

W. Hughes

Improvements in Malt Kilns and Malt-Houses

Sheet 1



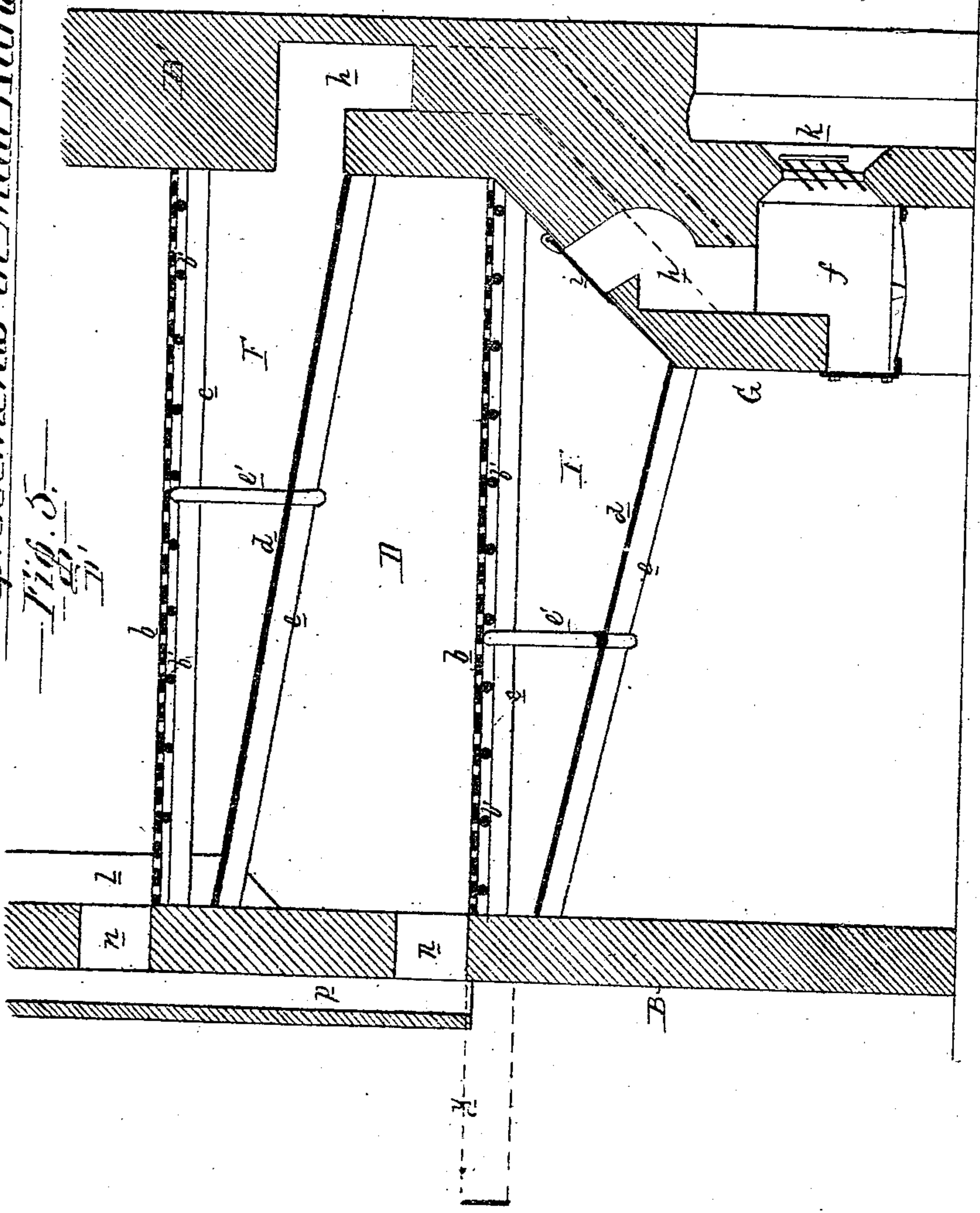
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Wm. Hughes
by his atty
Chas. D. Brown

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John D. Clark

Fig. 5.



