

Specification of William Knox Stuart : treating and utilizing sewage.

Contributors

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A.D. 1868, *4th MARCH.* N^o 744.

SPECIFICATION

OF

WILLIAM KNOX STUART.

TREATING AND UTILIZING SEWAGE.

LONDON:

PRINTED BY GEORGE E. EYRE AND WILLIAM SPOTTISWOODE,

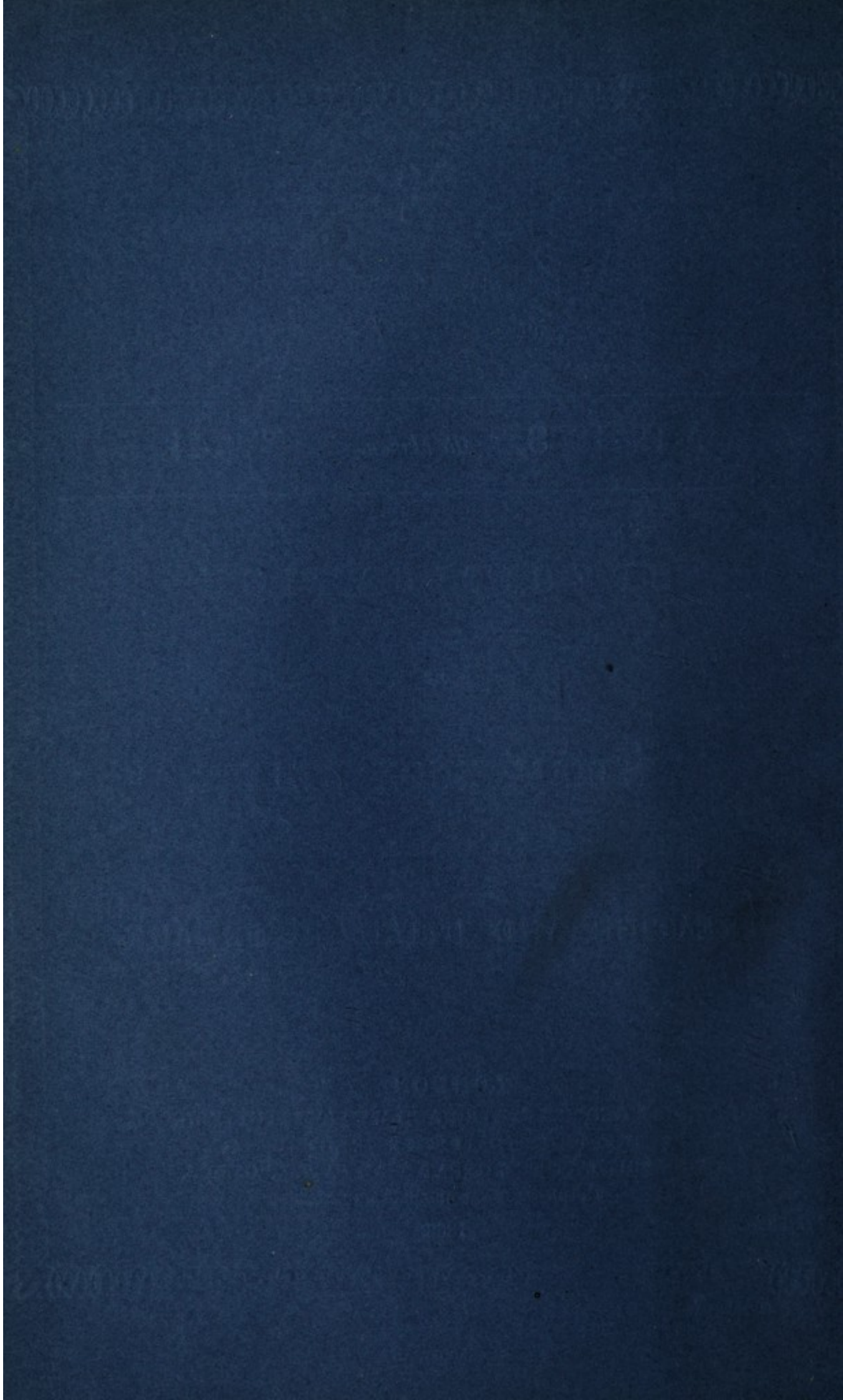
PRINTERS TO THE QUEEN'S MOST EXCELLENT MAJESTY:

PUBLISHED AT THE GREAT SEAL PATENT OFFICE,

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8d.

