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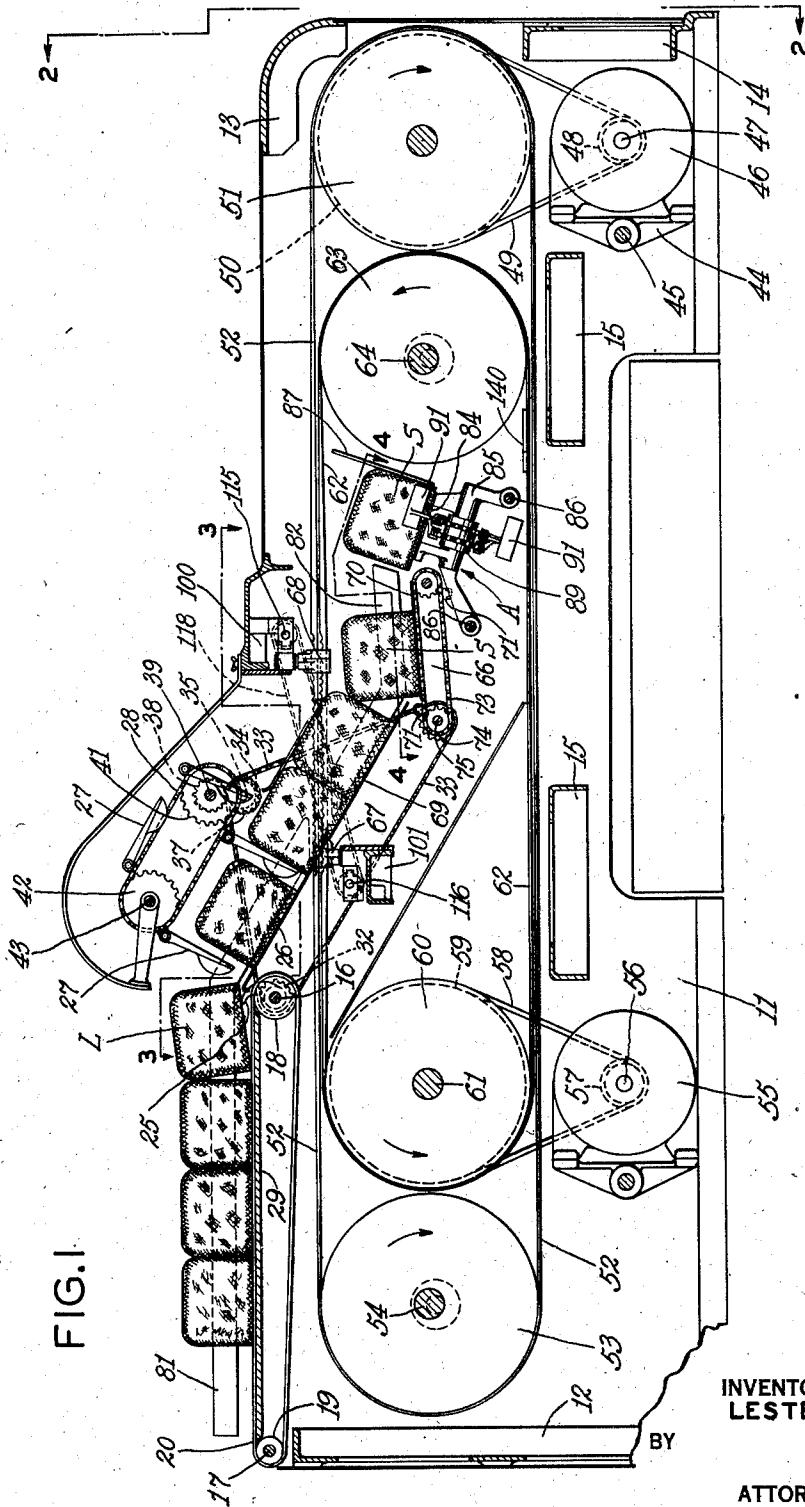
L. FERENCI .

