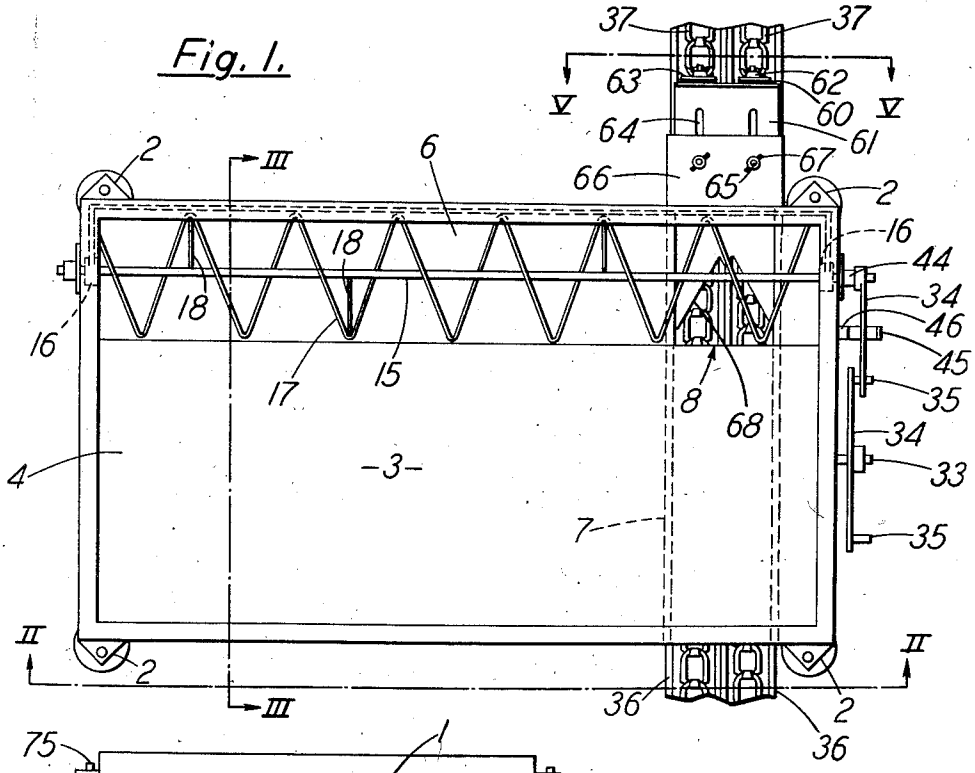
Feb. 5, 1957 M. L. SMALLEGAN 2,780,341

POULTRY FEED HOPPER CONSTRUCTION

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Fig. 1.



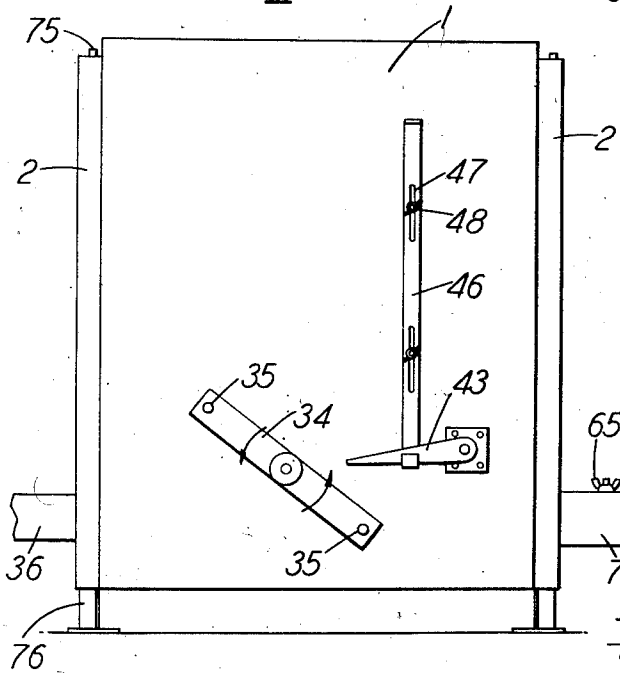


Fig. 4.

