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Contributors

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A.D. 1870, 8th JANUARY. N° 67.

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

OF

WILLIAM HENRY HUGHAN.

TREATING SEWAGE, &c.

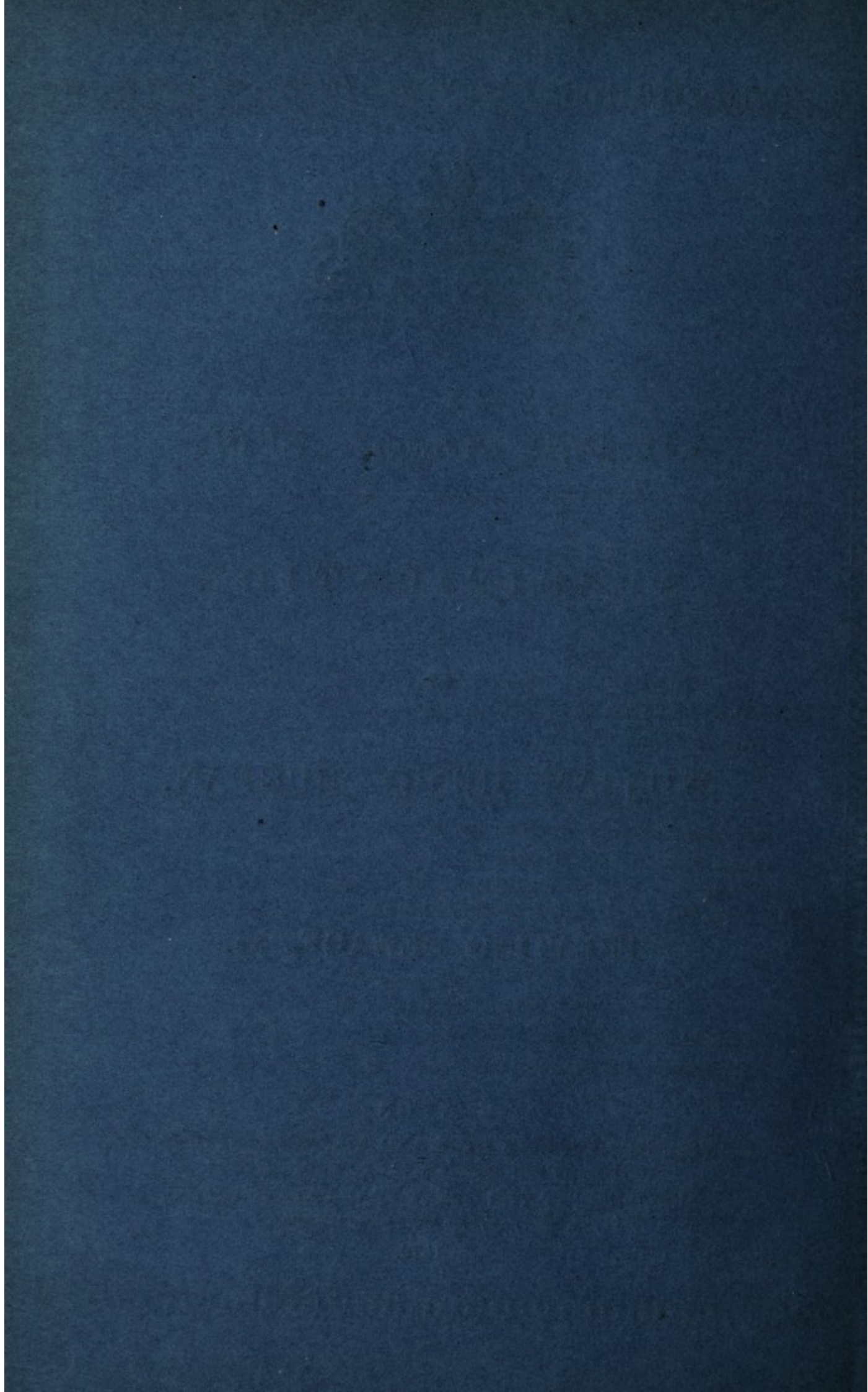
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A.D. 1870, 8th JANUARY. N° 67.

Treating Sewage, &c.

LETTERS PATENT to William Henry Hughan, of Newton Stewart, North Britain, Postmaster and Guano and Seed Merchant, for the Invention of "IMPROVEMENTS IN THE TREATMENT OF NIGHTSOIL, SEWAGE, URINOUS SUPERPHOSPHATES, GAS LIME REFUSE, AND OTHER REFUSE MATTERS FOR THE PURPOSE OF DEODORIZING, OF OBTAINING MANURE, AND OF DILUTING ACIDS WITH URINOUS MIXTURES."

