Jan. 27. 1925. 1,524,423

W. H. CHAPMAN

DEVICE FOR DISCHARGING ELECTRICITY FROM GASOLINE TANKS AND THE LIKE

Filed June 3, 1922

Fig. 1.

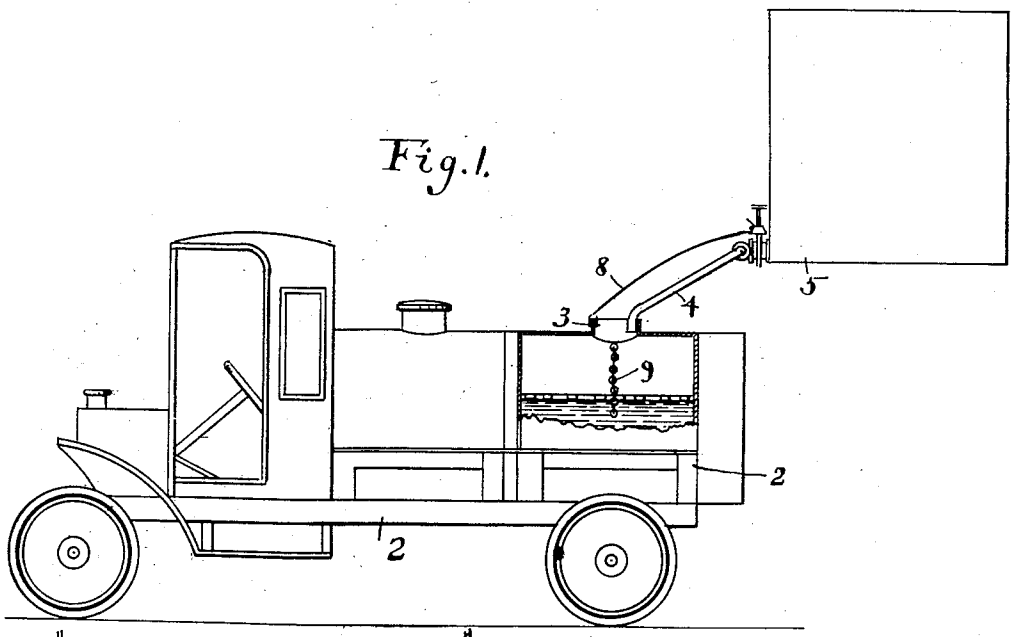


Fig. 2.

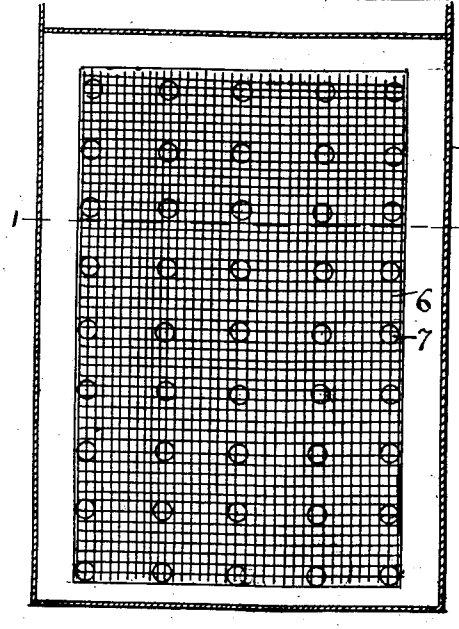
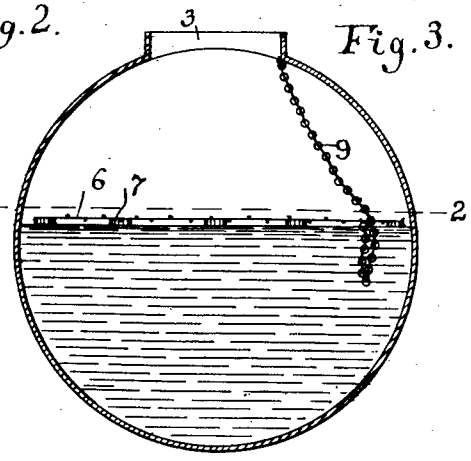


Fig. 3.



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UNITED STATES PATENT OFFICE.

WILLIAM H. CHAPMAN, OF PORTLAND, MAINE.

DEVICE FOR DISCHARGING ELECTRICITY FROM GASOLINE TANKS AND THE LIKE.

Application filed June 3, 1922. Serial No. 565,723.

To all whom it may concern:

Be it known that I, WILLIAM H. CHAPMAN, a citizen of the United States, residing at Portland, in the county of Cumberland and State of Maine, have invented certain new and useful Improvements in Devices for Discharging Electricity from Gasoline Tanks and the like, of which the following is a specification.

My invention relates to a device for discharging static electricity from gasoline tanks and the like.

It is well known that several disastrous explosions and fires have occurred in connection with the filling of truck tanks with gasoline fed through a pipe from a supply tank. The cause of these fires has been somewhat in dispute but a personal investigation that I have made of the matter shows that there is sufficient charge generated in the gasoline and sufficient opportunity for its accumulation on the exposed surface of the gasoline in the tank that is being filled to produce a spark capable of igniting the gasoline vapors.