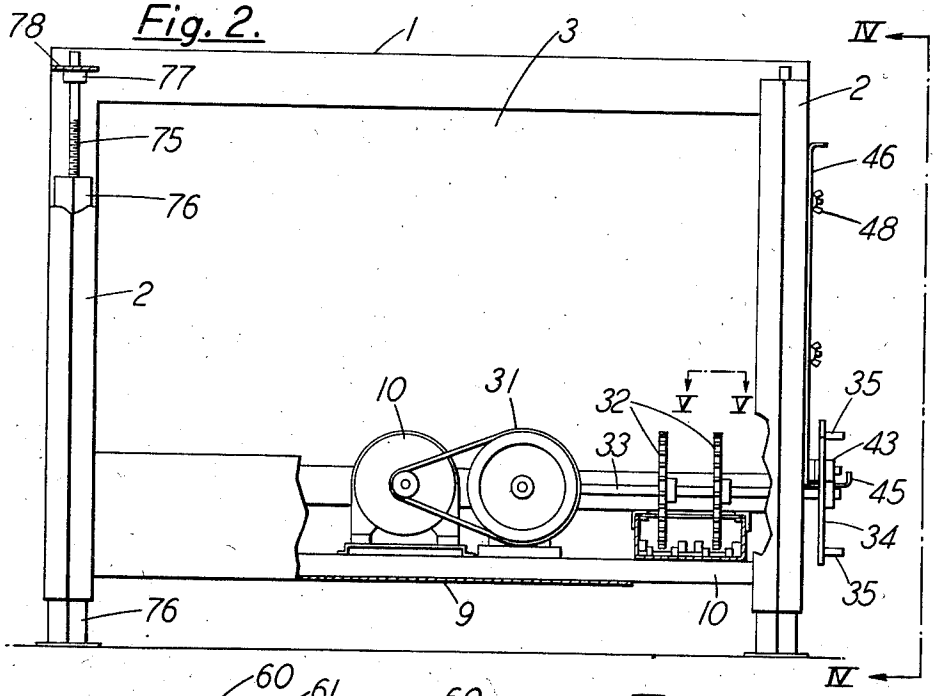
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POULTRY FEED HOPPER CONSTRUCTION

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Fig. 2.



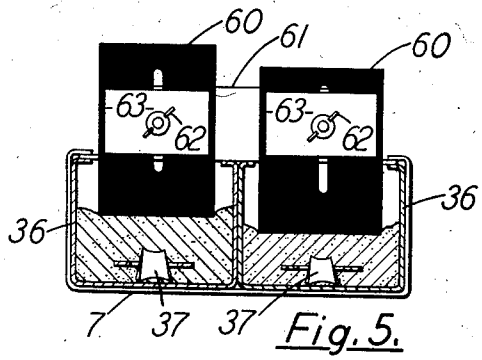


Fig. 5.

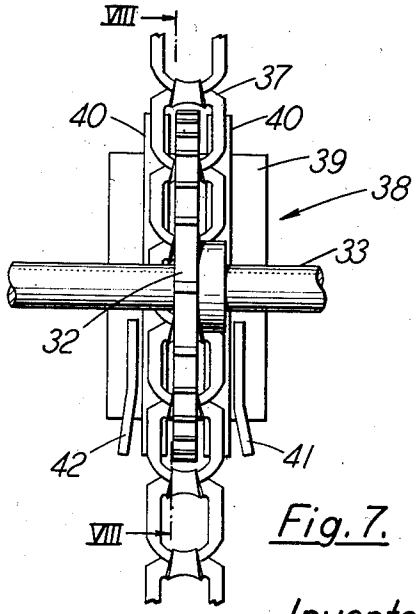


Fig. 7.

