J. E. GROVES.

MACHINE FOR FEEDING PELLETS INTO CONTAINERS.

APPLICATION FILED MAY 8, 1920.

1,383,623.

Patented July 5, 1921.

3 SHEETS—SHEET 1.

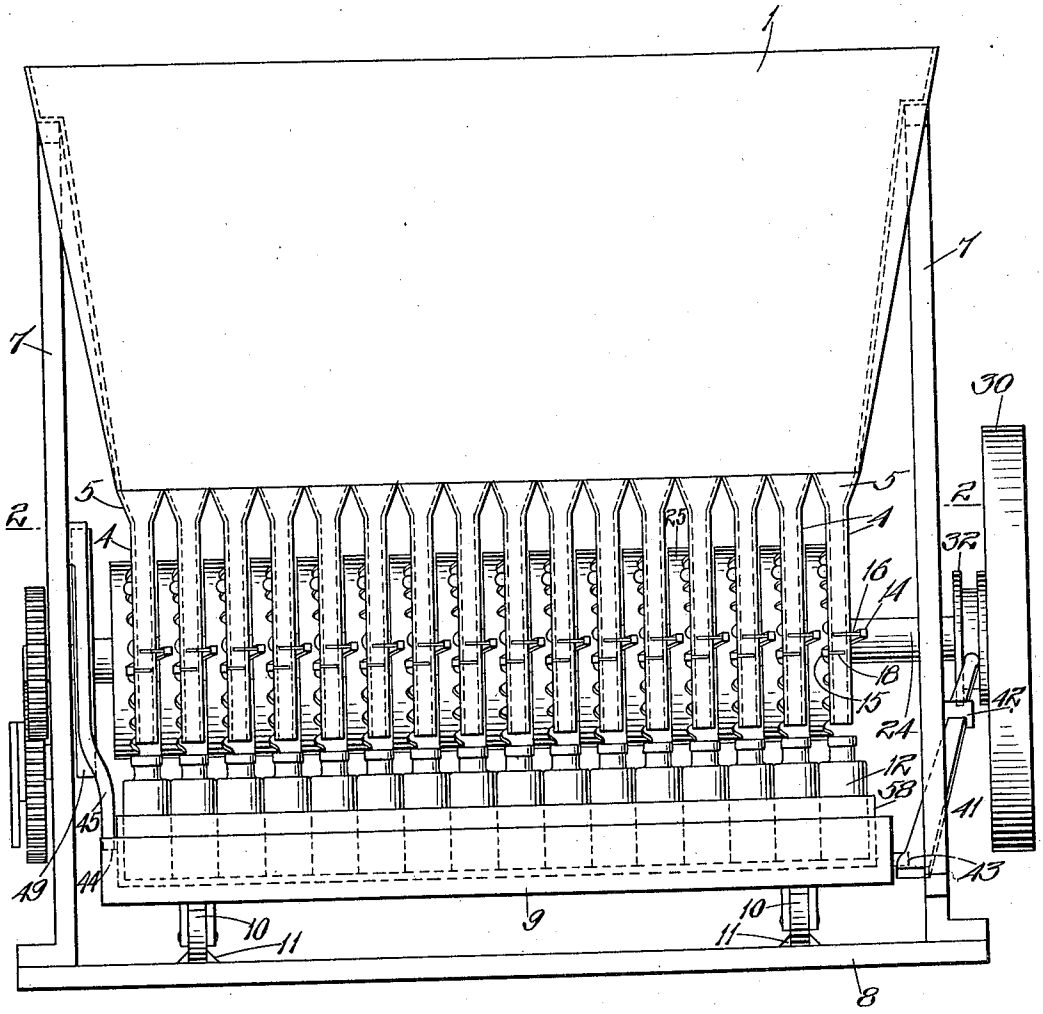


Fig. 1.

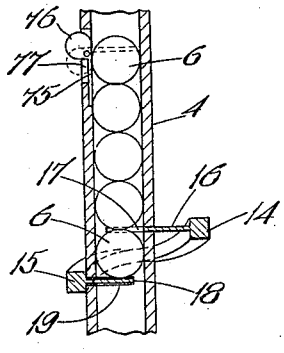


Fig. 4.

INVENTOR:

James E. Groves

by Macleod, Calver, Copeland & Dick

Attys.

