SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO
DIVISIÓN DE NUEVAS CREACIONES

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ASUNTO		
	Radicación	**07-20636**
	Trámite	002
	Evento	001
	Actuación	430
	Oficio	№ 08850
	Folios	**022**

Patente de Invención	[X]	Patente de Modelo de Utilidad		[ ]	
Vía Nacional	[X]				
Vía PCT (fase nacional)	[ ]	Cap. I	[ ]	Cap. II	[ ]

Como resultado del examen de fondo, realizado con fundamento en el artículo 45 de la Decisión 486 de la Comisión de la Comunidad Andina, se le comunica:

1. Documentos estudiados

1.1. Descripción: Folios: 4 a 6 tal como se radicó inicialmente

1.2. Reivindicaciones: Folio 7 tal como se radicó inicialmente

2. Objeto de la invención

- Título de la solicitud *(folio 1)*
  Combustible gel ecológico
- Las reivindicaciones 1 a 2 de la solicitud en estudio se refieren a
  Una composición combustible en forma gelatinosa utilizable dentro de un envase portador con ayuda de una parrilla adaptable al envase, inflamable con fósforo o encendedor y que se caracteriza por incluir los siguientes elementos porcentuales:

Alcohol de caña etílico	*85%*
Agua	*11.8%*
Espesante	*2%*
Colorante	*0.2%*
Bactericida	*0.2%*
Fungicida	*0.1 %*
Antioxidante	*0.4%*
Ajustes	*0.3%*

- El anterior producto busca *proporcionar una composición combustible gaseosa*
- La Clasificación Internacional de Patentes (IPC) para esta solicitud es *C 10 L 1/00.*

3. Determinación del Estado de la Técnica

- La fecha que se ha tenido en cuenta para determinar el estado de la técnica es *1 de marzo de 2007*
- Teniendo en cuenta la fecha indicada se realizó la búsqueda en el estado de la técnica de documentos relacionados con la solicitud encontrándose los siguientes documentos más relevantes:

Nº	Documento	Título	Fecha de publicación
D1	US 2 613 142	Alcohol fuel gel	11.05.1948
D2	US 3 072 467	Fuel gel	08.01.1963
D3	US 4 575 379	Fuel composition and method of preparation and method of preparation therefor	11.03.1986
D4	WO 03 074935	Fuel gel	12.09.2003
D5	US 2003 0217504	Fuel gel	27.11.2003
D6	RU 2197994	Disifecting agent "leseptik"	10.02.2003
D7	GB 2087724	Bactericide for foods and food processing machines or utensils	03.06.1982
D8	US 4 235733	Antibacterial soap containing thrichlorohydroxy dyphenyl ether bactericide and an organic phosphoric ester as a stabilizer therefor	25.11.1980
Dn	Cientos de documentos más relacionados		

4. Análisis de patentabilidad (Artículo 14 D. 486)

Nivel inventivo *(Artículo 18 D. 486)*

El solicitante pretende que se le proteja una composición combustible basada en etanol que busca reemplazar lo que él mismo denomina "combustibles de campaña" tales como briquetas de carbón, kerosene, leña, cocinol o alcohol industrial, combustibles que el solicitante desea reemplazar por su volatilidad, por su dificultad de manipulación entre otros inconvenientes.

Para esto, el solicitante propone un combustible en estado gelatinoso de alto poder calorífico basado en alcohol etílico. La solución propuesta ya es muy conocida en el ámbito técnico como se demostrará.

D1 (US 2613142) de 1952 relaciona un combustible en gel basado en alcoholes, donde uno de los alcoholes que se puede manejar es el alcohol etílico. Nótese que las proporciones coinciden con lo relacionado en la presente solicitud.

D2 (US 3 072 467) también menciona combustibles en gel basados en alcohol que también puede ser etílico. La proporción coincide con lo establecido en la presente solicitud.

D3 (US 4 575 379), D4 (WO 03074935), D5 (US 2003 0217504) y D6 (RU2197994) son mejoras a dichos combustibles en gel donde le ingrediente principal puede ser el etanol

De lo anterior se tiene que la solución propuesta por el solicitante no solo ya existía en el estado de la técnica, sino que la misma idea ha sido mejorada y superada con creces. Por consiguiente lo relacionado en la solicitud no representa un adelanto en la técnica y no tiene ningún nivel inventivo.

Por otra parte, el solicitante también menciona el uso de bactericidas, fungicidas entre otros. En este arte es muy común el uso de aditivos como lo conoce cualquier experto en el arte. Los bactericidas y fungicidas muchas veces se colocan en vehículos basados en etanol por lo que su uso en la formulación es predecible y factible (por ejemplo ver D7 GB 2087724 y D8 US 4 235733). Tampoco esto representa un salto en el arte.

Por todo lo anterior, la presente solicitud carece del nivel inventivo para que se le conceda el privilegio solicitado.

5. Conclusión:

Los requisitos de patentabilidad de la presente solicitud se encuentran afectados así:

N°	Documento N°	Reivindicaciones afectadas	Requisito que afecta
D1	US 2 613 142	1 – 2	Nivel Inventivo
D2	US 3 072 467	1 – 2	Nivel Inventivo
D3	US 4 575 379	1 – 2	Nivel Inventivo
D4	WO 03 074935	1 – 2	Nivel Inventivo
D5	US 2003 0217504	1 – 2	Nivel Inventivo
D6	RU 2197994	1 – 2	Nivel Inventivo
D7	GB 2087724	1 – 2	Nivel Inventivo
D8	US 4 235733	1 – 2	Nivel Inventivo
Dn	Decenas de documentos más	1 – 2	Nivel Inventivo

En cumplimiento del artículo 45 de la Decisión 486 de la Comisión de la Comunidad Andina, se le indica que debe dar respuesta dentro del término de SESENTA días contados a partir de la fecha de notificación de la presente comunicación. En caso de no dar respuesta al presente requerimiento, o si a pesar de la respuesta subsistieran los impedimentos para la concesión, se denegará la patente.

Notifíquese el presente oficio conforme a lo dispuesto en el numeral 5.2, literal e), del capítulo quinto del título primero de la Circular Única N° 10 de 2001.

Alix Carmenza Céspedes De Vergel
Directora de Nuevas Creaciones (C)

Concepto Técnico No. **2324**
Examinador Técnico **202003**
El anterior requerimiento fue notificado por fijación en lista, de fecha 15 JUL. 2010

Patented Oct. 7, 1952 2,613,142

UNITED STATES PATENT OFFICE

2,613,142

ALCOHOL FUEL GEL

Sol B. Wiczer, Washington, D. C.

No Drawing. Application May 11, 1948, Serial No. 26,470

6 Claims. (Cl. 44—7)

1

The present invention relates to a solidified gel fuel using methyl cellulose as the gelating agent and a polar type organic liquid such as alcohol as the combustible liquid.

Methyl cellulose has great advantages for this purpose in that it forms a true gel of any desired viscosity merely by cold admixture with the alcohol in quantity sufficient to give the desired viscosity. The methyl cellulose has the further advantage that a stable gel is produced exhibiting no syneresis over considerable periods of time.

Commercial methyl cellulose varies in the degree of methylation ranging from 1 to 3 methyl ether radicals per glucoside linkage. The practical difference for purposes herein is that the lower methylation products require a greater quantity to obtain the same gel viscosity. Useful gels are possible using from 3 to 50% of methyl cellulose having 1 to 3 methyl groups per glucoside linkage determined as weight percent of the final fuel composition. Using methyl, ethyl or iso propyl alcohols as 70 to 90% commercial alcohol (balance water, denaturant corrosion inhibitor, coloring matter etc.), it is preferred to use 5 to 20% of 4000 cps. methyl cellulose.

In order to improve the polarity and solubility of the solvent for the methyl cellulose, only polar solvents such as commercial alcohols usually containing 5 to 35% of water are used. Such polar solvent may also contain minor quantities not over 25% of non polar solvents such as benzol or gasoline.

Example I

One pound of (Dow) 4000 cps. methyl cellulose is agitated at room temperature with 1½ gals. of 80% ethyl alcohol. A smooth gel is obtained which will maintain its shape but will flow under pressure. The gel is stable and burns with a continuous flame leaving a small charred residue. It does not melt during combustion.

Example II

One pound 4000 cps. methyl cellulose is agitated with 1 gallon of 80% ethyl alcohol. The product gels immediately and is considerably thicker than the product of Example I.

Example III

Example I is repeated by substituting 70% iso propyl alcohol. The product appears substantially the same but burns with a hotter flame.

2

Example IV

Example I is repeated substituting 90% methyl alcohol. A medium viscosity gel similarly combustible is obtained.

In the above examples if the methyl cellulose has not been finely shredded it may require excessive agitation to remove lumps. In such case the methyl cellulose is first kneaded with only a portion of the solvent until the lumps are broken up in a thick paste, the balance of liquid being subsequently added with agitation until the gel is thinned to desired viscosity.

In an alternative method, the methyl cellulose is first wet with relatively dry alcohol and then mixed with small quantities of water or aqueous alcohol to obtain the final 70 to 90% alcohol used.

Use of lower temperatures during agitation will tend to reduce inclusion of air bubbles which makes the product opaque. For this purpose the gel may be formed by stirring at —5° C.

Example V

One pound of methyl cellulose is agitated with 1 gallon of liquid consisting of 10% benzol, 80% methanol and 10% water by volume to obtain a solid fuel gel.

Various conventional additives for alcohol and fuel gels may be used such as dyes, denaturants, and oxidizing agents such as sodium nitrate without departing from the spirit of the present invention.

I claim:

1. A combustible gel comprising a volatile combustible liquid and a gelating agent therefor, said combustible liquid being composed of at least 75% of commercial alcohol having 1–3 carbon atoms, said commercial alcohol consisting of at least 70% of alcohol, the balance of said commercial alcohol being substantially water, said combustible liquid being gelled with 3–50% by weight thereof of methyl cellulose.

2. A combustible gel comprising a volatile combustible liquid and a gelating agent therefor, said combustible liquid being composed of at least 75% of commercial alcohol having 1–3 carbon atoms, said commercial alcohol consisting of at least 70% of alcohol, the balance of said commercial alcohol being substantially water, said combustible liquid being gelled with 5–20% by weight thereof of methyl cellulose.

3. A combustible gel comprising a volatile combustible liquid and a gelating agent therefor, said combustible liquid being composed of at least 75% of commercial methanol, said commercial methanol consisting of at least 70% of methanol, the balance of said commercial methanol being substantially water and normal commercial methanol impurities, said combustible liquid being gelled with 5–20% by weight thereof of methyl cellulose.

