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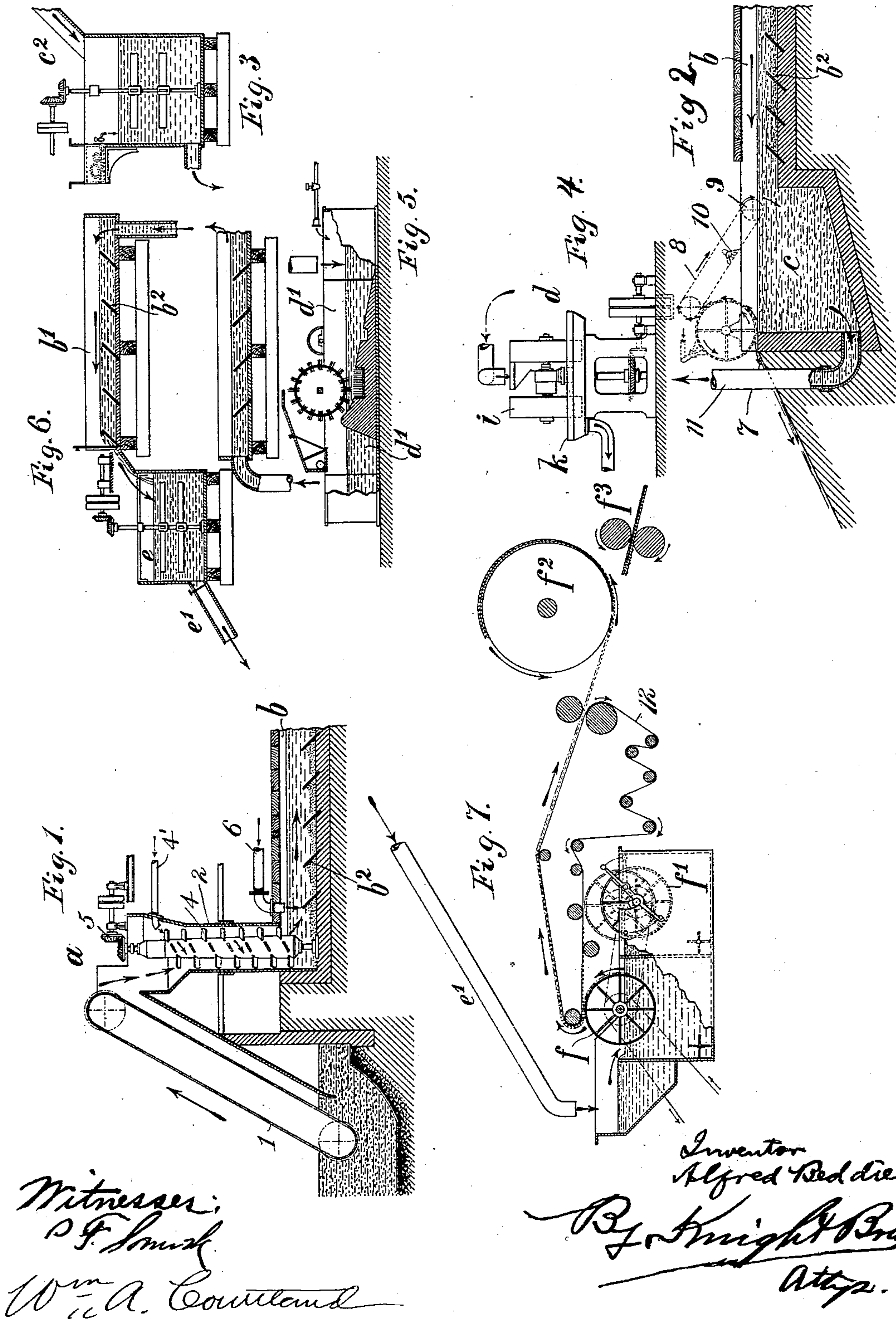
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A. BEDDIES.

PROCESS OF CONVERTING RAW PEAT INTO PAPER PULP.

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NO MODEL.



UNITED STATES PATENT OFFICE.

ALFRED BEDDIES, OF BERLIN, GERMANY.

PROCESS OF CONVERTING RAW PEAT INTO PAPER-PULP.

SPECIFICATION forming part of Letters Patent No. 751,139, dated February 2, 1904.

Application filed August 5, 1902. Serial No. 118,442. (No specimens.)

To all whom it may concern:

Be it known that I, ALFRED BEDDIES, a subject of the German Emperor, residing at Hanoverschestrass 1, Berlin, Germany, have invented a certain new and useful Process of Converting Raw Peat into Paper-Pulp, of which the following is a specification.

