SOLIDIFIED HYDROCARBON FUEL PACKAGE

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This invention relates to a solidified hydrocarbon fuel package. In another aspect, this invention relates to a solidified hydrocarbon fuel packaged in a unique and novel manner to provide an improved burner and fuel assembly.

The use of charcoal as a fuel for grills, barbecues and other cooking equipment for broiling, barbecuing and grilling has gained great popularity in recent years, both for indoor and outdoor facilities. This can be attributed, at least in part, to the general acceptability of charcoal cooking as an improved method of preparing certain foods such as various cuts of meat, and to improved economical charcoal cooking equipment. A serious disadvantage of employing charcoal as a source of heat is the difficulty encountered in igniting the charcoal. As the ignition point of charcoal is higher than the temperature produced by an ordinary match, a method of ignition comprising the saturation or the pouring on the charcoal of a highly flammable fuel and the ignition of the fuel with a match has been employed.

The employment of these highly flammable fuels is both dangerous and expensive, as much of the fuel is lost by evaporation. Thus, it can be seen that there is a distinct need for an easily ignitable fuel that produces an intense heat, is particularly adaptable for home use as a charcoal lighter, is not dangerous, and is convenient to handle, store and transport from place to place. In addition thereto, there is a distinct need for a packaged fuel that can be readily employed in and of itself as a source of warmth, light, or cooking heat.

I have by my invention provided a solidified hydrocarbon fuel packaged with a metallic foil wrapping such that, prior to use, the wrapping is convertible to a combustion restrictor which, by providing an extending upper chimney and supplementary air vents, results in controlled fuel-air mixing, efficient combustion, and substantially smokeless operation.

According, an object of my invention is to provide an improved solidified hydrocarbon fuel package.

Another object of my invention is to provide an improved solidified hydrocarbon fuel package wherein the package can be employed as a burner or combustion restrictor and fuel assembly.

Other object, advantages, and features of my invention will be readily apparent to those skilled in the art from the following description and the appended claims.

The invention is applicable to the packaging of a solidified hydrocarbon fuel having a composition comprising a major portion of a normally liquid hydrocarbon and a minor portion of a normally solid high molecular weight polymer of a 1-olefin having 2-8 carbon atoms per molecule. Polymers of 1-olefins include homopolymers of 1-olefins having from 2-8 carbon atoms and copolymers of these 1-olefins with each other. Representative examples of suitable 1-olefins include ethylene, propylene, butene-1, pentene-1, hexene-1, heptene-1, 4-methylpentene -1, 5-methylhexene-1, 4,4-dimethylhexene-1, 4-methylhexene-1, octene-1, and the like. Suitable olefin polymers include variously polymerized ethylenes as well as polypropylene, ethylene-propylene copolymers, and ethylene-butene-1 copolymers. Generally, the composition of the solidified hydrocarbon fuel will contain less than about 40 weight percent of the solid high molecular weight polymer and preferably will contain less than about 35 weight percent of the solid polymer.

The solidified hydrocarbon fuel can be prepared by blending together the hydrocarbon and high molecular weight polymer at a temperature at which an essentially uniform homogeneous blend can be obtained. The blended mixture is cooled, molded, or extruded to obtain a desired shaped product exhibiting the physical characteristics and appearance of the high molecular weight polymer alone. The hydrocarbon employed in the blend is a normally liquid hydrocarbon boiling up to about 750° F. at atmospheric pressure. Reference is made to copending application Serial No. 180,024, filed March 15, 1962, by James E. Keeple, for a more complete description of the solidified hydrocarbon fuel employed. In the drawings:

FIGURES 1a, 1b and 1c illustrate one embodiment of the inventive solidified hydrocarbon fuel package.

FIGURES 2a, 2b and 2c illustrate a second embodiment of the inventive solidified hydrocarbon fuel package.

FIGURES 3a, 3b and 3c illustrate a third embodiment of the inventive solidified hydrocarbon fuel package.

Referring to FIGURE 1a, there is illustrated a doughnut-shaped solidified hydrocarbon fuel wrapped or enclosed in a metallic foil, thereby preparing a packaged solidified hydrocarbon fuel. The metallic foil employed can comprise any metal or metal alloy which may be drawn into a foil and which melts above about 500° C. The thickness of the metallic foil employed will depend on the individual metal utilized but will generally be in the range of about 0.5 to about 5 mils. Foils of aluminum and the common alloys of aluminum are preferred because of their availability and relatively low cost. Aluminum foils which range in thickness from about 2 to about 3 mils are satisfactory.

