No. 614,258. Patented Nov. 15, 1898.

H. A. WHEELER.

ART OF SETTING TILES IN KILNS.

(Application filed May 21, 1898.)

(No Model.)

Fig. 1.

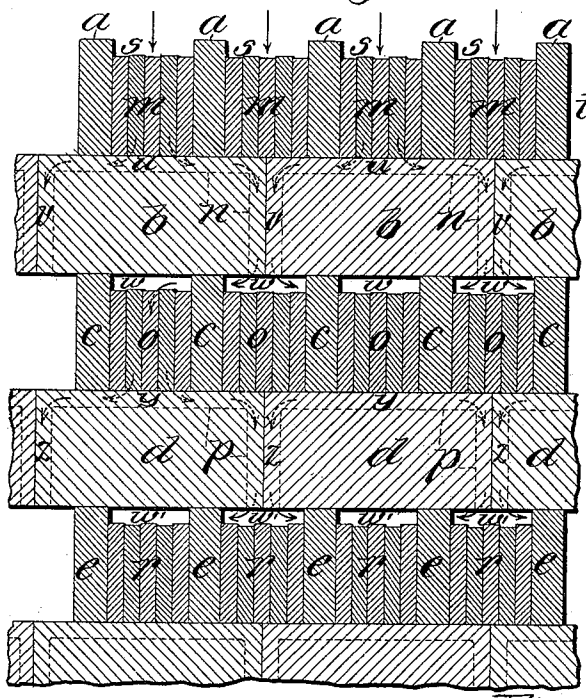


Fig. 2.

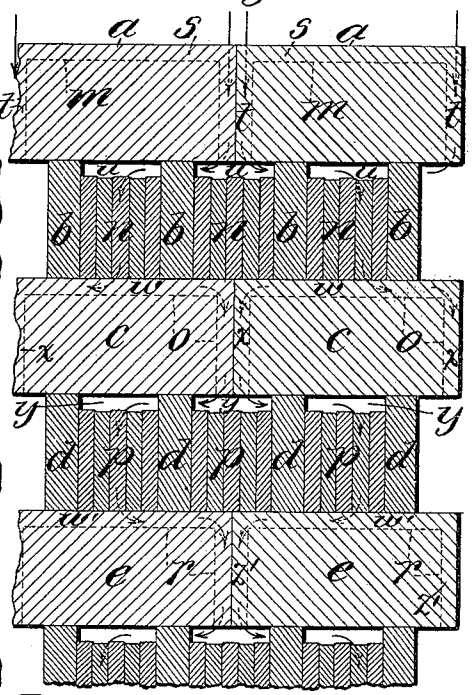
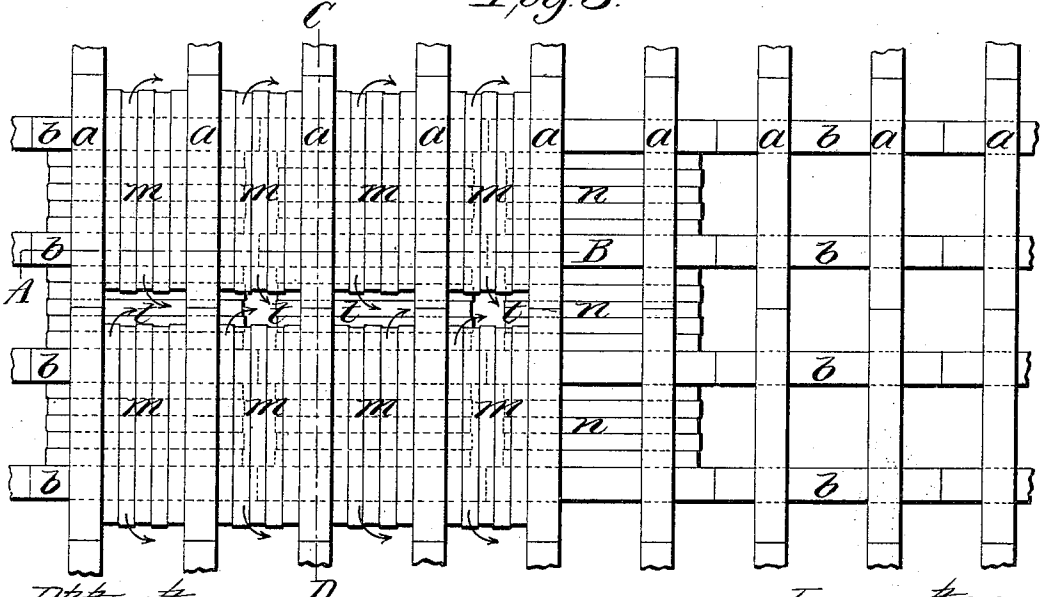


Fig. 3.



Attest:

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UNITED STATES PATENT OFFICE.

HERBERT ALLEN WHEELER, OF ST. LOUIS, MISSOURI.

ART OF SETTING TILES IN KILNS.