The object of my invention is to convert in a continuous process raw peat as obtained directly from the bog into a smooth, consistent, and homogeneous pulp suitable for paper-making. I accomplish this by subjecting the raw peat to a continuous series of successive mechanical treatments, whereby the raw peat is converted into paper and paper products.

It is well known that by a simple process of grinding pulp of comparatively uniform consistency may be obtained from wood and pulp and paper made in a continuous operation at the same place of manufacture. This process is not available for peat by reason of its complex and heterogeneous character, whereas wood possesses a comparatively uniform and homogeneous texture. By the process about to be described I produce directly from raw peat by mechanical or physical means a uniform pulp or pulp product in a continuous operation.

In the accompanying drawings there is illustrated schematically and in the way of an example the apparatus employed in carrying out my process. The different views are numbered in the order of sequence in which the various mechanical devices are employed.

Figure 1 is a sectional view showing a means for conveying the peat from the bog to the disintegrator, also showing a portion of a separating-trough. Fig. 2 is a similar view showing a settling-tank and a portion of a separating-trough. Fig. 3 is a like view of a stirring tank or reservoir. Fig. 4 is an elevation of a rotary crusher. Fig. 5 is a sectional view of the disintegrating-tank used subsequently to the crushing operation. Fig. 6 is a sectional view of the separating and mixing tanks used subsequently to the crushing and disintegrating operations, and Fig. 7 is a sectional view of a sheet-making device which may be used in connection with my process.

The peat, which in some cases may have to

be transported by means of suitable vehicles to a certain distance, is extracted from the bog by an apparatus such as is shown in Fig. 1 in the accompanying drawings. Any suitable excavating and conveying device 1 may be used to transfer the peat from the bog to the disintegrator 2. This disintegrator may be of any desired form. The form which I prefer and which is illustrated in the drawings shows a vertical chamber provided with a vertical shaft 3, carrying blunt knives 4, by means of which the peat is roughly disintegrated. The shaft and the arms carried thereby may be rotated by any suitable means connected with a source of power such as is shown at 5. In this disintegrator the peat is broken and "tempered," water being introduced at 6, the earthy matter, stones, and heavier matter being separated from the peat in the conduit or trough *b*. A current of water is supplied to this trough near the inlet to the same by a pipe 6. The bottom of this trough is provided with inclined baffle-plates *b*², the purpose of which is to intercept the heavier particles and sediment carried by the current. The fibers and lighter particles are floated along the trough by the water-current to a settling-tank *c*, of larger area than the conduit and in which by reason of the checking of the flow the fibers and other matter carried by the current are deposited. The length of this conduit may be regulated according to conditions under which the process is carried out. It may be from twenty to fifty meters in length where the apparatus for further disintegrating and purifying the peat is situated in proximity to the source of raw material; but where this apparatus is situated at a remote distance from the source of raw material the conduit may be one hundred or more meters in length, according to the distance which it is required to transport the material. The settling-tank and the succeeding devices may thus be housed in a suitable factory at a distance from the bog.

In the conduit *b* the baffle-plates *b*² are inclined relative to the flow of the current, as indicated by the arrow on the drawings, toward the direction from which the current comes. By means of treatment of water as

above described not only are the larger and heavier constituents of the peat separated out, but the acids contained in the peat are washed out by the water.

5 From the settling-tank *c* the overflow of the water is conducted away at the point marked 7 in the drawings. Near the surface of the water in this tank is arranged a screen *c'* of a rotary type. This screen has for its object
10 the interception of the lighter fibers which rise to the top of the tank. These fibers are deposited by the action of the screen upon its surface and from thence are transferred to a belt or apron 8, traveling in contact therewith
15 and by means of which they are returned to the tank at a point 9. Suitable showers are arranged over the surfaces of the screen and apron, as at *c''* and 10, respectively, to keep the surfaces thereof in efficient working condition.
20

From the settling-tank *c* the fibers suspended in water are transferred through the pipe 11 by means of any suitable pumping apparatus, to be further disintegrated in the devices *d*
25 and *d'*. Before proceeding to these disintegrating devices the pulp is preferably conducted to a reservoir or tank *c''*, provided with stirring devices, as shown, to keep the fibrous matter uniformly suspended in the water.
30 While in this tank there may be added to the pulp a binding material, such as a solution of resin, and eventually a certain quantity of wood-pulp or the like, or in case the acidity has not been completely removed from the
35 pulp by the washing to which it has been subjected a neutralizing agent, such as a solution of soda or of lime-water, may be added to the pulp while in this tank. The pulp is fed from this tank *c''* to the disintegrating and beating
40 devices *d* *d'*, in which the knots and particles of wood, long fibers, &c., contained in the pulp are disintegrated, the pulp is converted into a more uniform consistency, and the fibers separated and distributed evenly in suspension
45 in the water.

