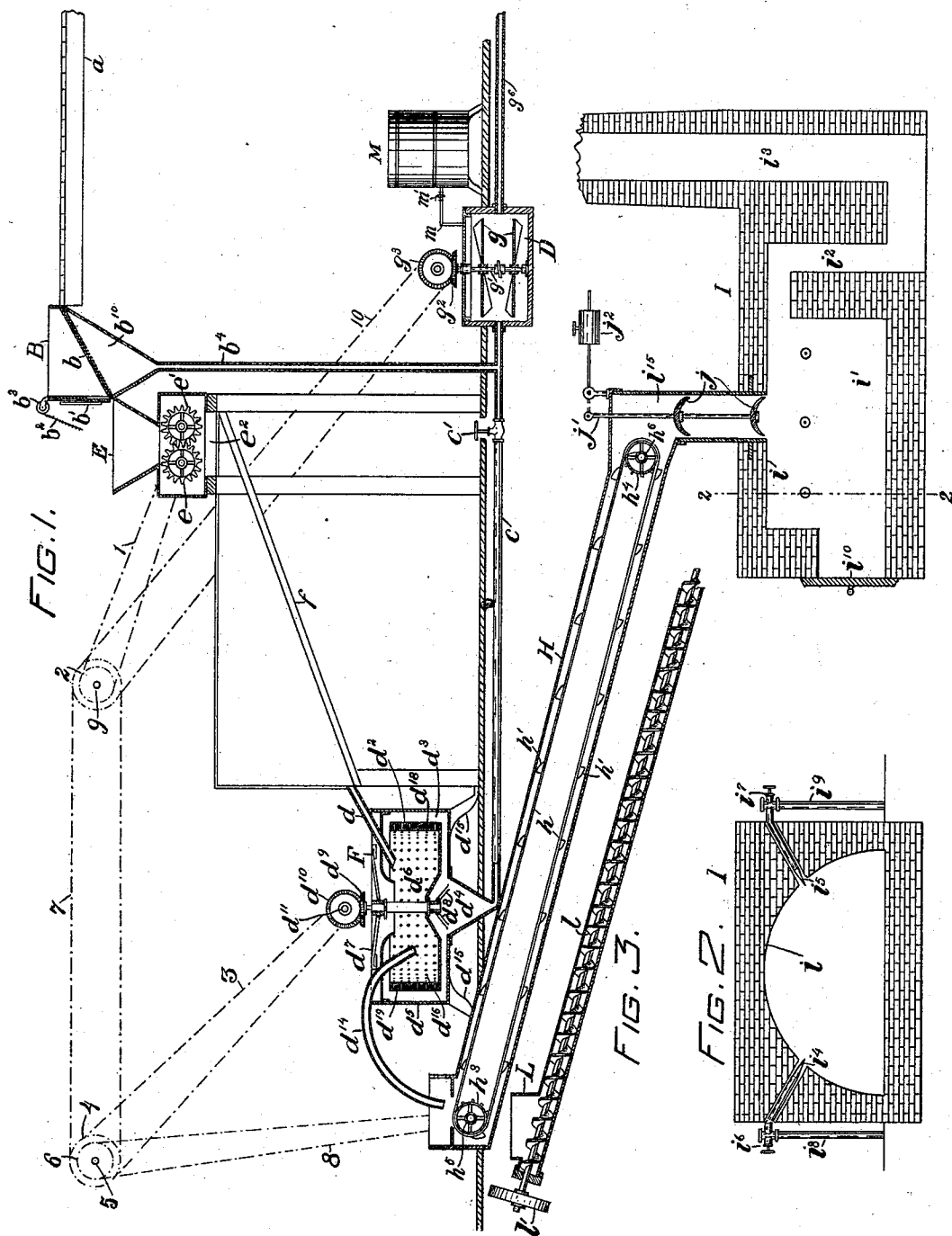


(No Model.)

N. DOWLING.
APPARATUS FOR TREATING GARBAGE.

No. 506,361.

Patented Oct. 10, 1893.



