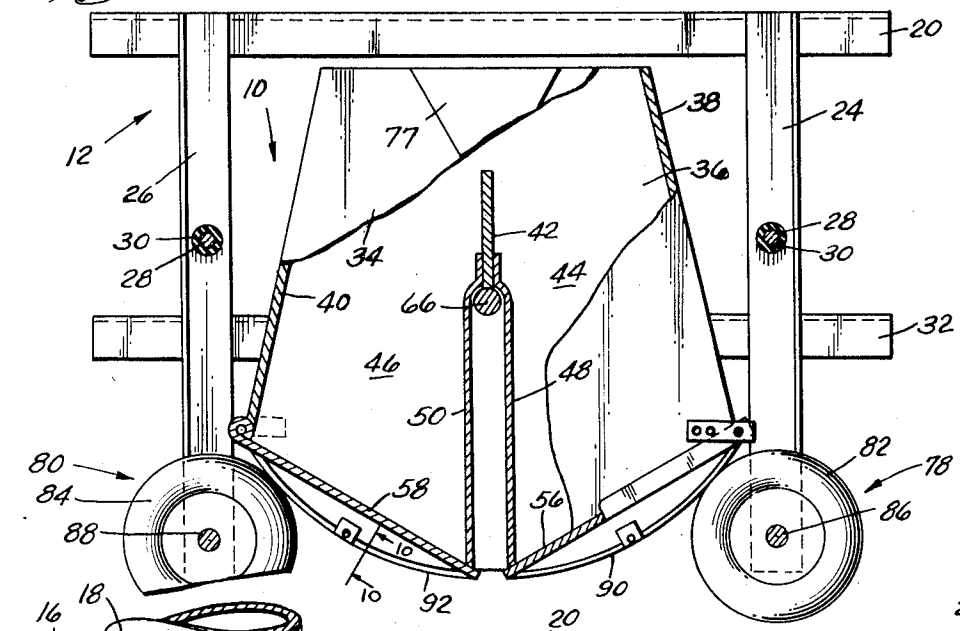
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AUTOMATIC WEIGHER FOR CATTLE FEED AND THE LIKE

