

PATENT SPECIFICATION

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(54) GROCERY SACK PROCESS AND MACHINE

(71) We, NATIONAL PETRO-CHEMICALS CORPORATION, a corporation organised and existing under the laws of the State of Delaware, United States of America, of 99 Park Avenue, New York, New York 10016, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to bags, e.g. grocery sacks, of plastics material, e.g. high density polyethylene film (HDPE). Paper grocery sacks are used by the billions, but plastics has significant advantages over paper including greater toughness, wet strength and moisture resistance, lighter weight, good appearance and excellent reuse potential.

Grocery sacks of HDPE are known and one such sack is shown in U.S. Patent No. 3,669,347. U.S. Patent No. 3,606,822 discloses a method and apparatus for making such a sack. The problem is in rapidly, continuously, and automatically making such sacks as the prior art involves a sack-by-hand operation which by its nature is slow and consequently uneconomical.

The prior art of making paper bags is ancient and quite well worked, see e.g. U.S. Patent No. 634,081, but the solutions to problems making paper sacks including suitable means for folding, sealing and cutting are not applicable to a similarly constructed bag of plastics such as HDPE, due primarily to the differences in the characteristics of the materials; because HDPE does not seal, cut or fold like paper, machines for making paper bags are presently useless for making sacks or bags of HDPE.

Certain of the advantages offered by thermoplastic materials pose difficulties in bag forming operations, and particularly

folding, in that electrostatic effects may tend to maintain a gusseted web in a flattened condition, and flexural properties increase resistance to fold and crease formation, especially where multiple and complex folds are required to be performed within a small region and at high speed.

The present invention provides a process of forming a bag having a folded bottom from a length of flattened tubular web of thermoplastic material having at each lateral terminus thereof a longitudinal gusset integrally joined to the two faces of the flattened tubular web length along respective first and second longitudinal folds, the web length being open at one end and sealed at the other by a transverse seal, the process comprising engaging the first and second folds adjacent to the sealed end and advancing the engaged portions of said folds longitudinally in the same general direction at respective different speeds so that the sealed end becomes folded to a folded bag bottom; in a preferred form it provides a process of forming bags with folded bottoms, from a flattened tubular web of plastics material having at each lateral terminus thereof a longitudinal gusset integrally joined to the two faces of the flattened tubular web along respective first and second longitudinal folds, wherein said web is fed through a zone in which it is transversely sealed at spaced locations and transversely severed adjacent the sealed portions to form a series of longitudinally disposed sealed web lengths, one extremity thereof being sealed, and a bag bottom is folded into each sealed web length by a process including the steps of separately engaging the first and second longitudinal folds of a sealed web length at spaced points on each side of the sealed web length adjacent the sealed end thereof, causing the engaged portions of the first and second longitudinal folds to move at

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respective different longitudinal speeds in the same general direction so as to form a folded bottom at the sealed end, and releasing the resulting bag. The invention also provides an apparatus for forming bags from a flattened tubular web of plastics material having at each lateral terminus thereof a longitudinal gusset integrally joined to the two faces of the flattened tubular web along respective first and second longitudinal folds, which comprises means for sealing and cutting said web into predetermined lengths sealed at one end thereof; means for advancing said web and said sealed web lengths longitudinally; and means for forming the sealed lengths into bags with folded bottoms comprising first and second gripping means for gripping the first and second folds of each advancing sealed web length respectively, the first gripping means being engageable with the first folds of a sealed web length at a first distance from the sealed end thereof and the second gripping means being engageable with the second folds at a distance from the sealed end substantially equal to or less than the first distance and means for advancing the first and second gripping means in the same general direction as the sealed web length, one at the same speed as the said length and the other at slower speed so that the sealed end becomes folded to form a folded bag bottom.

35 The initial flattened tubular web may be of high density polyethylene film. The invention may provide printed sacks, the surface of the web under controlled tension being treated to receive printing, then aligned prior to printing, and then printed on.

