

[54] **AUTOMATIC BAG SHAPING AND BAG TOP FORMING APPARATUS**

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[51] Int. Cl. **B65b 7/06, B65g 15/14**

[58] Field of Search **53/372, 371, 139, 188, 53/124 CC, 378, 379, 187, 186, 190, 124 A, 124 TS, 249, 251; 93/32, 77 R, 77 CL; 198/165, 166**

[56] **References Cited**

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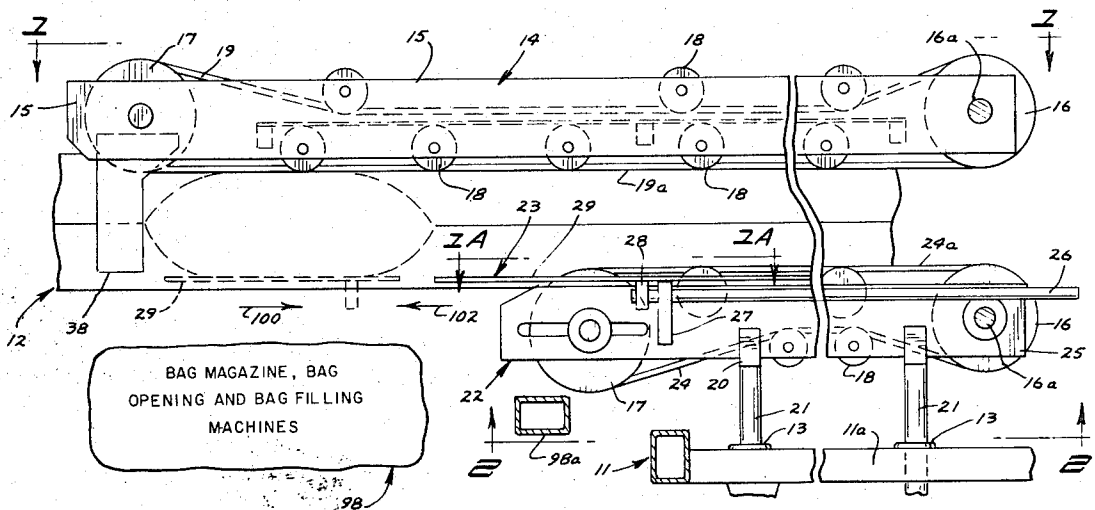
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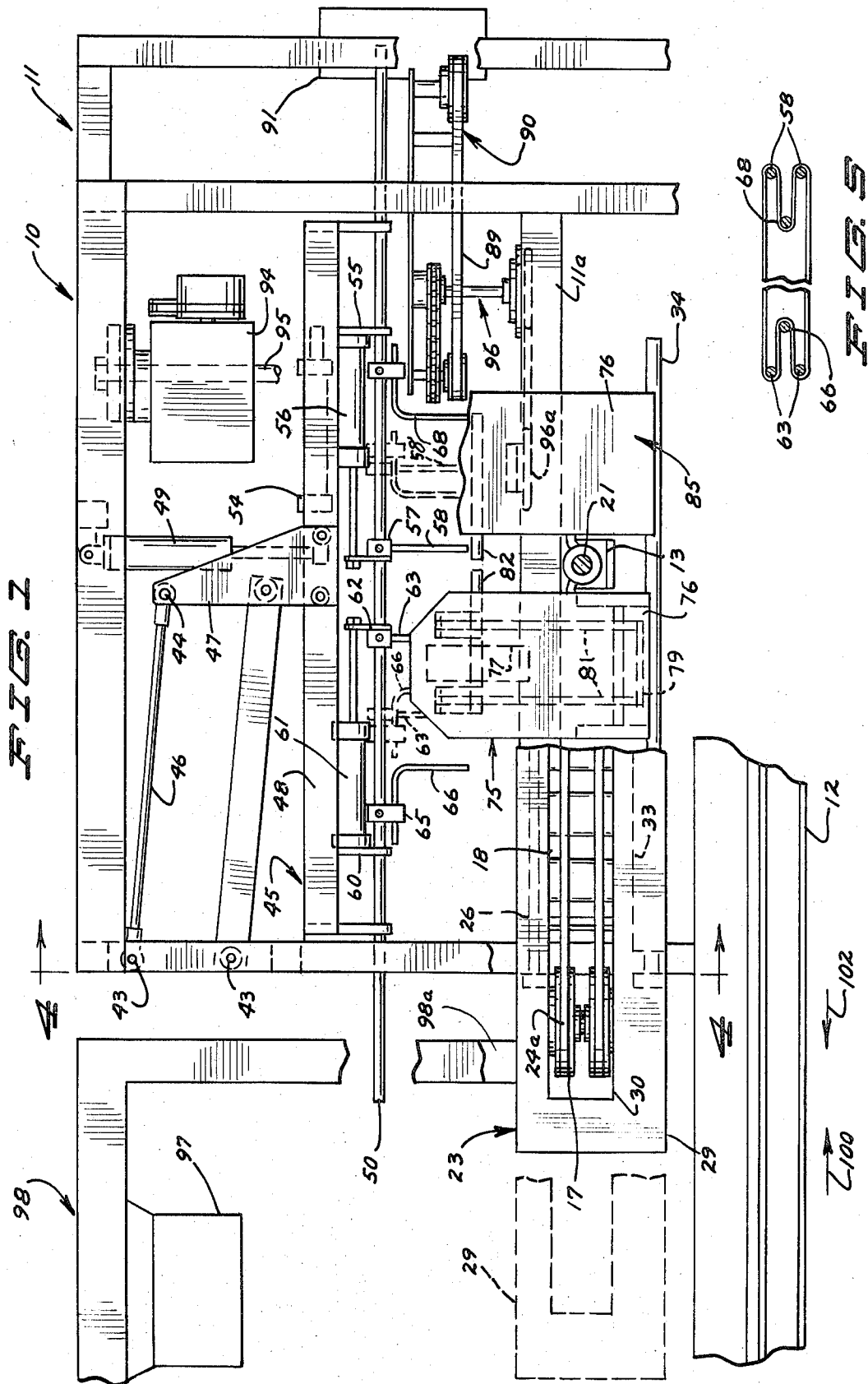
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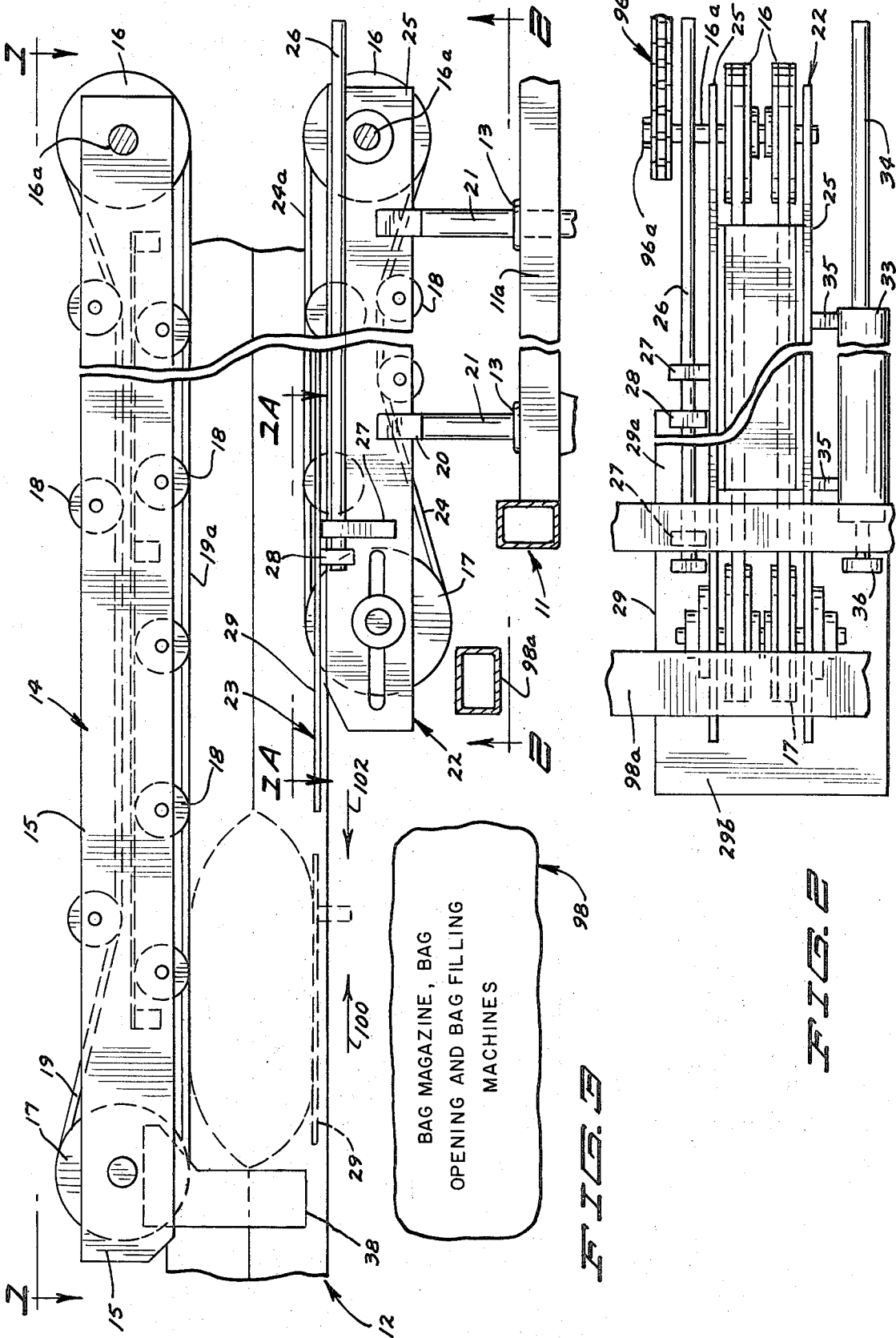
[57] **ABSTRACT**

