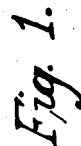


E. H. CARRUTHERS

METHOD AND APPARATUS FOR PACKING FLAKE MATERIALS

7 Sheets-Sheet 1



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Sept. 4, 1951

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2,567,052

METHOD AND APPARATUS FOR PACKING FLAKE MATERIALS

Filed Sept. 17, 1947

7 Sheets-Sheet 2

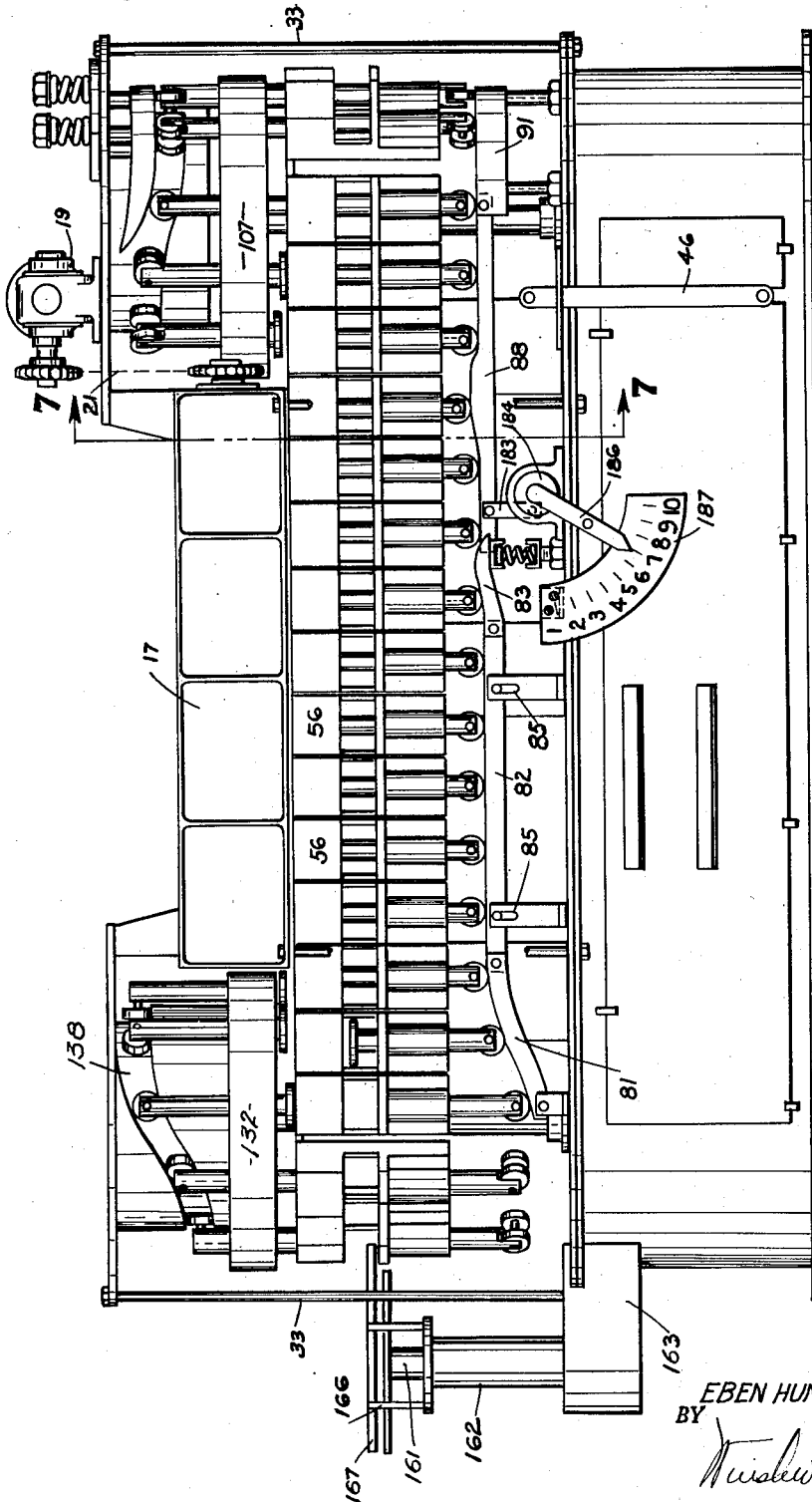


Fig. 2.

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METHOD AND APPARATUS FOR PACKING FLAKE MATERIALS

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7 Sheets-Sheet 3

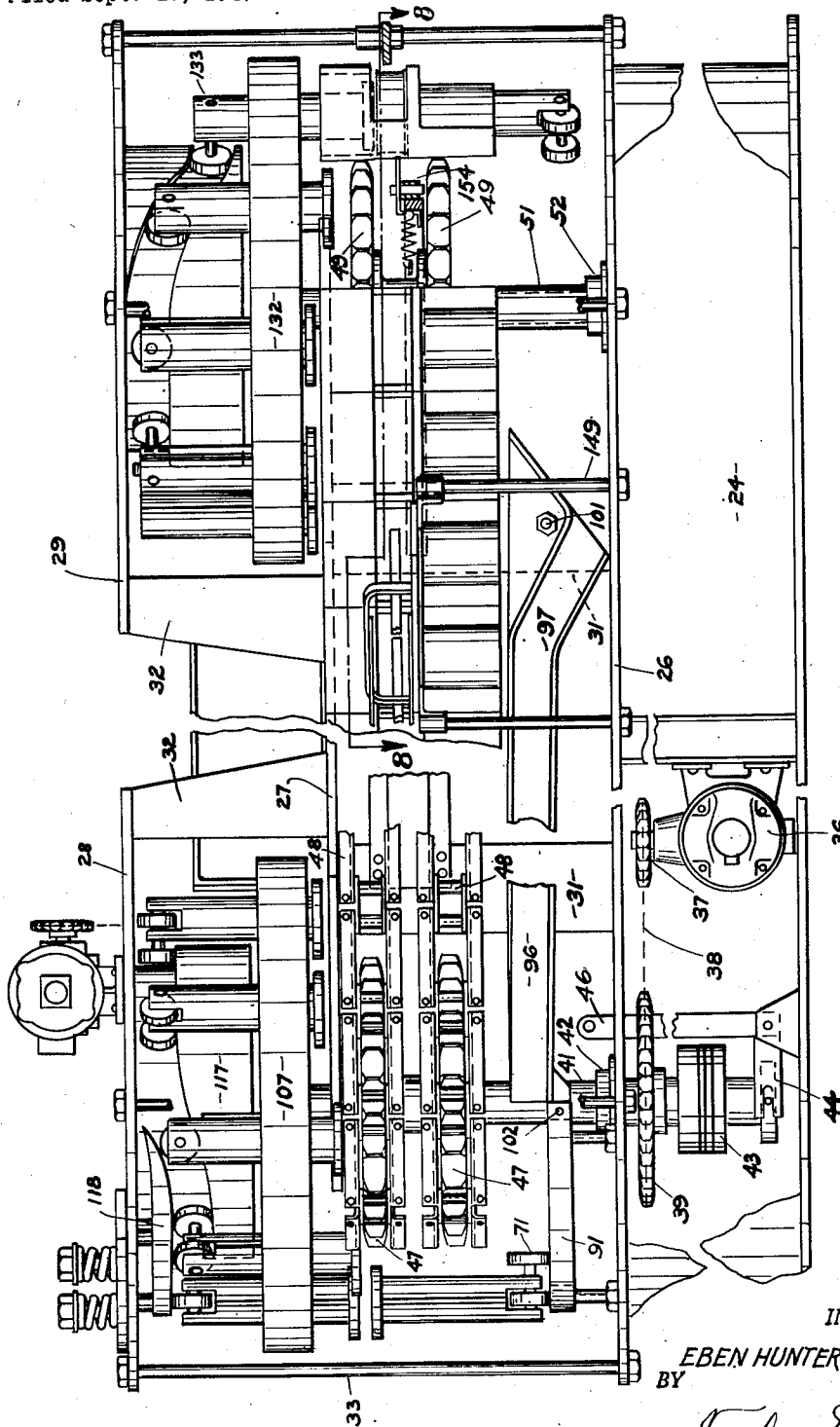


Fig. 3.

