(No Model.) 4 Sheets—Sheet 1.

P. ARNOLD.

BRICK DRIER.

No. 434,313. Patented Aug. 12, 1890.

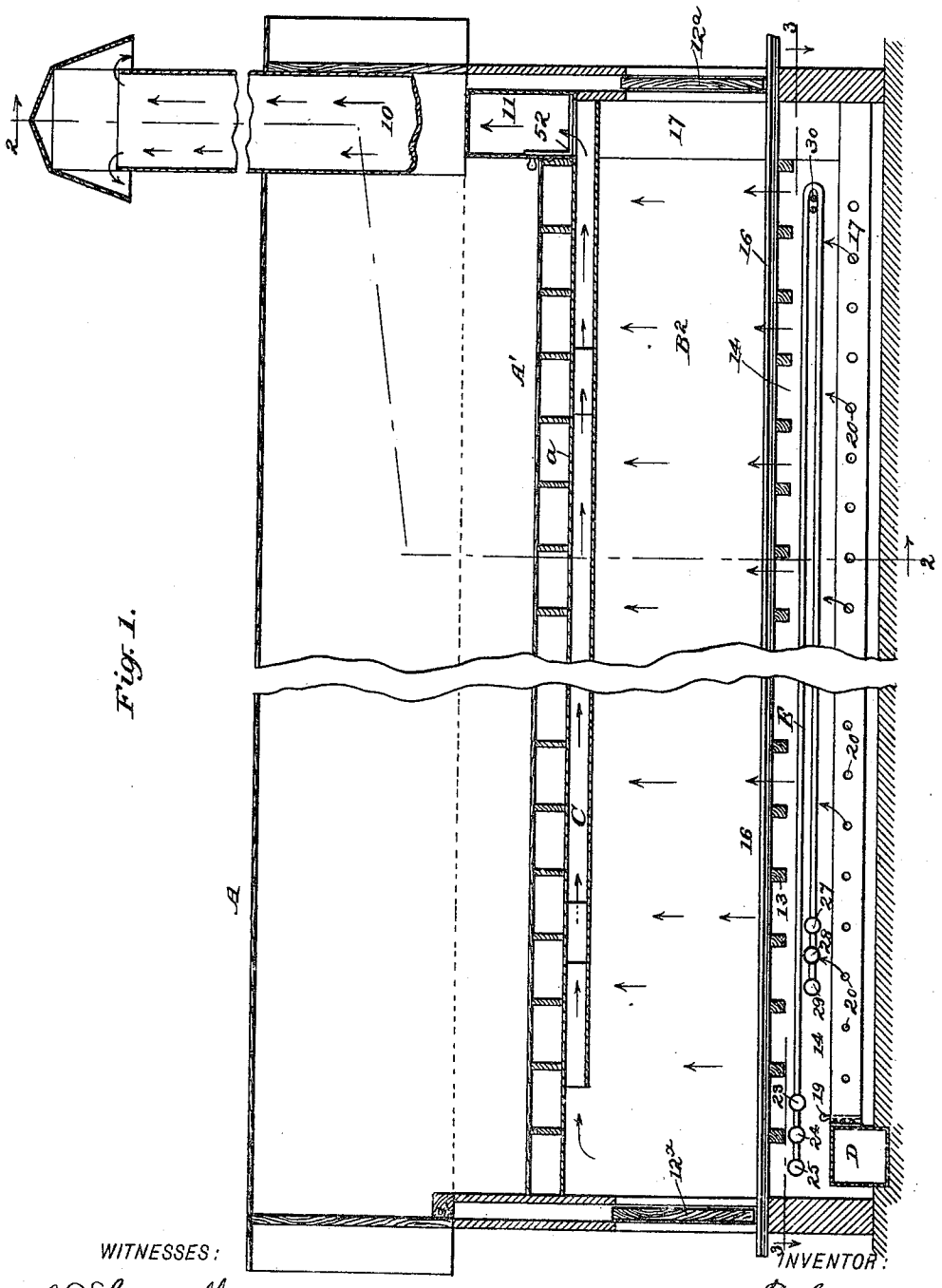


Fig. 1.

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BRICK DRIER.

