No. 765,476. PATENTED JULY 19, 1904.

R. GOODWIN, JR.

STEAM DRYING AND HEATING SYSTEM.

APPLICATION FILED FEB. 5, 1904.

NO MODEL. 2 SHEETS—SHEET 1.

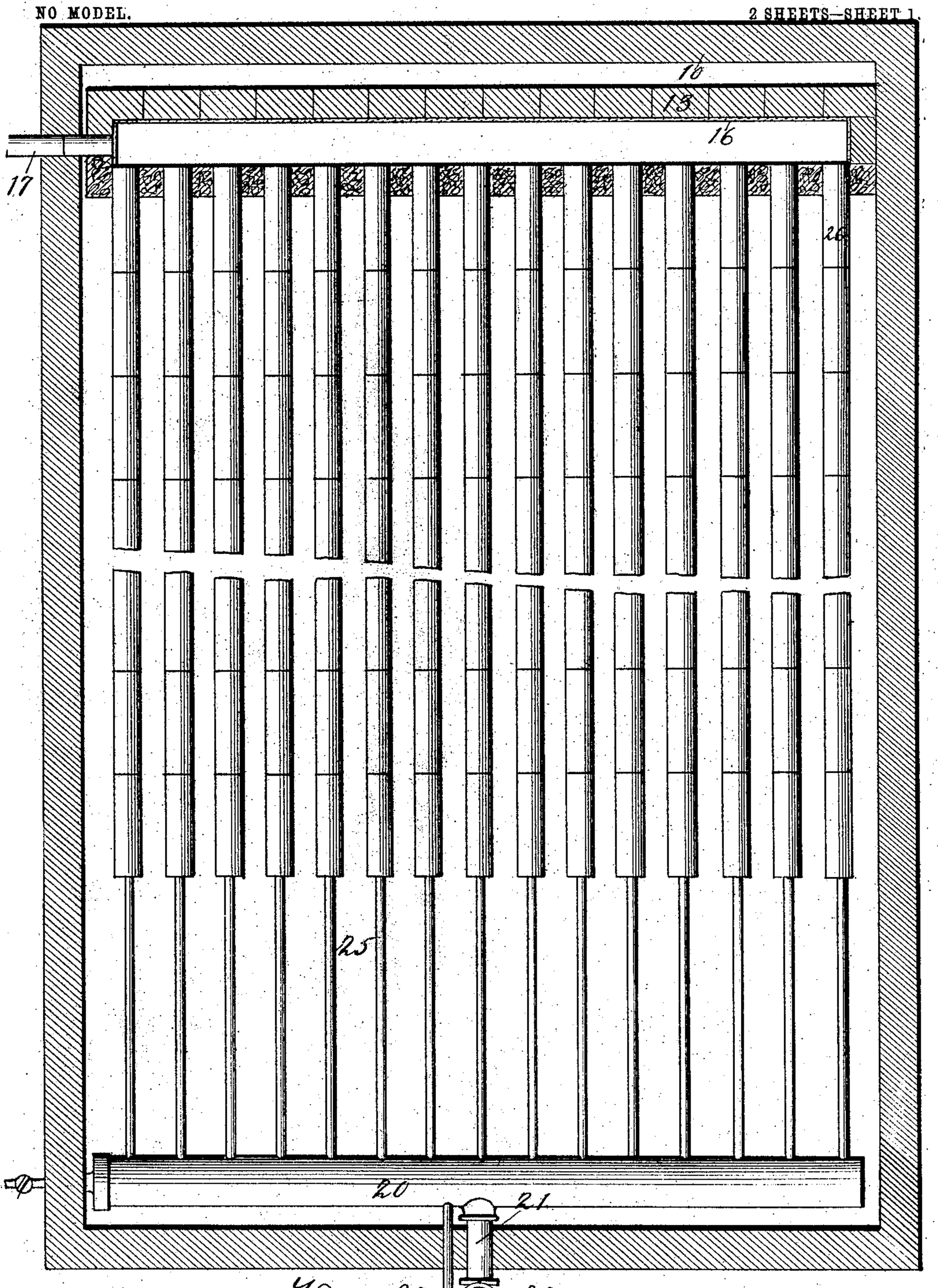

Fig. 1.

