

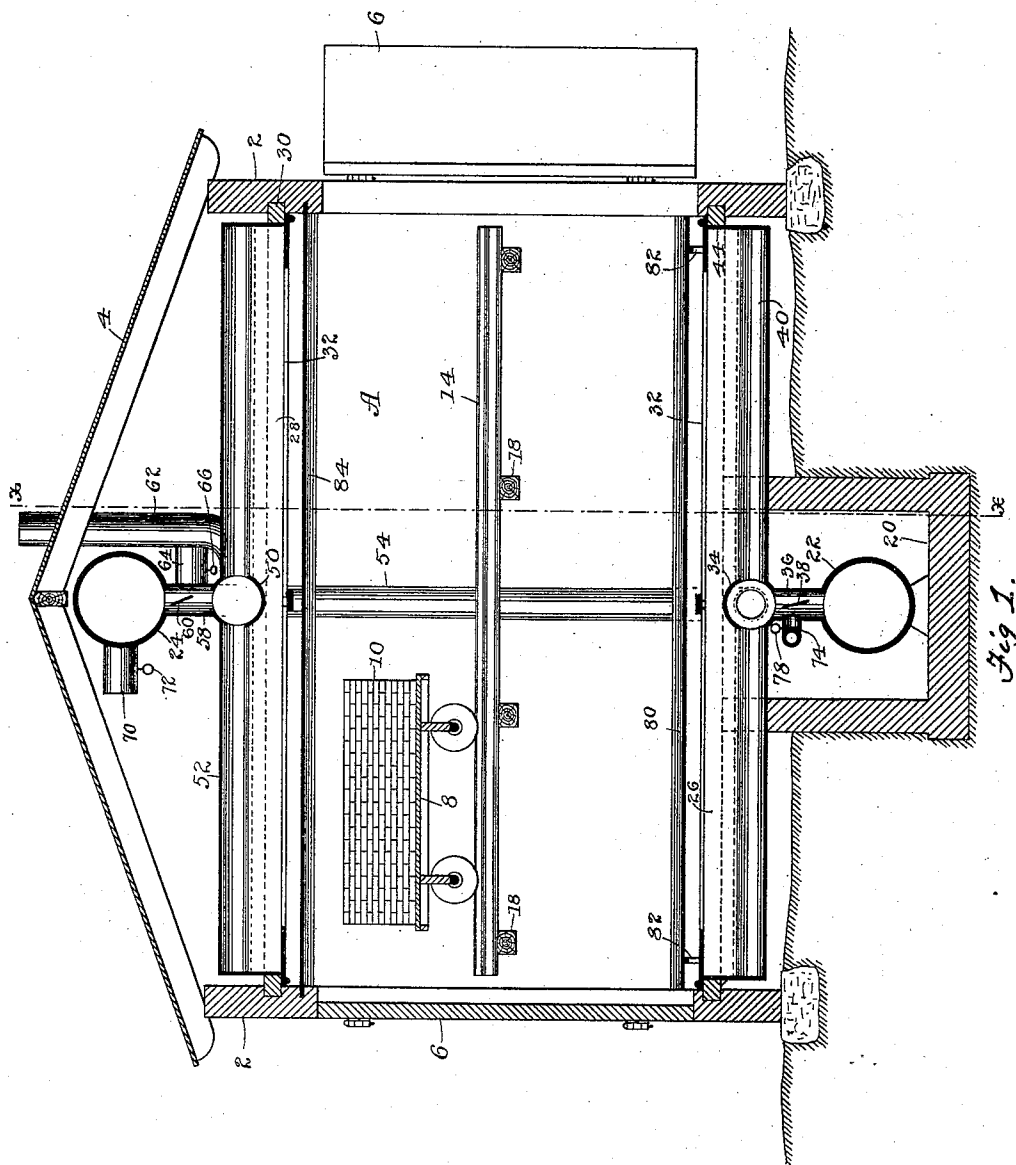
(No Model.)

2 Sheets—Sheet 1.

C. J. DION.
PROCESS OF DRYING BRICK.

No. 487,827.

Patented Dec. 13, 1892.



