April 21, 1931. J. H. L. BOETTCHER 1,801,997

MACHINE FOR FEEDING BISCUITS AND THE LIKE

Filed March 4, 1926 6 Sheets-Sheet 1

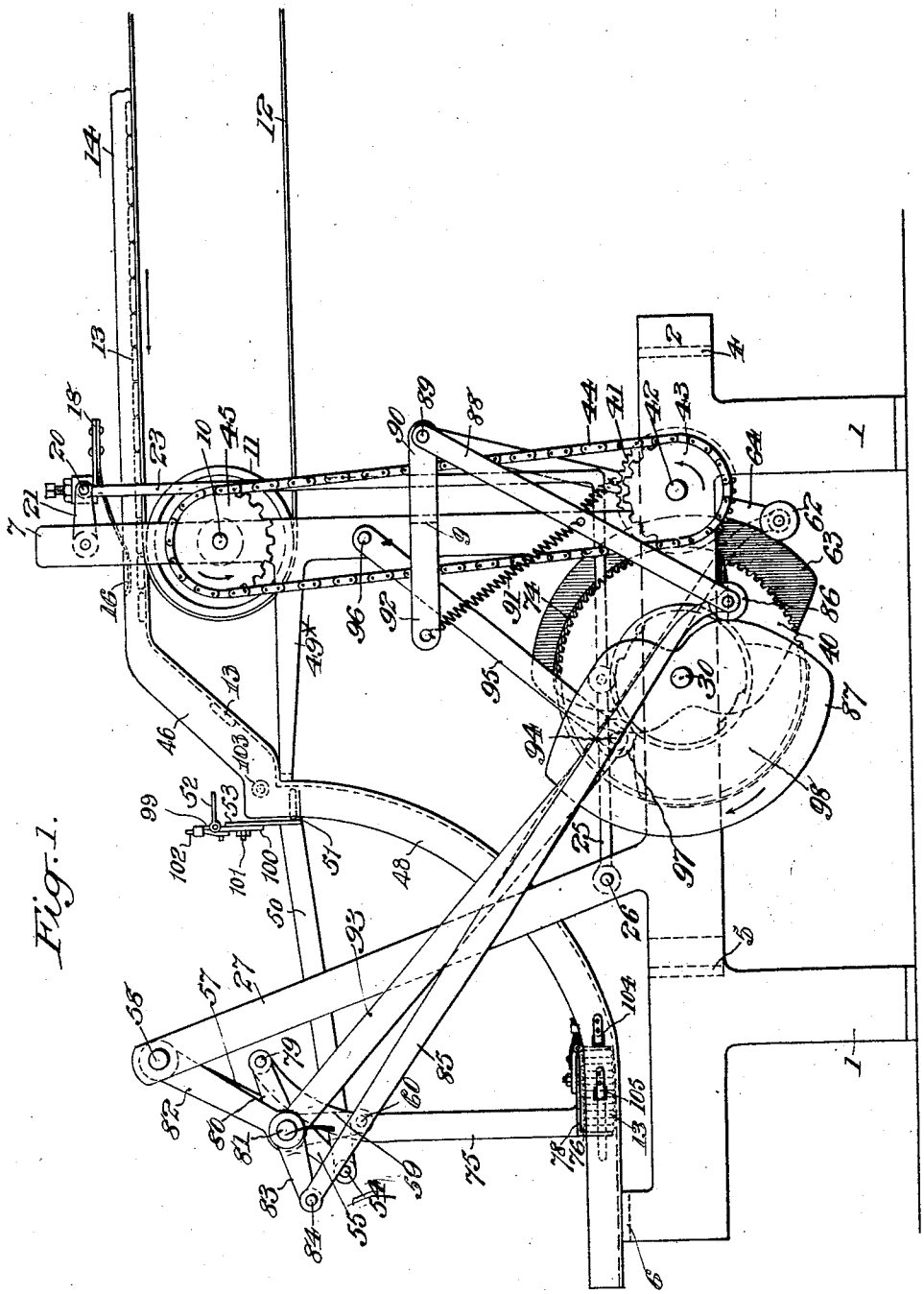


Fig. 1.

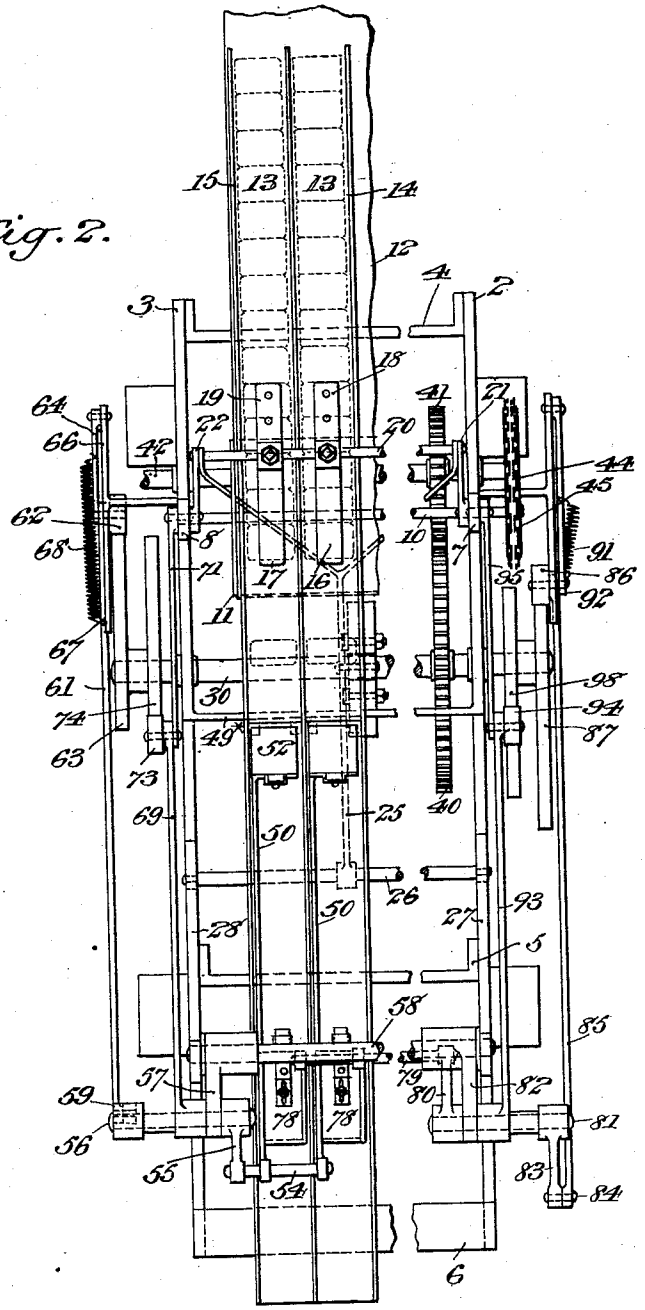
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MACHINE FOR FEEDING BISCUITS AND THE LIKE

