No. 738,136. PATENTED SEPT. 1, 1903.

F. WHITE.

BLOCK OF PEAT.

APPLICATION FILED JUNE 28, 1902. RENEWED JUNE 13, 1903.

NO MODEL.

Fig. 1.

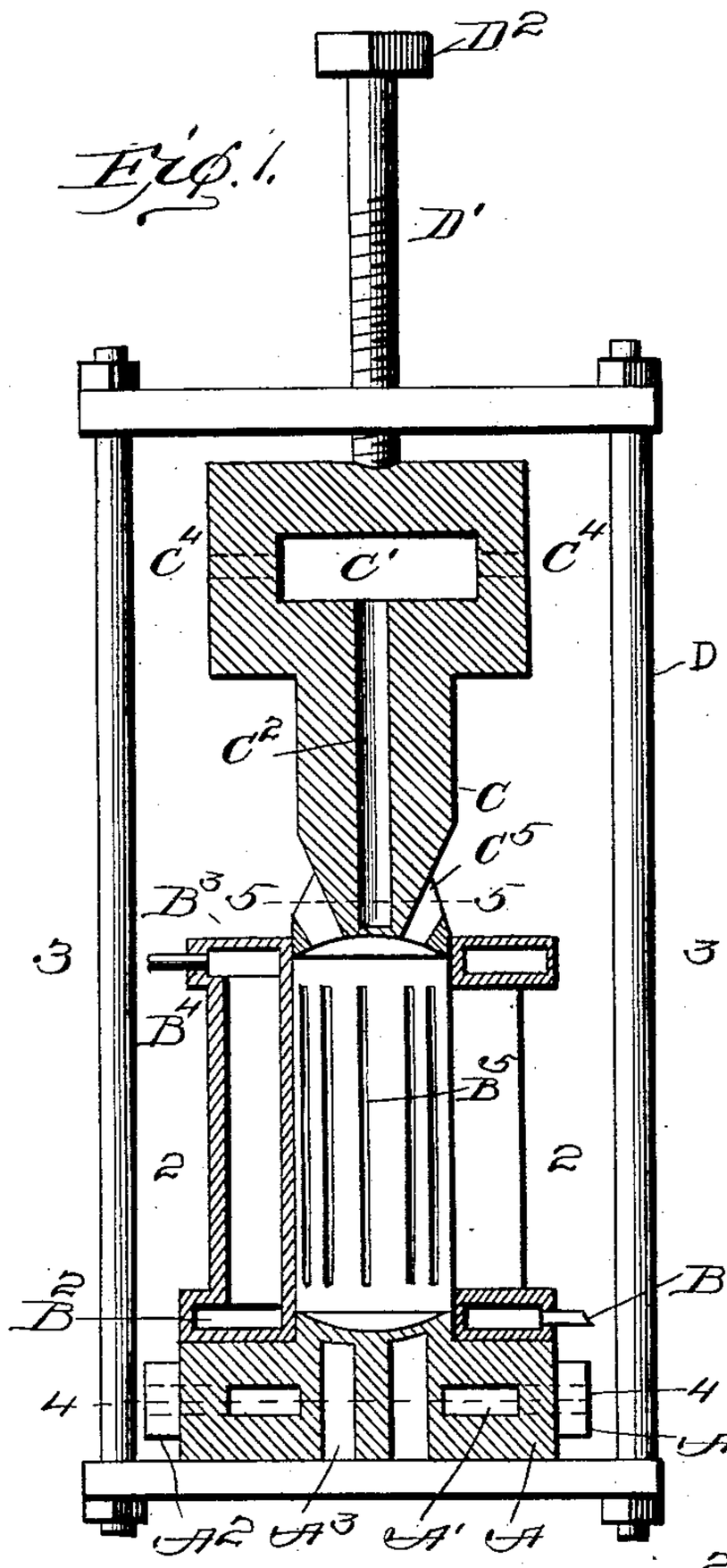


Fig. 2.

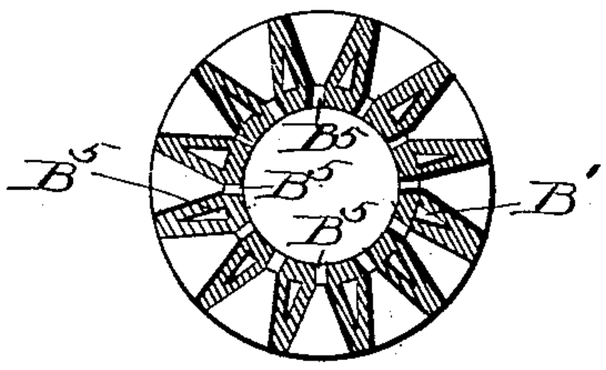


Fig. 3.

