United States Patent

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[54] **AUTOMATIC TAB SLITTER FOR CASER**
17 Claims, 6 Drawing Figs.

[52] **U.S. Cl.** **53/167,**
53/250, 53/381 R, 83/488
[51] **Int. Cl.** **B65b 5/08,**
B65b 43/26, B65b 61/00
[50] **Field of Search** 53/381,
382, 167, 250; 83/488

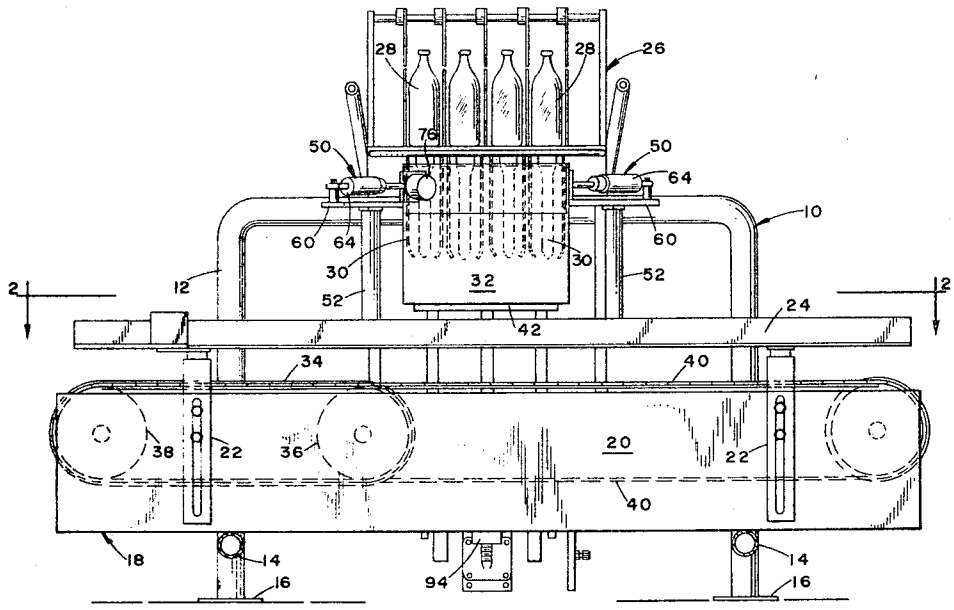
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ABSTRACT: Mechanism for severing tabs connected to adjacent edges of certain flaps of a shipping case to be packed with containers or the like in connection with casing operations, said tabs holding the upper flaps of a caser closely against the outer surfaces of the sides and ends of a case incident to being loaded. The caser includes mechanism to elevate the cases successively to loading mechanism and incident to such elevation, tab-severing means are positioned to engage the tabs to sever the same and thereby permit the flaps to be closed as a subsequent operation. The tab-severing mechanism includes units respectively movable diagonally toward and from opposite corners of a case where the tabs are located and include rotatable serrated cutters which are power-driven. Fluid-operated means also move said cutter units laterally toward said corners of a case to position the same for severing the tabs.