An automatic bag shaping and bag top forming machine for receiving a filled bag and having horizontally elongated bottom and side endless conveyors with one side conveyor and bottom conveyor extending a substantial distance rearwardly of the other side conveyor, a side conveyor member mounted adjacent the shorter side conveyor for movement between an extended position extending substantially the same distance rearwardly as the longer side conveyor and a retracted position a substantial distance forwardly of the extended position, a bag top forming assembly mounted for vertical and horizontal movement to shape the bag top to form gussets as the bag is being conveyed by the conveyors, a bag top holding assembly for retaining the bag top in a shaped condition as the bag top forming assembly is moved vertically upwardly from the bag top and the bag is being conveyed by the above conveyors to conveyors for the bag top that retains the bag top in a shaped condition as the bag is moved adjacent the sewing machine, and machines for picking up an empty bag and moving the bag above the bottom conveyor when the conveyor member is in its retracted position and filling and depositing the picked up bag on the bottom conveyor when the side conveyor member is in its extended position.

4 Claims, 6 Drawing Figures



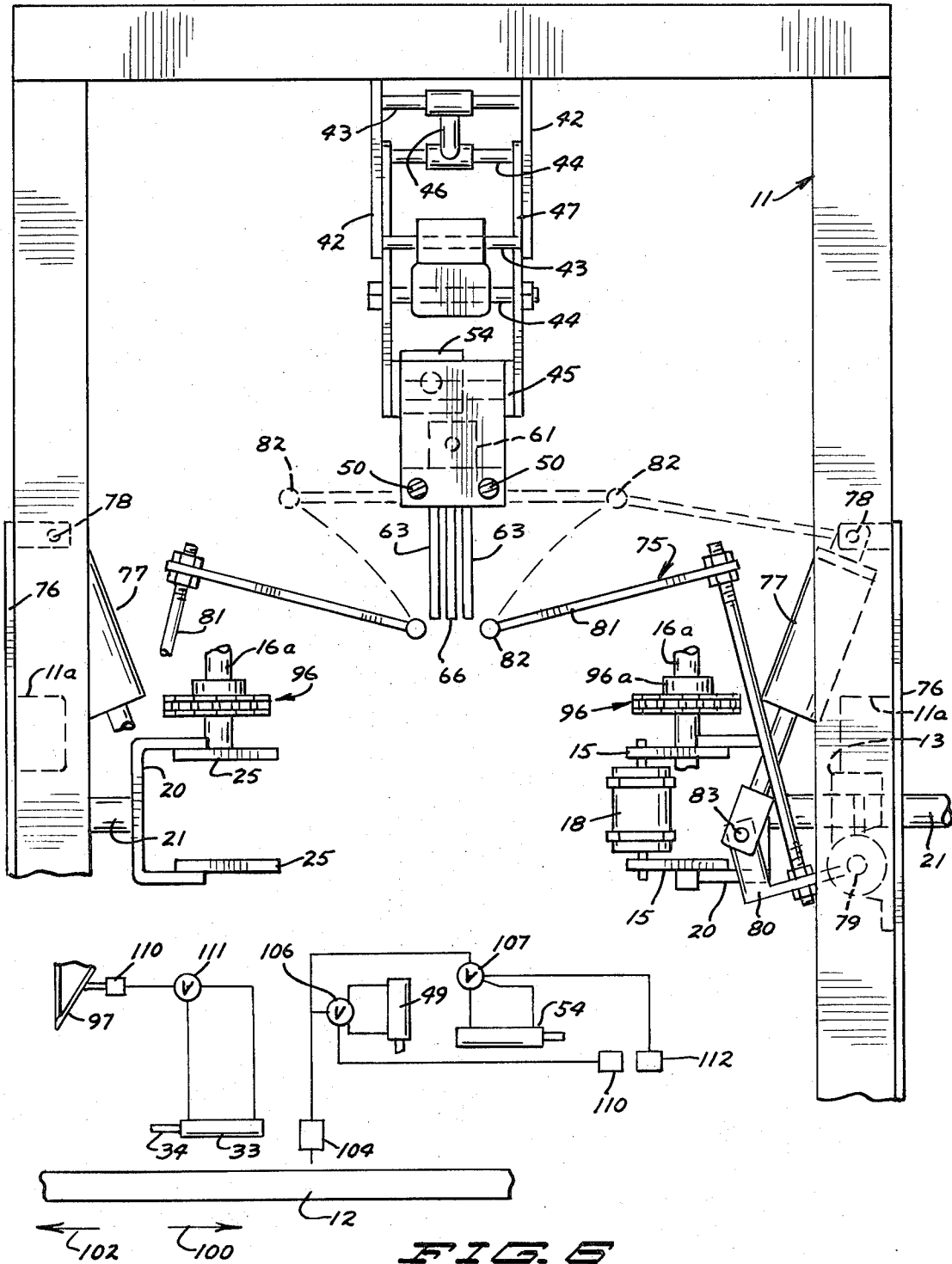




F I O B

F I O B

FIG. 4



AUTOMATIC BAG SHAPING AND BAG TOP FORMING APPARATUS

BACKGROUND OF THE INVENTION

A bag shaping and bag top forming machine having conveyor members for conveying a filled bag and shaping the top of the filled bag for a sewing or taping operation as the bag is being conveyed.

In the prior art it is old to provide machines for forming and shaping bags tops preparatory to sewing, for example, see U. S. Pat. No. 3,167,897 to Hopkins et al. However, with such prior art machines, at times the bags when automatically filled and deposited on the conveyor thereof are overly round, or inclined rearwardly, or bulged so that a proper bag top closure is not formed, or the filled bag falls rearwardly so that its top no longer extends upwardly. In order to overcome problems of the above nature, as well as others, this invention has been made.

