This invention relates to the construction of signaling devices for use with tanks containing liquids. The signaling devices in general are of the type disclosed in the reissue patent to Mathey, No. 22,391.

While reference will be made to fuel oil tanks, it will be understood that the invention is equally useful with any type of tank in which the signaling unit of the present construction is connected in series with a vent pipe.

It has been customary for some years past to install in household fuel oil tanks an audible signaling device which will enable oil to be delivered from the outside of the house without the necessity of the operator going to the cellar to read the gauge on the tank. This is accomplished by the use of an automatic signaling device basically of the type disclosed herein which advises the operator when the liquid level has risen to a predetermined point within the tank.

The general practice in installing audible signaling devices of this class has been to disconnect the vent pipe from the tank, saw off a short section of the vent pipe immediately above the tank, and insert between the tank and the new lower end of the vent pipe the casing of a signaling unit with the intrusion tube depending into the tank a suitable distance. In the preferred arrangement, the lower end of the casing is screwed into the tank and the lower end of the vent pipe is screwed into the upper end of the casing. In some instances, however, it is impracticable to effect a screw-threaded connection between the pipe and casing. In these situations a modified form of casing has been used having on its upper end a so-called compression fitting. The purpose of this type of connection is to enable the casing to be connected in a fluid-tight relationship with the lower end of the vent pipe without the aid of screw threads.

The compression fitting that is now customarily used in the trade has means provided for maintaining the longitudinal relationship of the whistle casing and the vent pipe.

Occasionally, however, due either to carelessness or an attempt to rush completion of an installation, the positive means that provides against longitudinal movement of the parts may be omitted, in which case, while the connection may remain substantially leakproof, downward movement of the lower end of the pipe into the casing may occur. When this happens, the end of the vent pipe when used with the present type whistle casing may reach a point where it comes into such close proximity to the whistle that it substantially decreases the area of the effective venting passage, a particularly undesirable condition when the tank is overflowed. Should the stop means be distorted by the vent pipe pressure, the whistle assembly may be prevented from freely rising from the seat, thus substantially decreasing the effective venting area.

The present invention, therefore, contemplates a whistle housing construction having one or more inwardly extending stops designed to permit the installation within the housing of an audible signaling device incorporating relief means so that when the housing is connected to the vent pipe any possibility of the lower end of the vent pipe reaching a position where it could interfere with the proper operation of the signaling unit, or unduly restrict the venting areas will be eliminated.

The nature of the invention will more particularly appear as the description proceeds with the aid of the accompanying drawings, in which Fig. 1 is a fragmentary vertical cross-sectional view of a tank, showing the fill pipe, signaling unit and vent pipe in elevation.

Fig. 2 is a vertical cross-sectional elevation of my novel casing properly connected to a vent pipe by a compression fitting.

Fig. 3 is a cross-sectional elevation of a modified form of casing, showing the relationship of the casing to a vent pipe when the latter, due to improper installation, has shifted to the lowermost possible position.

Fig. 4 is a cross-sectional plan view on the line 4-4 of Fig. 2.

Referring to the drawings, in Fig. 1 is shown a typical oil tank 2 having a fill pipe 4 and a vent pipe 6. Introduced between the vent pipe 6 and the tank is an audible signaling device 8.

The improved audible signaling device of the present invention is shown in Figs. 2 and 3, and consists of a housing 10 having a circular seat 12 on which rests a whistle assembly comprising a hemispherical ball valve 14 containing a button type whistle 16 having aligned upper and lower orifices 18 and 20, respectively. Depending from valve 16 and in series with the whistle is an intrusion tube 22, the lower end of which, as at 24 in Fig. 1, is set at a level at which it is desired the indication of the rising liquid be given.