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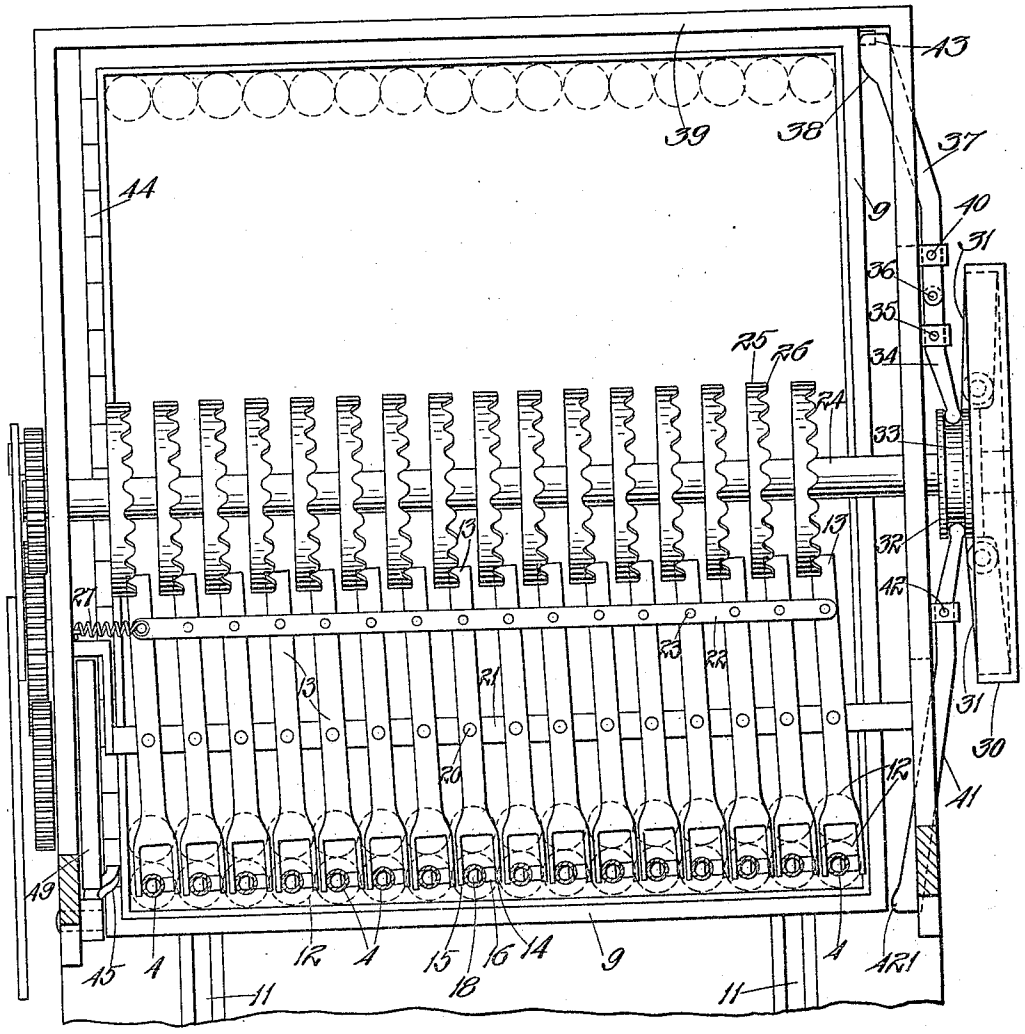


Fig. 2.

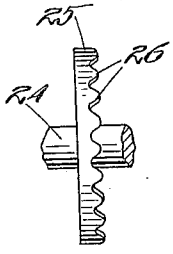


Fig. 6.

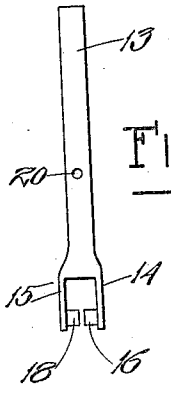


Fig. 5.

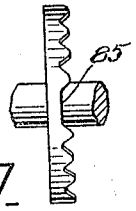


Fig. 7.

INVENTOR:

James E. Groves

by Macleod, Calver, Copeland & Dike

Attys.

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3 SHEETS—SHEET 3.