4. A combustible gel comprising a volatile combustible liquid and a gelating agent, said combustible liquid being composed of at least 75% of commercial ethanol, said commercial ethanol consisting of at least 70% of ethanol, the balance of said commercial ethanol being substantially water, said combustible liquid being gelled with 5–20% by weight thereof of methyl cellulose.

5. A combustible gel comprising a volatile combustible liquid and gelating agent therefor, said combustible liquid being composed of at least 75% of commercial isopropyl alcohol, said commercial isopropyl alcohol consisting of at least 70% of isopropyl alcohol, the balance of said commercial isopropyl being substantially water and normal commercial isopropyl alcohol impurities, said combustible liquid being gelled with 5–20% by weight thereof of methyl cellulose.

6. A combustible gel comprising a volatile combustible liquid and a gelating agent therefor, said combustible liquid being composed of 70–90% of an alcohol having 1–3 carbon atoms and 0–25% of a volatile combustible hydrocarbon liquid selected from the group consisting of gasoline and benzol, the balance of said liquid to 100% being substantially water, said combustible liquid being gelled with 3–50% by weight thereof of methyl cellulose.

SOL B. WICZER.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,046,101	York	June 30, 1936
2,102,005	Jones et al.	Dec. 14, 1937

FOREIGN PATENTS

Number	Country	Date
860,470	France	June 27, 1939

OTHER REFERENCES

Draeger et al.: Journal American Medical Asso., Aug. 11, 1945, p. 1097.

"Methocel," copyright 1948–1949, The Dow Chemical Co., pgs. 2 and 5.

"Ethocel Handbook," Dow Chemical Co., 1940, p. 13.

United States Patent Office 3,072,467 Patented Jan. 8, 1963

3,072,467

FUEL GEL

Sol B. Wiczer, 1815 H St. NW., #516, Washington, D.C.

No Drawing. Filed June 10, 1960, Ser. No. 35,108
7 Claims. (Cl. 44—7)

The present invention relates to a solidified gel fuel comprising a mixture of gelating agents for a polar type organic liquid such as alcohol as the combustible liquid.

In my prior Patent 2,613,142, whose disclosure is here incorporated by reference, I disclosed the use of methyl cellulose as a gelating agent. It has the outstanding advantage that gel formed therewith is substantially stable with respect to syneresis. However, it has the disadtage that the cellulosic residue becomes gummy with heat and tends to remain as a charred residue when the alcohol has been exhausted therefrom by combustion. Other cellulosic compounds, such as esters of organic acids like cellulose acetate and other lower alkanoic acids, and ethers like carboxy methyl cellulose and the like, also do not burn completely, but otherwise are good gelating agents.

I have now found that fuel gels formed with such charring cellulose ester and ether gelating agents like methyl cellulose admixed with at least about 3% by weight of nitro cellulose will generally burn more completely, leaving less residue. I may use more than 3% of nitro cellulose in admixture with such cellulosic ether or ester gelating agent as methyl cellulose, such as up to 75% of nitro cellulose in admixture with the methyl cellulose, the balance being charring cellulose compound like methyl cellulose. Though my gelating agent may comprise from 3 to 75% nitro cellulose and from 97 to 25% charring gelating agent like methyl cellulose, cellulose acetate, carboxy methyl cellulose, and cellulose sulfate, preferably I would use from 15 to 25% nitro cellulose, the balance being charring cellulose such as methyl cellulose.

The gel is composed of about 5 to 20% of gelating agent, depending upon how viscous a gel is desired. The methyl cellulose preferably used is the same as described in my prior patent. The combustible liquid alcohol may be any lower alcohol, such as methyl, ethyl, propyl or isopropyl alcohols, ranging from about 65 to 95% in concentration, the balance being water. Sometimes, other combustible liquids such as acetone, diethyl ether, gasoline or benzol may be admixed with the alcohol to modify its combustible characteristics when added thereto in small quantity, not usually exceeding about 25%, the balance being the alcohol and water, as described.

The nitro cellulose component is the nitro cellulose of commerce, usually nitrated to a degree less than used to produce explosive nitro cellulose, i.e., the nitro cellulose will generally be nitrated to about a 12 to 12.5% nitrogen content.

There are several ways of forming my fuel gel. The methyl cellulose gel may be formed as described in my patent, that is, by adding a few percent, such as 5 to 20% of methyl cellulose to the alcohol by merely admixing the components cold, and thereafter, dry nitro cellulose in finely divided form is stirred into the gel thus formed to homogenously distribute it. As another method, a gel pre-formed, using nitro cellulose as the sole gelating agent, may be evenly admixed by stirring with a gel formed with methyl cellulose. As a further method, the dry gelating agents in admixture may be first wet with dry alcohol, usually cold alcohol, partially dissolving the nitro cellulose, and the product thereafter is further mixed with alcohol containing sufficient water

to impart to the final mixture about a 5 to 35% water content.

The following examples will illustrate the practice of this invention:

Example 1.—1 lb. of 4,000 cps. methyl cellulose is evenly mixed with ¼ lb. of 12.3% nitro cotton, and the dry mixture is then agitated with 1.5 gallons of 85% ethyl alcohol until a smooth gel is obtained. The gel may be packaged in cans or in tubes. It will burn, leaving a much reduced residue as compared to methyl cellulose alone.

Example 2.—1 lb. of 4,000 cps. methyl cellulose is admixed with 1 gallon of 90% ethyl alcohol, and ½ lb. of 12.4% nitro cotton is stirred into the gelatinous mixture until it is homogenous.

Example 3.—½ lb. of 4,000 cps. methyl cellulose is evenly admixed with ½ lb. of 12.4% nitro cotton. The mixture is wet with 1 gallon of 95% ethyl alcohol, prechilled to —10° F. and stirred to a homogenous suspension. Thereafter, stirring is continued with a dropwise addition of water until the volume is increased by about 10%, the total product forming, with continued slow agitation, a homogenous gel.

Various modifications will be apparent to one skilled in the art, and, accordingly, it is intended that the description herein be considered as exemplary and not limiting, except as defined in the claims appended hereto.

I claim:

1. A fuel gel comprising a major proportion of a lower alkanol having a minor water content, gelled with a minor gelating proportion of a mixture of cellulose compounds comprising methyl cellulose and nitro cellulose, the nitro cellulose being in proportion of 3 to 75% of the cellulose compound mixture.

2. A fuel gel comprising a major proportion of a lower liquid alcohol as the liquid fuel component, gelled with a mixture of methyl cellulose and nitro cellulose in quantity in the range of 5 to 35% of the gelating mixture, the nitro cellulose component being in the range of 3 to 75% of the cellulose component mixture.

3. A fuel gel comprising a volatile combustible liquid composed of at least 65% of an aqueous solution of a lower alkanol, having 1 to 3 carbon atoms, said aqueous solution of a lower alkanol consisting of at least 65% alkanol, the balance being substantially water, said combustible liquid being gelled with 3 to 30% by weight of a mixture of methyl cellulose and nitro cellulose, the nitro cellulose being present in quantity of about 5 to 75% of the cellulose mixture.

4. The fuel gel as defined in claim 3, in which the gelating agent is 5 to 20% of the composition, and the alcohol is commercial methyl alcohol.

5. The fuel gel as defined in claim 3, in which the gelating agent is 5 to 20% of the composition, and the alcohol is commercial ethyl alcohol.

6. The fuel gel as defined in claim 3, in which the gelating agent is 5 to 20% of the composition, and the alcohol is commercial isopropyl alcohol.

7. The fuel gel as defined in claim 3, in which the liquid fuel comprises alcohol admixed with up to 25% of another volatile, alcohol miscible, combustible liquid.

References Cited in the file of this patent

UNITED STATES PATENTS

1,934,860	Jones et al.	Nov. 14, 1933
2,102,005	Jones et al.	Dec. 14, 1937
2,207,894	Onderdonk	July 16, 1940
2,613,142	Wiczer	Oct. 7, 1952

United States Patent [19]

Browning

[11] **Patent Number: 4,575,379**

[45] **Date of Patent: Mar. 11, 1986**

[54] **FUEL COMPOSITION AND METHOD OF PREPARATION THEREFOR**

[76] Inventor: **John M. Browning**, 496 Stratford Ave., Elmhurst, Ill. 60126

[21] Appl. No.: **619,041**

[22] Filed: **Jun. 11, 1984**

[51] **Int. Cl.**[4] **C10L 7/00**

[52] **U.S. Cl.** **44/7.4**; 102/365; 252/315.3; 44/7.6

[58] **Field of Search** 44/7.2, 7.4, 7.6, 7.7; 102/363, 365; 252/315.3; 149/2

[56] **References Cited**

U.S. PATENT DOCUMENTS

3,899,439	8/1975	Mahlman	252/315.3 X
4,038,206	7/1977	Karl	252/315.3 X
4,152,289	5/1979	Griffin, Jr.	44/7.6 X
4,205,724	6/1980	Swanson et al.	252/315.3 X
4,244,826	1/1981	Swanson	252/315.3 X
4,302,208	11/1981	Wood et al.	44/7.6
4,439,328	3/1984	Moity	252/8.5 M X

OTHER PUBLICATIONS

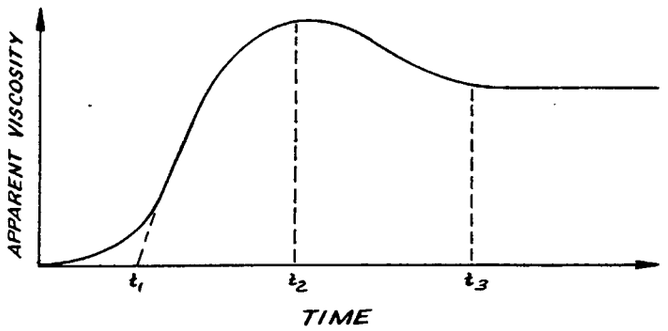
"Bermocoll TM —Cellulose Ethers", Brochure published by Berol Kemi AB of Stenungsund, Sweden.

