Feb. 9, 1971 J. L. RAUDAT 3,561,189

SHIFTING GRID

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Fig. 1

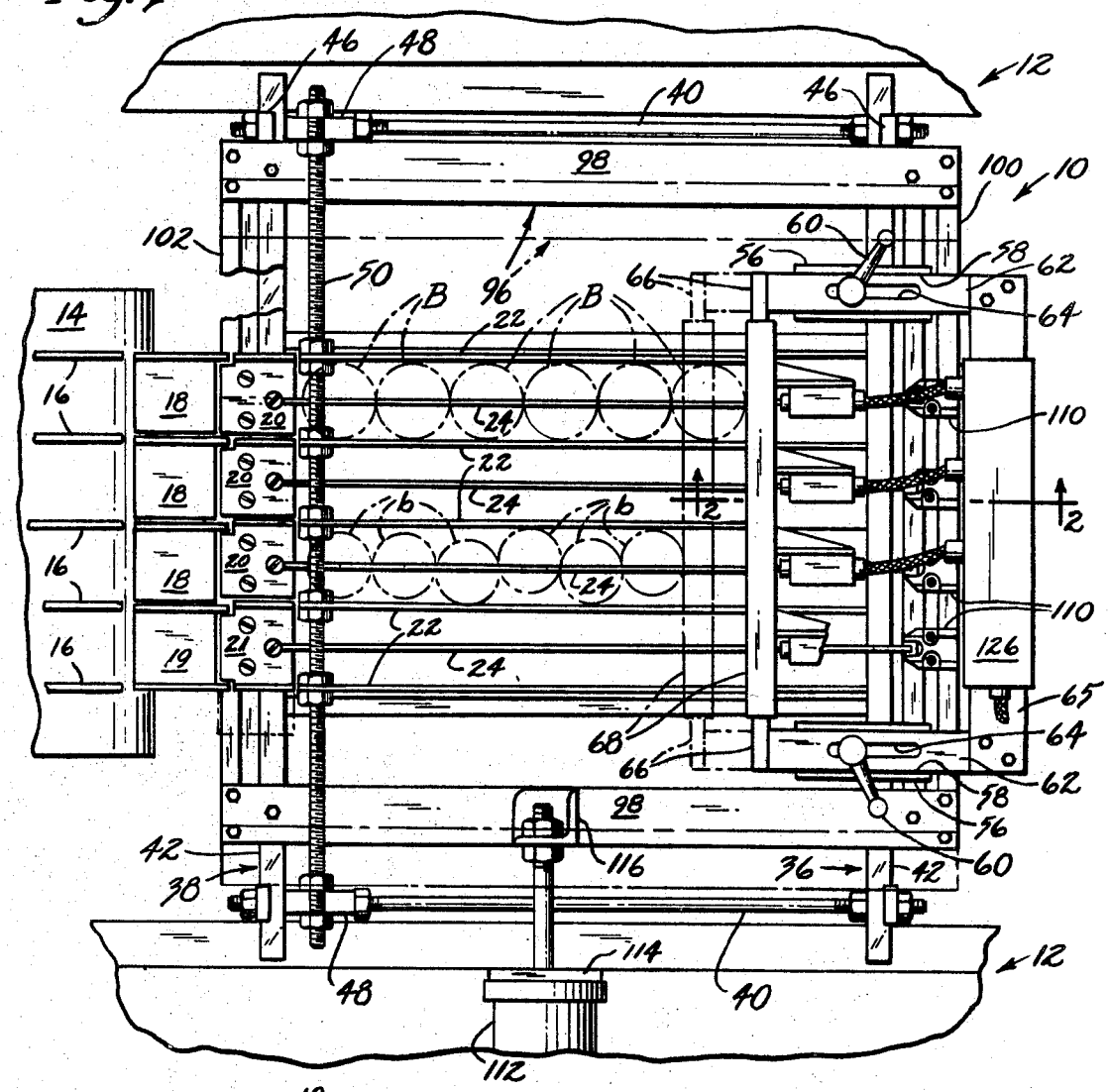

Fig. 2