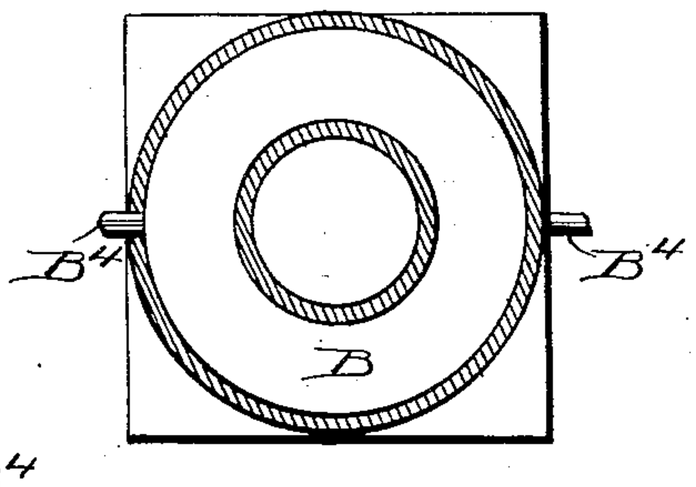


Fig. 4.

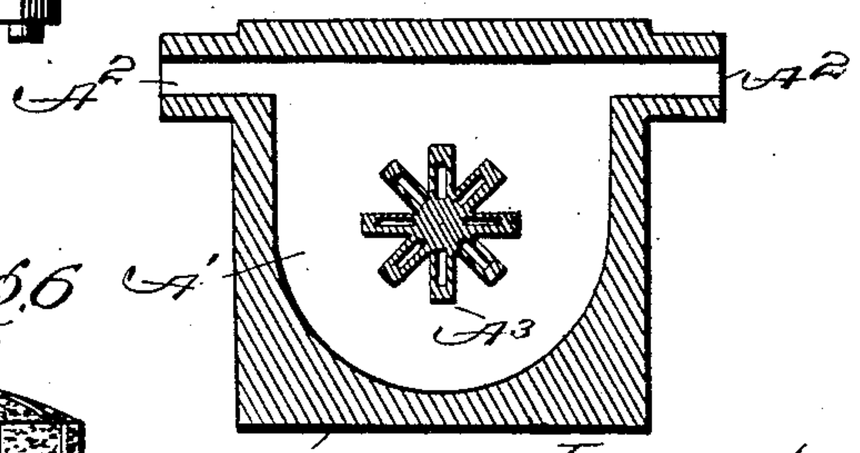


Fig. 5.

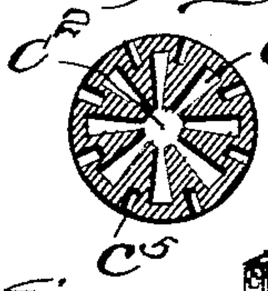
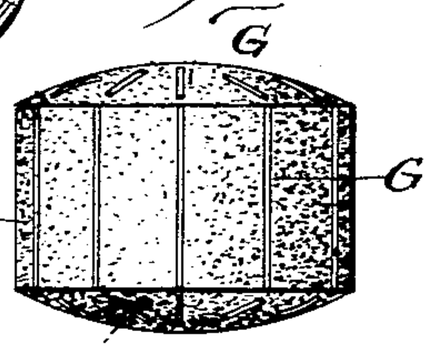


Fig. 6.



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No. 738,136. Patented September 1, 1903.

UNITED STATES PATENT OFFICE.

FRANK WHITE, OF TORONTO, CANADA, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO HIMSELF, AND GEORGE ALEXANDER GRIFFIN, OF GUELPH, CANADA.

BLOCK OF PEAT.

SPECIFICATION forming part of Letters Patent No. 738,136, dated September 1, 1903.

Application filed June 28, 1902. Renewed June 13, 1903. Serial No. 161,389. (No model.)

To all whom it may concern:

Be it known that I, FRANK WHITE, a citizen of the Dominion of Canada, and a resident of Toronto, in the Province of Ontario, Dominion of Canada, have invented certain new and useful Improvements in Blocks of Peat, of which the following is a specification.

