

Specification of Alfred Henry Hart and William Parry : treating sewage.

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A.D. 1867, 19th MARCH. N° 788.

SPECIFICATION

OF

ALFRED HENRY HART
AND
WILLIAM PARRY.

—
TREATING SEWAGE.
—

LONDON:

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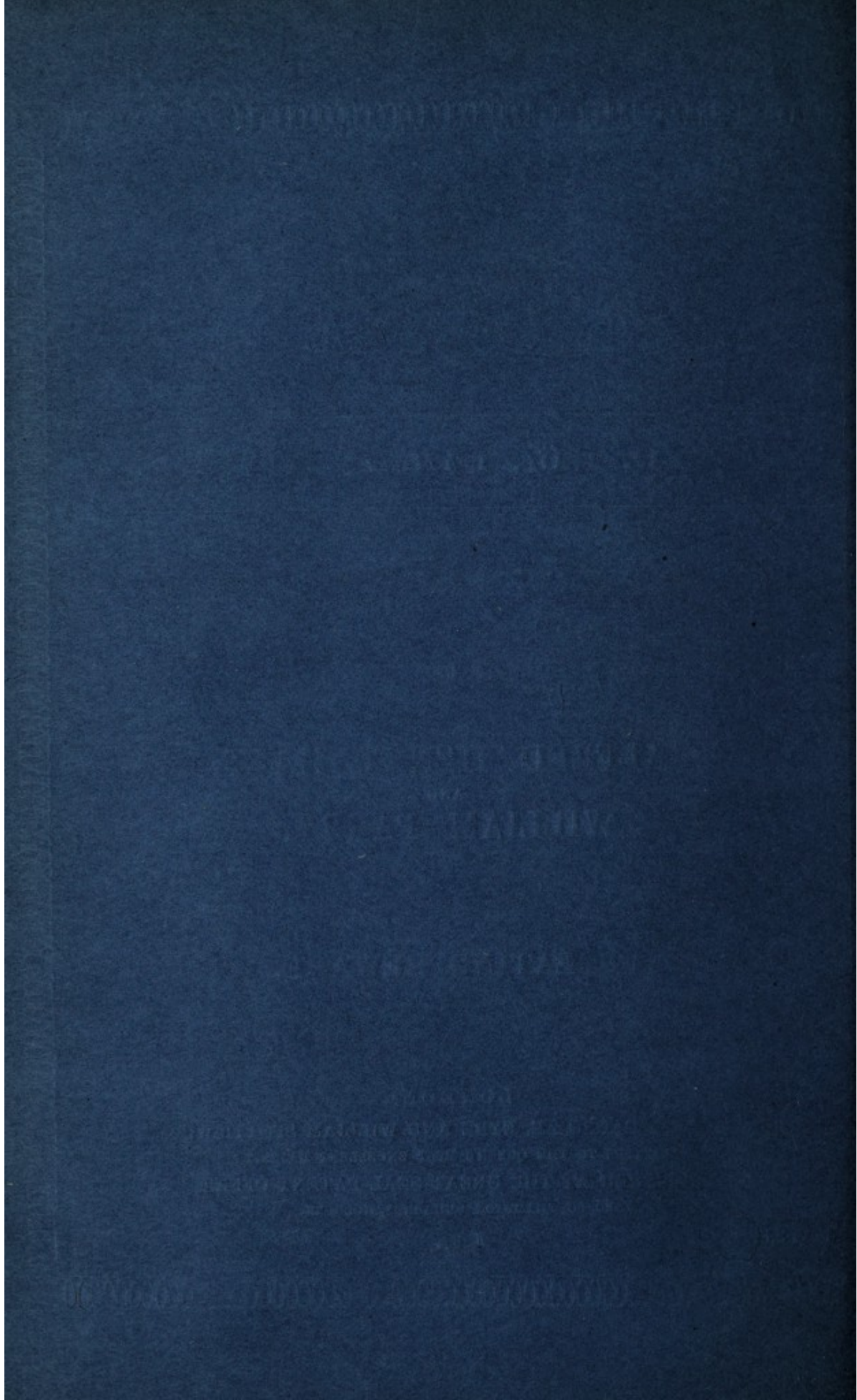
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A.D. 1867, 19th MARCH. N° 788.

