2 Sheets—Sheet 1.

J. BONFIELD.

APPARATUS FOR TREATING REFUSE FROM SLAUGHTER HOUSES FOR FERTILIZING PURPOSES.

No. 181,402. Patented Aug. 22, 1876.

Fig. 1.

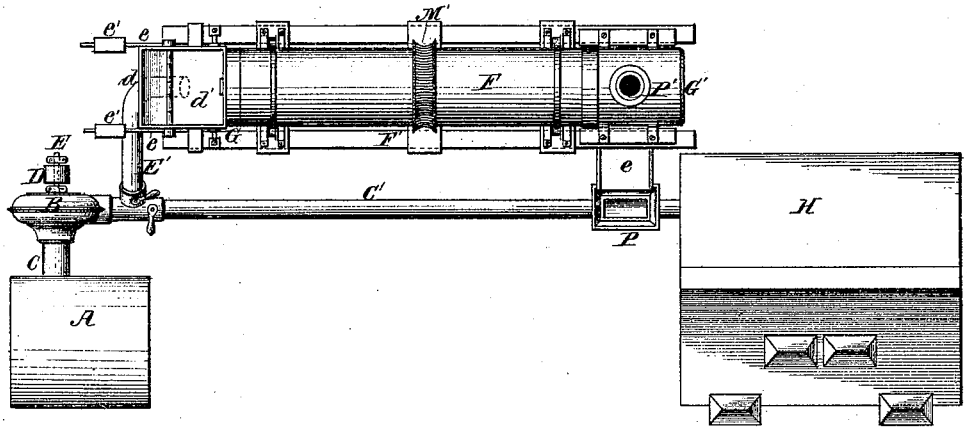


Fig. 2.

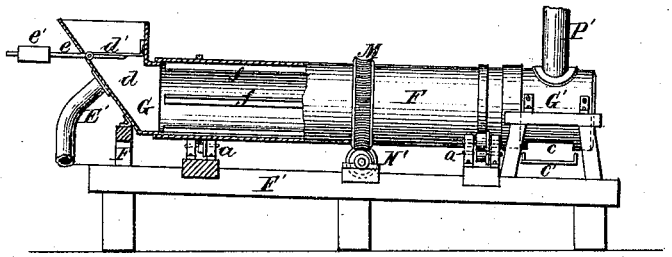
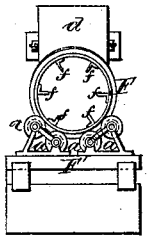


Fig. 3.



Witnesses.

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2 Sheets—Sheet 2.

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APPARATUS FOR TREATING REFUSE FROM SLAUGHTER HOUSES FOR FERTILIZING PURPOSES.

No. 181,402. Patented Aug. 22, 1876.

Fig. 4.

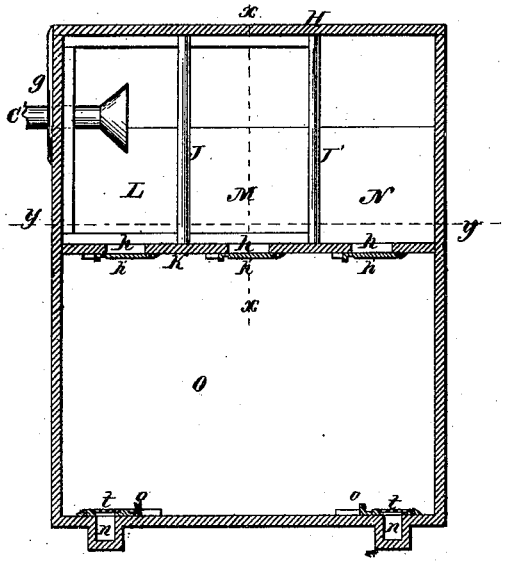


Fig. 5.

