

# UNITED STATES PATENT OFFICE.

GEORGE GRIFFITHS, OF LOS ANGELES, CALIFORNIA, ASSIGNOR OF ONE-HALF TO WILLIAM HENRY AVERY, OF SAME PLACE.

## COMPOSITE FUEL AND PROCESS OF MAKING SAME.

SPECIFICATION forming part of Letters Patent No. 604,317, dated May 17, 1898.

Application filed February 15, 1897. Serial No. 623,589. (No specimens.)

*To all whom it may concern:*

Be it known that I, GEORGE GRIFFITHS, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Composite Fuel and Process of Making the Same, of which the following is a specification.

My invention relates to fuels composed of various ingredients which used separately are not capable of satisfactory use for burning or heating purposes. The great objection heretofore with fuels of this character has been the difficulty of producing a binder which is inflammable, but which will possess sufficient tenacity while being burned to prevent the fuel disintegrating and smothering out the fire. It is essential that this binder retain to a large extent its inflammable qualities and that it shall not be so thick as to render its thorough incorporation with the other matter of which the fuel is composed difficult or too laborious. My present invention is the embodiment of several years' experimentation and study, and the fuel I produce is superior to any other fuel of this class of which I am aware.

My invention relates particularly to composite fuel embodying bray or asphaltum and crude petroleum mixed therewith and a body, such as leaves and twigs from the eucalyptus-trees, incorporated therewith. The crude petroleum and bray which I have used in practicing my invention is that produced in Southern California and has an asphaltic base, thereby differing from the eastern oils, which have a paraffin base. In the course of my experiments I have found that with this material used in any of the known ways satisfactory fuel could not be produced, since the binder would not be sufficiently tenacious to hold the fuel in shape while burning and the disintegration thereof smothered out the fire.

It is an object of my invention to produce a composite fuel which will be highly inflammable, will retain its shape while burning and not become disintegrated, and will be cheap and highly satisfactory in use.

In Southern California there are many large groves of eucalyptus-trees, the wood of

which is utilized for fuel. Large quantities of brush and leaves are annually removed from the groves, and heretofore they have been disposed of by burning, since there is no way in which they can be profitably utilized. The leaves are full of a very inflammable oil, which in its extracted state is known as "eucalyptus-oil." The fumes and odors from the burning eucalyptus and from the eucalyptus-leaves unburned are pleasant and highly medicinal.

Another object of my invention is to utilize the eucalyptus leaves and twigs and to produce therefrom, in combination with other natural products, a fuel which is capable of generating great heat, will ignite easily and not be liable to go out after once lighted, and which will be medicinal in its effects.

My invention also comprises the process of making composite fuel, which consists in placing bray and a little crude petroleum in a receptacle, bringing it to the boiling-point, boiling it until smooth, then adding more crude petroleum and boiling thoroughly until smooth and sticky, then adding eucalyptus leaves and twigs cut into short lengths and thoroughly incorporating them with the mixture, after which the fuel, while hot, is molded into suitable chunks or blocks.

In practicing my invention I use bray, which is the residue of naturally-evaporated crude petroleum mixed with sand or silt. This bray comes in quite large chunks and is placed in a suitable receptacle with enough crude petroleum to nearly or quite cover the bray. Then heat is applied to bring the mixture to a boil, and the boiling is continued until the bray is melted and the mixture becomes practically smooth. Then the major portion of the crude petroleum is added to the mixture, and the mixture is boiled until it becomes sticky and perfectly smooth. Ordinarily this takes about twenty minutes after the addition of the last petroleum; but the length of time varies according to the quality of the bray. Then the eucalyptus leaves and twigs, which have been previously thoroughly dried and chopped into small lengths of about an inch and a half, are thrown into the mixture and thoroughly incorporated therewith, and



while hot the fuel is placed in suitable molds and molded into chunks or blocks convenient for handling and burning.

The advantage which is gained by boiling the mixture until it becomes sticky and perfectly smooth is that the stability of the molded blocks is much greater than can be produced by former methods of manufacture, so that the fuel made by my improved method will stand up better in the grate than when the mixture is simply heated and thoroughly mixed. The high temperature to which the material is brought before being pressed into blocks enables it to better resist the heat, so as not to become disintegrated while burning.

