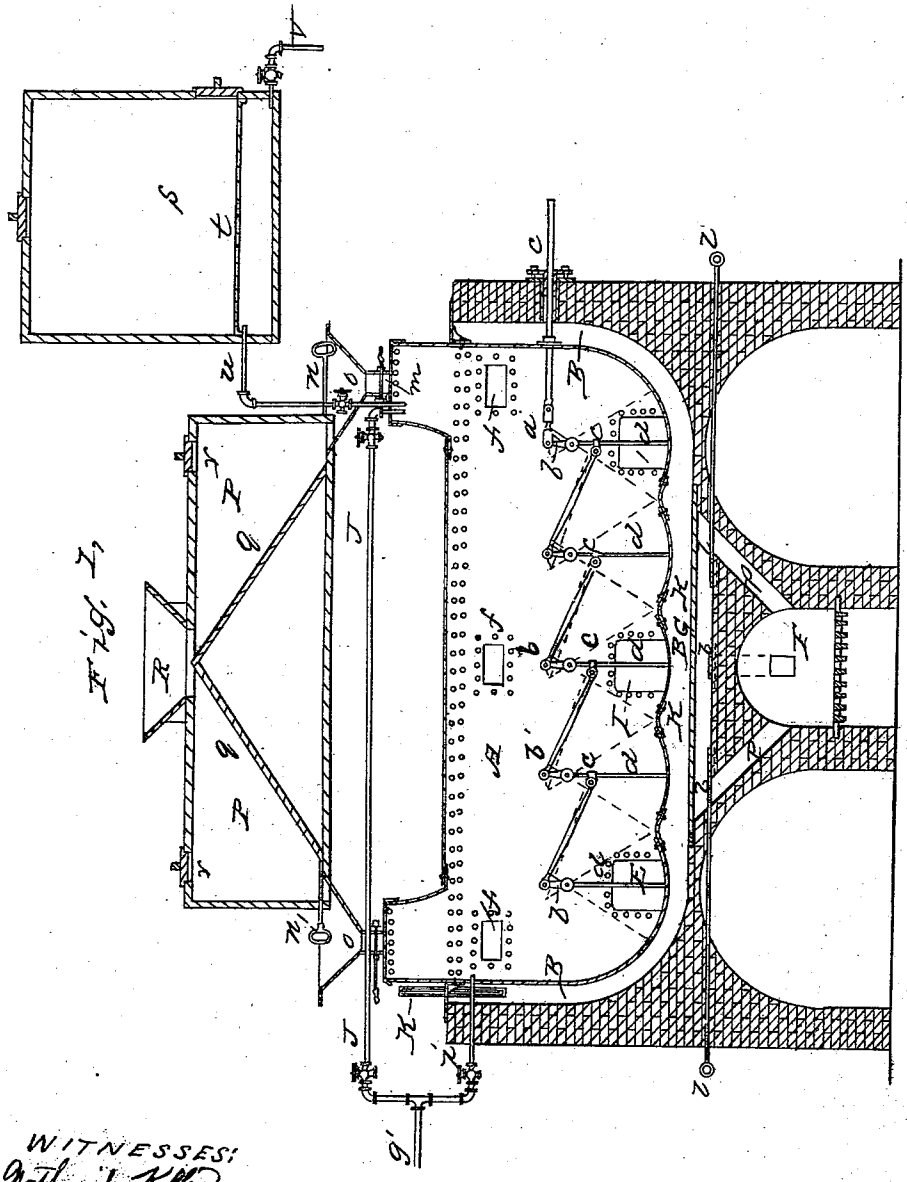
2 Sheets—Sheet 1.

H. S. FIRMAN.

Apparatus for Deodorizing, Desiccating, and Mixing Manure.

No. 84,686. Patented Dec. 8, 1868.



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2 Sheets--Sheet 2.