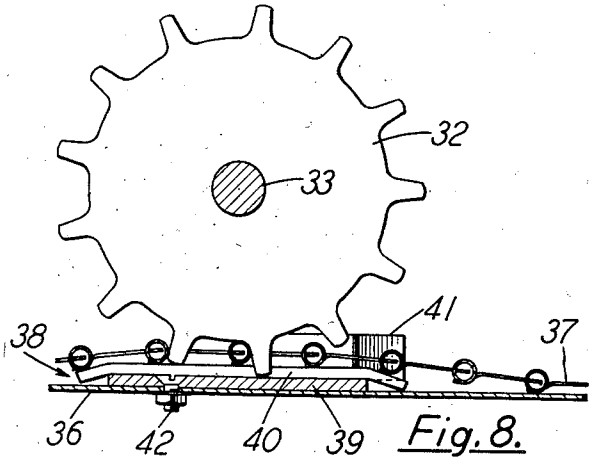


Fig. 8.

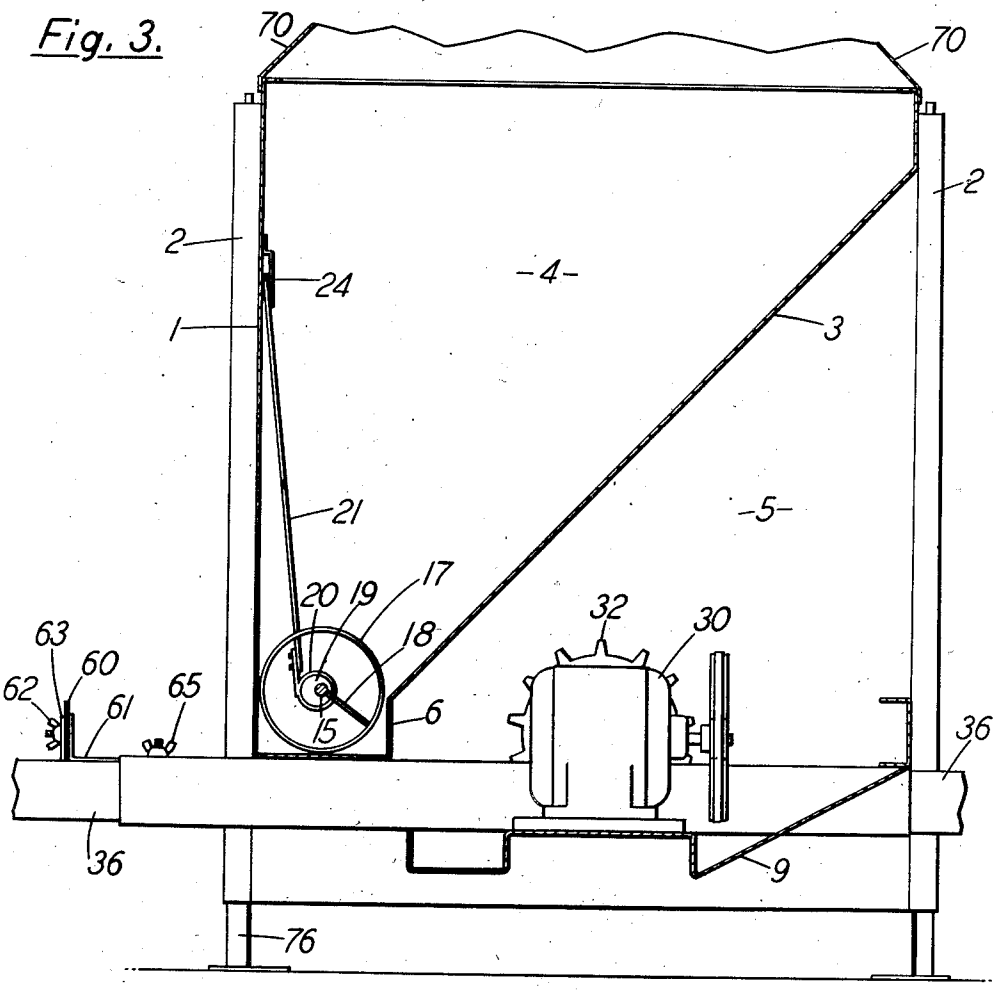
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Feb. 5, 1957 M. L. SMALLEGAN 2,780,341

POULTRY FEED HOPPER CONSTRUCTION

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Fig. 3.