1868.





A.D. 1868, 4th MARCH. N° 744.

Treating and Utilizing Sewage.

LETTERS PATENT to William Knox Stuart, of Glasgow, in the County of Lanark, North Britain, Chemist, for the Invention of "**IMPROVEMENTS IN ARRANGEMENTS AND APPARATUS FOR DEALING WITH AND UTILISING SEWAGE.**"

Scaled the 28th August 1868, and dated the 4th March 1868.

PROVISIONAL SPECIFICATION left by the said William Knox Stuart at the Office of the Commissioners of Patents, with his Petition, on the 4th March 1868.

I, WILLIAM KNOX STUART, of Glasgow, in the County of Lanark, North Britain, Chemist, do hereby declare the nature of the said Invention for "**IMPROVEMENTS IN ARRANGEMENTS AND APPARATUS FOR DEALING WITH AND UTILISING SEWAGE,**" to be as follows, that is to say:—

This Invention relates to a system of dealing with and utilising sewage in a convenient, economical, and profitable manner; and in carrying out this system in practice it is proposed to separate the solid and other matters in the sewage to obtain these in a valuable and marketable condition, and moreover to deliver the water in an unpolluted and pure or nearly pure condition either into a river or for any use for which it may be found suitable.

The system comprises the employing of a single main intercepting sewer or channel to convey the contents of a group of city sewers to a suburban establishment, whereat the separating and utilising processes

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are to be conducted. At such establishment the main channel supplies the sewage to large reservoirs and numerous depositing tanks, the arrangement and construction of which mainly constitute the present Invention. The sewage first enters and spreads over a large shallow reservoir which is formed with a deepened channel or race along the side opposite to the inlet. A grating or set of rails is fitted along both sides of this race to keep back floating and bulky articles. In the race there is an agitator somewhat in the form of a shuttle which is made to reciprocate from end to end of the race by means of cords passing over pulleys and actuated by means of a water wheel which may be driven by the sewage current itself. The action of the shuttle agitator is to drive out some solid matters over the inclined ends of the race, and to assist lighter solids in floating over the front edge of the reservoir into a series of depositing tanks arranged adjacently to the reservoir. At about the surface of the water in each tank there is arranged a layer of straw or other open absorbent material, which is held between a couple of gratings; this layer serves to absorb gaseous and floating matters and is changed periodically. The heavier solids find their way beneath the absorbent layer into the lower parts of the tanks, each of which is formed with a central well down to which the bottom generally inclines. Conical or pyramidal covers are applied to the wells, and being mostly below the water level are made hollow so as to be partially floated and consequently easily raised or lowered. After a well has been emptied in the manner herein-after explained its cover is slightly raised and the solid matters in the sewage find their way under it into the well. A tunnel is formed under the tanks, and the bottom of each well is fitted with a sluice or door; and when a well is full of solid matter the hollow cover is screwed down and the bottom sluice is opened to allow the matter to fall out into a waggon placed below to receive it. In order that the matter may fall out freely a tap or valve is opened in the top of the hollow cover to allow air to enter above. The solid matter separated in this way may be conveyed by waggons and by rail to farms to be used as manure. The liquid flows from the depositing tanks onwards to filters or absorbing beds of various materials to be dealt with according to known chemical processes for absorbing and removing gaseous and other matters from the water which is finally delivered or discharged in a pure or nearly pure condition.

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SPECIFICATION in pursuance of the conditions of the Letters Patent, filed by the said William Knox Stuart in the Great Seal Patent Office on the 2nd September 1868.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, WILLIAM
5 **KNOX STUART**, of Glasgow, in the County of Lanark, North Britain, Chemist, send greeting.