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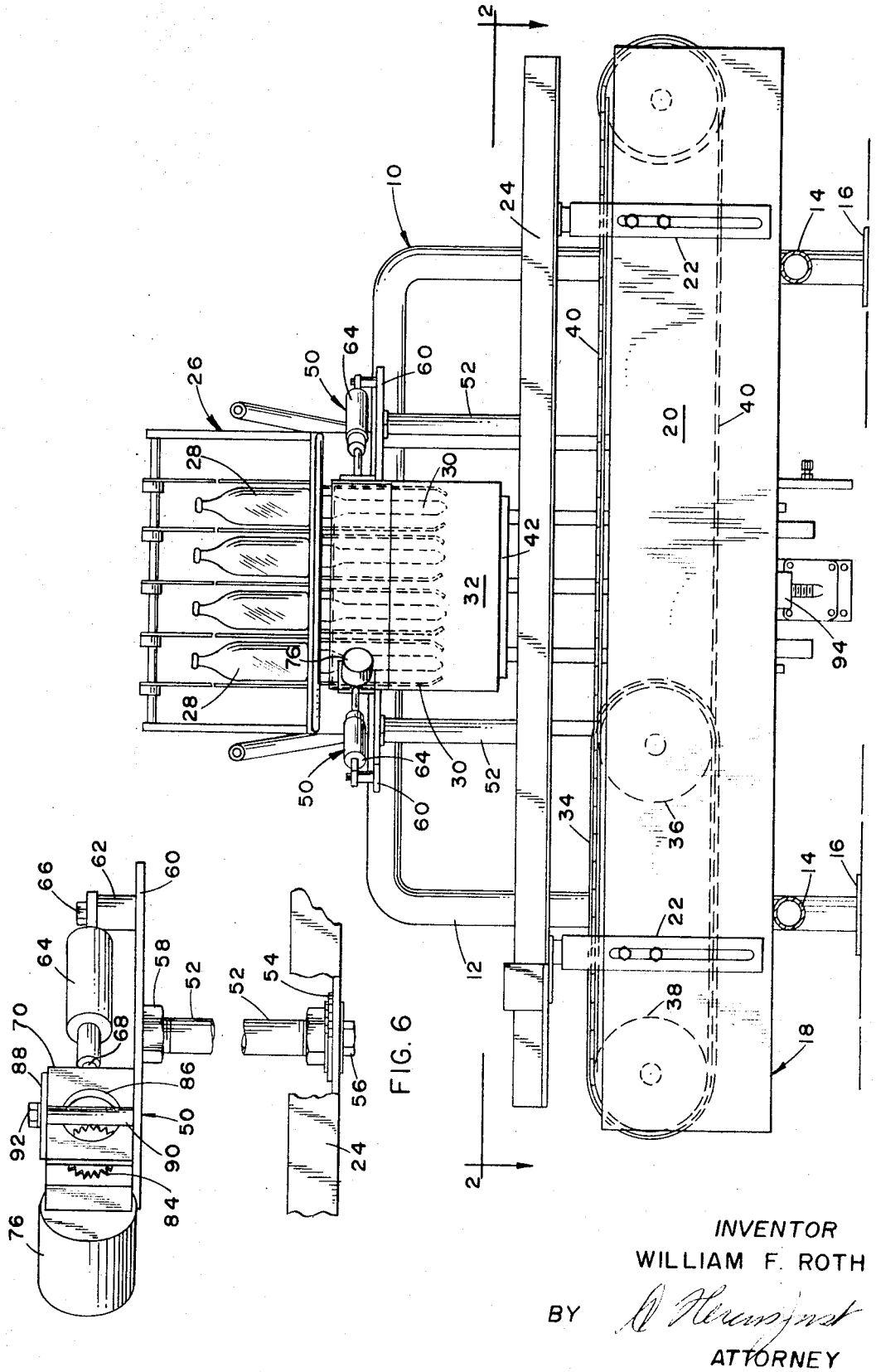


