

[54] APPARATUS FOR APPLYING CARRIER GRIDS TO BOTTLES

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[51] Int. Cl. B65b 21/00

[58] Field of Search 53/3, 35, 48, 49, 74, 313, 53/314, 315

[56] References Cited

UNITED STATES PATENTS

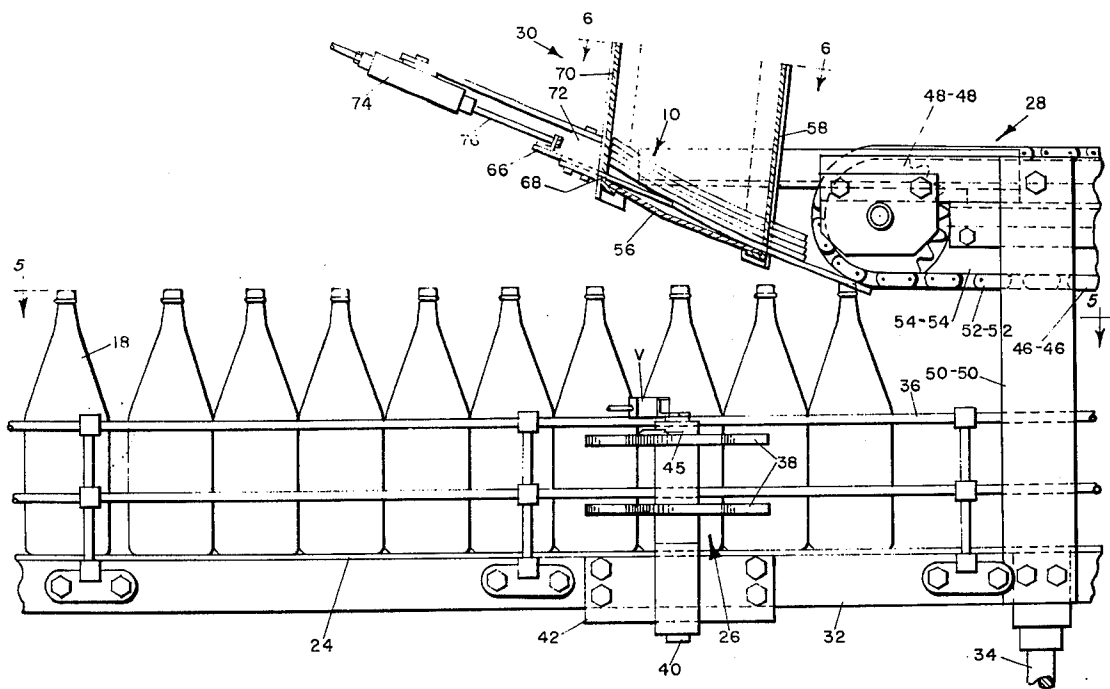
3,447,280 6/1969 Cunningham et al. 53/48
3,742,677 7/1973 Best 53/35 X

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Attorney, Agent, or Firm—Dike, Bronstein, Roberts,
Cushman & Pfund

[57] ABSTRACT

Apparatus for applying carrier grids to the tops of groups of a predetermined number of capped containers, comprising a conveyor for moving the containers standing upright thereon along a predetermined horizontal path, a pocket wheel arranged adjacent the conveyor in the path of movement of the containers rotatable by movement of the containers therealong, a pair of spaced parallel chains supported above the conveyor along the path of movement of the containers in an inclined position with one end above the tops of the containers and the other end below the tops for progressively applying pressure to a grid deposited on the tops of the containers, a hopper for holding a stack of grids, an ejector for ejecting the lowermost grid in the hopper downwardly at an angle directly into the path of movement of the tops of the containers, and means operable by the counter to effect operation of the ejector when the counter has counted a number of containers corresponding to the number of containers the grid is designed to hold.

