Specification of George Edward Noone : deodorizing and treating sewage, &c.;

A.D. 1866, 25th April. N° 1163.

SPECIFICATION

OF

GEORGE EDWARD NOONE.

DEODORIZING AND TREATING SEWAGE, &c.

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Deodorizing and Treating Sewage, &c.

LETTERS PATENT to George Edward Noone, of No. 50, George Street, Hastings, in the County of Sussex, Civil Engineer, for the Invention of "IMPROVEMENTS IN MACHINERY AND PROCESSES FOR DEODORIZING AND TREATING SEWAGE AND OTHER REFUSE, AND MANUFACTURING THEREFROM MANURE AND OTHER SUBSTANCES FOR CHEMICAL AND OTHER USES."

Sealed the 24th October 1866, and dated the 25th April 1866.

PROVISIONAL SPECIFICATION left by the said George Edward Noone at the Office of the Commissioners of Patents, with his Petition, on the 25th April 1866.

I, GEORGE EDWARD NOONE, of No. 50, George Street, Hastings, in the County of Sussex, Civil Engineer, do hereby declare the nature of the said Invention for "IMPROVEMENTS IN MACHINERY AND PROCESSES FOR DEODORIZING AND TREATING SEWAGE AND OTHER REFUSE, AND MANUFACTURING THEREFROM MANURE AND OTHER SUBSTANCES FOR CHEMICAL AND OTHER USES," to be as follows:—

This Invention relates to certain improvements upon the machinery and process or processes set forth in the Specification of Letters Patent granted to me on the 14th of November, One thousand eight hundred and sixty-four, No. 2832, by which improvements a large amount of ammonia is secured in

the form of salammoniac or other ammoniacal salt from liquid and solid sewage and other refuse matters; also the solid matters of such sewage or refuse are purified by separating from them grit, sand, stone, and other matters of little value.

My Invention as applied to town sewage consists, first, in placing a tank at or near the outfall of the sewer, divided into compartments with percolating partitions and sluices to open and shut at pleasure. One of the compartments retains the solid matter to be lifted to the machine above, the others hold the liquid which is pumped out; part of it, by preference the strongest part, is pumped into the machine just mentioned. This machine is what I term a washing apparatus, consisting of one or more tanks or receivers divided by double partitions with space between, one of each pair of partitions being fixed to the top, the other to the bottom of the tank. In these tanks or receivers I produce agitation of the liquid and solid matters raised from the tank below either separately or together by means of one or more agitators acting either mechanically, as by fans, beaters, plungers, or other suitable mechanical arrangements of parts, or by jets of steam, air, or liquid thrown upon or into the sewage to be purified. The sewage is allowed to flow over, under, or through the partitions either regularly or intermittently from tank to tank when more than one are used, leaving the heavier mineral substances, such as grit and sand and other refuse behind, to be separately removed from time to time as may be required. I sometimes use heat in this process. The double partitions are sufficiently far apart to prevent choking, and are arranged by preference so that the sewage may flow over the top of the first partition, under the second, and then ascend into the next compartment, leaving the sand, grit, and other heavy refuse at the bottom of the tanks, which may be cleaned through a man-hole or otherwise.

Secondly, I pass the sewage thus separated from the mineral and other refuse matters into a tank subjected to heat where the organic and other substances held in suspension are combined with lime or lime liquor with or without soda or potash, the ammonia thus freed passes to a condenser containing hydrochloric or other acid, where it is retained, and the liquor thus made is afterwards converted into salammoniac or other salt of ammonia by means of evaporating pans or otherwise. I cause the organic and solid matters generally thus separated to enter a calciner or drying machine, as described in my Specification before mentioned, or instead of such calciner a chamber or chambers heated by the direct action of fire or by hot air or steam. I add to the calciner or hot chambers a dome top or shield supported on pillars to prevent the vapour when condensed returning to the body of

