

June 14, 1955

A. L. COLL

2,710,682

EGG HANDLING APPARATUS

Filed Aug. 24, 1951

8 Sheets-Sheet 1

Fig. 2

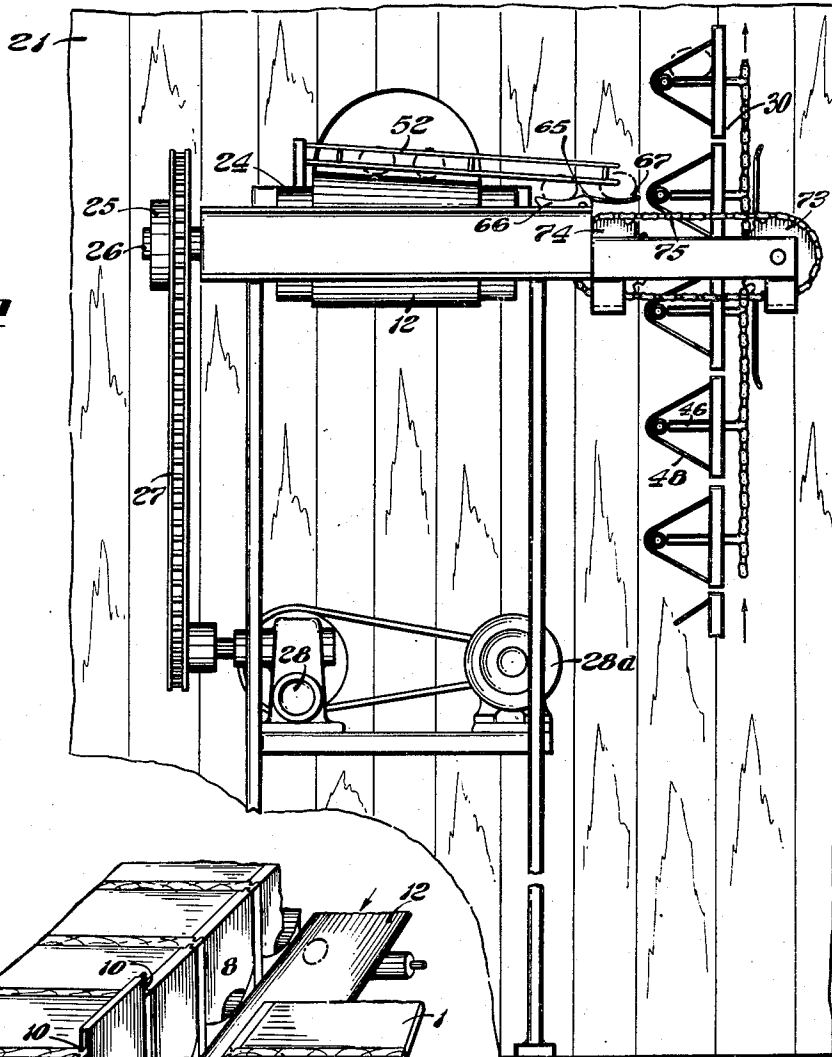
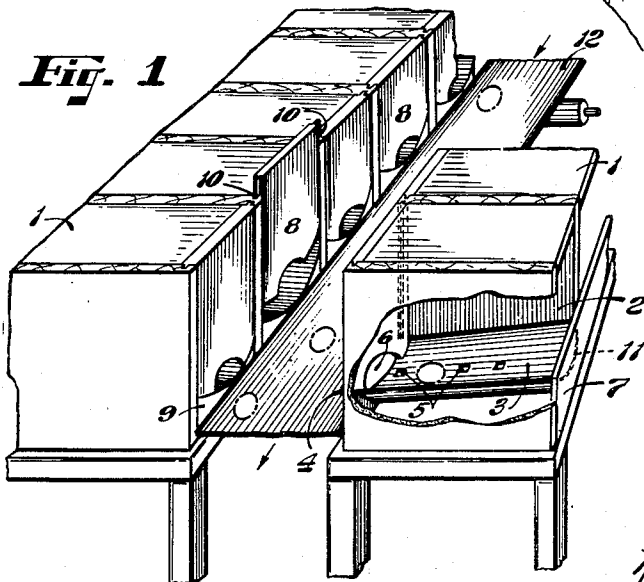