It will be noticed in Figs. 2 and 3 that ball valve 14 has an interior cavity in the upper part of which the whistle 16 is positioned. The intrusion tube 22 extends through a suitable hole in the bottom of the ball valve and is prevented
from escaping downwardly by a flared end 52. Three obvious procedures could be followed in the association of the ball valve, whistle and the intrusion tube. Firstly, the end of the tube could be flared as shown and the tube then passed downwardly through the hole in the ball valve until the flared end engaged the valve interior. Thereafter the whistle could be set in place in the ball valve. Secondly, the upper end of the tube prior to being flared could be passed upwardly through the hole in the ball valve after which the end could then be flared and the whistle set in place. Thirdly, the ball valve and whistle may first be assembled after which the upper unflared end of the tube is placed within the ball valve. Then by means of a special tool the upper end of the tube is flared while within the ball valve. While the operation of signals of this type is well known, since they have been in use for many years, it nevertheless will be described briefly. As the liquid enters through fill pipe 4, the displaced gas is vented to the atmosphere through vent pipe 6, passing en route through tube 24 and whistle 16. The tank pressures developed during normal filling are adequate to cause whistle 16 to produce a plainly audible sound which travels out through the vent pipe 6. When the tank is full, the lower end of tube 24 will be trapped, so that no further gas can flow to the whistle through the lower part of tube 22. Further venting, however, can take place through the whistle, the gas passing through hole 25 in the side of tube 22. Gas reaching the whistle through this hole is so disturbed in its flow that no sound will be given. Thus, upon trapping of the lower end 24 of tube 22, the whistle ceases sounding, although gas may continue thereafter to flow through the whistle via port 25. Cessation of the whistle indicates to the operator that the tank is substantially full, and that the supply can be shut off.

During filling, if the rate of fill is so great as to build up the pressure in the tank unduly, then valve 14 will be forced upwardly from seat 12 to a greater or less degree, depending upon the pressure, so that some of the displaced gas may be bypassed to the vent pipe 6 around valve 14. When this occurs, however, it does not affect the sounding of the whistle, which continues until the lower end of tube 22 is trapped.

If, after tube 22 is trapped, the operator fails to shut off the liquid supply so that there is continued development of pressure within the top of the tank, then valve 14 will again be forced upwardly from its seat, so that the gas may continue to be vented to the atmosphere.

If therefore becomes apparent that ball valve 14 may always be free to move from seat 12, for otherwise there might develop a dangerous condition and normal operation of the unit would be prevented. For example in the case of liquid overflow due to failure of the operator to cut off the liquid supply the out flowing liquid will cause the whistle assembly to rise until it engages the bottom stop. If at this time the lower end of the vent pipe should be in contact with the upper stop the effective venting area would be substantially equivalent to the perimeter of the vent pipe multiplied by the distance between the upper and lower stops. This area will be at least as great as the effective area of the vent pipe and, therefore, the development of excessive pressure will be avoided. On the other hand, if the downward movement of the vent pipe were sufficient to distort the stop to a degree permitting the whistle assembly to be engaged and held fixed on its seat then in the case of liquid overflow the vent pipe will then be engaged in the intrusion tube and whistle. This would be a venting area insufficient for venting overflowing liquid and as a result excessive tank pressures would be set up.

Therefore, the importance of stops of adequate strength and proper spacing to prevent any interference with normal operation of the whistle assembly can be appreciated. Where a so-called compression fitting is used to secure the lower end of vent pipe 6 to casing 16, the preferred construction of the invention contemplates that the upper end 22 of casing 18 shall be externally threaded as at 28. These threads are adapted to receive the internal threads 30 of cap 32 having an interiorly turned flange 34.

The end of vent pipe 6 has a circumferentially extending slot 36 into which is sprung a split washer 38, ordinarily of metal, the lower side of which rests on the upper end of casing 26. Obviously, this arrangement prevents further movement of pipe 6 into the casing. To hold washer 38 in place against the end of the casing there is provided a plurality of flexible, compressible washers or gaskets 40, 42 and 44, which are compressed downwardly by the split washer by screwing the flanged cap 32 downwardly.

Occasionally, however, installation of the compression fitting is carelessly made, with the split washer 38 omitted. If this is done, it is obvious that vent pipe 6 can slide downwardly within the casing 26 except as it may be limited by some stop means. In the construction up to the present, no means has been provided which satisfactorily insure that the lower end of vent pipe 6 may not at some time rest on or be close to the whistle 16 and its supporting valve 14.

