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SEED-CELLING KNIFE

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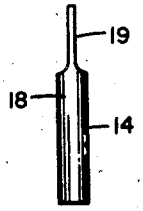


Fig. 4

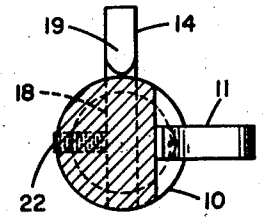


Fig. 3

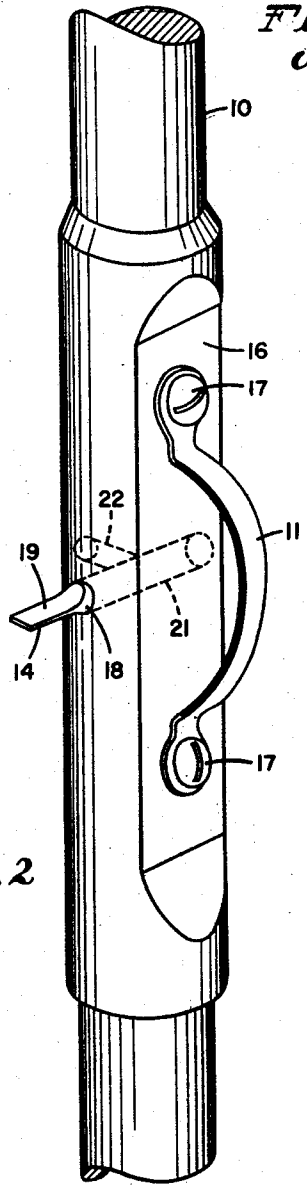


Fig. 2

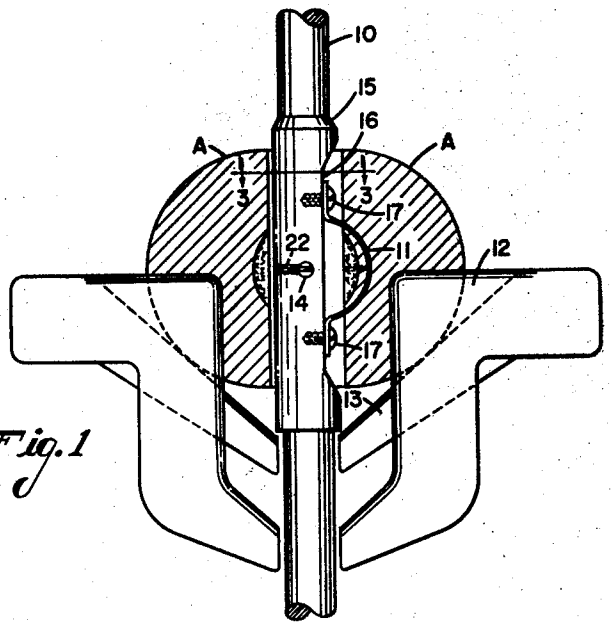


Fig. 1

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SEED-CELLING KNIFE

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6 Claims. (Cl. 146—40)

The present invention relates to seed-celling apparatus for use in machines for seed-celling and slicing apples and similar fruits.

In the preparation of apples for cooking, canning and drying, it is customary practice to pare and core the apples. Then the apples are fed into a combined seed-celling and slicing machine for removal of the seeds and seed cells and for quartering the apples or dividing them into lesser divisions.

In conventional seed-celling and slicing machines, the cored apples are dropped over a rotating spindle, to one side of which the celling knife is secured. The slicing blades are mounted radially of the spindle and are located just beneath the celling knife. During the celling operation, the slicing blades enter partly into the apple and serve to hold it against rotation while the seed-cells are being removed. Immediately after celling is completed, the apple is forced through the slicing blades and another cored apple is dropped into position on the slicing blades for celling.

The rotation of the celling knife in an apple exerts an outwardly-directed, expansive pressure on the apple. The partial entrance of the slicing blades into the apple prior to the celling operation weakens the apple, and in some cases may result in the apple being split prematurely because of the outwardly expansive pressure exerted by the celling knife. This may occur particularly where the apple happens to be unusually soft and mellow. When an apple is thus split prematurely, it is usually broken up into a number of small, undesirable and possibly unusable fragments.

After celling, the seeds and seed cells removed from the apple drop downwardly through the slicing blades with the apple itself, and generally are broken up into irregular large pieces by the slicing blades. The apple slices, seeds, and the large fragments of the seed cells are then screened in order to separate the desired apple slices from the undesired seeds, seed cell fragments, and any small pieces broken from the apple slices. With conventional celling techniques, the separation obtained by screening is seldom satisfactory, since the size of the undesirable portions is frequently larger than the size of the desired finished product. This is attributable partly to the incomplete separation between the large seed cell fragments and partly to a wide variation in the diameters of the whole fruit.

An object of the present invention is to provide an improved celling knife apparatus which reduces the fragments of seed cells to particles of small size, so that screening separation of the particles and the apple slices is facilitated.