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Fig. 1



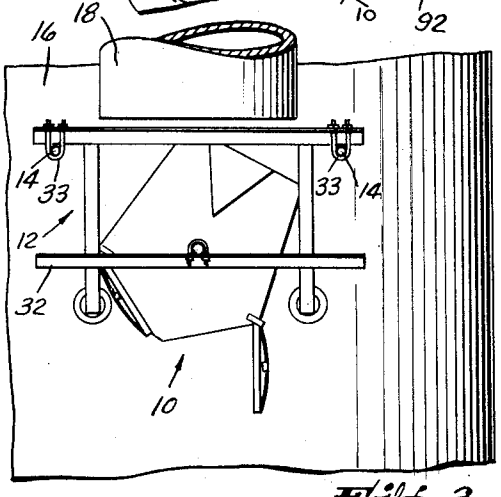


Fig. 3

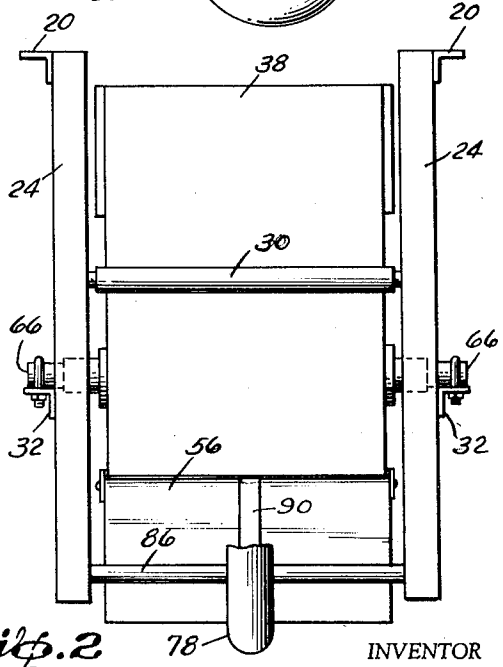


Fig. 2

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AUTOMATIC WEIGHER FOR CATTLE FEED AND THE LIKE

Filed Oct. 20, 1958 3 Sheets-Sheet 2

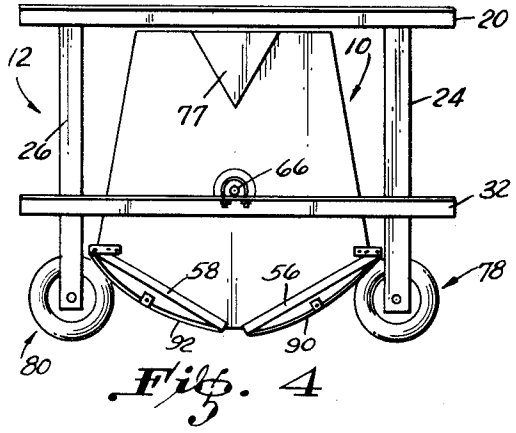


Fig. 4

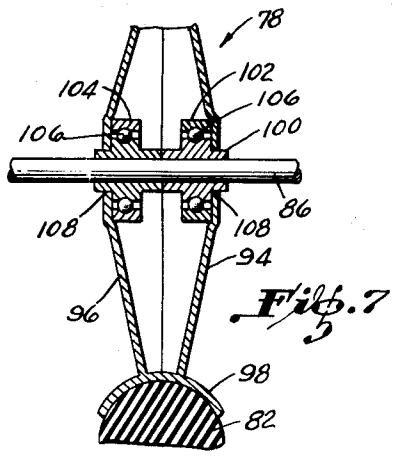


Fig. 7

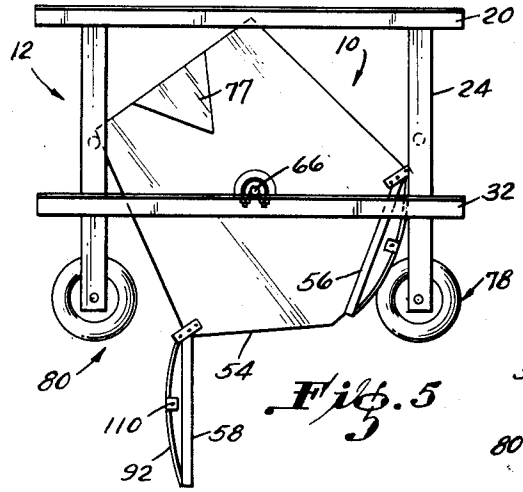


Fig. 5

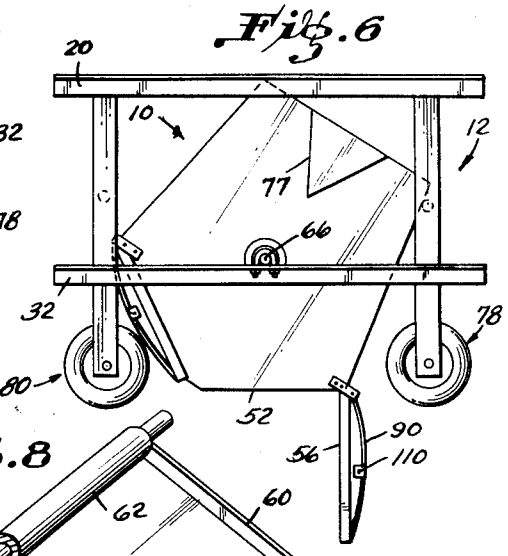


Fig. 6

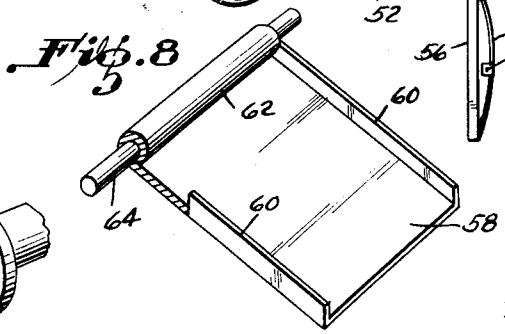


Fig. 8

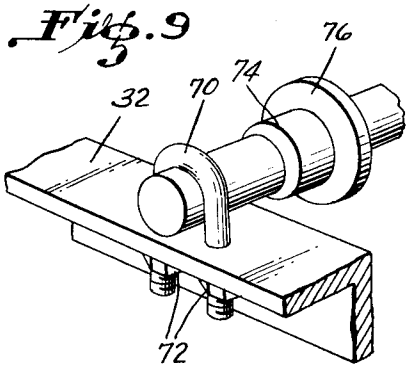


Fig. 9

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AUTOMATIC WEIGHER FOR CATTLE FEED AND THE LIKE

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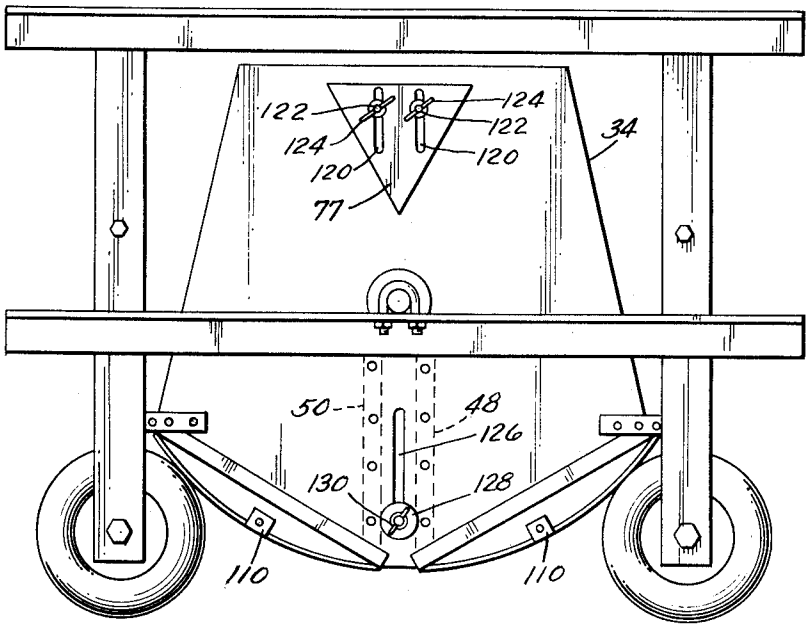


Fig. 11

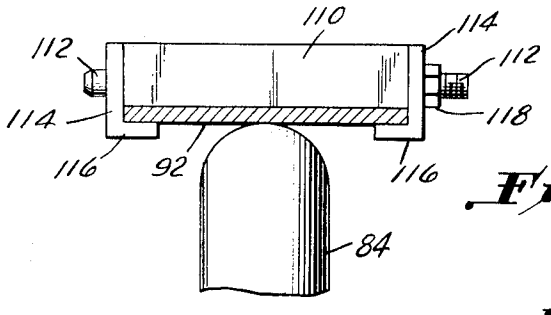


Fig. 10

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2,942,836

AUTOMATIC WEIGHER FOR CATTLE FEED AND THE LIKE

Lester Ernest Meyer, R.F.D. 1, Olin, Iowa

Filed Oct. 20, 1958, Ser. No. 768,333

4 Claims. (Cl. 249—33)

The present invention relates to an automatic weigher for cattle feed and the like. More particularly the present invention relates to a device for metering silage such as cattle feed from a silo or other source of supply into a suitable receptacle.

The present invention is an improvement over pending application, Serial No. 733,946, filed May 8, 1958, and entitled Automatic Weigher for Cattle Feed and The Like. In addition to the objects set forth in the aforementioned pending application, the present invention has for an object to provide a two compartmented oscillating hopper which is formed with upwardly converging side walls, the lower portion of the compartments thereby being formed larger than the upper portions so that bridging of the compartment discharge openings by silage is prevented.

Another object is to provide planar-like gravity swinging gates for closing the compartment openings.

Still another object is to provide arcuate shaped convex tracks that are secured to the gates and that are adapted to be engaged by compressible wheel members for alternately closing the gates as the hopper oscillates.

Still another object is to provide weight members that are secured to the convex tracks and are adjustable along the length thereof, the weight members providing for control of the rate of movement of the gravity swinging gates.

With the foregoing and other objects in view, the invention will be more fully described hereinafter, and will be more particularly pointed out in the claims appended hereto.

In the drawings, wherein like symbols refer to like or corresponding parts throughout the several views.