SPECIFICATION forming part of Letters Patent No. 614,258, dated November 15, 1898.

Application filed May 21, 1898. Serial No. 681,396. (No model.)

To all whom it may concern:

Be it known that I, HERBERT ALLEN WHEELER, a citizen of the United States, residing at the city of St. Louis, in the State of Missouri, have invented a new art or method or process of setting tile and other thin forms of clay in a kiln preparatory to burning the same; and I declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to follow and utilize the same.

The art or method or process is adapted to the setting in a kiln for burning of tile or other sheet-like forms of clay goods—such as roofing-tiles, flooring-tiles, thin slabs of refractory goods, &c., and especially the thin sheets known as "clay shingles," for in this class of clayware, that have considerable length and width, but slight thickness, the tendency to warp, twist, check, crack, and break is very great during the period of burning the same from the great difficulty of being able to secure uniform drying, heating, shrinking, and cooling by the various methods or processes of setting now in use, and in consequence the loss is very great. These difficulties arise from the tile or other thin goods being so set or arranged that they are not equally heated in all directions, which causes warping, twisting, checking, and cracking, or else they are not free to first expand when the kiln is first heated and subsequently shrink when the burning is further advanced from the weight of overlying tile or material that rests upon them, and which causes twisting, checking, cracking, and breaking of the tile, because the individual tile are not free to move, for if clay goods are unequally heated they warp and twist toward the side which dries or is heated first, and unless the clay is very tough it is also apt to check or crack or even break from unequal drying, heating, or cooling. Again, if the clay goods are so set or arranged that they are weighted down by overlying material resting on them this interferes with the free movement for the expansion and subsequent contraction or shrinkage that occurs in the process of burning, and more or less warping, checking, cracking, and even breakage is apt to result in consequence, besides which internal strains are produced in the individual tile, which greatly affect its strength and toughness, because of the interference in contraction caused by the overlying weight. Thin goods especially, like clay shingles, feel these effects very severely, and in consequence the losses from warping, checking, and breakage are very large, besides which the few first-class goods that are produced are lacking in toughness.

The object of my invention is to so set or arrange the tile, &c., as to overcome unequal heating and cooling, thereby avoiding all tendency to warp, twist, check, and crack, and to so set the goods that no weight rests on them, and consequently they are free to expand or contract, which prevents the twisting, checking, cracking, and breakage that occur when they carry the overlying material, while it results in a much tougher, stronger tile from the absence of the internal strains that arise from such overlying weights interfering with the free movement of the internal particles in shrinking.

With this object in view my invention consists of an art or method or process of setting or arranging tile and other thin clay products by which the heat passes equally on all four sides of the tile during the operation of burning in the kiln by means of special passages or ducts or ports that completely encircle or girdle the tile, except where the tile rests on the saggar-blocks, while the tile or other thin clay goods are so carried by special blocks or saggar-tile that no weight rests upon them, so that they are free to expand or shrink, and hence there is no tendency to warp, twist, check, crack, or break, while the burned tile are much stronger because the freedom of movement allows the internal particles to accommodate themselves to the different conditions of burning and cooling without setting up internal stresses.

In the drawings herewith annexed to illustrate the method or process similar letters represent similar parts.

Figure 1 is a longitudinal section on the line A B. Fig. 2 is a cross-section on the line C D, and Fig. 3 is a plan showing the arrangement of the tile and the supporting saggar-blocks.

My method of supporting and carrying the

tile, clay shingles, or other thin clayware is to set the thin ware that is to be burned in a kiln in parallel contiguous series or packets *r*, and these packets rest on edge or vertically between parallel hard-burned saggar-blocks *e e e*. On these blocks *e* are set another series of packets of tile *p p p*, also on edge and at right angles to *e*, which rest on the blocks *e* and which are supported laterally by a set of blocks *d d d*, which are at right angles to *e*. Another set of blocks *c c c* rest on the blocks *d* and at right angles to them and between which are the packets of tile *o o o*. Similarly blocks *b b b* rest on and at right angles to *c*, between which are the packets of tile *n n n*, and another set of saggar-blocks *a a a* rest on and at right angles to *b*, between which are the packets of tile *m m m*. Similarly by this method of carrying the tile, &c., to be burned on and between saggar-blocks made of hard-burned refractory material the kiln can be set indefinitely in a lateral, longitudinal, or vertical direction. By this method of carrying the unburned thin clay goods in packets or parallel series in pockets formed in and carried by independent built-up saggar-blocks there is no weight resting on the green clay goods, which are at liberty to expand and contract or shrink without hindrance, and consequently there is no tendency for them to warp, check, crack, or break, or to be rendered brittle and weak from internal strains that result when the clay goods have to carry the weight of overlying material.

