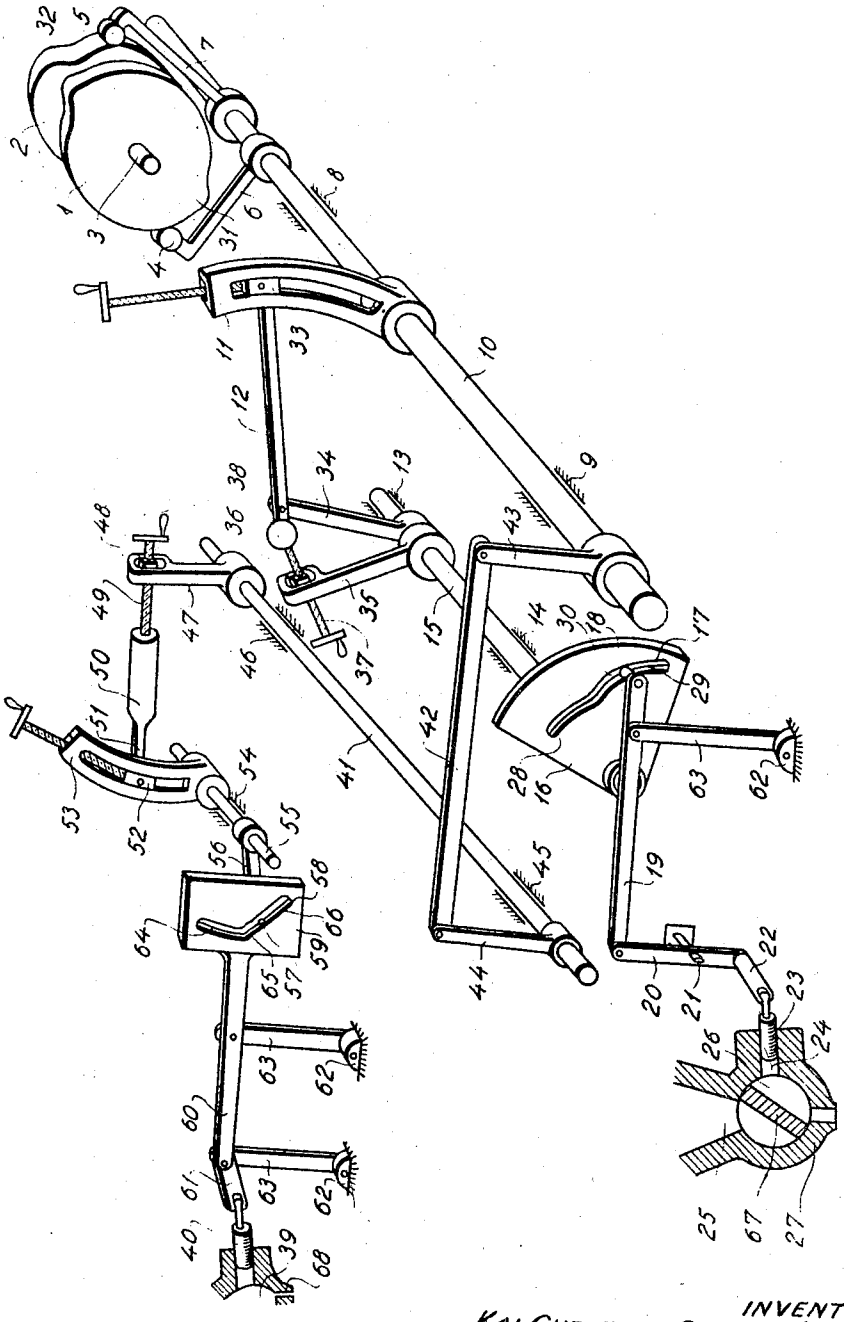
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CHOCOLATE CASTING MACHINE DRIVE

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CHOCOLATE CASTING MACHINE DRIVE

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This invention relates to a chocolate casting apparatus, wherein the casting mouth-pieces of the apparatus are guided by rods moved by one, two or more cam discs, which discs are moved simultaneously with the conveyor, and preferably by its driving gears. By means of this construction both the casting length and the casting quantity can be continually adjusted during operation, and a feature of the apparatus according to the invention is the provision of a shaft alternately rotated by a cam disc and which is provided with means for alternately rotating a second shaft. Between the second shaft and the casting mouth-piece there is provided a back-lash unit with a back-lash motion depending upon the phase-displacement of the latter shaft in proportion to the motion of the former shaft, which phase-displacement is adjustable.