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Fig. 4.

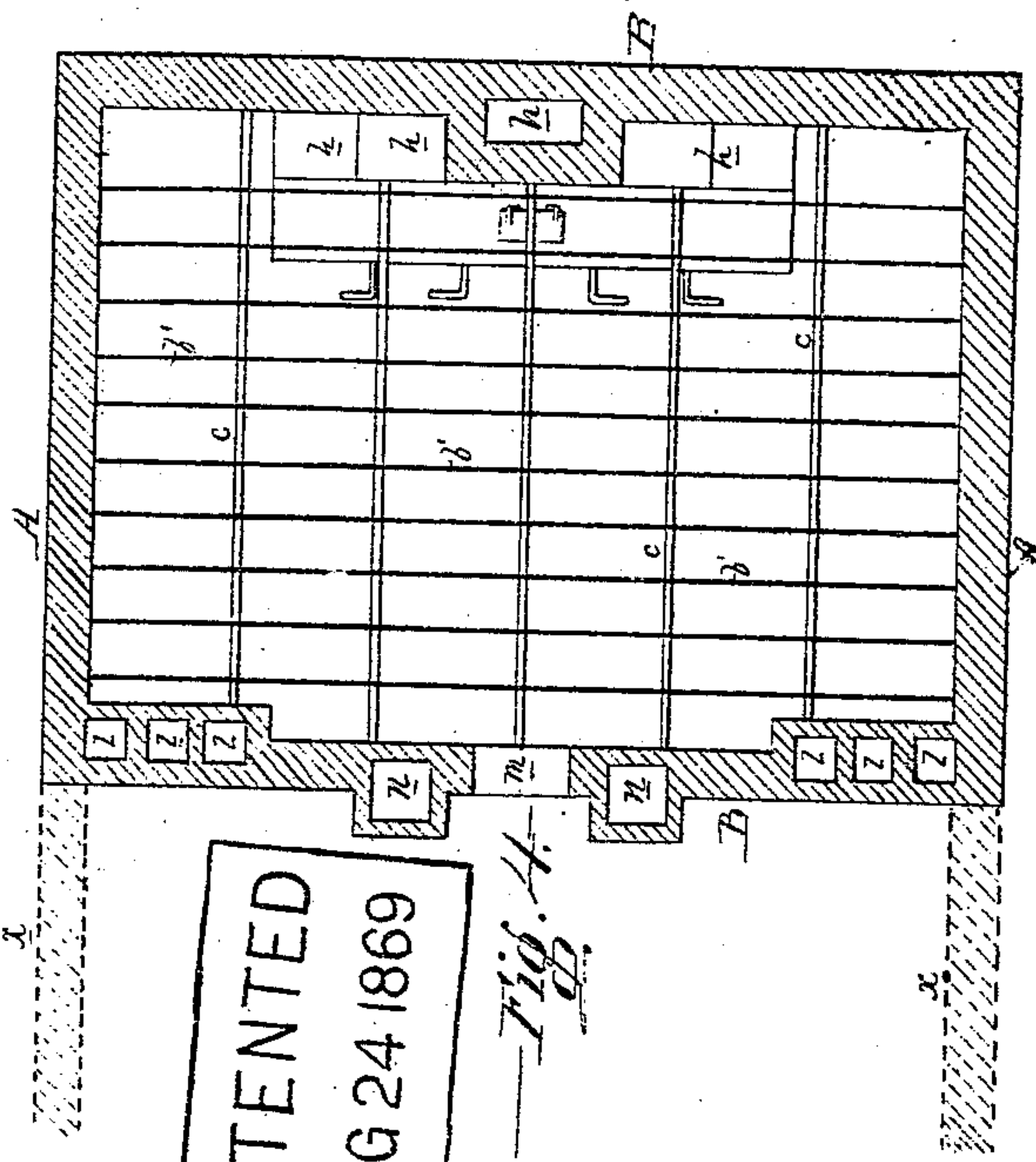
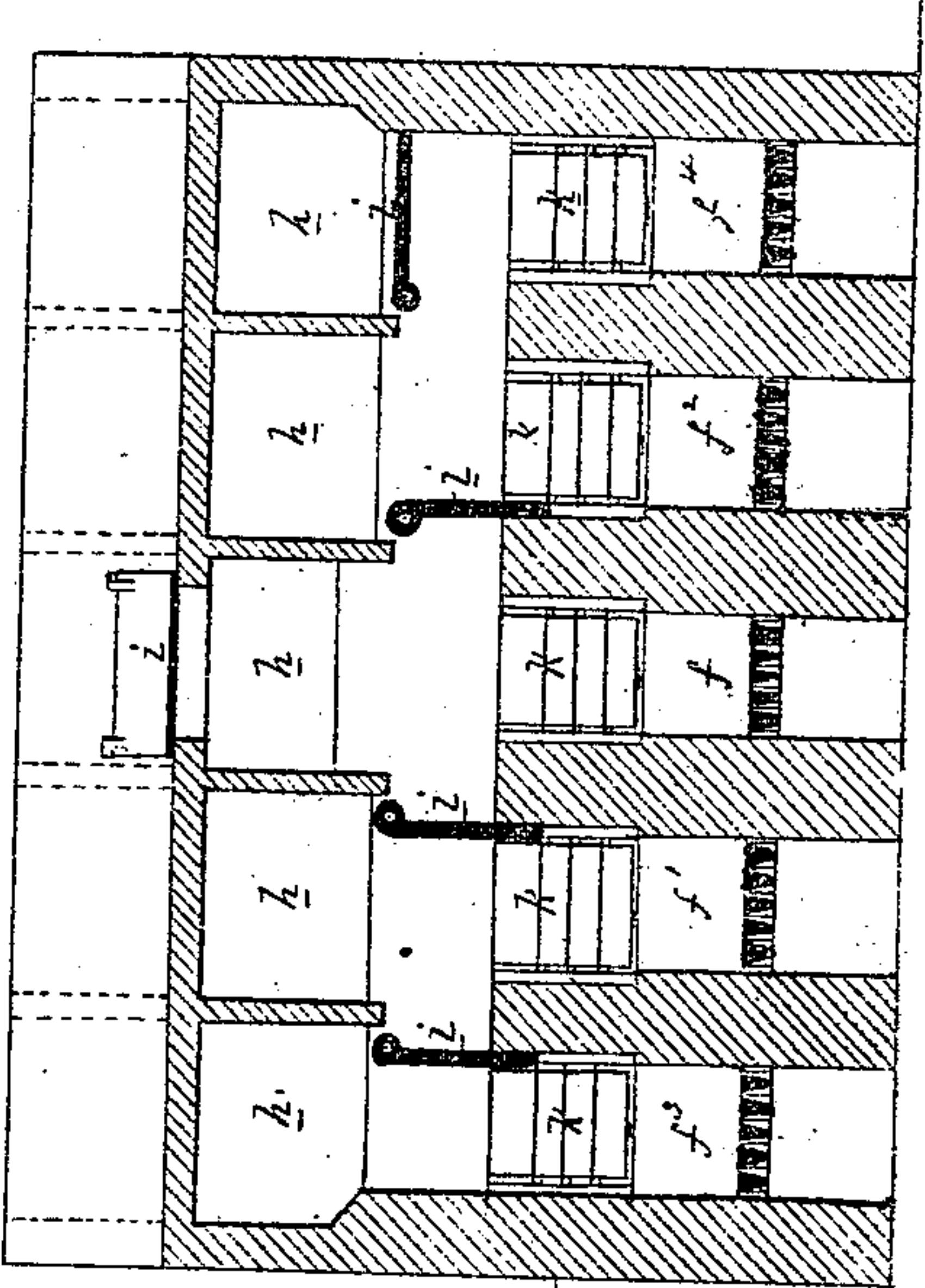


Fig. 6.