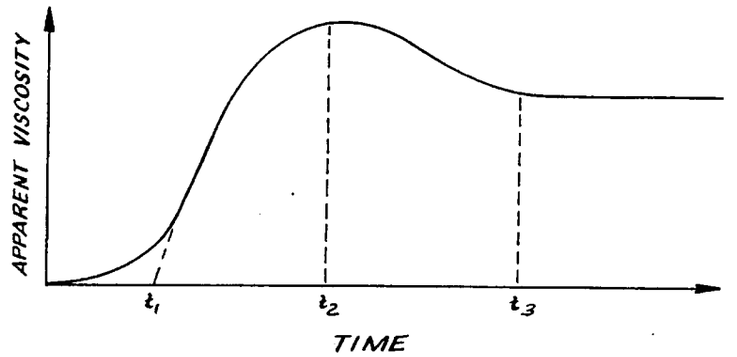
Primary Examiner—Peter A. Nelson
Attorney, Agent, or Firm—Emrich & Dithmar

[57] **ABSTRACT**

A fuel composition in the form of a gel is particularly adapted for use in a fireplace or a heater and offers the advantages of increased stability, reduced burn rate, decreased noxious by-product generation, and enhanced safety. Comprised of a combination of water, alcohol and ethyl hydroxyethyl cellulose, the miscibility of these components is accomplished by lowering the pH of the mixture. Once in solution, the pH of the mixture is then raised to increase its viscosity in forming a stable gel. Various low carbon alcohols, or blends thereof, may be utilized to provide a range of combustion characteristics. In addition, various salts may be incorporated in the stable gel fuel to provide a desired flame characteristic.

13 Claims, 1 Drawing Figure





FUEL COMPOSITION AND METHOD OF PREPARATION THEREFOR

BACKGROUND OF THE INVENTION

The present invention relates generally to combustible fuel compositions and is particularly directed to a fuel composition in the form of a gel for use in a fireplace.

The use of unvented fuel-fired space heaters has increased with the increase in the general cost of heating fuels. A portable unvented space heater is considerably more efficient than a central heating system fueled with oil or natural gas because of the capability to provide heat where needed while eliminating, or reducing, the heating of unused areas. Over the course of a heating season, it has been estimated that as much as half of the heat produced in a central heating system is wasted primarily through the system's chimney. By contrast, a kerosene heater delivers approximately 90% of its heat to its surroundings. The use of an efficient space heater in combination with a lowering of the thermostat of the central heating system is one of the most effective ways to save energy and money.

Various types of space heaters are currently available. Two of the more common space heaters currently in use are portable electric and kerosene heaters. In general, a kerosene heater is less expensive to operate because of the lower relative cost of its fuel. However, even the most sophisticated kerosene heaters suffer from various limitations such as pollution of the air including the emission of unpleasant odors, the generation of soot which may be deposited upon the walls and other surfaces of the room in which the heater is located, and the increased hazard inherent in using a flammable liquid.

Another type of heater gaining increased acceptance is the portable fireplace which offers several advantages over the kerosene-type heater. For example, many portable fireplaces possess the attractiveness of a conventional fireplace while offering 100% heat gain because of the absence of down drafts and chimney flue heat loss. In addition, portable fireplaces offer the attractiveness of a conventional fireplace and the heating flexibility of a conventional space heater. In spite of these advantages, portable fireplaces now in use suffer from many of the same shortcomings inherent in conventional kerosene space heaters. For example, precautions must be taken in the storage and handling of the liquid fuel. If spilled, the liquid fuel will burn readily if absorbed by a household item such as a rug, which acts as a wick. Attempts have been made, with varying degrees of success, to increase and provide a uniform viscosity of the fuel to reduce the spilling hazard and provide a uniform combustion rate. In addition, fuels currently used in portable fireplaces emit various hazardous substances including carbon monoxide, nitrous oxide, and sulfur dioxide at levels considered unacceptable by current safety standards. Finally, the cost of fuels used in portable fireplaces generally exceed the cost of kerosene and restrict the use of portable fireplaces as an alternative heating source.

The present invention is intended to overcome the aforementioned limitations and thus represents an improvement over the prior art. The fuel composition of the present invention is in the form of a gel and thus eliminates the hazards of a fuel spill while providing the capability to regulate the rate of fuel consumption and associated combustion characteristics. The fuel may be easily and inexpensively packaged in a fireproof container and conveniently used therein either in a fireplace, particularly of the portable type, for cooking, or for providing an attractive source of light. The number and extent of noxious combustion by-products is minimized and soot and ashes are completely eliminated.

OBJECTS AND SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide an improved fuel for heating and cooking.

It is another object of the present invention to provide a combustible fuel particularly adapted for use in a fireplace which offers minimal noxious combustion by-products, a controllable burn rate, and a wide range of flame characteristics.

Yet another object of the present invention is to provide a low cost, conveniently packaged, and safe fireplace fuel.

A further object of the present invention is to provide a combustible fuel in a stable gel form which provides increased safety in storage, handling and use.

A still further object of the present invention is to provide a high alcohol content combustible fuel in a stable gel form.

It is a further object of the present invention to provide a fuel composition particularly adapted for indoor use which produces neither ashes nor smoke and is economical to use.

The present invention contemplates a combustible fuel comprised of alcohol, water and a cellulose ether in gel form. Miscibility is achieved by reducing the pH of the mixture below 7. By then increasing the pH above 7, a uniformly textured gel is formed at a rate determined by the pH value. Various lower carbon alcohols, and combinations thereof, may be employed to provide a desired flame characteristic and various salts may be added to similarly control flame color. In a preferred embodiment, ethyl hydroxyethyl cellulose is utilized to provide a low cost flammable fuel which is stable and conveniently packaged, stored and handled.

BRIEF DESCRIPTION OF THE DRAWING

The appended claims set forth those novel features which characterize the invention. However, the invention itself, as well as further objects and advantages thereof, will best be understood by reference to the following detailed description of a preferred embodiment taken in conjunction with the accompanying drawing, wherein is shown a viscosity curve for an aqueous solution to which is added ethyl hydroxyethyl cellulose in accordance with the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The present invention is directed to a fuel composition and method of preparation therefor. The fuel is a combustible fuel particularly adapted for use in a fireplace. However, the fuel of the present invention may also be used for the additional purposes of cooking or providing a decorative light source.

Preparation of the combustible fuel composition of the present invention begins with an aqueous alcohol solution. Various lower carbon alcohols, such as methanol, ethanol, propanol, isopropanol, etc., may be used. The alcohol utilized may be selected in accordance with the characteristics of the flame desired. For example, methanol provides a blue or a clear flame. Increasing the number of carbon atoms of the alcohol provides a more colorful flame. Thus, of the alcohols listed above, isopropanol provides the most colorful flame. In addition, the greater the amount of water in the aqueous alcohol solution, the cooler the flame produced and the longer the fuel will burn. Increasing the alcohol content of the aqueous alcohol solution will correspondingly increase the burn rate and provide a flame of increased heat intensity. In a preferred embodiment of the present invention, an aqueous solution containing 70% isopropanol is used.

The pH of the aqueous alcohol solution is then measured and adjusted to a value below 7. The pH of the aqueous alcohol solution may be lowered by adding virtually any acid in a conventional manner. In a preferred embodiment, the pH of the aqueous alcohol mixture is adjusted to a value of between 4 and 6 by adding trace amounts of hydrochloric (HCl) acid. The aqueous alcohol solution to which the acid is added is then mixed, or agitated, to fully disperse the acid in the mixture. Five minutes is typically required in order to achieve complete mixture of the acid and aqueous alcohol solution in adjusting the pH value thereof to within the desired value range.

Once the pH of the aqueous alcohol solution has been adjusted to within the aforementioned pH range, a cellulose ether is added to the mixture for dissolution therein. In a preferred embodiment, ethyl hydroxyethyl cellulose (EHC) in powder form is added to the aqueous alcohol solution. The solution is then further agitated in order to effect dispersion of the EHC throughout the aqueous alcohol solution. The grains of the EHC swell in the water before they dissolve oausing an increase in the viscosity of the solution. This can be seen in the Figure wherein is illustrated the change in apparent viscosity of an aqueous solution at various times following the addition of EHC thereto. In the Figure, t_1 represents the time at which the swelling of the grains of the EHC causes the viscosity of the solution to increase. Maximum swelling of the EHC grains occurs at t_2, while the final viscosity of the solution, or perfect dissolution of the EHC, is achieved at t_3. Various times indicated in the Figure may be controlled by selectively varying the pH value of the solution. For example, increasing the acid additive in the mixture will decrease the EHC dissolution rate, while alkaline additives tend to increase the EHC dissolution rate. In order to maintain the pH value at a desired level throughout the EHC dissolving period, the additives to the aqueous alcohol solution of EHC should have a good buffer capacity. In referring to the Figure, t_2 in a preferred embodiment is approximately 100 minutes where approximately 3% by weight of EHC is added to the aqueous alcohol solution. The amount of EHC added to the aqueous alcohol solution may vary from 2% for lower carbon alcohols and higher water concentration to 4% for higher carbon alcohols and lower water concentration.

The EHC may also be initially added to the alcohol and the slurry thus produced then added to the water. This pre-wetting of the EHC facilitates its dissolution in the water. In another arrangement, the EHC may be provided in an alcohol-water soluble shell which is added to the aqueous alcohol mixture. Following dissolution of the outer shell, the EHC then dissolves in the solution at a rate dependent upon the pH of the solution.

With the EHC dissolved in the aqueous alcohol solution, the pH of the solution is then increased to a value greater than 7 by the addition of a base in order to form a gel. The viscosity of the solution will increase without the addition of a base, but the rate at which a gel is formed can be adjusted by appropriate control of the pH of the solution. For example, increasing the pH to a value of 8.5 results in the formation of a gel within 8 minutes. In a commercial environment, however, it may be desirable to use a lower pH to permit additional time for formation of the gel for packaging purposes. For example, increasing the pH to a value of only 7 will result in the formation of a gel in approximately 40 minutes. In addition, if hydrochloric acid is used in the earlier described step of reducing the pH of the aqueous alcohol solution, a base containing sodium, such as sodium hydroxide or sodium bicarbonate, would be preferred in the subsequent step of increasing the solution's pH in order to precipitate out the chlorine in the form of a harmless salt (NaCl) which, in turn, adds color to the flame of the thus formed combustible fuel.

Prior to adding the base to the EHC and aqueous alcohol solution, various metal salts may be added to provide a desired flame characteristic for the thus formed fuel composition. For example, addition of a strontium salt will result in a bright red flame. Addition of a barium salt will produce a green flame. The addition of sodium, such as in the aformentioned forms of sodium hydroxide or sodium bicarbonate, will not only reduce the noxious effects of the chlorine in the solution, but will also provide a yellowish orange flame. Various combinations of the aforementioned salts may be added to the fuel composition of the present invention to impart a variety of desired flame characteristics thereto. In addition, various well known masking agents, or odorizers, may be added to the fuel composition prior to formation of the gel form thereof in order to provide a desired fragrance during combustion of the fuel composition.