the calciner or hot chambers on to the solid matter while being dried, such condensed vapour being carried off by a canal round the lower part of the dome or shield. This liquor with the other pumped-up sewage water is passed to a main in connection with perpendicular pipes or hydrants containing chambers with perforated bottoms charged with lime, charcoal, animal black, gravel, or small stones, or other substances suitable for filtering purposes, thus all substances held in suspension are made to subside. These percolating chambers are made movable from the hydrants for the convenience of cleansing. The substances used in filtering together with the filterings, when either or both are of a fertilizing nature, are mixed with the other purified solid matters. The solids, when dried as described, are pulverized in a mortar or otherwise, and screened to separate the fine from the coarse.

Thirdly, my Invention consists in compounding the dried purified solid matter of sewage with ammoniacal salts obtained as above described or otherwise in such proportions as may be desirable according to the strength of the manure required; also in compounding the solid matter of sewage either with or without the addition of ammoniacal salts with natural or artificial phosphates or other chemical substances of fertilizing properties, so as to make a compound artificial manure possessing the character required for the particular crop it is intended for.

Fourthly, my Invention consists in a mechanical arrangement for making the compound before described. This consists of a bin with several compartments, which contain the several ingredients to be compounded. In each compartment a roller or chain wheel is fixed, round which a chain passes. The chain carries small cups made to hold a fixed amount and caused to dip into and take a portion of the pulverized contents from the respective compartments up an inclined channel, at the top of which the cups pass over a second chain wheel, and becoming inverted discharge their contents into a general receiving chamber. These contents then pass on to a screen or sieve having a reciprocating or shaking motion, and are sifted and fall into a bin or receptacle below. The cups are capable of being removed from the chain when cups of larger or small capacity are required.

The various parts of the foregoing arrangements requiring motive power may be moved by steam, water, or other prime mover, or where the scale of the apparatus is small by animal power or by manual labour; and in order to prevent any annoyance or nuisance arising from the process I hermetically seal the whole of the apparatus from the outfall of or inlet from the sewer to the discharge of the calciner, where the solid portion is returned dried and deodorized, and the waters pass purified from the mouth of the hydrants.

The foregoing arrangements or parts of them may be employed for deodorizing sewage and other refuse for sanitary purposes irrespective of the manufacture of manure, the resulting chemicals being used for any purpose for which they may be suitable or treated as waste.

SPECIFICATION in pursuance of the conditions of the Letters Patent, filed by the said George Edward Noone in the Great Seal Patent Office on the 25th October 1866.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, GEORGE EDWARD NOONE, of No. 50, George Street, Hastings, in the County of Sussex, Civil Engineer, send greeting.

WHEREAS Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the Twenty-fifth day of April, in the year of our Lord One thousand eight hundred and sixty-six, in the twenty-ninth year of Her reign, did, for Herself, Her heirs and successors, give and grant unto me, the said George Edward Noone, Her special licence that I, the said George Edward Noone, my executors, administrators, and assigns, or such others as I, the said George Edward Noone, 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 MACHINERY AND PROCESSES FOR DEODORIZING AND TREATING SEWAGE AND OTHER REFUSE, AND MANUFACTURING THEREFROM MANURE AND OTHER SUBSTANCES FOR CHEMICAL AND OTHER USES," upon the condition (amongst others) that I, the said George Edward Noone, 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 George Edward Noone, 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 thereof, reference being had to the Drawings hereunto annexed, that is to say:—

This Invention relates to certain improvements upon the machinery and

process or processes set forth in the Specification of Letters Patent granted to me on the 14th day of November 1864, No. 2832, by which improvements a large amount of ammonia is secured in the form of salammoniac or other ammoniacal salt, and the fertilizing constituents of sewage are effectually separated from grit, sand, stone, and other matters of little value, while from the greater efficacy of the manure and its diminished bulk a corresponding advantage ensues to the agriculturist in its application to the soil as well as economy in its transit. In the present Invention I use lime or lime liquor, with or without soda or potash, with the application of heat for the purpose of freeing the ammonia and hydrochloric or other acids to condense the same into salammoniac in solution; also sulphate of lime and other known filtering substances placed in proper chambers in pipes or hydrants for the purpose of causing the removal of all solid matter suspended in the weaker sewage which may not be pumped up to wash the solid and extract the ammonia as hereafter explained.

