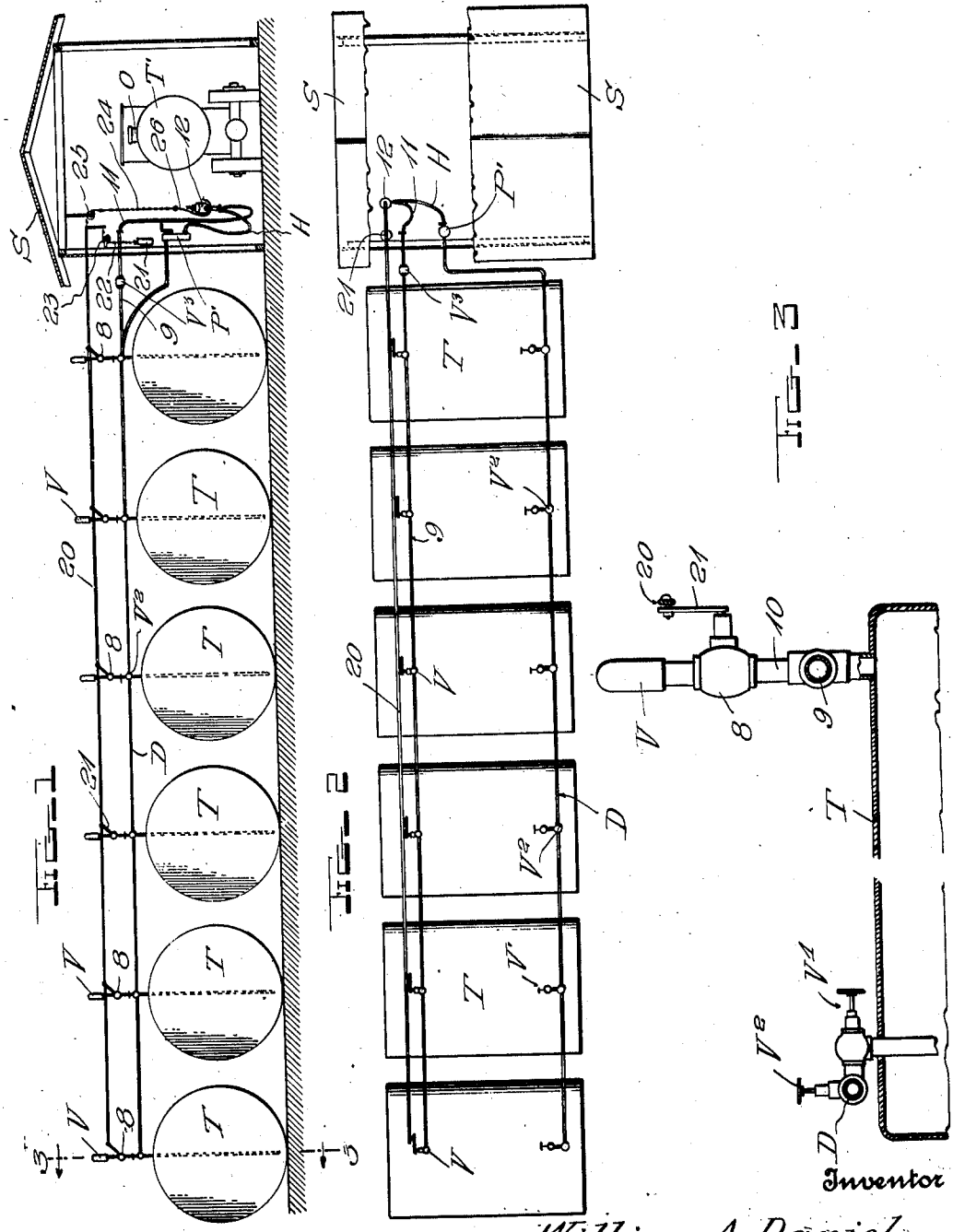
Jan. 3, 1928. 1,655,312

W. A. DANIEL

TANK FILLING AND VENTING MEANS

Filed March 28, 1927 2 Sheets-Sheet 1



Witness

Inventor

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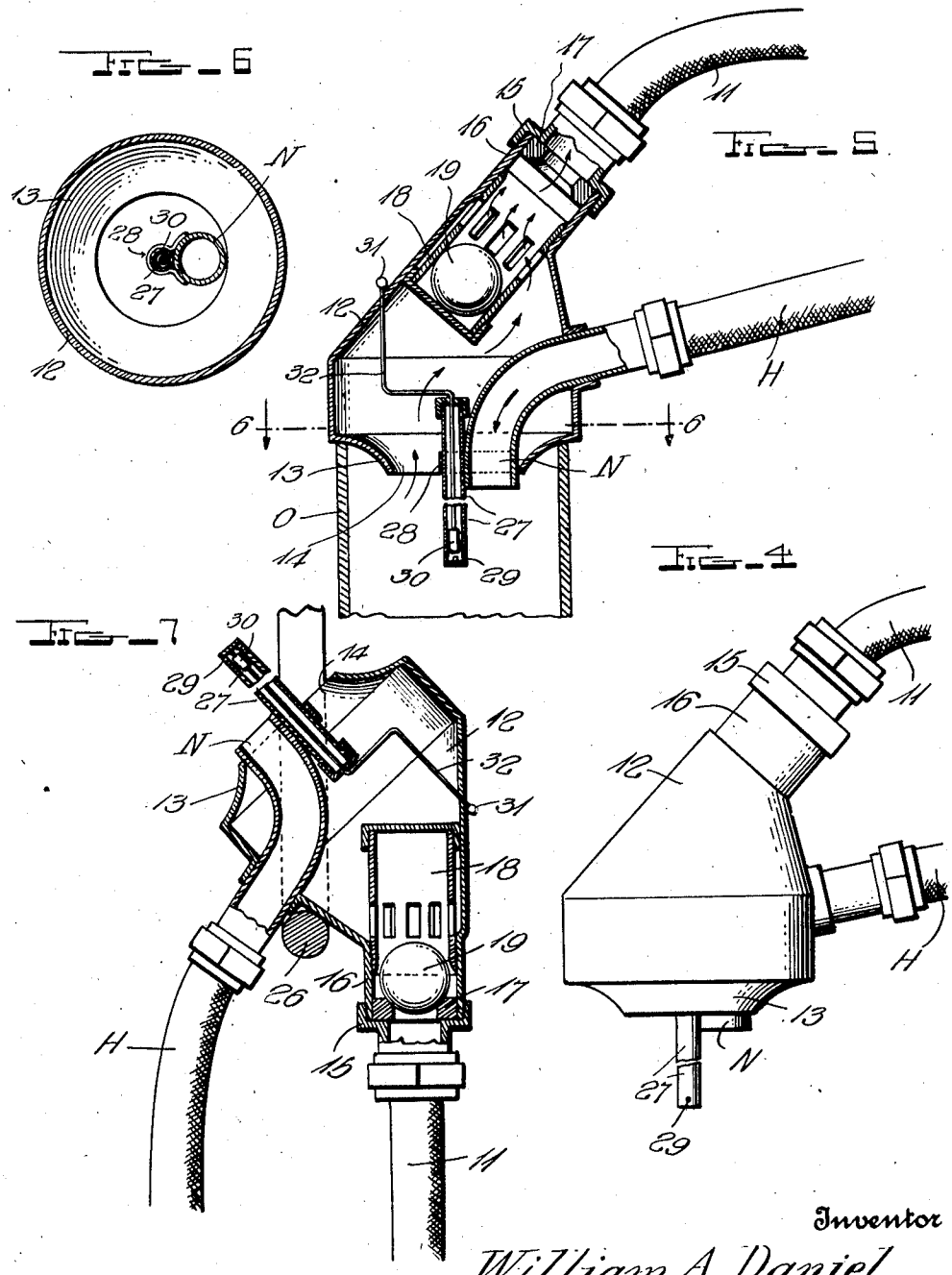
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UNITED STATES PATENT OFFICE.

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TANK FILLING AND VENTING MEANS.

Application filed March 28, 1927. Serial No. 179,163.

