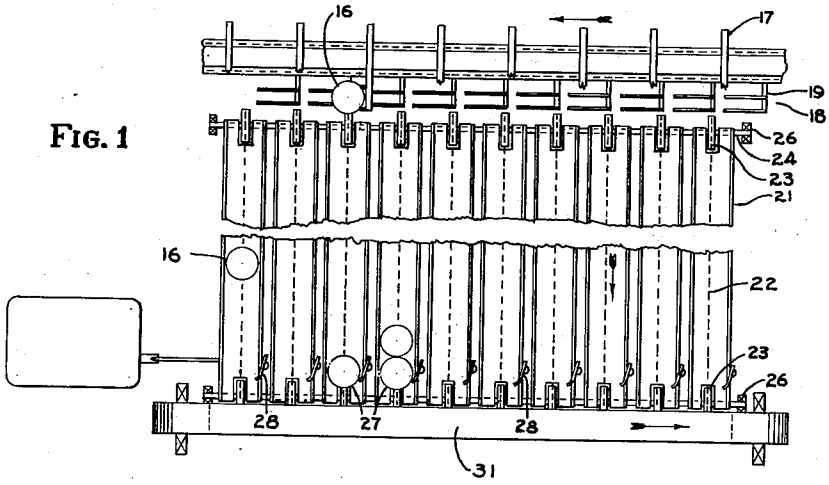
May 24, 1949. E. H. CARRUTHERS 2,470,976

APPARATUS FOR PACKING PRODUCTS OF VARIABLE WEIGHT

Filed June 11, 1945 4 Sheets-Sheet 1

FIG. 1



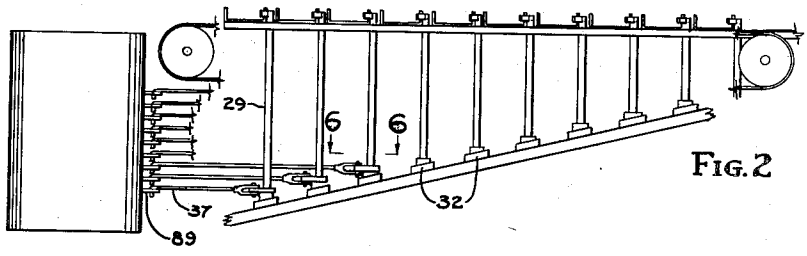


FIG. 2

FIG. 3

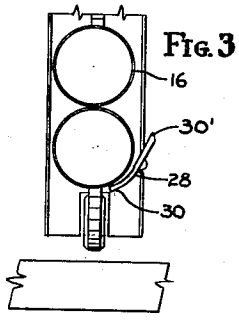


FIG. 4

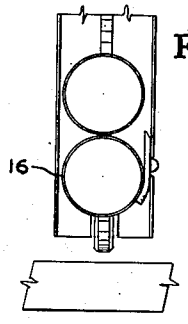


FIG. 5

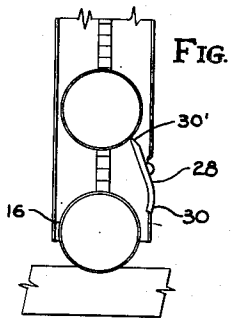
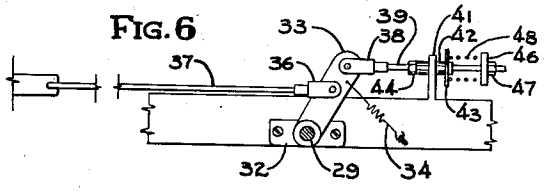


FIG. 6



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APPARATUS FOR PACKING PRODUCTS OF VARIABLE WEIGHT

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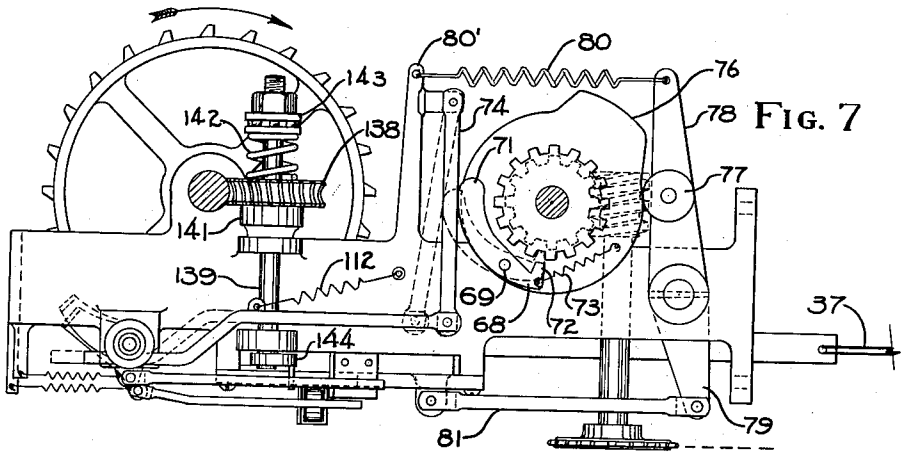


FIG. 7

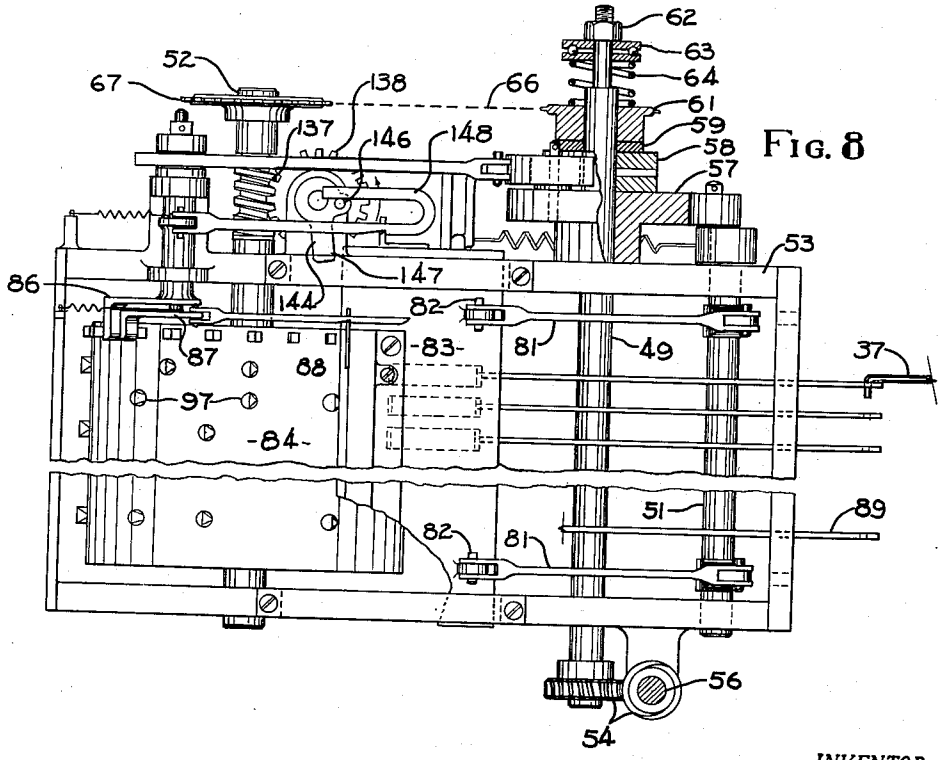


FIG. 8

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APPARATUS FOR PACKING PRODUCTS OF VARIABLE WEIGHT

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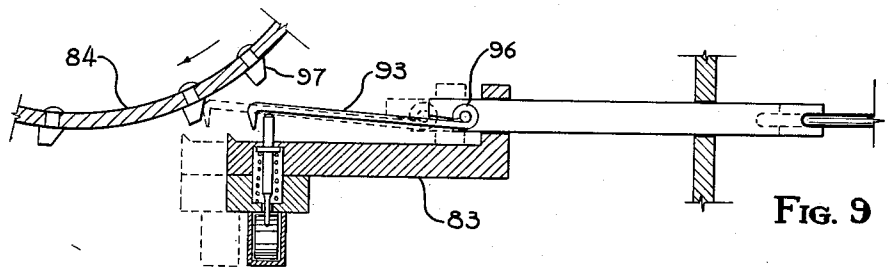