2,293,053

SLICING MACHINE

Filed July 10, 1940

3 Sheets-Sheet 1



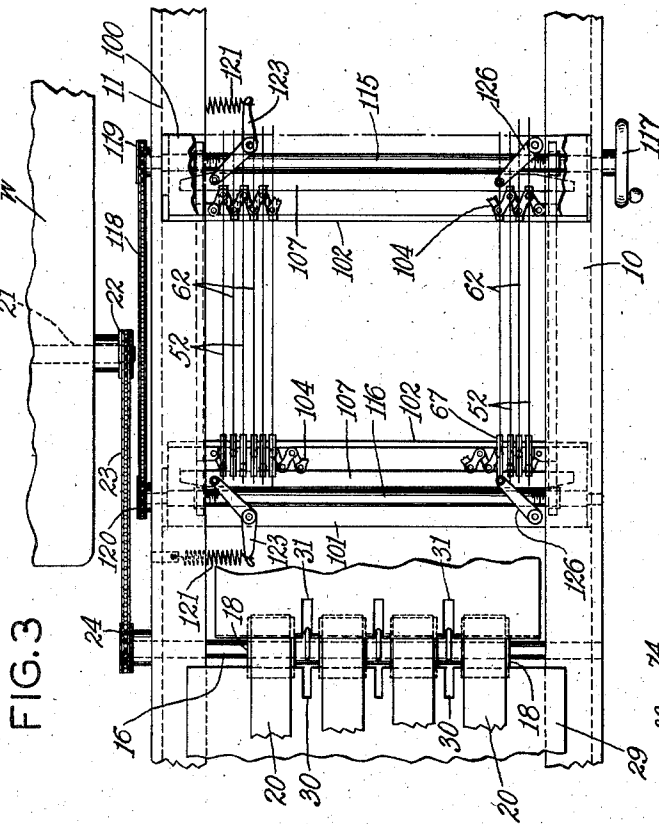
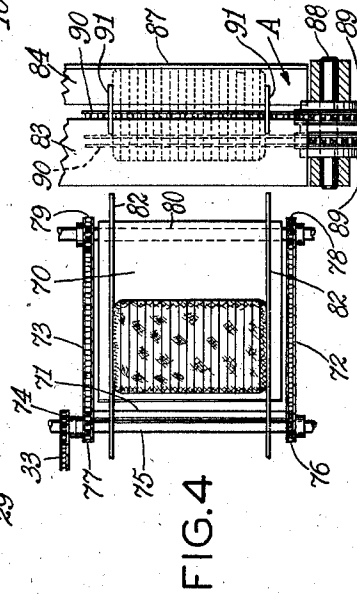
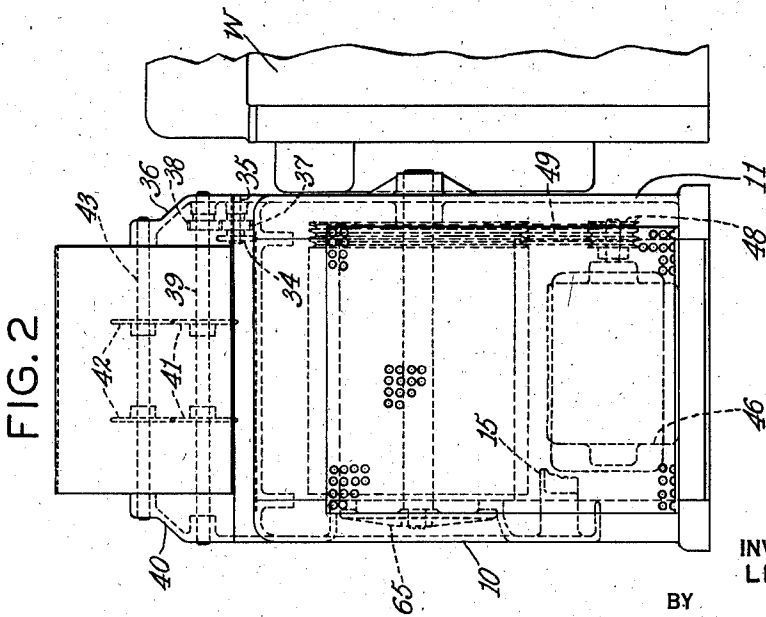
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3 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