18 Claims, 8 Drawing Figures



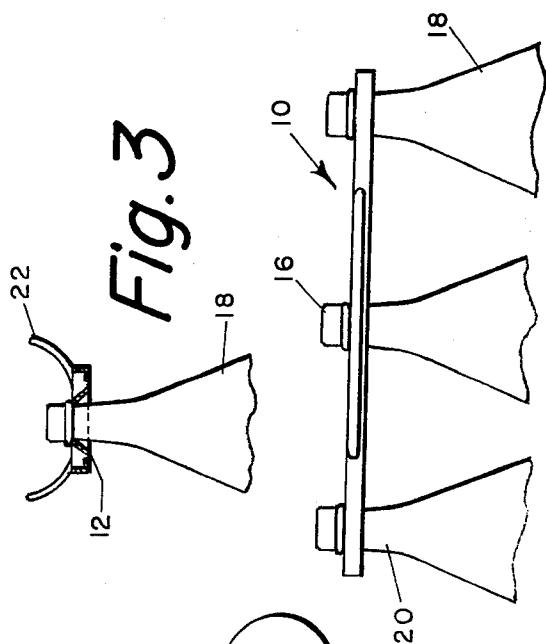


Fig. 2

Fig. 1

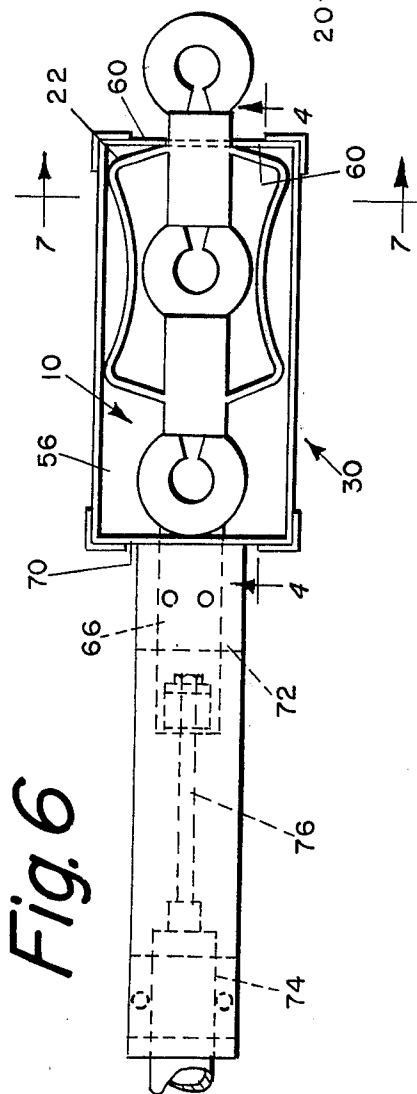


Fig. 3