FIG. 9

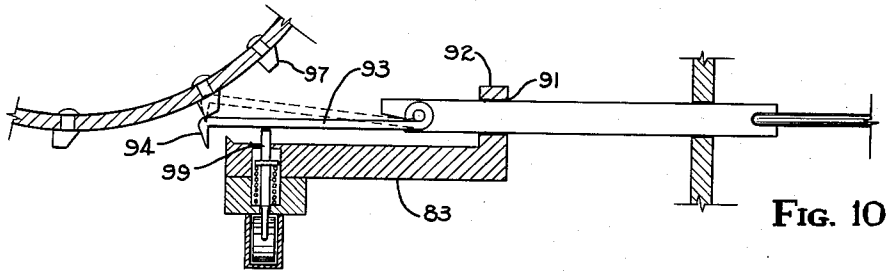


FIG. 10

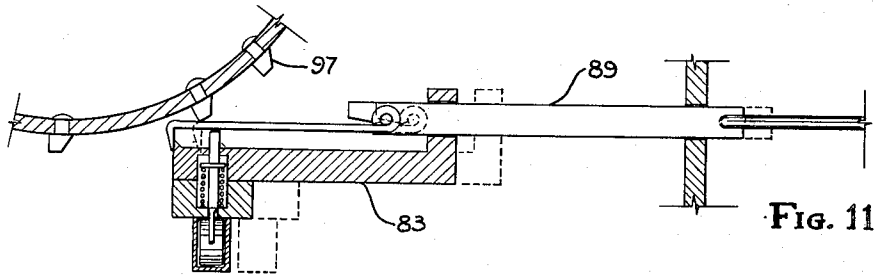


FIG. 11

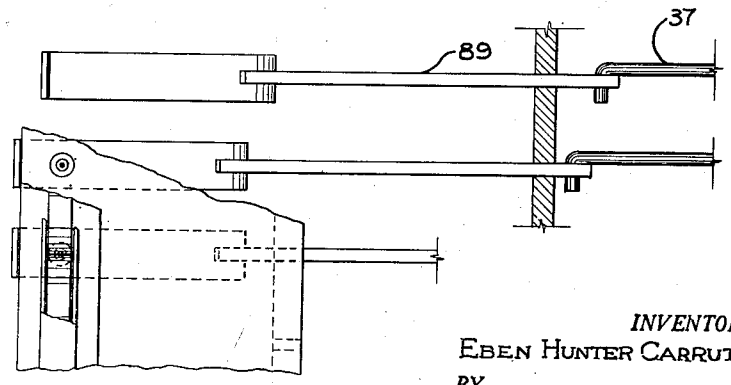


FIG. 12

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APPARATUS FOR PACKING PRODUCTS OF VARIABLE WEIGHT

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FIG. 13

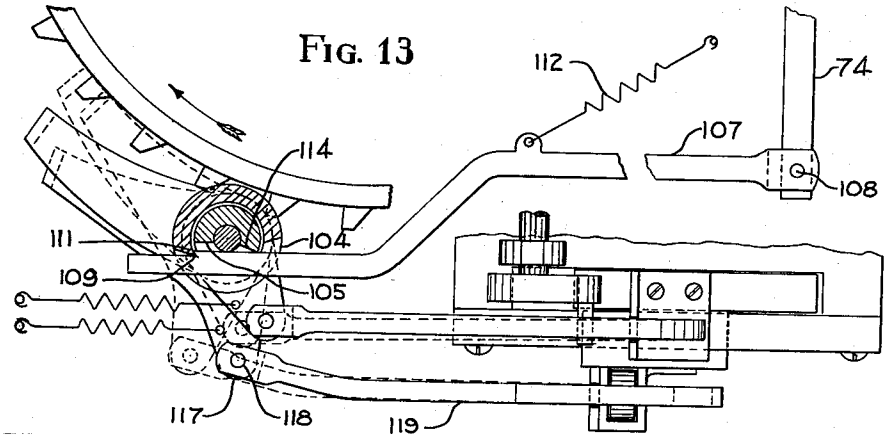


FIG. 14

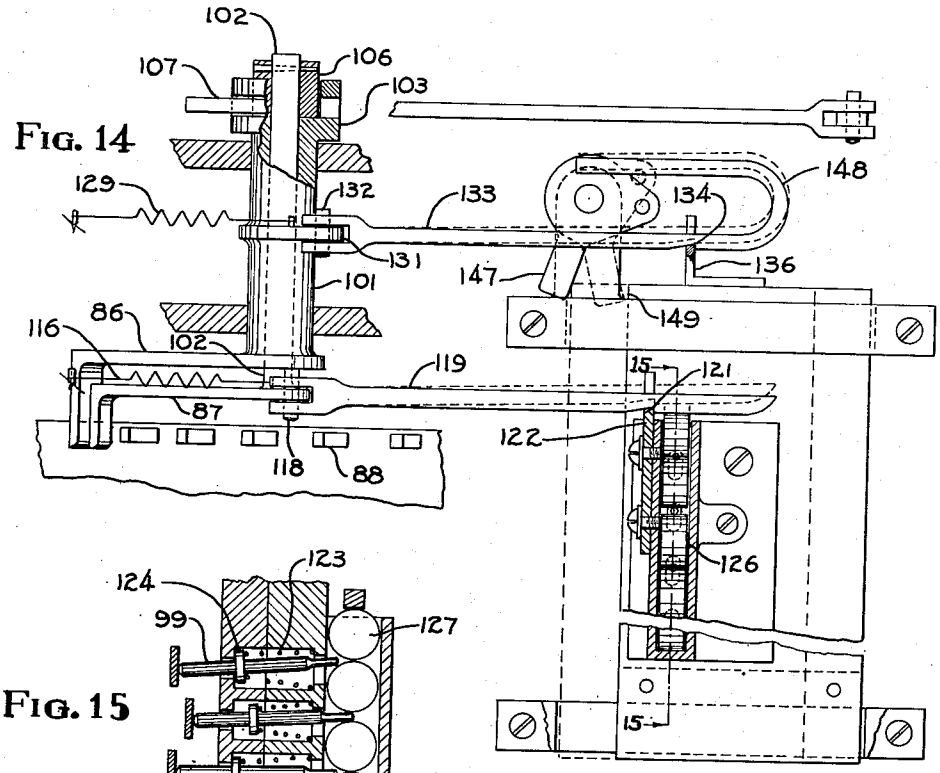


FIG. 15

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Patented May 24, 1949

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UNITED STATES PATENT OFFICE

2,470,976

APPARATUS FOR PACKING PRODUCTS OF VARIABLE WEIGHT

Eben H. Carruthers, Warrenton, Oreg., assignor to E. H. Carruthers Co., Warrenton, Oreg., a corporation of Oregon

Application June 11, 1945, Serial No. 598,880

26 Claims. (Cl. 214—16)

1

My invention relates to apparatus for packing products particularly products or materials of variable weight. Reference is made to my copending applications, Serial No. 444,510, filed May 26, 1942; Serial No. 531,491, now abandoned, filed April 17, 1944; and Serial No. 556,803; filed October 2, 1944.

In my copending application, Serial No. 444,510, I have shown and described a method and apparatus for selectively packing products of variable weight. The apparatus shown in the present application is an improvement thereon, being particularly concerned with the mechanism for selecting weight combinations of the articles or materials so that a predetermined weight thereof is available for packing. While the invention will be described in connection with the packing of tuna, it will be understood that the invention has application wherever a plurality of articles or materials of variable weight are to be packed in a single container and the weight of such articles or materials is to be guaranteed to the customer.

An object of my invention is to provide an improved, reliable and simplified apparatus for selecting a plurality of articles or materials, the combined weight of which will substantially equal a predetermined desired weight.

Another object of my invention is to provide apparatus which is entirely mechanical and positive in its operation to select from components which have been stored in separate weight groups in accordance with their weight, a plurality of combinations of said components from separate weight groups the combined weight of which will equal the predetermined desired weight.

