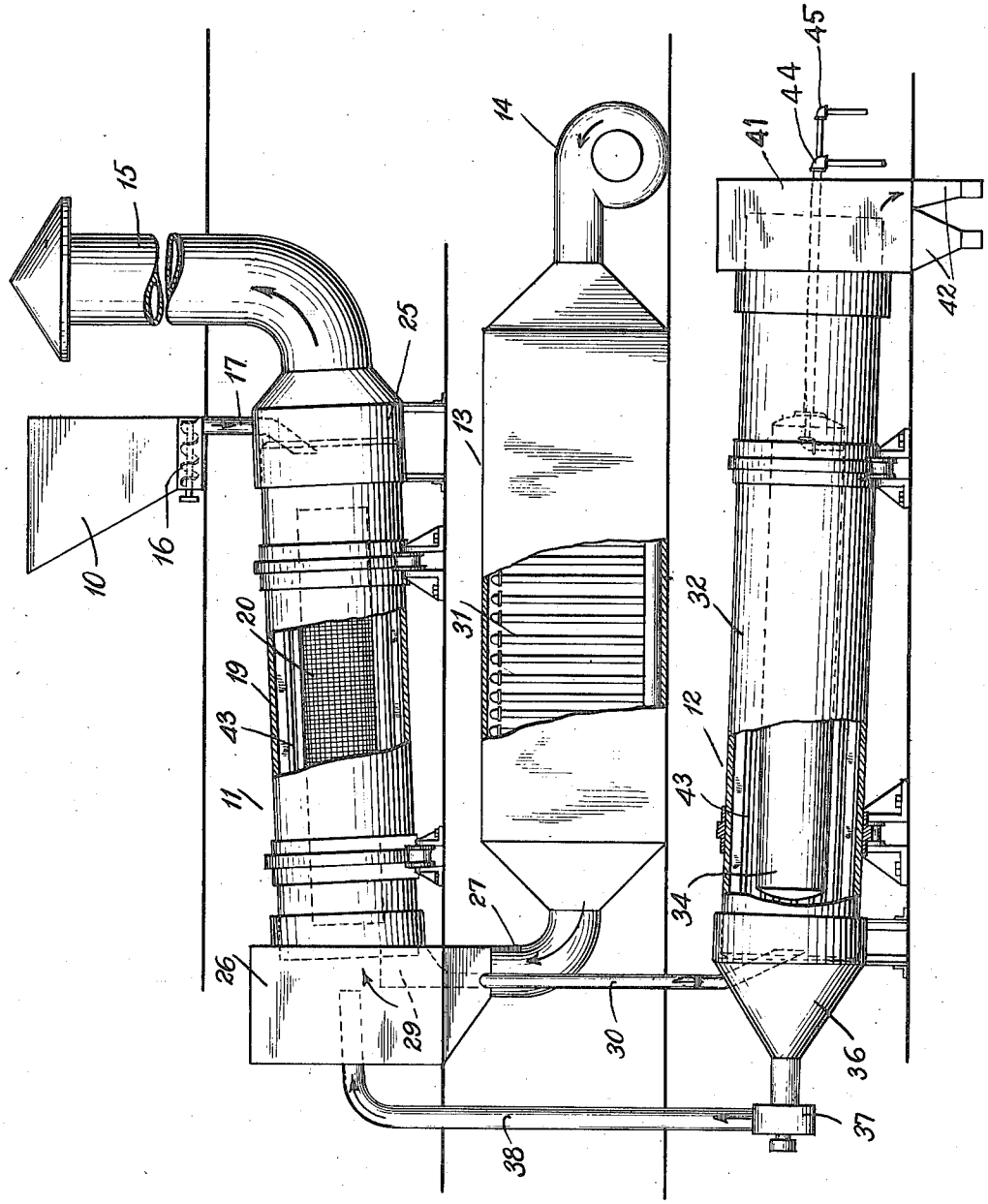
G. ENGEL.

PROCESS OF GRANULATING AND DRYING SUGAR.

APPLICATION FILED NOV. 10, 1915.

1,216,554. Patented Feb. 20, 1917.




