This invention relates to enrobers or machines for coating biscuits or sweetmeats or other so-called “centres” with chocolate or like coating.

It is customary in machines of the above kind to pass the centres upon a wire mesh band conveyor under a transverse curtain of liquid chocolate for coating or encasing the centres with a layer of chocolate, and to treat the coated centres while the chocolate is still in a plastic condition to the action of an air blast or blasts to distribute the coating evenly and remove surplus chocolate.

A feature of the present invention is to provide improved air blast nozzle means adapted to operate with greater efficiency than those at present known and to afford improved facilities for angular adjustment and regulation.

The invention consists in air blast nozzle means for enrobers, comprising two or more nozzles coupled to air supply means, and means whereby the direction of each nozzle may be adjusted independently of the other nozzle or nozzles so that the air blasts from the nozzles may be arranged to act in the same sense or direction or at oppositely inclined angles.

The invention also consists in providing air blast nozzle means having a hinged connection with an air supply duct (through which the air velocity is preferably constant) for enabling the direction of the nozzle to be adjusted while maintaining a smooth air flow from the duct to the nozzle without any abrupt change of direction or change of velocity.

According to the preferred form the nozzle comprises a pair of plates or flaps hinged on a transverse axis to the air supply duct, each plate being connected to one end of a lever, the other end of which is pivotally attached to a displacement bar or element for manipulating the nozzle plates and adjusting them for altering the direction or angle of the blast. One or both of the levers may be adjustably connected to the bar or element for the purpose of enabling the width of nozzle slot or opening to be regulated.

Double air blast nozzles have been employed hitherto. These known nozzle devices are adjustable for direction so that the angle of the air blast with respect to the centres may be altered but in all positions the two air streams of the pair always remain parallel. It has been found that these arrangements and their capacity for adjustment do not fulfill requirements since the blasts do not act uniformly upon the travelling centres and are liable to cause undue displacement in one direction or another of the chocolate, which may result in the denuding of the centres at some part or parts and a local piling of the chocolate elsewhere, while certain of the sides of the centres are liable to be masked from the air action.

It is an object of the present invention to provide air blast means adapted to avoid the above difficulties and afford facilities for controlling the air blast treatment such as will ensure the desired distribution and uniform coating of chocolate upon the centres.

With this end in view the invention consists in providing a plurality of nozzles and means adapted to enable independent angular adjustment thereof so that the air blasts from the nozzles may be arranged to act in the same sense or direction or at oppositely inclined angles, in such a way that the front and rear as well as the upper surface of the centres may be equally treated to the air blast effect.

A further feature of the invention resides in supplying the nozzles with air in parallel through individual ducts from a main trunk or supply line.

With a view to further improving the efficiency of the air supply for the nozzles the invention also comprises the employment of a main trunk or supply line provided with a distribution box or hood so formed that air passes therethrough towards the nozzles at an increasing velocity.

The invention also comprises in combination with a distribution box or hood according to the preceding paragraph, the provision of a pair of independent nozzle supply ducts to each of which nozzles are connected and so formed that the air passes from the box to the nozzle in parallel at a constant velocity.

The preferred form of distributing box comprises a pair of air streams of gradually decreasing area and a streamlined surface element for dividing the air streams and promoting a smooth flow of air at a gradually increasing velocity.

In the accompanying drawings:

Figure 1 is a front elevation of the improved nozzle means according to the invention;

Figure 2 is an end elevation looking from the right in Fig. 1, and

Figure 3 is a section on the line 3-3 of Fig. 1

showing certain details of construction of the nozzles.