One of the objects of this invention is to provide for usage with machinery for automatically picking up an empty bag, fill the bag and drop the filled bag, a bag top forming and shaping machine that includes new and novel apparatus for aiding in shaping a bag as it is filled, and retaining the filled bag in an upright condition as the filled bag is dropped and initially conveyed in a forward direction. In furtherance of the above object, it is another object of this invention to provide new and novel apparatus that provides a structurally free space for swinging an empty bag to a generally vertical position and thereafter at least partially enclosing part of the side and rear portions of the bag as it is filled and dropped preparatory to being conveyed to a bag top shaping operation.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary vertical elevational view of the apparatus of this invention with portions broken away, a portion of said view being generally taken along the line and in the direction of the arrows 1—1 of FIG. 3, and a portion of the view showing the extensible conveyor assembly being generally taken along the line and in the direction of the arrows 1A—1A of FIG. 3; a part of the bag opening and filling apparatus with which this invention is used being partially diagrammatically illustrated;

FIG. 2 is an enlarged fragmentary vertical elevational view generally taken along the line and in the direction of the arrows 2—2 of FIG. 3 of the extensible conveyor assembly with an intermediate part thereof broken away;

FIG. 3 is a top view of the conveyor assemblies of this invention with the extensible conveyor assembly shown in a retracted condition in solid lines and part thereof shown in an extended condition in dotted lines; and diagrammatically indicates in block form the magazine, bag opening and bag filling machines with which the apparatus of this invention is utilized;

FIG. 4 shows a fragmentary transverse elevational view of the bag top shaping assembly, and one of the bag top holding assemblies in a bag top holding position in solid lines, and bag top holding bars in their datum position in dotted lines, said view being generally taken along the line and in the direction of the arrows 4—4 of FIG. 1;

FIG. 5 is a diagrammatic view of the bag top shaping fingers in a position that the bag top has been shaped to provide a gusseted closure preparatory to a bag top sewing or taping operation; and

FIG. 6 is a schematic showing of the hopper spout assembly (turned 90° relative its actual position) of the bag filling machine, and the bottom conveyor assembly, various hydraulic piston cylinder combinations and part of the control circuitry of the apparatus of this invention.