The device *d*, Fig. 4, is a crushing device of the type known as "edge-runners," in which the knots and wood particles, stems, &c., are ground and crushed between the
50 disks and pan *i* and *k*; but any other type of crusher may of course be used. From this crushing device the pulp is conducted to the device *d'*, Fig. 5, of the well-known form of "Holländer" rag-engine or beating-engine.
55 In this the fibers are torn apart and the pulp reduced to the proper condition for use in paper-making machinery.

Notwithstanding the above series of mechanical treatments, the pulp still contains, as
60 compared with ground wood-pulp, particles of varying character and density. These may be partly removed by conducting the pulp over a sand-trap or series of baffle-plates *b''*, as in Fig. 6, by means of which the denser
65 particles are removed before the pulp is ad-

mitted to a reservoir *e*, provided with a stirrer to prevent settling of the fibrous matter. The elimination of irregularities in the pulp product may, however, be more effectively done
70 and an absolutely smooth finished product obtained by separately adding to the peat-pulp as an outer layer a surface of absolutely uniform wood-pulp. This is accomplished in the
75 paper-making machine *f* *f'* *f''* of any suitable construction by means of several cylinders, such as *f* and *f'*, Fig. 7, the position of which is preferably adjustable, and subsequent calendering of the product between calender-rolls *f''*.
80

When an entire peat-pulp product is desired, the peat fibers are led from the reservoir *e*
85 to the paper-machine by the pipe *e'*. When a wood-pulp as above mentioned is desired, the adjustable cylinder *f* is employed. This cylinder is adjusted by any suitable means
90 to feed a peat-pulp layer to the apron or felt 12, from which it is transferred to the roll *f''*, where it is allowed to form a layer of the desired thickness. The cylinder *f'* is then lowered out of contact with the felt, and cylinder *f* is raised, so as to feed a thin layer of
95 wood-pulp to the felt 12, which deposits it on the peat-pulp layer on roll *f''*. The alternate action of cylinders *f* *f'* may be automatic.

There may be three or four or more, adjustable or not adjustable, cylinders arranged similarly to those shown in Fig. 7, with means to
100 cause any one of them to be placed in or withdrawn from working relation to the felt 12 and roll *f''*. By this means a composite pulp product may be built up of successive layers of different varieties or grades of pulp. For
105 instance, one cylinder may deposit peat-pulp, another wood-pulp, and another a mixture in any desired proportions of peat and wood pulps.

The pulp board or paper having been formed is dried in the usual manner by means of drying-cylinders, either in the usual continuous
110 paper-making machines or with the help of the known intermittently-working presses. In every case the sheet must be passed between calender-rolls *f''*, which impart a smooth surface to the board or paper. When
115 completed, the product possesses as even a texture and smooth a finish as paper and board made from wood-pulp.

It is necessary that the peat be subjected to all of the treatments described in order to obtain therefrom a smooth and uniform product,
120 as each operation contributes its share to producing the result.

By the process described I have succeeded in converting an irregular and heterogeneous raw material into a product of regular and consistent texture solely by physical treatment.
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Having thus described my invention, the following is what I claim as new therein and desire to secure by Letters Patent:

1. The process of converting raw peat into
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a homogeneous pulp product, comprising the following steps: disintegrating the raw peat, separating heavier and inorganic matter; adding wood-pulp; crushing the fibers; tearing
5 apart and separating said fibers, and converting the resultant pulp into a sheet.

2. The process of converting raw peat into a homogeneous pulp product, comprising the following steps: disintegrating the raw peat;
10 separating heavier and inorganic matter; adding wood-pulp; crushing the fibers; tearing apart and separating said fibers; converting the resultant pulp into a sheet; overlaying said sheet with wood-pulp, and pressing and cal-
15 endering said sheet.

3. The process of converting raw peat into a homogeneous pulp product, comprising the following steps: disintegrating the raw peat; separating heavier and inorganic matter;
20 crushing the fibers; tearing apart and separating said fibers; forming with the resultant pulp a sheet built of successive layers of peat-pulp and wood-pulp, and pressing and calendering said sheet.

25 4. The process of converting raw peat into a homogeneous pulp product, which consists in disintegrating the raw peat while subjecting it to treatment with water; separating heavier and inorganic matter by means of a
30 flow of water; checking the flow and allowing fibrous matter to settle; crushing the harder and knotty portions of fibrous matter evenly throughout a body of water, and converting the same into a sheet.