Therefore, in the present invention, there is disclosed a novel casing construction capable of preventing a vent pipe secured thereto by a compression fitting from coming into engagement with or unduly close to the whistle. This construction includes integral lugs or stops 46 shown in Fig. 2, both of which in this figure are shown in the same horizontal plane. The lugs or stops may be varied, however, in their vertical position as shown at 48 and 50 in Fig. 3. The horizontal area of the lugs is so small that the cross-sectional effective venting area is reduced a negligible degree at that point. That is, the minimum effective area through the casing does not reduce the venting capacity below what it would be otherwise.

Furthermore, the lugs are so positioned that valve 14, by its self or with the whistle in position and with intrusion tube 22 removed therefrom, may be inserted into the casing from the top by turning the valve at right angles to its normal seated position. This permits the valve and whistle, either together or one at a time to be lowered downwardly between the lugs and then turned to the position shown in Figs. 2 and 3. When the ball valve is in this position, the intrusion tube 22 with its upper end flared may then be inserted into the opening of the housing from the top of the housing if the whistle is not already in position in the valve. If the whistle is in position the intrusion tube with its upper end unflared may be inserted into the valve opening through the lower end of the housing to have its upper end thereafter flared by a special tool thereby to
maintain the parts in permanent fixed relationship. The structure disclosed herein obviously requires that the intrusion tube be inserted in the ball valve after the latter is in horizontal position below the stops as movement of the whistle assembly past the stops in either direction is prevented so long as the intrusion tube is connected thereto to limit rotation of the ball valve on a horizontal axis.

It is appreciated that it is old to provide a stop for limiting the upward movement of a movable whistle of the type in question. In the present invention, however, the novelty is believed to reside in the combination of a new and novel casing having integral stops therein and a whistle assembly of such design that it may be always maintained within predetermined upper and lower limits with adequate venting areas always assured. The stops are of such strength and so located that downward shifting of the vent pipe from whatever cause cannot lock the signal on its seat or otherwise interfere with proper operation.

While the invention has been shown and described in relation to a preferred form of the invention, it will nevertheless be understood that it is not to be limited thereby, but only by the appended claims.

I claim:

1. A signaling unit for use with a tank comprising a tubular casing having a seat within said casing, a whistle assembly comprising a valve member supported by said seat and a whistle carried by said valve member, an upper stop and a lower stop integral with said casing extending laterally from the wall of said casing above said seat, said upper stop being long enough to engage the lower end of a vent pipe positioned within the upper end of said casing should said pipe be moved downwardly a sufficient distance, and said lower stop being long enough to engage said whistle assembly substantially equal to the venting capacity of said pipe, said valve member and whistle when turned to vertical position being capable of insertion into said casing past the stops to rest on the said seat but which valve member and whistle when turned to horizontal position as in normal operating position within said casing cannot then be moved upwardly past said stops, said valve member having secured thereto an intrusion tube which tube was placed in said valve member and in the lower end of said casing after said valve member had been placed within said casing below said stops, said intrusion tube acting to prevent rotation of said valve member about a horizontal axis beyond a predetermined angle which angle is less than the angle necessary to enable said whistle assembly to be moved upwardly past said stop.

2. A signaling unit for use with a tank comprising a tubular casing having a seat within said casing, a whistle assembly comprising a valve member supported by said seat and a whistle carried by said valve member, an upper stop and a lower stop integral with said casing extending laterally from the wall of said casing above said seat, said upper stop being long enough to engage the lower end of a vent pipe positioned within the upper end of said casing should said pipe be moved downwardly a sufficient distance, and said lower stop being long enough to engage said whistle assembly substantially equal to the venting capacity of said pipe, said valve member and whistle when turned to vertical position being capable of insertion into said casing past the stops to rest on the said seat but which valve member and whistle when turned to horizontal position as in normal operating position within said casing cannot then be moved upwardly past said stops, said valve member having secured thereto an intrusion tube which tube was placed in said valve member and in the lower end of said casing after said valve member had been placed within said casing below said stops, said intrusion tube acting to prevent rotation of said valve member about a horizontal axis beyond a predetermined angle which angle is less than the angle necessary to enable said whistle assembly to be moved upwardly past said stop.

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