

Specification of Francis Gerard Prange and William Whitthread : utilizing sewage.

Contributors

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A.D. 1872, 6th FEBRUARY. N^o 379.

S P E C I F I C A T I O N

OF

FRANCIS GERARD PRANGE
AND
WILLIAM WHITTHREAD.

UTILIZING SEWAGE.

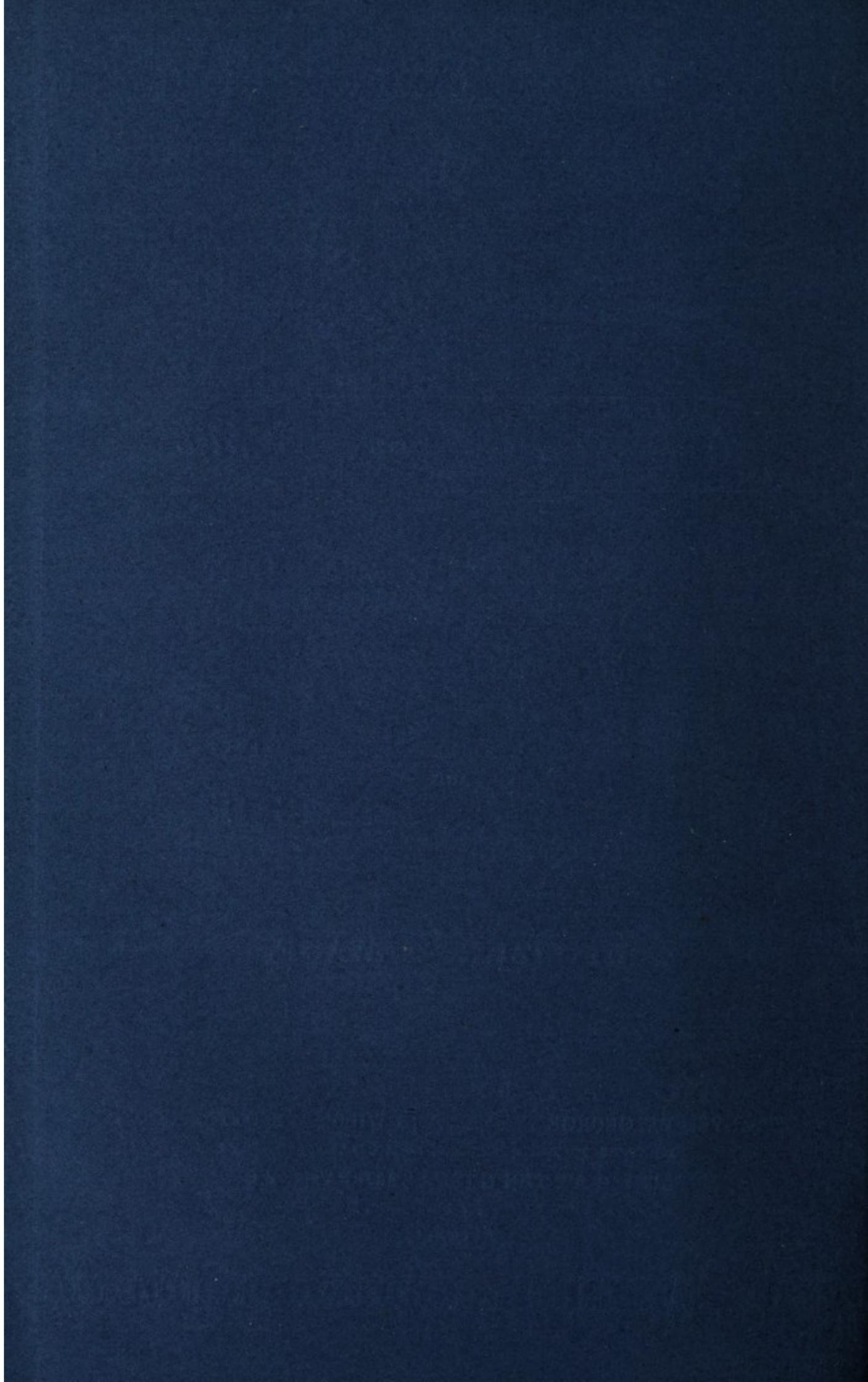
LONDON:

PRINTED BY GEORGE E. EYRE AND WILLIAM SPOTTISWOODE,

PRINTERS TO THE QUEEN'S MOST EXCELLENT MAJESTY:

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A.D. 1872, 6th FEBRUARY. N^o 379.

