FILL CAP FOR FILL PIPES OF UNDERGROUND INSTALLATIONS

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My invention relates to improvements in fill caps for fill pipes of underground installations such as those embodying an underground fuel tank for supplying an oil burner.

Many underground fuel oil tanks such as those for domestic oil burners, are provided with a fill pipe coupled to the tank and extending vertically upward to approximately the surface of a concrete sidewalk, lawn or other structure or material laid and leveled off for pedestrians, after the tank and its fill pipe have been covered over. This fill pipe is generally threaded at its top, open end, and internally-threaded fill cap is screwed onto the threaded pipe end for a distance from about one-third to about one-half the longitudinal dimension of the cap. A brass stopper is screwed into the fill cap to close the fill pipe. A suitable gasket between the fill cap and the associated stopper prevents leakage between these two parts. Such an underground installation of a tank is simple enough and presents no particular problem or difficulty, except for one thing. This resides in the fact that the estimated length to which the fill pipe has been cut is frequently either in excess or short of the exact length to place the top surface of the fill cap exactly flush with the concrete sidewalk or other surface. With the prior art construction or design a relatively slight discrepancy in this regard can be corrected for when the trowel or other implement is about to be applied to finish or level off the concrete or other surface at and about the fill cap. If the fill cap is seen to be slightly too high or slightly too low it is rotated clockwise or counter-clockwise, as the case might be. Thus, the fill cap is either screwed down further onto the pipe end or is raised to make the top surface of the fill cap lie flush with the aforesaid surface.

There are troublesome disadvantages in the above. In the first place the top, open end of the fill pipe must be externally threaded for application of the fill cap thereto. Furthermore, the extent or range of the threads is necessarily limited, which fact likewise limits the possible extent or range of adjustment of the fill cap axially with respect to the pipe end, for the purpose explained. For example, a fill pipe might have been cut too long, and so much so that even with the fill cap screwed down as far as the threads permit, the top surface of the cap still is as much as a quarter inch or more above a concrete sidewalk or other surface immediately at and about the fill cap. Such a condition presents a hazard against or over which pedestrians might stumble or trip. Should this construction violate some city or local ordinance, the job does not pass inspection. It then becomes necessary to break away and remove the concrete and any other material about the pipe for a distance and to a depth sufficient to expose enough of the pipe end for cutting and rethreading thereof. The fill cap is then screwed onto the shortened pipe end and to the extent or distance vertically where at its top surface will now be exactly flush with the concrete surface after the sidewalk construction previously removed has been replaced and a new concrete surface has been applied and leveled off about the fill cap.

The frequency of occurrence of the difficulty just explained is more easily understood after considering, for example, just what takes place and what the conditions or circumstances are in the underground installation of a fuel oil tank at a location over which there is subsequently laid a concrete sidewalk or other finished surface for pedestrians. In the first place, the tank and the sidewalk are installed by different crews of workmen, neither of which can be expected to have too much consideration for or interest in the related aspects of the work laid out for and to be done by the other crew. The members of one or both of the crews might even be inexperienced in their own particular kind of work. However, in most cases they are far below the engineering level. The tank crew is primarily interested in getting its own job done. A reasonable approximation of the length to which the fill pipe should be cut is sufficient as far as they are concerned. The sidewalk crew, likewise, is concerned only in completing its job. After this is done and even if it is seen that the top of the fill cap on the fill pipe protrudes a prohibitive distance above the finished surface of the sidewalk, any concern or future trouble about this hazard is invariably left for someone else to worry about.

With the foregoing in mind, it is one of the objects of my invention to provide an improved construction or design for an adjustable fill cap for fill pipes which does not require that the fill pipe be threaded at its top, open end; and which provides for adjustment of the fill cap axially of the fill pipe either up or down and to an extent or over a range sufficient to bring the top surface of the fill cap exactly flush with the finished surface of the sidewalk or other surface if such surface is laid reasonably according to specifications.