Fig. 1



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8 Sheets-Sheet 2

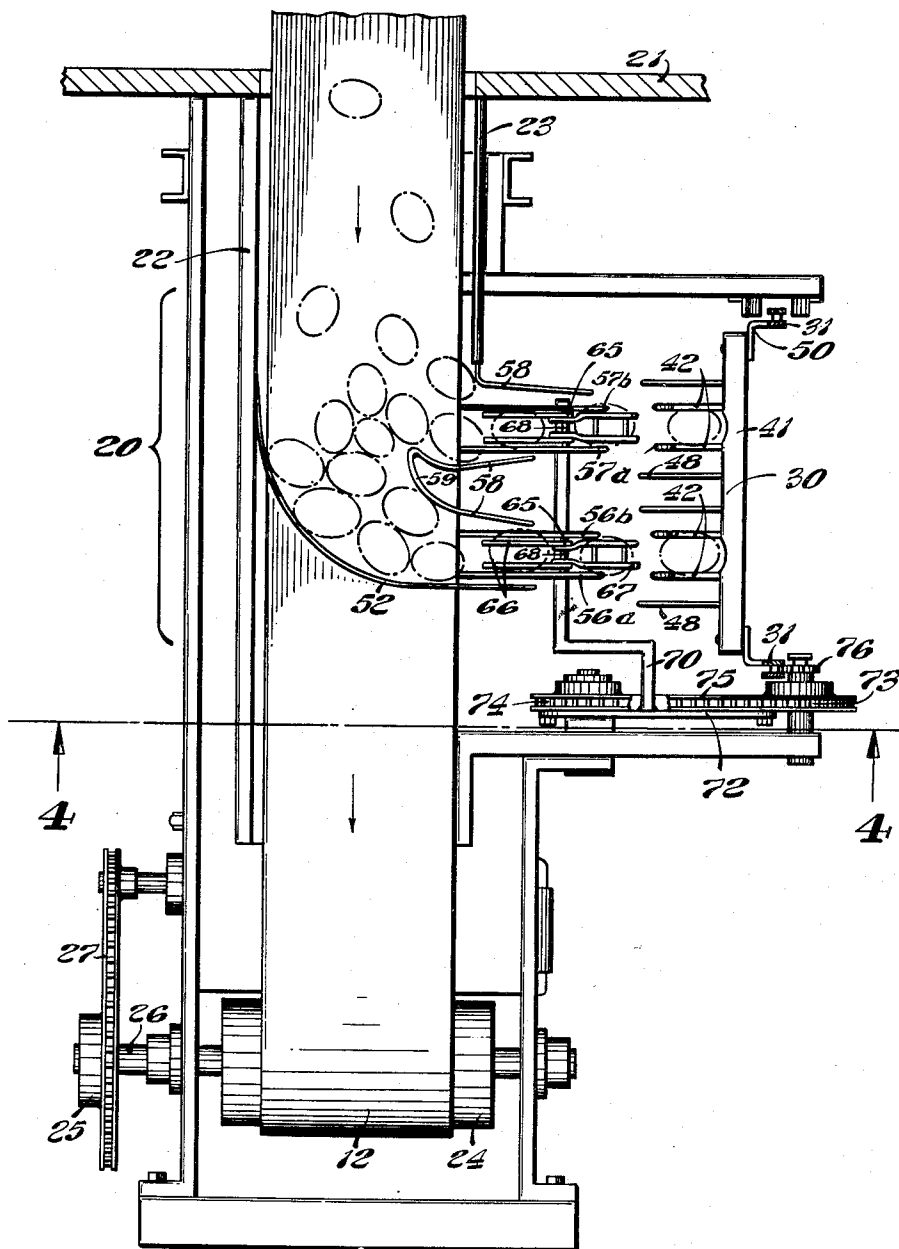


Fig. 3

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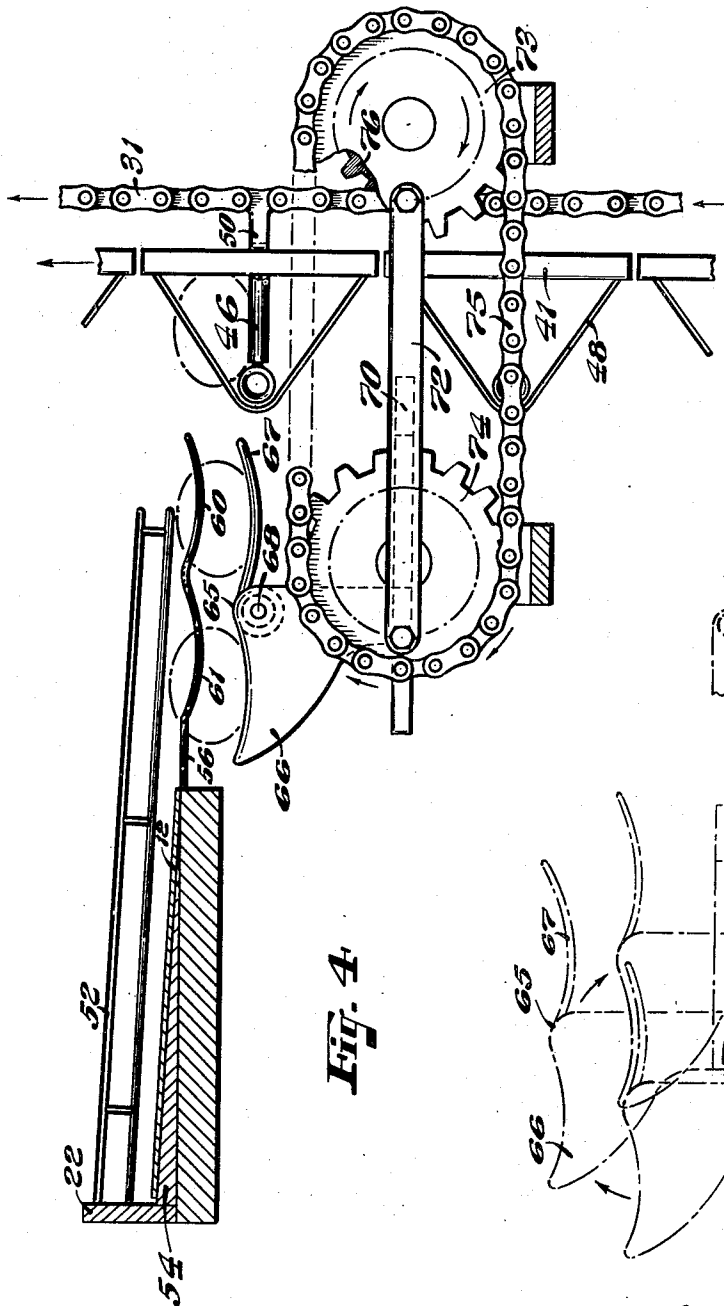
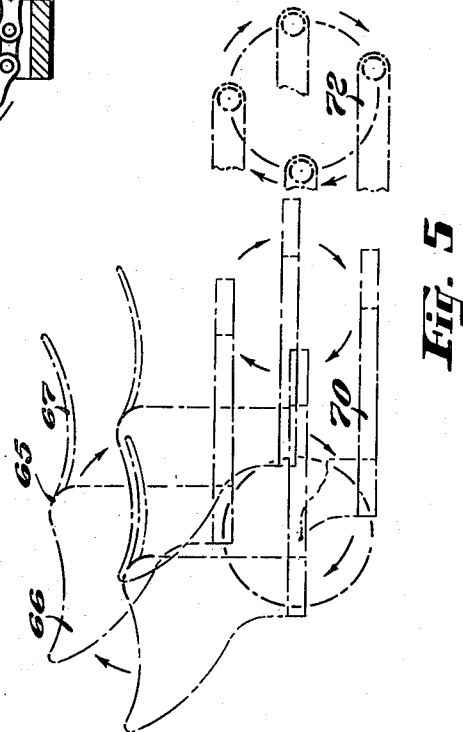
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8 Sheets-Sheet 3



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EGG HANDLING APPARATUS

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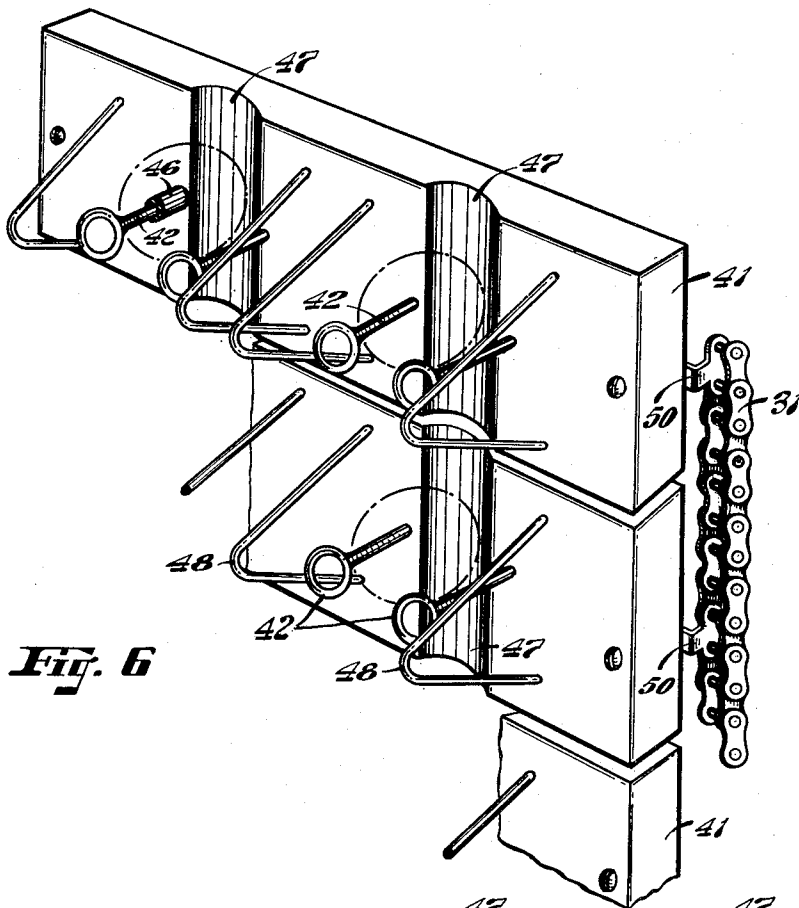


