Sept. 8, 1942. H. N. NIEBUHR 2,294,927

BLADE SPACER

Filed Nov. 12, 1938 2 Sheets-Sheet 1

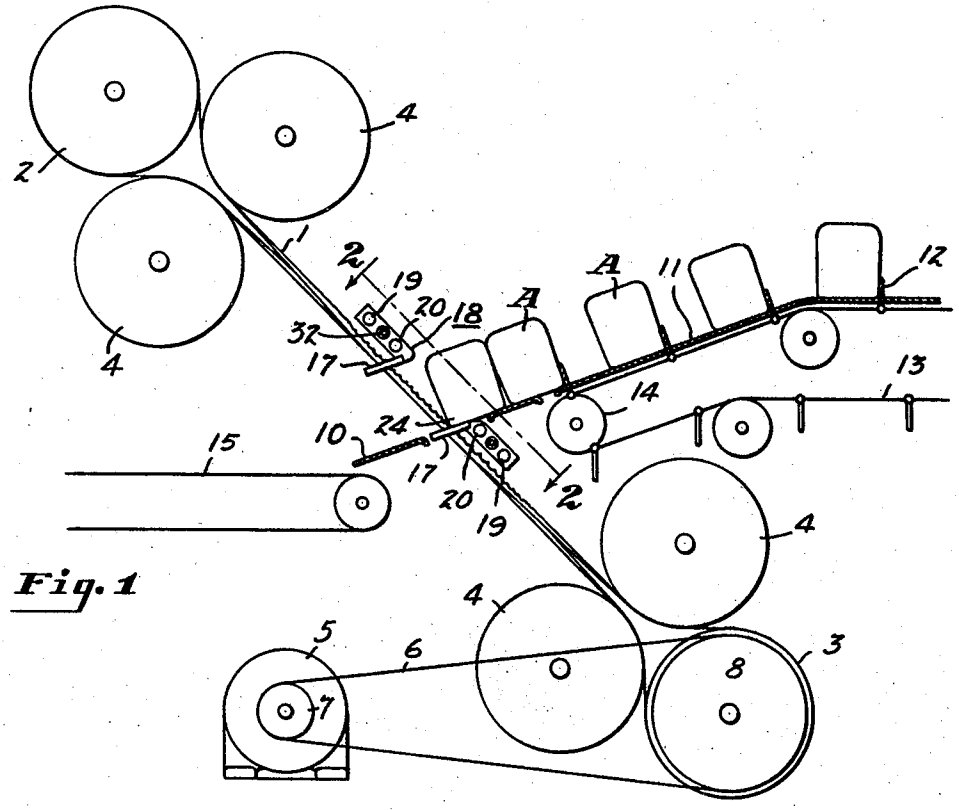


Fig. 1

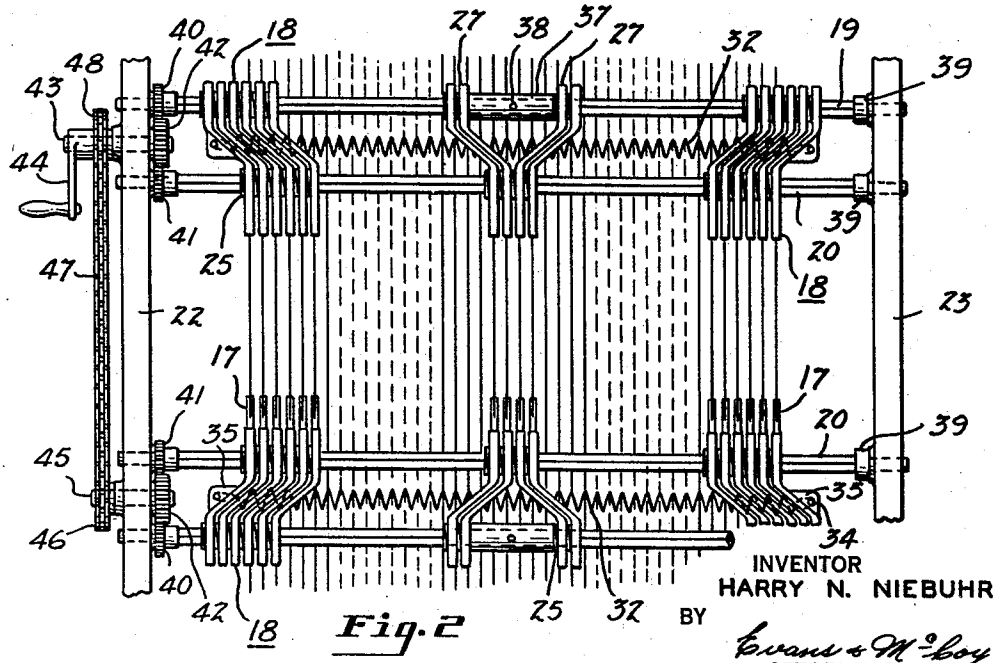


Fig. 2

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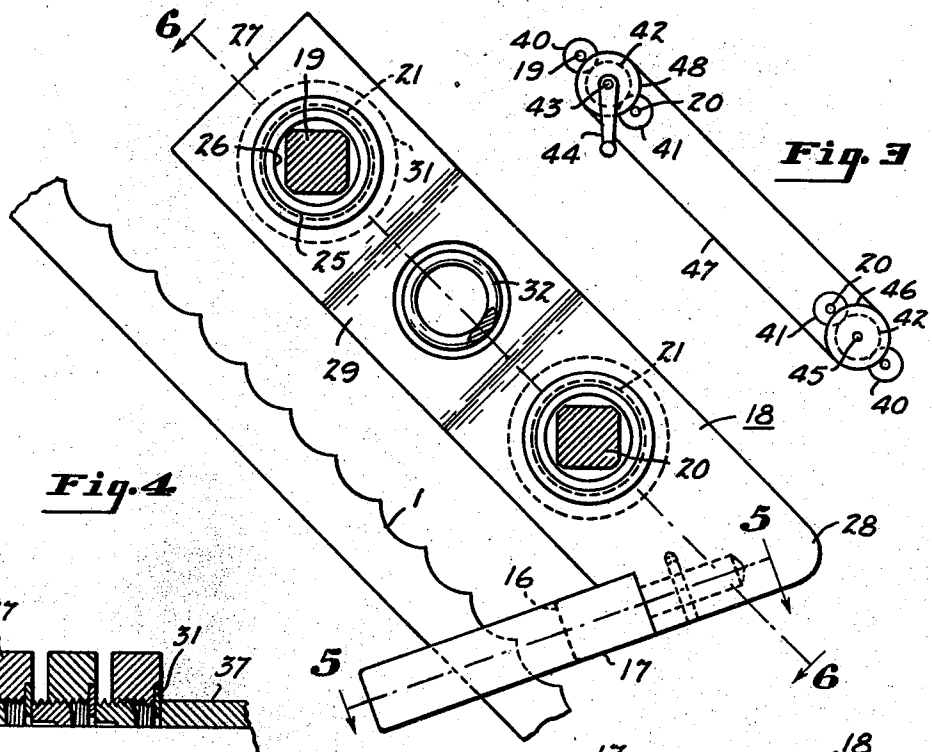


Fig. 4

Fig. 3

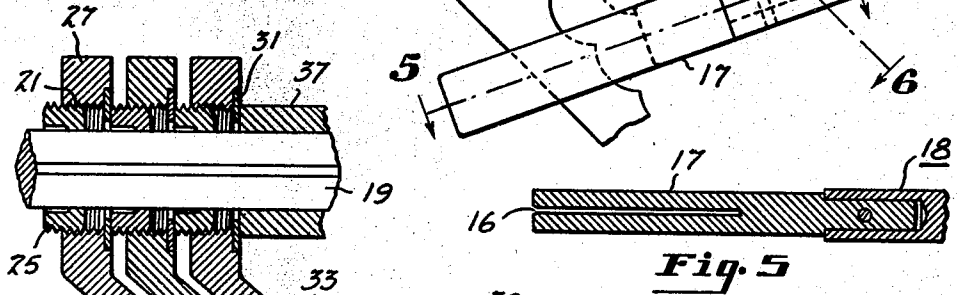


Fig. 5

Fig. 6

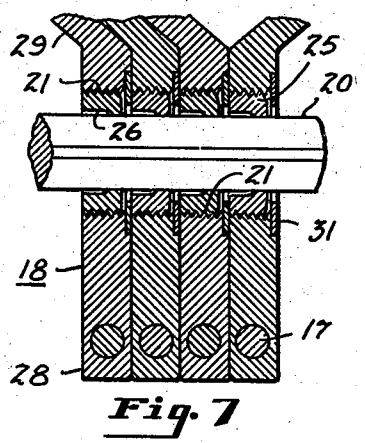


Fig. 7

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BLADE SPACER

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Application November 12, 1938, Serial No. 239,973

16 Claims. (Cl. 146—88)

This invention relates to improvements in blade spacers and more particularly to a blade spacer for adjusting the distance between the slicing knives or cutters of a bread slicing machine so as to vary the thickness of the slices produced thereby.

