

J. W. LEWIS.  
 RELIEF VALVE STRUCTURE.  
 APPLICATION FILED JAN. 22, 1920.

1,432,111.

Patented Oct. 17, 1922.

FIG. 1.

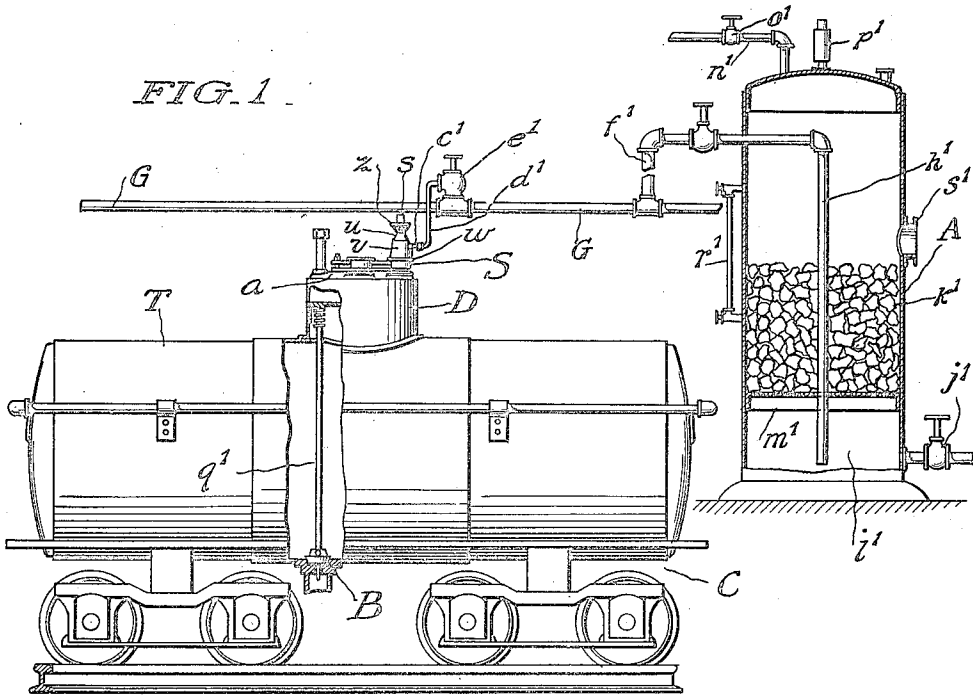


FIG. 2.

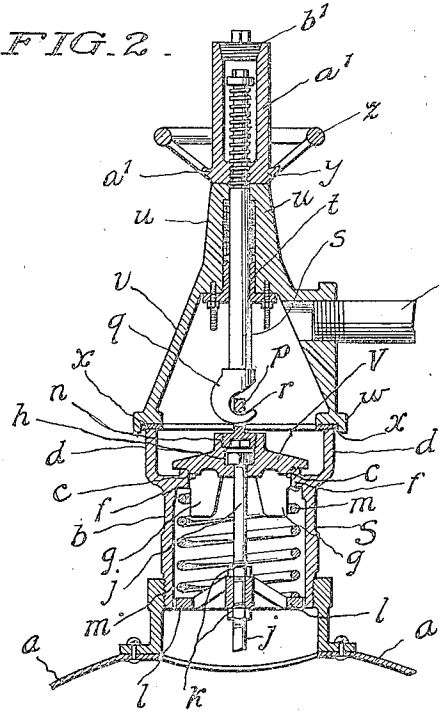
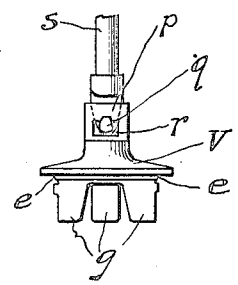


FIG. 3.



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## UNITED STATES PATENT OFFICE.

JOSEPH W. LEWIS, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE ATLANTIC REFINING COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

## RELIEF-VALVE STRUCTURE.

Application filed January 22, 1920. Serial No. 353,351.

*To all whom it may concern:*

Be it known that I, JOSEPH W. LEWIS, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Relief-Valve Structures, of which the following is a specification.

