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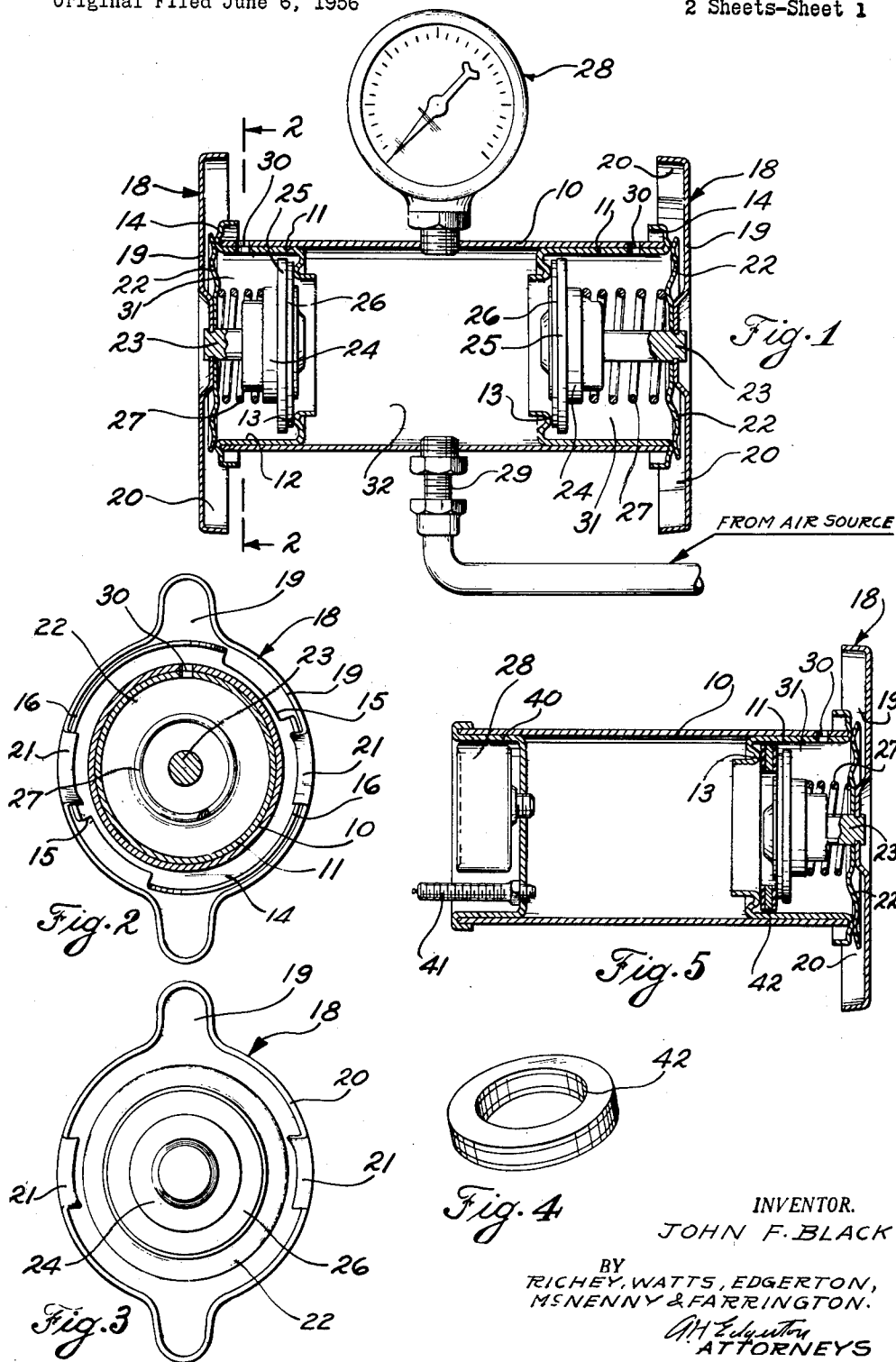
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3,014,361

