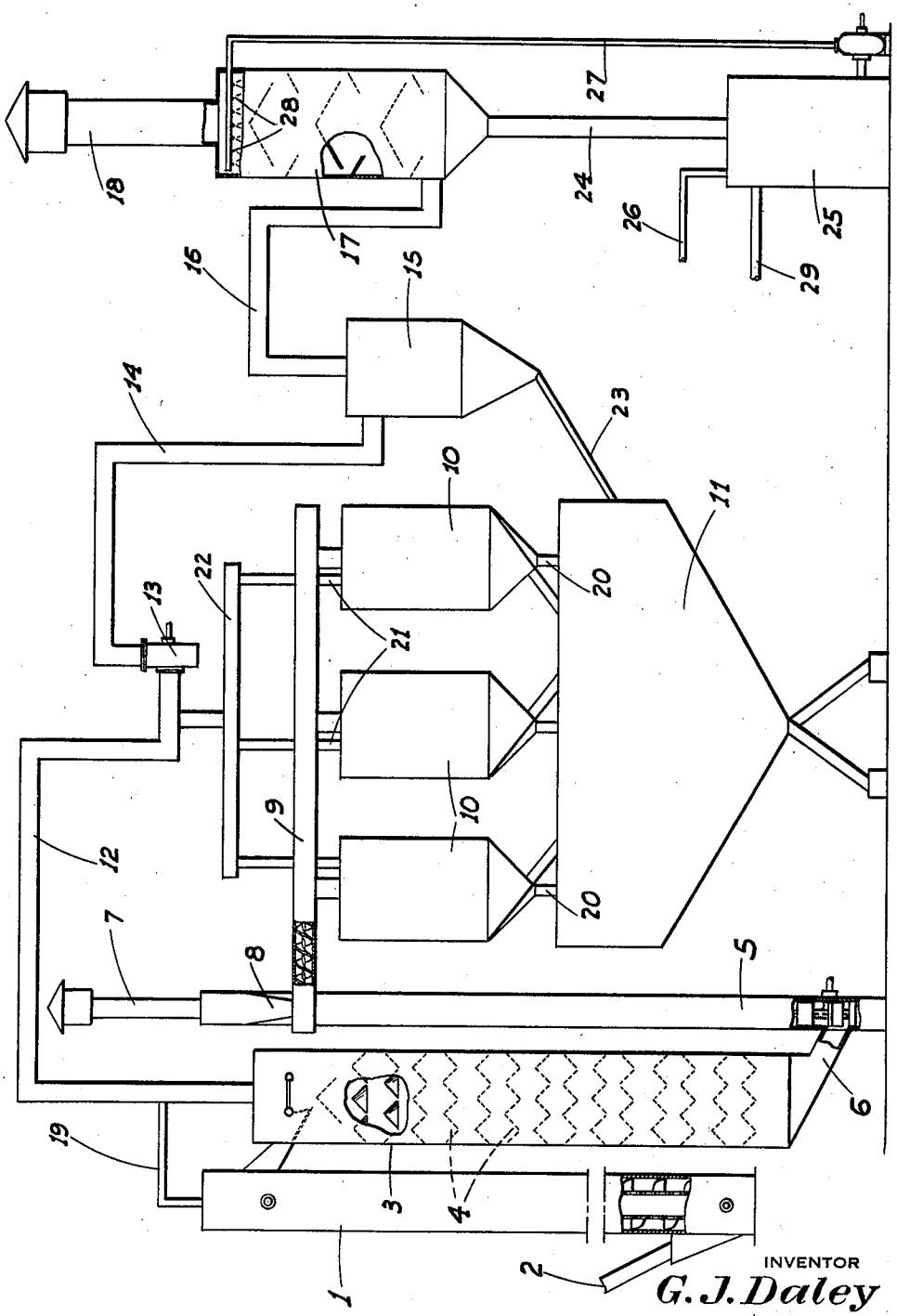
March 10, 1936. G. J. DALEY 2,033,416

APPARATUS FOR COOLING GRANULATED SUGAR AND ELIMINATING SUGAR DUST THEREFROM

Filed Oct. 30, 1933



INVENTOR
G. J. Daley

BY

ATTORNEY

Patented Mar. 10, 1936 2,033,416

UNITED STATES PATENT OFFICE

2,033,416

APPARATUS FOR COOLING GRANULATED SUGAR AND ELIMINATING SUGAR DUST THEREFROM

Gustave J. Daley, Stockton, Calif.

Application October 30, 1933, Serial No. 695,884

1 Claim. (Cl. 127—17)

This invention relates to sugar manufacture and particularly to the treatment of the same after the crystallized product has been separated from the mother liquors, and before being bagged for the market.

While numerous slight variations in the processes are practiced by various factories, the manufacture of beet and cane sugars is standardized, and the invention relates to a particular portion of the general process and is applicable to either cane or beet sugar or to any crystalline sugar from any source.

In the standard manufacture of sugar, the crystallized product after separation from the liquors has formerly been passed through a drying apparatus or granulator heated by steam or other means, and the sugar in its heated condition is then screened for separation into various grades as to fineness of crystals after which it is bagged for the market.

Serious difficulties have resulted from the above described process of handling the finished product inasmuch as the sugar if stored for a period of time became unmarketable because of the solidifying or caking of the sugar together with other objectionable features, so that reprocessing was necessary. The reprocessing required that the sugar be again placed in solution and recrystallized which is a lengthy and costly operation.