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METHOD AND APPARATUS FOR PACKING FLAKE MATERIALS

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7 Sheets-Sheet 4

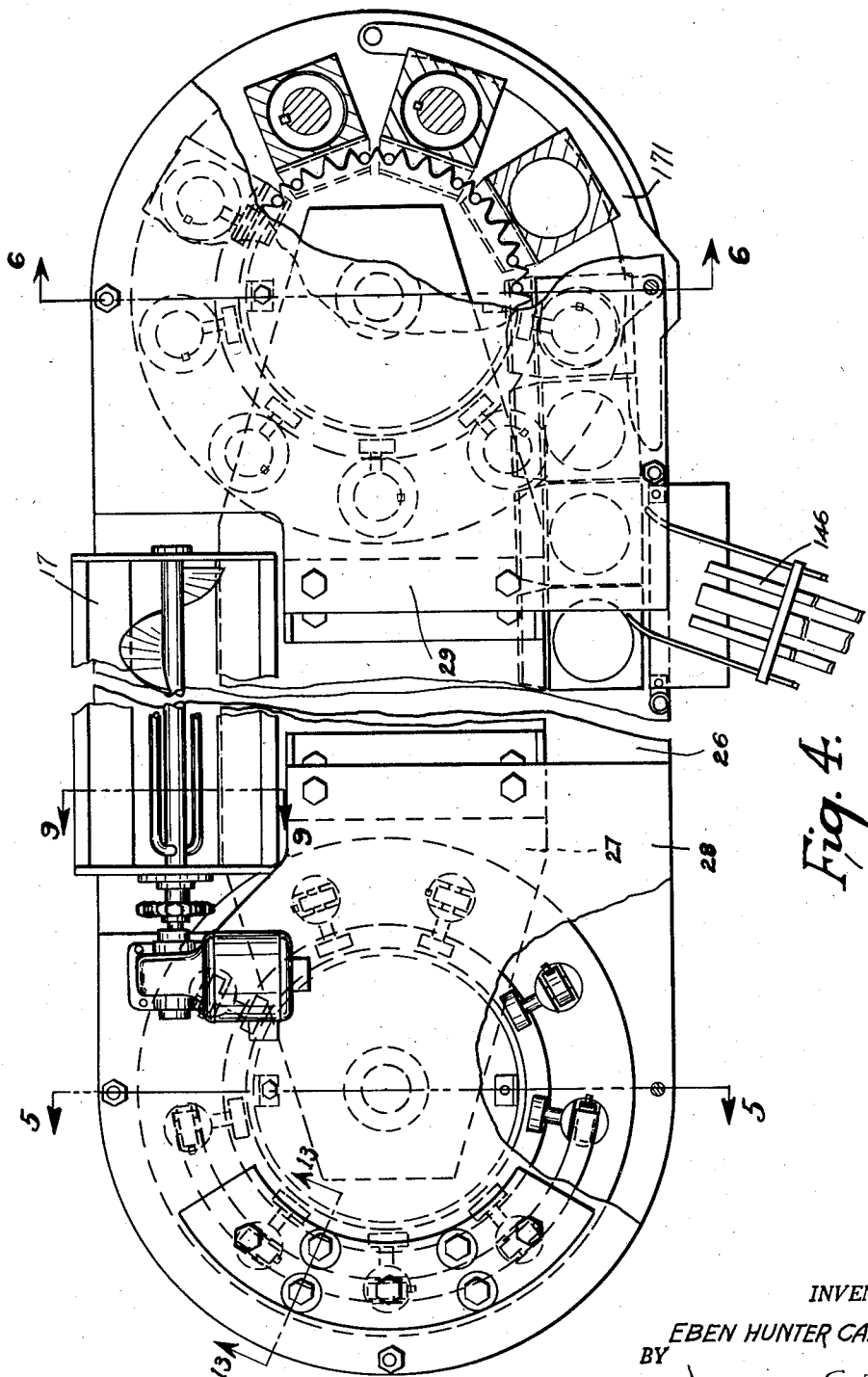


Fig. 4.

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METHOD AND APPARATUS FOR PACKING FLAKE MATERIALS

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7 Sheets-Sheet 5

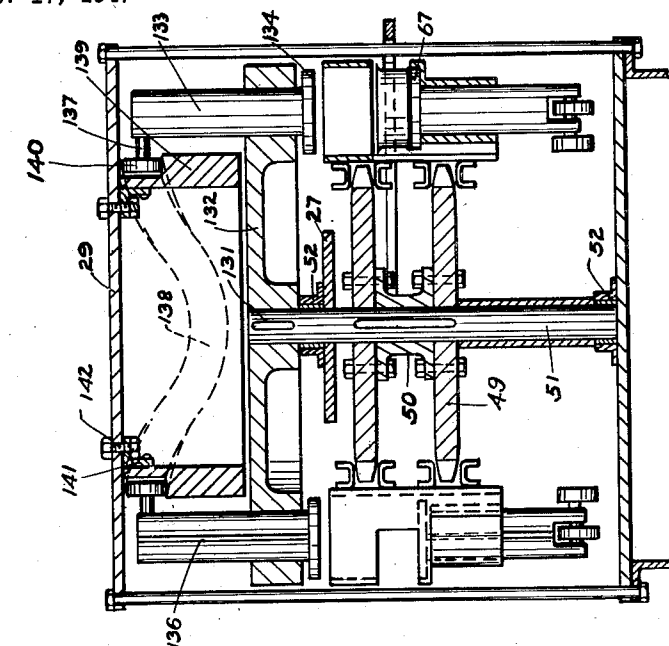


Fig. 5.

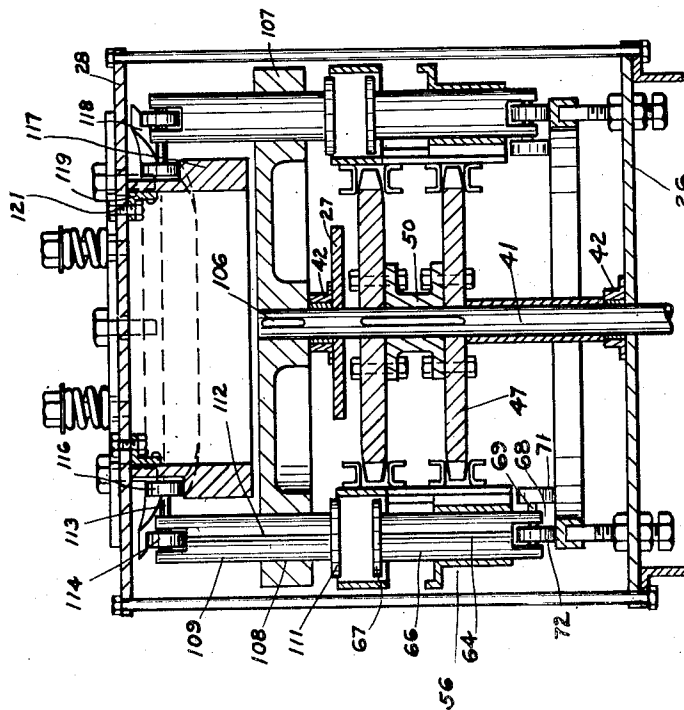


Fig. 6.