In this way there is obtained a significant simplification of the operating connections of the casting apparatus. Instead of two special arm-systems for moving the members which regulate the casting length and of those regulating the casting quantity, there is provided a single arm-system, i. e. a single-movement transmission connection comprising both of the regulating members. As a result, the apparatus is of simpler construction and safer in operation.

In adjusting the apparatus, the time of casting must first be determined in proportion to the movement of the moulds and then the starting of the casting must be determined in relation to its termination by adjusting the back-lash unit which is effected by adjusting the movements of the second rotatable shaft in relation to the movements of the first rotatable shaft.

This adjustment may in one embodiment of the apparatus according to the invention be obtained by a connecting arm which is variable and adjustable in the longitudinal direction, but of course other movement transmission members which produce a phase-displacement, such as a synchronous gear, can be employed.

However, if a connecting arm adjustable longitudinally is used, this may, according to the invention, be displaceable at one or both ends in proportion to the axis of rotation of the rotatable shaft or shafts to effect variation of the angular velocity of the second shaft in proportion to the angular velocity of the first shaft.

Furthermore, the back-lash unit may be embodied in any convenient manner, e. g. as a pin

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and slot mechanism having a suitably formed slot.

Not only in making "cat tongues" (small flat chocolate bars) but also in making ordinary prismatic bars it is desirable that the cast string be thickened at the ends almost as in a soup-stock, thereby making certain that the chocolate in flowing out will fill the corners of the mould dish completely. For obtaining this type of casting the apparatus contains, according to the invention, a single and effective means, which, together with the other distinguishing features and advantages of the invention, are described more fully in the following description in connection with an embodiment for apparatus according to the invention, shown skeleton-like, perspectively in the drawing.

From two curve discs 1 and 2, fastened to a revolving shaft 3, which is driven by the conveyor or its driving means, an alternating swinging motion is transmitted through guide pulleys 4 and 5 to the arms 6 and 7 on a shaft 10 embedded in bearings 8 and 9. This shaft transmits its oscillating motion through a link arm 11 and a link bar 12 connected to arm 11 to another shaft 15 rotatably supported in bearings 13 and 14, which on one end carries a slotted disc 16 having a slot 17, and in which is engaged a vertical journal or pin secured to 18 a connecting rod 19. The alternating rotational motion of the shafts 10 and 15 is transmitted to the connecting rod 19, which is longitudinally displaced, thereby turning a double-armed lever 20 around a pivot 21. Lever 20 through a joint-bar 22 displaces a piston 23, which is inserted in a side channel 24 in the discharge chamber of the casting tank 26. By squeezing the piston 23 into the channel 24 the quantity of chocolate, being in the chamber 26, is squeezed out through the mouth-piece 27 of the chamber in proportion to the volume the piston 23 displaces in the channel 24. By varying the length of travel and speed of the piston 23 the cast quantity of chocolate and the period of time for the casting may thus be regulated. The slot 17 consists, partly of a circular part 28, partly of a spiral part 29, and finally of a spiral part 30 having a greater pitch than the part 29 combining parts 28 and 30. The journal 18 travels normally from a point on the part 28 to a point on the part 29 and back again during operation of the apparatus. As long as the pin slides in the slot 28, no motion of the piston 23 takes place, but as soon as the pin enters the slot part 30, the piston 23 travels quickly in-

wards in the channel 24, and later on, when the pin 18 enters the slot part 29, the piston travels a little more slowly. This augmented speed of the piston 23 is realized only at the start of the travel of the piston, whereby a string is laid out from the mouth-piece 27 which is slightly thickened at its foremost end. This results in producing sufficient quantities of chocolate at the foremost end of the mould dish to ensure that its corners will be totally filled, when the chocolate runs out in the mould, e. g. owing to the fact that it passes a knocking table.

