

No. 633,005.

Patented Sept. 12, 1899.

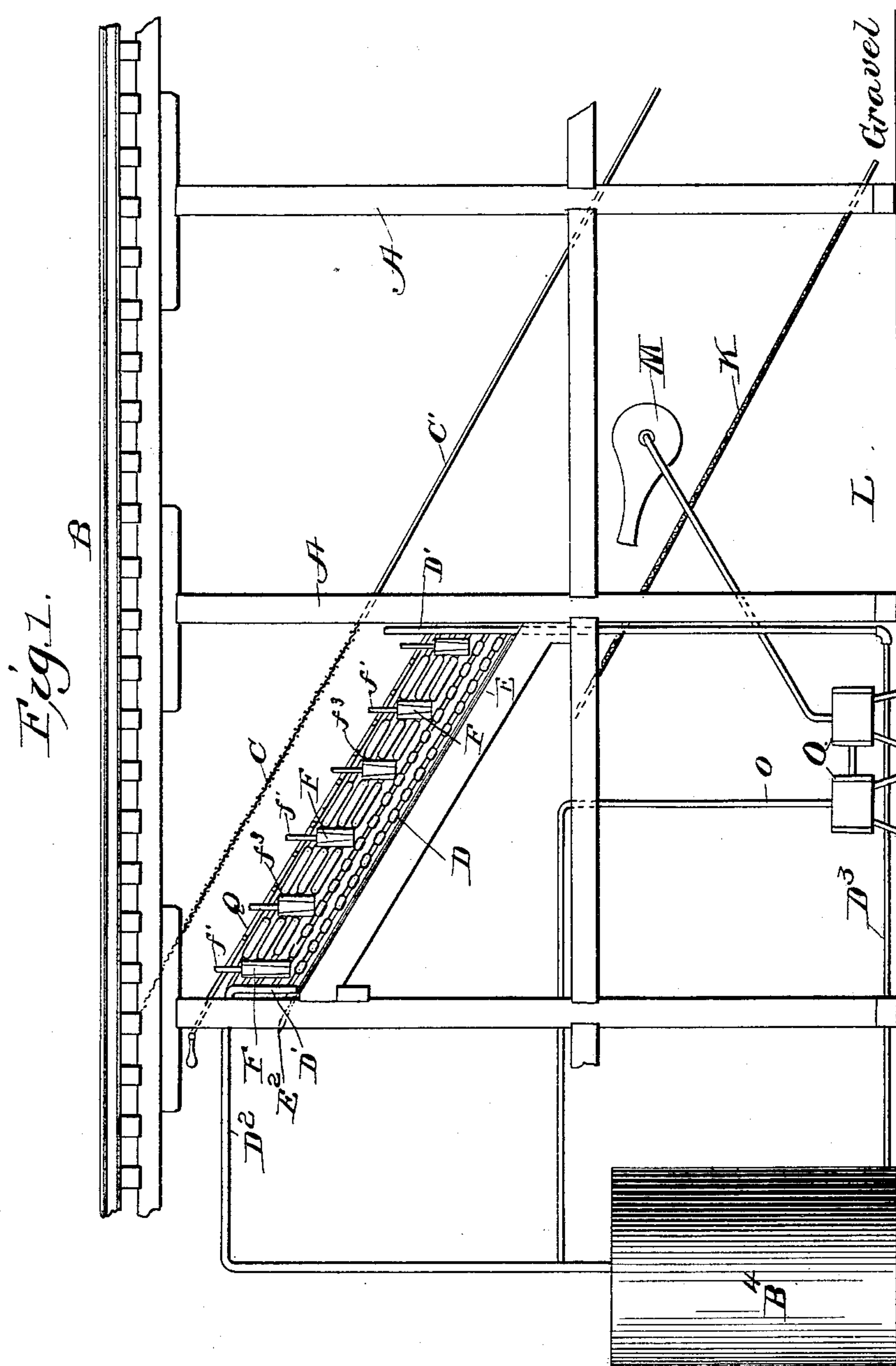
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SAND DRIER.

Application filed May 13, 1899.

(No Model.)

