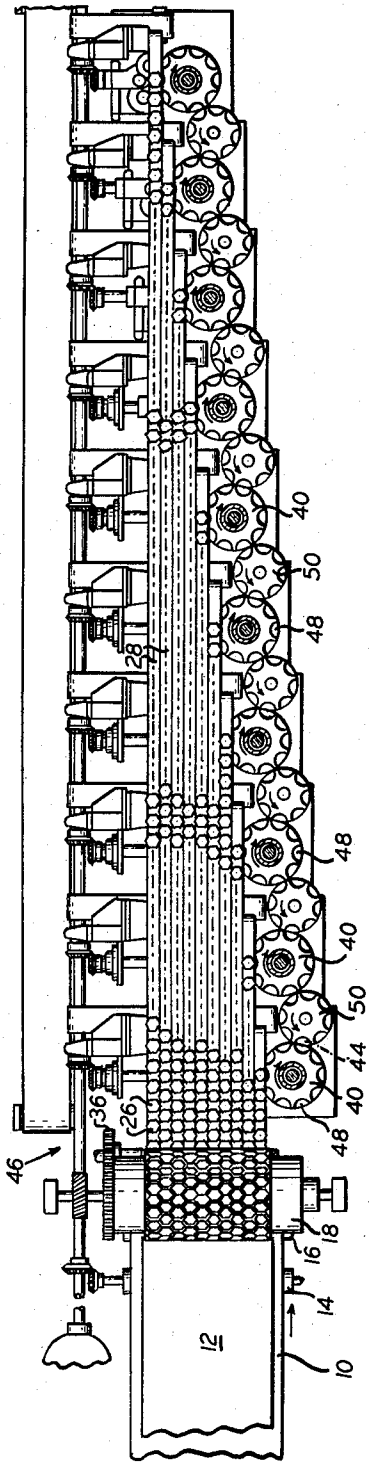
Aug. 18, 1959 A. B. EREKSON ET AL 2,899,787

CAN PACKING MACHINE

Filed April 21, 1958 5 Sheets-Sheet 1

FIG. 1.



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CAN PACKING MACHINE

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FIG. 3.

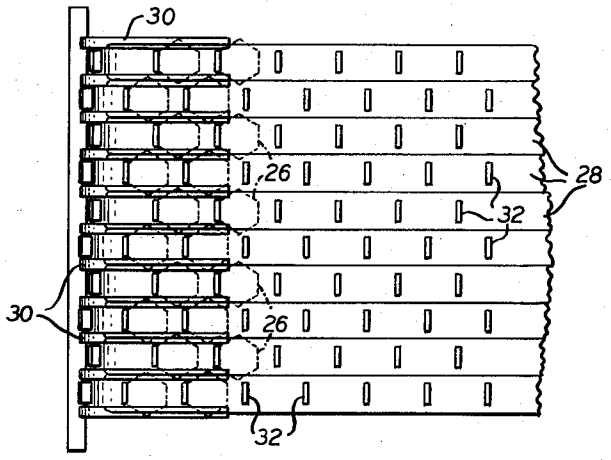
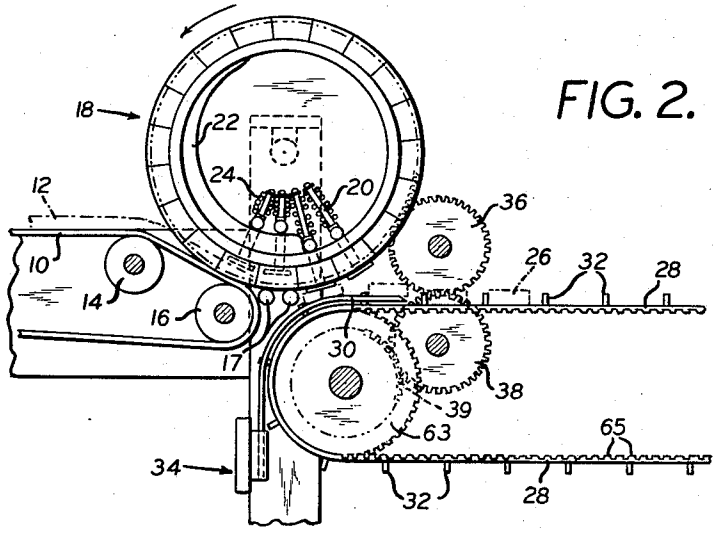


FIG. 2.