My Invention as applied to town sewage consists, first, in placing at or near the outfall of the sewer a tank divided into compartments, with percolating and protecting partitions and sluices to open and shut at pleasure; one of these compartments retains the solid matter to be lifted to a machine above, as described in the Specification of the before-mentioned Letters Patent, the other holds the liquid, part of which, by preference the strongest part, is pumped up into the machine just mentioned. The remainder of the sewage water is caused to pass by gravitation, as hereafter explained, through pipes or hydrants charged with filters. The machine above mentioned is what I term a washing machine. If the tank at the outfall of the sewer is at a sufficient elevation the washing machine may be placed at a lower elevation, so that the solid portion and part of the liquid portion of the sewage may be caused to flow into it. The washing machine consists of one or more tanks or receivers divided by double partitions with space between to prevent clogging, one of each pair of the partitions being fixed to the top and the other to the bottom of the tank. In these tanks or receivers I produce agitation of the liquid and solid matters raised from the tank below, either separately or together, by means of one or more agitators acting either mechanically, as by fans, beaters, plungers, or other suitable mechanical arrangements of parts, or by jets of steam, air, or liquid thrown upon or into the sewage to be purified; the sewage is allowed to flow over, under, and through the partitions either regularly or intermittently from tank to tank when more than one are used, leaving the heavier mineral substances, such as grit, sand, stone, and other refuse behind, to be separately removed from time to time through man-holes

in front of the apparatus or otherwise. I sometimes use heat in this process. The double partitions are sufficiently far apart to prevent choking, and are arranged by preference so that the sewage may flow over the top of the first partition and under the second, and then ascend into the next compartment, leaving the sand, grit, and other heavy refuse at the bottom of the tanks to be cleared as before described.

Secondly, I pass the sewage thus separated by means of the partitions before mentioned from the mineral and other refuse matter into a tank subjected to heat, and having a dome top and pipe communicating with a bulb condenser charged with hydrochloric acid. This I call my ammonia tank, in which the organic and other substances held in suspension are combined with lime or lime liquor, with or without soda or potash, made by preference from sewage water pumped into a tank for that purpose, which tank communicates with the ammonia tank and supplies the required amount. The ammonia thus freed by the lime liquor passes to the condenser charged with hydrochloric or other acid and becomes salammoniac in solution; it is afterwards converted by evaporating pans into crystallized salammoniac. A fresh charge from the washing tank causes the organic and solid matter thus separated from the ammonia to flow over and under another set of partitions into a tank fitted with perforated plates or with an endless wire cloth working over 2 rollers in an inclined position, to which motion is given, the solid sewage being in a kind of pulp form flows on to the wire cloth and is taken up under a roller working on the surface of the cloth, which presses the liquor from the solid sewage through the wire cloth into a save-all, while the solid matter continuing its longitudinal traverse on the wire cloth falls nearly dry into a calciner or drying chamber, as described in the Specification before mentioned, or instead of such calciner a chamber or chambers heated by the direct action of fire or by hot air or steam. I add to the calciner or hot chamber a dome top or shield supported on pillars to prevent the vapour when condensed returning to the body of the calciner or hot chambers on to the solid matter while being dried, such condensed vapour being carried off by a canal round the lower part of the dome or shield. Instead of being passed over a wire cloth or perforated plates to separate the liquor from the solid sewage as before explained, the sewage may be strained by any other known method in its passage from the ammonia tank to the calciner or hot chambers. The liquor resulting from the condensed vapour from the calciner or hot chambers with the other pumped-up sewage water which has passed through the save-all before mentioned falls into a main in connection with pipes or hydrants containing various chambers with perforated bottoms charged with

