United States Patent

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[54] **VALVE CAP**
6 Claims, 5 Drawing Figs.

[52] **U.S. Cl.** **137/382**
[51] **Int. Cl.** **F16k 27/08**
[50] **Field of Search** 137/560, 380, 381, 382; 251/351; 138/89, 89.4, 90, 94, 96; 4/295

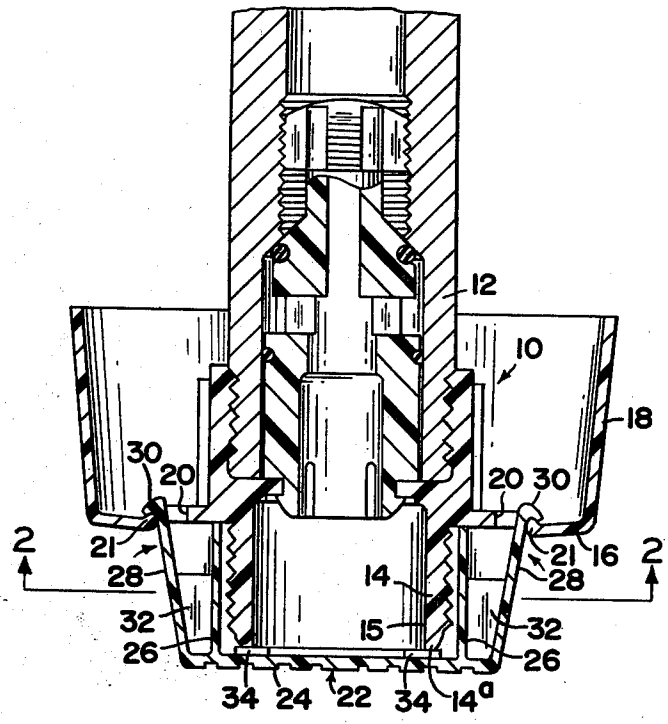
[56] **References Cited**

UNITED STATES PATENTS

969,776	9/1910	Foley	138/89X
2,768,766	10/1956	Woebbeking	137/381

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Assistant Examiner—R. B. Rothman
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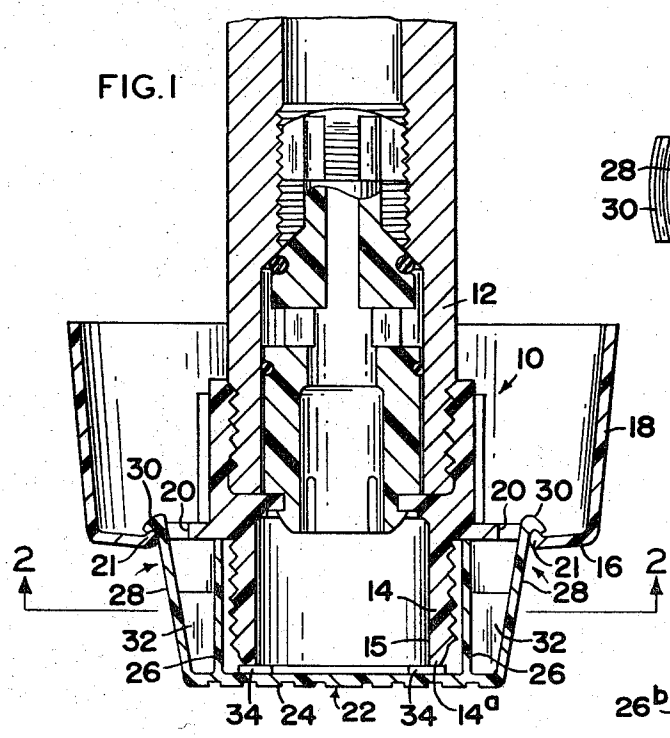
ABSTRACT: A valve cap for releasably covering the outlet of a drain valve draincock having a cup-shaped body covering the draincock aperture and integral fingers adapted to secure the cap releasably to the drain valve.