Filed March 4, 1926 6 Sheets-Sheet 2

Fig. 2.



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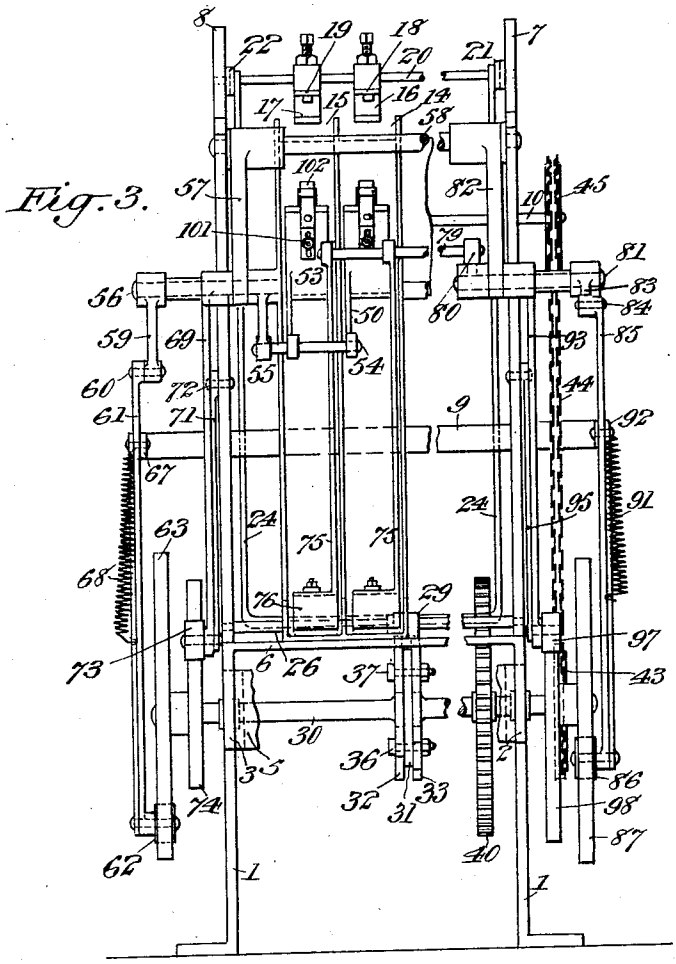
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MACHINE FOR FEEDING BISCUITS AND THE LIKE

Filed March 4, 1926 6 Sheets-Sheet 3

Fig. 3.



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MACHINE FOR FEEDING BISCUITS AND THE LIKE

