Dec. 3, 1929. R. S. CROSBY ET AL 1,737,877

MACHINE FOR COUNTING AND PACKAGING ARTICLES

Filed Oct. 10, 1928 4 Sheets-Sheet 1

Fig. 1

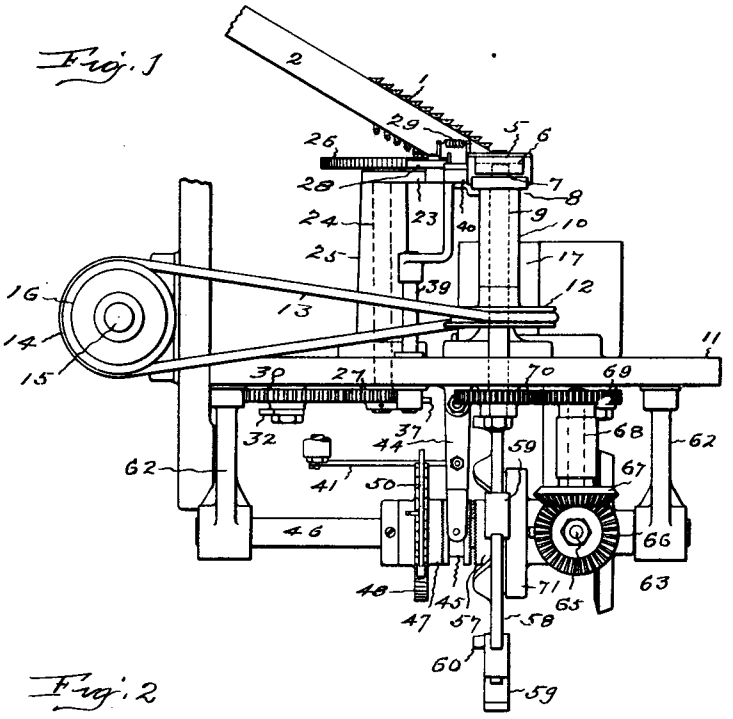
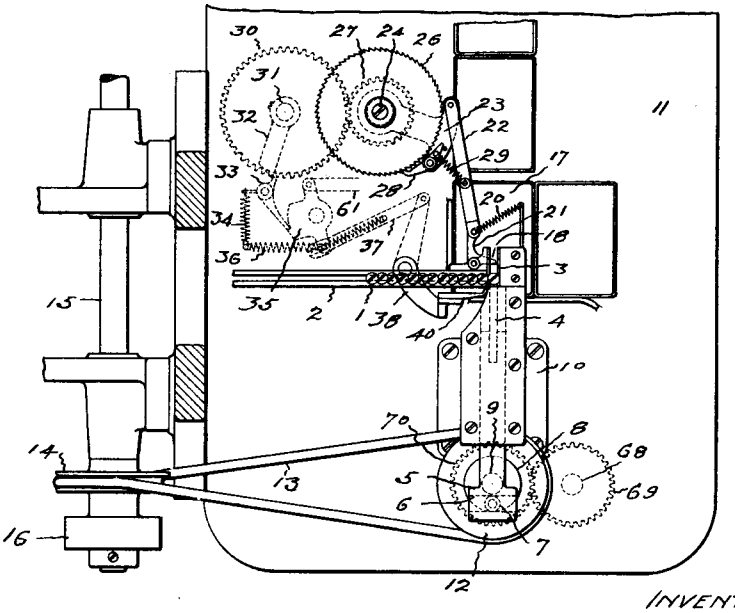


Fig. 2



INVENTORS

Reuben S. Crosby
Frank E. Newton
Harry P. Williams
Attys.

