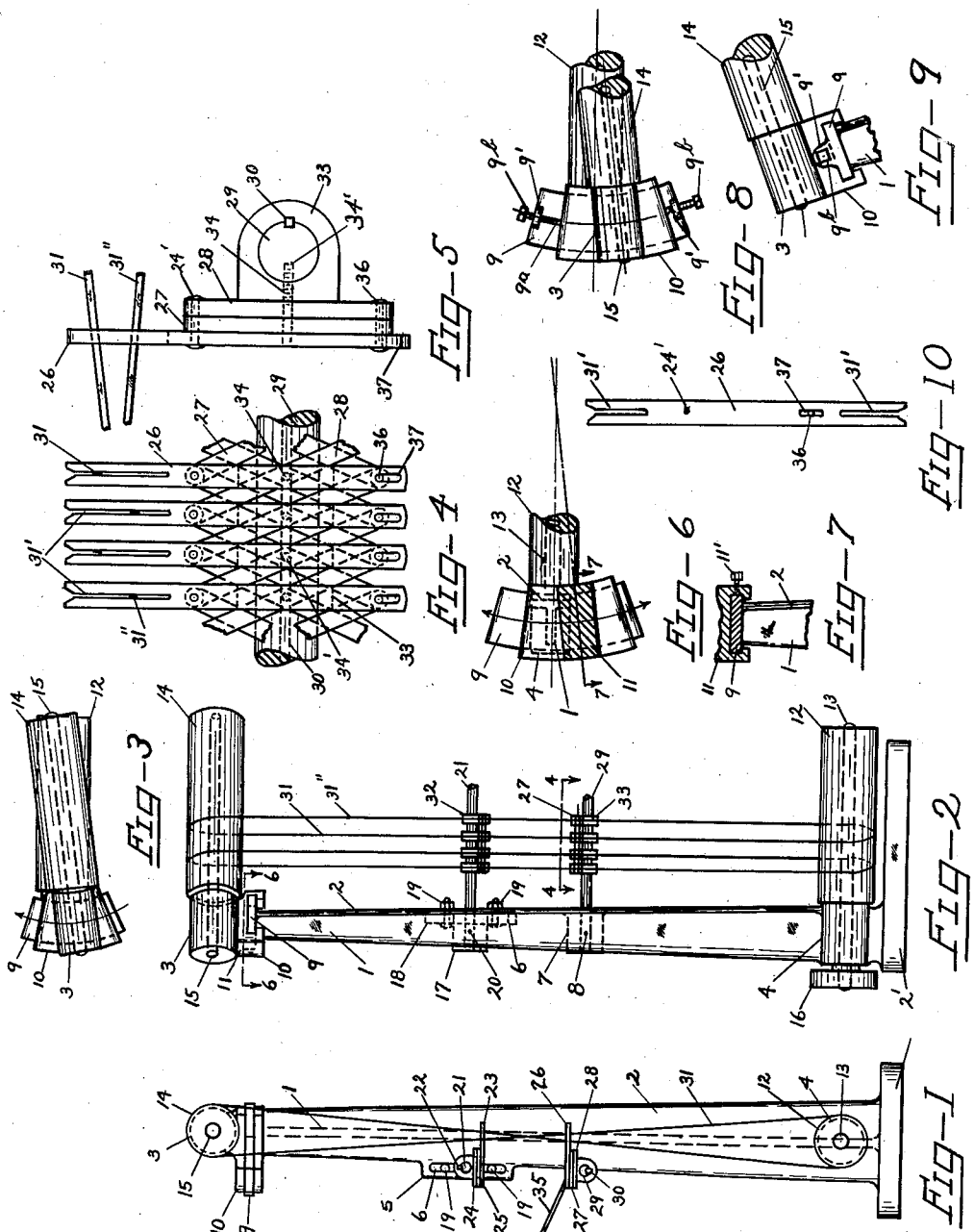
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BREAD SLICING MACHINE

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BREAD SLICING MACHINE

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21 Claims. (Cl. 146—88)

My invention relates to improvements in bread slicing machines of the general type shown in Letters Patent No. 2,160,957 issued to me June 6, 1939.