My invention further contemplates the provision of apparatus in which a plurality of articles or materials after being weighed and stored in separated weight groups are automatically selected in accordance with predetermined weight combinations so that the combined weight of the articles or materials selected substantially equals a predetermined desired weight.

Other objects and advantages of my invention will be pointed out in the claims and will be apparent from the foregoing description, when taken in connection with the accompanying drawings, in which:

Fig. 1 is a diagrammatic plan view of the apparatus of my invention;

Fig. 2 is an elevation largely diagrammatic showing a portion of the selecting mechanism;

Fig. 3 is an enlarged plan view of a portion of

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Fig. 1 with the trigger or tray stop in tray retaining position;

Fig. 4 is a view similar to Fig. 3 showing the trigger or tray stop in a position such that the trays may be released upon actuation of the selecting mechanism;

Fig. 5 is a view similar to Figs. 3 and 4 showing the trigger or tray stop in tray releasing position or a tray in the act of being released;

Fig. 6 is a plan view showing the lower ends of the trigger or tray stop shafts and a portion of the actuating mechanism therefor;

Fig. 7 is a plan view of the actuating and selecting mechanism;

Fig. 8 is a front elevation of Fig. 7;

Fig. 9 is a sectional view taken through a portion of the selecting drum and showing the mechanism between the selecting drum and the trigger or tray stop for actuating the tray stop, the parts as they are shown in solid lines corresponding to the tray stop position of Fig. 3;

Fig. 10 is a view similar to Fig. 9 showing the position of the parts when the trigger or tray stop is in the position shown in Fig. 4;

Fig. 11 is a view similar to Figs. 9 and 10 with the parts in the position corresponding to the Fig. 5 position of the trigger or tray stop;

Fig. 12 is an elevational view of Fig. 11 with parts of the selecting drum broken away;

Fig. 13 is an enlarged plan view similar to Fig. 7 showing the selector drum, stopping pawls and their latches;

Fig. 14 is a front elevation of Fig. 13, and

Fig. 15 is a sectional view of a portion of the slide or carriage taken substantially on the line 15—15 of Fig. 14 and illustrating the mechanism for predetermining the number of components which must be in a position to be released before any of such components may be released.

In my copending application, Serial No. 444,510, filed May 26, 1942, of which the present application is a continuation in part, I have shown and described a method and apparatus for selectively packing products of variable weight. Briefly described the method and apparatus shown in that application automatically weighs articles, materials or components as they are carried through a path of travel; sorts the articles or components into segregated weight groups or compartments; automatically selects a plurality of articles or components from such segregated weight groups the total weight of which, when combined, substantially equals the predetermined desired weight which is to be placed in a container; compacts such articles or components to

the size and shape of the container which they are to occupy; and transfers the compacted articles or components to the container.

The method and machine shown in application, Serial No. 444,510, has been particularly designed for the packing of tuna. The machine shown in said application is suitable for use in the packing of some articles or components of variable weight. However, I have found that in a cannery, such as a tuna cannery, an electrically operated machine particularly the selecting mechanism of said invention is not entirely satisfactory due to the fouling of the electrical contacts by steam and hot water required to clean fish refuse from the machine.

The present invention accordingly has been developed to replace the electrical system shown and described in the above mentioned application and provide a machine which is entirely mechanical in its operation. I have found a mechanically operated machine less subject to interruption in production and requires less service and maintenance than the machine of the above mentioned application particularly under the conditions encountered in a tuna cannery.

In packing tuna the fish is first split into its natural quarter sections, cleaned and cut into the desired lengths in accordance with the height of the can or other container in which the tuna is to be packed. These pieces are of various weights and one or more pieces are placed in each of a plurality of trays, cups or supports 16. The trays or supports carrying the pieces of tuna are carried or pushed by means of conveyor arms 17 along a path of travel 18 which comprises a series of weighing arms 19. These weighing arms or levers are connected each to a weighing mechanism and each is adapted to be actuated when a tray with the predetermined weight of tuna for which its weighing mechanism has been set rides over the weighing arms.

Depression of the weighing arms to actuate the weighing mechanism (not shown) actuates push rods adapted to discharge the trays or supports together with the pieces of tuna thereon into one of a series of segregated weight groups, compartments or channels. The compartments are provided with bottom walls and side walls to maintain the trays in adjacent weight groups segregated. In my copending application, Serial No. 556,803, filed October 2, 1944, I have shown and described in detail the weighing mechanism diagrammatically illustrated in Fig. 1.

As shown in said application the successive weighing mechanisms are arranged in predetermined decrements of weight so that the heaviest pieces of tuna are discharged into the compartment or channel 21 at the right hand end of the machine, the next heaviest pieces in the second compartment, and so forth down to the compartment at the left hand end of the machine. Any desired number of segregated weight groups or compartments may be employed, depending upon the accuracy desired and the range of weights of pieces or components encountered. In the drawings I have shown ten such segregated weight groups, but it will be appreciated that this is merely for purposes of illustration and that any desired number of weight groups may be employed.

Thus the weighing and sorting mechanism places in each segregated weight group or compartment pieces or components of substantially the same weight. For example, there may be stored in the first compartment pieces of tuna

weighing approximately 90 grams, in the second compartment pieces weighing approximately 87 grams, in the third compartment pieces weighing approximately 84 grams, and so forth in three gram decrements down to the smallest pieces desired to be included. Those pieces of tuna which are over or under the weight of the weight groups for which the machine has been set may be shunted aside by any suitable means not necessary to be considered herein. Small pieces may be placed two or more in a tray and large pieces may be broken up and placed separately in trays.

The trays or supports carrying the pieces of tuna are carried or urged to the forward ends of the compartments or channels 21 preferably by means of chains 22 mounted on sprockets 23 although gravity may be employed if desired. The sprockets are mounted on shafts 24 supported by bearings 26, the shafts 24 being driven from any suitable source of power.

The trays are carried to the forward end of the machine, as illustrated at 27, where their forward movement is interrupted or stopped and their movement further regulated by means of tray stops or triggers 28. The stops 28, most clearly shown in Fig. 3, are mounted intermediate their ends rigidly on pivot rods or shafts 29 which are adapted to be actuated to position the triggers or stops in any one of three positions illustrated in Figs. 3, 4, and 5.

In Fig. 3 I have illustrated the position of the tray stop in which the trays in the compartments are locked by engagement of the curved end 30 of the stop with the tray against the release of any of the trays therefrom. In Fig. 4 I have illustrated the position of the stop in which the trays, while restrained by the curved end of the tray stop, may be released upon the actuation of mechanism to be described. In Fig. 5 I have illustrated the position of the stop when a tray is in the act of being released and showing how the pointed end 30' of the tray stop prevents the discharge of more than one tray from the same compartment.

As will presently appear the present machine is designed to release three trays from three separate compartments simultaneously. However, it will be appreciated that this is primarily illustrative and suited to the conditions encountered in the packing of tuna. If desired, the machine may be set up to release two, four or any other desired number of trays simultaneously. The group of trays are released or carried by the chains 22 onto a pick up belt 31 which sweeps them to one end of the machine where, in the particular packing process herein being considered, the product, in this case tuna, is transferred to a filling chuck or mold which is part of a can or container packing mechanism. The mechanism preferably employed at the packing end of the machine is illustrated in my copending application, Serial No. 556,803, filed October 2, 1944.

The pivot rods or shafts 29, as shown most clearly in Figs. 2 and 6, have their ends supported in foot bearings 32 carried by a portion of the frame of the machine. The lower end of each pivot rod is rigidly connected to a crank arm 33 which is normally urged by a spring 34 in a clockwise direction, as viewed in Fig. 6, or to the position of the tray stop shown in Fig. 3. A clevis 36 is pivoted to the crank arm intermediate its ends and the clevis is connected to a pull rod 37.

Pivotally secured to the other end of the crank arm is a clevis 38 which is connected to a spring rod 39 which loosely slides through an abutment

41 carried by the frame. On the spring rod is slidably mounted a sleeve 42 which has a flange 43. An adjustable nut 44 limits the movement of the sleeve. A spring backing member 46 is held in position by a nut 47, a spring 48 being interposed between the flange 43 and the backing member 46.