Other objects and advantages will hereinafter appear. For the purpose of illustrating my invention and embodiment thereof is shown in the drawings, wherein FIG. 1 is a front elevational view, partly in section, of an adjustable fill cap constructed in accordance with and for the purpose of my invention, the section being taken on line 1—1 in FIG. 3;

FIG. 2 is a plan view of FIG. 1;

FIG. 3 is a section taken on line 3—3 in FIG. 1;

FIG. 3a is an enlarged fragmentary view taken from FIG. 3, the scale being substantially four times that in FIG. 3;

FIGS. 4, 5 and 6 are simplified, elevational views illustrative of a common form of fill cap of the prior art and of conditions where the top surface of such fill cap is, respectively, a small but prohibitive distance too far above a sidewalk or other surface, a small but prohibitive distance too far below a sidewalk or other surface, and a considerable distance too far above a lawn or other surface;

FIGS. 4a, 5a and 6a are comparative views similar and corresponding, respectively, to FIGS. 4, 5 and 6 and illustrative of how the improved fill cap herein can be made to correct for the prohibitive conditions shown in FIGS. 4, 5 and 6; and

FIG. 7 is a view similar to each of FIGS. 4 through 6a and illustrative of the manner in which the improved fill cap herein can be forced either down or up, to adjust the fill cap with respect to the pipe end in the direction axially or longitudinally of the latter.

In FIG. 1 the reference character 10 designates the open, top or terminal end of a fill pipe coupled to an underground tank (not shown) and extending vertically upward to approximately the surface 11 of a concrete sidewalk, lawn or other structure or material laid and leveled off for pedestrians, after the tank and its fill pipe have been covered over. As shown, the outside surface of pipe end 10 is smooth, i.e., it is not threaded as in the prior art construction. It is common practice to use, for the fill pipe, standard iron pipe having an inside diameter of two inches.

Shown applied to the pipe end 10 is my improved fill
cap, designated generally by the reference numeral 12 and comprising a cap portion 14 externally threaded at one end thereof to receive a brass stopper 15 of standard construction and provided at its other end with a cylindrical sleeve 16 coaxial and fixed with respect to cap portion 14. In the specific embodiment of Fig. 1, the sleeve 16 is held in place by a detent 18 formed in cap portion 14. Cap portion 14 is provided with an internal shoulder 14a which prevents sleeve 16 from being forced too far into the cap portion 14, as shown in Fig. 1. The sleeve portion 14 and cap portion 14 are formed as a single unit, there being a press fit between these two parts. Cap portion 14 is provided with an internal shoulder 14a against which sleeve 16 stops, in the assembly of these two parts.

The inside surface 17 of sleeve 16 beyond cap portion 14 is smooth, and the inside diameter of sleeve 16 beyond cap portion 14 is uniform and greater than the outside diameter of pipe end 10 to an extent sufficient for a relatively loose fit of sleeve 16 about pipe end 10. Sleeve 16 may be a piece of steel tubing about five inches long and of any suitable thickness or gauge such as from one-sixty-fourth to one-thirty-second of an inch. For the purpose hereinafter described and as shown in Figs. 1, 3, and 5, three equally spaced pairs of parallel slits 18 are made through the material of sleeve 16, each of the slits being substantially parallel to the longitudinal axis of the sleeve. The material between and only directly at and along the respective slits 18 of each pair of the same is bent slightly inward toward the longitudinal axis of sleeve 16. This provides the three pairs of knife edges 19, adjacent pairs being spaced one hundred twenty degrees from each other. Each knife edge is substantially parallel to the longitudinal axis of sleeve 16 and extends outward beyond the inside surface 17 a distance sufficient to cause the knife edge 19 to bite or cut into the relatively smooth, outside surface of pipe end 10, thus to interlock with the latter.

In explanation of the operational or functional aspects of the stopper 15 to cap, reference will first be made to Figs. 4, 5, and 6 wherein '10' designates the open, top or terminal end of a fill pipe which is externally threaded, as heretofore. Onto this pipe end there is screwed a fill cap 12' internally threaded at its lower end, for this purpose. In the condition shown in Fig. 4, the fill pipe has been cut too long so that even though fill cap 12' is screwed down as far as the threads will permit, the top of this cap still protrudes a prohibitive distance above the sidewalk or other surface 11. In the condition shown in Fig. 5 the fill pipe has been cut too short, so that the top surface of fill cap 12' is too far below surface 11. This would provide a well 22 for the accumulation of water, dirt or other undesirable matter over fill cap 12'. In the condition shown in Fig. 6, the fill pipe has been cut to extend a considerable distance too far above surface 11. In such case, to make the top surface of fill cap 12' flush with surface 11 the concrete or other material about pipe end 10 must be removed for a distance and to a depth sufficient to expose enough of the pipe end for cutting and retrofitting thereof. Fill cap 12' is then screwed onto the shortened pipe end, and the sidewalk or other construction at the fill cap is repaired or patched up, flush with the fill cap.