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FIG. 1



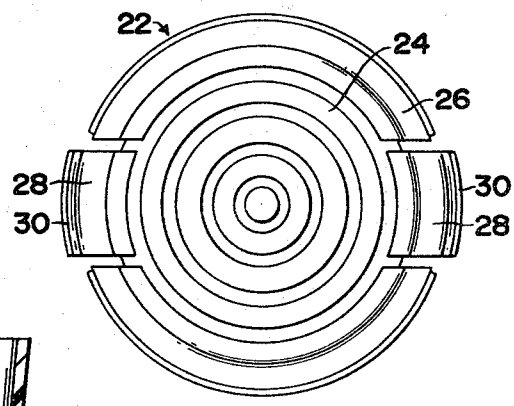
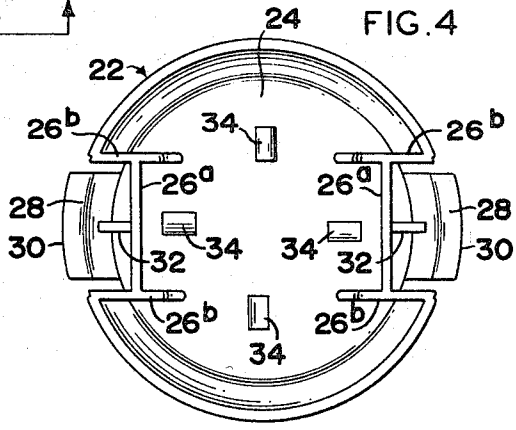


FIG. 3

FIG. 4



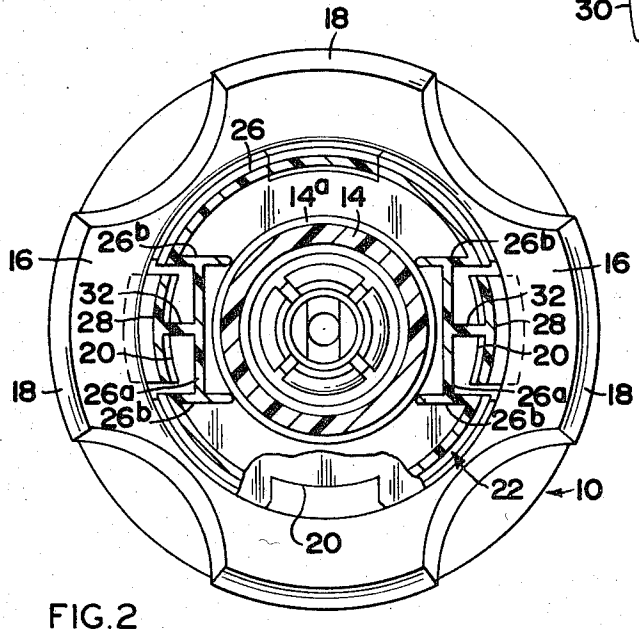
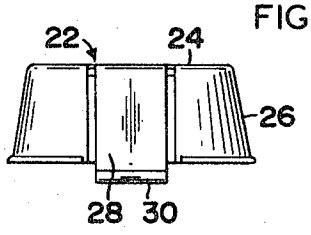


FIG. 2

FIG. 5



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VALVE CAP

BACKGROUND OF THE INVENTION

This invention is concerned with a drain valve cap for use on a draincock of a liquid containing reservoir, in particular, a hot water heater. Many drain valves in common use on hot water heaters and the like are generally similar in construction to the drain valve described in U.S. Pat. No. 3,181,555. The drain valve of this type is adapted to be threadedly received on a tubular drain member extending outwardly from the heater and generally located near the base thereof. The portion of the drain valve with which this invention is particularly concerned includes a depending exterior hollow annular member (draincock) with webbing extending radially and outwardly therefrom. This webbing can be of any desired shape and will usually form an integral handle portion by which the valve can be actuated to and from the opened-closed positions.