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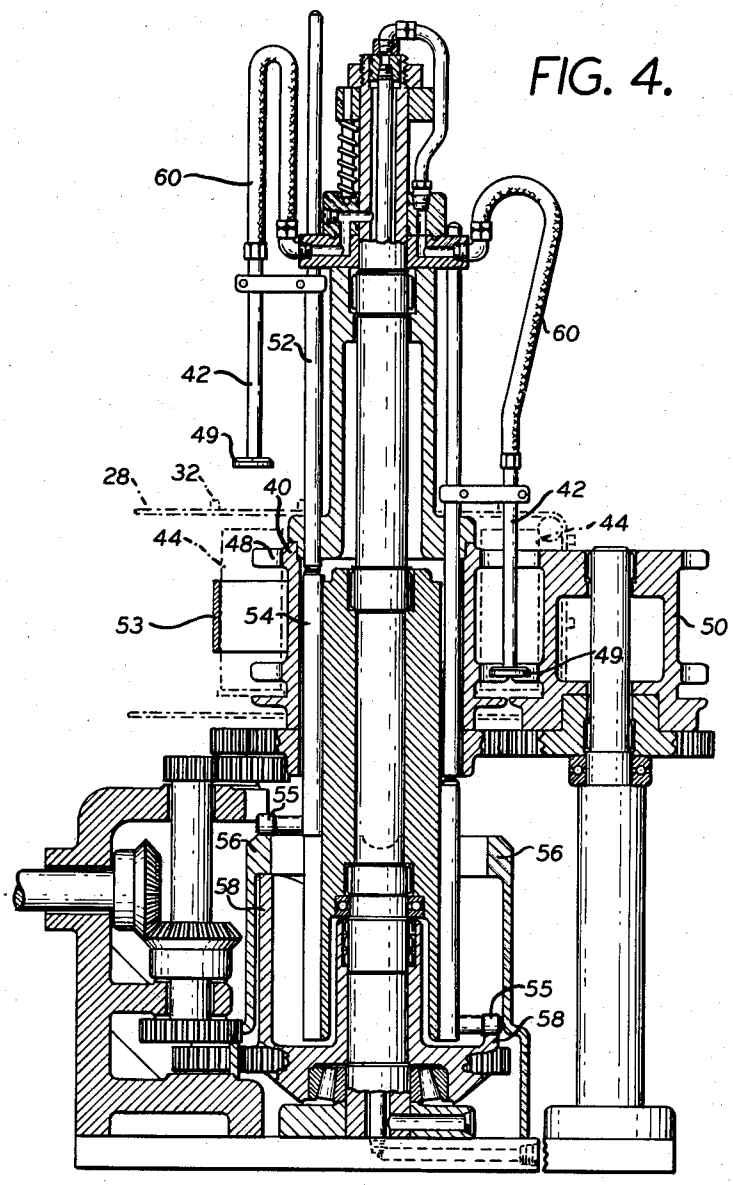
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CAN PACKING MACHINE

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FIG. 4.



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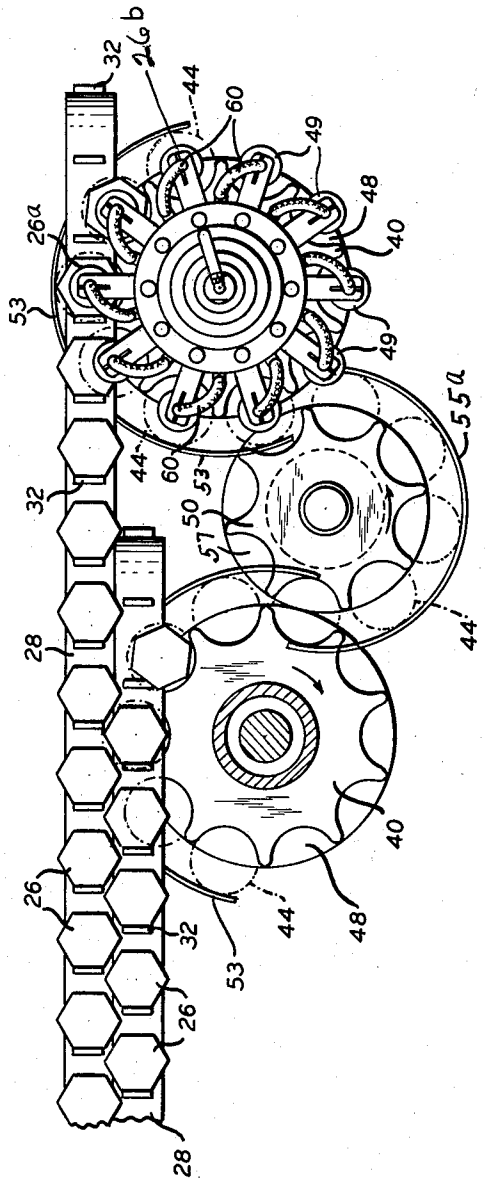
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CAN PACKING MACHINE

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FIG. 5.