It is an object of the invention to provide a blade spacer having individual elements or fingers for spacing and guiding the cutter blades of a slicing machine, which elements or fingers are carried by movable guide members having associated therewith positive mechanism for adjusting the distance between the guide members and fingers while the cutter blades are moving.

Another object is to provide a blade spacer having guide members which are rigidly supported in adjusted position with a minimum of play or deflection so that blades or cutters guided thereby have a minimum permissible lateral movement or displacement.

Another object is the provision in a blade spacer of a multiplicity of individual blade guiding members which are carried by spaced supporting members in a manner which prevents lateral twist or misalignment of the guide members with respect to one another.

A more specific object is to modify the type of spacer shown in co-pending application Serial No. 260,044 filed March 6, 1939, of Vollmer and Herwehe and to provide, in a slicing machine of the character having a plurality of endless cutter bands carried on spaced drums, means for spacing and guiding the individual laps of the cutter bands, which means can be adjusted to vary the spacing between the cutters while the bands are in motion, there being cutter blade spacing and guiding elements below and above the path of the articles to be sliced. Other objects and advantages will become apparent from the following detailed description of a suitable embodiment of the invention which is made with reference to the accompanying drawings, in which

Figure 1 is a diagrammatic illustration with parts removed showing the manner in which blade guiding and spacing mechanisms constructed in accordance with the present invention are used with an endless band type slicing machine;

Fig. 2 is a detail view, with parts removed, taken substantially on the line 2—2 of Fig. 1 and enlarged with respect thereto;

Fig. 3 is a diagrammatic detail showing the mechanism for simultaneously adjusting the blade spacers and guides which are disposed above and below the path of articles through the bands;

Fig. 4 is a fragmentary detail, partly in section, showing the mounting of a guide member and the manner in which it guides a cutter band or blade;

Fig. 5 is a fragmentary detail, in section, showing one of the blade receiving fingers, taken substantially on the line 5—5 of Fig. 4;

Fig. 6 is a fragmentry detail view, partly in section and with parts removed, taken substantially on the line 6—6 of Fig. 4, showing the manner in which a plurality of the guide members are mounted on the supporting members; and

Fig. 7 is a fragmentary detail corresponding to Fig. 6 showing the guide members contracted toward one another to effect a minimum spacing of the cutter bands.

The blade guide mechanism of the present invention is shown as applied to a slicing machine of the endless cutter band type, such as shown in co-pending application of Kottmann and Vollmer, Serial No. 260,046, filed March 6, 1939, and used for slicing bread. Referring to the drawings by numerals of reference which indicate like parts throughout the several views, the apparatus comprises a plurality of endless cutter bands 1 which are carried around spaced top and bottom drums 2 and 3, respectively. Between the drums the blades are given a half twist so that the cutting edges of both laps of each band are directed in the same direction. If desired, a number of idling or guide drums 4 may be provided to maintain a suitable tension in the bands and to dispose both laps of all the bands in substantially a common plane which may pass through the axes of the drums 2 and 3. All of the drums are mounted on shafts journalled in, or otherwise carried in conventional manner by side frames, not shown, and the bottom drum 3 is driven by an electric motor 5 through a belt 6 running on pulleys 7 and 8.

The cutter bands 1 are all of substantially the same length and are disposed in side by side relation on the drums 2 and 3. A succession of loaves A or other articles to be sliced are advanced to and through the knives or cutter bands 1 intermediate the drums 2 and 3 over an infeed conveyor comprising a supporting apron 11 and a plurality of flights 12 mounted at uniform intervals on an endless belt 13 running over pulleys or suitable rotatable members 14 and driven by a motor, not shown.