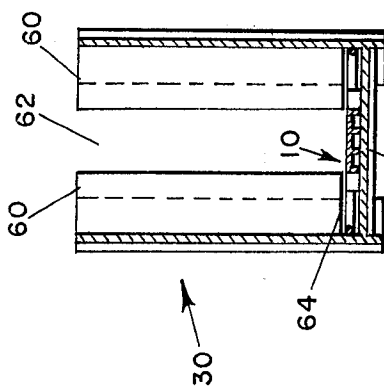


Fig. 4

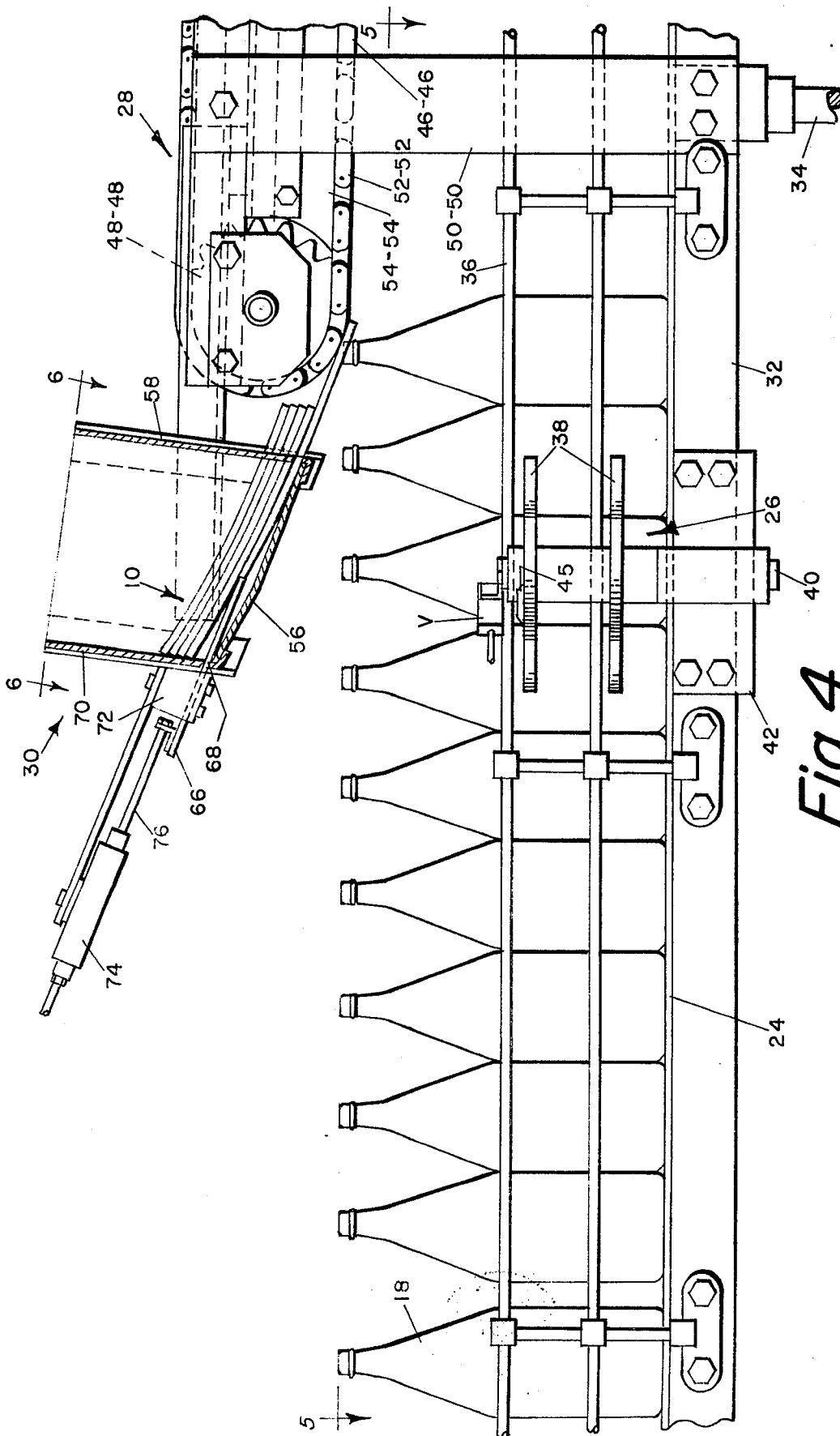
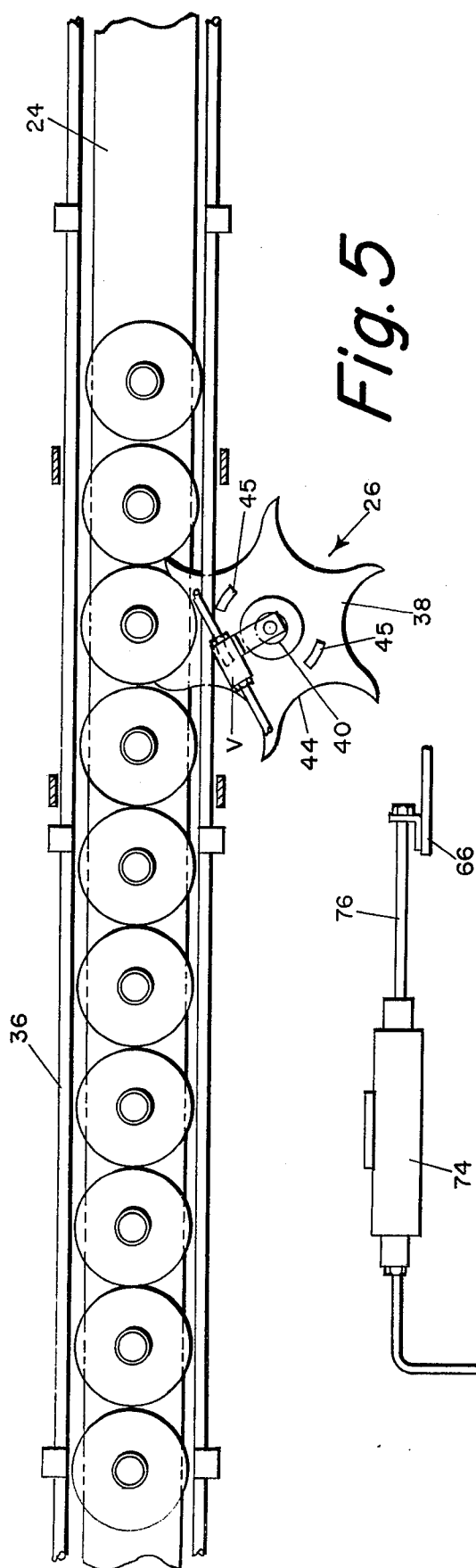
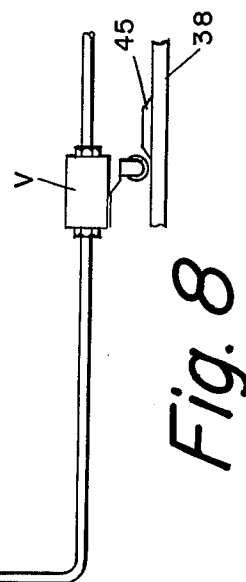