In the same manner arrangements have been made for giving the chocolate string laid out a thickening at its extreme back end, the curve discs 1 and 2 having their normal Archimedean spiral form concluded by, respectively, a cam 31 and a dish 32 which give the shaft 10 an augmented speed of rotation a little before the conclusion of the motion. This augmented speed of rotation will be transmitted to the shaft 15, the slot disc 16 and the piston 23, which thereby augment the casting and produce the said thickening of the extreme back end of the strings laid out.

The link bar 12 is, as mentioned, at its one end connected with the link 11, and by altering the distance from the shaft 10 of the link block, the shaft 15 may be made to have a greater or smaller angular velocity in proportion to that of the shaft 10, whereby the travel length of the vertical journal 18 in the slot 17 will be greater or smaller. The piston 23 will thereby travel a longer or shorter distance during one rotation of the shaft 10. Thus the quantity of chocolate casted, per unit of time, from the mouth-piece 27 is regulated by the adjustment of the link 11.

At its other end the link bar 12 is pivotally connected with arm 34 loosely revolving on the shaft 15, and adjacent arm 34 there has been fastened to the shaft 15 another arm 35, in which there is rotatably fastened a threaded block 36, into which enters a threaded shaft 37, which is connected with the end of the link bar 12 in a universal ball and socket joint 38. By rotation of the threaded shaft 37 one can vary the effective length of the link bar, as the motion from the link bar 12 is not transmitted through the loosely fitting arm 34, but through the threaded shaft 37 and the arm 35 to the shaft 15.

At each casting, the journal 18 is, as previously explained, in the circular slot part 28, and by now turning the threaded shaft 37 the starting position of the vertical journal 18 may be displaced in the slot 28. In other words the length of the path which the vertical journal will travel in the slot part 28, before it enters in the slot parts 30 and 29, is adjusted. Thus by turning the threaded shaft 37 one determines how far the vertical journal 18 must travel into the slot part 29, one determines consequently the duration of the motion of the piston 23 and thereby the duration of the casting or the length of the string laid out.

When thus the thickness of the string is regulated by adjustment of the link 11, and the length of the string is regulated by the threaded shaft 37, the phase of the shaft 3 is finally corrected in relation to the motion of the conveyor with the mould, so that the string laid out corresponds to the mould dish, not only as to thickness and length but also that it is laid out in the right manner and at the right moment.

According to the invention, the plant may be effected in many other ways than the above described. There is, for instance, shown on the drawing another casting tank 39 with mouth-piece 68 and with piston 40, which is driven from a shaft 41 through a connecting joint rod 42, with appurtenant link arms 43 and 44, respectively fastened to the shafts 10 and 41. The shaft 41 is rotatably supported in bearings 45 and 46 and carries at one end an arm 47, with a revolving block 48, in which a threaded shaft 49, is rotatably positioned. This shaft is at its threaded end inserted into a thread bushing 50 on the end of a rod 51, which is revolvingly connected with the block 52 in a circular link 53 on a shaft 55, rotatably supported in a bearing 54. This shaft bears a fast arm 56 with pivot pin 57, which is inserted in a slot 58 in a slot disc 59 on an arm 60 shiftable longitudinally and which by means of a link bar 61 is connected with the piston 40.

An approximate displacement of length of the arms 60 and 19 is brought about by means of pivotal arms 63 in fast bearings 62, which arms are pivotally connected with the bars 60 and 19.

The slot 58 has as does the slot 12, a circular part 64, in which the pin 57 can move by the rotation of the shaft 55 without moving the piston 40. In connection with the slot part 64 there is a slot part 65 of the form of an Archimedean spiral, proportionally strongly pitching, and a slot part 66 having the form of a less strongly pitching Archimedean spiral.

By adjustment of the link 53 the same effect is obtained as by adjustment of the link 11, and by adjustment of the shaft 49 the same effect is obtained as by the adjustment of the shaft 37.