AUTOMOBILE COOLING SYSTEM TESTING DEVICE

Original Filed June 6, 1956

2 Sheets-Sheet 1



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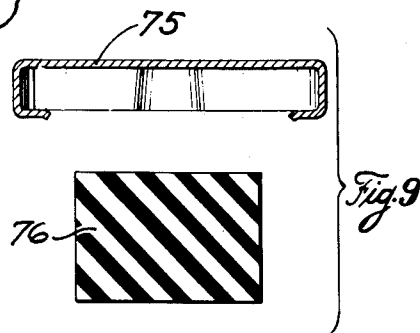
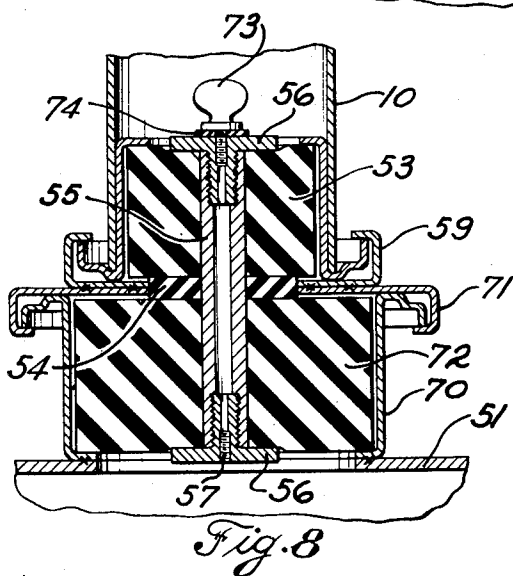
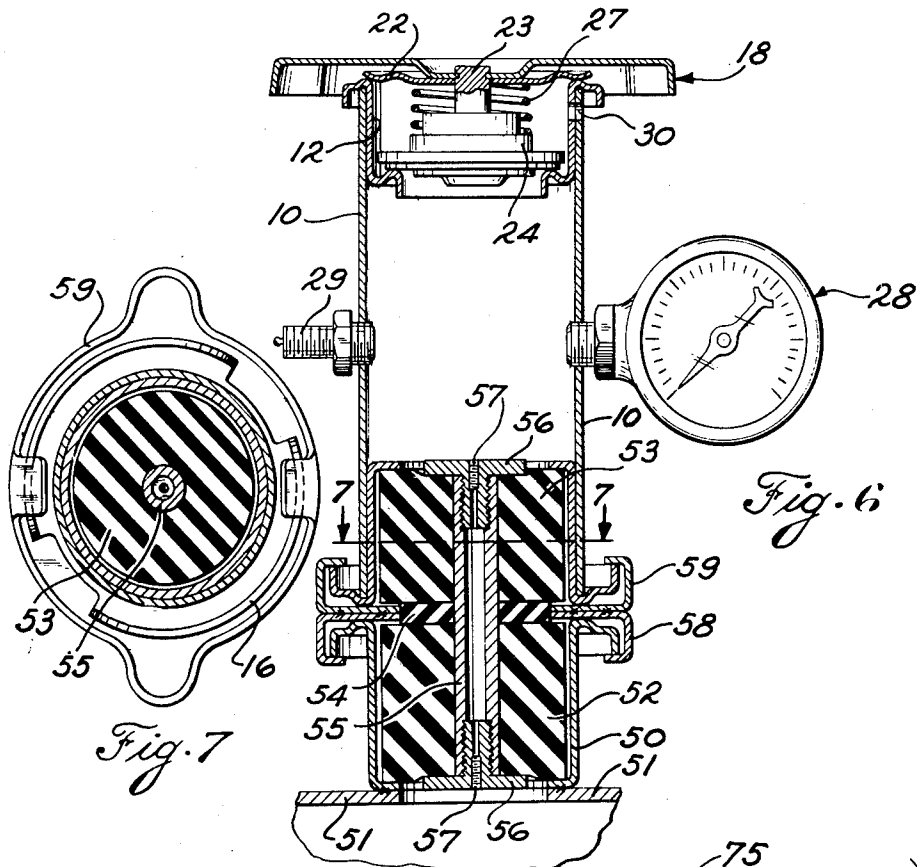
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3,014,361

AUTOMOBILE COOLING SYSTEM TESTING
DEVICEJohn F. Black, 307 Morewood Parkway,
Rocky River 16, OhioOriginal application June 6, 1956, Ser. No. 589,766.
Divided and this application Sept. 12, 1957, Ser. No.
687,848

6 Claims. (Cl. 73-40)

This invention relates to testing apparatus for automobile pressurized cooling systems, the objects of the invention residing in the combination of a radiator cap and an accumulator cylinder having a gauge therein to form a structure which is light in weight, portable, efficient of operation, and economic of manufacture. This application is a division of Serial No. 589,766, filed June 6, 1956, entitled "Automobile Cooling System Testing Device," now abandoned. A similar and related apparatus for testing radiator caps in an automobile cooling system is disclosed and claimed in my co-pending application for patent, Serial No. 704,704, filed December 23, 1957, as a continuation-in-part of Serial No. 589,766 and under the title, "Radiator Cap Testing Device Accumulator."