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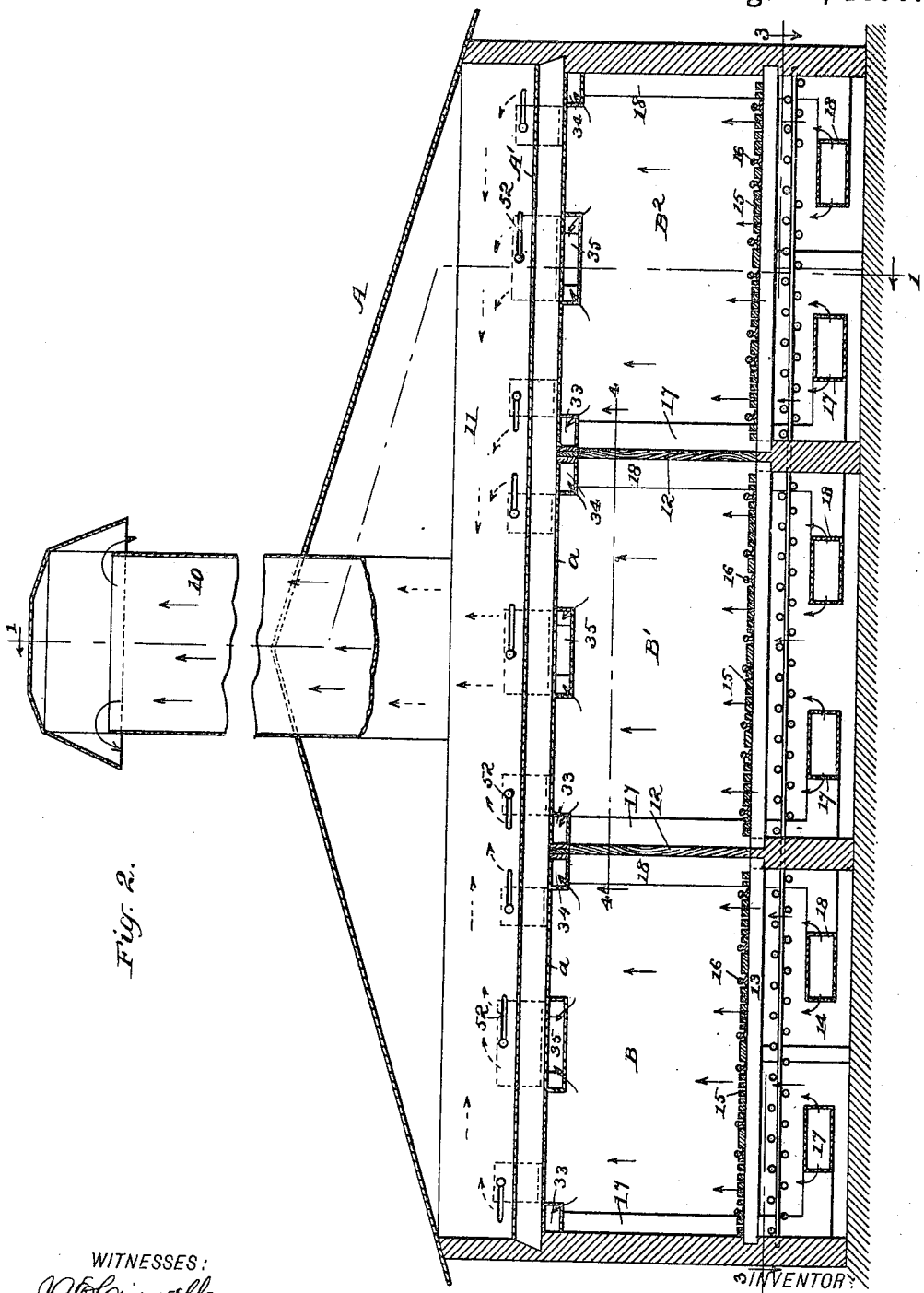


Fig. 2.