Referring now to the drawings, the apparatus of this invention, generally designated 10, includes a frame generally designated 11. Mounted on the frame 11 to extend longitudinally, including a substantial distance longitudinally rearwardly of the frame is a V-trough conveyor assembly 12. Mounted by the frame to be in part in overhanging relationship to the V-trough conveyor assembly is the first longitudinally elongated side conveyor assembly, generally designated 14. The conveyor assembly 14 includes a pair of spaced horizontal plates 15 that at their one ends mount a drive shaft 16a on which drive rolls 16 are mounted; at their opposite ends mount idler rolls 17; and intermediate the rolls 16, 17, mount back up and tensioning rolls 18. Endless conveyor belts 19 are extended around the rolls 16, 17, 18 to have inner runs 19a in overhanging relationship to one side of the conveyor 12. The plates 15 are mounted in vertical spaced relationship by brackets 20 which in turn are mounted on transverse rods 21 that are mounted by the adjacent longitudinal frame member 11a by mounting members 13. The conveyor assembly 14 extends a substantial distance rearwardly of the frame 11 as will be more fully indicated hereinafter.

The apparatus 10 includes a second side conveyor assembly, that has a conveyor, generally designated 22 and an extension assembly generally designated 23. The conveyor 22 is of substantially the same construction as conveyor assembly 14, other than it does not extend nearly the same distance rearwardly of the frame as assembly 14. The inner runs 24a of the belts 24 of the conveyor 22 are in overhanging relationship to the V-trough conveyor assembly on the side opposite from the inner runs 19a.

The extension assembly 23 includes a longitudinally elongated guide rod 26 that is slidably mounted for horizontal longitudinal movement by a pair of spaced blocks 27 which in turn are mounted by the upper plate 25 of the conveyor 22. Fixedly attached to the guide rod are a pair of longitudinally spaced blocks 28 which in turn are fixedly secured to the upper leg 29a of the longitudinally elongated gate 29. The gate from at least adjacent the rearward end portion thereof to the forward end portion thereof has a generally planar vertical surface facing the conveyor assembly 14, the gate being provided with a horizontally extending cutout 30 that opens forwardly to have the upper and lower inner runs 24a extend therethrough to be slightly more closely adjacent the conveyor assembly 14 than the planar surface of the gate. Thus the gate is of generally U-shaped configuration and has upper and lower legs 29a and a rearward web portion 29b.

A two-way acting, horizontal piston cylinder combination 33, 34 includes a cylinder 33 dependently mounted by the lower plate 25 in a fixed position by a pair of blocks 35. The piston cylinder combination 33, 34 includes a piston rod 34 mounted for longitudinal

movement parallel to the inner runs **24a**, the rear end of the piston rod being fixedly secured to a block **36** that is in turn bolted to the lower leg **29a** of the gate. Through the guide rod and piston cylinder combination the gate is mounted for horizontal movement between a position (solid line position of FIGS. 2 and 3) that the web portion **29b** is closely adjacent and extends rearwardly of the idler rolls **17** of the conveyor **22**; and a second position (dotted line position of FIGS. 2 and 3) that the web portion **29b** extends rearwardly to a location generally transversely opposite the idler rolls **17** of the conveyor assembly **14** and the legs **29a** still extend forwardly of the idler rolls **17** of the conveyor **22**. A bracket **38** is mounted by the plates **15** to extend substantially transversely across the entire width of the V-trough conveyor assembly in overhanging relationship thereto at a location closely adjacent the idler rolls **17** of conveyor **14**; the rearward edge portion of the web **29b** being closely adjacent the bracket when the gate is in its dotted extended condition of FIGS. 1 and 3.