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CAN PACKING MACHINE

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FIG. 6.

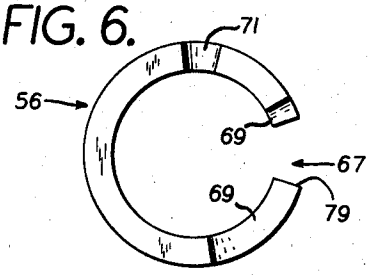


FIG. 7.

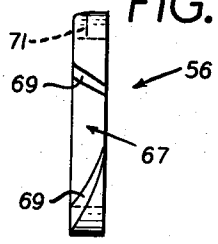


FIG. 8.

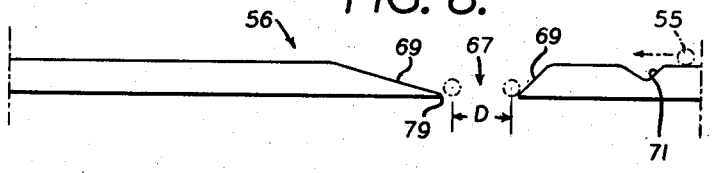


FIG. 9.

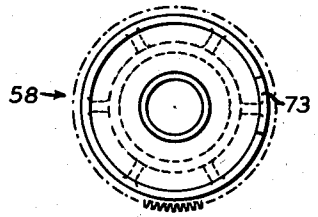
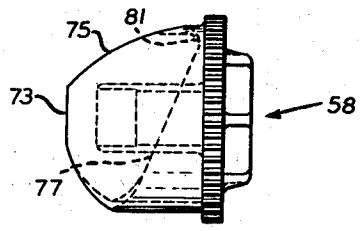


FIG. 10.



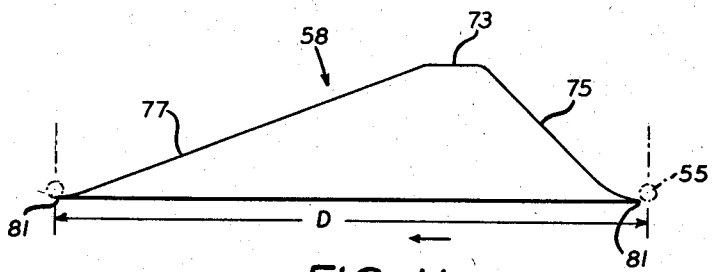


FIG. 11.

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United States Patent Office 2,899,787 Patented Aug. 18, 1959

2,899,787

CAN PACKING MACHINE

Arthur B. Erekson, Scarsdale, N.Y., Malcolm S. Lane, Baltimore, Md., and Richard L. Seidman, South Norwalk, Conn.

Application April 21, 1958, Serial No. 729,909

8 Claims. (Cl. 53—244)

This invention relates to a machine for filling shaped flat objects into containers.

The invention is particularly useful in introducing biscuit dough cutouts or blanks into cans and evening up approximately the total weight of biscuits in each of the thousands of cans packed daily and thus avoiding wasteful overweights and illegal underweights.

The difficulty normally encountered of uneven weights is due to varying thickness of the sheet of dough. This causes variations in the weight of the 10 or other fixed number of pieces commonly placed in one can. The smooth, even packing at a minimum of expense and time is also a problem since the dough units have a tendency occasionally to buckle somewhat or come to rest in tilted position in the can.

Our machine makes possible the quick and uniform packing of the blanks. Also the machine selects the blanks for a single can from different parts of the dough sheet from which the blanks have been cut, actually, from ten or so different positions across the sheet and lengthwise of the sheet. In this manner unevenness of the thickness or weight of the units are averaged out in the assembly in the can.