The present invention thus provides an improved fuel composition and method of preparation therefor. The gel form of the fuel composition of the present invention offers various advantages such as a retarding of fuel evaporation particularly with respect to alcohol-based fuels, increased safety due to the elimination of spill hazards, and a controllable burn rate as determined by the amount of alcohol in the fuel. Reduced amounts of alcohol will result in lower combustion temperatures and reduced burn rates. In addition, the present invention provides a fuel in gel form having a uniform viscosity throughout which also ensures a more uniform burn rate throughout combustion of the entire fuel sample. In a preferred embodiment, the EHC is in the form of a powder having a particle size 98% <0.3 mm (98% through US mesh No. 50) and is treated for fast dispersing and an adjustable dissolving rate. EHC for use in the present invention is available from Berol Kemi AB of Sweden under the tradename "BERMOCOLL E."

While particular embodiments of the present invention have been shown and described, it will be obvious to those skilled in the art that changes and modifications may be made without departing from the invention in its broader aspects. Therefore, the aim in the appended claims is to cover all such changes and modifications as fall within the true spirit and scope of the invention. The matter set forth in the foregoing description and accompanying drawings is offered by way of illustration only and not as a limitation. The actual scope of the

invention is intended to be defined in the following claims when viewed in their proper perspective based on the prior art.

I claim:

1. A method for forming a combustible fuel gel comprising the steps of:

forming an aqueous alcohol solution;

adjusting the pH of said aqueous alcohol solution to a value less than 7;

adding a cellulose ether to said pH-adjusted aqueous alcohol solution;

mixing the cellulose ether aqueous alcohol solution; and

increasing the pH of the cellulose ether aqueous alcohol solution to a value above 7 in forming said combustible fuel gel.

2. The method of claim 1 wherein said cellulose ether comprises ethyl hydroxyethyl cellulose.

3. The method of claim 2 wherein said ethyl hydroxyethyl cellulose comprises between 2% and 4% by weight of said aqueous alcohol solution.

4. The method of claim 1 wherein the step of adjusting the pH of said aqueous alcohol solution to a value in the range of 4 to 6 comprises adding an acid thereto.

5. The method of claim 4 wherein the pH of said aqueous alcohol solution is adjusted to a value in the range of 4 to 6 by adding trace amounts of hydrochloric acid thereto.

6. The method of claim 5 wherein the step of increasing the pH of said cellulose ether aqueous alcohol solution comprises adding a base containing sodium thereto.

7. The method of claim 1 wherein the pH of said cellulose ether aqueous alcohol solution is increased to a value in the range of 7 to 8.5.

8. The method of claim 1 wherein said aqueous alcohol solution includes a low carbon alcohol.

9. The method of claim 8 wherein said aqueous alcohol solution includes methanol, ethanol, propanol, or isopropanol.

10. The method of claim 1 wherein said aqueous alcohol solution includes a combination of low carbon alcohols.

11. The method of claim 1 further comprising the step of adding a metal salt to the cellulose ether aqueous alcohol solution during the mixing thereof.

12. A combustible fuel in gel form comprising:

a low carbon alcohol;

water added to said alcohol to form an aqueous alcohol solution;

an acid added to the aqueous alcohol solution to reduce the pH thereof below 7;

a cellulose ether added to the pH-reduced aqueous alcohol solution; and

a base added to the cellulose ether aqueous alcohol solution to increase the pH thereof above 7 in forming a gel.

13. The method of claim 1 wherein the pH of said aqueous alcohol solution is adjusted to a value in the range of 4 to 6.

* * * * *

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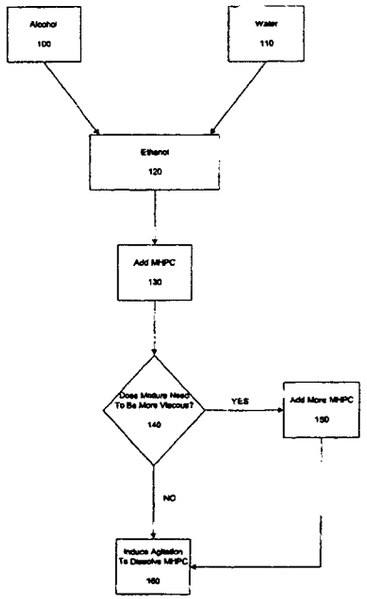
(54) Title: FUEL GEL



(57) Abstract: The invention is a fuel medium. The medium is in a gel state and consists entirely of material from vegetable matter in combination with alcohol, primarily ethanol, although other low carbon alcohol may be used in combination with some water. This blend is made into a gel by the addition of Methyl Hydroxyl Propyl Cellulose (MHPC). When spilled, the gel is biodegradable and not harmful to the environment. During combustion the gel is smokeless, without soot, devoid of noxious gas emissions, non-carcinogenic and non-corrosive. The gel form makes for ease of packaging, as fuel for suitable cooking and barbeque/fire lighter units, and the reduction of ash makes for easy maintenance of these units. Ease of packaging makes the product easy to transport, thereby offering flexibility of use. The low cost of production, due to the efficacy of the MHPC, makes the present invention affordable to low-income earners.

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SUMMARY OF THE INVENTION

The embodiments of the present invention provide a fuel medium. According to one embodiment of the present invention, since this medium is a gel, prior art fuel spillage hazards are eliminated. According to another embodiment of the present invention, the fuel gel comprises entirely of material from vegetable matter in combination with alcohol, primarily ethanol, although other low carbon alcohol may be used in combination with some water. This blend is made into a gel by the addition of Methyl Hydroxyl Propyl Cellulose (MHPC). According to another embodiment of the present invention, it is easily biodegradable when spilled and is not harmful to the environment, and can hence be used both indoors and outdoors. According to another embodiment of the present invention, the present invention in itself does not need anything else to enhance its viscosity, but may be strengthened by the addition of Fusel Oil, or, more specifically, Amyl alcohol, which is a major constituent of Fusel Oil. According to another embodiment of the present invention, during combustion it is smokeless, without soot, devoid of noxious gas emissions, non-carcinogenic and non-corrosive hence eliminating the impartation of unpleasant odors to the food being cooked.

According to another embodiment of the present invention, the gel form of the present invention makes for ease of packaging, as fuel for suitable heating units that are portable, and as fuel for suitable barbeque/fire lighter units. The reduction of ash and residue makes for easy maintenance of the heating and lighter units. One major benefit of the ease of packaging makes the product easy to transport, thereby offering flexibility of use, making even military use possible. The low cost of production, due to the efficacy of the MHPC, makes the present invention affordable to the low-income earners, thereby providing a preferred alternative to prior art fuels. According to other embodiments, the present invention has an enhanced ability to retain alcohol and to reduce its evaporation which increases the fuel's shelf life. The viscosity, once achieved, remains constant, stable, and uniform thus providing a steady burn. The burn rate and heat intensity can be altered by increasing or decreasing the water content of the alcohol-water mixture prior to adding MHPC. Thickening of the gel increases over time, as the MHPC dissolves, thereby improving ease of packaging. Since the right viscosity needed for cooking is achieved using less than 5% MHPC, the production cost is reduced.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other features, aspects and advantages of the present invention will become better understood with regard to the following description, appended claims and accompanying drawings where:

Figure 1 is a flowchart illustrating an approach to increase viscosity of the present invention.

Figure 2 is a flowchart illustrating another approach to increase the viscosity of the present invention.

Figure 3 is a graphical representation of a comparative analysis of the viscosity achieved in the above two approaches.

FUEL GEL

BACKGROUND OF THE INVENTION

CROSS-REFERENCE TO RELATED APPLICATIONS

The present application claims the benefit of priority from pending U.S. Provisional Patent Application No. 60/360,626, entitled Fuel Gel , filed on March 1, 2002, which is herein incorporated by reference in its entirety.

1. FIELD OF THE INVENTION

The present invention relates to cooking, and in particular to a fuel medium in a gel state.

2. BACKGROUND ART

There are some human needs that have to be fulfilled everyday for the human to live and sustain a healthy life. Eating items classified as food, both cooked and raw, is one such human need. Foods need some kind of fueling agent to increase the temperature to a level where any living organisms within the foods are killed and to eventually cook the foods. There are many areas in the world where even today electricity and solid or liquid fuels, some of the most conventional ways of cooking food, are unavailable, scarce, expensive, or, in themselves, inappropriate to use. We will explore these conventional ways of cooking food along with their drawbacks next.

Solid Fuels

Solid fuels, for example coal and wood, are generally readily available and commonly used, particularly in the developing nations of the world. They form a natural source of fuel for cooking, and have been in use for many centuries. They not only offer adequate heat for cooking, but are a good source of light as well. However, they do not offer the flexibility often demanded in various applications, for example in the military, in areas devoid of vegetation, or in areas that are wet and damp. Igniting solid fuels is also often problematic, and once combustion has begun, its control is not easy. Transportation and storage is also of concern. Moreover, during combustion, one often has to cope with smoke, soot, impartation

of odors, and sometimes the alteration in the taste of the food being cooked. Solid fuels is used both indoors and outdoors, but often the site where cooking takes place is neither portable, nor easily shifted.

Liquid Fuels

Liquid fuels, like paraffin (also called kerosene) is significantly cleaner than solid fuels, and offer a whole range of advantages, which altogether makes for a preferred alternative. However, it too emits soot, noxious gases, and smell. It is relatively costly and can pose serious health, fire, and environmental hazards when spilled. However, with paraffin, it is now possible to make use of portable heaters and cookers. For example, Primus stoves, which run on paraffin, are common kitchen gadgets in low-income dwellings in some developing nations.

Electricity

Electricity has only recently taken over solid and liquid fuels as a viable food heating source. Using electricity to cook and heat foods eliminates the emission of soot, smoke, noxious gases, and other odors associated with solid and liquid fuels. However, producing, storing, and transporting electricity is not only an expensive utility, but since the production of electricity is conventionally tied with cascading waters, it cannot be produced by nations that do not have perennial cascading rivers or the means to dam such natural resources. Even a nation like Canada that has the natural and almost perennial resource as the Niagara Falls charges its citizens staying in provinces outside Ontario much more than the ones who live within the province of Ontario because storage and transportation of electricity is sometimes more expensive than its production.

DETAILED DESCRIPTION OF THE INVENTION

The embodiments of the present invention provide a fuel medium. According to one embodiment of the present invention, this medium is a bio-degradable gel. In the following description, numerous specific details are set forth to provide a more thorough description of embodiments of the invention. It will be apparent, however, to one skilled in the art, that the embodiments of the present invention may be practiced without these specific details. In other instances, well known features have not been described in detail so as not to obscure the invention.

