

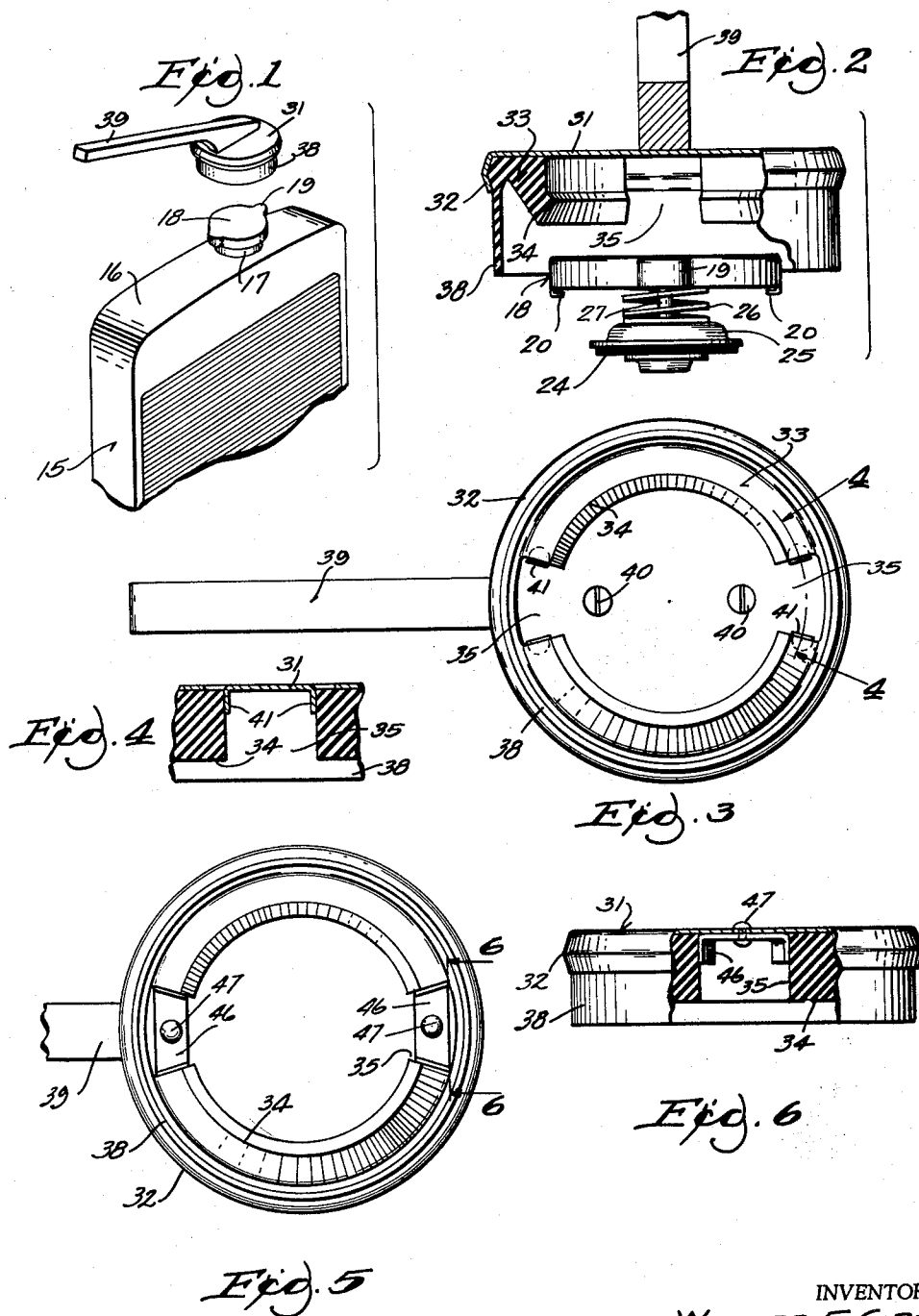
June 1, 1965

W. F. GROTE
RADIATOR CAP REMOVER

3,186,263

Filed July 5, 1963

2 Sheets-Sheet 1



INVENTOR
WALTER F. GROTE
BY
Miller Henninger
ATTORNEY

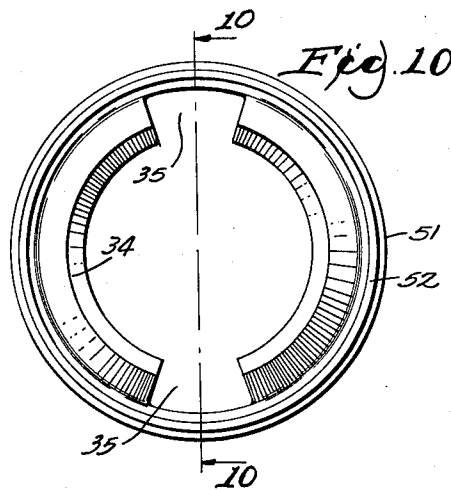
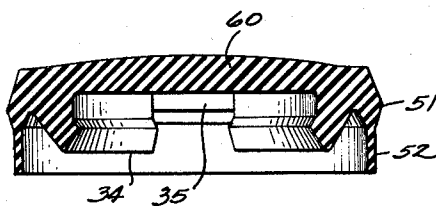
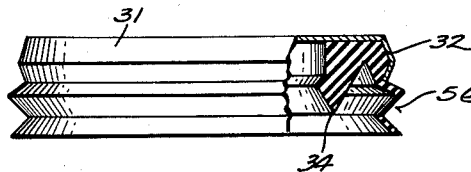
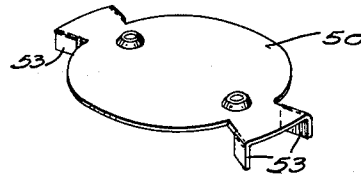
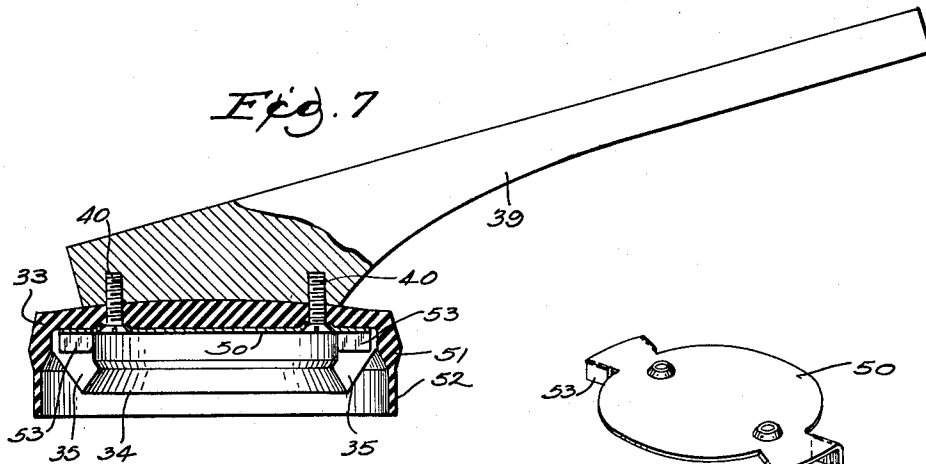
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INVENTOR
WALTER F. GROTE
BY
Miles Henninger
ATTORNEY

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RADIATOR CAP REMOVER

Walter F. Grote, Madison, Ind., assignor to The Grote Manufacturing Company, Madison, Ind., a corporation of Kentucky

Filed July 5, 1963, Ser. No. 292,924

3 Claims. (Cl. 81-3.1)

This invention relates to improvements in a tool for safely releasing, removing and replacing the cap of an automobile radiator.

Whenever a liquid cooled internal combustion engine operates under conditions leading to heating of the cooling liquid, it is possible for the liquid to reach its vaporizing temperature or even to be heated above the boiling point. In some cases the vapor builds up pressure sufficiently to eject a substantial quantity of liquid from the radiator if the radiator cap is removed before the pressure is vented. Even if the radiator cap is only loosened so that vapor may escape relatively slowly from the radiator, the vapor itself may well be above the boiling point of the liquid. In either case, the person releasing or removing the cap is in danger of being scalded or of being otherwise hurt in attempting to avoid ejected hot liquid or a cloud of hot vapor.