WHEREAS Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the Fourth day of March, in the year of our Lord One thousand eight hundred and sixty-eight, in the thirty-
10 first year of Her reign, did, for Herself, Her heirs and successors, give and grant unto me, the said William Knox Stuart, Her special licence that I, the said William Knox Stuart, my executors, administrators, and assigns, or such others as I, the said William Knox Stuart, my executors, administrators, and assigns, should at any time
15 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 ARRANGEMENTS AND APPARATUS FOR DEALING WITH**
20 **AND UTILISING SEWAGE**," upon the condition (amongst others) that I, the said William Knox Stuart, 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
35 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 William Knox Stuart, do hereby declare the nature of my said Invention, and in what manner the same
30 is to be performed, to be particularly described and ascertained in and by the following statement in writing, reference being had to the accompanying Diagrams, that is to say:—

My said Invention relates to a system of dealing with and utilising sewage in a convenient, economical, and profitable manner; and in
35 carrying out this system in practice I separate the solid and other matters in the sewage in order to obtain these in a valuable and marketable condition, and I deliver the water in an unpolluted and pure

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or nearly pure condition either into a river or for any use for which it may be found suitable.

My system comprises the employing of a single main intercepting sewer or channel to convey the contents of a group of city sewers to a suburban establishment, whereat the separating and utilising processes 5 are to be conducted.

And in order that my said Invention, and the manner of performing the same may be properly understood, I have hereunto appended a Sheet of explanatory Diagrams to be herein-after referred to, and indicating the main features of my improved arrangements and apparatus. 10

Figures 1 and 2 are Diagrams corresponding to sections taken at right angles to each other of a portion of the works at such a suburban establishment as has been herein-before referred to.

The main channel or intercepting sewer 1 supplies the sewage to one or more large reservoirs 2, and through such reservoir to numerous 15 depositing tanks 3; the arrangement and construction of which mainly constitute my present Invention. The sewage first enters the large reservoir 1, which is formed with a deepened channel or race 4 along the side opposite to the inlet gratings; or sets of vertical rails 5, 6, are fitted along the sides of this race 4 to keep back floating and bulky articles. 20 In the race 4 there is an agitator, shown separately in plan in Figure 3, and in side elevation in Figure 4, and which is made somewhat in the form of a shuttle. This agitator shuttle is made to reciprocate from end to end of the race 4 by means of cords passing over pulleys, or by means of a simple connecting rod 7 actuated by means of a water 25 wheel 8 driven by the sewage current itself as it falls into the reservoir 2 from the main sewer 1, ducts 9 being adapted to the end of the sewer to direct the current upon the water wheel. The shaft of the water wheel 8 is arranged to drive a pair of inclined shafts 10, 11, by bevil wheels, and an eccentric on one of these inclined shafts actuates 30 a lever 12 to which the shuttle connecting rod 7 is jointed. The ends of the race 4 are to be inclined upwards (although this is not shown in the Diagrams); this inclination being for the purpose of carrying them above the level of the water, so that matters intercepted by the shuttle may be thrown out of the reservoir. The shuttle is in the form of a 35 double-ended scoop with bottom and sides shaped to fit the race. The two ends are hinged to a vertical partition piece in the middle, to which the connecting rod 7 is jointed. When the shuttle comes to either end

