Aug. 17, 1926. 1,596,385

R. E. WILSON

PREVENTION OF EVAPORATION

Filed May 4. 1923 2 Sheets-Sheet 1

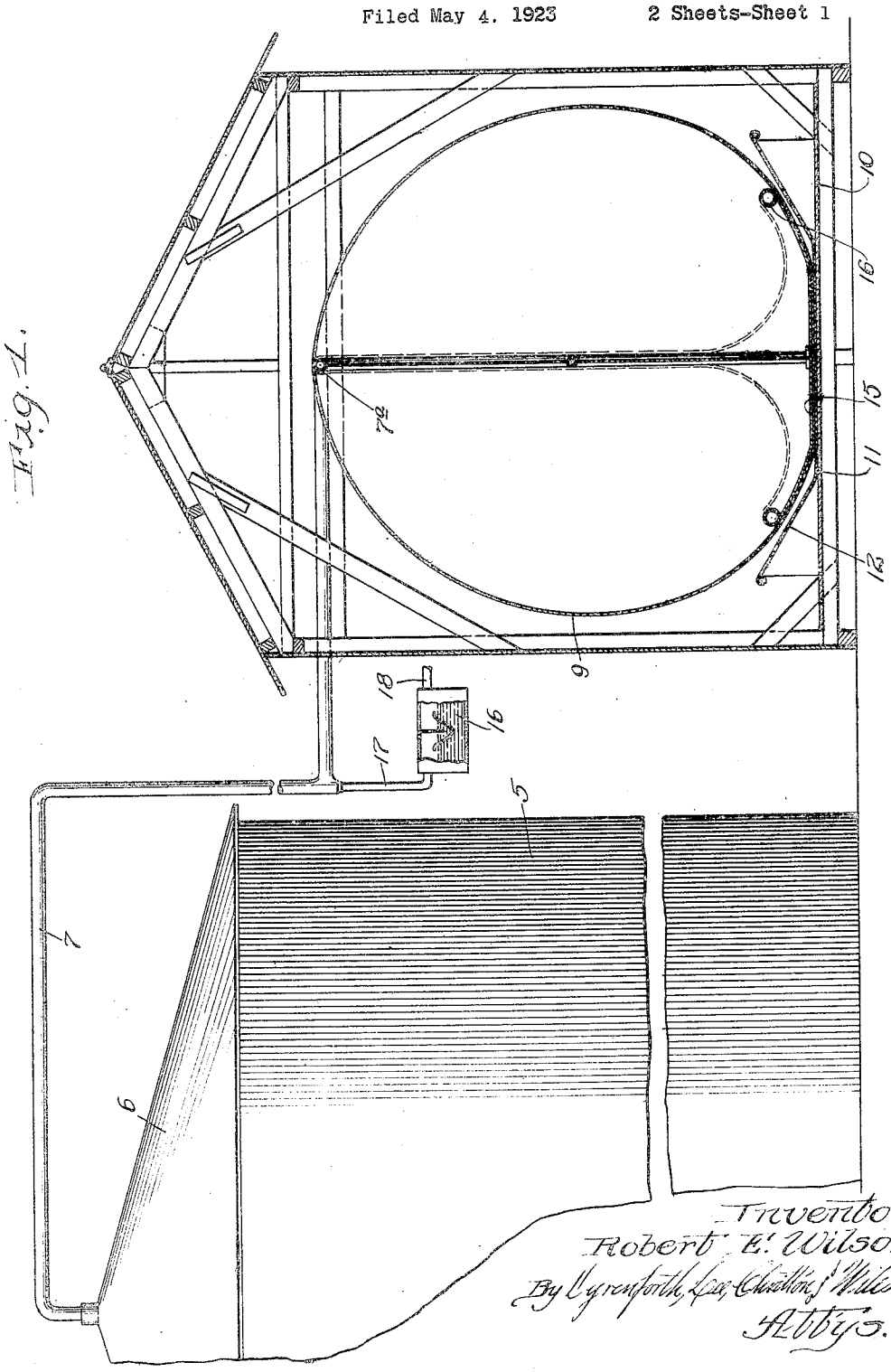


Fig. 1.

Inventor:
Robert E. Wilson,
By Lyon, Lyon, Christian & Miles,
Attys.