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METHOD AND APPARATUS FOR PACKING FLAKE MATERIALS

Filed Sept. 17, 1947

7 Sheets-Sheet 6

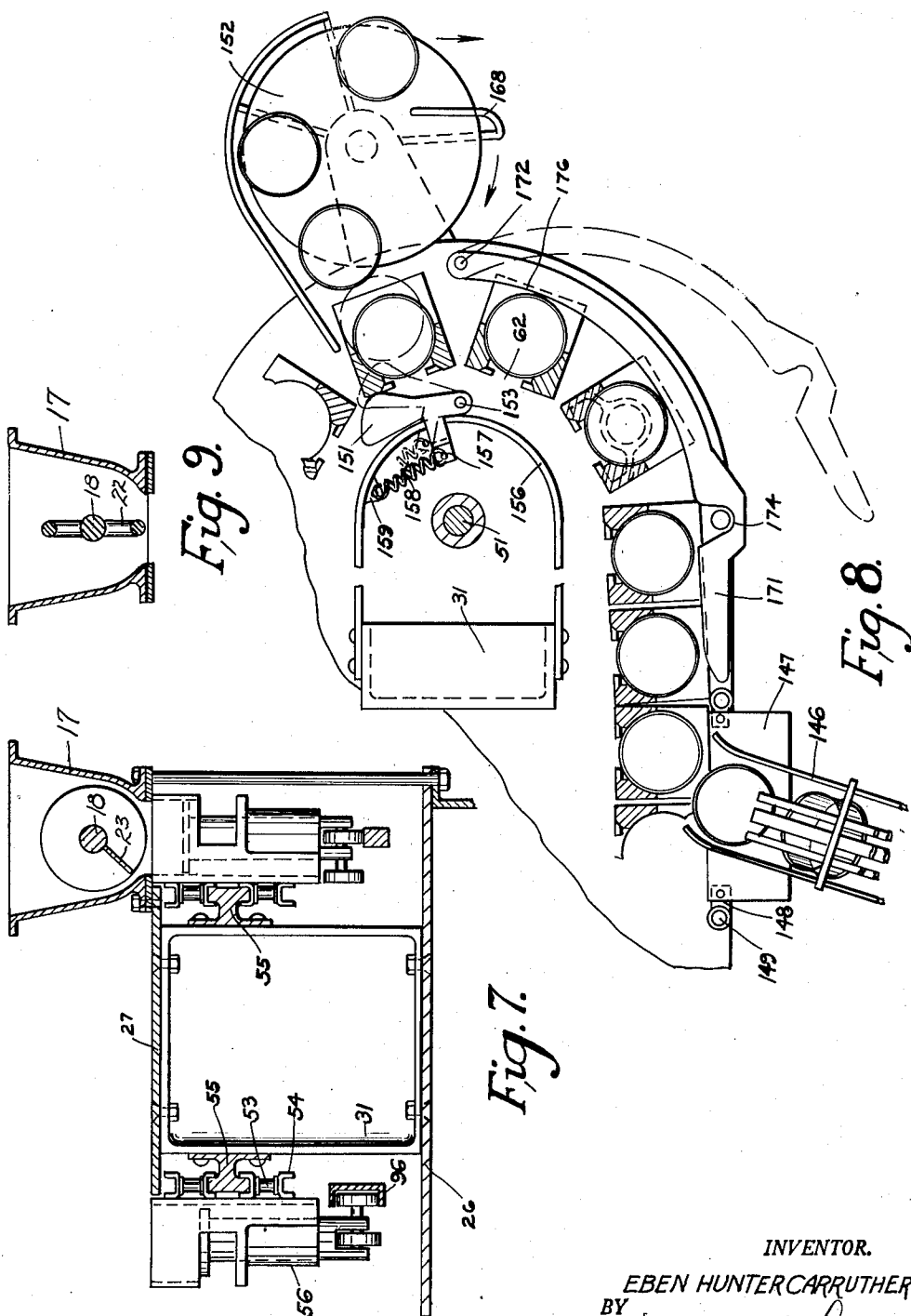


Fig. 7.

Fig. 8.

Fig. 9.

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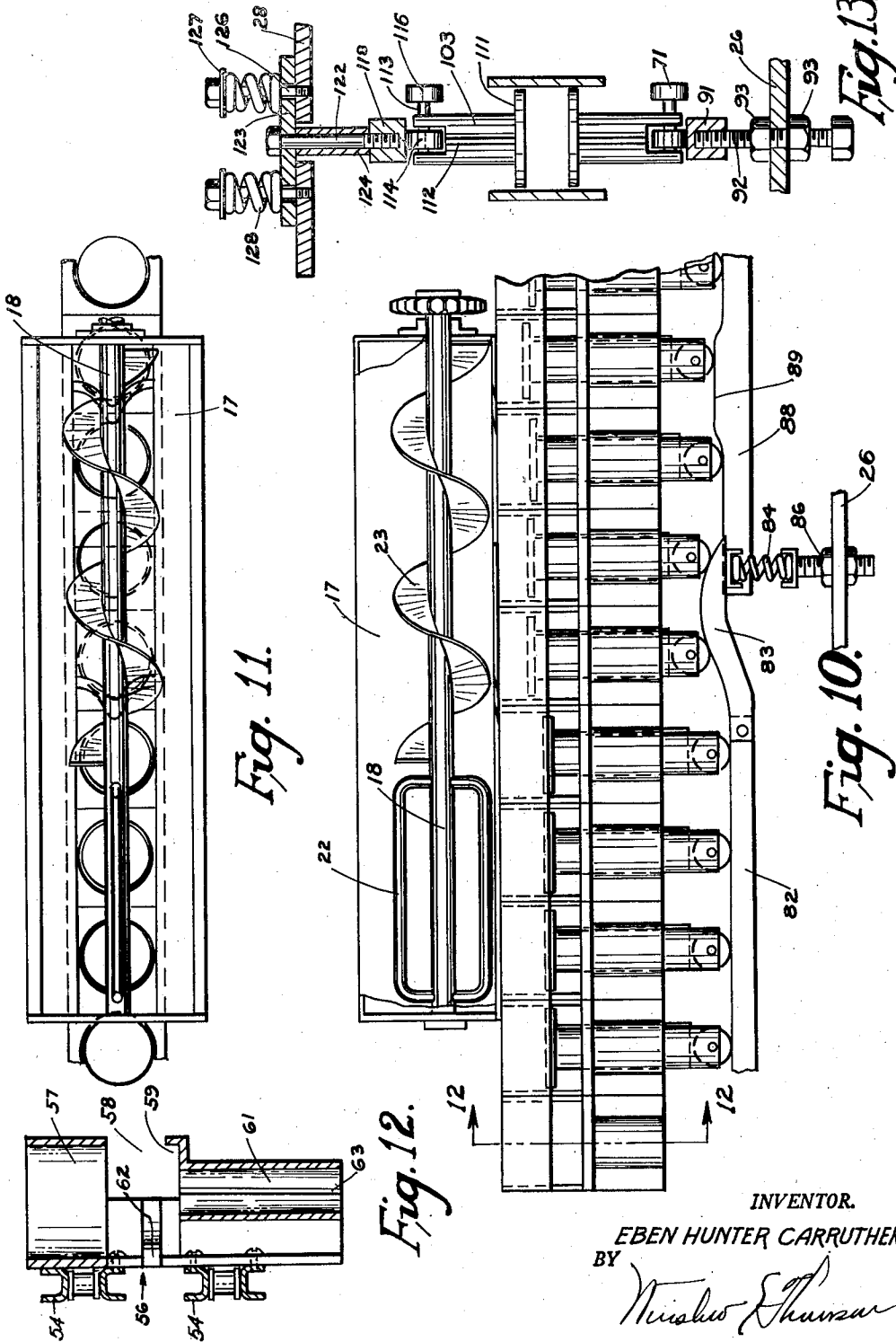
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METHOD AND APPARATUS FOR PACKING FLAKE MATERIALS

Filed Sept. 17, 1947

7 Sheets-Sheet 7



INVENTOR.

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UNITED STATES PATENT OFFICE

2,567,052

METHOD AND APPARATUS FOR PACKING
FLAKE MATERIALS

Eben H. Carruthers, Warrenton, Oreg.

Application September 17, 1947, Serial No. 774,626

38 Claims. (Cl. 226—103)

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My invention relates to a method and apparatus for packing flake materials and, while not limited to this purpose, has been primarily developed for the purpose of packing flake tuna fish.

An object of my invention is to provide an efficient machine adapted to compress or form flake tuna into a cake and pack such tuna in a can which when opened by the user presents an attractive homogeneous appearance.

Another object of my invention is to provide a method of packing moist flaky materials in which a compression chamber is loosely filled with such materials, thereafter the materials are pre-compressed to form a mass of uniform density, then the mass is trimmed to a desired volume to arrive at a mass of the desired weight, and thereafter the mass is compressed to form a cake of sufficient cohesiveness and rigidity that the cake will retain its cake form during packing in a can and maintain such form until the can is emptied for use.

