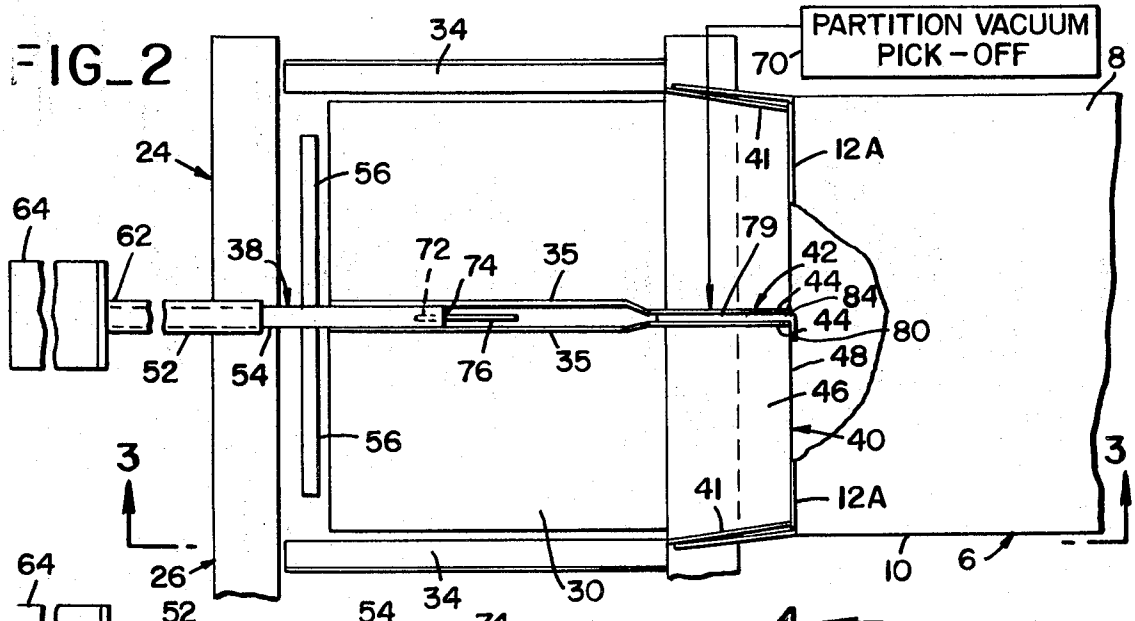
March 9, 1971 M. O. DOCILI 3,568,395

APPARATUS FOR PLACING PARTITIONS BETWEEN STACKED RECEPTACLES IN A CONTAINER

Filed March 7, 1969

FIG_2



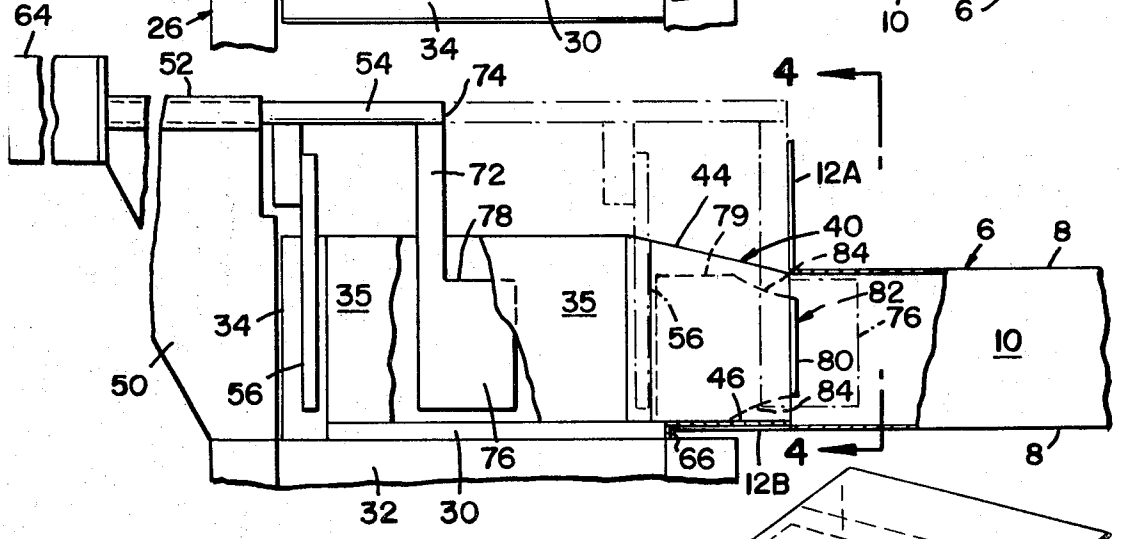


FIG_3

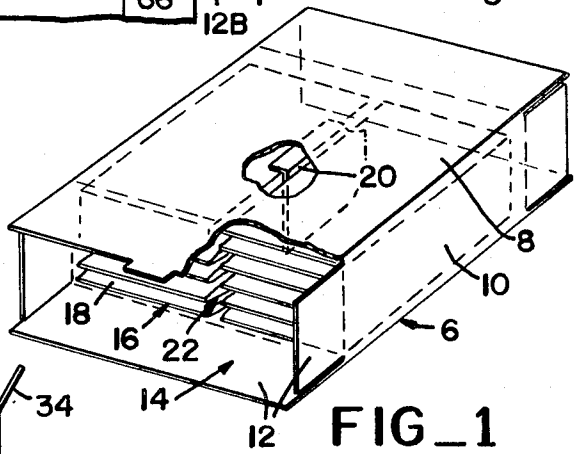


FIG_1

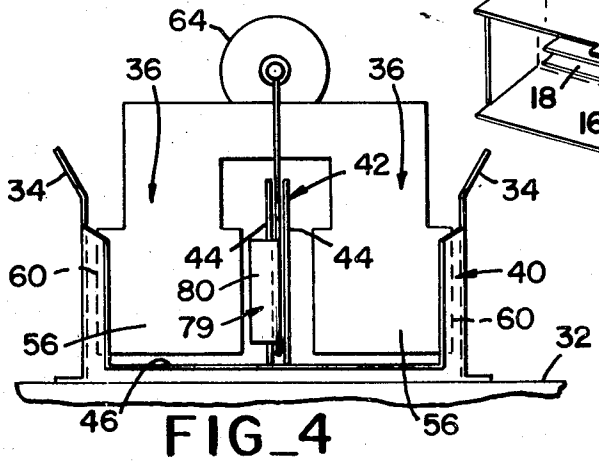


FIG_4

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APPARATUS FOR PLACING PARTITIONS BETWEEN STACKED RECEPTACLES IN A CONTAINER

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U.S. Cl. 53—26 11 Claims

ABSTRACT OF THE DISCLOSURE

A method and apparatus for placing loose partitions between flat sides of a container such as a cardboard box in which the partition is disposed intermediate stacks of receptacles holding the articles being packed. The partitions are inserted into the box simultaneously with the receptacle stacks so that the stacks maintain the partition in an upright position during and after their insertion.

BACKGROUND OF THE INVENTION

This invention relates to apparatus for filling containers and more particularly to apparatus for automatically placing a loose partition between a pair of stacked receptacles in a cardboard carton or a similar container.

In the packaging of dry materials it is conventional to package premeasured quantities of the dry material in flat envelopes and to then pack a plurality of such envelopes in cardboard cartons. The cartons are usually made from comparatively thin paper boards having relatively little strength. It is the usual practice to pack two stacks of flat envelopes in a carton. To assure the maintenance of the general dimensions of the cartons and of the stacked arrangement of the envelopes during movement of the filled cartons through the plant and during their shipping glued-in strips of paper board are placed in the cartons.

The glued-in strips act as a partition separating the stacks of envelopes in the carton, prevent their shifting and becoming interleaved, which causes the center of the cartons to bulge, and further serve to maintain the structural integrity of the carton. Bulged containers have an unsightly appearance and a tendency to jam during their transportation in automatic conveyers in the manufacturing plant. Consequently, the provision of a partition between the stacks is essential.

The primary drawback encountered in the use of glued-in strips is their cost. For example, in a typical carton holding 12 envelopes of non-fat dried milk solids, each envelope having milk solids for reconstitution to one quart of milk, the cost of such glued-in strips is approximately 1.5 to 2 cents per carton. Thus, in a plant filling some ten million cartons annually the yearly costs of the glued-in strips amounts to between $150,000 and $200,000.