Dec. 3, 1929. R. S. CROSBY ET AL 1,737,877

MACHINE FOR COUNTING AND PACKAGING ARTICLES

Filed Oct. 10, 1928 4 Sheets-Sheet 2

Fig. 3

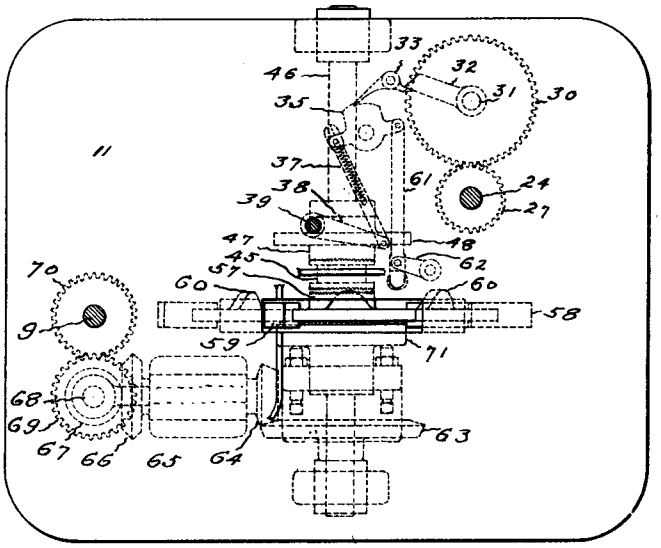
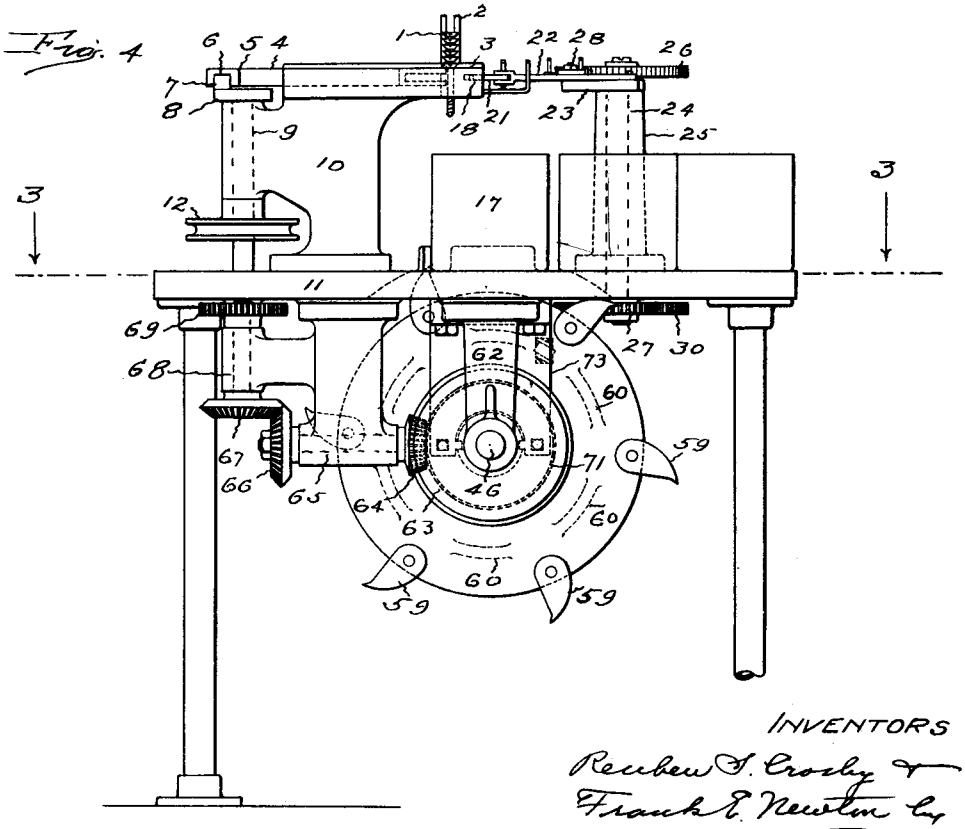


Fig. 4



INVENTORS

Reuben S. Crosby
Frank R. Newton
by Harry P. Williams
Atty.

