United States Patent

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[54] FLUID-DEFLECTING CAP REMOVER

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[52] **U.S. Cl.** .....**81/3.1 R,** 81/90 B

[51] **Int. Cl.** **B67b 7/44,** B25b 29/00

[58] **Field of Search** 81/3.1, 90, 3, 3.34, 125, 177

[56] **References Cited**

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[57] **ABSTRACT**

This invention relates to a safety device for the removal of caps from radiators and the like, and provided mechanism for the remote manipulation of a cap for its removal and which incorporates a deflection shield that turns any dangerous flow of fluid in harmless directions, whereby a person can safely open a radiator even when under abnormal pressures that would present dangerous conditions.

4 Claims, 4 Drawing Figures

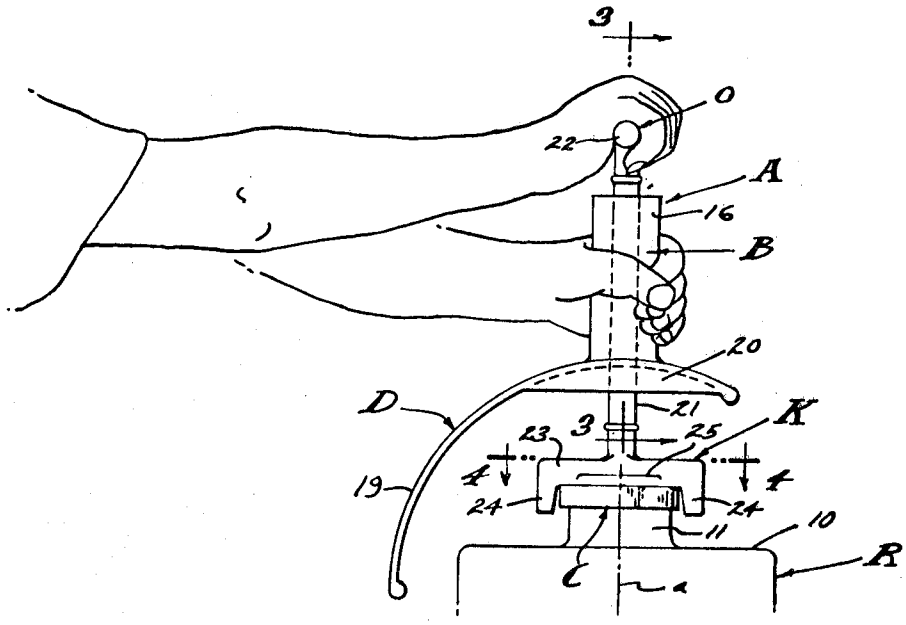


FIG. 1.

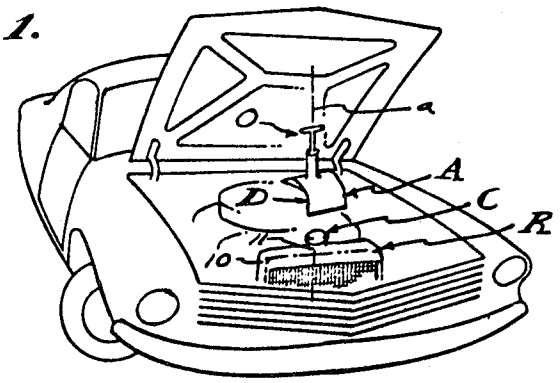


FIG. 2.

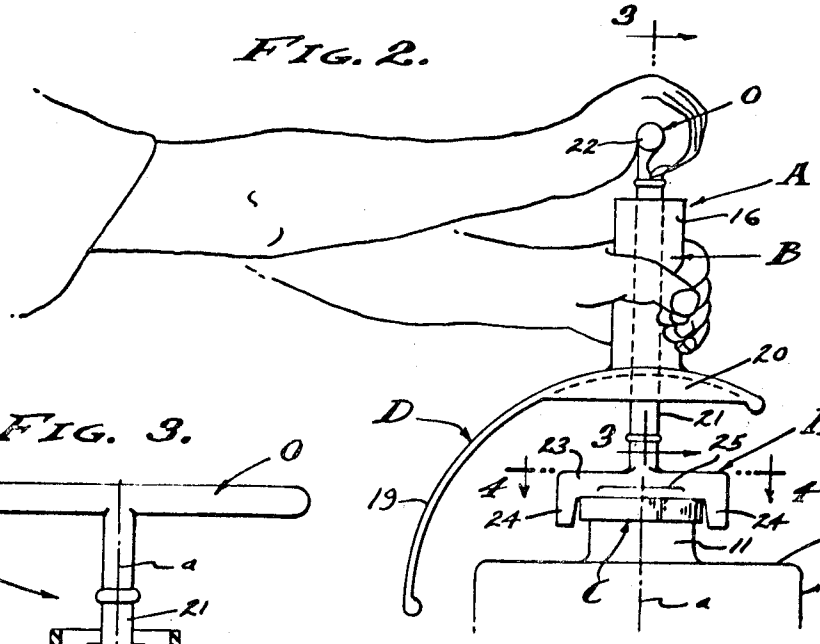


FIG. 3.

