A. O. DUPUY.

DRYING PLANT.

APPLICATION FILED JAN. 21, 1909.

1,067,411.

Patented July 15, 1913.

2 SHEETS—SHEET 1.

Fig. 1

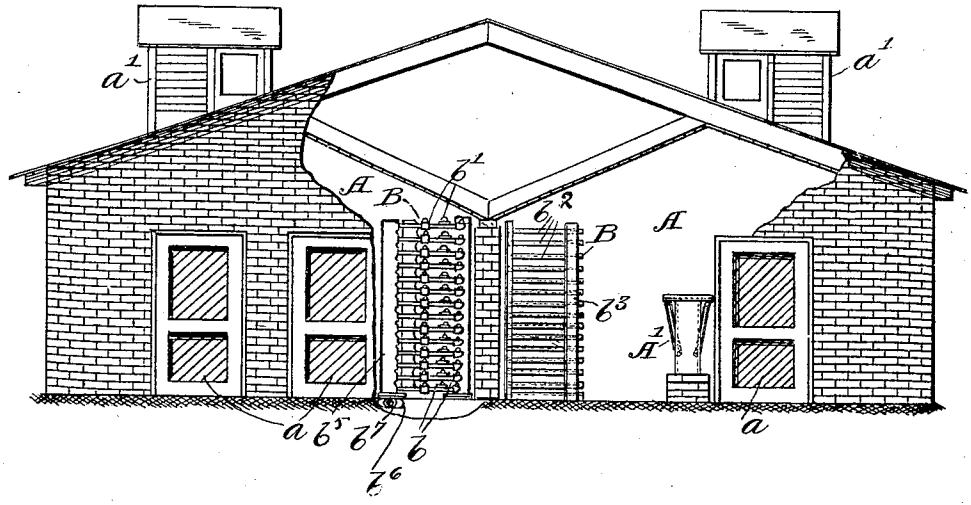


Fig. 2

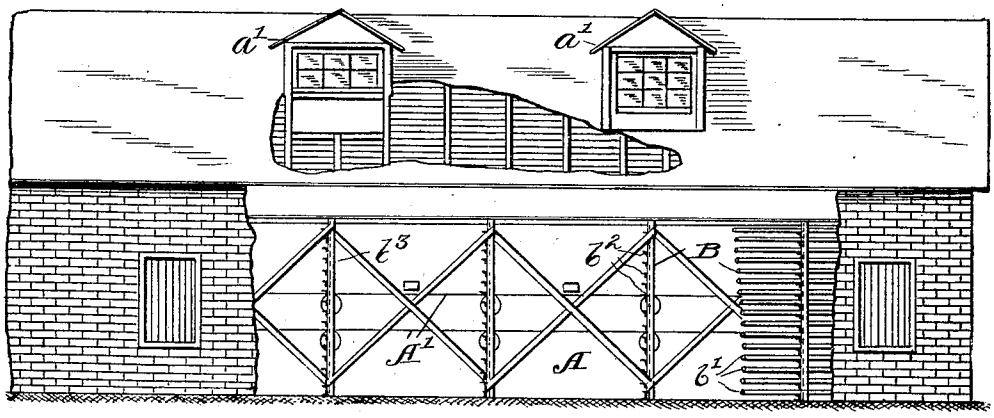
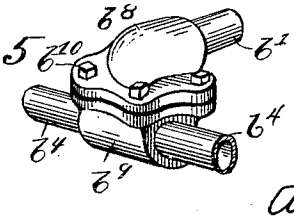


Fig. 5



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2 SHEETS—SHEET 2.

