Nov. 14, 1967 D. WAINBERG 3,352,215

FEEDING MECHANISM FOR A CONTAINER FORMING MACHINE

Filed May 29, 1964 4 Sheets-Sheet 1

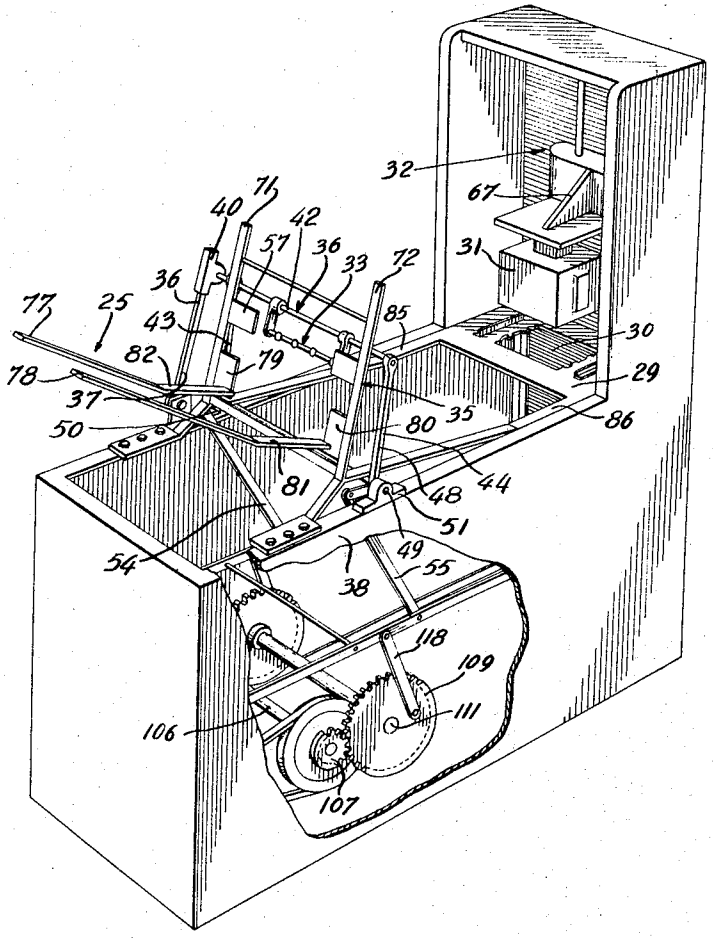


FIG. 1

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Filed May 29, 1964 4 Sheets-Sheet 2