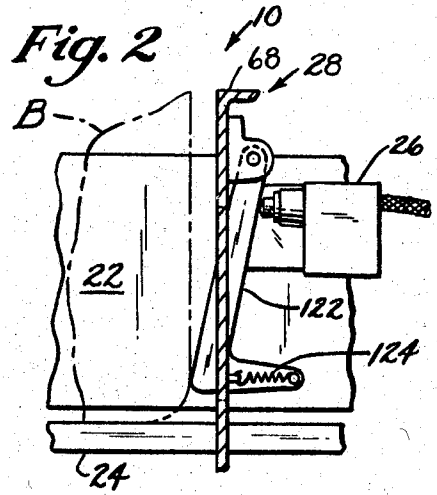

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Fig. 3

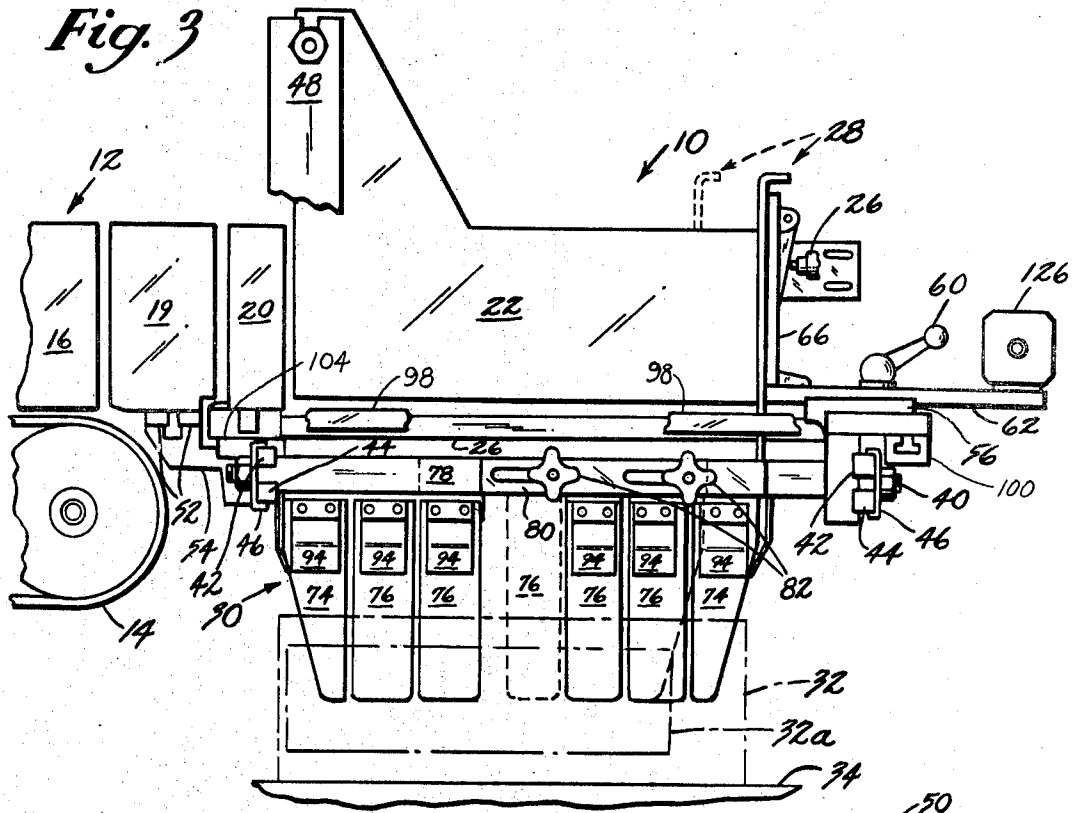
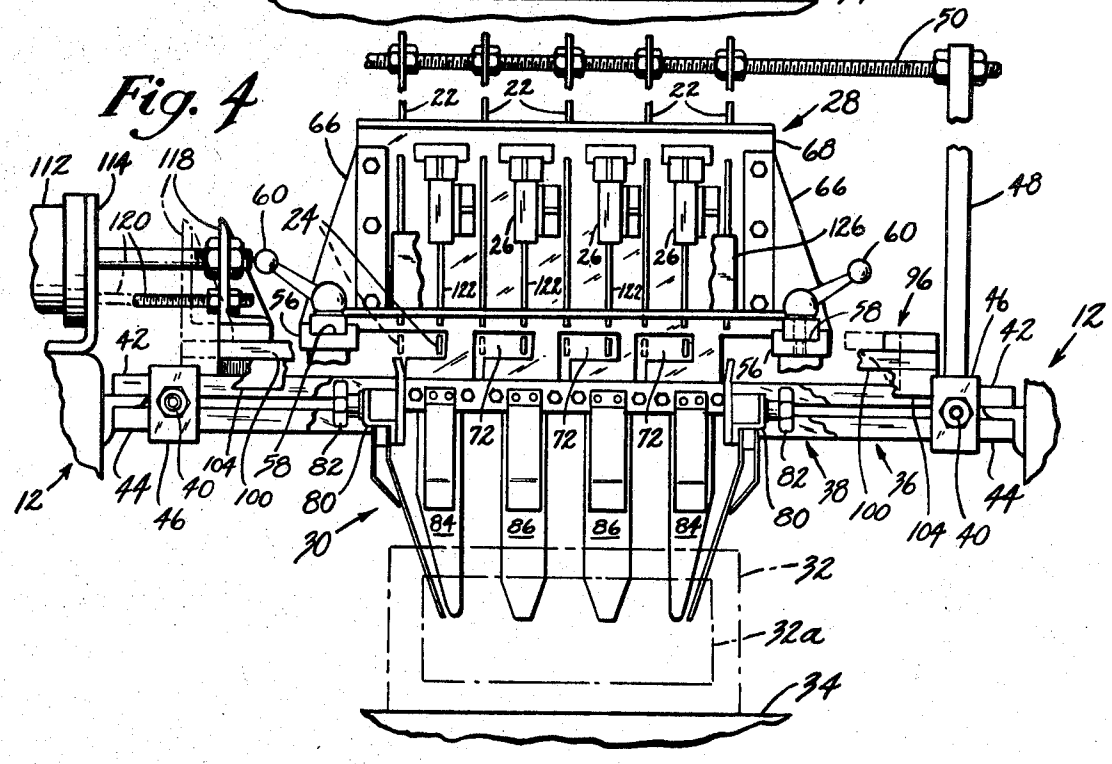


