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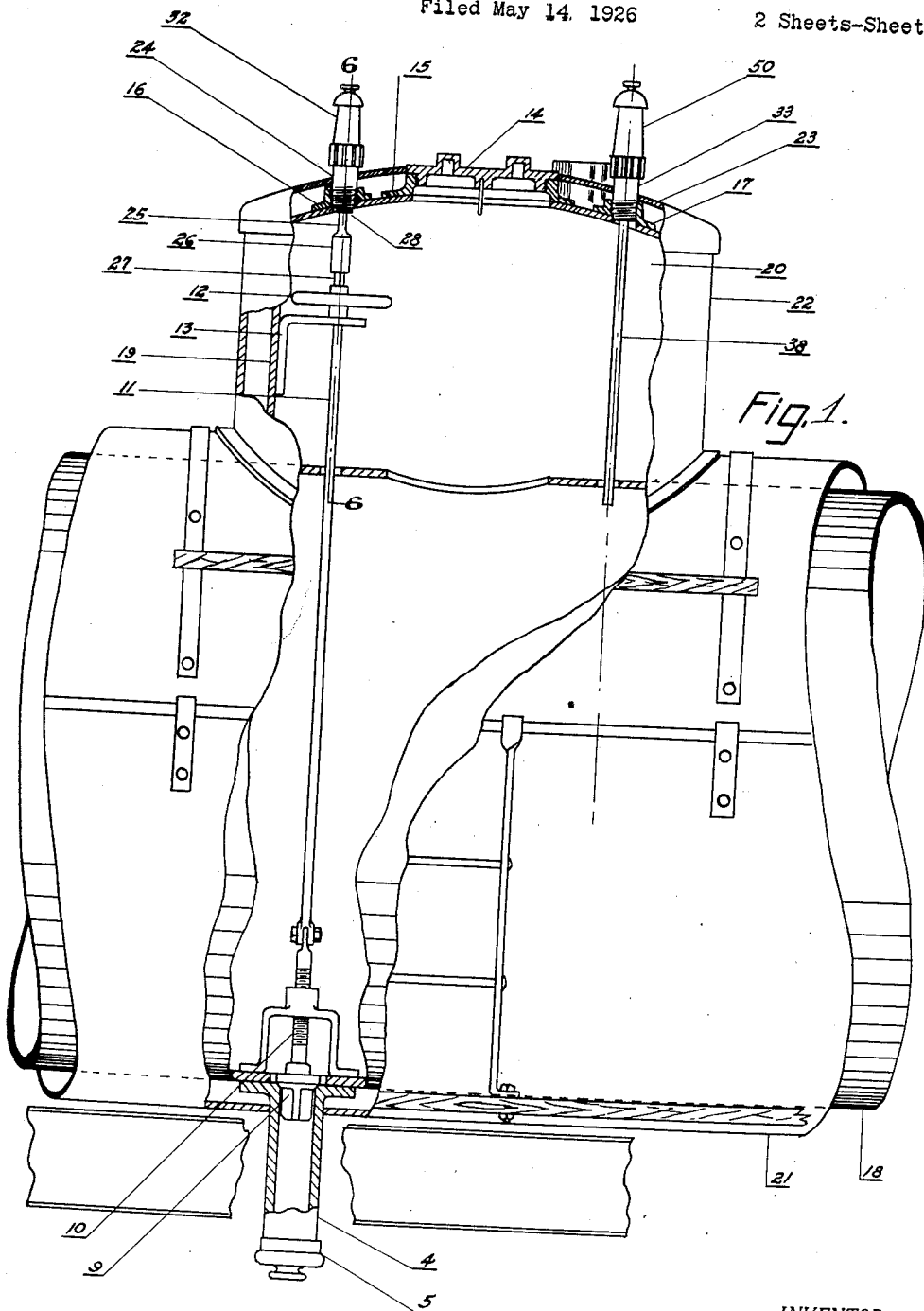
S. V. OSBURN

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SAMPLING DEVICE FOR TANK CARS

Filed May 14, 1926

2 Sheets-Sheet 1



INVENTOR.

