To all whom it may concern:

Be it known that I, Joseph Stubbers, a citizen of the United States, and a resident of the city of Covington, in the county of Kenton and State of Kentucky, have invented a certain new and useful Improved Safety Appliance for Gasolene-Tanks Subjected to Pressure from Within Outward, of which the following is a specification.

My invention relates to gasolene-tanks which are subjected to a pressure exerted within and pressing outward against the walls of the tank. Such tanks may be subjected to such pressure by having gas or vapor pumped into them by a force-pump or by carrying gasolene subjected to heat, which latter generates vapor. The rapidity with which vapor is generated depends upon the amount of heat communicated. With reference to the generation of vapor in the tank by heat, it should be noted that this generation may occur in the regular operation of a gasolene-generator connected to the tank or may occur by an accident, whereby the tank is subjected to an unexpected outward contact with heat, especially in the condition of flame.

One feature of my invention consists in providing safety appliances substantially as hereinafter specified, which prevent in the tank any pressure to a degree beyond which is safe.

Another feature of my invention consists in means for automatically reducing any pressure in the tank before the tank is opened and for so reducing the pressure that the vapor of gasolene under pressure shall be conveyed away to a place where its fumes shall do no harm.

The several features of my invention and the various advantages resulting from their use, conjointly or otherwise, will be apparent from the following description and claims.

In the accompanying drawings, making a part of this application, and in which similar letters of reference indicate corresponding parts, Figure 1 represents a side elevation of a gasolene-gas generator and gasolene-tank combined therewith and a construction applied thereto illustrating my invention. Figure 2 represents in vertical central section that portion of the mechanism shown in Fig. 1, which more particularly illustrates my invention. This figure shows the mechanism on a larger scale than it is shown in Fig. 1. Fig. 3 represents an elevation of the fill-plug, and Fig. 4 is a vertical central section of the fill-sleeve. Fig. 5 is a section, vertical and central, of the rupturable disk and the chamber which contains it, illustrating another mode of uniting the separate parts of the chamber. Both Figs. 3 and 5 are on the same scale as Fig. 2.

I will now proceed to describe my invention in detail.

A indicates a gasolene-tank, which preferably is made of seamless copper and without soft-soldered joints. One of the preferred modes of making the tanks consists in forming a shell out of one piece by what is known as the process of "drawing" it up and onto this shell securing a brass head, preferably by brazing or casting it thereto.

The tank is to be suitably upheld. In the present illustrative instance the tank is duly supported on standards A, supporting bands A, extending under and above the tank and connected at A. The brass head on this tank may have the lugs A and A, which are drilled and tapped for the purpose of respectively connecting the generator and initial-heat burner; but the connection of these to the tank may be made in any secure manner.

The generator may be of any suitable design, the one shown here being selected on account of its simplicity: T indicates a gas (or vapor) delivery valve. N indicates the initial-heat burner. P is a cylinder located over the generator for the purpose of preventing the products of combustion coming from the subflame-burner from entering into the commingling-tube and also for the purpose of preheating the air before it is mixed with the vapor.

The cylinder is open at a proper place or places to receive the fresh air to be mixed with the vapor of gasolene delivered from the valve T. To capacitate this cylinder for receiving such fresh air, I make it open at one or both ends. These openings in the cyli-
nder for the reception of fresh air may be protected with a wire screen to prevent any flame from entering into the mixing-tube.

R indicates the subflame-burner. A pipe R' connects the delivery-pipe P to the subflame-burner for the purpose of supplying the subflame-burner with some of the mixed vapor and air, which mixture passes up into this delivery-pipe P' and is thereby conveyed to the burners or other desired point. This mixture of vapor and air is composed of vapor ejected from the valve T into the cylinder and into the delivery-pipe and on its way thither mixed with the air entrained from outside into the cylinder P through the aforementioned air-inlet openings of it.

S indicates the generator for generating the gasolene vapor.

W indicates a shield to prevent the subflame of the subflame-burner R from being blown out.

N indicates a conduit for conducting the vapor to the initial heat burner N. Of this burner N indicates the delivery end of the valve and N' the hand-wheel or equivalent means for regulating this valve N'.

V indicates a conduit for conducting gasolene from the tank A to the generator S.

In view of the state of the art further description of the construction of this apparatus for generating vapor of gasolene and intermingling that vapor with air is deemed unnecessary.

Suitable means for creating a pressure in the tank A and continuing such pressure therein are to be employed. In the present exemplification I have shown one kind of such means; viz., an air-pump B, provided with a preferred kind of suitable base B'. A pipe C is the connecting-conduit from the pump to the gasolene-tank A.

