

Machine for Cutting Melons on Ring-Sheeds

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ABSTRACT: The article deal the principle of operation of a mechanized machine for cutting melons into circular slices by the method of rotation on curvilinear lodgments. The principle of operation of circular knives inherited from the apparatus previously developed by the authors. The results of experimental studies showing the efficiency of the developed machine are presented.

KEYWORDS: apparatus, frame, circular knives, table top, cradles, surface, chain, drive, pulp, testicle, melon.

I. INTRODUCTION

Previously, we developed an experimental setup for cutting the melon fruit into ring slices [1]. Operating experience has revealed some of its shortcomings. So, for a full cutting of a melon across with an average diameter of 200 mm, the diameter of a circular knife should be at least 400 mm. This aggravates the manufacture of large-diameter circular blades and increases the cost of equipment.

In addition, a lot of technological time is spent for laying melon into the plant and removing its cut slices and the productivity of the machine drops. The deliberate curvilinearity of the lodgement does not allow to process melons of different sizes.

To eliminate these drawbacks, we have upgraded and made some changes to the design of the machine (Fig. 1) [2].

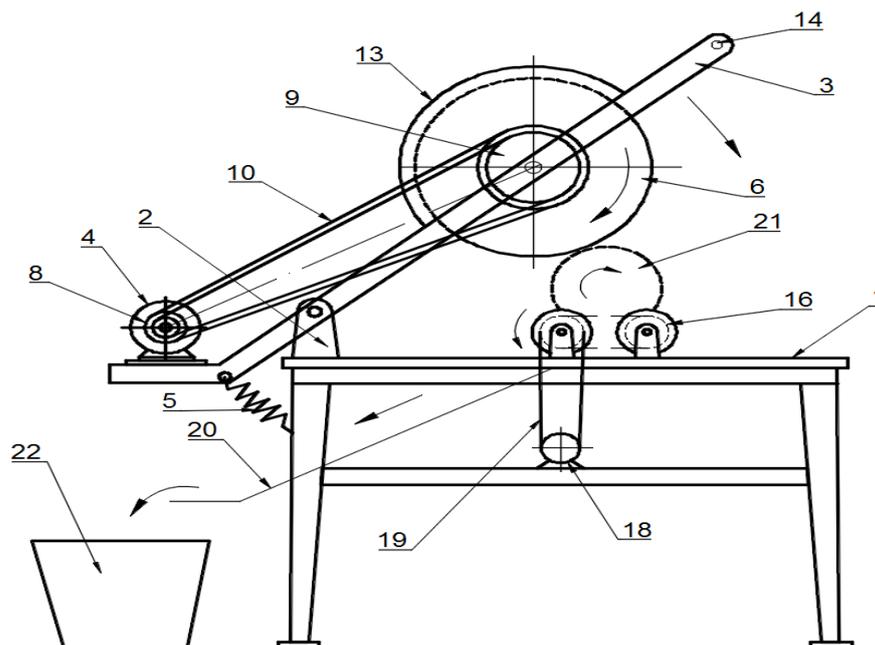


Fig .1. A general view of the machine for cutting in melon annular segments (end view)

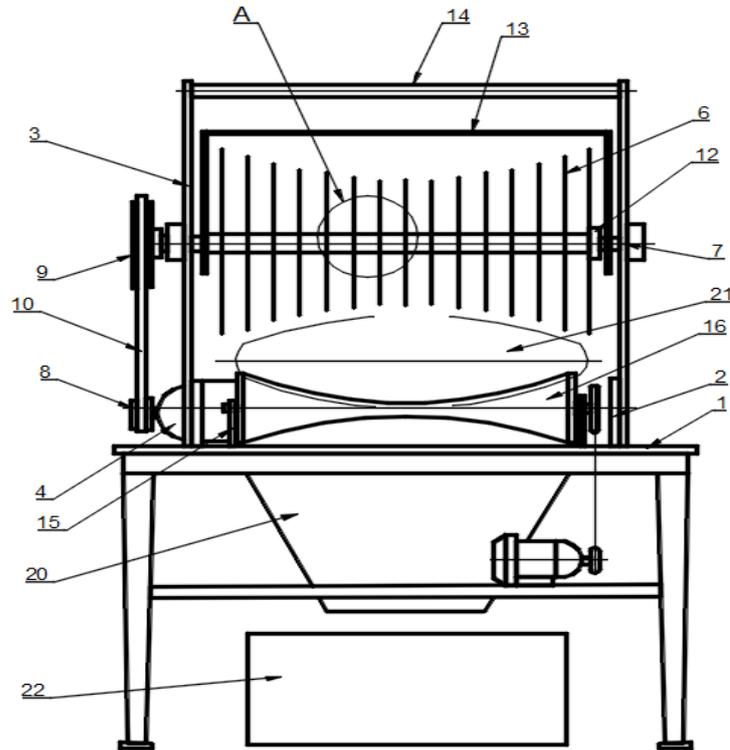


Fig.2. Machine for cutting in melon slices (front view)