In the position shown in Fig. 6, which corresponds to the position of the stop shown in Fig. 3, the spring 48 is preloaded. The nut 44 is adjusted so that when the crank arm is moved in a counterclockwise direction, as viewed in Fig. 6, the flange 43 engages the abutment 41 when the trigger or tray stop is in the position shown in Fig. 4. This movement of the parts does not result in further compression of the preloaded spring. Movement of the crank arm from the position of the parts illustrated in Fig. 4 in a counterclockwise direction or to the tray stop position of Fig. 5 further compresses the preloaded spring.

When the tray stop is in the position shown in Fig. 3 or its normally closed position, no trays may be released from the corresponding compartment. Additional trays discharged into such compartment are carried forward to the position shown in Fig. 3 but cannot be released. Upon movement of the pull rod 37 (Fig. 6) as will be presently described to the left as viewed in Fig. 6, the tray stop is moved to the position of Fig. 4 against the action of the spring 34. When in the position shown in Fig. 4 the trays are in a position to be released, but in shifting from the tray stop position shown in Fig. 3 to that shown in Fig. 4, the preloaded spring 48 serves no function. The pull rod must overcome only the resistance of spring 34. This spring is relatively light and serves to return the trigger or tray stop to the position of Fig. 3 if no tray has been carried by the chain into the stop position of Fig. 4 when the stop is in such position. It will be noted that the tray stop is retained in the position of Fig. 4 by a tray against the action of the spring 34.

The purpose of the above arrangement (the light spring 34 and the preloaded spring 48) is to prevent the placing of too great a strain on the mechanism, as under certain conditions of operation as will be presently described, it is necessary to actuate all of the series of pull rods 37 (Fig. 2) to shift the parts from the position of Fig. 3 to that of Fig. 4 simultaneously. This action, as previously mentioned, does not result in compression of the preloaded springs.

The purpose of the preloaded spring 48 is to prevent release of trays when the tray stop is in the position shown in Fig. 4. That is, the preloaded spring imposes a resistance to the rotation of the tray stop such that it cannot be moved to the position shown in Fig. 5 should a long column of trays accumulate behind the tray stop. Without such strong resistance, the pressure due to the conveying effort of the chains 22 might force the stop open or partially open to the position of Fig. 5 and thereby release trays when their release is not desired. However, to open the stop beyond the position of Fig. 4, the preloaded spring must be compressed and the effort required for such compression of the preloaded spring is beyond that supplied by even a full column of trays in the channel.

The arrangement above described does not place too great a load on the mechanism since, as will presently appear, only a limited number of tray stops are shifted from the position shown in Fig. 4 to that shown in Fig. 5 simultaneously.

During a shifting of the parts from the position of Fig. 4 to that of Fig. 5, it will be noted that the trays are urged onto the pick up belt 31 by the combined action of the chains 22 and the rotational movement of the tray stops.

Referring now to Figs. 7 and 8 which show portions of the mechanism for actuating the pull rods 37, three shafts are shown, a cam shaft 49, a rocker shaft 51 and a selector drum shaft 52. These shafts are mounted in suitable bearings carried by a main frame 53. The cam shaft 49 is driven by a worm and worm gear 54, the worm being mounted on a drive shaft 56 which is driven continuously at constant speed from any suitable source of power.

On the upper end of the cam shaft (Fig. 8) a cam 57 is loosely mounted the shape of which is shown in Fig. 7. Above the cam and rigid with the cam shaft is a notched or toothed disk or sprocket 58. Above the toothed disk 58 is a friction disk 59 and a sprocket 61 loose with respect to the cam shaft. The end of the cam shaft is threaded to receive a nut 62 which retains in position a bearing assembly 63 and confines a spring 64 which presses against the loose sprocket 61 and thereby presses the friction disk 59 into engagement with the rotating toothed disk 58. Thus the sprocket 61 is driven with a limited amount of torque determined by the frictional engagement of the parts. The sprocket 61 through a chain 66 drives a sprocket 67 rigidly mounted on the end of the selector drum shaft. By this arrangement the selector drum is driven at a constant speed but can be held against rotation accompanied by slipping of the clutch 59, 61 without interrupting the rotation of the cam shaft 49.

As previously mentioned, the cam 57 is loose on the cam shaft, but may be rotated with the shaft by means of a dog or pawl 68 which is adapted to be moved into and out of engagement with the toothed disk 58. The dog 68 is pivotally mounted for swinging movement by means of a pin 69 carried by the cam 57. The dog has a tail 71 and a tooth 72 adapted to mesh with the teeth of the notched disk. The dog tooth is normally urged into engagement with the toothed disk 58 by means of a spring 73.

When the dog is engaged with the toothed disk, the cam rotates with the cam shaft; but if the tail of the dog engages in its rotation a cam bar 74, the dog is thrown out of engagement with the toothed disk and the cam is stopped approximately in the position shown in Fig. 7. As will presently appear the cam is rotated through one revolution each time it is actuated and automatically disengaged at the end of such rotation unless the selecting mechanism has found another combination prior to the completion of a rotation.

The cam has a single lobe 76 shaped as shown in Fig. 7 upon which rides a roller 77 carried by a rocker arm 78. The rocker arm 78 is mounted on the rocker shaft 51 carried by the frame and one end thereof is secured to a spring 80 connected to a fixed part of the frame, as shown at 80'. The spring functions to maintain the roller 77 in engagement with the cam and restore parts connected to the rocker shaft to their normal positions. As is evident from Fig. 7 when the cam makes a revolution, the rocker arm and rocker shaft are actuated so as to actuate crank arms 79 and connecting rods 81.

The connecting rods 81, shown most clearly in Fig. 8, are bifurcated at their ends and piv-

otally connected at 82 to a slide or carriage 83 slidable in ways provided in the frame of the machine. It will be appreciated that upon each complete rotation of the cam 76, the slide or carriage makes a forward and backward movement, that is from the position shown in Fig. 9 to that shown in Fig. 11 in solid lines and return.

Rigidly mounted on the selector drum shaft is a selector drum 84 or movable member which is continuously driven by the sprocket 61 on the cam shaft unless rotation of the selector drum is stopped or its movement interrupted by either of two stopping pawls, a long stopping pawl 86, and a short stopping pawl 87. When the selector drum is stopped by one of the pawls, the sprocket 61 on the cam shaft 49 slips because of its friction drive. For the purpose of cooperating with the pawls 86 and 87, the periphery of the drum is provided with a plurality of stops 88 which are spaced equally distant around the selector drum. When either of the stopping pawls engages any one of the stops 88, the rotation of the selector drum is interrupted until the slide or carriage has made a complete forward and backward movement. Any number of stops 88 may be employed as will presently appear.

As shown most clearly in Figs. 2 and 12, each of the pull rods 37 is pivotally connected to a pull bar 89. As shown most clearly in Fig. 9, the pull bars freely extend through slots 91 formed in an offset section 92 of the slide or carriage 83. The forward ends of the pull bars are each pivotally connected to a finger 93 having a hooked end 94.

From Fig. 9 it will be clear that the end 96 of the hooked fingers may abut against the offset section 92 of the slide or carriage. Thus, whenever the slide is caused to make a forward and backward movement by reason of rotation of the cam 76, the hooked finger associated with each and every pull bar which lies in the solid line position of Fig. 9 is shifted from such solid line position to the dotted line position shown in the same view or from an inactive position to an active position. Insofar as the slide is concerned those hooked fingers which are advanced remain in such position. This movement of the hooked fingers actuates the pull rods 37 and the crank arms 33 to shift the tray stops 28, corresponding to the hooked fingers shifted, from the position shown in Fig. 3 to that shown in Fig. 4.