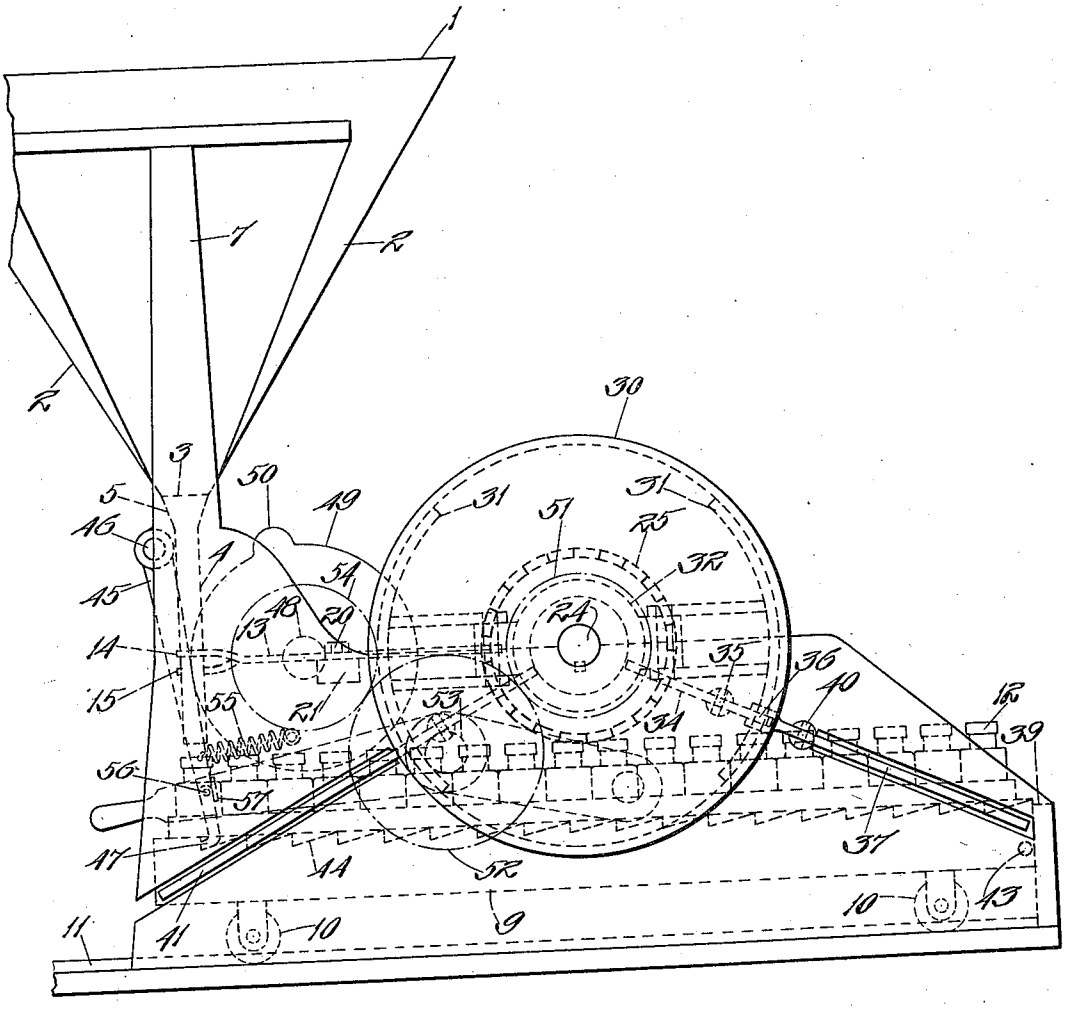


Fig. 3.

INVENTOR:

James E. Groves

by Macleod, Calver, Copeland & Dike

Attys.

UNITED STATES PATENT OFFICE.

JAMES E. GROVES, OF BOSTON, MASSACHUSETTS.

MACHINE FOR FEEDING PELLETS INTO CONTAINERS.

1,383,623. Specification of Letters Patent. Patented July 5, 1921.

Application filed May 8, 1920. Serial No. 379,748.

To all whom it may concern:

Be it known that I, JAMES E. GROVES, a citizen of the United States, residing at Boston, county of Suffolk, State of Massachusetts, have invented a certain new and useful Improvement in Machines for Feeding Pellets into Containers, of which the following is a specification, reference being had therein to the accompanying drawings.

The invention relates to a new and useful improvement in machines for feeding and delivering a predetermined number of pellets or other small articles into containers therefor. One object of the invention is to deliver one by one the pellets from a suitable supply into a container which is placed beneath the feed apparatus until a predetermined number of the pellets are delivered into the container. Another object of the invention is to provide automatic means whereby when one container has received its proper quota of pellets it will be removed and another container will be brought into position to receive a corresponding quota of pellets. Another object of the invention is to provide means whereby when a tray containing a quantity of containers to be filled, is placed in position for certain of the containers to be in receptive position, the machine will be automatically started. Another object of the invention is to provide means whereby when the first container or the first row of containers is filled the tray will be automatically moved to carry the filled containers out of receptive position and to bring another set of containers into receptive position.