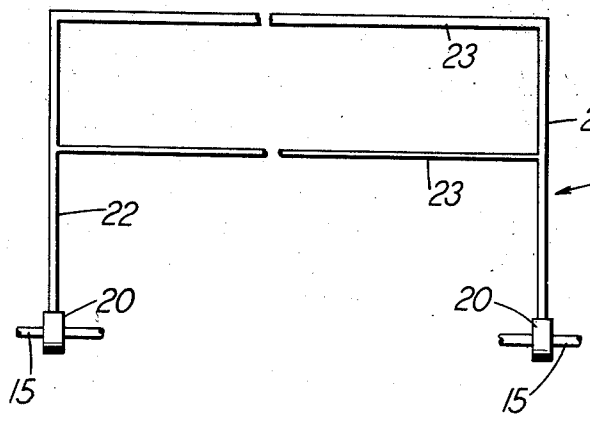


Fig. 6.

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POULTRY FEED HOPPER CONSTRUCTION

Marvin L. Smallegan, Zeeland, Mich., assignor to Automatic Poultry Feeder Company, Zeeland, Mich., a corporation of Michigan

Application June 25, 1951, Serial No. 233,302
3 Claims. (Cl. 198—58)

This invention relates to automatic poultry feeding equipment and more particularly to an improved hopper unit for such equipment.

Automatic poultry feeding equipment normally consists of one or more troughs tracing a closed path along which feed is moved by a chain or equivalent endless moving mechanism. The feed is stored in a hopper and supplied to the troughs as needed. In the construction of these hoppers, it is not only important to provide a hopper of sturdy construction and suitable for long periods of continuous operation without maintenance interruptions but it is also of the utmost importance that the feed be constantly supplied by the hopper to the troughs. This poses a serious problem because the feed is normally dry and of mixed consistency as to density, particle size and shape. Under these circumstances, it frequently happens that the material will bridge within the hopper with the result that no feed will be distributed, even from a full hopper, into the troughs. It is, therefore, the primary object of this invention to provide a hopper construction of simple design in which the feed cannot bridge whereby a constant supply of feed to the troughs will be assured so long as there is any quantity of feed remaining in the hopper.

It is important that the rate of feed distribution be capable of accurate regulation. This regulation must be effective throughout a wide range whereby the hopper is capable of meeting all of the various demands of the poultry raiser upon this type of equipment. This range of demand upon the feeder may vary from a relatively small flock of baby chicks to a large flock of grown turkeys. It is a further object of my invention to provide a hopper capable of rapid adjustment to meet all of these various demands.

In the design and construction of these hoppers, it is also important that they be designed to prevent injury to the poultry which may crowd around them. For this purpose, it is essential that as much of the moving mechanism as possible be enclosed whereby the poultry will not be injured. The design of such a hopper is another object of my invention.

It is also important to provide a design in which poultry droppings cannot reach any of the vital mechanism to produce binding or corrosive deterioration. It is also important that the mechanisms be so designed that should small quantities of poultry droppings be carried into the feed distributing mechanism by the incoming chain, the chain driving mechanism and feed distributing mechanism will not become galled and inoperative. It is an additional object of my invention to provide a hopper incorporating these desired features.

These and other objects of my invention will be immediately seen by those acquainted with the design and construction of poultry feeding equipment upon reading the following specification and the accompanying drawings.

In the drawings:

Figure 1 is a plan view of my improved hopper, showing the hopper with the cover removed.

Figure 2 is a rear, elevation view of my hopper taken along the plane II—II of Figure 1, showing the hopper with the rear panel removed.

Figure 3 is a sectional, elevation view of my hopper taken along the plane III—III of Figure 1.

