A. TEN BOSCH.

METHOD AND MEANS FOR REMOVING WATER FROM PEAT.

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1,369,611. Patented Feb. 22, 1921.

Fig. 3

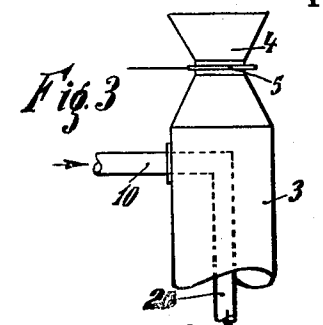


Fig. 1

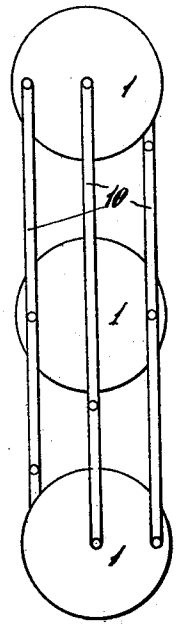


Fig. 2



Fig. 4

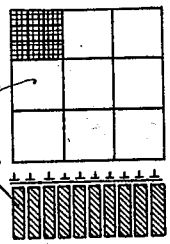


Fig. 5

Inventor.

A. ten Bosch

By K. R. Kerslake

Atty.

UNITED STATES PATENT OFFICE.

ABRAHAM TEN BOSCH, OF THE HAGUE, NETHERLANDS, ASSIGNOR TO NAAMLOOZE VENNOOTSCHAP NEDERLANDSCHE VEENVERWERKING MAATSCHAPPIJ, OF THE HAGUE, NETHERLANDS, A COMPANY OF NETHERLANDS.

METHOD AND MEANS FOR REMOVING WATER FROM PEAT.

1,369,611. Specification of Letters Patent. Patented Feb. 22, 1921.

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To all whom it may concern:

Be it known that I, ABRAHAM TEN BOSCH, a subject of the Queen of the Netherlands and residing at 9 Bachmanstraat, The Hague, the Netherlands, have invented certain new and useful Improvements in Methods and Means for Removing Water from Peat, of which the following is a specification.

The present invention relates to a method of and means for freeing peat of water by expression after the application of heat thereto.

It is a well known fact that fresh peat usually containing 85% of liquid behaves like a liquid if subjected to pressure in an inclosed space. In other words the water absorbed in the peat cannot be removed from same by pressure exclusively.

The Swede Ekenberg deserves the merit of having found that water can be removed from peat by pressure if heat is applied to same.

The fact that notwithstanding said invention the method proposed by Ekenberg has not come into commercial use, is due to the fact that the process is not sufficiently efficient to be practical, in spite of all improvements proposed and effected by Ekenberg and others.

The present invention relates to a method of this kind for removing water from peat in which the heat is applied to the fresh mass in a manner so as to increase the efficiency. The invention provides for the possibility of efficiently reclaiming earth containing peat and thus solves the question of fuel consumption independent of coal mines.

The principle of the invention is based on the fact that from the moment the temperature of the peat is raised and pressure applied to same, it tends to release the liquid absorbed. This tendency increases as the temperature and pressure rise. This behavior appears to be caused by part of the vegetable cells of which the peat is composed giving way under the internal pressure induced by a comparatively little rise in temperature. The characteristic difference of this method as against the process of Ekenberg in principle consists in that the latter, while subjecting the peat to great pressure in inclosed horizontal reservoirs, raises its temperature above the point at which wet-carbonization is initiated, and then conveys the peat to presses for squeezing the water out of same.

According to one feature of the present invention the peat initially is subjected to pressure exerted by its own weight in open towers or columns, whereupon, under application of an artificial pressure, in inclosed spaces the temperature of the peat is gradually raised. During said process the peat initially is pre-heated by the warm discharge water obtained from other towers and thereby frees part of its water and then is heated to the required temperature by means of steam applied. Heating of the peat, however, is preferably not carried as far as the wet-carbonizing temperature.

According to a second feature of the invention the liquid expressed during the gradual increase of temperature and pressure is supplied to a fresh mass of peat contained in a second vertical column or tower, while the liquid discharged from the latter is conveyed to a third and if need be afterward to still another column of fresh peat. As indicated above the fresh peat is always first mixed with the warm liquid pressed from a pre-heated mass of peat.

A third feature consists in that the peat after having been freed from water to a sufficient degree, is removed from the tower by means of the pressure prevailing in said tower. Then the tower in open condition is filled again and the mass operated upon by the warm discharge liquid recovered from a third or following tower.