Another object of the invention is to provide means whereby when the tray has been moved out far enough so that the last row of containers is filled, the machine will be automatically stopped. Another object is to provide a telltale device to indicate whether the pellets are being fed from the hopper to the tube. It is to be understood, however, that the invention is broadly applicable to a machine in which either one or more containers are filled at the same time.

The invention will be fully understood from the following description when taken in connection with the accompanying drawings and the novel features thereof will be pointed out and clearly defined in the claims at the close of this specification.

The machine shown in the drawings as embodying the invention is equipped with means for filling sixteen bottles at the same time, and for rapid work it is intended to have the invention embodied in machines which are capable of filling a plurality of containers simultaneously.

For convenience of description the articles with which the bottles are being filled will be referred to as pellets.

In the drawings, Figure 1 is a front elevation of a machine embodying the invention.

Fig. 2 is a horizontal section on line 2—2 of Fig. 1.

Fig. 3 is a side elevation viewed from the right of Fig. 1.

Fig. 4 is an enlarged sectional view of one of the delivery tubes with a tell-tale device for indicating when the pellets are not feeding, if for any reason the feed is stopped.

Fig. 5 is a detail plan view of the feed device.

Fig. 6 is a detail plan view of the feed actuating cam.

Fig. 7 is a view showing a modified form of feed actuating cam.

Referring now to the drawings, 1 represents a hopper having oppositely flaring sides which taper toward the bottom, the bottom edges of the two sides 2—2 being parallel with each other and forming a long narrow bottom 3 with which are connected a series of tubes 4 having a flaring upper portion 5 so that the pellets with which the hopper is filled will readily run down through the flaring mouth 5 of the tube into the more contracted lower portion 4 of the tube. The contracted portion 4 of the tube should be of just sufficient interior diameter to form a loose fit for a single pellet 6, so that the pellets can pass down in single series only and not wedge each other. The hopper 1 is supported on suitable frame memmers 7—7, which rise from a supporting base 8. The tubes 4 are all open at the bottom, the lower ends being at some distance above the base 8. A carriage 9 is provided to hold the supply of bottles and which can be moved into position beneath the feed tubes. This carriage as shown consists of a rectangular receptacle or body 9, which is provided on its under side with wheels 10, so that the car-

riage can be rolled into and out of position, and on the base 8 there are placed tracks 11 formed with guide grooves in which the wheels 10 move so as to accurately guide the carriage in its travel.

The machine shown in the drawings being intended to fill sixteen bottles at a time, the carriage 9 is of sufficient size to just hold a tray 58 wide enough to contain sixteen of the bottles in a single row, as shown in Fig. 1, and the carriage and tray may be made long enough to contain as many rows of sixteen bottles each as desired. As shown in the drawings the machine is made to contain eighteen rows of bottles as shown in the side elevation view, Fig. 3.

As already stated the pellets will roll down from the hopper into the several tubes, one on top of another. Means are provided whereby one pellet at a time can pass out of the tube into a bottle while the series of pellets above the lowermost is positively held back. The means provided for doing this is a vibratory knife having two blades which are alternately brought into position to form a cut-off. They are so positioned with relation to each other that when one is open the other is closed. When one blade is in closed position it operates to hold back the entire column of pellets, and then when that withdraws from operative position to allow the lowermost pellet to pass out of the tube, the other knife comes into operative position to hold back the remainder of the column above the lowermost, as plainly shown in Fig. 4. In the preferred embodiment of the invention this cut-off device consists of a lever 13 which is pivoted intermediate its ends, as will be hereinafter described, so that it can vibrate, and is forked at one end forming the two branches 14—15 which straddle the tube 4. These two branches are offset from each other and straddle the tube 4 in such manner that the branch 14 is elevated some distance higher than the branch 15. Said branches 14—15 are spread apart from each other somewhat greater than the diameter of the tube 4, so that the branches of the fork permit horizontal vibratory movement with relation to the tube. The branch 14 carries a laterally extending horizontal blade 16 which engages with and plays back and forth in a slot 17 in the periphery of the tube 4, and the branch 15 is provided with a laterally extending horizontal blade 18 which plays back and forth in a slot 19 in the periphery of the tube 4. See Fig. 4. These two blades are so arranged that when the lowermost blade 18 is projected into the tube the upper blade 16 will be outside of the hollow portion of the tube, and the column of pellets 6 will be supported by the lowermost blade 18. When the lowermost blade 18 is retracted, the upper blade 16 will move in between the lowemost pellet and the next pellet above, allowing the lowermost pellet to drop out of the tube while the remainder of the column of pellets is supported by the blade 16 which operates as a cut-off. It will be obvious that by vibrating the lever 13 the two blades 16—18 will be alternately moved in and out allowing a single pellet at a time to drop out through the tube.