Fig. 4



APPARATUS FOR APPLYING CARRIER GRIDS TO BOTTLES

BACKGROUND OF THE INVENTION

Apparatus for applying carrier grids to the tops of containers to form groups of containers are disclosed in U.S. Pat. Nos. 3,383,828 and 3,742,677. In each of the aforesaid patents the grids are supplied in continuous strips for application to the tops of the containers. The apparatus of this invention is designed to apply the grids to the tops of the containers from a stack of grids as in my copending applications Ser. No. 308,964, filed Nov. 24, 1972 and Ser. No. 413,781, filed Nov. 8, 1973. The earlier of these applications relates especially to applying grids to groups of containers containing at least two rows of containers and the later to apparatus especially to applying grids to groups of containers containing only one row of containers. In each of the apparatus the grids are released from a hopper to a downwardly inclined tray within which they are supported with their lower ends close to the path of movement of the tops of the containers. The gravitational depositing of the grids in the aforesaid apparatus is quite satisfactory for relatively slow speed operations wherein groups of containers of a predetermined number are placed in individual cartons and loaded onto the conveyor but is not adequate for high speed operations wherein the containers are not loaded into individual cartons but on the contrary are delivered by the conveyor in continuous succession. It is accordingly the purpose of this invention to provide apparatus for applying individual grids to the tops of containers moving at relatively high speed and especially to means for delivering the grids to selected numbers of containers in such a way as to apply the grids to groups of containers of a predetermined number.

SUMMARY

This invention relates to apparatus for applying carrier grids to the tops of predetermined number of containers in a line of successive containers to form groups of containers of a predetermined number with a carrier grid connecting the containers in the group for carrying as a group and comprises a conveyor movable along a predetermined path along which containers are moved continuously in succession, means for effecting movement of the conveyor, means adjacent the path of movement of the containers on the conveyor for counting the containers, grid pressing means supported above the conveyor along the path of movement of the containers having transversely spaced surfaces extending along the path of movement of the containers, said surfaces being inclined from one end to the other from a level above the tops of the containers to a level below the tops of the containers, the distance between the surfaces being such as to permit the tops of the containers to pass between them, means supported above the conveyor in the path of movement of the containers operable to project a grid downwardly toward the path of movement of the tops of the containers to cause the leading end of the grid to be intercepted by a container at the one end of the grid pressing means and means operable in response to the counting means to effect operation of the last means each time it counts a number of containers corresponding to the number of openings in the grid. The conveyor has a horizontal run for supporting the containers standing upright thereon for

movement along the aforesaid predetermined path beneath the hopper and the pressure-applying means and there are transversely spaced guide rails at opposite sides of the conveyor for supporting containers in upright positions. The counting means comprises a pocket wheel supported adjacent one side of the conveyor on a vertically disposed shaft with its pockets extending horizontally above the conveyor such as to be intercepted by the successive containers thereon and to be rotated thereby thus counting the successive containers. The grid pressing means comprises spaced parallel chains supported above the conveyor along the path of movement of the containers on longitudinally spaced sprockets, the lower runs of which provide the aforesaid transversely spaced inclined surfaces which progressively apply pressure to a grid deposited on the upper ends of the containers. There is means for effecting movement of the chains at a speed corresponding to that of the conveyor. The means for supplying grids to the tops of the containers comprises a hopper supported above the conveyor for holding a stack of grids, the bottom of the hopper sloping downwardly and forwardly in the direction of movement of the conveyor for supporting the grids in a downwardly inclined position such that a projection of the lowermost grid intersects the path of movement of the tops of the conveyors at a point beneath the one end of the pressure-applying means. There is an ejector mounted to the hopper movable in the plane of the bottom for ejecting the lowermost grid from the hopper to cause the leading end to intersect the path of movement of the containers at the one end of the pressure-applying means and means operable by the aforesaid counter when it counts a number of bottles corresponding to the number in the group to be supported by the grid to cause the ejector to eject a grid into position for interception.

The invention will now be described in greater detail with reference to the accompanying drawings wherein:

FIG. 1 is a plan view of a carrier grid of the kind to be applied by the apparatus herein disclosed;

FIG. 2 is a fragmentary elevation showing the grid applied to the tops of a group of three bottles;

FIG. 3 is a fragmentary elevation from one end of FIG. 2 showing the handles of the grid bent upwardly for carrying of the group of bottles;

FIG. 4 is a fragmentary side elevation of the apparatus of this invention with the hopper within which the grids are supported in section;

FIG. 5 is a plan view of the apparatus taken on the line 5-5 of FIG. 4;

FIG. 6 is a view taken on the line 6-6 of FIG. 4;

FIG. 7 is a section taken on the line 7-7 of FIG. 6; and

FIG. 8 is a diagram of the control circuit.