WITNESSES:
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APPARATUS FOR TREATING GARBAGE.

SPECIFICATION forming part of Letters Patent No. 506,361, dated October 10, 1893.

Application filed November 25, 1892. Serial No. 453,001. (No model.)

To all whom it may concern:

Be it known that I, NORTH DOWLING, a citizen of the United States, residing at the city of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Apparatus for Treating Garbage or Refuse Matter, of which the following is a specification.

My invention has relation to apparatus for treating garbage or refuse matter.

The principal objects of my invention are, first, to provide an apparatus for converting garbage or refuse matter into a pulverized substance for fertilizing and other purposes; second, to provide comparatively simple, durable and efficient apparatus for disinfecting garbage or refuse matter and separating the solid from the liquid portions, converting the solid matter into an ash and thoroughly disinfecting the oily, fatty or liquid constituents thereof; and, third, to provide a plant wherein disinfected garbage or refuse matter in transit separated from the liquid constituents thereof, is dried and then incinerated for producing economically and expeditiously a pulverized substance for fertilizing and other purposes and with the separated liquid matter treated by the admixture of disinfectants therewith and the mechanical agitation thereof for effecting the thorough disinfection of the same.

My invention consists of an apparatus for the treatment of garbage or refuse matter hereinafter described and claimed.

The nature, characteristic features and general scope of my invention will be more fully understood from the following description taken in connection with the accompanying drawings forming part hereof; and in which—

Figure 1, is a view partly in central section and partly in side elevation of a plant or apparatus found practically efficient for treating garbage or refuse matter embodying the features of my invention. Fig. 2, is a transverse sectional view of a furnace taken on the line 2—2, of Fig. 1, showing hydrocarbon jet burners disposed at an angle to the plane of the furnace and adapted to effect the thorough or complete incineration of the dried garbage or refuse matter from the top in a downward direction. Fig. 3, is a longitudinal

central sectional view of a modified form of conveyer to that shown in Fig. 1, for delivering the solid matter from the centrifugal separator and drying machine to the furnace for effecting the incineration thereof.

Referring to the drawings *a*, is a platform onto which the refuse matter or material, which in transit, is in a suitable manner preliminarily disinfected and anterior to the delivery of the same onto the platform *a*. The refuse matter is then conveyed or dumped into the chute *B*, provided with grate-bars *b*, and with a movable gate *b'*, operated by means of a chain *b²*, passing over a pulley *b³*, in any preferred manner. This chute *B*, has connected therewith a pipe *b⁴*, leading to a cross-pipe or conduit *c*, provided with a check valve *c'*, and connected respectively with a mixing chamber *D*, at one end thereof, and at the other end with a centrifugal drying and separating machine *F*. The garbage or refuse matter deposited in the chute *B*, upon the raising of the gate *b'*, by means of the chain *b²* falls preferably by gravity through the funnel-shaped mouth of a squeezing, compressing and pulping appliance *E*, provided with cog-wheels *e* and *e'*, which mesh or gear with each other in such manner as that the matter passing between them is squeezed, pulped, and compressed and the surplus fluid removed therefrom during the operation flows through the opening *e²*, along the incline plane *f*, to the trough *d*, connected with the perforated basket or whirler *d²*, of the centrifugal machine *F*, and percolates through the walls of the basket or whirler *d²*, into the annular chamber *d³*, and then flows through the funnel-shaped outlet *d⁴*, into the pipe *c*, through which pipe it is conducted or flows into the mixing chamber *D*, wherein this oily, fatty or other liquid is subjected to a treatment to be presently fully described.

On one of the journals or shafts of the gear-wheels *e* and *e'*, geared to each other, is a pulley, not shown, and around which passes a belt 1, which is connected with a pulley 2.