A further object of my invention is to provide a machine adapted to compress flake tuna or other materials capable of being compressed into a cake and pack a substantially uniform predetermined weight of such materials into a can.

My invention further contemplates the provision of a machine which includes a series of compression chambers which may be filled with a predetermined volume or weight of tuna in flake form and compressed into a cake and then transferred to a can, the compression of the tuna being sufficient and its cohesiveness being such that when in the can, with oil, upon opening the can and inverting it, the cake of tuna will drop out of the can as a whole cake.

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

Fig. 1 is a schematic view of the machine of my invention with the compression chambers or cylinders thereof unrolled better to illustrate the operation of the machine and the method of my invention;

Fig. 2 is a front elevation of the machine showing the filling side of the machine;

Fig. 3 is a rear elevation of the machine with parts broken away so as to illustrate in greater detail important parts of the machine;

Fig. 4 is a partial top plan view of the machine with parts broken away better to illustrate the invention and with the turntable 152 shown in Fig. 8 omitted;

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Fig. 5 is a sectional view taken substantially on the line 5—5 of Fig. 4 in the direction indicated by the arrows;

Fig. 6 is a sectional view taken substantially on the line 6—6 of Fig. 4 in the direction indicated by the arrows;

Fig. 7 is a sectional view taken substantially on the line 7—7 of Fig. 2 in the direction indicated by the arrows;

Fig. 8 is a view taken substantially on the line 8—8 of Fig. 3 in the direction indicated by the arrows and showing in detail the path of travel of the cans;

Fig. 9 is a sectional view taken substantially on the line 9—9 of Fig. 4 in the direction indicated by the arrows and showing the filling trough and agitator bars;

Fig. 10 is an enlarged view of a portion of Fig. 2 showing the compression pistons in dotted lines and with the side wall of the filling trough removed to better illustrate the agitator bars and the screw conveyor for the flake tuna;

Fig. 11 is a top plan view of Fig. 10;

Fig. 12 is a sectional view taken substantially on the line 12—12 of Fig. 10 in the direction indicated by the arrows to illustrate the construction of the compression cylinder or chamber and associated parts; and

Fig. 13 is a sectional view taken substantially on the line 13—13 of Fig. 4 in the direction indicated by the arrows.

While the machine of my invention has been primarily designed for the purpose of packing flake tuna, which is relatively moist and capable of being compressed into a cake, the machine of my invention may be also used for the purpose of packing other materials of somewhat similar character.

Referring to Fig. 1, the flake tuna is dumped into a hopper 16 and falls by gravity therefrom into a filling trough 17 (see also Fig. 10). The filling trough is relatively long, extending throughout the major portion of one side of the machine, as shown in Fig. 2. This, as will presently appear, is important as it gives a relatively long straight run at the filling position of the compression chambers or cylinders, making it possible to completely fill each compression chamber without excessive agitation of the tuna. Excessive agitation is likely to beat the tuna into a pulpy mass and its is a particular object of my invention to handle the tuna gently so as not to break down its character as flake tuna. The sidewalls of the filling trough slope inward and downward, as shown most clearly in Figs. 7 and 9.

Carried by the end walls of the filling trough are bearings which support a shaft 18. The shaft 18 is driven by a motor 19 (Fig. 2) which is connected to the shaft by means of sprockets and a chain 21. Mounted on the shaft 18 are a pair of U-shaped agitator bars 22, the purpose of which is to relatively gently agitate the tuna as drops into the filling trough so as to distribute it into the compression chambers or cylinders presently described. Also mounted on the shaft 18 is a helical screw conveyor 23, the pitch and direction of rotation of which is such that flake tuna is carried from left to right of the machine, as viewed in Figs. 1 and 10. In the schematic showing of Fig. 1 which may be considered as a linear development of the machine the movement of the materials after they are in the pressure chambers presently to be described is from left to right as viewed in that figure.

The machine includes a base generally indicated by the numeral 24, a support plate 26, a support plate 27 and support plates 28 and 29 (see Fig. 3). In Fig. 4 parts have been broken away to show the four main support plates of the machine. Support plate 27 is carried by columns 31 mounted on support plate 26. The plates 26 and 27, together with one of the supporting columns 31, is shown in section in Fig. 7. Plates 28 and 29 are supported from the plate 27 by means of pedestals 32 and by staybolts 33 which extend from the plate 26 (see Figs. 2 and 3).

Carried by suitable supports in the base of the machine (Fig. 3) is a motor 36 which drives a sprocket 37 which through a chain 38 drives a sprocket 39. The sprocket 39 is loosely mounted on a shaft 41 which is suitably journaled in the support plates 26 and 27, as indicated at 42 (see also Fig. 5). The sprocket 39 is connected to the shaft by means of a clutch 43, the clutch elements of which are frictionally connected together by a clutch shifter 44 operated by a hand control 46 (see also Fig. 2). A pair of sprockets 47 rotate with shaft 41 being keyed thereto (Fig. 5) and drive special chains 48 which pass over sprockets 49 mounted on a shaft 51. The shaft 51 is also journaled in the plates 26 and 27, as indicated at 52. Each set of sprockets is rigidly connected together by couplers 50 (Figs. 5 and 6).

The special chains are shown most clearly in Figs. 5, 6 and 7 and include the usual cylindrical driving roller 53 which is engaged by the teeth of the sprockets 47 and 49 and the conventional roller links of a standard roller chain. A pair of U-shaped links 54 are pivotally connected to the faces of the roller links of each chain by conventional side plate pins. A mold unit 56 (Fig. 7) is connected as for example by screws, as shown in Fig. 12, to the mounting faces of each set of four U-shaped links 54. The adjacent U-shaped links 54 are not connected to each other so that they are free to shift angularly with respect to each other as the chain passes around the sprockets.

As shown in Fig. 7, carried by the supporting columns on the front and back of the machine is a rail 55 over which the facing U-shaped links 54 run. The purpose of the rails is to maintain the mold units in alignment with each other particularly during the straight runs of the mold units and in alignment with the filling trough during filling of the mold units.

As shown most clearly in Fig. 12, the mold units 56 each include a cylindrical compression

chamber or cylinder 57, a front opening 58 forming an entry way for the cans as will presently appear, a piston seat 59 and a cylindrical piston guide 61. The rear wall of the mold unit is slotted, as shown at 62, the purpose of which will later appear. The piston guide 61 is slotted at 63 to receive a guide rib 64 formed on the piston 66 (Fig. 5). The piston has an enlarged head 67 which in the retracted position lies on the seat 59, as shown in Fig. 6. As shown most clearly in Fig. 5, the piston 66 at its lower end is bifurcated, as shown at 68, to receive a shaft 69 which carries an inner roller 71 and an outer roller 72.

Referring now to Fig. 2, the pistons 66 are actuated by a series of cams. At the left of Fig. 2 which we will term the beginning of the cycle, the outer rollers 72 ride on a cam 81 which rises steeply, as shown in the drawings, to raise the pistons 66 so that the pistons close the lower ends of the compression chambers 57. The rollers then ride along a straight section of a cam 82 during the filling operation. The rollers 72 then ride upward on a cam 83 which I shall call, for convenience, a pre-compression cam.

As shown in Fig. 2 at 85, the cam 81 and the cam 82 are adjustable upward and downward to adjust the amount of loose fill, as will presently appear. The pre-compression cam 83 is adjustable independently of the cams 81 and 82 to vary the amount of pre-compression. The pre-compression cam 83 is loaded by a spring 84 and is adjustably supported, as shown at 86, from the plate 26.

The outer rollers 72 then ride on to a cam 88 having a rise 89 which I will, for purposes of convenience, call a trimming cam. As will presently appear, the trimming cam has an accurate and fine adjustment to adjust the volume of material in the compression chambers and hence the weight. From the trimming cam 88 the rollers 72 ride on to a semi-circular cam 91. The cam 91 is shown in section in Fig. 13 and as shown in that view is supported by threaded elements 92 which extend through the support plate 26 and, after adjustment by adjusting the screw upward or downward, may be locked in position by nuts 93.

