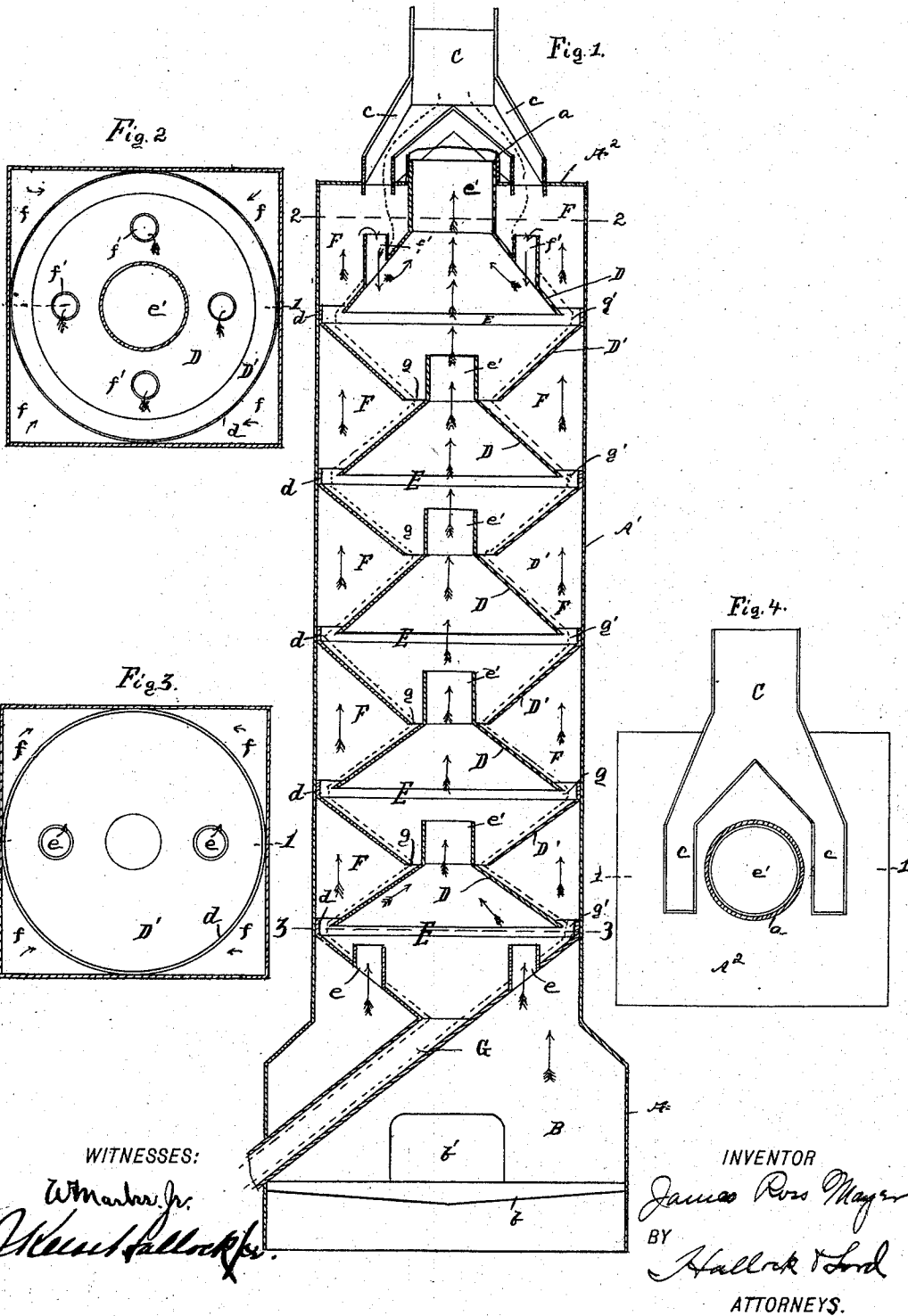


(No Model.)

J. R. MAYER.
SAND HEATER.

No. 571,382.

Patented Nov. 17, 1896.



UNITED STATES PATENT OFFICE.

JAMES ROSS MAYER, OF ERIE, PENNSYLVANIA.

SAND-HEATER.

