

Specification of Henry Young Darracott Scott : treating sewage water.

Contributors

Scott, Henry Young Darracott.

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A.D. 1873, 18th NOVEMBER. N° 3742.

SPECIFICATION

OF

HENRY YOUNG DARRACOTT SCOTT.

TREATING SEWAGE WATER.

LONDON:

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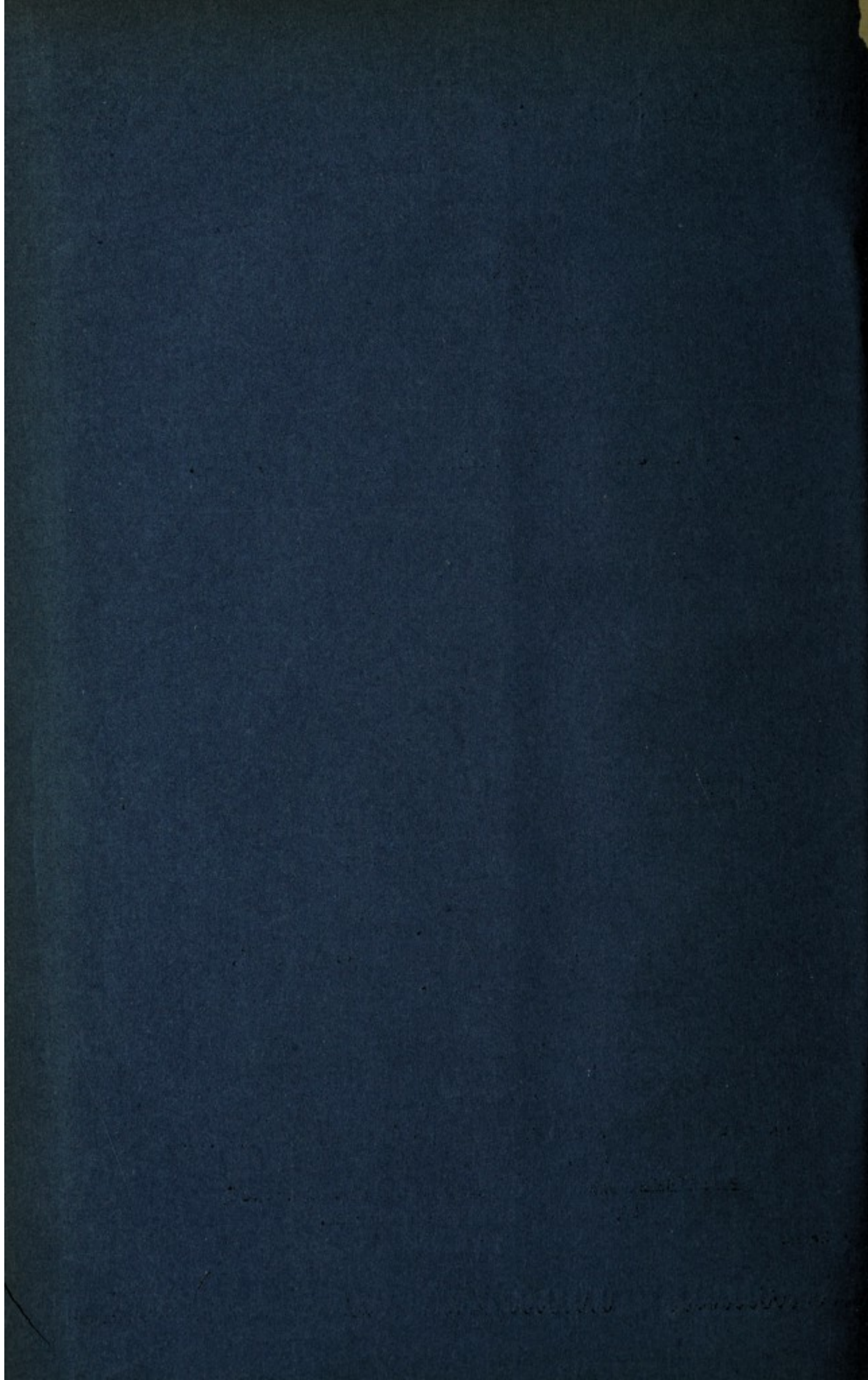
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A.D. 1873, 18th *NOVEMBER*. N^o 3742.

Treating Sewage Water.

LETTERS PATENT to Henry Young Darracott Scott, of Ealing, in the County of Middlesex, Major-General, C.B., for the Invention of "IMPROVEMENTS IN THE PURIFICATION OF SEWAGE WATER."

Sealed the 8th May 1874, and dated the 18th November 1873.

