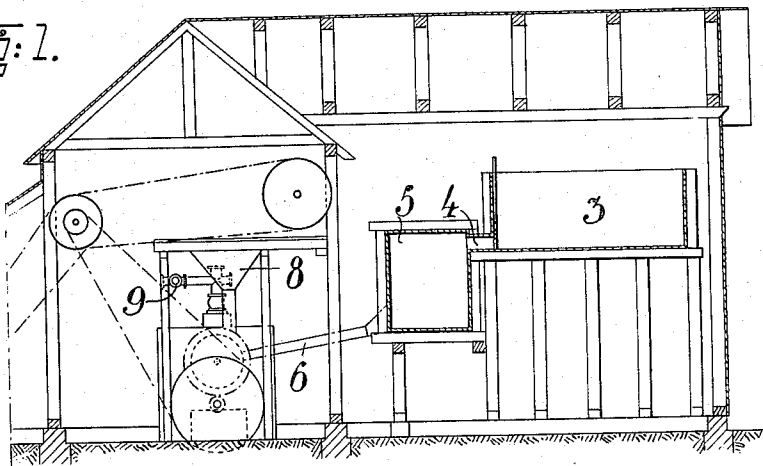
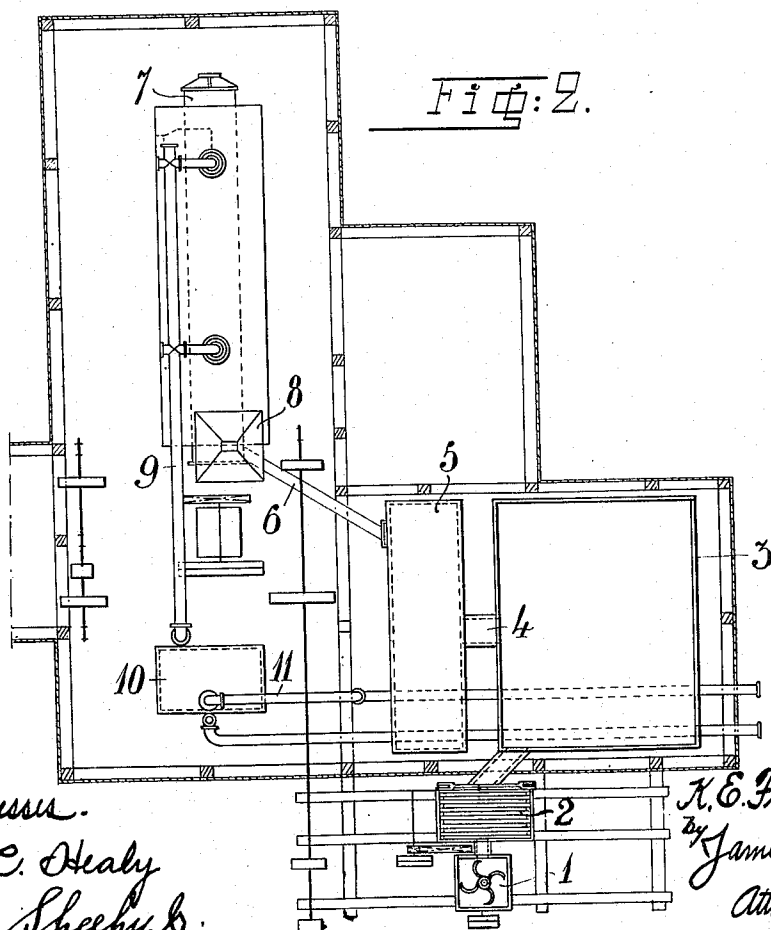


APPARATUS FOR REDUCING NIGHT SOIL AND RECOVERING AMMONIA THEREFROM.

Patented Apr. 20, 1909.

3 SHEETS—SHEET 1.

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Witness.