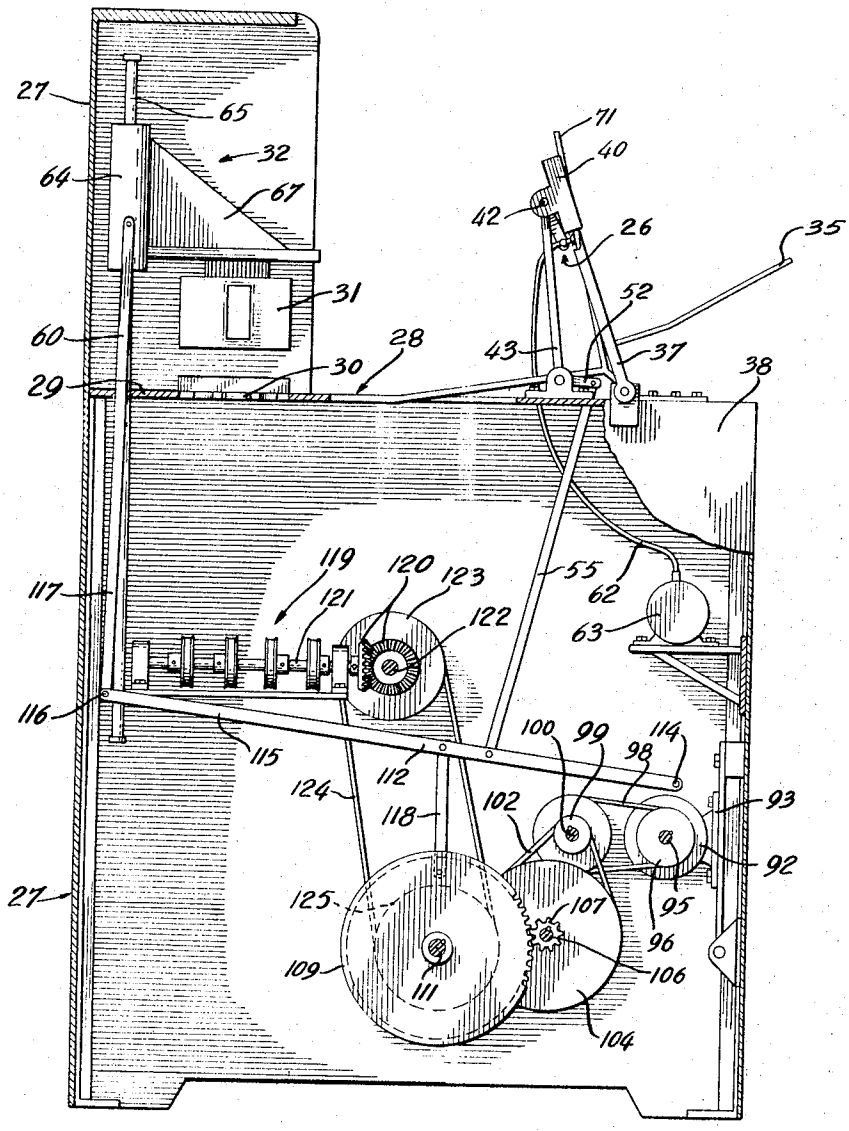


FIG. 2

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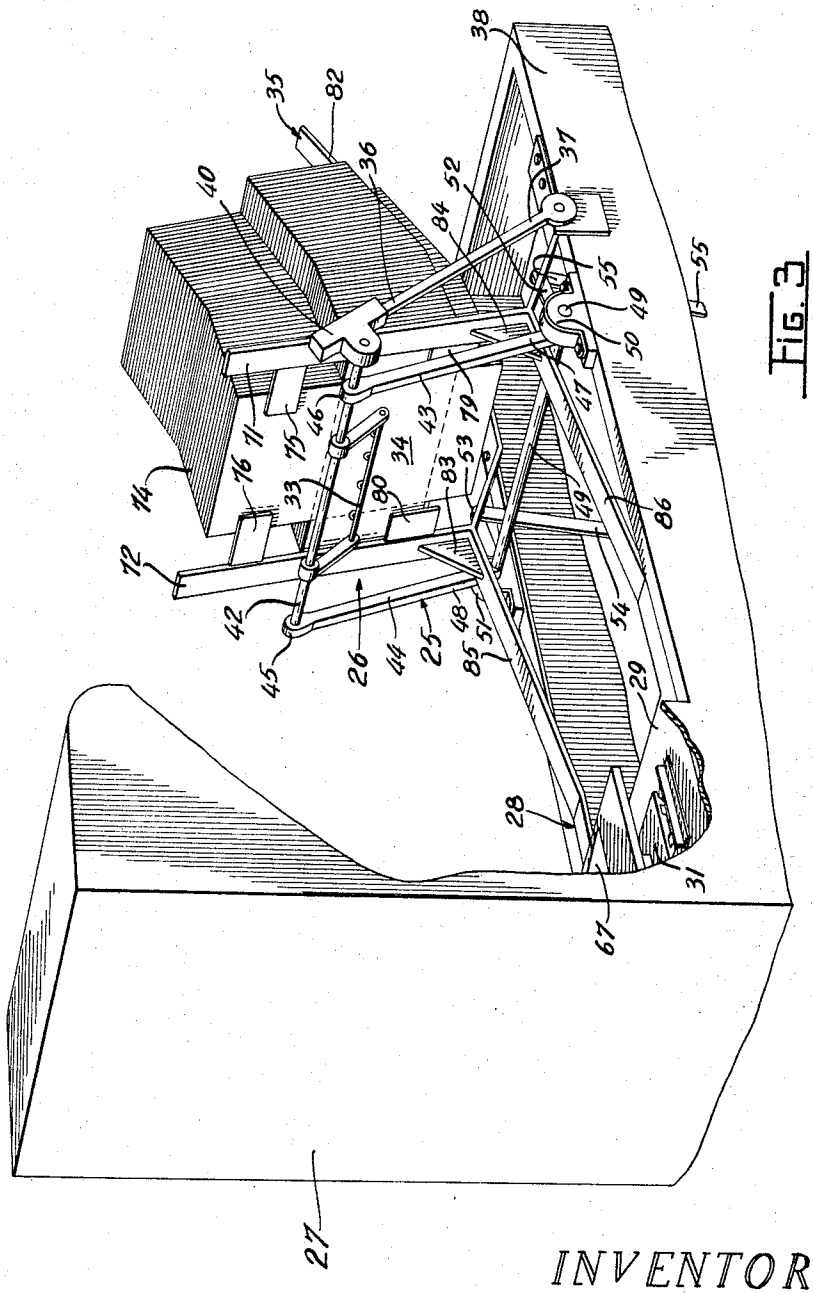