Other objects and advantages more or less ancillary to the foregoing, and the manner in which all the various objects are realized, will appear in the following description, which considered in connection with the accompanying drawings, sets forth the preferred embodiment of the invention.

In the drawings:

FIG. 1 is a longitudinal section of the improved testing apparatus;

FIG. 2 is a transverse sectional view thereof, the section being taken on the line 2-2 in FIG. 1;

FIG. 3 is a plan view of the inner face of one of the radiator caps embodied in the invention;

FIG. 4 is a view in perspective of a spacer ring or washer used to increase the spring load on the valve;

FIG. 5 is a modified form of the device illustrated in FIG. 1;

FIG. 6 is a longitudinal sectional view of the testing device of FIG. 1 having an adaptor on one end thereof to test the radiator of an automotive vehicle;

FIG. 7 is a transverse sectional view thereof, the section being taken on a plane indicated by the line 7-7 in FIG. 6;

FIG. 8 is a longitudinal section through a testing device of the form illustrated in FIG. 6, but formed to accommodate a larger radiator filler neck such as used on a truck; and

FIG. 9 is an exploded view of a modified form of the assembly shown in FIG. 6.

Referring first to FIG. 1, the apparatus comprises a metallic seamless tube 10 (approximately four inches (4") long) having cups of the form of radiator filler necks 11 secured in air tight relation in each end thereof. The filler necks are of the usual form which embody a tubular shank 12, an internal flange 13 in one end thereof constituting a valve seat, and a transversely disposed end wall 14. The end wall is formed with a pair of diametrically opposed notches 15 therein for the reception of radial ears on the radiator cap and the remaining portion of the end wall is formed with depending flanges machined with inclined cams 16 for drawing the cap into intimate engagement with the end wall 14 of the filler neck. The ends of the cams 16 are formed with depending lugs to delimit the rotative movement of the cap as it is revolved over the cams 16 or screwed into locked position with the filler neck.

The radiator caps 18 comprise an annular metal stamp-

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ing 19 defining a cap cover having opposed finger grip lugs thereon and a depending flange 20. The flange is fabricated with inturned ears 21 intermediate the lugs, adapted to enter the notches 15 in the filler neck and engage the cams 16. The inner face of the cap cover 19 is provided with a spring metal disc 22 engageable with the end wall 14 of the filler neck and a post 23 slidably engaged with an inverted cup 24. The cup is formed with flange 25 thereon which is faced with a rubber gasket 26 engageable with the valve seat 13 in the filler neck. The rubber gasket 26 is held in intimate engagement with the seat 13 by a helical spring 27 interposed between the disc 22 and the cup 24. When the cap is in position on the filler neck, tensive effort on the gasket and valve seat is provided by screwing the cap down over the inclined edges of the cams 16.

The filler neck and caps vary somewhat in depth and are also made with variable spring loading for automobiles of different type and make, hence, for the convenience of the user of the testing apparatus, a filler neck of the longer type is secured in one end of the tube 10, while the shorter type is mounted in the other end.

This double-ended construction, each with a different depth of radiator neck, enables the construction of an exceedingly simple and foolproof device which is almost universal in its ability to test the current assortment of popular radiator caps. However, the double-ended tube has a greater significance than mere interchangeability of caps. Relief valve devices are expensive and subject to malfunction. This statement is manifestly true, otherwise we would not be concerned about testing of the radiator caps. By this construction, a relief valve and safety overload device is obtained by the simple expedient of selecting a standard new or known value radiator cap of a higher relief rating than the one to be tested, and inserting that cap into the end of the tube opposite the end into which the cap to be tested will reside. Hence, no relief valve need be purchased with this construction and the relief valve that is used is instantly replaceable by a selected one of the stock of caps usually carried by the service garage. The ability to test a cap need never be forfeited because of a malfunctioning relief valve.

The central portion of the tube 10 is drilled and tapped to receive the threaded shank of an air gauge 28, and an air valve 29, of the type employed in an automobile tire, is mounted in the tube, preferably at a right angle to the axis of the air gauge coupling.

