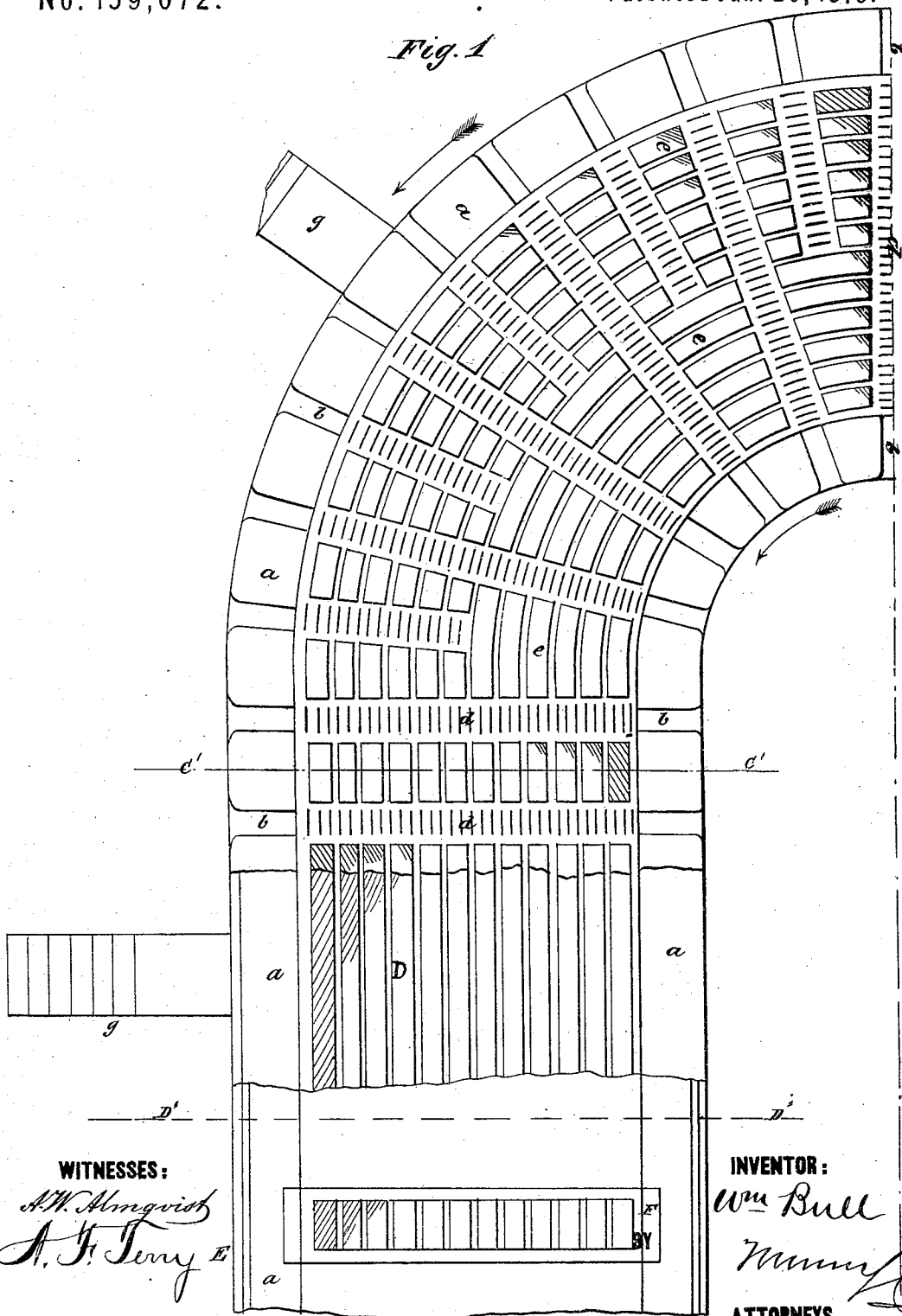


W. BULL.
Brick-Kiln.

No. 159,072.

Patented Jan. 26, 1875.