Referring to FIGURE 1b, there is illustrated a cross-sectional view taken along the lines 1—1 of the packaged solidified hydrocarbon fuel of FIGURE 1a. A doughnut-shaped solidified hydrocarbon fuel 11 is wrapped in the metallic foil 12. The metallic foil is tightly crimped to itself to form an effectively sealed package. This seal can be effected at any convenient location such as at the periphery of the solidified hydrocarbon fuel or at its center as illustrated in FIGURE 1c.

The sealed package can be opened or reformed to form a combustion restrictor having a combustion chamber and provided with appropriate means of circulating air and solidified hydrocarbon fuel forming another combustion mixture. Referring again to FIGURE 1b, cardboard discs 13 are fastened to the underside of the metallic foil. A string 14 is attached to both cardboard discs 13. An upward pull of string 14 will pull the metallic foil in an upward direction, rupturing the metallic foil to simultaneously form a chimney 16 and a vent 17 as illustrated in FIGURE 1c. Means other than the pull string 14 and discs 13 can, of course, be employed to open the fuel package. As can be seen from FIGURE 1c, the chimney 16 is frustr-conically shaped.

The fuel package can now be readily employed as a combustion restrictor or burner. The solidified hydrocarbon fuel is readily ignited with a spark or a flame. The burning gases are channeled upwardly through the chimney 16 and from the fuel package, creating a natural draft and by means of additional combustion air through the vent 17 to the fuel package in the illustrated manner. A substantially smokeless flame is produced suitable as a fire kindler, or a source of warmth, light, and cooking heat.

To aid in the circulation of air to the fuel package, the fuel package can be propped up slightly from a support
ing base. In many instances the solidified hydrocarbon fuel will retain its shape and form during the process of burning. If, however, before it is consumed, a portion of the polymeric component of the fuel softens and flows, it will be retained in the annular depression of the assembly until it becomes consumed or until the burner is extinguished. Thus, the air vent is prevented from becoming constricted or blocked by movement of the heat-softened fuel composition.

Referring to FIGURE 2a, a cylindrical-shaped solidified hydrocarbon fuel having a center passage is packaged in metallic foil with the packaged solidified hydrocarbon fuel designated by the number 20. A tangential method of folding the metallic foil at the top of the cylinder is therein illustrated with the purpose of the tangential fold hereinafter described.

FIGURE 2b is a cross-sectional vertical section taken along the lines 2—2 of FIGURE 2a. Referring to FIGURE 2b, a cylindrical-shaped solidified hydrocarbon fuel 24, having a vent opening 26, is wrapped in a metallic foil 22. A cardboard disc 21 having a string 23 attached thereto, is positioned beneath metallic foil 22. Upon pulling string 23 and removing disc 21, the tangentially folded metallic foil neatly unfolds to form the combustion chimney 27 illustrated in FIGURE 2c. The removal of the disc 21 also breaks the seal in the center air vent channel 26 and permits the fuel burner of FIGURES 2a, 2b and 2c to function in the same manner as the burner of FIGURE 1.

Referring to FIGURE 3a, a third embodiment of the inventive solidified hydrocarbon fuel package 30 is illustrated, said solidified hydrocarbon fuel package 30 comprising a cylindrical-shaped solidified hydrocarbon fuel wrapped in a metallic foil. As in the case of the embodiment illustrated in FIGURE 2a, the metallic foil is wrapped about the solidified hydrocarbon fuel such that the metallic foil at the top of the cylinder is folded in a tangential method.

FIGURE 3b is a cross-sectional vertical section taken along the lines 3—3 of FIGURE 3a. As illustrated in FIGURE 3b, a solidified hydrocarbon fuel 31 is wrapped in a metallic foil 32, the top layer of metallic foil 32 wrapped in a tangential method illustrated in FIGURE 3a. A metallic foil disc 33 is positioned beneath metallic foil 32 and attached to a cardboard disc 35. A string 34 is attached to cardboard disc 35 and upon pulling string 34 upwardly, disc 35 and metallic foil disc 33 are removed to provide the combustion restrictor of FIGURE 3c. The solidified hydrocarbon fuel 31 is effectively sealed by the metallic foil disc 33 closing openings or passages 36 prior to the employment of the fuel package 30 as a burner.

In operation, combustion air passes through vents 36 positioned as illustrated in FIGURE 3c and the effluent combustion gases are passed from fuel package 30 via chimney 37.

As will be evident to those skilled in the art, various modifications of this invention can be made, or followed, in the light of the foregoing disclosure and discussion without departing from the spirit or the scope thereof.

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