SUMMARY OF THE INVENTION

The present invention provides a method and apparatus permitting the insertion of loose partitions in containers, such as cardboard cartons. The partitions maintain the receptacles in their respective adjacent stacks and support the flat sides of the carton. Briefly, according to the method the carton is aligned with a pair of adjacent envelope stacks so that its flat sides are substantially perpendicular to the gap between the stacks. A partition is placed in the gap between the stacks, and the stacks and the partition are simultaneously moved into the container through an opening thereof. During and after the insertion of the stacks and the partition in the carton the stacks maintain the partition in its perpendicular position to the flat carton sides. Thus, the partition strengthens the flat

side and prevents a shifting and interleaving of the envelopes in the adjacent stacks during the subsequent handling of the carton.

Functionally the loose partition of the present invention is equivalent to and replaces the glued-in strip found in prior art cartons. Economically, however, it affords substantial savings. Thus, in the earlier referred to typical application of the present invention to a packing operation processing some ten million cartons annually, the cost reduction for the carton amounts to about 1.5 cents, including the cost for the loose partition. Annual savings of about $150,000 are realized in the operation.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects, features, and advantages of the present invention will be more apparent after referring to the following specification and attached drawings in which:

FIG. 1 is a perspective view of a carton with a portion of one of its sides broken away to illustrate a loose divider inserted in the carton according to the present invention;

FIG. 2 is a fragmentary plan view of the filling station of a carton packing machine provided with means for the insertion of loose dividers constructed according to the present invention;

FIG. 3 is a fragmentary, elevational view of the filling station, and is taken on line 3—3 of FIG. 2; and

FIG. 4 is a front elevational view, partially in section, of the filling station and is taken on line 4—4 of FIG. 3.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring first to FIG. 1, a container such as a paper board carton **6** comprises a pair of large, flat sides **8** joined by transverse walls **10**. Flaps **12** are integrally constructed with the sides and walls of the carton and permit the closing of open ends **14** of the carton in a conventional manner.

A pair of parallel, adjacent stacks **16** of receptacles, such as flat envelopes **18**, filled with a premeasured quantity of a material, are positioned side by side in the carton, the stacks being substantially perpendicular to flat sides **8**. A loose divider or partition **20**, preferably constructed of paper cardboard, is disposed in a gap **22** intermediate the envelope stacks. The partition has a width substantially equal to the spacing between sides **8** of carton **6** and a lesser length than the distance between the open carton ends. The partition may be flat or it may have an L-shaped configuration, as illustrated in FIG. 1, the long leg of the L spacing sides **8** and the short leg being disposed between one of the envelope stacks **16** and a side **8** to anchor the partition and reduce its longitudinal movement in gap **22**.

The partition is loosely disposed in the carton, that is, it is neither affixed to the carton nor to the envelope stack. It is maintained in its upright position by stacks **16** which are relatively tightly packed in the carton. Thus, the partition acts as a barrier between the stacks and prevents envelopes **18** of the two stacks from becoming interleaved and bulging the center of carton sides **8**. The partition furthermore spaces the carton sides and increases their resistance to being unduly compressed or crushed particularly if handling and vibrations cause the materials in the envelope to compact and reduce the effective heights of the stacks. Unattractive distortions of cartons and the aforementioned jamming of conveyors are thereby prevented. The envelope stacks aid the partition in this function in that they provide lateral support and prevent the buckling of the partition under compressive forces exerted on sides **8** even if the partition is constructed of relatively low-strength paper board.

The insertion of partition **20** in carton **6** according

to the method of the present invention is performed at a filling station **24** of an automatic packing apparatus **26**. The detailed construction of the packing apparatus at points other than the filling station is of no importance to the present invention and it is, therefore, not described herein.

Referring to FIGS. 2–4, a typical prior art filling station for the insertion of a pair of parallel, adjacent stacks **28** of receptacles, such as envelopes, flat boxes, etc., in a carton **6** comprises a flat, horizontal support plate **30** mounted on a suitable support structure **32** and cooperating with inner and outer upright side walls **34** and **35**, respectively, to define a pair of adjacent hoppers **36** for the envelope stacks. The support plate and side walls are stationary at filling station **24** and suitable conveying means (not shown) for periodically placing stacks of a predetermined number of envelopes in each hopper are provided. Alternatively, the hoppers may form part of the conveyor and move in and out of filling station **24** while being filled with envelope stacks at another location on the machine.