2,293,053

SLICING MACHINE

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15 Claims. (Cl. 146—88)

This invention relates to band saw slicing machines, more particularly to bread slicing machines of the type having two series of band saws mounted on two separate sets of drums.

An object of the invention is to provide a slicing machine which is suitable for use in conjunction with a bread wrapping machine. To this end there is provided a pusher type conveyor and a delivery conveyor driven from the wrapping machine in timed relation for pushing the loaves through the band saws and advancing them into the infeed conveyor of the wrapping machine.

A further object of the invention is to provide a construction wherein alternate slicing runs of the band saws are driven in opposite directions, to prevent collapsing of the loaves during the slicing operation. To this end two series of bands are mounted upon separate sets of drums with the bands of one series disposed within and between the bands of the other series and driven in opposite directions. A single run intermediate the drums of each series is twisted so that their cutting edges are in position to slice the oncoming loaves and the sliced loaves are delivered to the infeed conveyor of the wrapping machine which is arranged between the slicing and ineffective runs of the band saws.

Another object of the invention is to drive the driving drums of each series in directions such that the slicing runs will be pulled taut by the driving drums. Thus irregularities in the slices due to slicing with slack slicing runs interspersed with taut slicing runs, as heretofore, will be avoided.

Still another object of the invention is to provide mechanism for adjusting the spacing of the slicing runs for the production of various slice thicknesses. To this end there may be used link chain sections on whose pintles are mounted the band saw guides which are relatively moved to establish various uniform spacings of the slicing runs by expanding and contracting the chain sections. The ends of the chain sections are attached to oppositely movable members for effecting the desired expansion or contraction, and the links are normally contracted by members extending along the chain sections.

With these and other objects not specifically mentioned in view, the invention consists in certain constructions and combinations hereinafter fully described and then specifically set forth in the appended claims.

In the accompanying drawings which form a part of this specification, and in which like char-

acters of reference indicate the same or like parts:

Fig. 1 is a sectional side elevation of the slicing machine arranged to deliver sliced loaves to the in-feed runway of a wrapping machine;

Fig. 2 is an end view of the machine taken from line 2—2 of Fig. 1;

Fig. 3 is a plan view of a portion of the machine taken from line 3—3 of Fig. 1;

Fig. 4 is a detail plan view, taken from line 4—4 of Fig. 1, showing the relation of the slicing machine delivery conveyor and the in-feed runway of a wrapping machine;

Fig. 5 is a view on an enlarged scale of the adjusting means for the band saw guides when used in conjunction with vertically disposed band saws;

Fig. 6 is an enlarged sectional end view of a portion of Fig. 5 taken from line 6—6 of the same;

Fig. 7 is an enlarged detail view taken from line 7—7 of Fig. 5, showing the mounting of the band saw guide members;

Fig. 8 is a detail view of the adjusting means showing the link chain in a contracted position whereby the band saw courses are uniformly spaced to produce thin slices; and

Fig. 9 is a detail view of the adjusting means showing the link chain in an expanded position whereby the band saw courses are uniformly spaced to produce thicker slices.

Referring to the drawings, the improved slicing machine consists of side frames 10 and 11 which are held together by tie members 12, 13 and 14 and U-shaped tie supports 15. The frames 10 and 11 support cross shafts 16 and 17 which are provided with pulleys 18 and 19, respectively, the narrow pulleys 18, Fig. 3, being spaced on drive shafts 16 and drive a series of belts 20 running over the idler pulley 19.