N. C. Healy

J. J. Sheehy Jr.

Inventor

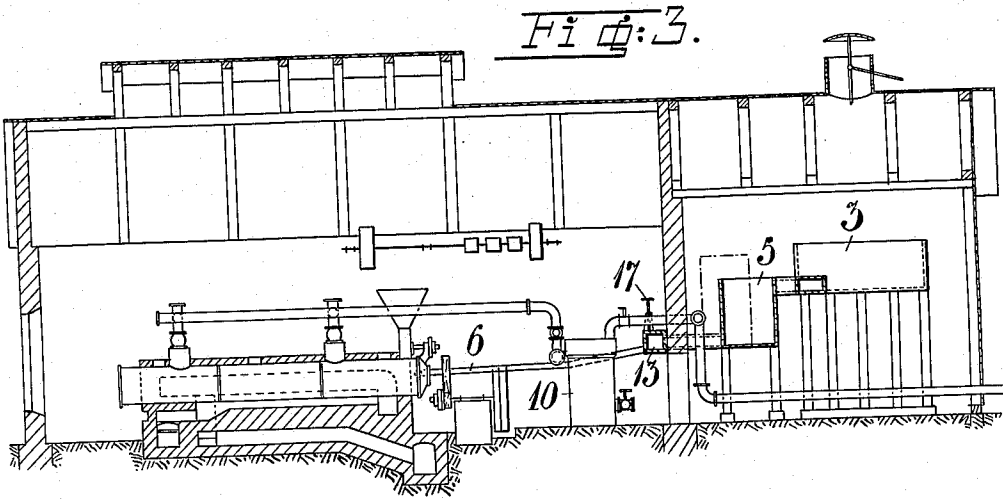
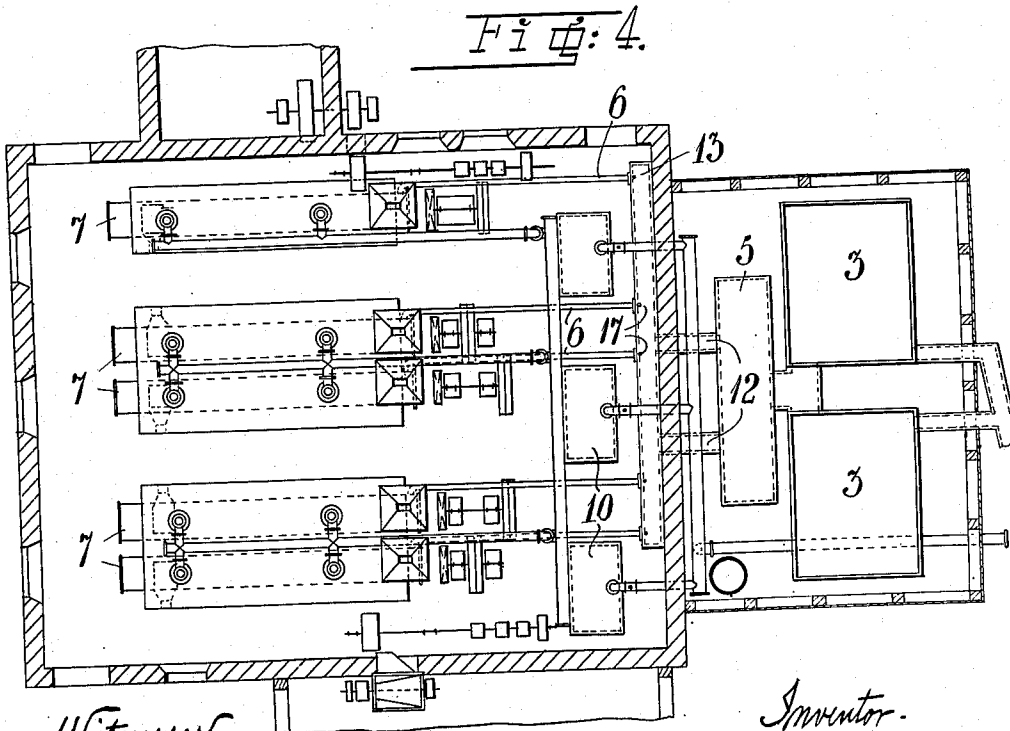
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 APPARATUS FOR REDUCING NIGHT SOIL AND RECOVERING AMMONIA THEREFROM.
 APPLICATION FILED APR. 18, 1908.

918,744.

Patented Apr. 20, 1909.
 3 SHEETS—SHEET 2.



Witnesses.
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 3 SHEETS—SHEET 3.

Fig: 5.