Fig. 3

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FEEDING MECHANISM FOR A CONTAINER FORMING MACHINE

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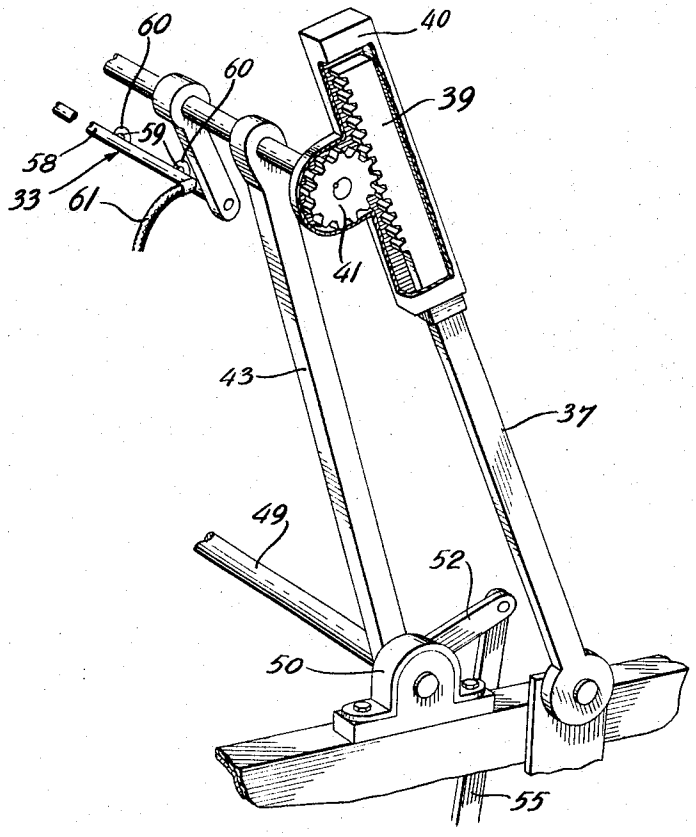


FIG. 4

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3,352,215

FEEDING MECHANISM FOR A CONTAINER FORMING MACHINE

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Filed May 29, 1964, Ser. No. 371,191
4 Claims. (Cl. 93—51)

The invention relates to improvements in a feeding mechanism for a container forming machine as described in the present specification and illustrated in the accompanying drawings that form a part of the same.

The invention consists essentially of the novel features of construction as pointed out broadly and specifically in the claims for novelty following a description containing an explanation in detail of the acceptable forms of the invention.

Among the objects of the invention is to facilitate the removal of pre-cut blanks from a magazine and quickly transfer them to a forming die of the container forming machine in a positive manner and with speed and dexterity.

An object of the invention is to devise a means whereby the magazine for the pre-cut blanks will form an integral part of the forming die and may be quickly and detachably secured to the container forming machine in such a way that the throat of the forming die will automatically be situated below the plunger of the plunger mechanism and in direct alignment position therewith and thereby avoiding any need of manual adjustments for positioning the magazine and the forming die in relation to each other that would otherwise be necessary in other types of feeding mechanisms where the magazine and the forming die constitute separate units.

Another object of the invention is to contrive a means whereby the blank pick-up member and the blank pick-up mechanism will always be in a coaxial alignment position during its motion of travel between and in relation to the discharge end of the magazine and the throat of the forming die, with little or no adjustments being required, and consequently eliminating extraneous parts to the machine and minimizing possible maladjustments in the setting up of the feeding mechanism with relation to the magazine and the forming die.

