Feb. 17, 1953 G. K. MOORE 2,628,810

CHECK VALVE

Filed March 19, 1949

FIG. 1

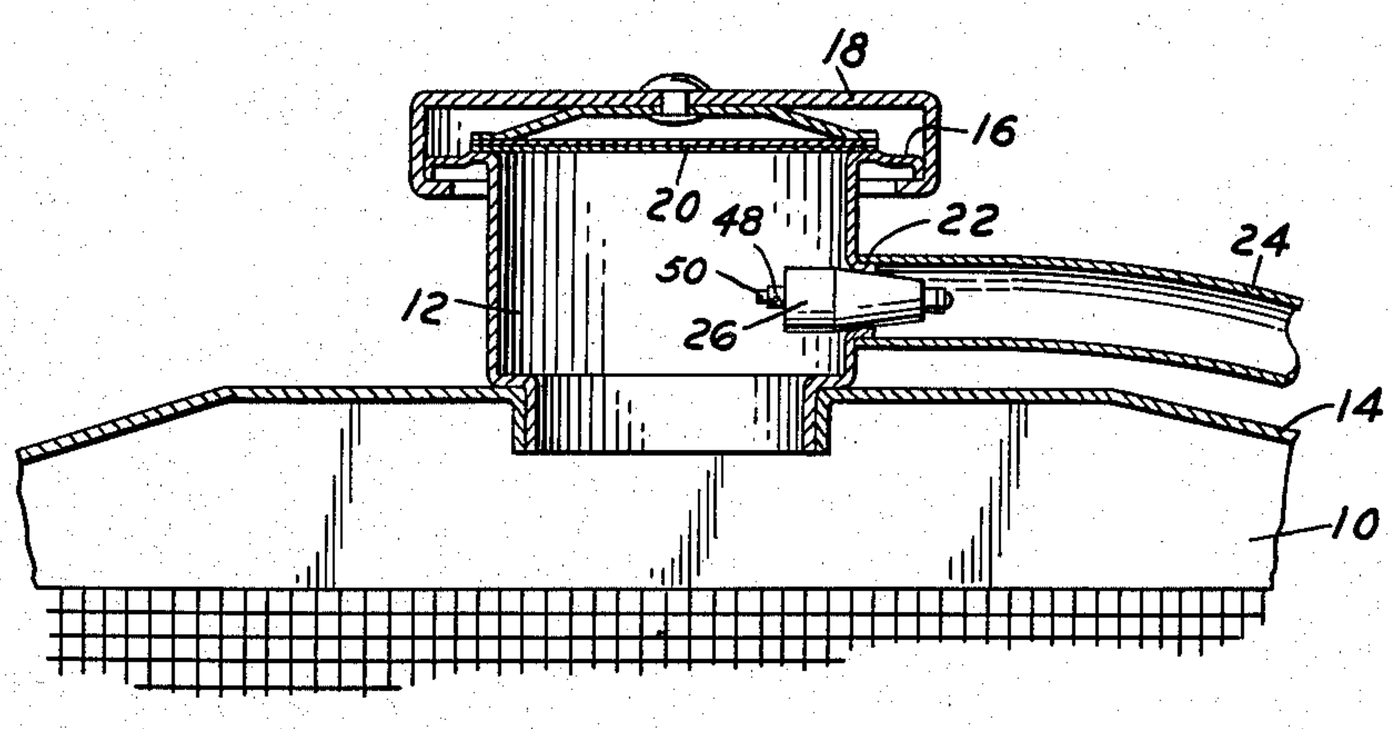


FIG. 3

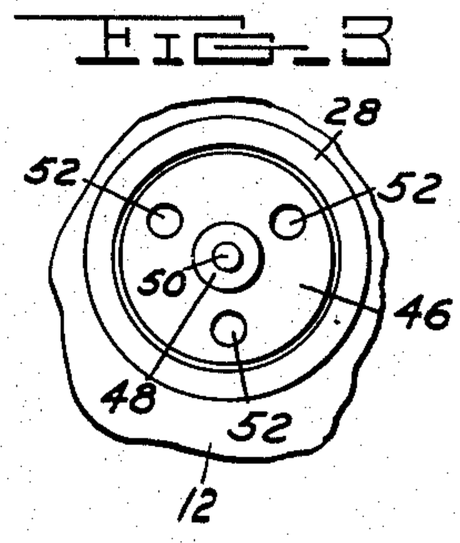
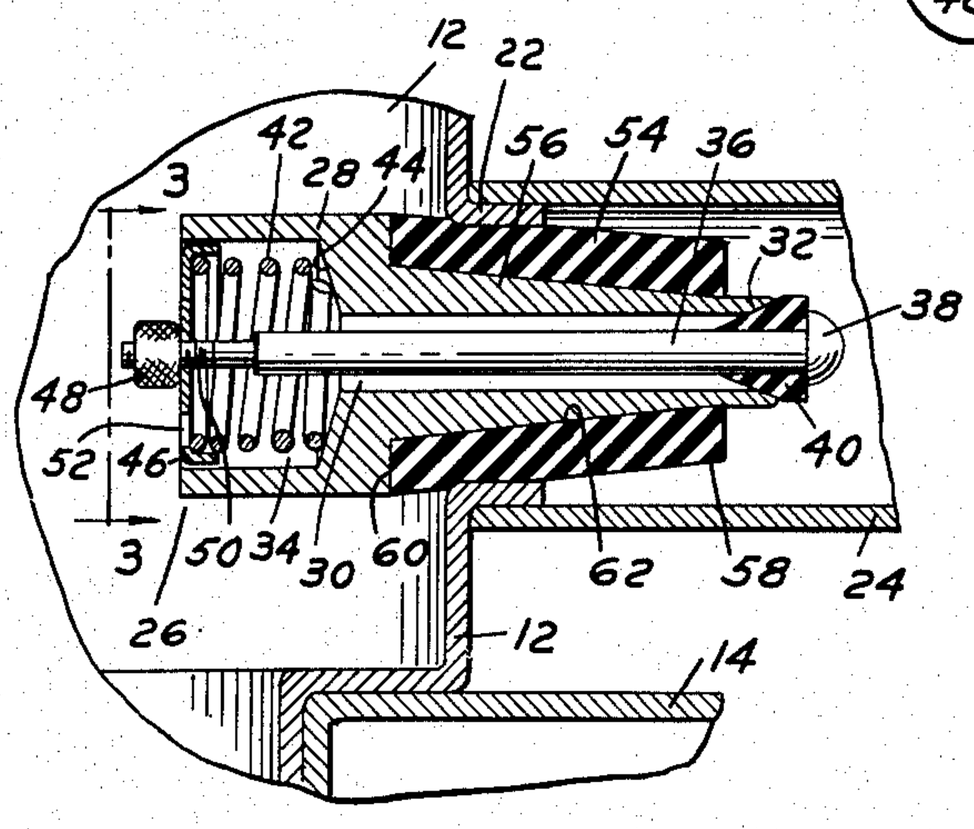


FIG. 2



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CHECK VALVE

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1 Claim. (Cl. 251—145)

1

This invention relates to a check valve and more particularly to a device for preventing the escape of water or anti-freeze vapors from the radiator of an internal combustion engine.

There has been proposed heretofore the provision of a check valve adapted to be mounted on some part of a radiator for an internal combustion engine so that the water and anti-freeze vapors produced in the radiator are prevented from escaping from the radiator unless the pressure within the radiator exceeds a predetermined safe value. Some of these devices are in the form of a pressure cap for the filling spout of the radiator. A cap of this type is constructed so as to relieve the pressure in the radiator when it reaches a certain value. The main objection to a cap of this type is that a single cap is not adapted for universal use since different makes of cars require radiator caps of different sizes and configurations. Another solution proposed to this problem is the provision of a check valve assembly which is provided with a threaded collar for engagement with the threaded end of the overflow pipe which projects into the radiator. The check valve of this type is not entirely satisfactory not only because it requires the forming of threads on the end of the overflow pipe but also because size of overflow pipes varies with different types of cars. Each size of overflow pipe would necessitate a check valve of a different size. In addition in radiators of recent design the overflow pipe does not project into the radiator but merely extends to and is brazed on the wall of the filling spout. Radiators of this construction, therefore, present a real problem with reference to the connection of a check valve thereon.

