

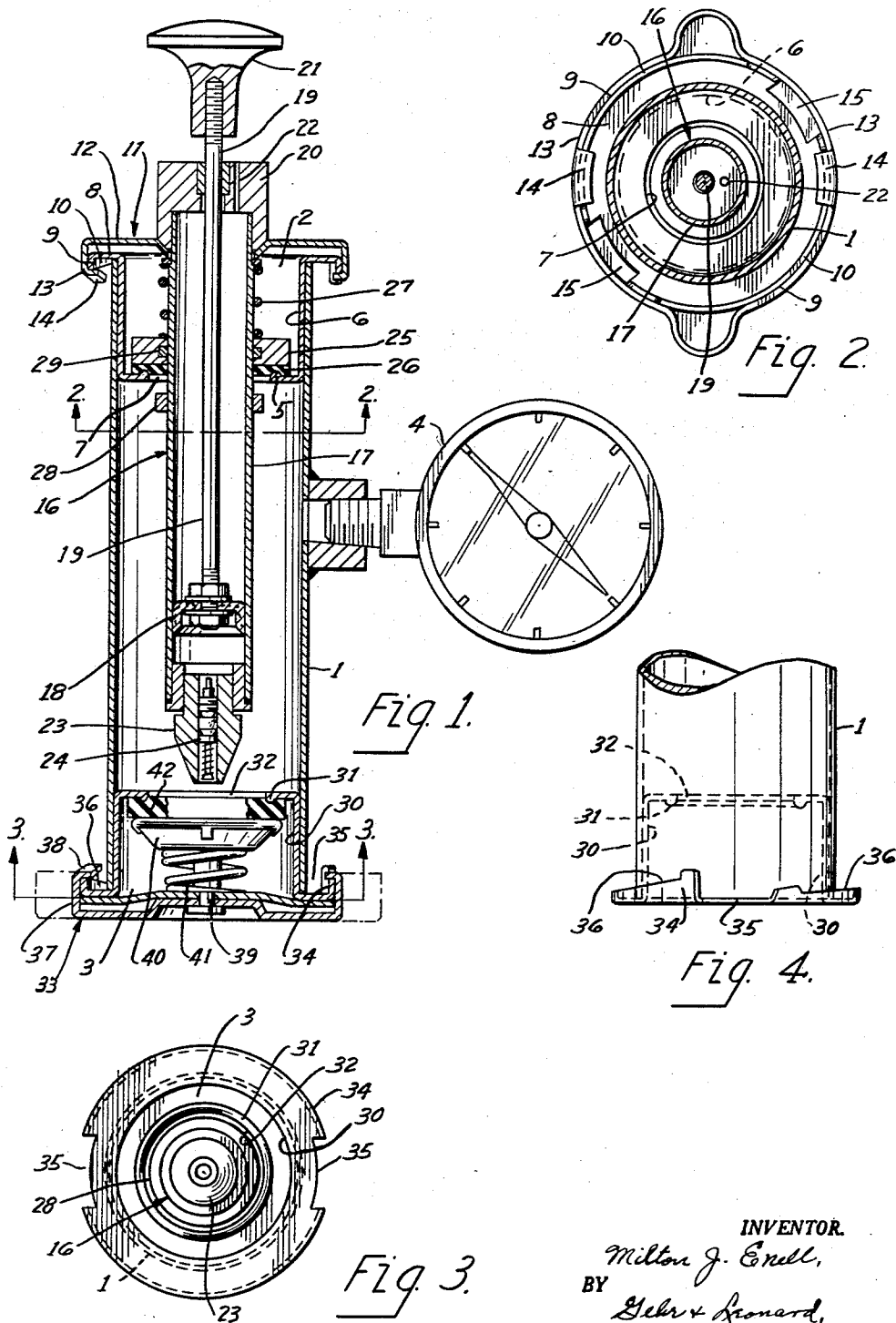
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RADIATOR CAP TESTING DEVICE

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RADIATOR CAP TESTING DEVICE

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1 Claim. (Cl. 73—45.8)

This invention relates to pressure testing devices and particularly to a fluid pressure testing device for testing leaks in pressure-sealing types of radiator caps used for sealing the inlet or filling spout of radiators of sealed liquid cooling systems of automobile engines.