Still another object of the invention is to devise a feeding mechanism that will deposit a pre-cut blank, one at a time, from the magazine to a folding die in a quick, even and accurate manner and that will be placed in the precise position so that the blank will be folded at the intended fold lines without the necessity of using auxiliary guide members or the like for adjusting the position of the blank on the die.

Still another object of the invention is to avoid an accidental mis-alignment of a pre-cut blank on the forming die of a container forming machine and to assure that only one blank at a time is taken from the magazine and delivered to the forming die, thereby minimizing the danger of any disruption or breakdown in the operation of the machine, the stopping of production, and on occasions, necessitating repairs to the machine.

A further object of the invention is to provide easier access to the blanks supported in the magazine and permitting greater freedom for the removal of the foremost blank therefrom through reducing the blank retaining means to the minimum, and thereby effecting a smoother operation for the removal of the blanks from the magazine to the forming die of the container forming machine.

A still further object of the invention is to devise a means whereby the combined magazine and forming die unit may be quickly and easily removed from the container forming machine and the blank pick-up member detached from the blank pick-up mechanism, and both

adapted to be replaced with other combined magazine and forming die units and blank pick-up members in accordance with different styles, shapes and sizes of blanks that may be required.

A still further object of the invention is to permit easy and quick adjustment of the suction cups or other gripping members of the blank pick-up member and their speedy removal therefrom where necessary.

A still further object of the invention is to minimize costly breakdowns of the assembly lines and to provide a blank feeding mechanism that will be durable in construction, simple to manufacture, light and compact in form, easy to operate and requiring the minimum of space for installation and operation.

The invention, together with the above and other objects and advantages, is set forth in more technical detail in the following description and accompanying drawings.

In the drawings:

FIGURE 1 is a perspective view of the blank feeding mechanism as applied to a container forming machine and partly broken away to illustrate the operation of the longitudinal oscillating rods.

FIGURE 2 is a side view of the container forming machine and the feeding mechanism with the casing removed.

FIGURE 3 is a fragmentary perspective view of the container forming machine illustrating the feeding mechanism greatly enlarged.

FIGURE 4 is an enlarged fragmentary perspective view of the blank pick-up mechanism showing the rack and pinion mechanism.

Like numerals of reference indicate corresponding parts in the various figures.

Referring to the drawings, the blank feeding mechanism, as indicated by the numeral **25**, consists of the blank pick-up mechanism **26**, which is secured to the container forming machine **27**, and the combined magazine and forming die unit **28**, all in close proximity to one another. The forming die **29** has the throat **30** and forms a part of the unit **28**, the throat **30** being situated below the plunger **31** of the container forming mechanism **32** and in direct alignment position therewith.

The blank pick-up mechanism is formed of an actuating means for operating and guiding a blank pick-up member **33** which is used for removing a foremost blank **34** from the discharge end of the magazine **35**, that supports the pre-cut blanks in an edgewise position, and to transport the blank to the container forming mechanism and depositing the same directly on the face of the throat of the forming die and in proper alignment with the plunger **31** of the plunger mechanism.

The actuating means for the blank pick-up member **33** consists of a rack and pinion mechanism, in which the toothed rack **36** has its lower end **37** pivotally secured to one of the side walls **38** of the container forming machine and its toothed portion **39** enclosed in the housing **40**. The pinion **41** is secured to one end of the transverse oscillating shaft **42** and meshes with the toothed portion **39** of the rack, and is held within the housing **40** to complete the rack and pinion mechanism.

The rocker or oscillating arms **43** and **44** have their upper ends **45** and **46** mounted on the transverse oscillating shaft **42** and adjacent to the ends thereof, while their lower portions **47** and **48** are secured to the transverse oscillating shaft **49** which has its end journalled in the bearing members **50** and **51** that are secured to the machine frame.

The lower portion of the oscillating arms **43** and **44** extend beyond the transverse shaft **49** and terminate in offset or bell crank members **52** and **53**. The eccentric rods **54** and **55** are secured to the offset or bell crank members **52** and **53**, and in turn, are connected to the

operative mechanism of the container forming machine and will hereinafter be more generally described for the purpose of particularizing an acceptable means for actuating the feeding mechanism.

