Specification of Henry Young Darracott Scott and John Berger Spence : treating sewage, &c.;

Contributors

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A.D. 1874, 22nd JANUARY. N° 283.

SPECIFICATION

OF

HENRY YOUNG DARRACOTT SCOTT
AND
JOHN BERGER SPENCE.

TREATING SEWAGE, &c.

LONDON:
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A.D. 1874, 22nd JANUARY. N° 283.

Treating Sewage, &c.

LETTERS PATENT to Henry Young Darracott Scott, of Ealing, in the County of Middlesex, Major-General, C.B., and John Berger Spence, of Manchester, in the County of Lancaster, Merchant, for the Invention of "IMPROVEMENTS IN THE TREATMENT OF SEWAGE AND AMMONIACAL LIQUIDS."

Sealed the 14th July 1874, and dated the 22nd January 1874.

PROVISIONAL SPECIFICATION left by the said Henry Young Darracott Scott and John Berger Spence at the Office of the Commissioners of Patents, with their Petition, on the 22nd January 1874.

We, HENRY YOUNG DARRACOTT SCOTT, of Ealing, in the County of Middlesex, Major-General, C.B., and JOHN BERGER SPENCE, of Manchester, in the County of Lancaster, Merchant, do hereby declare the nature of the said Invention for "IMPROVEMENTS IN THE TREATMENT OF SEWAGE AND AMMONIACAL LIQUIDS," to be as follows:—

The object of this Invention is the treatment of sewage and ammoniacal liquids so as to abstract therefrom the ammonia present in a cheap, portable, and stable form.

In carrying out our Invention, when the liquid to be operated upon is town sewage resulting from the use of "water carriage," and the overflow of cesspools, we generally commence by removing the suspended matters by subsidence or one of the well-known methods of precipitation, preferably by the lime process, but in cases in which the sewage is not mixed with storm waters or land drainage we may omit this process.

We pass the clarified or limed sewage through layers composed of natural phosphate of iron in the hydrated condition, or of phosphate of iron prepared as herein-after described, and we prefer to make use of upward filtration for the purpose, or we agitate with the sewage water so large a quantity of the said phosphate of iron that the liquid becomes thoroughly well swept by its particles, so that as far as possible the want of fluidity in the precipitant may be supplied. The phosphate salt or salts are then allowed to subside in combination with the ammonia abstracted from the liquid in order that the top water may be drawn off.

If the lime process is not used for the purpose of removing the suspended matters before the application of the phosphate of iron we apply lime in conjunction with it.

The same processes are applicable in the case of ammoniacal liquids in general.

If the sewage is not carried away by water carriage nor removed to a depôt to be there treated, as practised in some towns (when the urine can be treated as above), we separate the solids from the liquids by well-known contrivances, such as the "séparateur" of the French, and pass the liquids through a filter of lime or magnesia or dolomitic lime, and then through a filter of the phosphate of iron. By this means the ammonia present in the liquid will be absorbed.

In lieu of using one filter of phosphate of iron (and this remark applies to "water carriage" sewage as well as to urine and other strongly ammoniacal liquids) we may use several filters, removing the phosphate as it becomes more and more impregnated with ammonia to the filter more advanced in the series towards the source of supply of the liquid, so as to keep the most saturated phosphate in contact with the liquid strongest in ammonia. The effluent from the filters may then be run into the drains, or it may be passed through a filter of charcoal before this is done.

With a view to the more complete decomposition of the urine we prefer to retain it in a well covered tank for some hours before passing it through the filters.

We sometimes make use of the said phosphates in conjunction with lime and charcoal and other deodorants for deodorizing and retaining the fertilizing elements of night soil.

The phosphate of iron we prefer to use is the natural phosphate, which we grind to a fine powder, preferably with the assistance of levigation, either alone or in conjunction with lime or dolomitic lime.

We also use a phosphate prepared from phosphoric acid, holding iron and other substances in solution, or phosphoric acid only by digesting in the phosphoric acid carbonate or silicate of iron or the oxides of this metal.