Briefly stated, the invention comprises the herein described machine and parts thereof, particularly a machine for filling uniformly shaped flat objects into an open end container such as a can, the machine including means for delivering the objects in line on a moving conveyor in predetermined spaced relationship to each other lengthwise of the conveyor, means for (1) moving one of the containers to be filled adjacent to and to the side of one of the said objects on the conveyor, (2) lifting the said one of the objects from the conveyor, depositing the object in the container, and then releasing the object from the lifting mechanism, (3) returning the said lifting mechanism to the pick-up position for a succeeding one of the said objects on the conveyor, and (4) repeating the cycle.

In general, the machine provides means for performing in turn the following operations: Cutting the sheeted dough into blanks of desired size and shapes that are regular, as for instance, hexagonal, square, rectangular, or the like, transferring these cutouts to a conveyor with spaces between the blanks as arranged lengthwise on the conveyor, lifting the biscuit blank at a predetermined position by a mechanism that is synchronized with a rotating support for the cans, keeping the biscuit blank at all times, between its pick-up and its being deposited in the can, centrally disposed above the can in which the blank is to be deposited, depositing the blank in the can, removing the lifting mechanism from the can, then lifting a second biscuit by a like mechanism from another part of the conveyor spaced both laterally and lengthwise of the conveyor from the pick-up position of the first biscuit and suitably from a separate parallel conveyor strip adjacent to the first conveyor, placing this second biscuit on top of the first one in the can, and repeating the operation with cutouts from other parts of the sheet of dough until the can is filled to the necessary extent.

The invention will be further illustrated by description in connection with the drawings, in which:

Fig. 1 is a plan view of the machine partly broken away to show the circular platforms of the biscuit transfer mechanism.

Fig. 2 is a side elevation partly in section of the feed end of machine of Fig. 1.

Fig. 3 is a plan view, on a somewhat enlarged scale, of the feed end of the side-by-side conveyor strip assembly.

Fig. 4 is an elevational section of the mechanism for biscuit lifting and depositing and for revolution of the cans.

Fig. 5 is a plan view, partly broken away for clearness of illustration, showing in more detail than Fig. 1 particularly the means for transferring containers from one rotating support to another and placing biscuits in the cans.

Fig. 6 is a plan view of the stationary cam of the machine.

Fig. 7 is an edge view of the same cam.

Fig. 8 is a developed profile view of cam surface of this stationary cam.

Fig. 9 is a plan view of the rotating cam showing also some of the drive mechanism.

Fig. 10 is a side view of the rotating cam.

Fig. 11 is a developed profile view of the camming surface of the rotating cam.

The figures are in part diagrammatic and parts not illustrated are conventional.

There is shown a driven belt 10 with a sheet 12 of biscuit dough being delivered thereon over the rollers 14 and 16 to a position beneath a rotary cylinder cutter indicated generally at 18. The cutter includes radially arranged cutters with internal plungers 20. These plungers are raised from the cutting position, by stationary cam 22, against the pressure of springs 24.

The cutouts or blanks of biscuit dough remain on the cutters until the cutters come above the fingers 30. These fingers suitably are spaced rods extending in the general direction of the movement of the conveyor 28 but slightly above the end thereof that is to the rear, when the machine is operating, i.e., the feed end. These fingers 30 extend to the sides of the spacing elements or lugs 32 which project upwardly between adjacent fingers and to such height that, as the lugs move between the fingers 30, the lugs contact the rear edge of the biscuit cutouts and carry them forward as illustrated in Fig. 2 and at fixed spacing to each other lengthwise of the conveyor. The lugs 32 are at distances, between the closest points of each, greater than the length of the separate cutouts, that is, their dimension from front to back.

Conventional power equipment (not shown) operates the synchronizing gears 36, 38 and 39 so that the relative speeds of the cutting mechanism 18 and of the conveyor 28 are determined. Driving means for the belt 10 are usual and not shown but are such that the speed of this belt is slower than the speed of conveyor 28. As a result, there is created space between the cutouts after they are delivered from belt 10 to conveyor 28 through the mechanism described.

The machine includes supports 40 for the lifting mechanism 42 and for the containers such as cans 44. These supports are rotated by power mechanism indicated generally at 46, including central shaft and counter-shafts, as shown in Fig. 1.