Such prior art packing machines further include a ram or plunger **38** reciprocable parallel to support plate **30** and side walls **34** to move the envelope stacks **28** past a funnel-shaped horn or chute **40** into carton **6** positioned adjacent and communicating with the horn. The chute comprises two halves separated by a centrally positioned holder **42** and outwardly bound by a pair of sides **41** tapered towards each other to enable their insertion into open carton end **14**.

For the proper insertion of partitions **20** in carton **6** holder **42** is defined by a pair of narrowly spaced, upright plates **44** having their lower ends secured to a horizontal portion **46** of horn **40**. The spacing between the plates is sufficient to permit the placement of partitions **20** in a vertical position in the slit defined by the plates. The plates terminate at a forward end **48** of the horn and extend rearwardly a distance equal to or greater than the length of the partition placed therein. If support plate **30** and upright side walls **35** remain stationary at filling station **24**, the upright plates **44** of holder **42** may be integrally constructed therewith.

To mount ram **38** an upright web **50** is mounted to support structure **32** in alignment with holder **42** and upright side walls **35** of hopper **36**. An elongate, tubular sleeve **52** is secured to the upper end of web **50** and has an axis parallel to support plate **30** and side walls **34**, **35**.

An elongate rod **54** is axially movably disposed in the opening of sleeve **52** and, adjacent its rearward end, mounts downwardly extending transverse push plates **56**. Each plate is spaced outwardly from the vertical plane in which the axis of rod **54** lies to define a slot or opening **58** having a sufficient width and height to clear side walls **35** and holder **42** during reciprocal movements of the rod in the sleeve. An outermost edge **60** of the push plates **56** is dimensioned to clear outer side walls **34** of hopper **36**. Means, such as a pneumatic actuator **64** is suitably mounted adjacent a rearward end **62** of sleeve **52** and is operatively connected with rod **54** for reciprocating the rod and push plates **56** along the axis of the rod and the sleeve.

In operation a pair of stacks **28** are placed in hoppers **36** whereby inner side walls **35** of the hoppers form a separating gap between the two stacks. Flaps **12** of carton **6** are opened (as illustrated in FIG. 1) and the upper flap **12A** is positioned outwardly as illustrated in FIG. 3. The carton is aligned with holder **42** so that its axis is parallel to the axis of rod **54** and the carton is moved towards the holder until its lower flap **12B** abuts a downwardly extending noxe **66** on bottom member **46** of the horn. In this position flat sides **8** of the carton are perpendicular to stacks **28** and upright holder plates **44** and the horn communicate the interior of the carton with hoppers **36**.

Pneumatic actuator **64** is now energized to move rod **54** and push plate **56** forwardly towards the horn, thereby moving the envelope stacks in the same direction and into the carton. During this movement the stacks are guided by hopper side walls **34**, **35** and by the horn, including the upright plates **44** of holder **42**, to maintain them in alignment. The slideable movement of the ram and the pusher plate continues until the latter is positioned at about the transition between the hoppers and the horn, as illustrated in phantom lines in FIG. 3. Thereafter, the pneumatic actuator is energized to return rod **54** and push plates **56** to their original positions.

At the forwardmost position of the pusher plates a major portion of each envelope stack is disposed interiorly of carton **6**. The carton is now merely tilted downwardly to allow the stacks to slide fully into the cartons under their own weight. Thereafter a new carton is placed adjacent horn **40** to repeat the operation. Under high speed operation the inertia of the stacks is often sufficient to fully insert the stacks in the carton, thus eliminating the need for tilting the carton.

To maintain the stacks separated and the spacing between flat sides **8** of the carton constant a partition or divider **20** is placed between upright holder plates **44**, either manually or by means of an automatic positioning device such as a vacuum pickup **70**.

