

Nov. 9, 1943.

S. R. HOWARD

2,333,790

PACKAGING MACHINE

Filed Oct. 15, 1940

4 Sheets-Sheet 1

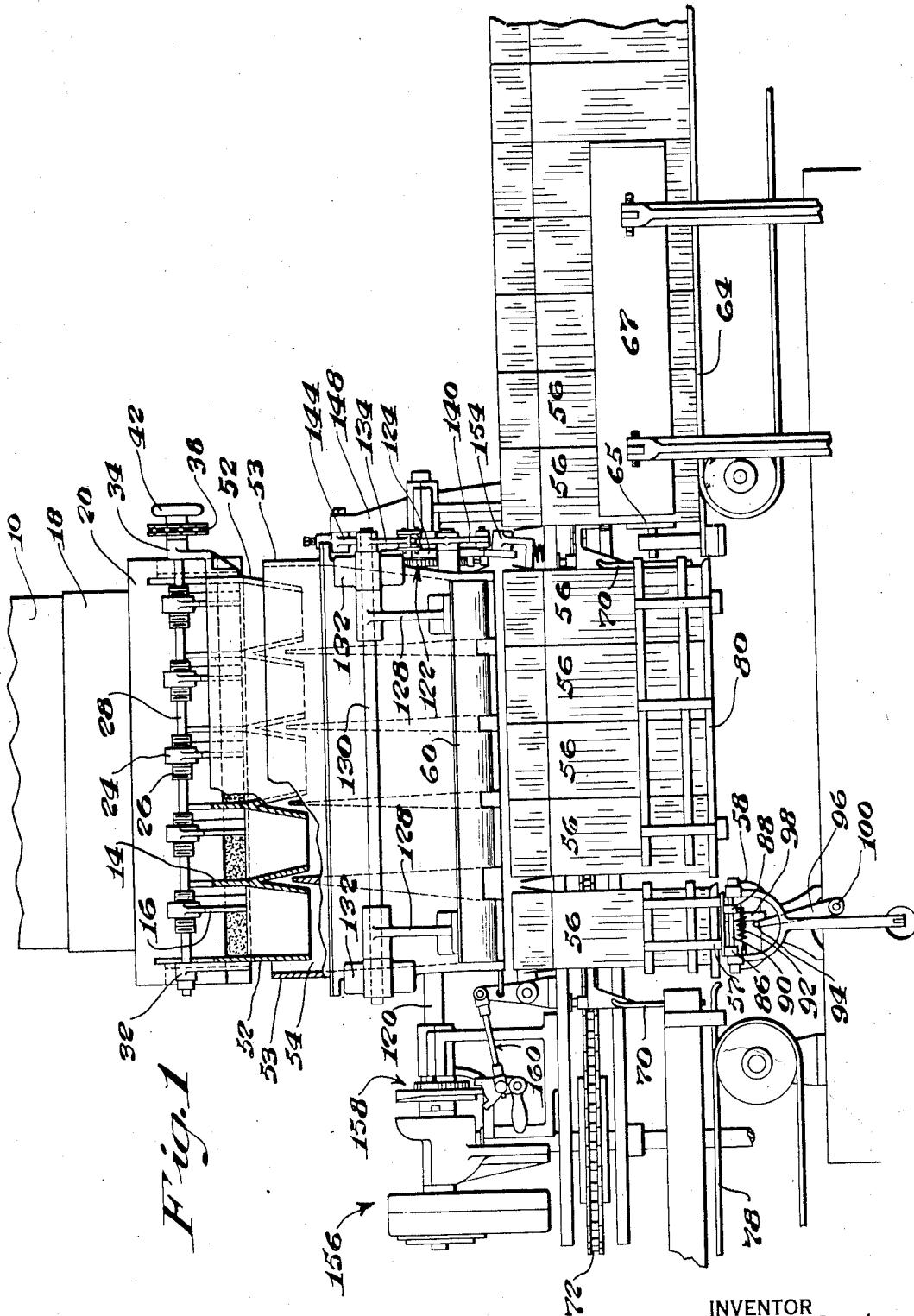


Fig. 1

