded shank 69 is provided for engagement by a packing nut 70, whereby the ends

of the tubes 17 and 18 may be attached to the bolts 65, to have said tubes communicate with the interior of the crank case 11.

Apparatus 75 is provided interiorly of the casing 20, adapted for cooperating with the passageways 23 and 34 therein in effectively controlling reclaimed fuel and oil. The apparatus 75 includes a stem 76, which extends axially of the casing 20, having one end thereof provided with a tapered valve head 77, for cooperation upon the tapered seat 24ª in the passageway 23. The opposite end of the stem 76 is provided with a valve head 78 of frusto-conical formation, altogether similar to the valve head 77, and adapted for cooperating upon the valve seat 35 provided in the passageway 34. Thus, when the valve head 78 is in abutting relation upon its seat 35 to close the passageway 34, the valve head 77 is disposed off of its seat 24ª, to open the passageway 23, and vice versa.

During operation of the internal combustion engine A, it is obvious that piston action within the cylinders will create a suction which will be transmitted through the tube 16 into the casing 20. Such suction will immediately unseat the valve head 78, and force the valve head 77 to close the passageway 23. The suction thus created will be transmitted through the tube 17, and create a partial vacuum within the chamber of the crank case 11. It is well known that the chamber in the crank case 11 in practically all types of internal combustion engines contains a certain amount of vapor and liquid fuel which is not consumed within the engine cylinders, and which slips by the pistons during compression. This fuel will, due to the suction in the tubular means intermediate intake and crank case, be transmitted thru the oil trap 15 into the intake 10, whereby such reclaimed fuel may be used in the engine cylinders. A spray of oil will in some instances be conveyed through the tube 17 into the oil trap 15, where the same is collected in the chamber 24 of the casing 20 due to the fact that the exit passageway 23 is closed, during engine operation, due to the suction action as hereinbefore described. However, it is obvious that the oil will continue to rise in the chamber 24, incident to long periods of operation, so that were no trip means provided, the oil would rise to a height above the opening 28, and flow backwardly into the crank case, plugging up the reclaiming tube 17. It is altogether possible that the oil would rise through the tube 16 and be conveyed into the intake manifold were no means provided for automatically tripping the oil in the chamber 34, after the same has reached a predetermined height. It is obvious that oil entering the intake manifold would carburize in the cylinders of the internal combustion engine, and which is the fault with most types of reclaimers.

The arrangement 75 preferably includes a tube 80 reciprocably disposed upon the valve stem 76, having a supporting spider 81 formed upon the lower end thereof, whereby said tube 80 may normally rest upon the inside surface of the bottom 22. A float 84 is reciprocably disposed about the tube 80 and, of course, rises and falls with the liquid within the casing 20. As the liquid within the casing 20 rises, the float 84 will be buoyed upwardly until the same comes in contact with a projecting flange 86, which is radially formed upon the tube 80 as a part thereof. Further elevation of the liquid within the casing 20 will carry the tube upwardly with the float 84. The extreme upper end of the tube 80 is provided with a frustoconical shaped valve head 87, adapted for cooperation in the tapered seat 38 provided in the passageway 34.

During operation of the internal combustion engine A, as above mentioned, the oil and gas flowing through the tube 17 will be baffled, and strained of foreign material through the filter elements 51 and 52, whereby said fuel and oil carried therewith enters the chamber 24 of the oil casing 20, so that the oil drops by gravity into the chamber 24, and the fuel in a vapor or semi-vaporized condition is carried upwardly into the intake manifold 10 as above described. Thus, it is obvious that the oil is continuously rising in the chamber 24. As the valve head 87 engages its seat 38 in the manner above described, the suction created by friction action in the engine A is shut off from communication with the chamber 24 of the casing 20. Immediately, the valve stem 76 and the valve heads 77 and 78 thereon are dropped by gravity, and are also assisted in the dropping operation by the partial vacuum within the crank case 11, so that the valve head 77 is unseated from the passageway 23 and the valve head 78 engages the seat 35. The oil trapped within the casing 20 will then flow through the passageway 23 into the drain tube 18 for returning to the crank case 11 for lubrication purposes. When the weight of the oil bearing against the valve head 77 is so decreased by flow into the drain tube 18 that the suction of the engine unseats the valve head 78, it is obvious that the valve 77 is closed to seal further draining of the oil from the casing 20.