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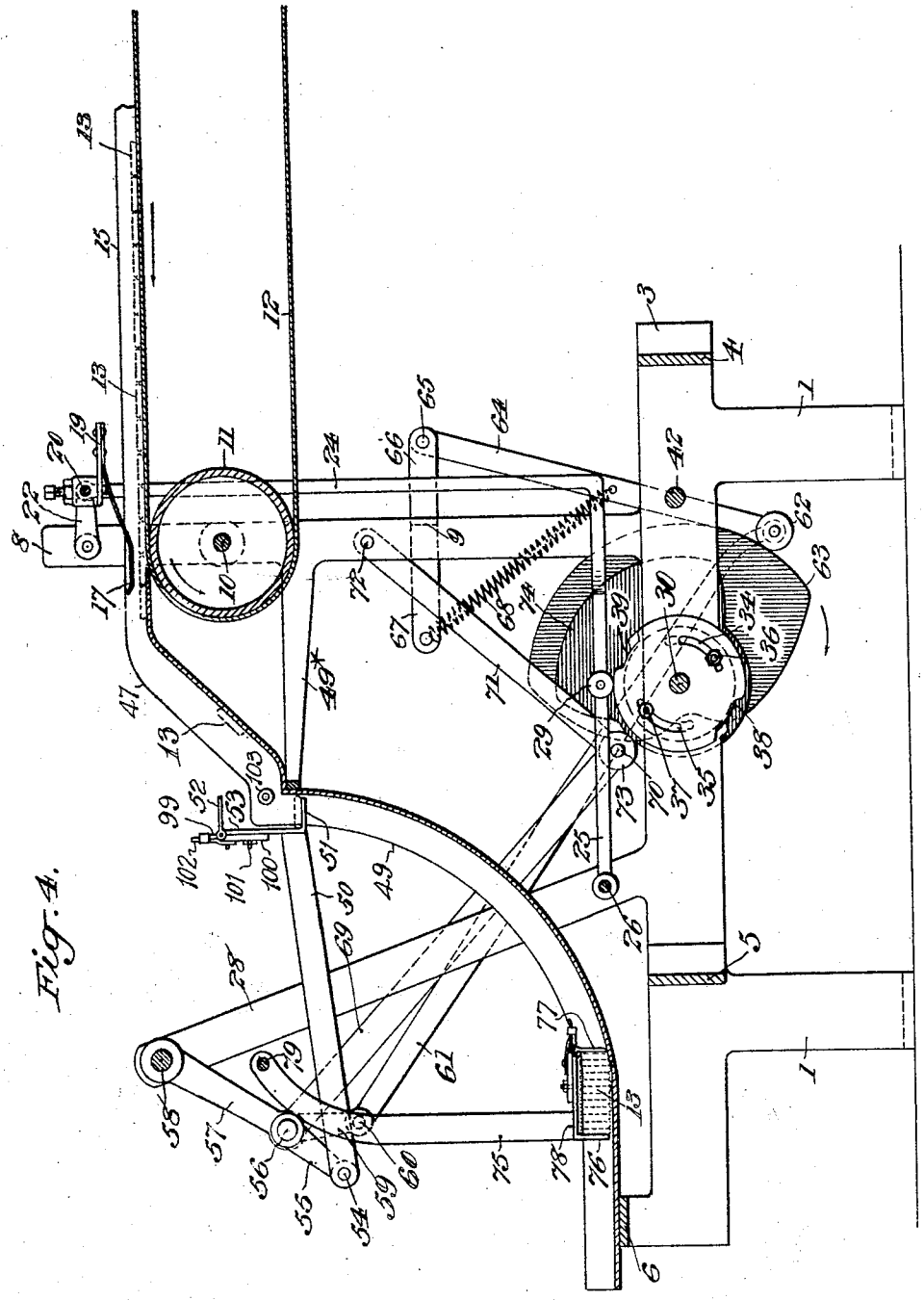


Fig. 4.

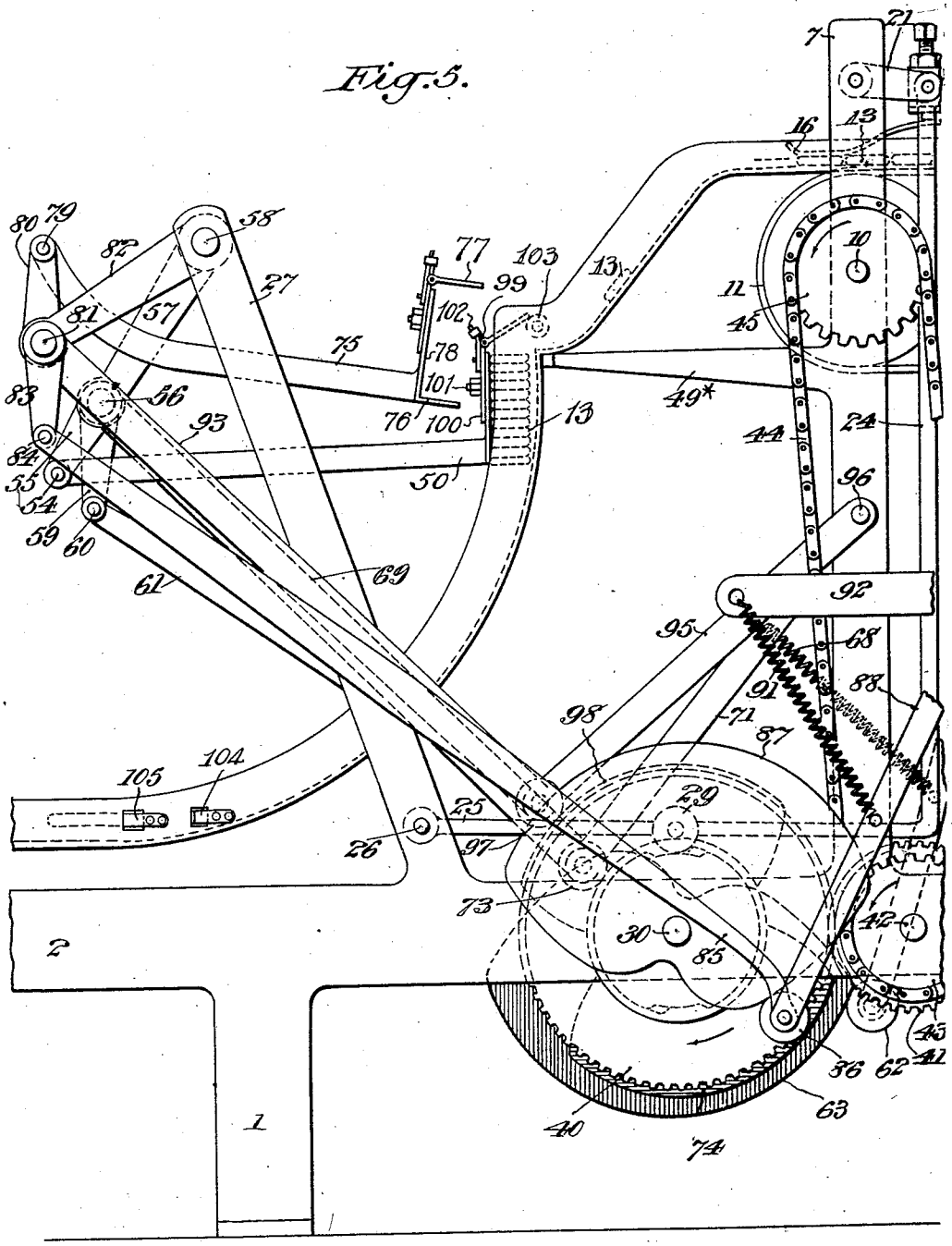
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MACHINE FOR FEEDING BISCUITS AND THE LIKE

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Fig. 5.