Attempts have been made to discharge static electricity from tank wagons but without success.

The usual practice is to ground the tank wagon by a flexible wire connected to it during the time of filling and leading back to the delivery pipe which is permanently grounded.

This method has proved inadequate because of the fact that gasoline is an insulator and may retain and accumulate a charge on its free surface which amounts to many thousand volts and can produce a spark along that surface similar to those that are frequently seen shooting across the surface of paper as it comes out of the calendar rolls in a paper mill. The object of my present invention is to provide a method of preventing the accumulation of such a charge on the upper free surface of the gasoline.

Gasoline flowing through a pipe generates a charge of static electricity by friction all along the inside surface of the pipe. This charge is not observable in the pipe itself because the two opposing charges, positive and negative, are bound by the condenser action which takes place between the outer layers of the column of liquid and the inside surface of the pipe. But, as each gallon of gasoline emerges from the pipe, the charge that has been generated and held bound on its cylindrical surface is released and the potential rises just as it does on a sheet of paper or of celluloid film which has been electrified by friction on some smooth surface. While lying in contact with the surface, there is no observable charge in it but let any part of it be lifted from the surface and a strong charge is instantly evidenced by attraction of a thread held near it or by repulsion of the leaves in a gold leaf electroscope. Such a charge in a gasoline tank may even produce sparks of an inch or more in length showing a tension of several thousands of volts. Gasoline being an insulator like paper or celluloid has charges developed on its surface by friction against the walls of a pipe and as it emerges from the pipe, the charges which were held bound by condenser action in the pipe are released and may have a tension of thousands of volts. Such a charge of static electricity is liable to discharge in a spark over the surface to the sides of the tank and ignite the gasoline.

Each gallon of gasoline while in a 3 inch pipe occupies a space of approximately 33 inches in length and exposes an outside peripheral surface of 307 square inches. A tank of 300 gallons capacity after being filled with gasoline flowing through a 3 inch pipe will also have in it the electric charge due to 300 multiplied by 307 or 92100 square inches of exposed frictional surface. As this total charge is distributed over a surface very much less than that on which it was generated, the electro-static strain tending to disruptive discharge is many times greater in the tank than in the pipe.

My present invention consists in the application of means for conducting away to ground the charge that accumulates on the exposed surface of gasoline in the tank. I attain this object preferably by having numerous conducting wires kept at or near the surface of the gasoline. In the form of apparatus which I prefer to use in tank wagons and which is shown in the accompanying drawing:

Fig. 1 is a side elevation partly in section,

Fig. 2 is a plan of the float and section on the line 2—2 of Fig. 2,

Fig. 3 is a section through the line 1—1 of Fig. 2.

A wire netting is supported on corks or other floats so as to keep it as near as possible to the surface of the liquid at all times and this is connected by flexible metal conductors or chains to the metal casing of the tank which is grounded in the usual way.

Referring to the drawing, 2 is the tank wagon, 3 is the manhole inlet, 4 is the supply pipe and 5 is the storage tank from which the gasoline is taken.

For the purpose of discharging the electricity which has accumulated in the tank, I form a float made up of wire netting 6 of relatively fine wire and preferably coarse weave 6 supported at intervals by corks 7. This float rests on the surface of the liquid rising and falling as the amount of gasoline in the tank varies. For the purpose of discharging the static electricity in the netting, I provide a chain cable of light weight 9 which connects with the steel tank at some convenient point and preferably at the manhole 3. From the tank wagon the charge passes over a conducting wire 8 which is usually connected with the tank wagon and the storage tank. The storage tank is alwards grounded and the electricity thus passes harmlessly to the earth. The float is here shown as about the area of the surface of the liquid but it may be much smaller and yet accomplish its purpose.

By the use of my apparatus, gasoline tank wagons are rendered perfectly safe from danger of taking fire from static electricity. While I have specifically mentioned gasoline my invention will, of course, apply to any non-conducting liquid which is run through pipes for the purpose of filling tanks thus concentrating dangerous charges of static electricity on the surface of the liquid.

While I have shown a conductor floating on the surface of the gasoline, such conductor may be otherwise supported adjacent to the varying surface of the tank so as to accomplish the result desired.

The mesh of the netting and the size of the wires should be such as to produce a corona discharge from the separate wires. When the weave is too fine the effect will be analogous to a solid or continuous conductor.

In practice I should recommend a mesh as coarse as 1 inch and a wire finer than No. 20.

I claim:—

1. A safety means for distributing gasoline, including a supply tank, a service tank, a feed pipe leading from said supply tank to said service tank, a longitudinally extended float adapted to float on the surface of the gasoline in said service tank and a grounded flexible conductor connected to said float.

2. A safety means for distributing gasoline including a supply tank, a service tank, a feed pipe leading from the supply to the service tank, a body of wire netting, floats for supporting said netting, a grounded flexible conductor connecting with said netting.

3. A safety means for distributing gasoline, including a supply tank, a service tank, a feed pipe connecting said supply and service tanks, a body of wire netting, floats for sustaining the same at the surface of the gasoline in the service tank and a grounded chain connected with said netting.

WILLIAM H. CHAPMAN.