substances suitable for filtering purposes, such as sulphate of lime, charcoal, and gravel, through which the main body of the sewage water, as well as that which has been pumped up and passed through the tanks, is filtered by gravitation, and all substances held in suspension are thereby removed. These percolating chambers are made movable from the hydrants for the convenience of cleaning, and may be lifted by a windlass with sliding pulley fixed over the mouth of the hydrants. The substance used for filtering, together with the filterings when either or both are of a fertilizing nature, are mixed with the other purified solid matter. The solids when dried as described are pulverized in a mortar or otherwise, and screened to separate the fine from the coarse.

I compound the dried purified solid matter of sewage with ammoniacal salts obtained as above described or otherwise in such proportions as may be desirable according to the strength of manure required, also I compound the solid matter of sewage, either with or without the addition of ammoniacal salts, with natural or artificial phosphates or other chemical substances of fertilizing properties, so as to make a compound artificial manure possessing the character required for the particular crop it is intended for.

Lastly, my Invention consists in a mechanical arrangement for making the compound before described. This consists of a bin with several compartments which contain the several ingredients to be compounded; in each compartment a roller or chain wheel is fixed, round which an endless chain passes. The chain carries small cups made to hold a fixed amount, and caused to dip into and take a portion of the pulverized contents from the respective compartments up an inclined channel, at the top of which the cups pass over a second chain wheel and becoming inverted discharge their contents into a general receiving chamber; these contents then pass on to a screen or sieve having a reciprocating or shaking motion, and are thus sifted and fall into a bin or receptacle below. The cups are capable of being removed from the chain when cups of larger or of smaller capacity are required.

The various parts of the foregoing arrangements requiring motive power may be moved by steam, water, or other prime mover, or where the scale of the apparatus is small by animal power or manual labour; and in order to prevent any annoyance or nuisance arising from the process I hermetically seal the whole of the apparatus from the outfall or inlet of the sewer to the discharge of the calciner, where the solid portion of the sewage returns dried and deodorized, and the liquid portion passes purified from the mouth of the hydrants.

The foregoing arrangements or parts of them may be employed for deo-

dorizing sewage and other refuse for sanitary purposes irrespective of the manufacture of manure, the resulting chemicals being used for any purpose for which they may be suitable or treated as waste.

Figure 1 of the accompanying Drawings is a block plan showing the arrangement and combination of the machinery and apparatus herein-before referred to; Figure 2 represents the tank at the outfall of the sewer, which tank is only represented in dotted lines in Figure 1. A is this tank; it is divided by percolating and protecting partitions at B into two compartments C, D, of which the compartment C retains the solid sewage, while the liquid sewage passes to the compartment D. E is an inclined channel for a dredger or a chain carrying buckets, as described in my former Specification before referred to, for lifting the solid sewage from the compartment C into the washing machine or tank F. G, G, are pumps for raising a portion of the liquid sewage from the compartment D into the washing tank; H is the ammonia tank into which the sewage is passed after having been treated in the washing tank; I is a dome top and pipe to the ammonia tank communicating with a condenser J, charged with hydrochloric or other acid; K is the lime liquor tank, the liquid being supplied thereto from the compartment D by the pumps G; the tank K communicates with and supplies the necessary amount of lime liquor to the ammonia tank H. The ammonia freed by the lime liquor passes to the condenser J and becomes salammoniac in solution; this is afterwards converted into crystallized salammoniac by evaporating pans L. M represents a mortar and pestle; N is the tank, fitted with an endless travelling wire cloth, on to which the sewage in a pulpy state passes from the ammonia tank H. A roller presses upon the sewage on this cloth and squeezes out the liquid portion into a save-all below, while the solid portion passes on to the calciner O. P, P, are the pipes or hydrants for filtering the liquor, and constructed and arranged as before explained. The main body of the sewage water which has not been pumped up from the compartment D, as well as that from the save-all below the wire cloth, and that resulting from the condensed vapour from the calciner O passes through the pipes or hydrants P, P, and is thereby filtered, all substances held in suspension being removed. Q is a bin formed with several compartments, into one of which the dried solid sewage passes from the calciner O, while the other compartments are supplied with the several ingredients to be mixed with the sewage for making manure. R is a chain wheel in each compartment; the chains carry cups which dip into and take up the contents of the several compartments and discharge them into a general receiving chamber S, below which is a sieve for sifting them into a receptacle. T is