Fig. 6

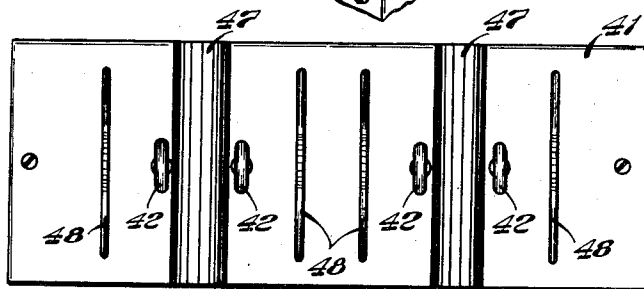


Fig. 7

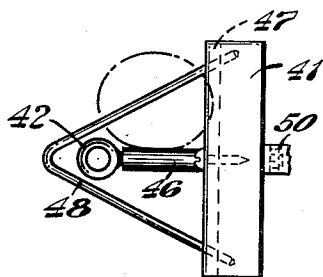


Fig. 8

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EGG HANDLING APPARATUS

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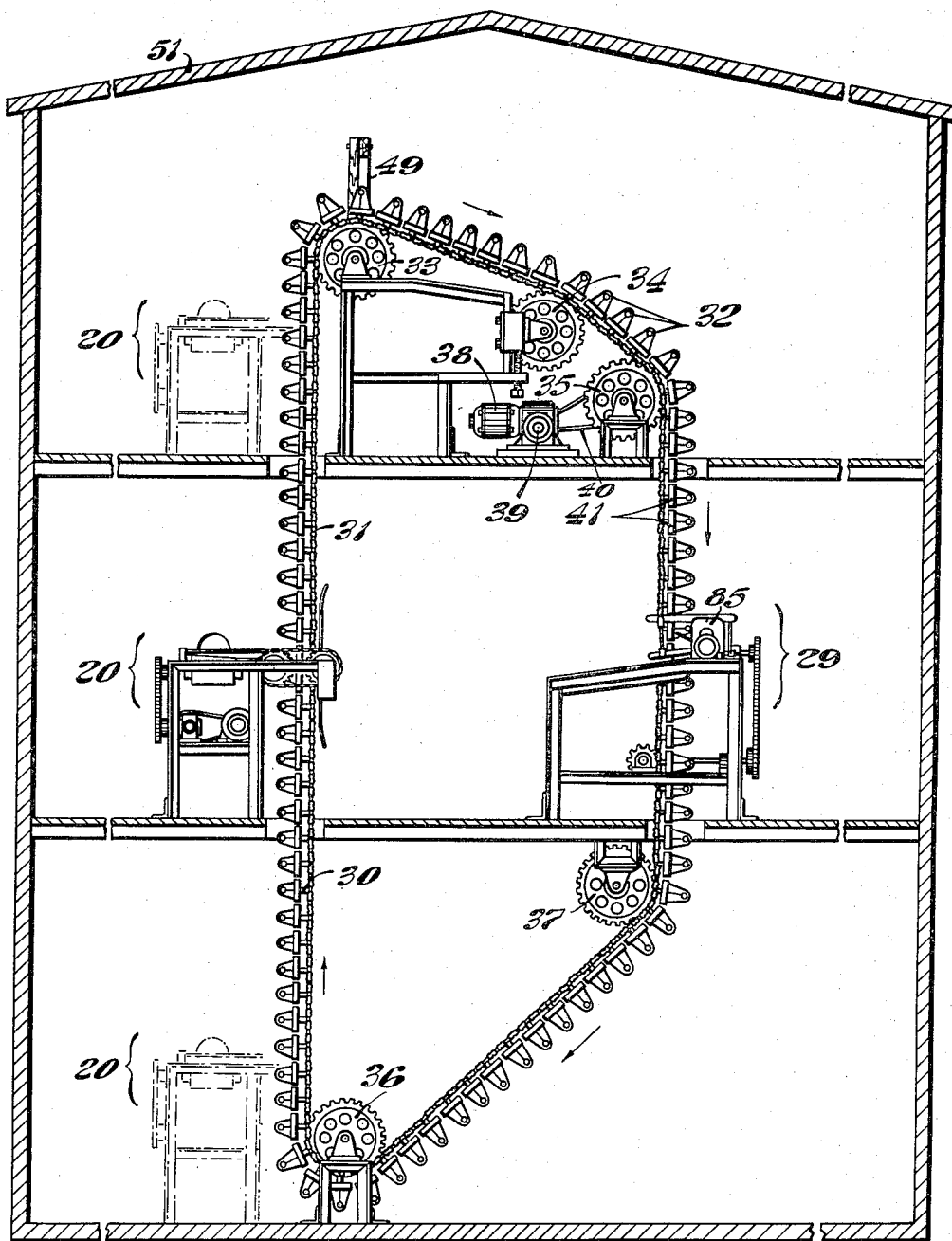


Fig. 9

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EGG HANDLING APPARATUS

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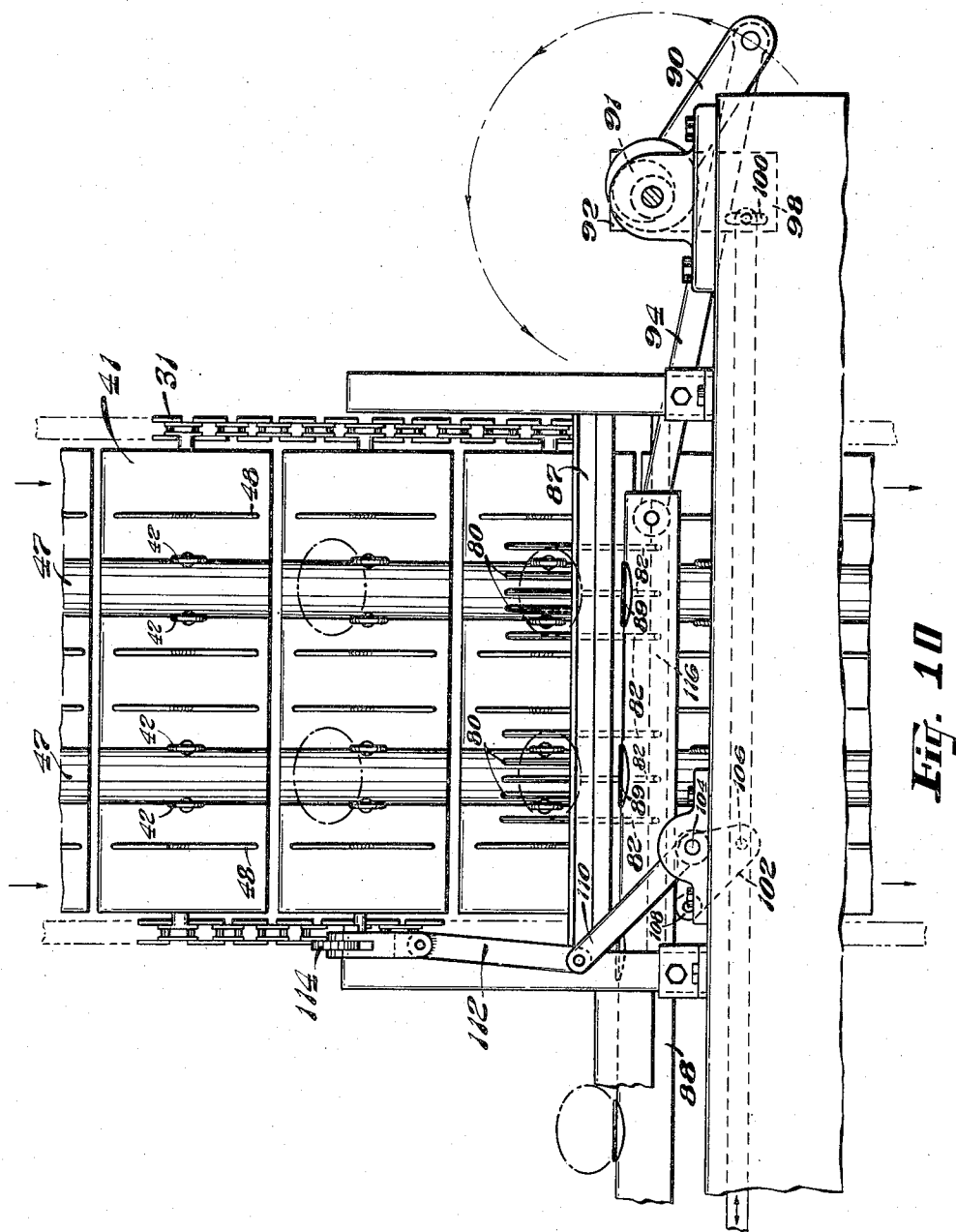