Storage stations for gasoline, kerosene and other volatile liquids, commonly embody storage tanks provided with vents normally open to the atmosphere, and a discharge line extends from the storage tanks, usually into a shelter into which tank trucks are run for filling. Under the present practice, gas or fumes escape from any tank being filled with danger of fire and asphyxiation, and loss of valuable gas. It is the primary object of my invention however, to provide means whereby the vents of the storage tanks are closed and said tanks placed in communication with the extraneous tank while filling of the latter takes place. Thus, the discharge of liquid from one or more of the storage tanks, creates a partial vacuum therein, and this vacuum is utilized to draw all fumes which would otherwise escape, into the storage tank or tanks.

Further aims are to provide for automatic closing of the storage tank vents upon movement of either the tank filling line, the fume conducting line, or both, into position for use; to provide for the automatic opening of the vents when the tank filling operation is completed and the free end (usually hose) of one or both of said lines is returned to a predetermined normal position; to provide novel means for closing the free end of the fume-conducting line when said line is not in use, thereby preventing escape of fumes into the shelter; and to provide a novel level indicator to show when the extraneous tank is full.

With the foregoing in view, the invention resides in the novel subject matter hereinafter described and claimed, the description being supplemented by the accompanying drawings.

Fig. 1 is a side elevation of a liquid storing and tank filling station embodying my improvements.

Fig. 2 is a top plan view partly in horizontal section.

Fig. 3 is an enlarged vertical section substantially on line 3—3 of Fig. 1.

Fig. 4 is an enlarged side elevation of the tank engaging head with which the fume-conducting and the liquid-discharge lines communicate.

Fig. 5 is a vertical sectional view through the parts shown in Fig. 4, showing the manner of engaging the head with a filling opening of a tank.

Fig. 6 is a horizontal sectional view on line 6—6 of Fig. 5.

Fig. 7 is a view similar to Fig. 5, but illustrating the normal relation of parts, when the apparatus is not in use.

In the drawings above briefly described, T designates a series of storage tanks for gasoline, kerosene or other volatile liquid, each tank having a vent V which is normally open to the atmosphere. A liquid discharge line D is provided for the tanks T and in the present showing embodies pipes P extending to the tank bottoms, valves V^1 for said pipes, additional valves V^2 where desired, a pump P^1, and a freely movable discharge end which is preferably in the form of a flexible hose H. This hose and preferably the pump also, are disposed within the conventional shelter S, into which tank trucks T^1, are driven for filling.

I provide the vents V with normally open valves 8 and provide a fume-conducting line 9 which may well consist of sections suitably coupled at 10 to portions of the vents V, said fume-conducting line having a freely movable inlet end, preferably in the form of a hose 11. A check valve V^3 may be used in this line if desired.

Provision is made for connecting the ends H and 11 of the lines D and 9 respectively, with the tank T^1 to be filled, and I also provide means for then closing all of the valves 8. Thus, upon discharge of liquid from one or more of the tanks T into the tank T^1, a partial vacuum is produced in the tank or tanks from which the liquid is being discharged, and this partial vacuum is utilized to draw all air and fumes from the upper portion of the tank T^1, into said tank or tanks T. Thus, no escape of fumes into the shelter S will take place, and hence, the fire hazard, the danger of asphyxiation and loss of valuable gas, are reduced to the minimum.

Preferred features of construction will now be described, with the understanding that the present disclosure is principally for illustrative purposes, and that within the scope of the invention as claimed, numerous variations may be made.

12 denotes a hollow head with which the hoses H and 11 are connected, said head having a substantially conical portion 13 for engagement with a filling opening O of the extraneous tank T^1, said portion 13 having an opening 14 by means of which the head and the tank are placed in communication.

The hose H is provided with a nozzle N which enters the head 12 and turns downwardly through the opening 14. The hose 11 is suitably coupled at 15 to a tubular neck 16 on the head 12, a valve seat 17 is provided in the outer end of this neck or at other desired location, and a valve cage 18 disposed within the head 12, is threaded or otherwise engaged with the inner end of the neck, said cage containing a ball valve 19 which is both opened and closed by gravity.