In the present day passenger automobiles and trucks, sealed liquid cooling systems are used for cooling the engines. In such systems the inlet end of the filling spout of the radiator is sealed during the normal operation of the engine by a readily detachable cap having a sealing disc or plug which is spring pressed into sealing relation with an internal annular seat within the spout.

Pressure is developed in such cooling systems during engine operation, the amount of pressure depending to a large extent upon the engine water pump design, water pump speed, and temperature of the coolant. Small leaks in the seal between the cap and radiator spout of the prior unsealed gravity cooling systems were much less important than in present systems as they would cause so little loss of cooling liquid as to be of no concern. In the present systems, however, the seal between the cap and the spout must be very effective to prevent loss of a large volume of coolant liquid. The necessity of a tight and effective seal is increased by the fact that present antifreeze solutions and the like tend to leak through valves and fittings much more readily than water. Therefore, it is becoming increasingly necessary that faulty sealing of the present type of radiator caps be discovered and rectified before loss of coolant due thereto causes serious damage to the engine and possible danger to the occupants of the car.

One of the principal objects of the present invention is to provide a small, simple, and compact device for testing the radiator caps of the type presently used for sealing the inlet spouts of automobile engine radiators.

The present device comprises essentially a sleeve or hollow body which is open at both ends, respectively. The ends of the sleeve are provided, respectively, with connectors by which the connecting fittings on conventional radiator caps of automobile radiators can readily be connected thereto and disconnected therefrom. Within the sleeve are a pair of transverse partition walls, each wall being spaced a short distance from a different one of the ends. Each wall has an internal annular seat. These seats are adapted to receive a plug of the radiator cap in sealing relation. The seats are spaced different distances from their associated ends of the sleeve corresponding, respectively, to the distances which the seats for the cap valve plugs of "short" caps and of "long" caps, for example, caps of a passenger automobile and a truck, are located from the inlets of their associated radiator spouts. Thus one seat is in the proper position for sealing engagement with a "short" cap and the other is in proper position for sealing engagement with a "long" cap.

The invention also includes a pump which can be connected onto either of the connectors and when so connected will extend into the sleeve in coaxial relation to the plug seats, and a sealing plug slideable lengthwise on the

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barrel of the pump into seating position on either selected one of the seats, the plug having a sealed sliding fit with the pump barrel and being spring pressed in the seating direction. The connectors on the respective ends of the sleeve are preferably identical with those on the inlet end of a radiator spout of the pressure seal cap system so that either end of the sleeve can receive the connecting fitting of a radiator cap to be tested in the same manner as the cap would be received and secured in sealing relation on the inlet end of the radiator spout.

Accordingly, a "short" cap or "long" cap can be tested merely by securing the cap on the proper end of the sleeve, depending on the distance of the sleeve seat from the fitting, in the same manner in which it would be secured to the radiator spout, and then by securing the pump to the opposite end of the sleeve in essentially the same manner as the radiator cap is secured to the sleeve. Thus the plug on the pump barrel seals against the seat in one end of the sleeve and the cap valve plug seals against the seat in the other end of the sleeve. The sleeve is provided between the seats with a pressure gauge so that the pressure at which the cap begins leaking can be determined.

Various objects and advantages of the invention will become apparent from the following description, wherein reference is made to the drawings, in which:

Fig. 1 is a longitudinal sectional view through the axis of a preferred form of the testing device embodying the principles of the present invention with a radiator cap attached in position for testing;

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

Fig. 3 is a bottom plan view of the testing device with the radiator cap removed, and is taken on the line 3—3 of Fig. 1; and,

Fig. 4 is a fragmentary side elevation of the sleeve of the present invention showing the lower end thereof without the radiator cap attached.

Referring to Figs. 1 through 3, the testing device comprises principally a sleeve 1 which is open at both its upper end 2 and its lower end 3. Connected to the sleeve is a pressure gage 4 adapted to register pneumatic pressure developed within the sleeve. Near one end of the sleeve, such as the upper end 2, the sleeve is provided with a partition wall on which is an annular valve seat 5. The seat 5 is coaxial with the sleeve. A convenient manner of providing the partition wall and seat 5 is by means of a cup 6 which is telescopically fitted into the sleeve at the upper end and has its outer peripheral wall surface in sealed engagement with the interior peripheral wall of the upper end portion of the sleeve 1.

