Specification of James Alexander Manning : apparatus and processes for the precipitation of manure from sewerage and drainage waters.

A.D. 1853 . . . . . N° 2780.

SPECIFICATION

OF

JAMES ALEXANDER MANNING.

APPARATUS AND PROCESSES FOR THE PRECIPITATION OF MANURE FROM SEWERAGE AND DRAINAGE WATERS.

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Apparatus and Processes for the Precipitation of Manure from Sewerage and Drainage Waters.

LETTERS PATENT to James Alexander Manning, of the Inner Temple, in the County of Middlesex, Esquire, for the Invention of "IMPROVEMENTS IN THE TREATMENT OF SEWERAGE AND OTHER POLLUTED LIQUIDS, AND THE PRODUCTS THEREOF."

Sealed the 4th April 1854, and dated the 29th November 1853.

PROVISIONAL SPECIFICATION left by the said James Alexander Manning at the Office of the Commissioners of Patents, with his Petition, on the 29th November 1853.

I, JAMES ALEXANDER MANNING, of the Inner Temple, in the County of Middlesex, Esquire, do hereby declare the nature of the said Invention for "IMPROVEMENTS IN THE TREATMENT OF SEWERAGE AND OTHER POLLUTED LIQUIDS, AND THE PRODUCTS THEREOF" to be as follows:—

This Invention relates to the purification of the sewerage and drainage waters of cities and other localities in such manner as to precipitate the solid matters held in suspension therein, the deposit so produced being subsequently treated and applied as a manure, whilst the fluid matter itself is purified for general use. The preferable mode of proceeding, according to this Invention, is first to run or collect the

sewerage matter into tanks or receivers, and when so collected, animal charcoal, alum, and carbonate of soda and gypsum are added to the collected mass, in proportions varying with the nature of the sewerage, the whole being well agitated for a short time by mechanical means. This treatment very quickly precipitates all the solid matter held in suspension, leaving the super-natant liquid beautifully pure, clear, and tasteless and odourless. The bottom of the tank or receiver is formed with a considerable inclination, the descent or slope being towards a bottom side-door. With this arrangement the solid deposit is easily removeable by opening this discharge door, when the mass may be drawn out into a pug mill or mixing apparatus. Waste charcoal or carbonaceous matter of various kinds, kelp, factory waste, common salt, and gypsum, and horn dust riddlings are then mingled with the solid mass in varying proportions, and the matter is thus converted into a powerfully fertilising manure.

SPECIFICATION in pursuance of the conditions of the Letters Patent, filed by the said James Alexander Manning in the Great Seal Patent Office on the 29th May 1854.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, JAMES ALEXANDER MANNING, of the Inner Temple, in the County of Middlesex, Esquire, send greeting.

WHEREAS Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the Twenty-ninth day of November, in the year of our Lord One thousand eight hundred and fifty-three, in the seventeenth year of Her reign, did, for Herself, Her heirs and successors, give and grant unto me, the said James Alexander Manning, Her special license that I, the said James Alexander Manning, my executors, administrators, and assigns, or such others as I, the said James Alexander Manning, my executors, administrators, or 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 Inven-

tion for "IMPROVEMENTS IN THE TREATMENT OF SEWERAGE AND OTHER POLLUTED LIQUIDS, AND THE PRODUCTS THEREOF," upon the condition (amongst others) that I, the said James Alexander Manning, by an instrument in writing under my hand and seal, 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 James Alexander Manning, 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, reference being had to the accompanying Drawings, and to the letters and figures marked thereon, that is to say:—

My said Invention relates to the purification of the sewerage and drainage waters of cities and other localities in such manner as to precipitate the solid matters held in suspension therein, the deposit so produced being subsequently treated and applied as a manure, whilst the fluid matter itself is purified.