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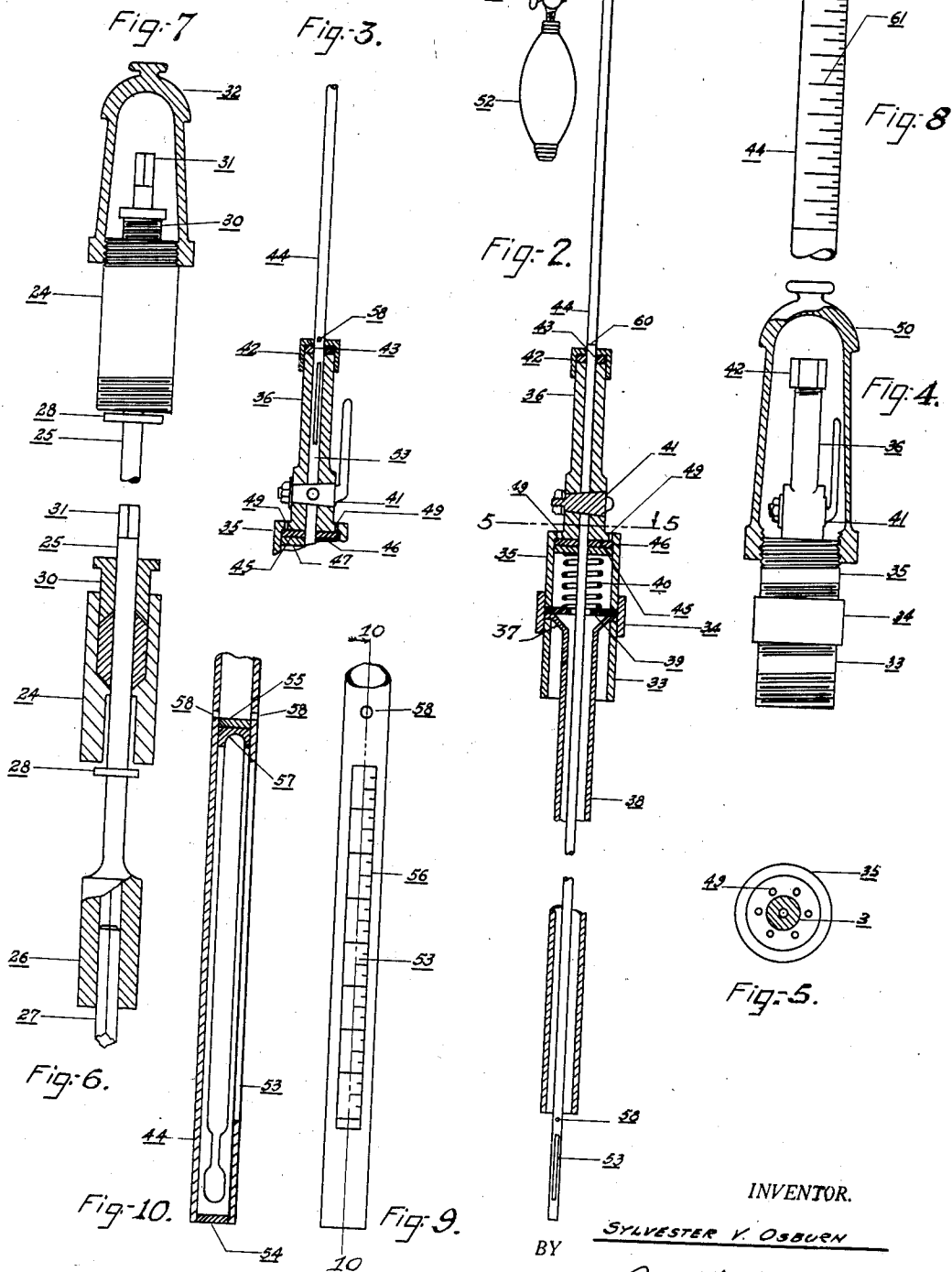
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UNITED STATES PATENT OFFICE.

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SAMPLING DEVICE FOR TANK CARS.