My invention relates to blocks or briquettes of peat dried and compressed into a form suitable for fuel.

My briquette is characterized by having its entire surface covered with a shell or jacket of greater hardness and density than the interior of the block, which jacket is, however, intersected at predetermined points by small and more permeable semiporous sections, which act as vents for the egress of any moisture which may still be contained within the interior of the block or of gas in the early stages of burning. This hard and dense jacket is, in fact, a tarry jacket containing some of the tarry constituents of the peat. In addition to this my block of peat is characterized by the fact that it is composed of substantially hard and dense undisintegrated peat fiber—that is to say, of peat which in so far as its fibrous nature is concerned is substantially in the same condition as peat in th bog. Finally, my peat block is progressively drier from the center to the surface, though containing on an average only a commercial per cent. of moisture. In order to make these characteristics of my peat block more clear and to show how such a block may be manufactured, I will describe the process which is used in its manufacture and a suitable apparatus for carrying out the process. It is to be understood, however, that the apparatus which I show is only one of a number of such which could be employed.

In the drawings, Figure 1 is a vertical cross-section of the apparatus. Fig. 2 is a horizontal cross-section on the line 2 2. Fig. 3 is a horizontal cross-section on the line 3 3. Fig. 4 is a horizontal cross-section on the line 4 4; Fig. 5, a horizontal cross-section on the line 5 5; and Fig. 6 is a side elevation of the peat block.

The mold which I have shown consists of a base A, a body portion B, and a plunger C. The base A is provided with ports A^2 for the admission or exit of steam or hot air. These ports communicate with a steam-space A′, by which the base of the mold is thoroughly heated. Drainage-slots A^3 communicate with the interior of the mold. The body of the mold is heated by steam or hot air fed through the ports B^4. The steam which is used to heat the body of the mold passes around the steam-spaces B^2 B^3 at the top and bottom of the mold-body, these steam-spaces being connected by the longitudinal steam-spaces B′. Longitudinal slots B^5 are formed in the mold-body and permit the moisture of the charge therein to escape to the outer air. These slots should not be greater in width at their entrance into the mold than three sixty-fourths of an inch. The mold may be conveniently made some three inches in diameter and may form a block from two to two and a half inches high.

Of course I can use radically-different constructions of mold from the one which I have shown; but in each case it will be well not to make the blocks much larger than is here indicated, and to choose a shape which will permit moisture from any interior part of the block to escape through the surface without being obliged to travel too great a distance in the block.

The plunger C is fed with the steam or hot air through the ports C^4, which communicate with the steam-spaces C′ C^2 C^3 for the purpose of thoroughly heating the plunger and more especially that portion of it which is in contact with the charge. The face of the plunger is provided with drainage-slots C^5.

The mold is surrounded with a press-frame D, and pressure may be supplied by a screw D′ by means of a handle applied to the squared head D^2; but this is merely one of the number of apparatuses which may be used to produce compression.

I have already noted that one of the advantages of my peat block is that it is made up of peat the fiber of which is undisintegrated and in about the same condition as when it comes from the bog. At the same time, when I make my blocks on a large scale, in which case a number of charges of peat will be un-

der treatment simultaneously, each in a separate mold, but all under the action of the same master or controlling pressing apparatus, it is necessary to insure that there shall be a certain degree of uniformity between the density of the charges in the several molds under treatment in order that some blocks may not be unduly compressed and others not be compressed sufficiently. I may therefore intermix peats of different degrees of density or peats which vary in their fibrous character, so to produce a practical uniformity of density and of fibrous character for the number of charges which are under simultaneous treatment by the same master press. Such intermixture, however, will not cause any substantial breaking up of the peat fiber. I may also say that I may drain from the peat as it comes from the bog such water as will naturally flow off before placing it into the mold.

