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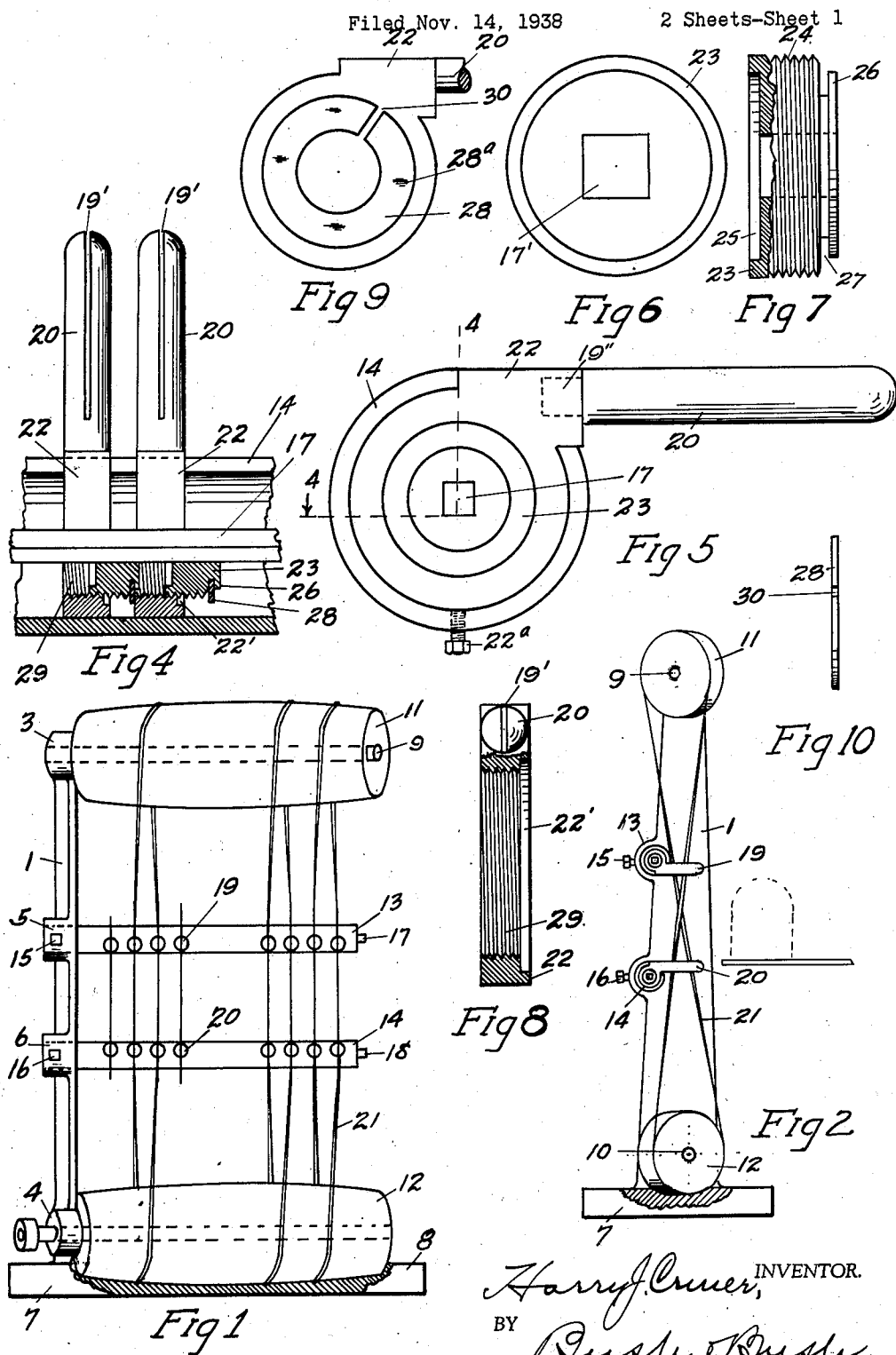
H. J. CRINER

2,160,957

BREAD SLICING MACHINE

Filed Nov. 14, 1938

2 Sheets-Sheet 1



Harry Criner, INVENTOR.
BY *Rush & Rush*, ATTORNEYS.