Utilizing Sewage.

LETTERS PATENT to Francis Gerard Prange, of Liverpool, in the County of Lancaster, Merchant, and William Whitthread, of the same Place, Analytical Chemist, for the Invention of "**IMPROVEMENTS IN THE UTILIZATION OF SEWAGE.**"

Sealed the 14th June 1872, and dated the 6th February 1872.

PROVISIONAL SPECIFICATION left by the said Francis Gerard Prange and William Whitthread at the Office of the Commissioners of Patents, with their Petition, on the 6th February 1872.

We, FRANCIS GERARD PRANGE, of Liverpool, in the County of
5 Lancaster, Merchant, and WILLIAM WHITTHREAD, of the same Place, Analytical Chemist, do hereby declare the nature of the said Invention for "**IMPROVEMENTS IN THE UTILIZATION OF SEWAGE,**" to be as follows:—

Our Invention consists,—

10 First. In adding to and mixing with liquid sewage a solution of di-calcic phosphate in an aqueous solution of mon-calcic phosphate with an alkaline earth or alkali, say lime, so as to precipitate

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the nitrogenous and manurial matters held in solution and suspension.

Second. In adding with the above-mentioned chemicals, when there is an excess of free ammonia, magnesium salts.

The said chemical substances may be added to the sewage (A) in 5 depositing enclosures whilst the sewage is flowing through at a slow rate, (B) in settling reservoirs, or (C) in the sewer close to the depositing enclosures or settling reservoirs. The addition is best effected under head C, because thereby thorough admixture is secured; a mixing agitator may be used if desired. 10

The proportion in which the chemical substances are added will vary with the quantity of nitrogenous and fertilizing matters contained in the sewage, and also as it may be desired, to render the effluent treated sewage water more or less clear and sweet. If the effluent treated sewage water is to pass into a stream or into the sea a larger quantity 15 will be added than in cases where the water is to be used for irrigation, but we would have it understood that the application of the said chemical substances in any and every proportion is beneficial both in respect of deodorizing the water and of precipitating and fixing the fertilizing matters. 20

When a sufficient quantity of the fertilizing matters have been carried down in the depositing enclosures or in the settling tanks the water is run off, and the fertilizing precipitate collected and used, either in the pasty state or dried, so as to be convenient for transportation.

SPECIFICATION in pursuance of the conditions of the Letters Patent, 25
filed by the said Francis Gerard Prange and William Whitthread in
the Great Seal Patent Office on the 6th August 1872.

TO ALL TO WHOM THESE PRESENTS SHALL COME, we, FRANCIS GERARD PRANGE, of Liverpool, in the County of Lancaster, Merchant, and WILLIAM WHITTHREAD, of the same Place, Analytical Chemist, 30
send greeting.

WHEREAS Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the Sixth day of February, in the year of our

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Lord One thousand eight hundred and seventy-two, in the thirty-fifth year of Her reign, did, for Herself, Her heirs and successors, give and grant unto us, the said Francis Gerard Prange and William Whitthread, Her special licence that we, the said Francis Gerard Prange and William
5 Whitthread, our executors, administrators, and assigns, or such others as we, the said Francis Gerard Prange and William Whitthread, 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,
10 and vend, within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man, an Invention for "IMPROVEMENTS IN THE UTILIZATION OF SEWAGE," upon the condition (amongst others) that we, the said Francis Gerard Prange and William Whitthread, our executors or administrators, by an instrument in writing under our, or their, or
15 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.

20 **NOW KNOW YE**, that we, the said Francis Gerard Prange and William Whitthread, 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, that is to say:—

25 Our Invention consists,—

First. In adding to and mixing with liquid sewage a solution of di-calcic phosphate in an aqueous solution of mono-calcic phosphate with an alkaline earth or alkali, say lime, so as to precipitate the nitrogenous and manurial matters held in solution and suspension.

