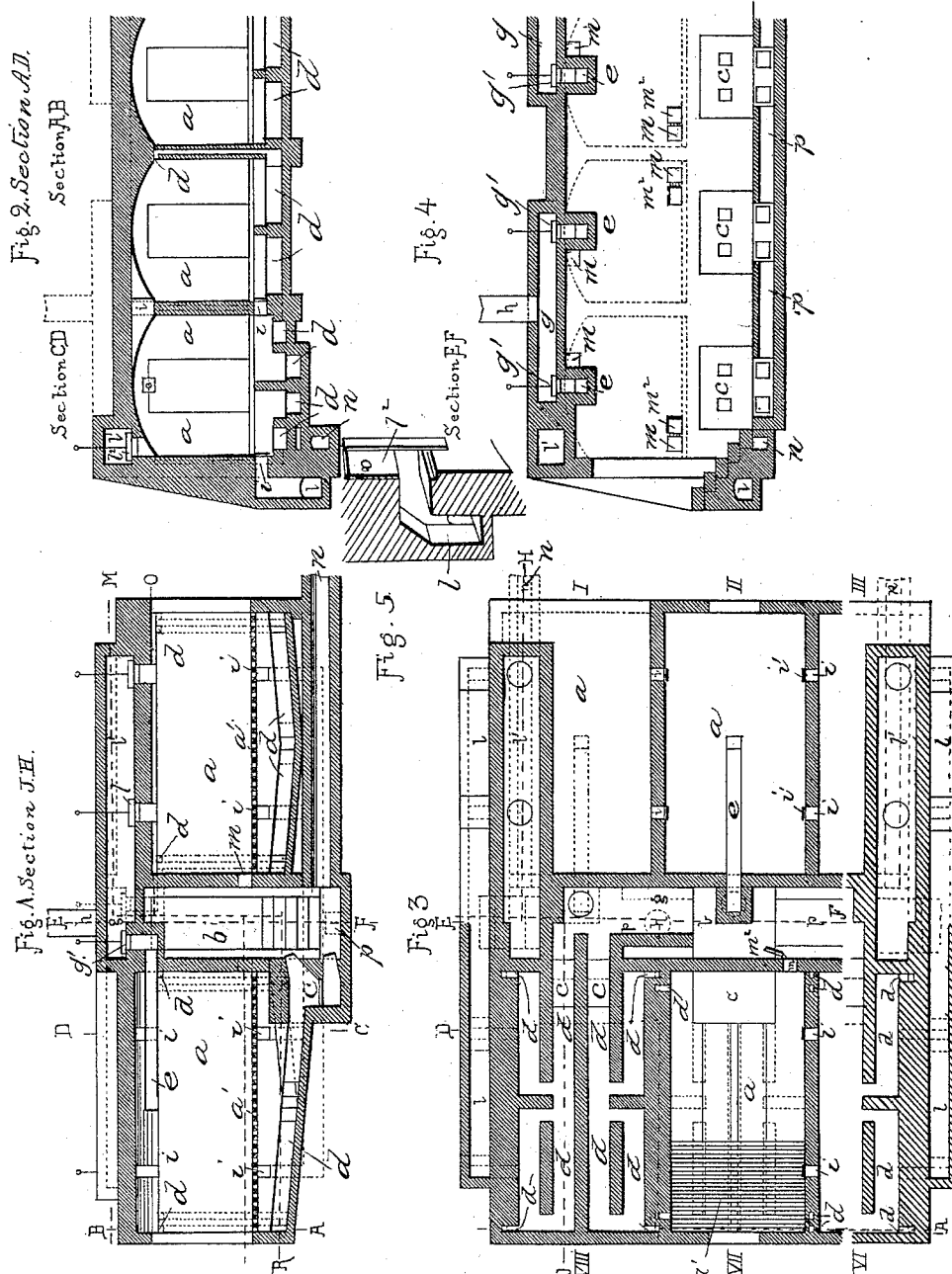


(No Model.)

G. WEIGELIN.
DRYING ROOM.

No. 460,298.

Patented Sept. 29, 1891.



Witnesses:

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UNITED STATES PATENT OFFICE.

GUSTAV WEIGELIN, OF STUTTGART, GERMANY.

DRYING-ROOM.