If a tray is in the position shown in Fig. 3, it moves or is moved by the chain 22 to the position shown in Fig. 4 in which position the tray locks the tray stop 28 in such position. The hooked fingers 93 of such locked tray stops remain in the dotted line or active position shown in Fig. 9 after the slide has returned to its rearward position or the solid line position of Fig. 9. If during this action, that is, movement of the tray stops from the position of Fig. 3 to that of Fig. 4, one or more of the compartments do not contain trays, the stops 28 associated with such compartments will be returned by the springs 34 to the position of the tray stop shown in Fig. 3. This restoration will be accompanied by a return movement of the corresponding hooked fingers from the dotted line position of Fig. 9 to the solid line position thereof. This restoring movement is important for the reason that if no tray is in the compartment and in the position shown in Fig. 4, the hooked finger corresponding to such compartment should be withdrawn from active position for reasons which will presently appear.

When the hooked fingers are in the dotted line

or active position shown in Fig. 9, the ends of the fingers are in a position such that they may be engaged by projecting lugs or cam buttons 97 mounted on the selector drum during the normal course of its rotation. With a hooked finger in the dotted line position of Fig. 9 rotation of the selector drum causes the finger as actuated by the cam buttons in alignment with it alternately to take the full line and dotted line position shown in Fig. 10 as the cam buttons and selector drum rotate.

The cam buttons or actuating elements 97 on the selector drum are placed in position thereon according to the combinations of trays that it is desired to release from the several channels or weight groups of components. The stops 88 as previously mentioned, are equally spaced about the drum and are in number equal to the total number of combinations of trays that can be selected. The number of combinations used depends upon the conditions encountered and may be any number up to the limit of the combinations possible to make up the desired predetermined weight in accordance with the number of weight groups employed. Corresponding to and in alignment with each pawl stop 88 is a vertical row of the cam buttons 97 which act to depress the hooked fingers. The mechanism may be set up to release two or more trays from two or more compartments simultaneously. In the particular arrangement shown, the mechanism is designed to release trays in groups of three. For this reason each vertical row of finger depressing cam buttons has three cam buttons or actuating elements.

It will be appreciated that with ten segregated weight groups or compartments it is possible to set up a number of combinations of three pieces or components which will equal a predetermined desired weight. For example, it might be desired to place 200 grams of tuna in the can or other container. In such case, the cam buttons are arranged on the selector drum so as to actuate successive combinations of hooked fingers to release trays from three compartments or weight groups, the total combined weight of each successive combination being approximately 200 grams. It will be appreciated that by increasing the number of weight groups of components and decreasing the decrement between weight groups, the number of combinations possible which will equal the predetermined desired weight is increased and the accuracy with which the weight of the three components approximates the desired weight is increased. The cam buttons may be either fixed to the drum or placed on the drum so that the arrangement of them can be readily changed thus to effect a change in the combinations selected.

In my copending application, Serial No. 444,510, I have described in detail a set up of combinations which might be used in the packing of tuna. It will, of course, be appreciated that it is not necessary to use all the combinations possible. The number of combinations used will depend on the conditions encountered. However, it is desirable that the pieces or components of most of the weight groups enter into two or more combinations to make up the desired predetermined weight. For example, I have shown a horizontal row of cam buttons 97 all of which are adapted to actuate the same hooked finger which means that the components in the weight group associated with this hooked finger are capable of entering into three different combinations to

make up the desired predetermined weight of 200 grams.

It will thus be seen that the positioning of the cam buttons on the selector drum predetermines the combinations which are to be selected. The number of components which are to be included in a combination, the weight groups from which the components are to be taken, and the total predetermined weight may be varied depending upon conditions encountered as, for example, the article or material being packed and the total weight of articles or materials to be placed in the cans or other container.

As previously mentioned, the long and short stopping pawls serve to stop the selector drum by engagement with the upper circle of stops **88** and through a mechanism to be described later, the cam **57** cannot make a rotational cycle unless one or the other of the stopping pawls is in stop engaging position. If the long stopping pawl **86** is in engagement with a stop, the cam buttons **97** on the selector drum are stopped in a position relative to the slide and hooked fingers as shown in Fig. 9. This, as will be later explained, causes the slide to move to the dotted line position and return (Fig. 9) and any and all hooked fingers that are in the retracted or full line position of Fig. 9 are brought up to the active or dotted line position.

Adjacent to and lying beneath each hooked finger is a detector pin **99** each of which extends through an enlarged opening in the slide **83**. The detector pins are arranged in a vertical row on the slide as shown in Figs. 14 and 15. The number of detector pins corresponds to the number of weight groups. As will be explained later, the detector pins serve to initiate actuation of the short stopping pawl **87**. Thus when a predetermined number of these detector pins, in this case three, are simultaneously depressed by their corresponding hooked fingers, the shorter stopping pawl stops the selector drum with the cam buttons in a position relative to the hooked fingers as shown in Fig. 10. The cam **57** then completes a rotational cycle and the slide, upon making a forward movement, engages the hooks of all the depressed fingers (in this case three) and pulls the corresponding pull bars **89** and the pull rods **37** to the left as viewed in Fig. 11 against the resistance afforded by the preloaded springs **48**. This action rotates the tray stops or triggers **28** from the position shown in Fig. 4 to that shown in Fig. 5, thereby releasing a tray from each of three weight groups.

It will now be clear that as the selector drum rotates, each vertical row of cam buttons is successively brought to and through the hooked finger depressing position of Fig. 10. However, only the hooked fingers can be depressed which are in the active position of Fig. 10. Those which are in the solid line position of Fig. 9 are not depressed and the tray stops or triggers **28** of such compartments are in the position shown in Fig. 3.

It will be appreciated that whether one or more of the compartments or weight groups are devoid of trays or components is dependent upon the rapidity with which the trays are fed to the weighing and sorting mechanism and upon the distribution of the trays in the various weight groups. For this reason it may be that only a portion of the hooked fingers are in the active position of Fig. 10 at any one time. Therefore, as the selector drum rotates, each vertical row of cam buttons in passing the finger depressing position

may depress none, one, two, or three hooked fingers.

Since the mechanism is set up for selecting three piece combinations, it is desirable that the selector drum be stopped in the position of Fig. 10 only if the hooked fingers of a complete combination (three in this case) are depressed, except for the stopping of the selector drum by the long stopping pawl. Then upon the selector drum being stopped, the cam **57** makes a revolution bringing three of the tray stops or triggers to the release position of Fig. 5. Three trays carrying pieces of tuna weighing substantially the predetermined desired amount are then released from the channels or weight groups. As previously mentioned, the actuation of the slide rotates all the tray stops or triggers **28** to the position of Fig. 4 momentarily so as to permit movement of any new supply of trays which may have been delivered to the compartments to the position of Fig. 4.

If the distribution of trays to the compartments or weight groups were such that no combination of trays was present in the position of Fig. 4 which would equal the predetermined desired weight or the arrangement for which the cam buttons on the selector drum had been set, the selector drum would continue its rotation without being interrupted by the short stopping pawl. The trays or components of additional compartments or weight groups such as would be required to complete combinations of trays would then be held in the position of Fig. 3 without the opportunity of being released to the position of Fig. 4.

For the above reason it is, therefore, necessary to provide a means of stopping the selector drum and allowing the cam **57** and slide **83** to complete a cycle in order to allow additional trays to get into the releasing position of Fig. 4. As will presently appear, the long pawl will stop the selector drum in the position of Fig. 9 if the short pawl fails to stop the selector drum during a complete rotation thereof. This stopping of the selector drum could not be accomplished by the short pawl as the mechanism is arranged as in such case it would cause a vertical row of cam buttons to stop in the hooked finger depression position of Fig. 10. It might then happen that one or two hooked fingers, but not the complete combination corresponding to this row of cam buttons, might be in the solid line position of Fig. 10 and a cycle of movement of the slide would cause the release of one or two trays and not the complete desired combination.

Referring now to Figs. 13 and 14, I have shown the arrangement of selector drum stopping pawls and their latches. The long pawl is fixed to a hollow cylindrical shaft **101** which is rotatably mounted in suitable bearings fixed in the frame of the machine. The short stopping pawl is fixed to a shaft **102** adapted to rotate within the bore of the long pawl shaft **101**. The upper end of the hollow shaft **101** is enlarged at **103** and slotted as indicated at **104** (Fig. 13). Fixed to the upper end of the short pawl shaft **102** in the manner shown is a collar **106** which is slotted as shown at **105**.