Fig. 10

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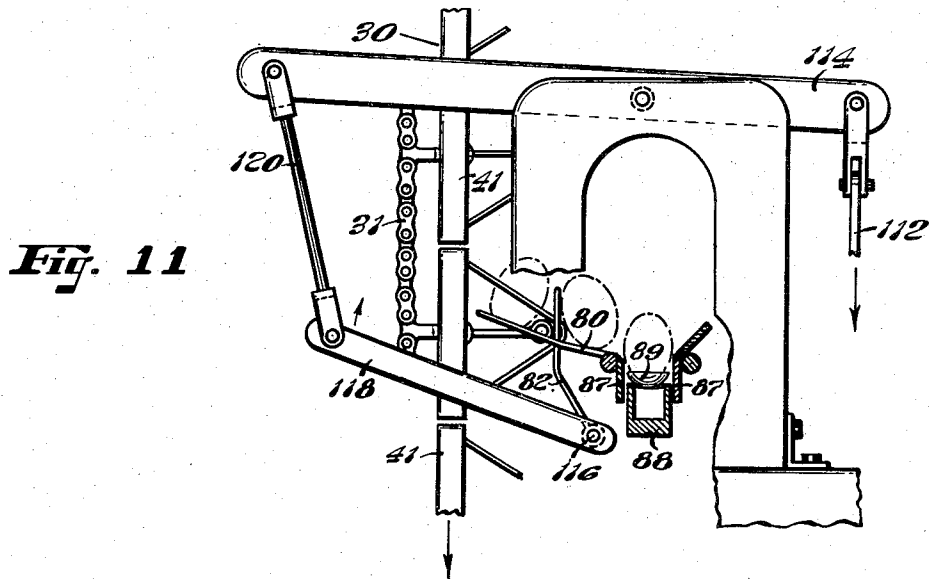


Fig. 11

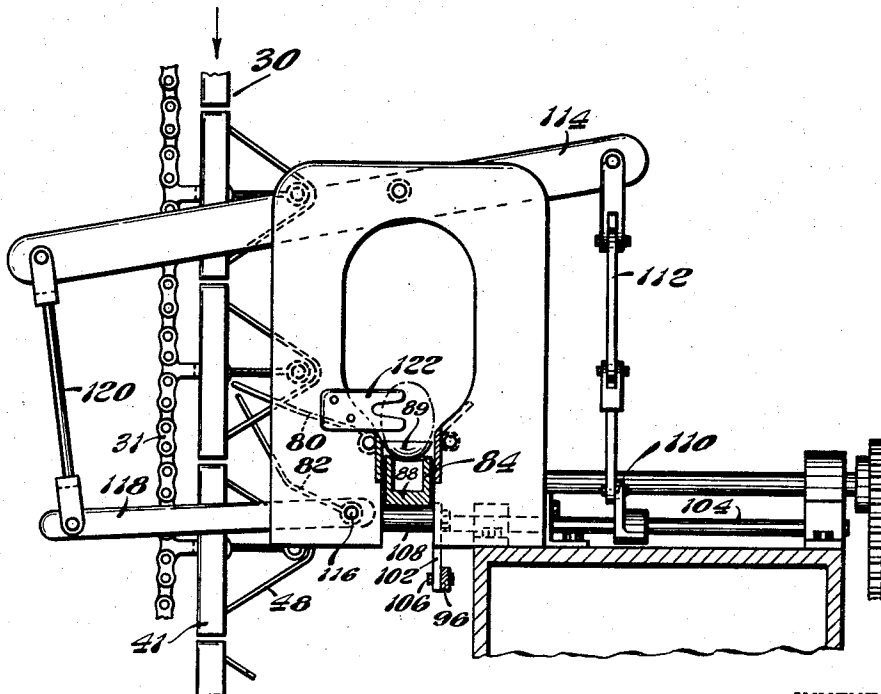


Fig. 12

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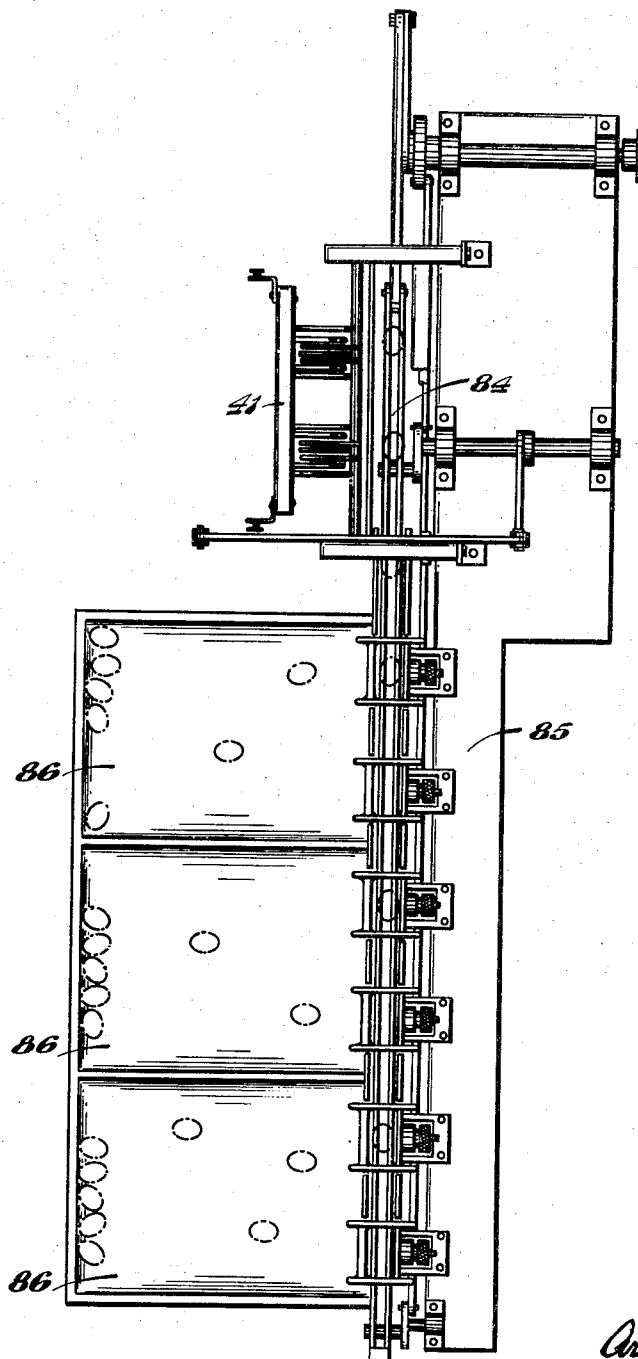


Fig. 13

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2,710,682

EGG HANDLING APPARATUS

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Application August 24, 1951, Serial No. 243,427

11 Claims. (Cl. 198—20)

This invention comprises new and improved apparatus or equipment for mechanically collecting eggs from the laying nests and delivering them to a common depot.

The common practice in the poultry industry is to collect eggs manually several times a day and deliver them to a central packing room where they are graded and crated. A variety of factors have heretofore blocked the development of mechanical egg collecting apparatus. The eggs are laid in a variety of places and must accordingly be collected from a multitude of sources. Their delicate nature and unique shape have heretofore precluded the use of conventional mechanical collecting and conveying apparatus.

It will thus be appreciated that the success of mechanical egg collecting systems demands first a means of inducing the hens to lay in predetermined places and a servicing of these places by primary collecting systems. In large poultry houses such a large number of hens are kept, and in such widely separated places, that a number of primary collecting systems are necessary. Accordingly, a secondary conveyor, served by the primary collecting systems, is necessary to deliver all the eggs to a common depot. A criterion of the secondary conveyor is that it must be adapted to collect eggs from different levels, since hens are normally housed on several floors in the hen house. Transfer mechanism must also be provided to transfer the eggs from the primary collecting system to the secondary conveyor, and from the secondary conveyor at the collecting depot.

Accordingly the objects of this invention, which provides a successful mechanical egg collecting apparatus, are to provide nests in which hens will readily lay; to provide such nests from which the eggs are removed as soon as they are laid; and to service such nests by primary collecting systems. Further objects are to serve the primary collecting systems by secondary conveyors, to provide mechanism for transferring the eggs from the primary collecting systems to the secondary conveyors; to provide a secondary conveyor adapted to collect eggs from several levels and to deliver them to a depot at any desired level by carrying them upward from the primary collectors to a convenient point of descent and then downwardly to a removal station; and to provide mechanism for removing the eggs from the secondary conveyor and delivering them to appropriate apparatus for further processing, such as grading or candling. Another important object is to handle the eggs as indicated above with no appreciable breakage.