PROVISIONAL SPECIFICATION left by the said Henry Young Darracott Scott at the Office of the Commissioners of Patents, with his Petition, on the 18th November 1873.

I, HENRY YOUNG DARRACOTT SCOTT, of Ealing, in the County of Middlesex, Major-General, C.B., do hereby declare the nature of the said Invention for "IMPROVEMENTS IN THE PURIFICATION OF SEWAGE WATER," to be as follows:—

This Invention relates to the treatment of sewage water colored with dyes for the purpose of removing the color therefrom.

10 In applying my Invention I prefer to commence the treatment of the sewage by the lime method of precipitation, using no more lime than is essential for clarification. The resulting precipitate is received into a tank, say, No. 1, and the effluent from it is then treated with sulphate

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or chloride of iron or alumina. This will again occasion a precipitate, which is to be allowed to deposit in tank No. 2. As much of the precipitant is added as will nearly but not quite neutralize the alkalinity of the water.

The effluent from tank No. 2 is next sufficiently acidified with 5 hydrochloric acid or oil of vitriol to change the color of delicate litmus paper.

The above treatment of sewage water colored by dyes will have the effect of rendering the water colourless as well as free from suspended matters. 10

In lieu of using salts of iron or alumina I sometimes obtain the precipitant for tank No. 2 by digesting animal charcoal prepared either from bones or resulting from the manufacture of prussiate of potash with hydrochloric or muriatic acid, and I add the solution thus obtained either separately or in conjunction with the charcoal to the sewage 15 water, or again I sometimes dissolve impure phosphates or either of the above acids, and add the solution thus obtained to the sewage water in tank No. 2.

Although I prefer the above order of procedure it is not essential to the chief object of this Invention (viz., deodorization of dyes in sewage) 20 that tank No. 2 shall be employed, as the operations in tank No. 1 and No. 2 may be combined when the precipitant is of little value, and in certain cases the second operation omitted altogether.

SPECIFICATION in pursuance of the conditions of the Letters Patent, filed by the said Henry Young Darracott Scott in the Great Seal 25 Patent Office on the 18th May 1874.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, HENRY YOUNG DARRACOTT SCOTT, of Ealing, in the County of Middlesex, Major-General, C.B., send greeting.

WHEREAS Her most Excellent Majesty Queen Victoria, by Her 30 Letters Patent, bearing date the Eighteenth day of November, in the year of our Lord One thousand eight hundred and seventy-three, in the thirty-seventh year of Her reign, did, for Herself, Her heirs and successors,

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give and grant unto me, the said Henry Young Darracott Scott, Her special licence that I, the said Henry Young Darracott Scott, my executors, administrators, and assigns, or such others as I, the said Henry Young Darracott Scott, my executors, administrators, and
5 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 PURIFICATION OF**
10 **SEWAGE WATER,**" upon the condition (amongst others) that I, the said Henry Young Darracott Scott, 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
15 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, do hereby declare the nature of my said Invention, and in what manner
20 the same is to be performed, to be particularly described and ascertained in and by the following statement (that is to say) :—

This Invention relates particularly to the treatment of sewage which is colored with dyes or other impurities for the purpose of removing the colour therefrom.

25 Purification in other respects, such as deodorization and the removal of nitrogenous matter, will also be effected by the process.

In applying my Invention I commence the treatment of the sewage by the ordinary lime method of precipitation, using as a general rule about twenty grains of lime per gallon, but I employ larger quantities
30 when the coloring matters are very strong. The resulting precipitate is received into a tank, say, No. 1, and the deposited matters may be employed as manure or for the preparation therefrom of agricultural lime or cements by well known methods.

The effluent from tank No. 1, which will consist of limed sewage
35 water, is treated or agitated with an impure sulphate or chloride of iron and alumina, which I prepare by digesting prussiate of potash charcoal in dilute sulphuric or hydrochloric acid. The effect of this chemical

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agent on the sewage will be to produce a further precipitate consisting of salts of iron and alumina mixed with the carbonaceous matter of the charcoal, which mixture will exercise a powerful deodorizing and decolorizing action upon the sewage water. These actions may be further increased by using a slight excess of the above mentioned precipitant as compared with the lime contained in the effluent from tank No. 1, so that not only is the lime completely neutralized but the effluent from tank No. 2 will pass off slightly acidified, or the same object may be effected by adding an equivalent proportion of free acid to the sewage to produce a like result. 10

The quantity of the precipitant (produced from the prussiate of potash charcoal), and which must be used with the sewage from tank 1, and which must be agitated with it, will depend on the strength of the dyes, and the quantity of the precipitant required for this purpose will vary between very wide limits. 15