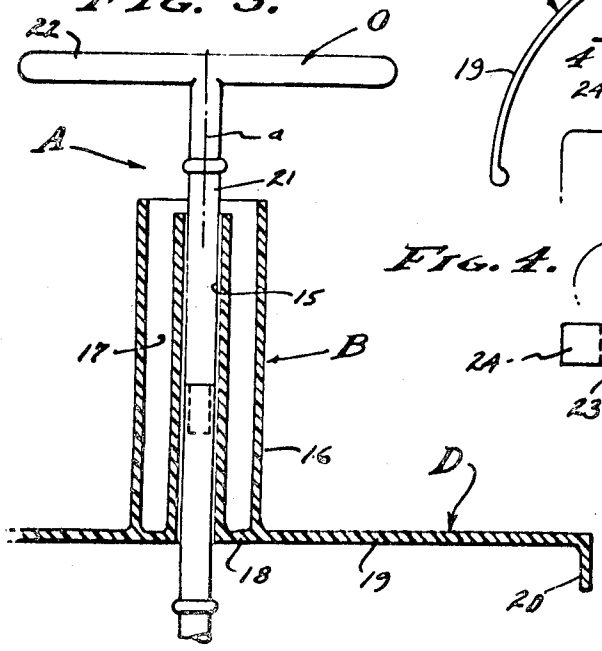
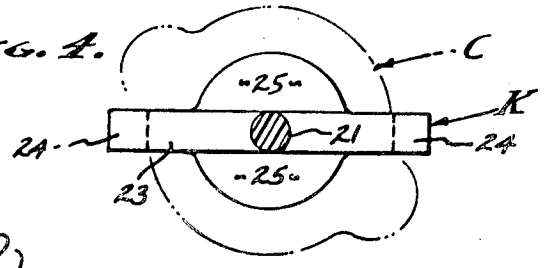


FIG. 4.



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FLUID-DEFLECTING CAP REMOVER

This is a refiling of abandoned application Ser. No. 683,852 filed Nov. 17. 1967.

A best example of a condition or situation where this fluid-deflecting cap remover has extensive application is that of the automobile with an overheated engine. Therefore, we will describe our invention as it is applied to such a situation, where the automobile is probably overheated, but wherein the extent thereof is unknown to the person who is required to service the same by making an inspection as to the level of liquid in the radiator. Said inspection requires the removal of the radiator cap which at best is under some pressure in the modern automobile, and which may be unknowingly under excessive pressure. It is well known that hot water and steam are extremely dangerous as they emanate from an overheated radiator, and the cap mechanism which normally captures itself in a loose position is in many cases faulty. Consequently, it is not uncommon for service personnel to be scalded by hot water and/or steam uncontrollably emitted from overheated radiators of automobiles. Therefore, the fluid-deflecting cap remover of the present invention is highly utilitarian in its provision for remote manipulation of a radiator cap in effecting its removal from an overheated radiator and in its provision for the harmless effect of redirected fluids of dangerous character.

It is an object of this invention to provide a safety device that enables a person to manipulate a cap for its removal and from a remote position, isolated by distance and eliminating thermal conductivity from extreme temperature parts to which the cap is normally attached. With the present invention the device enables coupled engagement substantially the same as in direct manual engagement, said coupled engagement being remote and through a heat-insulating element.

It is another object of this invention to provide a device that enables a person to remove a cap from its normal position on a related structure, such as on a radiator which has reached abnormal temperature and corresponding abnormal pressure and without danger or risk to the person. With the present invention the device enables manipulated removal of a cap, during which any pressured fluid, for example in the form of water or steam, is redirected and/or deflected laterally and downwardly and away from the person.

It is still another object of this invention to provide a fluid-deflecting cap remover that is versatile in its applicability to various radiator installations. That is, the instant device has flexibility in its application to various radiators and other closely surrounding equipment.