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2 Sheets-Sheet 2

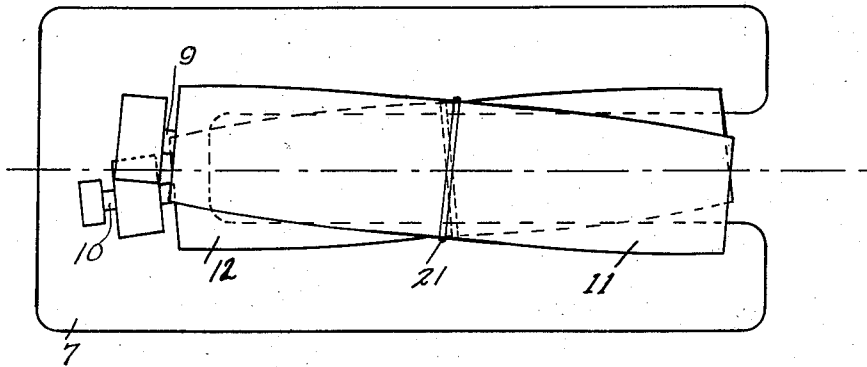


Fig 3

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UNITED STATES PATENT OFFICE

2,160,957

BREAD SLICING MACHINE

Harry J. Criner, Davenport, Iowa, assignor of one-half to A. G. Bush, Davenport, Iowa

Application November 14, 1938, Serial No. 240,237

20 Claims. (Cl. 146—88)

My invention relates primarily to bread slicing machines of the endless band-blade type although it may also be applied to other uses and may in part be applied to reciprocating slicing machines.

5 The objects of my invention are to provide an improved method and apparatus whereby the cutting courses of the blades of a multiple band-blade machine are carried approximately into the required spaced cutting position by the mul-
10 tiple pulleys or drums which carry the blades so that very little pressure will be required upon the blades to twist the blades into parallel position at right angles to the travel of the loaves of bread, and to provide improved twisting and
15 guiding means to cooperate with such pulleys in guiding the cutting courses of the blades during the slicing operation; to provide such apparatus in a form which will permit the spacing devices to be made having a minimum width and the greatest practicable spread in proportion to their
20 width, so that a single series of spacers may be utilized to guide and space at a given height all of the cutting courses of all the usual plurality of band-blades in common use in band-blade slicers;
25 to provide such a machine utilizing spacers of not to exceed three-eighths of an inch and a possible spread between spacers of at least one-quarter of an inch, thus permitting the slicing of bread in slices from three-eighths of an inch in thick-
30 ness up to slices of five-eighths of an inch in thickness and of any intermediate thickness. Other objects will appear in the following description.

I attain these objects by the means illustrated in the accompanying drawings, in which,

35 Figure 1 is a front elevation of my machine referring to the left of Figure 2 as the front, but showing only a part of the band-blades;

40 Figure 2 is a side elevation but with all the blades except one omitted for clearness and showing a fraction of the discharge table with a loaf of bread in dotted lines thereon;

45 Figure 3 is a diagrammatic top or plan view to show the angle of incidence of the multiple pulleys or drums but with the taper of the drums exaggerated and omitting the bosses and tubular arms which carry the spacing mechanism;

50 Figure 4 is an enlarged sectional detail of the lower series of spacers on the line 4—4 of Figure 5;

Figure 5 is an enlarged detail end view of the lower series of spacers;

55 Figure 6 is an enlarged detail end view of one of the sleeves;

Figure 7 is a side elevation of one of the sleeves partly in section to show the seat 25;

Figure 8 is a side elevation of one of the spacing rings partly in section;

Figure 9 is a detail of the washer 28 inserted in the seat 22' of the spacing ring 22;

Figure 10 is an edge view of one of the washers 28.

Similar numerals refer to similar parts throughout the several views.

10 My apparatus in its preferred form comprises a vertical side frame 1 T-shaped in section and having a base 7 with feet 8 extending laterally therefrom. The band-blades 21 are carried by
15 pulleys 11 and 12 upon shafts 9 and 13 mounted in bosses 3 and 4 formed integral with the frame 1.

