United States Patent

[11] **3,537,494**

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[54] **SLICING MACHINE**
11 Claims, 8 Drawing Figs.

[52] **U.S. Cl.** **146/78,** 146/83, 146/98
[51] **Int. Cl.** **B26d 4/24**
[50] **Field of Search** 146/78, 163, 98, 83

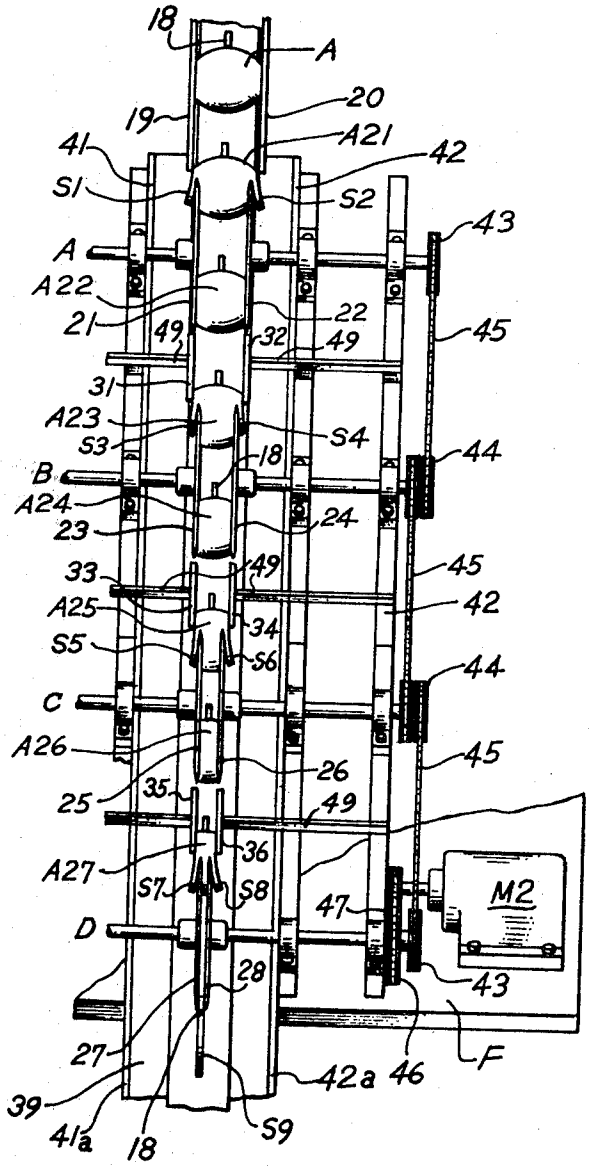
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Assistant Examiner—Z. R. Bilinsky
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ABSTRACT: A slicing machine for articles such as vegetables, fruit and the like which is capable of producing equal-thickness slices by orienting the articles and holding them oriented while passing successive pairs of slicing blades, the first pair to slice two slices from opposite ends of the article, the next pair to slice two more ends from the now shortened article and so on. Orientation of the articles is achieved by delivering them to a pair of side elements which are spaced from each other so as to receive between them the article which has previously been provided with flat ends to slide along the facing surfaces of the side elements, a wheel or conveyor belt being provided to serve as a bottom for the side elements and having article engaging blades to move the articles along the side elements and past the successive slicing knives. Intermediate the successive slicing blades, additional pairs of side elements provide continuing orientation of the articles even though their lengths are successively reduced by the removal of slices from the ends thereof, the first mentioned side elements and the additional side elements as well as the slicing blades being arranged in a specific manner to accomplish the desired type of slicing mentioned.



