Feb. 23, 1943. A. A. KOTTMANN ET AL 2,311,762

SLICING MACHINE

Filed March 29, 1941

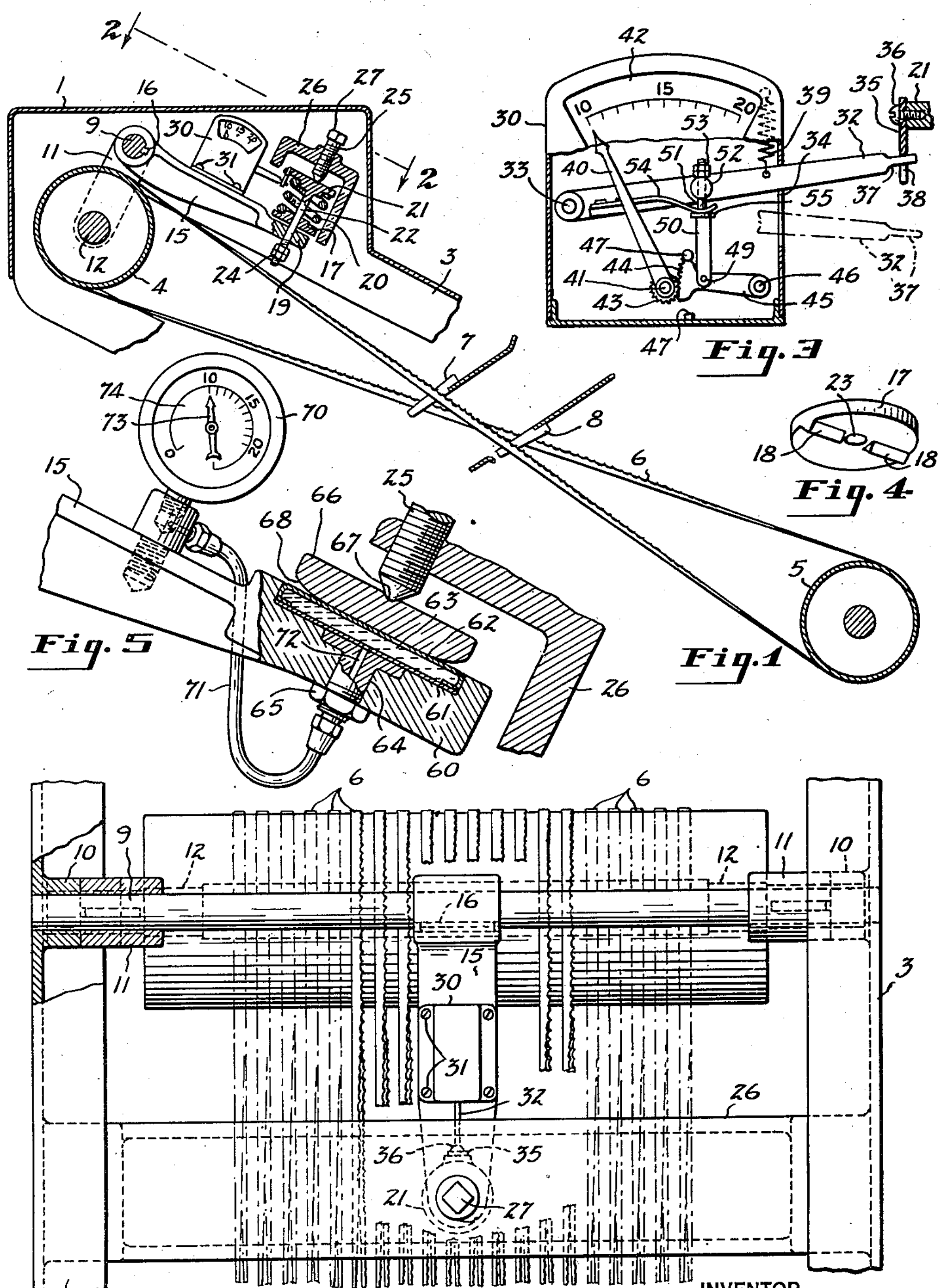

Fig. 1 Fig. 2 Fig. 3 Fig. 4 Fig. 5

INVENTOR
Arthur A. Kottmann
Harvey F. Elliott
BY *Evans & McCoy*
ATTORNEYS

Patented Feb. 23, 1943 **2,311,762**

UNITED STATES PATENT OFFICE

2,311,762

SLICING MACHINE

Arthur A. Kottmann, Davenport, Iowa, and Harvey F. Elliott, Cleveland, Ohio, assignors, by mesne assignments, to The Bettendorf Company, a corporation of Maryland

Application March 29, 1941, Serial No. 385,910

4 Claims. (Cl. 146—88)

This invention relates to multiple bladed slicing or sawing machines, and more particularly to bread slicing machines having a plurality of endless cutter bands supported and actuated by spaced drums.

Bread slicing machines of the endless cutter band type wherein the cutter bands are trained around parallel rotatable drums are customarily provided with means for varying the spacing between the cutters so that the thickness of the slice produced may be changed at will. Such spacing varying means may consist of intricate mechanism for uniformly moving the individual cutter guides toward and away from one another or may include a plurality of interchangeable combs or cutter guide plates, a pair of the latter being shown in the drawing. When a bread loaf of any given size is to be cut into thin slices a greater number of cutter bands are required than when such a loaf is to be cut into relatively thick slices. Therefore, when a machine is provided with means for adjusting the slice thickness and a sufficient number of cutter bands to cut the largest contemplated loaf into the thinnest contemplated slices, it is obvious that when shorter loaves are being sliced or the loaves are being cut into thicker slices, the endmost cutting bands of the machine will be running idle, merely wearing away the guides and consuming power. Accordingly, it is desirable to be able to remove the endless cutter bands except when they are necessary for slicing the large loaves or producing the thinnest slices. However, difficulty arises when changing the number of band blades carried by the supporting and actuating drums because of resultant variations in the tension maintained in the cutter bands. If the drums are spring loaded to provide for the tension in the cutter bands and no change is made in the setting of the springs when the number of bands is increased or decreased, the resultant tension on the cutters is proportionately varied. This result is objectionable because the machine and the cutters are designed to operate more satisfactorily and to have