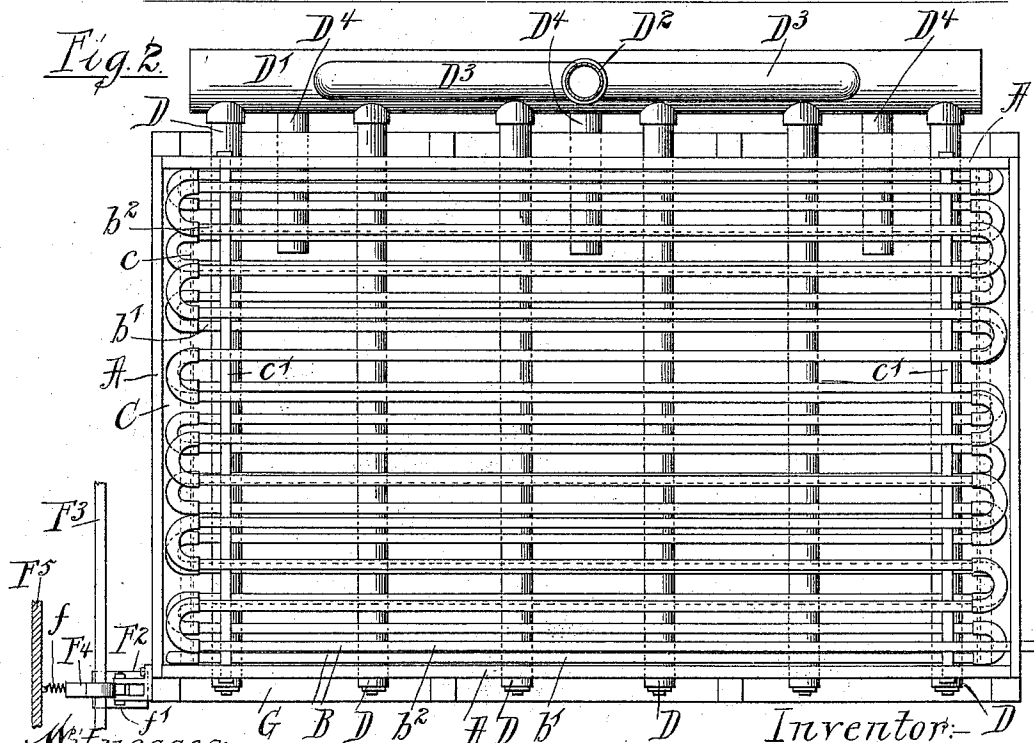
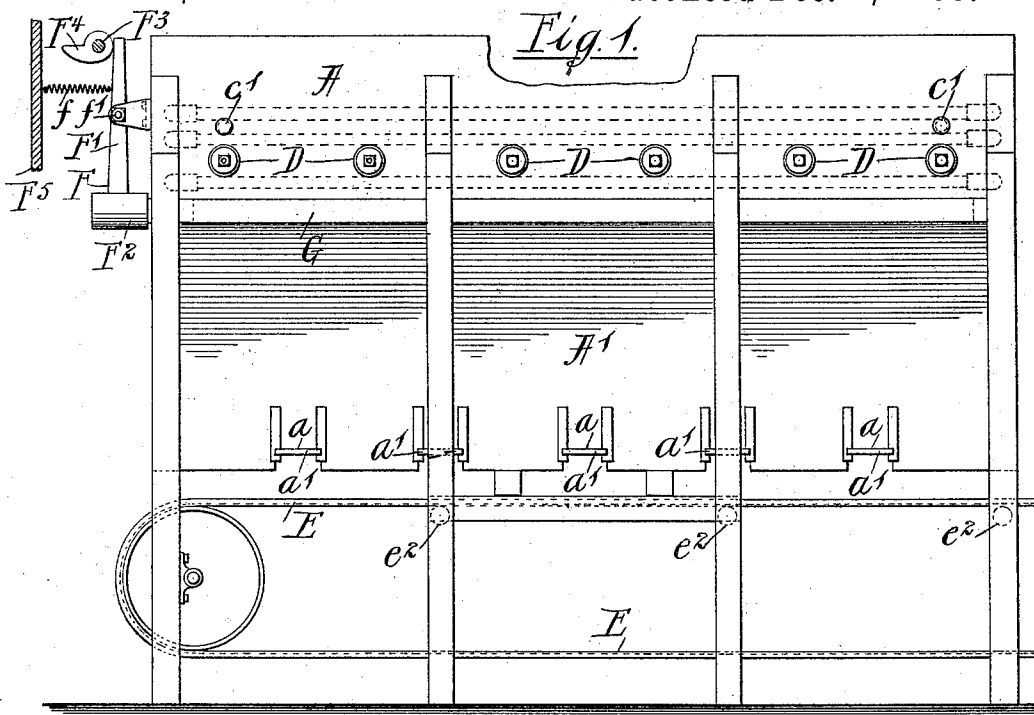


J. H. FINLAY.
SAND DRIER.

No. 550,824.