Intermediate bosses 5 and 6 are united to the frame 1 approximately midway between the pulleys and spaced apart approximately the height of a loaf of the bread which the machine is de-
20 signed to slice.

In these intermediate hubs 5 and 6 tubular arms 13 and 14 are removably mounted and se-
25 cured by set screws 15 and 16 respectively. Slid- ingly mounted in the upper arm 13 is a series of spacing rings 22 having united thereto fingers 19 having their inner ends 19' fitted to the
30 rings 22 by press-fit or other suitable means. The fingers 19 are provided with slots 19' of sufficient depth to embrace and guide the cutting courses of the blades.

The pulleys 11 and 12 are spaced apart and mounted with their horizontal axes in parallel planes, but instead of the axes of these pulleys
35 lying in the same vertical plane, they are so ar- ranged that the center points of both pulleys are in a single line extending at right angles to the aforesaid planes.

In this description I am referring to a ma-
40 chine in which the supporting frame 1 extends vertically directly upward from the base 7 and I refer to the left of the machine as shown in Fig-
45 ure 2, or the feed end of the machine, as the front of the machine and to the right of the machine as shown in said Figure 2, as the dis-
charge or rear end of the machine. For con-
50 venience I also refer to the length of the ma- chine as extending from front to rear and to the width of the machine as extending from left to right in Figure 1.

55 As the multiple pulleys or drums 11 and 12 extend transversely of the machine parallel to the base, it is convenient to refer to them as lying in horizontal planes and to the side frame 1 as extending upward vertically, but it is ob-

vious that my apparatus may be constructed with the center line of the pulleys as above described extending at some other angle to the horizontal and that in such cases the so-called horizontal planes would be inclined to a corresponding angle.

It may accordingly be understood that by horizontal and vertical planes I refer to planes at right angles to each other. Likewise, by the term "transverse axis" of the machine, I refer to an axis extending at right angles to the length of the machine and parallel to the base.

The shafts 9 and 10 are not parallel to the transverse axis of the machine as in the forms of band-blade machines now in common use but are inclined to such axis at an angle of approximately five degrees. The upper pulley 11 has its shaft mounted in the hub 3 at a point a little to the rear of the middle line of the supporting frame 1 and the lower pulley 12 has its shaft revolvably mounted in the hub 4 at a point a short distance in front of the middle of said supporting frame.

The shafts 9 and 10 are so positioned in their respective hubs and so spaced lengthwise of the machine that the vertical planes of their axes would intersect approximately at the above described center line of the pulleys. Therefore the upper pulley is inclined forwardly at an angle of about five degrees and the lower pulley is inclined rearwardly at the same approximate angle.

When so placed it is obvious that the distances between the centers of the upper and lower pulleys at their ends will be somewhat greater than the distance between the centers of said pulleys at the middle thereof and in order to compensate for this variation in distance, I form the pulleys 11 and 12 with a somewhat larger diameter at the middle than at the outer ends and with a gradual, regular slope from the outer ends toward the middle, the pulleys being largest at the middle and smallest at the outer ends.

With pulleys approximately eighteen inches in length, a variation of approximately one-eighth of an inch will be sufficient to allow for the variation in distance separating said pulleys at their outer ends and at the middle, but it is a mere matter of mathematical calculation to determine these variations in distance for machines of various sizes and the variation required in the circumferences or diameters of the pulleys at different points can be readily calculated after the variations in distance above mentioned have been determined.

When the pulleys are sloped as above described, the blades may be adjusted and will travel laterally upon the pulleys just as easily as the blades will travel laterally upon the ordinary parallel pulleys now in use.

The tension of the blades on the pulleys may be adjusted by use of eccentric bushings of the kind heretofore in use and wellknown in the art or any other suitable means for varying the spacing of the pulleys may be utilized to bring them to a proper tension or to release the tension on them when necessary to change the lateral spacing of the blades thereon.

The blades in my apparatus are mounted upon the pulleys in Figure 8 form as shown in Figure 2 so that the natural twist of the blades in taking the Figure 8 form will have a tendency to turn the cutting portions thereof toward a line at right angles to the line of travel of the bread being fed to the machine.

