capacity of the tank is 3,000 imp. gals. The tank is filled through a cast iron manhole in the top, on which there is hinged a cast iron door, held down on the manhole, which has an 18 in. opening, by four ½ in. swing bolts, which drop back on the top of the tank when the cover is opened for filling.

In the bottom of the tank, there are two pipe openings, one of which connects with the locomotive, as may be noted in fig. 1 showing the application of the oil burning equipment to the fire box. On each side of the tank centre line, there is a valve of the form shown in fig. 2. That on the left is for the feed, and that on the right is for draining off water or draining the tanks, this latter valve leading into a short length of pipe outside the rail, where the oil may be thrown away, or, by a further connection, drawn off into a storage tank, when for any reason the tank is to be cleaned or repaired. The construction of the valves is simple. A cone on the lower end of a valve rod, guided in a bridged frame on the bottom of the tank, fits into a corresponding opening

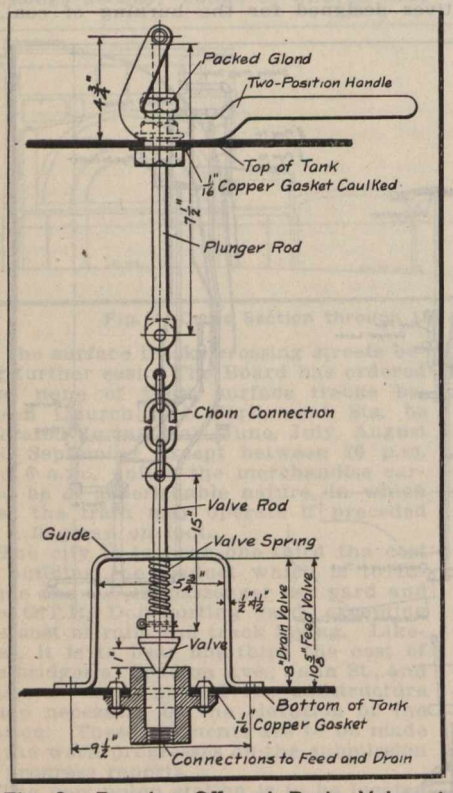

Fig. 2. Drawing Off and Drain Valves in the Oil Tank.

in a cast member rivetted to the bottom of the tank. An upper plunger rod is connected to this valve rod by a length of chain, this upper plunger rod being guided in the top of the tank through a packed gland which prevents the oil and oil fumes from escaping around this rod. A two position handle of the form indicated, raises or lowers the valve into the open or closed position. When the handle is vertical, the valve is held closed by the coiled spring wound on the valve rod, bearing on the top of the valve and on the under side of the bridged guide. These valves have thus only two positions—wide open and closed. The two openings in the top of the tank between these two are for a ½ in. pipe connection from the locomotive for the heating steam. The oil in the tank in cold weather tends to coagulate and will not run freely. To overcome this difficulty, two different methods of heating the oil are in use. The first is similar to the one described in connection with the G.T.R. oil burning motor car, where there was a steam coil in the oil tank, encircling the oil valve outlet. The method employed in this case, which is the one in most general use, has the steam pipe, in this case ½ in., extending down into the oil nearly to the bottom, where it branches with a T connection, and on the end of each branch there is a downwardly projecting elbow from which steam is blown through the oil around the drawing off valves, keeping it in a freely flowing fluid state as required. The principal objection to this method of heating the oil lies in the fact that the condensed steam mixes with the oil in the tank, instead of passing off through the coils as in the radiation method of heating. This water in the oil must be prevented from passing off into the burner with the oil. Water, from its higher specific gravity, settles to the bottom in the tank, thereby presenting a simple method of keeping the oil and water separate. The drain valve in the bottom of the tank, which has been described, is flush with the bottom. The feed valve, on the contrary, has the valve face raised above the tank bottom 2 11-16 ins. below which level the water may accumulate and be drained off from time to time through the drain valve. Normally this drain valve is left closed, and the feed valve kept open, the burner control being at a point further along the connection. It may be mentioned that these valves, while controlled in this case from the two position handles on top of the tank, in the majority of designs with a control system similar to this have the control handles on the front end of the tank connecting to the valve chain through a bell crank.

Each tender has a measuring rod as in fig. 3, to determine the quantity of oil remaining in the tender. This is accomplished by noting the depth of oil in the tank and then referring to a capacity table for the quantity this indicates. The fireman is at all times aware of the conditions of his fuel. The construction of the measuring rod is very simple. A short length of 1 in. pipe, with 1½ to 1 in. reducer on its upper end, is mounted on the top of the tank by two nuts, on each side of the top plate. Through this pipe there is a ½ in. square rod extending to within ¼ in. of the bottom of the tank, and graduated in inches through its length. The raising of this rod from the supporting pipe gives the fireman the required knowledge.