The preferable mode of proceeding according to this Invention, is first to run or collect the sewerage matter into tanks or receivers, and when so collected, animal charcoal, alum, and carbonate of soda and gypsum are added to the collected mass, in proportions varying with the nature of the sewerage, the whole being well agitated for a short time by mechanical means. This treatment very quickly precipitates all the solid matter held in suspension, leaving the super-natant liquid beautifully pure, clear, tasteless, and odourless. The bottom of the tank or receiver is formed with a considerable inclination, the descent or slope being towards a bottom door or discharge port. With this arrangement, the solid deposit is easily removeable by opening this discharge door, when the mass may be drawn out into a pug mill or mixing apparatus. Waste charcoal or carbonaceous matter of various kinds, kelp, factory waste, common salt, or the refuse brine derived from the curing of provisions, and gypsum, or phosphate of lime, and horn dust riddlings, are then mingled with the solid mass, in varying

proportions, and the matter is thus converted with a powerful fertilising manure. What I mention under the head of "factory waste," I wish to be understood as the refuse from certain manufactures or processes, such, for example, as the refuse salt or brine arising from the curing of provisions, such refuse salt or brine, in addition to its value as a fertilising agent, contains a certain amount of animal matter, which I prefer to use instead of ordinary saline matter.

And in order that my said Invention may be properly understood, I shall now proceed to describe the Figures on the Sheet of Drawings hereunto attached. Figure 1, on my Sheet of Drawings, is a transverse vertical section of one form of tank or receiver with the agitator and other details which I propose to adopt in my system of treating sewerage matters or other polluted liquids; Figure 2, on the same Sheet, is a plan of the tank and its collateral apparatus with the greater portion of the cover or lid removed, to show the agitator clearly, whilst the tank wall at this part, together with the ducts or fluid passages, are in horizontal section.

The tank or receiver A is, in this instance, a large brick structure, formed by a circular wall B, and a foundation mass of brickwork or masonry C. A series of such tanks may be conveniently ranged or disposed together at the required locality and level of the town whence the sewerage is to be taken. The main arterial sewer is put in communication at one end with the influx pipe D, of cast iron; the other end is connected, as delineated in my Drawings, with a junction or elbow valve chest E, from which separate branch, supply pipes F, G pass to the respective tanks. The branch is represented in the present instance as supplying the crude sewerage to the tank, this pipe having a full opening to the main duct D, whilst the oscillating valve disc H shuts off the connection with the other branch F. The valve H is set upon a vertical spindle, which passes out at the top and bottom of the valve chest, and has keyed upon each projecting extremity a toothed segmental lever I. These segments are respectively in gear with the toothed pinions J, fast upon the vertical spindle K, which is supported in suitable bearing brackets, and has upon its upper end a double hand lever for working it. By this means an attendant can, at

any time, regulate the fluid supply to the tanks. The tank is roofed over with planking carried upon horizontal metal girders to form a platform for the attendants. In the centre of this platform is a vertical frame L, of cast iron, carrying on its top two bearings for a horizontal driving spindle, on which are two winch handles M, for the working of the agitator by two attendants. The winch shaft has fast upon it two bevil pinions N, which gear on opposite sides, with the bevil wheel O fast on the top of the agitator spindle P. This spindle, supported at its upper end in a collar bearing in the framing L, and at the bottom in a foot step Q at the bottom of the tank, has upon it an upper and a lower agitator vane wheel R, S. Each of these vane wheels is composed of four inclined and eccentrically disposed vanes bolted to suitable collar pieces on the shaft. The upper smaller vane wheel serves to agitate the upper strata of the liquid in the tank, whilst the bottom larger vane performs a similar operation at the very bottom of the tank. The precipitating and purifying ingredients are deposited in the tank by the agency of the pillar valve boxes T, U. The pillar box T is a plain hollow cylinder covering a supplying hole in the platform, and having in its bottom a clack valve V, to which a bent handle W is hinged, being passed upwards through a hole in the top cover X. The other pillar chest U is a rectangular box fitted with a hinged lid, in a similar, and having a horizontal slide disc at its bottom for the discharge of the contents of the box into the tank. With these arrangements the operators can quickly deposit the necessary ingredients in these valve boxes, and then close up the matters by the top lids, whilst by drawing the handle W, or the slide Y, the several deposited matters are at once let fall into the fluid mass in the tank.

