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R. TANNER & O. TOLAAS.

APPARATUS FOR DRYING SAND.

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NO MODEL.

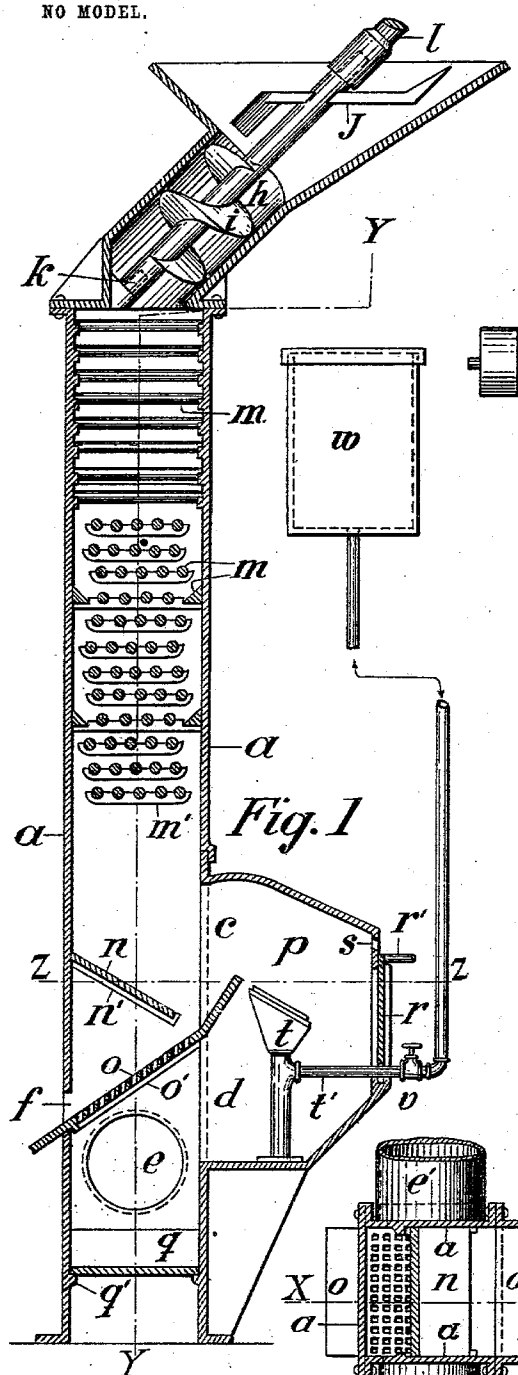


Fig. 1

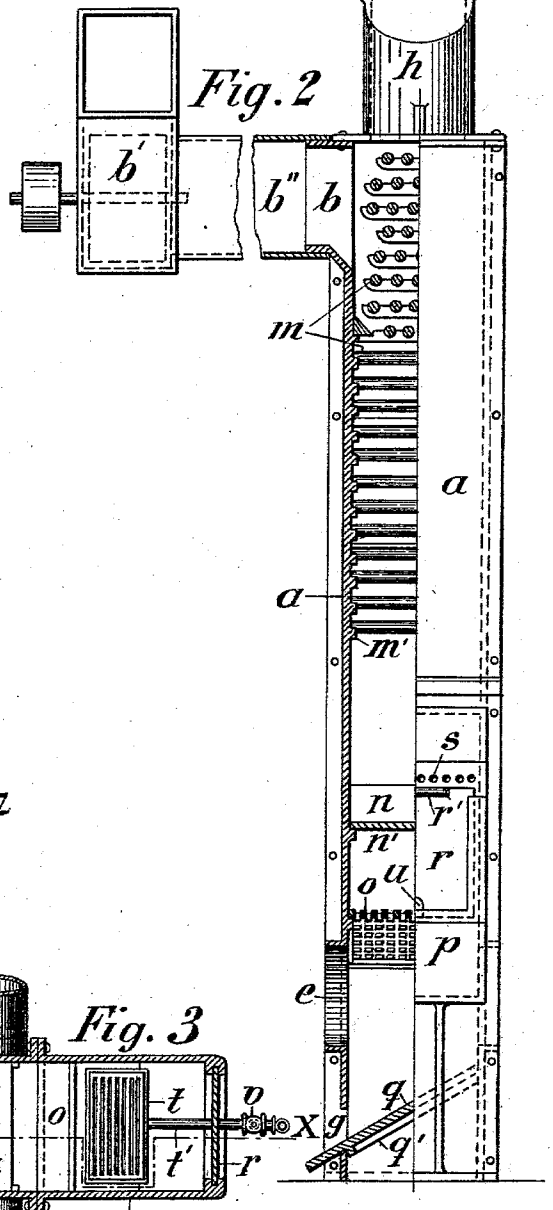


Fig. 2

Fig. 3

Witnesses.

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UNITED STATES PATENT OFFICE.

RUDOLF TANNER AND OLE TOLAAS, OF ST. PAUL, MINNESOTA.

APPARATUS FOR DRYING SAND.

SPECIFICATION forming part of Letters Patent No. 745,689, dated December 1, 1903.

Application filed February 7, 1902. Serial No. 93,020. (No model.)

To all whom it may concern:

Be it known that we, RUDOLF TANNER, a subject of the King of Sweden and Norway, and OLE TOLAAS, a citizen of the United States of America, both residing at St. Paul, in the county of Ramsey and State of Minnesota, have, as joint inventors, invented a new and useful Apparatus for a Continual Process and an Apparatus for Evaporating Moisture from Sand and other Fine-Grained Mineral Substances, of which the following is a specification.