The mechanism for operating the lever 13 is as follows:—Each one of the levers 13 is pivoted at 20 to a cross bar 21 which forms a fixed portion of the frame of the machine. Said levers 13 are all connected together by a tie bar 22 so as to move in unison. Preferably the connections between the levers 13 and the tie bars are pivoted connections as shown at 23.

Mounted in the frame at some distance back of the rear ends of the levers 13 is a rotary shaft 24 on which are mounted a series of rotary cams 25, preferably one cam for each of the levers 13. These cams are in the form of a wheel with cam teeth 26 projecting laterally from the periphery thereof. These cams are so mounted with relation to the levers that during the rotation of each cam the teeth 26 will successively engage one edge of the lever which is intended to be actuated by that particular cam. As the lever rides up onto the high part of the cam tooth it will throw the lever the extreme length of its stroke in one direction. A spring 27 is connected at one end with one end of the tie bar 22 and is fastened at its other end to the frame. As soon as the high part of the cam tooth has moved out of engagement with the lever, the spring 27 which has been put under tension while the lever was riding up on the high part of the cam will pull the lever back into the position shown in Fig. 2 into the notch between two of the cam teeth ready to be again actuated by the next cam tooth. The movement of the lever by the cam causes the lever to move in a direction to move one of the blades 16—18 into its cut-off position and move the other one out of its cut-off position, and the movement in the reverse direction by the spring 27 causes the reverse movement of the cut-off blades. As shown in the drawings, the cam actuates the opening movement of the lowermost blade 18. It is obvious, however, that the machine may be adjusted so that the spring will control the opening of the lowermost blade and the cam control the opening of the upper blade. So far as the invention is concerned it is immaterial which order is followed.

For convenience it is preferred that the cams shall each have as many cam teeth as the number of pellets desired to have put into a single bottle, so that the full complement will be put into the bottle at a single rotation of the cam and shaft, and that the feed of the box or carriage to bring another row

of bottles into alinement with the tubes shall take place at the end of each rotation of the shaft. This, however, is not essential.

The shaft 24 has a clutch connection with a driving pulley 30 which is loosely mounted on said shaft. The clutch mechanism shown is a friction clutch of well-known form, comprising two friction members 31—31 which have pivoted connection with a clutch actuating spool 32 mounted on the shaft 24 in such manner as to be axially slidable on said shaft but keyed thereto so as to rotate therewith. This form of connection is so well-known that it is not necessary to illustrate it specifically in the drawings.

The clutch actuating spool 32 is in the form of a pulley with a groove 33 in its periphery with which is engaged one end of a two-part lever. Said two-part lever comprises a member 34 fulcrumed at 35, its rear end being pivoted at 36 to another member 37 whose rear end has a cam face 38 which is adapted to be engaged by the side of the carriage 9 when the carriage is moved back into its rearmost position. When the carriage is thus moved back into its rearmost position where it strikes the rear wall 39 of the frame, it engages said cam face 38 and rocks the lever arm 37 on its pivot 40, throwing out the rear end of said arm 37 and turning in the forward end, thereby turning in the rear end of the lever arm 34 and pushing outwardly the forward end of the arm 34. This causes the friction clutch to engage with the pulley 30 and start rotation of the shaft 24 and cams 25, and therefore the vibration of the levers 13 so that the pellets can begin to feed into the first row of bottles beneath the tubes.

Means are provided whereby the carriage will be intermittently moved forward one step after each row of bottles is filled. This mechanism will be hereinafter described. When the carriage is moved forward far enough for the last row of bottles to be filled, it is then moved farther forward and in its farther forward movement it disengages the clutch to stop the rotation of the shaft 24. This mechanism will now be described.

A lever 41 is fulcrumed intermediate its ends at 42 to a fixed part of the frame, and has one end which engages with the groove 33 in the clutch spool, and its forward end has a projection 421 which extends alongside of the carriage 9. Projecting from the side of the carriage near its rear end is a lug 43 which is located down and out of the way of the rear end of the lever arm 37 so as not to interfere therewith. When the carriage is moved forward a sufficient distance after the last row of bottles in the carriage has been filled, the said lug 43 will engage with the projection 421 on the lever 41 and turn said lever 41 on its fulcrum so as to cause the portion of the said lever which engages with the groove in the clutch member 32 to disengage the clutch and thus stop the rotation of the shaft 24.

