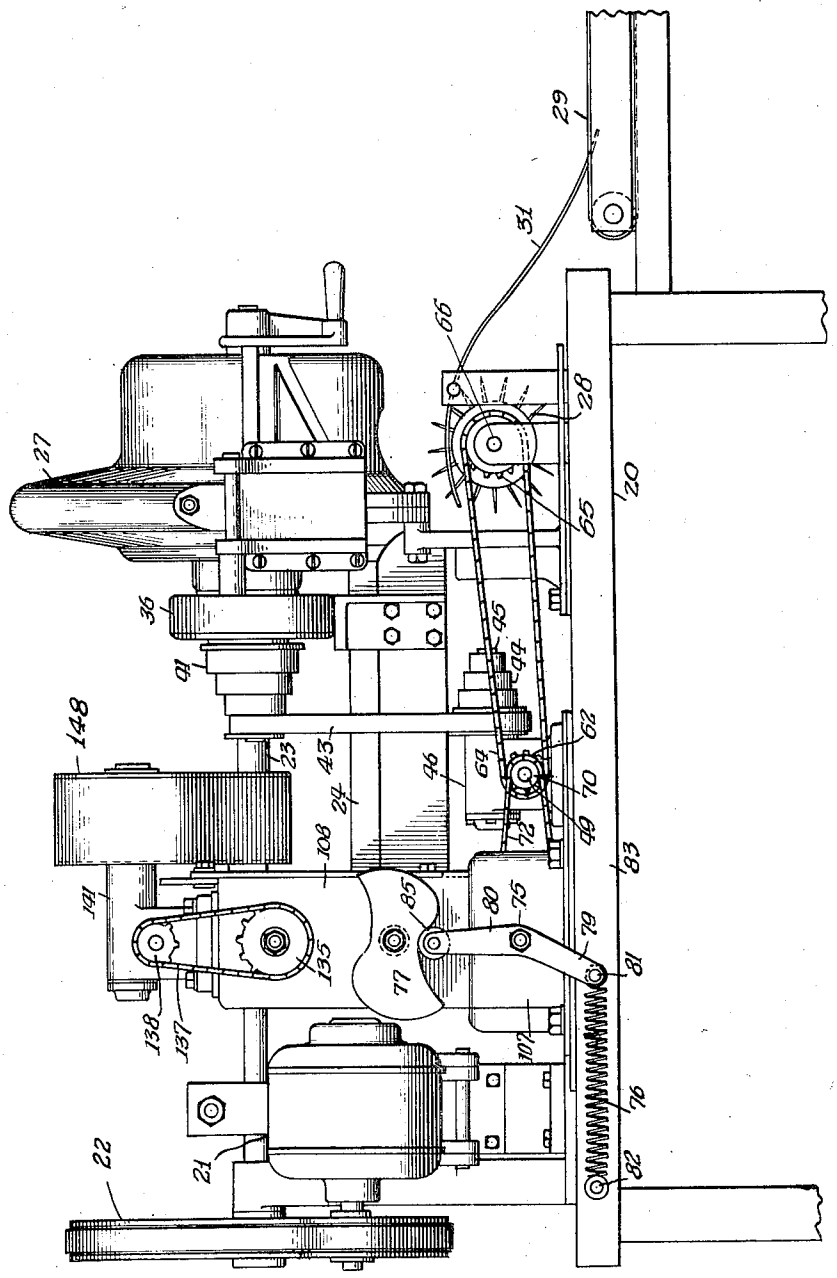
Sept. 2, 1947. W. MAHLER 2,426,835

SLICE DELIVERY AND ARRANGING APPARATUS FOR SLICING MACHINES

Filed Oct. 18, 1943 8 Sheets-Sheet 1

FIG. 1



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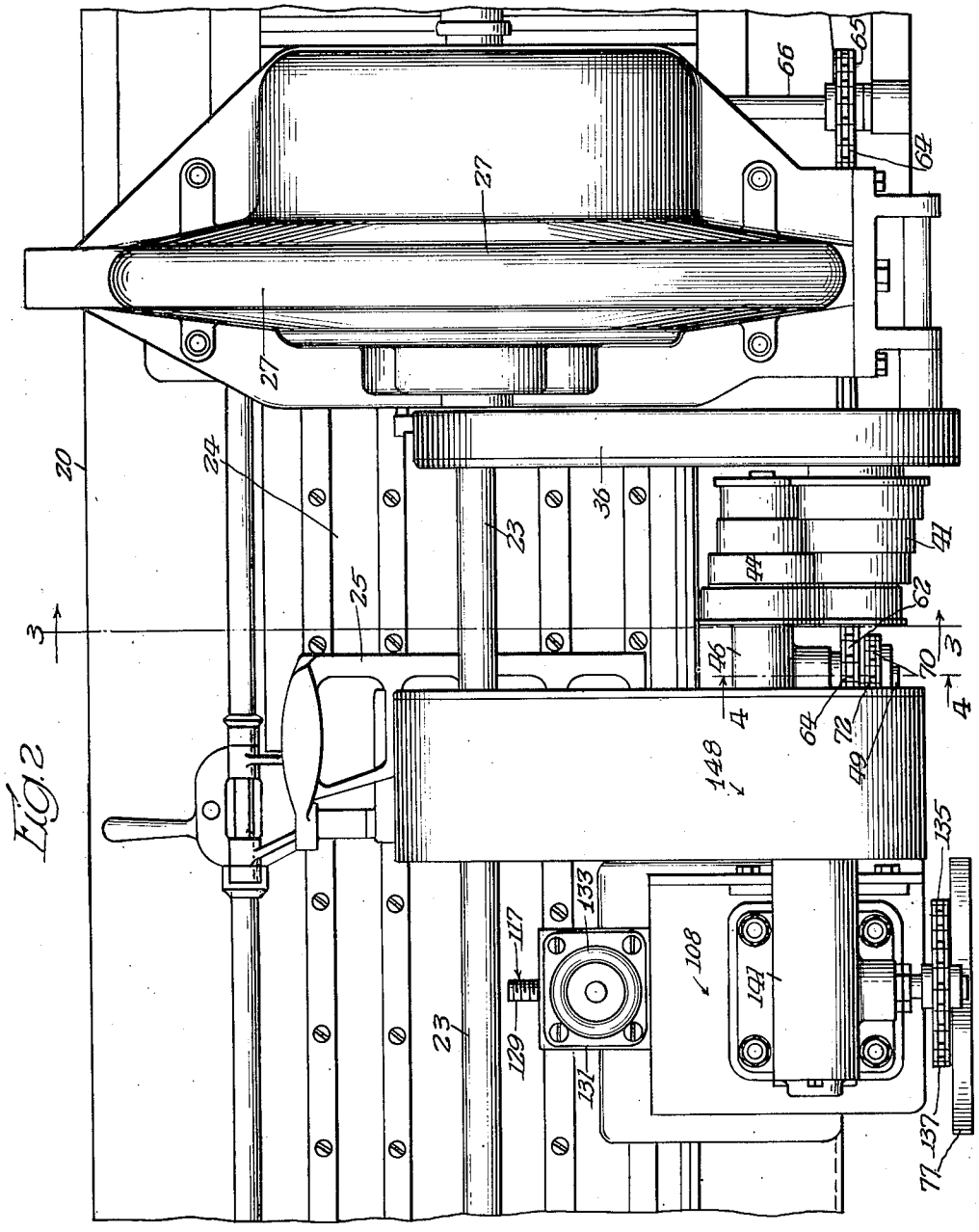


