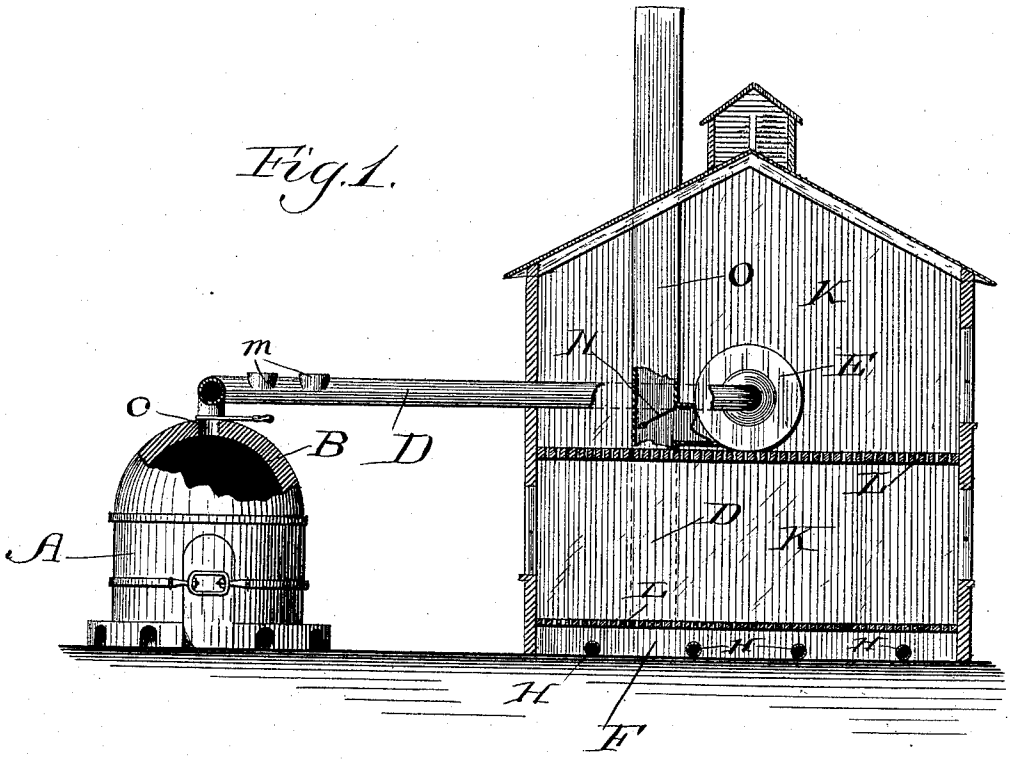
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R. PORTER.

APPARATUS FOR THE UTILIZATION OR DISPOSITION OF SURPLUS OR WASTE HEAT IN POTTERY KILNS.

No. 324,882. Patented Aug. 25, 1885.

Fig. 1.



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(No Model.) 2 Sheets—Sheet 2.