Mounted on the frame **11** above the conveyor assemblies is a bag top shaping assembly, generally designated **45**, that includes parallel linkages **46** having one ends pivotally connected at **43** to plates **42** that are dependently attached to the frame and opposite ends pivotally connected at **44** to brackets **47**. The brackets **47** mount a generally horizontal, longitudinally elongated subframe **48**, a piston cylinder combination **49** having a cylinder pivotally connected to the frame **11** and a piston rod pivotally connected to the subframe for vertically moving the subframe. The subframe dependently mounts a pair of longitudinally elongated horizontal rods **50** for translatable longitudinal slidable movement relative thereto. A two-way acting piston cylinder combination **54** includes a cylinder fixedly mounted by the sub-frame and a piston rod connected to a bracket **55** to move therewith, the bracket **55** in turn being mounted on the rods **50** for moving said rods horizontally therewith. The bracket **55** mounts a cylinder of a two-way acting piston cylinder combination **56** in a fixed position relative thereto, the piston rod of said combination in turn being attached to a mounting member **57** that dependently mounts a pair of transversely spaced fingers **58** to move therewith. The mounting member **57** is mounted on the rods **50** for horizontal slidable movement relative thereto. A bracket **60** is mounted in a fixed position on the rods **50** and in turn mounts a two-way acting horizontal piston cylinder combination **61** that includes a cylinder mounted by the bracket **60** in a fixed position and a piston rod connected to a mounting member **62** for moving the mounting member therewith. The mounting member **62** is slidable mounted on the rods **50** and in turn dependently mounts a pair of transversely spaced depending fingers **63** to move therewith.

A first mounting member **65** is mounted on the rods **50** for movement therewith, the mounting member **65** in turn mounting a finger **66** which has a vertically depending portion. A second mounting member **65** dependently mounts a finger **68** in a fixed position relative the rods **50**. With the piston cylinder combination **54** in its retracted condition of FIG. 1 and the piston cylinder combinations **56**, **61** in their extended conditions of FIG. 1, the fingers **58**, **63** are longitudinally intermediate and substantially spaced from the finger **66** and finger **68** with the finger **66** being substantially rearwardly of the fingers **63** and the finger **68** substantially for-

wardly of the fingers **58**, (fingers in a datum condition relative the subframe). Further fingers **66**, **68** are longitudinally spaced from and transversely intermediate each pair of fingers **63**, **58** as indicated in FIG. 5 which shows the relative location of the fingers in a bag top formed condition that provides gussets in the bag top.

Referring to FIGS. 1 and 4, on each transverse side of the frame **11** on transverse opposite sides of the side conveyors there is mounted a plate **76** of the respective bag top holding assembly **75**. Each bag top holding assembly **75** includes a piston cylinder combination **77** having the cylinder thereof pivotally connected to the adjacent plate **76** by a pivot member **78** and a piston rod pivotally connected at **83** to a bracket **80**. Bracket **80** is pivotally connected at **79** to the adjacent plate. A mounting member **81** has one end attached to the bracket **80** to move therewith and an opposite end connected to a longitudinally elongated holding bar **82**. Members **77-81** mount and move the holding bar between the dotted line elevated position of FIG. 4 that is substantially transversely spaced from the path of travel of the top of a filled bag on the bottom conveyor and a lower transverse inward position to butt against one side of bag top portion of the bag while the fingers in the bag top shaping assembly are in the relative positions shown in FIG. 5. Longitudinally rearwardly of each bag top holding assembly **75** is provided a second bag top holding assembly, generally designated **85**, of the same construction as the bag top holding assemblies **75**. The bars **82** of assemblies **85** extend longitudinally forwardly of the side conveyor assemblies **14**, **22**.

The entry nips of a pair of endless conveyor belts **89** of a conveyor assembly **90** are located adjacent the rearward end portions of the bars **82** of the assemblies **85** and vertically above the bottom conveyor for retaining the bag top in a shaped, closed condition and the bag upright as the bag is conveyed forwardly on the bottom conveyor assembly. The conveyor belts **89** extend up to the conventional bag top sewing machine and/or taping machine **91** for retaining the bag top in a proper condition for the sewing and/or taping operation by the bag top sewing and/or taping machine **91** that may be mounted on frame **11** or on a separate frame **11** (not shown). The bottom conveyor extends beneath the machine **91**.

A motor **94** is mounted on the frame **11** and has a shaft extension **95** that is drivingly connected to the belts **89** and to the sprockets **96a** keyed on shafts **16a** to drive the belts **89**, **19a**, **24a** through drive mechanism, generally designated **96**.

Since the bag magazine, bag opening and bag filling machine, designated **98** may be of the construction described in co-pending application Ser. No. 30,681, filed Apr. 22, 1970 other than the conveyors thereof for carrying the filled bag are not used, the machine **98** will not be described; said pending application being incorporated herein by reference.