35 5. The process of converting raw peat into a homogeneous pulp product, which consists in excavating the peat from the bog, disintegrating the same while subjecting to treatment with water, further separating the peat
40 by means of water, separating heavier and inorganic matter by means of a flow of water, checking the flow and allowing fibrous matter to settle, crushing the harder and knotty portions of fibrous matter, separating and dis-
45 integrating the fibers, distributing the fibers evenly throughout a body of water, and converting the same into a sheet.

6. The process of converting raw peat into a homogeneous pulp product, which consists
50 in excavating the peat from the bog, disintegrating the same while subjecting to treatment with water, separating heavier and inorganic matter by means of a flow of water, checking the flow and allowing fibrous matter
55 to settle, distributing the fibers throughout a body of water, adding a cementing agent, crushing the harder and knotty portions of fibrous matter, separating and disintegrating the fibers, distributing the fibers evenly
60 throughout a body of water, and converting the same into a sheet.

7. The process of converting raw peat into a homogeneous pulp product, which consists
65 in excavating the peat from the bog, disintegrating the same while subjecting to treat-

ment with water, separating heavier and inorganic matter by means of a flow of water, checking the flow and allowing fibrous matter to settle, distributing the fibers throughout a
70 body of water, adding a cementing agent and wood-pulp, crushing the harder and knotty portions of fibrous matter, separating and disintegrating the fibers, distributing the fibers evenly throughout a body of water, and con-
75 verting the same into a sheet.

8. The process of converting raw peat into a homogeneous pulp product, which consists in disintegrating the raw peat, removing heavy and inorganic matter and acid therefrom, settling the fibrous matter, suspending the fibers
80 throughout a body of water while adding an acid-neutralizing agent, conveying the fibrous matter to crushing devices and crushing the harder and knotty portions of fibrous matter, separating and disintegrating the fibers, dis-
85 tributing the fibers evenly throughout a body of water, and converting the same into a sheet.

9. The process of converting raw peat into a homogeneous pulp product, which consists in excavating peat from the bog, disintegrating the same, removing heavy and inorganic
90 matter and acid therefrom, settling the fibrous matter, suspending the fibers throughout a body of water while adding an acid-neutralizing agent, crushing the harder and knotty portions of fibrous matter, separating and dis-
95 integrating the fibers, distributing the fibers evenly throughout a body of water, and converting the same into a sheet.

10. The process of converting raw peat into
100 a homogeneous pulp product, which consists in excavating peat from the bog, disintegrating the same, removing heavy and inorganic matter and acid therefrom, settling the fibrous matter, suspending the fibers throughout a
105 body of water while adding an acid-neutralizing agent, adding wood-pulp, crushing the harder and knotty portions of fibrous matter, separating and disintegrating the fibers, distributing the fibers evenly throughout a body
110 of water, converting the same into a sheet, overlaying said sheet with wood-pulp, and pressing and calendering said sheet.

11. The process of converting raw peat into a homogeneous pulp product, which consists
115 in excavating peat from the bog, disintegrating the same, removing heavy and inorganic matter and acid therefrom, settling the fibrous matter, suspending the fibers throughout a body of water while adding an acid-neutraliz-
120 ing agent, adding wood-pulp, crushing the harder and knotty portions of fibrous matter, separating and disintegrating the fibers, distributing the fibers evenly throughout a body of water, forming in continuous operations a
125 sheet built of successive layers of peat-pulp and wood-pulp, and pressing and calendering said sheet.

12. The process of converting raw peat into a pulp product, which consists in excavating
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the peat from the bog, disintegrating the same while subjecting it to treatment with water, separating heavier and inorganic matter by means of a flow of water, checking the flow
5 and allowing fibrous matter to settle, adding wood-pulp, crushing the harder and knotty portions of fibrous matter, separating and disintegrating the fibers, distributing the fibers evenly throughout a body of water, convert-
10 ing the same into a sheet, overlaying said sheet with wood-pulp, and pressing and calendering said sheet.

13. The process of converting raw peat into a pulp product, which consists in excavating
15 the peat from the bog, disintegrating the same

while subjecting to treatment with water, separating heavier and inorganic matter by means of a flow of water, checking the flow and allowing fibrous matter to settle, adding wood-pulp, crushing the harder and knotty portions
20 of fibrous matter, separating and disintegrating the fibers, distributing the fibers evenly throughout a body of water, forming in continuous operations a sheet built of alternative layers of peat-pulp and wood-pulp, and press-
25 ing and calendering said sheet.

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Witnesses:

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HENRY HASPER.