FIG. 1

FIG. 6

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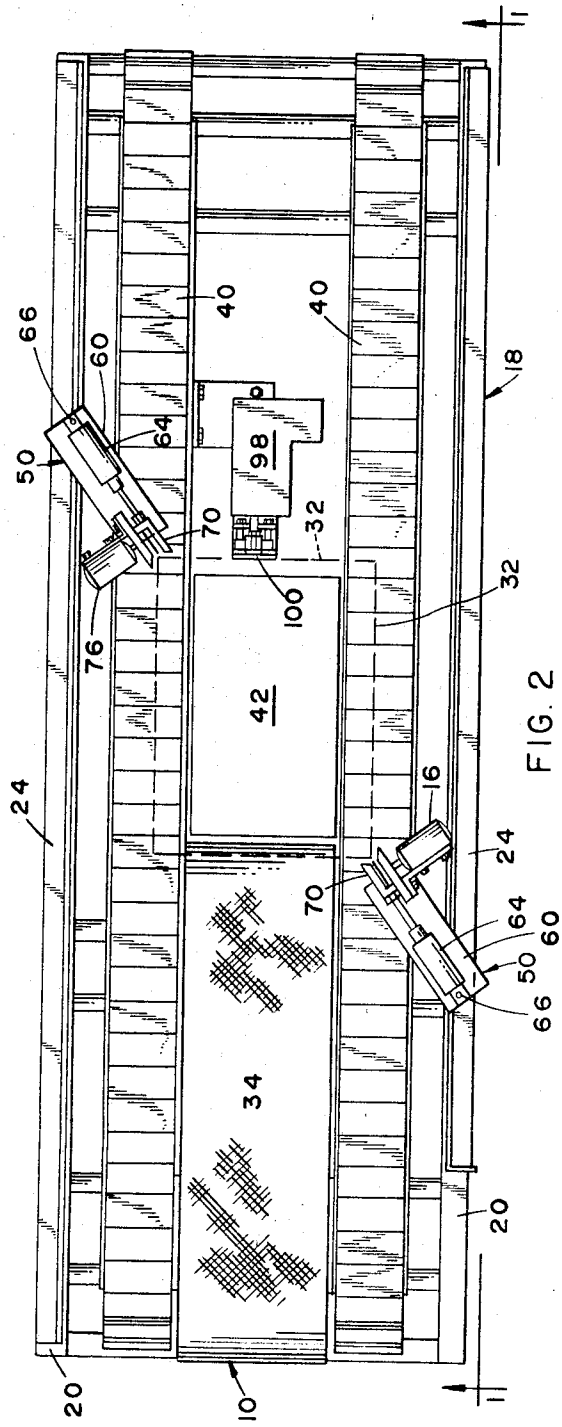


FIG. 2

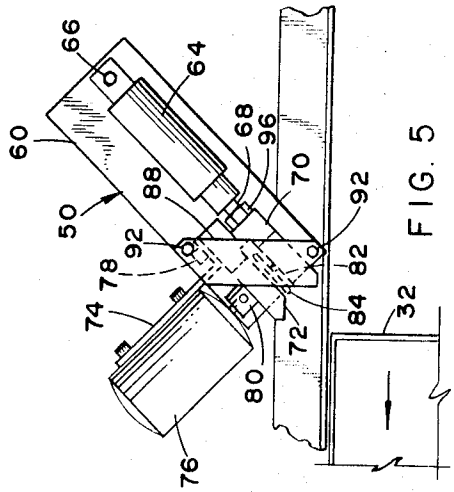


FIG. 5

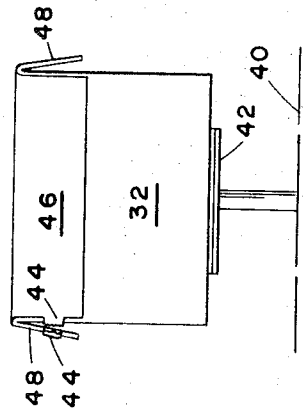


FIG. 4

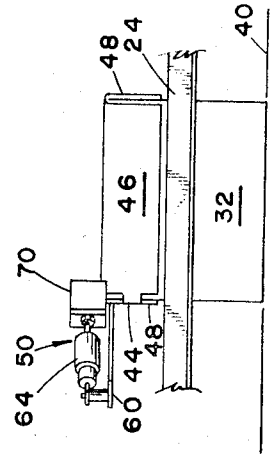


FIG. 3

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AUTOMATIC TAB SLITTER FOR CASER

BACKGROUND OF THE INVENTION

In casing operations in which shipping cases formed from corrugated board and otherwise are loaded or packed with containers or other items, a relatively recent innovation has been introduced wherein the blanks from which the cases are formed include locking tabs extending between adjacent ends of the flaps which ultimately become the upper flaps of a case when folded into cubical configuration and the bottom flaps have been folded into closed position for movement to a loading station in a casing machine commonly referred to as a caser. It is only necessary to provide two tabs or tab locks respectively in diagonally opposite corners of the case. The purpose of the tabs is to hold the top flaps of the case closely adjacent the outer surfaces of the side and end walls thereof so as to be free of interference with various operations which the case may encounter during various operations leading to the loading or packing of the case with the items ultimately to be disposed therein.

