

A. HOFFMANN.

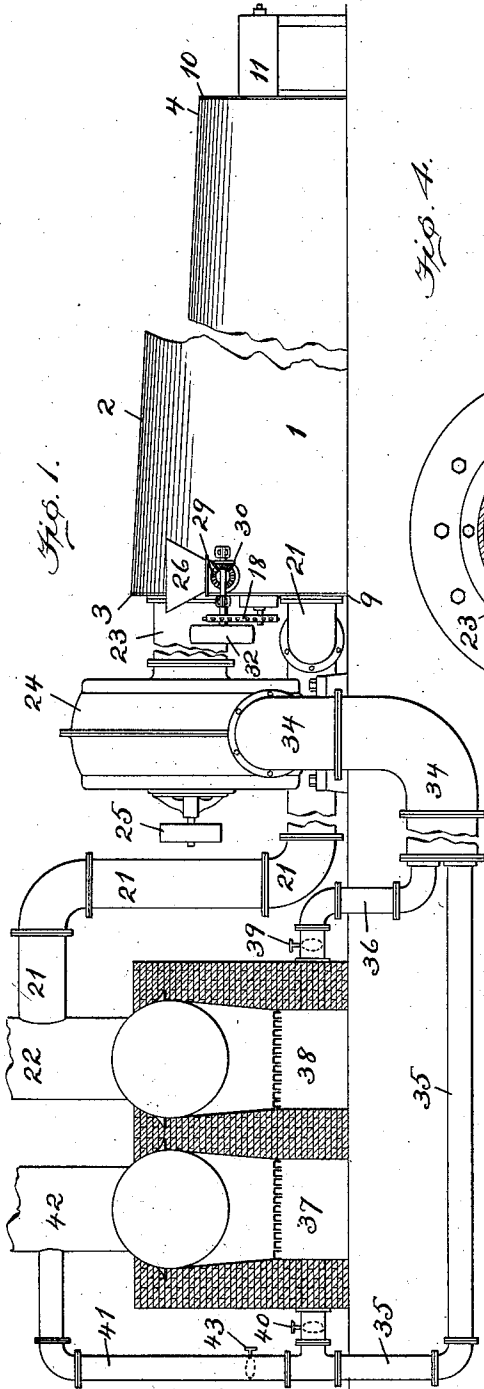
DRIER.

APPLICATION FILED JULY 6, 1912.

1,061,941.

Patented May 13, 1913.

2 SHEETS—SHEET 1.



Witnesses
Edwin L. Bradford
G. Ferd. Vogt.

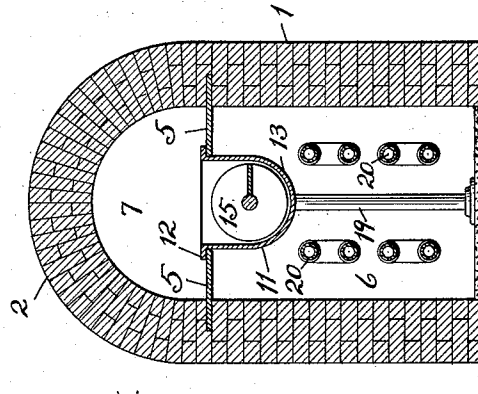
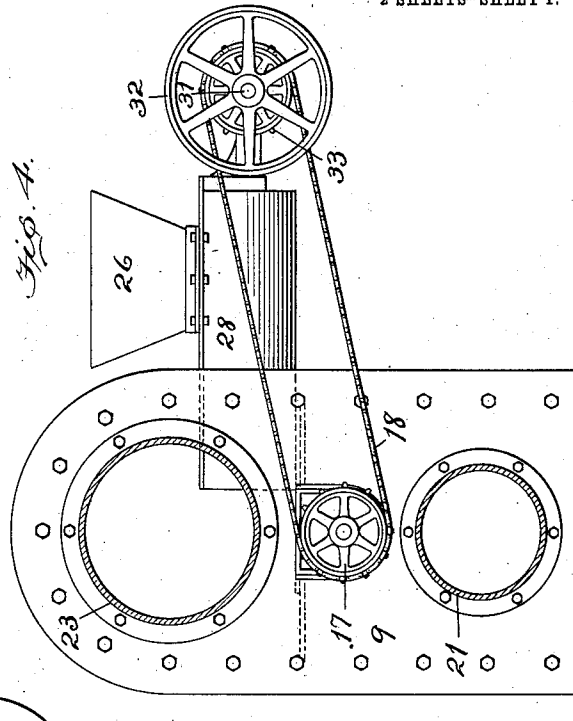


Fig. 5.