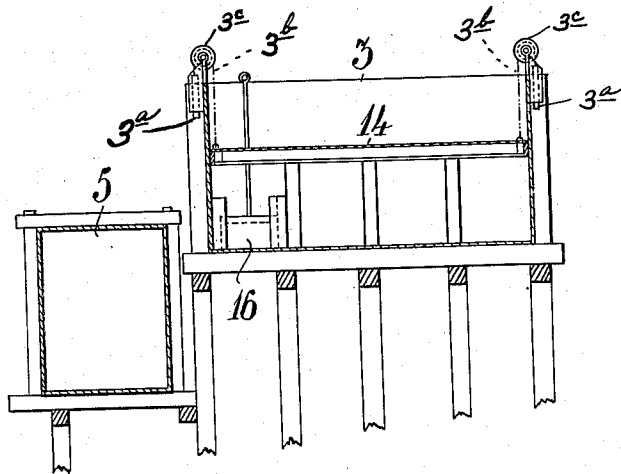
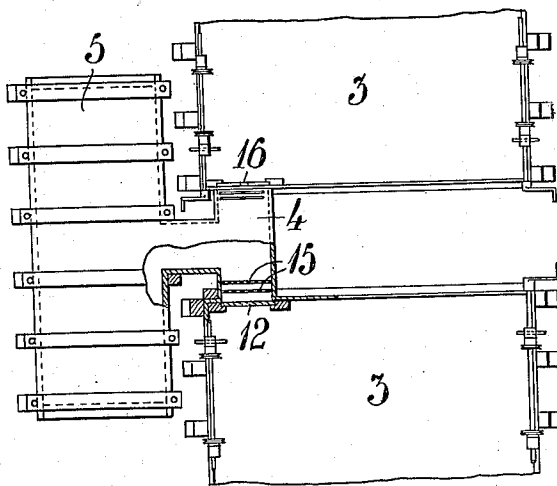


Fig: 6.



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UNITED STATES PATENT OFFICE.

KNUT EDWARD FRYKLIND, OF STOCKHOLM, SWEDEN.

APPARATUS FOR REDUCING NIGHT-SOIL AND RECOVERING AMMONIA THEREFROM.

No. 918,744.

Specification of Letters Patent.

Patented April 20, 1909.

Application filed April 18, 1908. Serial No. 427,832.

To all whom it may concern:

Be it known that I, KNUT EDWARD FRYKLIND, a citizen of the Kingdom of Sweden, residing at Stockholm, Sweden, have invented
5 new and useful Improvements in Apparatus for Reducing Night-Soil and Recovering Ammonia Therefrom, of which the following is a specification.

This invention relates to improvements in
10 plants for treating night-soil and the like by means of quick-lime.

The object of the invention is to provide devices whereby the night-soil will be subjected to a suitable preliminary treatment
15 and whereby the continuation of the process will be secured.

The invention consists, chiefly, in the provision of a system of holders and pipe conduits hereinafter more particularly described
20 for transferring successively and automatically the night-soil to that or those boilers in which the treating of the night-soil by means of quick-lime is accomplished in well known manner.

In the accompanying drawings which illustrate the invention:—Figure 1 shows a vertical section and Fig. 2 a plan-view of a plant constructed in accordance with the present invention. Fig. 3 shows a vertical
30 section and Fig. 4 a plan-view of a larger plant having five boilers. Fig. 5 shows a vertical section and Fig. 6 a part of a plan-view of the night-soil holders on a larger scale.

Referring to Figs. 1 and 2, 1 and 2 indicate beating apparatus of well known construction, in which the raw night-soil is subjected to a preliminary working for removing paper and other impurities, the night-soil by the action of the said apparatus being converted into a semi-liquid state. The apparatus 1 has a rotating stirrer, while the apparatus 2 has a grated bottom swinging up and down. From the holder 2 the night-soil flows into a reservoir 3 which by means
45 of a pipe conduit 4 is in connection with a closed holder 5 placed on a lower plane than the reservoir 3, so that it will always be filled with night-soil at a certain pressure.
50 The said closed holder is connected to a cylindrical closed vessel 7 preferably a boiler by means of a pipe 6. The boiler 7, which is shown only diagrammatically as being of substantially well known construction, is at
55 the front end provided with a device 8 for feeding in quick-lime and has in its interior

a rotating stirrer which mixes the night-soil and the lime intimately and feeds the mixture slowly toward the rear end of the boiler. During the passage through the
60 boiler the lime is slaked by the water contained in the night-soil and by the heat developed by the reaction the main part of the nitrogen will be forced off as ammonia which together with steam flows off through a pipe
65 9 to an autoclave 10 containing sulfuric acid which binds the ammonia to ammonium sulfate, while the steam flows through a pipe 11 which in suitable manner may be drawn through the different parts of the
70 plant for heating the same. The boiler 7 is inclosed by masonry and provided with a suitable fire-place in order to render it possible to increase by outer heat supply the development of heat caused by slaking the
75 lime and thereby to control the degree of dryness of the night-soil when leaving the boiler at the rear end thereof through a suitable delivering device not shown.