FIG. 2

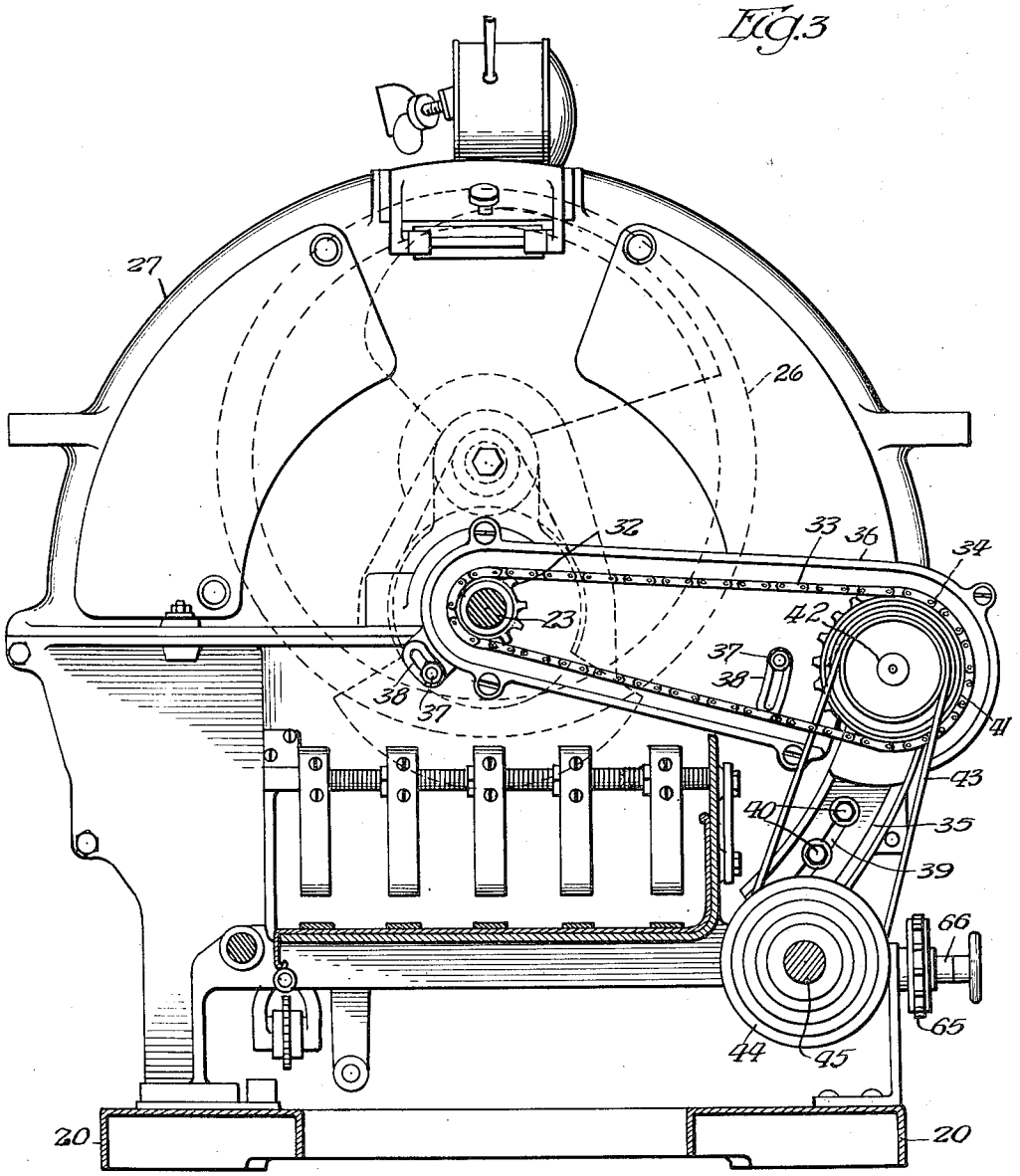
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SLICE DELIVERY AND ARRANGING APPARATUS FOR SLICING MACHINES