Lower blade spacing and guiding fingers, to

be later described, are disposed in operative alinement with the infeed conveyor apron 11 and support the articles A as they are sliced and pass through the cutters 1 and until they are deposited either directly on a discharge conveyor or on a suitable support 10, which is disposed as a continuation of the lower blade guiding and spacing fingers. The discharge conveyor may be an endless belt 15 which may be driven synchronously with the infeed conveyor belt 13.

Above and below the path of the articles A the individual laps of the cutters or band blades 1 are received in elongated slots 16 of guide fingers 17 of the upper and lower blade spacing and guiding mechanisms. The fingers 17 are carried by guide members 18 slidably mounted on spaced substantially parallel supporting members 19 and 20.

The ends of the supporting members 19 and 20 are journalled for rotation in frame members 22 and 23 which are secured to the supporting structure of the slicing machine or, if desired, may be the side frames thereof which carry the drums 2, 3, and 4. The upper blade guiding or spacing mechanism, disposed above the path of the articles A, is arranged so that the supporting members 19 and 20 thereof are disposed in a common plane which is substantially parallel to the plane of all of the cutter bands 1. Accordingly, the guide members 18 which are mounted on the supporting members of the upper blade guide mechanism, are disposed in substantially parallel relation with respect to the plane of the cutter bands. Similarly, the supporting members 19 and 20 of the lower or bottom blade guiding and spacing mechanism disposed below the path of the articles through the cutters, are in a plane substantially parallel to the plane of the cutter bands and the lower guide members 18 are likewise disposed in a plane substantially parallel to the plane of the cutter bands.

Preferably, the path of the articles A is substantially oblique to the paths of the cutter bands so that lower leading corner 24 of each article is first engaged by the cutting edges of the bands at the beginning of the slicing of each article.

The guide fingers 17 are arranged in substantially parallel relation with respect to the path of the articles A and the fingers of the upper guiding mechanism are disposed as closely adjacent thereto as possible, to afford a more accurate guiding and spacing of the several laps of the various cutter bands and to insure a more uniform and even slicing. Additionally, the upper guide fingers serve as a hold down for the articles during slicing. Hence, the fingers 17 of the upper blade guiding mechanism are disposed at acute angles with respect to their associated guiding members 18, while the guide fingers 17 of the lower blade spacing mechanism are disposed at obtuse angles with respect to their associated guide members, as shown in Fig. 1. Other than in the angles at which the blade guide fingers 17 are attached to the corresponding guide members 18, the upper and lower blade guide mechanisms may be substantially alike so that the following description of one is applicable to the construction of the other.

A multiplicity of threaded spreading or expanding elements or bushings 25 are slidably mounted on each of the supporting members 19 and 20 and are secured thereon against rotation by any suitable means, such for example as by making the supporting members square or non-circular in cross section, as shown, and having squared or non-circular apertures through the spreading elements. If desired, the expanders may be conuter-recessed or relieved, as indicated at 26, to reduce the area of contact with the supporting members.

The guide members 18 each comprise end portions 27 and 28 and a body portion 29. The end portion 27 is apertured and threadedly mounted on one of the spreader elements carried on the supporting member 19, and the end portion 28 is apertured and threadedly mounted on one of the spreading elements carried by the supporting member 20. As appears in Fig. 6, the end portion 27 of each of the guide members is offset with respect to its associated end portion 28 so that the connecting body portion 29 extends obliquely between the supporting members 19 and 20. This feature of construction prevents lateral play or twisting of the guide members and fingers carried by the supporting members and thus imparts lateral stability to the individual guides or spacers of the spacing mechanism.

Desirably, the guide members 18 are formed of a suitable strong and rigid material such as metal and may be formed by a casting operation so that the ends and body portion may be integral. Upon rotation of the supporting members 19 and 20 the threaded spreading elements 25 carried thereby may be screwed into or out of the end portions of the guide members so as to retract the spreading elements into the threaded apertures of the guide members or to project shoulders 30 of the spreading elements from the apertures in the guide members. If desired, all of the spreading elements 25 and the bores or apertures in the guide elements which receive the spreading elements may be provided with threads 21 of the same character, that is, either right or left hand threads, so that a material reduction in manufacturing cost can be realized over what would obtain if some right hand and some left hand threads were necessary. In such case the spreading elements will all project from the same relative side of the several guide members, as shown.