The above described method allows for continuous operation. All undue heat losses are obviated within practically possible limits and thus an exceedingly high degree of efficiency obtained.

The invention further relates to an arrangement for carrying out the method described.

The accompanying drawing illustrates, by way of example and diagrammatically, such an arrangement. This arrangement consists in a plant comprising three towers or columns; although this number will appear most suitable in practice it is obvious that a plant may have more or less towers or columns.

Figure 1 is a plan view of a series of three towers and connections.

Fig. 2 represents one of the towers in side elevation on a reduced scale.

Fig. 3 is a vertical section through a tower and illustrates the various pipe connections and lines for steam and water.

Fig. 4 is a plan view of and Fig. 5 a vertical section through a grid or filter for use in a tower as illustrated by Fig. 3.

Each tower has a height of some 80 feet. The lower 50 feet (at 2) is preferably of larger width than the upper 30 feet (Fig. 2). The tower may be constructed of sheet steel and must be able to stand a pressure of some 70 lbs. per square inch. At the upper extremity a filling funnel 4 is provided the interior of which is separable from the interior part 3 of the tower by means of a steam tight slide valve 5. At or near the bottom of the peat containing space of the tower, the discharge of the dried peat is arranged for. In the example illustrated said discharge is composed of pipes 6 fitted with slide valves 7 and connected to the wall of the tower. Immediately below said discharge pipes 6 a heavy grid or block is mounted (Figs. 3, 4 and 5). Said grid has the shape of a block 8 traversed by passages allowing the expressed water to flow off into the space 9 provided at the bottom end of the tower.

To the wall of the tower a plurality of pipe lines for steam and water, all provided with cut-off valves, are connected, *i. e.* at the top end the pipe 10 for the supply of warm discharge water from the preceding tower, to be mixed with the fresh peat and for heating same. The pipe 10 is extended within the tower by an elbow pipe 20 having a length of some 16 feet. In addition two ring pipes 11 and 12 for steam, connected to the inner space of the tower, are fitted in different heights around the latter, *i. e.* one pipe (11) at half the height of the tower and the second one (12) at some distance above the peat discharge 6. The number of such pipes may vary according to requirements. Below the grid 8 a supply pipe 13 for steam is provided, said pipe being connected to an elbow pipe 14 in the interior of the tower. Said pipe 14 is extended in the shape of a perforated pipe 15 fitted upon the grid 8 and arranged coaxially with the tower wall.

Into the space 9 a steampipe 16 opens through which steam may be supplied for cleaning the grid. To the lowermost part of the space 9 the water discharge pipe 17 is connected. Said pipe contains steam traps, or in case the plant comprises a plurality of towers is fitted with a centrifugal pump 18, adapted for conveying the discharge water through the pipe line 10 to the next tower.

The plant operates as follows:

The valve 5 of one of the towers is opened and said tower is filled with fresh peat, usually containing 85% of water. The peat falls upon the grid 8 and gradually fills the tower 1 as a plastic mass. During the filling operation, the discharge openings 6 and all steam supply pipes are closed, but the water discharge 17 is open, in order to allow the expressed water to flow off through the branch pipe 19. In a tower having a height as described the pressure upon the peat below the narrower part 3 amounts to some 30 lbs. per square inch (absolute pressure). During this operation warm discharge water of 90° C., from some other tower is supplied (*e. g.* through the upper pipe 10) for pre-heating the mass contained in the tower to some 50° C.

The percentage of water expressed by the weight of the column resting upon the lower layers amounts to some 30% of the weight.

Then steam is supplied through the steam pipes 13 as well as the ring pipes 11 and 12. Said steam heats up the peat to a higher temperature with the result, that practically immediately upon the steam supply being opened, the liquid contained in the mass commences to flow off. A great number of experiments have proven that the amount of water per metric ton of fresh peat can be reduced by this operation to 450 kg. (*i. e.* the water content can be reduced to about 75%). The water flowing off, having a temperature of 90° C., may be pumped to a second tower through the pipe lines 17, 10, 20.

As soon as the liquid freed by the action of the steam of 100° C., ceases to flow off, the tower, which up to that time has constantly been kept full is closed by means of the slide valve 5. Then the pressure of the steam within the tower is run up to about 70 lbs. per square inch, and consequently the temperature of the peat is gradually raised to 150° cent. It has been found that this temperature, in coöperation with the pressure of 70 lbs. per square inch is sufficient for bringing the amount of liquid contained in the mass from 75% down to 68%. The hot water emerging from the tower at its lower end is supplied to a next one, open at that time. In view of the high pressure exerted upon the mass in the first mentioned tower, the pump 18 is not needed and can be bypassed.