The cup is arranged in the upper end of the sleeve with its bottom inwardly disposed relative to the upper end of the sleeve and providing a partition wall. The bottom of the cup has an opening or port 7 which is bounded by the seat 5 and is coaxial with the sleeve.

At its upper end the cup 6 is provided with an annular, external, radially extending, flange 8 which at its free outer edge is provided with depending flange portions 9 which, in a direction circumferentially of the cup, slope endwise of the sleeve and act as cam surfaces, as indicated at 10, the flange portions each providing a suitable connector for connection to a connecting fitting of a radiator cap.

Detachably mounted on the upper end 2 of the sleeve 1 is a connecting body 11 such as is provided on a radiator cap. The body 11 has a top or end wall 12 provided with a depending circumferentially extending flange 13 which, at spaced locations along its under edge, is provided with inward turned portions forming connecting lugs 14. Suitable cut-outs 15 are formed in the flanges 8 and 9. The connecting lugs 14 are positioned so that when the fitting 11

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is moved axially onto the end of the sleeve 1 at the upper end of the sleeve in a relative rotated position of the fitting 11 and sleeve about the axis of the sleeve in which the lugs 14 are aligned with the cut-outs 15, the in-turned lugs 14 can pass through the cut-outs 15. After the lugs 14 have passed toward the sleeve through the cut-outs 15, the body is rotated about the sleeve axis and the lugs 14 engage the cam surfaces 10 and draw the body 11 toward the upper end of the sleeve.

Mounted fixedly on the body 11 and extending through the top wall thereof is a pump 16 having a barrel 17, the outer surface of which near its upper end is in sealed relation to the body 11. The barrel 17 of the pump, when the body 11 is installed as above described on the upper end of the sleeve 1, extends into the interior of the sleeve in coaxial relation to the seat 5. The barrel extends a substantial distance beyond the seat 5 toward the opposite or lower end 3 of the sleeve.

The pump is provided with the usual plunger or piston 18 and operating rod 19 which extends through a suitable block 20 secured to the fitting 11. An operating knob 21 is provided on the upper end of the rod 19 and a suitable inlet duct 22 is provided in the block so as to admit outside air into the pump chamber.

At its lower end the pump is provided with a discharge passage 23 in which is seated a check valve 24 of the type commonly used in automobiles and bicycle tire tubes. The valve 24 is adapted to permit air to flow from the pump into the interior of the sleeve and prevent the return of air into the pump barrel.

The exterior of the barrel 17 is ground and polished for at least a substantial portion of its length. Slidably mounted on the polished portion of the barrel in coaxial relation thereto is a valve plug 25 having on the face nearest the discharge end of the pump a suitable resilient sealing disc 26 which is adapted to seal on the seat 5 when pressed firmly thereagainst by the plug 25. A seating spring 27 is provided and yieldably urges the plug 25 toward the discharge end of the pump.

A restrainer 28 is mounted on the barrel in a position beyond the seating positions of the plug 25 so as to limit the movement of the plug toward the discharge end of the pump when the pump is separated from the sleeve. The plug 25 is provided with an internal annular recess in which is located a sealing washer 29 which prevents the escape of fluid pressure around the valve plug 25 between the barrel 17 and plug 25.

At the lower end of the sleeve a cup 30 is provided and is in sealed relation to the sleeve. The cup 30 has a bottom wall forming a partition wall in the sleeve and on which is a seat 31 which bounds an opening or port 32. The cup 30 is the same in all respects as the cup 6 except that its bottom wall and seat 31 are spaced a lesser distance from the lower end of the sleeve than the seat 5 is spaced from the upper end of the sleeve.

The end 3 of the sleeve is used to test "short" caps in which the distance from the top of the spout to the seat in the spout is less than the corresponding distance of the seat in a "long" radiator spout. The sleeve at the upper end 2 on the other hand, is used to test "long" radiator caps.

In the form shown in Fig. 1, a "short" cap 33, suitable for "short" spout radiators is shown installed on the lower end of the sleeve for testing. This lower end of the sleeve is provided with a flange 34, similar to the flanges 9 above described. The flange has cut-outs 35 and sloping cam surfaces 36. The flange 34 with its cam surfaces provides a connecting fitting identical with that on the upper end of the sleeve. The cap 33 has a connecting fitting in the form of a peripheral flange 37 with inturned lugs 38 which cooperate with the surfaces 36 for drawing the cap toward and onto the end of the sleeve in the same manner as the body 11 connects with the sleeve. The cap 33 is a conventional cap and is provided with a central pin 39 on which a valve plug 40 is guided

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for movement axially of the cap. A spring 41 urges the plug 40 away from the cap into seating position. The plug is provided with a sealing disc 42 which cooperates with the seat in the associated end of the sleeve 1.