The tube 10 and the filler necks 11 are cross-drilled adjacent the outer ends thereof to provide openings 30 for the escapement of air within the voids 31 intermediate the valve seats and discs 22. This construction facilitates the use of high pressure air without injury to the air gauge. For example, when a hand pump is employed, or when the testing apparatus is used in a garage or service station equipped with an air compressor for a car lift that delivers air at a pressure of approximately one hundred and fifty pounds (150 lbs.) the hose therefrom, having a tire coupling on one end thereof, may be applied to the tire filler valve 29 to charge the accumulator chamber 32 of the testing apparatus. As the high pressure air enters the chamber, at least one of the gaskets 26 will be lifted from its associated seat and the excess air will escape through the space between the lifted gasket and its seat. Upon removal of the air coupling or pump, however, the spring in the filler cap will immediately seal the chamber, and the gauge 28 will indicate the efficiency of the spring and the condition of the gasket and/or valve seat in the cap being tested. The opening 30 also serves to release excessive air pressure in the event the disc 22 fails to yield.

In operation, the gasoline station attendant or garage

mechanic making the test, first removes the cap to be tested from the automobile and inspects the marking thereon to determine the weight of the spring used therein. He then screws the cap being tested on one end of the tube 10 and screws another cap of a known efficiency and having a heavier spring therein which constitutes a safety valve upon the other end of the tube. He next applies air pressure in accordance with the pressure load indicated by the markings on the cap being tested, observing the gauge 28 to ascertain the strength and stability of the spring and rubber gasket valve seal.

In the modified form illustrated in FIG. 5, the tube 10 is provided with a flanged cap 40 sealed within the tube adjacent one end thereof. The tube in this embodiment, is of a diameter which will accommodate the assembly of the air gauge 28 and a tire filler valve 41 within the cap 40. The radiator filler neck used in this device is of the longer type, and a spacer or washer 42 of the requisite thickness is employed to facilitate tests on caps of the shorter form. The washer 42 is preferably made from a magnetized metal plate to accommodate the attachment thereof to any steel surface of the device in order to avoid the loss thereof when not in use. The washer in its preferred form, is provided with thin rubber discs vulcanized upon the opposed faces thereof to assure its sealed engagement with the valve and valve seat.

As shown in FIGS. 6, 7 and 8, the apparatus heretofore described, may, with the addition of an adaptor, be used to check the radiator cooling system. The adaptor, for this purpose, comprises a rubber block or plug 52, a second shorter rubber block 53, and an intermediate washer 54. These parts are united by an axial tube 55 having cap screws 56 in the ends thereof, each being provided with a threaded opening 57 therein. These parts, when so united, form a test fluid conducting and sealing means which forms a seal against each of the two abutted internal flanges in the connected filler necks.

The end of the block 52 engages the inner face of a radiator cap shell 58, and the block 53 engages the inner face of a second inverted radiator cap shell 59 which is welded or otherwise affixed to the first cap shell 58. The cap screws 56 are drawn down to effect a sealed engagement between the blocks and the washer 54 which is mounted in aligned openings in the radiator cap shells 58 and 59.

The top portion of a radiator to be tested is shown in FIGURES 6 and 8. This top portion includes a filler neck 50 which is soldered to a radiator shell 51. The neck 50 is substantially identical to the previously-described filler necks 11 including an integral flange and a transversely disposed end wall. In use the plug and cap shell assembly is inserted in the filler neck 50 and the rubber block 52 is compressively engaged with the base thereof by action of the inclined cam 16. The tube 10, as shown in FIG. 6, is next secured to the upturned cap shell 59 and air pressure is applied in the manner heretofore described, preferably by a portable appliance, such as a hand pump.

The assembly illustrated in FIG. 8 is similar to the cooling system testing device of FIG. 6, save that a larger filler neck 70 is shown and an enlarged cap shell 71 and rubber block 72 are employed therewith. The cap screws 56 may be tapped, as illustrated, and a screw plug 73, seated on a gasket 74, may be inserted therein in the event this assembly is used to test a filler cap. It will be understood that the assembly may be made up in any desired combination with respect to the length and diameter of the rubber blocks, and that such combination of parts is contemplated herein as fully within the scope of the invention.

If desired, a radiator cap shell 75 (FIG. 9) and a solid rubber block 76 of suitable length, may be substituted for the cap assembly 18 of FIGURE 6. In this case, the cap shell is formed without a central opening

therein and the parts are not attached to each other, the plug or block being merely dropped into the filler neck and compressively clamped therein when the cap shell 75 is tightened in place. As has previously been indicated, the cap assembly 18 is preferred as a closure for the end of the tube 10 which is the upper end in FIGURE 6. The standard radiator cap assembly 18 is preferred for two reasons. The first of these reasons is that it provides a safety-pressure relief valve of known and proper capacity. The second is that the operator of this device does not require any special closure for the upper end of his test mechanism. He has a readily available closure in the form of a standard radiator cap. If the operator is, for example, a gasoline station operator, he has a new and proper safety valve in his normal inventory of caps offered for sale.