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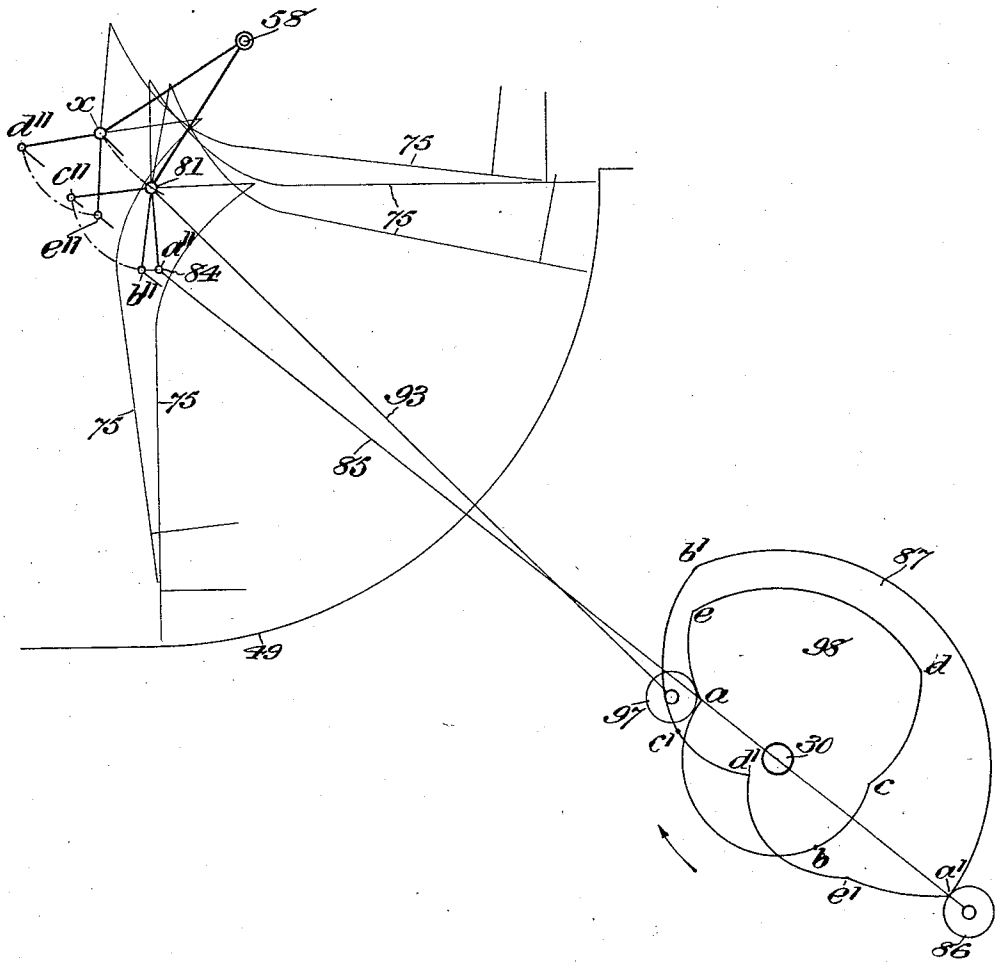
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MACHINE FOR FEEDING BISCUITS AND THE LIKE

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Fig. 6.



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UNITED STATES PATENT OFFICE

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MACHINE FOR FEEDING BISCUITS AND THE LIKE

Application filed March 4, 1926. Serial No. 92,184.

This invention relates to a machine for feeding biscuits and the like, and has for an object to provide apparatus whereby biscuits may be taken from a traveling conveyor that brings them from the ovens, and fed to cartons or packages without being touched by the operative.

Another object consists in providing apparatus whereby a plurality of stacking and feeding devices may continuously and successively operate in the same path without interference with each other.

Another object consists in providing apparatus whereby the delivery of the biscuits or the like to the stacking and feeding devices is intermittent and automatically controlled so as to be coordinated with the operation of the stacking and feeding devices.

Another object consists in providing apparatus of this character which is arranged so as to be adaptable for construction in banks so that a considerable number of sets of the operating parts may be simultaneously operated from a given driving mechanism.

Another object consists in providing certain improvements in the form, construction, and arrangement of the several parts whereby the above named and other objects may effectively be attained.

A practical embodiment of the invention is represented in the accompanying drawings in which

Fig. 1 represents a side elevation;

Fig. 2 represents a broken plan view;

Fig. 3 represents a broken end elevation;

Fig. 4 represents a longitudinal vertical section;

Fig. 5 represents a side elevation, on an enlarged scale, showing the parts in positions different from those represented in Fig. 1.

Fig. 6 represents a diagrammatic view illustrating the movement of certain parts.

The apparatus includes a frame work which embodies legs 1 that support longitudinal members 2, 3, which are united by cross members 4, 5, and 6.

A pair of vertical supports 7, 8, project upwardly from the longitudinal members 2, 3, near one end thereof, and the said supports are braced by a cross bar 9.