The transverse oscillating shaft **42** forms the support for the blank pick-up member **33**, the latter being secured to the transverse shaft **42** by means of the bracket arms **56** and **57**. These bracket arms are adjustably secured to the transverse oscillating shaft **42** and detachably secured to the blank pick-up member **33**. The blank pick-up member may be constructed in various ways, but as illustrated, it is in the form of a rigid longitudinal hollow member or tube **58** provided with a plurality of orifices or apertures **59** formed at predetermined locations along its length and having the suction cups **60** connected therewith. The air ducts **61** and **62** are connected to suitable inlets leading into the tube **58** and to the vaccum pump mechanism **63**, and which is controlled for suctionally withdrawing the blanks from the magazine and for releasing such blanks, when they are in abutment engagement with the face of the forming die.

The container forming mechanism **32** consists of a crosshead **64** slidably mounted on the vertical posts **65** and **66** that are fixedly secured to the machine frame. The crosshead **64** has the bracket **67** secured thereto or forming an integral part thereof and from which is suspended the plunger **31**. The operating rods **68** and **69** are secured to the crosshead and are connected to the operative mechanism of the container forming machine. The plunger **31** is placed in vertical alignment with the throat **30** of the forming die **29** and is adapted to engage with the blank **34** and force the same through the throat of the forming die for forming the container.

It is of great importance that the blank is placed on the forming die with great accuracy for its successful folding into a formed container, as the slightest disarray or out of position of the blank on the forming die, at the moment the plunger engages it, will cause the blank to fold incorrectly, and where self-locking flaps are employed, the walls of the container will not be locked properly and the blank or partially formed container will have to be set aside as useless and a waste. This mishap often causes a disruption of the assembly line, and on occasions, damage to the machine is effected.

Furthermore, it is necessary that great care be taken that the blanks be fed separately to the forming die, as otherwise if several blanks adhere to one another and are placed in that condition on the forming die, the plunger will not be able to properly impel the adhering blanks through the throat of the forming die due to insufficient clearance space between the walls of the throat of the forming die and the plunger, thereby resulting in the destruction of the blanks, and again, possible danger of damaging the machine.

These objectionable features, so often encountered in other types of container forming machines are avoided in the present invention, because the magazine for the blanks is so constructed that unnecessary pressure to propel the blanks along the length of the magazine to discharge end thereof, which results in the tight bunching together of the blanks and inviting them to stick to one another, is eliminated.

The magazine for the blanks is detachably secured to the container forming frame and is located in the adjacent position to the feed mechanism and within the reach and abuttal engagement with the blank pick-up member of the blank pick-up mechanism, at a predetermined point of its path of travel during its arcuate oscillation between the magazine and the forming die. The pre-cut blanks **34** are placed in an endwise position in the magazine and are supported and guided therein in a suitable manner that will hereinafter be more fully described.

The magazine **35** consists of a gate **70** formed of the vertical posts **71** and **72** that are joined together at their lower ends by the transverse member **73** and having their upper ends provide journals for the transverse roller **74**, the whole completing an open frame through which the blanks are removed from the magazine. These vertical posts have the blank retaining plates or fingers **75** and **76** projecting inwardly and which may be fixedly or movably secured thereto.

The blank supporting members **77** and **78** are secured to the inwardly projecting bracket plates **79** and **80**, which are welded or otherwise secured to the vertical posts **71** and **72**. These blank supporting members are parallel to one another and extend rearwardly, in a longitudinal direction, from the gate **70**.

The shape and angular construction of these longitudinal blank supporting members are quite essential for the natural positioning and gravity feeding of the blanks along the length of the magazine and to the discharge end thereof, which is the gate, the gate being an integral part of the magazine, and, as a matter of fact is an integral part of the forming die of the container forming machine.

In the prior structure of the blank magazines used in feeding mechanisms for container forming machines, the magazines are set at too steep an angle; this has the effect of increasing the weight and pressure of the blanks at the discharge end of the magazine, thus creating greater difficulty in removing the blanks singly from the magazine.

In other instances, the angle of the magazine is set in such a way that there is barely sufficient gravity to give the required self-impulse to the blanks to make the requisite speed for the proper continuity of the flow of the blanks to the discharge end of the magazine and their removal therefrom by the blank pick-up mechanism. In other instances, where the magazine is set in an approximate horizontal position, pressure plates are utilized to push the blanks along the length of the magazine to the discharge end thereof, sometimes aided by movable blank supporting rods. Again, this has been found unsatisfactory, since this has the effect of squeezing the blanks tightly together at the discharge end of the magazine, with the result, that in many instances the blanks adhere to one another and are removed in that condition from the magazine and deposited in the same condition on the forming die.