In some instances from twenty-five to fifty grains of the charcoal to every gallon of the sewage will supply enough carbon and salts of iron and alumina to produce decolorization of the sewage, but in other cases I have found as much as two hundred grains per gallon was necessary to produce the desired effect. The proportion of acid as compared with the amount of charcoal required for the preparation of the compound will depend on the composition of the prussiate of potash charcoal, but the following will be found to produce good results in average cases, viz., one part by measure of commercial hydrochloric acid, to which five parts of water are added and five parts of the refuse charcoal. After these ingredients have remained together for some time (say, about an hour) their thorough incorporation and admixture may be rendered complete by passing the mass under an edge runner in an ordinary mortar mill. Any other contrivance for thoroughly mixing the ingredients may however be employed if preferred. 20 25 30

The precipitant obtained in tank No. 2 by the addition of this mixture may, after straining off the greater part of the water, be used again for the precipitation of a fresh charge of limed effluent from tank No. 1, it being only necessary to treat the mixture with hydrochloric acid, as before, which will have the effect of redissolving the precipitated iron and alumina. This operation may of course be repeated over and over again. The expense of this part of the process will thus be limited to the labour 35

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and the cost of the hydrochloric acid, which in some parts of the country may to a great extent be considered a waste product.

I sometimes use the spent charcoal of sugar refineries for the second part of the process, viz^t., that which is performed in tank No. 2. In this case I employ enough acid to bring all the phosphoric acid or a considerable proportion of it into the soluble condition. The precipitate thus produced consists chiefly of phosphate of lime and charcoal.

Mineral phosphates dissolved in acid may be used in conjunction with the animal charcoal, and the deposit, when the cleansing powers of the charcoal are wholly exhausted, may be disposed of as manure, together with the precipitated phosphates with which it has thus become mixed.

Although I prefer the above order of procedure it is not essential to the chief object of this Invention (viz^t., the decolorization of sewage) that tank No. 2 shall be employed. For instance, prussiate of potash charcoal being but of trifling value the charcoal prepared therefrom may be added with the lime or before or immediately after it in tank No. 1. When however the precipitant has the value which spent animal charcoal from the sugar refineries adds to the precipitate this course is inexpedient, as the worthless suspended matters in the raw sewage degrade the quality of the resulting manure.

Having now described my Invention of "Improvements in the Purification of Sewage Water," and having explained the manner of carrying the same into effect, I wish it to be understood that under the above in part recited Letters Patent I claim, purifying sewage water by producing a precipitate therefrom, and removing the coloring matters contained therein by means of compounds of iron and alumina or lime with carbon, such compounds being derived from the treatment of prussiate of potash or other refuse animal charcoal with hydrochloric or sulphuric acid, as herein set forth.

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

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

LONDON:

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Printers to the Queen's most Excellent Majesty. 1874.

Scott's Apparatus in Treating Sewage Water

and the rest of the hydraulic work which is some parts of the machinery may to a great extent be considered a mere machine.

I sometimes use the light channel or sewer tubular for the second part of the process viz, that which is performed in tank No. 2. In this case I employ enough acid to bring all the precipitated matter of a considerable proportion of it into the soluble condition. The precipitate thus produced consists chiefly of phosphate of lime and charcoal.

Mineral phosphates dissolved in acid may be used in conjunction with the animal charcoal and the deposit when the cleaning powers of the charcoal are wholly exhausted, may be disposed of as manure, together with the precipitated phosphates with which it has thus become mixed.

Although I provide the above order of procedure it is not essential to the chief object of this invention (viz, the decomposition of sewage) that tank No. 2 shall be empty. For instance, provision of fresh charcoal being not of trifling value the charcoal prepared therefrom may be added with the lime or before or immediately after it in tank No. 1. When however the precipitate has the value which spent animal charcoal has the sugar refuse adds to the precipitate the amount is inconsiderable as the worthless suspended matters in the raw sewage degrade the quality of the resulting manure.

Having now described my invention of improvements in the treatment of sewage water, and having explained the manner of carrying the same into effect, I wish it to be understood that under the above in part recited Letters Patent I claim, in addition to sewage water by passing a precipitate therefrom, and removing the coloring matters contained therein by means of compounds of iron and alumina or lime with carbon, such compounds being decayed first the treatment of precipitate of waste or other refuse animal charcoal with hydrochloric or sulphuric acid as herein set forth.

In witness whereof, I the said Henry Jones Bancroft Scott, have hereunto set my hand and seal, the sixteenth day of May, in the year of our Lord One thousand eight hundred and

HENRY J. SCOTT, (Sd)

Printed by George Fisher, at the Press of the Patent Office, London.