In using the apparatus of this invention, at the time the gate **29** is in its solid line retracted position of FIG. 1, an empty bag is removed from the bag magazine of machines **98** and swung upwardly to be clamped onto the hopper spout assembly **97** of the bag filling machine that in part is indicated by reference No. **98** of FIG. 3 in the manner described in said copending application. The bag in being swung up from the bag magazine to

be clamped on hopper 97 is moved through a path of movement that the bag in part crosses between the bracket 38 and the gate 23 at a lower elevation than the top of the gate, the frame 98a of machines 98 mounting the hopper spout assembly above the conveyor 12 rearwardly of frame 11. In a position clamped on the hopper spout 97 of the bag filling machine, the bag depends to a lower elevation than the gate 29, but is vertically spaced from the belts of the V-trough conveyor assembly. As the bag is clamped onto the hopper spout assembly 97, a switch 110 is actuated to operate valve 111 to apply fluid under pressure to the end of the cylinder 33 for moving its piston rod in a direction of arrow 102 toward bracket 38. Prior to the time the charge is dumped into the bag clamped on the hopper spout assembly, the gate 29 is in its extended position whereby the bag side walls extend downwardly intermediate the inner runs 19a and the gate, and the rear edge portion of the bag is adjacent the bracket 38. Thus members 19a, 29 and 38 act to limit the bulging of the bag in horizontal directions therebetween.

After the bag has been filled, the hopper spout mechanism automatically releases the bag to drop it on the bottom conveyor, and at the same time operates switch 110 whereby valve 111 is operated to apply fluid under pressure to the end of the cylinder 33 for moving the piston rod 34 in the direction of arrow 100 at substantially the same rate that the inner runs are moving. The filled bag dropped onto the bottom conveyor is thence conveyed in a forward direction (arrow 100) and the gate moves toward its retracted position preparatory to another empty bag being swung up onto the hopper spout assembly.

As the filled bag moves forwardly, between inner runs 19a, 24a, it contacts a switch member 104 for operating valve 106 for applying fluid under pressure to the upper end of the cylinder 49 for moving the subframe 48 in a downward direction and valve 107 for applying fluid under pressure to the piston cylinder combination 54 for moving the rods 50 in a forward direction at the same rate of speed as the filled bag on the conveyor assembly 12 is being conveyed. As assembly 45 moves downwardly, the fingers 63 and fingers 58 in their most closely adjacent positions are moved downwardly into the bag top and fingers 66, 68 are moved downwardly exterior of the bag. When the assembly 45 is moved to its lowermost position, it operates a switch (not shown) for applying fluid under pressure to cylinders 56, 61 for retracting their piston rods to move the fingers 58, 63 longitudinally away from one another at the same rate of speed. In so moving, the opposite side wall portions of the bag are moved into abutting relationship to fingers 66, 68 respectively whereby the side walls of the bag are drawn taut and together to a position generally indicated in FIG. 5 to form gussets in the end walls. Thereafter, as the bag and the rods 50 move forwardly bracket 55 operates a switch (not shown) to operate valves (not shown) to first operate the cylinders of the assemblies 75 to move the bars 82 thereof to their solid positions on opposite sides of the bag top just after the fingers have moved to FIG. 5 position for retaining the bag top side walls closely adjacent one another in the formed condition; and as the bag is conveyed further forwardly to in part extend between the assemblies 85, the bars 82 of assemblies 85 are moved together. As the bag moves forwardly of the assemblies 75, a switch (not shown) is engaged by the bag whereby

the valve for the cylinders of assemblies 75 return its bars 82 to their datum dotted line positions of FIG. 4. After the bars 82 of assemblies 75 have moved to their bag top holding positions which permits the bag top in the position of FIG. 5, being conveyed therebetween, the bracket 55 operates switch 104 that operates valve 106 to apply fluid under pressure to cylinder 49 for elevating the subframe. Thereafter the bracket 55 engages a switch 112 that operated valve 107 to retract the piston rod of combination 54 and combinations 56, 61 to extend their piston rods. At this time, the bag top moves into the entry nip of the belts 89 to be retained in a closed position as it is moved up to the machine 91 to have the sewing and/or taping operation performed by machine 91; and the bars 82 of the assemblies 85 are thence retracted to datum positions.

We claim:

1. For use with a machine that removes an empty bag from a bag magazine, opens and fills the bag and drops the filled bag; bag shaping and bag top forming apparatus comprising a longitudinally elongated frame having a front end and a rear end, conveyor means mounted on the frame for conveying a filled bag from the rear end to the front end, means mounted on the frame for forming and shaping the bag top of a filled bag on the conveyor means preparatory to forming a bag top closure, said conveyor means including a first side conveyor having an inner run and a second side conveyor transversely spaced from the first conveyor and extending a substantial distance rearwardly of the first conveyor, longitudinally extensible means mounted on the frame adjacent the first conveyor for movement between a first position extending substantially as far rearwardly as the second conveyor and a second position substantially forwardly of the first position to cooperate with the second conveyor to shape the bag as it is being filled and convey the filled bag forwardly, the extensible means comprising a gate member having a generally planar surface parallel to the direction of movement of a bag by the conveyors; said gate member having a cutout providing legs which extend above and below the inner run to have the first conveyor extend through the cut out when the extensible means is in its second position and the inner run extend more closely adjacent the second conveyor than the planar surface, and power means for moving the extensible means to its first position before the bag is being filled and move it toward its second position after the bag is filled.