The outer rollers, after passing around the semi-circular cam 91 (see Fig. 3), enter a position such that the inner rollers 71 enter the track of a cam 96 (Fig. 3). The cam 96 I will, for purposes of convenience, call the piston withdrawal cam. The cam 96 is relatively long and is slightly inclined downward through the major part of its length so that the pistons 66 are withdrawn gradually, for a purpose which will presently appear. The cam 96 is turned downward sharply at 97 to withdraw the piston rapidly from the position shown at the left in Fig. 7 to the dotted line position shown at the left in Fig. 6. This action permits a can to enter the mold unit through the entrance opening 58 (Fig. 12) and seat on the top of the enlarged part 67 of the piston 66, as shown at the right in Fig. 6. After the inner roller 71 leaves the cam 96, the associated piston is in a fully retracted position and is not controlled by a cam until the outer roller again engages the cam 81 (Fig. 2).

The long cam 96 is bolted to one of the columns 31, as shown at 101 (Fig. 3). At its other end the long cam 96 is bolted to the semi-circular cam 91, as shown at 102. The long cam 96 may be adjusted upward or downward by adjust-

ment of the semi-circular cam 91, as previously explained in connection with the description of Fig. 13. Thus the cam 96 always remains in a position to receive the inner roller after the outer roller leaves the semi-circular cam 91, notwithstanding any adjustment of the semi-circular cam 91.

Keyed to the drive shaft 41, as shown at 106 (Fig. 5), is a turret 107. The turret 107 has a plurality of bores 108 adapted to receive upper compression plungers or pistons 109. The plungers 109 are similar to the pistons 66 and include enlarged faces 111 and ribs 112 which mate with grooves (not shown) formed in the bores 108 of the turret 107.

At their upper ends each of the plungers 109 is bifurcated to receive a shaft 113 which carries a pair of rollers 114 and 116. The inner rollers 116 ride on a cam 117 which is circular, as shown in Fig. 3. The outer rollers 114 during a portion of their circular path of movement with the turret 107, ride on a compression cam 118. The cam 117 is bolted to angle plates 119 which are rigidly carried by the top plate 28, as shown at 121 (Fig. 5).

As shown most clearly in Fig. 13, the compression cam 118 is carried by a plurality of bolts 122, the heads of which engage a pressure plate 123. A sleeve 124 encircling the bolt bears against the cam 118 and against the lower face of the pressure plate 123. Threaded into the support plate 28 are a pair of bolts 126 which extend through bores in the pressure plate 123. Washers 127 which engage the nuts of the bolts serve as backings for springs 128. Thus the plate 123 floats and is urged into engagement with the support plate 28 by the springs 128. With this construction, as will presently appear, the compression force exerted on the tuna during its compression into cake form is slightly yielding.

Referring now to Fig. 6, the shaft 51 carried keyed thereto, as shown at 131, a turret 132. The turret 132 is bored to receive a plurality of pistons or plungers 133 which have enlarged ends 134 and are provided with ribs 136 which ride in guide slots (not shown). Carried by the plungers 133 are shafts 137 which ride in a cam groove 138 provided in a circular cam plate 139. The cam plate 139 is carried by angular brackets 141 which are bolted, as shown at 142, to the support plate 29.

In Fig. 8 I have shown the path of movement of the cans. The cans enter the machine through a can chute 146 which is conventional in construction and need not be further described. The cans enter on a can platform 147 which is supported by brackets 148 carried by support rods (Fig. 3) 149 extending upward from the support plate 26. The cans enter the mold units through the entrance openings 58 (Fig. 12) and are pushed into the pockets or saddles immediately under the cylindrical parts of the mold units by the weight of the cans in the chute. The cans are carried with the mold units in this position while the ejecting plungers 133 transfer the molded compressed material from the cylinder or compression chamber into the can. After the ejecting plungers are withdrawn sufficiently to clear the top edge of the can, a can ejector 151 pushes the filled can on to a can turntable 152.

The can ejector 151 is pivoted at 153 to a pivot support 154 (Fig. 3) which is carried by a band 156 bolted to one of the supporting columns 31. The can ejector has a tail piece 157 adapted to receive the end of a spring 158, the other end

of which is connected to the band, as shown at 159. As the mold units are successively presented to the can ejector 151, engagement of the can ejector with a mold unit, tensions the spring 158 and as soon as the can ejector comes in registry with the slot 62 (Fig. 12) in the mold unit, the spring 158 forces the can ejector to the dotted line position shown in Fig. 8 to eject the can on to the turntable 152.

The turntable may be mounted on a shaft 161 (Fig. 2) which extends through a supporting column 162 carried by a bracket 163 extending from the supporting base of the machine. The shaft 161 may be driven by a chain and sprocket (not shown) from the shaft 51. Extending from flange on the supporting column are a pair of bars 166 which carry a can guard 167 to prevent the cans from being discharged centrifugally from the turntable 152. The cans are discharged from the turntable by an arm 168 which discharges the cans on to a suitable conveyor (not shown).

As shown in Fig. 8, as the cans are rotated with the mold units, they are held in position by a can guard 171. This can guard is pivoted at 172 to one of the staybolts 33 and is cut out at 174 to extend around another staybolt so that the inner edge of the can guard will lie close to the peripheries of the cans. At the position approximating 176 the guard engages the side wall of the can so as to insure that the can is against the vertical walls of the mold unit and in positive alignment with the associated compression chamber. The can guard may be shifted to the position shown in dotted line in Fig. 8 for the purpose of enabling access to the cans in case one of them becomes jammed or bent during its passage through the can chute and the machine.

In Fig. 1 I have schematically illustrated the operation of the machine of my invention in which the somewhat oval path through which the mold units travel has been rolled out better to illustrate the operation of the machine. During the filling operation which is shown at the left of Fig. 1, the outer rollers 72 are riding along the straight portion of the cam 82. The molds are filled by the brushing action of the U-shaped agitator bars 22 which loosely fills the compression chambers of the mold units with the flake material as they are successively presented to filling position. As the compression chambers travel to the right they are further filled, if necessary, by the action of the screw or helical conveyor 23.

After being loosely filled, the rollers 72 ride on the cam 83, a knife 181 is provided above the mold units which, as the compression chambers pass over the edge, scrapes off the loose material. Thereafter, while the rollers are passing over the high point of the cam 83, the pistons in the compression chambers are pre-compressing the flake material against the extension of the knife 181. This pre-compression may be made any desired amount by adjusting the position of the cam 83 upward or downward as previously described. This pre-compression of the material is for the purpose of imparting a substantially uniform density to the mass of material in the compression chamber.

After leaving the cam 83, the rollers ride on the high point 89 of the cam 88, the pistons are raised slightly so as to raise the partly compressed material in the mold chambers just slightly to enable a second knife 182 to cut off a thin slice of the partially compressed cake.

This trimming operation is for the purpose of securing accurate weight by accurately controlling volume of the partially compressed flake material in the mold. By "trimming" applicant means that the material is removed and not that the surface of the material is merely smoothed.

To assure accurate control of volume and therefore weight and also to permit adjustment of the volume and weight of the final cake to be placed in the can an accurate and fine adjustment of the cam 88 is provided, which as shown in Figs. 1 and 2, includes an eccentric strap 183 pivoted to the cam 88 and pivotally connected eccentrically to a rotatable element 184. Rigidly connected to the rotatable element 184 is a pointer 186 which may be shifted with respect to a graduated segment dial 187.

One of the important features of my invention is that the machine may be adjusted for filled weight of the can while the machine is in operation, that is, with flake material supplied in sufficient quantity to loosely fill each of the compression chambers and with a predetermined pre-compression pressure applied to the pistons by the cam 83 against the extension of the knife 181, the cans may be weighed as they come off the machine. If the filled cans are slightly underweight or overweight, the pointer 186 may be rotated while the machine is in operation to decrease the amount of trim and therefore increase the weight of the cake placed in the can or increase the trim to decrease the weight of the cake placed in the can.

