Generic this invention relates to dryers, but it more especially directed to such an apparatus applicable to the drying of sand and the like.

One of the principal objects of this invention is the provision of a sand drying apparatus including a heating unit embracing a specially designed firebox, wherein flame spaces are provided between the side walls and the fire for directing the flames against said side walls, and baffle means for distributing the heat and retarding the discharge from the firebox.

Another important object of this invention is the provision of a sand drying device of this character comprising a unique hopper and firebox protective structure, and novel means including rotatable grates for effecting the automatic discharge of the dried product and preventing the clogging of the same at points of discharge from the firebox.

With these and other objects in view, which will become apparent as the description proceeds, the invention resides in the construction, combination and arrangement of parts, hereinafter more fully described and claimed, and illustrated in the accompanying drawings, in which like characters of reference indicate like parts throughout the several figures, of which:

Fig. 1 is a vertical cross sectional view of my improved device;

Fig. 2 is a longitudinal sectional view of the same; and

Fig. 3 is a horizontal sectional view of the lines 3-3 of Fig. 2.

The dryers of this general character with which I am familiar have proven deficient by reason of being too costly and complex in structure, not uniformly drying the product being directed to the discharge points, and inability to effect the expeditious removal of extraneous matter tending to prevent the automatic or continuous discharge of the dried material, and it was to overcome such deficiencies and provide a device having a firebox with tapering walls to direct and cause the flames to contact and follow the inner surfaces thereof, means to distribute the heat and retard its escape, adequate and properly proportioned discharge openings, unique hopper and firebox protective structure, and movable grate means contiguous the discharge openings to expeditiously prevent clogging of the material at such points and effect the removal of such extraneous matter in the sand or other material being treated as would tend to interrupt the proper flow of the dried product, that I designed the drier forming the subject matter of this invention.

The frame A, in the present instance, is rectangular in configuration and comprises a front casting 1 formed with legs 2, terminating at its upper edge in the oppositely extending lateral projections 3, and with a central opening 4 normally closed by door 5, and a rear casting 6 formed with legs 2 and lateral projection 3 similar to front casting 1, and also terminating at its upper edge in an outwardly projecting lateral flange 7 constituting a shelf or soot trap, as will hereinafter more fully appear.

The castings 1 and 6 are connected at opposite sides by the respective angle bars 8 supported by and suitably secured to angle lugs 9 bolted or otherwise connected to the respective castings. If desired, these lugs may be integrally cast with the front and rear castings. Said castings 1 and 6 are connected at their upper edges by angle bars 10 seating on projections 3 to which they are bolted at their respective ends or otherwise suitably secured.

Coming now to the firebox structure B, the same comprises sides 11 having their lower edges supported on castings 1 and 6 at the bases of the projections 3 to which they are bolted or otherwise suitably secured, said sides 11 incline upwardly and inwardly in meeting direction to points 12, from which points they sharply incline upwardly forming the dome or roof sections 13, terminating at their meeting edges in flanges 14 firmly connected by bolts 15 forming the ridge 16.

The sides 11 are formed at their end edges with the oppositely projecting lateral flanges 17 and 18. The ends 19 and 20 conform in configuration to a cross section of the firebox as shown in Fig. 1 and are adapted to seat behind flanges 17 to which they are bolted or otherwise suitably secured. Front end 19 is formed with an opening 21 closed by fire door 22, and rear end 20 is formed with a substantially centrally disposed opening 23 in which is inserted one end of smoke stack or pipe 24, and below said opening 23 is soot door 25 permitting removal of soot and access to said firebox.

The firebox B is especially constructed as above described so that the flames will be directed to and follow the inner walls thereof and an even distribution of heat by said roof structure effected.

The above described firebox construction is important in effecting an even distribution of heat over the inner surface wall area and substantial
confinement of heat by the roof structure effected, since as the bed of coals or fire settles, flue-like spaces are formed adjacent walls 11 directing the flames along said walls 11 effecting a quick and continuous heating of said firebox, and in order to further distribute the heat at the rear thereof and prevent its rapid discharge through smoke pipe 24, the baffle plates 28 forming a tortuous path for said heat and smoke before being discharged therefrom are provided. Baffle plate 29 is secured to angle irons 30 bolted or otherwise suitably secured to walls 11 with its lower end spaced from the flange 7 constituting the bottom of said firebox at the rear thereof and likewise spaced from end 33. Baffle 26 is spaced inwardly from baffle 29 with its lower end substantially flush with flange 7 and is secured similar to plate 25 by angle irons 36, with its upper end spaced from roof sections 35.