better wearing characteristics when the cutters are operated at a certain or predetermined constant tension. For example, a machine designed for operation with a cutter tension of 100 lbs. in each blade or band may produce unsatisfactory slices if run at a lesser tension, and if the tension is increased materially over 100 lbs. the result may be excessive wear in the blade guides and other parts of the machine or even blade breakage. It is, therefore, the principal object of the present invention to provide improved means for readily adjusting the tension in the cutter bands of a slicing machine so that such tension may be easily maintained at or about a predetermined amount for each cutter band, even though the total number of cutter bands be varied.

Although the invention is particularly useful in slicing machines having adjustable slice thickness control, the invention also has utility in connection with machines having fixed slice thickness when it is desired to vary the number of cutter bands.

Another object of the invention is therefore to provide a blade tension adjustment for band type slicing machines which includes means for indicating the tension in the cutters.

Another object is to provide a slicing machine blade tension adjustment which has a gauge calibrated so that in adjusting the blade tension the gauge reading corresponds numerically to the number of blades in the machine when the desired tension is established in the blades.

A further object of the invention is to provide a blade tension adjusting means which includes a gauge and which is simple in design and construction and relatively inexpensive to manufacture. Other objects and advantages will become apparent from the following detailed description of suitable embodiments of the invention made in connection with the accompanying drawing, in which:

Figure 1 is a fragmentary elevational view, partly in section and with parts removed, showing a slicing machine embodying the invention;

Fig. 2 is a view, partly in section and with parts broken away or removed, taken substantially on the line 2—2 of Fig. 1 and enlarged with respect thereto;

Fig. 3 is a detail view, partly in section and with parts removed, showing a suitable mechanism for the gauge for indicating the tension in the cutters;

Fig. 4 is a perspective detail showing the fulcrum or knife edge on the bottom of the spring retainer used in the blade tension adjustment device of Fig. 1; and

Fig. 5 is a fragmentary detail, partly in section and with parts broken away, illustrating a modification of the invention employing a liquid or fluid type of gauge.