When the liquid ceases to flow through the grid 8 of the first tower and only steam escapes therethrough, the treatment of the peat contained in said tower can be considered finished. At this moment the valves 7 are opened and the peat freed from water is pressed against the high internal friction of the matter through the pipes 6 into wagons or the like. The peat is then ready for further treatment, for example, for further removal of the water and for being briqueted in presses. The method just described is repeated with additional amounts of peat in the second and then in the third tower. At any moment therefore one tower is open for being filled with fresh peat. The plant op-

erating uninterruptedly has an exceedingly high efficiency. Heat losses of the towers and pipe lines obviously may be kept at a minimum by covering same with suitable insulating material.

It has been found, that stoppage of the grid 8 is not to be feared. This appears to be due to a cushion of water accumulating (during the first part of the steaming operation) below the peat in the interior of the tower upon which the peat (of lower specific gravity) floats. If need be steam for cleaning the grid 8 may be applied through the pipe 16 into the space 9 during or after discharging the tower.

The method according to the invention can also be carried out with other materials than peat having the same property with relation to the water absorbed.

I claim:—

1. A process of dewatering wet peat which comprises establishing and maintaining a column of peat in a vertical container open at its top and of such a height that the lower portion of said column is under a considerable superatmospheric pressure produced by gravity by the weight of the peat lying thereupon, allowing the water expressed by this pressure to be expelled through a filtering member located near the lower end of said column of peat, then closing the container at its top and subjecting the entire mass of peat to the action of elevated pressure in the presence of hot elastic fluid injected thereinto under suitable pressure, while allowing water to continue to filter away through said filtering member.

2. A process of dewatering wet peat which comprises establishing and maintaining a vertical column of peat open at its upper end to communication with the atmosphere, and of such a height that the lower portion of said column is under a considerable superatmospheric pressure produced by the peat lying thereupon, causing heated water to flow in physical contact with such wet peat while under sufficient pressure to expel water from said peat, through a filtering member located near the lower end of said column of peat, whereby the addition of a given amount of said hot water forces more than its own weight of water out of the peat, and thereafter closing the top of said column of peat, and subjecting the entire column of peat to a superatmospheric pressure of an elastic fluid introduced at the upper end of said column, while allowing water to filter away at the bottom of said column.

3. A process of dewatering wet peat which comprises establishing and maintaining a vertical column of peat of such a height that the lower portion of said column is under a considerable superatmospheric pressure produced by the peat lying thereupon, causing heated water to flow in physical contact with such wet peat while under sufficient pressure to expel water from said peat, through a filtering member located near the lower end of said column of peat, whereby the addition of a given amount of said hot water forces more than its own weight of water out of the peat, then subjecting the entire mass of peat to the action of pressure in the presence of hot elastic fluid injected thereinto under superatmospheric pressure, while allowing water to continue to filter away from the lower part of said column of peat.

4. In the process of claim 1, the step of drawing off the hot water liberated from the peat in the last mentioned operation, and delivering the same to another mass of peat undergoing the first step of the process.

5. A plant for carrying out the method hereinbefore described of removing water from peat by heat treatment, which plant comprises vertical towers, a supply opening at the top end of each tower, means for hermetically closing the same, supply pipings for steam and discharge pipings for water connected to said towers.

6. A plant for carrying out the method hereinbefore described of removing water from peat by heat treatment, which plant comprises vertical towers, a supply opening at the top end of each tower, means for hermetically closing said opening, supply pipings for steam and discharge pipings for water connected to said towers and a pipe line between the bottom end of each tower and the next tower near its open and upper end, for conveying the liquid accumulating in the bottom part of one tower to the upper part of said next tower.

7. A plant for carrying out the method hereinbefore described of removing water from peat by heat treatment, which plant comprises vertical towers, having a larger width at the lower than at the upper part, a supply opening at the top of each tower, means for hermetically closing said opening and supply pipings for steam and discharge pipings for water connected to said towers.

8. A plant for carrying out the method hereinbefore described of removing water from peat by heat treatment, which plant comprises a vertical tower, having a larger width at the lower than at the upper part, a supply opening at the top of each tower, means for hermetically closing said opening, supply pipings for steam and discharge pipings for water connected to said towers, a grid in the lower part of said vertical tower and a space below said grid for accumulating the water expressed from the pulp and flowing-off through said grid.

In testimony whereof I affix my signature.

ABRAHAM TEN BOSCH.