The objects of my invention are to provide means for varying the angle of one of the blade-carrying drums relative to the other blade-carrying drum to vary the spacing of the cutting courses of the blades; to provide means by which the spacing of the blades may be varied while the machine is in motion; to provide an improved form of spacing and guiding apparatus for the blades; to provide means by which the spacing of the blade guides intermediate the drums may be varied by change in the relative angle of the drums to each other; to provide means by which a change of angle in the drums relative to each other will automatically cause all of the blade guides and spacers to move on their supports to predetermined spaced distances; to provide a guiding, spacing and supporting apparatus which will automatically cooperate with the changing of the relative angle of the blade-carrying drums to each other, to uniformly change the spacing of the blades upon the drums and the spacing of the guide members upon their supports; to provide floating supports for the guide members which act upon all the guide members of a given series to maintain them at all times in predetermined spaced relation laterally at all positions of adjustment; to provide blade spacing and guiding members, the spacing of which may be varied automatically by varying the angle of the drums to each other; to provide a floating mechanical movement for automatically and uniformly changing the spacing of a series of guiding and spacing members. Other objects will appear from the description.

I accomplish these objects by the means shown in the accompanying drawing, in which—

Figure 1 is a side elevation of my machine showing the blade-carrying drums in parallel position;

Figure 2 is a front elevation, but showing only a part of the band-blades and showing the drums inclined at an angle to each other;

Figure 3 is a diagrammatic top view illustrating the position of the drums when mounted at an angle to each other, as shown in Figure 2;

Figure 4 is an enlarged detail plan view of a portion of the lower guide assembly and its supporting and spacing means;

Figure 5 is an enlarged detail side view of the spacing and supporting means;

Figure 6 is an enlarged detail partly in section, on the line 6—6 of Figure 3;

Figure 7 is a sectional detail on the line 7—7 of Figure 6;

Figure 8 is a detail of an alternate form of mounting for the upper drum;

Figure 9 is a detail side view of the part shown in Figure 8;

Figure 10 is a detail of an alternate form of blade-guiding bar having slots in both ends thereof.

Similar numerals refer to similar parts throughout the several views.

My apparatus comprises a wide supporting frame 1 which is preferably formed T-shaped in section, with flanges 2 to aid in providing rigidity, and a broad base 2' is united to the frame. A hub 4 is formed integral with the lower end of the frame and the lower shaft 13 is mounted in the hub 4 carrying upon its outer end a drive pulley 16 adapted to be driven by a belt or other suitable means. Upon the inner end of the shaft 13 is mounted a drum or pulley 12 capable of driving a series of band-blades 31 mounted thereon.

At the top of the frame 1 a flat head 9 is formed integral with the frame upon which a movable block 11 is slidably mounted, the head 9 having flanges which engage complementary flanges 10 united to the block 11.

Upon the upper side of the block 11 a hub or boss 3 is formed in which a shaft 15 is mounted. Upon the shaft 15 a drum 14 is revolvably mounted adapted to carry the upper portion of the band-blades 31 driven by the drum 12.

The drum 14 may be revolvably mounted upon the shaft 15 to revolve directly thereon or it may be provided with ball, roller or other bearings of the types commonly in use.

I prefer to mount a rather large tube in the hub 3 and to mount the shaft 15 which carries the drum 14 inside of the tube upon suitable ball bearings, the shaft 15 being projected outwardly beyond the tube so that the drum 14 may be rigidly secured thereto. The hub 3 and the tube should be formed of sufficient size and length to afford a firm support for the shaft 15 and drum 14 so as to prevent unnecessary vibration or displacement thereof during operation.

The flanges of the head 9 and the flanges 10 of the block 11 are preferably cut upon an arc described from a radius extending from a center point in a straight line projected extending through the middle and center points of the drums 12 and 14, but the length of the radius

on which this arc is described may be varied if desired, to afford means for cutting slices of varying thicknesses from a single loaf, and the relative length of the bars 27 and 28 hereafter described may be varied to correspond to such varying thicknesses.