The shaft 16 of the slicing machine derives motion from a driven shaft 21 of the wrapping machine W, Fig. 3, said shaft 21 being provided with a sprocket 22 driving a chain 23 running over a sprocket 24 mounted on shaft 16. A number of spaced trip fingers 25 are also mounted on shaft 16, and tend to separate the leading loaf L being advanced by conveyor belts 20 from the succeeding loaves. The fingers 25 encounter the bottom of the loaf and lift it so as to enter upon an inclined support plate 26, and thus be in the path of pusher arms 27 carried by endless conveyor chains 28 which advance the loaf to the slicing zone. A support plate 29, which underlies the upper loop of the conveyor belts 20, is pro-

vided with notches 30, and the plate 26 also has notches at 31 to permit passage of the fingers 25.

A sprocket 32 mounted on shaft 16 drives a chain 33 which runs over a sprocket 34 mounted on a stud 35 carried by a pedestal 36, the chain 33 also driving a sprocket to be presently described, which imparts motion to a discharge conveyor. The stud 35 also supports a gear 37 which is in mesh with a gear 38 mounted on a cross shaft 39 supported by pedestals 36 and 40. Sprockets 41 mounted on shaft 39 drive the chains 28 over idler sprockets 42 which are mounted on a shaft 43 also supported from pedestals 36 and 40.

A motor bracket 44, which is secured to a cross rod 45 carried by the side frames 10 and 11, Fig. 1, supports a motor 46. The motor shaft 47 is equipped with a pulley 48 driving V-belts 49 running in grooves 50 of a drum 51 which drives the endless band saws 52 in a clockwise direction. The bands 52 run over an idler drum 53 which revolves on a shaft 54 having eccentric trunnions supported in frames 10 and 11. Thus by turning the shaft in its bearings the blades may be tensioned for proper cutting action, or slackened when removing or mounting the same on the drums 51 and 53.

The inner series of band saws is driven from a motor 55 supported in the same manner as motor 46 previously described. The shaft 56 of motor 55 is equipped with a pulley 57 driving V-belts 58 running in grooves 59 of a drum 60 mounted on a shaft 61 supported by the side frames. The drum 60 drives the band saws 62 which run over an idler drum 63 in a counter-clockwise direction. The drum 63 revolves on a shaft 64 having eccentric trunnions supported in frames 10 and 11. By turning the shaft in its bearings provision is made for proper tensioning of the blades and also to permit the blades to be easily removed from or mounted on the drums 60 and 63.

To enable the mounting of the band saws about their respective drums, the frame 10 is equipped with detachable bearings 65, Fig. 2, which support one end of the band saw drum shafts. The upper runs of the band saw blades are used for slicing and they are twisted so that their cutting edges face the loaves, which are pushed through them on to a delivery conveyor 66, Figs. 1 and 4, which transports them to an in-feed conveyor A of the wrapping machine. The slicing regions of the blades 52 and 62 are held in a vertical position by a set of relatively adjustable guides 67 engaging both the inner and outer series of band saws and a second set of guide members 68 also engaging the inner and outer series of band saws. Both sets of members 67 and 68 may be mounted on a link chain section for relative adjustment to produce various spacings of the band saws for different slice thicknesses, in a manner to be presently described. The guides 67, Fig. 1, are provided with inclined faces which form a continuation of the support plate 26 and also bridge the gap between plate 26 and table 69 and support the advancing loaf.

The loaf having passed through the slicing runs is propelled on to a table 70 of conveyor 66 where it rests momentarily until engaged by one of the spaced pusher bars 71 whose ends are secured to endless chains 72 and 73 of the conveyor. The chain 33, previously mentioned, runs over a sprocket 74, Figs. 1 and 4, mounted on a shaft 75, whereby motion is imparted to the sprockets 76 and 77 which drive their respective chains 72 and

73 over idler sprockets 78 and 79 mounted on a shaft 80. The shafts 75 and 80 are supported in bearings of the side frames 10 and 11.