SPECIFICATION forming part of Letters Patent No. 571,382, dated November 17, 1896.

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To all whom it may concern:

Be it known that I, JAMES ROSS MAYER, a citizen of the United States, residing at Erie, in the county of Erie and State of Pennsylvania, have invented certain new and useful Improvements in Apparatus for Heating or Drying Sand and Similar Materials; and I do hereby 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 make and use the same.

This invention relates to apparatus for drying and heating sand and similar substances; and it consists in certain improvements in the construction thereof, as will be hereinafter fully described, and pointed out in the claims.

Figure 1 shows a vertical section on the line 1 1 in Figs. 2, 3, and 4. Fig. 2 shows a horizontal section on the line 2 2 in Fig. 1. Fig. 3 shows a like section on line 3 3 in Fig. 1. Fig. 4 shows a plan view of the top.

A wall A of any desired construction and material incloses a furnace B, which is provided with the usual grate-bars *b* and door *b'* for the introduction of fuel. Connected with the furnace and preferably directly above is the drying and heating chamber, which is inclosed by a wall A', preferably forming the chamber square in cross-section. Over the chamber is placed a cap A'', through and from which extends the stack *a*. The material to be operated upon is introduced at the top, being dumped from the elevator or other conveyer into the hopper or spout C, from which it passes into the spreaders *c c* in the drying and heating chamber, the spreaders effecting the introduction at different points. Within the drying and heating chamber are a series of inclined surfaces which are exposed to the heated gases from the furnace and over which the material operated upon is passed. These inclined surfaces are preferably formed by a system of conical (or pyramidal) shaped plates D and D', the plates D' being inverted and below the plates D. Each plate D' has a slight uprightring *d* on its outer periphery, which overlaps the edge of the plate D above it, thus forming a passage *g'*, through which sand passes from the top plates D to the inverted plates D', the rings *d* preventing an

overflow. The plates D' are open at the center, thus allowing the material to pass to the top plate below through passages *g*, so that the material coming in at the top is spread over the top plate by the spreader *c* and passes continuously by its own gravity over the system of plates to and through the discharge-pipe G, as indicated by the dotted lines. These plates D and D' are arranged to form a series of alternating spreaders and hoppers having portions of their edges free from each other and from the walls of the chamber, so that passages are formed for the material to be dried, and there are also formed draft-flues independent of the passages for the material being dried. The spreaders and hoppers are alternately arranged one above the other, so that the products of combustion are carried through the chamber and in contact with the under surfaces of both the spreaders and hoppers by an active draft.

Each top and inverted chamber form between them a convection-chamber E, by means of which the heated gases from the furnace are brought in contact with the material flowing over the inverted plates and the under surface of the top plates. These chambers are connected by ducts *e'*, which pass from the top plates through the central openings in the inverted plates into the chambers above, and the ducts *e* connect the lower chamber with the furnace, thus forming an uninterrupted communication from the furnace to the stack.

Between each inverted plate and top plate are formed annular convection-chambers F, and these are connected by the passages *f* at the corners of the main chamber, thus bringing the heated gases from the furnace in contact with the under surfaces of the inverted plates and the running material on the top plates. Ducts *f'* pass through the plate at the top of the chamber and thence into the stack.

It is a well-known fact that the wet material requires a much greater inclination of plate to insure its passage than the dry material. In order that the material remain in the chamber during the full limit of time that it can be made to run, I have graduated the inclination of the plates, with the upper plates of greater inclination and the lower

plates of less inclination. I have also graduated the passages g and g' , making them larger at the top and smaller at the bottom, to effect an even distribution throughout the system.

Among the several advantages of my construction may be noted the fact that the heated gas at no place is required to pass through the material, but is led from the furnace to the stack by flues independent of the passages for the material, so that a forced draft can be easily maintained and has no tendency to force the material into and out of the stack; the heated combustion-gases and flame directly from the furnace come into direct contact with the plates, the inner currents contacting the lower surfaces of the top plates and the outer currents the lower plates, so that the plates can be maintained at high temperature, and over the running-surfaces of material there is both inside and outside a volume of combustion-gases in direct connection with the stack, which, in addition to imparting heat, take up the moisture as it is liberated from the material, carrying it with them through the stack; the great amount of heating-surface in a small space; a free vent for vapors taken from the material, and the smooth and equal distribution of the material over the running-surface.