Witnesses
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By Orwig & Lane atty's

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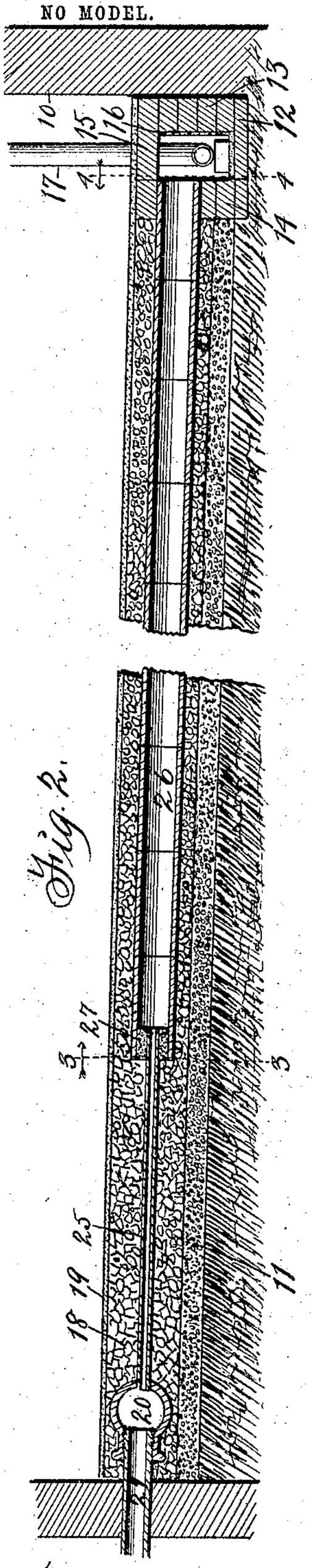

Fig. 2.

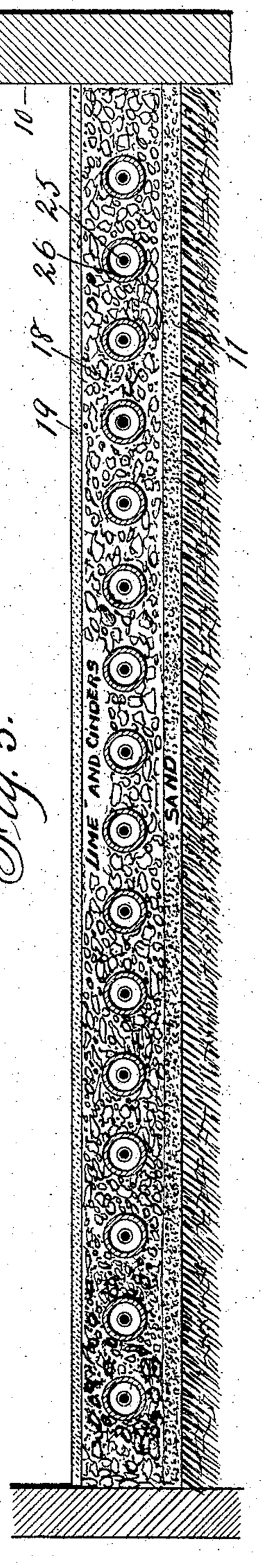

Fig. 3.

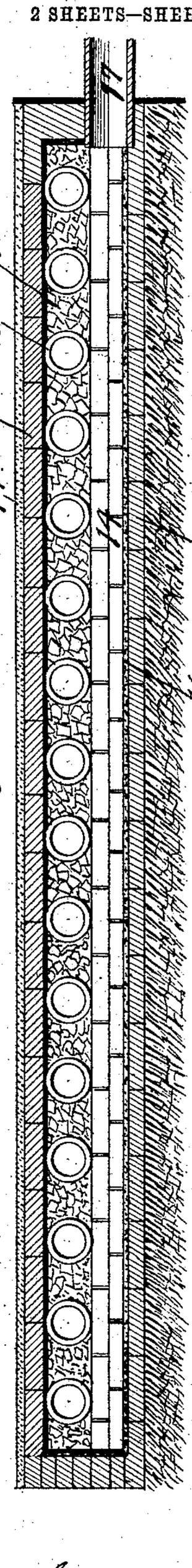

Fig. 4.

Witnesses
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No. 765,476. Patented July 19, 1904.

UNITED STATES PATENT OFFICE.

ROBERT GOODWIN, JR., OF REDFIELD, IOWA.

STEAM DRYING AND HEATING SYSTEM.

SPECIFICATION forming part of Letters Patent No. 765,476, dated July 19, 1904.

Application filed February 5, 1904. Serial No. 192,102. (No model.)

To all whom it may concern:

Be it known that I, ROBERT GOODWIN, Jr., a citizen of the United States, residing at Redfield, in the county of Dallas and State of Iowa, have invented certain new and useful Improvements in Steam Drying and Heating Systems, of which the following is a specification.