30 Second. In adding with the above-mentioned chemicals, when there is an excess of free ammonia, magnesium salts.

The said chemical substances may be added to the sewage (A) in depositing enclosures whilst the sewage is flowing through at a slow rate, (B) in settling reservoirs, or (C) in the sewer close to the depositing
35 enclosures or settling reservoirs. The addition is best effected under head C, because thereby thorough admixture is secured; a mixing agitator may be used if desired.

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The proportion in which the chemical substances are added will vary with the quantity of nitrogenous and fertilizing matters contained in the sewage, and also as it may be desired to render the effluent treated sewage water more or less clear and sweet. If the effluent treated sewage water is to pass into a stream or into the sea a larger quantity 5 will be added than in cases where the water is to be used for irrigation, but we would have it understood that the application of the said chemical substances in any and every proportion is beneficial both in respect of deodorizing the water and of precipitating and fixing the fertilizing matters. 10

When a sufficient quantity of the fertilizing matters have been carried down in the depositing enclosures or in the settling tanks the water is run off and the fertilizing precipitate collected and used, either in the pasty state or dried, so as to be convenient for transportation.

In carrying our Invention into practice we prefer when the effluent 15 treated water is not to be used for fertilizing purposes by irrigation, to proceed as follows :—We treat one equivalent of tricalcic phosphate with two equivalents of sulphuric acid. The resulting mass from that treatment will consist of a mixture of one equivalent of mono-phosphate, two equivalents of calcic sulphate, and such impurities as are contained 20 in the materials used. We next add by weight three parts of the above mono-calcic phosphate and impurities to one part of tricalcic phosphate and water in sufficient quantity to form a thin paste. The mono-calcic phosphate reacts upon the tricalcic phosphate and forms di-calcic phosphate which is held in solution by the excess of mono-calcic 25 phosphate.

The solution obtained as described is added to the liquid sewage in such quantity as shall produce a faint acid reaction. The said reaction having been obtained hydrate of lime is added in such quantity as shall cause precipitation of nitrogenous and manurial matters contained in 30 the sewage. In all cases care must be taken not to add more lime than is necessary to effect precipitation.

When the effluent water is to be used for fertilizing by or during irrigation, we add a less quantity of the solution of mono and di-calcic phosphates. 35

Although we prefer to allow the sewage treated as above described to

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settle in tanks or reservoirs, it will be evident that it may be filtered through any suitable substance.

Having now described the nature of our said Invention, and particularized the same in such manner that others will be enabled to carry
5 our improvements into effect, we claim, utilizing sewage, substantially by the means herein set forth.

In witness whereof, we, the said Francis Gerard Prange & William
Whithread, have hereunto set our hands and seals, the Thirty-
first day of July, in the year of our Lord One thousand eight
10 hundred and seventy-two.

FRANCIS GERARD PRANGE. (L.S.)

WILLIAM WHITTHREAD. (L.S.)

In the presence of

J. T. KING,

15

Patent Agent,

Liverpool.

LONDON :

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Printers to the Queen's most Excellent Majesty. 1872.

Francis J. Whitbread's Invention in relation to the
 rolls in tanks or receptacles, it will be evident that it may be filtered
 through any suitable substance.
 Having now described the nature of our said Invention, and par-
 ticularized the same in such manner that others will be enabled to carry
 out our improvements into effect, we claim, without prejudice, substantially
 by the means herein set forth.

In witness whereof, we, the said Francis Gerard Prange & William
 Whitbread, have hereunto set our hands and seals, the Thirtieth
 first day of July, in the year of our Lord One thousand eight
 hundred and seventy-two.

FRANCIS GERARD PRANGE (s.s.)
 WILLIAM WHITBREAD (s.s.)

In the presence of
 J. T. KING,
 Patent Agent,
 Liverpool.

LONDON:

Printed by GEORGE EDWARDS and WILKINSON, Stationers,
 Printing to the Queen's most Excellent Majesty, 1872.