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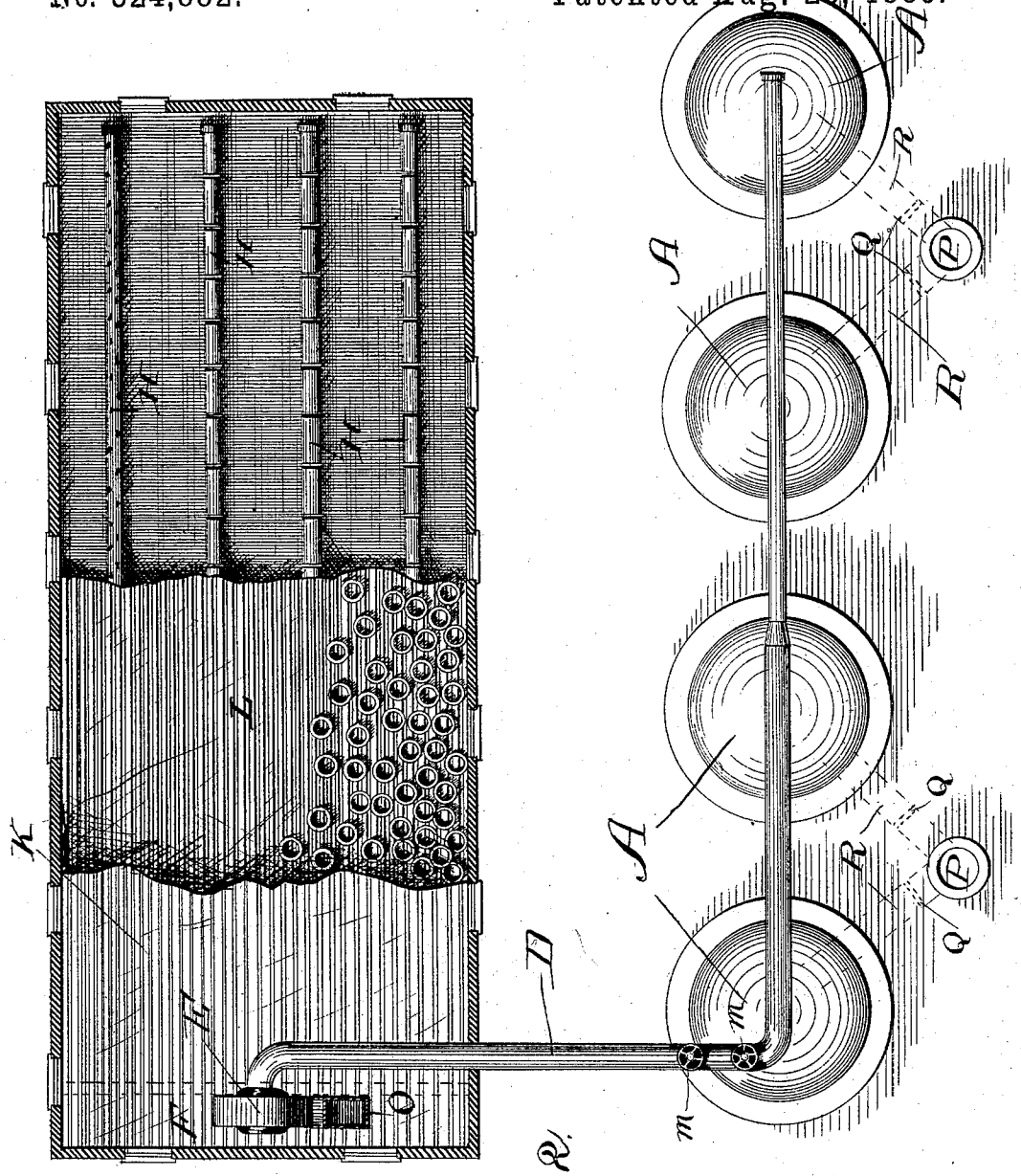


Fig. 2.

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UNITED STATES PATENT OFFICE.

RUFUS PORTER, OF LEWISTOWN, ILLINOIS.

APPARATUS FOR THE UTILIZATION OR DISPOSITION OF SURPLUS OR WASTE HEAT IN POTTERY-KILNS.

SPECIFICATION forming part of Letters Patent No. 324,882, dated August 25, 1885.

Application filed March 10, 1884. (No model.)

To all whom it may concern:

Be it known that I, RUFUS PORTER, of the city of Lewistown, in the county of Fulton and State of Illinois, have invented a certain new and useful improvement in apparatus for the utilization or disposition of surplus or waste heat in pottery kilns, for burning or baking drain-tile, sewer-pipe, fire-brick, or other articles of earthen mold and formation, by the storing, directing, and distributing of such heat throughout the drying room or chamber containing the drain-tile, sewer-pipe, or fire-brick in their first stages of preparation and drying for the kilns, of which the following is a full, clear, and exact specification, reference being had to the accompanying drawings, and to the identification figures and letters thereon.

That my invention may be fully understood, I will now describe the construction and operation of the same.

The kiln or oven for the burning of the drain-tile, &c., is of the usual shape and form, preferably with approximately straight sides and circular top, in which is an opening, secured by a lid or lids, to retain the heat while the tile or other earthenware is in process of burning. The heat generated in this oven or kiln is of a very high temperature, frequently ranging as high as 3,500° Fahrenheit. Some of this heat can be used to advantage at all times while the drain-tile, sewer-pipe, fire-brick, or earthenware are in process of burning, if desired or necessary. Immediately upon the completion of the burning of the drain-tile, &c., it is always necessary to cool this kiln or oven down or off before it can be emptied again and restocked or refilled with drain-tile or the desired material to be burned. This heretofore has been accomplished by removing the lid, exposing the opening or openings at the top of the kiln, for the purpose of allowing the heat to escape into the open air. This mode of cooling the kiln is a complete waste of heat, obtained at a considerable cost in generating, and also occupies several days' time in cooling the kiln in this manner to the proper degree of temperature, so that it can be emptied and restocked, which has to be accomplished by workmen bodily entering the kiln.