The fuel gel is designed for use in cooking. However, other uses can conceivably be covered including heating or boiling of water, lighting, and heating applications in the cold season.

Alcohol (Ethanol) obtained from vegetable matter is the focal point in the present invention. Vegetable matter typically consists of not more than 95% ethanol in its purest form, the remainder of it being water. The alcohol-water blend is variable with water content ranging from a maximum of 30% by weight to a minimum of 5% by weight. This blend type allows for miscibility as it involves a polar substance, the alcohol, in water. However, as the carbon content of the alcohol used increases, so too does the difficulty encountered in dissolution. Combustion properties of the alcohol in the final gel also varies progressively with increase in carbon content. Therefore, lower carbon alcohol is preferred. It also remains apparent that the higher the water content of the gel formed, the lower will be the heat intensity and the slower the rate of combustion.

There are two approaches that can be followed in gel formation depending on the desired nature and viscosity of the finished product.

In the first approach, MHPC is added to the mixture of alcohol got from vegetable matter and water to a maximum of up to 5% by weight. The greater the quantity of MHPC added, the more viscous is the gel formed upon vigorous agitation, which results in the complete dissolution of the MHPC. Agitation can vary depending upon the quantity of gel produced from mixing by hand, to using a wooden stick to mix the blend, to using a mixing apparatus similar to concrete mixing. Addition of MHPC to levels above 5% is not necessary and in fact results in the formation of a semi solid mass as opposed to the desired gel. Therefore, gel strength is already adequate at this stage. It is important to also note that there

is no need to make adjustments to the pH of the alcohol-water blend in order to dissolve the MHPC. The MHPC is readily soluble & dissolves completely without the additions of any acids, alkali or buffer solutions, and neither is there need for the elevation of temperatures to assist the process as it occurs at room temperature. The gel formed is thus ready for use & requires no salts to enhance viscosity. The gel formed in this manner is significantly more stable, uniform, and requires 30% less cellulose to produce a gel of equal strength (viscosity) as that of any prior art gel fuels.

This first approach is shown diagrammatically in Figure 1. At step 100, alcohol from vegetable matter that consists of not more than 95% ethanol is mixed with 5% water at step 110. This blend is termed Ethanol at step 120. At step 130, MHPC is added to the Ethanol. At step 140, a check is made to see if the mixture needs to be more viscous. If it does, then at step 150 more MHPC is added to the mixture before going to step 160. If the mixture has the required viscosity, then at step 160 agitation is induced to completely dissolve the MHPC in the mixture.

In the second approach, the procedure described above is followed in its entirety. However, the addition of Fusel Oil (a by-product of the production of ethanol from sugar cane processing) or amyl alcohol in its purer form up to 5% by weight, further enhances gel strength, thereby further reducing the amount of cellulose (MHPC) required. This has the obvious production cost advantages, while further enhancing all the other advantages described thus far. It is important, however, that the addition of Fusel Oil, is not an absolute requirement for production of the fuel gel. The fuel maintains all of its properties adequately even without the addition of the Fusel Oil.

This second approach is shown diagrammatically in Figure 2. At step 200, alcohol from vegetable matter that consists of not more than 95% ethanol is mixed with 5% water at step 210. This blend is termed Ethanol at step 220. At step 230, Fusel Oil is added to the mixture. At step 240, MHPC is added to the mixture. At step 250, a check is made to see if the mixture needs to be more viscous. If it does, then at step 260 more MHPC is added to the mixture before going to step 270. If the mixture has the required viscosity, then at step 270 agitation is induced to completely dissolve the MHPC and Fusel Oil in the mixture.

In both of the above two procedures, the viscosity of the gel increases with time as dissolution of the MHPC approaches completion. The gel viscosity becomes constant after a

period of 5 days. Refer to the graphical illustration of Figure 3 for a comparative analysis of the viscosity achieved in each instance. It is also important to note that the finer the granular form the MHPC is available in, the greater is its rate of dissolution. It is apparent that the viscosity of the gel produced in this manner is significantly greater than that produced by use of Ethyl Hydroxyl Cellulose (EHC) as described in prior art inventions. The major difference being the incomplete dissolution of EHC compared with the complete dissolution of MHPC in this invention.

It is also apparent that the present invention therefore incorporates all the advantages of prior art similar inventions where EHC is used. In fact, the present invention even goes beyond all prior art inventions with regards to advantages observed. Notably, as there is no need for any pH adjustments, no additives in the form of bases, acids or buffers are required and neither are any inorganic salts required to enhance gel formation. Therefore, the gel formed is kept as natural as possible while remaining bio-degradable and environmentally friendly. According to another embodiment of the present invention, the gel state makes for ease in packaging and for use in portable cooking units and barbeque/fire lighters.

Other embodiments of the present invention include the significantly enhanced ability to retain alcohol and to reduce its evaporation, which increases the shelf life of the gel. The viscosity, once achieved, remains constant, stable and uniform, thus providing steady burn properties. The burn rate and heat intensity can be altered by increasing or decreasing the water content of the alcohol-water blend prior to addition of the MHPC. Thickening of the gel increases over time, as the MHPC dissolves, thereby improving ease of packaging. Less MHPC is required to make the gel, therefore reducing production costs.

The MHPC used in the present fuel gel is available from Hercules International Ltd., and is more commonly known as CULMINAL MHPC 20 000S. While the grade of the product is specific, it is apparent that similar results can be obtained by the use of cellulosics of the same basic chemistry in terms of molecular structure, physical properties and behavior. The present invention and its description are not limited but rather cover all and any such obvious adaptations.

Thus, a fuel medium is described in conjunction with one or more specific embodiments. The embodiments of the present invention are defined by the following claims and their full scope of equivalents.

CLAIMS

We claim:

1. A fuel medium, comprising:
a gel mixture of not more than 95% ethanol by weight obtained from vegetable matter and at least 5% water by weight.

2. The fuel medium of claim 1 wherein said gel mixture is not more than 70% ethanol by weight obtained from vegetable matter and between 5% and 30% water by weight.

3. The fuel medium of claim 1 wherein said gel mixture further comprises of up to 5% MHPC by weight.

4. The fuel medium of claim 3 wherein said gel mixture further comprises of up to 5% amyl alcohol by weight.

5. The fuel medium of claim 1, 2, 3, or 4 is obtained without the addition of any acids, without the addition of any alkali, without the addition of any buffer solutions, without a change in room temperature, or without a change in pH level of said ethanol, said amyl alcohol, said MHPC, or said water.

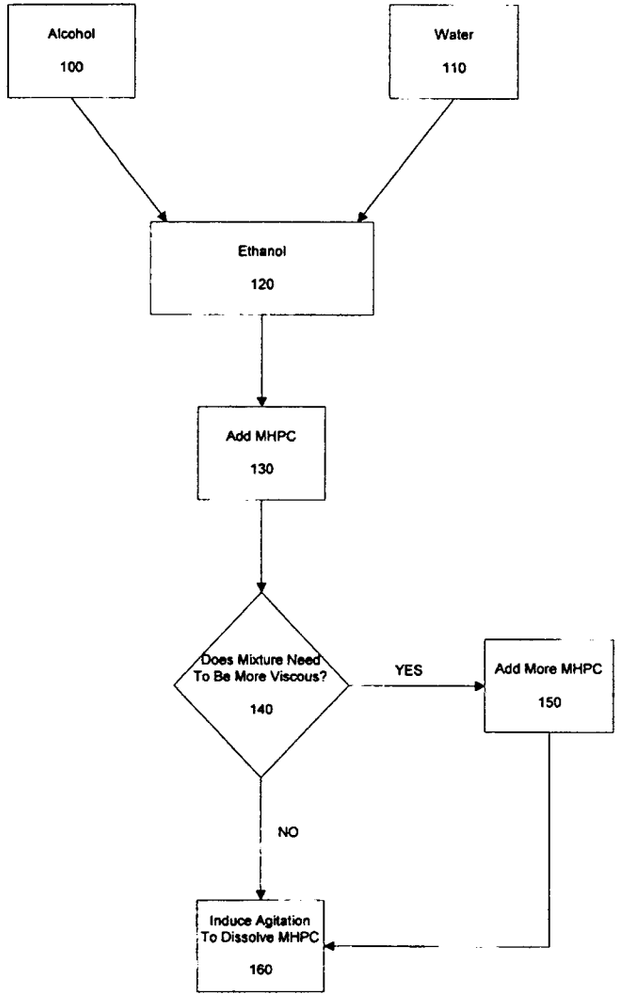
6. The fuel medium of claim 5 is biodegradable.

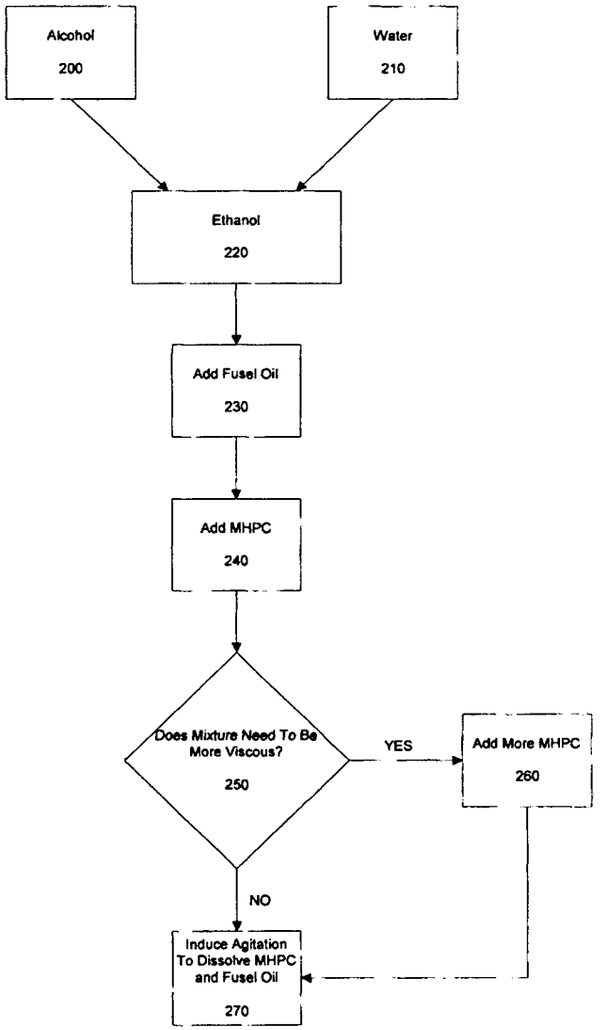
7. The fuel medium of claim 5 has the ability to retain alcohol.