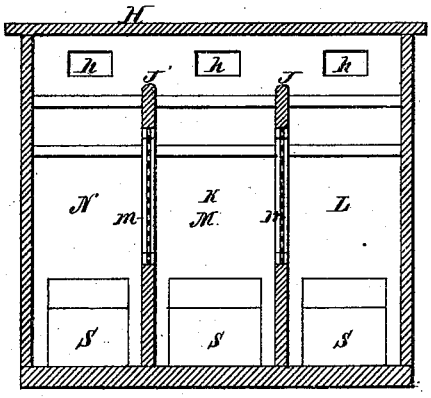
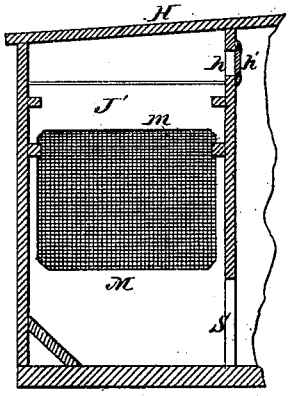


Fig. 6



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UNITED STATES PATENT OFFICE.

JOHN BONFIELD, OF CHICAGO, ILLINOIS.

IMPROVEMENT IN APPARATUS FOR TREATING REFUSE FROM SLAUGHTER-HOUSES FOR FERTILIZING PURPOSES.

Specification forming part of Letters Patent No. **181,402**, dated August 22, 1876; application filed March 9, 1876.

To all whom it may concern:

Be it known that I, JOHN BONFIELD, of Chicago, in the county of Cook and State of Illinois, have invented a new and Improved Apparatus for Utilizing Refuse Matter from Slaughter-Houses for fertilizing purposes; and I do hereby declare the following to be a full, clear, and exact description thereof, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a general plan or top view of a fertilizing apparatus embodying my said invention. Fig. 2 is a side elevation of the drying-cylinder and parts employed in operating the same, a portion of the cylinder being broken away, showing the interior of the same; and Fig. 3 is a cross-section of the same. Fig. 4 is a sectional plan of the receiving-chamber. Fig. 5 is a vertical transverse section of the receiving-chamber, taken on the line *y y*, drawn across Fig. 4; and Fig. 6 is a vertical longitudinal section of a portion of the same, taken on the line *x x*, drawn through Fig. 4.

Similar letters of reference indicate like parts in the several figures of the drawing.

My invention relates to that class of apparatus employed in utilizing the refuse substances from slaughter-houses for fertilizing purposes, and its object is to facilitate the drying and separating of the same. It consists in the peculiar construction and operation of an apparatus for that purpose, which will be more fully understood by the following description and claims.

In the drawing, A represents the furnace proper, which is constructed with an outer and inner wall, forming an air-chamber surrounding the sides, end, and top of the inner wall. This chamber is provided with a suitable opening for the admission of air to be heated. B is an ordinary exhaust-fan, communicating with the air-chamber of the furnace through pipe C. This fan is rotated by means of a belt passing around pulley D on shaft E of the fan, and communicating with any suitable motor.

H is the receiving-chamber, which is usually located at a distance of from thirty to sixty feet from the furnace. This receiving-chamber is provided with a series of partitions, J, J′, and K, forming separate compartments L, M, N, and O, as shown in Fig. 4. Partitions J and J′ are each provided at the center with a screen, *m*, as shown in Fig. 6. The meshes of the fabric constituting these screens are of different sizes, the meshes of the screen of partition J being coarser than those of partition J′. C′ is a metal pipe, permanently attached to the fan-case B, and communicating with compartment L of the receiving-chamber H through the main or outer wall, as shown in Fig. 4. This pipe passes through an elongated opening in the wall, and is secured in position by means of a sliding plate, *g*, through which it passes. This plate covers the opening in the wall, and is so arranged as to admit of being moved in the direction of its length, the object of which is to change the position of the inner end of the pipe, when desired.

Permanently attached to pipe C′, and communicating with the interior of the same near the receiving-chamber, is a hopper, P, (shown in Fig. 1,) which receives the material from cylinder G through trough *c*. F is an open-ended cylinder, journaled at its ends upon and around short stationary cylinders G G′, permanently secured to a frame-work, F′, and is so arranged as to admit of a free and easy rotary movement. This cylinder F is also supported, at a point near its ends, upon anti-friction wheels *a*, journaled in suitable boxes secured to frame F′. E′ is a horizontal pipe, one end of which communicates with the interior of pipe C′ at a point near the fan, and at the other end with the interior of cylinder F through the end of cylinder G, as shown in Figs. 1 and 2. Mounted upon the upper surface of cylinder G is a hopper, *d*, communicating with the interior of the same. Hinged to this hopper, and extending over the entire area of the same, is a bottom, *d′*, to which are attached levers *e e*, passing through the wall of the hopper, and upon which are mounted adjustable weights *e′ e′*, arranged to admit of being moved toward or from the hopper. The

arrangement of this bottom is such as to tip downward under the weight of the material in the hopper, so as to allow it to pass into the cylinder, and to move back to its normal position by the gravity of the weights when the material has passed off. The lower surface of cylinder G′ is provided with an opening, *e*, communicating with a conducting-trough, *e′*, extending from the cylinder to hopper P of pipe C′.

