To all whom it may concern:

Be it known that we, WILLIAM H. HANNAM and WARREN E. MURRAY, citizens of the United States, residing in the city and county of San Francisco and State of California, have invented certain new and useful Improvements in Apparatus for Drying Sugar, of which the following is a specification.

The hereinafter described invention relates to an apparatus for drying or expelling moisture from sugar, for the purpose of preventing the clogging or lumping of the sugar as delivered to the discharge runways and to provide for the free flowing thereof.

The invention resides essentially in dividing the body of sugar into comparatively thin layers or streams, and conveying the sugar so divided through an atmosphere of heated air, which is forced through the layers of propelled sugar in order to come into contact with the crystals or grains thereof for expelling the moisture therefrom, and of the layers of sugar to the heated air forced therethrough being sufficient to perfectly dry the sugar, in which dried condition it is delivered to suitable means for conveying the same to a place of deposit.

In order to comprehend the invention reference should be had to the accompanying sheets of drawings, wherein—

Figure 1 is a side elevation of the improved apparatus, illustrating a plurality of endless conveyers for the sugar, a plurality of fixed receptacles or containers for the heated air, means for supplying heated air thereto under pressure, the feed hopper for the sugar to be dried, the hopper for receiving the dried sugar, and the delivery devices into which the dried sugar is discharged, the covers for the heat receiving receptacles or containers being removed. Fig. 2 is a vertical sectional view of the intermediate hopper into which the sugar from the first conveyer is discharged, said view disclosing the relative arrangement of the upper end of the first conveyer and the lower end of the second conveyer working through said hopper, the conveyers being broken away. Fig. 3 is a detail side elevation of the first conveyer, illustrating the means for driving the same, the heat receptacle or container therefor, and the feed hopper for supplying sugar to said conveyer, the cover for the heat receptacle or container being removed. Fig. 4 is a cross sectional view taken through one of the heat receptacles or containers, illustrating the cover applyed thereto for confining the heat therein, and the endless conveyer working over the same. Fig. 5 is an enlarged detail broken plan view of a portion of one of the swinging frame sections composing the endless conveyer, the meshed covering thereof being removed. Fig. 6 is an edge view of the part disclosed by Fig. 5 of the drawings, illustrating the meshed covering as applied thereto. Fig. 7 is an enlarged detail broken plan view of one of the conveyers. Fig. 8 is a broken front elevation of the intermediate hopper, disclosing the position of the inclined grizzly bars therein onto which the layers of sugar from the first conveyer are discharged. Fig. 9 is a detail broken vertical sectional view of the lower end portion of the feed hopper for the sugar, disclosing the position of the first conveyer relative thereto.

In the drawings, the numeral 1 is used to designate any suitable form of a supporting structure or frame for sustaining the working parts of the apparatus, and 2 and 2' what shall be termed longitudinally disposed heat receptacles or containers, placed one in advance of the other and preferably arranged at an incline, Figs. 1 and 3 of the drawings. Heated air is supplied to these receptacles or containers by means of the conduits 3 and 3' respectively extended therein, and which lead from the blower 4 for drawing heated air from any suitable source of supply and forcing the same through the conduits 3 and 3' into the receptacles or containers 2 and 2'. These said receptacles or containers are, in the present case, formed with an inclined bottom wall 4' for upwardly deflecting the heated air forced therein, and said bottom wall is provided with a removable section 4' by means of which access may be had to the interior thereof for any desired purpose,—Fig. 4 of the drawings. The heat receiving receptacles or containers are open at their top, and over each works an endless conveyer or carrier for the sugar to be dried. These carriers each consists of two sprocket chains
5 and 5' which work over sprocket wheels 6 and 6' mounted respectively on the upper and lower shafts 7 and 7', and are connected by a series of transversely disposed open metallic frames 8 hinged thereto at their upper ends, which frames are each covered by a fine mesh wire 9, the fineness of which is such as to prevent the crystals or grains of sugar passing therethrough to the interior of the said heat receptacles or containers. The upper run of each endless conveyer or carrier is supported against sagging by means of the endless belts 10 and 10', which work over the belt wheels, not shown, secured to the cross shafts 7 and 7'.