Dec. 3, 1929. R. S. CROSBY ET AL 1,737,877

MACHINE FOR COUNTING AND PACKAGING ARTICLES

Filed Oct. 10, 1928 4 Sheets-Sheet 3

Fig. 5

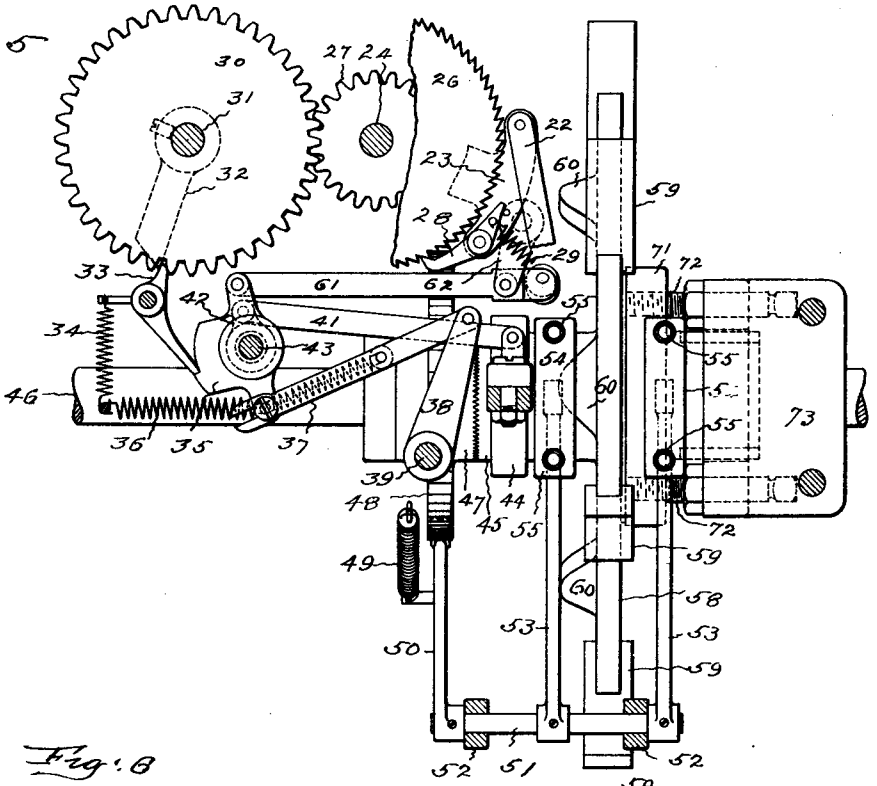
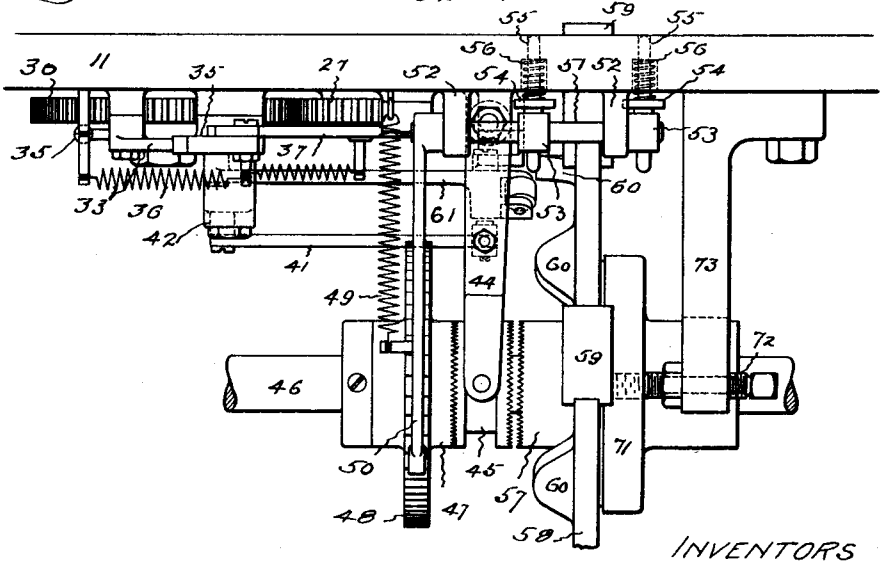


Fig. 6



INVENTORS

Reuben S. Crosby

Frank E. Newton

Harry P. Williams

Atty.