Figure 1 is a vertical sectional view of the automatic weigher embodied in the present invention with parts shown in elevation;

Figure 2 is a side elevational view of the invention illustrated in Figure 1;

Figure 3 is a front elevational view of the automatic weigher in the position of use on a silo and disposed below the silo discharge spout for receiving silage therefrom;

Figure 4 is a front elevational view of the automatic weigher in the neutral position, wherein the gravity swinging gates are located in the closed position thereof;

Figure 5 is an elevational view similar to Figure 4, showing the automatic weigher in the oscillated position whereby the left-hand gravity swinging door is open;

Figure 6 is an elevational view similar to Figure 5 showing the automatic weigher in the opposite position whereby the right-hand gravity swinging gate is open;

Figure 7 is a horizontal sectional view of a gate retaining wheel member;

Figure 8 is a perspective view of one of the gravity swinging discharge gates;

Figure 9 is a fragmentary view in perspective of the bearing for the hopper shaft;

Figure 10 is a vertical sectional view taken along lines 10—10 in Figure 1, and

Figure 11 is a front elevational view of the hopper illustrating the adjustable counterweights and an alternative counter-weight construction.

Referring now to the drawings and for the present to Figures 1, 2 and 3, a two-compartment oscillating type weighing hopper is illustrated and is generally indicated at **10**. The weighing hopper **10** is shown supported by a frame, generally indicated at **12**, which is adapted to be mounted on overhead beams **14**, the overhead beams **14** being secured to and projecting outwardly from a silo housing **16**. The hopper **10** is positioned immediately below the spout of a discharge chute **18** of the silo housing **16** and is elevated sufficiently above the ground to provide for the passage of a truck or other receptacle thereunder, the truck or receptacle being adapted to receive the measured feed as delivered by the automatic weigher or hopper **10**.

The frame **12** includes spaced upper L-sections **20** to which are secured by welding, brazing or the like two pairs of spaced vertical standards **24** and **26**. Each pair of standards **24**, **26** are spaced apart by horizontal rods **28** which are preferably enclosed by rubber sleeves **30**, the purpose of which will be set forth hereinafter. Secured to the vertical standards **24**, **26** and spaced below the upper L-sections are hopper supports or side beams **32** which are also L-shaped in section. As shown in Figure 3, the upper L-sections have U-shaped hangers **33** secured thereto which are adapted to receive the overhead beams **14** therein for hanging the frame **12** and hopper **10** thereon. It is understood that only one form of frame and supporting structure is illustrated for suspending the automatic weighing device from the silo housing **18** and other equivalent structures may be utilized without departing from the spirit of the invention. It is further understood that the automatic weigher may be spaced further from the silo housing **16** if desired and/or suitable extension chute may be provided for conveying the feed to the weigher.

Referring now to Figure 1, the hopper **10** is shown including a front wall **34**, rear wall **36**, upwardly converging side walls **38**, **40**, and a central partition **42** which divides the hopper into two equal opposed compartments **44** and **46**. The uppermost ends of the compartments **44**, **46** are exposed and define inlets for the silage that is received from the spout of the discharge chute **18**. By forming the hopper **10** with the upwardly converging side walls **38**, **40**, the compartments **44**, **46** are formed with the lower portions thereof larger than the upper portions. It is seen that this construction will prevent bridging of the silage as it is discharged from the compartments since the smaller upper compartment portions will, in effect, meter the feed into the compartment interiors. Once the silage has passed through the smaller upper inlet opening, passage through the larger discharge openings is assured and bridging of the compartments by the silage is thereby avoided.

Secured to the lower end of the central partition **42** and extending downwardly therefrom are spaced partition walls **48** and **50** that cooperate with the central partition **42** to define the separate compartments **44** and **46**. As seen in Figure 1, the uppermost ends of the partition walls **48**, **50** are formed with offset portions that causes the partition walls to extend downwardly at a slight pitch, the offset portions also providing sufficient spacing between the partition walls for accommodating the main shaft of the hopper as will be described hereinafter.

The lowermost ends of the partition walls **48**, **50** terminate somewhat below the side walls **38**, **40** and define therewith inclined discharge openings **52** and **54** respec-

tively (see Figures 5 and 8). The discharge openings or exits **52**, **54** are controlled by pivotally mounted doors or gates **56**, **58** one of which is illustrated in Figure 8. As shown in Figure 8, the gate **58** is planar-like in construction and includes side flanges **60** that may fit either within or without the side wall **40**. The gate **58** is further formed with a rolled extension that defines a bearing **62** which is adapted to freely rotate about a pin or trunnion **64**, the trunnion **64** being secured in the front and rear walls **34**, **36**.