Referring again to the pump and its cooperating valve plug 25, the plug 25 is movable along the barrel 17 of the pump distances such that it can seat on the seat 5 when its body 11 is connected to the connector on the upper end 2 of the sleeve, or can seat on the seat 31 when its body 11 is connected to the connector on the lower end 3 of the sleeve. The spring 27 holds the plug firmly against either seat sufficiently tightly so that it cannot be unseated at a pressure less than that at which the plug of the cap being tested can be unseated.

Thus, in order to test a cap of a passenger automobile radiator, the pump body 11 is installed on the upper end of the sleeve 1 as illustrated in Fig. 1, and the radiator cap to be tested is installed on the lower end 3 of the sleeve. Thereupon the pump is operated to develop sufficient pressure to test the cap, the pressure so developed being indicated by the gauge 4. If the cap is sealing properly, it will hold the pressure constant at a predetermined level. Usually the pressure in the sleeve is raised until the cap begins to leak, whereupon the pumping is discontinued and the pressure drops until it levels off. The maximum sealing pressure of the cap is thus determined readily by referring to the gauge 4.

If it is desired to test a truck radiator cap, then the body 11 is removed from the upper end 2 of the sleeve 1 and secured to the lower end 3 in which case the valve plug 25 is seated against the seat 31. A truck cap is then secured to the upper end 2 of the sleeve 1 in the same manner as the cap 33 was secured to the lower end of the sleeve 1, whereupon the plug of the truck cap is seated on the seat 5 and can be tested in the manner above described.

The sleeve is sufficiently long so that a substantial amount of air can be accumulated to maintain a pressure even with slight leakage of the cap thus affording ample opportunity for the operator to observe the cap carefully and determine the location of the leak and its possible cause.

Having thus described my invention, I claim:

A pump for use in connection with a testing device for testing automobile radiator caps and which testing device comprises a sleeve, duplicate connectors arranged one on each end of the sleeve, each connector being adapted to be connected detachably to the connecting fitting of a radiator cap of the pressure sealing type, said sleeve having a pair of transverse partition walls therein arranged one partition wall near each end, one of said partition walls being disposed at a greater distance from its associated end of the sleeve than the other wall is from its associated end of the sleeve, each of said walls having a port therethrough and a seat surrounding the port and exposed toward the end of the sleeve nearest to it, each seat being adapted, when the connector nearest to it is connected to the connecting fitting of said cap, to be engaged in sealing relation by a valve plug on said cap, and a pressure gauge connected to the sleeve between said seats, said pump comprising a connecting body adapted for detachable connection to either of said connectors, an elongated rigid pump barrel connected near one of its ends to said body in a fixed position relative thereto wherein, if the body is connected to either end of the sleeve, the barrel will extend into the sleeve from that end of the sleeve to which the body is connected and through the port adjacent to that end, a plunger in and reciprocable axially of the barrel, an outwardly opening check valve at the other end of the barrel, a valve plug mounted on and surrounding the barrel between the ends of the barrel for movement along the barrel, said plug being in sealed relation to the exterior peripheral wall of the barrel, resilient means engaging the plug and urging the plug toward said other end of the barrel, said plug

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being positioned axially of the barrel relative to the body so that, if the body is connected to the connector of either end of the sleeve, the plug will seat on the seat at the end of the sleeve to which the body is connected and the outlet end of the pump will lie between the seats of the sleeve. **5**

References Cited in the file of this patent

UNITED STATES PATENTS

1,503,411 Zimmerman ----- July 29, 1924 **10**

6

2,007,100
2,668,437
2,760,367
2,847,851

Varese ----- July 2, 1935
Patch ----- Feb. 9, 1954
Stromberg ----- Aug. 28, 1956
Enell ----- Aug. 19, 1958

OTHER REFERENCES

Publication: "Pres-sure-tite Tester," by Press-Sure-tite Products Inc., Detroit, Michigan, 2 pages, copy received Jan. 19, 1955, published in 1954 (73-45.8).