SPECIFICATION forming part of Letters Patent No. 460,298, dated September 29, 1891.

Application filed May 1, 1891. Serial No. 391,237. (No model.) Patented in Austria-Hungary November 19, 1890, No. 37,254 and No. 59,878.

To all whom it may concern:

Be it known that I, GUSTAV WEIGELIN, a citizen of the Kingdom of Würtemberg, residing at Stuttgart, Würtemberg, Empire of Germany, have invented a new and useful Improvement in Drying-Rooms, (for which I have obtained a patent in Austria-Hungary November 19, 1890, No. 37,254 and No. 59,878,) of which the following is a specification.

My invention serves the purpose of artificially drying moist masses, earths, freshly-formed stone, and earthenware in order that the operation of brick-making establishments, potteries, and cement factories may be continued without interruption throughout the entire year, and therefore, also, in winter when climatic conditions make it difficult or impossible to dry in the open air.

The object of the invention is to utilize to its fullest possible extent the fuel employed.

It is also my object to complete the drying process in a short time, while at the same time the cracking of the stones to be dried will be avoided. This result is attained by causing the bodies to be dried to be heated in gradual stages from chamber to chamber, and, moreover, by introducing the heating gases and smoke which are to carry out the drying process from above. The generated vapors are thus absorbed by the smoke and carried to the chimney.

Figure 1 represents a vertical transverse section of the drying-room taken on the broken line J H, Fig. 3; Fig. 2, a longitudinal section taken on broken line A D, Fig. 3; Fig. 3, a sectional plan in which chambers I, VIII, IV, and V are taken on the broken line R M, Fig. 1, while chambers II and VII are taken on the broken line P O; Fig. 4, a longitudinal vertical central section on line E F, Figs. 1 and 3; and Fig. 5, a detail view showing the arrangement of the slides in the flue l.

As shown, my drying apparatus is preferably in the form of an oblong kiln provided with a central and common passage b, communicating with all the drying-chambers I, II, III, &c., and adapted to be shut off.

The chambers a, arranged to the right and left of the central passage b, are provided

with hearths or fire-boxes c, which are charged from the central passage. The fire is conducted from the fire-boxes c into the flues d d, which are covered with iron plates, and through these under the floor and through vertically-ascending continuations of these flues into the drying-chamber, the vertical continuations being provided with discharge-openings directly under the arched ceiling of the chamber. The products of combustion impart their heat to the chamber, and, having been saturated with the watery vapors arising from the moist charge of the material to be dried, depart through smoke-flue e, entering the smoke-collector g, and thence passing into the open air through chimney h. The passages between the flues e and the smoke-collectors g are controlled by dampers or valves g'. The central passage b is directly connected with the open air by means of the flue n. (See particularly Figs. 1 and 3.) The central passage may, moreover, be brought into circulating connection with each chamber by means of the openings m m', which are adapted to be closed, for example, by means of doors m². The adjoining chambers a a are provided with the perforated or slotted floors a', upon which the material to be dried is placed, and they are connected by circulating openings or ports i i, situated close to the floor and the arched roof and adapted to be tightly closed by slides, (indicated at i'.) As will be noted, the lower ports i are beneath the open or slotted floor a'. In order to establish a circulation extending through the entire system of chambers, the two chambers at each end of the kiln or drier at the right and left of the central passage communicate by means of flues l l', adapted to be closed by means of slides and valves, (indicated at l'.) The fire-boxes are connected by means of the flue or channel p.

As already stated, the drying is carried out in the four chambers, which for the time being constitute a complete series, by a rise of temperature in graduated steps in the respective chambers, so that of the four chambers one alone is actually heated and one is cooling off, while the two others derive their heat

from the one actually heated and the chamber cooling off. For example, when chamber VIII is cooling off (by virtue of the circulation of the air from the central air-passage through said chamber VIII, the doors m^2 of openings m and m' having previously been opened) and chamber I is heated, the adjoining chamber II, which has already received a gentle preliminary heating, derives its heat from chamber I through the ports or openings $i i$, while the still unheated chamber III receives its heat by the influx of the surplus heat from chamber VIII (because the same is being cooled off) passing through opening m' at the top of said chamber VIII and opening into the passage b . This heat passes into the closed passage or flue b , and thence into chamber III by another port m' opening into this chamber. The heated air passing from chamber III proceeds downwardly through the heating-flues $d d$ and fire-box c into the flue p , and is thence conducted to the fire-box c of the heated chamber to support the combustion. The chamber III hence receives its preliminary heat by means of air heated through cooling of chamber VIII, while chamber II, which has already passed through this stage of the heating process, receives a second rise in temperature by circulation of heated air from chamber I, and chamber I finally receives the highest degree of heat from the fire in the hearth.

