J. J. AULL.

EXHAUST PRESSURE REGULATOR.

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1,046,718. Patented Dec. 10, 1912.

Fig. 1

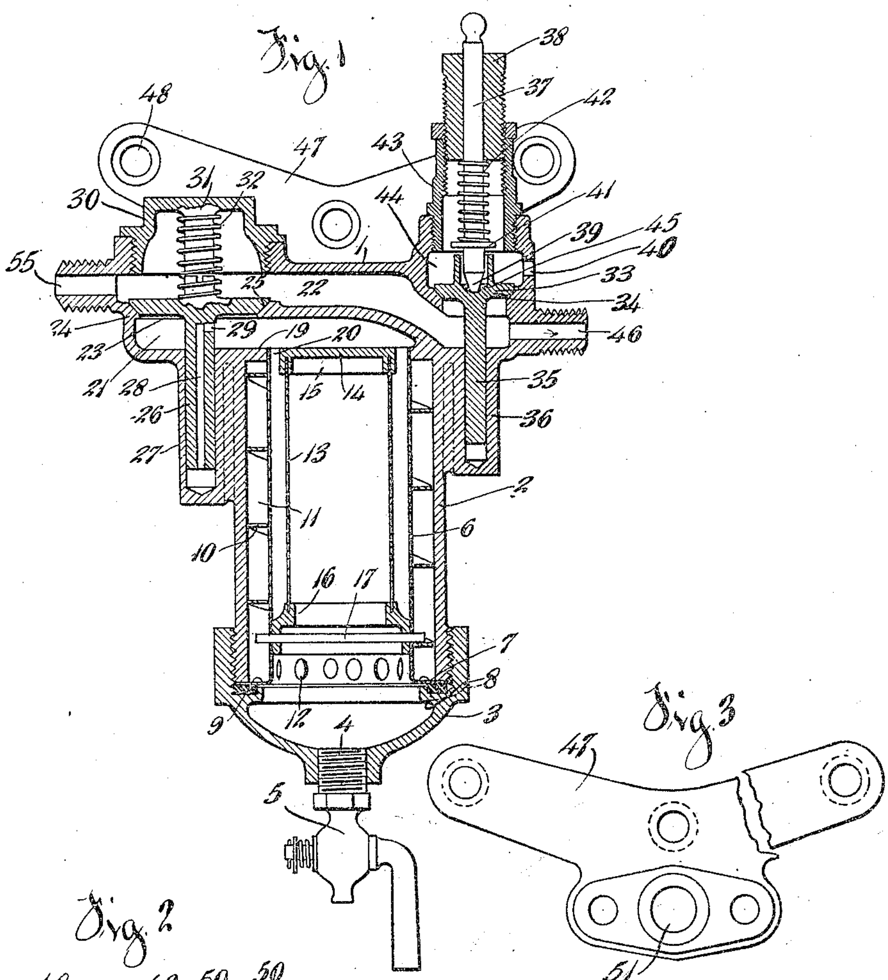


Fig. 3

Fig. 2

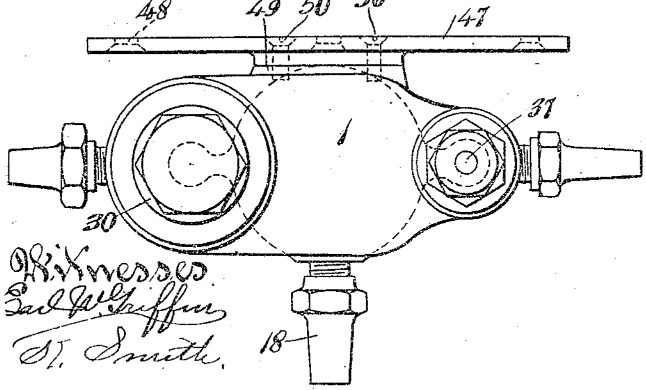
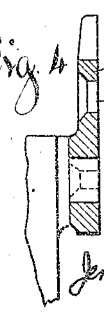


Fig. 4



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EXHAUST-PRESSURE REGULATOR.

1,046,718. Specification of Letters Patent. Patented Dec. 10, 1912.

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To all whom it may concern:

Be it known that I, JEROME J. AULL, a citizen of the United States, and a resident of the city of Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Exhaust-Pressure Regulators, of which the following is a clear, full, and exact description, reference being had to the accompanying drawing, forming a part of this specification.

My invention relates to devices for utilizing the exhaust pressure from internal combustion engines for supplying pressure to feed the liquid fuel where the fuel tank is not located in convenient position for a gravity feed, or where a forced feed is desired.