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Fig. 3



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Fig. 4

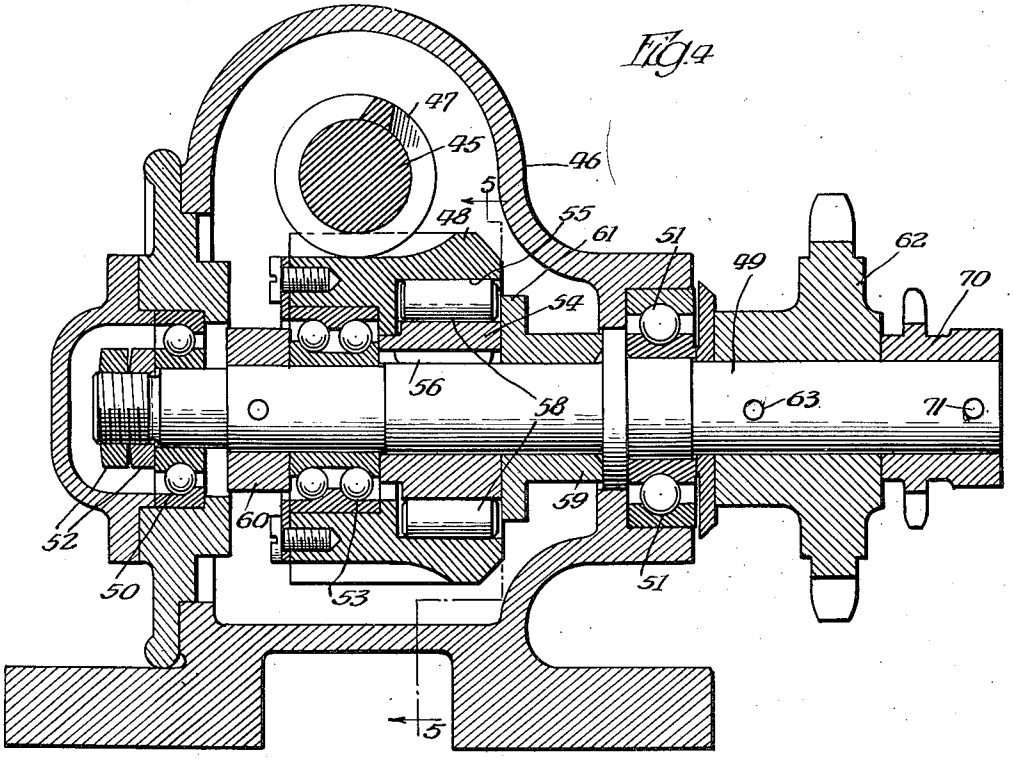
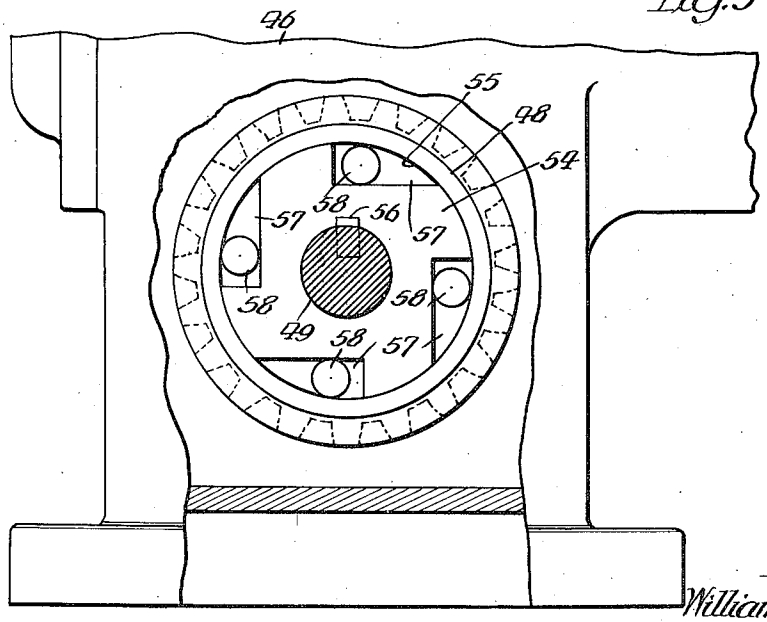


Fig. 5



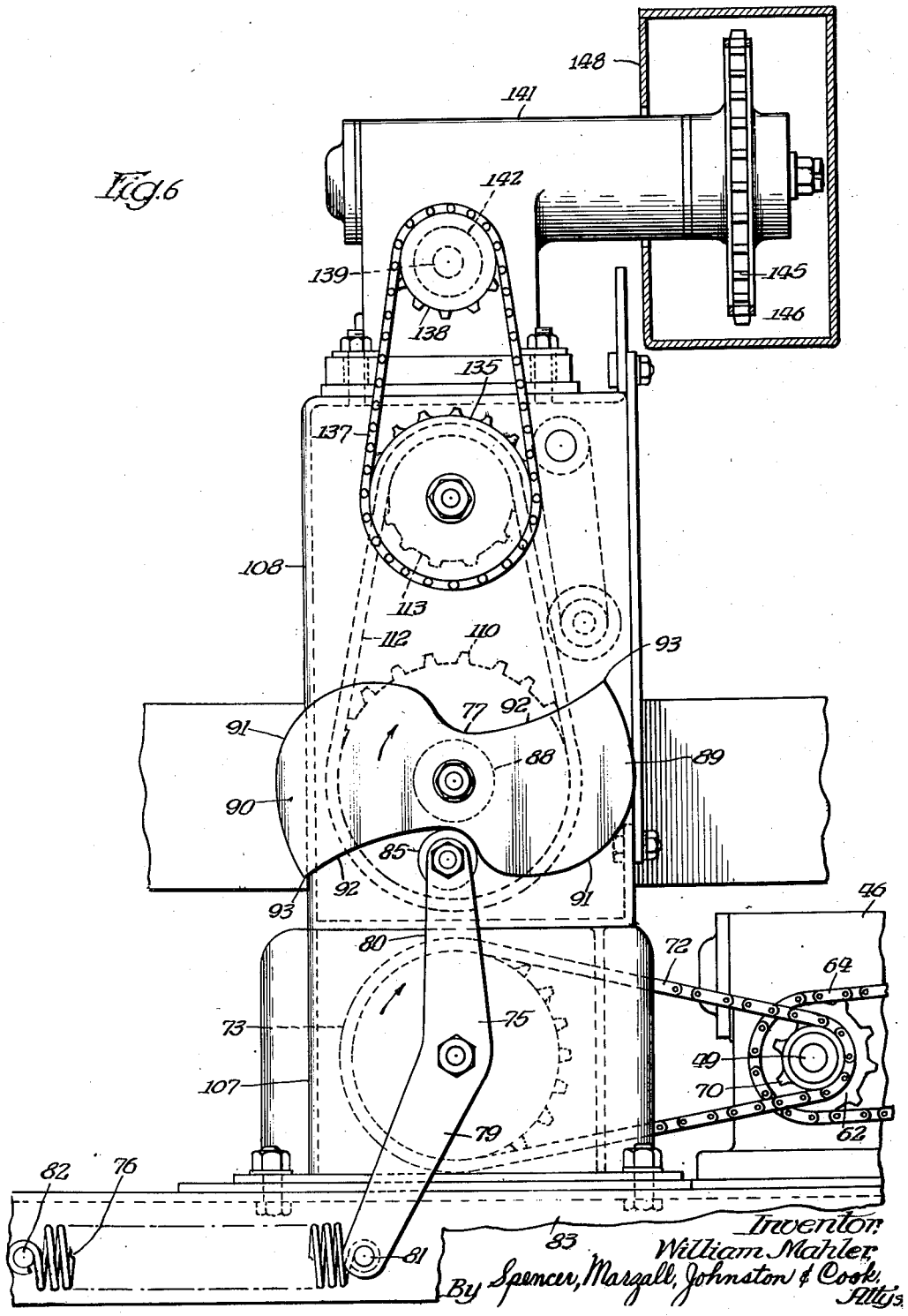
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SLICE DELIVERY AND ARRANGING APPARATUS FOR SLICING MACHINES

