Specification of Baldwin Latham : purifying sewage.

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A.D. 1873, 28th JANUARY. N° 331.

SPECIFICATION

OF

BALDWIN LATHAM.

PURIFYING SEWAGE.

LONDON:
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1873.

A.D. 1873, 28th JANUARY. N° 331.

Purifying Sewage.

LETTERS PATENT to Baldwin Latham, of No. 7, Westminster Chambers, Victoria Street, Westminster, in the County of Middlesex, for the Invention of "IMPROVEMENTS IN PURIFYING SEWAGE AND TREATING PRODUCTS OBTAINED THEREFROM FOR THE PRODUCTION OF MANURE."

Sealed the 18th March 1873, and dated the 28th January 1873.

PROVISIONAL SPECIFICATION left by the said Baldwin Latham at the Office of the Commissioners of Patents, with his Petition, on the 28th January 1873.

I, BALDWIN LATHAM, of No. 7, Westminster Chambers, Victoria Street, Westminster, in the County of Middlesex, do hereby declare the nature of the said Invention for "IMPROVEMENTS IN PURIFYING SEWAGE AND TREATING PRODUCTS OBTAINED THEREFROM FOR THE PRODUCTION OF MANURE," to be as follows:—

My Invention relates to the purification of sewage and the extraction of manure of considerable value therefrom by making use of the precipitate which has been removed from sewage by the processes known as

the "alumina," "phosphate of alumina," and other phosphatic processes, and the "magnesia" and "iron" processes.

For the purposes of my Invention, the sewage is first treated by any of the above-mentioned processes, but, by preference, I treat the same according to the process described in the Specification to M. F. Anderson's Patent, dated 8th December, 1869, No. 3550, whereby I obtain a precipitate composed of hydrated oxide of alumina, phosphate of alumina, and phosphate of lime, together with organic and other matters. This precipitate I remove from the tanks in which the sewage is treated, and I dry the same by any suitable known process, afterwards allowing it to stand a sufficient time for the catalytic action of the earthy materials present to have changed the organic matter into humus, mould, and other inoffensive compounds. When this action is complete the compound is treated with sulphuric, hydrochloric, or other acids, but, by preference, with sulphuric acid. The action of this acid is to convert the oxide of alumina into sulphate and sesqui-sulphate of alumina, and the phosphates of alumina and lime into superphosphates, as also to carbonize some of the organic matter.

The proportion of the acid used for the compound will vary greatly according to the nature of the sewage matter, the limits being from about one part by weight of the compound and one part by weight of the acid to ten parts of the compound and one part of the acid. The compound so treated is then mixed with water and added to the sewage matter to be treated, or it may be mixed directly in the dry state with the sewage. Should the sewage not be sufficiently alkaline to neutralize the acid in the compound, I add any suitable alkali in sufficient quantity to neutralize the same, but, by preference, I use the lime produced by burning magnesian limestone for this purpose.

The proportion of the compound added to the sewage will vary considerably according to the quality of the sewage. Thus, 1 lb. of the compound to from 50 to 1000 gallons of the sewage to be treated may be used, but I do not limit myself to these proportions.

On the addition of the lime or other alkali an immediate combination takes place between the lime and the sulphuric acid of the sulphate and sesqui-sulphate of alumina, and of the superphosphates of alumina and lime; and the alumina, the phosphate of alumina, and phosphate of lime are precipitated. At the same time the flocculent deposit formed in

separating from the sewage drags down the suspended matters in the sewage, and the humus, mould, and carbonized organic matters of the compound added combine with some of the ammonia of the sewage which is carried down in the deposit. The deposit thus produced may either be used itself as a manure, or it may be treated with sulphuric or other acid, in order to render the phosphates of alumina and lime soluble, and to fix the ammonia compounds; or the compound may be again dried and treated and be applied to a fresh quantity of sewage in the above-described manner, and this operation may be repeated until a manure of a sufficient degree of richness or concentration is obtained.

For carrying out the above-described process, the solid matter in the sewage may be first separated by the apparatus described in the Specification to Letters Patent granted to me on the 17th March 1869, No. 809, and it may then be passed into tanks, where, after admixture of the above-described compound, it is either allowed to stand or it is caused to flow through the tank in a sufficiently slow current to allow the precipitate to deposit.

The effluent water may be again treated either by the process described in Anderson's Specification before mentioned or by any other known process, for the precipitation of any matters remaining therein after treatment by the above-described process, or the effluent water may be applied to the irrigation of land, or it may be purified by the well-known process of intermittent downward filtration.