Treating Sewage.

LETTERS PATENT to Alfred Henry Hart, of No. 22, Gresham Street, in the City of London, Manufacturer, and William Parry, of Birmingham, in the County of Warwick, Mineral Surveyor, for the Invention of "**IMPROVEMENTS IN TREATING OR PURIFYING SEWAGE, AND IN APPARATUS TO BE USED FOR THAT PURPOSE.**"

Sealed the 30th August 1867, and dated the 19th March 1867.

PROVISIONAL SPECIFICATION left by the said Alfred Henry Hart and William Parry at the Office of the Commissioners of Patents, with their Petition, on the 19th March 1867.

We, **ALFRED HENRY HART**, of No. 22, Gresham Street, in the City of London, Manufacturer, and **WILLIAM PARRY**, of Birmingham, in the County of Warwick, Mineral Surveyor, do hereby declare the nature of the said Invention for "**IMPROVEMENTS IN TREATING OR PURIFYING SEWAGE, AND IN APPARATUS TO BE USED FOR THAT PURPOSE,**" to be as follows:—

Our improvements in treating or purifying sewage consist in mixing therewith as herein-after described clay, clay iron ore, or manganesic earths, whereby the suspended and dissolved organic and inorganic matters contained therein are precipitated, and the water of the sewage is rendered clear and

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inodorous or nearly so. We mix the clay, or clay iron ore, or manganic earth with water to the consistence of cream or liquid mud, and add the mixture to the sewage to be treated. The said mixture and the sewage are intimately mixed in any convenient manner, and afterwards allowed to stand at rest for a time. The solid matter of the clay, or clay iron ore, or manganic earth combines 5 with the principal part of the organic and inorganic matters of the sewage, and gradually subsiding leaves the supernatant water free or nearly free from the said organic and inorganic matters.

The water may be drawn off from the sediment by the use of the apparatus constituting the second part of our Invention, or in any other convenient manner, 10 and may be poured into a stream without injury thereto. The solid matter constitutes a valuable manure.

Our improvements in apparatus to be employed in treating sewage are as follows:—Instead of the usual tanks having a great superficial area we sink vertical shafts or sets of vertical shafts; these shafts may be lined with masonry 15 or cast iron. The sewage of one day is conducted to one of these shafts or set of shafts, that of another day into another shaft or set of shafts, and so on in succession. When the sewage in any one of the shafts or sets of shafts becomes sufficiently clear by the subsiding of the suspended matter it is drawn off and disposed of in any convenient manner. The solid matter or mud is raised from the bottom 20 of the shafts by a screw placed by preference in an inclined position, or by the pressure of another portion of sewage which is made to press the mud upwards through suitable channels to the required level. We prefer to make the shafts of somewhat larger diameter at bottom than at top to facilitate the deposition of the suspended matter. The shafts are constructed upon an 25 inclined passage, which communicates with the several shafts at their lower ends. When we treat sewage in tanks instead of the shafts described we construct the tanks of masonry. In the centre of the tank is a vertical pipe; a second inner pipe slides within the former, and is made water-tight by packing. On the top of the inner pipe and surrounding its mouth is an iron 30 plate supported by a wooden frame to give it buoyancy. This plate is suspended by chains passing over pulleys, by means of which chains the said plate can be raised above or sunk below the level of the liquid in the tank. Balance weights may be used to support plate in the required position. When the liquid in the tank has been allowed to rest sufficiently long to permit of 35 the subsidence of the suspended matter the plate is lowered below the surface, when the clear liquid is drawn off from the top and passes away down the pipe. The plate can be lowered as required to suit the sinking level of the

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liquid, and the clear liquid is thus drawn off without disturbing the sediment at the bottom of the tank. A frame or guard may be fixed around the plate to arrest corks or floating bodies and prevent them passing down the pipe. The clay, clay iron ore, or manganesic earth may be mixed with the sewage as
5 it passes into the shafts or tanks.

SPECIFICATION in pursuance of the conditions of the Letters Patent, filed
10 by the said Alfred Henry Hart and William Parry in the Great Seal
Patent Office on the 13th September 1867.