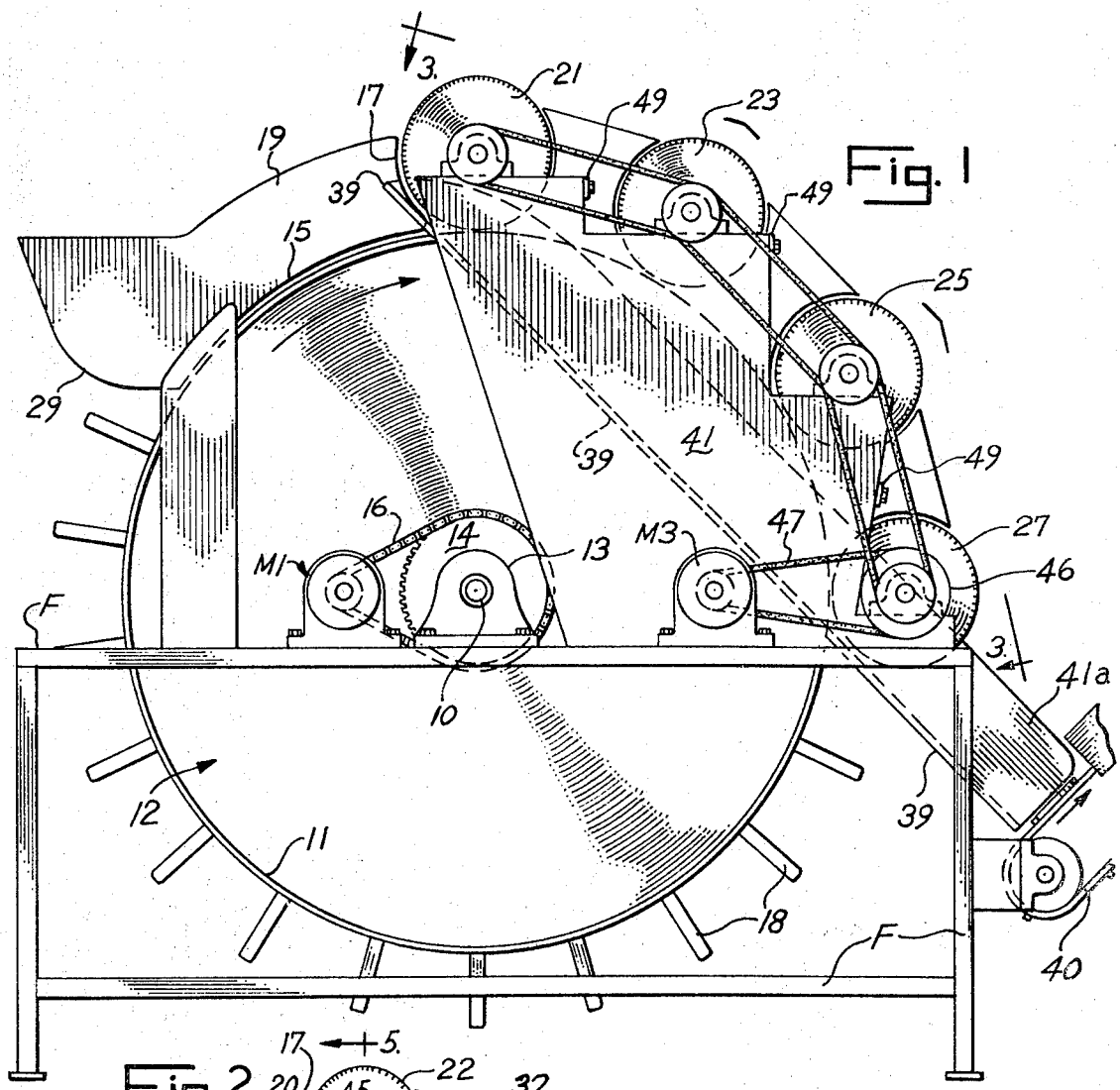


Fig. 1

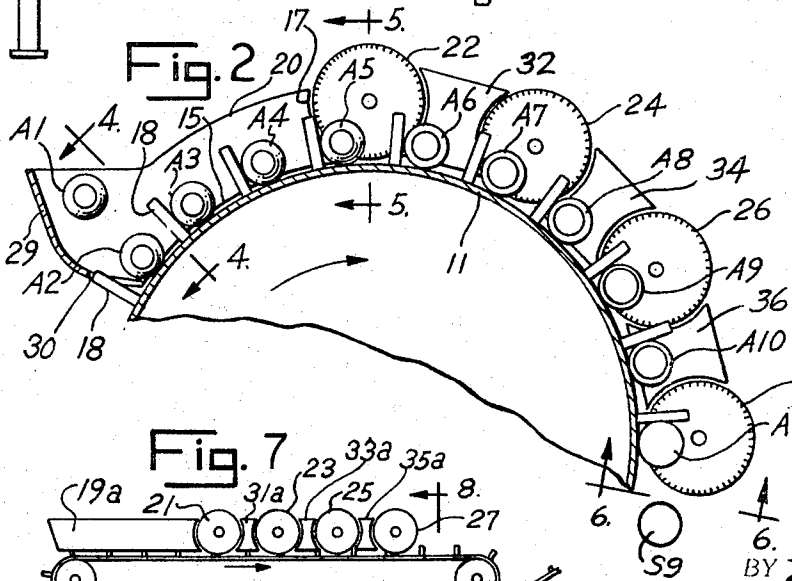


Fig. 2

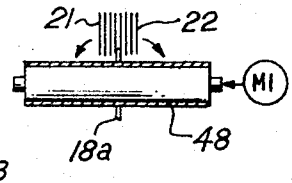


Fig. 8

Fig. 7

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Fig. 3

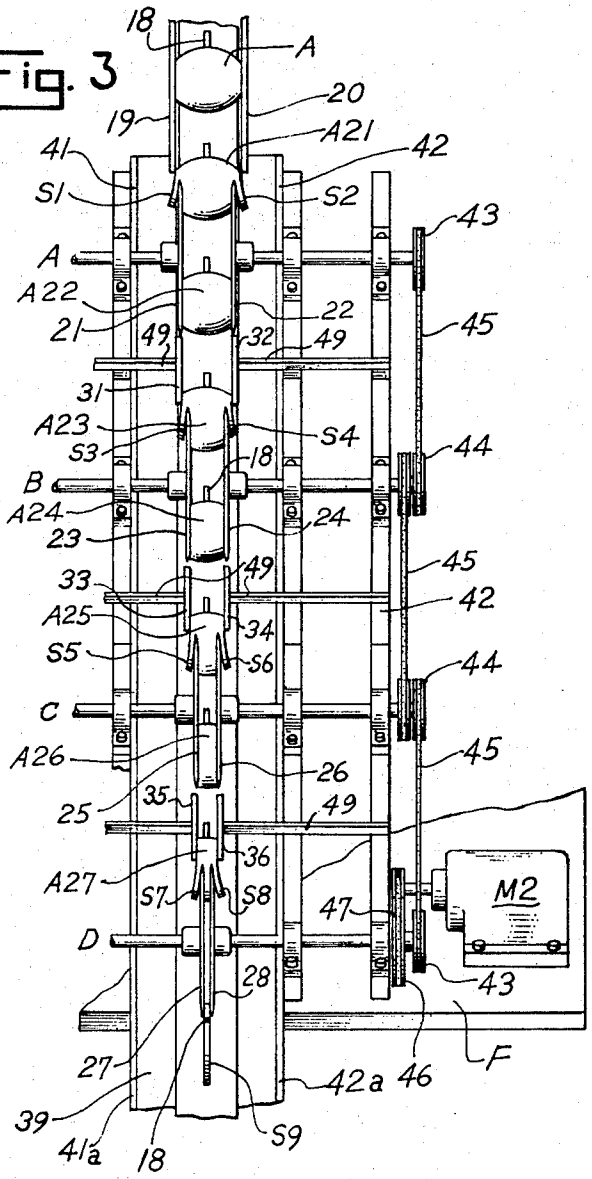


Fig. 4

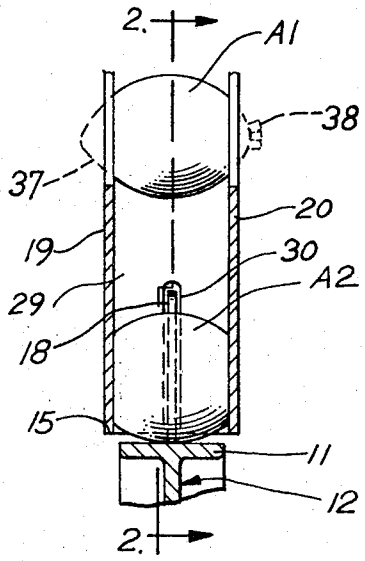


Fig. 5

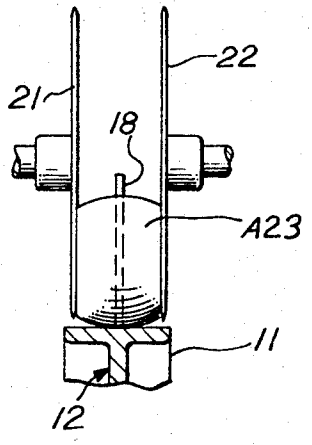
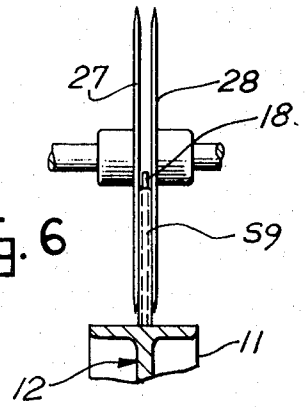


Fig. 6



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SLICING MACHINE

BACKGROUND AND OBJECTS OF THE INVENTION

Heretofore vegetables, fruit and the like have been sliced in slicing machines having gang slicing blades such as used for slicing loaves of bread. Even when using blades of the thinnest material found practical, slices of unequal thickness result and the adjacent surfaces of the vegetables or fruit are bruised in an undesirable manner. Especially in the slicing of onions for providing onion rings for "french fried onions" it is desirable to provide unbruised slices of equal-thickness throughout.