A shaft 10, has bearings near the upper ends of the vertical supports 7, 8, and has fixed thereon a pulley 11 around which passes a conveyor belt 12 that has suitable supporting means, not shown.

The belt 12 is adapted to convey biscuits or the like, which are represented in dotted lines and denoted by 13, so that they may be received in channels 14, 15, which are suitably fixed to the vertical supports 7, 8, and project laterally therefrom immediately above the upport portion of the belt 12.

It will be understood that the oncoming biscuits, being fed by the belt 12, will continuously urge the preceding biscuits to advance along the channels 14, 15, in the direction indicated by the arrow on Fig. 1 and, in order that the feed of the biscuits may be intermittently interrupted, for a purpose to be hereinafter described, I provide an intermittently actuated stop. The said stop consists of a pair of fingers 16, 17, which may be composed of leaf springs or the like. They have their operative ends projecting downwardly into the channels 14, 15, so as to be adapted to engage the top of the biscuits immediately below them. The other ends of the fingers 16, 17, are secured to brackets 18, 19 which are carried by a rod 20 that has its ends mounted in arms 21, 22, that are pivoted in the vertical supports 7, 8. A pair of drop arms 23, 24, have their upper ends connected to the rod 20. They are L-shaped, as clearly shown in Fig. 1, and their lower extensions are united into a single horizontal extending arm 25 that is pivoted on a rod 26 which is supported in standards 27, 28, that project upwardly on an angle from longitudinal members 2, 3, of the machine frame.

The horizontal arm 25 carries an anti-friction roller 29 that is adapted for contact with a cam which is fixed on a shaft 30 that is journaled in the longitudinal frame members 2, 3. The said cam is composed of three discs 31, 32, 33, and said discs have arcuate slots, denoted generally by 34, 35, formed therein, which are traversed by bolts 36, 37. The discs 32 and 33 are of greater diameter than the intermediate disc 31 and they have notches, denoted generally by 38, 39, formed

in their peripheries, the notches on one disc being adapted to register with the notches on the other. It is these notches which serve as the cam surfaces for cooperative action with the roller 29 on the horizontal arm 25 and it will be seen that, by loosening the bolts 36, 37, the discs 32 and 33 may be circumferentially adjusted with respect to each other so as to vary the location and extent of the notches 38, 39 in the combined discs, thereby varying the moment at which the roller 29 is allowed to drop into and is forced out of the notches 38, 39. It will be understood that the disc 31 is fast to the shaft 30, while the discs 32 and 33 are rotatable thereupon. After the desired adjustment has been made, the tightening of the bolts 36, 37 will lock the discs 32 and 33 to the disc 31 so as to make them, in effect, fast to the shaft 30 and operated by it.

The shaft 30 carries a gear 40 which is pinned, or otherwise suitably secured, thereto, and meshes with a gear 41 that is fast on a power shaft 42 which is journaled in the longitudinal frame members 2, 3, and actuated from a suitable source of power, such as a motor, not shown.

In order to actuate the belt 12, a sprocket wheel 43 is fixed on the end of the shaft 42 and a chain 44 leads from said wheel to a sprocket wheel 45 fixed on the shaft 10 that carries the belt pulley 11.

From the foregoing arrangement it will be seen that, when the shaft 30 is rotated, the roller 29 will periodically come into register with the notches 38 and 39, thereby allowing the horizontal arm 25 and vertical drop arms 23, 24 to move downwardly. The said downward movement will bring the fingers 16, 17 into contact with the tops of the biscuits lying immediately below them in the channels 14, 15 and thereby stop the delivery of the biscuits during the period the roller 29 remains in one or the other of said notches. While this stop is effective, the belt 12 will merely slip under the line of biscuits 13 being delivered into the channels, thus allowing for the hindrance of delivery without injury to the biscuits. As soon as the roller 29 passes out of either of the notches 38, 39, the fingers 16, 17 will be lifted from the biscuits and the delivery will again take place.

The channels 14, 15, have their inner ends terminating in a pair of corresponding downwardly sloping slides 46, 47, the lower ends of which open into a pair of corresponding downwardly curved guides 48, 49. The upper end of the guides and lower end of the slides are supported by a bracket 49* that projects from the uprights 7, 8; and the lower end of the guides rests upon the cross member 6.

According to the scheme of this apparatus, the biscuits pass down the slides 46, 47 and are then taken by conveyors along the curved guides 48, 49, until, at the bottom thereof, they are suitably fed to cartons or packages. A plurality of such conveyors are provided and they are arranged so that each one operates in all the guides, the one following the other in the same endless path from one end of the guides to the other and then back to the first end. The construction and operation of one arm and free end of each conveyor and its actuating mechanism is clearly shown in Fig. 4 and will now be described.

The conveyor is marked 50 and consists of a pair of arms which have their free ends fashioned to constitute open structures having bottoms 51, tops 52, and backs 53. The area of each bottom is such as to conveniently support the biscuits, and the spacing of the tops 52 from the bottoms 51 is such as to readily accommodate the number of biscuts desired to be supplied to each carton or package.

The other ends of the conveyor arms are fixed at 54 in spaced relation on an angle arm 55 that is fast to a rock shaft 56 which is journaled in a swing member 57 that is pivoted on a rod 58 which is mounted in the upper ends of the standards 27, 28. Another arm 59 has one end fast to the rock shaft 56 and its other end pivoted at 60 to a link 61 that extends downwardly at an angle and has its lower end provided with an anti-friction roller 62. The said roller is fitted to engage the periphery of a cam 63 that is fixed near one end of the driven shaft 30, whereby the rotation of the said cam will reciprocate the link 61 and arm 59, thereby rocking the shaft 56 and, hence, oscillating the arm 55.