Sealed the 5th July 1870, and dated the 8th January 1870.

PROVISIONAL SPECIFICATION left by the said William Henry Hughan at the Office of the Commissioners of Patents, with his Petition, on the 8th January 1870.

I, WILLIAM HENRY HUGHAN, of Newton Stewart, North Britain,
5 Postmaster and Guano and Seed Merchant, do hereby declare the nature of the said Invention for "IMPROVEMENTS IN THE TREATMENT OF NIGHTSOIL, SEWAGE, URINOUS SUPERPHOSPHATES, GAS LIME REFUSE, AND OTHER

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REFUSE MATTERS FOR THE PURPOSE OF DEODORIZING, OF OBTAINING MANURE, AND OF DILUTING ACIDS WITH URINOUS MIXTURES," to be as follows:—

My Invention consists in the substitution of urine or mixed human excrements (as, for instance, in nightsoil) for the water commonly employed in the processes of manufacturing superphosphates (for manures 5 and other purposes).

In the manufacture of superphosphates from animal or mineral sources, such as bones, coprolites, and phosphate of lime in general, requiring conversion into soluble phosphate the dissolving acids are largely diluted with water, as, for instance, in dissolving one ton of 10 bones, say, 740 pounds white oil of vitriol, or 850 pounds brown acid is used, an equal volume of water, say, 100 gallons are employed in diluting the acid, and in a proportionate strength for mineral phosphates (for which water I substitute urine or nightsoil). Such nightsoil or sewage must be collected in as pure a form as possible in urinals in tubs, 15 as at Salford and Rochdale, or in any other improved form that protects the excreta from contamination with ashes, cinders, coals, water, and rubbish; but even in the cesspool system or common ash-pits, privies, and sewers the contents are of great value for the dilution of acids, as employed in my Invention for manure purposes. 20

My Invention is applicable to all the acids, whether sulphuric, hydrochloric, nitric, or nightsoil, and the proportion of urinous or nightsoil can be fixed by manure manufacturers according to the required superphosphate, whether of a dry or liquid manure.

I myself use the Invention as an improvement upon the Letters 25 Patent, No. 2883, and dated 19th September 1868, granted to me for "Improvements in the Treatment of Nightsoil, Sewage, and other like Refuse Matter for the Purpose of Deodorizing and Converting the same into Manure. In dissolving 418 pounds of mineral phosphate I prefer to dilute 320 pounds brown vitriol with 322 pounds nightsoil excrements 30 or pure urine. As soon as the dissolving or solution is completed I do not require to evaporate or dry by mixture the resulting solution, but I apply it direct in combination with sulphates of potash or magnesia, or soda, such substances separately or in combination forming a suitable cement in my process of cementation of nightsoil & sewage. The 35 utilization of this discovery will double the value of superphosphates in uniting with their manure richness the nitrogenous or ammonial

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elements and alkaline salts of the urine, constituting a manure far superior to the best Peruvian guano. At present the urine is drained into the sea or most convenient receptacle of canal, stream, or river, and is thus a source of pollution and disease, whereas by my Invention the
5 urine and nightsoil of Great Britain can be utilized, and if so used will effect important valuable sanitary improvements. Heating the diluted urinous or nightsoil acids makes the dissolving process easier, producing more complete solution of all manure constituents in the phosphates. The urine or nightsoil can be collected in barrels out of urinals or tubs
10 and forwarded to manure manufacturers, and certain ingredients may be introduced to keep the urine or nightsoil in an unfermented condition.

My discovery is a double benefit, as it enriches the superphosphate, and from the action of the urinous constituents renders less acid necessary. The phosphoric acid is also rendered soluble, and protected
15 against any tendency to revert into an insoluble condition. In cementing the nightsoil known by the name of black manure (a mixture of nightsoil, ashes, cinders, and coals) I employ the superphosphate made as described, together with sulphates of lime, potash, or magnesia, separately or in combination. The mixture is accomplished in a mortar mill, on
20 which the black manure is well ground up into mortar. It may be used directly as a manure without admixture after being treated in the same manner as the cemented nightsoil (Patent No. 2883, A.D. 1868), but I prefer it enriched as described.