In Fig. 4 the condition is about the same as that in Fig. 4 except that the pipe end 10 is not threaded, and use is made of my improved fill cap 12. The brass stopper 15 is first removed and replaced by a nipple 20, as shown in Fig. 7. Nipple 20 is screwed fairly tightly into the top end of cap portion 14. A pipe cap 21 is screwed onto the head 20 to provide a butt for the latter. Fill cap 12 is then applied to pipe end 10, as shown. By means of a hammer whose head is partly shown and designated by the reference character h, fill cap 12 is now hammered down, onto and about pipe end 10. During such action, the knife edges 19 bite or cut into the outside surface of pipe end 10 and interlock with the latter to prevent rotary movement of fill cap 12 relatively with respect to the pipe end, about the longitudinal axis of the latter. Such rotary movement might otherwise occur if application of considerable torque is required in tightening or loosening stopper 15. Fill cap 12 is hammered down until the top surface of cap portion 14 is exactly flush with surface 11, after which nipple 20 is removed and stopper 15 is screwed into place, as shown in Fig. 1. A leather or rubber gasket 24 under the latter, prevents leakage of liquid between cap portion 14 and stopper 15, is assurance against any leakage between these two parts.

In Fig. 5 the condition is about the same as that in Fig. 5 except, as before, that pipe end 10 is not threaded. Stopper 15 is removed and replaced by nipple 20, as in Fig. 7. A suitable handle such as an U or fork head, is applied about nipple 20 below pipe cap 21, and upwardly-directed blows are applied to the tool handle or its head to raise fill cap 12 until it is flush with surface 11. As before, nipple 20 is then removed and stopper 15 is screwed into place.

For the condition shown in Fig. 6a, the pipe end 10 is cut to the proper length, but need not be threaded as in Fig. 6. Fill cap 12 is applied as in Figs. 4c and 7 and is hammered down until the top surface of cap portion 14 is flush with surface 11. The concrete or other material previously removed is replaced and is finished or leveled off about fill cap 12, flush with the top surface of cap portion 14.

It is contemplated to make the inside diameter of sleeve 16 such that the space between the inside surface 17 thereof and the outside and relatively smooth surface of pipe end 10 is about one sixty-fourth of an inch, and to bend the material of sleeve 16, at slits 18, inward to an extent sufficient to cause knife edges 19 to protrude beyond surface 17 a distance of about one thirty-second of an inch. The disposition of the three pairs of knife edges 19 in the direction circumferentially about the longitudinal axis of sleeve 16, i.e., with adjacent pairs of the knife edges spaced from each other one hundred twenty degrees, eliminates the necessity to hold sleeve 16 substantially centered with respect to the longitudinal axis of pipe end 10. Thus, the space between the adjacent surfaces of pipe end 10 and sleeve 16 is substantially uniform, throughout.

It might in some cases be required to make the knife edges 19 more effective in the way of preventing axial or longitudinal movement of the fill cap 12 relatively with respect to pipe end 10, and to do this without resorting to the alternative of causing the knife edges to bite or cut into the outside surface of pipe end 10 to a greater degree or extent. Such a requirement can be met by slitting the material of the cap, not slits 18, instead of being parallel to the longitudinal axis of the latter, are inclined to such axis at an angle of about twenty degrees as indicated by dash lines in Fig. 1, or at any other angle, as might be required. It is important to appreciate the novel construction and the dual function of the interlocking connection between pipe end 10 and fill cap 12, as provided by the knife edges 19 or any other means equivalent to the latter. One function of such means is to prevent relative rotary movement of fill cap 12 with respect to pipe end 10 when sufficient torque is applied to stopper 15 to loosen and remove the latter or to screw in the same, tight. The construction is such as to permit elongation of fill cap 12 onto and about pipe end 10 and subsequent axial adjustment of fill cap 12 in either direction, while at the same time forming or making the interlocking connection sufficient to prevent relative rotary movement of fill cap 12 with respect to pipe end 10, the construction and action being such that the interlocking connection remains. The second function of the knife edges 19 or other equivalent means is to fix or to lock fill cap 12 against axial movement downward on pipe end 10 such as might occur should a wheel of a heavy vehicle roll over or come to rest on cap portion 14 and stopper 15. The extent or degree of this second function may be increased by having the knife edges 19 somewhat inclined to the longitudinal axis of fill cap 12, as shown in dash lines in Fig. 1. The knife edges 19 may be heat-treated...
or otherwise hardened, to be the equivalent of tool steel. The curvature or arc of the bent material between the slits 18 of each part, gives to the same, ground to the knife edges a certain degree of spring or resiliency.