The block 11 may be adjustably mounted upon the head 9 and secured in place by a set screw 11' or the head may be formed with upwardly projecting lugs 9' having set screws 9b threaded therein to bear against opposite ends of the block 10 for the purpose of adjusting the position thereof relative to the head 9, and it is obvious that such position may be adjusted while the machine is in motion.

Band-blades 31 are mounted upon the drums 12 and 14 preferably having their cutting courses crossed in figure 8 form, as shown in Figure 1, but if desired, the cutting courses may be run in parallel and in such case, the blade guides 26 may be extended and provided with slots at both ends as shown in Figure 10.

Just below the level of the feed chute I mount in the frame a support 29 which may be of any suitable shape or form although I prefer to form it as a round bar or shaft which may be secured against turning by a set screw 8. This bar 29 extends transversely of the machine and carries a series of supporting rings or blocks 33 slidably mounted thereon, equal in number to the cutting courses of all the blades. Each of these rings has united thereto a pivot post 34. Upon each pivot post a pair of crossed arms 27 and 28 are pivotally mounted at their center points. The arms 27 and 28 are pivoted together in series near their ends, similar to double lazy tongs.

The rings 33 are secured against turning on the shaft 29 by a spline 30 secured in the shaft 29, or other suitable means. Pivot bolts 24' unite the adjacent ends of the bars 27 and 28 at one end and pivot bolts 36 unite the opposite ends thereof.

The pivot bolts 24' and 36 extend through the arms 27 and upon such extended ends guide bars 26 are pivotally mounted. The guide bars 26 are provided with slots 37 at one end which permit movement of the pivot bolts 36 therein longitudinally of such slots. The opposite ends of the guide bars 26 are provided with slots 31' which extend outwardly to the ends of such bars and which slots embrace the cutting courses of the band-blades 31 to guide and space them. The middle ring 33 is preferably rigidly united to the shaft or bar 29 by a suitable pivot bolt 34' threaded thereon so as to center the entire guide assembly but to permit free movement of the spacing rings on each side of the center one. It is obvious that any one of the rings 33 may be thus rigidly united to the shaft 29, but I prefer to thus secure only the middle one of said blocks.

When the band-blades are mounted in figure 8 form, the slots 31' are preferably made long enough to extend somewhat farther than the cutting courses of the blades traveling through them and when uncrossed blades are used, both ends of the guide bars 26 are extended and slots 31' are cut in both ends thereof extending as far as necessary.

The lower shaft 29 is preferably mounted at a fixed height, but may be made adjustable by any of the ordinary means in common use.

A corresponding shaft 21 has one end mounted in a suitable hub 17 united to a block 18 adjustably secured to the frame flange 2 by bolts 19 and may be secured against turning by a set screw 20. A slot 6 is formed in the flange 2 which permits the position of the bolts 19 to be adjusted vertically to the height necessary to cause the fingered bar 23 to contact the top of the bread during the slicing operation. The shaft 21 has mounted thereon a guide assembly comprising rings 22, lazy tong arms 24 and 25 and guide bars or fingers 23 corresponding to the lower guide assembly but being mounted in inverted position.

In the construction of my machine I prefer to form the frame 1, the hubs 3 and 4, and the shafts 15 and 13 of sufficient size and proportions to provide ample strength and rigidity without the use of any auxiliary supporting means, but if desired, the shafts 13 and 15 may be extended beyond the drums and an auxiliary supporting frame or bar may be united to the base and fitted with bearings to support the projected ends of the shafts 13 and 15.

In the operation of my machine the drums are first set at the proper angle relative to each other so that the varying angle of the drums will cause the opposite cutting courses of each blade to travel at the desired lateral spacing from each other. When drums ten inches in diameter are used, a very small variation in the angle between the drums of approximately three and one-half degrees will be sufficient to separate the blades so as to cut three-eighths inch slices and a slight increase in the angle to approximately five and one-half degrees will be sufficient to separate the cutting courses laterally to half an inch.