A release arm **107** is fixed to the end of the cam bar **74** as shown at **108**. The release arm **107** is adapted to ride in the slots **104** and **105**. The release arm is provided with a notch or latch **109** which abuts, when the parts are in their normal position, against a cooperating part **111** formed on the inner wall of the long pawl shaft. When the parts are in the cooperating position shown,

the release arm is locked against movement to the dotted line position of Fig. 7, thus holding the tail 71 of the dog 68 in the position shown and preventing rotation of the cam. During a rotation of the cam a spring 112 normally urges the release arm in a direction upward and to the right as viewed in Fig. 13, thereby urging the cam bar to the solid line position of Fig. 7. In this position of the parts the release arm is in a position to be reengaged by the cooperating part 111 when the pawls are returned to their normal position. Since the release arm is locked, the cam 57 can only be rotated through one revolution before its rotation is interrupted unless the selecting mechanism has found another combination during the latter part of the rotation of the cam.

From Fig. 13 it will be noted that if the short stopping pawl shaft 102 is rotated in a clockwise direction, the release arm will be engaged by the part 114 of the collar 106. Rotation of the long pawl shaft will withdraw latch 109, 111. Either of such actions disengages the latch 109, 111 releasing the release arm. Such action results in the tail of the dog 71 pushing the cam bar aside against the action of the spring 112, the dog spring 73 exerting a greater force on the cam bar than the spring 112. With the cam dog in engagement with a tooth of the disk 58, the cam 57 makes a complete revolution causing a forward and backward movement of the slide.

Referring now to Fig. 14, the short stopping pawl 87 has a spring 116 which normally urges the pawl into engagement with the drum stops 88. The short stopping pawl 87 has a tail 117 which is pivotally connected at 118 to a latch bar 119. The latch bar 119 has a latching notch 121 in which the end of an adjustable latching element 122 is adapted to seat, as shown in Fig. 14. A lifting of the latch bar 119 enables the short stopping pawl to move to drum stopping position under the influence of spring 116.

In Fig. 15 I have shown the row of detector pins 99 which are depressed by the hooked fingers. Each pin extends loosely through its opening in the slide so that it may be tilted out of axial alignment from its normal position and may also be thrust endwise. The detector pins are normally urged to their outer position by means of springs 123 which lie in compartments formed in the slide, one end of the springs bearing against the walls of the compartments while the other ends bear against collars 124 formed on the detector pins. The inner end of each detector pin is reduced in diameter and extends through an elongated slot formed in the slide as shown in Fig. 15. Thus the detector pins have considerable freedom of movement in a vertical plane.

The slide is provided with a channel 126 and confined by the side walls of this channel as shown in Fig. 14 is a column of disks or short cylinders 127. The number of these disks is one in excess of the number of weight groups for which the machine is set. The disks are in such position that when the detector pins are in their normally retracted or outer position the reduced diameter ends of the detector pins enter into the wedge shaped spaces between the adjacent disks, each such space corresponding to a weight group. However, the detector pins do not enter far enough to engage the disks and retain them out of contact with each other. If, however, a hooked finger is depressed by a cam button on the selector drum, the corresponding detector pin is pushed endwise to a position such that the end of the pin enters between adjacent disks and separates them an amount equal to the diameter of the end of the detector pin.

The above action causes the top disk of the column to rise a distance equal to the diameter of the end of the detector pin, the bottom disk of the column resting against the closed lower end of the channel, as indicated at 128. If two detector pins are entered between the disks, the top disk will be raised by an amount equal to the diameter of two detector pins. Since the machine has been set up to select three piece combinations, the adjustable latching element 122 is adjusted to a position such that the latch bar 119 can not be released until three detector pins are separating the disks so as to raise the top disk of the column and hence the latch bar 119 by an amount equal to the diameter of the ends of three detector pins.

Because the machine is set up to select only combinations of three, there can never be more than three detector pins in disk separating position at one time as there are only three cam buttons in each vertical row on the selector drum. Of particular importance is the fact that the latch bar 119 can not be released unless each of the cam buttons of a vertical row has depressed a hooked finger and correspondingly three detector pins have been inserted between adjacent disks 127 so as to increase the length of the line of disks by the combined diameter of the ends of three detector pins. If less than three detector pins are depressed the selector drum, of course, continues its rotation until it finds a combination.

The long drum stopping pawl 86 is normally urged into engagement with a stop 88 by a spring 129 (Fig. 14). For the purpose of holding the long pawl 86 out of engagement with the stops 88, the long pawl shaft 101 has an arm 131 which is attached by means of a pin 132 to the bifurcated end of a latch bar 133. A notch 134 is provided in the latch bar 133 and the margin thereof is adapted to be engaged by a latch element 136 which is mounted on the top end of the slide.

As shown most clearly in Fig. 7, 8 a worm 137 is cut in the drum shaft near its upper end which drives a worm wheel 138 in a counterclockwise direction, as viewed in Fig. 8. The worm wheel is loosely mounted on a shaft 139 which is supported in suitable bearings carried by the frame. A friction disk 141 is fixed to the shaft and the worm wheel is pressed by means of a spring 142 into frictional engagement with the friction disk 141. A bearing assembly 143 is mounted at one end of the shaft and at the other end of the shaft a crank element 144 is mounted. The crank element 144 has a crank pin 146 and a tail piece 147.

The end of the latch bar is return bent, as shown at 148 (Figs. 8 and 14) so that the end thereof lies in the path of rotation of the crank pin 146. The crank pin is adapted to lift the latch bar 133 off the latch element 136 when the crank has rotated a predetermined amount. With the latch bar released, the long pawl is brought into engaging with a stop 88 by the spring 129 thus stopping the selector drum and allowing the cam 57 to make a revolution. As the slide makes its forward movement in a direction to the left, as viewed in Fig. 14, the tail piece 147 of the crank is engaged by the front edge 149 of the slide and the crank is turned back to the solid line position shown in Fig. 14. The friction drive between the worm wheel and the shaft allows

the crank to be turned back against its normal direction of rotation.

With the crank restored to its normal position the latch bar 133 drops down and return movement of the slide causes the latch element 136 to pick up the latch bar and draw the long pawl 86 with it out of stop engaging position with the selector drum against the action of the spring. Rotation of the selector drum is then resumed. The above action, as previously described, releases trays from the position of Fig. 3 to that of Fig. 4.

The ratio of the worm 137 and worm wheel 138 and the positioning of the crank pin 146 with respect to the latch bar is such that approximately one revolution of the selector drum will move the crank from the solid line position of Fig. 14 to the dotted line position in which position it disengages the latch bar. Thus if the selector drum is not stopped by the short pawl during one revolution of the selector drum, it will be stopped automatically by the long pawl engaging one of the stops.

It will be understood under normal conditions of operation, that is, with the trays being distributed to all or most of the compartments or weight groups and with the trays being fed to the weight mechanism sufficiently rapidly, that the selector drum will be stopped by the short pawl to select a combination after making only part of a revolution. Only under abnormal conditions of operation does the long pawl function to interrupt the rotation of the selector drum. Under normal conditions of operation, when the rotation of the selector drum is being interrupted by the short pawl, the crank 144 will be moved back to its solid line position shown in Fig. 14 before the crank pin can raise high enough to release the latch bar of the long pawl.

It will be noted when the short pawl interrupts the rotation of the selector drum, followed by rotation of the cam and forward movement of the slide, that the long pawl latch element 136 rides to the left as viewed in Fig. 14 and the latch bar 133 rides with it. This causes the long pawl to drop onto the top of one of the stops 88 in which position it is ineffective. Similarly, when the latch for the long pawl is released, movement of the slide to the left causes the short pawl to drop into an intervening space between two stops on the drum. Both in the case of the short and the long pawl, return movement of the slide picks up the latches so that the parts are restored to the position shown in Fig. 14.

From the foregoing description, it is believed that the operation of the machine of my invention will be apparent. With the machine in operation but with no trays or components being supplied to the various compartments or channels, the triggers or tray stops will be opened to the position of Fig. 4 at intervals of time equivalent to that of one revolution of the selector drum as a result of the tripping of a long pawl latch. As the trays carrying the pieces of tuna are fed to the weighing mechanism, they will be discharged into the channels where they will take up the position shown in Fig. 3 until the next actuation of the long pawl.