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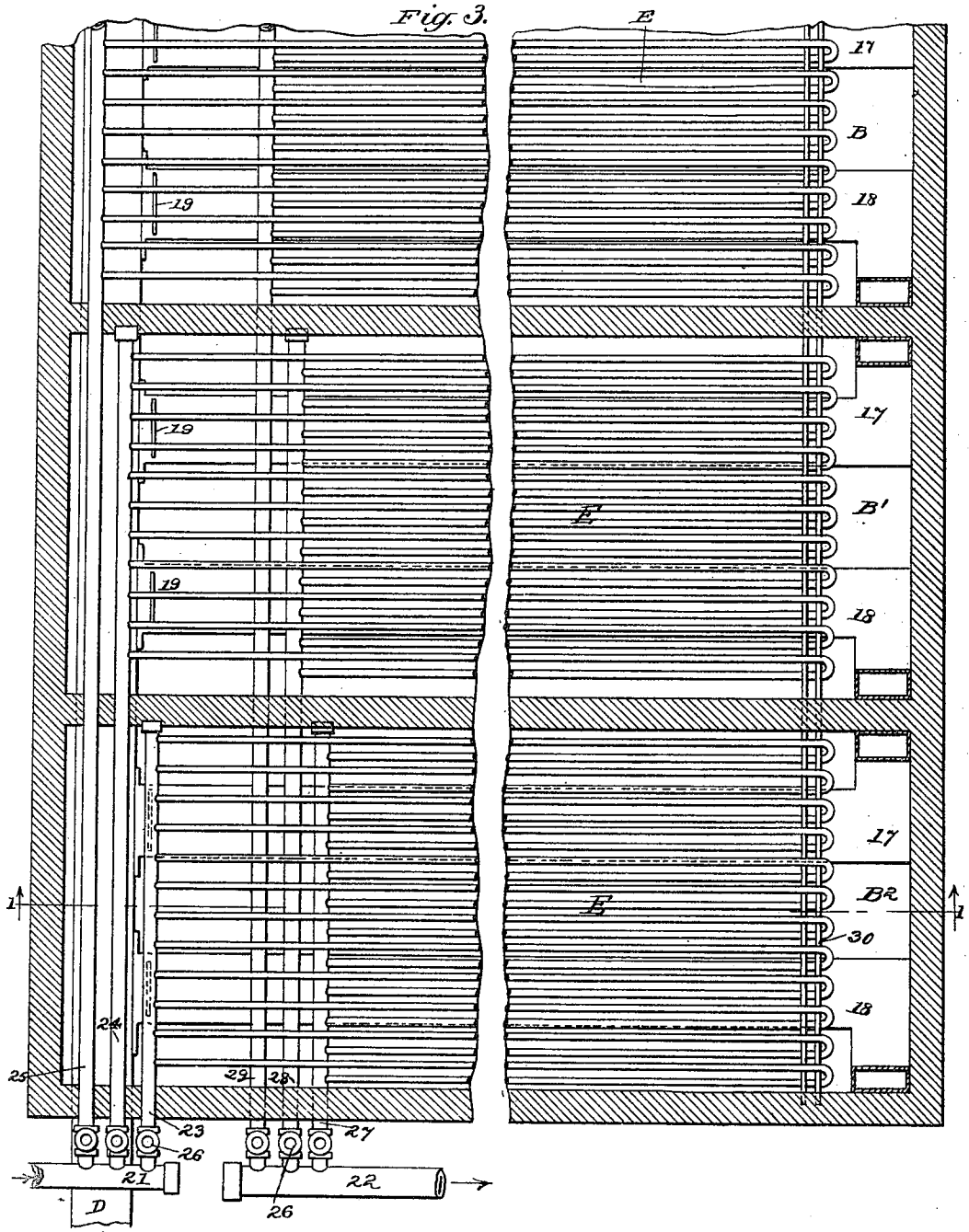
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Fig. 3.



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No. 434,313. Patented Aug. 12, 1890.

Fig. 4.

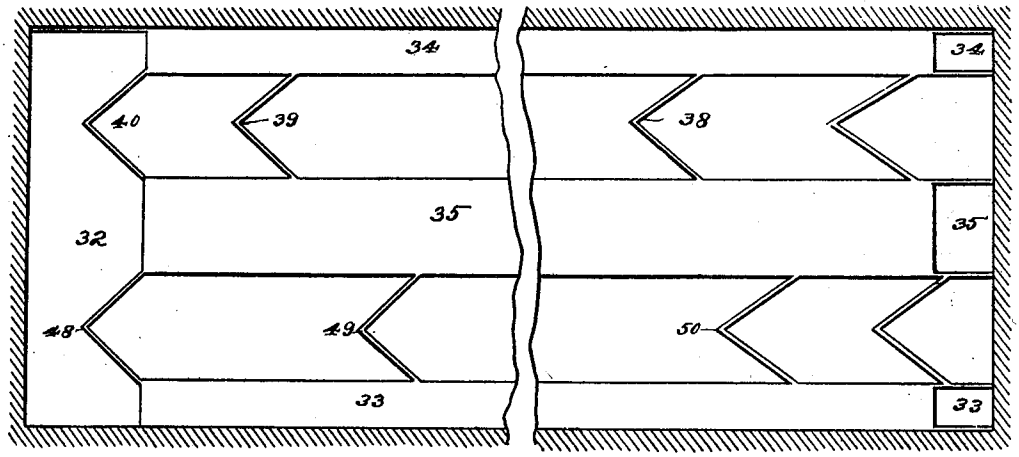


Fig. 5.