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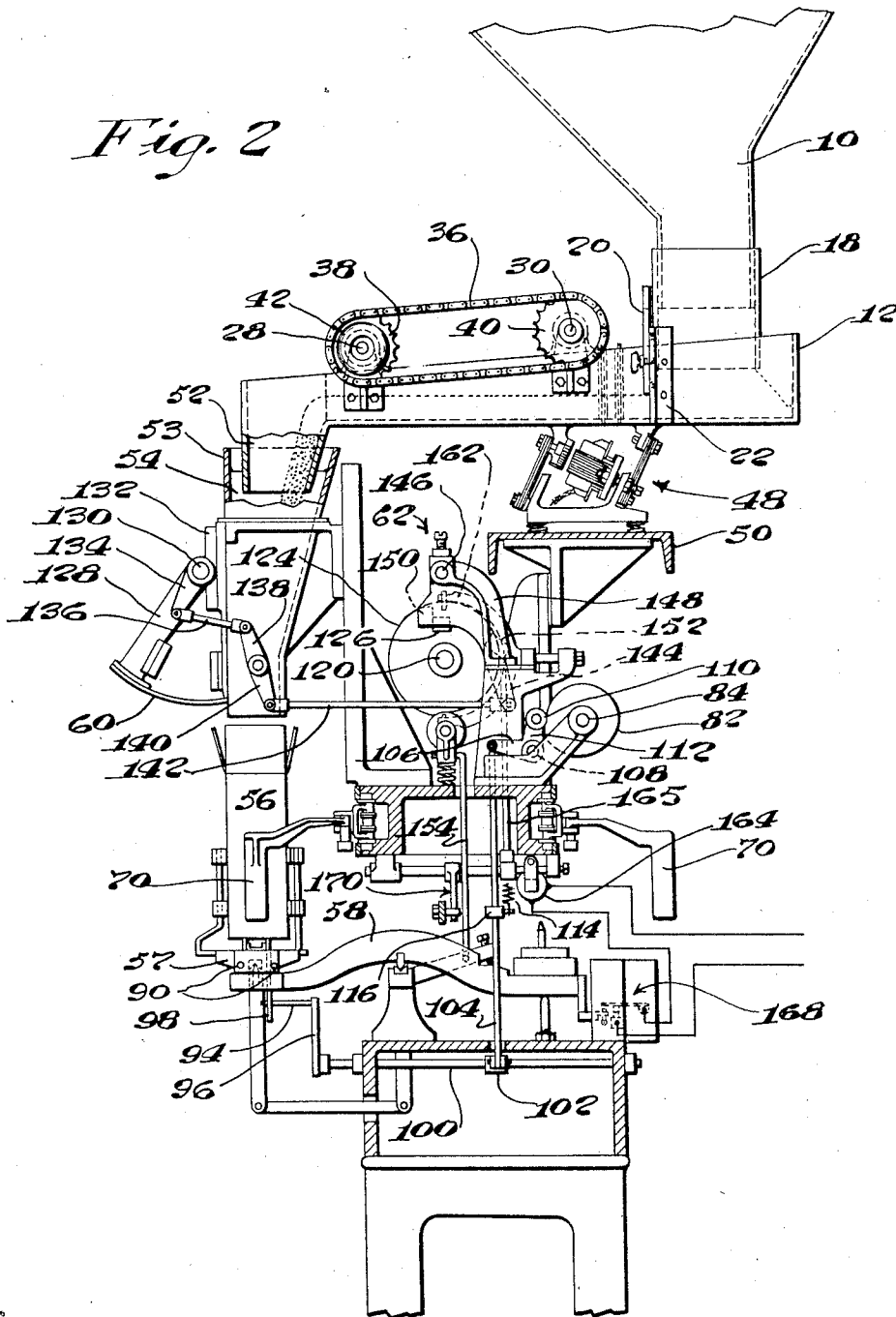
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4 Sheets-Sheet 2