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The invention relates to a sampling device for tank cars, and more particularly to a sampling device for drawing volatile inflammable and other liquids, as gasoline oil and the like, from railway tank cars and taking the temperature at any desired depth in the tank, and measuring the outage in the tank.

Gasoline is so volatile that it cannot be retained wholly in liquid form and railway tank cars are equipped with safety valves to allow the constantly accumulating gases to escape, the Bureau of Explosives and American Railway Association requiring these valves to open with and at twenty five pounds above atmospheric pressure per square inch of valve area.

When a tank car is to be unloaded the first operation heretofore has been to open a vent and allow the gas to escape, and not only has the accumulated gas escaped, but a large per cent of the remaining liquid has been vaporized by the release of pressure from twenty five pounds above atmospheric pressure to atmospheric pressure.

So great is the vaporization of gasoline that it is not unusual to lose five hundred gallons and upwards from one shipment in a single eight thousand gallon capacity tank car, and it must be remembered that the largest portion of this loss occurs in reducing the pressure from twenty five pounds above atmospheric pressure to that of the atmosphere after the car reaches its destination.

Five hundred gallons is merely mentioned as a usual loss, as sometimes the loss is fifteen hundred gallons and more from an eight thousand gallon shipment.

The gasoline that is lost in gaseous vapors is the most valuable part of the gasoline, as it is the most volatile part, and gasoline that is deficient in the volatility is not marketable, it being understood that most gasoline must be saturated with casinghead gasoline, the most volatile of all gasolines, in order to render it marketable.

The expensive waste of losing this large volume and volatility of the gasoline is not the most important feature of the loss resulting from venting tank cars, as it is always a very dangerous practice and often results in great property loss and considerable loss of life, and injury to individuals.

The gas escaping from a vented tank of casinghead gasoline often saturates the air for more than one quarter of a mile distance from the car, and it has been known to ignite at a point several hundred feet from the car, destroying the car and all property and life near the car, examples of which occurred at Yale, Oklahoma, August 25th, 1921; Memphis, Tenn., January 24th, 1921; and Ardmore, Oklahoma, in September, 1915, resulting in a heavy loss of property and the loss of a number of lives.

The quantity of gasoline in a tank has heretofore been determined by removing the dome cover and measuring the outage, which is commonly known to be the quantity the shell lacks of being shell full. This outage is then deducted from the amount the tank holds shell full.

A still further reason for removing the dome cover heretofore has been to secure samples of the liquid contents of the tank and to secure temperature of the liquid, it being common practice to secure both sample and temperature at or near the top of the liquid, near the center and near the bottom of the tank.

The present invention has provided an improved sampling device for tank cars of volatile and inflammable liquids, for gauging the outage, taking the temperature from the bottom, center and top of the tank, and taking samples from the bottom, center and top of the tank, without removing the dome cover, so that the tank may be unloaded with the dome cover in place, eliminating the heretofore dangerous and wasteful practice of venting and opening the tank before unloading.

By gauging the outage, taking the temperatures and samples from the top, center and bottom of the tank without outwardly venting or opening the tank, the unloading of the tank becomes practical and a large per cent of the gas that has usually been wasted may be saturated with gasoline of less volatility, leaving only the tank full of mixed gas and atmosphere when the tank has been emptied of liquid, eliminating all the danger of escaping gases which has proven so destructive to both life and property.

With these and other objects in view, the

invention consists in the features of construction, combinations and arrangements of parts as hereinafter set forth and more particularly pointed out in the appended claims, the accompanying drawings illustrating a form of the invention.

In the drawings:

Fig. 1 is a fragmentary view in elevation of a tank car, broken open to illustrate the connection of the improved sampling device to an ordinary tank car.

Fig. 2 is an enlarged fragmentary sectional view taken on line 2—2 of Fig. 1.

Fig. 3 is a fragmentary view of Fig. 2 with certain parts in a different operative position.

Fig. 4 is an enlarged fragmentary view of Fig. 1 with a certain part broken open.

Fig. 5 is an enlarged sectional view taken on line 5—5 of Fig. 2.

Fig. 6 is an enlarged fragmentary sectional view taken on line 6—6 of Fig. 1.