8. The fuel medium of claim 5 on combustion is smokeless, without soot, void of noxious gas emission, non-carcinogenic and non-corrosive.

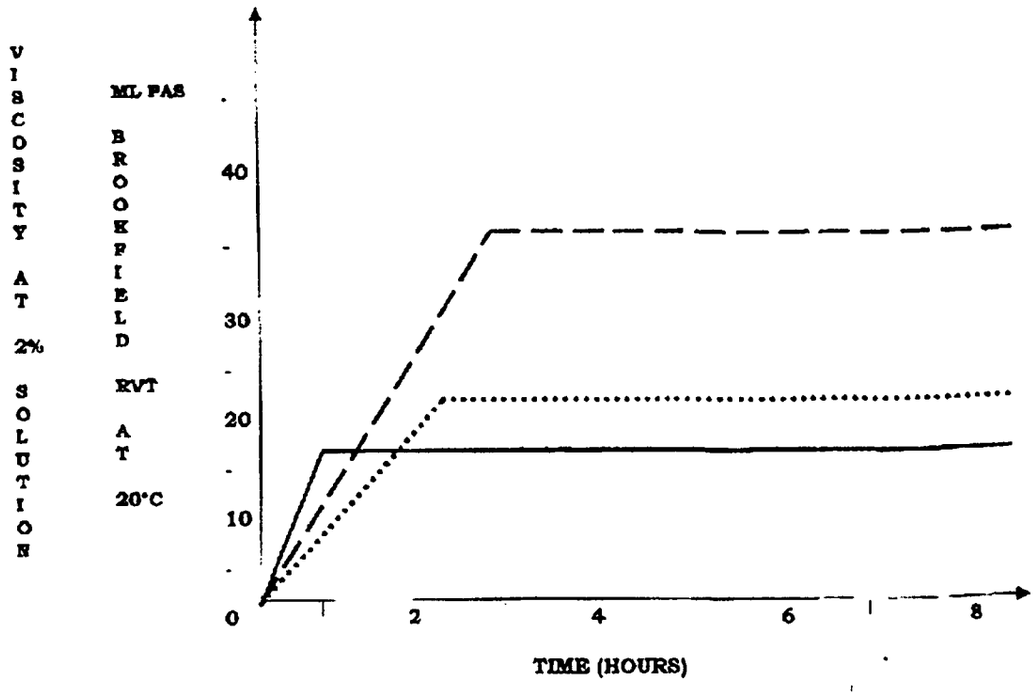
9. The fuel medium of claim 5 has a viscosity which is constant, stable, and uniform once formed giving a steady burn and steady heat intensity.

10. The steady burn and steady heat intensity of said fuel medium of claim 9 can be altered by increasing or decreasing said water content of ethanol-water mixture prior to the addition of said MHPC.


Alcohol
100
Water
110
Ethanol
120
Add MHPC
130
Does Mixture Need To Be More Viscous?
140
YES
Add More MHPC
150
NO
Induce Agitation To Dissolve MHPC
160


Alcohol
200
Water
210
Ethanol
220
Add Fusel Oil
230
Add MHPC
240
Does Mixture Need To Be More Viscous?
250
YES
Add More MHPC
260
NO
Induce Agitation To Dissolve MHPC and Fusel Oil
270

COMPARATIVE VISCOSITY ANALYSIS CURVES



KEY: — — . INCREASE IN VISCOSITY WHEN FUSEL OIL IS USED

····· INCREASE IN VISCOSITY WITHOUT FUSEL OIL.

——— INCREASE IN VISCOSITY WHEN USING EHC

WHERE MHAPC IS METHYL HYDROXY PROPYL CELLULOSE & EHC ETHYL HYDROXY CELLULOSE

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(54) **FUEL GEL**

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(57) **ABSTRACT**

The invention is a fuel medium. The medium is in a gel state and consists entirely of material from vegetable matter in combination with alcohol, primarily ethanol, although other low carbon alcohol may be used in combination with some water. This blend is made into a gel by the addition of Methyl Hydroxyl Propyl Cellulose (MHPC). When spilled, the gel is biodegradable and not harmful to the environment. During combustion the gel is smokeless, without soot, devoid of noxious gas emissions, non-carcinogenic and non-corrosive. The gel form makes for ease of packaging, as fuel for suitable cooking and barbeque/fire lighter units, and the reduction of ash makes for easy maintenance of these units. Ease of packaging makes the product easy to transport, thereby offering flexibility of use. The low cost of production, due to the efficacy of the MHPC, makes the present invention affordable to low-income earners.

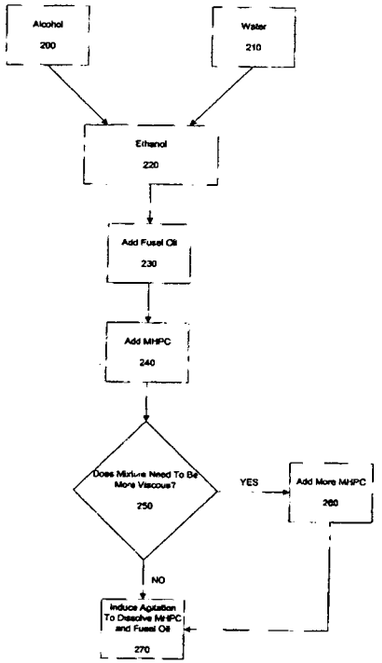


Figure 1

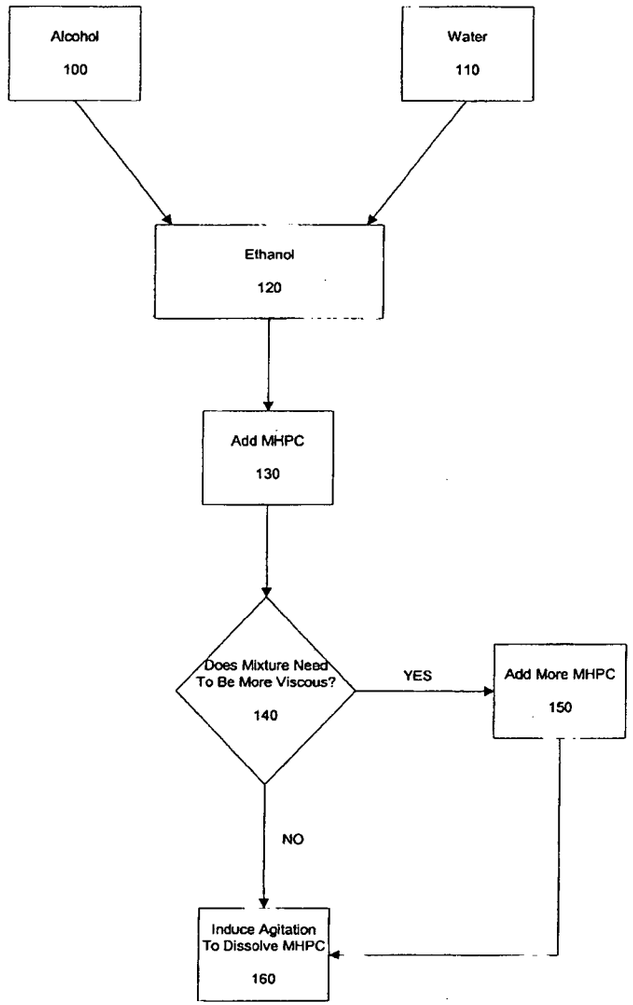
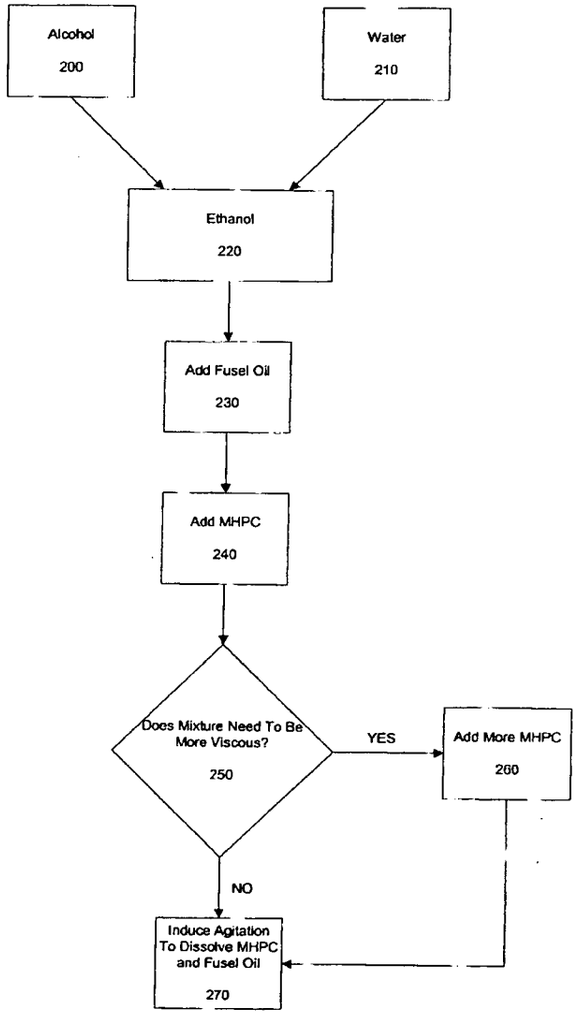


