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Modernization Actuator Zephyr Finisher Machine

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Abstract
Forming casting marshmallow (marshmallow) in contemporary machines of the brand 3K is carried out by the actuators comprising a cam-lever mechanism. The paper attempts to modernize these mechanisms, ie replacing them (the plunger mechanism and spool) on purely linkages, which improves machine performance.
Keywords: Executive mechanisms, zephyr, purely linkages.

1. Introduction

Zephyr is a type of casting pastes and different shape and lush texture. The technological process of preparation of marshmallow includes the use of apple puree with a solids content of about 15% with the addition of up to 8% apple-sugar mixture. Due to the large number of protein and prolonged knocking (22 ÷ 25 min), the mixture is a more lush. The adhesive syrup for zephyr mass is boiled to a large density than Pastila weight - up to a solids content of 84 ÷ 85%. Ready-agar syrup with a temperature of 90 ÷ 95 OC introduced into hit by an apple-sugar mixture in the ratio 1: 1 after which are added flavoring and aromatic substances.

Ready marshmallow mass has a density of 400 kg / m3, 28 ÷ 30% moisture. It has a high viscosity, these properties are explained by a high content of agar and allows mold casting weight. The casting to produce marsh-marshmallow jigs SA system Rabinovich and VN Sokolova.

2. The principle of operation of the drilling machine.

The machine (Figure 1) has a hopper (1) Dosing depositor mechanism (2), the conveyor (3) for the trays. The hopper is provided with a water jacket for maintaining the temperature zefirnoy mass at a certain level.

Mass loaded into the hopper (1) by gravity or by means of a special boot device. In operation of the machine (Figure 1b), pistons (11) is sucked into the cylinders from the weight of the hopper and then spools (2) direct it, i.e. during the return stroke of the cylinder mass is deposited through flexible tubes (3) with serrated tips (5) to move along the conveyor trays.

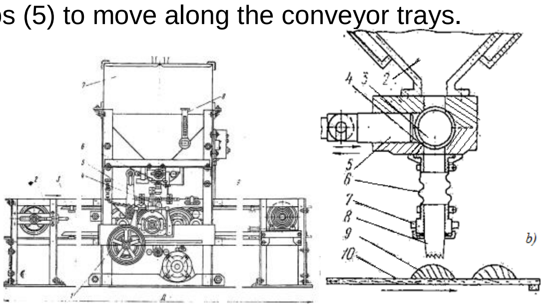

Fig. 1. Marshmallow Finish Machine

By means of a screw pair (10) can be adjusted stroke of plungers (11) and thereby providing a predetermined dosage weight portion, is deposited on the tray. Six coiled pipes (3) connecting the slide valve nozzle box with toothed lugs (5).

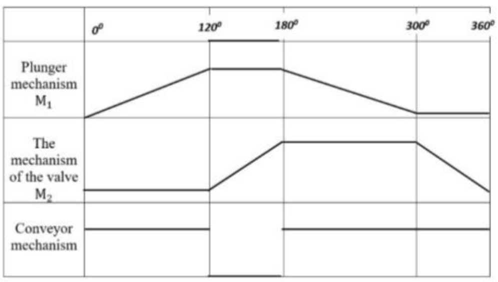

Fig. 2. The cycle chart and marshmallows sinhrogramma the casting machine.

A movable carriage (4), bearing the frame with toothed lugs fixed thereon, makes reciprocating movement along the conveyor and across it under the influence of the end (6) and the cylindrical cam (7) via a linkage system with a return spring.

As a result, a movable carriage makes complex longitudinal cross-forth motion, so that each portion is deposited zephyr mass acquires a circular shape with a corrugated surface ("shell"). Once the marshmallow is formed in an elongated shape such as "cakes".

3. Modernization of machine.

The aim of modernization is to replace cam mechanisms having a purely lever without changing the dimensions of the machine and accessories brand 33 K for the outflow of marshmallow. Such upgrading the one hand simplifies the structure of the actuators, on the other hand allows to increase the operating speed of the machine.

Dosage-dispensing head of the machine consists mainly of two mechanisms: the plunger and the valve mechanism. The cycle chart and sinhrogramma both mechanisms with the conveyor shown in Figure 2. The diagram shows that the plunger mechanism is in the final position of rotation of the main shaft Venue 60^0 machine. During this period, the valve mechanism itself turns the spool 90^0 and opens the way to the Gulf of mass. On the contrary, during this period the conveyor is at rest and ensures the implementation of the Gulf. actuators is shown in Fig. 3 (a, b).

Fig. 4 shows the proposed mechanisms to replace these mechanisms on a purely lever. However, resistance to prevent movement mechanism traverses plunger eccentric apply forklift mechanism shown in the first line of Fig. 4. This mechanism implements stop the driven member (in particular the plunger unit) to the desired angle (up to 60^0 reversal of the main shaft). If the plunger stroke reaches 92mm, the large radius of the eccentric takes R = 46mm, then φ_0 = (60) of-tion stop can be implemented with a maximum gap (Fig. 5):

$$\delta = R - R \cdot cos\frac{\varphi_o}{2} = 46 - 46cos\frac{60^o}{2}$$
$$= 46 - 46 \cdot 0{,}866 = 6{,}164mm$$

In view of the eccentric circle of radius R_e = 60mm and the minimum radius

r = 15mm, the distance between the forks of the mechanism is:

$$l = R_e + \delta = 60 + 6{,}164 = 66{,}164mm$$

In this case

$$h = R_e + (25 \div 30)mm = 46 + 26 = 72mm$$

In view of the pusher plunger stroke distance is between the uprights of the mechanism:

$$A = 2R_e + (10 \div 15)mm = 2 \cdot 60 + 10 = 130mm$$

To ensure symmetry traverse plungers is provided on the main shaft of the machine are two eccentric arrangements with the respective pusher (Fig. 6).