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Fig. 6



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SLICE DELIVERY AND ARRANGING APPARATUS FOR SLICING MACHINES

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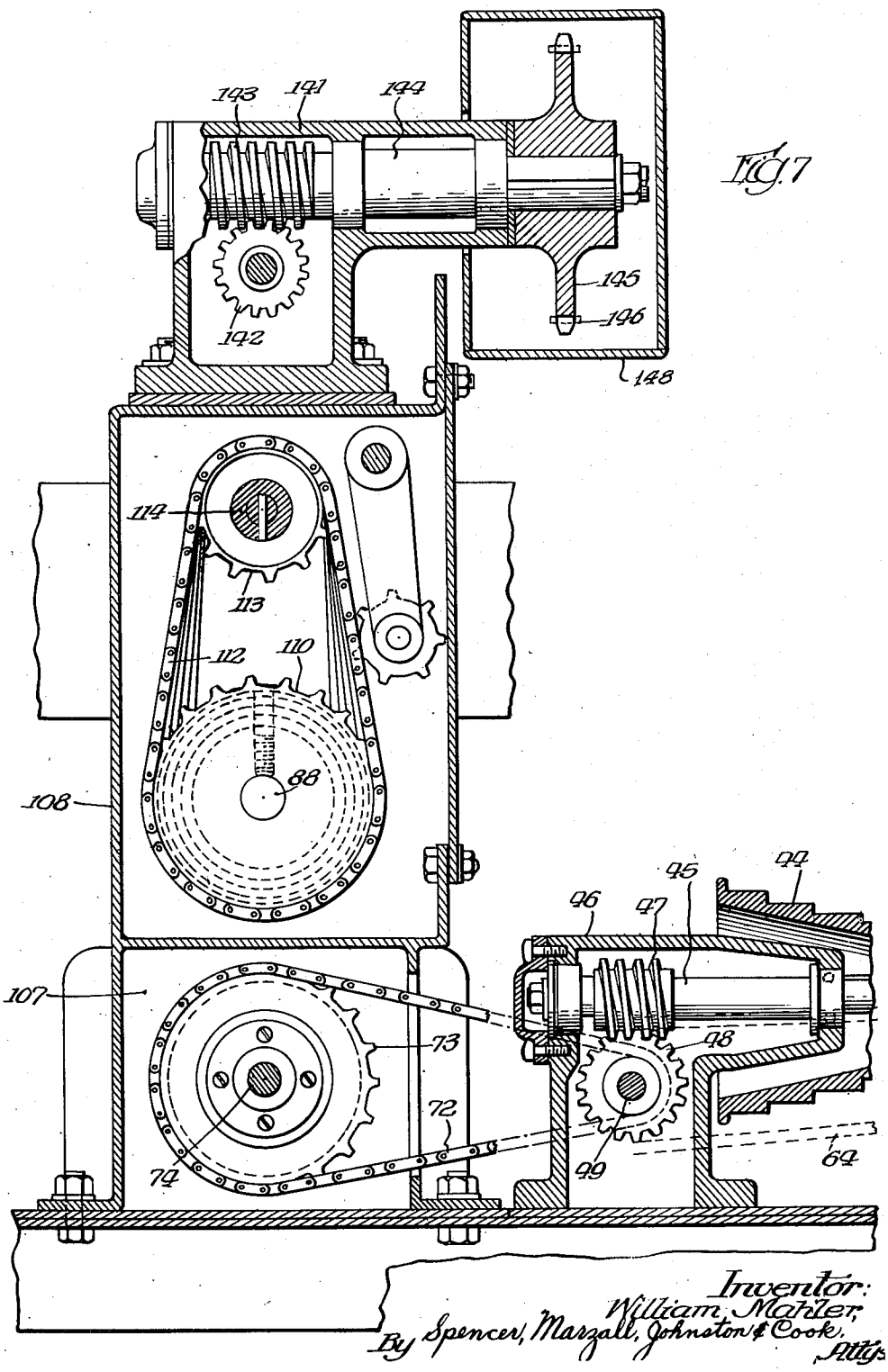