TO ALL TO WHOM THESE PRESENTS SHALL COME, we, **ALFRED**
10 **HENRY HART**, of No. 22, Gresham Street, in the City of London, Manufacturer,
and **WILLIAM PARRY**, of Birmingham, in the County of Warwick, Mineral
20 Surveyor, send greeting.

WHEREAS Her most Excellent Majesty Queen Victoria, by Her Letters
Patent, bearing date the Nineteenth day of March, in the year of our
15 Lord One thousand eight hundred and sixty-seven, in the thirtieth year of
Her reign, did, for Herself, Her heirs and successors, give and grant unto
us, the said Alfred Henry Hart and William Parry, Her special licence that we,
the said Alfred Henry Hart and William Parry, our executors, administrators,
and assigns, or such others as we, the said Alfred Henry Hart and William
20 Parry, 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, and vend,
within the United Kingdom of Great Britain and Ireland, the Channel
Islands, and Isle of Man, an Invention for "**IMPROVEMENTS IN TREATING OR**
25 **PURIFYING SEWAGE, AND IN APPARATUS TO BE USED FOR THAT PURPOSE,**" upon the
condition (amongst others) that we, the said Alfred Henry Hart and William
Parry, our executors or administrators, by an instrument in writing under our
or their hands and seals, or under the hand and seal of one of us or them,
should particularly describe and ascertain the nature of the said Invention,
30 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 Alfred Henry Hart, on behalf of myself
and the said William Parry, do hereby declare the nature of the said In-
35 vention, and in what manner the same is to be performed, to be particularly

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described and ascertained in and by the following statement thereof, that is to say:—

Our improvements in treating or purifying sewage consist in mixing therewith as herein-after described clay, clay iron ore, or manganesic earths, whereby the suspended and dissolved organic and inorganic matters contained 5 therein are precipitated, and the water of the sewage is rendered clear and inodorous or nearly so. We mix the clay, or clay iron ore, or manganesic earths with water to the consistence of cream or liquid mud, and add the mixture to the sewage to be treated. The said mixture and the sewage are intimately mixed in any convenient manner and afterwards allowed to stand 10 for a time. The solid matter of the clay, or clay iron ore, or manganesic earth combines with the principal part of the organic and inorganic matters of the sewage, and gradually subsiding leaves the supernatant water free or nearly free from the said organic and inorganic matters.

The water may be drawn off from the sediment by the use of the apparatus 15 constituting the second part of our Invention, or in any other convenient manner, and may be poured into a stream without injury thereto. The solid matter constitutes a valuable manure. The proportion of clay, clay iron ore, or manganesic earth to the sewage which we prefer to use is one ton of the said clay, clay ore, or earth reduced to the consistency of an easily 20 flowing mud to one hundred tons of sewage; but we do not limit ourselves to this proportion, as it may be varied to suit the particular sewage to be treated.

Our improvements in apparatus to be employed in treating sewage are as follows:—Instead of the usual tanks having a large superficial area we sink 25 vertical shafts or sets of vertical shafts. These shafts may be lined with masonry or cast iron. The sewage of one day is conducted to one of these shafts or set of shafts, that of another day into another shaft or set of shafts, and so on in succession. When the sewage in any one of the shafts or set of shafts becomes sufficiently clear by the subsiding of the suspended matter 30 it is drawn off and disposed of in any convenient manner. The solid matter or mud is conveyed to a chamber outside the shafts, and is raised therefrom by a screw or by the pressure of another portion of sewage which is made to press the mud upwards through suitable channels to the required level. We prefer to make the shafts of somewhat larger diameter at bottom than 35 at top to facilitate the deposition of the suspended matter. The shafts are constructed upon an inclined passage, which communicates with the several shafts at their lower ends. In the centre of the end shaft of each set is a

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vertical pipe. A second inner pipe slides within the former, and is made water-tight by packing. On the top of the inner pipe and surrounding its mouth is an iron plate supported by a wooden frame to give it buoyancy. This plate is suspended by chains passing over pulleys, by means of which
5 chains the said plate can be raised above or sunk below the level of the liquid in the shaft; balance weights may be used to support the plate in the required position. When the liquid in the shaft has been allowed to rest sufficiently long to permit of the subsidence of the suspended matter the plate is lowered below the surface, when the clear liquid is drawn off from
10 the top and passes away down the pipe. The plate can be lowered as required to suit the sinking level of the liquid, and the clear liquid is thus drawn off without disturbing the sediment at the bottom of the shafts. The clay, clay iron ore, or manganestic earth may be mixed with the sewage as it passes into the shafts, but it is preferred to discharge the said clay, clay ore,
15 or manganestic earth into the sewer in the town, so as thereby to effect a more perfect mixing of the said clay, ore, or earth with the sewage. The float arrangement described may also be applied to tanks now in use for treating sewage.