It is an important part of my method and apparatus that the angular mounting of the pulleys with reference to the transverse axis of the

machine will cause the upwardly and downwardly moving portions of the blades to travel in lines which are spaced apart at their crossing point.

With pulleys having their center points spaced sixty inches apart and mounted at an angle of five degrees to the transverse axis of the machine and with pulleys having a diameter of eight or ten inches, the natural line of travel of the band-blade around such pulleys in Figure 8 form will cause oppositely moving portions of a given blade to travel at an approximate distance of three-eighths of an inch from each other at their crossing point. It is therefore manifest that it will take very little lateral pressure of the guides upon said blades to guide them to a distance of three-eighths of an inch apart during their cutting action.

In Figure 8 band-blade machines heretofore in use some difficulty has been experienced because when the blades are given the proper tension for successfully slicing, it has been found that there was considerable friction between the blades and the guides causing undue wear of the guides and also causing a heating of the blades which was very detrimental.

With the form of apparatus shown above, it is possible to greatly reduce the pressure of the guides upon the blades because the natural travel of the blades, instead of bringing them practically in contact at their crossing point as heretofore, will cause them to travel at a predetermined spaced distance.

It is apparent that the angle of the pulleys may be varied so as to vary the lines of travel of the blades and it is a mere matter of mathematical calculation to determine what that angle should be for pulleys of a given size, taper and spacing.

As is wellknown, the thicknesses of slices commonly desired in the United States run from three-eighths to one-half an inch, and I prefer to form my pulleys of such size and taper and to position them at such angles and such spacing as to carry the blades in the natural course of their travel at a distance of approximately seven-sixteenths of an inch apart.

When so arranged no pressure will be necessary upon the blades to maintain their spacing although a slight pressure will be necessary to hold them twisted to right angles to the line of travel of the bread. When so arranged and it is desired to cut either three-eighths or half-inch slices, very little pressure of the guides will be necessary upon the blades to vary their position the sixteenth of an inch necessary to change to either three-eighths or half inch slices.

The fingers are preferably made of a thickness equal to the thickness of the spacing rings 22 or slightly less.

The tubular arms 13 and 14 are provided with longitudinal slots or channels through which a portion of the spacing rings 22 may project and the sides of the slots will act to prevent rotation of the spacing rings 22.

A lower series of similar spacing rings is mounted in the tubular arm 14. The fingers 19 project to the rear from the lower portion of the tubular arm 13 and the fingers 20 project to the rear from the upper portion of the tubular arm 14. The fingers thus located are spaced apart the proper distance to permit the passage of the loaves of bread and to act as guides and supports for the bread.

The hubs 5 and 6 may be rigidly united to the frame in fixed positions or they may be adjustably mounted thereon so as to permit the neces-

sary range of adjustments for different heights of loaves of bread.

The spacing rings 22 are formed with threads 29 upon the interior peripheries thereof. Sleeves 23 are provided with exterior threads 24 complementary to the internal threads 29 of the spacing rings and adapted to thread therein. Each sleeve 23 is provided with a projecting neck which has a circular groove 27 and a circular flange 26 formed thereon of a suitable size to enter a recess 25 in the adjacent side of the next sleeve. The recess 25 is of sufficient depth to permit the flange 26 to enter therein.

A thin washer 28 formed with a split 30 therein to aid in assembling, is mounted upon the neck of each sleeve 23 and secured in the groove 27. Each washer 28 is united to the adjacent face of its corresponding spacing ring by spot-welding 28a or other suitable means and the next adjoining spacing ring is formed with a recess 22' corresponding in size and depth to the size and thickness of the washer 28.

All the sleeves 23 are formed with square or other non-circular openings 17' formed therein and a rod 17-18 corresponding in section to the opening 17' is slidably mounted in each series of sleeves respectively. The openings 17' and the rod 17 are preferably formed square in section and the outer end of the rod 17 projects so that it can be readily rotated by a socket wrench or other suitable tool.

The innermost spacing rings are rigidly united to the tubular arms in which they are mounted by set screws 22a or other suitable means and the remaining spacing rings are free to slide longitudinally of said tubular arms when and as driven by the threads heretofore described.