Referring now to the drawing by numerals of reference which indicate like parts throughout the several views, the type of slicing machine in which the invention has been embodied includes a supporting structure or housing 1 having spaced approximately parallel side frame members 2 and 3. Mounted on the supporting structure for rotational movement about spaced substantially parallel axes are cylindrical drums 4 and 5 which receive a plurality of endless cutter bands 6 trained about the drums in side by side relation. The shaft or mounting means for the drum 5 is rigid in the frame or housing, while the shaft or mounting means for the drum 4 is floating or movable toward and away from the drum 5, as will later appear. If desired, the cutter bands may be twisted into a figure eight form (as shown in Fig. 1). Between the drums 4 and 5 are removable blade guide structures 7 and 8 which receive the individual runs of the cutter bands 6 and twist the latter into spaced approximately parallel cutting planes. These guide structures are interchangeable with other similar guide structures (not shown) having different spacings between the slots which receive the cutter runs. Bread loaves or other articles to be sliced are advanced by means not shown to and through the cutters 6 between the guide structures 7 and 8. Drive means (not shown) is connected to the fixed drum 5 to rotate the latter and thereby actuate the cutter bands 6.

The support or mounting means for the drum 4 includes a cross member or shaft 9 pivotally mounted to turn in journals 10 carried by the frame members 2 and 3. Arms 11 are secured on the pivoted member 9 in spaced parallel relation to one another and at the ends of the drum 4 have connection with a shaft 12. The drum 4 may be rigidly mounted on the shaft and the latter journaled in the ends of the arms 11, or as shown, the shaft 12 may have a rigid connection with the ends of the arms 11 and the drum 4 mounted rotatably on the shaft 12.

Mounted on the pivoted member or shaft 9 is an extension arm or lever 15 which is secured against rotation on the shaft as by a key 16. This lever arm may be disposed in various positions along the shaft, preferably at about the center thereof and at approximately 90° to the arms 11, as shown in Fig. 1.

A spring retainer 17 having on the underside thereof projections that provide fulcrum knife edges 18 is seated on the end of the lever arm 15 with the knife edges 18 paralleling the pivotal axis of the transverse support member 9 and engaging a notch or groove formed in a flat end portion 19 of the arm 15. A relatively stiff helical compression spring 20 is disposed with one end thereof seated against the retainer 17 and the other end thereof engaged by a cap 21 formed with a stem 22 that extends axially through the spring and through a central hole 23 in the retainer 17 and a similar hole in the flattened end portion 19 of the retainer 17. The stem 22 has a sliding fit in the holes 23 formed in the retainer 17 and the flat lever end 19 to be guided therein. Below the lever arm 15 the stem receives locking nuts 24 which hold the spring assembly together.

The cap 21 may be forced against the upper end of the spring 20 by means of an adjusting screw 25 threaded through a cross member or beam 26 that extends between and is supported by the side frame members 2 and 3. The screw 25 may be provided with a hand wheel or crank (not shown) or may be formed with a square head 27 to receive a wrench for turning the same. Preferably the end of the screw that engages the cap 21 is formed with a blunt or tapered point which seats in a suitable socket formed in the cap. By rotating the screw to compress the spring 20, the force of the spring acting on the lever arm 15 through the knife edges 18 of the retainer 16 tends to pivot or turn the member 9 and the drum supporting arms 11 in a clockwise direction as viewed in Fig. 1. This movement of the arms 11 shifts the shaft 12 and drum 4 away from the drum 5, the latter being mounted rigidly between the side frames 2 and 3 by well known means. This shifting of one of the blade supporting drums away from the other increases the tension in the cutters 6. Conversely, rotation of the screw 25 to decrease the force in the spring 20 allows the tension in the cutters 6 to draw the drums 4 and 5 together, thereby pivoting the drum supporting arms 11 and the member 9 in a counterclockwise direction as viewed in Fig. 1.