As soon as trays are in the position shown in Fig. 4, assuming the trays in such position are capable of completing a combination to provide the desired combined weight of pieces, further rotation of the drum will cause the short pawl to be tripped and a combination or group of trays will be automatically selected and released on to the pick up belt. The pick up belt then carries the trays with the pieces of tuna therein to the packing end of the machine which may be similar to that shown in my application, Serial No. 531,491, filed April 17, 1944.

It will be understood that if the trays are fed into nearly all of the channels at a comparatively rapid rate, there will be existing at all times many possible combinations of three trays which will contain the desired combined weight of tuna. In such case the drum may rotate only the distance between one drum stop or vertical row of cam buttons, between successive tray releasing cycles. However, the rate at which the groups of trays or successive combinations can be released to the pick up belt is controlled by the speed of rotation of the cam shaft 49. In other words, the short pawl may stop the selector drum immediately after it has started from a previous releasing cycle. However, the dog remains in engagement with the toothed sprocket through one complete revolution of the cam or until the tail piece is engaged by the cam bar. Thus the time interval between releases of combinations is held to a fixed minimum or to such fixed minimum plus any additional amount of time necessary for the selector drum to rotate until it finds another combination.

It will be appreciated while the machine has been described in connection with the packing of tuna, that the principles of my invention may be employed wherever it is desired to pack a plurality of articles or materials of variable weight in a container and guarantee to the customer a predetermined weight. It will also be appreciated that the weights given above and the setting of the machine for three piece combinations is merely illustrative of my invention. The number of weight groups into which the articles or components are separated by the weighing mechanism, the number of combinations for which the machine is set and the number of pieces entering into the combinations being dependent upon the articles or materials being packed and other conditions encountered.

While I have shown and described the preferred form of my invention, it will be appreciated that various changes and modifications may be made therein, particularly in the form and relation of parts, without departing from the spirit of my invention as set forth in the appended claims.

I claim:

1. A machine of the character described in which components have been segregated into groups in accordance with their weight, means for predetermining a plurality of combinations of components, each combination including components from a plurality of segregated weight groups and each of such combinations including components which combine to add substantially to a predetermined total weight, and means responsive to said predetermining means for selecting from said segregated groups a combination of components which combined add substantially to said predetermined total weight, said last mentioned means including a column of elements between the predetermining means and the selecting means and means shiftable by the predetermining means to positions between elements of the column to thereby vary the total length of said column.

2. A machine of the character described in which components have been segregated into groups in accordance with their weight, means for predetermining a plurality of combinations of

components each combination including components from a plurality of segregated weight groups, and each of such combinations including components which combine to add substantially to a predetermined total weight, and means responsive to said predetermining means for selecting from said segregated groups a combination of components which combined add substantially to said predetermined total weight, said last mentioned means including an assembly of normally engaging elements between the predetermining means and the selecting means and means actuated by the predetermining means for spacing said elements apart to increase the overall length of the assembly.

3. A machine of the character described comprising, in combination, means for storing components in separate weight groups, stop means for each of said weight groups, each of said stop means having three possible positions, a position in which the components are prevented from being released from said weight groups, a position in which components may be released and a component releasing position, means for shifting all of said stop means from the first to the second position simultaneously, and means for shifting a predetermined number of stop means from the second to the third position simultaneously.

4. A machine of the character described comprising, in combination, means for storing components in separate weight groups, stop means for each of said weight groups, each of said stop means having three possible positions, a position in which the components are prevented from being released from said weight groups, a position in which components may be released and a component releasing position, means for shifting all of said stop means from the first to the second position simultaneously, means for shifting a predetermined number of stop means from the second to the third position simultaneously, and means for insuring the elapse of a predetermined interval of time between successive shiftings of said stop means from the second to the third position.

5. A machine of the character described comprising, in combination, a movable member, a plurality of mechanical elements selectively positionable on said member, means for moving said member through a cycle of operation, a plurality of groups of components, each group containing components of like weight but the groups of components differing in weight, and means between said mechanical elements and said groups of components for releasing a plurality of components from different groups simultaneously which when combined add to a predetermined total weight.

6. A machine of the character described comprising, in combination, a movable member, a plurality of mechanical elements selectively positionable on said member, a plurality of groups of components, and means including a plurality of aligned and normally engaging elements between said mechanical elements and said groups of components for releasing a plurality of components from different groups simultaneously.

7. A machine of the character described comprising, in combination, means for storing components of like weight in separate weight groups, a movable member, elements selectively positionable on said member, stop means for each of said weight groups, each of said stop means having three possible positions, a position in which the components are prevented from being released from said weight groups, a position in which components may be released from said weight groups, and a component releasing position, means for shifting all of said stop means simultaneously from the first position to the second position, and means including said movable member for simultaneously shifting at least two but not all of said stop means from the second position to the third position in accordance with the positioning of said elements.

8. A machine of the character described comprising, in combination, means for storing components of like weight in separate weight groups, a movable member, elements selectively positionable on said member, stop means for each of said weight groups, each of said stop means having three possible positions, a position in which the components are prevented from being released from said weight groups, a position in which components may be released from said weight groups and a component releasing position, means for shifting all of said stop means simultaneously from the first position of the second position, means for restoring the stop means from said second position to the first position when no components are present in the group which correspond to such stop means, and means including said movable member for simultaneously shifting at least two but not all of said stop means from the second position to the third position in accordance with the positioning of said elements.

9. In a machine of the character described comprising, in combination, means for storing components of like weight in separate weight groups, an intermittently movable member, elements positionable on said member, stop means for each of said weight groups each of said stop means having three possible positions, a position in which the components are prevented from being released from said weight groups, a position in which components may be released from said weight groups, and a component releasing position, means for at intervals shifting all of said stop means simultaneously from the first position to the second position, and means actuated by said elements for simultaneously shifting a predetermined number but not all of said stop means from the second position to the third position in accordance with the positioning of said elements.

10. A machine of the character described comprising, in combination, means for storing components of like weight in separate weight groups, said components when in said groups having a releasing position and a non-releasing position, a movable member, elements selectively determinable thereon in rows with each row being associated with one of said weight groups, actuating means between each of said rows of elements and its corresponding group for releasing a component from said group when said actuating means is actuated by an element and a component of the group is in the releasing position, and means for releasing a component from each of a predetermined number of but not all of the groups simultaneously.

11. In a machine of the character described wherein components are separately stored in a plurality of weight groups, means for selectively and simultaneously releasing a component from each of at least two weight groups comprising a movable member having elements selectively

positionable thereon, members engageable by said elements to actuate said means, said members having an active position and an inactive position in which latter position said members are not engageable by said elements, and means for shifting said members from the inactive position to the active position.

12. In a machine wherein components are separately stored in a plurality of weight groups, means for releasing components from at least two but not all of said weight groups comprising a constantly rotating shaft, a cam positioned on said shaft and loose with respect thereto, means for rotating said cam with said shaft, and means for automatically interrupting the rotation of said cam upon the completion of a cycle of operation.

13. In a machine of the character described wherein components are stored in a plurality of separate weight groups, a stop means associated with each of said weigth groups, a movable member, an element carried by said member corresponding to each of said weight groups, a finger connected to each of said stop means, means for positioning such fingers as have components in their corresponding weight groups in a position such that the fingers will be engaged by said elements as said member is moved, said elements being arranged on said member so that only a predetermined number of said fingers may be engaged by said elements at the same time, means actuated by the engaged fingers for interrupting the movement of said member when said predetermined number of fingers have been engaged, and means actuated upon the interruption of the movement of said member for releasing the stops corresponding to the fingers which have been engaged to release components from the corresponding weight groups.