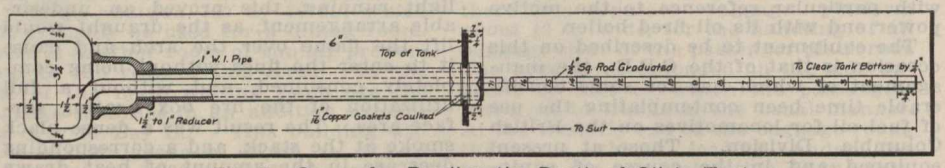

Fig. 3. Gauge for Reading the Depth of Oil in Tank.

Reference to fig. 1 shows the arrangement of the oil burning apparatus as applied to the fire box. Oil from the tank passes through a 1½ in. McLaughlin flexible conduit, and on through similar piping to an oil heater and thence to an oil control valve near the oil burner, where the flow of oil is regulated by the fireman, before passing into the burner. Steam for various auxiliary purposes is drawn from the steam dome through the piping to be seen at the top of this illustration. From a steam header on the back sheet of the fire box, the different connections branch off. Referring to the end elevation in fig. 1, the ⅜ in. connection on the right leads to the heater. The third, or ¾ in. connection, leads down and through another flexible conduit to the tank, providing steam for the heating of the oil in the tank before drawing off. The middle, or ½ in. pipe of this battery of three, provides steam to the burner for the atomizing of the oil. To meet these requirements, steam for the blower can be drawn from the dome. Provision is likewise made for steaming the boiler when cold by a shop connection to a 3 way valve on the outside of the smoke box, a connection running back along side the boiler to the header mentioned. Through the 3 way valve steam can be drawn from the shop main and passed to the burner and also to the various heating connections.

The type of heater or oil "superheater" used is shown in fig. 4. This second heater is required to maintain the free flow of the oil to the burner and to keep the oil from thickening between the time it leaves the tank heater and the time it reaches the burner. This heater is essentially a steam jacketted oil pipe. Through the centre there is a 7 ft. length of 1½ in. pipe, connecting at the right end through a tee to the oil tank main, and at the other end to the oil burner pipe. Encasing this, there is a 6 ft. 2 in. length of 3 in. pipe, attached to the inner pipe at the left end by a 3 to 2½ in. reducer, with a 2½ in. bushing tapped 1½ in. to receive the inner pipe. The other ends of the two pipes have a packed gland connection to permit of any variation in length between the inner and outer pipe lengths from unequal expansion. This packed connection is similar to that of the other end, except that the bushing, instead of being internally threaded, is bored to receive the outer diameter of the 1½ in. pipe, and counter bored for packing, which is forced into the space with a 2½ in. pipe cap bored the 1½ in. pipe size. Steam enters the annular space around the inner pipe through a ⅜ in. steam connection in the right reducer, and the condensation is drawn off through a ¾ in. pipe connection at the other reducer, this latter pipe being controlled by a ¾ in. globe valve. The steam pipe has a by pass connection into the end of the inner pipe, provided for the purpose of blowing out any dirt accumulation that

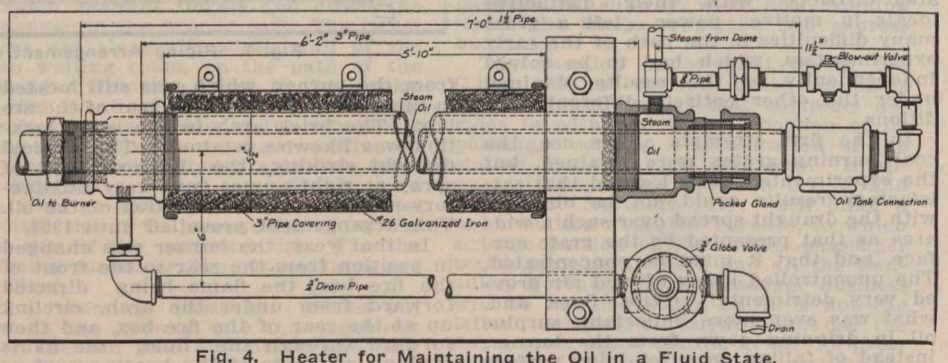

Fig. 4. Heater for Maintaining the Oil in a Fluid State.