The drums are preferably covered with a coating of rubber or other resilient material which will take up slack and will permit the described variation in the angle of the drums; it being obvious that with drums spaced apart in the usual manner, the variation in the distance between the middle of the drums and the ends of the drums will be so small as to be negligible, and it can be readily taken care of by a resilient coating or facing upon the drums.

When the blades have been placed upon the drums in the desired position, the upper and lower guide assemblies are put in place with the blades running through the respective corresponding slots of the upper and lower guide bars or fingers. The machine is then started in the usual way and the bread fed to the machine on the bread chute 35, and it can be supported by the guide bars or fingers of the lower guide assembly while being cut and retained against upward movement by the upper guide fingers.

When it is desired to change the thickness of the slices of bread being cut, the angle of the upper drum to the lower one is changed by the mechanism described, so as to increase or decrease the angle, and as the blades travel over the drums in their changed position, the blades will necessarily act upon the guide bars or fingers, with the exception of the one fixed bar, and will increase or decrease the spacing of these bars. As the movement of the guide bars or guide fingers is necessarily uniform away from or toward the middle fixed bar, the blades will necessarily be automatically moved along the drums laterally into positions corresponding to the changed positions of the guide fingers.

It is obvious that the blade drums of my machine may be mounted upon a vertical frame as shown so that the center of one drum will be directly above the center of the other drum, and

in such cases parallel planes passing through the axes of the drums would be horizontal and such a plane drawn to extend through the entire length of one drum would pass through the center point or middle of the other drum. However, in practice in many cases it is found advisable to mount the drums in a plane at an angle to the vertical and they may be so mounted with either the upper or lower drum in advance of the other drum. I therefore use the term "horizontal planes passing through the axes of the drums" to indicate not only such planes in a machine with a vertical frame, but also to include machines with an inclined frame, and in such cases the parallel planes, to be more exact, would stand at right angles to the inclined plane of the frame.

I have not attempted to describe any particular form of feed or discharge means, for it is obvious that my apparatus may be provided with any of the feed and discharge means well-known and in common use.

I do not limit my claims to the precise forms shown in the drawing, as various modifications thereof may be made without departing from the spirit of my invention. Neither do I limit my claims to bread slicing machines for the mechanical movement therein contained may be applied to spacing apparatus for looms, wood saws, and various other kinds of machinery.

I claim:

1. In a bread slicing machine, the combination with a base, of an upstanding frame united thereto, a drive shaft revolvably mounted in the frame and extending transversely of the machine, carrying a multiple-blade driving drum rigidly mounted upon the shaft, a corresponding multiple-blade carrying drum revolvably mounted in the frame and spaced from the first mentioned drum, said drums having their axes extending transversely of the machine in parallel spaced planes, a plurality of band-blades mounted in spaced relation on the drums, and means manually operable while the machine is running for varying the position of one of the drums so that its axis may stand at various acute angles to the axis of the other drum with reference to a plane projected through the axis of one drum and parallel thereto and extending through the center point in the axis of the other drum.

2. A bread slicing machine as described in claim 1, and means to guide the cutting courses of the blades actuated by the relative angle of the drums for automatically and uniformly changing the spacing of the blades to correspond to the relative angle of the drums.

3. A bread slicing machine comprising a base having an upwardly extending supporting frame united thereto, a hub or boss formed in the frame near the lower end thereof, a drive shaft revolvably mounted in said hub carrying a drum adapted to drive a plurality of band-blades, a head united to the upper part of the frame, a block adjustably mounted upon said head and having flanges interlocking with the head to secure the block against detachment from the head, a set screw to secure the block in fixed position upon the head, a hub formed integral with the block, a blade-carrying drum corresponding to the first mentioned drum revolably mounted upon the hub, both of said drums extending transversely of the machine in horizontal parallel planes, the head and the flanges of the block being formed upon an arc drawn from a radius projected from a straight line projected through the center points in both drums, and a plurality of spaced band-blades mounted upon the drums.