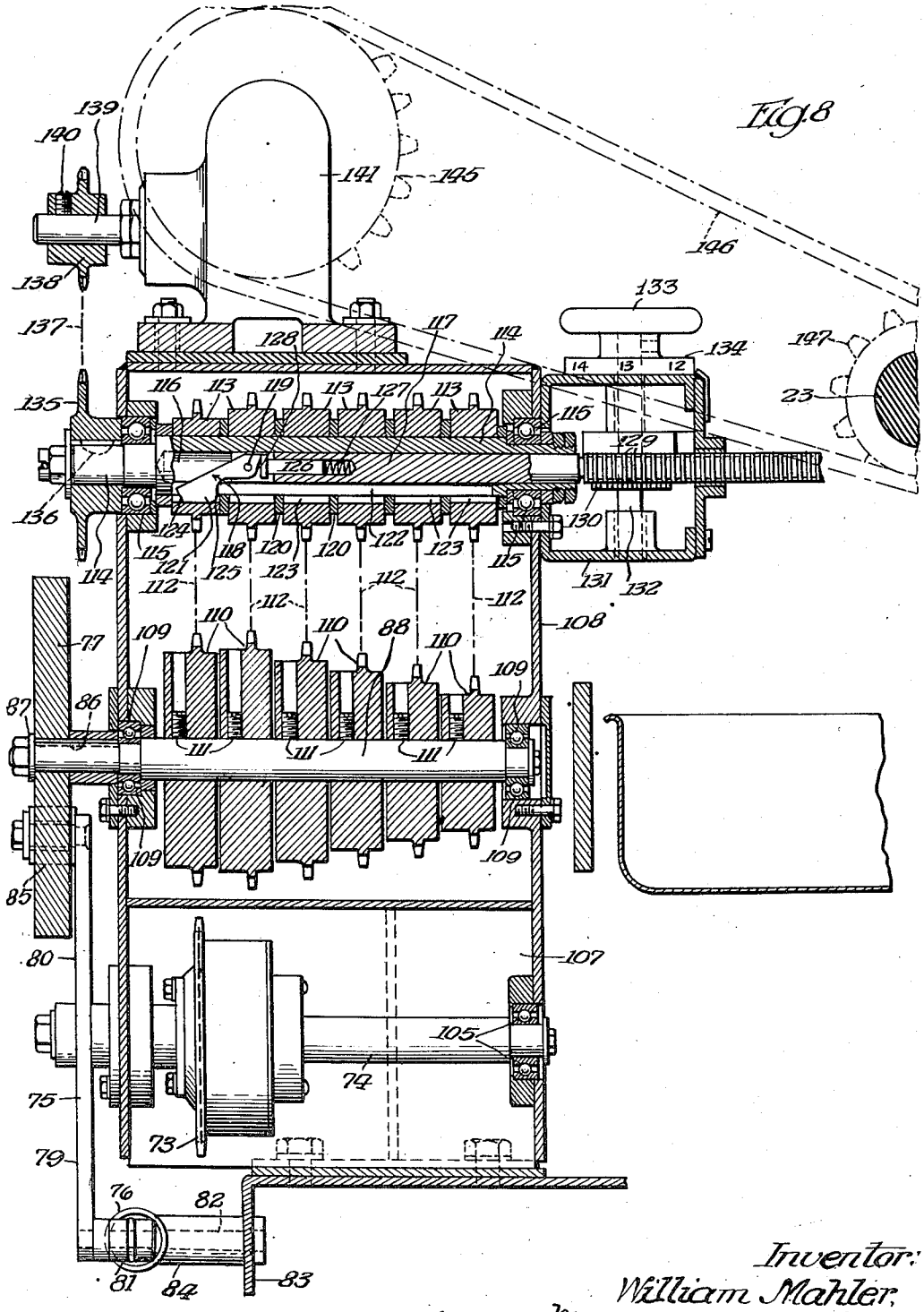
FIG. 7

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SLICE DELIVERY AND ARRANGING APPARATUS FOR SLICING MACHINES

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Fig. 9

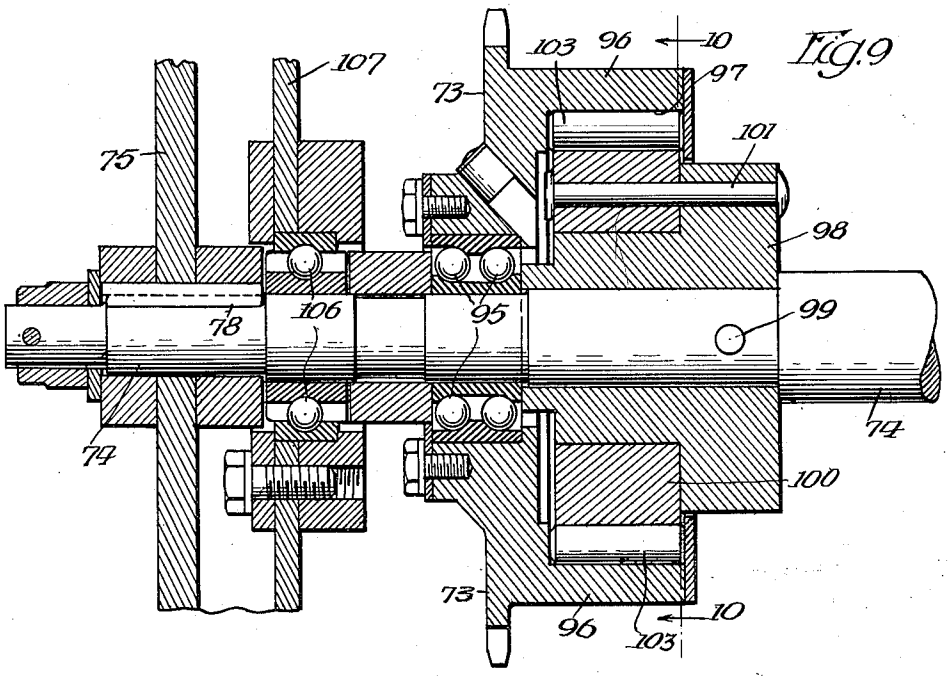
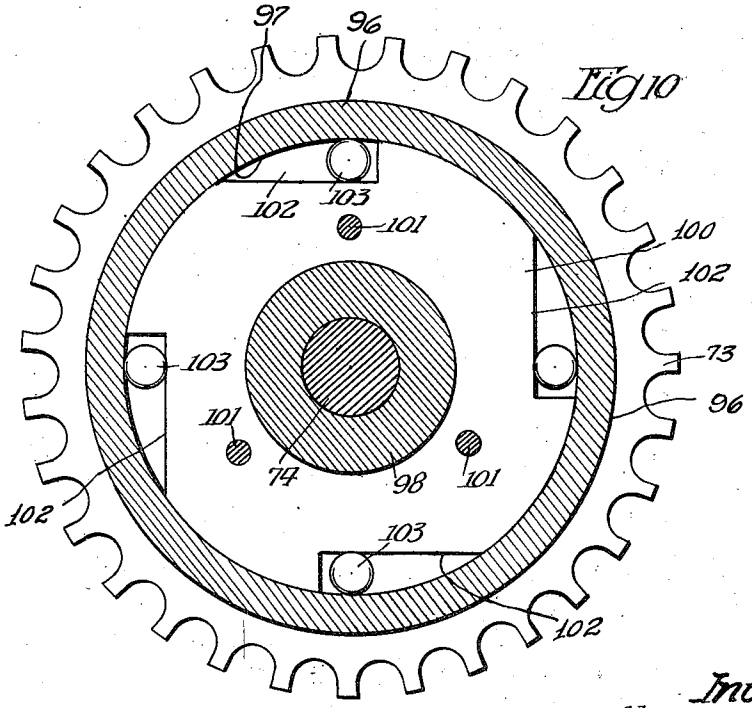


Fig. 10



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2,426,835

UNITED STATES PATENT OFFICE

2,426,835

SLICE DELIVERY AND ARRANGING APPARATUS FOR SLICING MACHINES

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Application October 18, 1943, Serial No. 506,624

8 Claims. (Cl. 146—94)

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This invention relates to slicing machines and more particularly to delivery apparatus for a bacon slicer or the like.

A primary object of the invention is the provision of apparatus for measuring desired quantities of sliced material, such as bacon, and for separating the measured quantities of material into individual groups adapted for ready packaging.

A further object is the provision of delivery apparatus adapted for association with a bacon slicer or the like and providing for dividing desired quantities of cut slices into separated groups whereby each group may be readily and rapidly packaged.

A further object is the provision of apparatus for taking cut slices from a slicing machine and delivering the slices to a moving conveyor in shingled form, the apparatus further providing for arranging the slices on the conveyor in separated groups each having a predetermined number of slices therein.

A still further object is the provision of a delivery apparatus for slicing machines which separates the cut slices into individual groups of a predetermined number of slices and which is readily adjustable to vary the number of slices in each individual group, whereby different desired quantities or weights of sliced material may be measured out and adapted for ready packaging.

Still another object is the provision of a rotary member for taking cut slices of material from a slicing machine and delivering the slices to a moving conveyor in shingled form, the speed of the rotary member being periodically accelerated to space the cut slices in separated groups of a predetermined number of slices.

Another object is the provision of a rotary member for taking cut slices of material from a slicing machine and delivering the slices to a moving conveyor in shingled form, the speed of the rotary member being periodically accelerated to space the cut slices in separated groups of a predetermined number of slices and the periods between acceleration being selectively variable to vary the number of slices in each group.

A still further object is the provision of delivery apparatus as set forth above which is readily applicable to existing slicing machines.

