A. D. FOOTE.

Improvement in Process and Apparatus for Heating Sand, Gravel, &c.

No. 129,329. Patented July 16, 1872.

Fig. 1

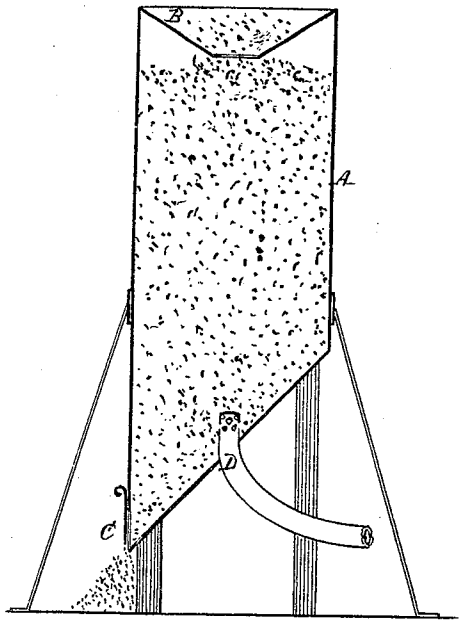
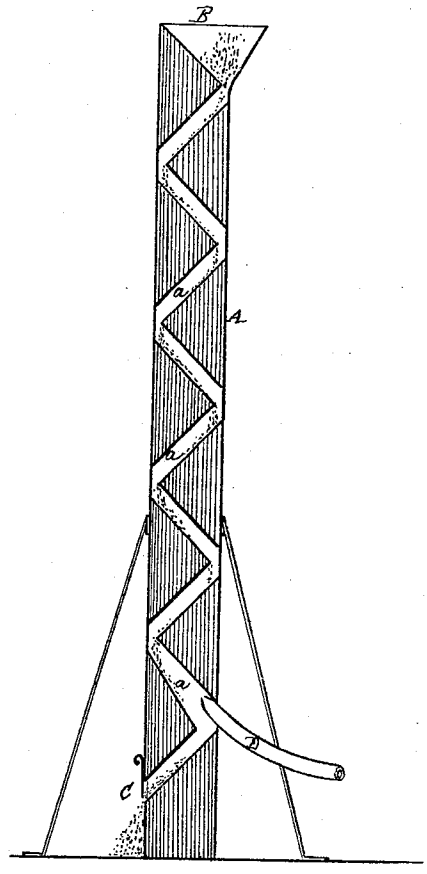


Fig. 2.



Witnesses
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UNITED STATES PATENT OFFICE.

ARTHUR D. FOOTE, OF WASHINGTON, DISTRICT OF COLUMBIA.

IMPROVEMENT IN PROCESSES AND APPARATUS FOR HEATING SAND, GRAVEL, &c.

Specification forming part of Letters Patent No. 129,329, dated July 16, 1872.

To whom it may concern:

Be it known that I, ARTHUR D. FOOTE, of Guilford, New Haven county, Connecticut, temporarily residing in Washington, District of Columbia, have invented a certain new and useful method of and apparatus for heating broken stone, gravel, or sand to be used in making concrete pavements and for other purposes, of which the following is a specification:

My invention has been made with more special reference to the preparation of stone, gravel, or sand in order to fit it to be mixed with the composition used in making concrete and similar pavements; but the stone, gravel, or sand so treated and prepared may, of course, be put to any other use for which it it may be adapted.

The invention may be stated to consist, first, in a mode of drying and heating stone, gravel, or sand by the application of superheated steam; and, secondly, in an arrangement of apparatus whereby the substance to be acted on by the heating agent is enabled to pass in a continuous stream into, through, and out from the heating or drying chamber.

The manner in which my invention is or may be carried into effect will be readily understood by reference to the accompanying drawing, in which—

Figure 1 represents in vertical section an apparatus for drying broken stone or coarse gravel in accordance with my invention. Fig. 2 is a like section of an apparatus for drying sand or fine gravel in a similar way.