While the provision of such locking tabs admirably suits the intended purpose until the case is packed, a problem is presented thereby in regard to the most expeditious and effective manner of severing said locking tabs so as subsequently to permit the upper flaps to be folded into closed position over the items packed into the case. Normally, the case packer is the last machine or unit of casing mechanism which is used prior to the case being closed and sealed, whereby cutting the tabs incident to or immediately after packing the case is necessary in order to effect such final closing and sealing of the case.

At present, such tabs are severed manually and thus constitutes a relatively expensive operation as distinguished from the use of automatic equipment to accomplish the same. Further, such severing must be effected with relative precision in that (1) the tab must preferably be completely severed, but (2) no appreciable cutting of the corner of the case immediately adjacent the tab should occur. Further, cutting corrugated board usually requires precise cutting equipment which should be quite sharp or the cutting results in skinning and tearing the outer paper sheet of the board in an unsightly manner, in addition to frequently not effecting complete severance of such locking tabs.

SUMMARY OF THE INVENTION

It is the principal object of the present invention to provide automatically operable mechanism for cutting or severing the locking tabs on cases of the type described above, such severing means being positioned adjacent the path of movement of cases in the immediate vicinity of the elevating means by which empty cases are raised toward a packer unit of a casing mechanism or machine, whereby the elevating movement of the cases is used to effect relative movement between the locking tabs of each case and the severing mechanism which simultaneously effects precise and adequate severance of both tabs on each case.

It is a further object of the invention to utilize power-operated rotatable blades having serrated peripheries to effect such severing of the locking tabs.

It is a further object of the invention to provide means to move the power-operated tab-severing means laterally toward and from the corners of cases which embody the locking tabs, such movement being effected by fluid-operated means which preferably is in circuit with the case-elevating means of the caser which also is fluid operated.

It is another object of the invention to provide self-centering or aligning means on the tab-severing unit, whereby the severing knives are accurately positioned in vertical alignment with said tabs so as to sever the same when the case is elevated incident to being packed by the packing unit of the caser.

Details of the invention and of the foregoing objects, as well as other objects thereof, are set forth in the following specification and illustrated in the accompanying drawings comprising a part thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a vertical elevation of the packing end of a casing machine as generally seen along the line 1–1 of FIG. 2 and illustrating the tab-severing means provided in accordance with the present invention.

FIG. 2 is a horizontal plan view of the forward portion of the casing machine illustrated in FIG. 1 as seen on the line 2–2 of said figure.

FIG. 3 is a fragmentary side elevation showing the initial position of a case having tabs on the downwardly folded, upper flaps which are to be slit and also showing the position of a tab-slitting or severing unit relative to said initial position of said case.

FIG. 4 is an exemplary side elevation shown diagrammatically, of a case raised to packing position by elevating means in the casing machine and showing the upper flaps after the tabs have been slit.

FIG. 5 is a fragmentary top plan view, on a larger scale than in the preceding figures and illustrating details of a tab-slitting unit embodying the principles of the present invention.

FIG. 6 is a fragmentary side elevation of the tab-slitting unit shown in FIG. 5, part of the supporting means being broken away for foreshorten the view.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The casing mechanism or caser **10** illustrated in FIG. 1 is of a commercial type well known in the casing industry. It includes a rugged frame **12** having horizontal transverse members **14** near the bottom thereof which extend between the lower ends of the frame members **12** that terminate in floor pads **16**. The horizontal frame members **14** support a conveyor frame **18** which includes vertically disposed side plates **20** which are suitably affixed to the frame members **12** and **14**. Connected to each of the side plates **20** is a pair of longitudinally spaced vertically adjustable supports **22** which are shown in FIG. 1. The upper ends thereof support horizontal members **24**.