Fig. 2



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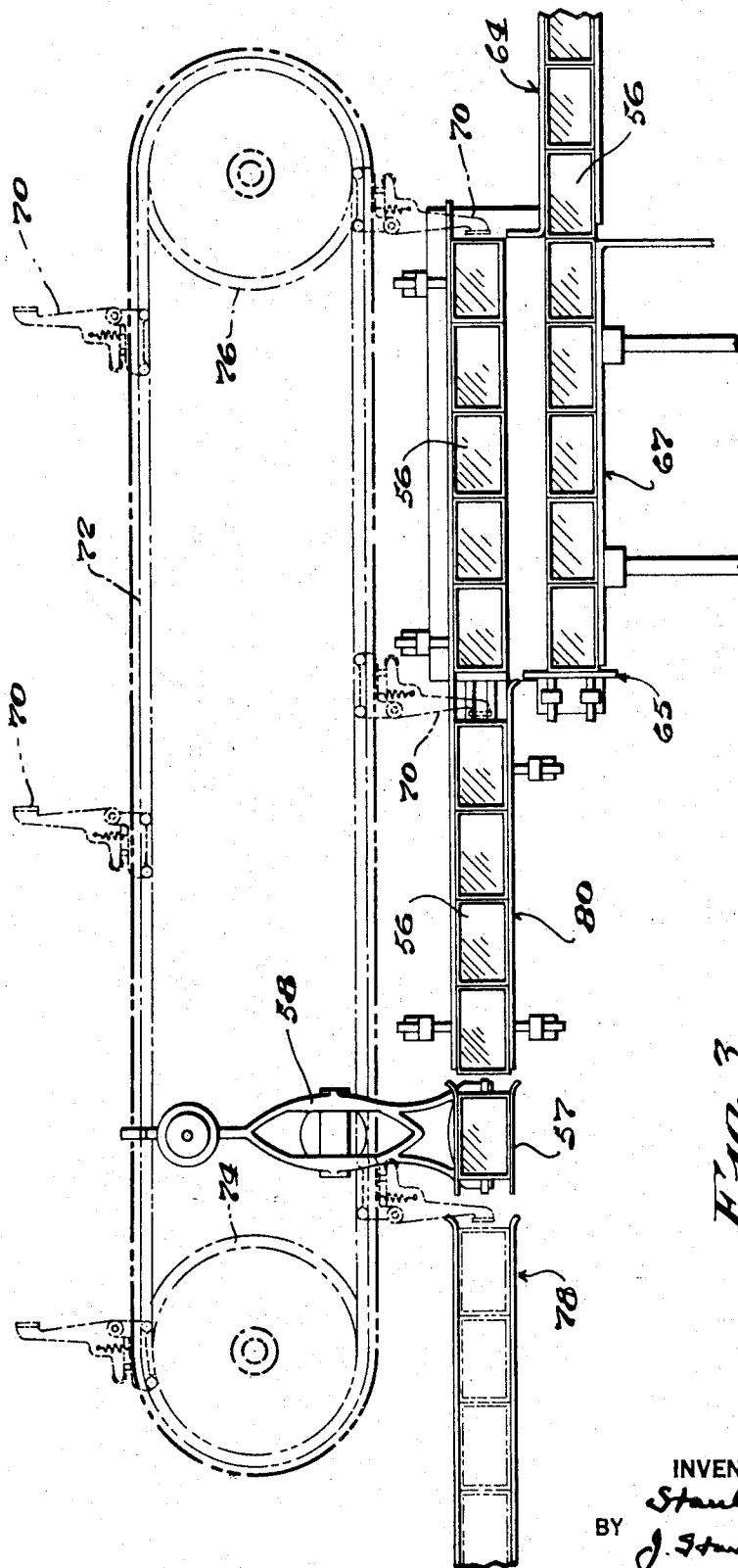