The various objects and features of this invention will be fully understood from the following detailed description of the typical preferred form and application thereof, throughout which description reference is made to the accompanying drawings, in which:

FIG. 1 is a perspective view of an automotive engine compartment having a radiator and cap, showing the application of the device of the present invention.

FIG. 2 is an enlarged detailed elevation of the device as it is applied to the radiator cap of the vehicle as indicated in FIG. 1.

FIG. 3 is a sectional view taken as indicated by line 3—3 on FIG. 2.

And, FIG. 4 is a sectional view taken as indicated by line 4—4 on FIG. 2.

As shown in FIG. 1 of the drawings, the fluid-deflecting cap remover A is positioned over the radiator R of the vehicle V and coaxially related to the cap C. This illustration shows the radiator cap C in full view, the fluid deflecting cap remover A being removed sufficiently axially for this purpose, and the manipulating hands of the servicing person removed in order to fully to fully expose the device hereinabove disclosed. In FIG. 2 the mated engagement of the fluid deflecting cap remover A is shown with the servicing person's hands manipulating the same, to hold the device and for rotation of the device to remove the cap C from the radiator R, partially or completely.

The fluid-deflecting cap remover A is primarily a safety device, having the welfare of the service personnel as its primary objective, and involves, generally, a body B, an operator O, a coupler K and a deflector D. The body B carries the elements O, K and D in the useful combination, wherein the operator O is manipulated to engage and revolve a cap C, and wherein the deflector D is simultaneously disposed in proper relation to the cap C and radiator R so as to redirect any explosion of fluids emanating from the said radiator.

The radiator R is shown in its usual form and location within the engine compartment of a vehicle V. The radiator is transversely and vertically disposed as related to the vehicle and has a top shell **10** from which a cap fitting **11** projects. It is to be understood that fitting **11** can project from a separate tank or any such vessel which might be under pressure, positive or negative. In any case, the fitting can vary in detail of construction depending upon the particular cap engagement desired. In the case illustrated, the fitting **11** has a rim with a depending flange having suitably shaped cam faces that engage with inturned ears on the cap C, in order to pull the cap C tightly onto the rim of the fitting **11**, and alternately to release said tightness partially and/or completely as may be required. Suitable stops and stepped arrangements are provided, and all to the end that rotation by manipulation effecting the cap C results in installation and/or removal of the cap, as desired. Such a cap is indicated but not shown in detail, inasmuch as the cap C per se and fitting **11** do not form part of this invention.

The body B and operator O are the two parts that are engageable by the servicing person, and the coupler K is the one part that is engageable with the radiator cap C. In carrying out this invention the two parts B and O are fabricated of non-heat-conductive material, preferably a molded plastic with selected structural properties. Accordingly, the body B and deflection D are fabricated of a flexible material, while the operator O and coupler K are fabricated of a stiff material. Such materials are, for example, flexible polyurethane for elements B and D, and glass-filled nylon or polyamide for elements O and K, each having properties which include high suitable strength factors, toughness and high resistance to environmental elements and conditions to be expected. The part K can also be of the same stiff plastic material as the operator O, or it may be of a metal if so desired. The device is shown as made entirely of plastic parts, whereby there is virtually no heat absorption into the device upon contact with other heated elements, and consequently there will be no retained heat that would harm a person's hand, or any other part touching the device.

The body B provides the carriage or frame of the device and which thereby cooperatively relates the elements D, K and O. Since the operator O is the principal manipulatable element, is is the body B which movably carries the operator so that it is manually engageable and engageable with the radiator cap C. Accordingly, the deflector D is carried in a predetermined position as related to engagement of the device with the radiator cap, and the deflector D is fixed to the body B, preferably molded integrally therewith. Therefore, the fluid-deflecting cap remover A is related to an operational axis *a* which is coincidental with the inlet and/or discharge axis of the radiator R and consequent rotational axis of the cap C. Axis *a* is normally a vertically disposed axis, as shown, and the manipulation of the cap C involves revolvement of the cap about said axis, followed by application or removal thereof along said axis. In accordance with the invention, the body B is elongated axially and is comprised of a bearing **15** surrounded by an insulating sleeve **16**. An annulus **17** separates the bearing **15** and sleeve **16**, the two parts being joined at one end by a base **18**.