Accidental or inadvertent opening of a hot water heater drain valve may cause hot water in the heater tank to spew out of the draincock with potential scalding or other injury to the person actuating the valve. To prevent or lessen the chances of such injuries, various valve caps have been proposed. Such caps generally have been releasably secured to the draincock in order to cover the aperture of same and thereby prevent or divert draining hot water from contacting the person actuating the valve. A majority of these prior art caps, however, are threadedly received on the annular member or draincock of the valve and therefore require and unscrewing operation for removal. This construction, of course, does not provide for draining and diversion of the contents of the tank with the cap in place; in addition, a plastic cap may, due to extreme temperature fluctuations, bind to the draincock and cause countless problems and/or damage to either the draincock or cap upon attempted removal.

The above-described problems are considerably lessened and often solved by a valve cap as defined by the present invention. This invention provides a safety cap which (1) when secured in place will allow drainage of the heater tank contents through the drain valve and yet prevent injury to the actuator thereof; (2) if desired, can easily be removed prior to opening of the drain valve; and (3) utilizes a construction which allows the experienced actuator to easily remove the cap but presents considerable difficulty to the adventurous child or infant.

SUMMARY OF THE INVENTION

The valve cap of this invention comprises a cup-shaped body having an end wall from which a sidewall transversely extends. At least two spaced-apart fingers originate at and are integral with the end wall. These fingers extend transversely from the end wall in a plane either parallel or coaxial with the sidewall and terminate opposite the end wall at latch means consisting of upturned flanges. Each finger is permitted movement in a plane at generally right angles to the plane of the sidewall by means of pivots integral with the inner surface of each finger and the outer surface of the sidewall. Since it is generally preferable to have the outer surface of the fingers flush with or in the same plane as the sidewalls, a generally U-shaped notch may be placed in the perimeter of the sidewall at the location of each finger. Utilizing such a notched construction, the pivots would be integral with the outer surface of the innermost section of the notch and the inner surface of the finger.

The pivots provide for lateral movement of the fingers and latch means transverse to the plane of the sidewalls. This lateral movement is necessary to place the latch means or flanges in register with slots provided in the webbing of the drain valve surrounding the draincock. Since the fingers span a distance greater than the distance between any two slots provided in the webbing of the drain valve, the user must apply pressure to the outer surface of each finger which causes the fingers to move inwardly (toward each other) and thereby be placed in register with the slots in the webbing. Each flange of the fingers is then placed into a respective slot on the webbing with the upturned flanges or latch means firmly grasping the edge of or a bead on the underside of the webbing.

complementing the grip or holding power of the flanges are integral resilient tabs located on the inner surface of the end wall. These tabs extend transversely from the inner surface of the end wall, preferably at approximately a 45° angle. The tabs are positioned so that upon placement of the valve cap over the draincock of the drain valve each tab will rest on the outermost edge of the draincock defining the draincock aperture and prevent the latch means from being properly inserted in the webbing slots. Therefore, in order to properly place the flanges or latch means in the slots, it is necessary that sufficient downward pressure be applied to the cap to flex the resilient tabs on the mentioned edge of the draincock. Thus, after the flanges are seated in the slots, a certain amount of pressure (dependent upon the angle at which the tabs extend from the end wall) is placed upon the flanges or latch means via the fingers whereupon the grasp of the fingers upon the underside of the valve slots is considerably increased. In fact, such a construction has been found to retain the valve cap in position even with large quantities of water passing through the drain valve and pushing against the end wall of the cap.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a longitudinal section of a hot water heater drain valve with a valve cap embodying the principles of this invention in place thereon;

FIG. 2 is a cross-sectional view of FIG. 1 taken along line 2–2;

FIG. 3 is a top plan view of a valve cap embodying the principles of this invention;

FIG. 4 is a bottom plan view of the valve cap;

FIG. 5 is a side plan view of the valve cap.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In FIG. 1 there is shown a drain valve **10** releasably secured to the tubular drain member **12** of a hot water heater (not shown). The portion of the drain valve **10** with which this invention is concerned essentially includes a depending annular draincock **14**, aperture **15** and outermost edges **14***a* defining aperture **15**. Extending radially and outwardly from the base of draincock **14** is webbing **16** which can form an integral handle **18** for opening and closing drain valve **10**.