Fig. 3

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4 Sheets-Sheet 4

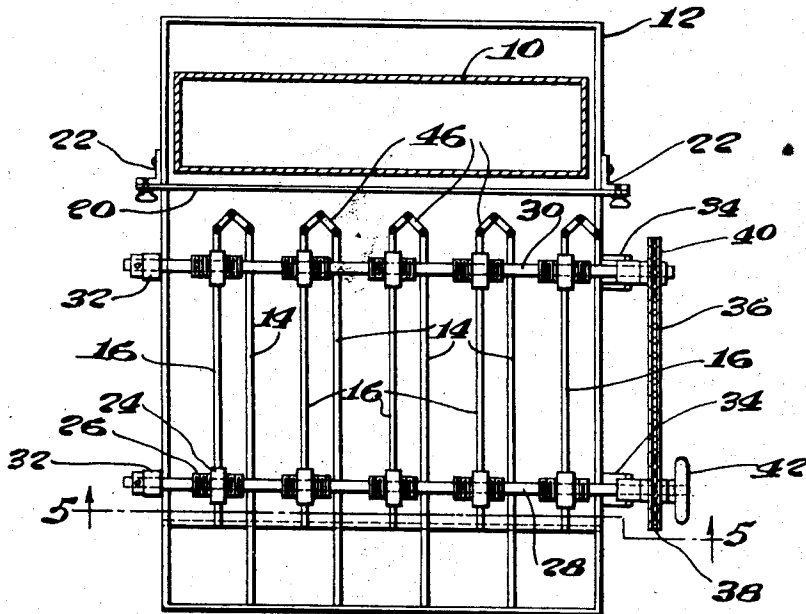


Fig. 4

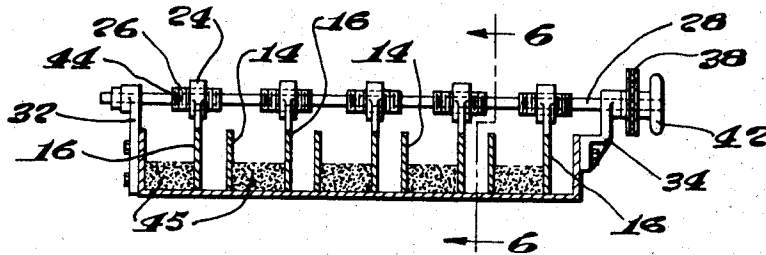


Fig. 5

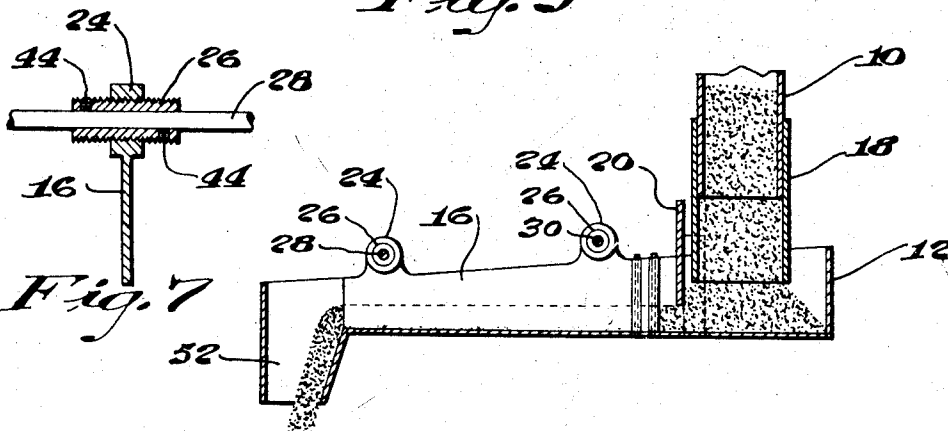


Fig. 6

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PACKAGING MACHINE

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Application October 15, 1940, Serial No. 361,260

9 Claims. (Cl. 249—55)

This invention relates to a packaging machine.

The invention has for an object to provide a novel and improved packaging machine provided with a vibratory feeding trough capable of delivering a plurality of uniform streams and having provision for weighing one of the streams and having control mechanism for terminating the feed of the material when the weighed load reaches a predetermined amount whereby a plurality of substantially equal loads may be obtained in a rapid and simplified manner.

Another object of the invention is to provide a novel and improved material feeding mechanism including vibratory feeding trough divided to provide a plurality of substantially equal paths for delivery of the material and in which provision is made for adjusting the paths to obtain a greater or less volume of material being fed.

With these general objects in view and such others as may hereinafter appear, the invention consists in the packaging machine, the material feeding mechanism, and in the various structures, arrangements and combinations of parts hereinafter described and particularly defined in the claims at the end of this specification.

In the drawings which illustrate the preferred embodiment of the invention, Fig. 1 is a front elevation of a packaging machine embodying the invention; Fig. 2 is a side elevation, partly in cross section, of the machine shown in Fig. 1; Fig. 3 is a plan view of the container transferring and conveying mechanism, to be referred to; Fig. 4 is a plan view of the material feeding mechanism; Fig. 5 is a cross-sectional view on the line 5—5 of the material feeding trough shown in Fig. 4; Fig. 6 is a cross-sectional view on the line 6—6 of Fig. 5; and Fig. 7 is a detail view, in cross section, of one of the adjustable dividing members shown in Fig. 5.