Also these supports contain equally spaced peripheral pockets 48 of size to receive the cans 44 to be filled. Transfer mechanism including star wheels 50 are disposed between adjacent ones of the rotating supports for transferring the containers 44 from one of the rotating supports to the next as illustrated in Fig. 1, the star wheels being driven at the same peripheral speed as the said rotating supports 40. Guide strips 53 (Fig. 5) direct the cans into the pockets 48 and strips 55*a* direct the cans into the peripheral pockets 57 of the star wheels.

The lifting element proper includes the tube 42, an air-permeable head 49, and means such as threads (not shown) holding the head on the said tube. The head may be of usual kind such as a perforated brass can with 1/32 inch drill holes therein or one with a wire screen face of 20–40 mesh wires sufficiently stiff to be shape-retaining.

The means mounting the tube in vertically movable manner and means for alternately lowering and raising the tube include the vertically slidable rod 52, cam follower 55, stationary annular lifting cam 56, and lowering (plunger dipping) cam 58, also annular, with means rotating the cam 58 at a fixed speed of 1 revolution for each biscuit pick-up. When there are ten pick-up plunger heads on the rotating support assembly, for example, then the plunger dipping cam 58 must rotate 10 times for 1 rotation of the said assembly. The dipping action upon the plunger (through the cam 58, cam follower 55 and said rod 52), causes the plunger 42 of the lifting mechanism to sink into the can, at the biscuit release position as the cam follower 55 passes across the gap 67 (Figs. 6–8), and then rise during the course of only a few degrees of revolution of the cam follower 55, the total distance across the gap corresponding to 36° of rotation for the 10-stage assembly referred to above. The high speed of rotation of cam 58 makes unnecessary such a steep pitch of ascent 77 of the camming surface as would cause a sudden blow or bump on the cam follower 55, as it is raised suddenly from the release position. The sudden dip and reelevation of follower 55 is accomplished quickly, in spite of the moderate pitch, by the high speed of this flying cam 58.

Means are shown for creating reduced pressure inside the lifter head 49 and alternately increasing the pressure, as by air supplied alternately through vacuum or pressure pumps (not shown). The reduced pressure is induced when the lifter head is at the position 26*a*, at which the biscuit cutouts are picked up, the increased pressure at the release position 26*b*.

The annular stationary cam 56 is an incomplete circle with gap 67, of distance across D, between the two ends thereof and with sloped surfaces of the ends as shown at 69 (Figs. 6–8). The cam surface of this stationary cam carries a depression 71 at the position for bringing the plunger head down onto a biscuit at the pick-up position thereof, as the cam follower 55 enters this depression. The gap 67 causes the cam follower, as it moves across the gap, to drop onto the rotating cam 58 at the position 73 (Figs. 9–11). The cam 58 rotates faster than the cam follower 55 revolves and is so mounted and driven that the steep slope 75 of the rotating cam overtakes the follower and the cam follower runs down this steep slope immediately after the follower starts to move across the gap 67. As a result, the pick-up head, attached indirectly to the cam follower, deposits the biscuit in the can 44 at the point 81 on the cam. Then, as the rotating cam moves, at its high speed under the cam follower 55, the cam surface 77 of lesser slope elevates the cam follower to the point 79 on the stationary cam. The cycle is then repeated.

Means that are conventional and are not fully shown drive the rotating cam at an angular speed that is as many times faster than the speed of revolution of the cam follower 55 as there are filling stations on the rotating support assembly 40. In other words, the rotating cam makes a complete revolution while the cam follower and the rotating assembly, in which the cam follower is mounted, moves only through the distance D of Fig. 8, that is the distance apart of the filling stations represented by the can positions 48 (Fig. 1) in the rotating support. When there are ten of these filling stations to a rotating support, then the rotating cam moves through 360° while the cam follower moves through only 36°.

The operation of the machine will be largely evident from the description of it that has been given.

More specifically, the dough is formed into a flat sheet, as for instance approximately 5/8 inch thick, which is delivered to the rotary cutter by means of a belt. The cutter extends also over the starting end of the strip conveyors to which are attached the timing lugs or spacing elements 32. The action of the cutter is to blank out the biscuits and deposit them in proper timing on the fingers 30.

The cutter contains cam actuated plungers which are released at the proper point in relation to the strip conveyors so that each biscuit cutout is deposited at the proper place. The biscuit is momentarily arrested by support on the said fingers where the biscuit is stationary until a timing lug 32 comes up behind it and advances the biscuit in the proper position on the conveyor strip.

The cutter shown makes hexagonal biscuit blanks. There is no waste except at the sides of the sheet and no interference, therefore, by waste such as would be formed between round shapes.