4. A bread slicing machine comprising a base having an upwardly extending supporting frame united thereto, a hub or boss formed in the frame near the base, a drive shaft revolvably mounted in said hub carrying a drum adapted to drive a plurality of band-blades, a block adjustably mounted upon the upper part of the frame and secured against detachment therefrom, set screws threaded in the frame to bear against opposite ends of the block to secure the block in adjusted position upon the frame, a hub formed integral with the block, a blade-carrying drum corresponding to the first mentioned drum revolvably mounted upon the hum, both of said drums extending transversely of the machine in horizontal parallel planes, the block being formed and movable upon an arc drawn from a radius projected from a given point in the axis of the upper drum, and a plurality of band-blades mounted upon the drums.

5. A bread slicing machine as described in claim 4, and a spacing mechanism comprising a transverse support intermediate the drums having a plurality of blocks equal in number to the cutting courses of the blades slidably mounted thereon, each block having a pair of cross bars pivoted thereto at their crossing point, said bars being pivoted together at their ends in the form of lazy tongs by pivots extending beyond the bars, guide bars pivotally mounted upon the respective pairs of extending pivots and having one end extended and slotted to form guide fingers to embrace the cutting courses of the blades.

6. In a band-blade bread slicing machine, and a spacing mechanism comprising a transverse support intermediate the drums having a plurality of blocks equal in number to the cutting courses of the blades slidably mounted thereon, each block having a pair of crossed bars pivoted thereto at their crossing point, said bars being pivoted together at their ends in the form of lazy tongs by pivots extending beyond the bars, and guide bars pivotally mounted upon the respective pairs of extending pivots and having one end extended and slotted to form guide fingers to embrace the cutting courses of the blades.

7. In a band-blade bread slicing machine, and a spacing mechanism comprising a spaced pair of guiding and spacing assemblies each having a transverse support intermediate the drums having a plurality of blocks equal in number to the cutting courses of the blades slidably mounted thereon, each block having a pair of crossed bars pivoted thereto at their crossing point, said bars being pivoted together at their ends in the form of lazy tongs by pivots extending beyond the bars, and guide bars pivotally mounted upon the respective pairs of extending pivots and having one end extended and slotted to form guide fingers to embrace the cutting courses of the blades.

8. In a band-blade bread slicing machine, a spacing mechanism as described in claim 7, in combination with means for adjusting the height of the upper spacing assembly relative to the lower one.

9. A spacing mechanism as described in claim 6, and means to secure one of said blocks in fixed position upon its support.

10. A mechanical movement for uniformly adjusting the spacing of a plurality of members arranged in a spaced series, comprising a support, a plurality of blocks mounted thereon all but one being slidable longitudinally thereof,

pivot posts united to the blocks respectively, a double series of crossed rackbars mounted upon said pivot posts with their ends pivoted together as in lazy tongs with pivots extending beyond the bars, the middle crossing points of adjacent rackbars being pivoted upon said pivot posts, a series of guide bars pivotally mounted upon the pairs of corresponding pivots in the ends of the rackbars respectively, each of said guide bars having one end extending beyond such pivots and slots formed in the extended ends of the guide bars, the pivot at one end of each guide bar being arranged to travel in a slot formed in and extending longitudinally of the guide bar.

11. A spacing mechanism as set out in claim 10 in combination with a band-blade bread slicing machine having a pair of spaced, angularly adjustable drums carrying a plurality of band-blades, the cutting courses of the blades being embraced and spaced by the slotted guide bars, so arranged that a change in the angular adjustment of the drums will cause the blades and the slotted guides to co-act in uniformly spacing all the cutting courses of all the blades.

12. A bread slicing machine comprising an upwardly extending supporting frame, a pair of spaced blade-carrying drums revolvably mounted in the frame with their longitudinal axes extending in parallel horizontal planes and their middle or center points in the same line at all angles of adjustment, a plurality of spaced band-blades mounted on the drums, and means manually operable while the machine is running for adjusting the relative angular position of the drums to each other in planes at right angles to a plane produced through the entire longitudinal axis of one drum and the middle of the longitudinal axis of the other drum on a straight line produced through the center points of the drums, whereby the blades will space themselves apart at their crossing points at uniform distances proportional to the relative angles of the drums in their varying allowable positions of adjustment.