The hopper **10** is adapted to oscillate on the frame **12** as the silage is alternately poured into and exhausted from the compartments **44** and **46** and for this purpose is provided with a shaft **66** that is suitably secured to the front and rear walls **34**, **36**. Referring to Figure 1 the shaft **66** is shown extending between the spaced partition walls **48**, **50** and sufficient clearance is provided between the partition walls to accommodate the shaft so that the hopper **10** may freely oscillate with the shaft. As shown more clearly in Figure 9, U-bolts **70** are fitted over the outer end portions of the shaft **66** in bearing relation therewith, the free ends of the end bolts extending through suitable openings in the side beams **32**. Nuts **72** threadedly engage the bolt ends beneath the horizontal web of the side beam **32** and retain the U-bolts in position therein. The shaft includes sleeves **74** having flanges **76** that extend over an extensive area of the rear and front walls of the hopper **10** and are secured thereto by welding, bolting or other suitable means, the shaft thereby being adapted to mount the hopper **10** for oscillating movement on the frame **12**.

In order to assist the hopper **10** in remaining in the silage receiving position until the next oscillating movement occurs, counterweights **77** are provided and are mounted by suitable means on the front and rear walls **34**, **36** adjacent the upper ends thereof. The counterweights are triangular in configuration, the apex of the triangles pointing downwardly, and it is seen as the hopper **10** is oscillated to and fro to the position shown in Figures 5 and 6, the counterweights will be shifted beyond the pivotal axis of the shaft **66**. Thus the counterweights **77** assist in retaining the hopper in the oscillated position until the silage entering the opposite compartment is sufficient to swing the hopper to the opposed position.

During the operation of the device, the hopper **10** is adapted to oscillate back and forth alternately presenting the compartments **44**, **46** for communication with the delivery spout of the chute **18**. As seen in Figures 4, 5 and 6, as each compartment receives the silage from the chute **18**, the discharge opening therefor must be closed by its corresponding gate. In order to retain the gates **56**, **58** in the closed position during the operation of the device, wheel members **78** and **80** are provided and include rubber tires **82**, **84**, the wheel members being rotatably mounted between the vertical standards **24**, **26** on horizontal cross bars **86** and **88** respectively. Since the discharge gates **56**, **58** must be retained in the closed position under sufficient pressure to prevent leakage of the silage from the hopper compartments, the rubber tires **82**, **84** must be compressed, and for this purpose the gates **56**, **58** have arcuate shaped tracks **90**, **92** secured across the length thereof respectively. As seen in Figures 1 and 4–6, the rubber tires **82**, **84** are adapted to engage their respective tracks **90**, **92** and due to the bowed configuration of the tracks, the resilient material of the tires is compressed when the corresponding gate is moved to the closed position thereof. Accordingly, as the hopper oscillates from the position shown in Figure 5 to the position shown in Figure 6, the gates will be positively retained in the closed position during the period when their respective compartments are receiving silage from the pouring spout of the chute **18**.

Referring to Figure 7, the wheel member **78** is shown in more detail, it being understood that wheel member

80 is constructed in a similar manner. The wheel member **78** includes discs **94** and **96** which carry a rim **98** on their outer ends, the tire **82** being mounted thereon. An inner race sleeve **100** is fixed to the non-rotary axle or horizontal cross bar **86**, and outer rotary race rings **102**, **104** are arranged outwardly of the inner race sleeve **100** with ball bearings **106** interposed between the inner and outer parts **100**, **102** and **104**. The rotary discs **94**, **96** abut against shoulders **108** of the inner race sleeve **100** so as to preserve the alignment of the wheel **78** centrally of the convex outer surface of the track **90**.

During the operation of the hopper it is understood that the arcuate surfaces of the tracks **90**, **92** ride upwardly on the wheel members and particularly on the rubber tires **82**, **84**, compression of the tires taking place that results in a distortion of the rubber body of the tires. Since the rubber tires have inherent elasticity, this elastic pressure will be exerted against the gates **56**, **58**, snapping them to a closed position and retaining the gates tightly closed as the opposite compartment is being filled. This assures discharge of feed only at such times when the discharge gates are fully opened.