There are two main reasons why sugar thus solidifies. The first is the presence of very fine particles of sugar known to manufacturers as sugar dust and which acts as a sort of cement between the larger sugar crystals. The second reason is the heated condition in which the product is usually packed. Other objectionable features resulting from the packing of heated sugar are the detrimental effect on the containers or bags and absorption by the sugar of objectionable odors.

The principal object of my invention is to eliminate all the above objectionable features and results of the old process by a simple but effective system for removing the dust in a strong current of fresh air, and the cooling of the sugar; these two features being performed in a single operation. This results in a finished product which can be stored a considerable period and remain in a marketable condition at all times, thus saving the cost of reprocessing besides being in itself relatively simple to carry out.

To assist in the understanding of the process the accompanying drawing is presented, the figure on which is a diagram of the equipment used in carrying out said process.

In this drawing the numeral 1 denotes an elevator receiving from a chute 2 and delivering to the top of a cooling tower 3. A suitable distributing device is mounted in the tower immediately under the point of delivery of the elevator 1 so as to distribute the sugar over the entire cross sectional area of the tower. Disposed in the tower and extending from below said device to the bottom of the tower is a series or system of baffles 4. These are preferably of cone or pyramid form and are arranged to maintain the sugar during its downward passage through the tower in the form of thin evenly distributed streams.

The sugar from the bottom of the cooler is delivered to another elevator 5 by a bottom outlet 6 from said cooler. Fresh air is taken into the elevator 5 from a flue 7 which connects with the top of the shaft of the elevator 5. The sugar is discharged from the elevator 5 into a spout 8 which delivers into a feed trough 9 which contains a suitable scroll or other conveyor. This trough in turn discharges into vertical screen boxes 10 which discharge into a main bin 11.

A hot air and dust conduit 12 leads from the top of the cooler 3 to a suction fan 13 which draws air through the conduit and thus causes a strong draft of fresh air from the flue 7 to travel down the elevator shaft 5 and up the cooler 3 which are in communication with each other by means of the enclosed outlet passage 6. It will be seen that in botn instances this air is traveling in a direction opposite to the movement of the sugar. The air and dust from the fan passes through a conduit 14 into a cyclone 15; an exhaust dust conduit 16 from the cyclone leading to the bottom of a baffled dust box 17 which has a discharge stack 18 to the atmosphere.

There is also a dust conduit 19 from the top of the elevator shaft 1 to the conduit 12. Dust and air are also drawn from the bin 11 and screens 10 by conduits 20 and 21 respectively which are connected to a header 22 which in turn taps the conduit 12. The marketable sugar from the cyclone 15 is discharged into the bin 11 by a chute 23.

From the foregoing description it will be obvious that all the various parts of the equipment and which are connected with each other are closed off from the atmosphere, except the flue 7, so that the latter is the only point at which air can enter the system from atmosphere.

The box 17 has a bottom outlet 24 leading to a

tank 25 to which water is fed by a pipe 26. The water from the bottom of this tank is pumped to the top of the box 17 through a pipe 27, said pipe inside the box having sprays 28. An overflow pipe 29 from the tank 25 leads back to the main building of the apparatus for reprocessing.

From the above description it will be seen that the sugar fed to the chute 2 from the ordinary granulating apparatus and containing all the sugar dust normally accompanying that operation, is discharged into the top of the cooling tower 3. As previously stated the sugar dropping down to the bottom of the tower is spread out into a number of thin evenly distributed streams by reason of the baffles 4. This allows for a maximum cooling effect and also for the most efficient dust removal, both of which features are obtained simultaneously by the strong current of fresh air which is moving up through the tower.

The cooled and dust free sugar is discharged from the bottom of the tower into the second elevator 5 which serves the double purpose of an elevator and a cold air intake for the cooling tower. From said elevator 5 the sugar is distributed to the screening equipment and thence to the boxes for the separation of the product into the various grades with respect to their fineness of crystal; and thence they are conveyed to the various compartments in the main bin from which the sugars are packed into their several containers ready for market.

Since the device by means of which the sugar is conveyed from the spout 8 to the screen boxes 10 sometimes produces small quantities of sugar dust through the mechanical breaking up of some of the crystals, this portion of the apparatus is also connected to the air circulating or dust removing system previously described for the purpose of removing any such subsequently formed or secondary dust.

The heated and dust laden air withdrawn from the sugar is exhausted by the fan and discharged into the cyclone. This has a cone-shaped bottom as shown which serves the purpose of separating any actual sugar crystals which may be carried out of the cooling tower by the air current and which are then returned to the marketable sugar bin by the chute 23. Finally the air current passes from the cyclone to the dust box 17 where the sugar dust is dissolved in the water from the spray pipe 28 and the resulting "sweet water" is returned to the main equipment for reprocessing.

From the foregoing description it will be readily seen that I have produced such a device as substantially fulfills the objects of the invention as set forth herein.

While this specification sets forth in detail the present and preferred construction of the device, still in practice such deviations from such detail may be resorted to as do not form a departure from the spirit of the invention, as defined by the appended claim.

Having thus described my invention what I claim as new and useful and desire to secure by Letters Patent is:

In the manufacture of sugar, apparatus for the treatment of the sugar after it has been initially reduced to crystalline form comprising a cooling tower, into the top of which the crystals are fed, means in the tower to cause the crystals as they drop to be spread out in thin streams, a suction conduit connected to the top of the tower, an air intake to the bottom of the tower, a suction fan to the intake of which the conduit is connected, a cyclone, a conduit from the discharge of the fan to the cyclone, a dust box, means to spray water downwardly into said box, a conduit connecting said box with the cyclone, and a tank below and with which the bottom of the box communicates.

GUSTAVE J. DALEY.