When the head 12 is engaged with the filling opening O of the tank T^1, as seen in Fig. 5, the valve 19 is opened by gravity and hence, as liquid is discharged into said tank T^1 from the nozzle N, the inlet end 11 of the fume-conducting line 9, is open, permitting escape of fumes through said line, to the storage tank or tanks. When the head 12 and connected parts are not in use and are moved to a predetermined position, such as that shown in Fig. 7, the ball valve 19 engages the seat 17 and hence prevents any escape of fumes from the end 11 of the fume-conducting line 9. Provision is made, whereby upon disposition of the head 12 in a predetermined manner, after the filling of a tank T^1, the valves 8 of the vent V automatically open, again placing the storage tanks in communication with the atmosphere. Provision is also made, whereby upon movement of the head 12 to engage it with a tank T^1, the valves 8 will be automatically closed, thus placing the fume-conducting line 9 in condition to function.

In the present showing, a rod 20 is pivoted to arms 21 of the valves 8 for simultaneously opening all of said valves when moved in one direction and for simultaneously closing said valves when moved in the other direction. Suitable means, such as a weight 21, a cable or the like 22, and a pulley 23, are connected with the rod 8 and have a tendency to shift said rod in valve-closing direction. This tendency however, is normally overcome by means under the influence of the head 12. In the present showing, a cable or other flexible element 24 is connected with the rod 20, is passed over a suitable sheave or pulley 25, and is provided on its depending end, with a hook 26. When the apparatus is not in use, the head 12 is supported by this hook as shown in Figs. 1 and 7, and the weight of said head and associated parts, is sufficient to move the rod 20 in valve-opening direction, against the action of the weight 21 and associated parts. Thus, as long as the apparatus is not in use, the vents V are open to the atmosphere, as required. When a tank T^1 is to be filled however, the head 12 is disengaged from the hook 26 and engaged with the tank-filling opening, and as soon as said hook is free from the weight of said head and associated parts, the weight 21 comes into play to effect automatic moving of the rod 20 to valve-closing position. Thus, simultaneously with engagement of the liquid-discharge line with the extraneous tank T^1, the fume-conducting line is conditioned to establish communication between the tank T^1 and the storage tank or tanks T from which liquid is to be discharged. The result is, that as the discharge of liquid takes place and partial vacuum is created in the tank or tanks from which said liquid is drawn, all fumes and air rising in the tank T^1 as the latter fills, will be conducted through the fume-conducting line into said partial vacuum, thus overcoming dangers and loss which are now common occurrences.

When the head 12 is engaged with the filling opening O of the tank T^1, the valve 19 automatically opens, but when said head is again supported by the hook 26, automatic closing of said valve takes place to prevent escape of fumes into the shelter S. As soon as the hook 26 receives the weight of the head 12 and the associated parts, it actuates the cable or the like 24 and the rod 20 to immediately open the valves 8, again placing the storage tanks T in communication with the atmosphere as required.

I prefer to embody means with the head 12, for indicating when the tank T^1 is full. In the present showing, a tubular guide 27 is mounted within the head 12, being preferably secured to the nozzle N, by any desired means 28, said guide having one or more openings such as 29, to admit liquid. Within this guide, a float 30 is disposed, and this float is instrumental in operating a suitable visual indicator 31, this indicator being preferably on one end of an angular rod 32 whose other end is connected with the float 30. The guide 27 is of a length to position the float 30 at the desired level in the tank T^1, and when the liquid rises to this level, it enters said guide and raises the float, thereby raising the indicator 31 and signifying that the tank is full.

From the foregoing, taken in connection with the accompanying drawings, it will be seen that I have produced very advantageous improvements over tank-filling apparatuses heretofore in use, and although excellent results may be obtained from the general construction shown, I again invite attention to the fact that within the scope of the invention as claimed, numerous variations may be made.

I claim:—

1. In combination, a volatile liquid storage tank, a liquid discharge line therefrom adapted to lead to an extraneous tank to be filled, a fume-conducting line to the storage tank adapted for conducting fumes from the extraneous tank to said storage tank, at least one of said lines having a freely movable end, means for connecting the lines with the

extraneous tank, a normally open vent for the storage tank, a valve for said vent, and operating means for said valve embodying self-acting valve-closing means; said freely movable line end normally engaging said valve-operating means and holding it against action under the influence of the self-acting valve-closing means, to hold the vent valve open, said self-acting valve-closing means coming into play upon disengagement of said line end from said valve-operating means, incident to use.