Aligning and advancing means **26** are shown in the upper portion of FIG. 1 which are of conventional nature and provide parallel patch along which exemplary containers **28** are advanced in parallel rows. Such aligning and advancing means **26** comprise part of case-packing mechanism which also includes vertical guiding units **30** each comprising parallel sets of spring fingers shown in dotted lines in FIG. 1. There is a set of such fingers for each container **28** for purposes of cushioning downward movement and insuring accurate guiding of the containers into the compartments formed by corrugated board dividers which are disposed in the case **32**, for example, in order to separate each of the containers **28** from contacting each other when the same are lowered into the case. Such dividers are of well-known construction widely used in the casing industry, especially in regard to packaging glass containers within shipping cases.

The caser **10** also is provided with several types of conveyor means mounted within conveyor frame **18**. One of these types comprises an endless friction belt **34** which extends around supporting and driving drums **36** and **38** shown in FIG. 1. The other type comprises a pair of parallel endless flat top chains **40** which, as shown in FIG. 2, are spaced apart to accommodate the friction belt **34** therebetween as well as the elevating plate **42** by which the cases **32** are elevated from the lower position shown in exemplary manner in FIG. 3 to the packing position shown in FIGS. 1 and 4.

From FIG. 2, it also will be seen that the upper course of the friction belt **34** extends from the entrance end of the caser **10**, which is at the left-hand end of the illustrations thereof shown in FIGS. 1 and 2, to the leading edge of the elevating plate **42**. It is essential in casers of this type that the empty cartons be moved to the elevating plate **42** by the friction belt **34** due to

the light weight thereof in empty condition. While engaged by the friction belt **34**, the bottom of the case **32** is only lightly engaged by the flat top conveyor chains **40** but after the case has been elevated as shown in FIG. **1** to receive a full complement of the containers **28** and be packed therewith, the case is then much heavier. Upon the elevating plate **42** being lowered, opposite side portions of the case respectively engage the conveyor chains **40** for movement thereof to the discharge end of the caser which is adjacent the right-hand end thereof shown in FIGS. **1** and **2**.

The principal novel feature of the present invention comprises means to sever the tabs **44** which connect adjacent ends of the upper flaps **46** and **48**, which flaps respectively are folded downwardly from the upper edges of the open top of case **32**, as shown in FIG. **3**. As explained hereinabove, when the blank for the case **32** is formed, it is stamped from a sheet of corrugated board of the like and is suitably creased and incised so that when folded into flat condition, both of each of the side and end panels are foldably connected and are disposed in flat condition. In this condition, the bottom flaps, which are not shown in the figures, extending beyond said side and end walls of the flattened case, but within the planes thereof, while the upper flaps **46** and **48** are folded flatly against the outer surfaces of the upper portions of said side and end panels of the flattened case.

The foregoing arrangement is such that when the case is erected from flattened condition, into expanded, cubical condition and the bottom flaps are folded into engagement with each other, the tabs **44**, which preferably are located only at diagonally opposite corners of the case, will retain each pair of the upper flaps **46** and **48** in downwardly folded condition against the sides and ends of the case **32** in order that the upper flaps will not interfere with any of the casing arrangements and operations which occur prior to the opened case being packed when the case is elevated to the packing mechanism as illustrated in FIG. **1**.

When a full complement of containers or other objects are packed into the case **32**, there is no longer any need for the tabs **44** to remain intact and thereby hold the upper flaps in downwardly folded condition. Usually, the next operation is to fold the upper flaps into folded condition in which they overlie the contents of the case and the upper flaps usually are then sealed, thereby concluding the packing operation.

In accordance with the principles of the invention, it has been found appropriate, as well as simple and effective, to provide tab-severing mechanism in the form of units **50** which may readily be installed either in casers which already have been placed in service or upon new casers at the time of manufacturing the same. The tab-severing units **50** preferably comprise postlike support means **52** which are best illustrated in FIGS. **1** and **6**, the latter figure showing the support means interrupted to foreshorten the illustration thereof. Said support means conveniently may comprise an adequate length of suitable diameter of industrial tubing or pipe.