Dec. 3, 1929. R. S. CROSBY ET AL 1,737,877

MACHINE FOR COUNTING AND PACKAGING ARTICLES

Filed Oct. 10, 1928 4 Sheets-Sheet 4

Fig. 7

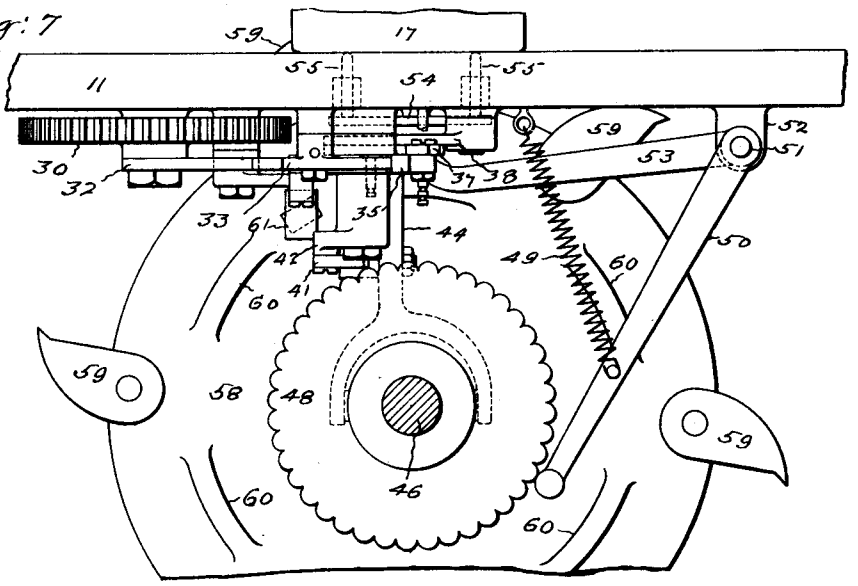


Fig. 8

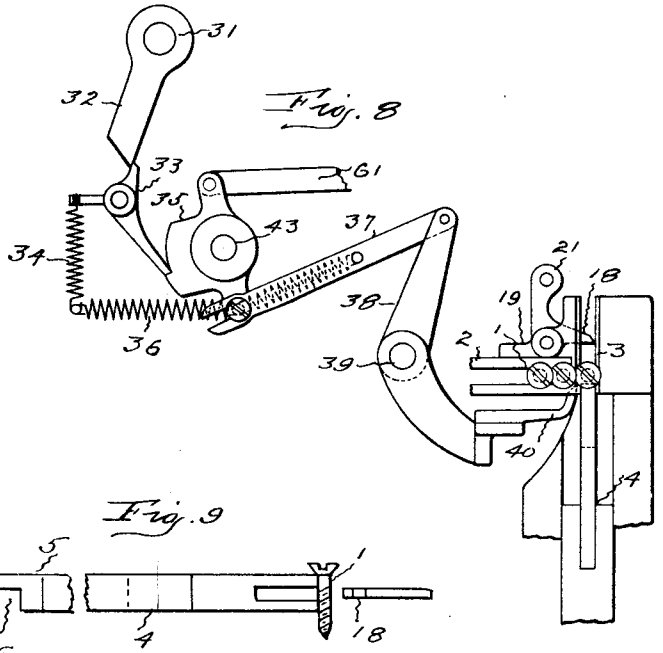


Fig. 9

INVENTORS

Reuben S. Crosby
Frank E. Newton, by
Harry P. Williams
Atty.

Patented Dec. 3, 1929 1,737,877

UNITED STATES PATENT OFFICE

REUBEN S. CROSBY AND FRANK E. NEWTON, OF HARTFORD, CONNECTICUT; SAID CROSBY ASSIGNOR TO SAID NEWTON

MACHINE FOR COUNTING AND PACKAGING ARTICLES

Application filed October 10, 1928. Serial No. 311,616.

This invention relates to a machine which is designed to automatically feed, count and deliver the exact predetermined number of small articles into boxes, or cartons, or similar receptacles, and while it is particularly adapted to count and package screws, or bolts or nails or the like, it may be employed for counting and packaging other small articles. For the sake of conciseness, the term "units" is used throughout the specification and it is to be understood as including screws, bolts, nails and any other articles of merchandise which the invention is capable of handling, and the term "boxes" is to be understood as including boxes, cartons and similar receptacles.

The object of the invention is to provide a machine which will rapidly count and deliver the exact number of units into boxes, the units which are passed through the machine themselves forming a connecting element between the feed and the counting mechanism so as to ensure the correct count and the delivery of the exact predetermined number of units into the boxes which when filled are automatically removed.

In the embodiment of the invention illustrated the units are fed down an inclined chute and delivered in front of a reciprocating slide which pushes one at a time to the end of a runway from which they drop into the box that is vibrated to cause the units to settle. As each unit is pushed along the runway it engages and moves a counting finger which is connected with a pawl that engages a ratchet wheel which is connected by gears with a shaft that carries a trip finger, the adjustment of which determines the count. Should a unit fail to appear in front of the slide, the slide reciprocates past the counting finger without causing it to function. The trip finger is set to such a position that when the desired number of units have been counted and delivered to a box, it will engage and trip a latch, which when tripped allows mechanism to act and cause a gate to close the bottom of the chute and temporarily interrupt the exit of units from the chute, and at the same time throw a clutch and cause the conveyor to push away the filled box, and allow an empty box to be brought into position to receive the following units. After a filled box is removed and an empty box is pushed into filling position the latch is automatically reset, the gate opens the chute and the feed of screws past the counting finger and into the box is resumed.

In the accompanying drawings Fig. 1 shows an elevation looking toward one side of the machine. Fig 2 is a plan view of the machine. Fig 3 is a horizontal section looking down on the plane indicated by the dotted line 3—3 on Fig. 4. Fig. 4 is a front elevation of the machine. Fig. 5 is a plan view on larger scale showing the relations of the mechanisms for operating the cut-off gate, the box conveyor and the box vibrating mechanism. Fig. 6 is a side elevation of the mechanism illustrated in Fig. 5. Fig. 7 is a front elevation of the box conveyor and vibrating mechanism. Fig. 8 is a detail view showing the gate-operating mechanism. Fig. 9 is a detail view of the unit feed slide and counting finger.