These and other objects and advantages of the invention will be apparent from the following description, the appended claims, and the accompanying drawings which illustrate a selected embodiment of the invention, and in which:

Fig. 1 is a side elevational view of a slicing machine having delivery apparatus in accordance with the present invention associated therewith;

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Fig. 2 is a part plan view of the apparatus illustrated in Fig. 1;

Fig. 3 is a transverse section taken along the line 3—3 of Fig. 2;

Fig. 4 is a detailed sectional view on a larger scale, the action being taken on the line 4—4 of Fig. 2;

Fig. 5 is a detailed section taken on the line 5—5 of Fig. 4;

Fig. 6 is a side elevation of the accelerating and timing mechanism;

Fig. 7 is a vertical section taken through the mechanism of Fig. 6;

Fig. 8 is a sectional view taken transversely of the mechanism shown in Figs. 6 and 7;

Fig. 9 is a detailed view of a free wheeling clutch mechanism associated with the accelerating and timing mechanism of Figs. 6, 7 and 8; and

Fig. 10 is a detailed section taken on the line 10—10 of Fig. 9.

The invention is herein disclosed for the purpose of illustration as being applied to a bacon slicer of the type disclosed in United States Letters Patent No. 1,976,824 to Ahrndt. Only such parts of the slicing machine itself as are necessary for an understanding of the present invention are described, and reference is made to said Patent No. 1,976,824 for a more complete description of the slicing machine. It is to be understood, however, that the slicing machine may be of any desired type and construction.

Referring to the drawings, the slicing machine (Figs. 1, 2 and 3) comprises a base 20, a motor 21, a fly wheel 22, and a shaft 23 which extends longitudinally of the machine and is rotated at substantially constant speed by the motor and fly wheel. Substance to be sliced is fed along a table 24 by suitable means such as a carriage 25, and is cut into slices by a rotary slicing knife 26 mounted within a knife housing 27 and driven by the shaft 23. Cut slices are discharged at the lower end of the knife housing 27 and at the right hand end of the machine as viewed in Fig. 1.

In accordance with the present invention, each slice as it is discharged is impaled upon the prongs of a pronged roller 28 which is positioned adjacent the discharge end of the slicing machine and provides for delivering the cut slices in shingled manner to a continuously moving endless conveyor 29. The conveyor 29 may be of any desired construction, and of any desired length.

The conveyor 29 may be independently driven or driven from any suitable part of the slicing machine, and is positioned below the top portion of the roller 28.

The cut slices are stripped from the pronged roller 28 and fed to the conveyor 29 by means of a plurality of stripper and guide fingers 31 which extend angularly downwardly from the top portion of roller 28 to the conveyor, and are arranged between the prongs of the delivery roller and the belts or webs of the conveyor. The delivery roller 28 is rotated in a clockwise direction as viewed in Fig. 1 by mechanism hereinafter described, and normally rotates at a constant speed co-ordinated with the speed of the slicing machine to receive and deliver a plurality of cut slices in shingled formation. Periodically, however, the roller 28 is accelerated to effect a spacing between groups of shingled slices delivered to the conveyor 29.

Cut slices are thus delivered to the conveyor 29 in separated groups each containing a predetermined number of slices corresponding, for example, to ¼, ½ or 1 pound lots. Each of these groups may then readily be taken up and packaged by operators along the conveyor. To provide for sepaarting the groups into lots of different quantities, a simply adjusted mechanism is provided to control the intervals or periods between acceleration of the roller 28.

Referring again to the drawings, a sprocket 32 is attached to the shaft 23 adjacent the knife housing 27 and operates a chain 33 trained over a sprocket 34 rotatably mounted upon an adjustable bracket 35. A housing 36 encloses the chain 33 and is adjustably mounted on the knife housing 27 by means of stud and slot connections indicated generally by the numerals 37 and 38. Bracket 35 is also adjustably mounted on the knife housing by means of an elongated slot 39 and bolts or studs 40.

A stepped pulley 41 is mounted upon a shaft 42 carried by the bracket 35 and rotated by the sprocket 34. A belt 43 operatively connects the stepped pulley 41 with a co-operating, oppositely disposed stepped pulley 44 mounted upon a longitudinally extending shaft 45. The arrangement of parts is such that a change of speed may be accomplished between the motor driven shaft 23 and the longitudinally extending shaft 45 by adjusting the position of the belt 43 upon the stepped pulleys 41 and 44. Tension of the belt 43 may be adjusted by adjustment of the bracket 35 and housing 36.

The shaft 45 is rotatably mounted in a gear housing 46 and carries a worm 47, Figs. 4 and 7, positioned within the housing and integrally attached to the shaft 45. The worm 47 meshes with a worm wheel or gear 48 which is mounted upon a transverse shaft 49 operatively supported in the housing 46 by means of ball bearings 50 and 51 and lock nuts 52. The gear 48 is rotatably mounted upon the shaft 49 by means of ball bearings 53 suitably positioned between the gear and shaft, and normally drives the shaft 49 at constant speed through a free-wheeling clutch mechanism illustrated in Figs. 4 and 5.

This free-wheeling clutch mechanism comprises a clutch member 54 which is operatively received within a circular recessed portion 55 provided in gear 48. The clutch member 54 is keyed to the shaft 49, as indicated at 56, and is provided with a plurality of peripherally arranged, wedge-shaped notches or pockets 57 each having a roller 58 loosely positioned therein.

The construction and arrangement of parts is such that the gear 48 normally drives the shaft 49 through the rollers 58 and clutch member 54, but the shaft 49 may be rotated at a greater speed than the gear 48 by slippage of the rollers and clutch member past the gear. Spacing collars 59 and 60 provide for maintaining the gear 48 and clutch member 54 in proper position with respect to the worm 47 and shaft 49. The collar 59 is also provided with an annular flanged portion 61 which serves to maintain the rollers 58 in proper operative position within the pockets 57 of the clutch member 54.

The shaft 49 drives a sprocket 62 which is attached to the shaft by a pin 63, Fig. 4, and operates a chain 64 which trains over a sprocket 65 attached to the shaft 66 of the pronged roller 28. The pronged roller 28 is thus normally driven at a constant speed by the shaft 23 through the worm drive 47—48, the free-wheeling clutch member 54, shaft 49, sprocket 62 and chain 64. This speed is so adjusted by means of the stepped pulleys 41 and 44 and the belt 43 that the cut slices are normally delivered to the roller 28 and conveyor 29 in shingled fashion. Periodically, however, the speed of the pronged roller 28 is accelerated to provide a spacing between groups of cut slices as above described.