In the manufacture of drain-tile, sewer-pipe, fire-brick, and other articles of a similar character, it is necessary to stack the green ware immediately after it has been molded or stamped until it becomes sufficiently dry and firm to permit of its being put in a kiln for burning. Such wares require protection from the weather, and it is therefore necessary to stack them in what are technically known as "drying-rooms;" and I wish it understood that in the description and claims of this specification I use the term "drying-room," as it is commonly used, in connection with the manufacture of the earthenware of the character hereinabove referred to. The air in these drying-rooms becomes saturated with moisture from the wet clay, so that the process of preliminary drying has heretofore been tedious and expensive.

In the ordinary drying-room now in use great difficulty has been experienced in securing a proper temperature, ventilation, and circulation of air, and to the absence of the necessary circulation and the desired temperature the loss, disfigurement, and imperfections of drain-tile or earthenware are, to a considerable extent, due.

It is the principal object of my invention to furnish a means of accelerationg the process of drying, and for this purpose I propose to introduce heated air from the kilns into the drying-rooms.

The drying-room can and should always be in close proximity to the burning-kiln, so that the drain-tile or other earthen articles, when of sufficient dryness, can be removed within the shortest space possible to the burning-kiln. The drain-tile, sewer-pipe, fire-brick, or earthenware are placed upon racks or slatted floors throughout the room.

In practical operation I have often found the heat from the kiln is of much too high temperature to pass directly from the kiln to the drying-room, and to regulate this and obviate any inconvenience or injury therefrom, I provide a section of pipe between the kiln and the exhaust-fan with several or as many openings, protected by slides, as may be desired to regulate and commingle, when necessary, a flow of outer air with the hot air from the kiln to the temperature desired; but it may be arranged with a perforated pipe which can be substituted or alternated with the one just

described for the purposes desired, or in some instances it may be desirable to connect the pipe or flue for the escape or withdrawal of the heat from the burning-chamber at an opening at or near the bottom of the kiln, or in connection with the flue or flues at the bottom of the kiln or running therefrom to the draft-stack or chimney, in which case such pipe or flue between the kiln and exhaust-fan may be placed, partially at least, under the ground.

In construction my invention is as follows: In connection with an ordinary burning kiln or kilns, I place a pipe, formed of any suitable material, so that the heat, when the lid is removed or the openings are uncovered, will escape or pass directly into this pipe, instead of diffusing itself into the open air. This pipe connects with the drying-room, preferably at an opening in or near the bottom of this drying-room, at a small reservoir or distributing chamber to receive this hot air, and at this opening in the drying-room, and connecting with it a series of perforated pipes, or preferably a series of lines of drain-tile, laid some half-inch a part, ramifying out about an equal distance from the floor or bottom of the room to all parts of the room, and underneath or between the drain-tile or earthenware in process of being dried. Between the kilns and discharging end of this hot-air pipe or flue, and upon this pipe and in connection therewith, and preferably located within the drying-room itself, I place an exhaust-fan, driven by any suitable mechanism, which sucks or draws the heat with great rapidity from the kiln and forces and distributes it with great rapidity into the distributing-chamber and then throughout the drying-room, such drying-room containing the usual ventilators, preferably at or near the top. By this means a building of ordinary size—say thirty-six by one hundred and twelve feet, and twenty-five feet high, with an exhaust-fan of a diameter of three feet and with a pipe about sixteen inches in diameter—will be heated and ventilated, and the air will be thoroughly circulated and changed therein readily in from ten to fifteen minutes.

As a part of my invention, also, I claim the use of the exhaust-fan in cooling the kiln, even when the heat taken therefrom by means of such fan is forced into the open air instead of being used to heat, dry, and ventilate the drying-room. Such burning-kiln, with pipe and exhaust-fan, can be cooled from twenty-four to thirty-six hours quicker than by the methods now pursued.