2. For use with apparatus that moves a bag onto a bag filling machine, fills the bag and thereafter drops the filled bag, conveyor apparatus comprising a longitudinal elongated frame having a rear end portion adjacent the bag filling machine and a front end portion remote therefrom, a longitudinally elongated bottom conveyor mounted on the frame for supportingly carrying a filled bag in forward direction and having a rear end portion extending beneath a portion of a bag filling machine to receive the dropped bag, a first longitudinally elongated endless side conveyor mounted on the frame and having an inner run extending above one side portion of the bottom conveyor, a second longitudinally elongated endless side conveyor mounted on the frame and having an inner run extending above the side portion of the bottom conveyor opposite the first conveyor, said second conveyor having a rear end portion extending rearwardly to a location transversely adjacent the rear portion of the bottom conveyor and the first conveyor

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having a rear end portion sufficiently longitudinally forwardly of the second conveyor rear end portion to permit a bag being moved transversely over the bottom conveyor rear portion while extending to a lower elevation than the top of the first conveyor, a gate movable from a first position extending rearwardly of the first conveyor in overhanging relationship to the bottom conveyor to cooperate with the second conveyor to retain the bag in an upright condition as the bag is dropped on the bottom conveyor rear portion and a second position permitting a bag being moved transversely over the bottom conveyor rear portion while extending to a lower elevation than the top of the first conveyor, and power means mounted on the frame and connected to the gate for moving that gate between its positions; said power means comprising means for translatorily moving the gate between its positions, the second position being substantially longitudinally forwardly of the first position, said power means comprising means for translatorily moving the gate between its positions, the second position being substantially longitudinally forwardly of the first position, the gate having a generally planar surface facing the second conveyor, and that the first conveyor has a longitudinal extending inner run transversely more closely adjacent the second conveyor than said planar surface, said gate having a cutout providing legs above and below the first conveyor when the gate is in its second position.

3. For use with apparatus that moves a bag onto a bag filling machine, fills the bag and thereafter drops the filled bag, conveyor apparatus comprising a longitudinal elongated frame having a rear end portion adjacent the bag filling machine and a front end portion remote therefrom, a longitudinally elongated bottom conveyor mounted on the frame for supportingly carrying a filled bag in a forward direction and having a rear end portion extending beneath a portion of a bag filling machine to receive the dropped bag, a first longitudinally elongated endless side conveyor mounted on the frame and having an inner run extending above one side portion of the bottom conveyor, a second longitudinally

elongated endless side conveyor mounted on the frame and having an inner run extending above the side portion of the bottom conveyor opposite the first conveyor, said second conveyor having a rear end portion extending rearwardly to a location transversely adjacent the rear portion of the bottom conveyor and the first conveyor having a rear end portion sufficiently longitudinally forwardly of the second conveyor rear end portion to permit a bag being moved transversely over the bottom conveyor rear portion while extending to a lower elevation than the top of the first conveyor, said first conveyor being substantially shorter than the second conveyor, and bottom conveyor, a gate movable from a first position extending from adjacent the first conveyor to a location substantially as far rearwardly as the second conveyor and extending rearwardly of the first conveyor in overhanging relationship to the bottom conveyor to cooperate with the second conveyor to retain the bag in an upright condition as the bag is dropped on the bottom conveyor rear portion and a second position substantially longitudinally forwardly of the first position to permit a bag being moved transversely over the bottom conveyor rear portion while extending to a lower elevation than the tops of the first conveyor, said gate having a generally planar surface facing the second conveyor, power means mounted on the frame and connected to the gate for translatorily moving the gate between its positions, and control means for operating the power means to move the gate to its first position after a bag has been moved onto the filling machine and prior to the filling of the bag, and to move the gate towards its second position when the bag is dropped from the filling machine at substantially the same speed as the conveyors move a bag thereon.

4. The apparatus of claim 3 further characterized in that the first conveyor has a rear portion and that said gate means has a front portion that extends forwardly of the first conveyor rear portion when the gate means is in its second position.

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