Our invention has for its object to provide an improved sand-drying apparatus; and to this end it consists of the novel devices and combinations of devices hereinafter described, and defined in the claims.

The apparatus is illustrated in the accompanying drawings, wherein like characters indicate like parts throughout the several views.

Figure 1 is a vertical section through the entire apparatus on the line x x of Fig. 3. Fig. 2 is a view, partly in front elevation and partly in vertical section, on the irregular line y y of Fig. 1; and Fig. 3 is a horizontal section on the line z z of Fig. 1.

The main body of the drying apparatus is in the form of a vertical duct or flue formed by walls a, which in the illustration given afford a flue which is rectangular in cross-section. The vertical duct or flue is provided with lateral openings b, c, d, f, and g. The openings c and d connect the flue with a laterally bulged or extended fire-chamber p. This fire-chamber p is provided with air-holes s, with a sliding gate r, having handle r'. In the fire-chamber p is placed a gas-burner t, which may be of any suitable construction and may be connected either to the elevated oil-tank w or to a source of gas-supply by means of a pipe t', which, as shown, is brought out from the apparatus through a passage u in the gate r and is provided with a valve v.

Attached to the top of a duct or flue a is a cylindrical spout of a hopper or case h. The feed-screw i is journaled at its lower end in a bearing k, depending from the case h, and at its upper end it is journaled in a support (not shown) and is provided with an agitating-arm j. Said screw i receives motion from a driving shaft or member l, connected to its upper end.

In the upper parts of the flue or duct a are placed alternated series or groups of parallel bars m. As shown, the bars m are supported at their ends on ledges m', formed on the walls of the duct or flue a. A deflecting-plate n inclines forward from the rear wall of the duct or flue a on a line between the lateral openings c and d of the flue. As shown, this plate n rests on ledges n', formed on the side walls of the flue. Inclining in a reverse direction from the deflecting-plate n, extending upward into the fire-chamber p and downward through the lateral openings f, is a perforate plate or screen o. As shown, said screen is supported by ledges o' on the sides of the flue or duct a.

Below the opening e is an inclined imperforate plate q, which projects outward through the opening g in one side wall of the duct and is, as shown, supported by ledges q' on the front and rear walls of the duct or flue a. The said openings e and g, it will be noted, are both located below the screen o.

When the burner t is lighted, a draft will be created, and the hot air from the fire-chamber p, passing through the opening c, will rise through the flue or duct a and will pass outward through the opening b in the top of said flue, while cold air will be drawn into the said fire-chamber p through the opening e. If desired, a forced draft of air may be produced through the said flue or duct a by a suitable device—such, for instance, as the fan b', which, as shown, is connected to the outlet-passage b by a tube b''.

The sand which is delivered into the hopper h is by the feed-screw i fed at the proper rate of speed into the upper end of the flue or duct a and falling onto the bars m it is cut into thin sheets, first in one direction and then in the other, while all the time it is subjected to the upwardly-moving current or blast of hot air, and is thus thoroughly dried. The dried sand falls onto the deflecting-plate n and by it is directed onto the upper end of the screen o. The dry and fine sand passes through the screen, while any coarse materials, such as gravel or small rocks, will pass out through the opening f. The dry sand, which passes

through the screen *o*, is quite highly heated, and in this condition it passes directly through the inflowing current of cold air from the openings *e*, and is thus to a very considerable extent cooled by the said cool blast, while the said inflowing blast is heated to a corresponding extent. In this way a preliminary heating of the air is effected which not only relieves the burner of considerable work, but effects an economy by saving heat, which would otherwise be wasted. The dry sand falling onto the deflecting-plate *q* is discharged outward through the opening *g*.

The invention above described is capable of considerable modification. For instance, instead of a burner *t* a heating-coil might be placed in the so-called "fire-chamber." Again, a hot blast of air from a furnace might be directed into the said fire-chamber. In short, any arrangement whereby the heat of the dried sand is caused to effect a preliminary heating of the air which is to be used after further heating to dry the sand would be within the scope of our invention. The device is of course capable of use for drying various other materials than sand. It might, for instance, be used for drying grain.

What we claim, and desire to secure by Letters Patent of the United States, is as follows:

1. In an apparatus adapted for drying sand, the combination with a vertical flue having an inclined screen at its lower portion, of a fire-chamber opening into one side of said flue both above and below said screen, means for heating air within said fire-chamber, and a cold-air-inlet passage opening into said flue below said screen whereby the cold air is caused to pass though the hot and dry sand precipitated through said screen, substantially as described.

2. The combination with the flue *a* having the deflecting-plate *n* and inclined screen *o*, of the fire-chamber *p* opening into said flue at *c* and *d*, an air-heating device located within said chamber *p*, said flue also having the discharge-passage *f* and cold-air-inlet passage *e*, the former of which is located above and the latter below said screen, substantially as described.

3. The combination with the flue *a* having the deflecting-plate *n* inclined screen *o*, discharge-passage *f* and cold-air-inlet passage *e*, of the fire-chamber *p* opening into said flue through the passages *c* and *d*, the burner *t* within said fire-box, the series of parallel bars *m* at right angles to each other in the upper portion of said flue, and means for delivering sand into the upper end of said flue, substantially as described.

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Witnesses:
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