The means for causing the intermittent forward feed of the carriage is as follows:— The upper edge of one side of the carriage 9 is formed with ratchet teeth 44. A downwardly hanging member 45 which acts as a pawl is pivoted at its upper end at 46 to a portion of the frame, and at its lower end it is provided with a tooth 47 which is adapted to engage with the blunt end of the ratchet notches 44 in the upper edge of the carriage.

Mounted on a stud shaft 48 is a disk 49 provided with a cam projection 50 projecting outwardly from its periphery, and which is adapted at each rotation of the said disk 49 to engage with the pawl lever 45 and thereby swing the said pawl lever 45 to the left as viewed in Fig. 3 so as to feed the carriage forward the distance of a single notch. The said cam disk 49 is driven by gear connection with the shaft 24 as follows:—

Mounted on the shaft 24 is a gear 51 which meshes with a gear 52 mounted on a stud shaft 53; the gear 52 meshes with a gear 54 mounted on the shaft 48. If the two gears 51 and 54 have an equal number of teeth, then the cam 49 will rotate once for each rotation of the shaft 24, so that at each rotation of the shaft 24 the carriage will be moved forward one step, that is the distance equal to the space between the notches 44. If it is desired to feed into the bottle a larger number of pellets than the number of cam teeth on the cam wheels 25, the shaft 24 and the cam wheels 25 should make enough more than a single rotation to make up for the increased number of pellets to be fed before the carriage moves forward, and in order to control the forward feed of the carriage in such case so that it will not move until the requisite amount of pellets have been fed into the bottle, the gear 54 may be replaced by another gear having a greater number of teeth than the gear 51, so as to retard the rotation of the cam 49 according to the increase in the number of pellets.

After the lever 45 has completed its forward stroke, that is to the left as viewed in Fig. 3, to feed the carriage forward, said pawl lever is swung back again into position to engage the next tooth or notch 44 in the side of the carriage. For this purpose a spring 55 is provided, one end of which is connected with the pawl lever 45 and the other end of which is connected with a fixed portion of the frame. Said spring is put under tension by the positive forward movement of the pawl under actuation of the cam

projection 50. In order to permit the pawl lever 45 to swing back over the top of the tooth which forms the notch 44, the said lever is made as a jointed lever, the two members of which are pivoted together at 56 so as to allow the said pawl lever to flex at that point in the backward swing; that is the lower portion of the lever will bend forward or to the left as shown in Fig. 3. It is prevented from bending backward beyond the straight line shown in Fig. 3 by means of a stop 57 which is attached to the upper member of the two-part lever and extends down behind the lower member of the lever.

Preparatory to operation of the machine, the bottles 12 are placed in a rectangular tray 58 which is adapted to fit snugly within the carriage 9, and which is of sufficient width in the illustration shown in the drawings to receive a row of sixteen bottles, and of sufficient length to receive eighteen rows. The tray is then placed in the carriage while the carriage is in a forward position, out from under the feed tubes. The carriage is then rolled on its tracks beneath the hopper into the position shown in Figs. 2 and 3, and when it reaches its most rearward position the rear right-hand corner as viewed in Fig. 2 engages with the cam face 38 on the lever 37, turning said lever 37 on its fulcrum so as to throw the clutch into operative engagement with the driving pulley 30, thus starting the machine. The cam disks 25 will rotate in the manner already described, vibrating the feed levers 13 and the cut-off blades 16—18. Before starting the machine, or at the end of the last operation, the feed lever will be left in a position where the blade 18 is in the position shown in Fig. 4, supporting the bottom of the column of pellets, and the blade 16 will be retracted so that the very first movement of the machine will be to withdraw the blade 18 and at the same time throw in the blade 16, thus allowing the lowermost pellet to drop out into the bottle and to shut off the column of pellets above it. As soon as the cam shaft 48 has rotated far enough for the cam projection 50 to engage the pawl lever 45, the carriage will be given its forward movement the length of one notch in the carriage, so as to bring the next row of bottles into position. As previously stated this forward movement might take place, and preferably does, at the end of a single rotation of the shaft 24, unless the parts are adjusted in such proportion and in such manner as to require more than a single rotation of the shaft 24 to supply the predetermined number of pellets to the bottle.