Inventor

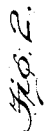
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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

ALEXANDER HOFFMANN, OF BALTIMORE, MARYLAND, ASSIGNOR OF ONE-HALF TO P. DEMAREST LOWE, OF NEW YORK, N. Y.

DRIER.

1,061,941.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, ALEXANDER HOFFMANN, a citizen of the United States, residing at Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Driers, of which the following is a specification.

This invention relates to an improved means for drying fertilizing and other materials.

An object is to provide an improved drier wherein the drying is effected by highly heated air and gases alone and whereby direct contact of fire with the material is avoided thereby preserving the virtues of the product and the resultant increase in its value.

A further object is to provide an improved construction of drier whereby the various odors usually passing therefrom may be passed through the furnace if desired and thereby the objectionable odors be eliminated.

A still further object is to provide an improved drier in which heat units may be drawn from the stack of a boiler, passed beneath the material to be dried; then caused to travel over the material in a direction reverse to that in which the material is traveling and forced back through the furnace or discharged into another stack, and another object is to provide a machine which shall be automatic and continuous in its operation to dry materials fed thereto.

With these and other objects in view, the accompanying drawings illustrate the invention wherein:—

Figure 1, shows the improved apparatus partly in side elevation and partly in sectional elevation. Fig. 2, illustrates a longitudinal sectional plan of the drier proper. Fig. 3, shows a longitudinal sectional elevation of the same. Fig. 4, illustrates an end elevation of the drier proper, and Fig. 5, a vertical cross-sectional detail through the same.

Referring to the drawings by numerals, 1, designates the shell, casing or wall of the drier proper, which may be constructed of brick, concrete or other suitable material and preferably has an arched or curved upper portion, 2, which diminishes in height from the feed end, 3, toward the discharge end, 4. A partition plate or wall, 5, extends longitudinally and horizontally between the ends of the drier and on the interior thereof

whereby to produce a lower longitudinal chamber, 6, and an upper longitudinal chamber, 7,—the two chambers being in communication at or adjacent to the discharge end by means of vertical side passages, 8. At the feed-end, 3, the drier is closed by a vertical plate, 9, and the discharge-end is provided with another plate, 10, which effects a closure of that end. A feed trough, 11, extends longitudinally through the drier and has side flanges, 12, which rest upon the horizontal partition plates, 5, so as to allow the curved bottom, 13, of the trough to depend into the lower longitudinal chamber, 6, of the drier. The upper side of the trough is open and is in direct communication with the upper longitudinal chamber, 7, of the drier. At the discharge-end of the drier, the trough extends through an opening in the plate, 9, and the projecting end thereof has an opening, 14, for the escape or discharge of the dried material. A screw conveyor, 15, extends through the trough, 11, and at the feed end the shaft of this conveyor passes through a bearing, 16, and carries a sprocket, 17, around which a drive chain, 18, passes to effect a rotation of the sprocket and the screw conveyor. Suitable supports, 19, are provided in the lower chamber, 6, of the drier to aid in sustaining the trough, 11, and steam heating pipes, 20, are also provided in said chamber whereby to aid in heating the latter. A conduit, 21, communicates with the lower chamber, 6, said conduit extending between said chamber and the stack, 22, of a steam boiler, as shown in Fig. 1. An exhaust conduit, 23, is attached to the front plate, 9, and communicates with the upper chamber, 7, of the drier and said exhaust conduit leads to an exhaust motor or fan, 24,—the latter being driven in any suitable manner, such as by means of a pulley, 25, around which a belt will be passed.

A feed hopper, 26, is conveniently located at the side of the drier and a feed screw, 27, carried in a trough, 28, serves to convey the material from the hopper and deposit it in the trough, 11, on the interior of the drier where screw-conveyor, 15, will advance it through the drying chamber during the drying operation. The feed screw, 27, in the present instance, is driven by means of bevel gears, 29, and, 30,—the latter being carried on a driving shaft, 31, which is revolved by

means of a pulley, 32. The shaft, 31, also carries a sprocket, 33, around which the chain, 18, passes, so that motion may be conveyed from shaft, 31, to the screw conveyer in the drier.