An ash pan or structure 31 is adapted to seat on angle bars 8 beneath said firebox with its free edges underlying or suitably secured to sides 12 and end 15, with the upper edge of its rear end 32 terminating flush with the free edge of flange 7, to which it may be secured if desired. Also a continuation of end 32 may constitute the baffle 32 if desired.

A series of spaced bearing lugs 33 are formed on or suitably secured to the inner surfaces of walls 11 adjacent their lower edges on which is mounted a movable grate structure 34 connected to shaker arm 35, and being of conventional construction further description would seem to be unnecessary.

The supporting structure A and firebox structure B having been described, I now come to the hopper structure C, which will be described as follows:

The hopper C is constructed preferably from sheet metal, and may be formed from any suitable material, and comprises sides 36 of a length substantially corresponding to that of firebox B bent or otherwise formed at its corners to provide the ends 37, the inner edges of which conform to the contour of said firebox and seat against the flanges 13 to which they are bolted or otherwise suitably secured, the lower edges being suitably secured to projections 3, or if desired the angle bars 18 may continue across the end to the firebox to which they may be secured.

Sides 36 are adapted to seat on angle bars 10 and are bent as at 33 to seat against the upturned portions of said angle bars to which they are firmly secured by bolts, rivets or other fastening means.

Said sides 36 extend on an inclined upwardly and outwardly beyond or above the edge 16 so that the hopper is wider at its upper edge than at its lower edge.

In order to protect the firebox when the hopper is being filled or is full of sand and to assist in directing the dried sand to the bottom of the hopper, the following structure is provided including an inverted V-shaped crown member 39 positioned over the edge 16 secured at its ends to said hopper by flanges 40 and bolts or other fasteners or clamps 41, and positioned thereover is preferably a triangular shaped mesh steel wire screen 42 supported and held spaced from the firebox B by cleats 43 suitably secured to the said firebox, the lower edges of said screen being spaced from the bottom of the hopper.

It will be noted that when the hopper is mounted as above described a longitudinal opening or slot will be formed intermediate the lower edges of the hopper and firebox and the respective projections 3 on each side of the firebox, and through which the sand is adapted to automatically feed or discharge as it becomes dry. However, in order to control the flow and prevent extraneous matter and the like from clogging the openings, I have provided the respective, and in the present instance, rotary cast iron grates 44, each located in one of the said openings and suitably spaced to flow in ends 37 on shaft 45 extending therethrough slightly above the projections 3, as clearly shown in Figs. 1 and 3 of the drawing.

From the above it will be apparent that I have designed a sand drier embodying a unique firebox structure adapted to quickly and uniformly dry the sand, protective screen means for said firebox additionally tending to prevent passage of the wet sand to the openings and assisting in feeding the dried sand to said outlet openings, and grate means for controlling the flow and preventing the clogging at any of the discharge openings or extraneous matter, such device being simple in construction, manufacturable at a minimum of cost, and efficient for the purposes intended.

Although in practice I have found that the form of my invention illustrated in the accompanying drawings and referred to in the above description as the preferred embodiment, is the most efficient and practical; yet realizing the conditions concurrent with the adoption of my invention will necessarily vary, I desire to emphasize that various minor changes in detail of construction, proportion and arrangement of parts, may be resorted to within the scope of the appended claims without departing from or sacrificing any of the principles of the invention.

Having thus described my invention what I desire protected by Letters Patent is as set forth in the following claim:

A drier for sand and the like comprising a frame including front and rear ends formed with lateral projections and constituting supporting means for a hopper, a rear end formed with an opening, a firebox being cast to provide immovable side elements connecting said ends including side and wall roof sections each of said sections tapering upwardly and inwardly and detachably connected along their meeting edges, said sections when assembled causing the particles of combustion to travel over their inner surfaces from front to rear and tortuously to exit through opening in the rear end, bar members connecting said lateral projections spaced to form exterior openings on the opposite sides of the firebox, a hopper surrounding said firebox with said sides connected to said bars and end edges to said projections, a screen enclosing said side elements conforming to the configuration of the firebox closed at its upper and open at its lower end and spaced from said firebox to form a converging passageway along the sides thereof, whereby the sand as it becomes dry is directed to and permitted to travel over the surface of said firebox.

GEORGE A. DIEHL.