When the second row of bottles receives its predetermined number there will be another forward movement of the carriage and so on until the carriage is moved forward its full distance to permit the last series of bottles to be filled. At the next movement the lug 43 on the rear right-hand corner of the carriage will engage the cam projection 421 on the lever 41 and disengage the clutch so as to stop the machine and permit the carriage to be withdrawn far enough to remove the tray and to replace it with a fresh supply of bottles.

While I have shown and described the machine as provided with one of the cams 25 for each one of the levers 13, it is obvious that inasmuch as the several levers are tied together, a single cam acting on one of the levers would actuate all of the levers in unison, but I prefer to have a cam for each lever, thereby insuring a more steady action.

In the modified form of cam shown in Fig. 7, there is provided a dead space 85, to allow a somewhat longer interval between the vibrations once at each rotation of the cam. This is to allow ample time for the movement of the carriage.

Each tube is preferably provided with a telltale device to indicate to the observer on the outside when the pellets are not feeding. It is located at some distance above the uppermost of the vibrating blades. This telltale device is shown in Fig. 4 and is as follows: A finger 75 having a weight 76 at one end is pivoted in a slot 77 in the wall of the tube in such manner that when the finger extends horizontally as shown in dotted lines in Fig. 4, the finger will extend transversely of the tube. It is pivoted at one side of the center of gravity so that when it is free to swing on its pivot the weight of the finger is overcome by the weight of the weighted end 76 so that it retains the finger in the horizontal position as shown by the dotted lines in Fig. 4. This will be its position when there are no pellets feeding. It swings so easily, however, that the weight of the column of pellets will turn the finger down into the full line position shown in Fig. 4, and retain it in that position as long as the pellets are feeding. The inner wall of the tube is formed with a recess to receive the finger 75 in its downwardly extending position so that it will not interfere with the clear passage through the tube. The observer can easily tell from the position of the ball weight 76 whether the finger is in the vertical position or whether it is in the transverse position, and therefore he can tell whether the pellets are feeding.

What I claim is:—

1. A machine for feeding articles into a container, comprising a reservoir, a feed tube leading from the reservoir, said feed tube being formed with two transverse slots in its periphery on opposite sides thereof, one located at some distance above the other, a pivoted lever having arms each carrying a blade, said blades being respectively adapted

to engage with said slots, and a rotary cam having a series of cam projections thereon which successively engage said lever to vibrate the lever and the said blades to move in and out within said slots transversely of the passage through the tube in such manner that when one of the blades moves transversely of the passage, the other blade is moved out of the passage.

2. A machine for feeding articles into a container, having a feed tube, a carriage which is movable beneath the lower end of said tube, a plurality of containers arranged within said carriage and so located that when the carriage is moved into position one of the said containers will be in alinement with the outlet end of said tube, a rotary cam and means actuated thereby for successively releasing the articles from said tube, a rotary shaft on which said cam is mounted, driving mechanism, clutch mechanism connected with said driving mechanism and said shaft, means actuated by the movement of the carriage into a certain position beneath the feed tubes to throw the clutch into operative position to start the rotation of the cam shaft, means controlled by the mechanism which actuates the releasing of said articles from the tube to actuate the movement of the carriage after a predetermined number of articles have been released from the tube, and means actuated by the withdrawal of the carriage to a predetermined point to disengage the clutch.

3. A machine for feeding articles into a container, having a feed tube, means for supporting a column of articles in said tube, means for releasing said articles one by one from said tube, a carriage which is movable beneath the lower end of said tube, a plurality of containers within said carriage, means for automatically moving said carriage in a step-by-step movement to successively bring each container into alinement with said tube, and means controlled by the mechanism which actuates the releasing of the articles from the tube to actuate the movement of said carriage after the releasing mechanism has been actuated to release a predetermined number of articles into the container.

4. A machine for feeding articles into a container having a feed tube formed with two transverse slots in its periphery, one located at some distance above the other, two vibratory blades which respectively engage with said slots, and means for vibrating said blades to move them in and out transversely of the passage through the tube in such manner that when one of the blades moves transversely of the passage the other blade is moved out of the passage, a carriage which is movable in and out beneath the lower end of said tube, a plurality of containers within said carriage, means for automatically moving said carriage in a step-by-step movement to successively bring each container into alinement with said tube, and means controlled by the mechanism which actuates the vibration of said blades to actuate the movement of said carriage after a predetermined number of vibrations of said blades.