The units 1, which are shown as screws, slide down an inclined chute 2 which may lead from any suitable hopper. Beneath the chute is a runway 3, and as the units reach the end of the chute they drop vertically into this runway. Movable horizontally in the runway is a slide 4, the front end of which is forked while the rear end has a head 5 with a groove 6 in its under side. In the groove of the head of the slide is a roll 7 which is eccentrically mounted on a disk 8 that is fastened to the upper end of a shaft 9 supported vertically in a bracket 10 on top of the table 11. Fixed to this shaft is a pulley 12 that by a belt 13 is connected with a pulley 14 on a shaft 15 which carries the

driving pulley 16. By this means the slide is given a rapid reciprocation, and as it moves forward if a unit has been dropped in front of it the unit is pushed along the track and dropped into a box 17. As the unit is pushed along the runway by the slide it engages the counting finger 18. Should a screw fail to drop or be held from dropping from the chute in front of the slide, the slide will reciprocate without causing the counting finger to be engaged as the limbs of the slide fork will pass above and below the counting finger without contact therewith.

The counting finger 18 is pivoted to a bracket 19 that is fastened to one side of the feed chute. A spring 20 connected with an arm 21 which projects from the counting finger yieldingly retains the finger extending into the runway in the path of the fed units. The arm 21 is connected by a link 22 with a rocker 23 that is free to turn on a shaft 24 which extends through a post 25 on the top of the table. Fastened to the upper end of this shaft is a ratchet wheel 26 and fixed to the lower end of the shaft is a pinion 27. Pivoted on the rocker 23 is a pawl 28 that is held engaged with the teeth of the ratchet wheel by a spring 29, Figs. 2, 5. By means of this mechanism each time the counting finger is moved by the feed of a unit the pawl moves the ratchet wheel the distance of one tooth and the pinion 27 is correspondingly turned.

The pinion 27 meshes with a gear 30 fixed to the shaft 31 to which a trip finger 32 is adjustably fastened. In the path of the end of the trip finger is the end of a pivoted latch 33 which is normally held by a spring 34 in engagement with a notch in a rocker 35. The trip finger is adjusted around the shaft according to the count desired, and when it is turned from that position by the pawl, ratchet wheel, pinion and gear so as to engage with the latch it releases the latch from the notch in the rocker allowing the rocker to be turned by a spring 36. Figs. 5, 8.

Flexibly connected with one arm of the rocker 35 is the end of a link 37, the other end of which is connected with a lever 38 that is attached to a shaft 39 which extends up through the table and at its upper end carries the gate 40 that is movable across the end of the chute, Figs. 1, 8. When the rocker 35 is released and is turned by the spring 36 the gate is swung across the end of the chute to temporarily interrupt the exit of units therefrom. When the rocker is returned the gate is moved from the bottom of the chute and the feed of units is allowed to resume.

A link 41 connects an arm 42 attached to the lower end of the shaft 43, to which the rocker 35 is fastened, with a lever 44 which has a forked lower end that engages a clutch member 45 which is splined on the continuously rotating shaft 46. Normally the clutch member 45 engages with a clutch member 47 on the hub of a disk 48 which has a serrated periphery, Figs. 5, 6, 7, and which turns freely on the shaft 46. Held by a spring 49 in contact with the periphery of this disk is the end of an arm 50 that is fastened to an arbor 51 which is supported by brackets 52 attached to the underside of the table. Fastened to this arbor are two arms 53, the free ends of which carry plates 54, Figs. 5, 6. Extending upward from the top of each of these plates through the table are two pins 55. Springs 56 normally press these plates down. The pins 55 are located below the position on the table upon which the box being filled with units is placed, and when the machine is in operation the rotation of the shaft 46 and serrated disk 48, through the lever, arms and plates causes the pins to be reciprocated against the bottom of the box as it is being filled, so as to cause the units to settle down therein. This takes place while the units are being fed into the box.

As the rocker 35 is released and is turned when a count is completed and a box filled, the lever 44 is swung so as to move the clutch member 45 from engagement with the clutch member 47 on the serrated disk which then stops rotating and the shaking of the box ceases.

When the clutch member 45 is shifted by the release of the rocker after the count is completed it is moved into engagement with a clutch member 57 on the hub of a disk 58 which turns freely on the shaft 46 and is only rotated when the clutch member 45 is engaged with the clutch member 57. This disk has attached to its periphery feed dogs 59 which are so located that when the disk is rotated they pass through an opening in the table and engage the edge of a box that has been filled and push it out of filling position. On the disk 58 are cam lugs 60 so located that, when the disk has been rotated sufficiently for a dog to move the box out of filling position, they engage a roll at the lower end of a bar 61, Figs. 3, 5, which has its upper end hinged to the rocker 35, the lower end of the bar being guided by a swinging arm 62. When a cam lug engages the roll and pushes the bar up the rocker 35 is by this means reset, that is, it is turned back so that the latch 33 will again engage the notch and hold the rocker. This movement of the rocker by the mechanisms described swings the gate away from the lower end of the chute so that units will resume feeding, and shifts the clutch member 45 back so that the box vibrating mechanism will again function.