A gauge 30 is mounted on the lever arm 15, as by screws 31, to indicate the force exerted on the spring 20. The specific construction of this gauge may be varied as desired, it being the purpose of the gauge by measuring the deflection of the spring 20 to indicate the total force or tension exerted on all of the cutter bands 6 by the blade adjusting means. The gauge illustrated includes a lever 32 pivoted in the casing of the gauge at 33 and extending through an opening 34 in the casing to an element or link 35 secured by screw 36 to the spring cap 21. The arm 32 is formed with a slender or reduced end 37 which is received in an open ended slot 38 formed in the element 35. A helical tension spring 39 having connection with the arm 32 draws the latter upwardly to hold the end 37 against the element 35 at the upper end of the slot 38. Thus the arm 32 follows the movement of the spring cap toward and away from the end 19 of the lever 15 as the spring 20 is compressed or allowed to expand upon adjustment of the screw 25.

Movement of the arm 32 is transmitted to an indicator or pointer 40 pivoted at 41 in the gauge housing and movable across a visible scale or dial 42 also carried by the gauge casing. A gear 43 secured to the pointer 40 at the pivot for the latter is engaged by an arcuate rack 44 on the end of an arm 45 pivoted in the gauge casing at 46. The arm 45 is normally drawn upwardly by a link 50 pinned at 49 to the arm 45 and attached to the arm 32 between the pivot 33 and the reduced end 37. Thus the pointer 40 is normally shifted by the arm 45 toward the left hand end of the scale or dial 42. The link 50 has a pivotal connection with the arm 32 and, in order that the gauge will not be injured upon movement of the arm 32 downwardly beyond its normal limit of movement, the upper end of the link 50 is formed with a reduced diameter threaded portion 51 which has a sliding fit in an element 52 pivoted on the arm 32. Lock nuts 53 on the reduced threaded portion 51 are held against the pivot element 52 by a relatively stiff leaf spring 54 which is carried by the arm 32 and has a bifurcated end that straddles the reduced portion 51 of the link and rests against a bearing element 55 carried by the link.

The gauge described above is so constructed and so connected to the relatively heavy spring 20 that excessive movement of the blade tension adjusting mechanism beyond that for which it is designed or intended does not injure the gauge. For example, if the spring 20 should be expanded so that the cap 21 moves upwardly beyond the position shown in Fig. 3, the reduced end 37 of the arm 32 is released through the open end of the slot 38. If the spring 20 should be excessively compressed so that the arm 32 is moved downwardly beyond its normal lower limit of movement indicated by the broken lines of Fig. 3, the leaf spring 54 is deflected as the arm 45 engages the stop 47 and the pivot element 52 slides downwardly on the reduced threaded portion 51 of the link.

The scale or dial 42 is inscribed or calibrated to read or indicate directly the number of blades for which the tension device is in adjustment. For example, assuming that 100 lbs. tension is to be maintained in each cutter band and ten cutter bands of equal length are to be employed, the total force exerted on the drum 4 is 2,000 lbs. since each blade exerts a force of 200 lbs. Therefore, in graduating the dial 42 the machine is assembled with ten blades of equal length and the screw 25 is rotated to compress the spring 20 until the cutter bands each have the desired 100 lb. tension, as determined by well known methods and devices. The position of the pointer 40 on the scale 42 when the blades are so tensioned is marked or inscribed "10" as shown in Figs. 1 and 3. Additional blades or cutter bands equal in length to one another and to the first ten are then threaded or placed about the drums 4 and 5. For example, if the maximum number of cutter bands to be used in the machine is twenty, ten additional bands may be assembled on the drums. In Fig. 2 the first ten bands placed on the machine for determining the "10 setting" of the pointer 40 are indicated in full lines, while the additional ten blades to be added are indicated by the broken lines. The adjusting screw 20 is now rotated to increase the force on the spring 20 until each of the twenty cutter bands has the desired 100 lb. tension, as determined by well known methods and means. The compression of the spring 20 required to provide the desired tension in the increased number of cutter bands depresses the lever 32 and moves the pointer 40 across the face of the dial or scale 42. The new position of the pointer 40 is inscribed "20", the number of the cutter bands now on the machine. The path of the pointer 40 between the inscriptions "10" and "20" is then divided into ten equal parts which represent respectively the movement of the pointer 40 resulting from the compression of the spring 20 required to apply sufficient force to the drum 4 to provide the 200 lbs. force opposing the 100 lb. tension of each cutter.