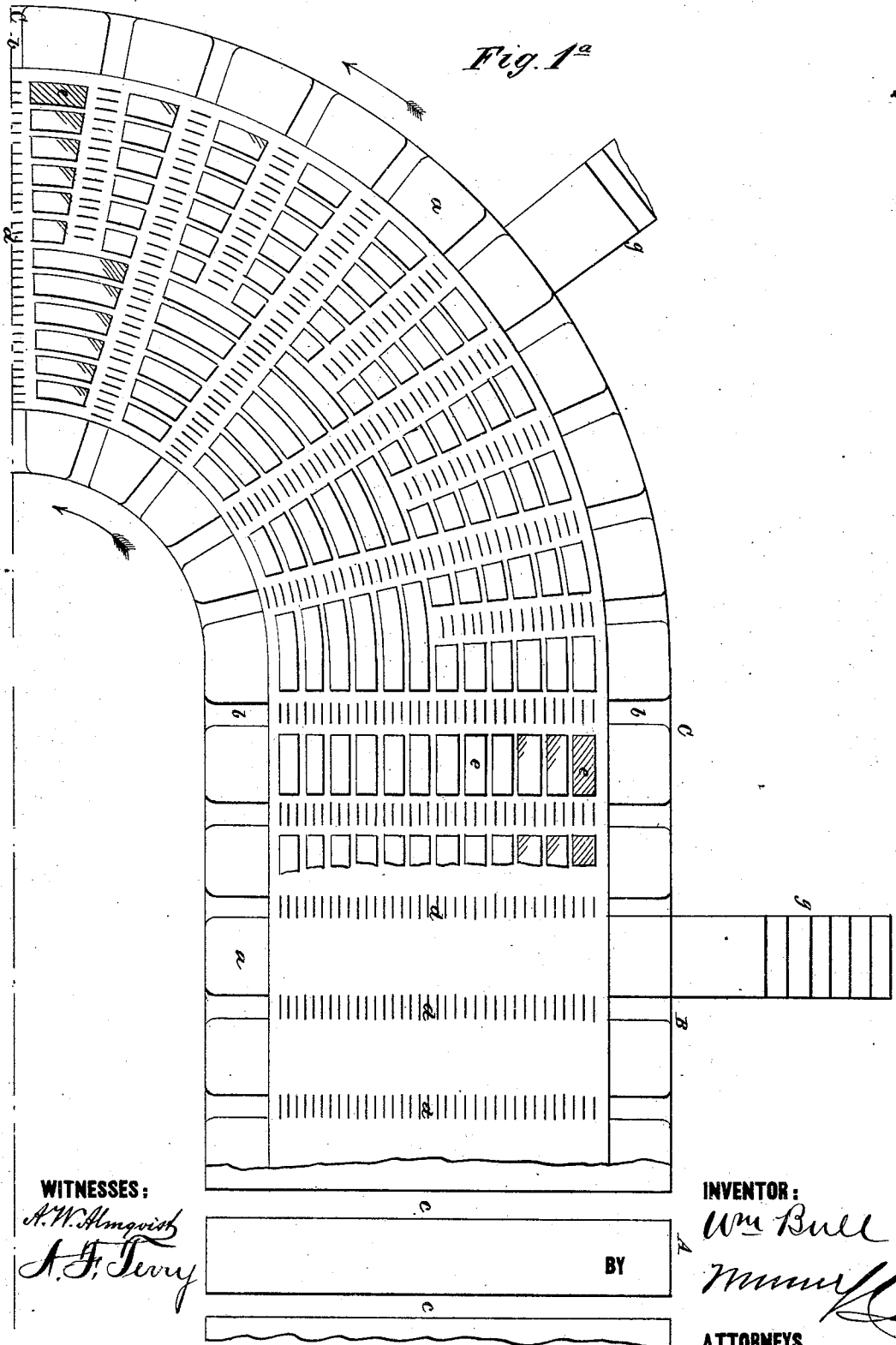
Fig. 1



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