The invention consists of that certain novel construction and arrangement of parts to be hereinafter particularly pointed out and claimed, whereby the check valve and the relief valve can be separated, so that the sizes of the two valves are not dependent on each other, and the check valve may be made large to more accurately control the passage of the gas, while the relief valve may be constructed of smaller size, and the amount of pressure required to open the valve can be more accurately regulated, at the same time that the two valves can be more accurately guided to their seats. Provision is also made for ready access to all of the parts for cleaning and for securing the device in place to prevent undue strain on the valve structure.

In the drawing, Figure 1 is a central longitudinal section of my improved regulator. Fig. 2 is a top plan view of the same. Fig. 3 is a front view of the bracket for securing the regulator in place. Fig. 4 is a transverse section of the same.

1 is the casing of the device formed in one casting, the horizontal portion for the valve chamber and valves, and a depending cylindrical portion 2 for the condenser and carbon collector. The lower end of the condensing chamber is exteriorly threaded to receive the drainage cap 3 which furnishes a receptacle for the condensed moisture, and which is provided with a screw threaded central opening 4, to receive a stop cock 5, through which the moisture can be drawn off from the condenser.

Mounted inside the condensing chamber is a tube or cylinder 6, preferably of sheet metal formed with outwardly extending annular flange 7 at the bottom, this flange resting between a corresponding internal flange 8 on the drain cap 3 and the bottom of the condensing chamber 2. The drain cap also carries in a suitable groove a packing ring 9 to seal the drainage cap to the condenser casing.

Secured on the outer cylindrical surface of the cylinder 6 is a spiral flange 10 which substantially fills the space between the cylinder and the wall of the condensing chamber, and this spiral flange descends spirally from the top to the bottom of the tube, and forms a spiral passage 11 for the exhaust gas. The lower end of the cylinder 6 is provided with an annular series of holes 12, which allow the gas to pass from the spiral chamber into the inside of the cylinder. Secured on the inside of the cylinder is a cylindrical strainer formed of fine wire mesh 13. The upper end of this strainer is closed by a metal cap 14, the wire mesh being inserted in an annular groove in the depending flange 15 of this cap. The lower end of the strainer is secured in the same way in a collar 16 which fits within the walls of the tube 6, and the strainer is held in position by a cotter pin 17, which passes through openings in the cylinder and in the collar which are brought into register with each other. The exhaust gases are introduced into the regulator through an inlet port 18, said port passing through the wall of the condensing casing 2 into the spiral passageway of the condenser. The upper end of the passageway is closed by the flange 19 on the casing, so that the incoming gases descending the spiral passageway, pass through the openings 12 into the inside of the strainer and out through the strainer, through passageway 20 into the pressure chamber 21 in the casing. The carbon of the burned gases and the moisture collects on the spiral flange and inside the strainer, and the moisture drops down into the drainage cap.

22 is the valve chamber formed lengthwise in the casing, and 23 is the check valve which is interposed between the inlet or pressure chamber 21 and the valve chamber 22. This check valve is formed with a comparatively large valve disk 24 which is seated in the casing at 25, and the valve disk, in

order that it may be accurately guided, is provided with a comparatively long depending stem 26 which fits in and is guided in the depending portion 27 of the casing. In order that this valve stem shall work quickly, a passageway 28 is formed through the stem opening at 29 into the inlet chamber, so that the pressure at the lower end of the stem is the same as at the top.

In order to prevent the check valve from opening too far, and to be able to accurately control the amount of opening, I provide a cap 30, which is screw threaded into the casing immediately above the valve disk. This cap is provided with a depending stem 31, on which is mounted a coiled spring 32 which bears between the inner surface of the cap and the top of the valve disk. This stem 31 serves as a guide for the spring and it extends downwardly very close to the top of the valve disk to form a stop and prevent the valve from opening too wide and the upper surface of the valve disk is provided with a boss to coöperate with this stop. The coiled spring promptly closes the check valve after each inrush of the exhaust gas.

The construction of the check valve and its comparatively large size with the screw cap 30 immediately above the valve gives ready access to the check valve for cleaning, and also permits of closer control of the amount of opening of the check valve.

33 is the relief valve, the seat for which at 34 is preferably provided in the opposite end of the valve chamber 22, and the valve disk of this valve is preferably smaller in diameter than the diameter of the check valve, and this relief valve is also provided with the long depending stem 35 which slides in and is guided in the depending portion of the casing 36 in the same way that the check valve stem is guided. The tension on the relief valve can be very accurately adjusted by my novel construction.

37 is a rod or stem mounted to slide in the plug 38, and this stem 37 is pointed at the lower end at 39, and the point engages a socket in the upper surface of the relief valve disk at 45.