In the operation of my apparatus the spacing rings and the sleeves are threaded together in series, being brought into close contact successively with their adjacent members.

The rods 17-18 are then inserted in the respective series of spacing rings and sleeves, said sleeves being freely slidable upon the rods, and the entire assemblies are then secured in the tubular arms 13 and 14 by sliding them in and securing the innermost spacing rings by the set screws 22a.

The arms 13 and 14 may then be turned so as to cause the fingers 19 to extend toward the rear horizontally and parallel and the tubular arms then secured in place by the set screws 15 and 16. The blades may then be mounted upon the pulleys with their cutting courses inserted in the proper fingers and the blades then tightened or if desired, the blades may be put on the pulleys before the tubular arms are secured in the frame.

When mounted as above described, the cutting courses of the blades will stand three-eighths of an inch apart and when it is desired to expand the spacing of the blades, the rods 17 and 18 are turned in the proper direction rotating with them the sleeves 23 and the action of the threads of the sleeves causes the spacing rings to travel outwardly from the frame, the spacing rings being held against rotation by the slots in the tubular arms in which they are mounted.

As the threads upon the spacing rings and in the sleeves are all of uniform pitch, the spacing rings will necessarily move laterally away from their preceding spacing rings at a uniform rate and to a uniform distance so that the spacing

of the fingers 19 will be uniformly expanded and the distance between the blades correspondingly increased.

For use in the United States, slicing machines will not need to cut slices thinner than three-eighths of an inch nor ordinarily thicker than five-eighths of an inch so that the spacing permitted by my apparatus is ample to cover the required variations in the bread slicing trade, although it is obvious that all the parts may be proportionately enlarged and the threads correspondingly increased so as to afford wider spacing, without departing from the spirit of my invention.

Likewise my invention may be applied to reciprocating slicing machines by forming the tubular arms 13 and 14 as the upper and lower cross-members of a reciprocating frame and pivoting or otherwise securing the blades to the fingers 19 and 20 by any of the means in common use.

In band-blades heretofore constructed in which blade-spacing mechanisms have been utilized, it has been necessary to use four series of spacers two of which extended to the rear from the front and two of which extended to the front from the rear, because the spacing mechanisms were of such size and proportions that they could not be reduced sufficiently in width without cutting down the support essential to hold the spacing rings in proper position, but in my apparatus with spacing rings and sleeves having a thickness of three-eighths of an inch, the fingers may be set to a gauge of five-eighths of an inch and still leave the spacing rings firmly supported upon the sleeves. The washers 28 will support the sides of the spacing rings to which they are spot-welded and the threaded portion of the sleeves will occupy at least one-eighth of an inch of the internal threads of the spacing rings and that will afford ample support for the spacing rings 22. In addition, the spacing rings 22 are slidable in the tubular arms 13 and 14 with a close enough fit so that the tubular arms themselves substantially assist in holding the spacing rings in proper position and alignment.

It is obvious that various modifications may be made in the details of my apparatus without departing from the spirit of my invention and I do not limit my claims to the precise forms or proportions shown in the drawings.

It is likewise obvious that my invention is applicable to band-blade machines in which a single band-blade is reeved in a plurality of loops in figure 8 form upon a pair of spaced pulleys and my claims referring to a plurality of band-blades mounted upon the pulleys are understood as including a plurality of loops of a single band-blade. Likewise the reference in the claims to spacing means applied to the cutting courses of the band-blades is to be understood as equally applicable to such spacing means applied to the cutting courses of a single band-blade reeved about the pulleys in loops in figure 8 form as shown in my co-pending application Serial No. 188,701.

I claim:

1. In a bread slicing machine, a horizontal base with supporting frame united thereto, a lower shaft revolvably mounted in the frame parallel with the base but at an acute angle to the transverse axis of the machine, an oppositely inclined upper shaft mounted in the frame in a plane parallel to the horizontal plane of the

lower shaft and extending at an acute angle to the transverse axis of the machine, similar revolvable blade-carrying pulleys or drums mounted upon said shafts respectively with the center point of the upper pulley and the center point of the lower pulley approximately in a single straight line parallel to the frame and at a right angle to the parallel planes of the pulleys, a plurality of band-blades mounted upon said pulleys for travel therewith and crossed in figure 8 form.