The following are important points in my Invention:—The manu-
25 facture of superphosphates and the like by acids diluted with urine or mixed human excrements instead of by acids diluted with water, as in common practice. The application of the urinous superphosphates as a further improvement upon my Patent as a constituent of a special cement in combination with sulphates of lime or magnesia, or potash
30 or soda, or phosphate of lime, together or separately in cementing up nightsoil, sewage, black manure by mortarising in a suitable mill into the mixed human excrements received from the tubs, as in operation at Salford and Rochdale. I introduce the urinous superphosphates in combination with the dry ashes, as found in the ash barrels, sulphates
35 of lime, magnesia, or potash or soda, thereby effecting a cementitious mixture in the mortar mill.

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I do not bind myself to one method of bringing the urine or nightsoil and acids together. I do not limit myself to urine or nightsoil fresh, but may employ it in the fermented condition also. Into the urinous or nightsoil superphosphate, previous to the boiling point, I introduce any old boots, shoes, rags, and bones, and the like refuse found in the tubs 5 or in the ash-pit barrels, or in the black manure or other nightsoil refuse with or without heat, in which they are dissolved, and in some instances I strengthen the urinous or nightsoil superphosphates by adding sulphates of magnesia or potash, soda, and nitric acid. The urinous or nightsoil superphosphates alone or in combination with sulphates of soda, of 10 magnesia, or potash, decomposes the coals, cinders, and carboniferous substances constituting the black nightsoil manure, and also as found in the dry ash barrel condition after incorporation with the contents of the nightsoil tubs, transforming the said coals, cinders, & ashes into a substance similar to nightsoil. Horse, cattle, and other farmyard 15 urinous liquid can also be brought into operation in the same manner as human urine. The decomposition of phosphates of magnesia, alumina, and the like phosphates in general can be accomplished as well as the phosphate of lime by admixture of urine with acids.

I paint, plaster, or cement the insides of the tubs used as receptacles 20 for human excrements or other vessels with the urinous superphosphates in the form of mortar, or any of the soluble phosphates in use. I make these tubs to run upon wheels and to act upon an axis by which they can be easily emptied. I also have a wooden, tin, or other open umbrella, whose stalk is screwed into the centre bottom of the tub or other re- 25 ceptacle, which I paint, plaster, or cement with a heavy coat of urinous or other superphosphate, upon which the mixed excrements fall and slide down to the bottom of the tub, being hidden from gaze and deprived of all splash soiling properties. The urinous superphosphates or other phosphates thus deodorise the excrements as they drop, disinfect and 30 sweeten and fix all deleterious compounds, adding at the same time very much to the manure value. As the excrements rise in the tubs they solve the phosphates into the mixture. If the mixture on withdrawal from the mortar mill does not disintegrate into a powder or cement rapidly enough, I compress it into brick perforated moulds by 35 the usual machinery in making bricks, or I apply heat to drive off the water not hydrated in the cementation process.

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The following is a mixture I sometimes make use of, namely, ground phosphates, 420 pounds; urine and fœces, 322 pounds; common salt (chloride of sodium), 112 pounds; carbonate of magnesia (in powder), 112 pounds; adding to the above four 480 pounds sulphuric acid, the
5 solubility of the phosphates being effected in the usual way. I prefer these proportions, but do not bind myself to such proportions or to one acid. I sometimes exclude magnesia, sometimes I add potash. I use this mixture both for plastering the tubs, as indicated, and for mixing up with nightsoil and plaster of Paris, or calcined and ground gypsum,
10 and mortarising in the mortar mill until capable of thorough cementation. The tubs herein-before referred to are used with or without wheels, and with handles or an axis. I use the mortar mill for mortarising nightsoil in the various conditions respective towns may have it, by incorporation and mixture with cementitious substances in
15 the mortar mill until the consistency of mortar is reached. I also use the mortar mill for grinding nightsoil products into a rough manure without cement. I introduce gas lime refuse and the like after being suitably prepared as a cementer of nightsoil.