SPECIFICATION in pursuance of the conditions of the Letters Patent, filed by the said Baldwin Latham in the Great Seal Patent Office on the 22nd May 1873.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, BALDWIN LATHAM, of No. 7, Westminster Chambers, Victoria Street, Westminster, in the County of Middlesex, send greeting.

WHEREAS Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the Twenty-eighth day of January, in the year of our Lord One thousand eight hundred and seventy-three, in the thirty-sixth year of Her reign, did, for Herself, Her heirs and successors, give and grant unto me, the said Baldwin Latham, Her special license

that I, the said Baldwin Latham, my executors, administrators, and assigns, or such others as I, the said Baldwin Latham, my executors, administrators, and assigns, should at any time agree with, and no others, from time to time and at all times thereafter during the term therein expressed, should and lawfully might make, use, exercise, and vend, within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man, an Invention for "IMPROVEMENTS IN PURIFYING SEWAGE AND TREATING PRODUCTS OBTAINED THEREFROM FOR THE PRODUCTION OF MANURE," upon the condition (amongst others) that I, the said Baldwin Latham, my executors or administrators, by an instrument in writing under my, or their, or one of their hands and seals, should particularly describe and ascertain the nature of the said Invention, and in what manner the same was to be performed, and cause the same to be filed in the Great Seal Patent Office within six calendar months next and immediately after the date of the said Letters Patent.

NOW KNOW YE, that I, the said Baldwin Latham, do hereby declare the nature of the said Invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement thereof, that is to say :—

My Invention relates to the purification of sewage and the extraction of a manure of considerable value therefrom by making use of the precipitate which has been removed from sewage by the processes known as the "alumina," "phosphate of alumina," and other phosphatic processes, and the "magnesia and iron" processes, or other suitable processes.

By the alumina processes is meant such as are described in the Specification of Patents obtained by H. Stothert, 17th April 1852, No. 14073; J. F. Pinel, 8th March, 1853, No. 581; J. A. Manning, 29th November, 1853, No. 2780; 27th March, 1854, No. 709; 7th August, 1855, No. 1786; 5th July, 1856, No. 1579; 1st February, 1858, No. 179; 31st May, 1860, No. 1343; H. Bird, 20th December, 1864, No. 3160; C. J. Lenk, 17th October, 1865, No. 2764; F. Sutton, 12th January, 1866, No. 101; R. Irvine, 28th August, 1866, No. 2218.

Processes known as "A, B, C, processes," contained in Patents of the 15th June, 1868, No. 1954; 8th February, 1870, No. 364; 12th, May 1870, No. 1354; 22nd February, 1872, No. 575; M. F. Anderson, 8th December, 1869, No. 3550; P. Spence, 9th July, 1870, No. 1949;

Fenton and Hollins, 21st September, 1870, No. 2534; and other similar processes.

By "phosphate of alumina" and other phosphatic processes is meant processes such as described in the Patents of G. L. Blyth, 15th February, 1858, No. 287; J. B. A. Dugléré, 13th September, 1858, No. 2073; Forbes and Price, 2nd March, 1870, No. 607; 19th April, 1870, No. 1137; A. P. Price, 7th May, 1870, No. 1314; Forbes and Price, 23rd June, 1870, No. 1789; T. J. Smith, 11th April, 1870, No. 1061; A. P. Vassard, 4th May, 1871, No. 1211, and 1st November, 1871, No. 2926; J. I. Lupton, 15th August, 1871, No. 2140; Prange and Whittbread, 6th February, 1872, No. 379; A. M. Clark, 6th February, 1872, No. 388; D. Campbell, 30th March, 1872, No. 944; H. Y. D. Scott, 26th August, 1871, No. 2243, and other similar processes.

By "magnesian and iron processes" is meant such as are described in the Specification of Patents of R. Dover, 16th October, 1851, No. 13775; T. J. Herapath, 15th March, 1853, No. 643; T. J. Dimsdale, 20th May, 1853, No. 1252; A. Smith and A. M°Dougall, 30th January, 1854, No. 142; J. Dales, 22nd September, 1859, No. 2157; H. A. Bonneville, 10th November, 1866, No. 2926; J. Burrow, 7th October, 1871, No. 2659, and other similar processes.