In other cases again we digest the natural phosphates in the said phosphoric acid with the view of preparing a phosphate of iron suitable for our purpose.

The treatment of the natural phosphates is sometimes commenced by digesting them with a mineral acid.

Phosphate of manganese may be substituted for phosphate of iron. Phosphate of magnesia may be combined with phosphates of iron. The resulting compound may be used as manure or as a source for the manufacture of ammonia and ammoniacal salts.

The ammoniacal phosphate of iron resulting from the above described process may be mixed in preparing manures with the solid fœces of closets and cesspools, whether deodorized previously or not.

The ammoniacal phosphates of iron may be (for some purposes) advantageously mixed with the dried deposit obtained by the precipitation of the suspended matters of the sewage water of towns. Sometimes again we add thereto shoddy, fustic, and other substances which have fertilizing properties.

In dealing with ammoniacal liquids and sewage conveyed to town outfalls by "water carriage" or to a depôt we sometimes proceed in different methods to that above described.

We agitate with the liquid to be treated phosphate of iron dissolved in phosphoric acid, in proportion to the amount of ammonia existing in the liquid, but in excess of that which would be arrived at by calculation or its chemical equivalent, and we subsequently stir in with it lime or dolomitic lime in excess.

We sometimes commence the treatment by adding to the sewage or other liquid a quantity of lime depending on its composition, or by otherwise removing by well-known methods the suspended matters and certain matters in solution.

SPECIFICATION in pursuance of the conditions of the Letters Patent, filed by the said Henry Young Darracott Scott and John Berger Spence in the Great Seal Patent Office on the 22nd July 1874.

TO ALL TO WHOM THESE PRESENTS SHALL COME, we, HENRY YOUNG DARRACOTT SCOTT, of Ealing, in the County of Middlesex, Major-General, C.B., and JOHN BERGER SPENCE, of Manchester, in the County of Lancaster, Merchant, send greeting.

WHEREAS Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the Twenty-second day of January, in the year of our Lord One thousand eight hundred and seventy-four, in the thirty-seventh year of Her reign, did, for Herself, Her heirs and successors, give and grant unto us, the said Henry Young Darracott Scott and John Berger Spence, Her special licence that we, the said Henry Young Darracott Scott and John Berger Spence, our executors, administrators, and assigns, or such others as we, the said Henry Young Darracott Scott and John Berger Spence, our 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 THE TREATMENT OF SEWAGE AND AMMONIACAL LIQUIDS," upon the condition (amongst others) that we, the said Henry Young Darracott Scott and John Berger Spence, our executors or administrators, by an instrument in writing under our, 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 Henry Young Darracott Scott, on behalf of myself and of the said John Berger Spence, do hereby declare the nature of our said Invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement, reference being had to the Drawing hereunto annexed, and to the letters and figures marked thereon (that is to say) :—

The object of this Invention is the treatment of sewage and ammoniacal liquids, so as to abstract therefrom the ammonia present in a cheap, portable, and stable form.

In carrying out our Invention, when the liquid to be operated upon is town sewage resulting from the use of "water carriage," and the overflow of cesspools, we commence by removing the suspended matters by the lime process of precipitation.

We pass the clarified or limed sewage through layers composed of phosphate of iron treated as herein-after described, and we prefer to make use of upward filtration for the purpose, or we agitate with the sewage water so large a quantity of the said phosphate of iron salt that the liquid becomes thoroughly well swept by its particles, so that as far as possible the want of fluidity in the precipitant may be supplied. The phosphate salts are then allowed to subside in combination with the ammonia abstracted from the liquid in order that the top water may be drawn off.

The same processes are applicable in the case of ammoniacal liquids in general.

If the sewage is not carried away by water carriage nor removed to a depot to be there treated, as practised in some towns (where the urine can be treated as above), we separate the solids from the liquids by well-known contrivances, such as the "separateurs" of the French, and pass the liquids through a filter of the prepared phosphate of iron salt, or through a filter of lime or magnesia or dolomitic lime, and then through

a filter of the prepared phosphate of iron salt. By this means the ammonia present in the liquid will be absorbed.