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Fig. 2,

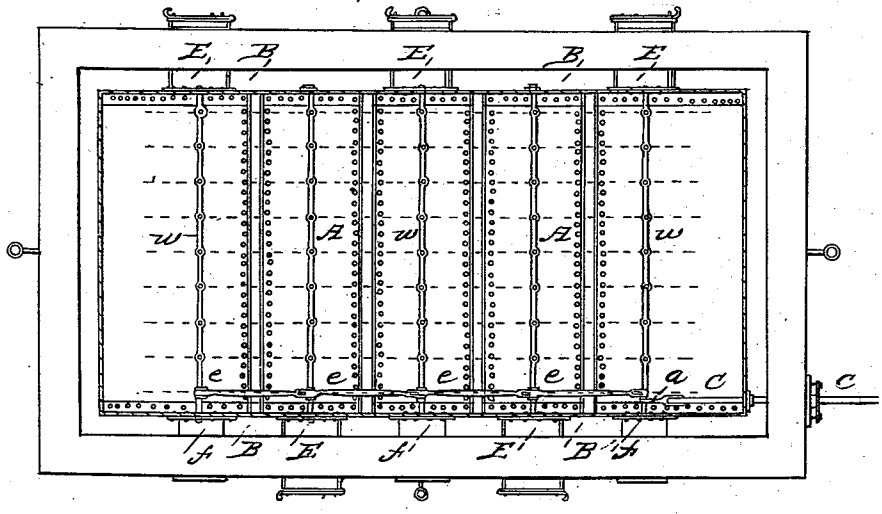
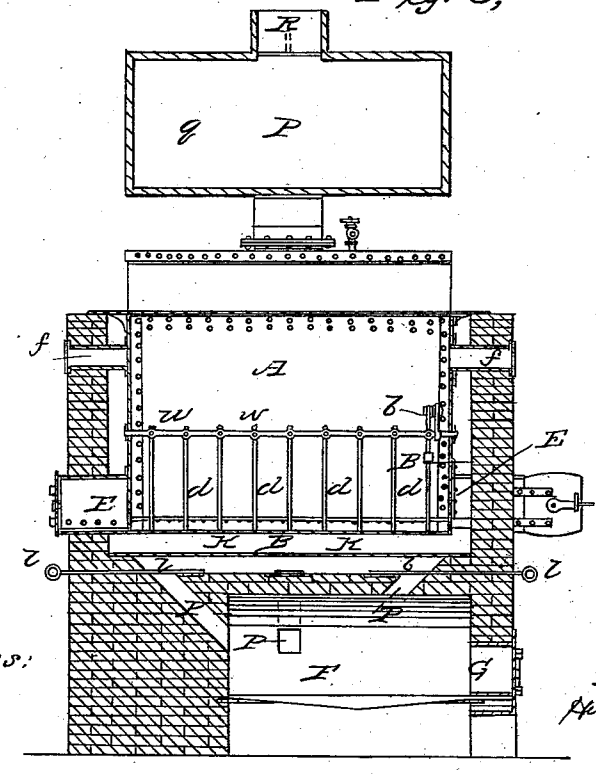


Fig. 3,



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HENRY S. FIRMAN, OF NEW YORK, N. Y.

Letters Patent No. 84,686, *dated December* 8, 1868.

IMPROVED APPARATUS FOR DEODORIZING, DESICCATING, AND MIXING MANURES.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, HENRY S. FIRMAN, of the city, county, and State of New York, have invented a certain new and useful Apparatus for Desiccating, Deodorizing, and Mixing Manures, or other similar compounds; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the annexed drawing, making part of this specification, in which—

Figure 1 is a longitudinal section through said apparatus, showing an end view of the mixers;

Figure 2, a horizontal section, showing a top view of said mixers; and

Figure 3 is a transverse section thereof, showing a side elevation of the mixers.

My apparatus consists, first, of a furnace, by which the heat is generated to dry the mixture; and, second, of a pan, in which the material is dried and mixed; and, third, of a hopper, by which the material is introduced into the pan; and, fourth, of a series of mixers, properly connected, and operated to stir and mix the materials as the drying proceeds.

To enable others skilled in the arts to which my invention appertains, to make and use the same, I will proceed to describe the construction of these various parts, and the relation they occupy to each other, and also their mode of operation.

In the drawing, the desiccating and mixing-pan is represented by A. It is an air-tight vessel, composed of boiler-iron, duly riveted and caulked, and formed in about the shape represented by the drawing.

This pan is set in a chamber, composed of brick-work, made larger in its length and breadth, by about one foot, than the pan, and about six inches deeper than the main body of said pan, leaving a flue under the bottom and on all sides of it, in the manner substantially as shown; the pan being supported on the top of the brick-work, by means of flanges riveted around the outside thereof, and arranged to lap over on the brick-work to form a top or cover to the flue around the pan.