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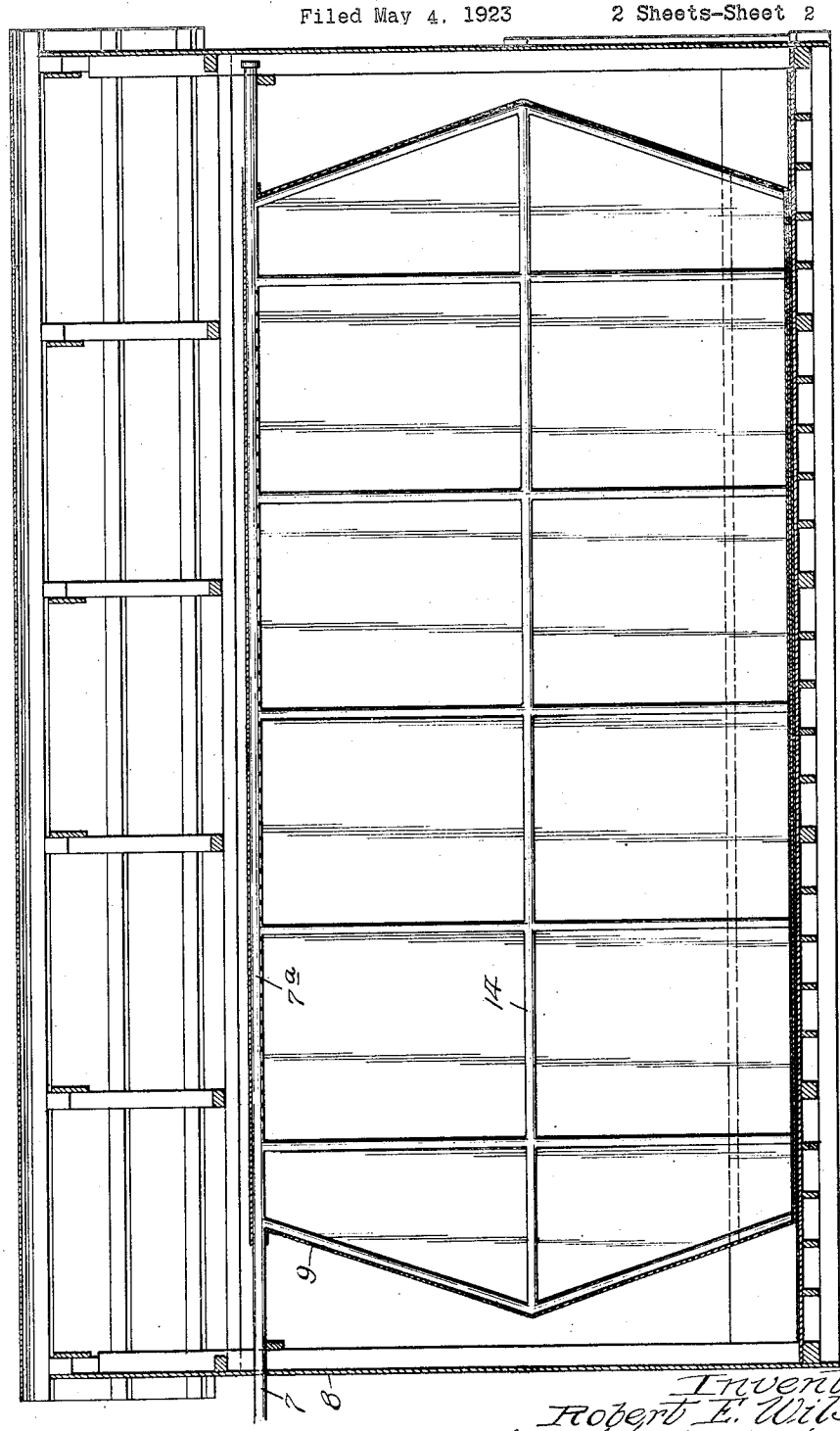


Fig. 2.

Inventor:
Robert E. Wilson,
By Dyer, Horth, Lee, Christy, Riley & Tibbits.

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UNITED STATES PATENT OFFICE.

ROBERT E. WILSON, OF CHICAGO, ILLINOIS, ASSIGNOR TO STANDARD OIL COMPANY, OF WHITING, INDIANA, AND CHICAGO, ILLINOIS, A CORPORATION OF INDIANA.

PREVENTION OF EVAPORATION.

Application filed May 4, 1923. Serial No. 636,590.

This invention relates to the prevention of evaporation of stored liquids, and more particularly of liquids such as gasoline, crude petroleum and the like ordinarily stored in tanks of varying capacity subject to a greater or less extent to atmospheric and climatic changes. It will be fully understood from the following description, illustrated by the accompanying drawings, in which;

Fig. 1 is a view, partly diagrammatic and partly in section, of apparatus suitable for carrying the present invention into effect, and

Fig. 2 is a longitudinal vertical section through the bag house illustrated at the right in Figure 1.

Referring more particularly to the drawings, the numeral 5 indicates a storage tank, illustrated diagrammatically, provided with a roof 6, from the vent of which leads a pipe 7. Pipe 7 leads into a bag house 8, in which is provided a bag 9, preferably collapsible, and constructed of fabric or other suitable pliable material so treated as to be substantially impervious to and unaffected by the vapors evolved from the tank 5. The bag 9 may, for example, be formed of a suitable fabric such as balloon silk, thoroughly impregnated or coated with a composition consisting mainly of gelatine with (if desired) a small proportion of a hardening agent, such as chrome alum, hexamethylenetetramine, formaldehyde, or the like, and a smal' proportion of a suitable softening agent such as glycerine, or the like. For example, I may form on the fabric a coating containing one part (by weight) glue, two parts glycerine, and one part water with ½ to 1½% ferrous sulfate. The bag is constructed of a capacity somewhat greater than the normal volume of gas or air that may be forced out of the tank 5, during the so called "breathing" of the tank; that is, the ordinary contraction and expansion of its contents with atmospheric changes.