The centrifugal drying and separating machine comprises an outer wall or shell *d⁵*, mounted on brackets *d¹⁵*, and in which shell is located the perforated basket or whirler *d²*, mounted on a vertical shaft *d⁶*, journaled to

brackets d^7 and d^8 . On the upper end of the shaft d^6 , is a miter-gear d^9 , meshing with a counter-gear d^{10} , secured to a cross-shaft d^{11} , carrying a pulley not shown, and around which a belt 3, connects the same with a pulley 4, mounted on a shaft 5. The basket or whirler d^2 , comprises inner and outer walls d^{16} and d^{18} , and between which is inserted a fibrous or cloth lining d^{19} , through which perforated walls of the basket or whirler d^2 , fatty, oily or liquid matter percolates into the chamber d^3 , in the rapid rotation of the machine, thereby thoroughly drying the solid matter and separating surplus liquid or moisture therefrom during the operation. The dried mass is then discharged by the centrifugal force of the machine automatically and continuously through the curved adjustable delivery tube or conduit d^{14} , extending into the basket or whirler d^2 , and into the mouth or hopper of a conveyer H, whence it is conducted along an endless apron h , provided with buckets or receptacles h' , and is discharged into the delivery chamber i^{15} , of the furnace I, provided with valve seats j , having a pivotal lever j' , normally supported in position by means of an adjustable weight j^2 . The matter deposited in the chamber i^{15} , falls by gravity into the furnace I, for the incineration thereof.

The conveyer H, Fig. 1, is provided with sprocket-wheels h^3 and h^4 , mounted on shafts h^5 and h^6 ; and on the shaft h^5 , is mounted a pulley, not shown, but around which passes a belt 8, connected with the pulley 6, and the latter is connected by means of a belt 7, with the pulley 2, or with a pulley mounted on the shaft 9. The sprocket-wheels h^3 and h^4 , are arranged so as to engage with their endless apron h . The conveyer illustrated in Fig. 3, may be employed in lieu of the endless apron h , of Fig. 1. This conveyer comprises a housing or trough L, in the end walls of which is journaled an archimedean screw l , provided with a pulley l' , mounted on one of the end journals and operated by means of a belt not shown connected with the main driving shaft of the apparatus or plant and the opposite end journal of the screw is connected or held in bearings provided in the wall of the delivery chamber i^{15} , of the furnace I.

The hydrocarbon burning furnace comprises an arched combustion chamber i , (Fig. 2,) an off-take i^2 , and a chimney i^3 . In the side walls thereof are projected tapering jet tube burners i^4 and i^5 , provided with stop-cocks i^6 and i^7 , connected with a supply of hydrocarbon oils or vapors introduced through the external pipes i^8 and i^9 . These jet tube burners i^4 and i^5 , are arranged preferably at an angle to the arch of the combustion chamber i , and extend a short distance into this chamber in order that a downward flame from opposite points or directions of the combustion chamber, may be presented to the mass deposited therein for the incineration or reduction thereof to a pulverized state or condition, when the same may be drawn out

or removed through the door i^{10} , of the furnace for use as a fertilizer or for other purposes. As the several steps mentioned are being proceeded with the oily, fatty or liquid matter is being conveyed continuously through the pipes b^4 and c , to the mixing chamber D, continuously supplied with disinfecting substance or materials from the tank or vat M, through the pipe m , provided with a stop-cock m' . The oily, fatty or liquid matter in the chamber D, is continually agitated by means of the stirring device g , consisting of paddles mounted on a vertical shaft g' , and actuated by miter gear-wheels g^2 and g^3 , through the intervention of a pulley, not shown, and a belt 10, (Fig. 1) connected with a pulley mounted on the shaft 9, on which the pulley 2, is mounted.