Witnesses:-

E. D. Lawrence
A. W. Welch

Inventor:-

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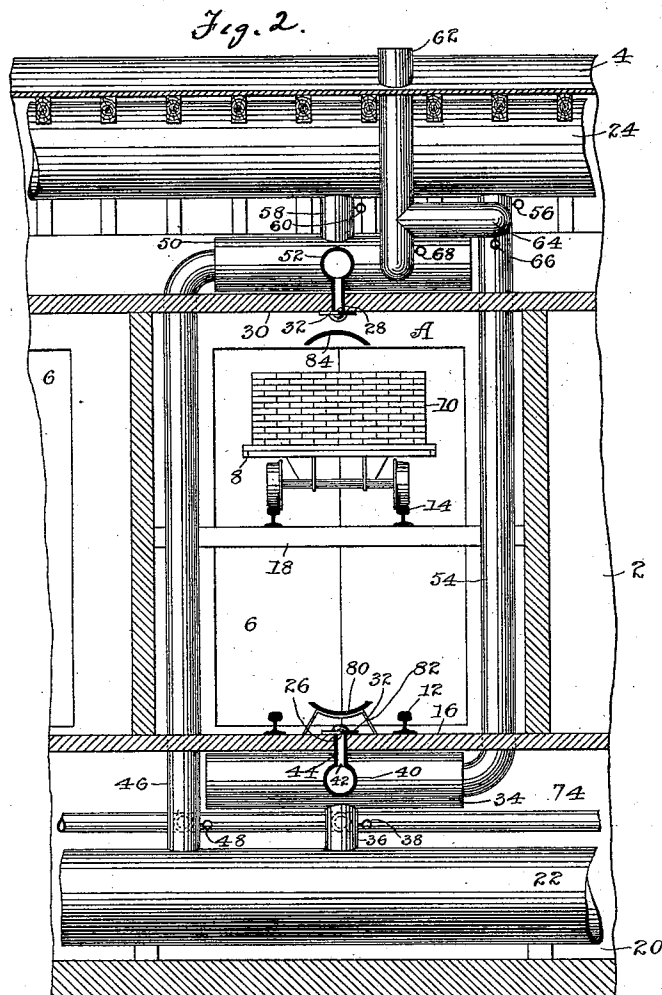
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Witnesses:-

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UNITED STATES PATENT OFFICE.

CHARLES J. DION, OF ST. PAUL, MINNESOTA.

PROCESS OF DRYING BRICK.

SPECIFICATION forming part of Letters Patent No. 487,827, dated December 13, 1892.

Application filed April 11, 1891. Serial No. 388,444. (No model.)

To all whom it may concern:

Be it known that I, CHARLES J. DION, of St. Paul, Ramsey county, Minnesota, have invented certain Improvements in the Process of Drying Brick, of which the following is a specification.

In the manufacture of brick, tile, terracotta, and similar materials the green stock after being formed requires to be thoroughly dried before burning, which process is usually carried out by exposing it in the open air. The changes in temperature and humidity and of circulation of the atmosphere make this process a very difficult and uncertain one, besides consuming several days' time, frequently accompanied by serious loss caused by unfavorable conditions of the weather. Various attempts have been made, therefore, for artificially drying the brick in inclosed chambers or kilns, but usually with unsatisfactory results, the currents of heated air rapidly drying the surfaces of the brick with which the air comes in contact, causing checking and warping, while the centers are still in a moist state. The moisture thrown off from the brick at the beginning of the process also is to some extent condensed on the ceiling of the chamber and drops back upon the brick, so as to injure, if not ruin, the top layers. To secure their perfect and uniform drying, it is therefore essential that there be no strong currents of heated air to strike upon them, but rather a gentle circulation of the atmosphere through and about them without currents or dead-air spaces, whereby all of the surfaces as nearly as possible are uniformly dried. It is also essential to the best results that this drying process be carried on at the center of the brick as nearly as rapidly as at the surface, so that the contraction shall be uniform and checking and cracking avoided. I accomplish this result by means of a new and improved process, which consists in first raising the temperature of the brick while in a moist state to a high degree in an atmosphere of such humidity as to prevent its drying until the entire mass is of a uniform temperature and then gradually decreasing the humidity of the atmosphere, while its temperature may be increased. The moisture in the whole mass is thus expelled by the heat, and by proper regulation of the humidity and

temperature the drying process may be carried on practically as rapidly at the center as at the surface of the brick.

To carry out my improved process, I provide an improved type of drying-kiln, usually with two or more independent chambers or compartments, connected with each of which is a circulating air system having an apparatus for heating the air therein and means for maintaining the circulation. The connection of the system with the several chambers is controlled by valves, whereby the direction of the circulation in each chamber may be reversed at will or entirely cut off. Valve-controlled outlets and inlets to the system are also provided for the discharging of moist air therefrom and the inlet of dry air. I also provide means for charging the air with moisture just before it enters the chamber to secure and maintain the proper degree of humidity.

While different means may be employed with more or less efficient results to carry out my improved process, I prefer to use the apparatus shown in the accompanying drawings, in which—

Figure 1 is a vertical longitudinal section of one of the drying-chambers, showing the connections of the air system and the tracks for carrying the cars of brick; and Fig. 2 is a vertical cross-section of the same on line $x x$ of Fig. 1.

In the drawings, 2 represents the side walls of the structure, 4 its roof, and 6 the outer doors, which should close practically air-tight. The cars 8, loaded with the green brick 10, are supported on the rails 12, arranged upon the floor 16 of the structure, or the rails 14, supported above the same on cross-timbers 18.

20 is a conduit extending underneath the floor of the structure, in which is arranged the main inlet air-pipe 22, while similarly arranged underneath the roof, above the chambers, is the return-main 24, which connects with the pipe 22 (connection not shown) and forms the circulating system. Interposed in the system, preferably at a distance from and independent of the kiln, is a fan or other means for establishing a circulation in the system and a heating apparatus to raise the inclosed air to the required temperature. These, however, form no part of my present

invention, and are therefore not shown in the drawings.