The vital feature in the successful application of this method of using saggar-blocks consists in my improvement in having the saggar-blocks appreciably larger than the tile or thin goods that are to be burned both in length and height, so that passages or openings are formed over the tile, at each end of the tile, and under the tile. Thus the saggar-block *a* is longer than the tile *m* that is to be burned, thus leaving a passage or duct *t t* at each end of the tile *m*. The saggar-block *b* is similarly longer than the tiles *n*, thus leaving the ducts or passages *v v* at each end of the tiles *n*. It is also higher than the tiles, so that it leaves the passage or duct or opening *u u* over the tiles *n* and under the tiles *m*. The greater length and height of the saggar-block *c* than the tiles *o* forms the ducts or passages *x x* at each end of *o* and the passages *w w* over the tiles *o* and under the tiles *n*. Similar differences between the sizes of the saggar-blocks and the tiles or clay shingles to be burned leaves the vertical series of ducts or passages *t v x z z'*, the longitudinal horizontal ducts or passages *u* and *y*, and the lateral horizontal ducts or passages *s*, *w*, and *w'*. Furthermore, these vertical, lateral, and longitudinal ducts or passages all communicate with one another, and hence from the top to the bottom of the kiln, from side to side of the kiln, and from end to end of the kiln, and consequently give an unbroken though tortuous passage for the air, heat, vapor, and gases of the kiln to pass completely through the entire contents of the kiln by going over the tops, down the sides, and along the bottom of every packet of tile in the kiln, whether it be a downdraft, sidedraft, or updraft kiln. Furthermore, every tile or clay shingle, as *n*, has the heat (or cooling-air) pass equally over the top at *u u*, down the sides or ends of the tile at *v v*, and under and along the bottom *w w*, and consequently as it is heated equally on all sides there is no tendency to warp, twist, check, or crack. The size of these ducts or passages, formed by making the saggar-blocks larger than the tiles to be burned, will be varied to suit the size of the kiln, kind of fuel used, character and shrinkage of the clay to be burned, and has to be determined for the local conditions of each kind and character of clay, size of the tile, kiln, and kind of fuel employed.

The size and character of the saggar-blocks for forming the pockets in which the packets of tile or thin clay goods is to be burned will depend on the size of the kiln, character of the goods to be burned, temperature employed, and character of the refractory clay with which they are made, and they are kept as small as is consistent with good practice.

If more than one size or kind of thin goods is to be burned, different sizes and kinds of saggar-blocks can be employed, provided each size is kept in and forms one horizon or stratum, so as to enable the ducts or passages to be maintained unbroken or not interrupted in their intercommunication.

The saggar-blocks can be made with square ends and form a butt-joint, as shown in the figures, in abutting against one another, or else to form a better support for the green ware they can be made with beveled ends and form a scarf-joint or an overlapping joint.

The spacing of the saggar-blocks and the number required under each packet of tile will depend on the clay to be burned, its shrinkage, and the size of the tile, as the less the amount of shrinkage the greater can be the distance between the saggar-blocks.

The packets are illustrated as being set in vertical series, supported by parallel saggar-blocks on each side of each packet, and resting on other saggar-blocks below that run at right angles to the same, as this will generally give the largest capacity for the least space; but when desirable, as in round kilns, &c., they can be set slanting or diagonally to accommodate special conditions, provided that the continuity of the ducts or passages are unbroken and that the heat passes equally around all the packets of tile.

Where it is necessary to use large-sized saggar-blocks in order to burn large tile, it may be found more convenient to subdivide the saggar-blocks into two or more smaller or narrower tile that are superimposed on one another to make the saggar-blocks lighter and easier to handle.

Having thus described my invention, what

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

1. A method or process of setting tile and other thin clay products in a kiln, for burning, which consists in setting them in packets composed of a series of parallel contiguous tiles, carrying said packets on and supporting them laterally by refractory blocks, and leaving open a series of passages or ducts over, under, and at each end of every packet of tile by having said refractory blocks of greater length and width than the tile to be burned, substantially as shown and described.

2. The combination of saggar-blocks in series of parallel blocks, with one series of parallel saggar-blocks resting on and at right angles to another series, with each series of parallel saggar-blocks alternately resting on and at right angles to the series immediately beneath, with each series forming pockets or spaces for the reception of packets of tile, with each saggar-block having greater length and width than the tile thereby forming passages or ducts over the tops, down the sides, and underneath said packets of tile, substantially as described.

3. The combination of abutting saggar-blocks in series of parallel blocks, with one series of parallel abutting saggar-blocks resting on and at right angles to the series of parallel abutting saggar-blocks immediately beneath, with each series of parallel abutting saggar-blocks alternately resting on and at right angles to the series of parallel abutting saggar-blocks immediately beneath, with each series forming pockets or spaces for the reception of packets of contiguous parallel tile or other thin clay products, with each saggar-block having greater length and width than the tile thereby forming unbroken passages or spaces or ducts around said packets of tile, substantially as shown and described.

In testimony whereof I herewith affix my signature in the presence of two witnesses.

HERBERT ALLEN WHEELER.

Witnesses:

WM. H. SCOTT,

RALPH KALISH.