Patented Aug. 24, 1943

2,327,835

UNITED STATES PATENT OFFICE

2,327,835

FUEL FOR GAS GENERATING AND DISPENSING SYSTEMS

Loyd J. White, San Antonio, Tex., assignor to Southern Steel Company, San Antonio, Tex., a corporation of Texas

No Drawing. Application December 6, 1941, Serial No. 421,994

2 Claims. (Cl. 44—52)

This invention relates to hydrocarbon fuel for use in ordinary liquefied gas dispensing systems, such as those designed for dispensing butane or mixtures of butane and propane which are composed predominately of butane. The main idea is to provide a new commercial fuel, including propane as the main volatile constituent, to take the place of butane and butane-propane blends, now commonly used in underground systems of the general type disclosed in Patents No. 2,121,675 and 2,176,829. A further aim is to provide such a fuel having a range of vapor pressures comparable to that of butane or commercial butane-propane blends. A further aim is to provide a new propane fuel comprising a mixture of propane and normally liquid hydrocarbon fuel which may be proportioned and blended so that its vapor pressure, at maximum operating temperatures, will not exceed the safe, design pressure limits of the many thousands of relatively low pressure, butane storage and dispensing systems already permanently installed for household and commercial uses. A still further aim is to employ a commercial, normally liquid fuel in making the blended mixture which will serve not only to enrich the BTU content of the propane vapor, due to its own vapor pressure, but, also, which can easily be separated from the mixture as the propane component is vaporized in a two-stage, pressure reducing, liquid eduction system of the type shown in my copending application Ser. No. 420,566, filed November 26, 1941.

Other aims and advantages of the invention will appear in the accompanying specification.

The present National Defense Program contemplates the use of butane in greatly increased quantities for the manufacture of high octane aviation fuel. At present, there are more than 150,000 underground butane gas storage and dispensing systems in use which would be seriously affected by a curtailment of its use, especially, for cooking, heating and refrigeration in rural communities. Propane is readily available for such uses. However, ordinary commercial propane has a much higher vapor pressure than butane or butane-propane mixtures composed predominately of butane, and cannot safely be used in the present low pressure butane systems. For example, at 100° F., propane has a vapor pressure of approximately 172 pounds, gauge; while butane develops a vapor pressure of only 37.5 pounds, gauge, and a mixture of 70% butane and 30% propane—a blend commonly used—develops a vapor pressure of approximately 78 pounds, gauge. Thus, it will be apparent that the handling of propane requires storage containers and truck tanks of materials having more than 100% greater strength and weight than those designed for butane and butane-propane blends. It is therefore an object of this invention to provide a mixture wherein propane is the main volatile component, which can be stored and transported in existing low pressure butane containers and which is usable in such systems without requiring expensive alterations, so that all butanes (normal butane and iso-butane) may be released as needed for making high octane, aviation fuel without great inconvenience to the present butane gas consumers.

In accordance with this invention, ordinary liquefied propane is mixed with a normally liquid, hydrocarbon fuel, such as commercial cracked gasoline, benzine, naphtha, or kerosene, or any readily miscible, normally liquid, petroleum or coal tar distillate which will reduce the vapor pressure of the mixture to within the safe pressure working limits of existing butane gas systems, most of which systems are designed and constructed to safely carry a maximum of 125 pounds, gauge pressure, per square inch. The normally liquid fuel is mixed with the propane in such proportion as to reduce its vapor pressure, at 100° F., to within the design working pressure of the containers to be served, as well as the transporting and storage equipment. In other words, the vapor pressure of the mixture should not exceed, say, 125 pounds per square inch, gauge, at 100° F. However, the pressure may be much lower, consistent with a desirable minimum of the normally liquid fuel in the mixture. It is preferred to mix ordinary gasoline with the propane, because the gasoline component of the mixture can readily be separated in the system after the mixture is delivered to a vaporizer and it is recoverable for subsequent use in automobiles, tractors, etc. It must be removed from the mixture before the propane is finally delivered as a vapor to the consuming appliances. However, some of the gasoline vaporizes and enriches the BTU content of the propane vapor, thereby increasing its heating value and improving its flame characteristics. The ratios of the propane and gasoline will range between, say, 70 parts, by volume, of propane to 30 parts of gasoline and 30 parts of propane to 70 parts of gasoline, depending on the desired vapor pressures for the low pressure systems and the range of operating temperatures. For example, it has been found that an approximately 50–50 mixture, by volume, is highly satis-

factory, because its vapor pressure, at 100° F., is between 70 and 80 pounds, gauge, depending upon the volatility of the fuels. Therefore, it comes within the pressure range of gas systems designed for butane and ordinary butane-propane mixtures. The more gasoline added to the mixture, the less will be its vapor pressure, and vice versa.

There is some moisture present in most all commercial hydrocarbon fuels and it is highly objectionable in liquefied gas systems, because, in cold temperatures, it may freeze and form ice on the regulator valve parts, causing them to stick and cease to function. Even though the present fuel mixture has anti-freeze properties, it is desirable to add some other anti-freeze solution to it to reduce the freezing point of the moistures in the mixture. For that purpose, a small quantity of methyl alcohol, say, about one quart to each hundred gallons of the mixture, may be added, because it has an affinity for the moisture.

It has been found that the new fuel mixture is eminently suited for use in low pressure systems and can be transported in the usual containers or truck tanks, heretofore used for transporting butane. When gasoline is employed as the liquid component, it enriches the propane vapor and is easily recovered for use in automobiles, trucks, tractors and the like. Moreover, ordinary gasoline has sufficient vapor pressure to deliver some of its own vapor to be mixed with the propane vapor, increasing its heat value and, to some extent, improving the flame characteristics of the propane vapor. It is contemplated, however, that many other miscible, normally liquid, hydrocarbon fuels may be used to advantage and it is to be distinctly understood that the claims herein are not limited to a propane-gasoline mixture.

It will be understood that commercial propane usually contains other, more or less volatile constituents, including a small percentage of ethane and some butane. Its composition is known to vary. Therefore, the term is used in the claims as applying to the commercial product. The invention contemplates any fuel mixture in which propane is the predominant, volatile component.

Obviously, the invention is not restricted to the particular fuel mixture herein described.

What is claimed is:

1. As a fuel for liquefied gas dispensing systems, a mixture of propane and gasoline consisting of between 70 parts propane, by volume, to 30 parts gasoline and 30 parts propane to 70 parts gasoline.

2. As a fuel for liquefied gas dispensing systems designated to operate at materially lower vapor pressures than that of propane, a mixture of propane and gasoline in the proportion of approximately 50 parts, by volume, of propane to 50 parts gasoline.

LOYD J. WHITE.