

Aug. 5, 1924.

1,503,907

P. J. A. MAIGNEN

HEATING DEVICE

Original Filed Sept. 20, 1919

FIG. I.

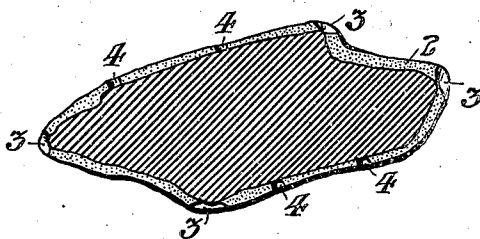


FIG. II.

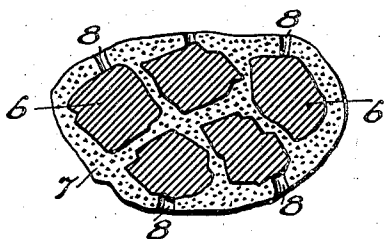
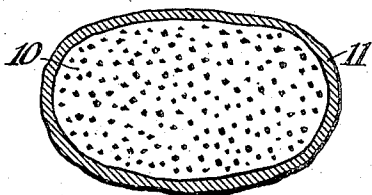


FIG. III.



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UNITED STATES PATENT OFFICE.

PROSPER JEAN AUGUSTE MAIGNEN, OF PHILADELPHIA, PENNSYLVANIA.

HEATING DEVICE

Application filed September 20, 1919, Serial No. 325,049. Renewed May 2, 1924.

To all whom it may concern:

Be it known that I, PROSPER JEAN AUGUSTE MAIGNEN, a citizen of France, residing at Philadelphia, in the State of Pennsylvania, have invented a certain new and useful Improvement in Heating Devices, whereof the following is a specification, reference being had to the accompanying drawing.

and combustion of fuel as to effect complete combustion of all of its constituents. In other words; the object and effect of my invention is to permit all of the combustible constituents of any fuel to be fully consumed in the order in which they may be rendered ignitable by the application of heat.

10 All combustible materials, classed as fuel, are susceptible of fractional distillation or disintegration, and such breaking up of fuels is imposed, more or less, by any attempts to consume the same. For instance; 15 ordinary coal includes not only more or less fixed carbon and carbonaceous substances, but more or less aqueous material; so that, upon being subjected to heat, coal first gives off volatile matter, primarily 20 water vapor and, secondary, gaseous hydrocarbon. If ordinary soft coal is subjected to heat under suitable control; all of its volatile constituents may be driven off, in succession, leaving a residue of fixed carbon, and such a result is substantially attained in the production of coke from bituminous coal, or charcoal from wood in specially constructed and controlled ovens. 25 By such costly and complicated apparatus, as a modern coke oven and its appurtenances, the major original contents of suitable fuel may be saved for combustion, but, by ordinary methods or means to which fuels are subjected to effect their combustion; the 30 major portion of the latent energy thereof is wasted. For instance, by ordinary furnaces or stoves, such as used for domestic heating and cooking; practically all of the volatile substance of fuel is discharged, unconsumed, for the reason that such devices are ordinarily designed to effect rapid combustion of the solid substance of the fuel.

45 In other words; to effect complete combustion of any fuel, its subjection to the action of heat must be so graduated as to permit the successive elimination therefrom of its ingredients which volatilize at successively higher temperatures and they must be discharged into an atmosphere maintained at proper temperature to effect their combustion; such temperature varying in accordance with the nature of the volatile matter, and no such conditions are realized in any ordinary heating device.

55 Therefore, it is the object of my invention to effect such fractional disintegration

As hereinafter described, such results are attained in a substantial degree, by the means and method characteristic of my invention and including the provision of an envelope for a body of fuel which, while 65 retarding the initial combustion of the solid constituents of the fuel, permits the volatile constituents to escape and be consumed in the order in which they are vaporized. 70

My invention includes the various novel features of construction and arrangement 75 hereinafter more definitely specified.

In the drawing: Fig. I is a sectional view of a heating device embodying my invention and including a piece of fuel in an individual container, formed by enveloping 80 said piece in a coating of plastic material of a semirefractory nature.

Fig. II is a sectional view of a heating device embodying my invention and including several distinct pieces of fuel in a common container, formed by imbedding said 85 pieces in a mass of plastic material.

Fig. III is a sectional view of a heating device embodying my invention and including a magma containing combustible material in an envelop which is a coating formed 90 by dipping said magma in a liquid.