The mold prior to placing the charge of moist peat therein may be heated to 300° or 350° Fahrenheit, and should be maintained at or near this temperature by the constant application of heat throughout the operation. This is a good temperature. At the same time nothing will prevent the employment of much higher temperatures. The mold having been heated, a charge of moist peat is placed therein and the cover put on. A slight pressure—say of ten pounds to the square inch—is thereupon immediately applied and maintained for a period of time which may vary from half a minute to four or five minutes. During this time the peat-cells, which are in contact with the heated mold-walls have their water-cells ruptured by the heat of the mold-walls and their contained water set free, so that they form, as I have discovered, an efficient screen or matte, which permits in the subsequent treatment the escape of the moisture from the interior of the charge through the matte and the drainage-apertures, but does not permit the escape of any substantial quantity of peat. After this matte has been well formed I gradually increase the pressure upon the charge in the mold and I preferably increase this pressure stepwise or in jumps—that is to say, beginning with a pressure of, say, ten pounds to the square inch and maintaining this for several minutes to form the matte, I may then increase the pressure to twenty, then to thirty, then to forty pounds to the square inch, leaving perhaps a minute between each increase of pressure, until the pressure has reached, say, two hundred and fifty to three hundred pounds to the square inch at the end of, say, thirty minutes. I can, however, make the steps of increase in pressure smaller or larger and the period between each step larger or smaller; nor in actual practice will it be necessary to perform the operation with the mathematical regularity here pointed out. While this increase of pressure stepwise or in jumps is preferable, I can also increase the pressure continuously and gradually, it being understood that heat at from 300° to 350° Fahrenheit or at even higher temperatures is being constantly applied. The figures which I have given are sufficient to enable an operator to produce good results. At the same time it is to be understood that the rationale of the operation consists in increasing the pressure in proportion as the block dries out, the increase of pressure at a given instant of time and the dryness of the block at the same instant of time being correlated and adapted each to the other. The heat must not outstrip the pressure; otherwise vacant spaces will be formed in the interstices of the peat, which would otherwise have been closed up, upon the exit of the moisture therefrom. On the other hand, the pressure must not be in excess of that adequate for working in proper combination with the heat; otherwise the mass of peat is too much compressed to permit of the proper escape of the moisture. When the operation is carried out in the proper manner, as above described, it is found that the escape of moisture through the matte, which has been formed over the drainage-slots and then through these drainage slots, produces in the peat block more or less defined vent-passages. This is due to the fact that the moisture, which first escapes from the charge in the form of water and thereafter in the form of steam, having adopted a given line of travel toward the vents in the interior of the block in the early stage of drying and compressing the block, naturally keeps along this same path in the later stages of drying and compression, thus, as before said, creating in the block more or less well defined vent-passages in communication with those portions of the surface of the block which lie over the drainage-apertures. When the block has been subjected to heat at the temperatures stated and to an increasing pressure of the amount stated for a period of about thirty minutes, more or less, it is found that the surface of the block consists of a jacket of greater hardness and density than the interior. This jacket is also of a tarry nature and apparently has its birth in the matte which is formed over the charge in the first stage of the operation. As the combined drying and compression take place in the later stage of the operation, this jacket grows gradually thicker, reaching a considerable but at no time a very great depth. The tarry jacket is somewhat brittle and seems to consist of superdesiccated peat fiber, probably mixed with some peat which is not fiber, the whole being permeated with tar and oil forced out of the peat by the gradual softening of the tarry substances of the peat through the action of heat and pressure. After the operation has been carried to the point at which this tarry jacket is substantially completely formed the applied pressure is gradually reduced to avoid fracture of the tarry jacket. Should the pressure be much increased after this tarry jacket has been com-

pletely formed, and more especially should it be suddenly increased, the tarry jacket will be ruptured. On the other hand, if the pressure is taken off two quickly before the block becomes set it seems that the sudden expansion of the peat which naturally follows results in fracturing the inclosing tarry jacket. I have therefore found that after the tarry jacket has been completely formed at the stage of the operation before referred to it is advisable to apply no further pressure. This naturally has the effect of permitting the pressure to run down of its own accord by the shrinking of the block away from the mold-walls. I may give as an example a case in which I had applied a pressure of three hundred pounds to the square inch when the tarry jacket was completely formed, this being the maximum pressure used in the operation. I added no further applied pressure during four minutes, and the pressure upon the block thereupon ran down gradually to one hundred and fifty pounds to the square inch, whereupon I released the applied pressure still further, and finally took the completed block from the mold. Generally speaking, I let the pressure run down to from one hundred and fifty to seventy-five pounds to the square inch before releasing the applied pressure and taking the block from the mold. The block thus formed has all of the characteristics above set out. It is shown in Fig. 6 of the drawings.