Referring to the drawings (FIGS. 1, 2 and 3), the grids 10 which are to be applied to the containers are flat plastic frames having longitudinally spaced neck encircling elements 12 arranged in a single row and connected to each other by webs 14, the neck encircling elements 12 being adapted to be expanded over the caps 16 of bottles 18 downwardly onto the necks 20 of the bottles below the caps. Handle members 22-22 connected to the webs 14 are provided in the plane of the webs for upward bending after the grid has been applied to the tops of the bottles, as shown in FIG. 2, to enable carrying the groups of containers to which the grid is applied. The grids are provided as individual

units supported in a stack for application to the tops of containers in which the number of containers corresponds to the number of neck encircling elements.

The apparatus for applying the aforesaid grids comprises a conveyor **24** for moving containers in succession along a predetermined horizontal path; means **26** for counting the containers moving along on the conveyor; pressure-applying means **28** for progressively applying pressure to grids deposited on the tops of the containers to force them downwardly over the caps onto the necks of the containers; and a hopper **30** for supporting a stack of grids for delivery to the tops of the containers at intervals controlled by the counting means **26**. The containers to which the grids are applied, as herein illustrated, are bottles; however, by modification of the grids the apparatus may be applied to the tops of cans.

The conveyor **24** (FIG. 4) is mounted on a rigid elongate frame **32** supported at its ends and intermediate the ends from the floor by means of pedestals **34**, only one of which is shown herein. The conveyor is of the flat plate type comprising spaced parallel chains with cross-plates and is supported at its ends on sprockets (not shown) in the same manner as shown in the aforesaid copending application Ser. No. 308,964 so that a portion of the conveyor travels in a horizontal plane below the pressure-applying means **28** and hopper **30**. The conveyor is driven at a constant speed by suitable means from a drive motor as shown in the aforesaid copending application. A belt conveyor or the combination of rails and belts along one or both sides may be substituted for the chain conveyor referred to above.

There are spaced parallel upstanding rails **36—36** mounted on the frame **32** at opposite sides of the conveyor **24** to support the containers **18** in upright positions as they travel along on the conveyor.

The means **26** for counting the containers comprises a pair of pocket wheels **38—38** mounted in vertically spaced relation on a vertically disposed shaft **40**, the lower end of which is journaled in a bearing block **42** bolted or otherwise fastened to the frame. Each pocket wheel **38** contains a plurality of shallow pockets **44**, the curvature of which corresponds substantially to the curvature of the cylindrical surfaces of the containers. These pocket wheels are mounted on the shaft **40** at levels intermediate the upper and lower ends of the cylindrical portions of the containers and so as to project horizontally across the conveyor and to be intercepted by the containers as they move along and rotated by such movement. At the upperside of the upper one of the pocket wheels **38** there are mounted diametrically disposed trigger blocks **45—45** which are rotated successively by rotation of the pocket wheels to actuate a valve **V** mounted on the frame. As thus arranged the valve **V** will be operated each time three containers in succession engage the pocket wheels. It is, of course, obvious that in the event the carrier grids were designed to carry more or less than three containers the upper pocket wheel would be provided with an appropriate number of trigger blocks. It is within the scope of the invention to employ other kinds of counting means, for example a photocell or an air switch.

The pressure-applying means **28** is like that shown in the aforesaid pending applications and comprises a pair of endless chains **46—46** mounted on sprockets **48—48** at each end of the frame supported above the frame **32** by frame members **50—50** with their lower runs

52—52 inclined forwardly and downwardly in the direction of movement of the conveyor from a level at one end (the left end as seen in FIG. 4) above the tops of the path of movement of the containers to a level at the other end to below the path of movement of the tops of the containers. The one end, as shown in FIG. 4, is located adjacent the hopper. There is means for continuously moving the chains **46—46** at a rate corresponding to movement of the conveyor and there is means **54—54** supporting the lower runs of the chains **52—52** against upward displacement throughout their entire lengths from sprockets to sprockets. The aforesaid structure is disclosed and described in the aforesaid applications. The inclined lower runs **52—52** of the chains **46—46** are spaced apart sufficiently to permit the tops of the containers to project upwardly through them and to engage and progressively apply pressure to a grid deposited on the tops of the bottles as the latter are moved along beneath the chains by the conveyor to press the grids downwardly over the caps onto the necks of the bottles.