The present invention provides a simple tool for releasing and removing an automobile radiator cap with greatly reduced danger of the user being scalded by boiling liquid escaping from the radiator or by hot vapor therefrom. Essentially the tool provides a resilient member forming a socket with pockets laterally therefrom for receiving an automotive radiator cap having ears extending therefrom, the resilient member providing an inner flange for gripping the cap and providing an outer skirt which can bear on the radiator around the cap for controlling the escape of hot vapor or liquid when the cap is released but not yet removed. The skirt is flexible but of sufficient thickness to resist the action of considerable fluid pressure and is long enough to seal against the radiator shell when the member is seated on a radiator cap in place on the radiator. The skirt is capable of compression and folding to allow venting of vapor on the side away from the user, without danger that vapor may escape on the compressed side of the skirt adjacent the user of the tool.

The elastic member may be molded around a metal plate or the metal member may be formed as a shallow cup receiving the elastic member, for reinforcing the body of such elastic part. Such plate or cup may serve for the attachment of the handle in a form particularly desirable for average passenger automobile drivers in that the handle facilitates blocking ejection of hot liquid and vapor toward the user and venting the vapor or ejected liquid from beneath the tool on the side away from the user and spaces the user's hand safely away from the venting vapor or liquid. When a metal plate or cup is part of the tool, lugs may be formed integral with the plate or cup to extend into the pockets in the resilient member for bearing on the ears of the cap when replacing or releasing the cap, or separate clips may be fastened to the plate or cup within the resilient member pocket to engage the cap ears.

In the drawings:

FIG. 1 is a perspective view of a fragment of an automotive type radiator with a cap to be removed, with the present tool shown as approaching the cap for engagement thereof.

FIG. 2 is a partial cross section of the present tool about to engage the radiator cap.

FIG. 3 is a bottom plan view of one form of the present tool.

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FIG. 4 is a fragmentary cross sectional view on the line 4-4 of FIG. 3.

FIG. 5 is a bottom plan view of the present tool in which separate clips are attached in each pocket of the socket member for engaging the ears of the cap.

FIG. 6 is a side elevation cut away to the line 6-6 of FIG. 5.

FIG. 7 is a cross section of the tool in which a disk-like plate is molded into the resilient member and a handle is attached to the plate.

FIG. 8 is a perspective view of the metal plate showing lugs struck therefrom to enter the pockets in the resilient member for engaging with the ears of the radiator cap.

FIG. 9 is a side elevation of a portion of the tool with a fragment broken away to show a tool with a metal cup, without a handle and with a modified form of skirt.

FIG. 10 is a bottom plan view of a one-piece, entirely resilient tool, and

FIG. 11 is a cross section of the structure shown in FIG. 10 and taken on the line 11-11 of FIG. 10.

Referring to the drawings by reference numerals, 15 generally designates an automobile radiator with a shell 16 in which is formed a filler neck 17 to be closed by a cap having a generally cylindrical portion 18 with two ears 19, extending diametrically therefrom. A common construction of the radiator cap 18, 19 is shown in FIGS. 1 and 2 as having two diametric inwardly extending ears 20 to engage under and interrupted outwardly extending flange of the radiator neck as is well known. A sealing member 24 is backed by a body 25 attached to the cap part 18 by a spring 26 and a pin 27 extends from the cap part 18 to limit compression of the spring 26. The cap top part 18, 19 seats in the socket and in the pockets of the tool to be now described, and the cap is held in its seated position in the tool by the resilience of a portion of the tool.

Referring now to the present tool, a metal member 31 is formed with a peripheral flange 32 which is of shallow V-shape in cross section for seating therein and holding a resilient generally annular member generally designated 33. The member 33 has a relatively heavy top portion from which extends a flange 34 to form a socket receiving the cap 18 and the flange is interrupted at two diametrically opposite points to provide pockets 35. The flange 34 extends downwardly and inwardly from the top of member 33 and defines an opening requiring slight expansion when the radiator cap passes through the opening. A flexible and compressible skirt 38 extends from the periphery of the socket member top portion 33 to a substantial distance below the flange 34, such skirt pressing around its entire periphery on the radiator shell when the tool is seated on the cap. A handle 39 extends from the backing member 31 and is attached thereto by fasteners such as screws 40. The handle is preferably a substantial length so that the user of the tool may have his hand well spaced from the neck of the radiator when the cap is to be released therefrom.

As shown in FIGS. 3 and 4, the backing member 31 has struck therefrom pairs of lugs 41 at the location where the pockets 35 occur. The pairs of lugs 41 are pressed into the spaces between the socket member pockets and preferably bear on the ends of the interrupted flange 34 to aid the general resilience of socket member 33, 34 in maintaining a firm seat in a cup-shaped backing plate. The pairs of lugs 41 each define a space into which a cap ear 19 seats readily and the lugs provide means whereby rotary motion of the handle 39 is transmitted to a radiator cap seated in the tool.