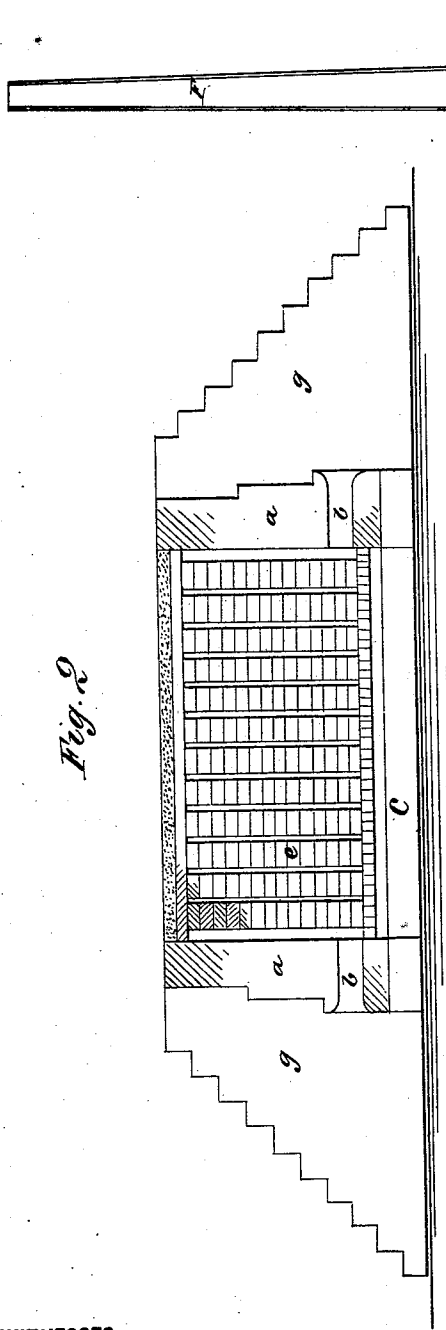
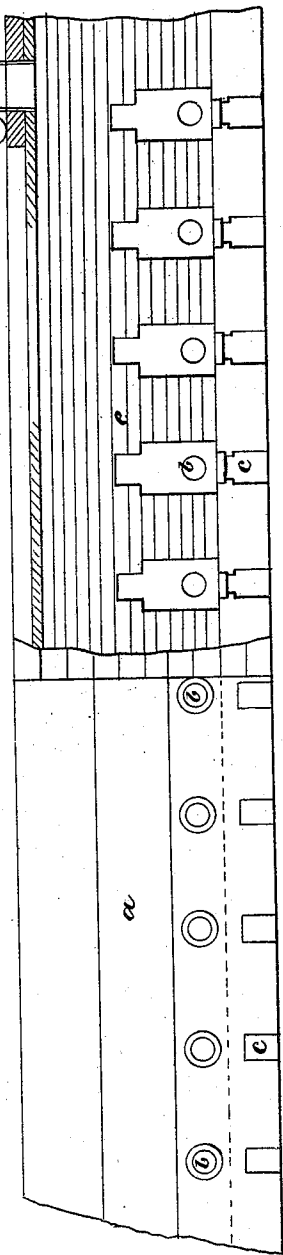