In the accomplishment of these objects, and in carrying out this invention, nests having a rounded or trough-shaped slanting bottom of lateral contour roughly similar to the underside of a hen are arranged in double back-to-back rows along and adjacent to a conveyor belt. The nests, to and from which the hens are free to go, comprise boxes having an open front. The bottom slopes toward the back, and the back wall, near the low point of the bottom, is provided with an opening large enough to permit an egg to roll therethrough, out of the nest and

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onto the adjacent conveyor belt. The hens are not reluctant to lay in such a nest.

The conveyor belt, comprising the primary collecting system, runs the entire length of the rows of nests and extends beyond the rows to a loading station where the eggs are transferred to an egg handling elevator. Preferably the loading station is separated from the nests and hens by a partition which is provided with an opening through which the conveyor runs. Similar rows of nests and conveyors are provided on the other floors of the hen house and the elevator also serves these floors. The conveyors are normally stationary and are started up individually whenever it is desired to collect the eggs from a series of nests at a selected level.

The elevator or secondary conveyor comprises a continuous or endless vertical conveyor which carries the eggs upward from the loading stations, around or across the top of the house, and down the other side to a common removing station. Means are provided to keep the eggs on the conveyor although each egg and its supporting means are turned over as the conveyor passes over the top point in the path of the elevating conveyor.

The elevator comprises a series of connected panels each provided with a pair of outwardly extending egg supporting means adapted to carry an egg. Guide means extend from opposed front and back edges of the panel and align with guide means of the adjacent panels. By this system as each panel travels over the top of the elevator the egg rolls along the guide means and is transferred onto the forward adjacent panel and is there carried by the egg supporting means of that panel. A feature of this aspect of this invention is that the egg supporting means must be adapted to support an egg from both top or bottom sides.

At the loading station, where the conveyor belt delivers the eggs to the elevating conveyor, a loading mechanism transfers the eggs to the elevator. A rail extends more or less diagonally across the belt to cause the eggs to be pushed off the edge of the belt and onto one or more feeder racks which direct the eggs toward the egg supporting means of the elevator. It is also preferred to incline the belt laterally at this point to assist the removal of eggs therefrom. A picker, operating between the feeder racks and the elevator, is preferably provided to lift an egg from the feeder racks and deposit it on the egg supporting means of the elevator, thereby to control the flow of eggs from the loading station to the elevator. The motion of the picker is synchronized with that of the elevator so that the picker is in delivery position at the same time each egg supporting means reaches the delivery point to receive an egg. The eggs are thus loaded on the elevator and carried by it over the top of its path and downward to the removal station.

At the removal station the eggs are lifted from the egg supporting means and delivered to the conventional feeder of an automatic grader. A pusher cooperating with fixed guide arms engages each egg as it nears the guide arms and pushes it from the elevator and down the guide arms onto the feeder. Each egg is then moved stepwise along the feeder and into the grader where it is delivered to the proper sorting tray. The pushers are synchronized with the elevator to assure the proper removal of each egg from its supporting means.

These and other features of the invention will be best understood and appreciated from the following description of a preferred embodiment thereof, selected for purposes of illustration, and shown in the accompanying drawings in which:

Fig. 1 is a perspective fragmentary view of the nests and conveyor belt, with parts broken away to reveal structural details;

Fig. 2 is the side elevation of a loading station;

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Fig. 3 is a plan view of a loading station;

Fig. 4 is a front elevation of part of a loading station as viewed from 4—4 of Fig. 3 and on a larger scale;

Fig. 5 is a schematic layout suggestive of the motion of the pickers;

Fig. 6 is a perspective view of a fragment of the elevator showing the egg carriers in detail;

Fig. 7 is a front elevation of a carrier;

Fig. 8 is a side elevation of a carrier;

Fig. 9 is a layout showing in side elevation a hen house equipped with loading stations, removal station and egg handling elevator;

Fig. 10 is a front elevation showing the removal station;

Figs. 11 and 12 are side elevations of the removal station in different phases of their operating cycle; and

Fig. 13 is a plan view of the removal station, and egg grader and sorting trays.

Referring now to Fig. 1 each nest 1 is shown to consist of a box having an open front 2 and a rounded or trough-shaped bottom 3 which slants toward the back wall 4. The bottom 3 may consist of such materials as sheet metal, but is preferably constructed of woven wire hardware cloth. In any case it is desirable that one or more holes 5 be provided to keep the nests clean by allowing for the removal of droppings and other refuse. The open mesh structure of hardware cloth is ideal for this purpose. The slope of the bottom 3 must be sufficient that an egg will roll slowly along it. A hole 6 is provided in the back wall 4 of the nest at the low point of the bottom, so that an egg deposited in the nest will roll out of it through the hole.

It has been found that a nest having a rounded and slanting bottom is entirely satisfactory and attractive to the hens and that they will readily lay in it, whereas they seem reluctant to lay in a nest having a sloping flat bottom. Apparently the sensation of the rounded bottom on the underside of the hens is sufficiently suggestive of a soft nesting material normally sought by hens for laying purposes to be considered by the hens as ideal for nesting.

The bottom 3 is secured between the back wall 4 and a front panel 7. The back wall comprises two mating sections, 8 and 9, which join along a line defining the curvature of the bottom. The upper section is retained in guideways 10 so as to be removable and the bottom 3 is secured between these two back wall sections. The egg delivery hole 6 is formed in and at the bottom of the upper section 8. The front panel 7 is provided with a groove 11 which also defines the curvature of the bottom of the nest, this groove being slightly higher than the joiner of the back wall sections to provide the proper slope to the bottom. The bottom 3 is engaged and supported in said groove 11 at the front edge, and is secured between the mating back sections 8 and 9 at the back edge.

The nests 1 are arranged back-to-back in two parallel rows each flanking one side of a conveyor belt 12, which extends the entire length of the rows. The belt 12 runs beyond one end of the row of nests to a loading station 20, shown generally in Figs. 2 and 3, and preferably through a partition 21 which separates the rows of nests from the loading station area. Beyond the nests, which act as sides for the belt, the belt runs between a pair of side boards 22 and 23, which prevent the eggs from rolling off the sides of the belt, after the belt has emerged from between two rows of nests. The conveyor belt 12 is normally stationary and may be driven by conventional means such as the end roller 24 around which the belt passes. The driving mechanism is herein shown as comprising a sprocket 25 keyed to the shaft 26 to which the end roller 24 is also secured. A chain drive 27 extending from a speed reduction unit 28 powered by an electric motor 28^a provides power to the sprocket 25 and end roller 24.

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At the loading station the eggs are transferred to the secondary conveyor by which they are delivered eventually to a common collection depot, other loading stations also serving to supply eggs to the secondary conveyor. A layout of a secondary conveyor comprising an egg handling elevator is shown in Fig. 9. Loading stations 20 on the three floors of the hen house 51 may each deliver eggs to the vertical elevator from whence the eggs are carried upward, around the top of the path and downward to the removal station 29.

The elevator 30 consists of a parallel pair of continuous roller chains 31 which carry throughout their length adjacently disposed egg carriers 32. The top of the elevator 30, between the ascending and descending sections, is supported to provide for a gradual upsetting of the egg carriers 32 so that each egg as it is carried over the top of the elevator is caused to roll gently forward onto the forward carrier, as explained more fully below. In the preferred apparatus, shown in Fig. 9, the elevator is supported at its top on three supporting members 33, 34 and 35, each shown as comprising a pair of sprockets over which the roller chains pass so that the section between the first supporting member 33 and the second supporting member 34 is inclined downward at about 20° and the section between the second support 34 and the third support 35 is inclined more steeply, at about 45°. Thus each egg between its ascent and descent is carried over two downwardly inclined sections of the conveyor during which time it is transferred to the carrier located in advance of the one which supported it during its ascent. Other equivalent means of supporting the top of the elevator to cause the gradual upsetting of the carriers necessary for proper gentle transfer of the eggs to the forward carrier may also be used. For instance a pair of supporting members, providing a single inclined region between the ascending and descending sections of the conveyor may be used, or alternatively, a single pair of large sprockets over which the carriers are gradually upset is satisfactory.

