(No Model.)

A. E. CLUTTER.

GRAIN DRIER.

No. 283,970. Patented Aug. 28, 1883.

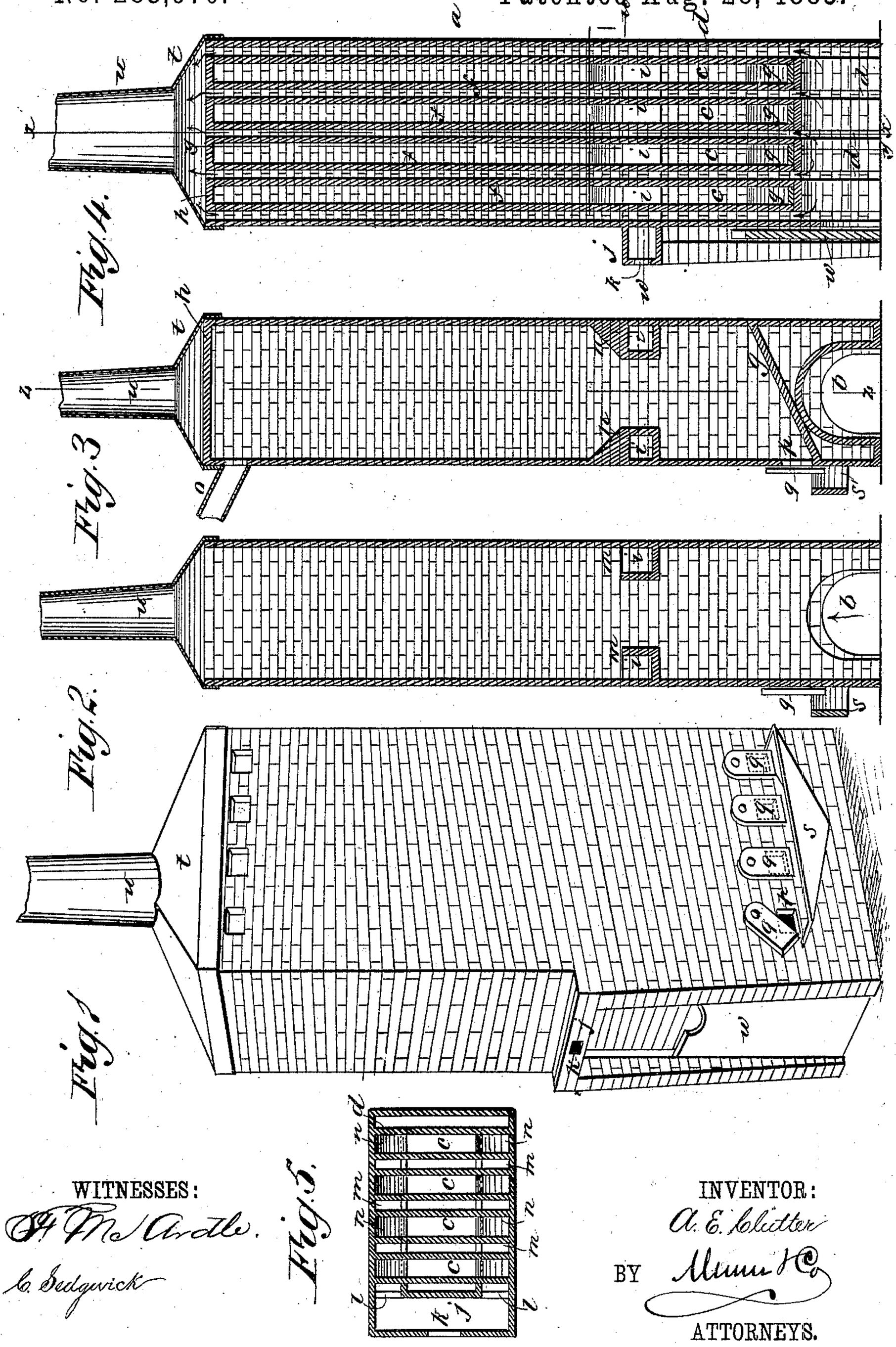

Fig. 4.

Fig. 5.

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ALBERT E. CLUTTER, OF LIMA, OHIO.

GRAIN-DRIER.

SPECIFICATION forming part of Letters Patent No. 283,970, dated August 28, 1883.

Application filed April 27, 1883. (No model.)

To all whom it may concern:

Be it known that I, ALBERT E. CLUTTER, of Lima, in the county of Allen and State of Ohio, have invented a new and Improved Grain-Drier, of which the following is a full, clear, and exact description.