The lower end of support means **52** preferably is threaded into a suitable flanged base **54**, best shown in FIG. **6**, which flange is provided with a tapped hole into which a locking bolt **56** may be threaded after extending through a suitable hole in the lower horizontal flange of the horizontal members **24** at suitable locations therein at opposite sides of the caser. The upper end of support means **52** may be threaded into a threaded boss **58**, shown in detail in FIG. **6**, which may comprise a commercial nut of suitable size, the upper face of which preferably is welded to a baseplate **60** with which each unit **50** is provided.

The baseplate **60** is provided with a short post **62** which extends upwardly from one end thereof for purposes of having one end of a fluid-operated cylinder connected thereto by means which preferably permit a limited amount of pivotal movement of said cylinder relative to the axis of post **62**. This is readily accomplished by means of a bolt **66** which extends through an ear projecting axially from the cylinder **64** and is threaded into the post **62**.

A piston, not shown, is movable in opposite directions relative to cylinder **64** by fluid introduced respectively into opposite ends thereof by conduit means of conventional nature which are not shown in detail but it will be understood that the same are of the type normally employed for such purposes. Said piston which is reciprocable within cylinder **64** is connected to a piston rod **68**, the outer end of which is fixed to a guide block **70** which is provided with a right-angled notch **72** in the outer end thereof, as is best shown in FIG. **5**. The walls defining said notch respectively are engageable with outer surfaces of one corner of the case **32**, as shown in FIG. **5**, when the cylinder and piston unit **64**, **68** project guide block **70** toward said corner of the case, as can be seen from FIG. **2**.

Fastened to one side of guide block **70** is an angled bracket **74**, which has a long leg fastened to one side of power means comprising an electric motor **76**, and a short leg, shown best in FIG. **5**, fastened to said guide block **70** by a bolt **78**. The shaft of the motor **76** extends through a bearing **80** on block **70** and intersects a slot **82** in said guide block **70** which bisects the angular notch **72** and extends inwardly therefrom for purposes of receiving tab-severing means preferably comprising a circular blade **84**. Said blade preferably has a notched periphery to provide saw-type teeth which insure positive severance of said tabs. Blade **84** is at least partially illustrated in FIG. **6**. For purposes of facilitating the connection of the blade **84** to the shaft of motor **76**, the guide block **70** is provided with an access hole **86** of suitable size which extends inward from the face of the block which is parallel to and opposite that which supports the bearing **80**, said opening being best shown in FIG. **6**.

From the foregoing, it will therefore be seen that the guide block **70** is fixed to the outer end of piston rod **68** so as to be movable with cylinder **64**, at least through a very limited angular movement about the axis of pivot bolt **66**. In view of the fact that motor **76** is rigidly connected to the guide block **70** by brackets **74**, it also will move with the guide block and cylinder through such limited angular movement, thereby carrying the circular blade **84** therewith.

Such pivotal movement is guided by an upper guide plate **88** which extends across a pair of spaced pillars **90**, the lower ends of which are fixed to the base plate **60** of each of the tab-severing units **50**. Securing bolts **92** extend through suitable holes adjacent opposite ends of the upper guide plate **88** and are threaded into the upper ends of the pillars **90**. In accordance with the preferred design of the units **50**, the width of the guide block **70** is such that there is a limited amount of space between the opposite sides thereof and the pillars **90** when the guide block is disposed intermediately between them.

From FIG. **2**, it will be seen that the caser **10** is provided with a pair of the tab-severing units **50** which respectively are adjacent opposite sides thereof and respectively are pivotally supported upon the upper ends of the supports **52** which are fastened to the horizontal members **24** of the main frame of the caser. Due to the vertical adjustability afforded by the vertical supports **22**, as described hereinabove, it is possible to adjust the effective operating range of the periphery of the circular blades **84** of each unit to function at a desired elevation above the conveyors **34** and **40**. Thus, upon the elevation of a case **32** by the elevating plate **42**, which is effected by means of fluid-operated cylinder **94**, and the movement of guide blocks **70** of each of the severing units **50** and the circular blades **84** therein laterally to the inwardly extended positions thereof by the power means comprising the fluid-operated cylinders **64** and the pistons therein, the diagonally opposite tabs **44** of case **32** will be moved vertically and simultaneously into contact with and past the peripheries of the circular blades **84** and be severed thereby.