It is an object of this invention to produce a check valve which will be effective in preventing water and anti-freeze vapors formed in the radiator from escaping through the overflow pipe in the radiator. More specifically, the invention has to do with the provision of a check valve which is formed so as to be engageable with the overflow pipe of a radiator by merely inserting the valve into the end of the radiator overflow pipe. The invention also contemplates a check valve which can be manufactured economically and which is provided with means for adjusting the valve to open at different predetermined pressures.

It is further an object of the invention to provide a check valve shaped so as to be insertable in the end of the overflow pipe of any conventional radiator.

2

In the drawings:

Figure 1 is a cross section through the upper portion of a radiator for an internal combustion engine showing the check valve arrangement of my invention.

Figure 2 is an enlarged sectional view of the check valve positioned within the end of the overflow pipe.

Figure 3 is an end view of the check valve taken along the lines 3—3 in Figure 2.

Referring to the drawings, and particularly to Figure 1, there is shown the upper portion of a conventional radiator 10 having a cylindrical filling spout 12 brazed or otherwise secured to the radiator shell 14. The upper end of the filling spout 12 is flanged as at 16 so as to resiliently engage a flanged cap member 18 which is provided with a seal 20 on the inside thereof which seats upon the upper end of the filling spout 12 with sufficient pressure to effectively seal the contents of the radiator. The filling spout 12 is provided with a flanged aperture 22, the flange projecting outwardly of the filling spout and forming a collar over which the end of an overflow pipe 24 is soldered, brazed or otherwise secured.