Figure 4 is an end, elevation view of my hopper taken along the plane IV—IV of Figure 2.

Figure 5 is a sectional, elevation view of the trough structure of my hopper taken along the plane V—V of Figure 1.

Figure 6 is a fragmentary, elevation view of the vertical agitator for my improved hopper.

Figure 7 is an enlarged, fragmentary view of the chain and sprocket for my improved hopper.

Figure 8 is an enlarged, sectional, elevation view taken along the plane VIII—VIII of Figure 7.

In executing the objects and purposes of my invention, I have provided a hopper having an inclined baffle dividing the hopper structure into a storage bin above and an operation chamber below. The lower end of the storage bin communicates with a trough within which is intermittently rotated a spiral for agitating the feed and for moving it toward one end. At this one end of the trough, the feed is released onto a moving chain which carries it out along the feed troughs. In the operation chamber is provided a means for driving the chain and for intermittently rotating the spiral.

In the following description the terms "upwardly" and "downwardly," and their equivalents, are frequently used and are to be taken to mean "upwardly" in the direction of the hopper as normally used and as the hopper appears in Figure 2 and "downwardly" away therefrom. The terms "front" and "rear" are also frequently used and are to be taken to mean the "front" of a hopper being in the direction in which the chain moves, that is, that portion of the hopper which is toward the top of the drawing in Figure 1 and "rear" away therefrom.

Referring to the drawings in detail, the numeral **1** indicates a generally rectangular housing having a leg housing **2** at each corner. The housing has within it an inclined baffle plate **3** (Figure 3) dividing the housing into a hopper bin **4** above the baffle plate and an operations chamber **5** below the plate. The baffle plate **3** extends the entire length of the housing. The lower end of the baffle plate terminates abruptly at one side of a trough **6**, which trough extends the entire length of the housing **1**. Adjacent one end of the housing **1**, a channel **7** is mounted below the trough **6** and extends from front to back through the housing at a right angle to the trough **6**. The bottom of the trough **6** is provided with an opening **8** communicating with the channel **7** (Figure 1). The lower end of the operation chamber **5** is substantially closed by a platform **9**, a portion of one end **10** of which extends under the channel **7**.

Extending along the centerline of the trough **6** is a shaft **15** supported on each end by journals **16** mounted in the end walls of the housing **1**. Around the shaft **15**, but at a substantial radius therefrom, is a helical element or spiral **17** secured to the shaft by the posts **18**. The diameter of the spiral is such that it does not provide a clearance in excess of .125 inch with the sides and bottom of the trough **6**.

At each end of the spiral **17** an eccentric boss **19** (Figure 3) is mounted on the shaft **15**. Each of these eccentric bosses **19** is surrounded by a collar **20** to which is attached the agitator frame **21**. The agitator frame **21** is rectangular, consisting of a pair of uprights **22** (Figure 6) joined by a pair of cross arms **23**. The upper end of the agitator frame is held against movement toward and away from the housing **1** by the clips **24** (Figure 3) seating over the upper of the cross arms **23**. The clips **24** are rigidly mounted to the front wall of the housing **1**.

Within the operation chamber **5** and mounted on the platform **9** are a prime mover **30**, speed reducer **31** and a pair of sprockets **32**. The sprockets **32** are mounted on and driven by a shaft **33** operatively connected on one of its ends to the speed reducer **31**. The other end

of the shaft 33 passes through the end wall of the housing 1 adjacent the channel 7 and has an arm 34 mounted on its end (Figures 1, 2 and 4). The arm 34 is mounted at its center to the shaft 33 and at each end is equipped with a movable peg 35. The shaft 33 is provided with a journal where it passes through the end wall of the housing 1.

