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METHOD FOR MANUFACTURING MOLASSES FEED

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METHOD FOR MANUFACTURING MOLASSES FEED

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2 Claims. (Cl. 99—5)

This invention relates to the manufacture of molasses feed and it proposes a process and apparatus, for impregnating or coating or otherwise treating the grain or grain product or roughage, with molasses or the like under such conditions as precisely to control the degree of saturation, and the state of dryness of the mixture, and the temperature both of the ingredients during mixing and of the final product.

One of the objects of the invention is to heat the grain or roughage during the mixing operation for the purpose of driving out the air and moisture from the interstices of the material and replacing the same by absorption, with the molasses.

Another object of the invention is the drying of the mixed product by a hot blast applied in multiple relation to a moving column of the mixture, the blast being so controlled that one or any number of the multiple jets of the same may be cut off affording an exact control of the degree of dryness imparted to the finished product.

Still another object of the invention is the provision of means for elevating the product and permitting its gradual fall, in counter-current contact with a cold blast, whereby the product, loosened in its descent is intimately contacted by the cold blast which at the same time imparts the final state of dryness, and reduces the temperature to the point at which the mixture will not ball and ferment in the bags.

Other objects of the invention will appear as the following description of a preferred and practical embodiment thereof proceeds.

In the drawings in which the same characters of reference have been used throughout the several figures to designate identical parts:

Figure 1 is a vertical section largely diagrammatic through an apparatus embracing the system of the present invention;

Figure 2 is a section taken along the line 2—2 of Figure 1;

Figure 3 is a vertical fragmentary section through one of the vertical flues showing the baffles;

Figure 4 is a section taken along the line 4—4 of Fig. 3;

Figure 5 is a section taken on line 5—5 of Figure 1; and

Figure 6 is a section taken on line 6—6 of Figure 3.

Referring now in detail to the several figures, the numeral 1 represents the preliminary mixing chamber in which the cereal or roughage component, supplied by the hopper 2 is mixed with molasses, stored in the tank 3 and admitted by the conduit 4. Double agitators 5 are rotatably mounted within the mixing chamber and driven by any suitable means such as the pulley 6. The agitators each comprise a series of radially arranged blades having inclined vanes so that the agitator acts as a conveyor in progressively moving the mixture toward the discharge end of the mixing chamber 7.

The mixing chamber is provided with a jacket 8 to which steam is supplied from a suitable source represented by the pipe 9. The tank 3 is heated by means such as the steam coil 10. By virtue of the heating of the mixing chamber, the cereal product or roughage becomes thoroughly heated during the process of mixing so that the native moisture and the absorbed air are driven out, the voids being filled by the molasses which enters the mixing chamber in heated and very fluid state.

The hopper by which the grain or roughage is supplied to the mixing chamber may be of any desired type, but is here shown as being provided with a plurality of rotary beaters 11 which stir the grain or roughage and prevent it jamming in the hopper. The proportions of the dry constituent and the molasses may be regulated by valves 13 and 15 controlling the discharge from the hopper 2 and the molasses tank 3, respectively.

The mixing chamber 1 discharges by way of a chute 14 indirectly into the first of a series of dryers 15, 16, 17 and 18. Since as will appear, the dryers are traversed by a volume of heated air, the chute 14 discharges directly into a stack 19 communicating with the dryers and by which the heated air exhausting from the dryers is vented.

The dryers 15 to 18, inclusive, are arranged in series and the mixture is progressively forced through the dryers and from one to the other by conveyors 21, 22, 23 and 24, driven through the entrained gearing 25.

Heated air is supplied to the dryers by means of a blower 26 preferably of the sirocco type, the air passing through a chamber 27 provided with steam coils 28 by means of which the air is highly heated. The heated air then passes into a manifold 29 having branches 30 communicating with the dryers 15 to 18. Each of the branches 30 is provided with a damper 31 by means of which the branch can be cut off entirely from the dryer with which it is connected. Thus, in its travel through the dryers, the mixture can be selectively subjected to four 100
volumes of drying air, three volumes, two volumes or a single volume and in this manner a precise control can be exercised over the degree of dryness imparted to the mixture.

5 The opposite ends of the dryers open into a header 33 receiving the exhaust air which ascends the stack 19, coming into heating and drying contact with the mix in its descent to the dryers.

10 The stack 19 terminates at its upper end in a hood 33 shaped to give an abrupt change to the direction of the effluent air enlarged so as to reduce the velocity of said air and provided with a baffle 34 for arresting any solid particles carried by the air. The object of this hood is to prevent the lighter portions of the feed which may not have become thoroughly mixed with the molasses passing out with the air exhaust. These particles are collected in the lower convergent portion 35 of the baffle and returned to the forward part of the mixing chamber 1 by means of a conveyor 36.

15 The thoroughly mixed, dried and heated feed discharging from the final dryer 18 is carried by a conveyor 37 to an elevator 38 in which it is carried upwardly to a relatively great height and dropped into an adjoining vertical flue 39 through which it descends by gravity into a boot 40, whereupon it is picked up by another elevator 41 and at the top, dropped into another flue 42 down which it gravitates and this alternate elevating of the mixture and gravitational descent of the same is repeated, if desired.

20 The final flue is in the form of a chute 45 through which the mix descends gravitationally to a conveyor cooler 46 comprising a casing having louver at its opposite ends in which are placed a pressure fan 47 and an eduction fan 48, which induce a current of air at atmospheric temperature through the casing. A series of substantially horizontal power driven belts 49 are arranged in the casing in staggered relation upon the uppermost of which belts, the mix is deposited from the chute. The cooled material then discharges into a final mixer where it is suitably commingled with a liquid nutrient ingredient, such for instance, as cotton seed oil which may be supplied from an elevated tank 51.

25 A cold air blower 44 is provided having a manifold discharge communicating near the bottom with each of the elevators and each of the flues. The object of elevating the mixture to a great height and then dropping it through the flues is to bring it into cooling relation to the ascending columns of cold air supplied by the blower 44. As the mixture descends by gravity through the flues, it is loosened and its particles separated so that the ascending cold air has access to every particle of the mixture. This is accomplished by the mixture falling upon the inclined baffles 20 constructed as shown in Figs. 3, 4 and 6 by spaced times 20°, with their free ends interdigitating. Aside from imparting the final degree of dryness to the mixture the cold air cools it down to the temperature at which it will not ball or ferment in the bags.

30 While I have in the above description disclosed what I believe to be a preferred and practical embodiment of the invention, it is to be understood that the details of construction as shown and described are merely by way of example and not to be considered as limiting the scope of the invention as claimed.

35 What I claim is:

1. Process for making sugared cereal stock feed having maximum concentration of molasses comprising impregnating cereal particles with molasses by mixing the particles in heated state with heated molasses, agitating the thus treated particles in a heated atmosphere to a state of dryness, separating the lighter incompletely impregnated particles from the heavier completely impregnated particles through suspension by discharging the dried mixture into a rising column of air, and returning the relatively light particles to the mixing phase of the process for further impregnation.

2. Process for making sugared cereal stock feed having maximum concentration of molasses comprising, heating a mass of cereal particles to drive moisture from the interstices, mixing the heated mass with heated molasses where by the cereal particles absorb and adsorb the molasses, becoming relatively heavy, drying the mixed mass by passing a drying current of air in contact with said mass while agitating the mass, discharging the mixture, anterior to the drying step into a rising column of the drying air whereby incompletely impregnated particles being relatively light are classified by suspension, and returning said light particles to the mixing phase of the process for further impregnation.

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