Fig. 3

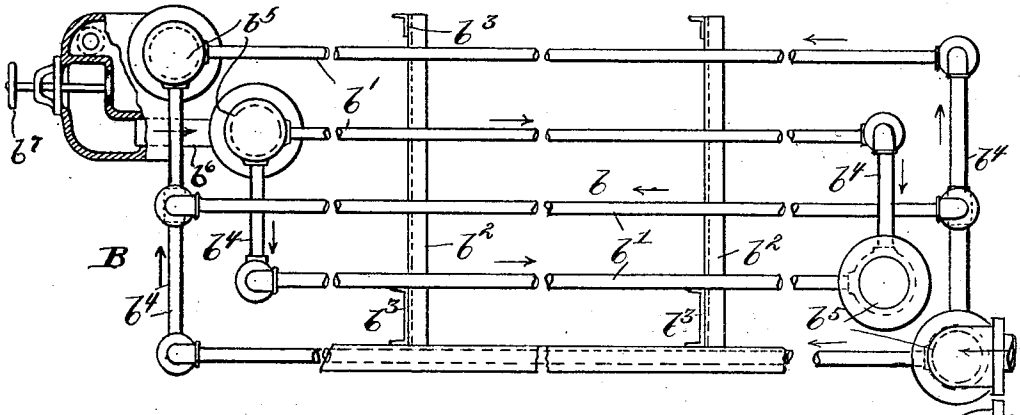
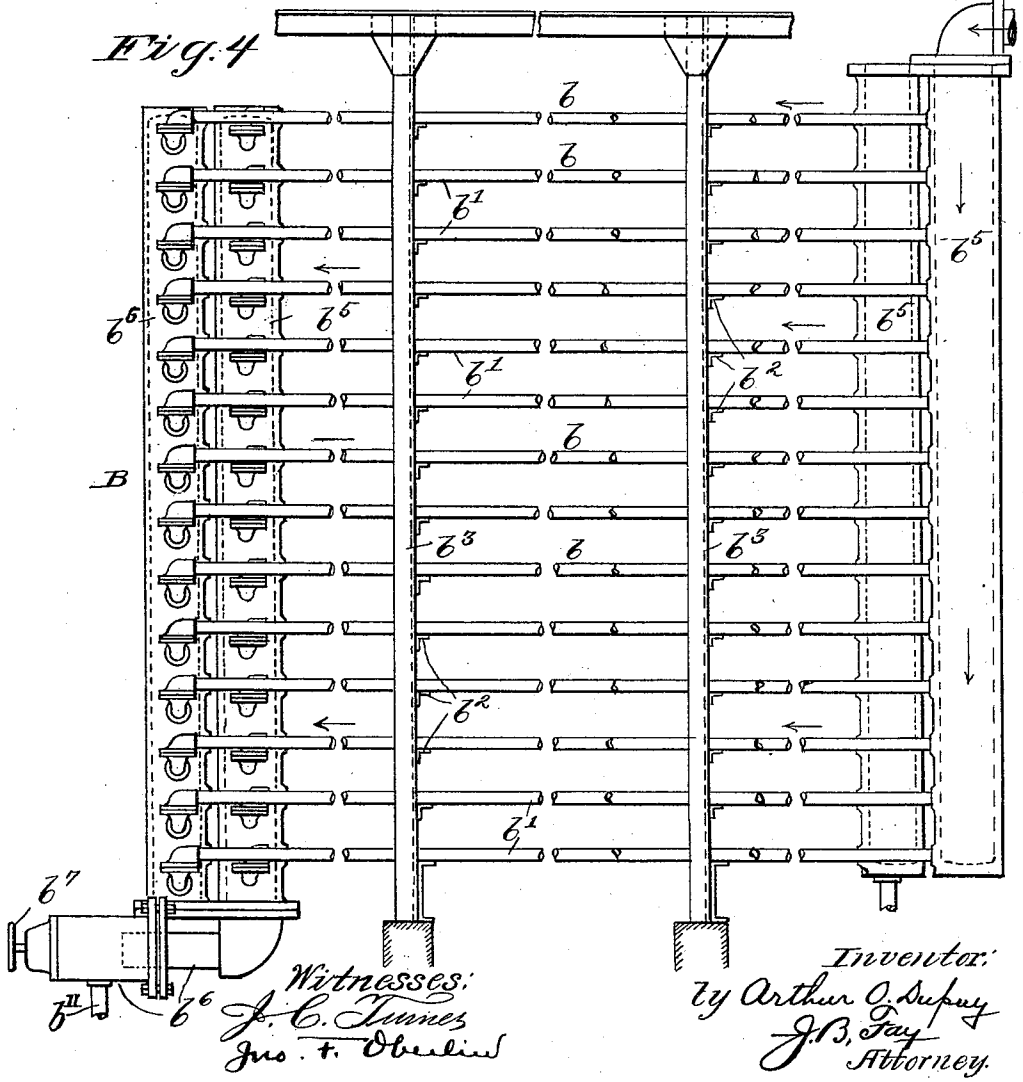


Fig. 4



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UNITED STATES PATENT OFFICE.

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DRYING PLANT.

1,067,411. Specification of Letters Patent. Patented July 15, 1913.

Application filed January 21, 1909. Serial No. 473,412.