The biscuit travels with the conveyor to the center line of the pick-up head at which point 26*a*, the center line of the biscuit, is directly under the center of the plunger or pick-up head. The pick-up head lowers at this instant and contacts the biscuit. By the partial vacuum inside the head, the biscuit is lifted from the strip conveyor and moved laterally in an arc and upward by the revolving pick-up head. After revolving through an angle of approximately 70°, the pick-up head, still revolving, starts to move also downward until it deposits the biscuit in its release position 26*b* in the can. As the can advances from the empty position at the left in Fig. 1 to the nearly filled condition at the right, there is a stepwise reduction in the distance to which the biscuit is lowered into the can, so that the first biscuit is deposited near the bottom of the can and later ones upon those previously introduced. It will be noted that the object lifting mechanism including the head 40 is moved continuously, by the power supplied through shaft 46, in the path of a complete circle, with dips at the positions of contact with an object to be lifted and later of release of the objects in the can (Figs. 4, 5, and 1.)

In all cases, air under pressure is introduced through the hollow plunger 42 into the pick-up head. This blows the biscuit off at position 26*b* (Fig. 5) at the start of retraction of the plunger from the can by means of the cam 56.

Cans 44 are fed by any usual means (not shown) into the machine at the first station and are then engaged in the pockets 48 in the rotating can support of carrier 40. Each carrier is exactly concentric with the center mounting of the pick-up plunger which the carrier supports and revolves. The can is carried through the filling cycle, each can in an individual pocket 48 of a carrier. At the introduction of each biscuit, the can is transferred to the next station by means of the star wheel 50 arrangement with guide 55*a*.

It is necessary to deposit one biscuit at each succeeding station in its exact level in the can. Therefore the succeeding pick-up heads from the left to right in Fig. 1 make strokes of diminishing length, so that the first head deposits the bottom biscuit in the bottom of the can and the last head at the right deposits the top biscuit. The biscuits neither tilt from the horizontal position nor compress the biscuits below.

Movements of parts of the machine are synchronized.

The filled cans, removed from the last filling station at the right (Fig. 1), are inspected and then closed in normal manner.

The dough constituting the biscuits may be any one that is commonly employed in prepared ready to bake biscuits, as, for example, a dough containing 100 parts by weight of wheat flour and approximately 62 of water, 2.5–3.5 of sodium acid pyrophosphate on the anhydrous basis, and sodium bicarbonate in amount at least equivalent to the pyrophosphate and suitably in excess thereof by 10%–40%. A particularly suitable composition for the dough is that described in the application for patent filed by Erekson and Duncan, February 26, 1958, Serial No. 717,564, entitled Dough Composition.

The container used is conventional for the purpose. Ordinarily it is a spirally wound paper can with aluminum foil lining and tinned sheet steel ends, the end seams allowing escaped of gas under pressure but holding back dough so that, as the dough expands to fill the can, the dough seals the gas escape outlets or seams. The can should be sufficiently strong and tight to withstand pressures of 12–16 lbs. p.s.i. and ordinarily a test up to 40 p.s.i. A common size of can for biscuit dough cutouts about 1⅝ inches across is 2 inches in diameter by 5½ inches high, both inside dimensions. A form of can that may be used with proper adjustment of the travel of the lifting head is the tubular container with plastic liner described in Patent 2,811,455, issued to Arthur B. Erekson on October 29, 1957 and entitled Container for Leavened Dough.

The conveyor **28** should be stable in length so that the spacing of objects carried thereon will be unchanging and dependable. We use to advantage a conventional rubber conveyor belt with notches **65** and dimension stabilizing material (not shown) embedded therein, as for example, closely spaced stainless steel wires extending lengthwise and as closed loops within the belt and with cross-grooves on the inside of the belt registering with the drive roller **63** (Fig. 2). To this conveyor belt we attach the evenly spaced elements or lugs **32** as by bolts (not shown).

Other parts of the machine are constructed of materials commonly used for like parts in other machines, as for instance, of steel, tinned steel plate, stainless steel, aluminum, brass, or the like.

The machine described, with ten side-by-side strip conveyors moving at a speed of about 33 feet a minute, has the capacity of 160 cans a minute when the biscuits are spaced at 2.5 inches on centers.

The machine may be used for packing, into containers such as cans, other objects including cookies and crackers in either the dough state or baked condition, shaped candies, plastic discs or shapes, and the like.