Acceleration of the delivery roller 28 is effected by a sprocket 70 which is pinned to the shaft 49 as indicated at 71, Fig. 4, and is periodically driven at accelerated speed by a chain 72 trained over a driving sprocket 73, Figs. 6, 7, 8, and 9. Sprocket 73 normally idles on a shaft 74, being rotated in a clockwise direction, Figs. 6 and 7, by the shaft 49, sprocket 70 and chain 72, but is periodically accelerated in such clockwise direction to drive the sprocket 70, shaft 49, sprocket 62, chain 64, sprocket 65 and roller 28 at an accelerated speed. During these periods of acceleration the driving gear 48 slips on the shaft 49 through the free-wheeling mechanism 54—58 as described above.

Periodic acceleration of the sprocket 73 is effected by means of an accelerating and timing mechanism comprising a bell crank lever 75, a tension spring 76 and a combined operating and timing cam 77. The lever 75 is keyed to one end of the shaft 74, as indicated at 78, Fig. 9, and comprises a pair of arms 79 and 80. Arm 79 extends downwardly and is connected at 81, Fig. 6, to one end of the spring 76, the other end of the spring being attached to a fixed pin or lug 82, Figs. 6 and 8, secured to a downwardly extending flange or apron 83 of the slicing machine and maintained in operative position by a spacing collar 84. The other arm 80 extends upwardly and carries a roller 85 which co-operates with the cam 77.

The cam 77 is keyed at 86, Fig. 8, to an end 87 of a shaft 88, and is continuously rotated in a clockwise direction as viewed in Fig. 6 by a change speed mechanism hereinafter described. The cam as illustrated actually comprises two similarly shaped cams or cam portions 89 and 90 which alternately engage and operate on the roller 85 of the bell crank lever 75. Each of the portions 89 and 90 comprises a leading cam surface 91 which curves along a path having a continuously increasing radius with respect to the center of shaft 88 and a trailing surface 92 which is cut along the arc of a circle having its center at the axis of the shaft 74 and a radius equal to the combined height of the arm 80 and roller 85. The construction of the cam 77 is

thus such that the bell crank lever 75 together with the shaft 74 are rotated or moved in a counter-clockwise direction as viewed in Fig. 6 during the time that the roller 85 is travelling on one of the cam surfaces 91. When a high point 93 of the cam is reached, however, the roller 85 is free to move along the arcuate surface 92 and the lever 75 together with shaft 74 are rapidly rotated in a clockwise direction by the spring 76, the spring being arranged always to exert a strong pull in this direction on the lever.

Bell crank lever 75 and shaft 74 are thus alternately moved in a counter-clockwise direction by the cam 77 and in a clockwise direction by the spring 76, the latter movement being arrested when the roller 85 engages a succeeding cam surface 91, as illustrated in Fig. 6. Cam 77 rotates at a relatively slow, constant speed, the speed being adjusted so that a desired quantity of cut slices are delivered to the pronged delivery roller 28 in shingled fashion during the period that the roller 85 is travelling on one of the cam portions 91. Thereafter, lever 75 and shaft 74 move very rapidly under action of spring 76 to rotate shaft 74 in the same direction as the idling sprocket 73 but at a much greater speed than the idling speed of the sprocket. This increased speed of shaft 74 is transmitted to sprocket 73 to accelerate the roller 28 through the mechanism above described and cause a spacing between groups of cut slices. The quantity of cut slices in each spaced group may thus be readily varied by merely changing the speed of rotation of the cam 77.

The increased speed of shaft 74 under action of spring 76 is transmitted to sprocket 73 by a free-wheeling mechanism illustrated in Figs. 9 and 10 and generally similar to the free-wheeling clutch 54—58 previously described. As shown in Figs 9 and 10, the sprocket 73 is rotatably mounted on the shaft 74 by roller bearings 95 and is provided with a flanged hub 96 having a circular recess 97. A collar or hub 98 is pinned to shaft 74 at 99 and carries a clutch member 100 received within the circular recess 97 of sprocket hub 96. Clutch member 100 is attached to collar or hub 98 by rivets 101 and is provided with a plurality of peripherally arranged, wedge-shaped notches or pockets 102 each having a roller 103 loosely positioned therein. The arrangement and construction of parts is such that sprocket 73 can normally idle on shaft 74, being driven in one direction by shaft 49, sprocket 70 and chain 72, while shaft 74 is rotated in an opposite direction by cam 77, but is moved at accelerated speed when shaft 74 rotates in the same direction as the sprocket under action of spring 76.

Shaft 74 is rotatably mounted by ball bearings 105 and 106, Figs. 8 and 9, in a lower section 107 of a transmission casing or housing 108. The shaft 88 is rotatably supported by ball bearings 109 in the transmission housing 108 and is driven at constant but changeable speed by any one of a plurality of sprockets 110. Each of the sprockets 110 is attached to the shaft 88 by a set screw 111 and is driven by a chain 112 trained over a driving sprocket 13 mounted on a driving shaft 14. The diameters of the respective sprockets 110 and 113 are so arranged that the shaft 88 and cam 77 can be driven at any one of a plurality of different speeds depending upon the particular set of sprockets utilized.

The shaft 114 is rotatably mounted in the housing 108 by means of ball bearings 115, Fig. 8, and is provided with a hollow bore 116 within which a rod 117 is longitudinally slidable. A key 118 is

pivotally mounted at 119 on the rod 117 and provides for selectively connecting the respective sprockets 113 with the shaft 114 for rotation therewith, the sprockets 113 being loosely mounted on the shaft 114 and separated by spacing collars 120 which completely surround the external diameter of the shaft. The key 118 is provided with a head 121 which is slidable in a longitudinal slot 122 provided in shaft 114 and is adapted to enter into a keyway 123 provided in each of the sprockets 113. The rod 117 and key 118 are thus rotated with the shaft 114, being driven by the key head 121 in the slot 122, and any sprocket 113 having the key head 121 received within its keyway 123 is also driven at the same speed as shaft 114. By shifting rod 117 and key 118 longitudinally of shaft 114 any desired sprocket 113 can be selectively connected with the shaft for driving thereby, or the key head can be caused to rest on the inner diameter of one of the spacing collars 120 whereupon the shaft 114 rotates without driving any of the sprockets 113.

Shifting movement of the key member 118 is facilitated by cam surfaces 124 and 125 which are provided on head 121 and cam the head into and out of the respective keyways 123. Positive movement of key head 121 into a selected sprocket keyway 123 is effected by a plunger 126 which is slidably mounted in rod 117 and is urged by a spring 127 against a cammed surface 128 on the key 118. Sliding movement of the rod 117 selectively to engage the locking key 118 with a selected sprocket 113 is effected by a circular rack 129 provided on the right hand end of the shaft 114, Fig. 8, and engaged by a spur gear 130 encased within a housing 131 attached to the transmission casing 108. Gear 130 is attached to a shaft 132 which is rotatably mounted in housing 131 and is operated by a knob or handle 133 selectively to move the rod 117 and key 118 along the length of shaft 114. Suitable indicia 134 is provided on the knob or handle 133 to indicate the position of key 118 and the speed of cam 77. Shaft 88 and cam 77 are thus driven at a selected speed by the shaft 114, shaft 114 being adapted to be rotated at a constant speed by a sprocket 135 keyed to one end of the shaft as indicated at 136, Fig. 8, and the number of cut slices delivered to the roller 28 between successive accelerations is readily varied or controlled by adjustment of rod 117 through the operating knob 133.