The plant shown in Figs. 3 and 4 has two
80 reservoirs 3, 3 and one closed holder 5 common to both said reservoirs, the night-soil flowing from the said closed holder 5 through pipes 12, a distributing drum 13 and pipes 6 to five boilers 7 of which four are arranged in pairs each of which is provided
85 with an ammonia condenser 10 while the fifth boiler 7 is independent of the other boilers and provided with a separate ammonia condenser. This plant is adapted for
90 ample supply of night-soil as in the case in large towns or the like. In front of the reservoirs 3 beating apparatus for removing paper and the like from the night-soil are provided in the same manner as in Fig. 2.
95

Figs. 5 and 6 illustrate the construction of the reservoirs and holders 3 and 5. The reservoirs are provided with a perforated false bottom 14 movable up and down onto which the night-soil is delivered from the
100 beating apparatus 2. The said bottom prevents lumps or the like contained in the night-soil, which have not been crushed by the beating apparatus, from entering into the pipe conduits leading to the boilers,
105 which lumps would clog up the said conduits and thereby cause interruptions of the continuous working. For the same purpose perforated doors 15 are provided between the reservoir and the conduit 4, through the perforations of which the night-soil passes.
110 For cutting off the connection between the

reservoir 3 and the holder 5, if desired, imperforate shutters 16 are provided, the said shutters also serving for controlling the speed at which the night-soil flows into the holder 5. In each pipe 6 is provided a shutter or the like 17, Figs. 3 and 4, for cutting off the night-soil from the corresponding boiler or for controlling the speed of flow of the night-soil.

10 The above described arrangement of the night-soil holders and conduits will secure a continuous and uniform working and thereby the obtaining of a great amount of ammonia and a uniform and substantially

15 dry night-soil lime practically free from smell and containing a predetermined percentage of lime. Should the perforated bottom of the reservoir be clogged up it can be lifted up above the surface of the night-soil and cleansed, and if the perforated shutters 15 need cleaning the imperforate shutter 16 is closed and then the shutter 15 lifted and cleaned, the closed holder 5 meanwhile delivering night-soil to the boiler or boilers,

20 so that the working is not interrupted. In cases where two or more reservoirs 3 are used it is not necessary while cleaning the perforated shutters to cut off more than one reservoir each time while the other or others

30 continue to deliver night-soil.

For the purpose of assisting in the raising of the perforated bottom 14 and maintaining the same at the height desired, counterbalance weights 3^a are provided, which are

35 connected with the bottom through cables 3^b, passed over sheaves 3^c, Fig. 5.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:—

40 1. In an apparatus for the purpose described, beating means, an open reservoir adapted to receive night-soil from said beating means, a closed holder connected with

said reservoir and disposed in a lower plane than the same, a closed vessel connected with 45 and adapted to receive night-soil from said closed holder, a device for feeding quicklime to said vessel, and means in the vessel for commingling the night-soil and quicklime and agitating the mass. 50

2. In an apparatus for the purpose described, a closed vessel, a device for feeding quicklime to said vessel, means in the vessel for commingling night-soil and quicklime 55 and agitating the mass, a closed holder connected with the vessel and adapted to supply the same with night-soil, an open reservoir arranged in a plane above the closed holder and connected with the same, means for beating night-soil prior to the passage of the 60 same to the open reservoir, a vertically movable, perforated bottom in the open reservoir, and means through which said bottom may be raised and lowered.

3. In an apparatus for the purpose described, a closed vessel, a device for feeding quicklime to said vessel, means in the vessel for commingling night-soil and quicklime 65 and agitating the mass, a closed holder connected with the vessel and adapted to supply the same with night-soil, an open reservoir arranged in a plane above the closed holder and connected with same, means for beating 70 night-soil prior to the passage of the same to the open reservoir, a vertically movable, perforated bottom in the open reservoir, counterbalance weights, and cables connecting the perforated bottom and said weights 75 and passed over sheaves.

In testimony whereof I have signed my 80 name to this specification in the presence of two subscribing witnesses.

KNUT EDWARD FRYKLIND.

Witnesses:

EWALD DELMAR,
JOHN DELMAR.