Particular attention is called to the portions G of the surface of the block. These are the portions which were juxtaposed upon the drainage-slots when the block was in the mold. These small sections G of the surface of the block are distributed at predetermined points of the surface. They are unglazed, semiporous, and more permeable than the rest of the tarry jacket. They communicate with the vents which have been formed along more or less predetermined lines in the interior of the block during the compressing and drying operation, and they themselves act as vents. While shown as narrow rectangles, these permeable portions may of course be made of other shapes. I may also say that while I have shown my block as substantially cylindrical in form it may be made of a variety of shapes, as a parallelepipedon or in the shape of a cog-wheel with teeth, or in other ways.

A block having the characteristics set out in this specification possesses many advantages over present known forms of peat fuel. As it is substantially covered with a hard tarry shell, the tendency of unglazed peat to absorb moisture under certain circumstances is materially overcome. As the jacket is left with semiporous permeable portions distributed at predetermined points over its surface, the moisture from the interior of the block is allowed to escape without tending to disintegrate the jacket. This action is facilitated by the fact that the interior of the peat block is formed with more or less defined vents communicating with these permeable portions of the jacket. This characteristic is also of advantage in the burning of the peat. The expanding steam from the more or less moist interior or the gases which may be formed in the early stages of the burning are free to escape without rending or materially cracking the block. Peat is ordinarily such a quick-burning substance that anything which will prevent subdivision, with its consequent increase in rapidity of combustion, is an important advantage.

Another feature of this invention, as already pointed out, is that the peat is compressed with its fibers as nearly as possible undisturbed from the position relative to one another which they occupied in the bog. Peat with its fibers so undisturbed forms a much more cohering block than is possible if the peat has been disintegrated. Again, my block contains such moisture as is found therein gradually distributed in an increasing ratio from the circumference to the center. This facilitates its burning.

Peat is usually turned out containing what may be called a "commercial" percentage of moisture, which may be defined as varying between five and thirty per cent. of the total mass. The treatment above described is adapted to produce any percentage of moisture within these limits by keeping the charge in the mold for a greater or less length of time. I may, if I like, produce a block, by appropriate treatment in the mold above described, to have about twenty per cent. of moisture and afterward allow the percentage of moisture to be reduced still further by atmospheric action. Since the block is provided with the described semiporous sections in its glazed surface, through which the moisture may escape, the block will maintain its shape practically unimpaired despite such further drying.

In some cases it will be advantageous to burn the peat while still containing the somewhat large per cent. of moisture just referred to, particularly where a slow and moderately hot fire is desired. The peat block, however, will be better suited for use where a quick hot fire is necessary, if it be treated for a longer time, and the moisture be reduced to a comparatively small percentage either by longer treatment under pressure in the heated mold or by being allowed to stand in the air after it is taken from the mold until the moisture has evaporated to a corresponding degree.

What I claim is—

1. As a new article of manufacture, a block of peat consisting of a mass of compressed agglomerated peat having a jacket of greater hardness and density than the interior, which jacket is intersected, at predetermined points, by small and more permeable semiporous sections which act as vents for the egress of moisture or gas, substantially as described.

2. As a new article of manufacture, a block

of peat consisting of a mass of compressed agglomerated peat having a tarry jacket of greater hardness and density than the interior, which jacket is intersected, at predetermined points, by small and more permeable semiporous sections which act as vents for the egress of moisture or gas, substantially as described.

3. As a new article of manufacture, a block of peat consisting of a mass of compressed agglomerated peat having a tarry jacket, which completely surrounds the block, of greater hardness and density than the interior, which jacket is intersected, at predetermined points, by small and more permeable semiporous sections which act as vents for the egress of moisture or gas, substantially as described.

4. As a new article of manufacture, a block of peat consisting of a mass of compressed agglomerated peat, progressively drier from the center to the surface and having a jacket of greater hardness and density than the interior, which jacket is intersected, at predetermined points, by small and more permeable semiporous sections which act as vents for the egress of moisture or gas, substantially as described.

5. As a new article of manufacture, a block of peat consisting of a mass of compressed agglomerated peat, progressively drier from the center to the surface and having a tarry jacket of greater hardness and density than the interior, which tarry jacket is intersected at predetermined points, by small and more permeable semiporous sections which act as vents for the egress of moisture or gas, substantially as described.

6. As a new article of manufacture, consisting of a mass of compressed agglomerated and undisintegrated peat having a jacket of greater hardness and density than the interior, which jacket is intersected, at predetermined points, by small and more permeable semiporous sections which act as vents for the egress of moisture or gas, substantially as described.

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

FRANK WHITE.

Witnesses:
F. T. CHAPMAN,
C. E. MARSHALL.