In general, the present invention contemplates a packaging machine of novel and simplified construction having a vibratory feeding trough capable of delivering a plurality of substantially uniform streams of material into a plurality of containers and in which provision is made for weighing the material delivered in one stream and for simultaneously cutting off all of the streams when the weighed load reaches a predetermined amount, to the end that a plurality of loads of substantially equal weight may be delivered by the machine. In the preferred embodiment of the invention, the vibratory feeding trough is subdivided to provide a plurality of substantially equal paths or runs capable of being adjusted to provide streams of substantially

uniform cross section. Provision is also made for feeding a plurality of containers into operative position to receive the loads delivered by the trough, one of the containers being preferably separated from the main group thereof and supported upon a weighing scale. In practice, the streams are guided into the containers through suitable funnels having provision for cutting off the streams through connections from the weighing scale.

In general, the illustrated machine embodies some of the features illustrated and described in the United States patent to Howard, No. 1,893,622, issued January 10, 1933, particularly with reference to the weighing mechanism, package feeding mechanism, and control mechanism to which reference may be made for a complete description thereof. For the purposes of the present invention, only sufficient portions of the complete weighing machine have been herein illustrated and will be described as appear to be necessary for a complete understanding of the invention. In the Howard machine, and in other prior weighing machines of which I am aware, a plurality of individual weighing units are provided, and in the operation of the machine, the machine cannot start on a cycle of operation until all of the independently operated weighing operations have been performed during the preceding cycle, so that if one scale should be operating at a slow rate, the other scales are delayed until it has completed its weighing operations. The present invention eliminates this delay.

Referring now to the drawings illustrating the preferred embodiment of the invention, in general the packaging machine comprises a supply hopper 10 through which the material to be packaged is permitted to flow by gravity into a vibratory feeding trough 12 provided with a plurality of stationary partition walls 14 and a plurality of adjustable walls 16 between which the material, withdrawn from the supply hopper, is fed by the vibratory movement of the trough. The supply hopper 10 is provided with an adjustable collar 18 in order to control the amount of material withdrawn from the hopper, and a vertically adjustable plate 20 disposed in front of the hopper outlet and extending across the feeding trough is provided to control the depth of the material being fed. As herein shown, the plate 20 is adjustably secured to angle bars 22 attached to the sides of the trough 12.

The stationary partition walls 14 are equally spaced in the trough and as illustrated in detail

in Figs. 4 and 5, the adjustable walls 16 are supported in the trough by threaded lugs 24 which cooperate with threaded sleeves 26 adjustably secured to cross shafts 28, 30. The shafts 28, 30 are journaled in bearing brackets 32, 34 attached to the sides of the trough and the shafts are connected together to be rotated simultaneously by a chain 36 running over sprockets 38, 40, fast on the shafts 28, 30 respectively. A hand wheel 42 mounted on the shaft 28 is provided to permit manual rotation of the shafts. In operation, when the shafts are rotated in one direction, the threaded lugs 24 riding on the threaded sleeves 26 effect movement of the movable partitions 16 in a direction toward their respective stationary partition walls 14 in order to simultaneously and uniformly decrease the width of the streams of material in the trough. Conversely, rotation of the hand wheel 42 in the opposite direction will effect a uniform widening of the streams. Provision is also made for individually adjusting the movable walls 16 by loosening the set screws 44 in the sleeves 26 and manually sliding the sleeves longitudinally of the shafts 28, 30 to their adjusted position whereupon the set screws are again tightened up to permit simultaneous adjustment as above described. It will be observed that adjacent stationary and movable dividing walls 14, 16 are hingedly connected together at the ends near the supply hopper by hinged plates 46 forming V-shaped ends which serve to divide the wide stream of material passing under the plate 20 into separate paths or runs 45 of substantially uniform cross section.

The vibratory feeding trough is arranged to be operated by a vibratory motor 48 of any usual or preferred form, which, as herein shown, is yieldingly mounted on a supporting platform 50 attached to the machine frame. As illustrated in Figs. 1 and 2, the material feeding end of the trough is provided with a plurality of funnels 52 arranged to guide the divided streams of material through a chamber housing 53 having feed cut-off chambers 54 and into containers 56 supported therebeneath.

A plurality of containers, herein shown as a group of five containers are simultaneously filled and as illustrated, one of the containers is supported on the weighing end of a scale beam 58 which may and preferably will comprise one of the weighing units shown and described in the Howard patent above referred to. The feed cut-off chambers 54 are provided with a material cut-off blade or shutter 60 arranged to be operated by control mechanism indicated generally at 62 adapted to be actuated by movement of the scale beam 58 to cut off the supply of material when a predetermined weight is reached in the weighed load. During the time the streams are cut off, the vibratory feeding trough may continue to feed material into the chambers 54 to accumulate loads therein to be deposited into the next successive group of containers moved into filling position.