The discharge duct for conducting away the pure water after the precipitation of the matters held in suspension in the sewerage is at Z. It is represented in this instance as a plain brick conduit, with a cast iron valve piece *a*, set in the tank wall. This mouth piece is carried up to form a guide and working face for the vertical sluice gate *b*, worked by a winch handle *c*, above; this handle is fast, on the horizontal spindle *d*, set in bearings in the tops of the bracket pillar *e* and *f*, and carrying at its opposite end a toothed pinion in gear with a rack passing down the

hollow of the pillar *f*, to the valve *b*, to which it is attached. The bottom of the tank is conical or has a slope to the centre from the circumference, for the better conducting away of the precipitated mass as it collects in the tank. At the apex of this reversed cone is a cast iron valve chest mouth-piece *h*, surrounding the central discharge aperture, and set directly over the open end of the elbow discharge pipe *i*, in direct communication with the straight sloping pipe *j*. The mouth *h*, is governed by the horizontal slide *k*, to the back of which is screwed one end of a long spindle *l*, passing through a side prolongation of the piece *h*, and out by a stuffing box *m*. The other end of this spindle is screwed and is entered into a fixed nut *n*, set outside the tank's base; and outside of this nut is a double lever *o*, for turning the spindle and setting the valve. Higher up in the tank's base is a small pipe *p*, opening at its inner end into the tank, and terminating externally in a stop cock *q*. From the external projecting portion of this pipe *p*, a glass tube *r* passes upwards to the level of the platform, and is graduated to shew the depth of the liquid in the tank.

In operating according to this general process of treating sewerage and other polluted liquids, the attendant first of all permits the required amount of the sewerage to flow into the tank by the pipe G, until, I shall suppose, the tank is full, as represented in my Drawings. The supply of sewerage matter is then cut off and the necessary ingredients, as herein-before specified, are then added to the collection of sewerage by means of the boxes T, U. Immediately thereafter the agitators R, S, are caused to revolve, by means of the winch handles M, for a space of two minutes, more or less. This process commingles the sewerage and the added ingredients in a most effectual manner, and permits the cleansing ingredients to have their full chemical effect upon the polluted mass. After being thus agitated the motion is suspended, and precipitation commences. In a short time, half an hour, more or less, the solid impurities of the sewerage are precipitated to the bottom of the tank in a dense layer, leaving bright water above. This supernatant liquid is then run out of the tank through the sluice valve *b* and the duct *z*, being allowed to flow away to any suitable lower level. The discharge slide K, at the bottom of the tank is then withdrawn, and the

thick deposit is allowed to flow off through the pipe *i*, *j*, for subsequent treatment as a manure.

In applying such solid or partially solid matter for the general purposes of manure, the mass may be at once discharged into a pug mill or mixing apparatus; the several matters or one or more of them herein-before described as applicable at this stage of the treatment, being now mixed and well commingled with the mass for the production of a highly fertilising dry manure.

The proportions of the herein-before described substances which I prefer to employ in the treatment and purification of sewerage and other polluted liquids are these; for every one hundred thousand gallons of sewerage water I use from fifty to sixty pounds, more or less, of powdered or reduced alum; a similar quantity of waste animal charcoal; about fifteen pounds, more or less, of gypsum or phosphate of lime. The carbonate of soda is only used when the crude matter to be treated is strongly impregnated, as is often the case in manufacturing towns. If solutions of the alum or of carbonate of soda be employed, then I allow either solutions of those containing in suspension the animal charcoal and gypsum or phosphate of lime to enter, either by two separate inlet pipes or otherwise, and effect deccomposition by agitation, or I allow a solution of either the alum or carbonate of soda to enter and become mixed with the sewage, and then add either the solution of carbonate of soda or alum, as the case may be, together with the animal charcoal and gypsum; and by means of the agitating apparatus, herein-before described, I cause the solution to mix, and thus effect decomposition in the solution. By so doing I find a smaller amount of the alum and carbonate of soda to be necessary owing to the precipitation of hydrate of alumina being more generally diffused, and thus more completely entangling and causing to separate the suspended and other matters contained in the sewerage. The animal charcoal and the gypsum may be added separately, either before or during any part of the defecating operation, without being in a state of suspension, as herein-before described. When the presence of acid requires a corrective, I add from ten to fifteen pounds, more or less, of carbonate of soda to every one hundred thousand gallons of polluted liquid, as before

referred to, taking care that the proportions of the carbonate of soda and alum bear a constant relation to each other. In the preparation of the precipitated matter for use as a manure I prefer to add about four hundred weight, more or less, of each of the herein-before described ingredients to each ton of the crude matters as deposited by the previous treatment. If the herein-before described defecating substances be employed in the form of powder, the several constituents are ground and mixed together prior to adding them to the sewerage water.