By referring to Fig. 1, it will be noted that a conduit, 34, leads away from the exhaust motor or fan and that from that conduit two branch conduits, 35, and, 36, are provided which lead to the ash pits of furnaces, 37, and, 38, respectively. The branch, 36, is provided with a valve or damper, 39, whereby communication between furnace, 38, and conduit, 34, may be cut off or established as desired, and a similar valve or damper, 40, enables communication to be established or cut off between furnace, 37, and branch, 35. Another branch conduit, 41, extends from branch, 35, and enters the stack, 42, of furnace, 37, and a damper or valve, 43, in this branch, 41, serves to cut the same off from branch, 35. It will thus be seen that by closing valves, 40, and, 43, and opening valve, 39, the exhaust from the drying chamber, 7, will be drawn off by the motor or fan and conveyed by conduit, 34, and branch, 36, to furnace, 38, where the exhaust vapors will pass up through the fire and thence to the stack, 22. Or, if desired, valves, 39, and, 43, may be closed and the exhaust vapors then conveyed by branch, 35, to the furnace, 37, or by closing valves, 39, and, 40, and opening valve, 43, the exhaust may be sent to the stack, 42.

In operation, the material to be dried will be dumped into hopper, 26, and conveyed by screw, 27, to the trough, 11, in the drying chamber. The screw conveyer, 15, will then slowly move the material through the trough toward the discharge end of the latter, during which time the motor or fan will operate. The action of this motor or fan creates a suction in conduit, 23, so as to draw the vapors and gases from the chamber, 7, into conduit, 23. This suction draws the heat units from stack, 22, through conduit, 21, into the lower chamber, 6, of the drier, admitting the heat in the lower chamber at the feed end of the drier and will act on the lower side of the conveyer trough, 11. The heat is then drawn up through the passages, 8, adjacent to the discharge end of the drier and into the upper drying chamber, 7, where the heat will be brought into direct contact with the material in the trough. The heat passing up through passages, 8, will be free of vapors that afterward are given off from the material being dried, and acts on the driest of the material first. The heat then passes over the material, picking up the moisture and vapors and is sucked out of the chamber, 7, at the feed end where the moisture and vapor is greatest. By this means the moisture laden heat is not passed over or brought into con-

tact with the driest of the materials consequently the latter passes from the conveyer in a much drier condition. As hereinbefore explained the exhaust may be carried to one or the other of the furnaces where its passage through the fire will free it of practically all the noxious odors. It will thus be seen that the motor or fan creates a suction at the feed end of drying chamber, 7, which draws the heat units from the stack or other point of heat supply and causes the heat to travel through chamber, 6, beneath the material, then up into chamber, 7, and over the material at the discharge end and to thereby apply the greatest heat to the driest of the material first, and preventing the moisture and vapor given off by the incoming material from passing over that material from which the moisture has passed.

Having thus described my invention what I claim and desire to secure by Letters Patent is:—

1. In a drier the combination with a furnace having a fire box and also having a stack, of a shell detached with respect to the fire-box of the furnace and having a feed-end and a discharge-end; means for conveying material through the shell from the feed to the discharge-end; means for conveying gases and heat from the stack to the discharge-end of the shell and means for drawing the gases and heat from the said stack through the conveying chamber.

2. In a drier the combination with a furnace having a fire-box and a stack, of a drying shell detached with respect to the fire-box of the furnace and having a lower chamber and an upper chamber; means for conveying material through the upper chamber of the shell; connections between the lower chamber of the shell and the stack of the furnace and means connected with the upper chamber of the shell for expelling the stack gases and heat from said upper chamber.

3. In a drier the combination with a furnace having a fire-box and a stack, of a drying shell detached with respect to the furnace and having a lower chamber and an upper chamber which communicate at one end; a trough extending through the shell; a conveyer in said trough; means for establishing communication between the stack of the furnace and the lower chamber of the shell beneath the feed-end of said trough and means connected with the upper chamber and above the feed-end of the said trough for expelling the stack gases and heat from said upper chamber.

4. In a drier the combination with a shell having a lower chamber and an upper chamber and the latter chamber being larger at one end than the other and being in communication with the lower chamber at its smaller, end, of means for

conveying material through the upper chamber in a direction from the larger to the smaller end; means connected with the larger end of the upper chamber for creating a suction therein and means for supplying heat to the lower chamber.

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5. In a drier the combination with a furnace having a fire-box and a stack of a drying shell detached with respect to the furnace and having a lower chamber and a tapering upper chamber with a communication between the smaller end of the upper chamber and said lower chamber; means for conveying material through upper taper-

ing chamber toward the smaller end of the latter; means for establishing communication between the stack and the lower chamber of the shell and means connected with the larger end of the upper chamber for expelling the stack gases and heat from the said upper chamber.

In testimony whereof I affix my signature in presence of two witnesses.

ALEXANDER HOFFMANN.

Witnesses:

G. FERD. VOGT,
CHAS. B. MANN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."