Arranged centrally in the floor of each chamber A is a narrow slot 26, and a similar slot 28 is arranged, preferably, immediately above the same in the ceiling 30. Sliding dampers 32 are pivoted at the ends of the slot, by means of which the size of the opening may be adjusted at will. The receiver 34 is arranged transversely of the chamber, between the floor and the main 22, being connected with the latter by means of the branch pipe 36, having the damper 38, and connected with the chamber by means of the air-pipe 40, having a slotted opening 42 in its top, connecting to the slot in the floor by means of the flanges 44. The pipe 46, having the damper 48, similarly connects the main 22 with the transverse receiver 50 above the chamber, which is connected to the slot 28 by means of the slotted pipe 52. The receiver 34 is connected by means of the pipe 54, having the damper 56, to the main 24, and the receiver 50 is connected with the main 24 by the pipe 58, having the damper 60. The outlet-pipe 62 connects with the transverse receiver 50 and is provided with the damper 68, the pipe 54 being connected with the pipe 62 above its damper by means of the branch pipe 64, having the damper 66. An upward circulation of air through the chamber is established by opening the dampers 38 and 60 and a downward circulation by closing said dampers and opening the dampers 48 and 56, and by the alternate opening and closing of said dampers the circulation through the chamber is reversed at will. Air is discharged from the system by opening either the valve 68 or 66, according to the direction of circulation, and the outer air is admitted to the system by opening the valve 72 in the inlet-pipe 70.

In order to prevent currents of air in the chamber and to render the circulation as general and uniform as possible, I provide curved deflectors 80, supported over the slots 26 upon standards 82, similar deflectors 84 being arranged underneath the slots 28 in the ceiling. The steam-pipe 74, connected with a suitable source of steam-supply, is arranged, preferably, underneath the structure parallel with the main 22 and connected with the branch pipes of the main 22, which connections are controlled by valves 78.

Having thus described the construction of the apparatus, the process itself may be described as follows: The chamber while open to receive the stock is preferably cut off entirely from the air system in order to prevent waste of the hot air and to permit the process to be carried on uninterruptedly in the other chambers. The chamber having been filled with brick, its doors are closed and the dampers 48 and 56 are preferably first opened to establish a downward circulation through the chamber. At the same time the damper 78, connecting with the steam-pipe, is opened to charge the air with moisture before it en-

ters the chamber. After the air has circulated for a time downward through the chamber the dampers 48 and 56 are closed and the dampers 38 and 60 opened to establish an upward circulation, the damper connecting the steam-pipe with the pipe 36 being opened to charge the air with moisture, as necessary. This circulation is reversed frequently throughout the entire process and as often as necessary to carry on the operation of heating and drying uniformly the tops and bottoms of the brick without necessitating their being turned. The air of the chamber is thus gradually heated by the mingling with it of the hot air from the system, the temperature and humidity at all times during the process being indicated and their control assisted by means of a thermometer and a hygrometer arranged in the chamber, the object, as stated, being to maintain such a degree of humidity as will prevent any drying of the stock during the first step of the process. The brick in the chamber are thus gradually heated to a high temperature through and through in their moist state, when the first part of the process is terminated by cutting off the admission of moisture to the chamber and alternately opening the valves 66 and 68 as the circulation is reversed to permit the gradual escape of the moist air from the chamber, while at the same time the damper 72 of the intake-pipe 70 is opened to supply the system with an equal amount of dry air. The humidity of the air in the chamber is thus gradually decreased and the moisture slowly expelled from the brick and carried off with the discharged air, the heat of their mass being such that the drying proceeds uniformly from the center of the brick outward. As the stock is thus gradually dried the temperature may be also gradually increased until the process is completed. The deflectors next to the slots in the ceiling and floor of the chamber distribute the air through the chamber and tend to prevent currents of air, which would dry the surfaces of the brick with which they come in contact too rapidly, and also prevent any dead-air spaces in which the drying process will be unduly retarded.

I claim—

1. In the drying of green brick and similar materials in an inclosed chamber by means of a connected circulating hot-air system, the process consisting of charging the air with sufficient moisture before it enters the chamber from the system to prevent the drying of the stock, circulating the air through the chamber until the stock is heated throughout uniformly to a high temperature, and then gradually decreasing the humidity of the air in the chamber, substantially as described.

2. The foregoing-described improved process of drying green brick and similar materials, consisting in first placing the same in an inclosed chamber having a communicating circulating hot-air system, then admitting the air from said system into said

chamber, charging the same before entering with sufficient moisture to prevent drying of the stock until it is uniformly heated, reversing the circulation from time to time, and then gradually decreasing the humidity of the air in the chamber and increasing its temperature, substantially as described.

3. The foregoing-described improved process of drying green brick and similar materials in an inclosed chamber by means of a circulating hot-air system consisting of charging the air before it enters said cham-

ber from the system with sufficient moisture to prevent drying of the stock until heated uniformly through and through and then gradually decreasing the humidity of the air and reversing the circulation from time to time, substantially as set forth. 15

In testimony whereof I have hereunto set my hand this 7th day of April, 1891.

CHAS. J. DION.

In presence of—

T. D. MERWIN,
A. MAE WELCH.