In lieu of using one filter of the phosphate of iron salt (and this remark applies to "water carriage" sewage, as well as to urine and other strongly ammoniacal liquids) we sometimes use several filters, removing the phosphate as it becomes more and more impregnated with ammonia to the filter more advanced in the series towards the source of supply of the liquid, so as to keep the most saturated phosphate in contact with the liquid strongest in ammonia. The effluent from the filters may then be run into the drains, or it may be passed through a filter of lime, or filters of lime and charcoal, before this is done.

With a view to the more complete decomposition of the urine we prefer to retain it in a well covered tank for some hours before passing it through the filters.

We sometimes make use of the said phosphate of iron salts in conjunction with lime or magnesia and charcoal and other deodorants for deodorizing and retaining the fertilizing elements of night soil.

The phosphate of iron we prefer to use is the natural phosphate, which we grind to a fine powder, preferably with the assistance of levigation, or we first apply heat to the natural phosphate sufficient to expel the water of combination and then grind it to a powder.

To bring the iron to the protoxide form we sometimes calcine the natural phosphate with carbonaceous matter. The powdered natural phosphates we then digest in hydrochloric or sulphuric acid, and add to the solution oxide of iron or carbonate of iron, or we may also employ silicate of iron. The compound thus produced is worked into a paste, and is then employed in the manner already described.

In some cases we add to the compound before use the waste lime refuse of soda or gas works.

We also use phosphates prepared from phosphoric acid holding iron and other substances in solution, such as are obtained in the manufacture of alum from phosphate of alumina by the Spence process, or phosphoric acid only by digesting in such acids carbonate or silicate of iron or the oxides of this metal.

In other cases again we digest the natural phosphates in the said phosphoric acid with the view of preparing a phosphate of iron suitable for our purpose.

The resulting compounds when withdrawn from the ammoniacal liquid may be used as manure or as a source for the manufacture of ammonia and ammoniacal salts.

The ammoniacal phosphates resulting from the above described process may be mixed (in preparing manures) with the solid fœces of closets and cesspools, whether deodorized previously or not.

The ammoniacal phosphate may also be (for some purposes) advantageously mixed with the dried deposit obtained by the precipitation of the suspended matters of the sewage water of towns. Sometimes again we add thereto shoddy, fustic, and other substances which have fertilizing properties.

In dealing with ammoniacal liquids and sewage conveyed to town outfalls by "water carriage," or urine carried to a depôt, we sometimes proceed in a different method to that above described.

In the case of urine we stir in with the liquid dolomitic lime or magnesia derived from dolomitic lime as above described, using the alkaline earth in excess, and then agitate with the liquid phosphate of iron dissolved in phosphoric acid, with or without the use of mineral acids, in proportion to the amount of ammonia in the liquid, but in excess of that which would be arrived at by calculation.

We sometimes introduce the acid phosphate solution first, adding it very gradually, and then stir in the alkaline earth as a subsequent operation.

We also in the case of the liquid sewage of town outfalls first treat the sewage with sufficient lime or dolomitic lime to precipitate it, and then subsequently, and as a distinct operation with separate collection of the precipitate, we stir in with the effluent natural phosphate of iron dissolved as aforesaid with hydrochloric, sulphuric, or phosphoric acid.

Having now described our Invention of "Improvements in the Treatment of Sewage and Ammoniacal Liquids," and having explained the manner of carrying the same into effect, we claim as the Invention

secured to us by Letters Patent as aforesaid, treating liquid sewage and ammoniacal liquors with phosphate salts or solutions prepared from natural phosphates of iron, in the manner or manners herein set forth.

In witness whereof, I, the said Henry Young Darracott Scott, have hereunto set my hand and seal, the Twenty-first day of July, in the year of our Lord One thousand eight hundred and seventy-four.

HENRY Y. D. SCOTT. (L.S.)

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