The loaves are guided in their travel on table 70 by adjustably mounted bars 81 and 82 suitably mounted on the machine in a conventional manner to engage the ends of the sliced loaves. The sliced loaves S advanced by the conveyor 66 are delivered on to a support of the in-feed runway A, said support consisting of spaced bottom plates 83 and 84 which are secured at one end to a bracket 85 mounted on rods 86 extending from the wrapping machine. An upright plate 87, suitably carried, forms a stationary rear wall for the runway. The bracket 85 supports a shaft 88 carrying two sprockets 89 which constitute one of the supports of the endless chains 90 having spaced flights 91, which pass through the gap between plates 83 and 84, and engage the sliced loaves received from the slicing machine, advancing them toward the wrapping station. This in-feed conveyor is intermittently driven by suitable means disclosed in Patent #2,181,432.

Referring to Fig. 3, the adjusting means for the band saw guides of the slicing machine is shown, and provides means for producing variable uniform spacing of the band saw courses. Since the same means is used for adjusting the bands when arranged in a vertical position, as shown in Figs. 5, 6 and 7, like characters of reference will be used to indicate like parts.

The adjusting device consists of spaced tie frames 100 and 101 secured to the side frames 10 and 11 of the machine. Each of the tie frames is provided with fixed bars 102 adapted to engage the rollers 103 of a double roller chain 104 as seen in Fig. 7. The bars 102 are provided with longitudinal grooves 105 to furnish clearance for the center and inner links 106 of the chains. Yieldable bars 107, which are actuated by means to be presently described, are provided to engage the rollers 108 of the chain, said bars having a longitudinal groove 109a to furnish clearance for the center links 106.

The end links of chains 104 are connected to blocks 107a mounted on pintles 108 supported by the spaced cross bars 109 and 110, Figs. 5 and 6. The bars 109 and 110, at their ends, support threaded blocks 11 clamped in position by bolts 112, said blocks being mounted on the right and left hand threaded portions 113 and 114, respectively of the spindles 115 and 116, whereby the chains 104 can be contracted or expanded. Said spindles are free to revolve in the frames 10 and 11, and spindle 115 is provided at one end with a hand wheel 117 for turning it and its co-acting spindle 116 by means of a chain 118 running over pulleys 119 and 120 mounted at the end of their respective spindles.

The bars 107 are held in engagement with the rollers 108 by springs 121, fastened at one end to posts 122 carried by frame 10, and connected at its other end to levers 123 turning on studs 124 in the frames 100 and 101. Said frames also carry studs 125 on which are mounted arms 126 connecting to bars 107 to produce parallel movement thereof.

The projecting portions 130, Figs. 5 and 7, of the chain pintles carry guides 67 and 68 for the two series of band saws 52 and 62. The outer series of bands 52 are guided by alternate guides, and the inner series of bands 62 are disposed between the bands 52 and located in the remaining guides. In this manner adjacent bands may be guided while traveling in opposite directions,

thereby eliminating the possibilities of collapsing the loaves during the slicing operation. With the chains 104 in a contracted position as shown in Fig. 8, the bands 52 and 62 are uniformly spaced to produce thin slices. On turning hand wheel 117 the chains 104 are expanded as shown in Fig. 9 and the bands 52 and 62 are uniformly spaced to produce thicker slices.

It may be noted that due to the horizontal arrangement of the slicing runs a lesser height of the slicing machine is obtained and disposal of the crumbs is facilitated. Moreover, regardless of the width of the loaf, it will be stopped by the abutment constituted by the front end of the plate 26 in the proper position to be elevated by the fingers 25 and advanced on to the plate 26 at the proper time to be engaged by a pusher 27. Since the shaft 16 is driven from the bread wrapping machine, the sliced loaves will be delivered between the flights 91 of the infeed conveyor in properly timed relation for any speed at which the bread wrapping machine is running. If desired, the crumbs may be scraped off both series of ineffective band saw runs by a diagonally arranged crumb ploughs similar to the crumb plough 140 shown in Fig. 3, operating on the inner faces of the ineffective runs of the inner series of band saws.