To effect desired severing of the tabs without appreciably contacting the exterior surfaces of the corners of the case **32** per se which underlie each tab **44**, it is essential that when the circular blades **84** are moved into operative position to sever the tabs, such movement must be stopped precisely. This is accomplished by means of an adjusting nut **96** which is threaded

onto each piston rod **68** to maintain the guide block **70** of each unit **50** in a precise and accurately determined position longitudinally upon each piston rod **68** after the same has been threadably adjusted to a desired position thereon. Any other equivalent adjusting means may be employed in lieu of said adjusting means or lock nut **96**, if desired.

In operation of the device, an empty case **32**, arranged in the condition shown in FIG. **3**, is delivered to the friction belt conveyor **34** in empty condition with the top open due to the side and end flaps **46** and **48** being maintained in downwardly folded position by the tabs **44** as described above. The frictional engagement between the conveyor **34** and the bottom of the case **32** is adequate to fully advance the empty case onto the elevating plate **42**. Stop mechanism **98** is provided with a contact plate **100** which is engaged by the leading end of the empty case **32** when it is fully positioned upon plate **42**. Said contact plate is connected to a microswitch or any other equivalent means which is energized when light pressure is exerted against the same.

The aforementioned mechanism is in circuit with control means, not shown, for fluid which is delivered through suitable conventional-type conduits, not shown, simultaneously to both of the cylinders **64** as well as cylinder **94**. Such action projects both tab-severing mechanisms comprising circular blades **84** simultaneously into position to engage the tabs **44** and sever the same incident to the elevating plate **42** raising the case, as shown in FIG. **1**, to the packing position to receive a full complement of containers **28** or equivalent items which are to be packed into the case. As explained above, maintaining the tabs **44** intact after this occurs is needless.

Upon the case **32** being packed with a complement of items it is to receive, suitable and conventional additional control means, not shown, are actuated to reverse the delivery of fluid under pressure to the opposite ends of the cylinder **64** and **94** so as simultaneously to retract the tab-severing blades **84** and also lower the packed case **32** onto the endless conveyor chains **40** when the elevating plate **42** is retracted to its lower position. It is to be understood that both of the cylinders **64** and/or **94** may, if desired, be of the type which are energized in one direction only by fluid under pressure and retraction may be effected by appropriate spring means of well-known type, not shown.

By the time the packed case **32** has been lowered onto the conveyor chains **40**, the guide blocks **70** and other elements of the severing means associated therewith will have been retracted to idle position as shown in FIG. **2**, thereby offering no obstruction to the passage of the packed case **32** toward the discharge end of the caser **10**, either due to the lateral arrangement of the tab-severing units or the vertical position thereof, or both.

It also will be seen that due to the limited amount of self-centering, pivotal movement which is permitted to guide blocks **70** of each unit **50** and the elements connected thereto and movable therewith, automatic centering and consequent accurate positioning of the tab-severing blades **84** relative to said tabs is assured. This is due to the guiding function afforded by the walls of angular notch **40** in the forward end of each of the guide blocks **70**, which walls extend vertically and in parallel relationship respectively to the connected side and end panels which form one corner of the case **32**. Accordingly, any limited variations in the positions of successive cases upon the elevating plate **42** or of slight variations in the shapes and sizes of cases **32** will be of no consequence as far as the effective severance of the tabs **44** is concerned, which severance also will occur simultaneously relative to all tabs on the case.

In the preferred operation of the device, particularly if the power means for the circular blades **84** comprise the electric motors **76**, said motors are arranged to operate continuously while the machine is in operation, rather than effect periodic operation thereof which would occur, for example, only while the cases are being elevated past the periphery of the blades **84**. By such arrangement, costly additional control mechanism is unnecessary and the amount of power required to operate the motor **76** continuously is negligible, especially in view of the limited amount of power required to effectively sever the tabs **44**. Further, if desired, hydraulic motors or other equivalent power means may be used in lieu of the electric motor **76**, within the purview of the present invention.