As stated above, stopper 15 is of a conventional construction and has the four inwardly directed and equally spaced lugs 23 which fit with a special wrench for turning the stopper.

For the purpose of sealing the space between surface 17 and the outside surface of pipe end 16, a standard oil-sealing compound is applied over these two surfaces before fill cap 12 is placed on the pipe end. Thus, with fill cap 12 in place as shown in FIG. 1, the compound serves the purpose of sealing the space between the aforesaid surfaces, and accordingly prevents seepage of water, oil or other liquid in either direction through the space between surface 17 and the adjacent surface of the pipe end. Satisfactory results can be obtained by using compounds such as those now identified on the market by the trade marks Permatex and Petroseal.

The term “fill cap” as used herein refers exclusively to a terminal fitting open from one end thereof to the other end of the same and applicable to the top, fuel-intake or open terminal end of a vertically-disposed fill pipe such as one of the latter by way of which an underground supply tank can be filled. Oil burned in an oven would be filled with fuel oil or poured into the fuel-intake end of the fill pipe from a nozzle or equivalent device inserted downwardly into and through the fill cap, the fill cap being internally-threaded at its upper end for reception of a closure part generally in the form of an externally-threaded brass plug or stopper.

It will be understood that various modifications within the conception of those skilled in the art are possible without departing from the spirit of my invention or the scope of the claims.

I claim as my invention:

1. An adjustable fill cap of the character described for the open, terminal end of a fill pipe; said fill cap comprising a cap portion open from one end thereof to the other end of the same and shaped and adapted at one of its said ends to fit and to accommodate a removable closure element for said pipe end, said cap portion at its other and opposite end being provided with a cylindrical sleeve substantially coaxial and fixed with respect to said cap portion, the diameter of said sleeve beyond said cap portion being substantially uniform and different than the diameter of said pipe end to an extent sufficient for said sleeve to telescope with said pipe end, the material of said sleeve from the outside surface thereof to the inside surface of the same being broken through along at least one line extending substantially longitudinally of the longitudinal axis of said sleeve, said sleeve material on one side of and immediately adjacent to said line having only its substantially longitudinal edge displaced radially of the sleeve material disposed on the other side of and immediately adjacent to said line thus forming at least one substantially knifelike edge interlocked with said pipe end at the adjacent surface of the latter.

2. An adjustable fill cap of the character described for the open, terminal end of a fill pipe; said fill cap comprising a cap portion shaped and adapted at one end thereof to fit and to accommodate a removable closure element for said pipe end, said cap portion at its other and opposite end being provided with a substantially cylindrical sleeve substantially coaxial and fixed with respect to said cap portion, the diameter of said sleeve beyond said cap portion being substantially uniform and different than the diameter of said pipe end to an extent sufficient for said sleeve to telescope with said pipe end, the material of said sleeve from the outside surface thereof to the inside surface of the same being broken through along two spaced lines each extending substantially longitudinally of the longitudinal axis of said sleeve, the sleeve material between said lines having only its substantially longitudinal edges displaced radially of the respective sleeve portions disposed circumferentially outwardly of said lines thus to form a pair of knifelike edges protruding from one of said surfaces of said sleeve for interlocking engagement with the adjacent surface of said pipe end upon said sleeve being forced into telescopic relation with respect to said pipe end.

3. An adjustable fill cap of the character described for the open, terminal end of a fill pipe; said fill cap comprising a cap portion shaped and adapted at one end thereof to fit and to accommodate a removable closure element for said pipe end, said cap portion at its other and opposite end being provided with a substantially cylindrical sleeve substantially coaxial and fixed with respect to said cap portion, the diameter of said sleeve beyond said cap portion being substantially uniform and different than the diameter of said pipe end to an extent sufficient for said sleeve to telescope with said pipe end, the material of said sleeve from the outside surface thereof to the inside surface of the same being broken through along pairs of spaced lines each extending substantially longitudinally of the longitudinal axis of said sleeve, the sleeve material between each of said pairs of lines having only its substantially longitudinal edges displaced radially of the respective sleeve portions disposed circumferentially outwardly of said lines thus forming at least one pair of knifelike edges spaced circumferentially about one of said surfaces of said sleeve and protruding from such sleeve surface for interlocking engagement with the adjacent surface of said pipe end upon said sleeve being forced into telescopic relation with respect to said pipe end.