B indicates the piston-rod of the pump, and B' a handle for operating such rod. A strap B', connecting the barrel of this pump to the tank, serves as a convenient means of upholding it and of making it portable with the tank A.

At the place where the tank A is to be filled with gasolene I locate a device described as follows: A sleeve or receptacle D is provided and an interior or female screw-thread D' and lower down with a shoulder D'. Below this shoulder the interior of the sleeve is duly connected to the interior of the tank A by the extension or conduit D'. The interior of this sleeve is connected to the interior of a pipe B' by a conduit E. D' indicates the fill-plug, provided exteriorly with a screw-thread D'', which latter engages the screw D' of the sleeve.

D. The upper end of this plug is formed so as to be capable of being duly rotated. A simple mode of forming it for this purpose is by making a slot D' in it to accommodate a wrench or any suitable instrument for screwing the plug down in the sleeve or up and out of the latter. D' is a screw which passes through the plug centrally or substantially so. The head of the screw is at the upper side of the plug and cannot pass through the plug. The other or free end of this screw D' passes down below the plug and is screwed into the metal disk D''. This disk D'' has a downwardly-extendable screw-threaded projection D''', around which at its upper part is a gasket D'', held in place by a nut D', screwed onto this projection D'''. This metal disk D'' has also a cone-shaped projection D'' centrally disposed on its upper side, and the bottom part of the plug D' is countersunk, so that the disk D'' will touch the plug D' only at the raised or upper part of the projection D'''. Such a construction allows the disk D' to swing, so that when it (its gasket) touches the shoulder D'' of the sleeve D it can and will settle down level and will not turn when plug D' is screwed up tighter, but will merely be pressed down onto this seat (annular shoulder) D'', thereby preserving the gasket and making a tighter joint. The disk D'' is smaller in diameter than the inside diameter of sleeve D'' so as to allow the vapor to pass freely around the disk when the same is removed from the shoulder D'' and pass through orifice D' into pipe E. Although this mode of constructing the sleeve, plug, and gasket and this provision of this device for keeping the gasket level, &c., are of my invention and constitute the preferred construction, yet the construction may be altered without affecting those principal features of my invention hereinafter described. Thus, for instance, the common mode of putting the gasket below the plug might be used or other modes be employed without materially affecting the principal features of invention.

The sleeve D has an opening D' in one side, with which one end of the pipe E aforementioned communicates. This opening is preferably close to the shoulder D'', where the plug makes its joint.

One end of the pipe E' leads to the outside of the building or to some place where the gas or vapor escaping therefrom cannot cause an accident. The other end E'' of this pipe is connected with a chamber H. The chamber H is preferably made in two separable parts—viz., H' and H''—for enabling the interior of the chamber to be reached. These parts are preferably connected by means of lugs H' on part H' and lugs H' on part H'' and bolts H'. The latter hold adjacent lugs H' and H' together in the well-known manner. A suitable conduit or passage-way H'' connects the chamber H to the gasolene-tank A.

The chamber H contains a diaphragm K, which consists of light sheet metal. In Figs. 1 and 2 this diaphragm K is shown raised somewhat in the center. This is the position it assumes when there is a pressure in the tank. A device for rupturing this diaphragm when
this pressure exceeds that which is safe or desired, as hereinafter more particularly specified, is present. This rupturing-abatement consists of a pin M, whose lower end is adapted to stand in the way of the diaphragm and meet it as it is raised by the pressure of the gas and vapor of the tank and when the pressure exceeds the amount fixed upon and the diaphragm continues to rise shall duly rupture it.

It is desirable to be able to regulate or adjust the device so that the disk K may burst at any desired pressure. Several desirable modes of effecting this regulation are, first, by providing means for lowering and elevating the pin M; second, by making the lower end of the pin more or less pointed; thirdly, different thicknesses of metal for the diaphragm may be employed. The first method of providing means for elevating and lowering the pin M may be conveniently carried out by providing the pin M with a screw-thread M', engaging a female thread in the boss H' of the chamber. Rotation of the pin in the proper direction operates to elevate or lower the pin, as desired, thereby bringing it nearer or farther away from the diaphragm K. If desired to have the sheet-metal diaphragm ruptured at less pressure, then the pin M should be screwed down. If desired to rupture the diaphragm at a greater pressure, then the pin should be screwed up.

The end of the pin M which is next to the diaphragm is preferably provided with a button M', and this button M', when present being the end of the pin, may be more or less pointed, as and for the purpose aforementioned.