FIGS. 5 and 6 are generally similar to the structure

described above but have U-shaped clips 46 attached by rivets 47 to the backing cup 31 at the location where such clips enter the pockets 35 when the socket member 33 and backing member 31 are assembled. The pairs of clips then severally receive the ears 19 of the radiator cap and transmit to the cap any turning force exerted on the tool. Both the lugs 41 and the clips 47 are arranged to put the socket member resilient flange 34 under slight compression endwise which tends to cause the flange to grip the radiator cap when it is seated in the tool.

In the structure shown in FIGS. 7 and 8, a metal plate 50 is molded into or otherwise embedded in or inserted into the socket part 33 and extends to adjacent the skirt. The skirt now has a thickened portion 51 and a thinner and very flexible portion 52. The plate 50 may be cut to provide pairs of lugs 53 which may be bent into the pockets 35 for engaging the ears 19 on the radiator cap. The handle 39 is then again attached to the reinforcing plate by screws 40.

In the structure shown in FIG. 9, the tool is left without a handle and the skirt is formed in bellows or zigzag fashion as is shown at 56. The tool is then of a size to be grasped in the hand by the average man so the tips of the fingers come just below the largest diameter of the flange 32 whereby the tool may be held firmly and controlled even though considerable pressure may be exerted against it.

FIGS. 10 and 11 illustrate a form of tool which does not have a metal backing cup nor a metal reinforcing plate and does not have a handle. The resilient member is now preferably made with a slightly heavier and more arched top portion 60 but is otherwise substantially the same as such member as shown in FIGS. 7 and 8. The skirt is again thickened at 51 and tapers to a thin wall part 52 which may be readily compressed and folded against the radiator shell. It is now preferred that the tool be made of a material of a durometer of approximately sixty to assure adequate transmission of rotary pressure on the cap ears.

The present tool is used for safely removing a cap from an automotive radiator containing hot liquid which is forming hot vapor, or which may eject hot liquid and/or vapor when the cap is removed (and if the vapor pressure has not been previously vented to atmosphere). The tool is placed so that the cap ears enter the tool pockets and sufficient pressure is put on the tool to expand the tool flange and allow the top portion of the cap to slip inside the flange and seat against the end of the socket of the resilient member. The cap ears are then between the lugs or in the clips so that the cap may be rotated to release it from the neck of the radiator. After the cap is released from the radiator neck, the tool is tilted toward the user

so that the skirt is pressed on the radiator shell on the side of the neck toward the user, but is lifted slightly away from the radiator shell on the side of the neck away from the user. Thus any vapor under pressure in the radiator is vented and discharged safely away from the user. The resilient socket member is preferably made from an elastomer not affected at the temperature of boiling of the common liquids used for automotive cooling, so that the radiator cap may be safely left in the tool and be returned thereby to the radiator neck so that the user need never touch the hot metal.

I claim:

1. In a tool for safely removing a cap from the neck of an automotive radiator containing a hot fluid, the cap having a main portion and ears extending radially therefrom, a resilient member having an interrupted flange providing a socket, receiving and gripping the cap main portion, and providing pockets receiving the cap ears, the resilient member having a flexible skirt peripherally of the flange and pockets and substantially enclosing the neck and cap upon the bearing of the skirt end on the radiator, and a rigid backing member attached to the resilient member for transmitting a torsional force thereto to release the cap from the radiator neck, the backing member having lugs extending into the resilient member pockets for severally bearing on the flange ends and engaging the cap ears for turning the cap on the neck.

2. The tool of claim 1 in which the resilient member flange has a relatively large cross section and expands responsive to the pressure of the backing member lugs thereon for receiving the cap main portion and contracts to grip the cap upon interruption of the pressure and release of the cap from the radiator neck.

3. The tool of claim 2 in which the resilient member skirt has a relatively thin cross section and is of a length to allow for flexing thereof on the radiator when the flange grips the cap, and a rigid handle attached to the backing member for exerting torque on and for tilting the tool upon release of the cap for thereby venting hot fluid from beneath the skirt.

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WILLIAM FELDMAN, *Primary Examiner*.

MILTON S. MEHR, *Examiner*.