When thus adjusted and with the gauge thus graduated the number of cutter bands or blades in the machine may be varied by the operator between ten bands and twenty bands and the drums readily adjusted to provide the desired predetermined tension in the cutters. The operator merely turns the screw 25 in the proper direction to move the pointer 40 to the position on the dial or scale 42 that corresponds to the number of bands carried by the drums 4 and 5. Therefore, the use of delicate or expensive devices for measuring the tension in the cutter bands each time the number of cutters is altered is eliminated and yet the proper tension may be maintained in the cutter bands at all times and regardless of the number of bands on the machine, within the prescribed limits of the manufacturer.

The invention is particularly advantageous because of the fact that the cutter bands are not held to exactly the same length by various manufacturers. Since the cutter bands are run under considerable tension, there is a stretching effect which is particularly noticeable after the bands have been resharpened by grinding so that the cross section of the band has been reduced. Accordingly, when an old set of cutter bands is replaced with a new set, or when one set is replaced with a set of different manufacture, the actual spacing of the drums 4 and 5 in all probability must be varied in order to place the new set of bands under the proper tension. In the present invention the spacing of the drums 4 and 5 may be varied by movement of the lever arm 15. Even though lever arm 15 is in a new position, the force exerted by the spring 20 will provide the proper tension in the new set of bands when the pointer 40 makes the proper indication on the scale or dial 42.

In Fig. 5 is illustrated a modification of the invention wherein substantially positive actuation of the lever or arm 15 is provided to replace the yieldable or resilient actuation of the arm provided by the spring 20 previously described. A relatively broad flattened end 60, corresponding to the end 19 previously described, is formed on the lever 15 and has a circular depression or recess 61 that receives a flattened receptacle or bulb 62 containing a fluid or liquid 63. The receptacle 62 may be formed of two pieces of relatively thin sheet metal, such as brass or copper marginally joined together. On its underside the receptacle is welded or soldered to a tubular flanged element 64 that extends through the bottom of the lever end 60, being held in place by a nut 65. A circular pressure member 66 is seated against the upper or outer flexible wall of the receptacle 62 and is formed with a socket 67 in the center of its upper surface which received the tapered end of the adjusting screw 25. Preferably the marginal edge of the pressure member 66 is rounded as indicated at 68 to avoid cutting the relatively thin metal of the receptacle 62. The pressure within the body of fluid 63 varies in accordance with the total force exerted on the drum 4. A gauge 70 for measuring fluid or liquid pressure and of conventional construction is mounted on the machine, for example on the arm 15, and is connected by a tubular conduit 71 to the element 64. A passage 72 in the tubular element places the gauge in communication with the body of fluid 63 in the receptacle 62.

The gauge 70 has a pointer 73 which is moved across a dial or a scale 74 as the pressure in the body of fluid 63 is varied. The calibration or graduation of the scale 74 is similar to that described above in connection with the embodiment of the invention illustrated in Figs. 1 through 4. First the minimum number of cutter bands for which the machine is designed are placed about the drums and the adjusting screw 25 is rotated until the proper or desired tension is established in the cutters. The position of the pointer 73 on the scale 74 is then inscribed with a number corresponding to the number of cutters. The maximum number of cutters for which the machine is designed are then placed about the drums 4 and 5 and tensioned to the proper or desired tension by adjustment of the screw 25. The new or altered position of the pointer 73 on the scale 74 is then inscribed with the larger number of cutters trained about the drums 4 and 5. The portion of the scale intervening between the points thus marked or inscribed for the minimum and maximum numbers of cutter bands is then divided and inscribed to represent the different numbers of cutter bands that may be used in the machine.