Fig. 4



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3,561,189

SHIFTING GRID

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U.S. Cl. 53—61 8 Claims

ABSTRACT OF THE DISCLOSURE

A shifting grid mechanism for receiving a row arranged charge of bottles from a bottle packing machine and directing and controlling the gravity fall of the charge into a container and having an adjustable barrier or stop for adapting the grid to accommodate charges of various size. Charge detecting means for controlling the operation of the grid and a portion of a chute for directing the gravity fall of the charge are associated with the barrier and adjustable therewith.

BACKGROUND OF THE INVENTION

This invention relates in general to machines for packing bottles, cans and other like articles and deals more particularly with an improved shifting grid for use with such a machine to direct and control the gravity fall of a row arranged charge of articles into a container.

Bottles, cans or like articles are delivered to a packing machine of the aforedescribed type in an upright position and are guided to a dividing mechanism which separates the articles into lanes for forming a desired charge pattern. Thereafter, the articles are conveyed to a charge forming area on a grid assembly. The assembled charge is loaded through the grid assembly and guided by one or more chutes into an empty space or container which has been raised to a loading position by a case feed lift table. The filled case is lowered and discharged from the case lift table and the cycle repeats itself. The grid assembly is made to handle articles in a limited range of sizes, as, for example, bottles in a limited range of diameters. To change the machine to handle articles outside of the given range, it is usually necessary to remove and replace the grid assembly with another grid assembly and make certain adjustments in the new grid assembly to accommodate the article to be packed. Removal and replacement of the grid assembly is, of course, a time consuming operation.

Accordingly, it is the general aim of the present invention to provide an improved grid assembly of the aforedescribed character which may be rapidly and accurately adjusted to accommodate charges in a relatively wide range of sizes to extend the capability of an associated article packing machine.

SUMMARY OF THE INVENTION

In accordance with the present invention, a grid assembly is provided which includes a frame for receiving and assembling a row arranged charge of articles from an article packing machine and a chute for directing and controlling the gravity fall of the charge into a case or container. One end of the frame and the chute is adjustable through a range of positions to adapt the grid to accommodate charges in a relatively wide range of article sizes.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary plan view of a bottle packing machine showing a shifting grid embodying the present invention mounted thereon.

FIG. 2 is a somewhat enlarged fragmentary sectional view taken along the line 2—2 of FIG. 1.

FIG. 3 is a fragmentary side elevational view of the machine and grid of FIG. 1, portions of the grid supporting members shown broken away.

FIG. 4 is a fragmentary end elevational view of the machine and grid of FIG. 1, portions of the grid supporting members shown broken away.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

In the description which follows and in the drawings forming a part of this specification, a grid embodying the present invention and indicated generally at **10** is illustrated and described with reference to a bottle packing machine, however, it should be understood that the present grid assembly may also be used with apparatus for packing cans, containers or other articles made of various materials.