Accordingly, one object of my present invention is to provide a slicing machine in which slicing blades in successive arrangement remove slices one-at-a-time from an end of an article (or two-at-a-time from opposite ends of the article for increased production), the articles all the while being held properly oriented as they pass the slicing blades.

Another object is to provide orienting means in the form of side elements upstream of a first pair of slicing blades and intermediate each successive pair of blades, together with a wheel, conveyor belt or the like forming a bottom for the side elements and thus enclosing three sides of each article, the successive slicing blades being set closer together, and likewise the side elements between successive blades being correspondingly set closer together, thereby maintaining orientation of the articles as slices are removed therefrom.

BRIEF SUMMARY OF THE INVENTION

A supporting frame is provided on which an article advancing wheel is journaled, the wheel having article advancing blades, one for each article delivered to the wheel. Side elements are provided with relation to which the wheel forms a bottom, thus producing a three-sided trough along which articles such as onions are advanced by article-advancing blades projecting from the wheel. A series of pairs of rotary slicer blades are successively encountered by the onions being advanced and are successively set closer together for slicing the ends from an onion held oriented by the side elements and delivered to the first pair of slicing blades whereupon the onion passes between additional side elements set more closely together, and the onion is delivered to the second set of slicing blades (also closer together), the successive slicing operations being repeated until the two next-to-the-last slices are sliced therefrom and the last slice then passes between the final two blades, a collecting chute being provided for all the slices to deliver them from the slicing machine.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevation of a slicing machine embodying my invention.

FIG. 2 is a similar view of the upper portion of the slicing machine, and is a section taken on the line 2–2 of FIG. 4, and through the plane of an article advancing wheel and adjacent certain article advancing blades thereof.