In order to fix the outer position of the hopper **10** during the oscillating movement thereof, the horizontal stop rods **28** are provided and as described above are preferably equipped with rubber sleeves **30** which are adapted to eliminate noise and jarring when the upper portions of the side walls **38** and **40** of the hopper strike the rubber sleeves during the oscillating movement of the hopper. It is seen that the stop rods **28** act as limit stops to predetermine the degree of oscillating movement of the hopper **10**.

In order to regulate the rate of opening of the gates **56**, **58** as the hopper alternately moves the compartments **44**, **46** into register with the pouring spout of the chute **18**, weights **110** are provided, one of which is shown in Figure 10 mounted on the track **92**. The weight **110** is secured to the track **92** by a bolt **112** which extends through opposed clips **114** that have a flange **116** formed on the underside thereof. The flange **116** fits below the underside of the track **92** and as the bolt **112** is tightened on a nut **118**, the weight **110** is securely fastened to the track **92**. This construction also provides for simple adjustment of the weight along the length of the track **92**, since it is only necessary to loosen the bolt **116** and then slide the weight **110** to the desired position. It is seen that by moving the weight **110** along the tracks **90**, **92** the weight distribution of the gates **56**, **58** may be adjusted to obtain the desired rate of movement thereof as the hopper **10** oscillates.

In operation and referring to Figures 4, 5 and 6, the hopper **10** is first illustrated in the upright or neutral position (Figure 4) in which position both gates **56**, **58** are retained in the closed position thereof by the wheel members **78**, **80**. Initially the hopper **10** is tilted manually, for example, to the position indicated in Figure 5, wherein the right-hand compartment **44** is positioned immediately below the spout of the delivery chute **18**. Feed or silage from the silo or other source is then permitted to descend under suitable control into the right-hand compartment **46**. Once the hopper **10** is tilted manually the weight of the hopper and the counterweights **77** will retain the hopper in this position until the weight of the feed introduced into compartment **44** from the chute **18** overcomes the weight of the hopper and the counterweights **77** and will cause the hopper to tilt to the opposite position shown in Figure 6. In this position, the discharge gate **56** under the added influence of the weight **110** moves out of engagement with the wheel member **78** and drops downwardly as shown to open the discharge opening **52**, whereby the feed may be gradually discharged from the compartment **44** through the opening **52** and into a waiting receptacle, truck body or the like.

Incident to the tilting movement of the hopper **10** to the position shown in Figure 6, the opposed gate **58**, under

the added influence of the weight **110**, swings to the closed position, the track **92** moving up on the wheel member **80** and the wheel member **80** rotating therewith so that the gate **58** is automatically closed at the same time that the left compartment **46** of the hopper is brought beneath the delivery chute **18**.

The rate of delivery of the feed or silage through chute **18** can be regulated so that the right-hand compartment **44** completes evacuation approximately at the same time that the left-hand compartment **46** is filled to a capacity. The hopper is then overbalanced and a re-tilting thereof occurs back to the position shown in Figure 5. In this position, the track **90** of the gate **56** once again rides up on the wheel member **78** to close the gate **56** while the opposite gate **58** is being released from engagement with wheel member **80** and swinging downwardly to the open position thereof. In this manner the hopper **10** oscillates back and forth automatically without the application of any power but simply by the alternate transfer of the load of the feed in sequence from one compartment to the other. By forming these compartments of a predetermined volume and capacity, the charges of feed as to weight and volume can be very accurately calculated, so that for a given number of alternating oscillating movements of the hopper a predetermined quantity of the feed or silage may be delivered. A counter or register may be employed to count the number of oscillations of the hopper and in so doing establish a record of the quantity of feed that has been dispensed.

Depending upon the weight and amount of silage being delivered, it may also be desirable to shift the position of the counterweight **77** to insure that the hopper will be properly oscillated. For this purpose adjustment of the counterweight is provided, and as shown in Figure 11, each counterweight **77** is formed with vertically extending slots **120** through which bolts **122** extend, the bolts **122** being mounted in the front and rear walls of the hopper. Wing nuts **124** engage the bolts and are adapted to secure the counterweights in the desired adjusted position.