Patented Dec. 3, 1895.



Witnesses:
John W. Adams
Clifton Hamlin

Inventor: D
John H. Finlay
by: Austin P. Cook & Brown his Attys

UNITED STATES PATENT OFFICE.

JOHN H. FINLAY, OF CHICAGO, ILLINOIS.

SAND-DRIER.

SPECIFICATION forming part of Letters Patent No. 550,824, dated December 3, 1895.

Application filed September 24, 1894. Serial No. 523,864. (No model.)

To all whom it may concern:

Be it known that I, JOHN H. FINLAY, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Sand-Driers; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to apparatus for drying sand; and it has for its object to provide a construction adapted to do the work thoroughly and at the same time much more rapidly than apparatus heretofore employed for that purpose.

The invention consists in the improvements hereinafter set forth, and pointed out in the appended claims.

In the accompanying drawings, Figure 1 is a side elevation of the apparatus. Fig. 2 is a top or plan view. Fig. 3 is a transverse sectional elevation thereof. Fig. 4 is a horizontal section in the line 4 4 of Fig. 3.

A represents an open-topped box having a hopper-bottom A', said receptacle being sustained in an elevated position by a suitable framework, as shown. In the line of convergence of the side boards which form the hopper-bottom A' are provided a series of openings *a*, each provided with a slide *a'*, these openings being for the purpose of allowing the dried sand to pass out of the hopper-bottom box A.

Within the box A are provided steam-pipes B, between which the sand descends, so that in coming in contact with or near said steam-pipes in passing between them it is heated and dried and thereafter drops to the bottom of the hopper A' and finds escape through the openings *a*. The steam-pipes, as here shown and as preferably constructed and arranged, consist of three series of coils—to wit, a lower series *b*, a middle series *b'*, and a top series *b*²—each series occupying a substantially-horizontal plane. These steam-pipes are desirably one and a quarter inch in diameter, those of the lower series *b* being separated by spaces of about three-eighths of an inch. This lower set of steam-pipes *b* are suitably supported—as, for example, by cross-beams C, connected with the general framework of the

apparatus, a length of gas-pipe or other suitable metal bar *c* being interposed between each of the beams C and the steam-pipes in order that the said pipes may not char or burn the beams. Of course, if preferred, a metal beam may take the place of the wooden beam C and its protecting gas-pipe *c*.

Upon the series of steam-pipes *b*, and arranged transversely thereto, are a series of exhaust-pipes D for carrying off moisture from the interior of the mass of sand in the box, said pipes D being provided in their lower sides with a series of holes *d*, as shown in Fig. 4. The pipes D are preferably about five inches in diameter and the holes *d* about two inches in diameter. The series of pipes D connect at one side of the apparatus with a header D', from which leads a pipe D², that passes into a flue or chimney, by which an air-draft is induced. As here shown, the header D' is connected with the pipe D² by means of branches D³, connecting with the header between its middle and its extremities.

Upon the transverse air-pipes D rest the second series of steam-pipes *b'*, which are placed preferably at a greater distance apart than the pipes *b*—as, for example, say two inches. Upon this second or middle series of steam-pipes *b'* are placed transverse metal spacing-bars *c'*, which may be of gas-pipe, and upon said spacing-bars *c'* rest the third or topmost series of steam-pipes *b*². These are desirably placed at a still greater distance apart, preferably about five inches. The end connections of the several series of steam-pipes are shown in Figs. 2 and 4. An exhaust-pipe or series of pipes D⁴ is provided to connect the open space within the hopper A' with the header D', as indicated in Figs. 3 and 4, having its end within the hopper A' open. The transverse pipes D preferably pass entirely through the box A, and at their ends opposite the header D' may be entirely open, or they may be closed by plugs, as shown, said plugs being, however, desirably provided with small openings through them, as indicated at the lower left-hand corner of Fig. 4 and in Fig. 1.

Beneath the hopper A' is arranged a belt carrier E for carrying away the dried sand. This belt is desirably of cotton. Upon this belt the dried sand is dropped through the openings *a*, and by movement of the belt the

sand is carried to any desired point—as, for example, to the foot of an elevator or to any other carrier or receptacle. (Not shown.)