In all such cases the blank supporting bars are rectilinearly constructed, and the whole magazine, as a unit, is generally secured to the container forming machine at the required angle, but with the supporting bars always in straight position.

In the present invention, such methods have been entirely changed. The blank supporting members **81** and **82** are deliberately constructed to be off the rectilinear line and in place thereof are formed with identical angles of varying degrees, such angles of varying degrees merging with one another without deleting from each other their proper functions in permitting the blanks to move themselves, through gravity, to the gate of the magazine in an orderly manner. This is accomplished without any unnecessary pressure being applied to the blanks and the avoidance of any accumulated weight that ordinarily would build up at the exit of the magazine.

It has been found that excellent results have been obtained by having the longitudinal length of each of the blank supporting members divided into two sections or portions **81** and **82**. The section or portion **81** is located adjacent to the discharge end or gate of the magazine and is set at an angle of approximately ten degrees and this merges with the section or portion **82**. The section or portion **82** is set at an angle of approximately twenty degrees and extends rearwardly of the front section or portion **81** of the individual blank supporting member.

It is preferable that the stacking of the blanks in the magazine should commence at the discharge end or gate of the magazine and be supported endwise on the blank supporting members and arranged vertically thereon.

It will be noted that the front sections or portions **81** are located at the discharge end of the magazine and which are set at the ten degree angle; therefore, as the

blanks are placed in the magazine and fill up the space on the approximate ten degree angular sections or portions of the blank supporting members, they will be placed on the approximate twenty degree angular sections or portions of the blank supporting members. In the meanwhile the blanks maintain their approximate vertical angular and alignment position with the blanks supported by the approximate ten degree angular front sections or portions of the blank supporting members.

In this way, the blanks will not overcrowd one another and they will be free from any frictional adhering contact with one another, that would otherwise occur if the blanks were mounted on straight runways set at an angle that would cause the blanks to pack tightly against each other, and thereby increase their cohesion at the lower end of the straight runways.

Although the angular degrees, as hereinbefore mentioned are acceptable for obtaining the required results, it is conceivable that in using blanks of different sizes and styles it may be necessary to make certain variations from the angular degrees as set forth. Furthermore, the blank supporting members may be constructed to have their lengths made in a series of multiple step formations of varying degrees and accomplish the same purpose, and it is to be understood that in the formation of the blank supporting members into different angular degrees of sections or portions that they are not to be restricted to any specific angular degrees or to the number of angles that may be formed throughout the length of the blank supporting members.

The magazine **35** and the forming die **29** are made integral, welded or otherwise secured together so as to make one complete unit and this may be accomplished in various ways in accordance with the specific requirements such as the size, shape and configuration of the pre-cut blanks to be formed into containers. As shown in FIGURES 1, 2, and 3, of the drawings, the brackets **83** and **84** are welded or otherwise secured to the lower portions of the vertical posts **71** and **72** and, with the transverse oscillating member **73** and the transverse roller **74**, constitute the frame or gate **70** of the magazine **35**. The longitudinal arms **85** and **86** are welded or otherwise secured to the brackets **83** and **84** and project beyond each side of the gate **70** and have their front extremities integral with, welded or otherwise secured to the forming die **29** and their other extremities detachably secured to the frame of the container forming machine.

An acceptable mechanism for operating the feeding mechanism and the container forming mechanism consists of the motor **92** which is secured to the pivotal base **93**, that is pivotally secured to one of the walls of the container forming machine, and which has the tension adjustable means **94** connected to the free end of the pivotal base.

The motor **92** has the drive shaft **95** on which is secured the drive pulley **96** and which is connected to the driven pulley **97** by the endless belt **98**. The driven pulley **97** is mounted and secured to the transverse shaft **99**, the latter having its ends suitably journalled to the side walls of the container forming machine.