The hopper **30** for supplying the grids to the tops of the containers, as shown in FIGS. 4, 6 and 7, is of substantially rectangular horizontal section and is mounted above the frame in a substantially vertical position adjacent the one end of the pressure-applying means **28**. Unlike the hoppers disclosed in the aforesaid pending applications the hopper disclosed herein has a solid bottom wall **56** which inclines downwardly and forwardly in the direction of movement of the conveyor such that a projection of its plane forwardly from the hopper intersects the path of movement of the tops of the containers at a point just below the entrance to the underside of the lower runs **52—52** of the chains comprising the pressure-applying means. The front wall **58** of the hopper is comprised of transversely spaced panels **60—60**, FIG. 7, which define an opening **62** which extends upwardly from the bottom of the hopper to the top of a width corresponding to the width of the neck encircling elements **12** of the grids so that when a stack of grids is placed in the hopper the forward or leading ends of the grids will project through the opening **62**, as shown in FIGS. 4 & 6 - the grids being held in this position by engagement of the handles **22—22** at opposite sides of the projecting neck encircling elements **12** at that end with the inner sides of the panels **60—60**. As thus stacked the weight of the grids in the stack hold the lowermost grid firmly in the inclined plane of the bottom of the hopper. At the bottom of the hopper in the forward wall **58** there is a transversely disposed slot **64** corresponding in height to the thickness of the grid which extends all the way across the hopper from side to side so that the lowermost grid can be pushed through this slot in the plane of inclination of the bottom to a position intersecting the top of the container at the place of entrance beneath the pressure-applying means. Projection of the grid to a position of intersection with the top of the container at the place of entrance beneath the pressure-applying means is effected by an ejector plate **66** supported at the rear side of the hopper for movement through a slot **68** provided in the rear wall **70** of the hopper. The ejector plate **66** is slidably supported in a block **72** mounted at the rear side of the hopper for movement in the plane of the bottom wall **56** and movement is effected by a pneumatic cylinder **74** and rod **76**, one end of which is connected to the cylinder **74** and the other end of which is connected to

the ejector plate 66. As thus provided the ejector plate positively moves the lowermost grid into a position for interception of the top of a container as it enters below the pressure-applying means and such ejection can be effected very rapidly in contrast to the gravitational delivery of the grids to the tops of the containers as employed in my pending applications. Additionally, because of the proximity of the hopper to the pressure-applying means, the forwardly projecting ends of the grids in the hopper which overlie the lowermost grid serve to hold and control the position of the lowermost grid as it is moved into position for interception without the need for ancillary guides or hold-down elements. This arrangement is especially conducive to high speed operation in which the containers are delivered continuously and in succession for application of grids thereto in contrast to the aforesaid applications wherein the containers are delivered in predetermined groups as by placing the containers in cartons. A gravitational delivery of the grids to the tops of the containers in such apparatus as this would not be possible. Further, it is possible by the use of this apparatus and by the positive delivery of the grids to the tops of the containers to dispense with the use of cartons for supporting the containers in a group for application of grids thereto.

The groups of containers to which the grids are to be applied from the succession of containers are selected by the aforesaid counter 26 which, as previously described, is rotated by engagement of the containers therewith as they are moved along the conveyor. When three successive containers have successively engaged the counter one of the trigger blocks 45, as shown in FIG. 5, actuates the valve V and this in turn through the circuitry illustrated in FIG. 8 supplies pressure through the valve V to the cylinder 74 to cause it to eject a grid into a position for interception by the leading one of the containers in the group of three containers counted by the counter.

The apparatus as thus described may be employed to apply grids to a greater or lesser number of containers and to two lines of containers by appropriate modification so that the counter will count out a lesser number of containers or a greater number of containers corresponding to the number of neck encircling elements provided in the grids and by, for example, mounting two pairs of pressure-applying members such as disclosed in the earlier of my pending applications.

The apparatus is simply designed, reliable and capable of very high speed operation without jamming or breaking of the grids and/or the containers to which they are applied.

It should be understood that the present disclosure is for the purpose of illustration only and that this invention includes all modifications and equivalents falling within the scope of the appended claims.

I claim:

1. Apparatus for applying carrier grids to the tops of predetermined numbers of containers, comprising a conveyor movable along a predetermined path along which the containers are moved continuously in succession, means for effecting movement of the conveyor, a counter supported adjacent the conveyor for engaging each container and for counting the containers, means supported above and longitudinally of the conveyor having spaced parallel, elongate members inclined relative to the conveyor from one end to the other, from a level at the one end above the path of

movement of the tops of the containers to a level at the other end below the tops of the containers, the distance between the elongate members being such as to permit the tops of the containers to extend upwardly therebetween, said elongate members operating to progressively apply downward pressure to a grid deposited on the containers moved along beneath them by the conveyor, and means for delivering grids to the tops of the containers comprising a magazine supported above the conveyor for holding a stack of grids, means for projecting a grid from the magazine each time the counter counts out said predetermined number of containers in a downwardly inclined direction such as to cause the leading end of the grid to project into the path of movement of the top of the leading one of the containers of the counted group at the place of movement of the containers beneath the one end of the elongate members.