Referring to Fig. I: The fuel 1 is a piece of ordinary bituminous coal. The envelop 2 containing said fuel 1 is conveniently 95 formed of a plastic medium spread thereon. Said container is conveniently preferably composed of semirefractory material, sufficiently durable to remain integral while the mass is subjected to sufficient heating to 100 fractionally distill and consume it, but is preferably so far frangible that it readily crushes and disintegrates thereafter; so that a fire made of such devices may be stoked like an ordinary coal fire, and when stoked, 105 the containers which have served their purpose disintegrate so that they may be readily withdrawn with the ashes. I find that suitable containers 2 may be made from a mixture containing fire-clay, sand, and liquid 110 sodium silicate. However, ordinary hydraulic cement may be used with or substi-

tuted for the fire-clay in said mixture, and other binding material may be substituted for the silicate. For instance, crude asphaltum or coal tar may be used as such binder. However, it is to be particularly noted that the liquid sodium silicate aforesaid is not mixed with the fuel, but included in a distinct coating or envelop exterior to the fuel but retained thereon during combustion of the fuel.

Although air may be admitted to and gaseous elements be evolved from said enveloping material 2, through pores which are invisible to the naked eye; I have indicated openings 3 and 4 for such purpose in the heating device shown in Fig. I, which may be termed a briquet, and it is to be understood that such openings as are indicated at 3 in said figure may be formed by tumbling such briquets in a rotary drum or sieve which knocks off the projecting corners of the container 2, or openings such as indicated at 4 in Fig. I may be formed by causing such briquets to roll down an inclined surface provided with suitable projections.

Referring to the form of my invention shown in Fig. II; the fuel elements 6 which may be fragments of coal, wood, or other combustible material, are enveloped in the container 7 which may be formed of plastic material smeared or molded thereon and having suitable pores or openings 8.

Referring to the form of my invention shown in Fig. III; the fuel element 10 may be a magma of compressed cellulose such as waste paper, sawdust, straw, weeds or other combustible material impregnated with crude oil or other hydrocarbon and the shell 11 containing it may be formed of such plastic material as above described or by dipping said magma in liquid sodium silicate and drying it. As above noted; the pores of the enveloping material may be invisible to the naked eye, and it is to be understood that said shell 11 is porous, although no openings therethrough may be apparent in Fig. III.

The briquets indicated in Figs. I and II, as above described, resemble coal in that they are designed to be ignited by what may be termed a base fire, of more readily combustible material such as wood kindlings; although such briquets as indicated in Fig. II, as described, may be ignited by first moistening them with combustible hydrocarbon. However, the briquet indicated in Fig. III, as described, may be directly ignited by a match or other small flame, the shell 11 thereof permitting the hydrocarbon contents to seep through to the outer surface, in position to be ignited.

Therefore, it is to be understood that a heating device constructed in accordance

with my invention may include a unitary piece of solid fuel, such as coal or wood, or may contain a number of loose units of solid fuel and in either case may contain a liquid or semiliquid combustible material. Moreover, the shell or container enveloping such fuel elements may consist of a film of fire resisting material either smeared or molded upon the fuel elements, or formed independently thereof, and may be unitary, affording access to the interior only by breakage of its walls, or may be formed in separable parts which may be repeatedly used.

Furthermore, when fuel briquets involving my invention are to be used in burning cement; the shells of the briquets may include the same material as is used for fluxing cement, and, when they are used for fusing iron, from its ore, such shells may contain a calcium derivative or other suitable flux for the iron.

In any case; the process of utilizing my improved heating devices includes what may be considered several steps, for instance; in treating peat, first, the free moisture is driven off as the temperature rises above that of the atmosphere until substantially all the free water is eliminated when the temperature reaches from 212° F., to 302° F. Second, the volatile combustible matters begin to be liberated and are ignited and burnt when their respective flash points are reached. When the temperature reaches 480° F., the light hydrocarbons begin to evolve and continue to do so as the temperature rises to from 617° F., to 753° F. Then, third, if air has access to the remaining fixed carbon, it becomes incandescent and continues to burn, as coke or charcoal, until it is reduced to ash. In such manner, all of the fuel value of the peat is utilized.

Therefore, I do not desire to limit myself to the precise details of construction and arrangement herein set forth, as it is obvious that various modifications may be made therein, without departing from the essential features of my invention, as defined in the appended claim.

1 claim:

A fuel briquet including peat mixed with combustible oil and having a distinct thick coating of cementitious material which is fire resistant.

In testimony whereof, I have hereunto signed my name at Philadelphia, Pennsylvania, this ninth day of September, 1919.

PROSPER JEAN AUGUSTE MAIGNEN.

Witnesses:

ARTHUR E. PAIGE,
CAROLYN E. REUTER.