It is understood that it is intended to cover all changes and modifications of the examples of the invention herein chosen for the purpose of illustration which do not constitute departures from the spirit and scope of the invention.

We claim:

1. A machine for filling uniformly shaped and generally flat surfaced objects into a can with open upper end comprising means for delivering the objects to a moving conveyor in line and in evenly spaced relationship to each other lengthwise of the conveyor, means for moving the can adjacent to one of the said objects on the conveyor and offset to the side of the said line of objects, lifting mechanism for lifting the object from the conveyor, means for moving the object lifting mechanism continuously in the path of a complete circle and, at one position in the circle, downwardly to the object to be lifted and at another downwardly into the can and there releasing the object from the lifting mechanism, for returning the lifting mechanism to a succeeding one of the said objects on the said conveyor and for repeating the cycle.

2. The machine of claim 1, the said conveyor being in the form of a series of strip conveyors disposed side-by-side and of varying lengths, the shortest length being on the side of the conveyor adjacent to the said lifting mechanism and the length increasing by steps so that the longest strip is on the opposite side of the machine, and the machine including a series of lifting mechanisms with one of them disposed adjacent to the position of termination of the delivery end of each of the said strips.

3. The machine of claim 1, the said lifting mechanism including a rotatable support for a plunger, an air permeable lifting head on the lower end of the plunger, means for alternately creating reduced air pressure inside the head at the pick-up position for an object and increased pressure at the release position, and means for rotating the support and lowering the plunger to the position at which the head thereon contacts the object to be lifted from the conveyor and for lifting the head and object thereagainst from the conveyor and for lowering them into the said can to the position for release of the the biscuit.

4. The machine of claim 1, the means for delivering the said objects to the conveyor including fingers extending adjacent to and above the feed end of the said conveyor and in the direction of movement thereof, means for delivering the said objects from the cutters onto the fingers, and narrow spacing elements upstanding from the said conveyor and between and above the fingers at predetermined distances greater, at the nearest points of the said elements, than the dimensions of the said objects from front to back, so that the objects are pushed from the fingers by the upstanding elements on to the conveyor and are moved therewith in front of and in contact with the said spacing elements and at distances apart determined by the spacing elements.

5. The machine of claim 3, the said rotatable support including means for holding the can in fixed relationship to the support and at all times directly under the said head on the lifting mechanism.

6. The machine of claim 3, including a stationary, annular lifting cam provided with a gap, disposed below the said plunger, acting upon the said plunger, and having an upper surface inclined so as to raise and lower the plunger in calculated manner following the profile of the inclined surface as the plunger revolves thereabove, an annular dipping cam in the form of a rotor with an upper surface inclined downward and then upward, means mounting the dipping cam immediately below the lifting cam so that the dipping cam bridges the said gap and lowers and then raises the said plunger as the support for the plunger moves across the gap, and means for rotating the dipping cam at the rate of 1 revolution for each lifting of one of the said objects.

7. In a machine for changing the elevation of a revolving part of the said machine, the improvement comprising a stationary annular cam disposed below the said revolving part, provided with a gap, and having an inclined upper surface acting upon the said part so as to control the elevation of the part in calculated manner as the part revolves and rests upon the inclined upper surface, a rotating annular cam with an inclined upper surface, means mounting the rotating cam immediately below the stationary cam so that the rotating cam bridges the said gap and controls the elevation of the said revolving part as the said part moves across the gap, and means for rotating the rotating cam at the rate of 1 complete rotation during the time of passage of the said revolving part across the said gap.

8. A machine for feeding objects to a conveyor in predetermined regular spacing from each other, the machine comprising spaced fingers disposed adjacent to, approximately parallel to, and above the feed end only of the said conveyor and extending in the direction of move-

ment thereof, means for delivering the said objects upon the fingers so that the fingers support the objects so delivered, and narrow spacing elements upstanding from the said conveyor and between and above the fingers so that the objects are pushed, by advancement of the upstanding elements, from the fingers and onto the said conveyor at distances apart of the objects determined by the said spacing elements.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 2,899,787 August 18, 1959

Arthur B. Erekson et al.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 6, line 1, after "and" insert -- means --.

Signed and sealed this 9th day of August 1960.

(SEAL)
Attest:
KARL H. AXLINE
Attesting Officer

ROBERT C. WATSON
Commissioner of Patents