What is claimed is:

1. In a slicing machine, the combination with an outer driving pulley, of an inner driving pulley of a diameter smaller than the outer driving pulley, a set of guide pulleys, a series of endless band saws trained over said outer pulley and one of said guide pulleys, a series of endless band saws trained over the inner driving pulleys and running over one of said guide pulleys and disposed within the series of band saws trained over the outer pulleys and aligned with the spaces between the outer band saws, members for twisting both series of bands at one side of the driving and guide pulleys into parallelism to form a slicing zone having slicing runs whose cutting edges face oncoming articles to slice the same, the inner drive pulley being disposed adjacent one end of said slicing zone and the outer drive pulley being disposed adjacent the other end of said slicing zone, and means for driving said inner and outer drive pulleys in opposite directions to cause alternate slicing runs to travel in opposite directions, said means including driving members operating to drive said driving pulleys in a direction which will pull taut the slicing runs of both series of band saws in said slicing zone.

2. In a slicing machine, the combination with an outer driving pulley, of an inner driving pulley of a diameter smaller than the outer driving pulley, a set of guide pulleys, a series of endless band saws trained over said outer pulley and one of said guide pulleys, a series of endless band saws trained over the inner driving pulley and one of said guide pulleys and disposed within the series of band saws trained over the outer pulleys and aligned with the spaces between the outer band saws, members for twisting both series of bands at one side of the driving and guide pulleys into parallelism to form slicing runs whose cutting edges face oncoming articles to slice the same, and means for driving said inner and outer drive pulleys in opposite directions to cause alternate slicing runs to travel in opposite directions, the diameters of said drive and guide pulleys being great enough to permit the articles to pass entirely

through the slicing runs without contacting the runs at the other side of said drive and guide pulleys, the inner drive pulley being disposed at the side of the oncoming articles remote from the outer drive pulley, and said means operating to drive the drive pulleys in opposite directions to pull both series of the slicing runs taut through the oncoming articles, the runs at the latter side of the drive and guide pulleys extending behind the path of the articles through said slicing means.

3. In a slicing machine, the combination with an outer driving pulley, of an inner driving pulley of a diameter smaller than the outer driving pulley, a set of guide pulleys, a series of endless band saws trained over said outer pulley and one of said guide pulleys, a series of endless band saws trained over the inner driving pulley and one of said guide pulleys and disposed within the series of band saws trained over the outer pulleys and aligned with the spaces between the outer band saws, members for twisting both series of bands at one side of the driving and guide pulleys into parallelism to form slicing runs whose cutting edges face oncoming articles to slice the same, means for driving said inner and outer drive pulleys in opposite directions to cause alternate slicing runs to travel in opposite directions, the diameters of said drive and guide pulley being great enough to permit the articles to pass entirely through the slicing runs without contacting the runs at the other side of said drive and guide pulleys, the runs at the latter side of the drive and guide pulleys extending behind the path of the articles through said slicing runs, and a conveyor extending between the operative and ineffective runs of said band saws and adapted to advance the sliced articles from between said runs.