Having now described and particularly ascertained the nature of my said Invention, and the manner in which the same is or may be used or carried into effect, I may observe, in conclusion, that I do not confine or restrict myself to the precise details or arrangements which I have had occasion to describe or refer to, as many variations may be made therefrom without deviating from the principles or main features of my Invention; but what I consider to be novel and original, and therefore claim as the Invention secured to me by the herein-before in part recited Letters Patent, is,—

First, the general arrangement and construction of machinery, apparatus, and the form of precipitating vessel, or modifications thereof, as well as the arrangement of inclined bottoms to the tanks, consisting either of one or more inclines.

Second, the employment and means of application of the several chemical agents, herein-before described, for defecating and separating certain matters from sewerage.

Third, the production of valuable manuring or fertilizing agents by the employment of the matters thus separated from sewerage, in conjunction with the before-mentioned adjuncts.

In witness whereof, I, the said James Alexander Manning, have hereunto set my hand and seal, this Twenty-sixth day of May, in the year of our Lord One thousand eight hundred and fifty-four.

JAMES ALEX. MANNING. (L.S.)

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MANNING'S Specification.
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FIG. 1.

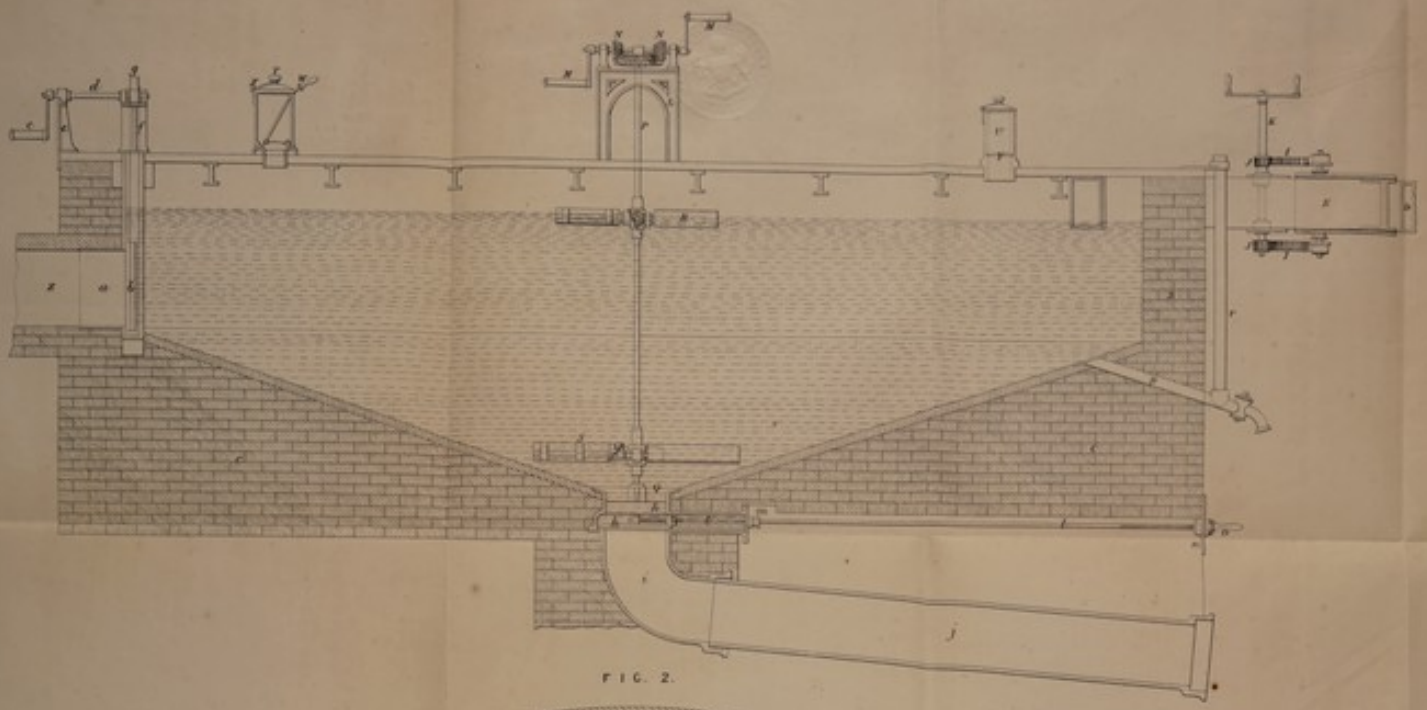
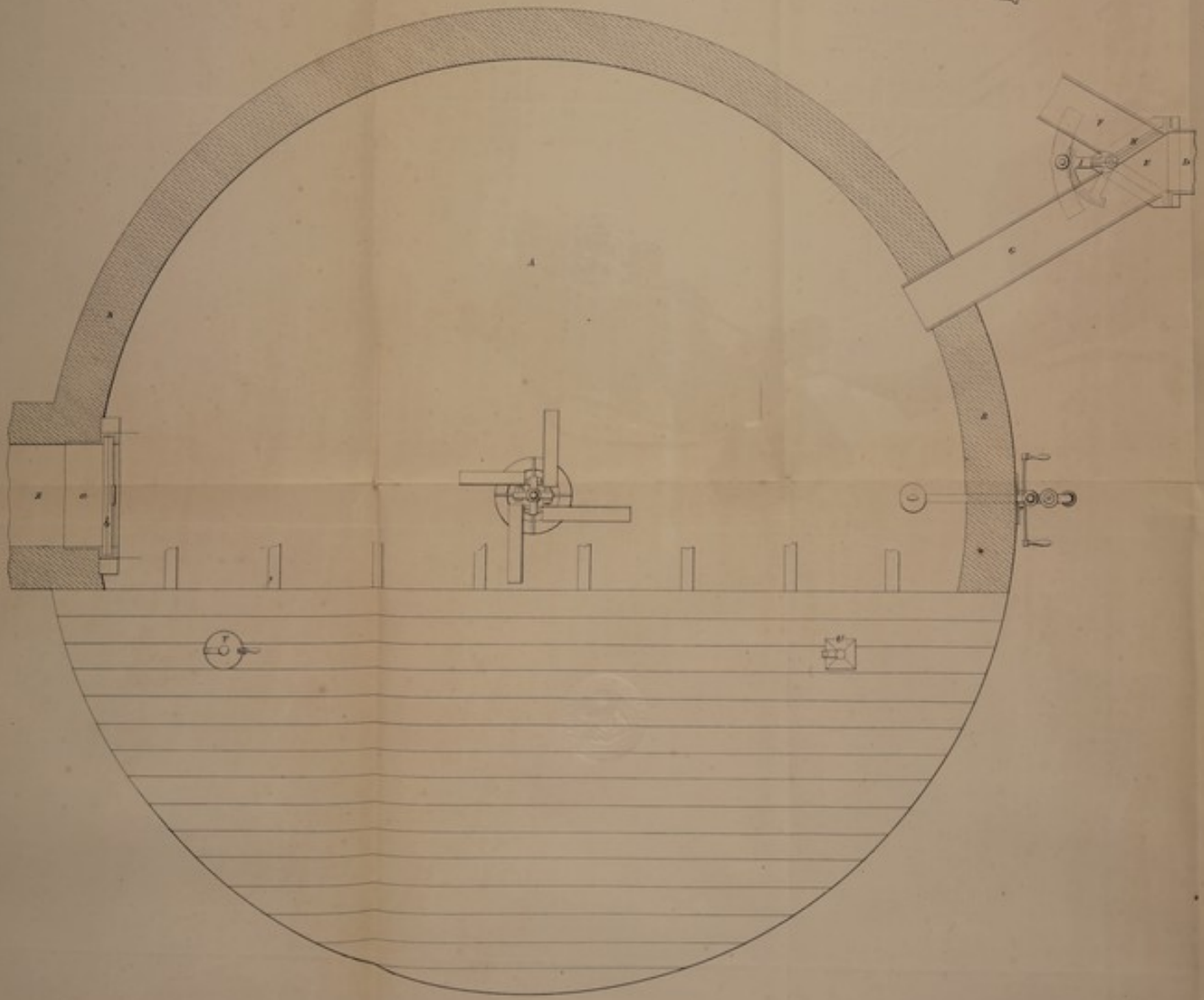


FIG. 2.



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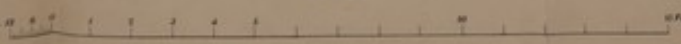

The filed drawing is partly colored.

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