My invention consists of a vertical smoke-stack separated vertically by brick partitions into grain-spaces and smoke-passages, in which the heat of the smoke from the furnace of a steam-engine, or from a small furnace at the bottom of the stack when heat from another furnace is not available, is to act upon the grain through the brick, which, being porous, absorbs the moisture expelled from the grain by the heat to be taken up by the escaping products of combustion, which thus greatly accelerates the drying process. The smoke-flues pass entirely through the stack from bottom to top; but the grain-spaces are closed at bottom and top, but have openings through one side wall of the stack for spouting in the grain at top and out at bottom, thus making a very simple device through which the grain gravitates, so as not to require handling, and so that the velocity of its movements may be regulated by gates or valves, according to the time it may be found necessary to retain it in the drier for being properly dried, all as hereinafter fully described.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is an elevation of my improved drier in perspective view. Fig. 2 is a sectional elevation on the line *x x* of Fig. 4 through one of the smoke-flues. Fig. 3 is a sectional elevation through one of the grain-spaces on line *y y* of Fig. 4. Fig. 4 is a sectional elevation on the line *z z* of Fig. 3, and Fig. 5 is a horizontal section on line *w w* of Fig. 4.

I build a brick stack, *a*, preferably of rectangular form, and of any approved size and height, with a small arch, *b*, at the bottom, suitable for a furnace for generating heat when required, dividing the space above into alternate grain-spaces *c* and smoke-flues *d* by means of brick partitions *f*, the smoke-flues extending through the stack from the arch to the top, but the grain-spaces being inclosed by slanting bottoms *g* and suitable covers, *h*. Besides opening into the furnace *b*, the flues also have connection, a short distance above the arch, with cross-flues *i*, through which the smoke and hot products of combustion from the furnace of a steam-engine or other furnace are to be discharged into said flues *d*, for utilizing such waste heat for operating the drier, in which the low temperature of such heat is sufficient, and is more economical than heat specially provided for the purpose. The smoke-pipe from such furnace is to be connected to the outside cross-flue, *j*, at *k*, where it divides and passes into the interior cross-flues at *l*, which connect with each of the vertical flues, except the terminal one, by openings *m* in the upper sides of said cross-flues. With the last flue *d* they connect by terminating at the partition, so as to open thereto to the full extent of their cross-section, for making larger passages, to induce greater draft thereat, to get the due measure of the heat products past the openings into the other flues. These cross-flues *i* have sloping covers *n* where they pass through the grain-spaces *c*, to prevent any grain from lodging on them. The grain is to be spouted into the grain-spaces *c* through spouts *o* at the top, and from the bottom it escapes through passages *p*, regulated by gates *q*, into a hopper, *s*, from which it is to be delivered to any conveyer or elevator, as desired.

On the top of the stack is a smoke-dome, *t*, and a pipe, *u*, for causing the draft and conducting the smoke away.

In practice I propose to band the stack properly with iron at suitable intervals along it from bottom to top, and also to provide it with tie-rods extending through the smoke-flues *d* and the grain-spaces *c*, which will have washers or collars on the smoke-flues and between the partitions, to prevent the pressure of the grain from collapsing the flues.

It will be seen that in this improved drier the brick partitions present one side to the heat and the other side to the grain, and thus absorb the moisture from the grain and deliver it up to the hot gases. It utilizes the waste heat from a boiler or other furnace. The grain enters and discharges from it by gravitation, and passes through it by settling down in uniform and undistributed masses, clearing

itself suitably, and enabling different batches to be passed through it successively without mixing, except in small measure, when the different kinds meet. It will admit different varieties at the same time in the different sections. It can be enlarged readily at any time by adding partitions. It is perfectly fire-proof, and can be safely placed in any building, and is adapted for regulating the action at will, either by increasing or diminishing the heat or the flow of the grain, or both, for adapting it to any kind and condition of grain. The passage of the grain into and through the drier is to be continuous, the grain-spaces being always kept full by regulating the discharge at passages *p*.

When the heat is to be supplied from another furnace, the furnace *b* is to be kept closed by a gate or slide, *w*, so as to maintain the proper draft; but when the heat is to be generated in said furnace *b* it will of course be opened suitably for the purpose, and in that case the passage *k* may be closed, if found necessary. If the heat from another furnace should be insufficient, the furnace *b* may also be used.

It will be seen that by the opening of the smoke-flues directly into the furnace below any moisture that may generate therein by sweating can escape below, and said openings facilitate the cleaning of the flues.

In practice the bottoms *g* will be made of brick and covered with sheet-iron to facilitate the sliding of the grain; but the tops *h* will be of brick only.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination, in a grain-drier, of a series of alternate grain-spaces and smoke-flues, a connecting-flue, *j*, for receiving the waste products of combustion from a boiler or other furnace, and cross-flues *i*, distributing said heat to said smoke-flues, substantially as described.

2. A grain-drier consisting of alternate smoke-flues and grain-spaces, and being provided with connections for receiving the waste products from a boiler or other furnace, the said drier also having a furnace, *b*, adapted for independent use or auxiliary to said waste products, substantially as described.

3. The combination of cross-flues *i* with a series of vertical flues, *d*, arranged alternately with grain-spaces *c*, the said cross-flues communicating with all of said vertical flues, except the terminal one, by openings *m* in the top, and having larger delivery into said terminal one than with the others, substantially as described.

4. The cross-flues *i*, in combination with the series of vertical flues *d*, arranged alternately with the grain-spaces *c*, and having openings *m*, communicating with said vertical flues, also having sloping covers *n* in the grain-spaces, substantially as described.

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Witnesses:
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