As illustrated and described in the Howard Patent No. 1,893,622, the machine is arranged to be operated in successive cycles, a complete cycle comprising a package filling or weighing cycle and a package moving cycle. As herein shown, provision is made for transferring a group of five containers from a line thereof supported upon an incoming belt 64, and for this purpose, the incoming containers are arranged to come to rest against a stop plate 65 and a pusher bar

67, of known construction, is arranged to transfer a group of containers from the incoming belt into the path of carrier fingers 70. The carrier fingers 70 are carried on a chain 72 running over sprockets 74, 76 which are arranged to be operated to advance the filled group of containers onto a discharge belt 78 and to advance a new group of containers into filling position. The mechanism for transferring and advancing the containers as above described may and preferably will comprise the mechanism illustrated in the Howard patent above referred to.

Referring now to Figs. 1 and 2, when the containers 56 come to rest in filling position, the last four containers of the group are supported upon a stationary supporting plate 80 while the fifth or leading container, still in contiguous engagement with the next succeeding container, rests upon the scale pan 57 of the scale beam 58. Provision is made for moving the leading container 56 away from the next succeeding container in order that the container on the scale may be free to weigh, and as herein shown, the scale pan 57 is arranged to be moved laterally after the main group of cartons has come to rest. The movement of the scale pan is effected through connections from a cam 82 fast on a cam shaft 84, the latter forming part of the control mechanism described in said Howard patent. The cam 82 is designed so that the separating movement occurs at the end of the package carrier movement. As herein shown, the scale pan 57 is provided with depending lugs 86, 88 slidably mounted on rods 90 secured in the outer end of the scale beam 58, see Fig. 1. A tension spring 92 is connected between the lug 88 and a portion of the scale beam 58. In operation, at the start of the carrier movement and thereafter until the package carrier movement is almost completed, the scale pan 57 is held to the right, viewing Fig. 1, against the action of the spring 92 by the engagement of a pin 94 on the upper end of a rock lever 96 with an arm 98 fixed to the scale pan and depending therefrom. The rock lever 96 is secured at its lower end to a rock shaft 100 which is journaled in the machine frame. A lever 102, also fast on the rock shaft 100 is connected by a link 104 to one arm 106 of a bell-crank pivoted at 108. A cam roll 110 carried by the second arm 112 of the bell-crank cooperates with the cam 82 and is held in engagement therewith by a spring 114 connected between a collar 116 secured on the link 104 and a portion of the machine frame. In operation, when the container feeding movement is nearly completed, the rock lever 96 is moved through the connections described, in a counterclockwise direction, view Fig. 1, to permit the scale pan 57 to slide on the rods 90 to the left under the influence of the spring 92 thus moving the leading or foremost container away from the main body of the group to prevent interference during the subsequent weighing operation.

From the description thus far it will be observed that a group of five containers are presented in operative position beneath the chambers 54 during one portion of a cycle in the operation of the machine and that one of the containers is disposed on a scale pan 57 separated from the remainder of the group. During a succeeding portion of the complete cycle of operation, the shutter 60 is opened, the accumulated loads in the chambers 54 are released into the containers, and the streams of material being delivered by the feeding trough 12 continue

to flow into the containers until a predetermined weight is reached in the weighed load, whereupon, as above described, the shutter 60 is closed and the package moving cycle of operation is initiated.