The deflector D is a baffle of curvilinear form, so as to have directive capabilities upon moving fluids, both liquids and gases. In practice, the discharge of fluids under pressure from the radiator R will necessarily emanate from the tubular fitting **11** and along the axis *a*, dispersing somewhat as it moves upwardly and away from the radiator and opened fitting. It is to

be understood that the presence of a partially removed cap C will increase the dispersion of fluids, in omni lateral directions as related to axis *a*. In accordance with this invention, the deflector D overlies the area of the fitting **11** and radiator cap C, and depends at least at one side of the device so as to shade the servicing person from the lateral dispersion of hot fluids. Specifically, it is the front side of the device at which the deflector D depends, so as to shield off any forward projection of fluids. In its preferred form the deflector D is a semicylindrical imperforate all **19** integral with the base **18** of body B, where it is tangentially normal to axis *a*, and which extends forwardly and downwardly in an arcuate curve to its lower extremity where it is stiffened by an inwardly turned bulbous lip. In order to reinforce the wall **19**, so as to ensure the upper portion retaining its semicylindrical curvilinear form, diametrically disposed ribs **20** depend at the opposite ends, as shown, and which have directive capabilities to turn moving fluids downwardly.

The operator O is the manually actuable element to be engaged by the servicing person and thereby manipulated into depressing engagement with the radiator cap C. In accordance with the invention, the operator O involves a shaft **21** journaled in the bearing **15** and free to rotate and reciprocate therein. Shaft **21** is substantially longer than the body **15** so as to permit a wide range of adjustability for proximately locating the shield of deflector D effectively close to the cap C. That is, said reciprocation feature provides for the accommodation of the device to a wide range of radiator installation variations. At the upper and exposed end of the shaft **21** there is a handle **22**, for example of T-shape and which adapts the shaft **21** to revolvement by manipulation through a person's hand, all to the end of revolving and holding the radiator cap C down and in position over the fitting **11**.

The coupler K is fixedly adapted to the shaft **21**, at its lower extremity, and is primarily a key attached to universally engage with radiator caps C varying in size. As shown, the shaft **21** is sectional, being pressed together of two telescopically related sections which can be keyed and snapped together (not shown) according to common practice. As a matter of practicality, caps C of the type under consideration are of standardized configuration; and it is a simple matter to fashion a spanner **23** with spaced depending lugs **24** that will engage with diametrically opposite projections or enlargements on the caps C of various sizes within a predetermined range. In practice, the spanner **23** is diametrically disposed and is provided with normally related stabilizing ears **25** that engage flatly with the top of caps C. Further, the lugs **24** are somewhat divergent and thereby accommodate variations in diameter of the caps to be encountered.

From the foregoing it will be apparent that we have provided a practical and highly utilitarian safety device, the operation of which will be obvious to those skilled in the art, and which is readily used in a proper manner so as to effectively prevent injury or harm which might otherwise be caused by the uncontrollable discharge of hot fluids from overheated radiators and the like. As shown, the body B is gripped in one hand and manipulated into a most advantageous position, taking advantage of the flexibility in deflector D to adapt to any interfering surrounding structure. And, when there is a properly accommodated position the operator O is manipulated as hereinabove described and shown.

Having described only a typical preferred form and application of our invention, we do not wish to be limited or restricted to the specific details herein set forth, but wish to reserve to ourselves any modifications or variations that may appear to those skilled in the art.

Having described my invention, I claim:

1. A fluid-deflecting cap remover having an operating axis to be disposed coincidental with the axis of the caps of radiators and the like, and comprising, a manually positionable handle-shaped body, a fluid deflector of curvilinear semicylindrical configuration fixedly carried by and at the lower end of the body and having a top section tangentially normal to and overlying the operational axis of the body and extending laterally to one side of the body and having one side section depending below the body from the lateral extremity of the top section to shield lateral projection of fluids dispersed along and laterally from the axis of the cap, an operator extended through the body and rotatably movable in a bearing therein and with a manually engageable handle fixed thereon above the deflector, and a cap coupler fixed to the operator beneath the deflector and manipulatable with the operator to remove the cap by movement of the same rotatably about and along said operating axis and into aligned turning engagement with the cap.

2. The fluid-deflecting cap remover as set forth in claim 1 and wherein the deflector is comprised of flexible material adapted to accommodate the device to otherwise obstructed positions.

3. The fluid-deflecting cap remover as set forth in claim 1 and wherein the body comprises a tubular sleeve surroundingly spaced from and thereby insulated from the bearing which carries the operator.

4. The fluid-deflecting cap remover as set forth in claim 1 and wherein the operator comprises a shaft with axially spaced stops for free limited reciprocation within said bearing, whereby the deflector carried by the body and the coupler carried by the operator are independently manipulatable.

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