INVENTOR

Godfrey Engel

BY

E. W. Marshall

ATTORNEY

# UNITED STATES PATENT OFFICE.

GODFREY ENGEL, OF BROOKLYN, NEW YORK.

## PROCESS OF GRANULATING AND DRYING SUGAR.

1,216,554. Specification of Letters Patent. Patented Feb. 20, 1917.

Application filed November 10, 1915. Serial No. 60,647.

*To all whom it may concern:*

Be it known that I, GODFREY ENGEL, a citizen of the United States of America, and a resident of Brooklyn, Kings county, and State of New York, have invented certain new and useful Improvements in Processes of Granulating and Drying Sugar, of which the following is a specification, reference being had to the accompanying drawing, forming a part thereof.

My invention relates to processes of granulating and drying sugar and has special reference to such as are practised by apparatus comprising cylindrical drums through which a blast of drying air is passed.

One object of my invention is to increase the output of finished product obtainable from apparatus of standard size, by using a blast of preheated air and wire screen cylinder instead of a steam drum for drying the sugar, thereby utilizing the space ordinarily occupied by the steam drum and increasing the capacity of the apparatus.

Processes of granulating and drying sugar which have hitherto been in general use, have involved a material loss of sugar which was carried off in the form of dust and of tailings at the exits of the apparatus. The air carried with it, as it was discharged from the apparatus, a certain amount of sugar as plainly indicated by tests, and by the white deposit of sugar at the exit and around the adjacent surfaces of the same. The process of my present invention avoids losses of this kind.

Another object of my invention is to prevent loss of sugar in the form of dust in the manner above indicated, by passing the drying air which is laden with sugar dust, through the moist sugar, so that the sugar dust is intercepted.

Another object of my invention is to improve the quality of the sugar by breaking up practically all of the lumps into separate crystals, permitting the drying air to come into contact with each crystal, and thereby obtaining the final product in marketable form with practically no tailings.

Other objects and advantages of my invention will be set forth hereinafter, and in order that my invention may be thoroughly understood, I will now proceed to describe the same in the following specification, and then point out the novel features thereof in appended claims.

The single figure of the accompanying drawings is an elevation, with certain of the parts broken away and shown in section, of suitable apparatus for practising the process of my invention.

The apparatus comprises a wet sugar bin 10, an upper granulator 11, a lower granulator 12, a heater 13, a fan or blower 14, a fan or blower 37, and a stack or ventilator 15.

The wet sugar bin 10 is made in the form of a hopper and is provided with a screw conveyer 16, or some other suitable means for continuously delivering the wet sugar through a spout 17 to one end of the upper granulator 11.

The upper granulator 11, comprises a hollow cylinder 19, which is rotatively mounted, and a concentric inner cylinder 20, formed of a wire screen, and fastened to the inside of the hollow cylinder 19. The common axis of the cylinders 19 and 20 is slightly inclined to the horizontal, the receiving end into which sugar is discharged from the spout 17 being higher than the outlet end.

The upper end of the cylinder 19 fits into a stationary box 25, from which the stack or ventilator 15 extends. The lower end of the cylinder extends into a stationary box 26, which is connected by a pipe 27 to one end of the heater 13. The inner cylinder 20 is open at each end and as already explained, is formed of wire mesh.

Within the stationary box 26 and in position to receive sugar discharged from the drum 19, in a hopper 29, which is connected by a pipe 30 to the lower granulator 12.

The heater 13 is interposed between the fan or blower 14 and the pipe 27 and comprises a casing or box in which a coil of steam pipe 31 is disposed.

The arrangement of parts is such that air is delivered from the fan or blower 14 to the heater and after its temperature is raised by the steam coil, it is forced upwardly from the pipe 27 and through the upper granulator 11, as hereinafter explained.

The lower granulator 12 comprises a rotatable cylinder or drum 32, which is similar to the drum 19 and is similarly supported. Within the drum 32 is a steam drum 34, which is coaxial with the cylinder 32 and is fastened to the inside of same.

A stationary funnel-shaped box 36 is fitted over the intake end of the cylinder 32 and is connected through a fan or blower 37 and a pipe 38 to the box 26.