2 Sheets—Sheet 1



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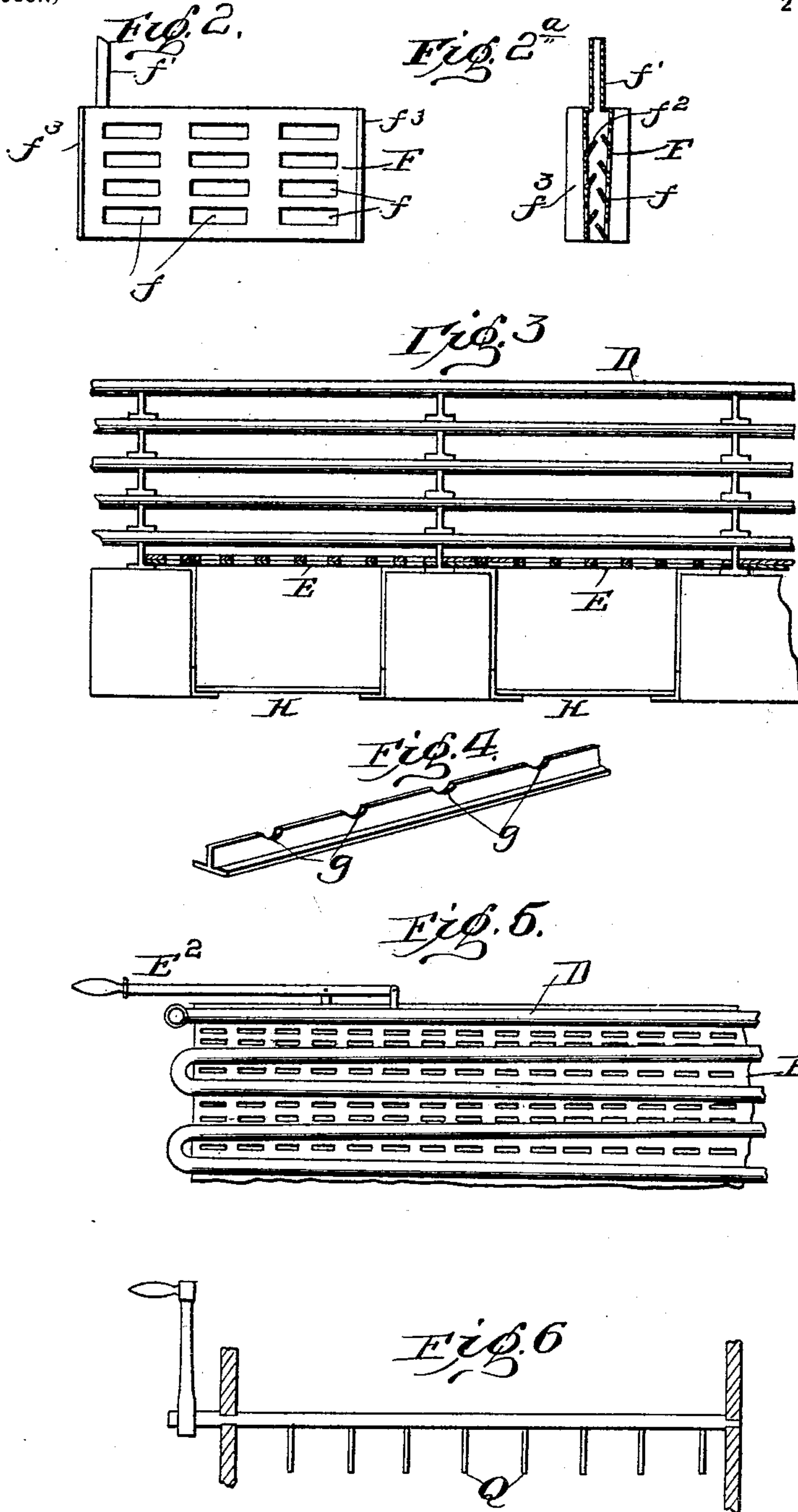
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UNITED STATES PATENT OFFICE.

THOMAS B. HOWE, OF SCRANTON, PENNSYLVANIA.

SAND-DRIER.

SPECIFICATION forming part of Letters Patent No. 633,005, dated September 12, 1899.

Application filed May 13, 1899. Serial No. 716,765. (No model.)

To all whom it may concern:

Be it known that I, THOMAS B. HOWE, a citizen of the United States, and a resident of Scranton, in the county of Lackawanna and State of Pennsylvania, have invented certain new and useful Improvements in Sand-Driers; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, and to the letters of reference marked thereon.

This invention relates to improvements in driers for sand and like substances, the object being to provide an apparatus which will effectually remove the moisture and gravel as well as dust from the dried sand by a continuous process and without requiring that the sand should be raised to such a high temperature as would destroy any of its qualities or prevent its almost immediate use in the manufacture of plaster and like compounds.

The invention consists in certain novel details of construction and combinations and arrangements of parts, all as will be now described, and the particular features of novelty pointed out in the appended claims.

Referring to the accompanying drawings, Figure 1 is a diagrammatic elevation of an apparatus embodying my present improvements. Fig. 2 is a detail front elevation and sectional projection of one of the ventilators of the preferred form. Fig. 2^a is a vertical section of the same. Fig. 3 is a cross-sectional view through a portion of the drying system of pipes, showing the manner of mounting and supporting the same. Fig. 4 is a detail of one of the T-irons employed for supporting and positioning the drying-pipe. Fig. 5 is a detail top plan view of a section of pipe and a portion of the sand-retaining screen, showing the handle for adjusting the size of the apertures. Fig. 6 is a detail of the agitator.