In carrying the invention into effect according to one mode as described by way of example, the fan for providing the air supply for the nozzles is connected by a conduit to a distribut-
ing box or casing which in cross section (Figure 1, i.e., a section transverse of the enrober machine) is of truncated triangular shape with the base downwards, while in a section at right-angles (Figure 2) the outline is also of truncated triangular shape but with the base upward. The walls of the box or casing may be of sheet metal and in the center of the box disposed symmetrically about the axis of the inflow of air from the fan is a surface element obstruction 3 which extends between the front and back walls 4 and 5 of the box so as to divide the air delivered by the fan into two equal streams 6 and 7. The obstruction 3 may be formed by curved plate members connected together to form a body of roughly elliptical shape in cross section with tapering upper and lower ends to give a streamlining effect, while the curvature of the plates is such that in conjunction with the outer side walls 8 and 9 of the box the air passages as viewed in cross-section of the machine are of gradually increasing dimensions to distribute the air flow evenly towards the nozzle means hereinafter described, which extend across the full width of the wire conveyor band for the centres to be treated. The obstruction 3 terminates short of the delivery box so that the air streams merge or adjoin thereat.

The angle of the downwardly converging front and back walls 4 and 5 of the box 2 are so arranged that despite the increasing width of the air stream passages the cross-sectional area of the air streams gradually decreases from the supply entrance to the delivery towards the nozzle means. The distributing box 2 at the bottom or the delivery side is of rectangular shape in plan and affords a transversely elongated delivery slot or mouth 10 to which is attached a pair of parallel-walled air ducts 11, 12 which diverge outwardly as seen in Fig. 2, and present the aspect of a breeches pipe. The area of these ducts 11 and 12 is constant throughout, the arrangement being such that the air entering the box 2 from the fan is divided first into two streams of gradually decreasing area so that gradually increasing air velocity is afforded, and then each stream is again divided as it passes into the breeches ducts 11 and 12 and travels therethrough at a uniform velocity.

The lower ends of the breeches ducts have mounted thereon a horizontal plate 13 below which the nozzles are mounted. At the outer ends of the horizontal plates depending side plates 14, 15 are secured between which the nozzle forming plates hereinafter described are located and these depending plates 14, 15 serve to form a closure for the ends of the nozzle forming plates so that they provide air blast deliveries across the full width of the conveyor band for the centres. The depending plates also form a convenient mounting for the rods or spindles by means of which the nozzle-forming plates are hinged to the horizontal plate at the delivery ends of the breeches ducts.

The nozzle-forming plates for the breeches ducts 11 and 12 are counterparts one of the other so that the description thereof can be conveniently referred to the arrangements for one of the legs or branches of the breeches ducts.

The nozzle is formed by a pair of plates 16 and 17 each of which is secured around one of the bars or spindles 18 referred to above which lie parallel to one another and are mounted in slots 19 in the closure plates 14, 15. The bars or spindles 18 carrying the nozzle plates are rotated ably mounted in the slots 19 of the closure plates and the underside of the horizontal plate 13 is provided with a layer of felt 20 against which the cups of the plates 16, 17 are bedded so that an air seal is afforded. The spindles 18 at one end conveniently project through the closure plate 15 so that they may receive means for controlling and adjusting the angular position of the nozzle plate 16, 17. These control means may comprise a pair of downwardly extending levers 21, 22 each of which is secured to the projecting end of a hinging bar or spindle 18 and pivotally connected at its upper end to a horizontal manipulating link or bar 23. The pivotal connection of the lever 21 of one of the nozzle plates may be secured to the manipulating link 23 by a slot and thumb screw connection 24, 25 so as to enable its nozzle plate 16 to be angularly adjusted with respect to the other nozzle plate 17 in order to alter the width of nozzle opening 26.

The tightening of the thumb screw 25 against the link also operates by the gripping action to hold the nozzle plates 16, 17 in their adjusted angular positions relatively to the breeches ducts 11, 12.

One of the levers 21 of the pair may have a downward extension 21 located between a pair of stops 26 provided on the adjacent closure plate 15 so as to limit the displacement of the manipulating piece and consequently the range of angular adjustment of the nozzle. Below the air outlet from the nozzles and spaced therefrom is a deflector 28 in the form of a flared channel plate is swung on a pair of end links 30 rotatably mounted upon one of the hinging spindles 18 for the nozzle flaps 16, 17. This deflector plate 28 when the nozzles are in operation is swung about its pivot out of the way of the air blast while to cut off the blast quickly it is dropped into position below the nozzle to deflect the air streams.