With the exception of the grid assembly of the present invention, the bottle packing machine indicated generally at **12** and partially shown in the drawings is conventional and need not be described in detail. In general the machine **12** comprises an in-feed conveyor **14** which transports bottles of uniform size indicated at B, B and *b*, *b* from a dividing mechanism (not shown) forwardly in parallel rows between stationary longitudinal guide plates **16, 16**. The leading bottles in the rows of bottles enter the grid assembly between bottle guides **18, 18** and **19** which form a part of the grid. The leading bottles are blocked and held in place between the bottle guides by engagement with the rear surfaces of a series of transversely shiftable longitudinally extending pushers **20, 20** and **21** operated by means hereinafter described. The pushers are movable between a blocking or broken-line position, as shown in FIG. 1, wherein they block the advance of bottles between the bottle guides **18, 18** and **19** and a releasing position wherein they longitudinally align respectively with the bottle guides. In the latter position of the pushers, the rows of bottles are advanced by line pressure from between the stationary bottle guides **18, 18** and **19** and slide forwardly between longitudinal members or guide plates **22, 22** along riding strips or rails **24, 24** operatively associated with the pushers and also forming a part of the grid. The guide plates **22, 22** define a series of similar vertically open longitudinal spaces adapted for downward passage of rows of bottles.

When a predetermined and equal number of bottles (six bottles in the apparatus as shown) have been advanced along each rail **24**, the front or leading bottle in each row actuates a detecting switch **26**. The switches **26, 26** are carried by a longitudinally adjustable barrier or stop indicated generally at **28** and sense the presence of a full charge on the grid to control operation of the aforementioned means for shifting the pushers **20, 20** and **21**. When all of the switches have been operated by the front or leading bottles, the said operating means shifts the pushers to their blocking position. The rails **24, 24** move with the pushers and slide transversely beneath the bottles to a releasing position wherein each of the rails is respectively vertically aligned with an associated one of the guide plates **22** whereupon the bottles fall by gravity through the open spaces defined by the plates **22, 22** and through an adjustable chute positioned therebelow and indicated generally at **30**.

The charge of bottles is received in a container or tray **32**. A lift table **34** which may, for example, comprise a part of the packing machine **12** is adapted to elevate the cases in succession to a bottle receiving position beneath the grid and is lowered to discharge packed or filled cases and to receive empty cases from an empty case in-feed conveyor (not shown). Cases are, of course, raised or lowered in properly timed relation with the transverse shifting movement of the pushers **20, 20** and

21 by a suitable control means. Such control means are or may be conventional and a showing and description thereof is deemed unnecessary for a full understanding of the grid of the present invention.

The grid **10** may be adapted to accommodate charges of articles in a relatively wide range of sizes by adjusting the position of the barrier **28** to vary the length of the spaces defined by the plates **22, 22**. In the drawings, the adjustable barrier **28** is shown in a full-line position corresponding to an adjusted position of the grid to accommodate bottles having a diameter substantially equal to the transverse spacing between adjacent guide plates **22, 22** in a row arranged charge with ix bottles in each row. The barrier is adjustable through a range of positions between its full and broken-line position. When the barrier **28** is adjusted to its broken-line position, the grid **10** accommodates rows of smaller bottles such as indicated at *b, b* arranged with six bottles in each row. The chute **30** is also adjustable to suit the container or tray for receiving the charge. In the drawings, the chute **30** is also shown in a broken-line position corresponding to the broken-line position of the barrier **28** for discharging a charge of bottles *b, b* into a container of appropriate size such as indicated at **32***a*.

Considering the grid **10** in further detail, the grid comprises a rectangular frame which has two parts or sections which include a lower section mounted on the frame of the machine **12** and an upper section supported on and slidably movable relative to the lower section. The lower section has longitudinally spaced transversely extending front and rear support members indicated generally at **36** and **38**, respectively, connected together by transversely spaced and longitudinally extending threaded tie rods **40, 40**. Preferably, and as shown, the front and rear support members **36** and **38** are of like construction and each comprises upper and lower generally rectangular bars **42** and **44** secured together in parallel but vertically spaced relationship by generally U-shaped clamp members **46, 46** fastened to the ends of the rods **40, 40**. A support member **48** extends upwardly from each rod **40** generally adjacent the rear support member **38**. The two support members **48, 48** are connected together at their upper ends by a transversely extending threaded rod **50** which passes through the guide plates **22, 22** and provides support for the latter plates as well as a means for adjusting the transverse spacing between them.