In the same way that the chambers VIII, I, II, and III form an operative series the chambers IV, V, VI, and VII co-operate by cooling IV, heating V, and preliminarily heating to a greater degree in VI and to a less degree in VII. When the chambers VIII and IV have been cooled, they are emptied and then freshly charged. I and V are then in turn cooled, while II and VI are heated, and so on. The process advances one chamber at each step. Of course any desired number of chambers may be employed, according as required. It is, moreover, not necessary to have exactly four chambers in each operative series; but according to the nature of the matter to be dried and the percentage of water contained in the same, as well as its sensitiveness to cracking, the number of chambers may be correspondingly increased by one or more chambers, or the rise of temperature in the heated chamber may be increased or diminished, the same to be governed always by the saturation of the vapors to an advantageous degree.

By carrying the energetically-acting ventilation over the moist charge instead of through the same the danger of cracking in sensitive articles is removed. The more slowly acting circulation is not prejudicial to the articles and may be regulated, moreover, by the slides. The continuity of the heating-flue being broken by the chamber permits a great portion of the heat to be withdrawn from the smoke in spite of its short path, inasmuch as

it yields its heat much faster by direct contact with the chamber-walls than if the same transmitted its heat through the walls of the heating-tubes. The direct introduction of the products of combustion into the chambers, moreover, enables the articles to be dried without the direct admixture of air, inasmuch as the products of combustion directly absorb and carry off the watery vapors. The introduction, warming, and passage of large quantities of air are thereby dispensed with and a great saving of fuel is also effected.

The management of two series of chambers with a central passage adapted to be closed, together with the other heating-flue and regulating arrangements, permits of the most complete utilization of the fuel, and especially also the recovery of the heat from the dried stones, &c.

Only by the complete exploitation and utilization of the heat which my arrangement offers is it profitable to employ artificial drying processes in practice.

What I desire to claim and secure by Letters Patent is—

1. In a drying apparatus, the combination of a series of chambers, each chamber communicating at top and bottom with the succeeding chamber and provided with valves to separately control the communication, with a common passage communicating with all the chambers at top and bottom, means for separately controlling such communications, and means for separately heating the various chambers, substantially as set forth.

2. In a drying apparatus, a series of chambers provided at top and bottom with slide-controlled ports between the successive chambers, fire-boxes beneath each chamber, flues leading from the fire-boxes to a point near the top of the chambers, and valve-controlled smoke-flues leading from the chambers to the chimney, in combination with a common passage connected with the outer air and communicating with each separate chamber by valve-controlled upper and lower openings, substantially as set forth.

3. In a drying apparatus, the combination of the following parts: a central passage communicating with the outer air, two series of chambers arranged at opposite sides thereof and communicating with each other successively by valve-controlled ports at top and bottom and with the central passage by door-controlled ports, also at top and bottom, fire-boxes beneath the separate chambers, smoke-flues leading therefrom into the chambers near the top thereof, and valve-controlled exit smoke-flues leading from each separate chamber, substantially as set forth.

4. In a drying apparatus, the combination of the following parts: a series of drying-chambers having ports, as i , at top and bottom in their dividing-walls, and slides, as i' , controlling the same, a common passage communicating with the same by door-controlled

ports and also with the outer air, fire-boxes
beneath the chambers provided with flues, as
d, arranged below the floors of the chambers
and extending upward to exits near the top
5 of the chambers, flues, as *p*, connecting the
several fire-boxes, and flues, as *e*, leading from
the top of the chambers to the chimney, sub-
stantially as set forth.

In testimony whereof I have signed this
specification in the presence of two subscrib- 10
ing witnesses.

G. WEIGELIN.

Witnesses:

AUGUSTE B. DRANTZ,
FRIEDRICH ZIMERMANN.