4. In a slicing machine, the combination with an outer driving pulley, of an inner driving pulley of a diameter smaller than the outer driving pulley, a set of guide pulleys, a series of endless band saws trained over said outer pulley and one of said guide pulleys, a series of endless band saws trained over the inner driving pulleys and disposed within the series of band saws trained over the outer pulleys and aligned with the spaces between the outer band saws, members for twisting both series of bands at one side of the driving and guide pulleys into parallelism to form slicing runs whose cutting edges face oncoming articles to slice the same, means for driving said inner and outer drive pulleys in opposite directions to cause alternate slicing runs to travel in opposite directions, the diameters of said drive and guide pulley being great enough to permit the articles to pass entirely through the slicing runs without contacting the runs at the other side of said drive and guide pulleys, a conveyor extending between the operative and ineffective runs of said band saws and adapted to advance the sliced articles from between said runs, and members for feeding loaves sidewise through said slicing runs and delivering it to said conveyor.

5. The combination with a drive pulley, of an idler pulley, a series of endless band saws trained over said pulleys, members for twisting the band saws into position to provide parallel runs having cutting edges facing oncoming articles, a link chain having pintles carrying said members, and means for expanding and contracting the length of said chain to establish various uniform spacings of said twisted runs, said means

including a shaft having oppositely threaded ends, threaded members mounted on said oppositely threaded portions of said shaft and connected to the ends of said chain, a stationary support extending along one side of said chain, and a yieldingly mounted support extending along the other side of said chain and pressing it against said stationary support.

6. The combination with a drive pulley, of an idler pulley, a series of endless band saws trained over said pulleys, a pair of link chains having pintles, members on the pintles of each link chain engaging and guiding said band saws, and means for expanding and contracting said link chains to establish various uniform spacings of the band saw runs engaged by said members for forming slices of various thicknesses, said means including a pair of shafts each having oppositely threaded ends, threaded members mounted on the oppositely threaded portions of each of said shafts and connected to the ends of one of said chains, devices tending to contract said chain, a sprocket on each shaft, and a sprocket chain running over said sprockets, whereby turning of one of said shafts will effect a simultaneous expansion of both of said chains to establish various uniform spacings of the band saws.

7. The combination with a drive pulley, of an idler pulley, a series of endless band saws trained over said pulleys, a pair of link chains having pintles, members on the pintles of each link chain engaging and guiding said band saws, and means for expanding and contracting said link chains to establish various uniform spacings of the band saw runs engaged by said members for forming slices of various thicknesses, said means including a pair of shafts each having oppositely threaded ends, threaded members mounted on the oppositely threaded portions of each of said shafts and connected to the ends of one of said chains, devices tending to contract said chain, a sprocket on each shaft, and a sprocket chain running over said sprockets, whereby turning of one of said shafts will effect a simultaneous expansion of both of said chains to establish various uniform spacings of the band saws, each chain having a sufficient number of pintles provided with guiding members to engage the operative runs of the band saws.

8. In a slicing machine, the combination with a driving pulley, of an idler pulley, a series of endless band saws mounted on said pulleys, an abutment, a traveling conveyor adapted to advance a row of loaves against said abutment, continuously driven members for elevating each loaf advanced against said abutment, whereby it will be advanced over the latter, an endless chain driven from said members, and pushers mounted on said chain for advancing through said band saws successive loaves advanced over said abutment.

9. In a slicing machine, the combination with a driving pulley, of an idler pulley, a series of endless band saws mounted on said pulleys, an abutment, a traveling conveyor adapted to advance a row of loaves against said abutment, continuously driven members for elevating each loaf advanced against said abutment, whereby it will be advanced over the latter, an endless chain driven from said members, and pushers mounted on said chain for advancing through said band saws successive loaves advanced over said abutment, a bread wrapping machine in-

feed conveyor extending transversely of the loaves being advanced through said band saws, and a device arranged to receive the sliced loaves advanced through the band saws and deliver them to said infeed conveyor, said members being driven from a driven shaft of the wrapping machine, and said chain and device being driven from said members.