The remainder of the elevator is supported in a conventional manner as by two pairs of sprockets 36 and 37 at the bottom between the ascending and descending sections. The elevator is driven through any one of the pairs of supporting sprockets such as the pair of sprockets 35 at the top of the descending section, as shown, a motor 38 and reduction gear 39, connected through a belt drive 40, provides the source of power.

From the foregoing description it is apparent that the egg carriers must each be adapted to support an egg on both the top and bottom sides, and that an egg must be free to roll from one carrier to the forward carrier as it passes over the top of the elevator.

A preferred carrier is shown in detail in Figs. 6, 7 and 8. Each consists of a panel 41, having one or more pairs of outwardly extending fingers 42 situated about midway between the top and bottom. The fingers 42 each have an enlarged end, and they are arranged in parallel pairs of such spacing that an egg may rest upon each pair, with the enlarged end sections serving to prevent the egg from rolling outwardly, as suggested by the drawings. Each finger conveniently consists of a pin having a vertical ring mounted radially at its outward end. Sleeves 46 of rubber, or other soft resilient material, are preferably mounted on the fingers to help minimize breakage, but they may be omitted if desired.

Guideways extend inwardly from the top and bottom edges of each carrier in alignment with each pair of fingers and with the guideways of the adjacent carriers, to help guide each egg from its carrier to the forward carrier as it passes over the top of the elevator. In the preferred apparatus these guideways consist of longitudinally aligned grooves 47 which extend across each carrier, between the pairs of fingers 42, the guideway portion being the outer sections of said grooves.

A pair of guards 48 surrounding each pair of fingers are

also preferably provided to help keep the eggs within the confines of the carriers. Although the eggs seldom contact the guards, it has been found occasionally that an egg fails to alight properly on the fingers and is then only retained on the carrier by means of the guards. The guard may consist of a V-shaped wire bail spaced laterally from each finger with its apex outwardly disposed and its plane vertical, as shown, or it may consist of any element adapted to support an egg between itself and one finger.

The carrier panels are mounted adjacently along the entire length of the conveyor, with sufficient space between them to allow them to pass around the several sprockets without interference with each other. In the preferred apparatus, which utilizes a pair of roller chains 31 to carry the panels, each panel is mounted on a link 50 having an outwardly extending L-shaped bracket. In the apparatus shown in the drawings each carrier panel is provided with two pairs of fingers, two guideways, and two guard bails to adapt it to carry two eggs.

With this type of carrier it has been found desirable to mount over the top of the elevator at the point just before the eggs tend to roll from their supporting fingers, a downwardly extending flat spring 49 which contacts the eggs to prevent them from rolling too rapidly onto the forward carrier by holding each egg on its original carrier until that carrier is fully aligned with the next preceding carrier, as best shown in Fig. 9. This spring may be omitted if desired if the inclination of the carriers at the point of transfer is not steep enough to result in appreciable breakage.

At the loading stations the eggs are removed from the belt conveyors 12 and fed onto the elevator 30. This is conveniently done by means of a guide rail 52 which extends more or less diagonally across the belt and engages the eggs to prevent their continued travel along the belt 12, and to direct them off the side of the belt where it passes the elevator. The side board 23 on the removal side of the belt terminates short of the guide rail to allow the eggs to be removed from the side of the belt. In this removal region it is also desirable to incline the belt to the removal side as shown at 54 in Fig. 4.

Extending from the edge of the belt 12 opposite each vertical row of carrier fingers 42 on the elevator is a pair of feeder racks 56^a and 56^b, and 57^a and 57^b (designated generally as 56 and 57), more or less aligned with said fingers. Each pair of feeder racks is flanked by guard rails 58 situated so as to prevent eggs from rolling off said racks 56 and 57. The guard rails between adjacent feeder racks extend inwardly over said belt and join in a finger 59 directed slightly into the direction of motion of said belt. Eggs may thus be removed from the belt to flow onto the feeder racks 56 and 57.

Each feeder rack is bowed slightly near its end whereby each pair forms a cradle 60 adapted to hold an egg and prevent its rolling from the end of the pair of racks which support it. A second bowed region 61 is preferably provided in the rack just inwardly from said terminal bow. Thus the feeder racks 56 and 47 cradle two eggs at their end and prevent the eggs from rolling freely along the rack and off the end. The ends of each pair of feeder racks 56 and 57 terminate just outwardly from the ends of the passing fingers 42 of the carriers which they feed, the terminal cradle 60 being spaced from the carrier fingers 42 by approximately the same distance that it is spaced from the inwardly adjacent cradle 61.

A picker 65 is provided to transfer the eggs from each pair of the feeder racks to the carrier fingers of the elevator. It consists of a vertical parallel pair of bed members 66 having slightly concave top surfaces spaced and arranged to pass between the pairs of racks. Extending normally horizontally from said bed members toward the elevator is a fork member 67, pivotally mounted to swing upward on a pin 68 extending between said bed members 66. The fork member 67 is mounted in a normally hori-

zontal position level with the top of the bed members 66 and may be swung upward. The fork member 67 is bowed downwardly whereby an egg may rest thereon, and it is sufficiently narrow to pass between the fingers 42 of the carriers.

The picker 65 is caused to travel translationally in a circular motion upward between the feeder racks 56 and 57 and downward with the fork member 67 between the carrier fingers 42. The bed member 66 and fork member 67 are spaced to correspond to the two cradle sections 60 and 61 provided in the pair of feeder racks 56 and 57. Thus the picker picks up two eggs on its upward motion between the feeder racks and carries them forward and downward to deposit the egg on the fork member 67 on the carrier fingers 42 and the egg on the bed member 66 on the terminal cradle 60 of the feeder rack, as suggested in Fig. 4 where eggs in various positions are indicated in broken lines.

The motion of the picker is synchronized with the motion of the elevator so that the fork member passes downwardly through each pair of carrier fingers. This is conveniently done by mounting the picker on a horizontal brace 70 which is secured to an arm 72 mounted horizontally and eccentrically between two sprockets 73 and 74 driven in synchronism by a timer chain 75. One of said sprockets 73 is driven by a coaxial driving sprocket 76 which engages the roller chain 31 of the elevator 30, said driving sprocket having the same number of teeth as there are links between adjacent carriers. Fig. 5 outlines the motion of the picker 65 and eccentric arm 72.

At the removal station shown in Figs. 10, 11, 12 and 13 the eggs are carried downward onto a fixed pair of guide arms 80 which extend between the carrier fingers 42. Pusher bars 82 rotatably mounted below the guide arms 80 swing upward each time the carrier fingers 42 pass the guide arms 80 to eject the egg carried by the fingers along the guide arms to any desired destination, shown illustratively as the feeder 84 of a grader 85. After the egg is ejected the pusher bars 82 swing back to position for receiving the next egg.

The pusher bars 82 are driven through the mechanism which controls the grader feeder 84, and its motion is synchronized with the motion of the elevator 30, so that the pusher bars 82 complete a cycle each time a carrier panel 41 advances to the unloading position. Synchronism is conveniently provided by driving the grader feeder 84 through a sprocket (not shown) which engages the roller chain 31 of the elevator, in the same manner that the picker 65 is synchronized with the elevator.

In the illustrated apparatus the eggs are pushed onto a pair of stationary parallel supporting bars 87 between which operate a slide bar 88. The slide bar 88 is provided with a series of cups 89 spaced to correspond to the spacing of the eggs as they rest on the supporting bars 87. The slide bar 88 is driven in translational cyclical motion, coming up between the bars 87 to pick up the eggs, then forward and down to deposit them farther along the bars 87. In this manner the eggs are moved stepwise into the grader 85 as they are ejected from the elevator.