13. A bread slicing machine comprising an upwardly extending supporting frame, a pair of spaced blade-carrying drums revolvably mounted in the frame with their longitudinal axes extending in parallel horizontal planes and their middle or center points in the same line at all angles of adjustment, a plurality of spaced band-blades mounted on the drums in crossed figure 8 form, and means operable while the machine is running for adjusting the relative angular position of the drums to each other in planes at right angles to a plane produced through the entire longitudinal axis of one drum and the middle of the longitudinal axis of the other drum on a straight line produced through the center points of the drums, whereby the blades will space themselves apart at their crossing points at predeterminable uniform distances proportional to the relative angles of the drums in their varying allowable positions of adjustment.

14. In a bread slicing machine, the combination with a base, of an upstanding frame united thereto, a drive shaft revolvably mounted in the frame and extending transversely of the machine, carrying a multiple-blade driving drum rigidly mounted upon the shaft, a corresponding multiple-blade carrying drum revolvably mounted in the frame and spaced from the first mentioned drum, said drums having their axes extending transversely of the machine in spaced parallel planes, a plurality of band-blades mounted in spaced relation on the drums, and means operable while the machine is running for varying the position of one of the drums so that its axis will stand at any desired acute angle to the axis of the other drum in a plane at right angles to a plane projected through the entire axis of one drum and parallel thereto and extending through the center point in the axis of the other drum, whereby the spacing of the blades in their cutting courses will be automatically and uniformly adjusted to correspond to the increased or decreased angle of the drums to each other.

15. In a bread slicing machine, the combination with a base, of an upstanding frame united thereto, a drive shaft revolvably mounted in the frame and extending transversely of the machine, carrying a multiple-blade driving drum rigidly mounted upon the shaft, a corresponding multiple-blade carrying drum revolvably mounted in the frame and spaced from the first mentioned drum, said drums having their axes extending transversely of the machine in spaced parallel planes, a plurality of band-blades mounted in spaced relation on the drums, means operable while the machine is running for varying the position of one of the drums so that its axis will stand at any desired acute angle to the axis of the other drum in a plane at right angles to a plane projected through the entire axis of one drum and parallel thereto and extending through the center point in the axis of the other drum, and means including a plurality of spaced slotted fingers to guide the cutting courses of the blades actuated by the changing relative angle of the drums for automatically and uniformly changing the spacing of the cutting courses of the blades to correspond to the relative angle of the drums.

16. In a bread slicing machine, the combination with a vertical supporting frame of a pair of spaced blade-carrying drums revolvably mounted thereon in parallel planes with a plurality of spaced band-blades mounted upon said drums, the said drums being arranged at an acute angle to each other and crossing each other at corresponding points in their axes, means carried by the frame by which the angle of the drums to each other may be adjusted while the machine is running, whereby the spacing of the cutting courses of the blades may be simultaneously and uniformly increased or decreased.

17. In a bread slicing machine, the combination with a base of an upstanding frame united thereto, a drive shaft revolvably mounted in the frame and extending transversely of the machine, carrying a multiple-blade driving drum rigidly mounted upon the shaft, a corresponding multiple-blade carrying drum revolvably mounted in the frame and spaced from the first mentioned drum, said drums having their axes extending transversely of the machine in spaced parallel planes, a plurality of band-blades mounted in spaced relation on the drums, means for varying the position of one of the drums so that its axis will stand at an acute angle to the axis of the other drum in a plane at right angles to a plane projected through the entire axis of one drum and parallel thereto and extending through the center point in the axis of the other drum on a straight line produced through the center points of the drums, whereby the blades will space themselves apart at their crossing points at predeterminable uniform distances proportional to the relative angles of the drums in their varying allowable positions of adjustment, and a spacing mechanism comprising a transverse

support intermediate the drums having a plurality of blocks equal in number to the cutting courses of the blades adjustably mounted upon said support, each block having a pair of crossed bars pivoted thereto at their crossing point, said bars being pivoted together at their ends in the form of lazy tongs by pivots extending beyond the bars, guidebars pivotally mounted upon the respective pairs of extending pivots and having one end extended to form guide fingers to embrace cutting courses of the blades.

