

UNITED STATES PATENT OFFICE.

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METHOD OF MANUFACTURING PEAT FUEL.

SPECIFICATION forming part of Letters Patent No. 715,271, dated December 9, 1902.

Application filed February 19, 1902. Serial No. 94,794. (No specimens.)

To all whom it may concern:

Be it known that I, ROBERT ARTHUR KELLOND, a subject of the King of Great Britain, and a resident of the city of Chicago, Cook county, and State of Illinois, have invented a certain new and useful Improvement in the Method of Manufacturing Peat Fuel, of which the following is a specification.

My invention relates to the manufacture of crude peat into hard dense blocks, cakes, or briquets to serve as fuel; and it consists of a method or process whereby the whole area or outer surface of the block, cake, or briquet is provided with a coating, envelop, or crust formed by the entire or partial fracture and carbonization of the peat fiber and consequent liberation of the tarry and oily constituents for a certain depth from the surface toward the interior, while the greater proportion of the peat, or that forming the center or core, retains all of its fibrous, carbonaceous, and volatile constituents and a percentage of moisture exceeding the atmospheric degree. In other words, I produce by my process a "seared" block of condensed or compressed peat, in contradistinction to the following, which are known in the art—viz., first, a block of peat carbonized throughout after the lighter volatile vapors have been first liberated and dissipated and with the tarry and resinous matters first separated and then recombined and intermixed with the fixed carbon while under the influence of intense heat and pressure; second, a block of peat dried to the atmospheric degree and retaining throughout all of the volatiles—light and heavy—produced simply by heavy compression and relying for its water-proofing quality only upon the shine or glaze imparted to the circumference of such block, (such block being a solid cylinder,) leaving the ends untouched while passing through the cold molds or tubes.

The block I manufacture embodies every feature of value found in either or both of the above and is more economical in production than either or than any other form of pressed peat known to me in the art, while it contains more combustible matter than the first-named or carbonized block and is free from the serious objections found in the actual

production of the latter or plain dry-pressed block in that it possesses no waterproof quality whatever, requires the extreme degree of dryness, an extravagant amount of power in compression, and after all is friable to such an extent as to unfit it for favorable consideration in the market.

By my improvement (as set forth in my application for patent on the "product," filed January 9, 1902, series of 1890, No. 88,952) I produce a smooth, oily, and dense texture externally of the block, so as to present the most inflammable constituents of the peat to the immediate action of the fire when igniting, to increase the hardness and water-resisting qualities of the manufactured fuel, and while not depriving the raw material of any really valuable combustible constituents (for an extreme preponderance of the lighter volatiles I have found only tends to unduly hasten the consumption) to render the blocks more lasting in the fire, and consequently more approaching to coal in value for steam-raising and domestic and other purposes where the maximum of heat is to be produced with the minimum feed and replenishment of fuel.

It is well known that the problem of drying the crude material as taken from the peat-bog down to anything approaching the degree of moisture existing in the surrounding atmosphere is one of the most serious and difficult of attainments in all modern processes of peat-fuel manufacture, and the other reason of failure to reach the market with this otherwise valuable fuel in any commercial quantities has been the necessity of constant, expensive, and so far unsuccessful experiments along this line.

Complete and continuous air-drying has proved impossible in America, owing to the climatic conditions, and cold-dry compression has been found impracticable unless the moisture is actually reduced to ten per cent. of the bulk of raw material.

My experience and experiments go to prove that in manufacturing my seared block of peat I need not reduce the moisture to such an extreme degree, but may avail myself of many economical systems used extensively for drying other materials than peat

which will readily liberate enough of the water to make my fuel highly combustible when the other qualities due to the "searing," which I have above set forth, have been imparted to the compressed blocks, and I thus make a superior fuel at much less expense than that called for under any of the old methods.

I prefer to "sear" or coat my block of peat-fuel with the partially-carbonized and tarry envelop or crust immediately after the initial compression has been imparted; but I may perform this searing operation at the same time that the solidification or compression takes place with equally good results.

To the above ends, therefore, the process or method which I have invented may be described as follows: The crude peat excavated or gathered from the bog is deprived of sticks, large roots, and valueless foreign substances, either by hand (which can often be done economically when a good quality of material is operated upon) or by any approved form of "picking" mechanism, (many such having been devised by peat operators,) and if sufficiently dry for the purpose (as it is sometimes when the bog has been well drained or when the parts operated upon have been long exposed to sun and atmosphere) the peat may be simultaneously broken to the required degree of fineness for compression, which I prefer shall be about the consistency of partially-powdered tea. If, however, the raw material contains more than about twenty-five per cent. of water as it generally does, the picking mechanism need only break it into smaller lumps than result from the excavating, and the material is then ready for drying, or I may dry it to the required degree immediately following the excavation. I have found that this degree of dryness may vary from, say, twelve to twenty-five per cent., or even more, of water remaining, according to conditions, density, &c. The "younger," more fibrous and less earthy the peat is the drier it should be made, in order to relieve it of that spongy character which leads to ready re-absorption of moisture and renders permanent compression difficult. When the raw material is "old," "mud," or "dredge" peat, I find that it does not require the extreme degree of dryness in making my seared block, either of these qualities being sufficiently dense and decomposed as to be practically homogeneous with even twenty-five per cent. of water remaining therein.