the engine for driving the various parts; U, U, are the steam boilers, and V, the ash-pit; W, W, are man-holes in the tank A.

And having now described the nature of my said Invention, and in what manner the same is to be performed, I declare that I do not confine myself to the precise forms and arrangements of machinery herein-before described, as the same may be modified in many ways without departing from the main features thereof; what I claim as my "Improvements in Machinery and Processes for Deodorizing and Treating Sewage and other Refuse, and Manufacturing therefrom Manure and other Substances for Chemical and other Uses," is,—

First, the construction and employment of what I have herein-before termed a washing machine, arranged and acting substantially as herein-before described, for the purpose of separating sand, grit, stone, and other heavy refuse from the sewage matters.

Second, the separation from the sewage matters of ammonia, and the condensation thereof substantially by the means and in manner herein-before described.

Third, constructing the calciner or hot chamber or chambers in which the solid sewage is dried with a dome top or shield formed with a canal for carrying off the condensed vapour, substantially as herein-before described.

Fourth, the construction and employment for filtering liquid sewage of pipes or hydrants formed with chambers having perforated bottoms and charged with filtering substances, substantially as herein-before described.

Fifth, the general arrangement of machinery substantially as herein-before described for compounding dried solid sewage and other materials for the manufacture of manure.

Sixth, the general combination of chemical and mechanical processes, substantially as herein-before described, for deodorizing and treating sewage and other refuse.

In witness whereof, I, the said George Edward Noone, have hereunto set my hand and seal, this Twenty-fourth day of October, One thousand eight hundred and sixty-six.

GEORGE EDWᴰ. NOONE. (L.S.)

LONDON:
Printed by GEORGE EDWARD EYRE and WILLIAM SPOTTISWOODE,
Printers to the Queen's most Excellent Majesty. 1866.

FIG. 1.