In order to insure that the roller 62 shall maintain contact with the cam 63, a spring arm 64 is arranged with one end pivoted to the end of the link 61 at which the roller 62 is located, while its other end is pivoted at 65 in a lug 66 which projects from the cross member 9 that spans the uprights 7, 8. Another lug 67 extends from the cross member 9 in a direction opposite to the lug 66, and a retractile coil spring 68 has one end secured to the lug 67 and the other end secured to the spring arm 64 intermediate its extremities. This construction causes the roller 62 to be yieldingly urged at all times toward the cam 63.

When the arm 55 is moved in one direction, the conveyor 50 will be swung downwardly, from the position shown in Fig. 4, throughout the length of the guides 48, 49, until it comes to a substantially vertical position near the lower extremity of the guides; and when the arm 55 is moved in the opposite direction it will impart opposite movement to the conveyor 50.

In order that the operative end of the conveyor 50 may be moved out of the way during its return travel to the top of the guides 48, 49, so as to permit downward movement of the other conveyor in the said guides, provision is made for lifting the conveyor 50 away from the guides by a movement substantially

in the direction of the longitudinal axis of the conveyor 50, after it reaches the lower part of the guides 48, 49, and for bringing the conveyor back into the guides, by an opposite movement, after it again reaches a position adjacent the upper end of the guides. This is accomplished by bodily swinging the arm 57 about its pivot 58, which movement is imparted by a link 69 that has one end loosely embracing the shaft 56. The other end of the link 69 is pivoted at 70 to the extremity of another link 71 which has its opposite end pivoted at 72 in the upright 8. At the pivot 70, an anti-friction roller 73 is located for engagement with a cam 74 which is fixed on the driven shaft 30 in spaced relation with respect to the cam 63.

The force of gravity causes the roller 73 to maintain contact with the cam 74, and the shape of the cam is such that it intermittently gives a sudden upward swinging movement to the arm 57, maintains the said arm in its upper position for a period, and then allows the said arm to suddenly move back to its lower position, at which it remains for the rest of the cycle. The cam 74 is timed so that its sudden upward swinging action upon the arm 57 takes place when the conveyor 50 is at its lowest point and the sudden downward swinging movement of the arm 57 takes place when the conveyor 50 is at its highest point.

The result of the foregoing mechanism is that the conveyor 50 is swung downwardly with its operative end within the guides 48, 49, from the top of the guides to the lower part thereof, then moved out of the guides and swung upwardly by a movement corresponding to its downward movement until it reaches a point adjacent the top of the guides, whereupon it is again projected into the guides. The endless path thus followed by the conveyor 50 consists of two swinging movements and two axial movements, the swinging movements being imparted by the cam 63 which oscillates the arm 55, through the described linkage, and the axial movements being imparted by the cam 74 which oscillates the arm 57 through the described linkage. It will be observed that the pivot point about which the arm 57 operates is fixed while the pivot point about which the arm 55 operates is floating, since it is located in the movable end of the arm 57.

The other conveyor is marked 75 and its actuating parts are well shown in Figs. 1 and 5. The said parts are the same in construction and operation as the parts which actuate the conveyor 50, and hence it will be sufficient merely to indicate them by number. The operative end of conveyor 75 has a bottom 76, a top 77, and a back 78. It is fixed at 79 in the end of an arm 80 which is fast on a rock shaft 81 that is journaled in the end of a swing arm 82 which is pivoted on the rod 58. Another arm 83 is also fast on the rock shaft 81 and to its end is pivoted at 84 a link 85 which has its other extremity provided with a roller 86 engaging a cam 87 fixed on the driven shaft 30. A spring arm 88 pivoted at 89 in a lug 90, which spring arm is actuated by a retractile coil spring 91 that has one end fast to a lug 92 and the other to the spring arm itself, serves to maintain the roller 86 in engagement with the cam 87. A link 93 has one end loosely embracing the shaft 81 and the other end pivoted at 94 to the extremity of another link 95 which has its other extremity pivoted at 96 to the upright 7. An anti-friction roller 97 is located at the pivot 94 for engagement with a cam 98 that is fast on the driven shaft 30 in spaced relation with respect to the cam 87.

The only differences between the construction and arrangement of the parts which actuate the two conveyors 50 and 75, are that the arms of the conveyor 75 are curved, as well shown in Fig. 1, and the two arms 80 and 83 project in substantially opposite directions from the rock shaft 81, whereas the corresponding arms 55 and 59 project from the rock shaft 57 at an acute angle with respect to each other. These differences are made so as to prevent the two conveyors from interfering with each other in their movements. It may be noted, in this connection, that the arms of the said two conveyors are arranged so that one arm of each conveyor lies between the two arms of the other conveyor. This is shown in Fig. 3, and it will be observed that the operative ends of the conveyors are enabled to travel in the same guides, because the said ends are offset from their arms in one direction on one conveyor and in the opposite direction on the other conveyor. While I have indicated each conveyor as having an operative end with bottom, top and back, it will be understood that each conveyor has, in fact, two identical operative ends comprising the said parts, such an end being formed on each of the pair of arms 50 so as to constitute, in effect, a double conveyor operating as a single unit, one end traveling in the guide 48 and the other in the guide 49.