When using two series of casting mouth-pieces 27 gradually, each guided from its main shaft 10 or 41, several advantages are obtained. Inter alia one can let each series of mouth-pieces cast only every second mould. Hereby the number of moulds of each type belonging to a machine is reduced to half, e. g. from 600 to 300 pieces, the one set of mouth-pieces casting the odd moulds, and the other set of mouth-pieces with their special adjustment mechanism casting the even moulds. The distance between the two series of mouth-pieces may correspond to 3 mould-breadths, whereby moulds Nos. 1 and 4 are cast at the same time and Nos. 2 and 5, Nos. 3 and 6 and so on are cast simultaneously. The mould-band is in this case moved with double speed, so that two moulds are carried on for each casting. With the mould-speed, thus augmented, the casting speed may also be augmented, and there will be plenty of time, while the mould, in which the mouth-piece is not to make any casting, passes below the mouth-piece, to take in new quantity of chocolate in the chamber 26 from the tank 25, lying above, by turning a diametrical plate 67. One may thereby obtain an essentially greater casting speed than by corresponding machines, where each mouth-piece 27 is cast in each mould, because in such machines the difficulties of taking in sufficiently quickly a new quantity of chocolate in the chamber 26 set a natural limit for the speed of the conveyor and consequently for the speed of the casting, which limit, as it will be understood, is about half of the limit to which one may raise the speed of the conveyor by casting only in every second mould.

Furthermore by using two sets of casting mouth-pieces one obtains the advantage of being able to let each set of mouth-pieces successively cast in each mould, so that one may for example produce two short chocolate bars, lying longi-

tudinally of each other in one and the same mould, by casting the foremost bar from one set of mouth-pieces and the hindmost bar from the other set of mouth-pieces.

If one lets the shaft 3 rotate once for the passage of each fourth mould under one mouth-piece, the mouth-piece will with curve discs 1 and 2 as shown make a casting in each second mould. If one desires the casting to be made in each mould, one must use a pair of other curve discs, producing a casting for each rotation of 90° of the shaft 3. On the other hand, one may get a casting in each fourth mould by using a pair of curve discs, which only brings about a casting once for each rotation of the shaft 3.

One may thus with the apparatus, according to the invention, be content with three pairs of curve discs, while in known machines, one must have at least 10 pairs of curve discs corresponding to each mould type, and even then one can not obtain the varied casting as above explained, e. g. by working simultaneously with two different types of moulds, which working besides making possible a reduction of the number of moulds of each of the 10 types of mould to half, also enables doubling the speed of the conveyor and thereby also the speed of casting.

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

1. In apparatus for casting chocolate and other moulded foodstuffs including a material holding container having a nozzle for dispensing the material and a reciprocable plunger operable in said container for effecting discharge of the material therefrom, in combination, a primary driving shaft having cam followers mounted thereon, driven cams engageable with said cam followers to effect rotational movement of said driving shaft, a secondary driving shaft, a back-lash unit comprising a cam disc member having a slot of predetermined configuration and a cam follower pin member engageable in said slot, one of said members being rigidly connected to the secondary driving shaft, linking means connecting the other of said members to said plunger to reciprocate said plunger in response to the movements of said back-lash unit member, and adjustable connecting means between said primary driving shaft and said secondary driving shaft, said connecting means comprising an adjusting member for changing the relative phase-displacement of said primary driving shaft and said secondary driving shaft, whereby to adjust the relative position of said follower pin in said slot.

2. In apparatus for casting chocolate and other moulded foodstuffs including a material holding container having a nozzle for dispensing the material and a reciprocable plunger operable in said container for effecting discharge of the material therefrom, in combination, a primary driving shaft having cam followers mounted thereon, driven cams engageable with said cam followers to effect rotational movement of said driving shaft, a secondary driving shaft, a back-lash unit comprising a cam disc member having a slot of predetermined configuration and a cam follower pin member engageable in said slot, one of said members being rigidly connected to the secondary driving shaft, linking means connecting the other of said members to said plunger to reciprocate said plunger in response to the movements of said back-lash unit member and adjustable connecting means between said primary driving shaft and said secondary driving shaft, said connecting means comprising an adjusting member for changing the relative angular velocity between said primary and secondary driving shafts, whereby to control the length of the stroke of said follower pin in said slot, and an adjusting member for changing the relative phase-displacement of said primary driving shaft and said secondary driving shaft, whereby to adjust the relative position of said follower pin in said slot.