Valve cap **22** has an end wall **24** adapted to cover aperture **15** of annular draincock **14**. Integral with and extending transversely from end wall **24** is annular sidewall **26** which preferably terminates at the base portion of annular draincock **14**. Also integral with and extending transversely from end wall **24** are fingers **28**. The ends of fingers **28** opposite end wall **24** terminate in flanges **30** which extend upwardly and transversely from the plane of fingers **28** and are adapted to be received within and grasp the underside of webbing **16** defining slots **20**. In addition, one edge of webbing **16** defining the slots **20** may have a bead **21** upon which flanges **28** may be firmly held.

It is preferred to maintain fingers **28** within the plane of sidewall **26** in order to present a smooth, uniform outer valve cap surface which does not inherently suggest to the small child, for example, the means or manipulation necessary to remove the cap. Therefore, it is necessary that fingers **28** extend transversely from the covering plate **24** but lie within the plane of the cap body sidewall **26**. In order to maintain such a spatial relationship, it is preferred to construct the sidewall **26** with circumferential notches at the desired locations of the fingers **28**. These notches can be U-shaped as seen in FIG. **4** thereby forming a sidewall notch portion **26***a* with sides **26***b*, **26***b*. In addition, the notches should be of a greater circumferential length than the fingers to allow the fingers movement at generally right angles to the plane of sidewall **26**. Movement of the fingers is necessary for insertion and removal of the cap as will be discussed in full detail below.

The ends of the fingers **28** opposite the covering plate have integral upturned flanges **30** which serve as latch means. These flanges **30** are adapted to be releasably received in the slots **20** extending through the webbing **16** of drain valve **10** which surrounds the draincock **14**. Thus, the cap is secured to the drain valve by pressure being placed on the outer surface of each finger **28** (in the direction of the arrows in FIG. **1**) which causes the fingers **28** and flanges **30** to be displaced inwardly of the cap body and thereby in register with the aforementioned slots **20**. Upon insertion of flanges **30** in slots **20** the pressure is released and fingers **28** and flanges **30** naturally bias outwardly and firmly grasp the underside edge of webbing **16**, which may, as discussed above, be beaded as at **21**.

It should further be noted that unrestricted movement of fingers **28** would be possible by eliminating the sidewall notch **26***a*, **26***b*, **26***b* noted above entirely. However, it has been found that to provide a built-in safety feature to the valve cap of this invention it is highly desirable to place the sidewall notches **26***a*, **26***b*, **26***b*, around the circumference of the cap **22** at the position desired for each finger. This safety feature is attained by placement of pivots **32** integral with the inner surface of fingers **28** and the outermost surface of sidewall **26** or sidewall notch surface **26***a*. These pivots are placed at generally right angles to both the sidewall **26** and the fingers **28** and might be said to act as "reverse" fulcrums. That is, instead of using the pivots **32** as fulcrum points to facilitate actuation of the fingers **28**, the fulcrum points are located away from flanges **30** and at generally right angles to the fingers **28** to impede accidental release of the safety cap. This construction has a two-fold safety effect: (**1**) the fulcrum points (pivots **32**) are located away from the middle of the fingers **28**, where the average person would squeeze; and (**2**) the fulcrum points (pivots **32**) in their position near the end wall require an amount of force for actuation of fingers **28** and flanges **30** greater than generally possessed by a small child. Thus, chances of accidental or inadvertent release of the valve cap by a youngster or inexperienced adult are greatly reduced. In addition, pivots **32** serve not only as fulcrum points for pivoting fingers **28** but also as spanners which position fingers **28** at the correct angle for proper alignment in slots **20**.