After leaving the trimming knife, the mold units enter positions in alignment with the bores in the compression turret 107. During travel in alignment with the compression turret, the rollers are riding on the cam 91 in which position the pistons 66 are held at a constant level, although this level is adjustable, as previously described. While the mold units are in alignment with the turret 107 the rollers 114 of the pistons 109 are acted upon by the spring loaded cam 118 to compress the flake material into a cake of predetermined thickness. The thickness of the cake is dependent upon the weight of the cake desired, the pressure exerted by the cam 118 and the position of adjustment of the cam 91.

In any event, it will be appreciated that any desired weight of the cake within the limits of the machine may be formed and that this cake may be molded at a desired pressure in accordance with the character of the tuna being packed. At times the tuna is more oily than at other times and the various adjustments of the machine described are necessary to maintain substantially constant weight and in order to secure a cake which will be retained in the compression chambers without support when the lower compression pistons are removed upon riding into the track of the cam 96. The compression pressure should also be not so great as to cause the material to lose an appreciable amount of oil or moisture.

In Fig. 1 the length of the cam groove 96 has not been shown. However, the long gradually sloping portion of the cam groove 96 is shown in Fig. 3. The purpose of the relatively long cam groove 96 and its gradually downwardly sloping character is to insure that the pistons will not be withdrawn too rapidly so as to create a suction likely to pull with it material from the cake or likely to draw the entire cake down with it.

In my co-pending application filed simulta-

neously herewith, Serial No. 774,625, filed September 17, 1947 (now abandoned), I have shown a form of piston which may be advantageously employed with the machine of my invention so as to prevent particles of the flake material from adhering to the pistons.

The pistons are then pulled downward when the rollers reach the part 97 of the cam 96, a can is dropped into the mold unit in the manner previously described and the mold units are brought into alignment with the bores in the turret 132. At the proper position in the rotation of the turret 132, the plunger 133 is actuated by the cam 138 and the compressed cake of flake material is pushed into the can. Because the cakes are all molded it is only necessary for the pistons to push the cakes free of the compression chambers and no packing pressure is required on the cans. It is usual to put oil in the can prior to filling the can with tuna although this may be done afterward. In any event when the can is sealed with oil, the user may open the can and upon inverting the can the tuna will drop out of the can as a molded cake.

While I have shown and described the preferred method and apparatus of my invention, it will be apparent 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 method of packing a predetermined weight of moist, flaky materials in a container which comprises loosely filling a chamber with said materials, compressing said materials sufficiently to form a mass of substantially uniform density, trimming said mass to a predetermined thickness, thereafter compressing said mass into a cake of sufficient rigidity and cohesiveness that it will adhere to the walls of the chamber without other support and transferring said cake to the container in cake form.

2. A method of packing a predetermined weight of moist, flaky materials in a container which comprises loosely filling a chamber with said materials, pre-compressing said materials to form a mass of substantially uniform density, trimming said mass to a predetermined thickness, and thereafter compressing said mass into a cake of sufficient rigidity and cohesiveness that when placed in a container with oil it retains its cake form and when the container is opened for use of the material, upon inverting the container, the cake will drop from the container in cake form.

3. A method of packing a predetermined weight of moist, flaky materials in a container which comprises loosely filling a chamber with said materials, pre-compressing said materials to form a mass of substantially uniform density, trimming said mass to a predetermined thickness, and thereafter compressing said mass into a cake of sufficient rigidity and cohesiveness that it will adhere to the walls of the chamber without other support and so that when placed in a container with oil it retains its cake form and when the container is opened for use of the material, upon inverting the container, the cake will drop from the container in cake form.

4. A machine for packing materials in a container comprising, in combination, a series of compression chambers, means for moving said compression chambers through a path of travel,

means for filling said chambers with the material to be packed, a piston movable with each of said compression chambers throughout their path of travel, a plunger, means for moving said plunger through a path of travel at least a part of which coincides with the path of travel of said chambers, and means for moving said plunger into a chamber to compress the material to be packed between the plunger and the piston.

5. A machine for packing materials in a container comprising, in combination, a series of compression chambers, means for moving said compression chambers through a path of travel, means for filling said chambers with the material to be packed, a piston movable with each of said compression chambers throughout their path of travel, means for moving said pistons relative to said chambers, a series of plungers, means for moving said plungers through a path of travel at least a part of which coincides with the path of travel of said chambers, and means for moving said plungers into and out of said chambers to compress the material to be packed between the plungers and the pistons, means for feeding containers to positions in alignment with said chambers and means for forcing the material out of said chambers into the containers.

6. A machine for packing materials in a container comprising, in combination, a series of compression chambers, means for moving said compression chambers through an endless approximately oval path of travel, a piston movable with each of said chambers throughout the path of travel, means for moving said pistons into and out of said chambers, means for filling said chambers with the material to be packed, a turret at each end of the oval, plungers carried by said turrets, means for rotating said turrets in synchronism with the movement of said chambers, means for moving said plungers into and out of said chambers, the plungers of one of said turrets cooperating with said pistons to compress the material in the chambers, and means for feeding the containers to a position in alignment with the said chambers adjacent said other turret, the plungers of said second turret serving to force the compressed materials from the chamber into the containers.

7. A machine for packing materials in a container comprising, in combination, a series of compression chambers, means for moving said compression chambers through an endless approximately oval path of travel, a piston movable with each of said chambers throughout the path of travel, means for moving said pistons into and out of said chambers, means for filling said chambers with the material to be packed, means for trimming off a slight amount of said material to bring said material substantially to a predetermined weight, a turret at each end of the oval, plungers carried by said turrets, means for rotating said turrets in synchronism with the movement of said chambers, means for moving said plungers into and out of said chambers, the plungers of one of said turrets cooperating with said pistons to compress the material in the chambers, and means for feeding the containers to a position in alignment with the said chambers adjacent said other turret, the plungers of said second turret serving to force the compressed materials from the chambers into the containers.

8. A method of packing a predetermined weight of moist, flaky materials in a container which comprises loosely filling a chamber with said materials from above the chamber, compressing

said materials sufficiently to form a mass of substantially uniform density by pressure applied below the materials, thereafter compressing said mass into a cake of predetermined dimensions and of sufficient rigidity and cohesiveness that it will adhere to the walls of the chamber without other support and transferring said cake to the container in cake form and with substantially said predetermined dimensions.

9. A method of packing a predetermined weight of materials in a container which comprises loosely filling a chamber with said materials, precompressing said materials to form a mass of substantially uniform density and predetermined volume, removing from said mass excess material so that the mass is of a predetermined thickness to bring the mass to substantially a predetermined weight, and thereafter compressing said mass into a cake, said precompressing and compressing steps being both carried out while the materials are maintained in continuous motion.

10. A method of packing a predetermined weight of materials in a container which comprises loosely filling a chamber with an unprecompressed weight of said materials, precompressing said materials to form a mass of substantially uniform density and predetermined volume, removing from said mass excess material so that the mass is of a predetermined thickness to bring the mass to substantially a predetermined weight, compressing said mass into a cake and transferring the compressed cake to a container, said precompressing, removing, compressing and transferring steps being carried out while the materials are maintained in continuous motion.

11. A method of packing a predetermined desired weight of materials in a container which comprises loosely filling a chamber with an unprecompressed weight of materials from above the chamber and at least partly by gravity, precompressing said materials sufficiently to form a mass of substantially uniform density and predetermined volume, trimming said mass to a predetermined thickness to obtain substantially said predetermined desired weight of materials, thereafter compressing said materials to a desired thickness less than the height of the container which they are to occupy and transferring the compressed materials to a container while they are in a compressed condition, said precompressing, trimming, compressing and transferring steps being carried out while the materials are maintained continuously in motion in a path of movement.

12. A method of packing a predetermined desired weight of materials in a container which comprises loosely filling a chamber with an unprecompressed weight of materials, precompressing said materials sufficiently to form a mass of substantially uniform density, trimming said mass to a predetermined thickness to obtain substantially said predetermined desired weight of materials, compressing said materials to a desired thickness less than the height of the container which they are to occupy, said precompressing, trimming and compressing steps being carried out while the materials are maintained continuously in motion in a path of movement, moving a container into said path of movement and into alignment with said chamber, and transferring the materials to said container while the materials and the container are maintained in motion in said path of movement.