For the purposes of my Invention, the sewage is first treated by any of the above-mentioned processes, but, by preference, I treat it according to the process described in the Specification of M. F. Anderson, 8th December, 1869, No, 3550, whereby I obtain a precipitate composed of hydrated oxide of alumina, phosphate of alumina, phosphate of lime, together with organic and other matters. This precipitate I remove from the tanks in which the sewage has been treated, and I dry the same by any suitable known process, to such an extent as to leave sufficient moisture in the material so that after being allowed to stand for a time the catalytic action of the earthy material present is such as to change the organic matter into humus, mould, and other inoffensive compounds. In some cases, however, it is not necessary for the materials to be laid together, as they may be thoroughly dried and used at once in carrying out my process. When the catalytic action is complete, or in the event of the deposit being only dried, the compound is treated with sulphuric acid, hydrochloric acid, or a mixture of other acids, but, by preference, with sulphuric acid. The action of the acid is to convert the oxide of

alumina into sulphate and sesqui-sulphate of alumina, and the phosphates of alumina and lime into superphosphates of alumina and lime, and also to carbonize the organic matter, converting it into vegetable and animal charcoal.

The proportion of acid used for the compound will vary greatly according to the nature of the sewage, or the precipitate removed from the sewage, the limits being from about one part by weight of the compound to one part by weight of the acid to ten parts of the compound and one part of the acid. A very good proportion is one of acid to two of the compound. By preference, the acid used is treated before admixture with the compound, as it is found in this case to have a more perfect action thereon. The compound so treated is then mixed with water or sewage and added to the sewage matter to be treated, or it may be directly mixed in the dry state with the sewage intended to be treated. Should the sewage not be sufficiently alkaline to neutralize the acid in the compound, I add any suitable alkali in sufficient quantity to neutralize the same, but, by preference, I use lime, produced by burning magnesian limestone for this purpose.

The proportion of the compound to be added to the sewage will vary considerably according to the quality of the sewage and the nature of the precipitate derived from the original sewage. Thus, 1 lb. of the compound to from 50 to 1000 gallons of sewage may be used, but I do not limit myself to these proportions.

On the addition of the lime or other alkali an immediate combination takes place between the lime and sulphuric acid of the sulphate and sesqui-sulphate of alumina, and of the superphosphates of alumina and lime; and phosphate of alumina, and lime, and hydrated oxide of alumina are precipitated. At the same time the flocculent deposit, formed by the compound in separating from the sewage, drags down the suspended matters of the sewage, and the carbonized or organic matter and humus or mould of the compound added, absorbs a portion of the ammonia of the sewage which is carried down with the deposit. The deposit thus produced may then be dried and either be used itself as a manure, or it may be treated with sulphuric acid, in order to render it soluble, and fix the ammonia compounds, and to render soluble the phosphates; or the compound may be again dried and treated and applied to a fresh quantity of sewage. But before being again treated with acid it may be charred or carbonized in retorts and the ammonia

collected by any known process, when it may be again treated with acid and used in the above-described manner, and this operation may be repeated until a manure of a sufficient degree of richness or concentration is obtained.

In carrying out the above proces, the solid matter in the sewage may be first separated by the apparatus described in the Specification to Letters Patent granted to me on the 17th March, 1869, No. 809, and it may then be passed into tanks, where, after admixture with the above-described compound, it is either allowed to stand or it is caused to flow through the tank in a sufficiently slow current to allow the precipitate to deposit.

The precipitate produced by this process either before or after being dried may be mixed with the matters extracted by the apparatus described in the Specification of the Patent granted to me of the 17th March, 1869, No. 809, and so form a valuable manure.

The effluent water, after the application of this process, may be again treated by the processes described in the Specification before mentioned of M. F. Anderson, or in that of J. J. Lundy's Patent, dated the 10th March, 1870, No. 713, or by any other known process for the precipitation of any matters remaining therein after treatment by the above-described process, or the effluent water may be applied to the irrigation of land, or it may be purified by the well-known process of intermittent downward filtration.

My before-described process may also be applied to the effluent water resulting from the treatment of sewage according to the process described in the Specification of the before-mentioned Patent of M. F. Anderson, or of any of the other Patents or processes before mentioned.

Having thus described the nature of my Invention and in what manner the same is to be performed, I would have it understood that I do not claim generally the use of matter precipitated from sewage as a precipitant, but I claim,—

First. The process substantially as herein described of drying the matter precipitated from sewage, and treating it with acid so as to carbonize the organic matters and produce a disinfecting and deodorizing material for use as a precipitant for the purification of sewage or for the production of manure.

Latham's Improvements in Purifying Sewage.

Second. The purifying of sewage by means of sewage precipitate treated as herein described.

Third. The use of manure produced from sewage precipitate, treated as herein described.

In witness whereof, I, the said Baldwin Latham, have hereunto set my hand and seal, this Seventeenth day of May, in the year of our Lord One thousand eight hundred and seventy-three.

BALDWIN LATHAM. (L.S.)

LONDON:
Printed by GEORGE EDWARD EYRE and WILLIAM SPOTTISWOODE,
Printers to the Queen's most Excellent Majesty. 1873.