3. In apparatus for casting chocolate and other moulded foodstuffs including a material holding container having a nozzle for dispensing the material and a reciprocable plunger operable in said container for effecting discharge of the material therefrom, in combination, a primary driving shaft having cam followers mounted thereon, driven cams engageable with said cam followers to effect rotational movement of said driving shaft, a secondary driving shaft, a back-lash unit comprising a cam disc having a slot of predetermined configuration and a cam follower pin engageable in said slot, said cam disc being connected to the secondary driving shaft, linking means connecting the follower pin to said plunger to reciprocate said plunger in response to the movements of said pin and adjustable connecting means between said primary driving shaft and said secondary driving shaft, said connecting means comprising an adjusting member for changing the relative angular velocity between said primary and secondary driving shafts, whereby to control the length of the stroke of said follower pin in said slot, and an adjusting member for changing the relative phase-displacement of said primary driving shaft and said secondary driving shaft, whereby to adjust the relative position of said follower pin and said slot.

4. In apparatus for casting chocolate and other moulded foodstuffs including a material holding container having a nozzle for dispensing the material and a reciprocable plunger operable in said container for effecting discharge of the material therefrom, in combination, a primary driving shaft having cam followers mounted thereon, driven cams engageable with said cam followers to effect rotational movement of said driving shaft, a secondary driving shaft, a black-lash unit comprising a cam disc member having a slot of predetermined configuration and a cam follower pin member engageable in said slot, one of said members being rigidly connected to the secondary driving shaft, whereby to move in direct response to the movements of said secondary shaft, linking means connecting the other of said members to said plunger to reciprocate said plunger in response to the movements of said back-lash unit member, and adjustable connecting means between said primary driving shaft and said secondary driving shaft, said connecting means comprising an adjusting member for changing the relative angular velocity between said primary and secondary driving shafts, whereby to control the length of the stroke of said follower pin in said slot, and an adjusting member for changing the relative phase-displacement of said primary driving shaft and said secondary driving shaft, whereby to adjust the relative position of said follower pin in said slot, said cam disc member being in the form of a quadrant and said slot having an arcuate portion and two differently spiralling portions, the last one having a pitch greater than that of the first one, whereby when the follower pin travels

in said slot the speed of travel of said plunger is zero, relatively fast and relatively slow, respectively.

5. In apparatus for casting chocolate and other moulded foodstuffs including a material holding container having a nozzle for dispensing the material and a reciprocable plunger operable in said container for effecting discharge of the material therefrom, in combination, a primary driving shaft having cam followers mounted thereon, a pair of driven cams engageable with said cam followers to effect rotational movement of said driving shaft, one of said cams having spiral portions and two extensions substantially 180° apart and the other of said cams having two spiral portions and an indentation whereby a reciprocating rocking motion of variable angular speed is imparted to said primary driving shaft, a secondary driving shaft, a back-lash unit comprising a cam disc member having a slot of predetermined configuration and a cam follower pin member engageable in said slot, one of said members being rigidly connected to the secondary driving shaft whereby to move in direct response to the movements of said secondary shaft, linking means connecting the other of said members to said plunger to reciprocate said plunger in response to the movements of said back-lash unit member, and adjustable connecting means between said primary driving shaft and said secondary driving shaft, said connecting means comprising an adjusting member for changing the relative angular velocity between said primary and secondary driving shafts, whereby to control the length of the stroke of said follower pin in said slot, and an adjusting member for changing the relative phase-displacement of said primary driving shaft and said secondary driving shaft, whereby to adjust the relative positions of said follower pin in said slot.

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