The operation of the grader feeder 84 and pusher bars 82 is controlled by a crank arm 90 and coaxial eccentric cam 91 having a block follower 92, the center of the eccentric cam 91 leading the crank arm 90 by about 90° in the illustrated apparatus. The crank arm 90 is connected through a connecting rod 94 to the slide bar 88 and imparts backward and forward motion thereto. An actuating rod 96 is connected to the block follower 92 by means of a pin 98 and slot 100 arrangement which allows the block 92 to move vertically independently of the actuating rod 96. The actuating rod 96 operates a triangular bell crank 102 which is mounted on a journalled shaft 104 above and across the actuating rod 96. A pin 106 links the actuating rod 96 with the lower corner of the bell crank 102.

The left corner of the bell crank, in the view shown

in Fig. 10 carries a roller 108 which supports the slide bar 83 and imparts the prescribed vertical motion to it.

The shaft 104, to which the bell crank 102 is fastened, is keyed to an arm 110 which is connected through an intermediate link 112 to a walking beam 114 pivoted near its midpoint. The arm 110 is positioned to oscillate in an arc, with said shaft, from a maximum clockwise position slightly to the left of the vertical to a maximum counterclockwise position slightly above the horizontal. The walking beam 114 is thus caused to oscillate synchronously with the arm 110.

The pusher bars 82 are mounted at their lower end on a rotatably mounted shaft 116. A crank arm 118 extends from this shaft 116 approximately parallel to the walking beam 114, and the end of this arm 118 and the free end of the walking beam 114 are linked together by a connecting link 120.

The grader feeder mechanism is synchronized with the elevator so that the actuating rod 96 starts its motion to the right in the view shown in Fig. 10 when the carrier fingers 42 come about even with the tips of pusher bars 82. This causes counterclockwise rotation of the bell crank 102 and of the arm 110 which is coaxial with the bell crank. Thus the walking beam 114 is rocked clockwise as are the pusher bars 82, and in so doing they pass upward through the carrier fingers 42 and away from the elevator 30 to push any egg on the carrier fingers 42 off, along the guide arms 80 and onto the parallel supporting bars 87 of the grader feeder 84. At the end of this operation the actuating rod 96 begins its motion to the left, thereby causing the pusher bars 82 to return to their lower position and the slide bar 88 to raise and lift the eggs from the parallel supporting bars 87. After the eggs are lifted by the slide bar 88, the crank 90 causes the slide bar 88 to advance to the left and carry the eggs along the grader feeder 84 into the grader 85. Thus the eggs are transferred from each carrier onto the grader feeder and then carried along the grader feeder into the grader, where they are sorted and discharged upon the sorting trays 86. In passing along the grader feeder 84, the eggs pass a tab 122 which aligns them with their long dimension parallel to their direction of travel, so that they are properly positioned for the grader 85.

In actual practice the hens lay their eggs in the nests 1 from whence they roll along the sloping trough-shaped bottom 3 thereof through the hole 6 in the back wall 4 and onto the belt conveyor 12.

To collect these eggs, and carry them to the grader, the elevator 30 is first started in motion, thereby simultaneously driving the picker 65 at the loading stations 20 and the ejector at the removal station 29. The belt conveyor 12 serving the row of nests from which it is desired to collect the eggs is then started, thereby bringing the eggs to the removal station to which that belt feeds. The eggs, on passing over the inclined section 54 of the belt 12, beyond the end of the side board 23, and upon contacting the guide rail 52, flow between the guard rails 58 and onto the feeder racks 56 and 57 where they settle in the cradles 60 and 61 formed at the ends of the feeder racks 56 and 57. The pickers 65 pick up the two eggs at the end of each pair of feeder racks, and carry them forward, setting the egg from the end of each feeder rack onto the carrier fingers 42, and setting the egg from the inward cradle 61 of the rack onto the terminal cradle 60, thereafter the cycle being repeated to transfer this second egg to the next pair of carrier fingers.

The eggs are carried upward by the elevator and past the loading stations on the upper floors. The pickers at these stations are normally operating, being also driven by the roller chain of the elevator, but are not delivering eggs. As these upper pickers pass the carrier fingers which are now carrying eggs, the fork extensions 67, which pass between the carrier fingers 42 are swiveled upward upon contacting the eggs on the carrier fingers, thus folding them out of the way.

When these upper stations are again used to deliver eggs to the elevator, the eggs will be forced along the feeder racks of each station and will then cause the fork member 67 on the picker 65 to swivel back to its horizontal position. It will be seen that the eggs themselves cause the swivelling of the fork member 67 up or down according to the necessities of its operation.

The eggs are carried over the top of the elevator, whereupon they contact the downwardly extending flat spring 99 mounted above the top of the elevator. The spring 99 yields to the continued motion of the egg under it, while holding it upon its original carrier until the egg passes beyond the said spring. Thereafter the egg rolls forward along the guideway 47 and usually onto the fingers 42 of the next forward carrier.

Occasionally an egg does not so roll. It may deviate from its normal course and settle between the fingers and the guard rails 48, for which event the guard rails are provided, or it may, because of its oblate form remain on its original carrier. Upon passing over the middle supporting sprockets 34, any such egg will be transferred to the forward carrier because of the steeper inclination at which it is then carried.

The eggs are then carried downward to the removal station 29 where the pusher bars 82 eject them from the carrier, along the guide arms 80 and onto the grader feeder 84, where they pass to the grader 85 and are automatically sorted onto sorting trays 86.

It will be understood that the entire apparatus is supported and driven by conventional mechanism, and that conventional and necessary adjusting means adapted to take into account wear, dimensional changes of the elevator, belt etc. are provided but not described in detail.

The bottoms 3 of the nests 1 may be removed, for renewal or cleaning, by lifting the top part 8 of the back panel 4, in its guideways 10 and pulling the bottom 3 back so that its front edge disengages from the groove 11 in the front panel 7. Thereafter the bottom 3 is replaced by inserting a sheet of the desired material of appropriate dimensions into position, engaging its front edge in the groove 11 and resting its back edge on the top surface of the lower panel 9 of the back 4, and thereafter replacing the top back panel 8 to engage the bottom 3 in place.

It is contemplated that modification of this apparatus will be obvious to those skilled in the art, and that such modifications may be made without departing from the scope of this invention. For instance, in the preferred apparatus described herein the nests are arranged in double rows along opposite sides of the primary conveyor. It is considered obvious that the nests may also be arranged in a single row along one side of each primary conveyor, or they may be staggered along one or both sides of the conveyors, with their bottoms sloping toward the conveyors so that the eggs may roll from the nests onto the conveyors. Also other means than those described may be used to drive the various elements and to synchronize their operation, for instance the loading stations, removal station and grader may be driven directly from the elevator driving unit rather than from the supporting chain as described. These and other modifications obvious to those skilled in the art are believed to be within the scope of this invention.

By means of the apparatus of this invention a three-story hen house housing 3000 hens on each floor is served and it has three double rows of nests each 170 feet long, on each floor. The conveyors between each row feed a single elevator of the type described, each panel carrying two eggs, and this elevator delivers the eggs to a single grader at the maximum rate of 3600 eggs per hour.

Having thus disclosed my invention and described in detail an illustrative embodiment thereof, what I claim as new and desire to secure by Letters Patent is:

1. An egg handling elevator comprising an endless

continuous conveyor having ascending and descending sections, a plurality of egg carriers adjacently disposed continuously along said conveyor, each carrier comprising a supporting panel having longitudinally aligned groove sections extending inwardly from opposed sides of said panel, the grooves of all the panels being in substantial longitudinal alignment, spaced finger members intermediately situated on said panel to support an egg in alignment with said grooves during ascendancy and descendency on opposite sides of said fingers, upper supporting means for said conveyor intermediate said ascending and descending sections over which the conveyor travels and at which the carriers are turned over, said supporting means being adapted to turn over said carriers gradually to allow each egg to roll in said groove members from one carrier to the one immediately preceding, and to be there supported during descendency on the other side of said egg supporting finger members, lower supporting means intermediate the descending and ascending sections of said conveyor, and driving means therefor.