Seated within the channel 7 are a pair of trough sections 36. The trough sections 36 do not extend through the hopper. At both the front and the back of the hopper these troughs terminate with a few inches of telescoping engagement with the channel 7. This engagement provides support for the ends of the troughs 36. Each of the sprockets 32 is mounted on the centerline of one of the troughs 36 (Figure 2). A separate chain 37 travels in each of the troughs 36. Beneath each of the sprockets 32 is a guide 38 for the chain 37. The guide 38 consists of a base 39 (Figures 7 and 8) on which is mounted a pair of rails 40, spaced apart the width of the sprocket 32. The rails, on each end are bent down over the base 39 to provide an inclined surface for supporting the chain 37. At the end of the guide 38 into which the chain 37 first enters are a pair of converging, upright wings or plates 41 for guiding the chain into proper alignment with the sprocket 32. Each of the guides is mounted to the channel 7 by a screw 42.

The shaft 15 and its associated spiral 17 are intermittently rotated by the arm 34 (Figure 4). A lever 43 is, by means of a ratchet 44 (Figure 1), mounted on the end of the shaft 15. The ratchet is so constructed that it rotates the shaft 15 only when the lever 43 is moved upwardly. The lever returns to its normal position by gravity. The downward movement of the lever 43 is limited by the hook 45 on the end of the vertically adjustable rod 46. Vertical adjustment of the rod 46 is effected by means of the slots 47 and wing nuts 48.

The volume of feed leaving the hopper as well as its distribution in the troughs 36 is regulated by the flexible dams 60 (Figures 1, 3, 4 and 5). The flexible dams are mounted on the slide 61 and are made vertically adjustable by means of the wing nuts 62 seating against the backing plates 63. The slide 61 is provided with a pair of slots 46 parallel to the movement of the chains 37. Through the slots 64 extend bolts 65 mounted on the channel cover 66. The slide is locked into place drawing up the bolts 65 by means of the wing nuts 67.

The rearward end of the slide 61 is provided with a W-shaped opening 68 centered between the troughs 36. Thus, the volume of feed entering into each of the troughs 36 through the opening 8 may be simultaneously regulated as the slide 61 is moved forwardly and rearwardly.

The upper end of the hopper is closed by a cover 70. This cover may be flat but preferably is peaked as is indicated by the fragmentary showing in Figure 3. The rear opening into the operation chamber 5 is preferably closed by a suitable panel of either solid, perforated or grille-like material.

Within each of the triangular leg housings 2 a slidable leg 76 is mounted. A screw 75 threadedly engages the upper end of the leg 76 whereby rotation of the screw 75 will effect movement of the leg (Figure 2). The screw 75 is equipped with a collar 77 bearing against the under side of the plate 78. The plate 78 is secured as by welding to the leg housing 2.

Operation

To operate my hopper, the hopper compartment 4 is filled with feed. The prime mover 30 is then started causing the chains 47 to start moving through the hopper. The speed reducer 31 causes the shaft 33 to rotate slowly. Preferably, the speed reducer is of a type suitable to permit variation of the speed of the shaft 33. The rotation of the shaft 33 by the prime mover 30 will cause the arm 34 to rotate. At each half revolution one of the pegs 35 will contact the lever 43, raising it until the peg slides out from under the lever. As soon as the lever 43 is released, it will, by gravity, drop until it rests upon the hook 45 of the rod 46. During the upward movement of the lever 43, the lever will rotate the spiral 17 causing both agitation of the feed within the trough 6 and causing that feed to move toward the opening 8. At the same time, by means of the eccentric bosses 19 (Figure 3) on each end of the spiral, the agitator frame 21 is caused to reciprocate vertically. This reciprocation of the agitator frame 21 prevents the feed from forming a bridge between the baffle 3 and the vertical front side of the housing 1. Any bridge that may try to form is broken by the movement of this agitator frame. When the lever 43 is released, it is free to drop downwardly into the hook 45 without moving the spiral 17 because of the ratchet 44.

The speed of rotation of the spiral 17 may be decreased by eliminating one of the pegs whereby the lever 43 is actuated only once during a full revolution of the shaft 33. The amount of rotation of the spiral upon each contact between a peg 35 and the lever 43 may be adjusted by raising or lowering the rod 46. In this manner, the length of arc through which the peg is in contact with the lever 43 may be increased or decreased. By a combination of these various adjustments, appreciable variation in the speed of the spiral may be obtained.