The frames 8 being hinged to the sprocket chains 5 and 5' swing outwardly as the said chains are carried over the upper sprocket wheels 6 and hang vertically as conveyed toward the lower sprocket wheels 6', assuming a horizontal position as carried over said lower sprocket wheels, Figs. 1, 3 and 7 of the drawings. The free edge of each frame slightly overlaps the hinged edge of the succeeding frame as they are brought into horizontal alinement in order to break joint, the said free edge being slightly upwardly flanged or turned for this purpose, as shown at a. As a matter of fact, these hinged frames serve as open sustaining plates for receiving and carrying forwardly the layers of sugar to be dried, which sugar is delivered onto the frame plates of the endless conveyer or carrier working over the heat receptacle or container 2 by means of the open bottomed feed hopper 11, held a slight distance above the lower end of the said conveyer, Figs. 1, 3 and 9 of the drawings. This hopper is provided in its front wall with a slide gate 12, which may be raised and lowered to vary the depth of the layer of sugar removed by the frame plates of the endless conveyer carrier as moved beneath the same.

As the sugar removed from the feed hopper 11 in comparatively thin layers is carried over the opened top heat receptacle or container, the hot air forced therein under pressure works through the open frames of the conveyer and the layers of sugar carried thereby, expelling the moisture therefrom and by so doing thoroughly drying the sugar. To confine the heat as long as possible and cause the same not only to pass through the layers of sugar but likewise to circulate over the upper surface thereof, each receptacle or container is closed by a cover 13, which acts as a housing for the endless conveyer or carrier and is provided with longitudinally disposed ways 14 which serve as guides for the sprocket chains 5 and 5' and the trunnions of the frames 8, which enter therein as the said frames move into horizontal alinement.—Fig. 4 of the drawings. The cover or housing 13 is secured to the receptacles or containers in any suitable manner, and to permit the escape of the heated air therefrom, the same is provided with a central longitudinally disposed outlet 14'. By thus confining the heated air and causing it to circulate over the upper surface of the layers of sugar, as well as passing therethrough, the heated air is thoroughly distributed and the heat units fully consumed.

Between the two receptacles or containers for the heated air is interposed a hopper 15, within which is arranged a grizzly composed of a series of inclined bars, or rods 15'.—Fig. 8 of the drawings, onto which the layers of sugar are dropped by the swinging frames of the endless conveyer traveling over the receptacle or container 2 as carried over the sprocket wheels of the upper shaft. The reason for dropping the layers of sugar onto this grizzly is to break up the cake, so that the same may be discharged onto the frames of the endless conveyer for the receptacle or container 2' in a divided state, and not as a dry or partially dried cake.

As conveyed over the receptacle or container 2', the sugar is subjected to the action of the heated air forced therethrough in the same manner as carried over the receptacle or container 2. However, to provide against the lateral displacement of the sugar as delivered onto the swinging frames of the second conveyer, there is arranged in advance of the hopper 15 the forwardly projected guide plates 15'.

The dried sugar as discharged or dropped from the swinging frames of the endless conveyer traveling over the receptacle or container 2', falls into a hopper 16, from whence the same escapes through a conduit 16' into a graduated rotary bolt 16' mounted within a hopper 17, the graded sugar escaping therefrom passing into the discharge outlet conduits 18, 18', 19 and 19', for conveying the same to a suitable place of deposit.

Any suitable means may be employed for imparting travel to the endless conveyers, a simple and effective means being a worm 20, mounted on a drive shaft 21, meshing with a worm gear on the cross shafts 7, Fig. 8 of the drawings. Only one worm is illustrated, but it will be understood that a similar worm is used for driving each of the cross shafts 7, each being mounted on and driven from the drive shaft 21.