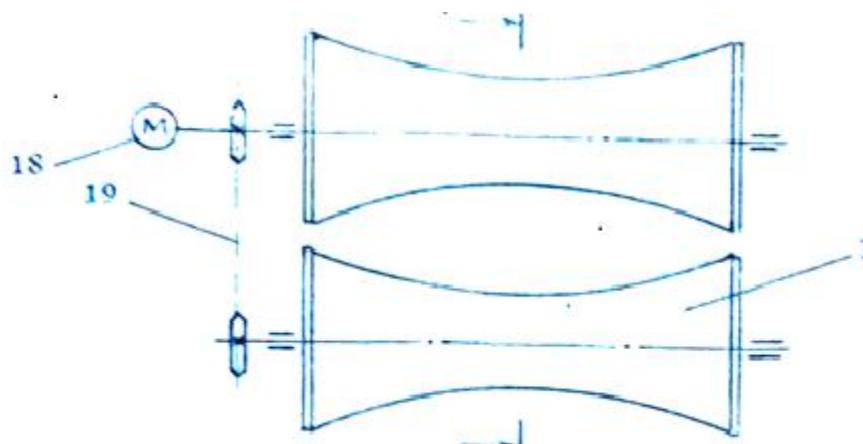


Figure 3. Kinematic drive circuit lodgements

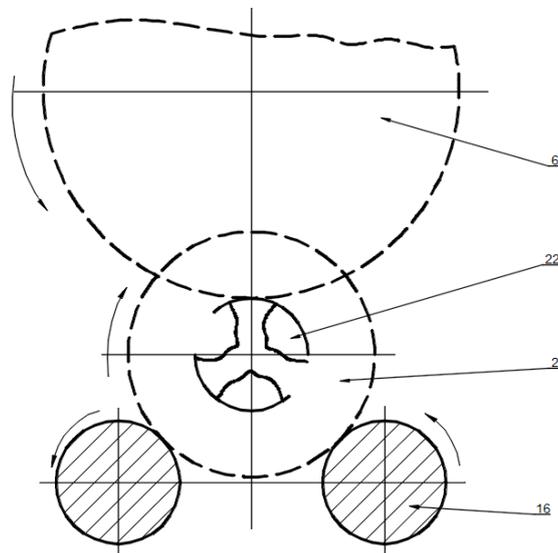


Figure 4. Sectional view of B-B in Figure 3

It contains a frame 1, on which, by means of earrings 2, is a pivoting frame 3, made in the form of a two-armed lever, on one shoulder of which an electric motor 4 is installed, acting as a counterweight, and a tension spring 5, and a cutting device in the other arm of disc knives of 6 mm in diameter, mounted on a rotating shaft 7. The shaft is driven from the electric motor 4 through the drive 8 and the driven 9 pulleys by means of a V-belt transmission 10. The disc knives 6 are fixed on the shaft 7 with spaced by alternating cylindrical sleeves 11 and captive gull 12 alternating between knives. From above, the knife pack is covered with safety casing 13. The frame is rotated by handrail 14.

On the frame 1 on the lugs 15, one pair of lodgement rolls 16 are installed, on the surface of which longitudinally arranged ruffles 17 are made. The rolls are driven from the gear motor 18 through a chain drive 19 and rotate in the same direction. On the back of the frame, opposite the rolls 16, there is an inclined skylight 20 for gathering slices of melon 21 cut into a team container 22.

The rollers 16 are also made with a concave surface of rotation corresponding to the outer surface of the melon to be processed. Consider the work of the proposed machine for cutting the fruit of the melon into ring slices. Sorted melon in size and shape (preferably (ellipsoidal or spindle-shaped) with a hard consistency of the pulp is peeled, peeled by a known method [2]. (See) with two lodgement rolls 16 having longitudinally located ruffles 17 across the entire surface. The gear motor is included 18 and drive the rollers into motion, while the fruit 21 will begin to rotate in the opposite direction due to the forces of adhesion with the grooves 17. Turning on the electric motor 4, drive the shaft 7 with the circular knives 6 and, controlling the handrail 14, slowly lower the swing frame 3 and the melon fruit is 21. At the same time, since the knives are set along a curve corresponding to the outer surface of the melon fruit, they are simultaneously pierced into the flesh of the melon rotating on the pedestal rolls and cut it to the seed cavity into annular slices with a width equal to the gap between the knives. drive knives and rolls, and move the frame to the top to its original position, this contributes to the counterweight (motor 4) and tension spring 5. After stopping all the moving elements, observing safety regulations, cut melon Lobules 21 are sent to skliz 20 in team tare 22 and the testis 11 is separated from the slices.

The proposed device has a number of advantages, the execution of the lodgement rolls with a concave surface of rotation does not require any fixing devices for fixing the processed melon. The melon fruit rotates freely towards the circular knives and cuts into circular slices [5]. A package of circular knives of various sizes and cylindrical sleeves allows you to get melon slices in different widths of rings, depending on the type of dried melon.

Paired lodgement rolls provide processing of melons in a wide range of sizes.



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The swivel frame with automatic lifting of the cutting 4 l device reduces the inter-operation time spent by the staff and contributes to an increase in productivity and production culture. In this case, it is strictly necessary to comply with safety requirements, as the disk knives rotate at high speed.

For the experimental setup, the circular knives were made of sheet steel, grade 65-G, 1.4 mm thick. The maximum diameter of the circular knives did not exceed 220 mm. Lodging rolls were made of PCB with a height of flute $h = 2$ mm.

Melon varieties were subjected to the experiment: Ich-kyzil and Non-gush with a pulp thickness of 45-50 mm. The width of the gap between the disc blades was changed within 15, 18, 21 mm by replacing cylindrical sleeves.

Experimental studies have shown good reliability of the proposed device. After some modifications, the proposed apparatus is recommended to be tested under production conditions in one of the farms that cultivate melons.

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