4. In combination, a fill pipe having an open terminal end, and a fill cap applied to said pipe end, said fill cap comprising a cap portion open from one end thereof to the other end of the same, a removable stopper element structurally independent of and removably associated with said cap portion at one of said ends of the latter and closing such end thus also closing said pipe end, said cap portion at the other end of said same being provided with a sleeve telescoped with said pipe end and having a relatively loose fit with respect to the latter, the material of said sleeve from the outside surface thereof to the inside surface of the same being broken through along at least one line extending substantially longitudinally of the longitudinal axis of said sleeve, said sleeve material on one side of and immediately adjacent to said line having only its substantially longitudinal edge displaced radially of the sleeve material disposed on the other side of and immediately adjacent to said line thus forming at least one substantially knifelike edge interlocked with said pipe end at the adjacent surface of the latter.

5. An adjustable fill cap of the character described for the open, terminal end of a fill pipe; said fill cap comprising a cap portion shaped and adapted at one end thereof to fit and to accommodate a removable closure element for said pipe end, said cap portion at its other and opposite end being provided with a cylindrical sleeve coaxial and fixed with respect to said cap portion, the inside diameter of said sleeve beyond said cap portion being substantially uniform and of greater diameter than the diameter of said pipe end to an extent sufficient for said sleeve to telescope over said pipe end, the material of said sleeve being broken through between and along two spaced lines parallel to the longitudinal axis of the sleeve, said sleeve material between said lines having its longitudinal edges displaced radially inwardly of that sleeve portion disposed circumferentially outwardly of said lines to form pairs of knifelike edges spaced circumferentially about the inner surface protruding from the sleeve inner surface for interlocking engagement with the adjacent surface of said pipe end upon said sleeve being forced into telescopic relation with respect to said pipe end.
6. An adjustable fill cap of the character described for the open, terminal end of a fill pipe; said fill cap comprising a cap portion shaped and adapted at one end thereof to fit and to accommodate a removable closure element for said pipe end, said cap portion at its other and opposite end being provided with a substantially cylindrical sleeve substantially coaxial and fixed with respect to said cap portion, the diameter of said sleeve beyond said cap portion being substantially uniform and different than the diameter of said pipe end to an extent sufficient for said sleeve to telescope with said pipe end, the material of said sleeve from the outside surface thereof to the inside surface of the same being broken through along pairs of spaced lines each extending substantially longitudinally of the longitudinal axis of said sleeve, the sleeve material between each of said pairs of lines having only its substantially longitudinal edges displaced radially of the respective sleeve portions disposed circumferentially outwardly of said lines and so displaced radially toward the adjacent surface of said fill pipe thus to form pairs of knife-like edges spaced circumferentially about one of said surfaces of said sleeve and protruding from such sleeve surface for interlocking engagement with the adjacent surface of said pipe end upon said sleeve being forced into telescopic relation with respect to said pipe end.

7. In combination, a fill pipe having an open terminal end, and a fill cap applied to said pipe end, said fill cap comprising a cap portion open from one end thereof to the other end of the same, a removable stopper element structurally independent of and removably associated with said cap portion at one of said ends of the latter and closing such end thus also closing said pipe end, said cap portion at its other and opposite end being provided with a substantially cylindrical sleeve substantially coaxial and fixed with respect to said cap portion, the diameter of said sleeve beyond said cap portion being substantially uniform and different than the diameter of said pipe end to an extent sufficient for said sleeve to telescope with said pipe end, the material of said sleeve from the outside surface thereof to the inside surface of the same being broken through along pairs of spaced lines each extending substantially longitudinally of the longitudinal axis of said sleeve, the sleeve material between each of said pairs of lines having only its substantially longitudinal edges displaced radially of the respective sleeve portions disposed circumferentially outwardly of said lines and so displaced radially toward the adjacent surface of said fill pipe thus to form pairs of knife-like edges spaced circumferentially about one of said surfaces of said sleeve and protruding from such sleeve surface and interlocked with the adjacent surface of said pipe end and disposed in telescopic relation with respect to said pipe end.

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