The various kinds of mixtures I have mentioned are contingent upon
20 the condition of the nightsoil named; but I may state generally that when I receive the nightsoil pure out of the tubs and the ashes dry out of the barrels the two following are important methods:—The first is to mix the whole of the contents (nightsoil of the tubs) with an equal weight of ground phosphates, and $2\frac{1}{2}$ hundredweight of salt to
25 the ton of phosphates, and add acid until the phosphates are soluble. When a less rich manure is contemplated I use only 420 pounds ground phosphates (less or more according to richness of manure required), 1 hundredweight common salt, 1 hundredweight carbonate of magnesia (native dolomite) in powder to the ton of excrements,
30 adding sufficient acid, generally 400 pounds, to dissolve the phosphates, but sometimes much less acid is necessary. Having ground up the contents of the ash barrels I incorporate them with the nightsoil superphosphate mixture in equal parts in the mortar mill, adding sulphate of lime until the proper degree of consistency is arrived at. This is
35 then withdrawn from the mill and allowed to set and harden until dry enough for crushing, after which it is ready for use. If not sufficiently dry for crushing I drive off the uncombined moisture by

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application of heat when rapidity of manufacture is essential. I sometimes add other ingredients besides carbonate of magnesia into the dissolving tub along with the phosphates, and I sometimes add other manure ingredients, such as potash, for incorporation in the mortar mill when I want to manufacture special manures. The nightsoil when not 5 used in the superphosphate manufacture must be treated to acid, and I would prefer the use of a carboy to a ton of nightsoil before being cemented up, otherwise it is dangerous, as protracting, overpowering, and sometimes destroying the cementitious principle. I sometimes use Portland cement, and this I prefer to use in the same manner as the 10 plaster of Paris or sulphate of lime, as herein-before described, in combination with the superphosphated urinous or nightsoil mixture, sometimes adding sulphate of magnesia and chloride of sodium. Portland cement I consider the best cementer of nightsoil alone, or in combination with phosphates, magnesia, and salt; but I occasionally use 15 other suitable cements upon consideration of price, locality, carriage, or otherwise.

SPECIFICATION in pursuance of the conditions of the Letters Patent, filed by the said William Henry Hughan in the Great Seal Patent Office on the 8th July 1870.

20

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, WILLIAM HENRY HUGHAN, of Newton Stewart, North Britain, Postmaster and Guano and Seed Merchant, send greeting.

WHEREAS Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the Eighth day of January, in the year of 25 our Lord One thousand eight hundred and seventy, in the thirty-third year of Her reign, did, for Herself, Her heirs, and successors, give and grant unto me, the said William Henry Hughan, Her special licence that I, the said William Henry Hughan, my executors, administrators, and assigns, or such others as I, the said William Henry Hughan, my 30 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 35

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IN THE TREATMENT OF NIGHTSOIL, SEWAGE, URINOUS SUPERPHOSPHATES, GAS LIME REFUSE, AND OTHER REFUSE MATTERS FOR THE PURPOSE OF DEODORIZING, OF OBTAINING MANURE, AND OF DILUTING ACIDS WITH URINOUS MIXTURES," upon the condition (amongst others) that I, the said William Henry Hughan,
5 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
10 after the date of the said Letters Patent.

NOW KNOW YE, that I, the said William Henry Hughan, do hereby declare the nature of my said Invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

- 15 My Invention consists in the substitution of urine or mixed human excrements (as, for instance, in nightsoil) for the water commonly employed in the processes of manufacturing superphosphates (for manures and other purposes).

In the manufacture of superphosphates from animal or mineral
20 sources, such as bones, coprolites, and phosphate of lime in general, requiring conversion into soluble phosphate, the dissolving acids are largely diluted with water as for instance in dissolving one ton of bones say 740 pounds white oil of vitriol, or 850 pounds brown acid is used, an equal volume of water, say, 100 gallons are employed in diluting the acid,
25 and in a proportionate strength for mineral phosphates, for which water I substitute urine or nightsoil. Such nightsoil or sewage ought to be collected in as pure a form as possible in urinals which may according to the system adopted at Salford and Rochdale, or in any other manner that protects the excreta from mixture with ashes, cinders, coals, water,
30 and rubbish. But even in the cesspool system or common ashpits, privies, and sewers the contents are of great value for the dilution of acids, as employed according to my Invention for manure purposes.

My Invention is applicable to all the acids, whether sulphuric, hydrochloric, or nitric, and the proportion of urinous or nightsoil
35 dilution can be fixed by manure manufacturers, according to the required superphosphate, whether of a dry or liquid manure.