Fig. 7 is an enlarged fragmentary view partly in section and partly in full view taken on the same line as Fig. 6.

Figs. 8, 9 and 10 are still further enlarged.

Fig. 8 is a fragmentary view of Fig. 2.

Fig. 9 is a fragmentary view of Fig. 2.

Fig. 10 is a sectional view taken on line 10—10 of Fig. 9.

Referring to the drawings, the outlet chamber 4, outlet chamber cap 5, outlet valve 9, valve stem 10, valve rod 11, valve manipulating wheel 12, valve rod bracket 13, dome cover 14, dome cover ring 15, flanges 16 and 17, tank shell 18, dome 19, dome head 20, tank shell jacket 21, dome jacket 22, and dome jacket cover 23, are all of common and well known construction, the view Fig. 1 being of a jacketed or insulated tank for casinghead gasoline, while the usual commercial grades of gasoline are shipped in tanks not jacketed or insulated, but otherwise of the same construction, it being immaterial to the invention whether the tank is jacketed and insulated or not jacketed or insulated.

In the flange 16 is secured the stuffing box 24 in which is revolvably mounted the auxiliary valve rod 25 provided with the internally squared socket 26 engaging the squared end 27 of the valve rod 11, held from upward movement by the washer 28, packed by the packing 29, and packing sleeve 30, and provided with the squared end 31 by which the auxiliary valve rod, the valve rod 11, and valve stem 10 may be rotated to open and close the outlet valve 9, the stuffing box 24 being capped by the cover cap 32 when in transit to prevent any possible leakage through the stuffing box from escaping.

In the flange 17 is secured the pipe nipple 33, to which is secured by the sleeve 34 the

base 35 of the elongated stop cock body 36, the flange 37 of the pipe 38, and the flat ring shaped base 39, for the spring 40, being clamped between the nipple 33 and the base 35.

The stop cock body 36 is provided with the ordinary stop cock plug 41 and the packing nut 42, the nut compressing the resilient packing ring 43 upon the body so that when the tube 44 is inserted in the nut it may easily be pressed downwardly through the body, but the packing will prevent the escape of any gas around the tube.

The base 35 of the stop cock body 36 is provided at the upper end thereof with the downwardly facing face 45 against which rests upwardly the resilient packing washer 46, held in place by the washer 47 and spring 40 so that atmosphere may enter through the holes 49, but the gases cannot escape therethrough.

The stop cock base 35 is provided with the cover cap 50, which is employed while the car is in transit to prevent the escape of any possible leakage through the stop cock, it being understood that the tube 44 is not in place as shown in Figs. 4 and 5 when the car is in transit.

The upper end of the tube 44 is preferably curved as shown and provided with the ordinary stop cock 51 to which is attached as shown the ordinary bulb pump 52 for the purpose that will appear hereinafter.

The lower end of the tube 44 is provided with the slot 53 and closed at the extreme end by the disk 54 and above the slot by the disk 55, the disks being soldered or otherwise secured in position.

Between the disks 54 and 55 is placed the ordinary thermometer 56 as shown with the figures on the thermometer showing through the slot so that they may be easily read, the thermometer being secured in place by the ordinary wax 57 around the upper end thereof as shown.

The holes 58 are provided in the tube 44 above the disk 55 for a purpose that will appear hereinafter.

The tube 44 is provided with the heavy distinguishable mark 60, and from this mark upwardly toward the stop cock 51 the tube is graduated as a scale of measurement 61, as shown in Fig. 8 for the purpose of measuring outage as will appear hereinafter.

The cover cap 50 is removed from the stop cock base 35 and the tube 44 inserted through the packing ring 43 and elongated stop cock body 36 to the stop cock plug 41, it being noted that in this position as shown in Fig. 3 the slot 53 and holes 58 have passed through the packing ring 43 so that no leakage can occur around the tube.

The stop cock 51 must now be closed, and the stop cock plug 41 turned to the position shown in Fig. 2 when the tube may be in-

serted to any depth through the stop cock body and plug, even to the bottom of the shell 18.