41 is a collar secured on the rod 37, and 42 is a coiled spring bearing between this collar 41 and the under surface of the plug 38. The plug 38 is screw threaded into the coupling 43 which in turn is screw threaded into the opening above the relief valve chamber 44. The coupling is provided so that access may be had to, and the relief valve inserted in place.

40 is the outlet for the relief valve.

By adjusting the plug 38, the exact amount of tension desired may be placed on the relief valve so that when the pressure in the tank exceeds the amount desired, the relief valve will open to relieve the excess pressure.

For convenience in use, I provide outlets 55 and 46 for each end of the valve chamber for connection to the gasolene tank, and to the pressure gage to register the amount of pressure carried.

For securing the regulator in place on the framework, I provide a bracket 47 with screw holes 48 separate from the main casing, and the bracket is secured to the boss 49 on the back of the casing by bolts or screws 50. Heretofore the supporting bracket has been formed integral with the casing, and with such constructions the strain in securing the device in place, especially when the regulator is used for automobile cars, has been liable to twist the casing and throw the valves out of proper adjustment. With my separate bracket secured as described, the strain comes between the bracket and its support.

For convenience in the event that it may be desired to connect the exhaust through the back of the casing, I provide an opening 51 in the bracket so that the same bracket can be used.

The operation of my improved regulator will be evident from the foregoing description. The connection being made through the pipe 18 with the exhaust from the engine, and the connection with the tank to the outlet 55 or 46 with the opposite outlet connected to a pressure gage and the plug 38 being adjusted to bring such tension on the relief valve that it will remain closed until the desired pressure of one or two pounds per square inch is obtained, the exhaust gas enters under the exhaust pressure into the condensing chamber 11, where the moisture is condensed and a good deal of the carbon deposited. The gas passes thence through the strainer and opens the check valve which immediately closes, admitting the pressure to the valve chamber 22 and thence to the tank. This pressure accumulates until the relief valve opens and at that point it remains balanced.

The condensing chamber is very accessible for cleaning, by merely unscrewing the drainage cap, and the check valve and relief valve are also readily accessible by removing the cap 30 in the one case and the coupling 43 in the other.

What I claim as new, and of my invention and desire to secure by Letters Patent, is:—

1. In a device of the character specified, a condensing and straining chamber, a check valve chamber in communication therewith, and a pressure chamber to accumulate pressure from the valve chamber, a check valve interposed between the check valve chamber and the pressure chamber, two outlets for said pressure chamber, a relief valve separate from the check valve, said relief valve controlling a relief outlet from the check valve chamber, means for regulating the

pressure on the relief valve to determine the valve chamber pressure and means affording direct access to the condensing and straining chamber, the check valve and the relief valve.

2. In a device of the character specified, a condensing and straining chamber, a check valve chamber in communication therewith, and a pressure chamber to accumulate pressure from the valve chamber, a check valve comprising a valve disk with a comparatively long guiding stem, a socket to guide the stem, and a spring to close the check valve, said check valve interposed between the check valve chamber and the pressure chamber, two outlets for said pressure chamber, a relief valve separate from the check valve, said relief valve controlling a relief outlet from the check valve chamber, means for regulating the pressure on the relief valve to determine the valve chamber pressure and means affording direct access to the condensing and straining chamber, the check valve and the relief valve.

3. In a device of the character specified, a condensing and straining chamber, a check valve chamber in communication therewith, and a pressure chamber to accumulate pressure from the check valve chamber, a check valve interposed between the check valve chamber and the pressure chamber, two outlets for said pressure chamber, a relief valve comprising a valve disk with a comparatively long guiding stem, a separate socket to guide the stem, a spring tending to maintain the relief valve disk seated, said relief valve separate from the check valve, and controlling a relief outlet from the check valve chamber, means for adjusting the tension of said spring to determine the valve chamber pressure and means affording direct access to the condensing and straining chamber, the check valve and the relief valve.

4. In a device of the character specified, a condensing and straining chamber, a check valve chamber in communication therewith, and a pressure chamber to accumulate pressure from the check valve chamber, a check valve comprising a valve disk with a comparatively long guiding stem, a socket to guide the stem, a spring to close the check valve, said check valve interposed between the check valve chamber and the pressure chamber, two outlets for said pressure chamber, a relief valve comprising a valve disk with a comparatively long guiding stem, a separate socket to guide the stem, a spring tending to maintain the relief valve disk seated, said relief valve separate from the check valve, and controlling a relief outlet from the check valve chamber, means for adjusting the tension of said spring to determine the valve chamber pressure and means affording direct access to the condensing and straining chamber, the check valve and the relief chamber.

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Attest:
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