2. An egg handling elevator comprising an endless continuous conveyor having ascending and descending sections, a plurality of egg carriers adjacently disposed continuously along said conveyor, each carrier comprising a supporting panel having longitudinally aligned groove sections extending inwardly from opposed sides of said panel, the grooves of all the panels being in substantial longitudinal alignment, and egg supporting means intermediately situated on said panel to support an egg in alignment with said grooves during ascendancy and descendency on opposite sides of said egg supporting means, upper supporting means for said conveyor intermediate said ascending and descending sections over which the conveyor travels and over which the carriers are turned over, said supporting means being adapted to turn over said carriers to allow each egg to roll in said groove members from one carrier to the one immediately preceding, and to be there supported during descendency on the other side of said egg supporting means, lower supporting means intermediate the descending and ascending sections of said conveyor, and driving means therefor.

3. In egg handling apparatus a device to transfer eggs from a moving belt to the fingers of an elevator of the class described comprising a guide rail adapted to urge the eggs to the side of the belt extending diagonally across said belt, means inclining the belt in the vicinity of said guide rail, egg feeder racks aligned with the elevator fingers and extending outward from said side of the belt, guard means adapted to direct eggs onto and along said egg feeder racks, and a circularly and translationally moving bed synchronized with said elevator to travel upward between said racks and lift an egg therefrom, and downward between said fingers to deposit the egg thereon.

4. A device to load eggs on the ascending supporting fingers of an egg handling elevator comprising a pair of feed racks aligned with said fingers onto which the eggs are fed, a circularly and translationally moving picker synchronized with said elevator to travel upward between the ends of said feed racks and lift an egg therefrom, and downward between the fingers of the elevator to deposit the egg thereon, said picker comprising a bed member adapted to support an egg and a normally horizontal forward extension also adapted to support an egg and being pivotally mounted for upward swinging, said extension passing between said fingers during the downward motion of said picker, whereby the picker lifts the two adjacent eggs from the end of the racks during its upward motion, and during its downward motion deposits the egg from the end of the rack onto the fingers of the elevator and deposits the adjacent egg on the end of the rack, thus feeding the eggs along the rack and onto the fingers of the elevator.

5. An egg handling elevator comprising an endless continuous conveyor having ascending and descending sections, a plurality of egg carriers adjacently disposed continuously along said conveyor, each carrier comprising a supporting panel having longitudinally aligned groove sections extending inwardly from opposed sides of said panel, the grooves of all the panels being in substantial longitudinal alignment, spaced finger members intermediately situated on said panel to support an egg in alignment with said grooves during ascendancy and descendency on opposite sides of said fingers, and guard bails surrounding each pair of fingers to prevent an egg from falling laterally off them, upper supporting means for said conveyor intermediate said ascending and descending sections over which the conveyor travels and over which the carriers are turned over, said supporting means being adapted to turn over said carriers gradually to allow each egg to roll in said groove members from one carrier to the one immediately preceding, and to be there supported during descendency on the other side of said egg supporting finger members, downwardly extending flat springs over the top of said elevator adapted to contact each egg on its carrier as it turns over and urge it thereon until said carrier is aligned with the next preceding carrier, lower supporting means intermediate the descending and ascending sections of said conveyor, and driving means therefor.

6. An egg carrier for an egg handling elevator comprising a panel, aligned guideways on a face of said panel extending inwardly from opposed edges thereof, and egg supporting fingers having enlarged outer ends intermediately situated on said panel to support an egg in alignment with said guideways.

7. An egg carrier for an egg handling elevator comprising a panel, a groove extending across a face of said panel adapted to guide a rolling egg, and two outwardly extending fingers having enlarged ends intermediately situated on said panel one on each side of said groove.

8. An egg carrier for an egg handling elevator comprising a rectangular panel, a groove extending across a face of said panel adapted to guide a rolling egg, two outwardly extending fingers having enlarged ends intermediately situated on said panel one on each side of said groove, and two guard bails extending outwardly from said panel parallel with said groove and surrounding said fingers and spaced therefrom to prevent an egg from falling laterally off said fingers.

9. Egg collecting apparatus comprising a hen house containing a plurality of horizontally movable primary conveyors situated one above another; an egg handling elevator comprising an endless continuous conveyor having ascending and descending sections, a plurality of egg carriers adjacently disposed continuously along said conveyor, each carrier comprising a supporting panel having longitudinally aligned groove sections extending inwardly from opposed sides of said panel, the grooves of all the panels being in substantial longitudinal alignment, and egg supporting fingers intermediately situated on said panel to support an egg in alignment with said grooves during ascendancy and descendency on opposite sides of said fingers, upper supporting means for said conveyor intermediate said ascending and descending sections over which the conveyor travels and over which the carriers are turned over, said supporting means being adapted to turn over said carriers to allow each egg to roll in said groove members from one carrier to the one immediately preceding, and to be there supported during descendency on the other side of said egg supporting means, lower supporting means intermediate the descending and ascending sections of said conveyor, and driving means therefor; means for transferring eggs from said primary conveyor to the ascending section of said elevator including a pair of feed racks aligned with said fingers onto which the eggs are fed from said primary conveyor, a circularly and translationally moving bed operating between said racks and

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said supporting fingers adapted to lift an egg from said racks and place it on said fingers, the motion of said bed being synchronized with that of the elevator so that the bed during its downward motion passes said supporting fingers during their upward motion; and means for removing eggs from said elevator at a predetermined location along the descending section comprising a pair of stationary guide arms extending toward said elevator in egg intercepting relationship with the fingers thereon, pusher bars cooperative with said guide arms, and means synchronized with said elevator to actuate said pusher bars outward from said elevator to eject eggs from said fingers and along said guide arms.

10. An egg handling elevator comprising an endless continuous conveyor having ascending and descending sections, a plurality of egg carriers adjacently disposed continuously along said conveyor, each carrier comprising a supporting panel having longitudinally aligned groove sections extending inwardly from opposed sides of said panel, the grooves of all the panels being in substantial longitudinal alignment, spaced finger members intermediately situated on said panel to support an egg in alignment with said grooves during ascendancy and descendency on opposite sides of said fingers, and guard bails surrounding each pair of fingers to prevent an egg from falling laterally off them, upper supporting means for said conveyor intermediate said ascending and descending sections over which the conveyor travels and over which the carriers are turned over, said supporting means being adapted to turn over said carriers gradually to allow each egg to roll

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in said groove members from one carrier to the one immediately preceding, and to be there supported during descendency on the other side of said egg supporting finger members, lower supporting means intermediate the descending and ascending sections of said conveyor, and driving means therefor.

11. An egg carrier for an egg handling elevator comprising a panel, aligned groove sections on the face of said panel extending inwardly from opposed edges thereof, and egg supporting means extending outwardly from the face of said panel between said opposed edges and adapted to support an egg on either side in alignment with said groove sections.

References Cited in the file of this patent

UNITED STATES PATENTS

746,247	Baggaley	Dec. 8, 1903
967,758	Goldman	Aug. 16, 1910
1,020,746	Dehler	Mar. 19, 1912
1,457,562	Thomas	June 5, 1923
1,796,119	Olson	Mar. 10, 1931
1,959,799	Potthoff	May 22, 1934
2,105,058	Smith et al.	Jan. 11, 1938
2,264,156	Apple	Nov. 25, 1941
2,371,783	Sneed et al.	Mar. 20, 1945
2,417,823	Hodson et al.	Mar. 25, 1947
2,430,689	Shook	Nov. 11, 1947
2,512,861	Hill	June 27, 1950
2,589,228	Cordis	Mar. 18, 1952