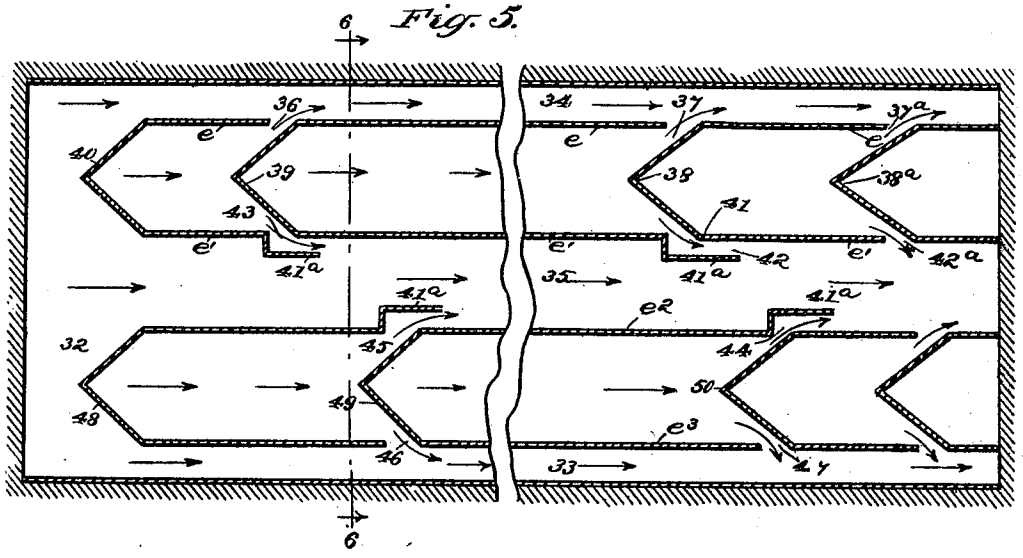
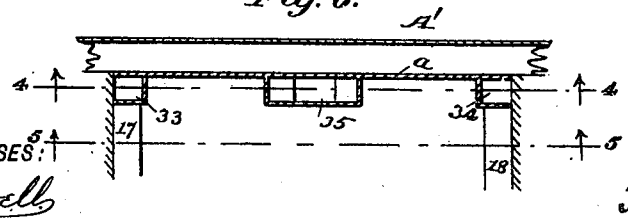


Fig. 6.



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UNITED STATES PATENT OFFICE.

PHINEAS ARNOLD, OF CANAL DOVER, OHIO.

BRICK-DRIER.

SPECIFICATION forming part of Letters Patent No. 434,313, dated August 12, 1890.

Application filed March 4, 1890. Serial No. 342,572. (No model.)

To all whom it may concern:

Be it known that I, PHINEAS ARNOLD, of Canal Dover, in the county of Tuscarawas and State of Ohio, have invented a new and useful Improvement in Brick-Driers, of which the following is a full, clear, and exact description.

My invention relates to an improved tunnel-drier designed for the purpose of drying quickly and cheaply materials of all kinds, more especially clay products, such as brick, sewer-pipe, pottery, &c.; and the invention has for its object to provide a drier having three compartments, more or less, preferably three, under one roof and independent of one another, whereby the process of drying may be carried on in one compartment while the next is being emptied and another filled, or the drying may be carried on in one while the others are idle, or all be employed simultaneously.

A further object of the invention is to provide a means for drawing off the saturated air from the material in process of drying in an effective and expeditious manner, and to construct a simple, durable, and economic drier.

The invention consists in the novel construction and combination of the several parts, as will be hereinafter fully set forth, and pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters and figures of reference indicate corresponding parts in all the views.

Figure 1 is a vertical section taken through the structure from front to rear on the lines 1 1 of Figs. 2 and 3. Fig. 2 is a transverse section taken through the building from side to side on the line 2 2 of Fig. 1. Fig. 3 is a partial horizontal section taken on the lines 3 3 of Figs. 1 and 2. Fig. 4 is a bottom plan view of one of the ceiling-flues, the walls of the compartment being in section, and the section taken on the lines 4 4 of Fig. 2 and 5 5 of Fig. 6. Fig. 5 is a horizontal section taken through the flue illustrated in Fig. 4 on the line 4 4 in Fig. 6; and Fig. 6 is a transverse section through one of the ceiling-flues, the section being taken on line 6 6 of Fig. 5.