Another object of the invention is to provide an improved seed-celling knife assembly in which removal of the seed cells from the knife itself is facilitated by the reduction of the seed cells to particles of small size which crumble readily and drop freely from the celling knife and along the spindle under very low force.

A related object of the invention is to reduce the outwardly-directed expansive force exerted by the rotation of the celling knife, so as to minimize or eliminate completely premature splitting of the apple attributable to the urging of the apple against the slicing knives by the outwardly-directed expansive pressure of the celling knife.

Other objects of the invention will be apparent hereinafter from the detailed description and the specification and from the recital of the appended claims.

The several objects of the invention are accomplished, in one embodiment of the invention, by the provision of an improved seed-celling knife assembly including two separate and distinct cutting edges. A first cutting edge or halving pin extends radially outward from the spindle and has a thin, flat blade adapted to project into the apple to make a transverse, disk-shaped incision centrally of the seed-cell area. Angularly spaced approximately 90° behind the first blade or halving pin, there is disposed a conventional semi-circular blade, the celling knife proper, adapted to cut an axial section from the apple to remove the seed-cell portion of the apple. The halving pin is vertically situated on the spindle so that it is located centrally of the span covered by the semi-circular blade. Preferably, the halving pin is so located as to bisect the axial section later cut by the celling knife.

The details of the invention, and its manner of accomplishing the objects thereof, may be most readily understood by reference to the drawings, in which:

Fig. 1 is a side elevation of one embodiment of the improved seed-celling assembly, showing a cored apple impaled upon the slicing knives in position for celling;

Fig. 2 is a perspective view of the seed-celling knife assembly;

Fig. 3 is a section on line 3—3 of Fig. 1; and

Fig. 4 is a side elevation of the halving pin.

Referring now in detail to the drawings, the numeral **10** denotes a rotary spindle having an enlarged portion **15**. Mounted on a flat portion **16** of the spindle which extends axially along the enlarged portion **15** is a semi-circular seed-celling knife **11**, held in position by screw fasteners **17** at each end thereof. A halving pin **14** is transversely seated in the spindle, angularly spaced 90° ahead of the celling knife in the direction of rotation of the spindle. A set screw **22** bears against the shank **18** of the halving pin and secures it in the recess **21** in the spindle. Below the celling knife assembly, and radially extending outwardly from the spindle, are a set of slicing knives **12** and **13**, in a conventional spider arrangement, but with alternate slicing knives **12** elevated above the other knives **13**. The higher alternate knives impale and support an apple thereon without weakening its structure unduly.

The halving pin **14** has a thin, flat blade **19** projecting from its shank **18**. The blade **19** extends outwardly from the spindle approximately as far as the seed-celling knife **11**. The pin is positioned vertically centrally of the span of the celling knife; and preferably, at the mid-point thereof.

During operation of the device, a cored apple A is dropped downwardly on the spindle and is impaled on the higher slicing knives **12**. This locks the apple in place and resists its tendency to rotate under the influence of the seed-celling knife **11**. However, the apple is not seriously weakened, as would be the case should it be impaled by all of the slicing knives.

With the apple A partially impaled on the upper edges of the higher slicing knives **12**, as indicated in Fig. 1, the halving pin **14** cuts a transverse, circular, disk-like swath centrally of the apple A as the spindle **10** rotates. The seed-cell knife **11** then makes a semi-circular cut in the seed-cell portion of the apple and removes a spherical segment from the apple. The blade **19** of the halving pin **14** should extend outwardly from the spindle so that

the radius of the transverse swath is at least equal to or greater than the radius of the spherical segment cut by the seed-celling knife 11.

The flattened portion 19 of the halving pin 14 is as thin as practicable, consistent with satisfactory strength. Thus, as it moves in its circular path through the flesh of the apple, it exerts very little outwardly-directed expansive force on the apple. Nevertheless, it leaves in its wake an open swath roughly corresponding in thickness to the thickness of the flattened portion 19. Thus, when the seed-celling knife 11 moves through its arcuate path during the cutting operation around the same portion of the apple, the flesh of the apple which is displaced is free to move inwardly, so that the outwardly-directed expansive force is eliminated for all practical purposes. In effect, the outwardly-directed expansive force of the seed-celling knife has been transformed to an inwardly-directed compressive force exerted against the seed-cells. There results a substantial elimination of premature splitting of the apple caused by the outwardly-directed expansive force exerted by the seed-celling knife 11.