It has been found that in the handling of different weight materials, or lesser amounts of material, a different distribution of load is present in the hopper and that a counterweight located adjacent the bottom of the hopper is most effective for the operation thereof. Referring again to Figure 11, an alternative counterweight construction is illustrated and includes a slot **126** formed in the front wall **34** between the partition walls **48, 50**. It is understood that the rear wall **36** would be formed in a similar manner. A counterweight **128** is adjustably mounted in the slot **126** by means of a wing nut **130** and is adapted to be adjusted vertically in accordance with the weight and amount of the material being distributed. The lower counterweight **128** will generally not be employed with the upper counterweight **77** and will only be used when a lesser amount of material is to be weighed. Thus when larger or heavier amounts are to be distributed by the hopper, the bottom weight **128** will be removed.

Since the hopper **10** is formed with the upwardly diverging side walls **38, 40**, the flow of the feed or silage through the compartment will be unimpeded and bridging of the larger discharge openings **52, 54** by the silage will be prevented.

By the use of the present invention, farmers may call for accurate amounts of feed to satisfy stock requirements which vary from time to time and thus there will be no waste and substantial savings will result since oversupplies will be avoided. Farmers will also find the device particularly useful as an adjunct to silos in automatically weighing the silage as it is delivered from the silo. Of course it is understood that the invention has uses in other connections and may be employed with materials other than cattle feed.

Although the best form of the invention has been disclosed herein, the right is reserved to all such modifications and changes as may come within the scope of the following claims.

What I claim is:

1. In an automatic weigher for cattle feed and the like, a frame, a two-compartment hopper mounted for oscillating movement on said frame, said hopper including upwardly converging side walls that terminate at the top of said hopper to define inlet openings and at the bottom of said hopper to define discharge openings, said discharge openings being larger than said inlet openings so that bridging of said discharge openings is prevented, gravity controlled discharge gates pivotally mounted on the lower end of said hopper and alternately opening and closing said discharge openings during the oscillating movement of said hopper, arcuate shaped tracks secured to said gates, weight means adjustably mounted on said arcuate tracks and movable along the length thereof to control the rate of movement of said gates, and means mounted on said frame and adapted to engage said tracks for retaining said gates in the closed position thereof.

2. An automatic weigher for silage comprising a frame, a hopper mounted for oscillating movement on said frame, said hopper including a central partition for dividing said hopper into two similar compartments and the side walls of said compartments converging upwardly so that the lower portion of said compartments is larger than the upper portion whereby bridging at the lower end of said compartments by said silage is prevented, discharge openings formed in the lower end of said compartments, gates pivotally secured to said hopper and adapted to alternately open and close said openings by gravity movement, said gates pivotally moving in response to the oscillating movement of said hopper, having a convex track secured thereto, weight means operatively connected to said gates for controlling the rate of movement thereof, said weight means being mounted on said tracks and adjustably movable along the length thereof, and resilient means mounted on said frame for engaging said tracks and retaining said gates in the closed position thereof.

3. An automatic weigher for silage comprising a two-compartment hopper mounted for oscillating movement beneath a spout for discharging silage, each of said compartments adapted to sequentially register with said spout for receiving silage therefrom as said hopper oscillates, said hopper including upwardly converging side walls for forming the lower portions of said compartments larger than the upper portions, whereby bridging of the lower portion by said silage is prevented, discharge openings formed in the bottom of said compartments, pivotally mounted planar-like gates secured to said hopper for closing said openings and adapted to normally open and close by gravity as said hopper oscillates, means adapted to alternately engage said doors as said hopper oscillates for retaining said doors in the closed position thereof, convex shaped tracks secured to the outer side of said planar-like gates, said tracks being adapted to be engaged by said retaining means when said gates are moved to the closed position thereof, and weight means mounted on said tracks and adapted to be adjusted along the length thereof for controlling the rate of pivotal movement of said gravity swinging gates.

4. An automatic weigher for silage comprising a frame adapted to be supported under a silo spout for discharging silage, a two-compartment hopper mounted for oscillating movement on said frame, each of said compartments adapted to sequentially register with said spout for receiving silage therefrom as said hopper oscillates, discharge openings formed in the bottom of said compartments, pivotally mounted planar-like gates secured to said hopper for closing said openings and adapted to normally open and close by swinging gravity movement as said hopper oscillates, a convex track secured to each of said gates, and weight means mounted on each track for

adjustable movement along the length thereof, said weight means controlling the rate of pivotal movement of said gravity swinging gates.

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