In the drawings, I have illustrated a two-story structure A, the flooring A′ of the upper story being above the center, as best shown in Fig. 2; but the shape and size of the structure may be varied as required. A single main offtake flue or chimney 10 is built at the rear central portion of the structure, which leads from and has direct communication with a second offtake-flue 11, located at the rear of said structure and at or above the ceiling-line *a* of the lower story, which flue extends from side to side of the building, as shown in Figs. 1 and 2. The lower story is divided by partitions 12 into three, more or less, preferably three, independent compartments B, B′, and B^2, each of which compartments at front and rear is provided ordinarily with a sliding door 12^a. The floor-beams 13 of the several compartments are laid some distance above the ground to provide for a heating or steam-pipe space 14. The floor of the compartments is so constructed that heat from the space 14 can radiate with the least possible obstruction into the compartments above, the said floor being ordinarily formed by securing to the beams a series of spaced slats 15, laid in movable sections, and when required rails 16 are also laid upon the beams at proper distances apart to accommodate tunnel-cars.

Within the steam-pipe or heating-space 14 a main air-duct D extends from side to side of the building, preferably at the front, which air-duct is provided with two branch ducts 17 and 18 in each compartment. These branch ducts extend within the heating-space to the rear of the compartments, and thence to the sides, as shown in Fig. 3, and upward through the floor—one in each corner—to a connection with the side ceiling-flues, which ceiling-flues are of peculiar construction, and will be hereinafter described.

Each branch 17 and 18 of the main air-duct is provided with a series of apertures 20 in the sides of that portion located within the space 14, and the said perforations are graduated in size, the smallest perforation being located at the front and the largest at the rear. The amount of air that is to pass from the main duct through the branch ducts may be regulated by any suitable or approved form of damper or dampers 19.

Outside of the building, at one side near

the front, a main steam-supply pipe 21 is located, and immediately to the rear of said pipe the discharge or exhaust-steam pipe 22 is supported.

If three drying-compartments are provided in the structure, three branch-pipes 23, 24, and 25 are carried from the steam-supply pipe 21 into the heating-space at the front. The pipe 23 extends transversely through the compartment B^2 only. The second pipe 24 passes through the compartments B^2 and B′, and the third pipe 25 through all of the compartments. Each pipe is provided with a suitable valve 26, whereby steam may be carried to any one compartment or to all of them, as may be desired. The discharge or exhaust-steam pipe 22, which is not only to the rear of the supply-pipe, but is also below the level of the said pipe, is likewise provided with three branches 27, 28, and 29, which extend across the compartments in similar manner to the branch pipes above referred to.

In each compartment a coil of pipe E is formed, extending ordinarily from the front to the rear, and constructed by uniting one end of a series of tubes to the front or delivery branch pipe located in the compartment, bending the tubes downward over supporting-rods 30, or otherwise suspending them from the beams 13 at the back of the compartments and connecting the opposite ends of the tubes with the discharge-branches. Thus a perfect circulation is obtained, and the branch pipes act as the heads of the coils. In each compartment I preferably arrange three ceiling-flues 33, 34, and 35, the said flues beginning a short distance from the front of the compartment and extending to the rear of the same.

In the inner wall *e* of the flue 34, as illustrated in Fig. 5, a series of openings 36 37 37^a, &c., is made at regular distances, and to the rear wall of the opening 37 one end of an angled deflector 38 is joined, which extends across the space intervening the inner wall *e* of the flue 34 and the contiguous wall *e′* of the central flue 35. A similar deflector 39, similarly disposed, is joined to the rear wall of the forward opening 36. The forward extremities of the inner wall *e* of the flue 34 and the wall *e′* of the flue 35 are connected by a third deflector 40, and a similar deflector 38^a, similarly disposed, is joined to the rear wall of the opening 37^a and the wall *e′* of the inner flue 35, and so on with the other deflectors, (not shown,) the purpose of said deflectors being to act as guides to facilitate the passage of saturated air through the openings into the flues connected with the chimney 10.

As above stated, the inner end of the deflectors 38 39 38^a and the rest of the series join the inner wall *e′* of the flue 35; but in said wall is formed a series of openings, as in the wall *e*. Said openings are protected by inwardly-extending angled hoods 41^a, open at the rear, forming thereby channels 42 43 42^a, &c., connecting with the central flue 35, the purpose of the angled hoods being to facilitate the passage of the saturated air into the center flue.