2. A structure as defined in claim 1, said shafts being mounted at an angle of approximately five degrees to the transverse axis of said machine.

3. A structure as defined in claim 1, in combination with means intermediate the pulleys for guiding the cutting courses of the blades in uniformly spaced parallel relation.

4. A structure as defined in claim 1, said shafts being mounted at an angle of approximately five degrees to the transverse axis of said machine, in combination with means intermediate the pulleys for guiding the cutting courses of the blades in uniformly spaced parallel relation.

5. A structure as defined in claim 1, said pulleys being larger at the middle and slightly tapered from the middle toward both ends.

6. A structure as defined in claim 1, in combination with means intermediate the pulleys for guiding the cutting courses of the blades in uniformly spaced parallel relation, and means for uniformly changing the gauge of such guiding means.

7. A structure as defined in claim 1, in combination with means intermediate the pulleys for guiding the cutting courses of the blades in uniformly spaced parallel relation, and manually operable means for uniformly changing the gauge of such guiding means.

8. A structure as defined in claim 1, means intermediate the pulleys for guiding the cutting courses of all the blades in uniformly spaced parallel relation, said means comprising a spaced pair of tubular arms mounted in the frame, a series of internally threaded spacing rings slidably mounted in each arm, a series of externally threaded sleeves in each arm corresponding in thickness to the spacing rings, said sleeves having non-circular central bores formed therein, the external threads of the sleeves being complementary to and adapted to thread into the internal threads of the spacing rings, the innermost spacing ring of each series being rigidly secured to its tubular arm near the frame, a non-circular rod corresponding in section to the bores of the sleeve slidably mounted in each series of said bores with its outer end projecting beyond the outermost annular members, said rods being free to be manually turned by a wrench or other suitable tool and when so turned, to rotate the sleeves within the spacing rings, each of said sleeves having revolvably mounted thereon at one end a washer, and having its opposite end threaded into an adjacent spacing ring, said washer being rigidly united to the next adjacent spacing ring by spot-welding or other suitable means.

9. A spacing mechanism comprising a support, a tubular arm mounted therein, a series of internally threaded spacing rings slidably mounted in the arm, a series of externally threaded sleeves corresponding in thickness to the spacing rings, said sleeves having non-circular central bores formed therein, the external threads of the

sleeves being complementary to and adapted to thread into the internal threads of the spacing rings, the innermost spacing ring being rigidly secured to the tubular arm near the support, a non-circular rod corresponding in section to the bores of the sleeves slidably mounted in said bores, said rod being free to be turned by a wrench or other suitable tool and when so turned, to rotate the sleeves within the spacing rings each of said sleeves having revolvably mounted thereon at one end a washer, and having its opposite end threaded into a spacing ring, said washer being rigidly united to the next adjacent spacing ring by spot-welding or other suitable means.

10. A structure as described in claim 9, and means to secure the spacing rings against rotation with the sleeves.

11. A spacing mechanism comprising a support, a tubular arm mounted therein, a series of internally threaded spacing rings slidably mounted in the arm, a series of externally threaded sleeves corresponding in thickness to the spacing rings, said sleeves having non-circular central bores formed therein, the external threads of the sleeves being complementary to and adapted to thread into the internal threads of the spacing rings, the innermost spacing ring being rigidly secured to the tubular arm near the support, a non-circular rod corresponding in section to the bores of the sleeves slidably mounted in said bores with its outer end projecting beyond the outermost spacing ring, said rod being free to be manually turned by a wrench or other suitable tool and when so turned, to rotate the sleeves within the spacing rings, each of said sleeves being formed with a flanged neck on one side thereof and a corresponding recess in its opposite side, a thin washer being revolvably mounted on said neck and rigidly united to the adjacent side of the next adjoining spacing ring of the series.

12. A structure as defined in claim 11 with each of said spacing rings being formed with a recess to receive the washer united to the next succeeding spacing ring, such recess corresponding in depth to the thickness of the washer.