From the foregoing, it can be seen that a reclaiming apparatus has been provided, which is of extremely practical nature, in that the same provides for the contingency of automatic return of the oil to the crank case. It is important that the breather tubes and like openings in the crank case be sealed, prior to operation of the engine, since the effective working of the device depending upon partial creating of vacuum within the crank case of the engine. The filters 51 and

52 are accessibly located, so that the same may be renewed from time to time. It is to be noted that that portion of the passageway 48 adjacent the filter 52 is enlarged, so that foreign material and the like may be trapped therein and removed by detachment of the connection 47, thus keeping the oil in the crank case in a clean condition.

Various changes in the shape, size and arrangement of parts may be made to the form of invention herein shown and described, without departing from the spirit thereof or the scope of the claims.

I claim:

1. In a reclaimer of the class described the combination of a receptacle providing an oil trap compartment therein, said receptacle having upper and lower aligning openings therein, the upper opening thereof having seats at opposite sides thereabove and therebelow, a valve stem reciprocably aligning with said openings, a valve head fixedly carried by the lower end of the valve stem operable in valved relation in the lower opening of said receptacle, a valve head carried at the upper end of the valve stem operable on the upper valve seat of the upper opening, said valve heads bearing such a relation to each other on the valve stem that when one is closed over its opening the other will be open with respect to its opening, a third valve reciprocably carried by the stem normally gravity operated to be spaced in open relation with respect to the lower seat of the upper opening of the receptacle, and float means operable by predetermined oil level in the receptacle compartment to engage the third valve and elevate the same into a closing relation upon the lower seat of the upper opening of the receptacle.

2. A reclaimer of the class described comprising a housing providing a liquid trap compartment therein, means providing a suction opening in the upper portion of said casing communicating with the compartment therein and having a valve seat converging toward said compartment, means providing a drain opening in the lower portion of said compartment communicating therewith and providing a valve seat converging toward said compartment, means providing a lateral supply opening through said casing, valves operable upon the converging valve seats in the upper and lower portions of said casing, means connecting said valves for synchronous movement whereby when one of the same is seated the other will be unseated, and float operated valve means movable independent of said last mentioned means adapted to close off communication of the suction opening from said compartment when the liquid in the oil trap compartment has reached a predetermined level.

3. In a reclaimer of the class described the combination of a receptacle having an oil receiving compartment therein, said receptacle upwardly therein having an upper suction opening therethrough with an upper valve seat converging towards the compartment and a lower valve seat for the suction opening facing into the compartment and converging upwardly away from the compartment, said receptacle having a lower drain opening therein provided with a downwardly facing valve seat converging toward the compartment of the receptacle, said upper and lower openings being in substantially aligning relation, a valve stem aligning with and extending through said upper and lower openings, said valve stem at opposite ends thereof having tapered valve heads thereon, the lower valve head being adapted to seat in the converging seat of the lower opening and the upper valve head being adapted to seat on the upper converging seat of the upper opening, a tube slidable on the stem within the compartment, said tube on the upper end thereof having a tapered valve head adapted to seat in the lower seat of the upper opening of the receptacle, said tube slidable on the stem being adapted to rest by gravity in a lower position in the compartment whereby its valve will be in spaced seating relation with the lower seat of the upper opening, said tube at the lower end thereof having a spider adapted to engage the receptacle in a non-interfering relation with the drain opening of said receptacle, float means reciprocable in the casing with respect to the tube and stem therein, said tube having a projection thereon which the float is adapted to engage at a predetermined oil level in the receptacle compartment in order to move the tube upwardly to seat its tapered valve head in the lower seat of the upper opening, the valve heads of the stem bearing such a relation to each that when one of the same is closed on its respective seat the other is open.

4. As an article of manufacture, a casing having oppositely positioned suction and drain openings therein, a third opening disposed laterally in said casing, a valve stem axially aligning with the first mentioned openings and having valve heads thereon for controlling said openings whereby one will be open when the other is closed, a float operable in said casing, and tubular valve means reciprocably disposed upon said valve stem independent of movement of the valve heads above mentioned having a lateral projection thereon for engagement by said float upon elevation of the latter, whereby said tubular means may be elevated for closing the suction opening.

5. In a reclaimer of the class described the combination of a casing providing a liquid compartment therein, said casing having an opening in the top thereof providing

a seat, said casing having an opening in the bottom thereof providing a seat, said casing having a lateral opening therethrough, valves for the seat in the top and bottom openings of said casing, a stem connecting said valves so that when one is seated the other will be unseated, the valve in said opening in the bottom of the casing being so positioned that when it is closed the weight of the liquid in said casing compartment will rest thereon, a float in the casing, and valve means movably connected with said float whereby to close off communication of the opening in the top of said casing when the liquid in the compartment has reached a predetermined level.

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