In the bottom of this brick chamber, a furnace, F, is formed, covered with an arch, and arranged with flues, P, radiating from the foot or heel of the arch, and which flues are covered with dampers, *l*, to regulate the admission of heat from the furnace to the chamber in which the pan is set; the handles, *l*, of said dampers being made to reach to the outside of the wall, to facilitate their adjustment.

To keep the heat or flame from ascending directly from the furnace against the bottom of the desiccating-pan, and burning the material treated, I arrange directly over the flues of the furnace an iron plate, Q, with a series of perforated holes, *k*, to be made therein, a little inside or out of the line of the furnace-flues, to break the force and direction of the ascending current of hot air from the furnace, and keep it from impinging in a given spot against the bottom of the pan.

To stir and mix the material to be treated in the pan, I arrange a series of shafts, *w w w w*, across it, and support them in suitable bearings made in or on the sides of the pan.

In each of these shafts, I put and secure a series of projecting rods, *d d d*, made long enough to reach to the bottom of the pan, or nearly so, leaving them free to vibrate to and fro over the bottom of the pan, which is curved on the arc struck by each of these rods, in the manner shown.

The aforesaid shafts and rods being made and arranged as above set forth, I connect them together by means of connecting-rods *e e* and levers *b b*, arranged substantially in the manner shown, connecting one of the end-shafts to the reciprocating rod *c*, by means of a link, *a*, by which means all these mixers are made to vibrate at one time in opposite directions, by the application of power to said reciprocating rod, thus constantly moving and mixing the material contained in the pan, and thoroughly incorporating the different elements with each other.

After the material has been sufficiently treated, it is removed from the pan through gates E E, of which there are three on each side, or on one side, as the case may require, said gates being fitted with suitable covers or doors to make them impervious to the air, and said pan is also fitted with lights of glass, *f*, through which the treatment of the material may be inspected from time to time, as the operation proceeds.

The material to be treated is introduced into the pan through the hopper R, into the box P, fitted with sloping bottoms, *q*, which direct the material to the hoppers *o* and through the valves *n*, which are arranged to open and close at the will of the attendant; the hoppers *o* being also fitted with steam-tight valves, *m*, to prevent the escape of the offensive gases from the pan after it has been charged.

The pan is also fitted with a pipe, J, connected to branch-pipes *i* and *g*, the object of which pipes is to create a circulation of the air and gas in the pan, through the agency of an ordinary air-pump attached to the pipe *g*, the said pipes being fitted with suitable receiving and delivering-valves, to insure the proper operation of the pump.

In connection with the desiccating or mixing-pan, there is a box, S, arranged in some suitable position, and which is also fitted with a false bottom, *t*, and connected to the pan by means of a pipe, *u*, for the purpose of carrying the unabsorbed gases from the pan to this chamber or box, which is to be charged with some suitable absorbent to take up the gases aforesaid, said box being also fitted with a waste-pipe, *v*, to carry off any water of condensation that may accumulate in the bottom of the chamber.

Now, the object of this invention is to manufacture manure from night-soil or the refuse of rendering-tanks, or other animal, vegetable, or mineral matter, without making the establishment a nuisance in which the manu-

facture is carried on, which object is accomplished by absorbing and utilizing the gases in the material while in an air-tight vessel, thus saving the gases, and avoiding the nuisance, by means of the apparatus above described, and illustrated in the accompanying drawing.

Having now described the construction and operation of my said apparatus,

I claim as new herein, and desire to secure by Letters Patent—

1. Arranging a close desiccating and mixing-pan, constructed substantially in the manner described, and provided with mixers, as set forth, in a close heating-chamber, over a furnace or heating-flue fitted with dampers, and constructed substantially as described.

2. The combination of the supply-hopper, constructed substantially as described, with a close desiccating-pan, for the purpose of introducing the material to be treated in the pan, as set forth.

3. Combining, with a close desiccating and mixing-pan, a deodorizing or absorbing-chamber, for the purpose of utilizing the offensive gases, and avoiding the nuisance occasioned by their escape from the pan.

4. Creating a circulation of the air and gas in the desiccating-pan by means of an air-pump affixed thereto, through the agency of pipes arranged substantially as described.

HENRY S. FIRMAN.

Witnesses:

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