Figure 1 represents in vertical longitudinal section a set of subsiding shafts
20 and apparatus connected therewith constructed according to our Invention, and Figure 2 is a horizontal section of the same; Figure 3 is a portion of the same separately. The same letters of reference indicate the same parts in each Figure of the Drawing.

At a short distance from the outfall of the sewer, and by preference under
25 the original sewer *a*, we construct a series of vertical shafts marked *b*, *b*, *b*², the said shafts gradually increasing in depth as represented. We prefer to make the first shaft 15 feet deep, the second shaft 17 feet deep, and so on, each shaft increasing 2 feet in depth (excepting the end one marked *b*²) from the first shaft. The said shafts may, however, be made of other depths,
30 the exact depth being determined by the depth of the outfall into the stream, partly above which the shafts are constructed. In laying down new works or extending or enlarging the present system of tanks, a saving will be effected by constructing the shafts on the same ground as that occupied by the sewer. Each of the shafts is made of a series of annular castings fitting
35 one upon another, the said castings being provided with flanges by which they may if necessary be bolted together. The bottom ring or casting of each shaft *b* is provided with a concave inclined plate *c*, by means of which plates an inclined and continuous channel is made at the bottom of the whole

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of the set of shafts *b, b*. The inclined bottom plates *c* are supported in the manner represented in Figure 1. The shafts communicate with each other by means of passages *d*, and the inclined channels *c* at the bottoms of the shafts communicate with each other by the passages *e*. In the end shaft *b²* the outfall or discharging arrangement is placed; the said discharging 5 arrangement consists of a vertical pipe *f* in the centre of the shaft for conveying away the clear liquid from the shafts, the top of the said vertical pipe being on a level with the bottom of the first or shallowest shaft. The vertical pipe *f* communicates by the pipe *g* and passage or channel *h* with the outfall. Above the pipe *f* is a float for temporarily raising or lowering 10 the level of the said pipe. The said float consists of a pipe *i* sliding within the pipe *f* and working water-tight therein. On the top of the pipe and surrounding its mouth is a plate *k*, which works upon the fixed vertical guide rods *l*. The said pipe or float *i, k*, is suspended by a chain *m* passing over a pulley and carrying a counterbalance weight. The pulley and weight are 15 not represented in the Drawing. The end shaft *b²* is made considerably deeper than the others, and the sides of the said shaft at the bottom are inclined (see Figures 1 and 3). At the bottom of the said shaft *b²* is a passage *n*, which communicates with an outer chamber into which the mud or subsidence from the shafts passes. This passage is opened and closed 20 by a sliding door or valve *p*, best seen in the separate view, Figure 3, in which the door or valve is represented raised and the passage *n* partly open. The sliding door or valve *p* may be lifted by a rod or chain.

We arrange a set of the shafts represented in the Drawing side by side and work them in the following manner:—The sewage treated with the clay, clay 25 ore, or manganesic earth in the sewer, or as it enters the shafts, is turned into one set of the shafts, and the said shafts filled therewith, after which the second set is filled, and so on; the said sewage is allowed to stand six to ten hours. As the shafts are filled with the sewage the float *i, k*, is raised, and the outflow pipe is thus supported above the level of the sewage in the said shafts. When 30 the sewage in the shafts has been left to rest sufficiently long to permit of the subsidence of the mud and suspended matters the weight is removed from the chain of the float balance when the top or plate *k* of the float sinks below the surface of the clear liquid which is drawn off from the top and passes by the pipes *i, f, g*, and channel *h* to the outfall, the discharge being continuous 35 until the float *i, k*, rests upon the top of the pipe *f*; the float *i, k*, is indicated partly raised in Figure 1 of the Drawing. By this arrangement the float follows the sinking level of the liquid, and the clear liquid is thus drawn off