The operation of the plant or apparatus hereinbefore described is as follows:—Power is applied to the several appliances from a main driving shaft by means of the pulleys and main and cross-belts mentioned in a well understood manner. The garbage or refuse matter disinfected in transit is deposited from the platform a , into the chute B, and the fatty, oily or liquid matter draining through the grate b and the outlet b^{10} , into the off-take pipe b^4 , to the cross-pipe c , and flows therefrom into the mixing chamber D, wherein it is continuously agitated by means of the stirring device g , actuated in the manner described. By opening the gate b' , the solid matter passes through the opening in the wall of the chute B, into and through the pulping, compressing and squeezing device E, and any surplus liquid matter removed during the operation passes in advance along the incline plane f , into the basket or whirler d^2 , of the centrifugal machine F, and percolates through the perforated walls of the basket or whirler d^2 , into the annular chamber d^3 , of the centrifugal machine F, and thence through the funnel-shaped outlet d^4 , into the pipe c , and thence flowing along through the pipe c , into the mixing and disinfecting chamber D. The solid compressed and pulped matter is then conducted by gravity or otherwise along the inclined plane f , to the bracket or whirler d^2 of the centrifugal machine F, revolved at a high rate of speed, and all moisture completely removed therefrom and by centrifugal force the dried solid matter is discharged through the outlet or curved chute d^{14} , to the conveyer H, and conducted along the endless apron thereof, into the delivery chamber i^{15} , of the furnace I, and by its own weight opening the counterbalanced valve j , to permit of the deposit of the matter into the combustion chamber i , of the furnace I, which is maintained at a high heat by means of the hydrocarbon jet burners i^4 and i^5 , and the incineration of the mass is effected by the downward jet flames brought into contact therewith. When incineration has been accomplished by opening the furnace door i^{10} , the pulverized mass may be withdrawn therefrom and cooled for

use as a fertilizing substance or material. The oily, fatty or liquid matter continually undergoing treatment for the disinfecting of the same in the mixing chamber D, may be conducted off through the outlet pipe *g*⁸, into the sewer or into any other preferred receptacle.

It will be manifestly obvious that as to minor details of the apparatus, modifications may be made without departing from the spirit of my invention; and therefore I do not wish to be understood as limiting myself to the precise construction and arrangement hereinbefore explained.

Having thus described the nature and objects of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A plant for treating garbage or refuse matter, comprising a chute provided with a grate, a pulping and compressing appliance, an inclined plane, a centrifugal separator and drier, an endless conveyer, a furnace, a disinfecting and agitating appliance, suitable connections and means for operating said pulping and compressing appliance, separator, drier, conveyer and agitating appliance, substantially as and for the purposes described.

2. A plant for treating garbage or refuse matter, comprising a chute provided with a grate and a movable gate, a compressing, squeezing and pulping appliance, an incline plane, a centrifugal separator and drier, an endless conveyer connected directly with a hydrocarbon jet burner furnace, suitable connections, and means for operating said compressing, squeezing and pulping appliance, separator, drier and conveyer, substantially as and for the purposes described.

3. A plant or apparatus for treating garbage or refuse matter, comprising a compressing or pulping appliance connected with a centrifugal drier and separator, a conveyer,

and a hydrocarbon furnace with a balance valve connected with the conveyer, and means for operating the compressing and pulping appliance, centrifugal separator and drier and conveyer, substantially as and for the purposes set forth.

4. A plant for treating garbage or refuse matter, comprising a hydrocarbon furnace provided with a counterbalanced valve connected with a conveyer, a centrifugal separator and drier connected by a curved discharge conduit or pipe with the conveyer, and a compressing, squeezing and pulping appliance connected with the separator and drier, substantially as and for the purposes described.

5. A plant for treating garbage or refuse matter, comprising a hydrocarbon jet burner furnace provided with an automatically controlled valve connected with a conveyer, a separator and drier connected with the conveyer, an elevated chute, a compressing, squeezing and pulping appliance connected with the separator and drier, and a mixer and disinfecter connected with the separator and drier and with the elevated chute, substantially as and for the purposes described.

6. A plant for continuously treating garbage or refuse matter, comprising a chute provided with a movable gate and a grate, a compressing and pulping appliance, an incline plane, a mixing and disinfecting appliance, a separating and drying appliance, an endless conveying device, a hydrocarbon furnace, suitable connections and means for continuously actuating the same, substantially as described.

In testimony whereof I have hereunto set my signature in the presence of two subscribing witnesses.

NORTH DOWLING.

Witnesses:

THOMAS M. SMITH,
RICHARD C. MAXWELL.