In the preferred practice of this invention the gusseted web which may or may not have printing thereon is fed, with the first longitudinal folds extending below the second, to a sealing, cutting and bottom folding machine wherein it is carried along, e.g. by grasping and forwarding means, such as grippers gripping the lower gusset edges; while travelling, the web is periodically transversely sealed, e.g. by travelling heat seal bars, then cut adjacent the seals, as by a rotary razor blade cutter operating against a soft plastics back-up roller so the cut plastics does not stick together. This provides a series of closely longitudinally spaced sealed web length or sacks closed at one end by the seal. Thereafter, preferably while the individual sacks are still carried by the grippers at the same speed as the web, they may be opened, as by a stream of air, preferably ionised air, to a predetermined limited amount to separate their top and bottom faces and render them susceptible to bottom folding

operations. The opening action also facilitates the presentation of the second (upper) longitudinal folds for grasping action in bottom folding. The bottom of each individual sealed web length or sack is then folded while moving by releasably engaging or gripping the upper (second) and lower (first) longitudinal folds at common or different positions adjacent the sealed end, the engaged portions of the respective longitudinal folds then being caused to move at different longitudinal speeds in the same general direction. Suitably, the sealed end forms the leading section of the sack, and the longitudinal folds are grasped with separate sets of moving grippers which sets travel at different speeds so that the upper folds are pulled back behind the lower folds to create a folded bottom incorporating generally transverse folds and creases adjacent the gripping region. Any air can then be removed from the individual sacks and the sacks flattened or pressed to press in the bottom folds and removed and stacked. The operations can be continuous, automatic and synchronised to produce bags at high speed.

A preferred embodiment of an apparatus and process according to the invention for making grocery sacks will now be described with reference to the accompanying drawings and the drawings accompanying the provisional specification. In the drawings:

Figure 1 is a schematic side elevation illustrating generally the components for carrying out the process.

Figure 2 is a side elevation of the sack sealing, cutting and bottom folding machine for making the grocery sack.

Figure 3 is a top plan view of the machine shown in Figure 2.

Figure 4 is a detail top plan view of a portion of an upper gripper assembly.

Figure 5 is a sectional elevation view taken along lines 5-5 of Figure 4 through an individual gripper.

Figure 6 is a sectional elevation view taken along line 6-6 of Figure 3 showing sack airing means.

Figure 7 is a sectional elevation view taken along line 7-7 of Figure 3 showing web cutting means.

Figure 8 is a sectional elevation view taken along line 8-8 of Figure 3 showing web sealing means.

Figures 9, 10 and 11 are diagrammatic views illustrating schematically the progressive folding of the bottom in the gusseted sack by means of travelling sets of grippers moving at differential speeds.

Figures 12, 13 and 14 are perspective views showing the gusseted web, the sealed and cut web forming a sack, and the completed folded bottom sack respectively.

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Figure 15 is a fragmentary enlarged top plan view partly in schematic of a lower gripper assembly.

Figures 16 and 17 are elevation views taken along line 16-16 of Figure 15, showing two operative positions. Figure 18 is an enlarged perspective view showing the spacer of Figure 15.

Figure 1 illustrates the components for practicing the process of this invention for making a gusseted folded bottom grocery sack from a roll of HDPE in tubular gusseted form such as a gusseted web GW, see Figure 12. The gusseted web is in the form of a flat web with inwardly extending gussets G as shown in Figure 12 and is in the form of a roll 16 or rolls 16, 16' supported on a roll stand 22 with brake means 24 for braking the roll shaft and consequently controlling the tension in the web as it is paid out. A tension sensor 26 for the web feeds back to the brake 24 to control the tension in the web.

A preprinting treatment means such as a flame treating burner 28 is positioned to treat one surface of the web to be printed upon. The gusseted web GW is then aligned by an automatic web guide 30 of the pivoted type controlled by edge sensors 32 which sense the position of the edge of the web and feed back to control the guides 30. The web is then printed upon by a suitable printing press 34 and the gusseted printed web GW leaves the printing press and passes directly into a bag making and bottom folding machine 36. The printing press, web tension control arrangement and other components ahead of the bag making and bottom folding machine are commercially available components which are assembled together as shown.

The bag making and bottom folding machine 36 includes a sealing section 38, a cutting section 40, a bottom folding section 42, which feeds into a collator-stacker 44 adjacent a bundle wrapping and shipping station 46.

Referring now to the bag making and bottom folding machine 36, it is supported on a machine base 48 which can conveniently be a number of separated supports such as legs 50 connected generally across the top by top rails 52. The gusseted web GW (Figure 12) is first transformed into the sealed bottom sack (Figure 13) by sealing and cutting, and then into a folded bottom grocery sack (Figure 14). The gusseted web is fed into the machine 36 by nip rollers 53, which are driven at a speed slightly greater than the speed of the web through the machine in order to remove tension on the heat seals and to compensate for web shrinkage during heat sealing.