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without disturbing the mud or sediment at the bottom of the shafts. The mud collected on the inclined bottoms of the shafts *b* and on the bottom of the end shaft *b*³ may be discharged therefrom when sufficient has accumulated by lifting the valve or door *p*, the said mud passing into the channel *n* and from
5 thence into the chamber outside the said shafts. After the clear liquid has been discharged from the shafts the latter are refilled with sewage. The counterbalance weight is replaced on the float chain before the shafts are refilled in order that the said float may rise with the inflow. In order to expedite the outflow of the clear liquid from the shafts several floats or
10 discharge pipes of the construction described may be employed. It is not necessary to remove the mud or sediment from the shafts after each discharge of the clear liquid therefrom. The mud discharged into the outer chamber described may be raised therefrom by screw buckets or other lifting apparatus. If by accident the outfall channel from the shafts be stopped the clear liquid
15 may pass from the shafts by the sewer *a* to the outfall. Although we find it convenient to construct the shafts of iron rings or castings bolted together, yet the said shafts may be constructed of masonry.

By the use of the apparatus described and represented for treating sewage great saving of labour is effected and the use of tools for cleaning the bottoms
20 of the shafts is dispensed with.

The float arrangement represented in the Drawing for discharging the clear liquid from the shafts may also be applied to the tanks now in use for treating sewage.

Having now described the nature of our Invention, and the manner in
25 which the same is to be performed, we wish it to be understood that we do not limit ourselves to the precise details herein described and illustrated, as the same may be varied without departing from the nature of our Invention ; but we claim as our Invention,—

Firstly, the improvements herein-before described in treating or purifying
30 sewage, that is to say, mixing with sewage, clay, clay iron ore, or manganese earths for the purpose of precipitating the suspended and dissolved organic and inorganic matters contained in the said sewage, substantially as described.

Secondly, constructing and arranging vertical shafts to be employed in
35 treating sewage, substantially in the manner herein-before described and illustrated in the accompanying Drawing.

Thirdly, the arrangement or combination herein-before described and illustrated in the accompanying Drawing of the parts of a float apparatus for

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discharging the clear liquid from shafts and tanks employed in treating sewage.

In witness whereof, I, the said Alfred Henry Hart, have hereunto set my hand and seal, this Seventh day of September, in the year of our Lord One thousand eight hundred and sixty-seven. 5

ALFRED HENRY HART. (L.S.)

Witness,

GEORGE SHAW.

LONDON:

Printed by GEORGE EDWARD EYRE and WILLIAM SPOTTISWOODE,
Printers to the Queen's most Excellent Majesty. 1867.

FIG. 1.