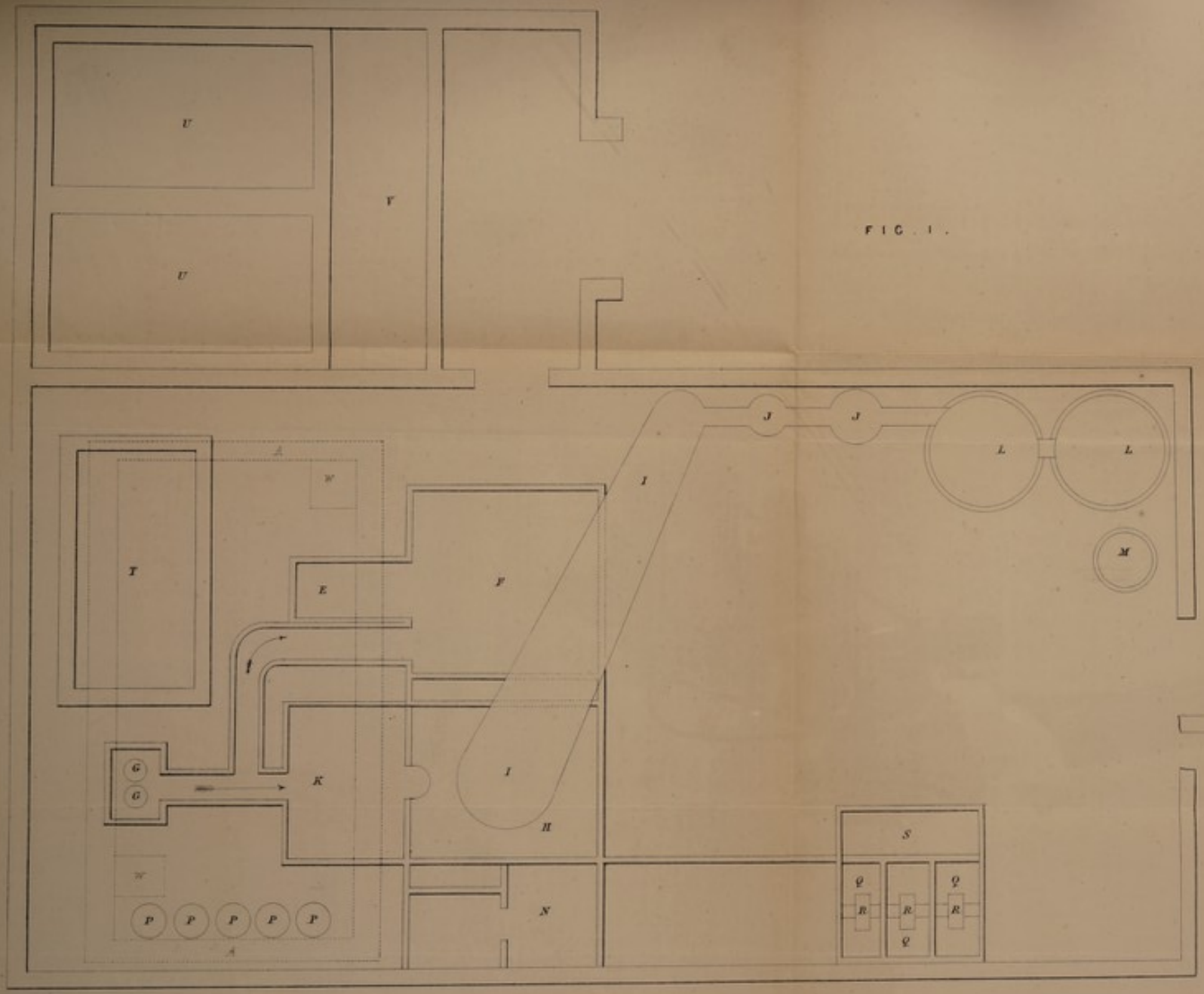
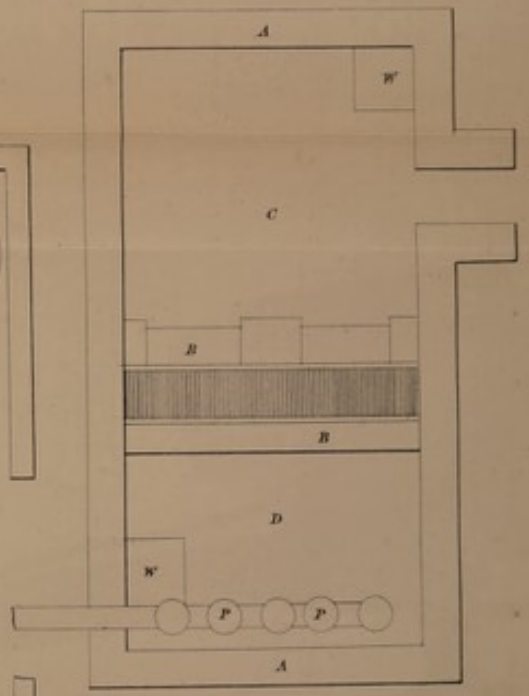


FIG. 2.



The filed drawing is not colored.

Drawn on Stone by Malby & Sons.

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