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of the race the end of it hinges downwards and allows the matters intercepted in its traverse thither to fall out of it down a duct into a revolving riddle or screen 13, 14. The two riddles 13, 14, are turned by the revolving shafts 10, 11, and being made with graduated openings or gratings in their sides they in revolving sort the matters received into them according to their sizes. The shuttle removes the heavier matters that pass through the grating 5, and by its agitation assists the lighter solids through openings 15 into the depositing tanks 3. Each tank 3 is covered in, and there are various absorbent media in the upper part of it, namely, between the top of the tank and a grating there is a quantity of charcoal, below this there is a layer of wood shavings, and lower still a layer of sawdust. The two lower layers are kept up simply by their buoyancy in the water. The top of the tank being below the level of the water in the reservoir 2 there is an upward pressure which causes the water to pass up through the sawdust, shavings, and charcoal to a branch outlet provided for it close to the top and communicating with a main pipe 16 which conveys the water away to be further dealt with if required. The absorbent media are changed at intervals as they become saturated; and as some of the sawdust may be withdrawn below when discharging the solids, as herein-after explained, each tank is fitted with a funnel pipe 17 reaching up above the water level and which is kept filled with sawdust to supply what is withdrawn below. The solids settle in the lower parts of the tanks 3, each of which is formed with a central well 18, down to which the bottom generally inclines. A conical or pyramidal cover 19 is applied to each well, and being below the water is made hollow so as to be partially floated and consequently easily raised or lowered. The cover 19 is held by a pipe 20, which passes up through a stuffing box in the top of the tank 3; and after a well has been emptied in the manner herein-after explained the cover is slightly raised by means of the pipe 20 (as shown at *a*, Figure 2), and the deposited solids find their way under it into the well 18. Space is arranged under the tanks 3 and wells 18, and the bottom of each well is fitted with a sluice or door 21, and when a well is full of solid matter the hollow cover 19 is screwed or otherwise fixed firmly down, and the bottom door 21 is opened to allow the matter to fall out into a waggon 22 placed below to receive it. In order that the matters may fall out freely a tap or valve is opened in the cover pipe 20 to allow the air to enter above. The bottom door 21 is closed by means of a chain and rod which passes up the cover pipe 20 and through a stuffing box in

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the top of that pipe. The solid matter separated in this way may be conveyed by waggons and by rail to farms to be used as manure. The liquid flows from the depositing tanks 3 by the pipes 16 onwards to filters or absorbing beds of various materials to be dealt with according to known chemical processes for absorbing and removing gaseous and other matters from the water which is finally delivered or discharged in a pure or nearly pure condition. 5

In Diagram Figure 2 a tank or reservoir 23 is shown as constructed below the end of the sewer 1; this is for receiving separately the portion of urine, which with modern city arrangements can be easily kept 10 separate from the general sewage, namely, that from public urinals or from the urinals of large works. This urine may be conveniently conveyed to the establishment by means of a pipe 24 carried along the top of the sewer 1 and leading into the tank 23.

Having thus particularly described my said Invention, and the 15 manner in which the same is to be performed, I have to state that I do not restrict myself to the precise details herein described; but that what I believe to be novel and original and claim as the Invention secured to me by the herein-before in part recited Letters Patent is, the dealing with and utilising sewage by means of improved arrange- 20 ments and apparatus, substantially such as are herein-before described.

In witness whereof, I, the said William Knox Stuart, have here-
unto set my hand and seal, this Thirty-first day of August,
in the year of our Lord One thousand eight hundred and sixty-
eight. 25

