to 2 in., and for pressures ranging from vacuum conditions to 300 psig. Figs. 23 and 24 illustrate types of thermostatic traps which are available at the present time.

Float and Thermostatic Traps. This type of trap is a combination of the float trap and the thermostatic trap, and finds its use in the draining of condensate from unit heaters, blast heaters, and coil heaters for water, oil or other liquids where there is apt to be a large volume of condensate which would not permit successful operation of thermostatic traps alone. The function of the float element of this trap is to handle the condensate, and of the thermostatic element to permit the flow of air and to prevent the flow of steam around the float valve. Float and thermostatic traps are made in sizes from ½ to 2 in. and usually operate under pressures varying from vacuum conditions to 40 psig, although some are made to operate at a maximum pressure of 200 psig. Fig. 25 illustrates a typical float and thermostatic trap.

Upright Bucket Traps. In this type of trap, the condensate enters the trap chamber and fills the space between the bucket and the walls of the trap. This causes the bucket to float, and forces the valve against its seat, the valve and its stem usually being fastened to the bucket. When the condensate in the chamber rises above the edges of the bucket, it overflows into it and causes the bucket to sink, thereby withdrawing the valve from its seat. This permits the steam pressure acting on the surface of condensate in the bucket to force the water to the discharge opening. When the bucket is emptied, it rises and closes the valve and another cycle begins. The discharge from this type of trap is intermittent, and it requires a definite differential pressure (usually 1 psi at least) between the inlet and outlet of the trap in order to

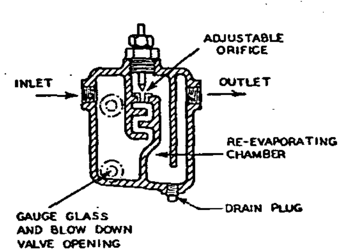

FIG. 29. FLASH TRAP

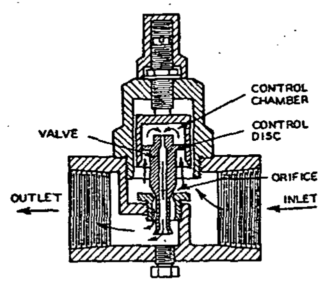

FIG. 30. IMPULSE TRAP

lift the condensate out of the bucket to the return opening. Upright bucket traps are used for draining condensate and air from blast coils, unit heaters, steam mains, laundry equipment, sterilizers, water and oil heaters and other equipment. This type of trap is particularly suited for use where there are pulsating pressures, such as draining steam lines and separators to reciprocating pumps or engines. It is not influenced by pulsations or wide fluctuations of pressure. Upright bucket traps are obtainable in sizes varying from ½ to 2½ in., and for pressures varying from vacuum to 1200 psig. Fig. 26 illustrates an upright bucket trap.

Inverted Bucket Traps. In this type of trap, steam, condensate and air enter the trap under the bell or inverted bucket. Steam floats the inverted bucket and closes the valve. Condensate entering the trap enables the inverted bucket to fall, opening the valve. The condensate then discharges through the open valve until steam again enters and displaces the water contained in the bucket, thus restoring its buoyancy. The steam pressure entering through the open valve discharges the trap. Air is eliminated automatically by passing through the small vent hole located in the top of the inverted bucket. Inverted bucket traps for use on low pressure systems, particularly with blast coils or unit heaters, are usually furnished with a large capacity opening equipped with a bi-metallic thermostatic element which closes when heated by steam, and opens when cooled by air and condensate, allowing air to escape from the inverted bucket to the trap outlet. Inverted bucket traps are used for draining condensate and air from blast coils, unit heaters, steam drips, laundry equipment, sterilizers, steam water heaters and other equipment. They are particularly suited for draining condensate from steam lines or equipment where abnormal amounts of air must be discharged, and where there is also foreign matter such as dirt, sludge and oil draining to the trap. The discharge from inverted bucket traps, like that of the upright bucket traps, is intermittent and requires a definite differential pressure between the inlet and the outlet of the trap in order to lift the condensate from the

bottom of the trap to the outlet of same. Inverted bucket traps are made in sizes from ½ to 3 in., and for pressures varying from vacuum to 2400 psig. Figs. 27 and 28 illustrate some of the types of inverted bucket traps which are available on the market at the present time.

Flash Traps. These traps depend on the property of condensate at a high pressure and temperature to flash into steam at a lower pressure. Condensate flows freely through the orifice of the trap due to the pressure difference from inlet to outlet of trap until steam enters the inlet chamber and mixes with the remaining condensate, heating the condensate and causing it to flash, thereby choking the flow through the orifice and allowing more condensate to accumulate in the trap. The discharge from flash type traps is intermittent. There are no moving parts in this type of trap. The orifice, however, is adjustable for the pressure differential required. A gage glass or float indicates whether the trap is operating. These traps can be used for draining condensate from steam water and oil heaters, blast heaters, unit heaters, dryers, vulcanizers, kitchen equipment, laundry equipment, evaporators, steam lines and other equipment, where the pressure differential between steam supply and condensate return does not drop below 5 psi. Flash type traps are made in sizes from ½ to 3 in., and for pressures varying from vacuum to 450 psig. Fig. 29 illustrates a trap of the flash type.

Impulse Traps. These traps are a modification of the flash trap, and depend on the same principle of flash for their operation. In the impulse trap the flashing action

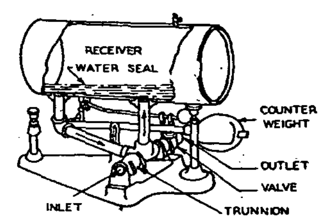

FIG. 31. TILTING TRAP

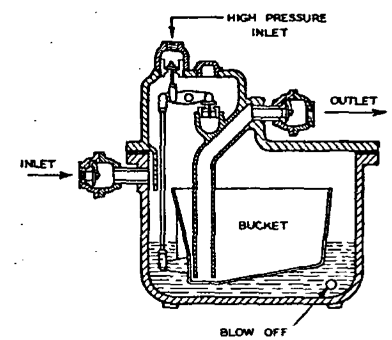

FIG. 32. LIFTING TRAP

is utilized to govern the movement of a valve by causing changes in pressure in a control chamber above the valve. A small portion of condensate, called control flow, by-passes continuously through the control chamber. At low and medium temperatures, the discharge through the center orifice reduces control chamber pressure, and the valve opens for free discharge of air and condensate.

When condensate reaches near-steam temperature, part of the control flow flashes into vapor, due to reduced pressure in control chamber. The increased volume of the condensate-vapor mixture restricts the discharge through the center orifice, and therefore the reduced pressure in control chamber builds up, closes the valve, and shuts off all discharge of hot condensate, except the small amount flowing through center orifice.

Under normal condensate loads, the valve opens and closes at short intervals. Under heavy loads, the valve opens wide and the discharge is heavy and continuous. Impulse traps can be used for draining condensate from steam mains, unit heaters, laundry equipment, kitchen equipment, oil and water heaters, sterilizers, and other equipment where the pressure at the trap outlet is 25 percent or less than that of the inlet pressure. Impulse traps are made in sizes from ½ to 2 in., and for pressures ranging from one to 600 psig. Fig. 30 illustrates a trap of the impulse type.

Tilting Traps. This type of trap as the name implies depends for its operation on the tilting of the trap receiver. When the receiver is in a horizontal position condensate accumulates until the weight of condensate overbalances that of a counterweight, when the receiver tilts. The tilting action opens the discharge valve, and steam pressure pushes the condensate out of the open discharge valve. When the receiver tank is emptied, except for a slight water seal, the receiver drops back to its