An outline of the construction and operation of the control mechanism indicated generally at 52 for opening and closing the shutter 60, for starting and stopping the carrier moving cycle, and for performing other operations incidental to the operation of the weighing machine, will now be described in a general way, reference being made to the aforesaid Howard patent for a full and complete disclosure thereof. Referring now particularly to Figs. 1 and 2, a main driving shaft 120 is continuously driven through any usual or preferred driving connections, not shown. A pawl and ratchet clutch indicated generally at 122, having one member fast on the shaft 120 and another member loosely mounted thereon, is arranged to be engaged during the operation of the machine to rotate a cam disk 124 formed integrally with the loosely mounted member of the clutch. The clutch is designed to permit but one half a revolution of the cam disk 124 at one time and as herein shown, the disk is provided with a cam lug 126 arranged to open the shutter 60 at the start of the weighing operation and to close the shutter at the end of the weighing operation. The shutter 60 is mounted on arms 128 fast on a cross shaft 130 journaled in bearing brackets 132 attached to the chamber housing 53. A lever 134 also fast on the shaft 130 is connected by a link 136 to one arm 138 of a two-armed lever pivotally mounted in the housing 53, the second arm 140 being connected by a link 142 to a lever 144 pivoted at 146 in a bracket 148 attached to the machine frame. The lever 144 is provided with two lugs 150, 152 adapted to be engaged by the disk lug 126 to rock the lever 144 clockwise to close the shutter 60 during one half revolution of the disk 124 and to rock the lever 144 counterclockwise during a subsequent one half revolution through the connections described. Provision is also made for locking the scale beam 58 when the shutter 60 is closed through suitable connections indicated generally at 154 arranged to be actuated by the periphery of the cam disk 124 so as to permit the filled containers to be moved across the scale pan 57 during the carrier moving portion of the cycle.

The carrier operating mechanism, indicated generally at 156 is arranged to be operated through connections from the main driving shaft 120 including a pawl and ratchet clutch 158 which is arranged to be engaged and disengaged through connections indicated generally at 160. The connections 160 are operatively connected to the scale locking mechanism 154 to operate simultaneously therewith so that in operation, when the shutter 60 is closed, the scale beam 58 is locked and the carrier mechanism is operated to advance the different groups of containers as hereinbefore described. During the second half revolution of the cam disk 124, the shutter 60 is opened and the scale beam 58 is unlocked to initiate another weighing operation.

The pawl and ratchet clutch 122 is controlled through connections from the scale beam 58, to terminate the feed of the material when a predetermined weight is reached, as fully described in the Howard patent above referred to, and as herein shown, such connections may include a rocking pawl stop carrier 162 which, when rocked

in one direction, permits the disk 124 to rotate one half revolution to open the shutter 60, and when rocked in the opposite direction, permits one half revolution of the disk to close the shutter. During the weighing operation, the rocking pawl carrier is held in a position to permit the shutter 60 to open by an electromagnet 164, normally energized, through connections including the linkage 165. The electromagnet 164 is energized by a circuit including a switch 168 arranged to be opened by the movement of the scale beam 58 when the predetermined weight is reached. The shaft 84 may be driven through connections from the carrier moving mechanism, and in practice, suitable resetting mechanism indicated generally at 170, may be provided which is actuated through connections from the shaft 84 as fully disclosed in the Howard Patent No. 1,893,622. In operation, when a predetermined weight is reached in the weighed container, the movement of the scale beam 58 will open the circuit to the electromagnet 164 at the switch 168 thus deenergizing the electromagnet and permitting the pawl stop carrier 162 to be rocked by a spring, not shown. Rocking of the pawl stop 162, as above described, effects closing of the gate 60 to terminate the feed of the material and to initiate the carrier movement to start another cycle of operation.

From the above description of the preferred embodiment of the invention, it will be observed that the present construction of the packaging machine enables increased production of a plurality of loads of substantially uniform weight to be obtained in a machine embodying a single weighing mechanism, thus simplifying the machine and effecting an economy in manufacturing and maintenance costs. It will also be observed that the incorporation of the vibratory material feeding mechanism having provision for dividing the material into a plurality of substantially uniform streams in a packaging machine adapted to weigh one of the streams contributes greatly to the accuracy with which the machine may operate.

While the preferred embodiment of the invention has been herein illustrated and described, it will be understood that the invention may be embodied in other forms within the scope of the following claims.

Having thus described the invention, what is claimed is:

1. A packaging machine having, in combination, a substantially horizontal vibratory material feeding trough containing dividing members constructed and arranged to feed material in a plurality of and at least three substantially uniform streams, means for controlling the flow of each of said streams, a weighing device for weighing the material deposited by only one of said streams, and connections between said weighing device and said flow controlling means adapted to terminate the flow of said plurality of streams when the weighed load reaches a predetermined amount whereby to produce one weighed load and a plurality of additional unweighed loads, each of approximately the weight of said weighed load.