2. Apparatus for applying carrier grids to the tops of containers comprising a conveyor having a horizontal run for supporting containers standing upright thereon for movement along a predetermined path, spaced parallel guide rails at opposite sides of the conveyor for supporting the containers in said upright positions while travelling along said path, means for moving the conveyor continuously, means adjacent the conveyor for counting successive containers, means supported above and longitudinally of the conveyor having transversely spaced elongate surfaces inclined relative to the conveyor from one end to the other from a level at the one end above the tops of the containers to a level at the other end below the tops of the containers, the distance between said surfaces being sufficient to permit the tops of the containers to project upwardly between them, said means operating to progressively apply downward pressure to a grid deposited on the containers moving along beneath it, means for projecting grids downwardly at an angle toward the path of movement of the tops of the containers so as to cause the leading ends of the grids to be projected into the path of movement of the tops of the containers, and means operable by the means for counting the containers to effect operation of the last means each time the number of containers counted corresponds to the number of grid openings.

3. Apparatus for applying carrier grids to the tops of containers, comprising a conveyor providing a supporting surface movable along a predetermined path for supporting containers standing upright thereon, means for effecting movement of the conveyor to move containers continuously along said path means adjacent the path of movement of the containers on the conveyor for counting the containers, grid pressing means supported above the conveyor along the path of movement of the containers for progressively applying downward pressure to containers moved along by the conveyor beneath it, said pressure-applying means having transversely spaced surfaces extending along the path of movement of the containers which are inclined from one end to the other from a level above the tops of the containers at the one end to a level below the tops of the containers at the other, the distance between the surfaces being such as to permit the tops of the containers to pass between them, means supported above the conveyor in the path of movement of the containers operable to project a grid downwardly toward the path of movement of the tops of the containers to cause the leading end of the grid to be inter-

cepted by a container at the one end of the grid pressing means, and means operable in response to the counting means to effect operation of the last means each time it counts a number of containers corresponding to the number of openings in the grid.

4. Apparatus for applying carrier grids to the tops of containers, comprising a conveyor providing a supporting surface movable along a predetermined path for supporting containers standing upright thereon, means for effecting movement of the conveyor to move the containers continuously along said path, means adjacent the path of movement of the containers on the conveyor for counting the containers, spaced parallel, longitudinally movable pressure-applying members supported above the conveyor for movement along the path of movement of the containers, said members being inclined from one end to the other, from a level above the tops of the containers at the one end to a level below the tops of the containers at the other end, the spacing between said members being sufficient to permit the tops of the containers to pass between them, means for moving said pressure-applying members in consonance with the conveyor to progressively apply pressure to a grid deposited on containers moved along beneath the pressure-applying members by the conveyor, means supported above the conveyor in the path of movement of the containers operable to project a grid downwardly toward the path of movement of the tops of the containers to cause the leading end of a grid to be intercepted by a container at the one end of the members as the containers move beneath said members, and means operable by the counter to effect operation of the last means each time it counts containers in a number corresponding to the number of containers the grid is adapted to hold.

5. Apparatus according to claim 4, wherein said pressure-applying members are chains mounted on sprockets with their lower runs inclined to the conveyor.

6. Apparatus for applying carrier grids to the tops of containers comprising a conveyor providing a horizontal supporting surface movable along a predetermined path for supporting containers standing upright thereon, means for effecting movement of the conveyor to move the containers along a predetermined path, a pocket wheel supported adjacent the path of movement of the containers, said pocket wheel being rotatable by engagement of successive containers therewith, pressure-applying means supported above the conveyor beyond the pocket wheel in the direction of movement of the containers beneath which the containers are moved by the conveyor, said pressure-applying means having transversely spaced surfaces between which the tops of the containers extend and which are inclined along the path of movement of the containers from a level above the tops of the containers to a level below the tops, said pressure-applying means being adapted to progressively press a grid deposited on the tops of the containers downwardly over the tops onto the necks, means supported above the conveyor for projected grids downwardly at an angle to the tops of the containers to cause the leading ends to be intercepted by the tops of the containers as they enter beneath the pressure-applying means at the one end, and means operable by the pocket wheel to effect operation of the last means when it counts a number of containers corresponding to the number of containers the grid is adapted to hold.

7. Apparatus according to claim 6, wherein the pocket wheel contains peripherally thereof a plurality of pockets which overlie the conveyor so that the pockets are engaged by successive containers to rotate the pocket wheel, and there is means on the pocket wheel operable by rotation of a number of pockets corresponding to the number of containers to be supported by the grid to effect operation of the means for projecting the grid.