My invention relates to valve structure whereby gas or other fluid under pressure may be drawn off at will, without contact with the atmosphere, from a tank or vessel through a valve normally held closed against the pressure by spring or equivalent.

My invention relates also to the employment of valve structure of the character referred to whereby gas under pressure within the tanks of tank cars or the like is released or drawn off without blowing into the atmosphere and without danger of ignition; and whereby the cover of the dome of the tank may safely be removed for access to means within the dome for operating the valve for drawing off the liquid contents of the tank.

My invention resides in a system for saving gas or vapors of highly volatile oils such as arising from gasoline, casing head naphtha or other oils while in tanks, and particularly tanks transported long distances by rail.

For an understanding of my invention, reference may be had to the accompanying drawing, in which—

Fig. 1 is a side elevational view, partly in vertical section, of apparatus comprised in my system of gas recovery.

Fig. 2 is a vertical sectional view, partly in elevation, on enlarged scale, of valve structure embodied in the system of Fig. 1.

Fig. 3 is a side elevational view of part of the valve structure.

Referring to Fig. 1, C is a railway truck or car carrying the tank T in which is transported gasoline, casing head naphtha or other oil from which separate permanent gas or vapors of extremely volatile oils, and all herein referred to as gas. The gas so separating is of substantial amount and is of substantial value, since it is utilizable for fuel or any other purposes and is well worth saving or recovering at the destination of the tank car, generally an oil refinery,

whereat recovered gas may be employed for fuel purposes or otherwise.

The gas so separating from the contents of the tank increases the pressure within the tank materially above atmospheric, and if allowed to escape into the atmosphere may become ignited with danger to life and property.

In any suitable position on the tank T, for example upon the cover *a* of the dome D, is provided a safety valve S comprising the hollow cylindrical or tubular member *b* having the valve seat *c* above which extends the cylindrical flange *d*.

Co-acting with the valve seat *c* is the valve member V having the valve surface *e* engaging the aforesaid valve seat *c*, which is formed above the inwardly extending shoulder *f*. Upon the valve member V and guided in the circular opening through the shoulder *f* are the downwardly extending lugs or projections *g*. In a recess *h* in the valve member V is disposed the head *i* of a bolt *j* upon which are threaded the nuts *k* between which is held the circular abutment *l* between which and the under side of the shoulder *f* is disposed the spring *m*, under compression, in position indicated in Fig. 2, thereby thrusting downwardly upon the rod *j* and holding the valve member V against its seat *c* in opposition to the gas pressure within the tank and dome.

Threaded into the upper side of the valve member V at *n* is the member *o* having the upwardly extending lug P having a hole *r* receiving the hook *q* on stem *s*. The vertical rod or stem *s* extends through the gland *t* secured to the hollow stem *u* integral with the casing *v* having the flange *w*, between which and the upper edge of the flange *d* intervenes the rubber or other gasket *x*.

Upon the upper end of the stem *u* rests the hub *y* of the hand wheel *z*. Through the hub *y* is threaded the stem *s*, which extends upwardly into the hollow stem *a* integral with hub *y* and closed at its upper end by a screw plug *b*<sup>1</sup>.

Communicating with the interior of the casing *v* is the pipe, hose or other suitable connection *e*<sup>1</sup> with which may connect a flexible hose or other conduit *d*<sup>1</sup> communicating through valve *e*<sup>1</sup> with the gas line G extending parallel to and adjacent the trackage on

to which the tank cars are shifted for unloading purposes.

From the gas line G connection is made through pipe  $f^1$ , controlled by valve  $g^1$  with a pipe  $h^1$  within the absorber A and extending downwardly therein, terminating near the bottom thereof in a chamber  $i^1$  into which is admitted through the valve  $j^1$  naphtha or other absorbing oil, which may extend to any suitable height, indicated by glass gauge  $r^1$ , for example, to a height above the cobblestones, bricks or other material  $k^1$ , which may be introduced through manhead  $s^1$ , and which are supported upon the open work grate  $m^1$ . From the top of the absorber tank A extends the gas pipe  $n^1$ , controlled by valve  $o^1$ , to any suitable gas storage device or other destination. The absorber A may be provided with a safety valve  $p^1$  of any suitable structure.