The principles of the present invention may be utilized in various ways, numerous modifications and alterations being contemplated, substitution of parts and changes in construction being resorted to as desired, it being understood that the embodiments shown in the drawing and described above are given merely for purposes of explanation and illustration without intending to limit the scope of the claims to the specific details disclosed.

What we claim is:

1. In a slicing machine having a supporting structure, a pair of spaced cylindrical drums, and a plurality of endless substantially equal length cutter bands trained around the drums under tension and in side by side relation, said bands being individually removable from the machine to alter the number of bands in use, means for mounting the drums on the structure and including members having connection with spaced points of the structure and engaging one of the drums at opposite ends of the latter, said member being interconnected for movement in unison and actuable to shift said one drum toward and away from the other drum while maintaining the rotational axes of the drums parallel thereby varying the tension in all of the cutter bands uniformly and simultaneously, means having connection with said members and operable to apply a variable force thereto for so actuating the members, and gauge means associated with said last named connectioned for indicating the magnitude of the applied force, said gauge means being so graduated and arranged that for a predetermined tension in each of the cutter bands the gauge means directly reads the number of cutter bands trained around the drums.

2. In a slicing machine having a supporting structure, a pair of spaced cylindrical drums, and a plurality of endless substantially equal length cutter bands trained around the drums under tension and in side by side relation, said bands being individually removable from the machine to alter the number of bands in use, means for mounting the drums on the structure and including spaced members pivotally mounted on the structure and engaging opposite ends of one of the drums, said members being interconnected for pivotal movement in unison and actuable to shift said one drum toward and away from the other drum while maintaining the rotational axes of the drums parallel thereby varying the tension in all of the cutter bands uniformly and simultaneously, means having connection with said members and operable to apply a variable force thereto for so actuating the members, and gauge means associated with said last named connection for indicating the magnitude of the applied force, said gauge means being so graduated and arranged that for a predetermined tension in each of the cutter bands the gauge means directly reads the number of cutter bands trained around the drums.

3. In a slicing machine having a supporting structure, a pair of spaced cylindrical drums, and a plurality of endless substantially equal length cutter bands trained around the drums under tension and in side by side relation, said bands being individually removable from the machine to alter the number of bands in use, means for mounting the drums on the structure and including a cross member pivoted on the structure and having spaced arm members rigidly secured thereto for movement in unison and extending laterally therefrom in generally parallel relation, said arm members having engagement with opposite ends of one of the drums for supporting the latter whereby actuation of the cross member and the arm members shifts said one drum toward and away from the other drum while maintaining the rotational axes of the drums parallel thereby varying the tension in all of the cutter bands uniformly and simultaneously, means having connection with said members and operable to apply a variable force thereto for so actuating the members, and gauge means associated with said last named connection for indicating the magnitude of the applied force, said gauge means being so graduated and arranged that for a predetermined tension in each of the cutter bands the gauge means directly reads the number of cutter bands trained around the drums.

4. In a slicing machine having a supporting structure, a plurality of cutter bands and means mounting the cutter bands under tension in side by side generally parallel relation, said bands being individually removable from the machine to change the number of bands in use, said mounting means including a member extending across and engaging all of the bands, means supporting said member on the structure, means to actuate said member for variable movement uniformly and simultaneously against all of the bands to vary the tension in the latter, said supporting means for the member including means operative to apply a variable force thereto for so actuating the member, and gauge means associated with said operative means to register the magnitude of the applied force, said gauge means being so graduated and arranged that for a predetermined tension in each of the cutter bands the gauge means directly reads the number of cutter bands in use.

ARTHUR A. KOTTMANN.
HARVEY F. ELLIOTT.