The shaft 46 upon which the vibrating disk 48 and the box feed and resetting disk 58 are loosely mounted, is supported by brackets 62 attached to the underside of the table. This shaft has a bevel gear 63 which is engaged by a bevel pinion 64 on an arbor 65 that has

a bevel gear 66 which is engaged by a bevel gear 67 attached to the lower end of an arbor 68. At the upper end of this arbor is a gear 69 that engages a gear 70 on the shaft 9 that operates the unit feed slide, Figs. 1, 2, 3, 4.

In order that the disk 58 bearing the box feed dogs 59 and the resetting cam lugs 60 shall be stopped quickly, as soon as the clutch member 45 is released from the clutch member 57, a friction disk 71 is arranged on the shaft 46 so as to bear against the back of the disk. The pressure of this friction disk is controlled by screws 72 which are threaded through the lower end of a bracket 73 that is fastened to the underside of the table, Figs. 5, 6.

The trip finger is set in position to trip the latch after the predetermined number of units has been fed into the box. When the latch releases the rocker, the rocker is thrown by its spring. This movement of the rocker causes the gate to swing across the lower end of the chute and stop the feed of units. It also shifts the clutch so that the vibration of the box being filled is stopped, and sets in operation the disk which feeds away the filled box, and also after the box has been removed, resets the rocker, which resetting of the rocker moves the gate away from the bottom of the chute and shifts the clutch back from the resetting and box feed disk into engagement with the vibrating disk, and the filling of another box is begun.

The invention claimed is:—

1. A machine for counting and packaging articles comprising mechanism for feeding the articles to be counted, a counting finger projecting into the path of the fed articles, counting mechanism actuated by the movements of the counting finger, a trip moved by the movements of the counting mechanism, a latch engaged by said trip after a predetermined number of movements of the counting mechanism, control means engaged and retained by said latch, a spring for throwing said control means when released from the latch, and a gate connected with and moved by the control means to interrupt the feed of articles when the control means is thrown by said spring.

2. A machine for counting and packaging articles comprising mechanism for feeding the articles to be counted, a counting finger projecting into the path of the fed articles, counting mechanism actuated by the movements of the counting finger, a trip moved by the movements of the counting mechanism, a latch engaged by said trip after a predetermined number of movements of the counting mechanism, control means engaged and retained by said latch, a spring for throwing said control means when released from the latch, a gate connected with and moved by the control means to interrupt the feed of articles when the control means is thrown by said spring, and means for reengaging the control mechanism and the latch.

3. A machine for counting and packaging articles comprising mechanism for feeding the articles to be counted, a counting finger projecting into the path of the fed articles, counting mechanism actuated by the movements of the counting finger, a trip moved by the movements of the counting mechanism, a latch engaged by said trip after a predetermined number of movements of the counting mechanism, control means engaged and retained by said latch, a spring for throwing said control means when released from the latch, a gate connected with and moved by the control means to interrupt the feed of articles when the control means is thrown by said spring, mechanism for removing a box from filling position set in operation when the latch releases the control means, and means for reengaging the control means and the latch when the box feed mechanism has moved a box from filling position.

4. A machine for counting and packaging articles comprising mechanism for feeding the articles to be counted, a counting finger projecting into the path of the fed articles, counting mechanism actuated by the movements of the counting finger, a trip moved by the movements of the counting mechanism, a latch engaged by said trip after a predetermined number of movements of the counting mechanism, control means engaged and retained by said latch, a spring for throwing said control means when released from the latch, a gate connected with and moved by the control means to interrupt the feed of articles when the control means is thrown by said spring, mechanism for vibrating the box being filled, mechanism for removing a box from filling position set in operation when the latch releases the control means, and means for reengaging the control means and the latch when the box feed mechanism has moved a box from filling position.

5. A machine for counting and packaging articles comprising a runway for receiving articles, a slide adapted to reciprocate in the runway and push articles therefrom, a counting finger projecting into the runway and arranged to be engaged by the fed articles, a pawl actuated by the movements of the counting finger, a ratchet wheel advanced by the movements of the pawl, a trip finger moved by the movements of the ratchet wheel, means engaged by the trip finger after a predetermined number of movements of the ratchet wheel, a rocker engaged by said means, means for turning the rocker when released, and a gate connected with the rocker and adapted to interrupt the feed of articles when the rocker is turned.