The belt is of peculiar construction in having marginal strips *eee* applied thereto to form side cleats projecting upwardly from the edges of said belt for the purpose of retaining the sand upon it. These cleats are unlike those which have heretofore been employed for a similar purpose upon belt carriers, inasmuch as they consist of flexible strips, preferably of rubber, riveted or otherwise secured to the belt proper. Cleats, of wood or other material, which have heretofore been employed are necessarily made in short sections, because they are inflexible, and it is found that the sand works beneath their ends or between the ends of adjacent cleats and rapidly causes them to get out of order and to make their replacement and repair necessary. By employing rubber or similar flexible and elastic strips and riveting them or otherwise securing them at short intervals or continuously to the belt proper the belt flexes readily over the end pulleys upon which it is trained and no spaces are opened for the objectionable admission of sand. The belt *E* is sustained by rollers or other guides *e*², as indicated by dotted lines in Fig. 1.

For the purpose of facilitating or hastening the movement of the sand downwardly between the steam-pipes a knocker *F* is provided, as seen in Figs. 1 and 2, said knocker consisting, as here shown, of a centrally-pivoted lever or bar *F'*, carrying the heavy iron hammer *F*² at its lower end. Opposite the upper end of the pivoted arm *F'* is arranged a slowly-rotating shaft *F*³, carrying a cam *F*⁴, which periodically and at intervals preferably of a quarter of a minute vibrates the arm *F'*, so as to move the hammer *F*² outwardly, and then releases the knocker, so as to allow it to strike against some portion of the apparatus and to thereby jar the steam-pipes and thus induce movement of the sand from the surfaces of the pipes downwardly to the hopper. The knocker *F* may be arranged to strike against the end of one of the longitudinal frame-beams *G*, Fig. 1, and its knocking action may be increased by the application of a spring *f*, applied in any suitable manner to the arm *F'*. As here shown, it is connected with said arm above its pivot *f'* and with some stationary part *F*⁵, which may be a convenient beam or wall or a suitable part provided for such attachment.

The steam-coils may be connected with each other, so as to be supplied through a single extension thereof, as shown at the lower right-hand corner of Fig. 2, and to all discharge into a suitable trap *T*, as shown in Fig. 4.

The operation of the apparatus above described is clearly apparent. The sand piled upon the steam-pipes is dried by the heat within the box, and especially by contact or

proximity with the steam-pipes in its downward passage to the hopper *A'*. The drying operation is greatly facilitated and hastened by means of the exhaust-pipes *D* having in their under surfaces the openings *d*. The outlet-pipe *D*², leading from said pipes *D* to a chimney, induces a draft of air inwardly through the pipes *D*⁴ or through the open ends of the pipes *D*, or both, and by this air-current moisture from the sand is entrained through the openings *d* and is carried away. The air pipe or pipes *D*⁴ also withdraw the moisture with air from the hopper *A'*, through which the dried sand is falling, and as a result the sand delivered from the hopper to the traveling belt *E* is in a thoroughly-dried condition. The drying operation is obviously continuous and is made much more rapid by reason of the air-current produced through the exhaust-pipes. The pipes *D*⁴ are a material improvement and contribute greatly to the result sought and attained. The knocker *F* or its equivalent, which may be in any suitable form and otherwise applied than shown in the drawings, also facilitates the movement of the sand downwardly between the steam-pipes as the sand becomes dry and increases the capacity of the apparatus. The belt *E*, having the flexible continuous side cleats *ee*, is also an improvement which forms the subject of one of the appended claims.

I claim as my invention—

1. A sand drier comprising an open topped box, a hopper beneath the box, a horizontal net work of steam and exhaust pipes separating the box and hopper at their juncture, said exhaust pipes being perforated on their under sides, discharge gates in the bottom of the hopper, and an endless conveyer arranged beneath said discharge gates.

2. A sand drier comprising an open topped box, a hopper beneath the box, a horizontal net work of steam and exhaust pipes separating the box and hopper at their juncture and comprising separate layers of parallel steam pipes and an intervening layer of transversely arranged exhaust pipes perforated on their under sides, tie bolts extending between the sides of the box transversely beneath the layers of steam pipes and supporting the latter, an open ended exhaust pipe leading out of the hopper, discharge gates in the bottom of the hopper, an endless carrier for conveying off the discharge from said gates, a knocker adapted to strike the box and hopper repeatedly to jar the sand through the same and means for actuating said knocker, substantially as described.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

JOHN H. FINLAY.

Witnesses:

M. E. DAYTON,
TAYLOR E. BROWN.