What I claim as new is—

1. In an apparatus for heating or drying sand and similar materials, the combination with the furnace; the heating-chamber; and means of introducing and discharging material respectively to and from it; of a series of inclined plates arranged in succession one above another in said chamber and having portions of the edges thereof free from the walls of the chamber and from each other so as to form ways for the passage of material to be dried over the surfaces of said plates and to make independent passages adjacent to said plates whereby are formed flues independent of the passages for the material, said flues being arranged to allow an active draft through said chamber and to bring the products of combustion into contact with the inclined plates.

2. In an apparatus for heating or drying sand and similar materials, the combination with the furnace; the heating-chamber; and means of introducing and discharging material respectively to and from it; of a series of alternating spreaders and hoppers arranged in succession one above another in said chamber and having portions of the edges thereof free from the walls of the chamber and from each other so as to form ways for the passage of the material to be dried over the surfaces of said spreaders and hoppers and to form independent passages adjacent to said spreaders and hoppers whereby are constituted flues independent of the passages for the material, said flues being arranged to allow an active draft through said chamber and to bring the

products of combustion into contact with the spreaders and hoppers.

3. In an apparatus for heating or drying sand and similar materials, the combination with the heating-chamber; and means of introducing and discharging material to and from it; of a series of plates of graduated inclinations the greater at the top and arranged in succession one above another in said chamber and means of introducing heat to said plates.

4. In an apparatus for heating or drying sand and similar materials, the combination with the heating-chamber; and means for introducing and discharging material to and from it; of a series of inclined plates arranged in succession one above another in said chamber with successive connecting-passages of greater dimension at the top than at the bottom; and means of introducing heat to said plates.

5. In an apparatus for heating or drying sand and similar materials, the combination with the heating-chamber; and means of introducing and discharging material to and from it; of a series of plates in said chamber arranged in succession one above another with graduated inclinations greater at the top than at the bottom and connected by passages of greater dimensions at the top than at the bottom; and means of introducing heat to said plates.

6. In an apparatus for heating or drying sand and similar materials, the combination with the furnace; the heating-chamber; and means for introducing and discharging material respectively to and from it; of a series of alternating spreaders and hoppers, arranged one above another in said chamber, and having portions of their edges free from each other and from the walls of the chamber whereby there are formed passages for the material to be dried, and independent passages adjacent to the said spreaders and hoppers constituting flues independent of the passages for the material, said flues being arranged to convey the products of combustion into contact with the under surfaces of the said spreaders and to allow an active draft through said chamber.

7. In an apparatus for heating or drying sand and similar materials, the combination with the furnace; the heating-chamber; and means for introducing and discharging material respectively to and from it; of a series of alternating spreaders and hoppers, arranged one above another in said chamber, and having portions of their edges free from each other and from the walls of the chamber whereby there are formed passages for the material to be dried, and independent passages adjacent to the said spreaders and hoppers constituting flues independent of the passages for the material, said flues being arranged to convey the products of combustion into contact with the under surfaces of the

said hoppers and to allow an active draft through said chamber.

8. In an apparatus for heating or drying sand and similar materials, the combination
5 with the furnace; the heating-chamber; and means for introducing and discharging material respectively to and from it; of a series of alternating spreaders and hoppers, arranged one above another in said chamber,
10 and having portions of their edges free from each other and from the walls of the chamber whereby there are formed passages for the material to be dried, and independent passages adjacent to the said spreaders and
15 hoppers constituting flues independent of the passages for the material, said flues being arranged to convey the products of combustion into contact with the under surfaces of both said spreaders and hoppers and to allow
20 an active draft through said chamber.

9. In an apparatus for heating or drying sand and similar materials, the combination with the furnace; of a heating-chamber substantially rectangular in cross-section; means of introducing and discharging material respectively to and from it; a series of conically-shaped plates arranged one above another in said chamber, the spaces formed at the corners between the plates and the walls of the heating-chamber forming flues independent of the passages for the material, said
25 spaces being connected with the furnace and the stack. 30

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

JAMES ROSS MAYER.

Witnesses:

J. M. SHERWIN,
J. KEEN HALLOCK.