To insert the partition into the carton rod **54** extends past pusher plates **56** a distance equal to the spacing between forward end **48** of horn **40** and the position (shown in phantom lines) of the pusher plates at the end of the first cycle of its operation. A slide **72** depends vertically downwardly from forward end **74** of rod **54** to adjacent a support plate **30** and has a thickness permitting it to pass through the space between upright holder plates **44**. As rod **54** moves towards horn **40** the slide engages the partition disposed between the holder plates and pushes it, together with stacks **28** of envelopes into the interior of carton **6**.

Plates **56** and slide **72** may be axially spaced, as shown in FIGS. 2 and 3, so that the plates first engage the envelope stacks and begin to move them into the container. Only after the stacks are about to or have entered the container does the slide engage the partition and moves it together with the stacks into the carton. Thus, as the partition leaves from between holder plates **44**, which maintain it in its upright position perpendicular to carton sides **8**, its position is maintained by the envelope stacks which move with the partition into the carton. The partition is thereby maintained in its proper position while effectively separating the two stacks of envelopes and preventing their interleaving.

After the carton has been tilted downwardly as described above to fully insert the stacks in the carton one edge of the partition may be relatively closer to one end of the carton than to the other because slide **72** cannot move past the open end of the carton. To position the slide more closely at the center of carton sides **8** it may be provided with a forwardly extending protrusion **76** having an upper edge **78** which is sufficiently low to permit it to enter the carton past the opening thereof. In this manner the partition is more deeply inserted into the carton.

Other devices for moving partition **20** from between holder plates **44** can be provided. For example, for high speed operation it might be desirable to apply brief blasts from air jets (not shown) for moving the partition pneumatically from between the holder plates towards carton **8**. The air blasts force the partition out of the holder and the two stacks of envelopes being moved into the carton and converging towards each other as guided by the tapered sides **41** of the holder frictionally engage the partition and carry it into the carton. Other known means for moving the partition out of the holder can, of course, be employed.

For low volume production slide **72** can be dispensed with. Partition **20** is placed between holder plates **44** as

before but the plates are shorter, in the direction of movement of rod **54**, than the length of the partition in that direction so that the partition protrudes past the end of the holder plate facing carton **6**. Actuation of ram **38** moves the envelope stacks **16** towards the carton. The inwardly tapered holder sides **41** urge the stacks towards each other and into engagement with the protruding portion of the partition. The partition is thereby frictionally engaged with the moving stacks and carried into the carton with them in the proper position. To facilitate the engagement between the partition and the moving stacks the former can be provided with a transverse web **80** (best illustrated in FIG. 2) which extends into the path of one of the envelope stacks on their way from the hopper into the carton. This method of insertion of the partition is not as successful for high speed operations because the required force to accelerate the partition to the speed of the moving stacks might be greater than the frictional forces developed between the partition and the stacks and can, therefore, result in the failure to insert the partition in the carton.

To aid the insertion of partition **20** in carton **6** the forward end **82** of the partition includes tapered or curved sides **84** so that the forward end of the partition has a transverse width substantially less than the spacing between sides **8** of carton **6**. Misalignments between holder **42** and carton **6**, tolerances in the spacing between carton sides **8**, and tolerances in the dimensions of partition **20** are thereby prevented from causing an interference between the carton and edges of the partition when the latter is inserted in the former which could then damage the partition and/or the carton. The tapered sides automatically center the partition between carton sides **8** during the insertion of the partition and, if required, spread the carton sides so that the partition fits snugly therebetween.

While one embodiment of this invention has been shown and described, it will be apparent that other adaptations and modifications can be made without departing from the true spirit and scope of the invention.

I claim:

1. A method for providing a container filled with adjacent stacks of soft, readily deformable and interleavable articles separated by a gap disposed intermediate a pair of parallel, spaced-apart container sides with a partition disposed between the stacks of articles and intermediate the container sides, the partition having a sufficient width to contact the spaced-apart container sides when inserted therein, the method comprising the steps of positioning an open end of the container adjacent the stacks, aligning the container with the stacks so that the stacks are substantially perpendicular to the container sides and the gap faces towards the container, placing a partition between the stacks, and applying independent forces to sides of the stacks facing away from the container to simultaneously move the stacks and the partition in the direction of the gap into the container without deforming and interleaving the articles.

2. A method according to claim **1** wherein the partition has an L-shaped configuration and wherein the method includes the step of anchoring the partition in the container by positioning a leg of the L-shaped partition intermediate a stack and a container side during and after the insertion of the stacks and the partition in the container.