In accordance with the illustrated embodiment of the invention, the sprocket 135 and shaft 114 are rotated at constant speed by the slicing machine with which the delivery, accelerating and timing mechanism above described are associated. To this end a chain 137, Figs. 6 and 8, is trained over the sprocket 135 and is driven by a sprocket 138 attached to a shaft 139 by a set screw 140. Shaft 139 is rotatably mounted in a gear housing 141 positioned on top of the transmission casing 108 and has a worm gear 142, Figs. 6 and 7, attached thereto. Worm gear 142 meshes with and is driven by a worm 143 integrally attached to a shaft 144 rotatably mounted in the gear housing 141. A sprocket 145, Figs. 2, 6, 7, and 8, is attached to the shaft 144 and is driven by a chain 146 trained over a sprocket 147 attached to the flywheel shaft 23 of the slicing machine. A protective housing 148 preferably extends transversely of the slicing machine and encloses the sprockets 145 and 147 and the chain 146.

A delivery apparatus that can be attached to an existing slicing machine, which delivers cut

slices in separated groups of a predetermined quantity of slices, and which can be readily and simply adjusted to vary the quantity of cut slices in each separated group is thus provided. The entire delivery apparatus including the accelerating and timing mechanism can be driven by the slicing machine itself. The periodic accelerations of the delivery roller **28** assist in stripping the cut slices from the roller and in causing the same to move in shingled fashion down the stripper fingers **31** onto the conveyor **29**.

Changes may be made in the form, construction and arrangement of parts without departing from the spirit of the invention or sacrificing any of its advantages, and the right is hereby reserved to make all such changes as fairly fall within the scope of the following claims.

The invention is hereby claimed as follows:

1. A slicing machine comprising means for slicing material into slices, a continuously rotating shaft included in said slicing means, delivery means for receiving cut slices from said slicing means and delivering the slices to a predetermined position, means including a free wheeling clutch for normally driving said delivery means at substantially constant speed from said shaft, a second free wheeling clutch operatively connected with said first clutch and having a part normally rotating in unison with the first clutch, an arm operatively connected with said second clutch, and means for periodically operating said arm in a direction and at a speed to effect acceleration of said drive means through said second and first clutches, said last named means comprising spring means for effecting accelerating movement of said arm, cam means for moving said arm against action of said spring means and for releasing the arm for movement under action of the spring means, and means for operating said cam means.

2. A slicing machine comprising means for slicing material into slices, a continuously rotating shaft included in said slicing means, delivery means for receiving cut slices from said slicing means and delivering the slices to a predetermined position, means including a free wheeling clutch for normally driving said delivery means at substantially constant speed from said shaft, a second free wheeling clutch operatively connected with said first clutch and having a part normally rotating in unison with the first clutch, an arm operatively connected with said second clutch, and means for periodically operating said arm in a direction and at a speed to effect acceleration of said drive means through said second and first clutches, said last named means comprising spring means for effecting accelerating movement of said arm, cam means for moving said arm against action of said spring means and for releasing the arm for movement under action of the spring means, and change speed means for operating said cam means, said change speed means being driven by the slicing machine.

3. A slicing machine comprising means for slicing material into slices, a pronged rotary member for taking cut slices from said slicing means, a continuously moving conveyor arranged adjacent said pronged rotary member and having its upper conveying portion positioned below the upper portion of the rotary member, a plurality of stationary stripping and guide members arranged between prongs on said rotary member and extending downwardly towards said conveyor to strip sliced material from the rotary member and guide it onto the conveyor, means for normally rotating said rotary member at substantially constant speed, and means for periodically accelerating the speed of rotation of said member.

4. A slicing machine comprising means for slicing material into slices, a pronged rotary member for taking cut slices from said slicing means, a continuously moving conveyor arranged adjacent said pronged rotary member and having its upper conveying portion positioned below the upper portion of the rotary member, a plurality of stationary stripping and guide members arranged between prongs on said rotary member and extending downwardly towards said conveyor to strip sliced material from the rotary member and guide it onto the conveyor, means for normally rotating said rotary member at substantially constant speed, means for periodically accelerating the speed of rotation of said member, and means for varying the periods between said accelerations.

5. A slicing machine comprising means for slicing material into slices, conveyor means for receiving said slices and delivering the same at a remote station, drive means comprising a shaft drivingly connected with said slicing means through a free wheeling clutch and connected to drive said conveyor means at a speed proportional to that of the slicing means, accelerating means periodically operable to drive said shaft at accelerated speed to effect spacement between groups of cut slices delivered at said remote station, and a timing cam drivingly connected with said slicing means and operatively associated with said accelerating means for controlling the operation thereof in timed relationship with respect to the operation of the slicing means.

6. A slicing machine comprising means for slicing material into slices, conveyor means for receiving said slices and delivering the same at a remote station, drive means comprising a shaft drivingly connected with said slicing means through a free wheeling clutch and connected to drive said conveyor means at a speed proportional to that of the slicing means, accelerating means periodically operable to drive said shaft at accelerated speed to effect spacement between groups of cut slices delivered at said remote station, a timing cam controlling the operation of said accelerating means, and change speed gearing drivingly connected with said timing cam and said slicing means to operate the cam at an adjustably variable rate of speed with respect to the operating speed of the slicing means.

7. A slicing machine comprising slicing means for slicing material into slices, a motor for driving said slicing means at substantially uniform speed, conveyor means for receiving said slices and delivering the same at a remote station, drive means for said conveyor means comprising a shaft driven by said motor through a free wheeling clutch and connected to drive said conveyor means, accelerating means driven by said motor and drivingly connected with said shaft through an overrunning clutch for periodically driving said shaft at accelerated speed, and timing means driven by said motor for controlling the operation of said accelerating means.

8. A slicing machine comprising slicing means for slicing material into slices, a motor for driving said slicing means at substantially uniform speed, conveyor means for receiving said slices and delivering the same at a remote station,

drive means for said conveyor means comprising a shaft driven by said motor through a free wheeling clutch and connected to drive said conveyor means, accelerating means driven by said motor and drivingly connected with said shaft through an overrunning clutch for periodically driving said shaft at accelerated speed, and timing means driven by said motor for controlling the operation of said accelerating means, said timing means comprising a cam driven by said motor and a spring actuated cam follower drivingly connected with said shaft through said overrunning clutch.

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