The tube 44 is now adjusted so that the holes 58 are at the required depth in the tank to secure the desired sample of the contents of the shell 18 and the stop cock 51 opened when the pressure within the tank will force the liquid through the tube and stop cock and pump 52 and it may be caught in any ordinary vessel as an ordinary glass or testing vessel.

When the sample has been secured, provided the temperature is desired from approximately the same depth, the tube 44 is raised until the mark 60 is visible above the packing nut 42, then the stop cock plug 41 may be closed and the tube fully withdrawn and the temperature read from the thermometer, it being understood that the depth of the holes 58 in the shell 18 may always be known by the scale of measurement 61 on the tube and that the thermometer is always immediately below the holes. Usually one sample and one reading of temperature near the center of the shell is sufficient, but when more than one sample or one temperature reading is desired or required the operation may be repeated as often as desired, always adjusting the tube 44 to the desired depth.

While the tube 44 is inserted in the shell 18 either before or after taking samples, the tube may be adjusted to the position shown in Fig. 2 with the mark 60 showing above the packing nut 42 and the cock 51 opened slightly so that gas will escape through the cock, the tube may then be lowered until liquid takes the place of gas and by a slight movement upwardly and downwardly the level of the liquid in the tank may be determined, as a difference of one-sixteenth of one inch in height will change the flow through the cock 51 from gas to liquid and from liquid to gas.

It requires but an instant to adjust the holes 58 to the level of the liquid after which the cock 51 may be closed and the scale 60 read to determine the outage of the shell, the tube may then be removed from the shell and stop cock body 36 and the stop cock plug 41 turned to closed position, as hereinbefore described.

The bulb pump 52 is provided so that a car that has been vented by accident may be treated in the same manner as that herein described, it being understood that if there were no pressure in the tank the bulb pump may be employed and liquid drawn from within the tank the same as though the tank contained pressure.

After the sample and temperature or samples and temperatures have been secured and the outage determined, the outlet valve 9 may be opened by the auxiliary valve rod 25 and the liquid together with such gases as

are carried with the liquid may be discharged into the usual container, it being understood that when the pressure in the tank falls below atmospheric pressure by reason of the removal of liquid, the resilient packing washer 46 will be pressed downwardly by the atmosphere against the spring 40 and the atmosphere will enter through the holes 49 preventing the forming of a vacuum in the tank and allowing the tank to be completely emptied of liquid.

The tube 44 and all metal parts that it may come in contact with while inserting it in the tank or withdrawing it therefrom are preferably formed of brass or soft metal so that rubbing or striking contacts will not cause a spark and explode the contents of the tank.

The improved sampling device is of considerable importance for the drawing of samples of liquid from, taking temperatures of the liquid within, and measuring the outage of liquid contained in closed tank cars, while the liquid is under pressure from accumulated gases within the tank, so that the car may be unloaded without removing the dome cover or venting the tank and a great loss of the liquid through vaporization prevented, as well as a great source of danger eliminated.

What I claim as new, and desire to secure by Letters Patent is:—

1. In a sampling device for railway tank cars, a tube, a return bend near one end of said tube whereby both ends of said tube are disposed in a common direction, a closing and opening means controlling said tube adjacent said bend, a thermometer in the opposite end of said tube and a hole adjacent said thermometer and intermediate said return bend and said thermometer, and means to permit the insertion of said tube to and withdrawal from the interior of the tank of a railway tank car without opening said tank to the atmosphere.

2. In a sampling device for railway tank cars, a tube, a bend near one end of said tube whereby both ends of said tube are disposed in a common direction, a closing and opening means controlling said tube adjacent said bend, and means to permit the insertion of said tube to and withdrawal from the interior of the tank of a railway tank car without opening the tank to the atmosphere.

3. In a sampling device for railway tank cars, a tube, an opening and closing means controlling one end of said tube, a thermometer in the opposite end of said tube, a hole and a scale of measurement intermediate said thermometer and said controlling means, and means to permit the insertion of said tube to and withdrawal from the interior of a railway tank car to withdraw liquid samples from and determine the temperature within said tank and measure the outage in said tank.

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