In the accompanying drawings, composed of two plates, Figure 1 is a vertical cross-section of all the parts. Fig. 2 is a plan view of all the parts.

The principal parts of said invention or device are composed as follows, as designated by the respective letters upon the drawings: A, the burning-kiln; B, the hot-air or burning chamber of the kiln; C, the lid, damper, or valve to permit the hot air or heat to be retained in the burning-chamber B or discharged into the connecting-pipe D at will. D is the pipe connecting the hot-air chamber of the kiln with the exhaust-fan and the exhaust-fan with the distributing-chamber or drying-room. E is the exhaust-fan. F is the reservoir or distributing-chamber. H H are the lines of distributing-pipe. K is the drying room proper. L shows the broken away slatted floor, upon which rests the drying tile. M M are the slides in the connecting-pipe to regulate the inflow of cool or outer air thereto when desired. O is a pipe by means of which the hot air may be deflected or forced into the open air when desired solely to cool the kiln. N is a damper by means of which the heated air drawn from the burning-chamber B through the pipe D may be caused to flow at will either on through the pipe D to the distributing-chamber F or through the pipe O, into the open air. P is the draft stack or chimney. R is the flue below the surface of the ground connecting the burning-chamber B of the kiln A with the draft stack or chimney P. Q is a damper or slide to regulate the draft from the burning-chamber B, through the flue R, to the draft chimney P.

It is evident that the several elements of this construction may be varied without in any way affecting the characteristic features of my invention.

I do not propose, therefore, to limit myself in the practice of my invention to the precise construction herein shown in all its details; but I desire and hereby intend to reserve the right to substitute for any of the devices hereinbefore described any equivalent devices, provided I do not thereby depart from the principles of the invention.

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

1. The combination of the drying room of a tile or earthenware manufactory, a kiln for burning said tile, an air-passage connecting the drying-room with the kiln, and an exhaust-fan for forcing the heated air of the kiln into the drying-room, thereby simultaneously cooling the kiln and ventilating and heating said drying-room, and drying the tile or earthenware therein contained, substantially as and for the purpose described.

2. The combination of the drying-room of a tile or earthenware manufactory, a kiln for burning said tile, an air-passage connecting the drying-room with the kiln, an exhaust-fan for forcing the heated air of the kiln into the drying-room, a distributing-chamber in said drying-room for receiving the heated air from the air-passage, and means for distributing the heated air therefrom throughout the drying-room, substantially as and for the purpose described.

3. The combination of the drying-room of a tile or earthenware manufactory, a kiln for burning said tile, an air-passage connecting

the drying-room with the kiln, and adjustable valves in said passage connecting with the outer air, whereby the temperature of the heated air passing into the drying-room may be regulated, substantially as and for the purpose described.

4. The combination of the drying room of an earthenware manufactory, said drying-room being provided with ventilators, a kiln or kilns where such earthenware is baked or burned, and an air-passage connecting said drying-room with said kiln or kilns, substantially as and for the purpose set forth.

5. As a means for distributing heated air throughout a drying-room, a line or lines of joints of tile or pipe laid with short spaces between the joints, substantially as shown and described.

6. As a means for distributing air throughout a drying-room, a chamber for receiving such heated air, and lines of short sections of pipe or tile, laid with spaces between the sections, ramifying from the chamber throughout the drying-rooms, substantially as shown and described.

7. In the manufacture of drain-tile, sewer-pipe, fire-brick, and other similar earthenware, the process of cooling the kilns wherein the earthenware is burned or baked, and accelerating the drying of the green ware, which consists in suitably regulating the temperature of the heated air from the cooling-kilns and causing it to pass through the drying-rooms wherein said green earthenware is stacked, substantially as and for the purpose set forth.

8. The combination of the hot-air or burning chamber B, pipe D, exhaust-fan E, distributing-chamber F, and drying-room K, substantially as and for the purposes described.

9. The combination of the hot-air or burning chamber B, connecting-pipe D, exhaust-fan E, and drying-room K, substantially as and for the purposes described.

10. The combination of the burning or hot-air chamber B, connecting-pipe D, exhaust-fan E, distributing-chamber F, distributing-pipes H H, and drying-room K, substantially as and for the purposes described.

11. The combination of the hot-air or burning chamber B, connecting-pipe D, slides M M, exhaust fan E, and drying-room K, substantially as and for the purposes described.

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Witnesses:
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