10. In a slicing machine, the combination with a driving pulley, of an idler pulley, a series of endless band saws trained over said pulleys, members for twisting one run of each band saw at one side of and intermediate the drive and idler pulleys into parallelism with their cutting edges facing oncoming articles to slice the same, the space between said operative runs and the runs at the other side of said pulleys being sufficient to admit an article to be sliced, a conveyor extending between said runs and arranged to receive the sliced articles and convey them from between said runs, spaced members disposed between said runs and arranged to engage the ends of the sliced articles for holding the sliced articles together as they leave the slicing runs until they are delivered to said conveyor, and means for pushing the articles through said slicing runs to slice the same and delivering the sliced articles between said members, and mechanism for advancing the sliced articles between said members and on to said conveyor.

11. In a slicing machine, the combination with a driving pulley, of an idler pulley, a series of endless band saws trained over said pulleys, members for twisting one run of each band saw at one side of and intermediate the drive and idler pulleys into parallelism with their cutting edges facing oncoming articles to slice the same, the space between said operative runs and the runs at the other side of said pulleys being sufficient to admit an article to be sliced, a conveyor extending between said runs and arranged to receive the sliced articles and convey them from between said runs, devices between said runs for holding the sliced articles together as they leave the slicing runs and delivering them to said conveyor, and means for pushing the loaves through the slicing runs and delivering them to said devices.

12. In a bread slicing machine, the combination with a plurality of flexible endless slicer bands, pulleys for driving and supporting said bands to provide a series of spaced operating runs adapted to slice loaves of bread, and to provide a series of non-operating return runs spaced more than the width of a loaf of bread from the operating runs to admit a loaf of bread between them, means for feeding loaves transversely in a path carrying them through the operating runs of said bands to slice the same, and mechanism coacting with said feeding means to admit the sliced loaves therefrom and feed the loaves lengthwise between said runs transversely of said path, said mechanism including a conveyor provided with spaced members coacting to grip the ends of the sliced loaves and hold the slices thereof together while advancing the same lengthwise from between said runs to a bread wrapping machine.

13. In a slicing machine, the combination with an outer series of band saws, of a set of pulleys for driving and guiding said outer series of band saws, an inner series of band saws disposed within the outer band saws and aligned with the spaces between the outer band saws, a set

of pulleys for guiding and driving said inner series of band saws, members for twisting both series of runs at one side of said sets of pulleys into parallelism and with their cutting edges disposed to slice oncoming loaves, both series of runs at the other side of said sets of pulleys being spaced sufficiently from the slicing runs to admit a loaf, and means for advancing loaves through the space between said runs and through said operating runs.

14. In a slicing machine, the combination with a primary series of endless band saws whose cutting edges are disposed in substantial alignment with each other, of primary set of spaced pulleys for guiding and driving said primary band saws, the band saw runs at one side of said primary pulleys being arranged in parallelism and constituting slicing runs, means for driving the primary band saws at equal speeds and in a direction which will pull their slicing runs taut, a secondary series of band saws, a secondary set of spaced pulleys for guiding and driving the secondary band saws, the band saw runs at one side of said secondary pulleys constituting slicing runs which are interspersed between the primary slicing runs and arranged in parallelism and alternating relation to the primary slicing runs, and means for driving said

secondary band saws at the same speed as said primary band saws and in a direction which will pull taut the secondary slicing runs and move the secondary slicing runs oppositely to the primary slicing runs.

15. In a slicing machine, the combination with two series of endless band saws, of separate cylindrical pulleys for driving each series of band saws, idler pulleys for guiding both series of band saws to provide slicing runs on each series of band saws which are alternatively interspersed with the slicing runs of the other series to form a slicing zone longitudinally of the slicing runs, members for twisting said slicing runs intermediate said driving and idler pulleys into parallelism, the pulley for driving one series of bands being disposed adjacent one end of the slicing zone and the pulley for driving the other series of bands being disposed adjacent the other end of the slicing zone, and means for driving said driving pulleys in opposite directions to cause alternate adjacent slicing runs to travel in opposite directions, said means including driving members operating to drive said driving pulleys in a direction which will pull taut the slicing runs of both series of band saws in said slicing zone.

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