My invention relates to certain improvements in the heating of buildings used for drying brick, tile, &c.; and my object is to provide a heating apparatus of this class of simple, durable, and inexpensive construction contained wholly beneath the floor of the building and arranged to utilize exhaust-steam from an engine or steam under pressure and to utilize this steam to its maximum capacity in heating and also to distribute the heat evenly throughout the entire floor and to retain it for a comparatively long time, so that by the use of exhaust-steam during a certain part of the day the heat will be retained, so that the temperature of the room will not be greatly lowered if no steam is admitted for a comparatively long time—that is to say, if exhaust-steam is used from an engine during the daytime the room will be kept comparatively warm throughout the night following, thus saving the expenses of attendants to keep a supply of steam for heating the building during the night.

My invention consists in certain details in the construction, arrangement, and combination of the various parts of the device, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims, and illustrated in the accompanying drawings, in which—

Figure 1 shows a horizontal sectional view of a building provided with my improved heating apparatus, illustrating the arrangement of the heating-pipes in the floor. Fig. 2 shows a vertical transverse sectional view of a building supplied with my improved heating device, taken on a line through the center of the distributing-pipes. Fig. 3 shows a transverse sectional view on the indicated line 3 3 of Fig. 2, and Fig. 4 shows a transverse sectional view on the indicated line 4 4 of Fig. 2.

Referring to the accompanying drawings, I have used the reference-numeral 10 to indicate the walls of the building to be supplied with my improved heating system. The entire heating system is to be placed beneath the floor of the building, and I prepare for it by first inclining the ground of the floor from one end to the other, so that water of condensation will drain toward one end of the floor. I then place a layer of sand 11 on top of the ground-surface to serve the double purpose of preventing the heat from radiating downwardly into the ground and also to serve as a drain through which the water of condensation may run toward the lower end of the building. At the lower end of the building I have provided a brick drain running transversely of the building and composed of a brick foundation layer 12, with a solid brick wall 13 in the rear and a loose brick wall 14 in the front, the opening in the drain being covered by a layer of bricks 15. I have provided a layer of cement 16, covering the front face of the wall 13 and the top face of the foundation-bricks 13 to prevent the passage of water through these walls. The wall 14 is not provided with a layer of cement, so that water of condensation passing through the sand 11 may readily enter the brick drain. At one of the brick drain is a discharge-pipe 17, extending outwardly to a point of discharge, so that steam in the brick drain may escape to the outside atmosphere. On top of the layer of sand 11 I have provided a comparatively thick layer 18 of porous or cellular substance—such, for instance, as a combination of lime and cinders. This layer is designed to be firm enough to support a thin cement floor 19 and yet is porous enough to permit the entire layer 18 to become filled wtih steam, as will hereinafter appear. The top layer of cement 19 is designed to be used as a floor and prevents the passage of steam upwardly from the layer of porous material 18.

In order to evenly distribute steam throughout the entire floor, I provide a header 20 at the end of the floor opposite from the tile drain, which header is preferably composed of a metal pipe of comparatively large diameter. Both ends of this pipe are closed, and the pipe extends from one side of the build-

ing to the other. The numeral 21 indicates a a steam-pipe communicating with the header 20 and provided with a cut-off valve 22. This pipe is designed to receive exhaust-steam from an engine and conduct it to the header 20. I have also provided a smaller pipe 23, provided with a valve 24 and communicating with the header 20 and designed to receive live steam from a boiler and carry it direct to the header 20. Communicating with the header 20 and arranged at regular distances throughout its entire length is a series of small metal steam-pipes 25, arranged at right angles to the header and extended longitudinally of the building to be heated. These pipes pass through the porous layer 18. At the end of each pipe 25 is a series of unglazed tile 26, extending through the porous layer 18 to the brick drain at the opposite end of the floor. A plug 27 is placed in the end of the tile surrounding the pipe 25.