When it is necessary to test a cap of a form that varies in size from those heretofore described, a cap shell is soldered or otherwise attached to a filler neck which is formed to receive the special cap to be tested. The filler neck in the cylinder assembly 10 is then provided with a rubber plug having an axial opening therein, and this plug is compressively engaged with the base of the cylinder filler neck and the cap shell when screwed in place. The special cap is then screwed on the special filler neck and air is injected into the cylinder in the manner hereto described.

Although the foregoing description is necessarily of a detailed character, in order that the invention may be completely set forth, it is to be understood that the specific terminology is not intended to be restrictive or confining, and that various rearrangements of parts and modifications of detail may be resorted to without departing from the scope or spirit of the invention as herein claimed.

What is claimed is:

1. A pressure tester for a vehicle radiator, comprising, a tube member having a through chamber therein, a first assembly at one end of said chamber, a radiator cap removably attachable to said first assembly, said radiator cap including a pressure valve and bottom seal extending into said chamber, said first assembly including a valve seat means coactable with said pressure valve and bottom seal of said radiator cap, an air escapement opening through said tube member between said valve seat means and said first end of said chamber, a second assembly at the opposite end of said chamber, gasket sealing means carried by said second assembly, said gasket means including a through aperture for communication between said chamber and a radiator being tested, a first radiator cap cover connected to the gasket means to secure said gasket means in said second end of said chamber, a second radiator cap cover connected to the gasket means to secure said gasket means to the radiator to be tested, said covers being connected together in back-to-back relationship, air inlet means in communication with said chamber, and a pressure gauge in communication with said chamber.

2. In a pressure tester for a vehicle radiator the combination of, a tube having a through passage extending from a first to a second end of the tube, first and second radiator filler necks respectively secured to the first and second ends of the tube, each of said filler necks including an internal flange and a transversely disposed end wall for the support of a radiator cap, a radiator pressure cap of a known efficiency constituting a safety valve secured to said first filler neck and closing the first end of the tube, first and second radiator cap covers welded together in back-to-back relation, said first cap cover being connected to said transversely disposed end wall of said second filler neck, said second cap cover being connectable to the filler neck of an automobile radiator to be tested, resilient blocks filling the space between the internal flange of said second filler neck and said first cap cover and projecting outwardly from said second cap cover to fill the

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space between an internal flange on such filler neck of such automobile radiator to be tested and said second cap cover, means connecting the blocks and cap covers together, said blocks having intercommunicating passageways therein to conduct air under pressure from said tube through said blocks and into a radiator to be tested, an air valve on said tube and communicating with the interior thereof, and an air gauge on said tube and communicating with the interior thereof to indicate the pressure in the tube and thereby indicate escapement of air from a radiator being tested.

3. The device of claim 2 wherein a tubular member provides said intercommunicating passageway and wherein the means connecting the blocks together includes said tubular member and means secured to the ends thereof to unite said blocks.

4. A mechanism for testing a vehicle radiator having a filler neck including a valve seat, said mechanism comprising, a test device including a filler neck having a valve seat, the test device also including means to supply a quantity of test air to and through said filler neck, and an adaptor secured to each of said filler necks and connecting the two together, said adaptor comprising, first and second radiator cap covers oppositely oriented and each secured to one of said filler necks, and fluid conducting and sealing means connected to the covers and providing an air conducting passage extending from one of said filler necks to the other, said fluid conducting and sealing means being biased into fluid sealing engagement with each of said valve seats.

5. An adaptor for connecting a radiator tester to a radiator comprising, first and second annular radiator cap cover members, each of said cover members including means on one side thereof to connect the cover to a radiator filler neck, the connection means on each of said

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caps being oriented in a direction away from the other cap, a first annular resilient block member extending outwardly past said first cover member connection means, a second annular resilient block member extending outwardly past the connection means on said second cap member, other means connecting the two block members together and forming a fluid conducting passage from one block to the other, and said passage being surrounded by each of said annular members.

6. An adaptor for connecting a radiator tester to a radiator comprising, first and second annular radiator cap cover members, each of said cover members including means on one side thereof to connect the cover to a radiator filler neck, the connection means on each of said caps being oriented in a direction away from the other cap, a first annular resilient block member extending outwardly past said first cover member connection means, a second annular resilient block member extending outwardly past the connection means on said second cap member, another annular member interposed between said block members and in abutment with each of them, a tube surrounded by each of the members and means at the ends of the tube urging the block members into abutment with said other member.

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