8. Apparatus for applying carrier grids to the tops of containers, comprising a conveyor providing a supporting surface movable along a predetermined path for supporting containers standing upright thereon, means for effecting movement of the conveyor to move the containers along said path, means adjacent the path of movement of the containers on the conveyor for counting the containers, pressure-applying means mounted above the container extending along the path of movement of the containers and inclined to the conveyor such that at one end it is above the level of the tops of the containers and at the other end it is below, said pressure-applying means providing spaced apart surfaces for engagement with a grid deposited on the tops of the containers at opposite sides of the tops between which the tops are adapted to project, a magazine mounted above the conveyor for holding a stack of grids, said magazine having a bottom inclined downwardly relative to the conveyor in a plane, a projection of which intersects the path of movement of the tops of the containers at the one end of the pressure-applying means, an ejector supported on the magazine to move in the plane of the bottom to eject the lowermost grids from the bottom, and means operable by the counter to initiate operation of the ejector.

9. Apparatus according to claim 8, wherein the magazine has at the side adjacent the pressure-applying means

an opening of a vertical height greater than the thickness of the single grid such as to permit the leading ends of a plurality of grids to project therethrough with the leading end of the lowermost grid close to the one end of the pressure-applying means substantially in the plane of the pressure-applying surfaces at the one end.

10. Apparatus for applying carrier grids to the tops of containers comprising a conveyor providing a supporting surface movable along a predetermined path for supporting containers standing upright thereon, means for effecting movement of the conveyor to move the containers continuously along said path, means adjacent the path of movement of the containers on the conveyor for counting the containers, grid pressure-applying means supported above the conveyor along the path of movement of the containers having transversely spaced surfaces extending along the path of movement of the containers, said surfaces being inclined from one end to the other from a level above the tops of the containers to a level below the tops of the containers, the distance between the surfaces being such as to permit the tops of the containers to pass between them, a hopper supported above the conveyor adjacent the one end of the pressure-applying means having a downwardly and forwardly inclined bottom wall, a projection of which intersects the path of movement of the tops of the containers at the entrance to the one end of the pressure-applying means and an ejector supported for movement in the plane of the bottom wall to

eject the lowermost grids to said position of intersection with the path of movement of the tops of the containers.

11. Apparatus according to claim 10, wherein the hopper has a front wall containing an opening from bottom to top through which the leading ends of the grids supported in the hopper extend downwardly and forwardly toward the entrance to the one end of the pressure-applying means to a position to support the lowermost grid in its ejected position from upward deflection.

12. Apparatus according to claim 10, wherein the front wall contains at the bottom a horizontal slot corresponding in height to the thickness of the grids through which the lowermost grid is ejected.

13. Apparatus according to claim 12, wherein the back wall of the container at the bottom has a horizontal slot through which the ejector is movable in the plane of the bottom to eject the lowermost grid through the slot in the front wall.

14. The method of applying grids to the tops of capped bottles comprising moving bottles continuously along a predetermined path, supporting a stack of grids above the path of movement of the bottles inclined thereto such that an extension of the plane of inclination of the lowermost grid intersects the path of movement of the tops of the bottles at an acute angle, ejecting the lowermost grid from the stack and advancing its leading end at said angle to said plane of intersection so that the forward movement of a bottle along said path into engagement with the leading end of the lowermost grid at said place of intersection engages and withdraws the grid from the stack, supporting the lowermost grid while it is being ejected and withdrawn against upward displacement so as to deposit the grids on the tops of a number of bottles corresponding in number to the number of bottles the grid is designed to

hold and progressively applying pressure to the withdrawn grid to press it downwardly over the caps onto the necks therebelow.

15. A method according to claim 14, comprising applying said downward pressure progressively to the grid as the leading end is withdrawn from the lower end of the stack and while the trailing end is still being held in said inclined position at the bottom of the stack.

16. The method of applying grids to the tops of containers comprising moving containers continuously along a predetermined path, supporting a stack of grids above the path of movement of the containers inclined thereto such that an extension of the inclined plane of the lowermost grid intersects the path of movement of the tops of the containers at a predetermined angle, projecting a grid in said inclined plane to a position such that the forward edge of the leading top encircling opening therein is below the path of movement of the tops of the containers and the rear edge is above the path of movement of the tops of the containers, and at such intervals as to cause the tops of the containers to engage said openings and withdraw the grids from the stack to a position of engagement with the tops of a number of containers corresponding to the number of openings in the grid and progressively applying pressure to the grid resting on the taps of the containers to push it downwardly over the tops.

17. A method according to claim 16, comprising supporting the lowermost grid at its projected position from upward displacement.

18. A method according to claim 14, comprising counting the successive bottles and projecting the lowermost grid to a position for interception for each count of bottles corresponding in number to the capacity of the grid.

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