W. K. STUART. (L.S.)

Witness,

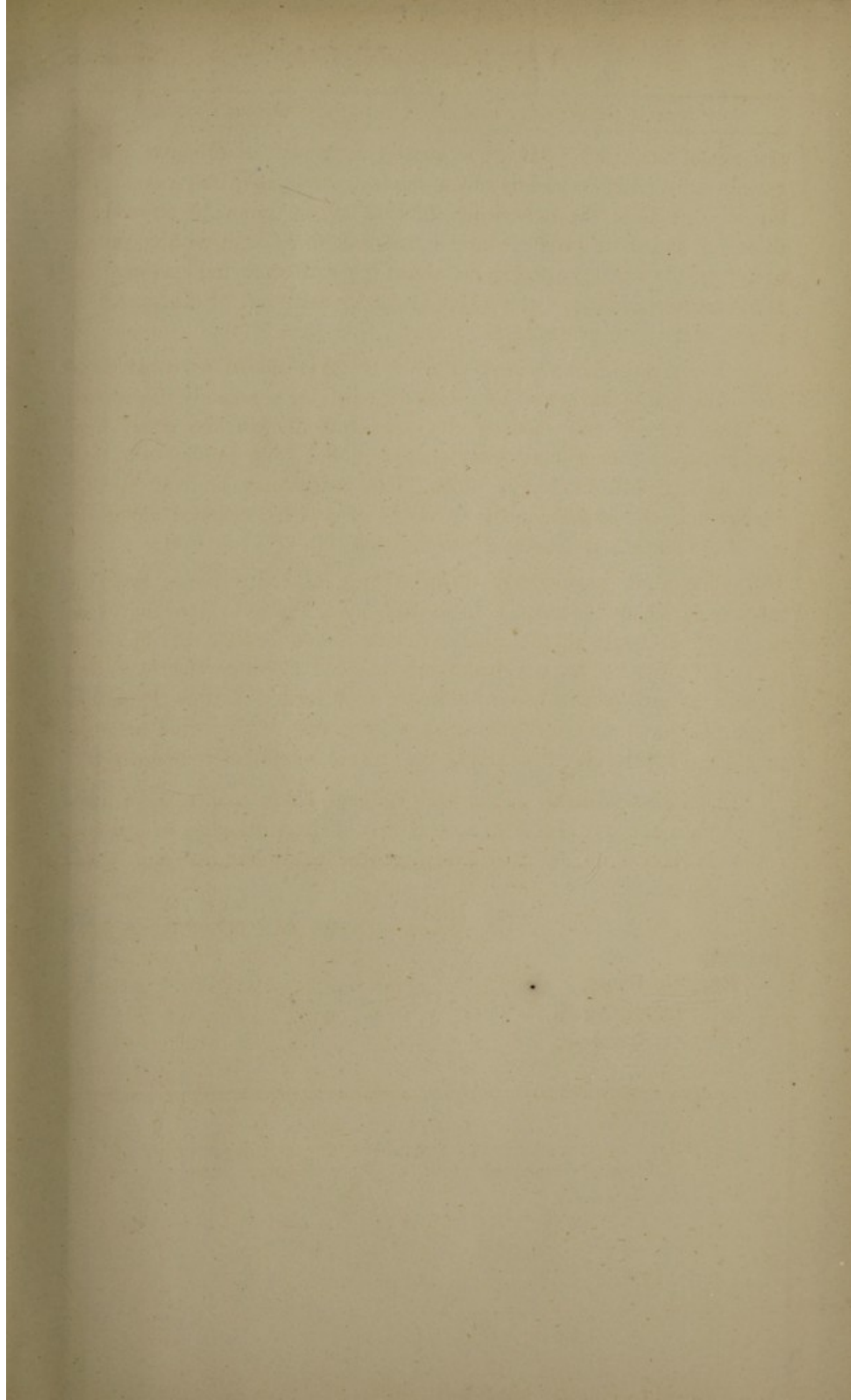
EDMUND HUNT,

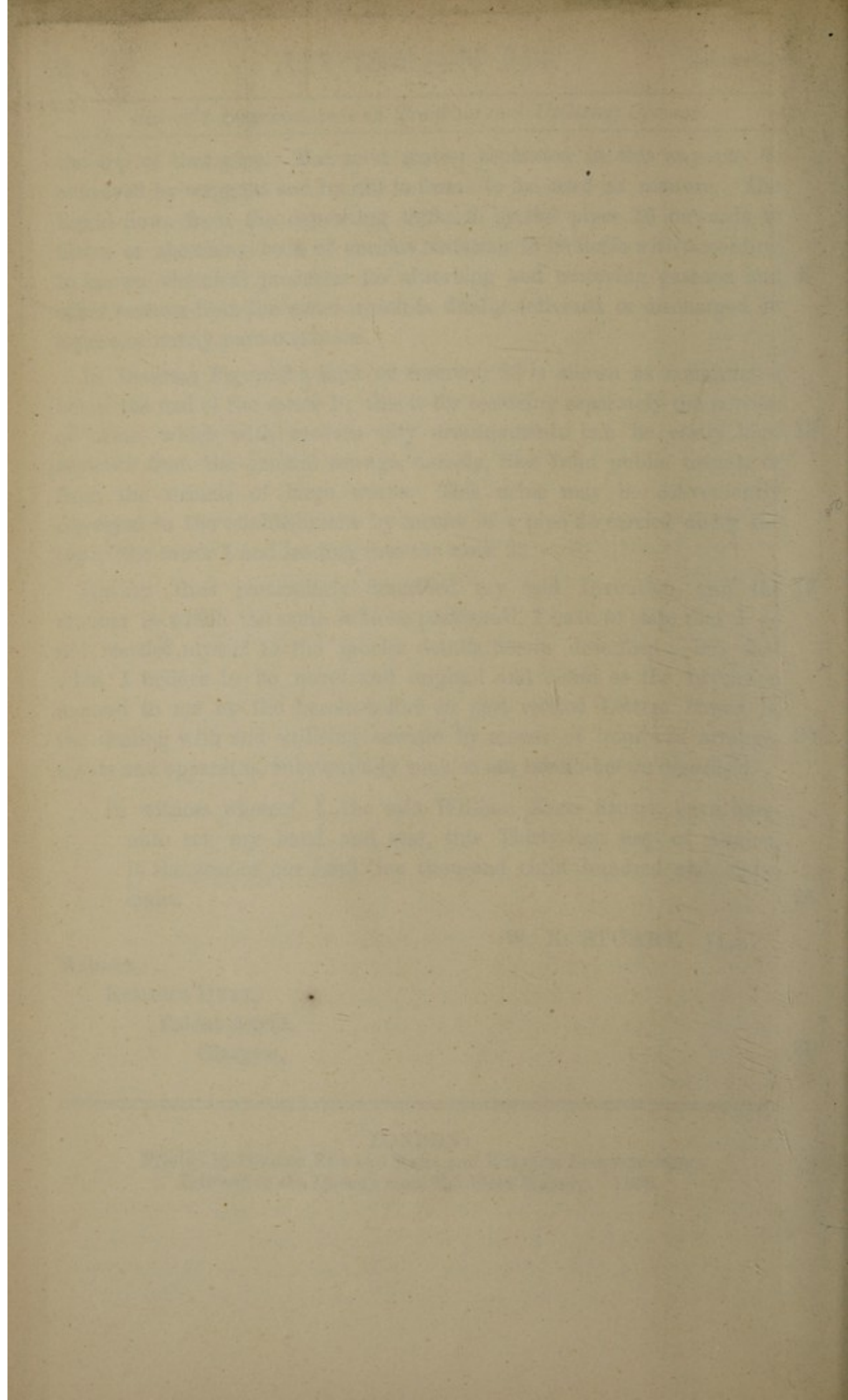
Patent Agent,

Glasgow. 30

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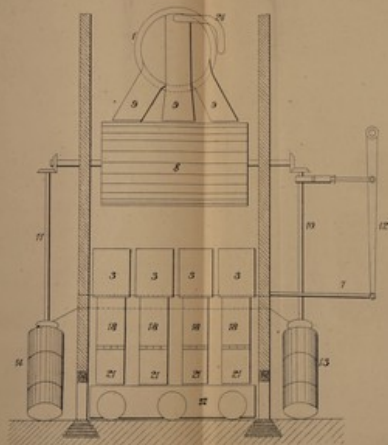


FIG. 2.

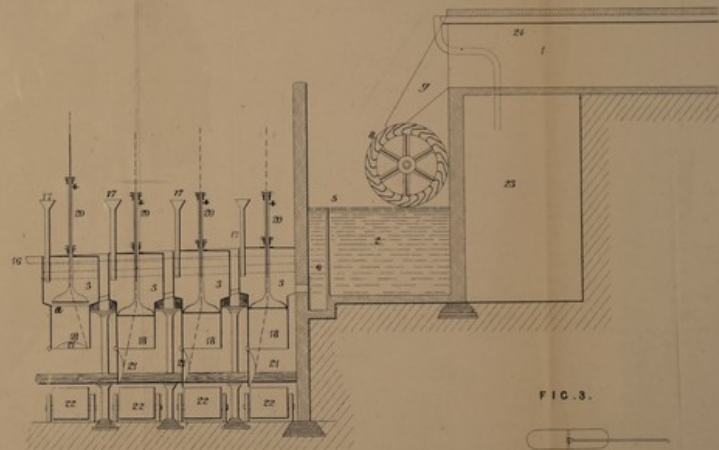


FIG. 3.

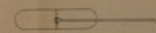


FIG. 4.



The filed drawing is partly colored.

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