6. A machine for counting and packaging articles comprising a runway for receiving

articles, a slide adapted to reciprocate in the runway and push articles therefrom, a counting finger projecting into the runway and arranged to be engaged by the fed articles, a pawl actuated by the movements of the counting finger, a ratchet wheel advanced by the movements of the pawl, a trip finger moved by the movements of the ratchet wheel, a latch engaged by the trip finger after a predetermined number of movements of the ratchet wheel, a rocker engaged by the latch, means for turning the rocker when released from the latch, and a gate connected with the rocker and adapted to interrupt the feed of articles when the rocker is turned.

7. A machine for counting and packaging articles comprising a runway for receiving articles, a slide adapted to reciprocate in the runway and push articles therefrom, a counting finger projecting into the runway and arranged to be engaged by the fed articles, a pawl actuated by the movements of the counting finger, a ratchet wheel advanced by the movements of the pawl, a trip finger moved by the movements of the ratchet wheel, a latch engaged by the trip finger after a predetermined number of movements of the ratchet wheel, a rocker engaged by the latch, means for turning the rocker when released from the latch, a gate connected with the rocker and adapted to interrupt the feed of articles when the rocker is turned, and mechanism for removing a box from filling position set in operation when the latch releases the rocker.

8. A machine for counting and packaging articles comprising a runway for receiving articles, a slide adapted to reciprocate in the runway and push articles therefrom, a counting finger projecting into the runway and arranged to be engaged by the fed articles, a pawl actuated by the movements of the counting finger, a ratchet wheel advanced by the movements of the pawl, a trip finger moved by the movements of the ratchet wheel, a latch engaged by the trip finger after a predetermined number of movements of the ratchet wheel, a rocker engaged by the latch, means for turning the rocker when released from the latch, a gate connected with the rocker and adapted to interrupt the feed of articles when the rocker is turned, and means for reengaging the rocker and the latch after a predetermined interval.

9. A machine for counting and packaging articles comprising a runway for receiving articles, a slide adapted to reciprocate in the runway and push articles therefrom, a counting finger projecting into the runway and arranged to be engaged by the fed articles, a pawl actuated by the movements of the counting finger, a ratchet wheel advanced by the movements of the pawl, a trip finger moved by the movements of the ratchet wheel, a latch engaged by the trip finger after a predetermined number of movements of the ratchet wheel, a rocker engaged by the latch, a spring for turning the rocker when released from the latch, a gate connected with the rocker and adapted to interrupt the feed of articles when the rocker is turned by said spring, and means for reengaging the rocker and the latch after a predetermined interval.

10. A machine for counting and packaging articles comprising a runway for receiving articles, a slide adapted to reciprocate in the runway and push articles therefrom, a counting finger projecting into the runway and arranged to be engaged by the fed articles, a pawl actuated by the movements of the counting finger, a ratchet wheel advanced by the movements of the pawl, an adjustable trip finger rotated by the movements of the ratchet wheel, a latch engaged by the trip finger after a predetermined number of movements of the ratchet wheel, a rocker engaged by the latch, a spring for turning the rocker when released from the latch, a gate connected with the rocker and adapted to interrupt the feed of articles when the rocker is turned by said spring, and means for reengaging the rocker and the latch after a predetermined interval.

11. A machine for counting and packaging articles comprising a runway for receiving articles, a slide adapted to reciprocate in the runway and push articles therefrom, a counting finger projecting into the runway and arranged to be engaged by the fed articles, a pawl actuated by the movements of the counting finger, a ratchet wheel advanced by the movements of the pawl, a trip finger moved by the movements of the ratchet wheel, a latch engaged by the trip finger after a predetermined number of movements of the ratchet wheel, a rocker engaged by the latch, means for turning the rocker when released from the latch, means connected with the rocker for vibrating a box being filled, a gate connected with the rocker and adapted to interrupt the feed of articles when the rocker is turned, and mechanism for removing a box from filling position set in operation when the latch releases the rocker.

12. A machine for counting and packaging articles comprising an inclined chute for feeding the articles, a runway at the lower end of the chute for receiving articles therefrom, a slide adapted to reciprocate in the runway and push articles therefrom, a counting finger projecting into the runway and arranged to be engaged by the fed articles, a pawl actuated by the movements of the counting finger, a ratchet wheel advanced by the movements of the pawl, an adjustable trip finger rotated by the movements of the ratchet wheel, a latch engaged by the trip finger after a predetermined number of movements of the ratchet wheel, a rocker engaged by the latch, a spring for turning the rocker when released from the latch, a gate connected with the rocker and adapted to be moved across the low-

er end of the chute when the rocker is turned by said spring, and means for reengaging the rocker and the latch after a predetermined interval.