Fig. 2

Fig. 4



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Fig. 3

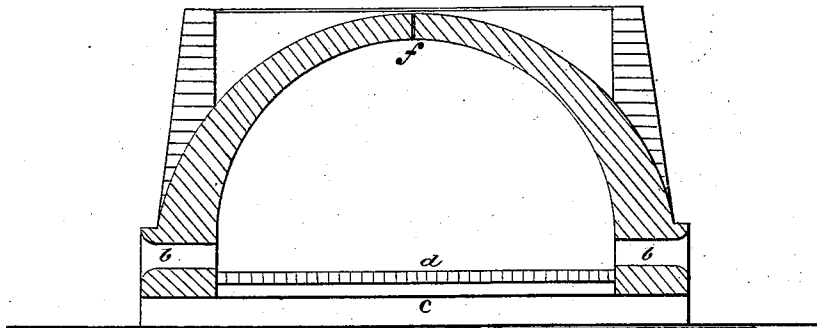


Fig. 7

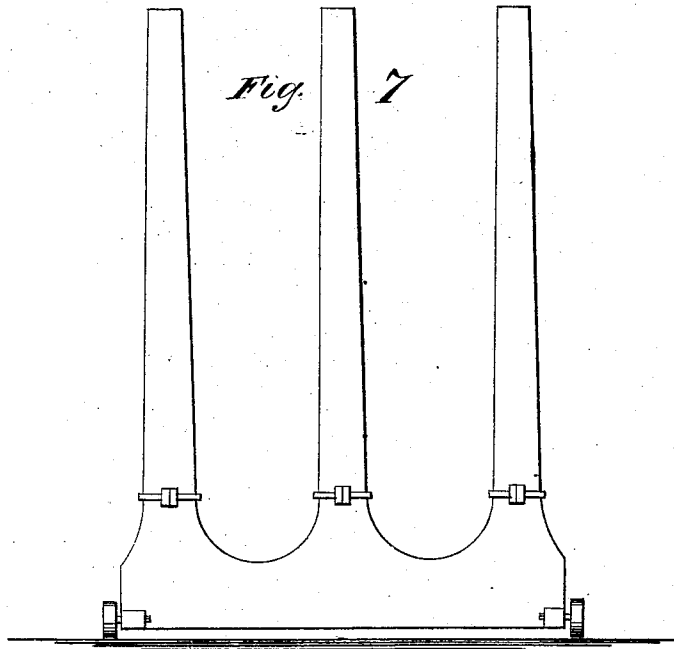


Fig. 5 *Fig. 6*



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UNITED STATES PATENT OFFICE.

WILLIAM BULL, OF EWELL, ENGLAND.

IMPROVEMENT IN BRICK-KILNS.

Specification forming part of Letters Patent No. **159,072**, dated January 26, 1875; application filed December 5, 1874.

To all whom it may concern:

Be it known that I, WILLIAM BULL, of Ewell, in the county of Surrey, England, civil engineer, have invented Improvements in Flame, Kilns, or Ovens for Baking or Burning Bricks or other goods by means of continuous firing, of which the following is a specification:

The kiln may be, in plan view, of a circular, oblong, or any other continuous form; the walls to be parallel and vertical, eight feet, more or less, in height, and twelve feet, more or less, apart. At the bottom of each wall openings, about nine inches wide and twelve inches high, should be left at intervals of three feet, more or less. The floor is then to be built between the parallel walls of the kiln eighteen inches, more or less, in height, the openings in the walls, already alluded to, to be carried across the whole width through the flooring, and to be covered in with bricks set apart or with fire-bars of metal, to allow of the ashes dropping through and being withdrawn through the openings in the kiln walls already described. A few inches above each ash-flue, a circular or square firing-flue is to be left for the insertion of the fuel. These flues are to be kept closed by any convenient method, except when putting in fuel. The bricks or goods to be burnt are to be set close together in walls one brick's length in thickness parallel to the kiln-walls. Between the walls of green bricks and the kiln-walls a space of four and a half inches is to be left, and between the walls themselves a space of three inches is to be left. These spaces are for draft-passages, and communicate with outlets at intervals, to be hereafter described. Opposite each firing-flue, or over the ash-flue and fire-bars, an opening is to be left in the walls of green bricks eighteen inches, more or less, wide, and two feet, more or less, high; the whole taken together forming a combustion-chamber for the fuel, which is to be inserted through the firing-flues before described. These walls of green bricks are to be carried up to within about a foot of the top of the kiln. The whole should then be covered over with a layer of bricks flat, if an arched top be not used, on which is to be spread a layer of about nine inches, more or less, of ashes,

soil, or rubbish, to prevent the escape of the heat. At intervals of forty feet, more or less, a width of about eighteen inches of the brick flat is to be open, over which, when required, a movable chimney on wheels of any convenient height, extending the entire width of the kiln, and with one or more square or circular outlets, may be placed as an outlet for the steam and waste products of combustion. To set a kiln of this nature going, it is necessary, after the kiln itself is constructed, to build a temporary wall across the kiln between two flues in any convenient part. Starting from this, the bricks or goods to be burnt are to be set, and the opening left for the escape of the steam and other waste products, as before described. The layer of ashes or earth is then to be spread, and to prevent this falling down the opening a single brick wall is to be built up to the level of the top of the kiln walls. Over the opening thus made the movable chimney is to be placed. The setting is to be carried on regularly, and the firing can now be commenced in the first four flues, and kept up as briskly as is consistent with a thorough combustion of the fuel. After thirty-six hours, more or less, a fifth flue can be opened; after forty-eight hours, a sixth. The first flue will now be ready to close, and when it is considered, from the look of the bricks and the settlement of the load, that it has been burnt enough, this can be done, and the ash-flue below it also. The seventh flue should now be fired. As each successive flue is closed another is to be opened, so that there are always six burning. Air for combustion of the fuel should be admitted through the lower or ash flues, as required, up to this. Each kiln will have about one hundred flues. On firing the forty-first flue the lower or ash flue under that first fired can be opened, and after this all the ash-flues (forty flues behind the part being fired) can be opened. The air for combustion of the fuel will after this time be supplied through the bricks burnt, and no more should be admitted through the ash-flues, in the part firing, than is absolutely necessary. In most cases, after the kiln is in full operation, they can be entirely closed. They should in no way be allowed to become choked up with ashes. After about sixty flues have been