The pipe 7 extends through the bag house and is supported within the latter at an elevated point. The pipe 7 passes through the bag 9, the bag being partially supported by being suspended from the pipe 7. That portion of the pipe 7 within the bag, indicated by the numeral 7ª, is provided with perforations through which air and vapors forced out of the tank may pass into the interior of the bag.

Within the bag house there is supported on the floor 10 a bottom member 11, formed with inclined guides 12, the result being a trough-like arrangement, the side members of which serve to aid in supporting the fabric of the bag. From this bottom member 11, there arise a number of vertical posts or pipes 13 which extend upward through the bag and are connected with a portion 7ª of the pipe 7 within the bag. Suitable transverse frame members 14 are provided, the whole forming a vertical frame for the support of the pipe 7 and the bag 9. The bag 9 completely surrounds this vertical support, being tightly secured to the support members at all points where they pass therethrough, to avoid leakage. Such points may be suitably cemented or glued down, as is readily apparent.

Within the fabric of the bag 9 there is arranged just above the cross-like member 11 a suitable cross-like member 15 of less width. This member serves as a support for the hose of the bag when the latter is collapsed. The edges of the side portions of the cross-like member 15 are rolled over as indicated at 16 to prevent damage to the fabric of the bag from contact therewith.

It is readily apparent from the construction described that during expansion of the contents of the tank 5, the gasoline-charged air passing out through the pipe 7 enters the bag 9 and causes the latter to expand to a greater or less extent. The bag being substantially impervious to these gasoline-charged vapors, the gasoline vapors are retained therein and, during contraction of the contents of the tank 5, the contents of the bag 9 are drawn back into the tank by suction. Since the vapors thus drawn into the tank from the gas bag 9 are already more or less saturated with gasoline vapor, the proportion of gasoline evaporated from the exposed surface of the liquid in the tank is consequently reduced.

In order to provide for undue or excessive expansion or inspiration of vapor or air, I may connect to the vent or to the pipe connected therewith any suitable safety device, for example, a liquid seal. In the drawings I have illustrated diagrammati-

cally a liquid seal 16 connected by pipe 17 to the conduit 7 and by outlet pipe 18 to the atmosphere.

Although the present invention has been described in connection with the specific details of a construction and of a method embodying the same, it is not intended that these shall be regarded as limitations upon the scope of the invention, except in so far as included in the accompanying claims.

I claim:

1. In apparatus for preventing loss by evaporation from storage tanks containing volatile hydrocarbon liquids, a storage tank provided with a vent and adapted to contain a volatile hydrocarbon liquid, a collapsible fabric bag substantially impervious to hydrocarbon vapors and adapted to care for ordinary changes in volume of vapor contents of the tank, a conduit connecting the vapor space of the tank to the interior of the bag, said vapor space, conduit and bag forming a vapor system, and a seal between the vapor system and the atmosphere operated on presure differential in either direction and adapted to operate on extraordinary changes in volume of vapor contents of the tank.

2. In apparatus for preventing loss by evaporation from storage tanks containing gasoline or the like, a tank of large size suitable for the retention of large, commercial volumes of such liquid and providing a vapor space thereabove, a collapsible bag formed of fabric provided with a coating impervious to the vapors given off by the liquid, said bag being of a volume sufficient to contain the normal volume of vapor mixture forced out of the tank due to daily atmospheric changes, and a conduit connecting the vapor space of the tank with the interior of said bag, the whole being sealed against free admission of the atmosphere.

3. In apparatus for preventing loss by evaporation from storage tanks, a trough-like bottom member, a vertical support mounted thereon, a collapsible bag impervious to gasoline vapors suspended from said support and resting upon said trough-like member, a storage tank, and means connecting the vapor space of the storage tank with the interior of said bag.

4. In apparatus for preventing the loss by evaporation from storage tanks, a bag support comprising a vertical frame and a bottom trough-like member supporting the same, a gas bag suspended from said frame and resting upon the frame near the bottom thereof, a storage tank, and means for connecting the vapor space of the storage tank with the interior of the gas tank.

5. In apparatus for preventing loss by evaporation from storage tanks containing gasoline, a tank, a collapsible bag formed of fabric provided with a coating impervious to the gasoline vapors, a descending conduit connecting the vapor space of the tank with the interior of the bag, and a liquid seal connected with said conduit and being opened by differences in pressure in either direction between the interior of said conduit and the atmosphere.

6. In apparatus for preventing loss by evaporation from storage tanks, a bottom supporting member, supporting means vertically spaced above said bottom supporting member, a collapsible bag impervious to gasoline vapors, suspended from said supporting means and resting on said bottom supporting member, a storage tank, and means connecting the vapor space of the storage tank with the interior of said bag.

ROBERT E. WILSON.