The number of revolutions of the main shaft of the machine:

$$n = \frac{\Pi}{60 \cdot mq \cdot C} = \frac{312{,}5}{60 \cdot 6 \cdot 0{,}06 \cdot 0{,}8} = 18\,Rpm$$

where, m=6 - the number of dispensing plungers, q = 0,06kq - mass products, C = 0,8 - coefficient of r continuity process.

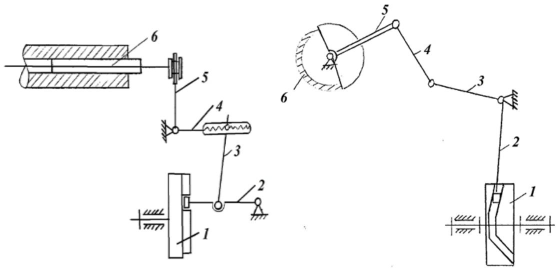

Fig. 3. Shema plunger mechanism and the spool

Thus, the shallow n = 24Rpm, define the necessary settings on the process, i.e. increasing the operating speed of the machine. Note that in addition to the eccentric mechanism, this mechanism may apply the slider-crank mechanism to hold out to the end positions (see Figure 4).

As the valve mechanism is a mechanism shown in the third line of Figure 4. As follows from the chart move the slide lever is 120 ÷ 125° Venue cent in extreme positions, and its rotation is only 60° during the rotation of the main shaft. To implement this project the movement of the crank-rocker mechanism from 120° a dwell. Mechanisms must ensure the rotation of the lever

l_3 PP % DQG WKH GLVWDQFH of the spool and the main shaft is equal to a = 190mm.

Any equations or formulae should be centered; and there should be one blank between the texts and the formulas.The maximum magnitude of the spool lever in dwell time is: $l_{3-3} = l_3 \cdot 2\sin\frac{90^0}{2} = 84{,}6mm$

Dimensions and units r, l_2 determined from the cosine theorem. With the system of equations:

$$(l_3 + r)^2 = a^2 + l_3^2 - 2al_3 \cdot \cos(\psi_o + 90^0)$$

$$(l_3 - r)^2 = a^2 + l_3^2 - 2al_3 \cdot \cos\psi_o$$

From the layout of the machine $\psi_o = 34^0, r = 75{,}5mm\ l_2 = 329{,}5mm$

4. Conclusion.

Defined estimated size allows to make basic drawings zefirootlivochnoy machines and increase the operating speed of the machine is 1.5 times

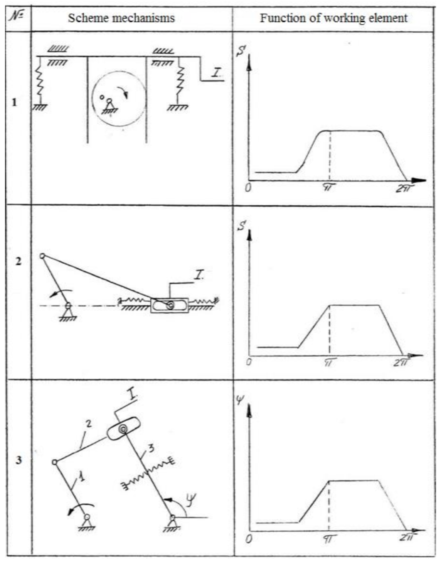

Fig. 4. Scheme of the proposed mechanisms

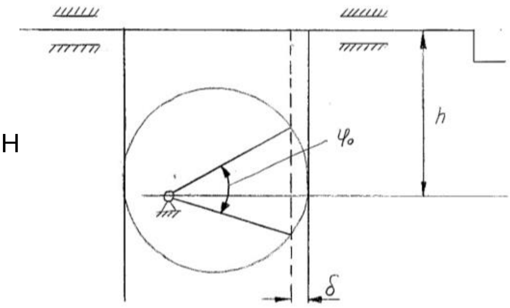

Fig. 5. Driving the eccentric mechanism.

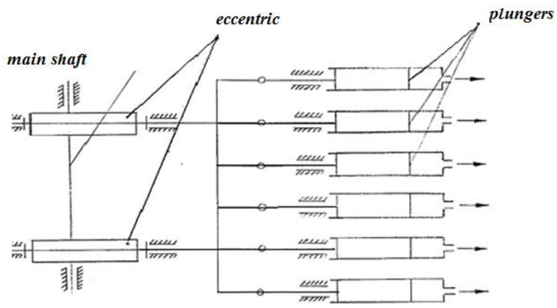

Fig. 6. Layout plunger mechanisms

References

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