13. A bread slicing machine comprising a support, a pair of spaced drums revolvably mounted thereon, a plurality of band-blades mounted upon the pulleys, upper and lower parallel slotted tubular arms mounted on the support, a series of internally threaded spacing rings slidably mounted in each of the arms with shoulders projecting through the slots, corresponding series of externally threaded sleeves corresponding in thickness to and threaded in the spacing rings, said sleeves having rectangular central bores formed therein, the innermost spacing ring being rigidly secured to the tubular arms, rectangular rods corresponding in section to the bores of the sleeves slidably mounted in said bores, said rods being free to be manually turned by a wrench or other suitable tool and when so turned, to rotate the sleeves within the spacing rings, each of said sleeves having one end threaded into an adjacent spacing ring on one side of said washer and having said washer rigidly united to the adjacent spacing ring on its opposite side by spot-welding or other suitable means, parallel fingers severally united to the shoulders and projecting laterally from the slotted arms, and slots in the fingers respectively to receive and guide the slicing blades at the upper and lower ends of their cutting courses.

14. In a bread slicing machine, a horizontal base with supporting frame united thereto, a lower shaft revolvably mounted in the frame parallel with the base but at an acute angle to the transverse axis of the machine, an oppositely inclined upper shaft mounted in the frame in a plane parallel to the horizontal plane of the lower shaft and extending at an acute angle to the transverse axis of the machine, similar revolvable blade-carrying pulleys or drums mounted upon said shafts respectively with the center point of the upper pulley and the center point of the lower pulley approximately in a single straight line parallel to the frame and at a right angle to the parallel planes of the pulleys, and slicing means mounted upon the pulleys having a plurality of cutting courses intermediate the pulleys for slicing the bread.

15. In a bread slicing machine, a horizontal base with supporting frame united thereto, a lower shaft revolvably mounted in the frame parallel with the base but at an acute angle to the transverse axis of the machine, an oppositely inclined upper shaft mounted in the frame in a plane parallel to the horizontal plane of the lower shaft and extending at an acute angle to the transverse axis of the machine, similar revolvable blade-carrying pulleys or drums mounted upon said shafts respectively with the center point of the upper pulley and the center point of the lower pulley approximately in a single straight line parallel to the frame and at a right angle to the parallel planes of the pulleys, a band-blade mounted upon the pulleys having a plurality of crossed cutting courses intermediate the pulleys for slicing the bread, all of said courses having their cutting edges extending toward the front or feed end of the machine.

16. In a slicing machine, a horizontal base with supporting frame united thereto, a lower shaft revolvably mounted in the frame parallel with the base but at an acute angle to the transverse axis of the machine, an oppositely inclined

upper shaft mounted in the frame in a plane parallel to the horizontal plane of the lower shaft and extending at an acute angle to the transverse axis of the machine, similar revolvable blade-carrying pulleys or drums mounted upon said shafts respectively with the center point of the upper pulley and the center point of the lower pulley approximately in a single straight line parallel to the frame and at a right angle to the parallel planes of the pulleys, slicing means comprising a blade mounted upon the pulleys having a plurality of crossed cutting courses intermediate the pulleys, in combination with means for uniformly adjusting the spacing of said cutting courses relative to each other.

17. A bread slicing machine as described in claim 14, in combination with means to support the bread while passing through the cutting courses of the slicing means.

18. A spacing mechanism as described in claim 11, said tubular arm being slotted longitudinally and each spacing ring having a blade support united thereto and projecting outwardly through such slot, in combination with slicing blades united to said supports severally and carried and spaced thereby.

19. A slicing machine as described in claim 14, in combination with uniformly adjustable spacing means arranged in two spaced series to space the cutting courses of the slicing means intermediate the pulleys.

20. A slicing machine as described in claim 14, in combination with uniformly adjustable spacing means arranged in two spaced series to space the cutting courses of the slicing means intermediate the pulleys, said spacing means, while being adjustable to change the spacing thereof, also acting to automatically change the spacing of the slicing means upon the pulleys to correspond to the changed spacing of the spacing means.

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