13. A machine for packing materials in a con-

tainer comprising, in combination, a series of compression chambers, means for moving said compression chambers through a path of travel, means for filling said chambers with material at least partly by gravity, a piston movable with each of said compression chambers throughout their path of travel, plungers on the opposite sides of said material from the pistons, means for moving said plungers through a path of travel only a part of which coincides with the path of travel of said chambers, and means for moving said pistons and plungers simultaneously into and out of pressure engagement with the materials, said filling and compressing operations being carried out while said compression chambers are continuously moved through their path of travel.

14. A machine for packing materials in a container comprising, in combination, a series of compression chambers, means for moving said compression chambers through a path of travel, means for filling said chambers with material, a piston movable with each of said compression chambers throughout their path of travel, plungers on the opposite sides of said material from the pistons, means for moving said plungers through a path of travel only a part of which coincides with the path of travel of said chambers, means for moving said pistons and plungers into and out of pressure engagement with the materials, means for inserting a container between each chamber and its associated piston after the piston has been withdrawn from engagement with the material and while the chamber is continuously moving through said path of travel, a second set of plungers, means for moving said second set of plungers through a path of travel only part of which coincides with the path of travel of said chambers, and means for moving said second set of plungers into the chambers to eject the materials therefrom.

15. A machine for packing materials in a container comprising, in combination, a series of compression chambers, means for moving said compression chambers through a path of travel, means for loosely filling the chambers each with an unpredictable weight of materials, means movable with the chambers for precompressing said materials sufficiently to form a mass of substantially uniform density and predetermined volume, means for trimming said mass to a predetermined thickness to obtain a substantially predetermined desired weight of materials, means movable with the chambers and including at least a part of said precompressing means for engaging the materials on both sides thereof while in the chambers and compressing the materials to a desired thickness less than the height of the containers which they are to occupy, said filling, precompressing, trimming and compressing means being operable while said chambers are maintained in continuous motion through said path of travel, means for successively moving containers into said path of travel and into alignment with said chambers, and means movable with the chambers through at least part of their path of travel for transferring the materials to said containers while the materials and containers are maintained in motion in said path of travel.

16. A method of packing a predetermined weight of moist, flaky materials in a container which comprises loosely filling a chamber with said materials, precompressing said materials to

form a mass of substantially uniform density and expel air from the mass, and thereafter compressing said mass while wholly in the chamber into a cake of sufficient rigidity and cohesiveness that when later placed in a container with oil it retains its cake form and is of substantially the same thickness as the thickness to which it was compressed and when the container is opened for use of the material, upon inverting the container, the cake will drop from the container in cake form.

17. A method of packing a predetermined weight of materials in a container which comprises loosely overfilling a chamber with said materials, reducing the volume which said materials may occupy by an action which enables gravity at least to assist in filling voids in the chamber and expel air from the mass to form a cylindrical mass of approximately uniform density, thereafter compressing said mass while wholly in the chamber into a cake by pressure applied axially of the cylindrical mass and thereafter transferring the compressed cake in cake form to a container, said volume reducing, compressing and transferring steps being carried out while the materials are maintained in continuous motion through a path of travel.

18. A method of packing a predetermined weight of moist pieces of material in a container, the materials being of such character that the pieces tend to adhere to each other which comprises loosely filling a chamber with pieces of said material, compressing the pieces sufficiently to form a mass of substantially uniform density and simultaneously expel air from said mass, removing from said mass excess material so that the mass is of a predetermined thickness, thereafter compressing said mass while wholly in the chamber into a cake of sufficient rigidity and cohesiveness that it will adhere to the walls of the chamber without other support, and transferring said cake to the container in cake form.

19. A method of packing a predetermined weight of materials in a container which comprises loosely overfilling a chamber having fixed cylindrical walls at least partly by gravity with an unpredictable weight of materials, at least lightly compressing said materials by a force applied axially of said chamber and in a direction opposed to the action of gravity on the material and sufficiently to form a cylindrical mass of approximately uniform density and predetermined volume, removing excess material from at least one end of said cylindrical mass to form a cylinder of material which is of substantially predetermined thickness and weight, and continuously moving said materials through a path of movement during the compressing step and the removal of excess material.

20. A method of packing a predetermined weight of materials in a container which comprises loosely filling a chamber having fixed cylindrical walls at least partly by gravity with an unpredictable weight of materials, at least lightly precompressing said materials by a force applied axially of said chamber and sufficiently to form a cylindrical mass of substantially uniform density and predetermined volume, removing excess material from at least one end of said cylindrical mass to form a cylinder of material which is of substantially predetermined thickness and weight, thereafter compressing said mass into a cake and then transferring the cake to a container, the pressure for forming said materials into a cake being applied axially of the

material and being sufficient so that the cake is cohesive and will adhere to the cylindrical walls of the chamber without further support and when placed in a container with oil it retains its cake form and is of substantially the same thickness as the thickness to which it was compressed and when the container is opened for use of the material upon inverting the container the cake will drop from the container as a cake of substantially the same thickness as the thickness to which it was compressed.

21. In a method of packing a predetermined weight of pieces of food material which are moist and cohesive in a container, the steps of compressing the material in a chamber which is of smaller cross-sectional area than the cross-sectional area of the container which the material is to occupy and which has rigid walls enclosing the material except for two axially open ends, the compressing pressure being applied axially of said chamber and with sufficient force to compress the material into a cake of predetermined thickness and of sufficient rigidity and cohesiveness that the cake will be held by the walls of the chamber without other support and will substantially retain the dimensions to which it was compressed, and depositing said cake in a container, said compression of the material, retention of the cake by the walls of the chamber and deposit of the cake in the container being carried out while the chambers are being moved continuously through a fixed path of travel, said cake being deposited in the container in compressed cake form so that when the container is opened and the container inverted the contents of the container will drop out of the container as a cake of substantially the same dimensions as the dimensions to which the cake was compressed.

22. In a method of packing a predetermined weight of pieces of food material which are moist and cohesive in a container, the steps of compressing the material in a chamber which is of smaller cross-sectional area than the cross-sectional area of the container which the material is to occupy and which has rigid walls enclosing the material except for two axially open ends, the compressing pressure being applied axially of said chamber and with sufficient force to compress the material into a cake of predetermined thickness and of sufficient rigidity and cohesiveness that the cake will be held by the walls of the chamber without other support and will substantially retain the dimensions to which it was compressed, and depositing said cake in a container, said compression of the material, retention of the cake by the walls of the chamber and deposit of the cake in the container being carried out while the chambers are being moved continuously through a fixed path of travel, said cake being deposited in the container in compressed cake form so that when oil is placed in the container the oil flows around the exterior of the cake and protects the cake during retorting and when the container is opened and the container inverted the contents of the container will drop out of the container as a cake of substantially the same dimensions as the dimensions to which the cake was compressed.

23. In a machine for packing material in a container, means for obtaining a substantially constant predetermined weight of material for deposit in each of a series of said containers comprising a series of chambers movable continuously through a path of travel, said chambers

having fixed walls which enclose the material on all sides except for the upper and lower ends which are open, a piston movable with each of said chambers through said path of travel and extending through the lower open ends of the chambers, said material being deposited in the chambers at least partly by gravity through the upper open ends of the chambers with the position of the pistons determining the volume of the chambers, means for moving said pistons into the chambers a predetermined amount to reduce the volume of the chambers which the material may occupy, said piston action assisted at least partly by gravity tending to fill voids in the chamber, means past which the upper open ends of the chambers pass during movement through their path of travel for removing excess material, and means for moving said chambers continuously through said path of travel.