Figure 2



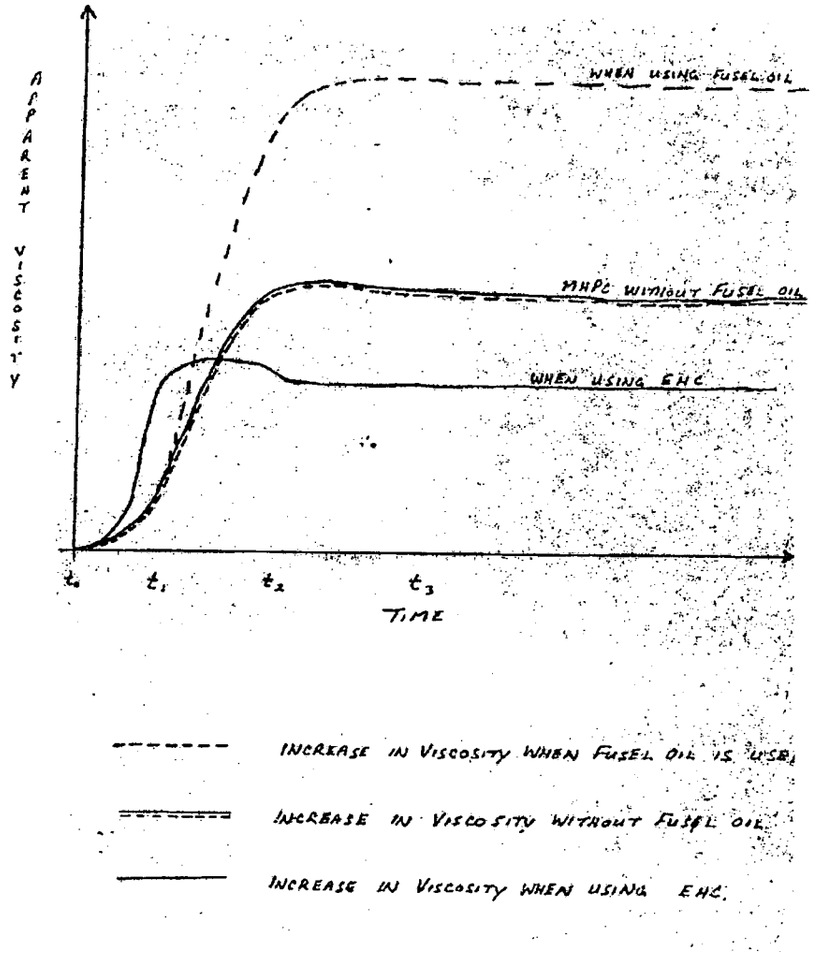


Figure 3

FUEL GEL

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The present application claims the benefit of priority from pending U.S. Provisional Patent Application No. 60/360,626, entitled Fuel Gel, filed on Mar. 1, 2002, which is herein incorporated by reference in its entirety.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The present invention relates to cooking, and in particular to a fuel medium in a gel state.

[0004] Portions of the disclosure of this patent document contain material that is subject to copyright protection. The copyright owner has no objection to the facsimile reproduction by anyone of the patent document or the patent disclosure as it appears in the Patent and Trademark Office file or records, but otherwise reserves all rights whatsoever.

[0005] 2. Background Art

[0006] There are some human needs that have to be fulfilled everyday for the human to live and sustain a healthy life. Eating items classified as food, both cooked and raw, is one such human need. Foods need some kind of fueling agent to increase the temperature to a level where any living organisms within the foods are killed and to eventually cook the foods. There are many areas in the world where even today electricity and solid or liquid fuels, some of the most conventional ways of cooking food, are unavailable, scarce, expensive, or, in themselves, inappropriate to use. We will explore these conventional ways of cooking food along with their drawbacks next.

[0007] Solid Fuels

[0008] Solid fuels, for example coal and wood, are generally readily available and commonly used, particularly in the developing nations of the world. They form a natural source of fuel for cooking, and have been in use for many centuries. They not only offer adequate heat for cooking, but are a good source of light as well. However, they do not offer the flexibility often demanded in various applications, for example in the military, in areas devoid of vegetation, or in areas that are wet and damp. Igniting solid fuels is also often problematic, and once combustion has begun, its control is not easy. Transportation and storage is also of concern. Moreover, during combustion, one often has to cope with smoke, soot, impartation of odors, and sometimes the alteration in the taste of the food being cooked. Solid fuels is used both indoors and outdoors, but often the site where cooking takes place is neither portable, nor easily shifted.

[0009] Liquid Fuels

[0010] Liquid fuels, like paraffin (also called kerosene) is significantly cleaner than solid fuels, and offer a whole range of advantages, which altogether makes for a preferred alternative. However, it too emits soot, noxious gases, and smell. It is relatively costly and can pose serious health, fire, and environmental hazards when spilled. However, with paraffin, it is now possible to make use of portable heaters and cookers. For example, Primus stoves, which run on paraffin, are common kitchen gadgets in low-income dwellings in some developing nations.

[0011] Electricity

[0012] Electricity has only recently taken over solid and liquid fuels as a viable food heating source. Using electricity to cook and heat foods eliminates the emission of soot, smoke, noxious gases, and other odors associated with solid and liquid fuels. However, producing, storing, and transporting electricity is not only an expensive utility, but since the production of electricity is conventionally tied with cascading waters, it cannot be produced by nations that do not have perennial cascading rivers or the means to dam such natural resources. Even a nation like Canada that has the natural and almost perennial resource as the Niagara Falls charges its citizens staying in provinces outside Ontario much more than the ones who live within the province of Ontario because storage and transportation of electricity is sometimes more expensive than its production.

SUMMARY OF THE INVENTION

[0013] The embodiments of the present invention provide a fuel medium. According to one embodiment of the present invention, since this medium is a gel, prior art fuel spillage hazards are eliminated. According to another embodiment of the present invention, the fuel gel comprises entirely of material from vegetable matter in combination with alcohol, primarily ethanol, although other low carbon alcohol may be used in combination with some water. This blend is made into a gel by the addition of Methyl Hydroxyl Propyl Cellulose (MHPC). According to another embodiment of the present invention, it is easily biodegradable when spilled and is not harmful to the environment, and can hence be used both indoors and outdoors. According to another embodiment of the present invention, the present invention in itself does not need anything else to enhance its viscosity, but may be strengthened by the addition of Fusel Oil, or, more specifically, Amyl alcohol, which is a major constituent of Fusel Oil. According to another embodiment of the present invention, during combustion it is smokeless, without soot, devoid of noxious gas emissions, non-carcinogenic and non-corrosive hence eliminating the impartation of unpleasant odors to the food being cooked.

[0014] According to another embodiment of the present invention, the gel form of the present invention makes for ease of packaging, as fuel for suitable heating units that are portable, and as fuel for suitable barbeque/fire lighter units. The reduction of ash and residue makes for easy maintenance of the heating and lighter units. One major benefit of the ease of packaging makes the product easy to transport, thereby offering flexibility of use, making even military use possible. The low cost of production, due to the efficacy of the MHPC, makes the present invention affordable to the low-income earners, thereby providing a preferred alternative to prior art fuels. According to other embodiments, the present invention has an enhanced ability to retain alcohol and to reduce its evaporation which increases the fuel's shelf life. The viscosity, once achieved, remains constant, stable, and uniform thus providing a steady burn. The burn rate and heat intensity can be altered by increasing or decreasing the water content of the alcohol-water mixture prior to adding MHPC. Thickening of the gel increases over time, as the MHPC dissolves, thereby improving ease of packaging. Since the right viscosity needed for cooking is achieved using less than 5% MHPC, the production cost is reduced.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] These and other features, aspects and advantages of the present invention will become better understood with regard to the following description, appended claims and accompanying drawings where:

[0016] **FIG. 1** is a flowchart illustrating an approach to increase viscosity of the present invention.

[0017] **FIG. 2** is a flowchart illustrating another approach to increase the viscosity of the present invention.

[0018] **FIG. 3** is a graphical representation of a comparative analysis of the viscosity achieved in the above two approaches.

DETAILED DESCRIPTION OF THE INVENTION

[0019] The embodiments of the present invention provide a fuel medium. According to one embodiment of the present invention, this medium is a biodegradable gel. In the following description, numerous specific details are set forth to provide a more thorough description of embodiments of the invention. It will be apparent, however, to one skilled in the art, that the embodiments of the present invention may be practiced without these specific details. In other instances, well known features have not been described in detail so as not to obscure the invention.

[0020] The fuel gel is designed for use in cooking. However, other uses can conceivably be covered including heating or boiling of water, lighting, and heating applications in the cold season.

[0021] Alcohol (Ethanol) obtained from vegetable matter is the focal point in the present invention. Vegetable matter typically consists of not more than 95% ethanol in its purest form, the remainder of it being water. The alcohol-water blend is variable with water content ranging from a maximum of 30% by weight to a minimum of 5% by weight. This blend type allows for miscibility as it involves a polar substance, the alcohol, in water. However, as the carbon content of the alcohol used increases, so too does the difficulty encountered in dissolution. Combustion properties of the alcohol in the final gel also varies progressively with increase in carbon content. Therefore, lower carbon alcohol is preferred. It also remains apparent that the higher the water content of the gel formed, the lower will be the heat intensity and the slower the rate of combustion.

[0022] There are two approaches that can be followed in gel formation depending on the desired nature and viscosity of the finished product.

[0023] In the first approach, MHPC is added to the mixture of alcohol got from vegetable matter and water to a maximum of up to 5% by weight. The greater the quantity of MHPC added, the more viscous is the gel formed upon vigorous agitation, which results in the complete dissolution of the MHPC. Agitation can vary depending upon the quantity of gel produced from mixing by hand, to using a wooden stick to mix the blend, to using a mixing apparatus similar to concrete mixing. Addition of MHPC to levels above 5% is not necessary and in fact results in the formation of a semi solid mass as opposed to the desired gel. Therefore, gel strength is already adequate at this stage. It is important to also note that there is no need to make adjustments to the pH of the alcohol-water blend in order to dissolve the MHPC. The MHPC is readily soluble & dissolves completely without the additions of any acids, alkali or buffer solutions, and neither is there need for the elevation of temperatures to assist the process as it occurs at room temperature. The gel formed is thus ready for use & requires no salts to enhance viscosity. The gel formed in this manner is significantly more stable, uniform, and requires 30% less cellulose to produce a gel of equal strength (viscosity) as that of any prior art gel fuels.

[0024] This first approach is shown diagrammatically in **FIG. 1**. At step **100**, alcohol from vegetable matter that consists of not more than 95% ethanol is mixed with 5% water at step **110**. This blend is termed Ethanol at step **120**. At step **130**, MHPC is added to the Ethanol. At step **140**, a check is made to see if the mixture needs to be more viscous. If it does, then at step **150** more MHPC is added to the mixture before going to step **160**. If the mixture has the required viscosity, then at step **160** agitation is induced to completely dissolve the MHPC in the mixture.

[0025] In the second approach, the procedure described above is followed in its entirety. However, the addition of Fusel Oil (a by-product of the production of ethanol from sugar cane processing) or amyl alcohol in its purer form up to 5% by weight, further enhances gel strength, thereby further reducing the amount of cellulose (MHPC) required. This has the obvious production cost advantages, while further enhancing all the other advantages described thus far. It is important, however, that the addition of Fusel Oil, is not an absolute requirement for production of the fuel gel. The fuel maintains all of its properties adequately even without the addition of the Fusel Oil.