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I myself use the Invention as an improvement upon the Letters Patent No. 2883, and dated 19th September 1868, granted to me for "Improvements in the Treatment of Nightsoil, Sewage, and other like Refuse Matter for the Purpose of Deodorizing and Converting the same into Manure." In dissolving 418 pounds of mineral phosphate I prefer to 5 dilute 320 pounds brown vitriol with 322 pounds nightsoil, excrements, or pure urine. As soon as the dissolving or solution is completed I do not require to evaporate or dry by mixture the resulting solution but I apply it direct in combination with sulphates of lime or potash or magnesia or soda, such substances separately or in combination forming 10 a suitable cement, in my process of cementation of nightsoil sewage. At present the urine is drained into the sea or most convenient receptacle of canal, stream, or river, and is thus a source of pollution and disease, whereas by my Invention the urine and nightsoil of Great Britain can be utilized, and if so used will effect important valuable sanitary 15 improvements. Heating the diluted urinous or nightsoil acids makes the dissolving process easier, producing more complete solution of all manure constituents in the phosphates. The urine or nightsoil can be collected in barrels out of urinals or tubs, and forwarded to manure manufacturers, and certain ingredients may be introduced to keep the 20 urine or nightsoil in an unfermented condition. A double benefit is produced by the use of my Invention, it enriches the superphosphate and from the action of the urinous constituents and renders less acid necessary. The phosphoric acid is also rendered soluble and protected against any tendency to revert into an insoluble condition. In cementing the night 25 soil known by the name of black manure (a mixture of nightsoil, ashes, cinders, and coals), I employ the superphosphate made as described together with sulphates of lime, potash, or magnesia separately or in combination. The mixture is accomplished in a mortar mill on which the black manure is well ground up into mortar. It may be used 30 directly as a manure without admixture after being treated in the same manner as the cemented nightsoil (Patent No. 2883, A.D. 1868,) but I prefer it enriched as described.

The following are important points in my Invention:—The manufacture of superphosphates and the like by acids diluted with urine or 35 mixed human excrements instead of by acids diluted with water as in common practice. The application of the urinous superphosphates as a

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further improvement on my Patent as a constituent of a special cement in combination with sulphates of lime or magnesia, or potash, or soda, or phosphate of lime together or separately in cementing up night soil, sewage, black manure by mortarising in a suitable mill the mixed
5 human excrements received from the tubs as in operation at Salford and Rochdale, I introduce the urinous superphosphates in combination with the dry ashes as found in the ash barrels, sulphates of lime, magnesia, or potash, or soda, thereby effecting a cementitious mixture in the mortar mill.

10 I do not bind myself to one method of bringing the urine or night-soil and acids together. I do not limit myself to urine and nightsoil fresh, but may employ it in the fermented condition also. Into the urinous or nightsoil superphosphate previous to the boiling point I introduce any old boots, shoes, rags, and bones, and the like refuse found
15 in the tubs or in the ash-pit barrels, or in the black manure, or other nightsoil refuse with or without heat, in which they are dissolved, and in some instances I strengthen the urinous or nightsoil superphosphates by adding sulphates of magnesia or potash, soda, and nitric acid. The urinous or nightsoil superphosphates alone or in combination with
20 sulphates or soda of magnesia or potash decomposes the coals, cinders, and carboniferous substances, constituting the black nightsoil manure, and also as found in the dry ash barrel condition after incorporation with the contents of the nightsoil tubs, transforming the said coals, cinders, ashes into a substance similar to nightsoil. Horse, cattle,
25 and other farmyard urinous liquid can also be brought into operation in the same manner as human urine. The decomposition of phosphates of magnesia, alumina, and the like phosphates in general can be accomplished as well as the phosphate of lime by admixture of urine with acids.

30 I paint, plaster, or cement the insides of the tubs used as receptacles for human excrements or other vessels with the urinous superphosphates in the form of mortar or any of the soluble phosphates in use. I make these tubs to run upon wheels and to act upon an axis by which they can be easily emptied. I also have a wooden, tin, or other open umbrella,
35 whose stalk is screwed into the centre bottom of the tub or other receptacle, which I paint, plaster, or cement with a heavy coat of urinous or other superphosphate, upon which the mixed excrements fall and slide

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down to the bottom of the tub, being hidden from gaze and deprived of all splash soil properties. The urinous superphosphate or other phosphates thus deodorize the excrements as they drop, disinfect and sweeten and fix all deleterious compounds, adding at the same time very much to the manure value. As the excrements rise in the tubs they solve the phosphates into the mixture. If the mixture on withdrawal from the mortar mill does not disintegrate into a powder or cement rapidly enough I compress it into brick perforated moulds by the usual machinery, or I apply heat to drive off the water not hydrated in the cementation process. 10