One side face of each of the ends 27 and 28 of the guide members is provided with an abutment to engage the shoulder 30 of the spreading element projecting from the next adjacent guide member. Such an abutment may be in the form of an annular washer 31 seated in a suitable recess or countersink formed in the end of the guide member, around the aperture which receives one of the spreading elements. Thus the washers 31 surround the supporting members 19 and 20 and are restrained against lateral shifting by the walls of the sockets or recesses formed in the faces of the guide members. Accordingly, when the supporting members 19 and 20 are rotated so as to project the spreading elements 25 from their sockets or apertures in the guide members 18, the shoulders 30 of the projecting spreading elements bear against the washers 31 of the next adjacent guide members to position the several guide members in uniform spaced relation with respect to one another, as shown in Fig. 6.

Upon rotation of the supporting members 19 and 20, so as to retract the spreading elements 25 into the threaded sockets or apertures in the guide members 18, the latter are permitted to move together in side by side relation, as shown in Fig. 7, thus decreasing the space or distance separating adjacent cutters or blades to a minimum. The threads on all of the spreading ele-

ments 25 are of uniform pitch so that for an equal number of turns or revolutions of the spreading elements in their respective sockets, they project from or are retracted into their respective guide members in equal or like amounts.

When projecting the spreading elements from the guide members the latter are positively forced apart from one another by the engagement of the projecting shoulders 30 of the spreading elements with the abutments or washers 31. In order to insure a contraction or moving together of the guide members when the supporting members are rotated so as to retract the spreading elements within their respective guide members, tension springs 32 are disposed through aligned openings 33 in the body portions 29 of the guide members of the upper and lower blade spacing mechanisms. The springs 32 are normally under tension and have their ends secured by pins 34 in sockets 35 formed on the end guide members.

The guide members 18 of each blade spacing mechanism, located to the left of the median or center line of the machine, as viewed in Fig. 2, are preferably arranged on the supporting members 19 and 20 so that the body portions 29 thereof extend obliquely to the left from the supporting member 20 to the supporting member 19, while the guide members to the right of the center line of the machine, as viewed in Fig. 2, extend obliquely to the right from the supporting member 20 to the supporting member 19. Sleeves 37 are secured by pins 38 on the supporting members 19 between the end portions 27 of the central guide members 18. The sleeves 37 serve to prevent excess endwise or lateral movement of the guide members on the supporting members so as to retain the blade guiding and spacing mechanisms centered between the frame members 22 and 23.

The supporting members 19 and 20 of each of the spacing mechanisms carry collars 39 which bear against the journals in the frame member 23 to prevent movement of the supporting members to the right, as viewed in Fig. 2. Adjacent the frame member 22 the supporting members 19 and 20 have secured thereon spur gears 40 and 41 respectively. Middle gears 42 mesh with the gears 40 and 41 of each of the spacing mechanisms and the teeth on the several gears are arranged so that the supporting members 19 and 20 rotate synchronously to effect equal increments of movement for both ends of the guide members carried thereby.

The middle gear 42 of the upper blade spacing mechanism is secured on a shaft 43 journalled in the frame 22 and having a crank 44 secured on the outside of the frame accessible to the operator of the machine. The gear 42 of the lower spacing mechanism is secured on a shaft 45 journalled in the frame member 22. On the outside of the frame member 22 the shaft 45 carries a gear 46 having a chain 47 trained thereover and a gear 48 secured on the shaft 43 of the upper blade spacing mechanism so that both the upper and lower middle gears 42 are synchronously turned by the crank 44 to effect simultaneous adjustment of the upper and lower blade spacing mechanisms.

The present invention thus provides a blade spacing and guiding mechanism for a slicing machine which permits quick and accurate adjustment of the distance between adjacent cutters and has a positive action between the adjacent guide members so that the forcing apart of the guide members to effect a wider spacing between cutter blades is produced by a positive mechanical movement.

Due to the character of the endless bands 1, which run freely over the drums 2 and 3, the blade spacing mechanisms, both upper and lower, may be simultaneously adjusted while the blade bands 1 are moving. This adjustment can be effected from the outside of the machine by means of the crank 44 so that the danger of injury to the operator is practically eliminated.