FIG. 3 is a somewhat diagrammatic elevation of the article advancing wheel and slicing knives of the machine looking in the direction of arrows on the line 3–3 of FIG. 1.

FIGS. 4, 5 and 6 are sectional views on the lines 4–4, 5–5 and 6–6 respectively of FIG. 2.

FIG. 7 is a diagrammatic view showing a modification in which a conveyor belt in place of an article advancing wheel is utilized; and

FIG. 8 is a diagrammatic sectional view thereof on the line 8–8 of FIG. 7.

On the accompanying drawings I have used the reference character F to indicate in general a supporting frame of any suitable type. A main shaft 10 is rotatably supported thereon, as in bearings 13, and an article advancing wheel 12 is mounted on the main shaft. Suitable means is provided for rotating the shaft 10 and the wheel 12, such as a motor M1, a sprocket 14 and a chain 16 driven through a suitable speed reducer which in turn is driven by the motor M1. Projecting

from the periphery of the wheel 12 are spaced article-advancing blades 18 which will be described in more detail hereinafter.

A pair of side elements 19 and 20 are provided to receive and orient articles to be sliced, and have an end wall 29 provided with a slot 30 through which the blades 18 pass. The side elements 19 and 20 are characterized by curved lower edges 15 closely adjacent a drumlike rim 11 of the wheel 12, and downstream ends 17 which are also curved for a purpose which will hereinafter appear.

Pairs of slicing knives or blades 21 and 22, 23 and 24, 25 and 26 and 28 are provided in the form of rotatable discs of the usual "vegetable slicer" type having serrated edges. The peripheries of the blades 21 and 22 are closely adjacent the curved downstream ends 17 of the side elements 19 and 20, and the remaining three pairs of slicing blades are spaced progressively further downstream as illustrated in FIGS. 1 and 2. Additional pairs of side elements, 31 and 32, 33 and 34, and 35 and 36 are provided as also shown in FIGS. 1 and 2, and have curved edges closely adjacent the rim 11, and upstream and downstream ends curved to lie close to the peripheries of the slicing blades as illustrated, the spacing here being similar to that referred to for the curved edges 15 and 17 and all spacings being less than the thickness of slices to be sliced from the articles to avoid any possibility of slices squeezing through such spaces and being mutilated or jamming the slicing machine during its operation.

Another important relationship of the parts is illustrated in FIG. 3 wherein the slicing blades 21 and 22 are out of alignment with, and spaced closer together than, the side elements 19 and 20. The spacing as illustrated is substantially one-ninth the distance between the inner faces of the side elements 19 and 20 so that nine slices can be sliced from the article indicated at A. Obviously, this distance can be some other multiple, such as one-seventh (if the side elements 35 and 36 and the blades 27 and 28 are omitted and the spacing correspondingly revised) resulting in seven slices from the article A instead of nine. The side elements and the slicing blades may be made adjustable as to the spacing between them, thus adapting them for other numbers of slices if desired.

With further reference to the relationship above referred to, it will be noted that the pairs of additional side elements 31 and 32 are substantially aligned with the slicing blades 21 and 22, the additional side elements 33 and 34 are closer together and correspond to the slicing blades 23 and 24 and so on.

A further relationship is shown in FIG. 3—that of the article advancing blades 18; less in thickness than the distance between the adjacent surfaces of the slicing blades 27 and 28 so as to pass between them without interfering with their operation. At the same time there is a relationship between the wheel rim 11 and the side elements 19 and 20 as shown in FIG. 4, the wheel rim serving as a bottom for the side elements so that, in effect, a three-sided trough is provided in which the articles A, such as onions or the like, are held oriented because of flat ends thereof being in parallel planes and those planes having substantially the same spacing as the distance between the inner surfaces of the side elements 19 and 20. In this connection, I may here mention that the onions may have the root 37 and the flower ends 38 thereof (shown dotted in FIG. 4), trimmed therefrom in an onion ring machine of the kind shown and claimed in my copending application, Ser. No. 827,683 filed May 26, 1969. That machine delivers the onions in timed relation with respect to the passage of the blades 18 through the slot 30 of the end wall 29 shown in FIG. 2 as indicated at A1, and they roll down the end wall 29 to the position A2 to be engaged by the next upcoming blade 18 and so on. My onion ring machine above referred to also has mechanism for peeling the onion before it arrives at position A1, and has mechanism to separate the onion rings from each other upon leaving the herein disclosed slicing machine.