Referring to Fig. 6, it will be seen that the movement of the conveyor 75, under the influence of cams 87 and 98, is diagrammatically represented. The arrow at the lower portion of the figure represents the direction of rotation of the cams which are fixed on the shaft 30. When the roller 97 is in engagement with cam 98 at the point marked *a*, roller 86 is in engagement with cam 87 at the point marked *a'*. At this juncture the pivot 84 is at the point marked *a''*. Now, as the cams rotate, roller 97 moves along the concentric portion of cam 98 until it comes to the point marked *b*. During this same period roller 86 traverses the long curved face of cam 87 until it reaches point *b'*. This travel moves pivot 84 to the position *b''* because

the long curved face of cam 87 is not concentric but has a lesser radius at the point b' than it has at the point a'; and this is what imparts the slow downward movement to conveyor 75 while the biscuits are being stacked therein. The floating pivot 81, however, remains stationary during this period because the face of cam 98, which is being traversed by roller 97, is concentric. Continued rotation of the cams moves roller 97 from point b to point c, and moves roller 86 from point b' to point c'. During this travel the floating pivot 81 also remains stationary, but pivot 84 is moved from point b'' to point c'' because the face of the cam 87 from b' to c' drops rapidly toward the axis of rotation of the cams. This imparts the downward swinging movement to the filled conveyor 75 so as to carry it to the bottom of the guide 49. Continued rotation of the cams moves roller 97 along cam 98 from point c to point d, and moves roller 86 along cam 87 from point c' to point d'. This causes floating pivot 81 to move from its lower position to its upper position marked x, because the surface of cam 98 from the point c to the point d passes abruptly away from the axis of rotation of the cams. The result of this action is to lift the conveyor 75 vertically away from the guide 49, while leaving it adjacent the lower portion of the guide. The next step in the rotation of the cams moves roller 97 along the surface of cam 98 from the point d to the point e, and moves roller 86 along cam 87 from the point d' to the point e'. This swings pivot 84 from point d'' to point e'' because the surface of cam 98 from b to e is concentric with the axis of rotation while the surface of cam 87 from d' to e' moves away from the axis, and this action correspondingly swings the conveyor to a point near the upper end of the guide 49, though spaced from it. The final step in the complete rotation of the cams moves roller 97 along the surface of cam 98 from e to a, and moves roller 86 along the surface of cam 87 from e' to a'. This causes floating pivot 81 to pass from its upper position x to its lower position because the surface of cam 98 from e to a slopes abruptly toward the axis of rotation of the cam. The surface of cam 87 from e' to a' moves abruptly away from the axis in order to permit the movement of roller 86 to accord with that of roller 97 and thereby prevent swinging movement of the pivot 84, so that the conveyor 75 will be projected from the limit of its upward swing directly toward the upper end of the guide 49.

In operation, as the operative end of one of the conveyors comes to the position of the conveyor 50 in Fig. 1, the fingers 16, 17 are automatically lifted from the biscuits being delivered and the latter begin to run down the slides 46, 47, following one another into the operative end of the conveyor 50. During this period said conveyor is moving down very slowly, the speed of its downward movement being sufficient to compensate for the stacking up of the biscuits, one on top of the other, in the said conveyor. After a given number of biscuits have thus passed down the slides and into the conveyor, which number is pre-determined according to the circumstances under which the machine is being operated, the fingers 16, 17, are automatically moved downwardly so as to contact with the biscuits in the channels 14, 15, and thereby arrest the feed. At this instant the position of the parts is represented by the conveyor 50 shown in Fig. 5.

In order to insure that the last biscuit passing into the conveyor does not hit against either top 52 and become injured, each said top is pivoted at 99 in a clip 100 secured to the back 53 by a bolt 101. Each said top 52 is formed like a bell crank and its rearward extension is engaged by a leaf spring 102 that is fastened to the clip 100 so as to yieldingly urge the top into horizontal position. Pins 103 are fixed in the lower end of the slide 46 in such position as to be engaged by the front edge of each top 52 just before the last biscuit is fed into the conveyor 50, and this engagement of each top with a pin 103, coupled with the downward movement of the conveyor, lifts each top, as indicated in Fig. 5, so as to eliminate any possibility of contact between it and the last incoming biscuit. As soon as each top has passed out of engagement with a pin 103, the spring 102 automatically brings it back into normal position. It will be understood that the tops 77 of the other conveyor, 75, are constructed, arranged and operated in the same way.

Inasmuch as the guides 48, 49, have bottoms and sides, the cooperation of the said guides with the operative ends of the conveyors forms a substantially complete enclosure for the biscuits during the downward movement of the conveyors in the guides, thereby protecting the biscuits during such travel.

When the conveyor reaches the lower part of the guides 48, 49, the biscuits carried by it are urged between a spring catch 104 and a spring blade 105. The catch is secured to one side of the guide and has its nose projecting through a hole therein so as to be in the path of travel of the biscuits. It is constructed and operated substantially like the well known umbrella catch. The blade spring is also fast to the guide and has its inner end projecting through a hole in the side of the guide and standing out into the path of the biscuits. All the biscuits carried by a conveyor will be caused to pass the catch 104, pressing it aside during their passage. After they have thus passed the catch the latter will spring out and serve to support the last biscuit in upright position. The inwardly projecting blade 105 will yieldingly

contact with the first circuit of any given lot and maintain it in upright position. Thus the lot of biscuits will be supported in the guide when the conveyor moves away from them, as previously described. At this juncture an operative may, by inserting an implement behind the lot of biscuits, eject them from the lower end of the guide into a carton or package, substantially as set forth in my United States Patent No. 1,518,556 dated December 9, 1924; or the lot of biscuits may be fed into a carton or package in any other suitable manner.

The operating cams are so shaped that, after a conveyor has been loaded with biscuits, its downward movement in the guides is very rapid and, likewise, the movements of the conveyors toward and away from the guides are rather sudden. On the contrary, the downward movement of the conveyors at the time they are being loaded with biscuits is very gradual so as just to accommodate the flow of the biscuits down the slides 46, 47.