The cylinder F is arranged on an incline toward the receiving-chamber, and is provided internally with a series of radial flanges, *f*, as shown in Figs. 2 and 3, the object of which is to agitate the material in the cylinder, and to cause it to move through the latter toward the receiving-chamber, where it is discharged through opening *e* into trough *e′*, through which it passes into hopper P and pipe C′.

P′ is an escape-pipe, communicating with the interior of cylinder G′, and extending through the roof of the building within which the apparatus is located, by which means the foul gases generated in the cylinder are allowed to escape.

M′ is a gear mounted upon cylinder F, and engaging with a corresponding gear, N′, on a horizontal shaft, communicating with any suitable motor, by which a rotary motion is imparted to the cylinder.

The upper portion of partition K is provided with a series of ventilating-openings, *h*, through which the foul gases may escape into compartment O. These openings are covered with sliding plates *h′*, which are so arranged as to open or close the openings, as may be desired.

The outer or main wall is also provided with openings *t t*, communicating with vertical flues *n n*, (shown in Fig. 4,) through which the foul gases escape from compartment O. These openings are also covered with sliding plates *o o*, arranged to open or close the openings, as may be desired. The end of pipe C′, projecting into the compartment L, is made funnel-shaped, as shown in Fig. 4, the object of which is to allow the fertilizing material to expand as it passes from said pipe, and thus spread more evenly over the surface of the adjacent screen J. The lower portion of partition K is provided with a series of openings, S, through which the fertilizing material is removed from the separate compartments L, M, and N.

With the ordinary apparatus employed in utilizing animal substance for fertilizing purposes, and the process by which it is worked, the raw material, such as the refuse matter from slaughter-houses and other similar substance, is first dried in heated cylinders until it becomes a fine pulpy mass, when it is removed from the cylinder and allowed to dry in the open air. This process of drying leaves the mass more or less solid; consequently it becomes necessary to pulverize the same before it is ready for use. My invention obviates this latter difficulty, leaving the mass in a powdered state when dry.

The operation of my invention is as follows: A sufficient amount of fuel is introduced into the fire-box of the furnace and ignited, when the products of combustion pass into the chamber of the furnace, heating the air in said chamber, and, when properly heated, motion is imported to the fan and to cylinder F, the fan exhausting the heated air from the chamber and forcing it into the receiving-chamber and cylinder F through pipes C′ and E′. The pulpy mass, as it is taken from the ordinary drying-cylinder previously mentioned, is then introduced into cylinder F, through hopper *d*, and in contact with the current of heated air passing through the cylinder, and by the rotation of the latter the mass is kept in motion, causing it to pass through the cylinder when it becomes thoroughly dry, and in a powdered state, when it is discharged from the cylinder through opening *e* into trough *e′*, through which it passes into pipe C′, and in contact with the current of air passing through said pipe, by which means it is forced through the pipe into the receiving-chamber and against the respective screens *m*, separating the coarser particles from the finer ones. To determine the temperature of the air as it passes into cylinder F, I provide a ventilating-opening arranged in the pipe near the furnace, which can be open or closed at will.

Having thus described my invention, I claim—

1. The combination of the air-heating furnace A, fan B, hot-air-blast pipes C′ E′, cylinders G F G′, and the receiving and screening-chamber H, all constructed, arranged, and operating substantially in the manner described, and for the purpose stated.

2. In combination with the hot-blast pipe C′, a series of upright screens, *m m*, located in the receiving-chamber H, and operating in the manner and for the purpose specified.

The above specification of my invention signed by me this 26th day of October, 1875.

JOHN BONFIELD.

Witnesses:
J. T. WHIPPLE,
N. H. SHERBURNE.