FIG. 2 shows further onions A2, A3, A4, etc. as they pass through my slicing machine, the spacing relationship being illustrated. In FIG. 3, however, the spacing relationship is out of

scale in order to show an unsliced onion at A, one at A20 having slices S1 and S2 cut therefrom, one at A21 having slices S3 and S4 cut therefrom and so on, until the one at A23 has slices S7 and S8 cut therefrom leaving only the last slice S9 passing between the slicing blades 27 and 28. All nine slices fall onto a chute bottom 39, down which they may slide to be deposited on a takeaway conveyor 40 or the like, which in my copending application delivers them to the ring separating mechanism above referred to.

The slicing blades 21 to 28, inclusive, are preferably of the rotating disc type with serrated edges, a standard item in the vegetable slicing art and usually termed "slicing discs". They are rotatable by mounting them on the ends of suitable shafts, as illustrated in FIGS. 1 and 3, which may be journaled in bearings mounted on pairs of side plates 41, 41*a* and 42, 42*a*. The side plates also serve as sides for the chute bottom 39 and as supports for the side elements 31 to 36 inclusive as through the medium of bars 49 shown in FIGS. 1 and 3.

Any suitable means may be provided for rotating the shafts such as (merely by way of example) single and double pulleys 43 and 44 belted together by belts 45, and a drive pulley 46 driven by a belt 47 from a motor M2 as shown in FIG. 3 for the slicing blades 22, 24, 26 and 28. A similar arrangement of pulleys 43*a* and 44*a* and belts 45*a* (not shown in FIG. 3) are provided for the slicing blades 21, 23, 25 and 27, as shown in FIG. 1, a second motor M3 being provided for driving them.

A driving arrangement can be provided for the conveyor type slicing machine shown in FIG. 7 wherein a conveyor belt 48 replaces the wheel rim 11 of FIG. 1, and has blades 18*a* mounted thereon for propelling the articles between the side elements and past the slicing blades which are identified in FIG. 7 by reference numerals such as found in FIG. 1 with the addition of *a*. In this type of installation, the conveyor belt 48 serves the additional purpose of receiving the onion slices according to the arrows *a* in FIG. 8, thus eliminating necessity for the chute 39, 41, 42 of FIG. 1, and the conveyor belt delivers the slices directly to the takeaway conveyor 40*a*.

From the foregoing specification, it will be obvious that I have provided a comparatively simple yet efficiently operating machine for slicing articles such as vegetables and/or fruit in such manner as to produce equal-thickness slices therefrom, due particularly to the slicing blade arrangement combined with side elements which constantly keep the articles oriented until they have been completely sliced.

I Claim:

1. In a slicing machine, a pair of side elements to receive therebetween articles to be sliced, which articles have flat ends confined by said side elements to thereby orient said articles, a first pair of slicing blades out of alignment with the downstream ends of said side elements, said pair of slicing blades being spaced from and substantially parallel to each other and being spaced closer together than the distance between said pair of side elements, additional pairs of slicing blades located downstream of said first pair of slicing blades and being set successively closer together for slicing successive slices from the ends of said articles, and additional pairs of side elements between said successive pairs of slicing blades, the downstream pair of said additional side elements in each instance being aligned with the slicing blades upstream thereof, and the space between said additional pairs of side elements substantially coinciding with the articles after slices have been cut from the ends thereof, and means for moving such articles along said side elements and past said slicing blades whereupon slices are cut by said slicing blades from the opposite ends of such articles, the thickness of which is determined by the out-of-alignment distance.