As best seen in FIGS. **1** and **4**, the inner surface of end wall **24** has resilient tabs **34** circumferentially and concentrically spaced thereon. These tabs **34** are integral with, extend transversely from and are positioned on end wall **24** so that upon placement of the valve cap **22** on drain valve **10** they contact edge **14***a* of draincock **14**. Therefore, to place valve cap **22** on the drain valve, it is necessary to exert a certain amount of pressure to resiliently bias tabs **34** against edge **14***a* of draincock **14** to enable flanges **30** to be properly seated in slots **20**. Thus, when valve cap **22** is in position on drain valve **10**, tabs **34** function to maintain a predetermined stress or tension on fingers **18** and flanges **30** to securely retain same. The amount of stress imposed on tabs **34** may be varied by increasing or decreasing the angle at which tabs **34** extend from end wall **24**. It is preferred that tabs **34** extend from end wall **24** at a 45° angle; however, it is understood that a 60° angle, for example, or a 30° angle, for example, would increase, respectively, the amount of pressure required to flex tabs **34** and therefore the amount of stress or tension placed on flanges **30**.

It has been found desirable to construct the entire valve cap **22** as taught by this invention of a resilient plastic material. Such a material allows the fingers **28** and tabs **34** the flexibility they require for proper operation yet maintains on overall rigid cap structure.

It can readily be seen that after valve cap **22** is secured to hot water heater drain valve **10** inadvertent or intentional opening of the valve **10** will not cause the contents thereof to be directed toward the person opening the valve. Water expelled through draincock aperture **15** will contact end wall **24** and sidewall **26** and be deflected by same not toward the person opening the valve but in the direction of the heater itself. Intentional draining of the heater tank with valve cap **22** in place on the drain valve **10** will cause the draining to last somewhat longer than if the valve cap **22** were removed. Thus, depending upon the user's requirements or prerogative, the draining operation may be effected with drain valve **10** open and valve cap **22** in place thereon or with cap **22** removed before the draining operation. A removal operation of cap **22** is, of course, the same as the insertion procedure with the exception that flanges **30** are pulled out of, not into, slots **20**.

For ease of description, the principles of the invention have been set forth in connection with but a single illustrated embodiment showing my valve cap. It is not my intention that the illustrated embodiment nor the terminology employed in describing it be limiting inasmuch as variations in these may be made without departing from the spirit of the invention. Rather, I desire to be restricted only by the scope of the appended claims.

I claim:

1. A valve cap for releasably covering the outlet port of a drain valve comprising:
- a cup-shaped body having an end wall;
- a sidewall means extending transversely from said end wall;
- at least two resilient spaced apart fingers integral with and extending transversely from said end wall;
- latch means integral with said fingers at the ends of said fingers opposite said end wall;
- said fingers having intermediate their length pivotal means whereby said fingers and latch means are capable of movement transverse to and independent from said end wall and said sidewall;
- said latch means thereby being adapted to be releasably secured to said drain valve by said fingers being releasably received by and outwardly based against the drain valve.

2. The valve cap of claim **1** wherein;
- said end wall has an outer and inner surface;
- said inner surface of said end wall having a plurality of spaced apart resilient tabs extending transversely from said inner surface and concentrically situated about said inner surface;
- the positioning of said tabs being such that when said cap is placed on said drain valve the exterior portion of a draincock on said drain valve contacts said tabs when said latch means are secured to said drain valve whereby said tabs are caused to flex and maintain stress on said latch means and thereby aid in keeping said latch means tightly secured to said drain valve.

3. The valve cap of claim **2** in combination with a drain valve;
- said drain valve having an annular outlet port defining an aperture at the exterior end thereof;
- said aperture communicating with valve opening and closing means in said valve;
- webbing extending radially and laterally from said draincock;
- said webbing having a plurality of slots extending therethrough;
- said slots capable of releasably receiving said latch means of said fingers to thereby releasably secure said valve cap to said drain valve.

4. The valve cap of claim **3** wherein;
- said pivotal means are substantially rigid generally rectangular members integral with the outermost portion of said sidewall and the innermost portion of said fingers.

5. The valve cap of claim **4** wherein;
- said pivotal means are positioned at generally right angles to said fingers and said sidewalls and are positioned between said end wall and the longitudinal midsection of said fingers.

6. The valve cap of claim **5** wherein;
- said sidewall has at least two generally U-shaped notches in its outer perimeter at the location of each of said fingers;
- said pivotal means being attached to the innermost portion of the perimeter of said notched sidewall and the innermost portion of said finger thereby maintaining said fingers within the plane of said sidewall.