As the shaft 33 is rotated, it turns the sprockets 32. These sprockets engage the chains 37 urging the chain 37 through the hopper. As the chains approach the sprockets, each of the chains enters one of the guides 38. The guides 38 align the chain with the sprocket by means of the upright plates or wings 41. They also raise the chain to assure a firm and constant contact between the sprockets and the chains. By reason of the spaced rails 40, the teeth of the sprockets are permitted to pass downwardly through the chain to effect a long, positive contact between each sprocket tooth and each link of the chain as it passes through the guides 40. After the chains 37 leave the sprockets 32, they pass under the opening 8 at the end of the trough 6. At this point, the feed from the trough 6 falls onto the chains and fills the channel 7. The slowing moving chain in the bottom of the channel 7 urges the feed out from under the opening 8 and away from the hopper 1.

By eliminating the troughs 36 in the hopper structure, the feed in the channel 7 is common to both troughs. Thus, if one trough is returning more feed than the other, the distribution of this feed between the two troughs will be brought into balance in the channel 7.

As the feed in the troughs 36 leaves the hopper its quantity is regulated and it is leveled and evenly distributed throughout each of the troughs 36 by the flexible dams 60. The flexible dams 60 are sufficiently rigid to resist the movement of the feed and to distribute it throughout the trough but at the same time will bend slightly to prevent the accumulation of large quantities of feed against their rearward faces. The dams 60 may be raised or lowered to regulate the depth of the feed as it passes out of the hopper (Figure 5). Thus, when two or more troughs are used, the depth of feed in each trough may be set at a different level. This permits simultaneous distribution of the correct quantity of feed into two troughs of different length. By shifting the slide 61 forwardly or rearwardly, the quantity of feed entering the troughs 36 through the opening 8 may be closely regulated. As the slide 61 is moved rearwardly it closes the opening 8 an equal amount with respect to each of the troughs 36. Thus, when only a small quantity of feed is necessary, the slide is moved rearwardly to the proper position and then fixed into position by tightening the wing nuts 66. The quantity of feed moved out of the hopper through the troughs 36 may be closely regulated by both the position of the slide 61 and the position of the flexible dams 60. When any major adjustment of the size of the opening is made, the speed of rotation of

the spiral 17 should be adjusted by the several means previously described. By means of these adjustments plus variation of the speed of the chain, the proper amount of feed may be distributed by this hopper for a given flock of poultry irrespective of the age and demands of the poultry. When the system is used for a growing flock starting when the flock is very small, the quantity of feed distributed by the troughs may be periodically adjusted to meet the increasing demand of the growing flock. Thus, the hopper is rendered capable of meeting the varying demands of a poultry raiser.

The entire hopper structure is made vertically adjustable to meet the height demands of various sizes and types of birds. Thus, when the flock consists of small chicks, the troughs 36 must be almost at floor level. At this point the hopper is lowered to its lowest point. Thereafter as the flock grows the troughs 36 must be periodically elevated to provide a proper feeding height and to prevent the chickens from standing on the troughs and depositing droppings into the feed. At each of these stages of development of the flock, the troughs 36 and entire hopper structure are raised. In the case of flocks of very large birds such as grown turkeys, the hopper is raised to its maximum height. To effect this raising, a crank is engaged to the upper end of the screw 75 and the screw thereby rotated. The rotation of this screw forces the adjustable legs 76 downwardly or upwardly with respect to the leg housings 2. By reason of the triangular shape of the leg 76 and the leg housing 2 the leg is prevented from rotating with the screw. The upward thrust on the screw is transmitted to the leg housing by the collar 77 bearing against the plate 78.