Like letters of reference in the several figures indicate the same parts.

In the present invention it has been my object to provide an apparatus wherein the sand might be delivered by means of carts or cars and by a continuous process the gravel separated therefrom, the sand dried, and the finer dust or loam removed from the dried sand, leaving the latter in a condition ready for immediate use in plaster-making, &c.,

while the gravel and dust will be delivered at separate points in condition for removal and subsequent use in other industries.

For carrying the invention into practice I have found it convenient to arrange the working parts of the apparatus in a heavy framework or building, parts of which are designated in the accompanying drawings, Fig. 1, by the letter A, such framework being sufficiently strong to support at its upper end a track or way, such as B, over which carts or cars for delivering the sand to the apparatus may be driven from any convenient roadway, while at the bottom of the apparatus suitable bins or receptacles may be arranged for the finer products.

Within the frame A and below the track or way before described I arrange a relatively large mesh inclined screen or preliminary separator C, upon which the sand is delivered and which will, while permitting sand and finer particles to pass therethrough, conduct the large particles and coarse gravel down to a point outside the apparatus, from which point it may be removed as desired. Immediately below the upper end of this screen C and in position to receive the sand and finer particles passing through said screen I arrange drying and separating apparatus which, in order that the product may have a progressively-forward movement, so as to dispense as nearly as practical with all machinery in the handling of the same, is also arranged on an incline or with the discharging-point lower than the receiving-point, which system is followed throughout the apparatus and enables me to take advantage of the force of gravity in the automatic handling of the raw and finished materials.

Primarily the drying portion of the apparatus consists in a system of pipes arranged in transverse lines, so as to require the sand in passing therethrough to come in proximity to or strike some one or more of the heating-pipes. This system of pipes, (lettered D in the accompanying drawings,) it will be observed, is arranged with the several coils extending from a higher progressively down to a lower plane, the several coils being attached at opposite ends to upper and lower manifolds D', from which the supply and return pipes D² D³, respectively, extend to a boiler D⁴.

The pipes D^2 D^3 enter the boiler at the top and bottom, respectively, so as to insure a constant circulation of the heating medium through the drying-coils D and also so as to insure a quick return of all the water of condensation from said coils down the manifold D' and pipe D^3 to the boiler, thereby dispensing with the necessity of blowing out the pipes when the condensation grows great due to the handling of very wet or cold sand and like materials.

Immediately beneath and in proximity to the lowermost coil of pipe D, I arrange a pair of screens E (best shown in Fig. 5 in said drawings) and each formed by a plate having apertures therein, the said plates being adapted to slide one upon the other, so as to vary the size of the apertures and permit a greater or less quantity of sand to pass therethrough and so as to retain the sand for a greater or less length of time in contact with or in proximity to the heating or drying pipes D. The two plates or screens E are movable with relation to each other by means of a handle E^2 , Fig. 5, preferably located at the upper end and shown in dotted lines behind the post A in Fig. 1.

In apparatus of this kind it is highly desirable to provide a ready escape for the moisture driven off by the heating of the sand, and in the present instance I prefer to make use of a series of vertically-arranged chambers or moisture-conduits F, Figs. 1 and 2, having side apertures or openings f and an escape pipe or conduit f' . These chambers are preferably located between the coils of heating-pipes D in vertical position, and in order to prevent the entry of sand through the apertures f wings f^2 are arranged within the chambers and extend upwardly at an inclination from the bottom of each of the apertures. It will thus be seen that while moisture may enter through these apertures or openings f yet the sand will not pass up over the wings; but the tendency of the sand will be to move downwardly constantly past the openings, thereby bringing successive portions of the sand into proximity to the openings for the escape of the moisture held thereby. The bottom of the moisture-conducting chambers may be left open, as indicated in Fig. 2, and thus any sand that may blow into the same or by any accident reach the interior will at once drop out and continue its downward movement. For the purpose of retaining the moisture-conducting chambers in their upright positions I preferably provide them with lateral wings f^3 , which will contact with the coils of pipes adjacent to the chambers and retain them in place.