13. A machine for counting and packaging articles comprising an inclined chute for feeding the articles, a runway at the lower end of the chute for receiving articles therefrom, a slide adapted to reciprocate in the runway and push articles therefrom, a counting finger projecting into the runway and arranged to be engaged by the fed articles, a pawl actuated by the movements of the counting finger, a ratchet wheel advanced by the movements of the pawl, an adjustable trip finger rotated by the movements of the ratchet wheel, a latch engaged by the trip finger after a predetermined number of movements of the ratchet wheel, a rocker engaged by the latch, a spring for turning the rocker when released from the latch, a gate connected with the rocker and adapted to be moved across the lower end of the chute when the rocker is turned by said spring, mechanism for removing a box from filling position set in operation when the latch releases the rocker, and means for reengaging the rocker and the latch when the box feed mechanism has moved a box from filling position.

14. A machine for counting and packaging articles comprising an inclined chute for feeding the articles, a runway at the lower end of the chute for receiving articles therefrom, a slide adapted to reciprocate in the runway and push articles therefrom, a counting finger projecting into the runway and arranged to be engaged by the fed articles, a pawl actuated by the movements of the counting finger, a ratchet wheel advanced by the movements of the pawl, an adjustable trip finger rotated by the movements of the ratchet wheel, a latch engaged by the trip finger after a predetermined number of movements of the ratchet wheel, a rocker engaged by the latch, a spring for turning the rocker when released from the latch, a gate connected with the rocker and adapted to be moved across the lower end of the chute when the rocker is turned by said spring, mechanism for vibrating the box being filled, and means for reengaging the rocker and the latch after a predetermined interval.

15. A machine for counting and packaging articles comprising a runway for receiving articles to be counted, a slide adapted to reciprocate in the runway and push articles therefrom, a counting finger projecting into the runway and arranged to be engaged by the fed articles, a pawl actuated by the movements of the counting finger, a ratchet wheel advanced by the movements of the pawl, an adjustable trip finger rotated by the movements of the ratchet wheel, a latch engaged by the trip finger after a predetermined number of movements of the ratchet wheel, a rocker engaged by the latch, a spring for turning the rocker when released from the latch, a gate connected with the rocker and adapted to interrupt the feed of articles when the rocker is turned by said spring, mechanism for vibrating the box being filled operated when the latch retains the rocker, mechanism for removing a box from filling position set in operation when the latch releases the rocker, and means for reengaging the rocker and the latch when the box feed mechanism has moved a box from filling position.

16. A machine for counting and packaging articles comprising an inclined chute for feeding the articles, a runway at the lower end of the chute for receiving articles therefrom, a slide adapted to reciprocate in the runway and push articles therefrom, a counting finger projecting into the runway and arranged to be engaged by the fed articles, a pawl actuated by the movements of the counting finger, a ratchet wheel advanced by the movements of the pawl, an adjustable trip finger rotated by the movements of the ratchet wheel, a latch engaged by the trip finger after a predetermined number of movements of the ratchet wheel, a rocker engaged by the latch, a spring for turning the rocker when released from the latch, a gate connected with the rocker and adapted to be moved across the lower end of the chute when the rocker is turned by said spring, mechanism for vibrating the box being filled operated when the latch retains the rocker, mechanism for removing a box from filling position set in operation when the latch releases the rocker, and means for reengaging the rocker and the latch when the box feed mechanism has moved a box from filling position.

17. A machine for counting and packaging articles comprising an inclined chute for feeding the articles, a runway at the lower end of the chute for receiving articles therefrom, a slide adapted to reciprocate in the runway and push articles therefrom, a counting finger projecting into the runway and arranged to be engaged by the fed articles, a pawl actuated by the movements of the counting finger, a ratchet wheel advanced by the movements of the pawl, an adjustable trip finger rotated by the movements of the ratchet wheel, a latch engaged by the trip finger after a predetermined number of movements of the ratchet wheel, a rocker engaged by the latch, a spring for turning the rocker when released from the latch, a gate connected with the rocker and adapted to be moved across the lower end of the chute when the rocker is turned by said spring, mechanism for vibrating the box being filled operated when the latch retains the rocker, mechanism for removing a box from filling position set in operation when the latch releases

the rocker, mans for reengaging the rocker and the latch when the box feed mechanism has moved a box from filling position, and a clutch connected with the rocker and engaged with said vibrating mechanism when the rocker is held by the latch and shifted into engagement with the box feeding and rocker resetting means when the rocker is released from the latch.

REUBEN S. CROSBY.
FRANK E. NEWTON.