18. A bread slicing machine comprising a base having an upwardly extending supporting frame united thereto, a drive shaft revolvably mounted in said frame near the lower end thereof carrying a drum adapted to drive a plurality of band-blades, a head united to the upper part of the frame, a block adjustably mounted upon said head and having flanges interlocking with the head to secure the block against detachment from the head, a set screw to secure the block in fixed position upon the head, a hub formed integral with the block, a blade-carrying drum corresponding to the first mentioned drum revolvably mounted upon the hub, both of said drums extending transversely of the machine in parallel planes, the head and the flanges of the block being formed upon an arc drawn from a radius projected from a straight line projected through the center points in both drums, and a plurality of spaced band-plates mounted upon the drums, and a spacing mechanism comprising a transverse support intermediate the drums having a plurality of blocks equal in number to the cutting courses of the blades adjustably mounted thereon, each block having a pair of crossed bars pivoted thereto at their crossing point, said bars being pivoted together at their ends in the form of lazy tongs by pivots extending beyond the bars, guide bars pivotally mounted upon the respective pairs of extending pivots and having one or both ends extended and slotted to form guide fingers to embrace the cutting courses of the blades.

19. In a bread slicing machine, the combination with a base, of an upstanding frame united thereto, a drive shaft revolvably mounted in the frame and extending transversely of the machine, carrying a multiple-blade driving drum rigidly mounted upon the shaft, a corresponding multiple-blade carrying drum revolvably mounted in the frame and spaced from the first mentioned drum, said drums having their axes extending transversely of the machine in spaced parallel planes, a plurality of band-blades mounted in spaced relation on the drums, means for varying the position of one of the drums so that its axis will stand at an acute angle to the axis of the other drum in a plane at right angles to a plane projected through the entire axis of one drum and parallel thereto and extending through the center point in the axis of the other drum on a straight line produced through the center points of the drums, whereby the blades will space themselves apart at their crossing points at predeterminable uniform distances proportional to the relative angles of the drums in their varying allowable positions of adjustment, and a spacing mechanism comprising a transverse support intermediate the drums having a plurality of blocks equal in number to the cutting courses of the blades adjustably mounted upon said support, each block having a pair of crossed bars pivoted thereto at their crossing point, said bars being pivoted together at their ends in the form of lazy tongs by pivots extending beyond the bars, guidebars pivotally mounted upon the respective pairs of extending pivots and having both ends extended to form guide fingers to embrace cutting courses of the blades.

20. In a bread slicing machine, the combination with a base of an upstanding frame united thereto, a drive shaft revolvably mounted in the frame and extending transversely of the machine, carrying a multiple-blade driving drum rigidly mounted upon the shaft, a corresponding multiple-blade carrying drum revolvably mounted in the frame and spaced from the first mentioned drum, said drums having their axes extending transversely of the machine in spaced parallel planes, a plurality of band-blades mounted in spaced relation on the drums crossed in figure 8 form, means for varying the position of one of the drum so that its axis will stand at an acute angle to the axis of the other drum in a plane at right angles to a plane projected through the entire axis of one drum and parallel thereto and extending through the center point in the axis of the other drum on a straight line produced through the center points of the drums, whereby the blades will space themselves apart at their crossing points at predeterminable uniform distances proportional to the relative angles of the drums in their varying allowable positions of adjustment, and a spacing mechanism comprising a transverse support intermediate the drums having a plurality of blocks equal in number to the cutting courses of the blades mounted adjustably upon said support, each block having a pair of crossed bars pivoted thereto at their crossing point, said bars being pivoted together at their ends in the form of lazy tongs by pivots extending beyond the bars, guidebars pivotally mounted upon the respective pairs of extending pivots and having one end extended to form guide fingers to embrace cutting courses of the blades.

21. In a band-blade spacing machine, a spacing mechanism as described in claim 13 in combination with means for adjusting the height of one of the spacing assemblies relative to the other spacing assembly.

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