2. A slicing machine in accordance with claim 1 wherein said means for moving said articles comprises a wheel, the periphery of which forms a bottom for said pair of side elements, said wheel having article engaging blades passing between said side elements and said slicing blades.

3. A slicing machine in accordance with claim 1 wherein the means for moving said articles comprises a conveyor forming a bottom for said pair of side elements, said conveyor having article engaging blades passing between said side elements and said slicing blades.

4. A slicing machine in accordance with claim 1 wherein said slicing blades are in the form of discs, means for rotating said discs, said first mentioned pair of side elements and said additional pairs of side elements having their downstream ends adjacent said discs and curved to closely follow the peripheries thereof to confine such articles to their oriented positions and produce substantially equal-thickness slices therefrom.

5. A slicing machine in accordance with claim 1 wherein a slice receiving chute is provided adjacent said slicing blades and said additional pairs of side elements to receive the slices cut from the articles by said slicing blades.

6. A slicing machine in accordance with claim 3 wherein said conveyor has side portions extending under said side elements and said slicing blades for receiving slices cut from the ends of such articles.

7. In a slicing machine, a pair of side elements to receive therebetween articles to be sliced, which articles have flat ends confined by said side elements to thereby orient said articles, a pair of disc slicing blades out of alignment with the downstream ends of said side elements, said pair of slicing blades being spaced substantially parallel to each other and being spaced closer together than the distance between said pair of side elements, means for rotating said blades, said pair of side elements having their downstream ends adjacent said discs and being curved to closely follow the peripheries thereof to confine said articles to their oriented positions and produce substantially equal thickness slices therefrom, and means for moving said articles along said side elements and past said slicing blades whereupon slices are cut by said slicing blades from opposite ends of such articles, the thickness of which is determined by the out-of-alignment distance.

8. In a slicing machine for slicing articles conveyed therethrough, a pair of side elements to receive therebetween articles to be sliced, which articles have flat ends confined by said side elements to thereby orient said articles, a first pair of slicing blades out of alignment with the downstream ends of said side elements, said pair of slicing blades being spaced from and substantially parallel to each other and being spaced closer together than the distance between said pair of side elements, additional pairs of slicing blades located downstream of said first pair of slicing blades and being set successively closer together for slicing successive slices from the ends of said articles, and additional pairs of side elements between said successive pairs of slicing blades, the downstream pair of said additional side elements in each instance being aligned with the slicing blades upstream thereof, and the space between said additional pairs of side elements substantially coinciding with the articles after slices have been cut from the ends thereof, whereby as said articles are moved past said side elements and said slicing blades, slices are cut by said slicing blades from opposite ends of such articles, the thickness of which is determined by the out-of-alignment distance.

9. A slicing machine in accordance with claim 8 wherein said slicing blades are in the form of discs, means for rotating said discs, said first mentioned pair of side elements and said additional pairs of side elements having their downstream ends adjacent said discs and curved to closely follow the peripheries thereof to confine such articles to their oriented positions and produce substantially equal-thickness slices therefrom.

10. A slicing machine in accordance with claim 8 wherein a slice receiving chute is provided adjacent said slicing blades and said additional pairs of side elements to receive the slices cut from the articles by said slicing blades.

11. In a slicing machine for slicing articles conveyed therethrough, a pair of side elements to receive therebetween articles to be sliced, which articles have flat ends confined by said side elements to thereby orient said articles, a pair of disc slicing blades out of alignment with the downstream ends of

said side elements, said pair of slicing blades being spaced substantially parallel to each other and being spaced closer together than the distance between said pair of side elements, means for rotating said blades, said pair of side elements having their downstream ends adjacent said discs and being curved to closely follow the peripheries thereof to confine said articles to their oriented positions and produce substantially equal thickness slices therefrom, whereby as said articles are moved past said side elements and past said slicing blades, slices are cut by said slicing blades from opposite ends of said articles, the thickness of which is determined by the out-of-alignment distance.