It is an object not to have the button press against the metal disk K when there is little or no pressure in the tank. The disk K may be soldered to the bottom or lower portion of the chamber H or be otherwise fastened to it in any suitable manner. The attachment when the arrangement is as shown will be at or near the peripheral edge.

The object of having the chamber H in separable divisions is primarily so that in case the disk be ruptured ready access to the interior of the chamber can be had to remove the ruptured disk and to replace it with a new one.

The separable divisions of the chamber may obviously be connected in various ways. For instance, part H' may be smaller in diameter than part H and have a male thread and part H' have a female thread, and in this event part H' may serve to clamp disk K in place and make a perfect joint. (See Fig. 5.)

Having now described the principal features of this invention, I will proceed to describe the operation. The generator is heated in the well-known manner by pumping air into the tank A containing the gasolene and opening and lighting the initial-heat burner N. The air is carbureted by the air coming in contact with the gasolene in the tank. While heating the generator air under pressure has to be introduced into the tank. In the present illustrative instance it is pumped into the tank. After the generator is heated sufficiently to generate vapor in the generator S then the valve T is turned on and the vapor shoots therefrom, passing into mixing-tube Q. The spouting of the vapor entrains the air into the commingling-tube Q and mixes with same and is carried through pipe P wherever desired. Some of this vapor, however, after it enters pipe P passes through pipe R into the subflame-burner R and is there ignited, which therefore keeps the generator hot, after which the initial-heat burner should be turned off. The gasolene is fed from the tank A into the generator S through pipe V. The pressure in the tank may be maintained by re-pumping air into the tank or in some other mode. When it is desired to refill the tank, plug D must be removed. When the plug is unscrewed only half a turn, the gases under pressure in the tank will immediately pass through the pipe E into pipe E' and from there to the outside of the building or some other place where the flames will do no harm. Another feature is that before the plug D is unscrewed all the way, all the pressure would be out of the tank, and on account of the pressure being exhausted the subflame at generator will be automatically extinguished, for the reason that without the pressure there is no vapor forced out of the needle-opening.

It is a well-known fact that gasolene when it becomes heated expands very rapidly, and it has occurred with many gasolene devices that under such circumstances the tank bursted and disastrous results would follow, and with certain other gasolene devices which have soldered joints the solder would melt and then the gas would escape into the room, increasing the fire. In many instances the flame burning around the tank was at first very small; but when the solder melted in the joints the gas would suddenly escape, making a large fire. It is therefore desirable that in the first place the tank should not have any soldered joints and in the second place that the tank cannot burst under any condition and in the third place that the gas cannot escape into the room under any condition. In my invention when too much pressure is created the disk K will bulge upward, as shown in drawings. It will be pressed up against the button M' on pin M, and soon thereafter it will rupture. When the disk K ruptures, the vapor in the tank A will escape through the connecting-pipe H' and from there pass through the ruptured disk K, thence through the pipe E' to the outside of the building. It will be noted that the pipe E' is used for two purposes. One is to carry the vapor under pressure out of the tank when the machine is to be filled and prior to this filling
and the other is for carrying the vapor out of the tank when the disk K ruptures. It will also be seen that instead of using a disk that will rupture I could use a safety-valve; but as it is absolutely necessary that the safety-valve should be perfectly tight, which may be difficult to obtain, I prefer a disk that will rupture at the proper time. At other times the disk has perfectly tight joints.

What I claim as new and of my invention, and desire to secure by Letters Patent, is—

1. The combination of a gasolene-tank, a sleeve connected thereto, a pipe connected to the sleeve and leading to a proper place for the discharge of vapor, or gas, a fill-plug adapted to engage said sleeve, the fill-plug and the sleeve being mutually constructed for enabling the vapor under pressure in the tank to escape through this pipe, before the fill-plug is removed, substantially as and for the purposes specified.

2. In combination with a gasolene-tank, means for maintaining pressure therein, an inclosed safety device adapted to escape gas under the predetermined pressure, and an escape-pipe leading from said safety device, a filling device having a by-pass and a pipe connecting said by-pass to said safety escape-pipe and a filler-plug for closing the tank below the by-pass, said plug likewise closing the by-pass when the same is in position to close the filling-opening into said tank, substantially as described.

3. In combination with a gasolene-tank, means for maintaining pressure therein, an inclosed safety device adapted to escape gas under a predetermined pressure, a filling device, means for escaping the accumulated gas from the tank when the filling device is opened, and an externally-conducted escape-pipe having branch connections with both of said devices for escaping gas from the tank, substantially as described.

In witness whereof I have set my hand to this specification in the presence of two subscribing witnesses.

JOSEPH STUBBERS.

Attest:

JOHN E. FITZPATRICK,
K. SMITH.