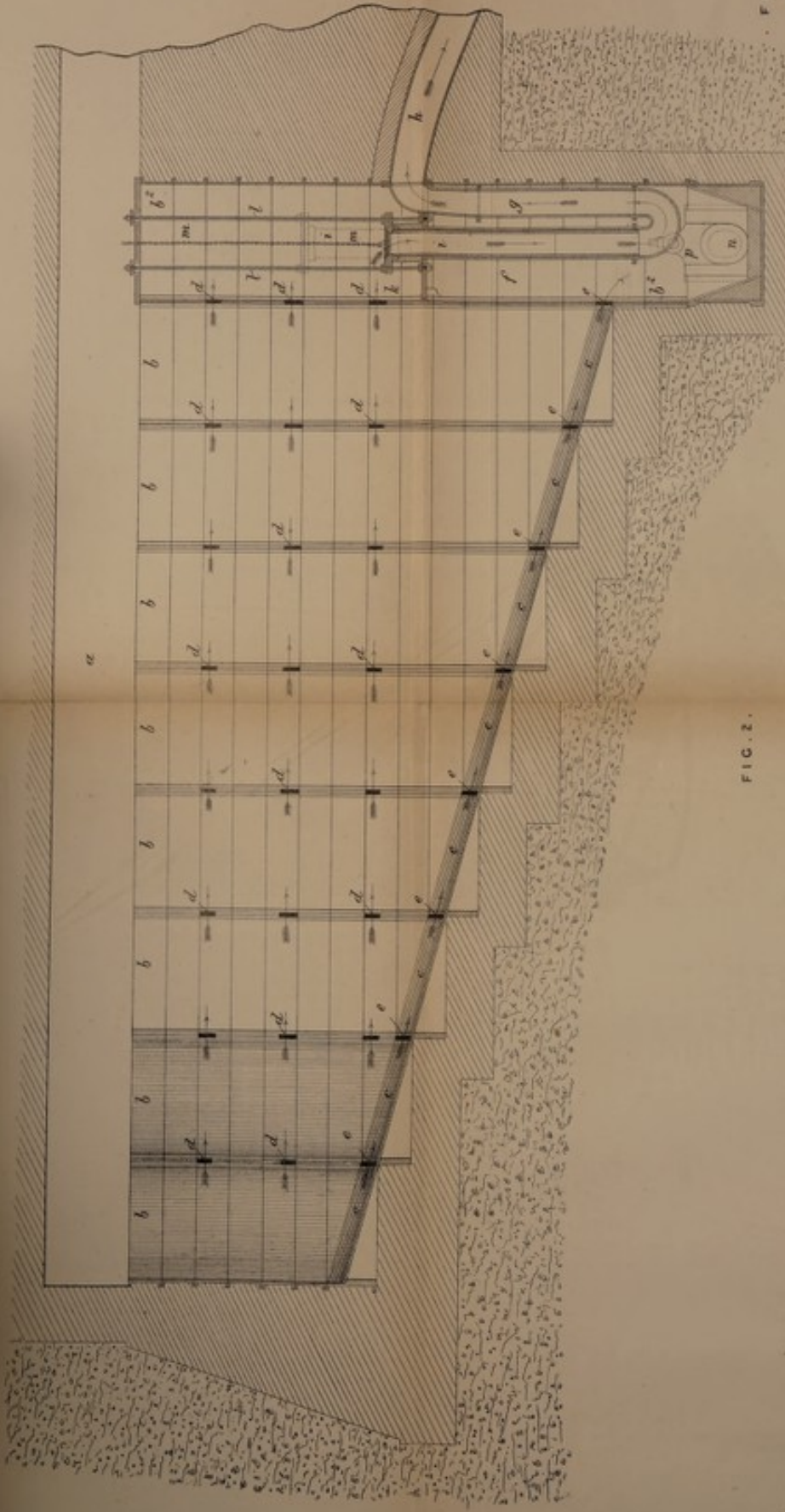


FIG. 2.

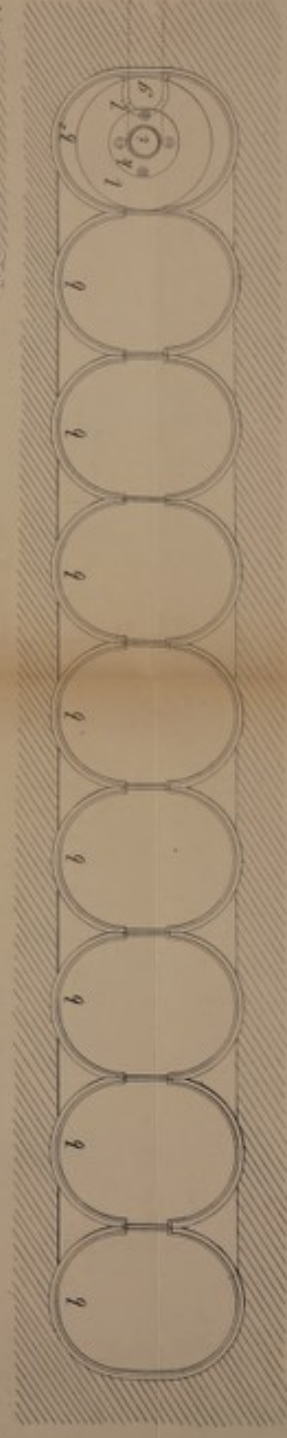
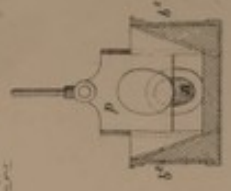


FIG. 3.



The fillet dressing is partly external.

LOSING: PIANELLO GROSSI, ERMANO EVI and WILIAM SPERDIERI,
Printers to the Queen and Excellent Majesty 1867

Drawn in Stone by Mulvan & Sons.