[0026] This second approach is shown diagrammatically in **FIG. 2**. At step **200**, alcohol from vegetable matter that consists of not more than 95% ethanol is mixed with 5% water at step **210**. This blend is termed Ethanol at step **220**. At step **230**, Fusel Oil is added to the mixture. At step **240**, MHPC is added to the mixture. At step **250**, a check is made to see if the mixture needs to be more viscous. If it does, then at step **260** more MHPC is added to the mixture before going to step **270**. If the mixture has the required viscosity, then at step **270** agitation is induced to completely dissolve the MHPC and Fusel Oil in the mixture.

[0027] In both of the above two procedures, the viscosity of the gel increases with time as dissolution of the MHPC approaches completion. The gel viscosity becomes constant after a period of 5 days. Refer to the graphical illustration of **FIG. 3** for a comparative analysis of the viscosity achieved in each instance. It is also important to note that the finer the granular form the MHPC is available in, the greater is its rate of dissolution. It is apparent that the viscosity of the gel produced in this manner is significantly greater than that produced by use of Ethyl Hydroxyl Cellulose (EHC) as described in prior art inventions. The major difference being the incomplete dissolution of EHC compared with the complete dissolution of MHPC in this invention.

[0028] It is also apparent that the present invention therefore incorporates all the advantages of prior art similar inventions where EHC is used. In fact, the present invention even goes beyond all prior art inventions with regards to advantages observed. Notably, as there is no need for any pH adjustments, no additives in the form of bases, acids or

buffers are required and neither are any inorganic salts required to enhance gel formation. Therefore, the gel formed is kept as natural as possible while remaining bio-degradable and environmentally friendly. According to another embodiment of the present invention, the gel state makes for ease in packaging and for use in portable cooking units and barbeque/fire lighters.

[0029] Other embodiments of the present invention include the significantly enhanced ability to retain alcohol and to reduce its evaporation, which increases the shelf life of the gel. The viscosity, once achieved, remains constant, stable and uniform, thus providing steady burn properties. The burn rate and heat intensity can be altered by increasing or decreasing the water content of the alcohol-water blend prior to addition of the MHPC. Thickening of the gel increases over time, as the MHPC dissolves, thereby improving ease of packaging. Less MHPC is required to make the gel, therefore reducing production costs.

[0030] The MHPC used in the present fuel gel is available from Hercules International Ltd., and is more commonly known as CULMINAL MHPC 20 000S. While the grade of the product is specific, it is apparent that similar results can be obtained by the use of cellulosics of the same basic chemistry in terms of molecular structure, physical properties and behavior. The present invention and its description are not limited but rather cover all and any such obvious adaptations.

[0031] Thus, a fuel medium is described in conjunction with one or more specific embodiments. The embodiments of the present invention are defined by the following claims and their full scope of equivalents.

We claim:

1. A fuel medium, comprising:

a gel mixture of not more than 95% ethanol by weight obtained from vegetable matter and at least 5% water by weight.

2. The fuel medium of claim 1 wherein said gel mixture is not more than 70% ethanol by weight obtained from vegetable matter and between 5% and 30% water by weight.

3. The fuel medium of claim 1 wherein said gel mixture further comprises of up to 5% MHPC by weight.

4. The fuel medium of claim 3 wherein said gel mixture further comprises of up to 5% amyl alcohol by weight.

5. The fuel medium of claim 1, 2, 3, or 4 is obtained without the addition of any acids, without the addition of any alkali, without the addition of any buffer solutions, without a change in room temperature, or without a change in pH level of said ethanol, said amyl alcohol, said MHPC, or said water.

6. The fuel medium of claim 5 is biodegradable.

7. The fuel medium of claim 5 has the ability to retain alcohol.

8. The fuel medium of claim 5 on combustion is smokeless, without soot, void of noxious gas emission, non-carcinogenic and non-corrosive.

9. The fuel medium of claim 5 has a viscosity which is constant, stable, and uniform once formed giving a steady burn and steady heat intensity.

10. The steady burn and steady heat intensity of said fuel medium of claim 9 can be altered by increasing or decreasing said water content of ethanol-water mixture prior to the addition of said MHPC.

* * * * *

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РОССИЙСКОЕ АГЕНТСТВО
ПО ПАТЕНТАМ И ТОВАРНЫМ ЗНАКАМ

(12) ОПИСАНИЕ ИЗОБРЕТЕНИЯ К ПАТЕНТУ РОССИЙСКОЙ ФЕДЕРАЦИИ

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(54) ДЕЗИНФЕКЦИОННОЕ СРЕДСТВО "ЛЕСЕПТИК"

(57)
Изобретение относится к дезинфекционным средствам для обработки объектов окружающей среды. Дезинфекционное средство содержит масло сосновое, катамин АБ, изоборнилацетат, оксиэтилированные жирные спирты и/или алкилфенолы, этанол или изопропанол и воду в определенных соотношениях. Средство обладает противомикробным действием по отношению к грамотрицательным и грамположительным бактериям и микобактериям, а также фунгицидным действием по отношению к плесневым грибам. 2 табл.

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RUSSIAN AGENCY
FOR PATENTS AND TRADEMARKS

(12) ABSTRACT OF INVENTION

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(54) DISINFECTING AGENT "LESEPTIK"

(57) Abstract:
FIELD: microbiology. SUBSTANCE: invention relates to disinfecting agents used for treatment of environment objects. Disinfecting agent comprises pine oil, catamine AB, isobornyl acetate, oxyethylated saturated alcohols and/or alkylphenols, ethanol or isopropanol and water taken in the definite ratios. Agent shows antibacterial effect with respect to gram-negative and gram-positive microorganisms and mycobacteria and fungicide effect with respect to mold fungi. EFFECT: valuable disinfecting properties of agent. 2 tbl, 7 ex

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(12) UK Patent Application (19) GB (11) 2 087 724 A

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512 B
A2D 2L 3B1 3B2A 3B2X
3B3X 3B4X
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(54) **Bactericide for foods and food processing machines or utensils**

(57) Previous techniques of sterilising foods and food processing machines or utensils suffer from a variety of disadvantages, such as causing a deterioration in the flavor or quality of the food. Such problems are now overcome by use of a bactericide comprising as active ingredients ethyl alcohol, and an organic acid or its salt and/or an inorganic acid or its salt. A food or a food processing machine or utensil can be sterilised by dissolving this bactericide in water, and contacting the resulting aqueous solution with the food or the food processing machine or utensil.

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Table 15

	Sites inspected	*Standard plate count*	*Lactic acid bacteria*	*Coloform organisms*
Conventional process	(1) Surface of Vienna sausage in the clean room (cells for each sausage)	2.5×10^2	1.8×10^2	+
	(2) That portion of the drum cutter which contacted with sausage	2.0×10^2	8.8×10^2	+
	(3) Surface of the conveyor	6.2×10^3	5.2×10^3	+
	(4) Aligner	7.2×10^2	5.3×10^3	+
	(5) Bucket	1.3×10^4	2.5×10^4	+
	(6) The surface of the sausage which passed through the bucket (5)	8.5×10^4	5.7×10^4	+
Process of the invention	(1') Vienna sausage (sprayed with a 10% solution of the bactericide) in the clean room	–	–	–
	(2') The product-contacting portion of the drum cutter sprayed with a 10% solution of the bactericide	–	–	–
	(3') Surface of the conveyor sprayed with a 10% solution of the bactericide	–	–	–
	(4') Aligner sprayed with a 10% solution of the bactericide	–	–	–
	(5') Bucket sprayed with a 10% solution of the bactericide	–	–	–
	(6') The surface of the sausage with passed through the bucket (5')	–	–	–

–: negative, +: positive

CLAIMS

1. A food or food processing machine or utensil which has been sterilised by an aqueous bactericide comprising (1) ethyl alcohol and (2) at one least organic or inorganic acid or salt thereof.

2. A food or food processing machine or utensil according to claim 1 which has been sterilised by contact with said bactericide for one minute or less.

3. A food or food processing machine or utensil according to claim 2 wherein contact has been for 30 seconds or less.

4. A food or food processing machine or utensil according to any one of the preceding claims wherein the unsterilised food or food processing machine or utensil has been dipped in, sprayed with or wiped with the bactericide.

5. A food or food processing machine or utensil according to claim 1 substantially as hereinbefore described in any one of Examples 1 to 7.

6. A liquid bactericide for foods and food processing machines or utensils, said bactericide comprising as active ingredients ethyl alcohol, and organic acid or its salt and/or an inorganic acid or its salt.

7. The bactericide of claim 6 which comprises as active ingredients ethyl alcohol, the organic acid or its salt, and the inorganic acid or its salt.

8. The bactericide of claim 6 which comprises ethyl alcohol and the organic acid or its salt as active ingredients.

9. The bactericide of claims 6 which comprises ethyl alcohol, and the inorganic acid or its salt as active ingredients.

United States Patent [19]

Watanabe et al.

[11] **4,235,733**

[45] **Nov. 25, 1980**

[54] **ANTIBACTERIAL SOAP CONTAINING TRICHLOROHYDROXY DIPHENYL ETHER BACTERICIDE AND AN ORGANIC PHOSPHORIC ESTER AS A STABILIZER THEREFOR**

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[73] Assignee: **Kao Soap Co., Ltd.**, Tokyo, Japan

[21] Appl. No.: **56,559**

[22] Filed: **Jul. 11, 1979**

[30] **Foreign Application Priority Data**

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[51] **Int. Cl.**[3] **C11D 9/34**; C11D 9/50

[52] **U.S. Cl.** **252/107**; 252/106; 252/108; 424/340; 424/347

[58] **Field of Search** ..... 252/106, 107, 108, 174.16, 252/DIG. 16, DIG. 17; 424/224, 340, 347

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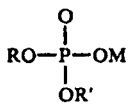
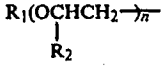
Primary Examiner—P. E. Willis, Jr.
Attorney, Agent, or Firm—Oblon, Fisher, Spivak, McClelland & Maier

[57] **ABSTRACT**

An antibacterial soap comprising 2,4,4'-trichloro-2'-hydroxydiphenylether in a range of 0.05 to 5% by weight and at least one organic phosphoric ester represented by the formula,



wherein R represents an alkyl group having 8 to 20 carbon atoms, or a group of



in which R_1 is an alkyl group having 8 to 20 carbon atoms, R_2 is a hydrogen atom or a methyl group, and n is an integer of 1 to 10; R' represents the same group as R, or a hydrogen atom or an alkali metal; and M represents a hydrogen atom or an alkali metal exerts a wide range of antibacterial activities and marked resistance to discoloration upon exposure to sunlight.

3 Claims, No Drawings