While the invention has been illustrated and described in its several preferred embodiments, it is to be understood that the same is not to be limited to the details herein illustrated and described since the same may be carried out in other ways falling within the scope of the invention as illustrated and described.

I claim:

1. A case filling and handling machine operable to fill shipping cases with containers and having conveyor means to move empty cases to filling mechanism and elevating means operable to raise cases from said conveyor means to said filling mechanism, said cases having the upper end maintained open by means of the upper flaps being locked against the sides of each case by tabs connected between the adjacent ends of certain flaps, in combination with cutter means, and means supporting said cutter means adjacent and a fixed distance above said conveyor means and said elevating means and in position to engage and cut the tabs on a case so as to completely sever the same when a case is raised by said elevating means to said filling mechanism.

2. The machine according to claim **1** further including means to move said tab-severing means laterally toward the corners of cases when said cases reach said elevating means and are to be raised, thereby to bring said tabs and severing means into engagement with each other.

3. The machine according to claim **2** in which said severing means further include self-centering means operable to guide each severing means toward a corner of each case.

4. The machine according to claim **3** in which said self-centering means comprise guide blocks having angularly related faces thereon respectively engageable with surfaces of adjacent downwardly extending upper flaps of a case and operable to effect disposition of said severing means in precise vertical alignment with the tabs connected to said flaps.

5. The machine according to claim **2** in which said means to move said severing means laterally toward the corners of a case comprise fluid-operated means.

6. The machine according to claim **5** in which said machine includes fluid-operated means connected to said elevating mechanism to raise and lower a case relative to said packing mechanism, and means connecting said fluid-operated means for said elevating mechanism and the fluid-operated means for said severing means to a source of fluid under pressure, and control means for said fluid under pressure operable to effect simultaneous actuation of all of said fluid-operated means.

7. The machine according to claim **1** in which said severing means comprise rotatably supported cutters and said severing means also including power-actuated means connected to said cutters to operate the same.

8. The machine according to claim **7** in which said movable cutters are circular and are supported for rotation, the periphery of said cutters being serrated.

9. The machine according to claim **7** in which each of said severing means is part of a unit which includes said power-operated means and said cutter, and means supporting said unit for lateral movement toward and from certain corners of a case when said case is disposed upon said elevating mechanism and is to be raised toward said severing means.

10. Mechanism to sever the tabs of cases for containers which extend between adjacent edges of certain upper flaps of a case to maintain the same against the sides of the case at least until it reaches elevating means and filling means in a machine for purposes of filling such cases, said severing mechanism comprising in combination, support means adapted to be aligned with said filling means and connected to such a machine adjacent the path of movement for cases to be moved to said filling means, and severing means comprising a

cutter supported by said support means and adapted to be positioned by said support means in vertical alignment with the tabs on a case when said tabs are moved vertically past said cutter incident to elevating said case to said filling means.

11. The tab-severing mechanism according to claim 10 further including guide means upon said support means, and additionally including means to move said severing means relative to said support means in opposite lateral directions toward and from the tabs of a case which are to be severed thereby.

12. The tab-severing mechanism according to claim 11 further including power means connected to said severing means and operable to effect said movement thereof in opposite lateral directions.

13. The tab-severing mechanism according to claim 12 in which said power means comprise fluid-operated cylinder and piston means connectable to a source of fluid under pressure.

14. The tab-severing mechanism according to claim 10 in which said severing blade comprises a power-operated rotatable blade.

15. The tab-severing mechanism according to claim 14 in which said rotatable blade is circular and the periphery thereof is serrated.

16. The tab-severing mechanism according to claim 14 in which said power means for rotating said blade comprises a unit, and means supporting said unit for lateral movement relative to said support means to dispose said severing means of said unit in position to engage tabs of a case to be severed thereby.

17. The tab-severing mechanism according to claim 16 in which said unit also includes fluid-operated means connected to said unit and operable to effect such lateral movement thereof.