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UNITED STATES PATENT OFFICE.

W. W. HUGHES, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN MALT-KILNS AND MALT-HOUSES.

Specification forming part of Letters Patent No. 94,114, dated August 24, 1869.

To all whom it may concern:

Be it known that I, W. W. HUGHES, of Philadelphia, Pennsylvania, have invented certain Improvements in Malt-Kilns and Malt-Houses; and I do hereby declare the following to be a full, clear, and exact description of the same.

My invention consists, first, in arranging a series of malt-drying chambers with perforated floors in respect to a malt-house, substantially as described hereafter, so that the manipulating of the malt may be facilitated; secondly, in inclining the partitions which form the bottoms of the drying-chambers, as described hereafter, so as to insure a uniform distribution of heated air through the perforated floor, and so as to form head-room for those who have to manipulate the malt on the perforated floor below; thirdly, of a certain arrangement of dampers, described hereafter, whereby the heated air may be directed to or excluded from any one or more of the drying-chambers; fourthly, in certain slatted valves for regulating the direction of air into and through the fire-chambers, and thereby regulating the heat of the said air before it reaches the drying-chambers.

In order to enable others skilled in the art to make and use my invention, I will now proceed to describe its construction and operation, reference being had to the accompanying drawing, which forms a part of this specification, and in which—

Figure 1, Sheet 1, is a sectional elevation of my improved malt-kiln; Fig. 2, a transverse sectional elevation on the line 1 2, Fig. 1, looking in the direction of the arrow 1; Fig. 3, a sectional elevation on the line 1 2, Fig. 1, looking in the direction of the arrow 2; Fig. 4, Sheet 2, a sectional plan view of the kiln on the line 3 4, Fig. 1; Fig. 5, a view of the lower portion of Fig. 1, drawn to an enlarged scale; and Fig. 6, a sectional view of the furnace, also enlarged.

Similar letters refer to similar parts throughout the several views.

A A and B B' represent the four walls of the kiln, C being the sloping roof, in the center of which is a chimney or ventilator, *a*.

It should be understood in the outset that this kiln is of the same height as the malt-

house in which the grain is steeped, germinated, and prepared for drying, and that it is arranged at one end of the said malt-house, or of itself forms the end of the same, its side walls, A A, being merely continuations of the walls *xx* of the malt-house, as shown in the plan view, Fig. 4.

The kiln is also divided into drying-stories D D¹ D² D³, &c., as hereafter explained, which correspond in number with the stories of the malt-house, and the floors of which are on a level, or nearly so, with the floors *y* of the said house, as seen in Fig. 1, this forming a most important feature of my invention, and one in which it differs materially from other malt-kilns.

Each of the floors of the several stories D D¹, &c., of the kiln consists of a plate, *b*, of perforated sheet-iron, which rests upon metal rods *b'*, the latter extending transversely across, and being secured to iron girders *c*, the opposite ends of which are let into the walls B B' of the kiln. (See Fig. 5.) At a short distance beneath each of these perforated floors is an inclined partition, *d*, of sheet-iron, which rests upon light iron girders *e*, the latter being let into the walls of the kiln, and being prevented from sagging by hangers *e'*, connected to the girders *c*. (See Figs. 3 and 5.)

The space F between each partition *d* and the floor *b* above it permits the heat to be equally distributed, and to be passed uniformly through the perforations of the said floor into the drying-chambers, as will be hereafter explained.

A furnace, G, Figs. 5 and 6, at the bottom of the kiln, has within it distinct and independent fire-places *f f¹ f²*, &c., these being, in the present instance, five in number, to correspond with the same number of drying-chambers D; and each fire-place communicates, by means of a flue, *h*, with one of the spaces F beneath the drying-chambers, in a manner which will be readily understood by referring to Figs. 1 and 5.