Due to the novel construction of the blade guide members and fingers and the manner in which they are mounted on and carried by the supporting members 19 and 20, increased rigidity and lateral stability is imparted thereto.

The principles of the present invention may be utilized in numerous constructions, changes being made in the particular details shown and described as desired, it being understood that various modifications and alterations are contemplated and that the embodiments shown are given for purposes of explanation and illustration.

What I claim is:

1. In a slicing machine, a plurality of spaced cutter blades, means for actuating the blades, a pair of spaced, substantially parallel supporting members disposed transversely with respect to the blades and adjacent thereto, a spreading element slidably mounted on each supporting member, and a guide member extending between the supporting members and carried by the spreading elements, said guide member having a portion to receive and guide one of the blades and a body portion which is oblique to the supporting members.

2. In a slicing machine, a plurality of spaced cutter blades, means for actuating the blades, a plurality of guide members disposed in side by side relation and individually associated with the blades to space and guide the latter, a pair of spaced, substantially parallel supporting members slidably received in end portions of the guide members, said guide members having aligned openings disposed intermediate the supporting members, a tension spring extending through said aligned openings, the ends of the spring being secured to end guide members, and means for spreading the guide members on the supporting members against the tension of said spring.

3. In a slicing machine, a plurality of spaced cutter blades, means for actuating the blades, a pair of spaced, substantially parallel supporting members disposed transversely with respect to the blades and adjacent thereto, a plurality of guide members individually associated with the blades to space and guide the latter, said guide members extending obliquely between the supporting members in side by side relation and slidably mounted thereon, aligned apertures formed in the guide members intermediate the supporting members, a tension spring extending through said aligned apertures, the ends of the spring being secured to end guide members, and means for spreading the guides on the supports under the tension of the spring to vary the spacing between the blades.

4. In a slicing machine, a plurality of spaced cutter blades, means for actuating the blades, a first pair of spaced substantially parallel supporting members disposed transversely with respect to the blades and adjacent thereto, a second pair of spaced substantially parallel supporting members spaced from said first pair of members and similarly disposed with respect to

the blades, a first group of guide members disposed in side by side relation and individually associated with the blades to space and guide the latter, said guide members extending between the first pair of supporting members, a second group of guide members similarly disposed and associated, the second group of guide members extending between the second pair of supporting members, a plurality of spreading elements slidably mounted on each supporting member and restrained against rotation relative thereto, said elements being threadedly received within the guide members and the elements associated with each pair of supporting members being arranged to project from the guide members toward an adjacent guide member upon rotation of said pair of members to separate the guide members, means for resiliently forcing the guide members together, means for synchronously rotating the first pair of supporting members, means for similarly rotating the second pair of supporting members, and means for simultaneously and synchronously rotating both pairs of supporting members.

5. In a slicing machine having a supporting structure and thin flexible blades, a spacer comprising a supporting member of elongated character disposed across and adjacent the blades, a group of guide members slidably mounted on the supporting member in side by side relation, stop means secured on the supporting member adjacent the center thereof and disposed between guide members in the center of the group, and elastic means connected to and extending between the guide members at the ends of the group to crowd the same and the intervening guide members toward the stop means.

6. In a slicing machine, cutter blades, a spacer support disposed adjacent the blades, a group of guides on the support and means associated therewith to engage and space the blades, a stop on the support to engage a guide in the center of the group and prevent such guide from moving along the support, and spring means extending through the group of guides and connected to the endmost guides to crowd the group together.

7. In a slicing machine, cutter blades, a pair of elongated supports disposed adjacent the blades in spaced parallel relation to one another, a stop on one support centrally thereof, guides extending obliquely between the supports and slidable therealong, each guide being associated with one of the blades to guide the same, and means having connection with the endmost guides to crowd the guides together on both sides of the stop.

8. In a slicing machine, cutter blades, a pair of elongated supports disposed adjacent the blades in spaced parallel relation to one another, a stop on one support centrally thereof, guides extending obliquely between the supports and slidable therealong, each guide being associated with one of the blades to guide the same, and means having connection with the endmost guides and extending through the guides intervening between the endmost guides to draw the endmost guides together and thereby crowd the guides together on both sides of the stop.