The apparatus in Fig. 1 consists of an upright box or cylinder, A, of any suitable material and dimensions, provided at the top with a funnel-shaped hopper, B, and so shaped at or near its lower end as to direct the stone to and discharge it from a discharge-aperture, C, provided with a sliding door or other suitable means for graduating the size of the discharge-opening, or for closing it entirely, if desired. To direct the stone toward the opening C, I in this instance make the bottom of the box or cylinder inclined, as shown, but any other arrangement for the purpose may be employed. At a point preferably above the discharge-opening I insert a steam-pipe, D, which is closed at top to prevent its being choked up by entrance of grit and dust, and is perforated on its sides to permit the discharge into the cylinder of steam or other heating agent employed.

It will be understood, as above stated, that the dimensions of the apparatus may be varied to suit the requirements of its use. I find that a cylinder eight feet long and three feet in diameter, with the lower end of the feed-hopper eight inches in diameter, and a four-inch steam-pipe, will answer well for ordinary purposes.

I use, for the purpose of drying and heating the stone, superheated steam, which is discharged into the cylinder through the steam-pipe D and passes up through and permeates the mass of stone. Whatever of steam remains after the passage through the stone can escape from the top of the cylinder through the hopper, although the quantity thus escaping is hardly appreciable. I am aware that ordinary steam has been used to heat stone in closed tanks, but such operation is tedious, and requires much time in order to bring the stone to the proper condition. By the use of superheated steam I shorten the operation to a very great extent, the stone being brought to proper condition in about five minutes after it enters the cylinder—that is to say, in about the time it takes to pass from the hopper to the discharge-opening. Thus I am enabled to make the operation continuous, the stone being constantly shoveled into the hopper and as constantly passing out from the discharge C, while the steam continuously enters and circulates up through the cylinder and the mass of stone therein contained.

By locating the steam-discharge D above the point C, where the stone escapes, there is no appreciable escape of steam from the discharge-opening C.

In order to properly heat fine gravel or sand, or other material which, like sand, would be apt to pack if put into a cylinder like that in Fig. 1, a somewhat different arrangement must be employed for the purpose of keeping the material loose and in such state as to permit the steam to work up through it properly.

One arrangement for this purpose is shown in Fig. 2, where the heating cylinder or box is provided with a series of inclines forming a zigzag passage, *a*, through which the sand or other like material passes. The box is provided at the top with a feed-hopper, and at the

lower part with a steam-pipe, D, arranged to open into the passage *a* above the discharge-opening C.

It will be seen that the general arrangement and operation of the apparatus is the same as already explained with reference to Fig. 1, the only difference being that in the present case inclines are used to keep the sand loose and in condition to be acted on properly by the steam. I desire it to be understood, however, that I do not limit myself to the special means for this purpose, shown in Fig. 2, as any other suitable means for keeping the sand loose and preventing it from packing may be employed. I also wish it to be understood that in a sand, gravel, or stone heating apparatus, arranged as described, to permit the material to enter and leave the heating cylinder or box in a continuous stream, heating agents other than superheated steam may be employed, although I much prefer to use the latter; while the use of superheated steam to heat stone, gravel, or sand is not necessarily limited to an apparatus discharging the material in a continuous stream.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The application and use, in sand, gravel, or stone heating apparatus, of superheated steam, substantially as and for the purposes herein shown and set forth.

2. In an apparatus in which the material to be heated passes through in a continuous stream, as described, the arrangement of the steam-pipe above the opening from which the material is discharged from the heating-cylinder, substantially as and for the purposes set forth.

3. An apparatus for heating sand, gravel or stone by superheated steam, in which the material to be heated passes in a continuous stream down through and out of the heating cylinder or box, while the heating agent passes through said material and up through the said cylinder in the opposite direction, substantially as shown and set forth.

In testimony whereof I have signed my name to this specification before two subscribing witnesses.

ARTHUR D. FOOTE.

Witnesses:
EDM. F. BROWN,
M. BAILEY.