I have described a hopper construction suitable for distributing a constant quantity of dry feed material at a selected rate of distribution. The hopper is so designed that the rate of distribution of the feed may be closely adjusted through a wide range of volumes. The hopper is also so constructed that the feed will be constantly distributed without interruption or blockage of the mechanism. The design of the hopper makes it suitable for use with flocks of various types of poultry irrespective of the age of the flock involved.

My invention is described using two troughs 36 passing through the channel 7 for removing feed from the hopper. It will be recognized that with minor redesign a greater or lesser number of troughs may be added. By blocking off the unused portion of the channel 7 by means of a length of wood or an inverted section of the trough 36, a single trough may be employed.

These and other modifications of my invention may be made without departing from the principle thereof. Each of these modifications is to be considered as included in the hereinafter appended claims unless these claims by their language expressly state otherwise.

I claim:

1. In poultry feed hopper construction for dispensing dry material of small particle size, said hopper having a housing and a baffle for dividing said housing into an upper chamber for said material and a lower chamber, said hopper comprising: a trough communicating with said upper chamber; a helically coiled rod having substantially the same length as said trough and mounted therein; means for rotatably mounting said helical rod to said housing; the bottom wall of said trough defining an opening therethrough through which said material may escape by gravity; means including a shaft and prime mover in said lower chamber; a lever on the end of said means for mounting said helical rod; an arm on said shaft adapted to periodically raise said lever for intermittently rotating said helical rod; an agitator rod eccentrically mounted on said means for mounting said helical rod.

2. In poultry feed hopper construction for dispensing dry material of small particle size, said hopper having

a housing and an inclined baffle for dividing said housing into an upper chamber and a lower chamber, the walls of said upper chamber converging in a downwardly direction, said hopper comprising: a first trough communicating with the lower end of said upper chamber; a second trough below and communicating with said first trough; said second trough extending through said housing at a right angle to said first trough and adjacent one end of said first trough; a prime mover; a first shaft rotatably driven by said prime mover; an arm mounted at its center on said first shaft for rotation therewith; a second shaft; a lever; ratchet means for operatively connecting said lever to said second shaft and adapted to rotate said second shaft when said lever is moved upwardly; a movable peg mounted on said arm remote from said first shaft for engaging said lever through a portion of its travel as said first shaft and arm rotates; said peg adapted to intermittently raise said lever causing intermittent angular rotation of said second shaft; adjustable means adapted to limit the downward movement of said lever thus adjusting the amount of angular rotation of said lever and said second shaft caused by each engagement of said peg with said lever; a helical rod element mounted on said second shaft within said first trough for urging material in said first trough into said second trough; an eccentric boss mounted on said second shaft adjacent each end thereof; a substantially rectangular frame mounted at its lower end to said eccentric bosses; means on said housing for engaging the upper end of said frame.

3. In poultry feed hopper construction for dispensing dry material of small particle size, said hopper having a housing and a baffle for dividing said housing into an upper chamber for said material and a lower chamber, said hopper comprising: a trough communicating with the bottom of said upper chamber; a first shaft extending longitudinally through said trough; means journalling said first shaft in each end of said hopper; a helically coiled rod surrounding said first shaft and radially spaced substantially therefrom; means securing said rod to said first shaft for rotation therewith; said rod extending substantially the full length of said trough; said trough having an opening adjacent one end for the escape of said material therefrom; a second shaft in said lower chamber; a prime mover in said lower chamber for continuously rotating said second shaft; an arm mounted on said second shaft for rotation therewith; a lever freely rotatably mounted on said housing; ratchet means for operatively connecting said lever to said first shaft; a movable peg mounted on said arm remote from said second shaft for engaging said lever a portion of its travel as said second shaft and arm rotates; said peg being adapted to intermittently raise said lever causing intermittent angular rotation of said first shaft; adjustable means adapted to limit downward movement of said lever thus adjusting the amount of angular rotation of said first shaft caused by each engagement of said peg with said lever; conveyor means cooperating with said opening for removing said material therefrom; driving means on said second shaft engaging said conveyor means for continuously driving said conveyor means.

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