In the wall e^2 of the central flue 35, and likewise in the inner wall e^3 of the side flue 33, a series of openings is made which practically correspond with the openings heretofore described. In the wall e^2 the openings 44 45, &c., are each practically closed by a hood 41^a, which is dispensed with in connection with the openings 46 47, &c., in the wall e^3 of the side flue 33. The forward ends of the walls e^2 and e^3 are connected by an angled deflector 48, corresponding to the deflector 40, and a series of angled deflectors 49 50, &c., spans the space intervening the walls e^2 and e^3, said deflectors being connected to said walls, as shown in Fig. 5.

The flues 33, 34, and 35 are covered, and each of said flues has direct communication with the upper offtake-flue 11; but communication may be shut off between any of the ceiling-flues and the offtake-flue by means of dampers 52, as illustrated in Figs. 1 and 2. As communication is established between the branches of the main air-duct and the flues 33, 34, and 35 and the offtake-flue 11 and chimney 10, such a current of air is obtained that the saturated air emanating from the bricks or articles to be dried rises upward, is gathered into the spaces between the flues 33, 34, and 35, and drawn into said flues through the openings shown in Fig. 5, from whence this hot saturated air passes upward and off through the chimney. This air may be utilized to assist in drying any substance placed in the upper story of the building, if desired, by providing suitable dampers to control the exit of the air from the offtake-flue 11 to the said upper story.

I desire it to be understood that, while specific construction has been shown and described, equivalent construction may be substituted without departing from the spirit of the invention.

In operation, when one compartment of the drier is filled with material the sliding doors at the ends are closed and the steam turned on by its proper valve. The steam passing through the coils E located in the compartment produces a regular heat. The air escaping through the outlets 20, arranged at different points along the sides of the branch air-ducts becomes heated, rises, and coming in contact with the material in process of drying becomes saturated with moisture and passes upward. Owing to the current formed by the three ceiling-flues 33, 34, and 35, connected with the draft stack or chimney, the saturated air is itself drawn off through the openings in the said roof-flues and passes out of the compartments into the draft stack or chimney.

It will be noted that by reason of the lower and upper air-ducts being provided with openings at different points in their length the air and the accumulated saturated air

from the material in process of drying rise to the openings in the roof-flues, thus leaving the material free from the softening and saturating effect of moisture. Thus the material in every part of the compartment is simultaneously dried.

By forming the drier with the several compartments and providing each with an independent heating means the process of drying is greatly facilitated, and the steam can be turned off from the compartment being filled with material to be dried to cool it without turning it off from those that are filled, thus permitting the drying process to be carried on uninterruptedly and without necessitating the workmen to be in heated compartment while filling the same.

In conclusion it may be noted that the main features of the invention consist in the independence of each compartment, the equal distribution of air by means of the ducts, and the instantaneous manner of removing the saturated air by means of the arrangement of draft-flues connected with the ceiling of each compartment.

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

1. The combination, with a chamber provided with a floor having openings therein, and an offtake-flue leading from said chamber, of air-ducts arranged beneath the floor and connected with the offtake-flue, the said air-ducts having perforations formed therein, heating-coils supported between the air-ducts and the floor, ceiling-flues having openings in their sides connected with the offtake-flue and air-ducts, and deflectors arranged between the said flue adjacent to the side openings therein, substantially as and for the purpose specified.

2. The combination, with a structure containing a series of independent chambers, a main air-duct extending from side to side of the structure, branch air-ducts having perforations therein and leading from the main duct within each chamber and having connection with the offtake-flues in the structure, each of the chambers being provided with a perforated floor above the lower section of the branch air-ducts, of a main steam inlet and outlet pipe, independent supply and exhaust pipes carried from the main steam inlet and outlet pipes to each of the several chambers, coils arranged independently within each of the chambers beneath the floor and having connection with the branch steam supply and exhaust pipes located therein, ceiling-flues in each chamber open at their forward ends and having communication with the air-duct and offtake-flues at their rear ends, the said flues being provided with openings in their sides, and deflectors arranged between the flues adjacent to the openings therein, substantially as shown and described, and for the purpose specified.

3. In a tunnel-drier, ceiling-flues consisting of a central flue or channel and an outer flue or channel at each side, which flues extend from the rear of the plate and terminate at a point approximating the forward end, the said flues being provided with openings in their inner walls, angled deflectors connecting the forward walls of the flues, and similar deflectors arranged between the flues near the openings therein, substantially as shown and described.

PHINEAS ARNOLD.

Witnesses:
W. H. ENNIS,
C. K. WHITNEY.