5. A machine for feeding articles into a container having a feed tube formed with two transverse slots in its periphery, one located at some distance above the other, two vibratory blades which respectively engage with said slots, means for vibrating said blades to move them in and out transversely of the passage through the tube in such manner that when one of the blades moves transversely of the passage the other blade is moved out of the passage, a carriage which is movable in and out beneath the lower end of said tube, a plurality of containers within said carriage, means for automatically moving said carriage in a step-by-step movement to successively bring each container into alinement with said tube, means controlled by the mechanism which actuates the vibration of said blades to actuate the movement of said carriage after a predetermined number of vibrations of said blades, and means actuated by the withdrawal of the carriage to a point beyond a predetermined point to stop the vibration of the blades.

6. A machine for feeding articles into a receptacle comprising a hopper having a bottom provided with a row of downwardly extending outlet tubes, each of said tubes being formed with two transverse slots in the periphery, one of which is at some distance below the other, two vibratory blades for each of said tubes which are respectively adapted to move transversely in and out within said slots in such manner that when one blade moves in to close the passage the other blade moves out from the passage, a pivoted lever for each pair of blades in which said blades are mounted, a rotary cam having a series of cam projections thereon which successively engage said lever to vibrate the lever and the said blades to successively open and close the passage through the tube, a carriage which is movable in and out beneath the lower ends of said tubes, and a plurality of containers within said carriage, there being as many containers in each row as there are feed tubes and so located that when the carriage is moved into position one row of the said containers will be in alinement with the outlet ends of said tubes.

7. A machine for feeding articles into a receptacle comprising a hopper having a bottom provided with a row of downwardly extending outlet tubes, each of said tubes being formed with two transverse slots in

the periphery, one of which is at some distance below the other, two vibratory blades for each of said tubes which are respectively adapted to move transversely in and out within said slots in such manner that when one blade moves in to close the passage the other blade moves out from the passage, a pivoted lever for each pair of blades in which said blades are mounted, a rotary cam having a series of cam projections thereon which successively engage said lever to vibrate the lever and the said blades to successively open and close the passage through the tube, a carriage which is movable in and out beneath the lower ends of said tubes, a plurality of containers within said carriage, there being as many containers in each row as there are feed tubes and so located that when the carriage is moved into position one row of the said containers will be in alinement with the outlet ends of said tubes, means for automatically moving said carriage in a step-by-step movement to successively bring each row of containers into alinement with said feed tubes, and means controlled by the mechanism which actuates the vibration of said blades to actuate the movement of the said carriage after a predetermined number of vibrations of the said blades.

8. A machine for feeding articles into a receptacle comprising a hopper having a bottom provided with a row of downwardly extending outlet tubes, each of said tubes being formed with two transverse slots in the periphery, one of which is at some distance below the other, two vibratory blades for each of said tubes which are respectively adapted to move transversely in and out within said slots in such manner that when one blade moves in to close the passage the other blade moves out from the passage, a pivoted lever for each pair of blades in which said blades are mounted, a rotary cam having a series of cam projections thereon which successively engage said lever to vibrate the lever and the said blades to successively open and close the passage through the tube, a carriage which is movable in and out beneath the lower ends of said tubes, a plurality of containers within said carriage, there being as many containers in each row as there are feed tubes and so located that when the carriage is moved into position one row of the said containers will be in alinement with the outlet ends of said tubes, means for automatically moving said carriage in a step-by-step movement to successively bring each row of containers into alinement with said feed tubes, means controlled by the mechanism which actuates the vibration of said blades to actuate the movement of the said carriage after a predetermined number of vibrations of the said blades, a rotary shaft on which said cams are mounted, driving mechanism, clutch mechanism connected with said driving mechanism and said shaft, means actuated by the moving of the carriage into a certain position beneath the feed tubes to throw the clutch into operative position to start the rotation of the cam shaft, and means actuated by the withdrawal of the carriage to a predetermined point to disengage the clutch.

9. A machine for feeding articles into a container, having a feed tube, means for supporting a column of articles in said tube, means for releasing said articles one by one from said tube, a carriage which is movable beneath the lower end of said tube, a plurality of containers within said carriage, means for automatically moving said carriage in a step-by-step movement to successively bring each container into alinement with said tube, means actuated by the positioning of the carriage in a certain position to start the operation of the mechanism which actuates the feed, means controlled by the mechanism which actuates the releasing of the articles from the tube to actuate the movement of said carriage after a predetermined number of articles have been released into the container, and means actuated by the carriage after a predetermined step-by-step movement to stop the driving mechanism of the carriage and of the releasing mechanism.

In testimony whereof I affix my signature.

JAMES E. GROVES.