fired, it will be found that the goods in the part first fired will be cool enough to admit of being unloaded. This can be done, and the operations of loading, firing, and unloading continued at pleasure. A movable roof over the part being loaded may be found necessary.

In order to further explain the nature of my said invention, and the manner in which the same is to be performed, I annex the accompanying drawings, in which Figure 1 shows a plan view of one end of an oblong kiln with circular ends. I give this sample, as it is a combination of a circular and a straight kiln, from which any other form of continuous kiln can be constructed.

The kiln, when complete, would exhibit about one hundred flues, their distance from center to center along the straight portions of the parallel walls being three feet six inches, such distance varying at the circular ends by reason of their radial direction.

It will be seen that intermediate flues are applied at the outer semicircle of the kiln, in order to compensate for the increased space between the radial flues; but these intermediate flues need only be carried partially across the kiln to about the extent shown, in order that the burning may be equalized as far as possible in all parts of the radial setting of the goods.

The plan view shows five different levels of the kiln. A shows a portion of the ground plan with spaces for the ash-flues. B shows section of kiln with flooring before setting the flues. C shows sectional plan at level of firing-flues, with the method of setting the bricks for the flues and draft-passages. D shows sectional plan of top with covering-brick removed, and E shows plan of top with position of chimney F for commencement of firing, when a temporary cross-wall should be built up at *c' c'* to start from. The arrows show the direction of the draft throughout the kiln when thoroughly at work.

Figure 2 shows a cross section of the kiln at D' D' of Fig. 1, with method of setting the bricks and draft-passages. Fig. 3 shows a cross-section of the kiln with an arched top, if such should be used, suitable openings being made for the movable chimney, and for the supply of the goods, and an opening at the top for gaging. Fig. 4 shows an elevation and longitudinal section of a straight portion of the kiln with chimney. At Figs. 5 and 6 an enlarged plan and section of dummy are shown for closing the mouth of the flues. Fig. 7 shows a front view of sheet-iron chimney,

capable of traveling on rollers along the top of the kiln. The chimney is shown with three outlets, to which the tubes or flues fifteen feet high are hinged or jointed, so as to be capable of being lowered down when necessary by means of the ordinary suitable gearing.

a a represent the walls of the kiln; *b b*, the firing-flues; *c c*, the ash-flues; *d d*, the fire bars or bricks set one inch apart to receive the fuel; *e e*, the walls or piles of bricks to be burnt, of which there are twelve rows or walls, the number of bricks in the walls varying according to the distances between the radial flues. *g* are permanent steps, giving access to the kiln.

It will be found in practice that the flues on the inside of the circular ends of the kiln will be ready to close before those on the outside, and in the proportion which the lesser length of inside concentric walls bears to that of the outside. There will at times, therefore, be one or more flues less firing on the inside of the circle.

The firing is under easy control, and the time for finally closing the flues can be known by the amount of settlement. About two inches all over will be found sufficient, and if one part settles more than another, the firing should be lessened in that particular part. The ashes or earth having been spread evenly over the top of the kiln, if an open top be used, the settlement can be determined by a straight-edge, and by taking a sample-brick from the top of the outer wall it can be ascertained when the bricks are thoroughly burnt.

Kilns or ovens of the foregoing description are also applicable to burning or baking other goods, such as lime, pottery, tiles, and otherwise.

If an arched top be used, the settlement can be determined by a gage passing through the hole shown at the top of the arch, Fig. 3.

Having now described the nature of my said invention, and the manner in which the same is to be performed, I claim—

In a kiln-oven, the walls, intermediate floor, interwalled ash-flues carried through said floor, superposed firing-flues, brick-receiving fire-bars, and green brick inside walls, all combined and covered with ashes or soil, except at intervals, as shown and described.

W. BULL.

Witnesses:

F. TOLHAUSEN,
F. CLAYTON.