I find that the inflammable qualities of the fuel are improved by adding thereto a quantity of one of the products of petroleum, which product is known as "distillate." There are two grades of distillate. One grade, known as "brown" distillate, ranges from 28° to 35° gravity, Baumé, and contains considerable asphaltum. This is the grade I usually employ in my fuel. The other grade is known as "white" distillate and ranges from 45° to 55° gravity, Baumé. This may be used, but is too volatile to give as good results as the brown distillate. This distillate is volatile, however, and in order to prevent its evaporation by reason of the heat I add the distillate to the fuel and mix it therewith immediately before molding into blocks. The operation of molding compresses the outside of the blocks, and thus prevents the evaporation of the distillate, which is upon the inside of the blocks.

By placing the bray in only a small quantity of petroleum and applying heat and melting the bray therein the operator can break up the lumps of bray and reduce the mixture to a thoroughly-smooth condition with far greater ease than is possible where all the petroleum is placed at once in the receptacle. Furthermore, the result of boiling the crude petroleum for the length of time which is necessary to thoroughly disintegrate and reduce the bray to a smooth condition is to evaporate or drive off from the crude petroleum the lighter products thereof. These lighter products are the most valuable for fuel purposes, and their loss cannot be compensated for except by the addition of other products after the boiling has been completed. This is too expensive to be practicable. By my process of adding the major portion of the petroleum only after the bray has been reduced to a smooth consistency the entire mixture may be brought to the proper stickiness to form a perfect binder without driving from that petroleum last added the lighter products thereof.

By thoroughly drying the leaves and twigs before incorporating with the binder better results are secured than is otherwise possible, for the reason that when the leaves and twigs contain moisture when coated with the binder the evaporation of the moisture is prevented

and a dull soggy fire is produced. Furthermore, the fuel is more liable to disintegration than when the moisture is previously expelled.

In practice the fuel burns with a cheerful even blaze, the essential oil in the eucalyptus-leaves adding to the intensity of the heat and assisting in producing perfect combustion of the asphaltum. The aroma of the eucalyptus-leaves while the fuel is burning and before it is burned is agreeable and highly medicinal in its effects. By using a large proportion of asphaltum in the mixture I am enabled to produce a fuel which is especially desirable for warding off frost in orange and other orchards, the essential oil in the eucalyptus causing the fuel to be sufficiently inflammable to prevent it from going out after once lighted, and the heavy carbon smoke from the asphaltum producing a protecting-blanket above the orchard which will ward off any ordinary frost. By reason of the inflammability of the fuel it may be burned in orchards without special appliances and good effects secured.

Now, having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A composition of matter to compose a fuel consisting of thoroughly-dried eucalyptus leaves and twigs cut into short lengths, bray or asphaltum, crude petroleum, and distillate.

2. The process of producing composite fuel, which consists in boiling bray and crude petroleum together until smooth and sticky; adding eucalyptus leaves and twigs chopped to suitable size; thoroughly incorporating the same with the mixture, and while hot, molding into suitable blocks.

3. The process of making composite fuel, which consists in placing bray and a little crude petroleum in a receptacle, bringing it to the boiling-point, boiling until smooth, then adding more crude petroleum and boiling thoroughly; then adding thoroughly-dried eucalyptus leaves and twigs cut into suitable lengths; thoroughly incorporating the leaves and twigs with the mixture; then adding distillate, and while the mixture is still hot, molding into suitable blocks.

4. The process of producing composite fuel, which consists in placing bray, with a little crude petroleum, in a receptacle; bringing the mixture to the boiling-point and boiling until smooth; then adding more crude petroleum and boiling until smooth and sticky; then adding thoroughly-dried eucalyptus leaves and twigs chopped to suitable size; thoroughly incorporating the same with the mixture, and while still hot, molding into suitable blocks.

GEORGE GRIFFITHS.

Witnesses:

ALFRED I. TOWNSEND,  
JAMES R. TOWNSEND.



It is hereby certified that in Letters Patent No. 604,317, granted May 17, 1898, upon the application of George Griffiths, of Los Angeles, California, for an improvement in "Composite Fuel and Processes of Making Same," errors appear in the printed specification requiring correction, as follows: On page 1, lines 29, 33, 71, 80, 83, 85, 88, and 96, and page 2, lines 37, 39, 40, 47, 56, 98, 101, 108, and 119, the word "bray" should read *brea*; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 21st day of June, A. D., 1898.

[SEAL.]

WEBSTER DAVIS,  
*Assistant Secretary of the Interior.*

Countersigned:

C. H. DUELL,  
*Commissioner of Patents.*