The check valve of this invention, generally designated as 26, comprises a body member 28 having an axial bore 30. At one end the bore 30 is flared as at 32 and at the other end the bore is enlarged as at 34. Within the bore 30 there is arranged a valve stem 36 having an enlargement 38 at one end against which a rubber plug member 40 is fitted. Plug 40 is of conical shape so as to fit snugly within the flared end 32 of the bore 30. Within the enlarged portion 34 of the bore there is arranged a coiled compression spring 42 which acts at one end against a shoulder 44 in the valve body and at the other end against a disc member 46. Spring 42 is maintained under the proper amount of tension between seat 44 and disc 46 by a nut 48 which is threadedly engaged with the threaded end 50 of valve stem 36 and against which the disc 46 is arranged to abut. Disc 46 is provided with a plurality of apertures 52 which communicate with the enlarged portion 34 of the bore 30.

In order to adapt the check valve of this invention for insertion into the end of different sized overflow pipes customarily used in radiator constructions, I have found it advantageous to provide on the outer surface of valve body 28 a rubber sleeve 54. Sleeve 54 is fitted on an undercut portion 56 of valve body 28 and is provided with a frusto-conical outer surface 58 which tapers from a large diameter at the shoulder 60

on valve body **28** to a small diameter at the end of the valve adjacent plug **32**. Although the undercut portion **56** of body **28** may be formed with a uniform diameter so as to accommodate a sleeve having a uniform internal diameter, it is preferred to form the undercut portion **56** with a taper as indicated at **62** and the sleeve **54** with a wall of uniform thickness. The outer diameter of sleeve **54** at its small end is smaller than the internal diameter of overflow pipes commonly used on radiators and the diameter of sleeve **54** adjacent shoulder **60** is greater than the internal diameter of overflow pipes commonly used when reduced by a double thickness of the wall of the filling spout **12**.

When it is desired to provide a radiator with a check valve device of this invention the valve is simply inserted with its small end foremost into the end of the overflow pipe **24** as is shown in Figure 2. The valve is pushed into the end of the overflow with sufficient pressure to compress the sleeve **54** and firmly wedge it in the overflow pipe. The frictional engagement of sleeve **54** with the flanged aperture **22** prevents the valve from becoming loose and falling out of the end of the overflow pipe **24**. This action is further supplanted by the pressure within the radiator which serves to push the valve further into the overflow pipe. When the pressure within the radiator exceeds the tension of spring **42** it acts against the plug **32** to shift the stem **36** to the right as viewed in Figure 2 to open the valve. When the pressure is relieved spring **42** acts through disc **46** and stem **36** to seat plug **40** against the flared end **32** of the valve and thereby effectively seal the radiator and prevent the further escape of vapors therefrom.

Depending upon the conditions of driving and the climate it will be appreciated that the relieving pressure of the valve should be variable within certain limits. When it is desired to increase the pressure at which the valve will relieve the vapors in the radiator, screw **48** is advanced into stem **34** so as to increase the tension in spring **42** and when it is desired to reduce the relieving pressure screw **48** is threaded outwardly from stem **38** to thereby diminish the tension in spring **42**. The end **50** of stem **36** is threaded along only a portion of its length however so that the maximum tension that can be applied to the spring is limited to a value wherein the relieving pressure is below the safe maximum value for the radiator.

It will thus be seen that I have provided a very efficient check valve for an overflow pipe of a radiator which can be economically manufactured and which will positively relieve the pressure within the radiator when it reaches a predetermined value. It will also be appreciated that by providing a sleeve **54** the valve may be used on overflow pipes of various sizes and the rubber enables the valve to be very firmly wedged into the end of the overflow pipe without the provision of additional means for holding the valve in the end of the pipe. The provision of the undercut portion **56** of valve body **28** with a taper enables the use of ordinary rubber tubing for sleeve **54** rather than a specially molded sleeve with an external taper.

What I claim is:

A check valve for an overflow pipe of a radiator for an internal combustion engine comprising a valve body having an axial passage therethrough, said passage being enlarged at one end to provided an axially extending, enlarged cylindrical socket open at one end of said body and being fashioned at its other end to provide a valve seat, the portion of said passage intermediate said ends of said body being of substantially uniform transverse dimension, a pin extending axially in said passage, said pin being smaller in diameter than the transverse dimension of said intermediate portion of said passage whereby substantial clearance is provided between said pin and said passage, a valve member supported at one end of said pin and cooperating with said valve seat to open and close said passage, a perforated disc supported at its center by the opposite end of said pin, said disc slidably engaging the side walls of said cylindrical socket to maintain said pin axially centered in said passage, a compression spring in said cylindrical socket surrounding said pin and having one end acting against said disc and its opposite end acting against the bottom wall of said cylindrical socket, the outer surface portion of said body adjacent said valve seat being of frusto-conical shape, and means forming the external surface of said check valve comprising a sleeve member formed of an elastic material and normally having substantially uniform inner and outer diameters, said sleeve member being stretched over said frusto-conically shaped surface of said valve body.

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