When a tank car is delivered upon the aforesaid trackage, the hand wheel  $z$  is rotated in such direction as to cause the stem  $s$  to move downwardly to project the hook  $q$  below the flange  $w$ , whereupon the operator passes the hooks  $q$  into hole  $v$ , the rubber gasket  $x$  having been placed in position indicated upon the upper edge of the flange  $d$  of the safety valve S, which latter it is understood is part of the tank or dome equipment and travels about with the tank. The operator then rotates the wheel  $z$  in opposite direction, thereby pulling upwardly upon the stem  $s$ , forcing the flange  $w$  more firmly against the rubber gasket  $x$ , thereby forming a pressure-tight joint between the casing  $v$  and the flange  $d$ . The hose connecting to the coupling  $c^1$  is connected to a valve as  $e^1$ , the latter being generally in closed position. The operator then rotates the wheel  $z$  still further in direction to pull upwardly upon the stem  $s$ , which lifts the valve V from its seat  $c$  in opposition to spring  $m$ , and the gas under pressure within the tank T then passes outwardly around the valve V into the casing  $v$  and thence into the hose  $d^1$ . The valve  $e^1$  may now be opened, and the gas will be drawn off from the tank T into the gas line G through pipe  $f^1$ , valve  $g^1$  and pipe  $h^1$  into the absorbent oil, which extracts more or less completely the oil vapors mingled with the gas. The permanent gas and any vapors not absorbed bubble upwardly through the absorbent oil and pass through the oil in the interstices between the stones  $k^1$  into the upper end of the absorber A, thence through pipe  $n^1$  and valve  $o^1$  for storage or other purpose.

The absorbent oil may be drawn off through valve  $j^1$  from time to time and fresh oil introduced into the absorber A.

The withdrawn oil may then be distilled for recovery of light oil vapors such as gasolene, naphtha and the like; or it may be mixed directly with naphtha.

The gas delivered to storage may be used as fuel in the oil refinery, or may be otherwise disposed of in any way desired.

After the gas has been drawn off from the tank T, it is safe to remove cover  $a$  from dome D for taking samples, measuring contents of the tank, and for allowing operation of valve rod  $q^1$  to open valve B to draw off the contents of the tank.

The accessory valve apparatus comprising the casing  $v$ , wheel  $z$ , stem  $s$  and hook  $q$  may be withdrawn, together with the gasket  $x$ , and the safety valve structure S is then again in condition to serve its usual function of relieving excess pressure from the tank while in transit or otherwise.

In accordance with my invention the accessory valve apparatus is detachably secured to the regular safety valve equipment and serves to operate the same to provide a draw-off for the valuable gas and vapors.

What I claim is:

1. The combination with a car tank and its safety valve structure, of a pipe line disposed adjacent the path of travel of said tank, detachable auxiliary valve structure for lifting the valve member of said safety valve structure and allowing passage of fluid, and a conduit connecting said auxiliary structure with said pipe line.
2. The combination with a car tank and its safety valve structure, of a gas line disposed adjacent the path of travel of said tank, detachable auxiliary valve structure for lifting the valve member of said safety valve structure and allowing escape of gas to said gas line, a conduit connecting said auxiliary structure with said gas line, an absorber into which said gas is delivered, and a second gas line into which said absorber delivers.
3. The combination with a safety valve, of a detachable casing communicating with the outlet of said valve, a conduit communicating with said casing, a rod, means on said rod for detachably engaging said valve, a stuffing box for packing said rod, and an operating member external to said casing having threaded engagement with said rod for actuating the same.
4. The combination with a safety valve, of a detachable casing communicating with the outlet of said valve, a conduit communicating with said casing, a rod, means on said rod for detachably engaging said valve, an operating member external to said casing having threaded engagement with said rod for actuating the same, said operating member having a closed chamber receiving said rod, and a packing for said rod within said casing.

In testimony whereof I have hereunto affixed my signature this 20<sup>th</sup> day of January, 1920.

JOSEPH W. LEWIS.