According to one arrangement the deflector 28 is interlocked with the clutch through which the drive to the wire band carrying the centres is communicated, so that when this clutch is disengaged the deflector is dropped into position to obstruct the air blast issuing from the nozzles according to a known arrangement.

It will be appreciated from the above that the pairs of flaps 16, 17 constituting the two nozzles can be turned about their pivotal axes or spindles independently to vary the angle of direction of the air blasts as desired. For example, by operation of the manipulating links 23 the two nozzles can be disposed so that the air blasts converge or meet or they can be turned by the manipulating links so that the air blasts diverge or are directed in an opposite sense or direction. The flaps 16, 17 on operation of the manipulating link 23 for each nozzle, move together for directional displacement. If it is required to adjust the width of a nozzle opening the adjustable lever 21 of a pair is angularly adjusted to move the edge of its flap 18 nearer to or further from another flap edge by loosening the thumb screw 25 on the manipulating link and resetting the pivot end of the lever in the slot 24 and tightening up the screw in the new position.

In operation, assuming that the nozzles 16, 17 are adjusted to give converging blast the centres on the wire band as they arrive under the nozzles will first receive an air blast operating upon the front and top of the centre, while as the centre proceeds it will receive a blast directed at an oppositely inclined angle upon the upper sur-
face of the centre and upon the rear side of the centre. If the nozzles 6, 7 are adjusted to afford diverging air blasts the centres similarly receive air directed against the top surface thereof and against the forward and rear sides.

I claim:

1. Apparatus for treating chocolate or like coated goods in an enrober to an air blast formed by two contiguous air streams comprising two juxtaposed air blast nozzles arranged in series, air supply means to which said nozzles are connected, and means for adjusting the direction of each nozzle independently of the other, whereby the air blasts from the nozzles may be arranged to act in the same direction or at oppositely inclined angles, each of said nozzles comprising a pair of plates hinged on transverse axes, each plate being rigidly connected to one end of a lever, the other ends of said levers being pivotally attached to a displaceable bar for manipulating the plates and adjusting them for altering the angle of the blast, one of said levers being adjustably connected to said bar for enabling the opening of the nozzle to be varied, said plates being secured in their adjusted position by a friction grip applied between one of said levers and the manipulating bar.

2. Apparatus for treating chocolate or like coated goods in an enrober to an air blast formed by two contiguous air streams comprising two juxtaposed air blast nozzles arranged in series, air supply means to which said nozzles are connected, and means for adjusting the direction of each nozzle independently of the other, whereby the air blasts from the nozzles may be arranged to act in the same direction or at oppositely inclined angles, each of said nozzles comprising a pair of plates secured upon spindles pivotally mounted in end closure plates, levers mounted on said spindles at one end thereof, the free ends of the levers being operatively connected to a displaceable bar for manipulating the plates and adjusting them for altering the angle of the blast, one of said levers having an extension moving between stops on an end closure plate.

3. Apparatus for treating chocolate or like coated goods in an enrober to an air blast formed by two contiguous air streams comprising two juxtaposed air blast nozzles arranged in series, air supply means to which said nozzles are connected, and means for adjusting the direction of each nozzle independently of the other, whereby the air blasts from the nozzles may be arranged to act in the same direction or at oppositely inclined angles, said nozzles being coupled to individual ducts from a main supply trunk whereby they are supplied in parallel and wherein the main supply trunk comprises a distribution hood having a streamlined surface element dividing the air stream into a pair of air streams of gradually decreasing area, and promoting a smooth flow of air at a gradually increasing velocity.

4. Air blast nozzle means for an enrober comprising an air supply duct, a nozzle coupled to said duct and comprising a pair of plates hinged to said duct on spaced transverse axes, each plate being rigidly connected to one end of a lever, the other ends of said levers being pivotally attached to a displaceable bar for manipulating the plates and adjusting them for altering the direction of the angle of the blast, said levers being adjustably connected to the bar for enabling the nozzle opening to be varied.

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