While two endless conveyers and two receptacles or containers for the hot air have been described and illustrated, such, however, is merely by preference, as a single conveyer and heat receptacle or container will suffice for successfully drying the sugar. By duplicating the parts, the receptacles or containers and likewise the endless conveyers may be constructed of lighter material, than where the drying depends on the use of
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a single heat receptacle or container and a single endless carrier. For this reason, preference is given to a duplication of said parts.

5 We are aware that changes and modifications may be made in the described working parts of the apparatus without creating a departure from the described invention, and we therefore do not wish to be understood as confining or limiting ourselves to the details of construction shown and described.

Having thus described the invention what is claimed as new and desired to be protected by Letters Patent is:

1. An apparatus for the described purpose, the same comprising a chamber or receptacle for heated air, an endless conveyor consisting of a plurality of hinged open frames working over said receptacle, a feed hopper arranged above said conveyor for supplying sugar to the hinged frames thereof as brought into horizontal alignment, and means for supplying heated air under pressure within the mentioned receptacle.

2. In an apparatus for the described purpose, the combination with a fixed air containing receptacle, of an endless conveyor composed of a series of independent hinged open frames, a feed hopper arranged above the upper run of said conveyor, a cover for said receptacle provided with an outlet for the escape of air, said cover serving as a housing for the upper run of the conveyor, devices for imparting travel to the endless conveyor, and means for supplying heated air under pressure within the air containing receptacle.

3. In an apparatus for the described purpose, the combination with a plurality of receptacles arranged one in advance of the other, of an endless conveyor consisting of a series of independent hinged open frames working over each of said receptacles, a feed device for delivering material to be dried onto one of said conveyors as the hinged frames thereof move into horizontal alignment, said conveyor delivering the material onto the conveyor arranged in advance thereof, devices for imparting travel to the said conveyors, and means for supplying heated air under pressure to each of the receptacles over which the conveyors work.

4. In an apparatus for the described purpose, the combination with a plurality of inclined receptacles arranged one in advance of the other, of an endless conveyor consisting of a series of independently hinged open frames, a cover for each receptacle provided with an outlet for the escape of heated air, said covers forming a housing for the upper run of each conveyor, a feed device for supplying material to be treated onto one of said conveyors as the frames thereof are brought into horizontal alignment, said conveyor delivering the material onto the conveyor arranged in advance thereof, and means for supplying heated air under pressure to each of the receptacles over which the conveyors work.

5. In an apparatus for the described purpose, the combination with a plurality of endless traveling conveyers, each composed of open mesh material and arranged one in advance of the other, of a hopper interposed between the discharge end of one conveyor and the receiving end of the other conveyor, an inclined grizzly within said hopper for receiving the discharge from one conveyor and delivering the same onto the surface of the advanced conveyor, a feeder for delivering material to be treated onto the receiving end of the first mentioned conveyor, heat containing devices over which said conveyers work, means for supplying heated air thereto under pressure, and mechanism for imparting travel to the endless conveyers.

6. In an apparatus for the described purpose, the combination with a plurality of endless traveling conveyers, each composed of open mesh material and arranged one in advance of the other, the advanced conveyor receiving material from the discharge end of the succeeding conveyor, of a feeder for delivering material to be dried onto the receiving end of the last mentioned conveyor, devices for imparting travel to said conveyers, heat containing receptacles over which the conveyers are carried, and means for supplying heated air under pressure to said receptacles.

7. In an apparatus for the described purpose, the combination with a heat containing receptacle, of means for supplying heated air thereto under pressure, an endless traveling conveyor working over said receptacle composed of a series of hinged open frames provided with a mesh covering, a feeder for supplying material to be treated onto the surface of said conveyor, and devices for imparting travel to the conveyor.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

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Witnesses:
N. A. ACKER,
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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."