In the furnace, between the fire-places and the lower ends of their several flues, is a space or chamber, in which dampers *i i i i*, operated from the outside of the furnace by suitable rods, are so arranged that the heat may be directed by them from each fire-place into its

own flue, or so that the heat from all, or from any number of the fire-places, can be directed into a single flue. (See Fig. 6.)

At the back of each fire-place, and above its grate-bars, is an opening, in which is arranged a regulator, *k*, for the admission of external air, this regulator consisting of a number of slats, hinged and connected together by a single rod, like those of a window-blind.

When the slats are turned downward, as seen in Fig. 5, the air passing between them is directed onto the fire, and becomes highly heated before passing into the flues above; but when the slats are turned horizontally a greater volume of air is admitted into the fire-place, but is not so highly heated, as it is not brought into contact with the fire, while if the slats are turned upward the air, in a comparatively cool state, will pass directly into the flue.

It will be seen, on reference to Figs. 3, 4, and 5, that each of the drying-chambers *D*, *D*¹, *D*², and *D*³ is furnished at as high a point as possible with two ventilators, *l l*, which extend to the top of the kiln, the steam and moisture from the upper chamber, *D*⁴, being carried off through the central flue, *a*, before mentioned, although this latter chamber may, if required, be furnished with ventilators *l*.

Access is obtained to the interiors of the drying-chambers from the floors of the malt-house through doors *m* Figs. 1 and 3, and on either side of these doors are openings *n n*, through which the malt, when dried, is shoveled into chutes *p*, communicating with suitable bins beneath. (See Fig. 5.)

The method of using my improved kiln is as follows: The malt, having been prepared for drying in the usual manner, is shoveled from the floors of the malt-house through the doors *m* into the several drying-chambers, where it is spread upon the floor to a depth of several inches, this arrangement of the drying-chambers in respect to the stories of the malt-house effecting a considerable economy of time, and facilitating the manipulation of the malt, and improving the quality of the latter, as comparatively few of the grains are crushed or injured. The heated air from the several fire-places, when the whole kiln is in operation, rises through the flues *h*, and passes into the spaces *F* beneath the drying-chambers, and thence through the perforations of the floor *b*,

and through the mass of malt, which has to be frequently turned by shovels until the drying is complete, the vapor, as it rises from the malt, not being suffered to remain in the drying-chambers, but passing off immediately through the ventilators *l l*. There is a twofold object in inclining the sheet-iron partitions *d* upward from the flues, the first of which is to direct the heat as it passes from the flues both upward and outward, so that it may be equally diffused throughout the spaces *F*, and thus pass regularly and equally through all portions of the perforated floors, a second object being to give greater height to the doors *m*, and to enable the attendants to perform their duty of turning the malt without stooping, except when close to the flues, the stories being of limited height.

It is not necessary that all of the drying-chambers should be in operation at one time, as they are entirely independent of each other, and the heat which passes to each chamber can be so regulated by the valves *k* and dampers *i*, before described, that malt of any quality, whether high-dried, amber, or pale, can be produced.

I claim as my invention and desire to secure by Letters Patent—

1. The drying-chambers *D D*¹ *D*², &c., arranged one above another, and having perforated floors, on a level, or thereabout, with the floors of an adjacent malt-house, substantially as herein described.

2. The partitions *d* of the said chambers, inclined upward from the hot-air flues *n*, substantially in the manner described.

3. The dampers *i*, so arranged between the furnaces, or in the flues of the same, that they can be used to direct the heated air into any or all of the drying-chambers, as may be required.

4. The slatted valves *k*, arranged at the back of each fire-place, for the purpose of regulating the direction of currents of cold air into the same, substantially in the manner described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

W. W. HUGHES.

Witnesses:

ANTHONY BECK,
HARRY SMITH.