The following is a mixture I sometimes make use of, namely, ground phosphates, 420 pounds; urine and fœces 320 pounds; common salt (chloride of sodium), 112 pounds; carbonate of magnesia (in powder) 112 pounds, adding to the above four 480 pounds sulphuric acid, the solubility of the phosphates being effected in the usual way. I prefer these proportions, but do not bind myself to such proportions or to one acid. I sometimes exclude magnesia, sometimes I add potash. I use this mixture both for plastering the tubs as indicated and for mixing up with night-soil and plaster of Paris or calcined and ground gypsum, and mortarising the mixture in the mortar mill until capable of withdrawal or thorough cementation. The tubs herein-before referred to are used with or without wheels and with handles or an axis. I use the mortar mill for mortarising nightsoil in the various conditions respective towns may have it by incorporation and mixture with cementation substances in the mortar mill until the consistency of mortar is reached. I also use the mortar mill for grinding nightsoil products into a rough manure without cement. I introduce gas lime refuse and the like after being suitably prepared as a cementer of nightsoil. 15 20 25

The various kinds of mixtures I have mentioned are contingent upon the condition of the nightsoil named, but I may state generally that when I receive the nightsoil pure out of the tubs and the ashes dry out of the barrels the two following are important methods:—The first is to mix the whole of the contents (nightsoil of the tubs) with an equal weight of ground phosphates and $2\frac{1}{2}$ hundredweight of salt to the ton of phosphates and add acid until the phosphates are soluble. When a less rich manure is contemplated I use only 420 pounds ground phosphates (less or more according to richness of manure required), 30 35

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1 hundredweight common salt, 1 hundredweight carbonate of magnesia (native dolomite) in powder to the ton of excrements, adding sufficient acid generally 400 pounds to dissolve the phosphates, but sometimes much less acid is necessary. Having ground up the contents of the ash barrels
5 I incorporate them with the nightsoil superphosphate mixture in equal parts in the mortar mill, adding sulphate of lime until the proper degree of consistency is arrived at. This is then withdrawn from the mill and allowed to set and harden, until dry enough for crushing, after which it is ready for use. If not sufficiently dry for crushing I drive off the
10 uncombined moisture by application of heat when rapidity of manufacture is essential. I sometimes add other ingredients besides carbonate of magnesia into the dissolving tub along with the phosphates, and I sometimes add other manure ingredients, such as potash for incorporation in the mortar mill when I want to manufacture special manures. The
15 nightsoil when not used in the superphosphate manufacture must be treated to acid, and I would prefer to use a carboy to a ton of nightsoil before being cemented up, otherwise it is dangerous to protracting, overpowering, and sometimes destroying the cementation principle. I sometimes use Portland cement, and this I prefer to use in the same
20 manner as the plaster of Paris or sulphate of lime as herein-before described in combination with the superphosphated urinous or nightsoil mixture, sometimes adding sulphate of magnesia and chloride of sodium. Portland cement I consider the best cementer of nightsoil alone or in combination with phosphates, magnesia, and salt, but I occasionally use
25 other suitable cements upon considerations of price, locality, carriage, or otherwise. I manufacture another modification of a cheap urinous superphosphate by incorporating and grinding equal (by preference) proportions of excreta and ashes either as collected mixed or separately, When ground to an impalpable paste I add sufficient acid (hydrochloric, sulphuric, or nitric,) to dissolve the mass. After this mixture is cool I
30 cement it up with sulphate of lime or other cements, and when sufficiently dried it is crushed and fit for use. I sometimes also enrich the last named mixture by adding a proportion of phosphates to the ashes and excreta before being dissolved with the acid, and likewise substitute
35 evaporation for cementation, utilising the cinder produce of the ashes for that purpose.

Having now particularly described the nature and object of my Invention and in what manner the same is performed, I hereby declare

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that I claim the Invention of "Improvements in the Treatment of Night-soil, Sewage, Urinous Superphosphates, Gas Lime Refuse, and other Refuse Matters for the Purpose of Deodorizing, of Obtaining Manure, and of Diluting Acids with Urinous Mixtures" as the same is herein-before set forth and described, it being understood that I do not claim the mere observient constituent details herein mentioned except when adopted and used in the manner and for the purposes herein-before set forth. 5

In witness whereof, I, the said William Henry Hughan, have hereunto set my hand and seal, this 5th day of July, in the year of our Lord One thousand eight hundred and seventy. 10

WILLIAM HENRY HUGHAN. (L.S.)

Witness,

THOMAS SMITH,

Corporation Manure Depot,

Salford. 15

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