Mounted and secured to the transverse shaft **99** and adjacent to the ends thereof are located the pulleys **100** and **101** which are connected by the endless belts **102** and **103** to the pulley wheels **104** and **105**. The transverse shaft **106**, to which the pulley wheels **104** and **105** are secured, is suitably journalled within the container forming machine, such as to the side walls of the casing, and have the gears or pinions **107** and **108** meshing with the gear wheels **109** and **110** that are secured to the transverse shaft **111** which is suitably journalled within the casing of the container forming machine.

The eccentric rods **54** and **55**, that are secured to the offset or bell crank members **52** and **53** of the oscillating arms **43** and **44**, are pivotally secured to the longitudinal oscillating rods **112** and **113**. These longitudinal oscillating rods **112** and **113** are pivotally secured at one end to

the fixed bearing members **114**, that are secured to the container forming machine casing, and have their other ends **115** pivotally secured to the lower ends **116** of the connecting rods **117**, the upper ends of the connecting rods being pivotally secured either directly or indirectly to the crosshead **64**.

Intermediate of their length, the longitudinal oscillating rods **112** and **113** are pivotally secured to the eccentric rods **118** that are eccentrically secured to the gear wheels **109** and **110**. The conveying mechanism **119** is operated by the intermeshing gear mechanism **120** mounted on the shafts **121** and **122**, the shaft **122** having the pulley wheels **123** secured thereto and which are connected by the endless belts **124** to the pulley wheels **125** secured to the transverse shaft **111**, and this completes an acceptable means for operating the feeding mechanism, the container forming mechanism and the conveying mechanism.

It will thus be seen that the blank pick-up member is adapted to be moved in a predetermined arcuate path of travel between the magazine and the container forming die, that is located below the plunger, is actuated by the rocker operating arms and the rack and pinion mechanism that will not only rotate the transverse oscillating shaft, from which the blank pick-up member is suspended and is secured thereto, in alternate directions but will alternately push and pull the blank pick-up member along its arcuate path of travel; simultaneously the rack and pinion mechanism will cause the blank pick-up member, at a certain stage of its travel, to be brought down at a steep incline towards and over the forming die and drop the blank thereon in an approximately horizontal and parallel position therewith. The motion, created by the rack and pinion mechanism, will also cause the blank pick-up member to remove itself from the forming die and from the path of the plunger in a steep arcuate rise and thereby permit the plunger to engage with the blank supported on the forming die and propel the same through the throat of the forming die.

This effects the declivitous and acclivous movement of the blank pick-up member due to the rotation of the transverse oscillating shaft, in alternate directions, and simultaneously causing the downward and upward motions to the blank pick-up member through the rack and pinion mechanism, and the arcuate oscillation of the rocker arms, that are connected with the transverse oscillating shaft, to effect the predetermined arcuate path of movement to the blank pick-up member.

As various possible embodiments might be made of the above invention, and as various changes might be made in the embodiment set forth, it is understood that all matter herein set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

What I claim is:

1. In a feeding mechanism for a container forming machine, a machine frame, a magazine adapted to support a plurality of pre-cut blanks in a edgewise position; a container forming mechanism secured to said machine frame; a blank pick-up mechanism secured to said machine frame and comprising a transverse shaft journalled to said machine frame, oscillating arms having their lower ends secured to said transverse shaft, a transverse oscillating shaft engaged by the upper ends of said oscillating arms, a pinion secured to one end of said transverse oscillating shaft, a toothed rack having its lower end pivotally secured to said machine frame and its toothed portion meshing with said pinion, a blank pick-up member secured to said transverse oscillating shaft, and eccentrically operating and oscillating means secured to said oscillating arms and adapted to oscillate said transverse oscillating shaft in a predetermined arcuate path of travel and moving said pinion and its meshing toothed rack therewith, said pinion and intermeshing toothed rack by such movements coincidently imparting a rotary motion to said transverse oscillating shaft in alternate

directions so as to control the movements of said blank pick-up member.

2. In a feeding mechanism for a container forming machine as claimed in claim 1, characterized by the fact that said eccentrically operating and oscillating means maintain said oscillating arms and toothed rack in constant approximately parallel positions to one another throughout the operational movements of said blank pick-up member.

3. In a feeding mechanism for a container forming machine as claimed in claim 1, characterized by the fact that a common housing encloses the toothed portion of the rack and said pinion.

4. In a feeding mechanism for a container forming machine as claimed in claim 2, characterized by the fact that said housing is supported by said transverse oscillating shaft.

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