The common axis of the steam drum 34 and the cylinder 32 is inclined to the hori-

zontal but in an opposite direction, if arranged as shown.

The pipe 30 which leads downwardly from the hopper 39 extends into the upper end of the cylinder 32 and is adapted to discharge the sugar received from the upper granulator into the lower granulator. The cylinder 32 at its discharge end is provided with a wire screen cap 40 and extends into a stationary open box or bin 41 from which the dry sugar is discharged in granular form through one or more spouts 42. The blower 37 produces a draft of air through the lower granulator and then through the upper granulator where it is in parallel with that produced by the blower 14.

Each of the granulator cylinders 19 and 32 is provided on its inner surface with a plurality of inwardly projecting blades or buckets 43 for the purpose of carrying the sugar upward as the cylinder rotates and dropping it upon the disseminating screen drum 20 or the steam drum 34 as the case may be.

The length of the cylinder in each case, the inclination of its axis and the speed at which it is rotated, are such as to carry the sugar upward and discharge it upon the inner drum a sufficient number of times to secure the result desired as more fully pointed out hereinafter.

The steam is supplied from any suitable source (not shown) through a pipe 44 to the steam drum 34 and to the coil 31 of the heater, the water of condensation being discharged through a pipe 45. The apparatus disclosed herein is more fully set forth in my copending application, Serial No. 60,648 filed of even date herewith.

The first part of my process consists in elevating and dropping wet sugar in an air passage and passing a large volume of warm air through the passage. This is accomplished in the apparatus above described by the blades or buckets 43 within the cylinder 19, which carry the wet sugar, fed into the cylinder by the screw-conveyer 16, upwardly and drop it onto the wire disseminating screen cylinder 20. The warm air is supplied by the blower 14, which forces air through the heater 13 and upwardly through the cylinder 19.

The next step in my process consists in elevating and dropping the sugar which has been dried to a greater or less extent, in a second air passage and passing a volume of cool, dry air through the passage. This volume is relatively small since the unobstructed cross-sectional area of the passage is smaller relative to that of the cylinder 19. This portion of the process is effected by the apparatus shown, the sugar being discharged from the lower end of the cylinder 19 through the pipe 30 into the cylinder 32, which serves to carry the sugar upwardly and drop it upon the steam drum 34. The blower 37 supplies the air which is drawn through the lower cylinder. Another step in my process consists in the passing of the air from the second passage through the first passage together with the larger volume of warm air. This is also accomplished by the blower 37 which forces air from the cylinder 32 through the cylinder 19. These devices all effect the drying of the sugar, the screen serving to separate the sugar into fine granular form as it falls and hence enabling it to dry more quickly, and the steam cylinder being located in the path of the sugar so that it falls upon it and is heated and thoroughly dried.

The process may be varied within the spirit and scope of my invention and other apparatus may be employed for practising my invention; consequently, I intend that only such limitations be imposed as are indicated in the appended claims.

What I claim is:

1. The process of drying sugar that consists in disseminating wet sugar in an air passage, disseminating nearly dried sugar in a second air passage and passing air through the second passage and thence through the first passage with the addition of fresh air, whereby the dry sugar dust from the second passage is intercepted by the moist sugar in the first passage.

2. The process of drying sugar that consists in disseminating wet sugar in an air passage, disseminating the partially dried sugar in a second air passage and passing a relatively small volume of cool air through the second passage and thence through the first passage with the addition of a large volume of warm air, whereby the dry sugar dust from the second passage is intercepted by the moist sugar in the first passage.

3. The process of drying sugar that consists in feeding wet sugar through an air passage, disseminating the sugar as it is fed therethrough, feeding nearly dried sugar through a second passage disseminating the sugar as it is fed, passing a relatively small body of cool air through the second passage in a direction opposite to the direction in which the sugar is fed and passing the air from the second passage through the first passage in the opposite direction from that in which the sugar is fed with addition to such air of a large volume of warm air, whereby the dry sugar dust from the second passage is intercepted by the moist sugar in the first passage.

In witness whereof, I have hereunto set my hand, this 8 day of November, 1915.

GODFREY ENGEL.