2. In a tank filling and venting means, a hollow head having an inlet for connection with a liquid discharge line, and a fume outlet for connection with a fume-conducting line, said head being shaped for engagement with a filling opening of a tank and having an opening by means of which it may communicate with the tank, and a gravity-closed and gravity-opened valve for said fume outlet, said valve opening when the head is positioned for use and closing when the head is returned to a predetermined normal position after use.

3. An improvement in a volatile liquid storage station embodying a storage tank having the customary vent to the atmosphere, and a liquid discharge line from the tank terminating in a freely movable end for engagement with a tank of a tank truck or car; said improvement comprising a fume-conducting line leading to said storage tank and having a freely movable end for engagement with the tank to be filled, a valve for closing said vent, a movable support for holding at least one of said freely movable line ends at a predetermined position when not in use, and means connecting said support and said valve for holding said valve open when said line end is engaged with said support and for automatically closing said valve upon removal of said line end from said support for use.

4. An improvement in a volatile liquid storage station embodying a storage tank having the customary vent to the atmosphere, and a liquid discharge line from the tank terminating in a freely movable end for engagement with a tank of a tank truck or car; said improvement comprising a fume-conducting line leading to said storage tank and having a freely movable end for engagement with the tank to be filled, a valve for closing said vent, a movably mounted hanger to support at least one of said freely movable line ends when not in use, said hanger being depressed by the weight of said line end, means connecting said hanger with said valve for holding the latter open as long as said hanger remains depressed, and means for automatically actuating said connecting means to close said valve upon removal of said hose end from said hanger.

5. In combination, a volatile liquid storage tank, a liquid discharge line therefrom adapted to lead to an extraneous tank to be filled, a fume-conducting line to the storage tank adapted for conducting fumes from the extraneous tank to said storage tank, at least one of said lines having a freely movable end, a vent from the storage tank to the atmosphere, a valve for said vent, a flexible element operatively connected with said valve to open the same when pulled, a pulley over which said flexible element passes and from which it depends, means on the lower end of said flexible element for supporting said freely movable line end when the line is not in use, whereby the weight of said line end will pull upon said flexible element and hold the valve open, and means for closing said valve when said freely movable line end is removed from said supporting means.

6. In combination, a volatile liquid storage tank having a vent valve, a liquid discharge line leading from and a fume-conducting line leading to said tank, means for connecting said lines with an extraneous tank to be filled, at least one of said lines having a free end for disposition at a predetermined normal position when not in use, and means operatively related with said free line end and operatively connected with said valve for disposing the latter at open position when said free line end is disposed at said normal position and for effecting closing of said valve upon movement of said free line end from said normal position for use.

7. In combination, a volatile liquid storage tank having a vent valve, a liquid discharge line leading from and a fume-conducting line leading to said tank, means for connecting said lines with an extraneous tank to be filled, at least one of said lines having a free end for disposition at a predetermined normal position when not in use, and operating means for said vent valve, said valve operating means embodying a controlling member co-operable with said free line end to dispose said valve at open position whenever said free line end is disposed at the aforesaid normal position and active to effect valve-closing upon movement of said line end from said normal position for use.

8. In an apparatus for filling an extraneous tank with volatile liquid from a storage tank and for passing volatile fumes and air from the extraneous tank to the storage tank; a line connected with the storage tank and adapted for connection with the extraneous tank, said line having a free end for disposition at a predetermined normal position when not in use, a vent valve for said storage tank, and means operatively related with said free line end and operatively connected with said valve for disposing the latter at open position when said free line end is disposed at said normal position and for effecting closing of said valve upon move-

ment of said free line end from said normal position for use.

9. In an apparatus for filling an extraneous tank with volatile liquid from a storage tank and for passing volatile fumes and air from the extraneous tank to the storage tank; a line connected with the storage tank and adapted for connection with the extraneous tank, said line having a free end for disposition at a predetermined normal position when not in use, a vent valve for said storage tank, and operating means for said vent valve, said valve operating means embodying a controlling member co-operable with said free line end to dispose said valve at open position whenever said free line end is disposed at the aforesaid normal position and active to effect valve-closing upon movement of said line end from said normal position for use.

In testimony whereof I have hereunto affixed my signature.

WILLIAM A. DANIEL.