9. In a slicing machine, cutter blades, a pair of elongated supports disposed in spaced parallel relation adjacent the blades, a stop on one of the supports centrally thereof, a number of guides mounted on the supports on both sides of the stop, each guide extending between the supports and being slidable therealong and being individually associated with one of the blades to guide the same, and resilient means having connection with the endmost guides between the supports and extending through the guides intervening between the endmost guides in substantially parallel relation to the supports to draw the endmost guides together and thereby crowd the guides together on both sides of the stop.

10. In a slicing machine, cutter blades, a pair of elongated supports disposed adjacent the blades in spaced parallel relation to one another, a stop on one support centrally thereof, guides on both sides of the stop extending obliquely between the supports and slidable therealong, the oblique portion of each guide making an acute angle with the longitudinal axis of the support having the stop on the side of the guide toward the stop, each guide being associated with one of the blades to guide the same, and means for crowding the guides together on the supports.

11. In a slicing machine, a plurality of spaced cutter blades, guides disposed in side by side relation and individually associated with the blades to guide and space the latter, a pair of spaced substantially parallel supports slidably received in spaced portions of the guides, said guides having aligned openings disposed intermediate the supports, and means extending through said openings and having connection with the endmost guides, said means being adapted to draw the endmost guides together.

12. In a slicing machine having thin flexible blades, a spacer comprising a pair of spaced substantially parallel elongated rotatable supporting members, a plurality of threaded spreading elements slidably mounted on each member for rotation therewith, a multiplicity of guide members disposed in side by side relation, each guide member having a pair of threaded apertures which receive elements on each of the supporting members and are wholly supported by such elements, an abutment member disposed across one end of each aperture, means for retaining one end of each element in bearing engagement with the abutment member disposed across one of the openings in the next adjacent guide member, and means for rotating the supporting members in unison to simultaneously screw both of the elements associated with each guide member into and out of the apertures thereof, the elements supporting each guide member being arranged to project evenly from the apertures thereof and to thereby spread the guide members along the supporting members by engagement with the abutment members.

13. In a slicing machine, cutter blades, a pair of elongated supports disposed with their axes in spaced parallel relation adjacent the blades, a stop on one of the supports centrally thereof, a number of guides mounted on the supports on both sides of the stop, each guide extending between the supports and being slidable therealong and being individually associated with one of the blades to receive and guide the same, and means having connection with the endmost guides and acting along a line spaced from and between the axes of said supports and approximately parallel to said axes to crowd the guides together against the centrally disposed stop.

14. A spacer comprising a pair of elongated supports disposed with their longitudinal axes in spaced parallel relation to one another, guides extending between the supports and mounted

thereon in generally parallel relation to one another for movement therealong, and elastic means extending between and having connection with the endmost guides, said elastic means acting along a line spaced from between and approximately parallel to said axes to draw the same and the intervening guides together along the supports, said acting line of the elastic means being substantially in the plane of the axes of the supports to avoid binding of the guides on the supports.

15. In a slicing machine having therein a plurality of relatively thin flexible blades, a spacer comprising a rotatable supporting member, a plurality of threaded spreading elements slidingly mounted on the member for rotation therewith, guide members disposed in side by side relation along the supporting member and having threaded apertures to receive the elements, and an abutment member disposed against one end of each of the apertures of the guide members, each of said guide members and the abutment member disposed thereagainst having interfitting engagement with one another whereby the abutment members are wholly supported by the guide members, said abutment members being spaced from and out of contact with the rotatable supporting member, and means for rotating the supporting member to screw the elements into and out of the apertures, each element upon being screwed out of the aperture in a guide member being arranged to bear against the abutment member in the next adjacent guide member and thereby spread the guide members along the supporting member.

16. In a slicing machine having elongated thin flexible cutters mounted in side by side relation with their cutting edges disposed in approximately a common plane and means for actuating the cutters for longitudinal movement, spacing mechanism comprising a pair of elongated members supported in spaced parallel relation to one another and with their longitudinal axes in a common plane spaced from and substantially parallel to the plane of the cutting edges of the cutters, a plurality of relatively thin guides extending between said members and slidingly supported thereby for movement therealong, means extending through the guides and having connection therewith for actuating the guides for movement along the supports, said last named means having a longitudinal axis substantially parallel to and spaced from the axes of the supports and acting along a line in the plane thereof to prevent binding of the guides on the supports, and fingers extending angularly from the guides to individually engage the cutters with a running fit to space and guide the cutters.

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