In many cases and under favorable climatic conditions evaporation of water may be effected in the open by the natural action of the sun and air, or it may be done under cover by using induced air-currents, or when the peat is very wet I may use a centrifugal to expel the bulk of the water, or when haste is necessary I may use any suitable mechanical or electrical drying apparatus, in which artificial heat may be employed of sufficiently high temperature to drive off the necessary amount

of moisture without scorching or carbonizing the fibers or releasing any appreciable proportion of the lighter volatiles. Having been thus dried, I prefer (where it has not been previously reduced to the required degree of fineness) to put the peat through a breaker or similar apparatus which will thoroughly separate and shorten the fibers without breaking into the minute cellular tissue which contains the volatile and tarry matters. This finely-divided material must now be cool enough to prevent the exudation of vapor from the interior after the block is formed, extreme heat and extreme cold being alike unfavorable to the formation of a permanent peat block, for reasons known in the art, about 65° Fahrenheit being what I estimate as the proper temperature to produce the best results in carrying out my invention. The peat is now ready for compression, and I proceed to feed the material thus prepared into suitable molds or dies for solidifying same and then, by preference, directly into extensions of these molds, which have been brought to a sufficiently high temperature by dry heat—gas, steam, or electricity—to sear the outer surfaces of the blocks by wholly or partially carbonizing the external fibers and liberating their constituent tar, their subjection to these instrumentalities being continued for a sufficient time to effect the necessary solidification and searing of the blocks, which may then be ejected automatically or otherwise and be carried away by a belt conveyer, inclined chute, or other convenient means.

In making a large heavy block I may so time the compression and regulate the heat as to give a greater thickness to the carbonized coating than would be necessary for smaller blocks, so as to increase the durability; but this will only be a matter of judgment, it being borne in mind, however, that the thicker the carbonized tarry coating the less friable will be the block. A good average thickness for the coating upon blocks of one pound and less in weight would be, say, one-eighth of an inch. For heavier blocks this may be advantageously increased in proportion.

The forming mechanism may be arranged to work either vertically or horizontally without affecting the product, and, as above mentioned, I may effect the compression in one part of the molding mechanism and the searing operation in another part or member. I prefer that the dies and plungers, however, should be laid in a horizontal line when I effect the compression either against a fixed or a semiyielding resistance, as the means for feeding the raw material, for ejecting the finished blocks or briquets, and for the disposal or carrying off of the gases resulting from the searing process may be readily and economically accomplished by devices which I am now formulating for these purposes; but all of these details would suggest them-

selves to persons skilled in the art. I prefer, to economize power and to effect a large output, to arrange several dies in one machine to operate simultaneously and with one contemporaneous feed of material. This last step in my process can be also carried out to advantage by the employment of a rotating table or bed in which are located a number of female dies or pockets, in connection with vertically-operating male dies or formers and heated rollers or other devices adapted to sear the exposed sides of the blocks after they have been formed and moved past the line of the male die, all in such a manner that the block is first formed out of raw material in a heated die or pocket, then seared upon any portion which has not been against a heated surface by a separate instrumentality while another pocket is being filled, and then ejected by other suitable means at another point of the circle of rotation of the table, or the dies may be arranged in a die-block arranged to be moved lengthwise, with like results. I wish it to be understood, however, that I do not limit myself to the precise methods described for preliminary treatment of the peat, nor to their exact sequence prior to the searing operation, nor to any of the suggested arrangements of mechanism, as all of these may be varied or modified, accord-

ing to the skill and judgment of those acquainted with the art, without producing a different article, departing from the principle, or sacrificing the advantages of my invention.

What I claim, and desire to secure by Letters Patent, is as follows:

The method or process of manufacturing peat into blocks, cakes, or briquets for fuel, which consists in first, preparing the raw material by relieving it of the preponderance of moisture and reducing it to a finely-divided state and moderate condition as to temperature, second, compressing the material thus prepared and while it contains moisture in excess of the atmospheric degree, into hard, dense blocks, and third, imparting to each block an outer coating, envelop or crust composed of the fixed carbon and tarry and oily constituents of the peat by a "searing" operation involving the application of intense heat only to the material at and near the surface of such blocks, substantially as and for the purpose set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ROBERT A. KELLOND.

Witnesses:

HENRY L. CARROLL,
A. D. MACKAY.