The lower grid section also provides support for the bottle guides **18, 18** and **19**. Each guide **18** is formed from a generally L-shaped plate and includes a horizontally disposed portion and a vertically disposed portion. The bottle guide **19** at the right-hand side of the grid as viewed from the rear comprises a generally U-shaped plate which has a horizontally disposed portion and two vertically disposed portions. The bottle guides **18, 18** and **19** are secured in transversely spaced series by horizontally disposed support members **52, 52** carried by a pair of L-shaped brackets **54, 54** fastened to and extending rearwardly from the rear support member **38** as shown in FIG. 2.

The adjustable barrier **28** is supported at the forward end of the lower grid section by a pair of transversely spaced brackets **56, 56** fastened to the forward support member **36**. Each bracket **56** has a horizontally disposed and longitudinally extending way **58** and carries a clamping screw **60**. The varrier **28** includes a pair of longitudinally extending side members **62, 62**. Each side member **62** is received in an associated way **58** and has a longitudinally elongated slot **64** through which one of the clamping screws **60** passes. A transversely extending cross member **65** connects the two side members at their forward ends. At its rear end, each side member **62** carries a vertically extending bracket **66**. A plate **68** is bolted to the brackets **66, 66** and extends transversely

therebetween. To accommodate the guide plates **22, 22** a transversely spaced series of vertically disposed slots are formed in the plate **68**. Additional horizontally disposed slots **72, 72** are also formed in the plate **68** to accommodate the movable rails **24, 24** as best shown in FIG. 3.

Support for the adjustable chute **30** is also provided by the lower grid section. The chute may take various forms but preferably and as shown it is comprised of a plurality of depending blade-like spring fingers arranged to form a generally rectangular chute for guiding the articles in the charge as they pass downwardly through the chute and into the container **32**. The spring fingers which form the sides of the chute are designated generally at **74, 74** and **76, 76** and carried by transversely spaced and longitudinally extending tie rods **78, 78** fastened to and extending between the front and rear support members **36** and **38**, respectively. The tie rods are generally vertically aligned with the outermost guide plates **22, 22**. As shown, the spring fingers which form each side of the chute are six in number, three being secured in fixed position to each tie rod **78**, and three being longitudinally adjustable relative thereto. The adjustable side fingers on each side of the grid are located toward the forward end of the grid and are fastened to a slotted support member **80** secured to an associated tie rod **78** by a pair of clamping screws **82, 82**. The spring fingers which form each end of the chute **30** are designated at **84, 84** and **86, 86** as best shown in FIG. 3. The rear end portion of the chute is formed by fingers **84, 84** and **86, 86** secured to and depending from the rear support member **38**, whereas the fingers which form the forward end of the chute are supported by and adjustable with the plate **68**. All of the spring fingers are bent to diverge downwardly and inwardly with respect to each other. Each spring finger has an associated auxiliary spring bearing inwardly against it to provide biasing reinforcement therefor. Typical auxiliary springs are indicated at **94, 94** in FIG. 3.

The upper or shifting portion of the grid comprises a generally rectangular frame indicated generally at **96** and has longitudinally extending side members **98, 98** connected by longitudinally spaced and transversely extending front and rear cross members respectively indicated at **100** and **102**. The upper grid section is supported on the lower grid section by front and rear bearing blocks respectively indicated at **104, 104** which slidably engage the upper surfaces of the bars **42, 42**. The pushers **20, 20** and **21** are fastened to the upper surface of the rear cross member **102** and are generally similar to the bottle guides **18, 18** and **19** in that they comprise three generally L-shaped plates **20, 20** and a generally U-shaped plate **21** arranged in transverse series. Each rail **24** is connected at one end to an associated pusher plate and at its opposite end to a holder **110** fastened to the front support member **100**. The upper grid section is arranged for transverse shifting movement relative to the lower grid section between a load-receiving position indicated in full lines in FIG. 1 and a load-discharging position shown in broken lines. In the receiving position, the pushers are generally aligned with the bottle guides and with the guide plates so that rows of bottles advanced by line pressure from the conveyor **14** may enter the load-forming area between the guide plates **16, 16** and slide forwardly along the rails **26, 26**. When the upper grid section is shifted to its load-discharging position each rail **26** is respectively vertically aligned with an associated one of the guide plates **22, 22** so that the rows of bottles comprising the charge fall freely into the container **32**.