As previously described, each conveyor has two arms and two operative heads and cooperates with both guides 48, 49, so that two lots of biscuits are simultaneously fed down through the guides by each conveyor. The conveyors work in the same manner and follow the same paths of travel, each one succeeding the other. It will, of course, be clear that the construction above described can be duplicated as desired so as to make banks of such apparatus, thus simultaneously feeding any reasonable number of lots of biscuits to be ejected into cartons or packages. To indicate this Figs 2 and 3 have been shown as broken views.

It will be seen from the foregoing that this apparatus avoids any manual handling of the biscuits from the time they are fed from the ovens until they are inserted in the cartons or packages. It is not necessary for the operator ever to touch a single biscuit in this part of the work and, therefore, the desired sanitary conditions are achieved. The biscuits are not only fed automatically, partly under the influence of gravity, but they are simultaneously stacked so as to form an accurate charge for the intended package and they are delivered for insertion in the package in this stacked condition. By arranging the conveyors so that they operate successively in the same guides, the size of the machine for any given output is decreased.

It will be understood that various changes may be resorted to in the form, construction and arrangement of the several parts, without departing from the spirit and scope of my invention, and hence I do not intend to be limited to the details herein shown and described, except as they may be included in the claims.

What I claim is:

1. Apparatus of the character described comprising, a guide for the biscuits having three walls, and a conveyor for a lot of biscuits adapted to move through the guide, said conveyor having three walls, whereby, when the conveyor is moving through the guide the lot of biscuits will be effectively confined by them on all sides.

2. Apparatus of the character described comprising, a plurality of guides for the biscuits, a plurality of conveyors adapted to successively feed lots of biscuits through said guides, each said conveyor having a plurality of operative ends, one end cooperating with each of the plurality of guides.

3. Apparatus of the character described comprising, a plurality of conveyors for feeding lots of biscuits, each conveyor including a plurality of arms, an arm of one conveyor being arranged to travel between two arms of another conveyor.

4. Apparatus of the character described comprising, a conveyor for feeding lots of biscuits, and means for actuating said conveyor, said means including a fixed pivot and a floating pivot, mechanism for moving the conveyor about the floating pivot to give the conveyor a swinging movement, and mechanism for bodily moving the floating pivot to give the conveyor a longitudinal movement.

5. Apparatus of the character described comprising, a guide for the biscuits, a swinging conveyor for feeding lots of biscuits through said guide, means for stacking the biscuits in the conveyor, and means for swinging the conveyor slowly while it is being stacked and relatively rapidly thereafter.

6. Apparatus of the character described comprising, a guide for the biscuits, a swinging conveyor for feeding lots of biscuits through said guide, and means for moving the conveyor in the direction of its longitudinal axis to withdraw it from the guide after it has fed its lot of biscuits therethrough, and for returning it to the other end of the guide by swinging movement and a movement in the direction of its longitudinal axis taking place in a path outside of the guide.

7. Apparatus of the character described comprising, a mechanical conveyor for feeding lots of biscuits, means for stacking biscuits in the conveyor, and a movable top on said conveyor, and automatic means for moving said top to avoid injury to the last biscuit of a lot stacked therein.

8. Apparatus of the character described comprising, a conveyor for feeding lots of biscuits, means for stacking biscuits in the conveyor, a movable top on said conveyor to avoid injury to the last biscuit of a lot stacked therein, and a device in the path of travel of the conveyor for engaging said top and moving it at the time the last biscuit of a lot is stacked therein.

9. Apparatus of the character described

comprising, a guide for the biscuits in substantially the form of an arc of a circle, a conveyor for feeding lots of biscuits through the guide, said conveyor being pivotally mounted at substantially the center of the circle of which the guide forms an arc, and means for swinging the conveyor substantially through a sector of the said circle and also moving the conveyor substantially on a radius of the circle.

10. Apparatus of the character described comprising, a guide for the biscuits in substantially the form of an arc of a circle, a conveyor for feeding lots of biscuits through the guide, said conveyor being pivotally mounted at substantially the center of the circle of which the guide forms an arc, and means for swing the conveyor substantially through a sector of the said circle and also moving the conveyor in two directions substantially on radii of the circle.

11. Apparatus of the character described comprising, a plurality of conveyors for feeding lots of biscuits, each conveyor including a plurality of arms, an arm of one conveyor being arranged to travel between two arms of another conveyor, and the conveying parts of each conveyor following the same path of functional movement.

12. Apparatus of the character described comprising, a guide for the biscuits, a conveyor for feeding lots of biscuits through the guide, means for stacking the biscuits in the conveyor at one end of the guide, means for actuating the conveyor in its course of travel, including means for swinging the conveyor slowly during said stacking, and means for removing the conveyor from the biscuits at the other end of the guide by a relatively quick axial movement.

13. Apparatus of the character described comprising, a plurality of conveyors for feeding lots of biscuits, each conveyor having a different and movable axis, each conveyor also having a series of biscuit-conveying ends, and a number of channels with which these conveyors cooperate less in number than the total number of biscuit-conveying ends.

14. Apparatus of the character described comprising, a conveyor for feeding lots of biscuits, means for moving the conveyor along an arcuate path from its point of loading to its point of discharge, means for moving the conveyor in a reverse direction along a different arcuate path from its point of discharge to its point of loading, and means for moving the axis of said conveyor.

In testimony that I claim the foregoing as my invention, I have signed my name this 2nd day of March, 1926.

JACOB HEINRICH LUDWIG BOETTCHER.