2. In a packaging machine, in combination, a vibratory material feeding trough, means for separating the material in the trough into a plurality of and at least three substantially uniform streams, said means including a series of fixed plates, a movable plate cooperable with each of said fixed plates and means hingedly connecting

the inner end of each fixed plate with its cooperating movable plate, a weighing device for weighing the material deposited by one of said streams, and means controlled by said weighing device for simultaneously terminating the flow of said plurality of streams to form a plurality of loads when the weighed load has reached a predetermined amount, to thereby produce one weighed load and a plurality of additional unweighed loads each of substantially the weight of the weighed load.

3. A packaging machine having, in combination, a vibratory material feeding trough having a plurality of spaced longitudinally disposed dividing plates for dividing the material into a plurality of and at least three substantially uniform streams, a weighing device for weighing the material deposited by one of said streams, and means controlled by said weighing device for simultaneously terminating the flow of said plurality of streams to form a plurality of loads when the weighed load has reached a predetermined amount, to thereby produce a plurality of unweighed loads each approximately equal to said weighed load.

4. A packaging machine having, in combination, a vibratory material feeding trough having a plurality of spaced longitudinally disposed dividing plates for dividing the material into a plurality of and at least three substantially uniform streams, means for adjusting said dividing plates to change the width of said streams, a weighing device for weighing the material deposited by one of said streams, and means controlled by said weighing device for simultaneously terminating the flow of said plurality of streams to form a plurality of loads when the weighed load has reached a predetermined amount to thereby produce a plurality of unweighed loads each approximately equal to said weighed load.

5. A packaging machine having, in combination, a vibratory material feeding trough having a plurality of spaced longitudinally disposed dividing plates for dividing the material into a plurality of and at least three substantially uniform streams, means for simultaneously and uniformly adjusting the amount of material comprising each of said streams, a weighing device for weighing the material deposited by one of said streams, and means controlled by said weighing device for simultaneously terminating the flow of said plurality of streams to form a plurality of loads when the weighed load has reached a predetermined amount to thereby produce a plurality of unweighed loads each approximately equal to said weighed load.

6. A packaging machine having, in combination, a vibratory material feeding trough having a plurality of spaced longitudinally disposed dividing plates for dividing the material into a plurality of and at least three streams of substantially uniform width, and a transversely disposed plate arranged to control the depth of said streams, whereby a plurality of streams of substantially equal cross section are produced, a weighing device for weighing the material de-

posited by one of said streams, and means controlled by said weighing device for simultaneously terminating the flow of said plurality of streams to form a plurality of loads when the weighed load has reached a predetermined amount to thereby produce a plurality of unweighed loads each approximately equal to said weighed load.

7. A packaging machine having, in combination, a vibratory material feeding trough having a plurality of spaced longitudinally disposed dividing plates for dividing the material into a plurality of and at least three substantially uniform streams, container moving means arranged to present a plurality of containers in position to receive said streams, means for separating one of said containers from the remainder of the group, a weighing device for weighing the material deposited by one of said streams into said one container, and means controlled by said weighing device for simultaneously terminating the flow of said plurality of streams to form a plurality of loads when the weighed load has reached a predetermined amount to thereby produce a plurality of unweighed loads, each approximately equal to said weighed load.

8. In a packaging machine, in combination, a material feeding trough, means in said trough for dividing the material passing through said trough into a plurality of streams of substantially uniform cross-sectional area, said means including a series of fixed plates, a movable plate cooperable with each of said fixed plates, means hingedly connecting the inner end of each fixed plate with its cooperating movable plate and means interconnecting said movable plates for simultaneous adjustment in substantially parallel relation to said fixed plates, a weighing device for weighing the material deposited by one of said streams, and means controlled by said weighing device for simultaneously terminating the flow of said plurality of streams to form a plurality of loads when the weighed load has reached a predetermined amount, to thereby produce one weighed load and a plurality of additional unweighed loads each of substantially the weight of the weighed load.

9. In a packaging machine, in combination, a material feeding trough, means in said trough including a series of fixed plates, a movable plate cooperable with each of said fixed plates and means associated with the inner ends of said plates arranged to prevent flow of material through the space between a fixed plate and its associated movable plate for dividing the material in the trough into a plurality of streams of substantially equal cross-sectional area, a weighing device for weighing the material deposited by one of said streams and means controlled by said weighing device for simultaneously terminating the flow of said plurality of streams to form a plurality of loads when the weighed load has reached a predetermined amount, to thereby produce one weighed load and a plurality of additional unweighed loads each of substantially the weight of the weighed load.

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