Various means may be provided for shifting the upper grid section, however, in the presently preferred embodiment a fluid motor or pneumatic cylinder **112** is employed for this purpose. The cylinder is carried by a bracket **114** mounted on the frame of the machine **12** and includes a piston rod which is connected to a bracket **116** fastened to one of the side members **98**. A threadably

adjustable stop rod **120** fastened to the bracket **116** engages the bracket **114** to limit the shifting of movement of the upper grid sections so that the rails are vertically aligned with the guide plates **22, 22** when the grid is shifted to its load-discharging position.

Movement of the upper grid section is occasioned by the detector assembly which comprises the aforementioned switches **26, 26**. As previously noted these switches are carried by the adjustable barrier **28** and are longitudinally adjustable therewith. The switches **26, 26** are mounted in transversely spaced series on the plate **68** as best shown in FIGS. 1 and 4, each switch being associated with a lane defined by a pair of guide plates **22, 22**. The mounting arrangement of a typical switch **26** is shown in FIG. 3. The switch is mounted on the forward side of the plate **68**. An operating finger **122** pivotally mounted on the forward side of the plate **68** projects rearwardly through a slot in the plate and is biased rearwardly or in a clockwise direction by a spring **124** as shown in FIG. 4. Thus the arm **122** is arranged to pivot in a counterclockwise direction in response to contact by a bottle B and thereby actuate the switch **26**. Each switch **26** is electrically connected to a junction box **126** which is in turn electrically connected to the control system for the machine and to an electrically controlled solenoid valve (not shown) for operating the air cylinder **112**. Preferably the switches **26, 26** are electrically interconnected so that all of the switches must be actuated to operate the air cylinder **112** and thereby shift the grid to its load discharging position.

What is claimed is:

1. A grid for receiving a charge of articles of generally uniform size arranged in longitudinal rows in an article packing machine and for controlling the gravity fall of the charge into a container, said grid comprising a charge receiving frame defining a series of similar vertically open longitudinally extending spaces respectively adapted for downward passage of rows of articles, adjustable stop means for varying the longitudinal extent of said spaces to accommodate rows of various length, article support means movable between a receiving position wherein the rows of articles are supported in said spaces and a discharging position wherein the rows of articles are free to fall downwardly through said spaces under the influence of gravity, and means defining a chute disposed below said spaces for receiving the charge from said frame and directing the downward passage of the charge into a container or the like, said chute defining means having a portion thereof associated with said stop means and longitudinally adjustable therewith to vary the length of said chute.

2. A grid as set forth in claim **1** including detecting means responsive to the presence of a charge in said frame for controlling the movement of said support means.

3. A grid as set forth in claim **2** wherein said detecting means is carried by and longitudinally adjustable with said stop means.

4. A grid as set forth in claim **1** wherein said stop means comprises a longitudinally adjustable barrier extending transversely of said frame and partially defining said spaces.

5. A grid as set forth in claim **4** wherein said barrier comprises a part of said frame and said chute defining means comprises a plurality of blade-like fingers depending from said frame, at least one of said fingers depending from said barrier and longitudinally adjustable therewith.

6. A grid as set forth in claim **2** wherein said detecting means comprises a transversely spaced series of electrical switches mounted on said stop means, each of said switches being associated with one of said spaces for sensing the presence of a row of articles in said one space.

7. A grid as set forth in claim **1** wherein said frame includes one part adapted to be supported in fixed relation to the packing machine and another part movable relative to said one part, said stop means being associated with said one part, said support means being associated with said other part.

8. A grid for receiving a charge of articles of generally uniform size arranged in longitudinal rows in an article packing machine and for controlling the gravity fall of said charge into a container, said grid comprising a charge receiving frame defining a series of similar vertcally open longitudinally extendng spaces respectively adapted for downward passage of rows of articles, said frame including a transversely extending barrier partially defining said spaces, said barrier being longitudinally adjustable for varying the longitudinal extent of said spaces to accommodate rows of various length, article support means movable between a receiving position wherein said rows of articles are supported in said spaces and a discharging position wherein said rows of articles are free to fall downwardly through said spaces under the influence of gravity, and a plurality of bladelike fingers depending from said frame and defining a chute for directing the downward passage of said charge into a container or the like, at least one of said fingers depending from said barrier for longitudinal adjustment therewith.

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U.S. Cl. X.R.

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