The pipes themselves are preferably arranged in parallel planes, and the several coils are preferably positioned and separated the proper distance by sections of T-iron, the flat head or face of which resting on a lower coil will afford a firm bearing, while the web or flange is recessed, as at g in Fig. 4, for re-

taining and holding the next higher coil in position. This method of assembling is followed throughout the entire coil and is illustrated clearly in Fig. 3, which figure also shows the retaining-screens at the bottom on the lower side of the coil and from which figure it will also be seen that beneath the retaining-screens is an inclined chute or way H, down which the sand and dried product is delivered at a point below the heating-coil. From this point of delivery and at a somewhat lower level another inclined screen K, of relatively fine mesh, extends down over the sand-bin L and terminates at a point preferably outside of the structure for the delivery of the gravel at the point marked "gravel" in Fig. 1 of the drawings. The gap or jump between the lower end of the chute H and the upper end of the screen K is utilized for the discharge of the dust and finer particles which are found undesirable in the sand, and these finer particles are driven out of the sand by means of an air-blast delivered from a blower or pressure-nozzle M, arranged in front of the jump or gap before mentioned and above the screen K. The air-pressure for this blast may be derived from a suitable compressor and engine, such as indicated diagrammatically at O in Fig. 1, and the engine may in turn be driven by steam generated in the boiler B^4 , for which purpose a pipe o is shown running from the diagrammatic illustration of the engine to the boiler.

Obviously the size of the whole apparatus may be made to accord with the desired capacity, and in handling and drying sand with it the sand is carted in over the top of the apparatus and dumped down on the screen C, the finer sand, gravel, &c., passing through said screen down into the drying-chamber formed by the compartment in which the steam-pipes are located, while the larger parts—coarse gravel, stone, &c.—travel off down the incline C' and are discharged outside of the apparatus. If the sand contains much moisture the retaining-screens may be set and the sand held up for a greater length of time in proximity to the heating-pipes, and as it dries out it will sift down through the said retaining-screen onto the chute beneath. Should it for any reason cake or clog above the drying-pipes, the agitator Q may be oscillated by hand to break up the accumulation of sand over the pipes and cause the same to feed down more rapidly. The sand falling on the chute will slide down the same and drop off of the lower end onto the finer-mesh screen K, being subjected in its passage from the chute to the screen to the action of the air-blast delivered from the nozzle or blower M, which is gaged so as to have only strength enough to drive off the dust and finer undesirable particles, while the sand and coarser particles will drop by gravity down onto the screen K, and the sand itself will drop through the meshes of said screen into the sand-bin L, while the gravel will travel down the screen

into the gravel pit or bin, preferably located outside of the apparatus.

The whole structure it will be seen is exceedingly simple, requiring little or no attendance for its manipulation, and when once set for operating upon sand of a given quality and containing a substantially uniform amount of moisture may be left to run of itself, it only being necessary to supply sand as rapidly as the apparatus can handle and permit it to pass through.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. A sand-drier comprising a receptacle for the sand having entrance and discharge openings therein at the top and bottom respectively, a system of heating-pipes arranged on an inclined plane in said receptacle and constituting irregular passages through which the sand passes to the discharge-opening, an inclined retaining-screen arranged immediately beneath the heating-pipes with means for varying the size of the openings in said screen for regulating the discharge of sand and the length of time the sand shall be held in contact with the said pipes, and an inclined chute arranged beneath said retaining-screen for conducting the sand to the sand-bin; substantially as described.

2. A sand-drier comprising a receptacle for the sand having entrance and discharge openings at the top and bottom respectively, a system of heating-pipes arranged in said receptacle, constituting irregular passages through which the sand passes, an adjustable retaining-screen located immediately beneath said system of pipes and for regulating the discharge of sand and the length of time the sand shall be held in contact with said pipes, a relatively coarse inclined screen located above said pipes for diverting the coarser gravel, an inclined chute located beneath the system of pipes, an inclined screen of relatively fine mesh located beneath the discharge end of the chute and a blast-nozzle for discharging the

finer and lighter particles from the dried sand in its passage from the chute to the lower inclined screen; substantially as described.

3. A sand-drier, comprising a receptacle for the sand, having entrance and discharge openings at the top and bottom an inclined intermediate system of heating-pipes, an inclined adjustable retaining-screen located immediately beneath said heating-pipes for regulating the discharge of sand and the length of time the sand shall be held in contact with the pipes, a boiler, manifolds at the upper and lower ends of the system of pipes, and pipes connecting said manifolds with the boiler at different levels respectively, whereby water of condensation in said pipes is caused to return to the boiler by gravity; substantially as described.

4. A sand-drier comprising a receptacle for the sand, having entrance and discharge openings at the top and bottom, an intermediate inclined system of heating-pipes, an adjustable screen located immediately beneath said heating-pipes and inclined at a coincident angle for regulating the discharge of sand and the length of time the sand shall be held in contact with the pipes, and a system of vertically-arranged ventilators located intermediate said pipes for discharging the moisture released from the sand by the heat; substantially as described.

5. A sand-drier comprising a receptacle for the sand having entrance and discharge openings at top and bottom, an intermediate system of heating-pipes, a regulating-screen located immediately beneath said system of pipes, and ventilators arranged intermediate the pipes and comprising chambers having discharge-openings and side entrance-openings with inwardly and upwardly extending wings for preventing the entry of sand substantially as described.

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Witnesses:

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A. V. BOWER.