After the spindle 10 has rotated through a celling cycle, downward pressure on the apple A forces it through the upper slicing knives 12, and the lower slicing knives 13, and another apple drops into place on the upper slicing knives 12. As the apple A moves downwardly, the severed seed-cell portions of the apple are carried downwardly through the slicing knives. The inward compressive force exerted by the seed-cell knife 11 is sufficient to cause some structural deterioration in the seed-cell portion of the apple, because of the weakening of this part of the apple by the halving pin 14. The subsequent passage of the seed-cells through the slicing knives causes breaking up of the seed-cell portion of the apple, while the remainder of the apple is divided into firm slices. Subsequent screening to separate the apple slices from the small, broken fragments of the seed-cell portion of the apple is considerably simplified and rendered more efficient by the extremely small size of the particles of the seed-cell portion. Furthermore, the increased frangibility of the severed seed-cell portion of the apple, caused by its halving and compression by the seed-celling knife, eliminates undesirable jamming of apple fragments between the seed-celling knife 11 and the underlying portion of the spindle 10, as has occurred in the past.

The 90° lead of the halving pin 14 ahead of the seed-celling knife 11 is important because of the disk-like hollow area which is formed in the seed-cell portion of the apple, which allows the force of the seed-cell knife to be directed inwardly as a compressive force, rather than outwardly as an expansive force. The relative positions of the halving pin and the seed-cell knife are quite important for satisfactory operation of the device. While a 90° spacing is preferred, substantially equally satisfactory results are obtained with angular spacings covering a fairly wide range. In practice, an angular range of about 30° up to about 120° has been found to give best results. The 90° spacing is preferred for the reasons set forth above, and also because maximum strength characteristics of the spindle 10 are utilized.

The invention is particularly useful where the apple being sliced happens to be soft and mellow, since even the slight entry of the slicing knives 12 into it may weaken its structure sufficiently for it to be apt to split prematurely under the outward expansive pressure exerted by the conventional seed-celling knife 11. With the halving pin and the seed-cell knife assembly of the present invention, the outwardly-directed expansive force exerted by the seed-cell knife 11 is directed inwardly and the potential apple segments are not forced apart prematurely.

While the invention has been described in connection with a specific embodiment thereof, then, it will be understood that it is capable of further modification, and this application is intended to cover any variations, uses, or adaptations of the invention following, in general, the principles of the invention and including such departures from the present disclosure as come within known or customary practice in the art to which the invention pertains and as may be applied to the essential features hereinbefore set forth, and as fall within the scope of the invention or the limits of the appended claims.

Having thus described my invention, what I claim is:

1. In a seed-celling and slicing machine for the removal of seed-cells and accompanying pulp from fruit, a rotary spindle adapted to receive cored fruit, a flattened cutting edge protruding from said spindle and adapted to cut a transverse swath in the seed-cell portion of said fruit on rotation of said spindle, means for holding the fruit approximately centered relative to said cutting edge, and secured to said spindle and spaced angularly behind said cutting means in the direction of rotation of said spindle, an arcuate cutting knife adapted to sever the seed-cell portion of the fruit from the remainder of said fruit upon rotation of said spindle.

2. In a seed-celling machine, a rotary spindle adapted to receive cored fruit, supporting means for the fruit to hold the fruit in operative position axially of said spindle, cutting means disposed on said rotary spindle for severing the seed-cell portion from said cored fruit including a radially extending flat cutting blade adapted to cut a circular transverse open path in said seed-cell portion upon rotation of said spindle, and an arcuate seed-celling knife angularly spaced behind said cutting blade on the spindle and adapted to sever the seed-cell portion from said fruit upon rotation of said spindle.

3. The machine of claim 2 in which said arcuate seed-celling knife is angularly spaced about 90° behind said cutting blade on the spindle.

4. In a seed-celling machine, a rotary spindle adapted to receive cored fruit, supporting means for the fruit to hold the fruit in operative position axially of said spindle, and a seed-celling knife assembly secured on said spindle, including an arcuate seed-celling knife adapted to sever the seed-cell portion from the fruit on rotation of said spindle, and angularly spaced ahead of said knife in the direction of rotation of the spindle, a radially extending flat pin adapted to cut a circular transverse open path bisecting said seed-cell portion of the fruit on rotation of said spindle.

5. In an apple seed-celling machine, a rotary spindle adapted to receive a cored apple, supporting slicing knives adapted to locate the apple in predetermined position axially of said spindle, and cutting means disposed on said rotary spindle for severing the seed-cell portion from said cored apple including a radially outwardly extending flat cutting blade adapted to cut a circular, transverse open path in the seed-cell portion of said apple on rotation of said spindle, and a semi-circular seed-celling knife angularly spaced behind said cutting blade on the spindle in the direction of its rotation and adapted to sever the seed-cell portion from said apple on rotation of said spindle.

6. The machine of claim 5 in which said radially extending flat cutting blade is integrally connected with a rod-like shank seated and adjustably secured within said rotary spindle.

References Cited in the file of this patent

UNITED STATES PATENTS

1,442,859	Coons	Jan. 23, 1923
2,070,311	Pease	Feb. 9, 1937
2,075,750	Pease	Mar. 30, 1937
2,089,501	Polk, Jr.	Aug. 10, 1937
2,121,097	Polk et al.	June 21, 1938
2,496,637	Pease	Feb. 7, 1950