To all whom it may concern:

Be it known that I, ARTHUR O. DUPUY, a citizen of the United States, and a resident of Cleveland, county of Cuyahoga, and State of Ohio, have invented a new and useful Improvement in Drying Plants, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

The class of drying apparatus to which the present invention belongs is that utilized in drying brick or other like clay products, wherein a series of racks is provided on which the bricks are placed pending the drying operation. These racks are generally arranged one above the other along the side or sides of the drying chamber, the brick being placed upon pallets of metal adapted to be supported on such racks. In the latter a suitable heating medium, usually steam, either live or exhaust, is circulated to supply the required heat.

The object of the present invention is the provision of a drying plant of this general character, that will be simple in construction, and, more important, one that will require a minimum amount of steam, or in other words, fuel, to operate the same, while at the same time, an equable heating effect is secured throughout the entire series of racks.

A further object, is to so construct the drier that the temperature of the racks, while still maintained thus uniform, may be gradually increased from a relatively low to a higher temperature.

To the accomplishment of the above and related objects, said invention, then, consists of the means hereinafter fully described and particularly pointed out in claims.

The annexed drawings and the following description set forth in detail certain mechanism embodying the invention, such disclosed means constituting, however, but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawings:—Figure 1 is a broken end view of a building equipped with my improved drying apparatus; Fig. 2 is a similar broken side elevation of such building; Fig. 3 is a plan view of one of the series of drying racks; Fig. 4 is a side elevational view of such a series; and Fig. 5 is a perspective view of a structural detail of one of the racks.

Referring first of all to the general views of the plant illustrated in Figs. 1 and 2, the same will be seen to comprise one or more elongated chambers A, along the side walls of which the driers B proper, are disposed. These chambers are provided with suitable doors a for entrance and exit, and with ventilators a' on the roof; while longitudinally of each extends a conveyer A′ upon which the product may be carried to the driers or away therefrom as the case may be. Driers B comprise, as has been indicated, a series of racks arranged one above the other. Each rack b comprises in turn a plurality of pipes b', in the present instance five, that are supported upon transverse bars b^2 secured to vertical posts b^3 along the respective walls of the drying chamber. It is more particularly with the steam supply connections of the pipes thus seen to constitute the several racks of the drier, and with the interconnection of such pipes, that interest at present lies.

Referring then to Figs. 3 and 4, the pipes b' of each rack will be seen to be divided into two sets of three and two each, so arranged as to alternate the one with the other. The ends of each set are connected by transversely disposed pipes or manifolds b^4, and such transverse manifold of each set is in turn connected with a vertically disposed manifold b^5, of which there will thus be seen to be two at each end of the series of racks, located at opposite corners thereof. Steam for heating the racks is supplied to one manifold b^5 only, (the one in the lower right hand corner of Fig. 3) or in other words, such steam is admitted directly to but one of such sets of pipes whereof each rack is seen to consist. Steam will be admitted to the other set only after passing through such first set, an expansible and contractible connection b^6 being provided for this purpose at the farther end of the racks between the corresponding manifolds. This connection, however, is controlled by a suitable valve b^7, so that the second set of pipes need not be supplied with steam, unless desired. A suitable drain pipe b^{11} is attached to the connection b^6.

In order that the pipes b' may provide an unobstructed and level support for the pallets, upon which the material to be dried is

placed, I support such pipes in a plane above the several transverse pipes or manifolds b^4 with which they are terminally connected. For convenience in assembling the pipes, as well as to permit such desired disposition thereof, I employ a specially designed fitting to effect such connection between their ends and such manifold. One form of such fitting is illustrated in Fig. 5, and will be seen to comprise two separable members into one of which b^9 is threaded the sections of the transverse manifold while the end of the rack pipe is threaded into the other b^8. These members are then clamped together with a suitable intervening layer of packing, by means of bolts b^{10} or the like, so that a good steam-tight joint is secured. At the same time the transverse pipes have sufficient spring to provide for the expansion and contraction of the longitudinal rack pipes, and thus do away with the necessity for a large number of expansion joints, such as have been found necessary in prevailing types of driers.