In practical use and assuming that it is desired to heat by means of exhaust-steam the valve 22 is opened and the interior of the header 20 is thus filled with steam. This steam will be distributed throughout the entire length of the header and will pass through the pipes 25, and these pipes will in turn conduct the steam to the unglazed tile pipes. Thus far the steam is carried without loss by passing through the pipes. However, when the steam enters the tile it expands and slowly traverses the entire length of the tile and also passes through the walls of the unglazed tile and through the joints, thus completely filling not only the hollow interior of the tile, but also filling the porous layer 18 with steam. The heat from the steam rises through the cement floor 19, and the layer of sand 11 prevents the heat from radiating downwardly. The water of condensation will pass downwardly through the tile, through the porous layer 18, and into the sand 11 and will be drained into the brick drain at the end of the building. The water of condensation within the tile will also pass into the brick drain. By the use of the small pipes 25 I provide for distributing the steam evenly throughout all of the tile, for if the tile themselves were connected direct with the header 20 then the tile nearest to the source of steam-supply in the header would receive all of the steam until said tile were completely filled with steam, and as this would take a comparatively long time the building would not be evenly heated. Another desirable feature in connection with the use of the pipes 25 is this: The header 20 is of comparatively large diameter and a considerable amount of heat radiated from it. The pipes 25 are of quite small diameter, and as the steam cannot pass through the walls of said pipes there is less radiation from them than from the tile, and hence the large body of the steam is passed direct from the header to the adjacent ends of the tile, and the end of the building containing the header is not heated any more than the opposite end, because the pipes 25 do not radiate as much heat as do the tile at the other end of the building. Furthermore, by providing the large number of tile pipes 26 having a comparatively large capacity I provide means whereby the exhaust-steam from an engine may be used and this steam permitted to expand freely, so that there will be comparatively little back pressure upon the engine.

In use after the steam has been admitted into the header for a short time all of the tile 26 are filled with steam, and the entire porous layer 18 is also filled with steam. This layer after once becoming warmed will retain its warmth for a comparatively long time and the warmth of the layer will prevent the steam from condensing rapidly, and if exhaust-steam is used in a system of this kind throughout the day it has been found that the porous layer will still contain steam and be quite warm throughout an entire night following. If it is desired to use live steam, the valve 22 is closed and the valve 24 opened. The space and the passage of the steam through the various pipes will be the same as before described.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States therefor, is—

1. A steam-heating system comprising a header, a number of metal pipes communicating with the header and of comparatively small diameter, and a porous pipe of comparatively large diameter communicating with each of said metal pipes of small diameter.

2. A steam-heating system comprising a header, a number of metal pipes communicating with the header and of comparatively small diameter, a porous pipe of comparatively large diameter communicating with each of said metal pipes of small diameter, and plugs in the ends of the porous pipes surrounding the ends of the metal pipes.

3. A steam-heating system comprising a header, a number of metal pipes communicating with the header and of comparatively small diameter, a porous pipe of comparatively large diameter communicatiug with each of said metal pipes of small diameter, and a drain receiving the water of condensation from all of said porous pipes.

4. A steam-heating system comprising a header, a number of metal pipes of comparatively small diameter communicating with the header and an unglazed clay pipe communicating with each of said metal pipes of small diameter.

5. A steam-heating system comprising a granular heat-insulating layer, a porous layer on top of it, a steam-tight layer on top of the

porous layer and porous pipes in the porous layer and means for introducing steam into the porous pipes.

6. A steam-heating system comprising a header, a number of metal pipes communicating with the header and of comparatively small diameter, a porous pipe of comparatively large diameter, communicating with each of said metal pipes of small diameter, a porous layer surrounding said pipes and a steam-guide layer covering the porous layer.

7. A steam-heating system comprising an inclined base, a layer of sand on top of the base, a porous layer on top of the sand, a cement floor on top of the porous layer, a number of unglazed clay pipes in the porous layer and means for introducing steam into said unglazed clay pipes.

8. A steam-heating system comprising an inclined base, a layer of sand on top of the base, a porous layer on top of the sand, a cement floor on top of the porous layer, a number of unglazed clay pipes in the porous layer, means for introducing steam into said unglazed clay pipes, and a brick drain receiving water from the layer of sand and communicating with the unglazed clay pipes.

9. A steam-heating system comprising an inclined base, a layer of sand on the inclined base, a layer of porous material on top of the sand, a cement floor on top of the layer of porous material, a drain communicating with the layer of sand and with the layer of porous material, a layer of cement on the interior of said drain on all sides except the sides communicating with the sand and the porous material, a steam-discharge pipe communicating with the drain, and means for introducing steam into the layer of porous material.

10. A layer of porous material, a steam-tight floor covering the layer of porous material, means for introducing steam into the layer of porous material and means for carrying off the water of condensation and surplus steam from said layer of porous material.

11. A steam-heating system comprising a base, a layer of sand on the base, a porous layer of lime and cinders on the sand, a cement floor covering the layer of porous material, a header in the layer of porous material, means for introducing steam into said header, a number of metal pipes communicating with the header and extending through the layer of porous material, unglazed pipes communicating with the said steam-pipes, plugs in the unglazed clay pipes surrounding the ends of the metal pipes, and means for drawing off the water of condensation and surplus steam from the layer of sand, the layer of porous material and the unglazed clay pipes.

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Witnesses:
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B. W. DUTTON.