3. A method according to claim **1** wherein the articles have a length in the direction of movement of the article into the container substantially greater than the length of the partition in the same direction, and wherein the step of placing the partition between the stacks comprises the steps of positioning the partition in the direction of movement forward of the stacks, and moving the stacks towards the container to thereby place the partition between the stacks, and wherein the method further includes the step of thereafter simultaneously moving the stacks and the partition into the container.

4. A method according to claim **1** wherein the step of simultaneously moving the stacks and the partition comprises the steps of applying a moving force to the stacks and frictionally interengaging the partition and the stacks whereby the stacks carry the partition into the container.

5. A method for filling cartons having spaced-apart, parallel sides constructed of a flexible material with a plurality of adjacent stacks of individual, relatively deformable envelopes filled with a fluid material, maintaining the envelopes in their respective stacks, and imparting rigidity to the carton sides, the method comprising the steps of continuously forming stacks of the envelopes, positioning a plurality of adjoining stacks at a filling station, placing an open end of a carton adjacent the filling station and aligning the carton with a gap between the stacks at the filling station so that the stacks are substantially perpendicular to the spaced-apart parallel carton sides, positioning a partition in the gap to maintain the partition substantially perpendicular to the carton sides, the partition having a width substantially equal to the spacing between the carton sides, and applying an independent force to each stack to slidably move the stacks and the partitions disposed in the gap through the open end of the carton into the carton, whereby the deformation or an interleaving of the envelopes during their slidable motions are prevented.

6. A method according to claim **5** wherein the step of placing the partition in the gap comprises the steps of placing the partition in a holder aligned with the gap between the stacks and wherein the step of slideably moving comprises the steps of moving a plunger means into engagement with the stacks and towards the open carton end to move the stacks towards the holder, and engaging the partition in the holder with the plunger means after the stacks are disposed on either side of the partition to thereafter simultaneously move the stacks and the partition into the carton.

7. A method according to claim **5** wherein the step of moving includes the step of moving the partition with a blast of a compressed gas towards the carton.

8. Apparatus for placing a plurality of adjacent stacks of relatively soft envelopes holding a fluid material and a loose partition intermediate the stacks in a box, the apparatus comprising: hopper means holding the stacks in adjacent relation at a filling station; chute means communicating with the hopper means and formed to be insertable in the box through an open end thereof; means positioning the chute means so that it extends in the direction of a gap defined between the adjacent stacks for guiding the stacks in the direction of the gap towards the box; a partition holder mounted at the filling station and holding a partition parallel to the gap; plunger means straddling the partition holder and formed to engage the stacks in the holder when traveling in the direction towards the chute means to apply independent moving forces to each stack; and drive means moving the plunger means towards and away from the chute means to thereby place the stacks into the box, the chute means being constructed to converge the moving stacks towards each other to interengage the stacks and the partition disposed in the gap whereby the stacks and the partition move simultaneously and the stacks maintain the partition substantially perpendicular to the parallel box sides.

9. Apparatus according to claim **8** wherein the chute means comprises a pair of spaced-apart guides having tapered sides for guidance of the stacks, and wherein the holder is defined by parallel, spaced-apart walls forming a slit for receiving the partition, the walls defining a portion of the chute means, the slit further communicating with the hopper means, and wherein the plunger means includes a slide aligned with and of lesser width than the slit, whereby actuation of the plunger means causes the slide to enter the slit and move the partition into the box.

10. Apparatus according to claim **9** wherein the hopper

means and the chute means define a horizontal sliding surface for the stacks, and wherein the plunger means comprises an axially movable rod disposed parallel to the sliding surface, wherein the slide depends from the rod and is disposed parallel to the rod, and wherein the plunger means further includes a pair of pusher plates extending perpendicularly to the slide from adjacent the rod to adjacent the sliding surface, the pusher plates defining a cut out positioned so that the pusher plates straddle the partition holder during the reciprocal movement of the plunger means.

11. Apparatus according to claim **8** including means applying a force to the partition disposed in the holder, the force acting in the direction of movement of the stacks, the force further being applied after a portion of the stacks has moved past the holder to thereby place the partition in the gap.

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53—35, 157, 258