As result of the construction of my drier, and particularly the manner in which I interconnect the sets into which the pipes of each rack are divided, it will be seen that I secure a circulation of the heating medium through such sets in opposite directions, so that the end of the radiator is located adjacent to its beginning. The heating effect that is secured from the condensation of the steam in its component pipes is thus equalized throughout the length of the rack, and the difficulty heretofore encountered of having the material dry too rapidly at the end to which the steam is first admitted, and too slowly at the opposite end, is hence entirely done away with. At the same time, by simply closing the by-pass valve b^7 controlling the connection between the two sets of pipes, I am enabled to cut off the steam entirely from the one set, reducing the radiating surface by two-fifths. This arrangement is particularly desirable at the beginning of the drying operation in case of tender clay, the by-pass being kept closed for a few hours, until the clay becomes firm enough to stand the higher temperature secured when the full amount of pipe is in circuit.

It will also be noted that by dividing the pipes entering into each rack into two sets, the pipes of one set alternating with those of the other set, a substantially uniform distribution of heat is secured transversely of said rack irrespective of whether the steam is supplied at one end only, or is allowed to traverse the whole series of pipes by opening the by-pass valve b^7. Furthermore, significance is to be attached to the use of a header or manifold at the farther end of the first set of pipes wherein the temperature of the heating medium may be equalized before being admitted to the return line of pipes. It will be evident that the steam discharged from the top rack will be at a higher temperature than that discharged by the bottom rack under ordinary circumstances, but by the arrangement in question this difference in temperature is equalized, and a much more uniform heating effect thus secured, all of which is highly desirable in dealing with a product of the kind in hand.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means stated by any one of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:—

1. In a drier, a rack comprising a plurality of pipes disposed in two sets, the pipes of one set alternating with those of the other, connections for supplying the heating medium to one set of pipes at one end of said rack, and independently controllable connections for supplying such medium, after passing through such first set of pipes, to the other set at the other end of said rack.

2. In a drier, a rack comprising a plurality of pipes divided into two sets, separate manifolds at the ends of each such set, steam supply connections to one manifold of one set of pipes, and a valve-controlled connection between the other manifold of such set and the corresponding manifold of the other set of pipes, whereby the steam, after passing through the first set, may be passed through the second set in the opposite direction when desired, the pipes of one set alternating with those of the other, whereby a substantially uniform distribution of heat transversely of said rack is secured whether steam is passed through said second set or not.

3. In a drier, a rack comprising a plurality of pipes divided into two sets, separate manifolds at the ends of each such set, steam supply connections to one manifold of one set of pipes, an expansible and contractible connection between the other manifold of such set and the corresponding manifold of the other set of pipes, and a valve controlling such connection, whereby the steam after passing through the first set, may be passed through the second set in the opposite direction when desired, the pipes of one set alternating with those of the other, whereby a substantially uniform distribution of heat transversely of said rack is secured whether steam is passed through said second set or not.

4. In a drier, a series of racks arranged one above the other and each comprising a plurality of pipes, the pipes of each rack being divided into two corresponding sets and the pipes of each set being so disposed

as to effect a substantially uniform distribution of heat transversely of the rack independently of the other set, separate manifolds at the ends of each series of such sets of pipes, steam supply connections to one manifold of one such series, and a valve-controlled connection between the other manifold of such series and the corresponding manifold of the other series of sets of pipes, whereby the steam, after passing through such first series, may be passed through the second series in the opposite direction.

5. In a drier, a series of racks arranged one above the other and each comprising a plurality of pipes, the pipes of each rack being divided into two corresponding sets, separate manifolds at the ends of each series of such sets of pipes, steam supply connections to one manifold of one such series, and a valve-controlled connection between the other manifold of such series and the corresponding manifold of the other series of sets of pipes, whereby the steam, after passing through such first series, may be passed through the second series in the opposite direction, the pipes of one set alternating with those of the other set, whereby a substantially uniform distribution of heat transversely of the rack is secured, whether steam is passed through said second series of sets or not.

6. In a drier, a series of racks arranged one above the other and each comprising a plurality of pipes, the pipes of each rack being divided into two corresponding sets, separate manifolds at the ends of each series of such sets of pipes, steam supply connections to one manifold of one such series, an expansible and contractible connection between the other manifold of such series and the corresponding manifold of the other series of sets of pipes, and a valve controlling such connection, whereby the steam, after passing through such first series, may be passed through the second series in the opposite direction when desired, the pipes of one set alternating with those of the other, whereby a substantially uniform distribution of heat transversely of said rack is secured whether steam is passed through said second set or not.

Signed by me this 2nd day of January, 1909.

ARTHUR O. DUPUY.

Attested by—
MARY GLADWELL,
JNO. F. OBERLIN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."