14. In a machine of the character described wherein components are stored in a plurality of separate weight groups, a stop associated with each of said weight groups, means for detecting the presence of components in the various weight groups, a rotatable member, elements selectively positionable on said member in accordance with various combinations of components from each of several weight groups which will make up a predetermined desired weight of components, a finger connected to each of said stops, means for positioning fingers the detecting means of whose weight groups have indicated the presence of a component therein in a position to be engaged by said elements as said member rotates, means for interrupting the rotation of said rotatable member when a predetermined number of said fingers are engaged by said elements, and means actuated by the interruption of the rotation of said member for releasing the stops corresponding to the engaged fingers to release components from said weight groups.

15. Apparatus wherein components have been segregated into groups in accordance with their weight and for use in the packing of a predetermined weight of components of variable weight in a container comprising, in combination, means including a movable member for predetermining a plurality of groups of components, each group including components from a plurality of segregated weight groups which combine to add to a predetermined total weight, a stop for each of said weight groups, and means entirely mechanical between said movable member and said stops and including said predetermined means for releasing a plurality of said stops simultaneously in accordance with the setting of said predetermining means.

16. A machine of the character described in which components have been segregated into groups in accordance with their weight, a stop for each of said weight groups, means for predetermining a plurality of combinations of components, each combination including components from a plurality of segregated weight groups and each of such combinations including components which combine to add substantially to a predetermined total weight, a column of elements, means shiftable by the predetermining means to positions between the elements of the column for increasing the total length of the column, and means actuated by the column when it reaches the proper total length for actuating a plurality of said stops to thereby release components from the corresponding weight groups.

17. A machine of the character described in which components have been segregated into groups in accordance with their weight, in combination, means for selecting a plurality of components from each of several weight groups the combined weight of which substantially equals a predetermined desired weight comprising a stop for each weight group for retaining the components thereof in such weight group, a driven movable member having mechanical elements thereon and having a cycle of operation, an expansible means, means actuated by said mechanical elements for lengthening said expansible means, and means actuated by said expansible means when expanded for releasing a plurality of stops to release a combination of components while the remainder of the stops are retained in component retaining position and during a cycle of operation of said member to release a plurality of combinations of components from such weight groups.

18. A machine of the character described in which components have been segregated into groups in accordance with their weight, in combination, means for predetermining a plurality of combinations of components, each combination including components from a plurality of segregated weight groups and each of such combinations including components which combine to add substantially to a predetermined total weight, said means including a driven movable member having mechanical elements thereon, an expansible means, means actuated by said mechanical elements for lengthening said expansible means, and means actuated by said expansible means when expanded for releasing from said segregated groups a combination of components which combined add substantially to said predetermined total weight.

19. A machine of the character described comprising, in combination, a movable member, a plurality of mechanical elements selectively positionable on said member, a plurality of groups of components, means between said mechanical elements and said groups of components for releasing a plurality of components from different groups simultaneously, said means including expansible means and means actuated by said mechanical elements for varying the length of said expansible means, and means for moving said member through a cycle of operation, said cycle of operation being successively repeated on each cycle of operation including the release of a plurality of components from different groups

in accordance with the setting of said mechanical elements.

20. A machine of the character described comprising, in combination, means for storing components of like weight in separate weight groups, stop means for each of said weight groups for retaining said components in said groups, said stop means having a component releasing position and a component non-releasing position, a movable member, mechanical elements selectively positionable thereon in rows with each row being associated with one of said weight groups and mechanical means between each of said rows of elements and its corresponding group actuated by said rows of elements for releasing a component from said group when said mechanical means is actuated by an element and a component of the group is in the releasing position.

21. In a machine of the character described wherein components are separately stored in a plurality of weight groups, in combination, stop means for each of said weight groups for retaining said components in said groups, said stop means each having a component releasing position and a component non-releasing position, means for releasing a combination of components from at least two but not all of said groups when the corresponding stops of said groups are in the releasing position, a movable member having a cycle of operation during which a number of combinations of components are released, mechanical means for interrupting the movement of said member to actuate said first mentioned means, means for moving said stops to shift them from the non-releasing to the releasing position upon interruption of the movement of said member, and supplementary means for interrupting the movement of said member at least once during its cycle of operation to enable the stops to shift from the non-releasing to the releasing position.

22. In a machine for packing a predetermined weight of a plurality of articles of variable weight in a container wherein the components have been segregrated into groups in accordance with their weight, the combination of a movable member, a stop for each of said weight groups for retaining components in said weight groups, means including a plurality of mechanical elements mounted on said movable member for releasing said stops to release components from said weight groups, said mechanical elements being arranged in parallel rows with each row corresponding to a weight group, said mechanical elements also being arranged in rows extending transversely to the first rows, said second rows determining the number of weight groups from which a component is to be released upon each operation of the machine, the arrangement of mechanical elements on said movable member being predetermined in accordance with the predetermined weight of components it is desired to release at each operation of the machine.

23. In a machine for packing a predetermined weight of a plurality of articles of variable weight in a container wherein the components have been segregated into groups in accordance with their weight, the combination of a movable member, a stop for each of said weight groups for retaining components in said weight groups, means including a plurality of mechanical elements mounted on said movable member for releasing said stops to release components from said weight groups, said mechanical elements being arranged in parallel rows with each row corresponding to a weight group, said mechanical elements also being arranged in rows extending transversely to the first rows, said second rows determining the number of weight groups from which a component is to be released upon each operation of the machine, the arrangement of mechanical elements on said movable member being predetermined in accordance with the predetermined weight of components it is desired to release at each operation of the machine, and means for moving said movable member through successive cycles of operation, each cycle including the potential release of a number of combinations of components and each cycle including the potential release of a component from each of said weight groups.

24. In a machine for packing a predetermined weight of a plurality of articles of variable weight in a container wherein the components have been segregated into groups in accordance with their weight, the combination of a movable member, a stop for each of said weight groups for retaining components in said weight groups, means including a plurality of mechanical elements mounted on said movable member for releasing said stops to release components from said weight groups, means for moving said movable member through a cycle of operation, said mechanical elements being arranged on said movable member in a manner such as to release a combination of components from different but not all of said weight groups, the total weight of said combination of components being equal to the predetermined desired weight, said cycle of operation normally including the release of a plurality of such combinations of components, said mechanical elements also being arranged on said movable member so that each component is potentially capable of entering into more than one combination of components during said cycle.

25. In a machine for packing a predetermined weight of a plurality of articles of variable weight in a container wherein the components have been segregated into groups in accordance with their weight, the combination of a movable member, a stop for each of said weight groups for retaining components in said weight groups, means including a plurality of mechanical elements mounted on said movable member for releasing said stops to release components from said weight groups, means for moving said movable member through a cycle of operation, said mechanical elements being arranged on said movable member in a manner such as to release a combination of components from different but not all of said weight groups, the total weight of said combination of components being equal to the predetermined desired weight, said cycle of operation normally including the release of a plurality of such combinations of components, said mechanical elements also being arranged on said movable member so that each component is potentially capable of entering into more than one combination of components during said cycle, and means for preventing the release of any of the components of a combination unless the complete combination may be released.

26. In a machine for packing a predetermined weight of a plurality of articles of variable weight in a container wherein the components have been segregated into groups in accordance with their weight, the combination of a movable member, a stop for each of said weight groups for retaining components in said weight groups, a plurality of mechanical elements mounted on

said movable member, means for moving said movable member through a cycle of operation, a column of elements, means actuated by said mechanical elements to positions between the elements of said column for increasing the total length of the column, means actuated by the column when it reaches the proper total length for actuating a plurality of said stops to thereby release components from the corresponding weight groups, said mechanical elements being arranged on said movable member in a manner such as to release a combination of components from different but not all of said weight groups, the total weight of said combination being equal to the predetermined desired weight, said cycle of operation normally including the release of a plurality of such combinations of components, said mechanical elements also being arranged on

said movable member so that each component is potentially capable of entering into more than one combination of components during said cycle.

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Certificate of Correction

Patent No. 2,470,976. May 24, 1949.

EBEN H. CARRUTHERS

It is hereby certified that errors appear in the printed specification of the above numbered patent requiring correction as follows:

Column 1, line 5, strike out the words and comma "now abandoned,"; column 18, line 73, after "repeated" strike out "on" and insert instead *and*;

and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 8th day of November, A. D. 1949.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.