24. In a machine for packing material in a container, means for obtaining a substantially constant predetermined weight of material for deposit in each of a series of said containers comprising a series of chambers movable continuously through a path of travel, said chambers having fixed walls which enclose the material on all sides except for the upper and lower ends which are open, a piston movable with each of said chambers through said path of travel and extending through the lower open ends of the chambers, said material being deposited in the chambers at least partly by gravity through the upper open ends of the chambers with the position of the pistons determining the volume of the chambers, means for moving said pistons into the chambers a predetermined amount to reduce the volume of the chambers which the material may occupy, said piston action assisted at least partly by gravity tending to fill voids in the chamber, means past which the upper open ends of the chambers pass during movement through their path of travel for removing excess material, a series of plungers movable through at least part of said path of travel, means for compressing the material in each of said chambers between a piston and a plunger into a cake of approximately predetermined weight, means for transferring the material in each of said chambers in cake form to a container, and means for moving said chambers continuously through said path of travel.

25. A method of packing a predetermined weight of materials in a container which comprises overfilling a chamber with a weight of materials in excess of the amount to be placed in the container, removing substantially said excess to bring the weight of materials in the chamber substantially to the desired weight, compressing said materials into a cake while wholly in the chamber, positioning a container in alignment with the chamber, transferring the cake from the chamber to the container and varying the volume of said chamber to vary the volume which the materials may occupy during overfilling to obtain more nearly the desired predetermined weight of materials to be placed in the container.

26. A method of packing a predetermined weight of materials in a container which comprises overfilling a chamber with a weight of materials in excess of the amount to be placed in the container, removing substantially said excess to bring the weight of material in the chamber substantially to the desired weight, compressing said materials into a cake while wholly in the

chamber, positioning a container in alignment with the chamber, transferring the cake from the chamber to the container and varying the volume of said chamber to vary the volume which the materials may occupy during overfilling to obtain more nearly the desired predetermined weight of materials to be placed in the container, all of said steps including the varying of the volume of the chamber being carried out while the materials are moved continuously through a path of travel.

27. A method of packing a predetermined weight of materials in a container which comprises overfilling a chamber with a weight of materials in excess of the amount to be placed in the container, removing substantially said excess to bring the weight of material in the chamber substantially to the desired weight, compressing said materials into a cake while wholly in the chamber, positioning a container in alignment with the chamber, transferring the cake from the chamber to the container and varying the volume of materials to be compressed into a cake to control weight and obtain more nearly the desired predetermined weight of materials to be placed in the container, all of said steps including the controlling of weight being carried out while the materials are moved continuously through a path of travel.

28. A method of packing a predetermined weight of materials in a container which comprises filling a chamber with said materials in an amount in excess of the weight to be placed in the container while simultaneously applying pressure on the materials to fill voids in the chamber and expel air, reducing the volume of the chamber which the materials may occupy while removing the excess materials to obtain substantially the desired weight to be placed in the container, compressing said materials into a cake while wholly in the chamber, positioning a container in alignment with the chamber and transferring the cake from the chamber to the container.

29. A method of packing a predetermined weight of materials in a container which comprises filling a chamber with said materials in an amount in excess of the weight to be placed in the container while simultaneously applying pressure on the materials to fill voids in the chamber and expel air, reducing the volume of the chamber which the materials may occupy while removing the excess materials to obtain substantially the desired weight to be placed in the container, compressing said materials into a cake while wholly in the chamber, positioning a container in alignment with the chamber, transferring the cake from the chamber to the container and adjusting the amount of said reduction in volume of said chamber to obtain more nearly the desired predetermined weight of materials to be placed in the container, all of said steps including varying the volume of the chamber being carried out while the materials are moved continuously through a path of travel.

30. A method of packing a predetermined weight of materials in a container which comprises filling a chamber with said materials in an amount in excess of the weight to be placed in the container while simultaneously applying pressure on the materials to fill voids in the chamber and expel air, reducing the volume of the chamber which the materials may occupy while removing the excess materials to obtain substantially the desired weight to be placed in

the container, compressing said materials into a cake while wholly in the chamber, positioning a container in alignment with the chamber, transferring the cake from the chamber to the container and varying the volume of materials to be compressed into a cake to control weight and obtain more nearly the desired predetermined weight of materials to be placed in the container, all of said steps including the controlling of weight being carried out while the materials are moved continuously through a path of travel.

31. A method of packing a predetermined weight of materials in a container which comprises filling a chamber with said materials in an amount in excess of the weight to be placed in the container while simultaneously applying pressure on the materials to fill voids in the chamber and expel air, removing substantially the excess materials to obtain substantially the desired weight to be placed in the container, compressing said materials into a cake while wholly in the chamber, positioning a container in alignment with the chamber, transferring the cake from the chamber to the container and varying the amount of excess materials removed to obtain more nearly the desired predetermined weight of materials to be placed in the container, all of said steps including varying the amount of excess materials removed being carried out while the materials are moved continuously through a path of travel.

32. A method of packing a predetermined weight of materials in a container which comprises filling a chamber with said materials in an amount in excess of the weight to be placed in the container while simultaneously applying pressure on the materials to fill voids in the chamber and expel air, removing substantially the excess materials to obtain substantially the desired weight to be placed in the container, compressing said materials into a cake while wholly in the chamber, positioning a container in alignment with the chamber, transferring the cake from the chamber to the container and varying the volume of materials to be compressed into a cake to control weight and obtain more nearly the desired predetermined weight of materials to be placed in the container, all of said steps including the controlling of weight being carried out while the materials are moved continuously through a path of travel.

33. A method of packing a predetermined weight of materials in a container which comprises the steps of filling a chamber with said materials in an amount in excess of the weight to be placed in the container while simultaneously applying pressure on the materials to fill voids in the chamber and expel air, removing substantially the excess materials to obtain substantially the desired weight to be placed in the container, compressing said materials into a cake while wholly in the chamber, positioning a container in alignment with the chamber, transferring the cake from the chamber to the container and adjusting the volume of said chamber so that a different volume may be available for material during the carrying out of at least one of said first two steps to obtain more nearly the desired predetermined weight of materials to be placed in the container.

34. A method of packing a predetermined weight of materials in a container which comprises filling a chamber with said materials in an amount in excess of the weight to be placed in the container while simultaneously applying

pressure on the materials to fill voids in the chamber and expel air, removing substantially the excess materials to obtain substantially the desired weight to be placed in the container, positioning a container in alignment with the chamber, transferring the materials from the chamber to the container and varying the volume of materials to which pressure is applied to control weight and obtain more nearly the desired predetermined weight of materials to be placed in the container, all of said steps including the controlling of weight being carried out while the materials are moved continuously through a path of travel.

35. A method of packing a predetermined weight of materials in a container which comprises filling a chamber with said materials in an amount in excess of the weight to be placed in the container while simultaneously applying pressure on the materials to fill voids in the chamber and expel air, reducing the volume of the chamber which the materials may occupy while removing the excess materials to obtain substantially the desired weight to be placed in the container, positioning a container in alignment with the chamber, transferring the materials from the chamber to the container and adjusting the amount of said reduction in volume of said chamber to obtain more nearly the desired predetermined weight of materials to be placed in the container, all of said steps including varying the volume of the chamber being carried out while the materials are moved continuously through a path of travel.

36. A method of packing a predetermined desired weight of materials in a container which comprises loosely filling a chamber with an unpredetermined weight of materials from above the chamber and at least partly by gravity, precompressing said materials while in the chamber sufficiently to form a mass of substantially uniform density and predetermined volume, and removing from said mass excess material so that the mass remaining in the chamber is of a predetermined thickness to obtain substantially said predetermined desired weight of materials.

37. A method of packing a predetermined desired weight of materials in a container which comprises loosely filling a chamber with an unpredetermined weight of materials from above the chamber and at least partly by gravity, precompressing said materials while in the chamber sufficiently to form a mass of substantially uniform density and predetermined volume, removing from said mass excess material so that the mass remaining in the chamber is of a predetermined thickness to obtain substantially said predetermined desired weight of materials, and thereafter compressing said materials to a desired thickness less than the height of the container which they are to occupy.

38. A method of packing a predetermined desired weight of materials in a container which comprises loosely filling a chamber with an unpredetermined weight of materials from above the chamber and at least partly by gravity, precompressing said materials while in the chamber sufficiently to form a mass of substantially uniform density and predetermined volume, and trimming said mass to a predetermined thickness to obtain substantially said predetermined desired weight of materials in the chamber, said precompressing and trimming steps being carried out while the materials are maintained continuously in motion in a path of movement.

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