The gusseted web, the sealed bottom

sacks and the folded bottom sacks are all carried through the production line of the machine 36 continuously, rapidly and at the same speed by gripping means positioned on each side of the gusseted web GW. These gripping means include side gripper chains 54 carrying openable grippers 56 which first longitudinal folds (sometimes termed herein lower gusset edges) Gel (Figure 12) of the web as it enters the machine at the right hand sides of Figures 2 and 3. Spacer fingers 60, or additional grippers at this position, also enter a gusset of the web. The open grippers are guided onto the lower gusset edges Gel by guides 61 so that one clamp of the gripper is inside the gusset and the other is below the web. The guides 61 also open the gussets G to allow gripper insertion.

The first step in operating on the gusseted web GW is to transversely seal across the web including the gussets while the web is moving and at intervals corresponding to the length of the desired sack. The sealing section 38 accomplishes this sealing with a plurality of transversely extending heat sealing bars 62, Figures 2, 3 and 8, carried by chains 64 trained around sprockets 66 and positioned so that the lower run of the chains carries the bars in contact with the surface of the gusseted web. The sealing section includes lower sealing bars 68, similar to bars 62, which are carried by chains 70, trained around sprockets 72 and driven in synchronism with chains 64. The chains are driven so that the bars travel at substantially the speed of the gusseted web. The sprockets in the sealing mechanism are supported from a superstructure 74 which also supports electrical apparatus (not shown) for applying electrical impulses to either one or both sets of the sealing bars for impulse sealing. The sealing bars 62 and 68 are positioned on the chains so that they coincide to grip the gusseted web between them, see Figures 2 and 8. In order to apply the correct pressure during heat sealing, a pair of adjustable pressing bars 76 are positioned behind at least the top heat sealing bars 62 in order to positively control the position and pressure of these heat sealing bars. Each of the heat sealing bars 62 carries a heatable portion on its outer surface to contact the gusseted web along the area to be sealed. Electrical power for heating the area to be sealed is supplied from a sectionalized bus bar 78, Figure 8, positioned between the pressing bars 76, which bus bar is contacted by brushes 80 carried by the heat sealing bars 62.

Following the application of the heat seal across spaced portions of the gusseted web, the web is cut in synchronism with

the sealing and closely adjacent each seal by cutting means 82, see Figure 2. These cutting means include a rotary cutter knife 84 and a back-up roller 86 positioned on opposite sides of the gusseted web. The rotary cutter knife 84 carries replaceable razor blade strip knives 88 in knife blocks 90 on its periphery, see Figure 7. A drive gear train 92 drives the rotary knife and the back-up roller 86 at the same speed. The back-up roller 86 has a replaceable soft polyurethane coating 94 into which the razor blade knives 88 cut. The arrangement is such that it overcomes a very difficult and basic problem encountered in cutting webs of HDPE 2 or 3 mils thick, namely that of the cut surfaces sticking together after cutting so that the web cannot be easily opened. With the cutting arrangement shown in Figure 7, the web is easily openable to facilitate the folding step so that the upper gusset edges can be gripped.

The opening step is accomplished at an airing station 96, see Figure 3. The airing station includes an air nozzle 98. Figure 6, supported from a transverse support 100 and connected to a suitable source of air under pressure. The tip of the air nozzle is directed toward the open end of the sack which has just been cut and blows onto this end in order to open the sack for subsequent bottom folding. Various means may be used to assist in the aeration of the sack e.g. the bottom surface of the gusseted sack may be held down by a second set of rectangularly shaped lower grippers (not shown) or by vacuum means including a vacuum box 102, Figure 6, connected to a source of vacuum through line 104, over the top of which travels a perforated belt 106 driven by synchronized drive means at the speed of the web carrying chains 54.

In order to control the opening of the sacks to a predetermined amount and have each sack open the same amount, there is positioned a limiter plate 108 at an angle which is shown in Figure 6, which limiter plate is supported from transverse supports 110. When leaving the airing station 96, the sacks are open an amount substantially equal to the distance that the trailing edge 109 of the limiter plate 108 extends above the belt 106.

The aired and slightly open sealed sack then enters the bottom folding station 42 where the second longitudinal folds (sometimes termed herein upper gusset edges) Geu are gripped by upwardly inclined upper gripper assemblies 112, Figures 2 and 3, positioned on each side of the sack, particularly by travelling grippers 114 carried by chains 116 travelling around sprockets 118, see Figures 3 and 4. The

trailing edge 109 of the limiter plate 108 positions the upper gusset edges Geu and guides the grippers 114 into position to grip these gusset edges.

The details of the grippers 114 are shown in Figures 4 and 5 and they can be essentially identical to the grippers 56 for the lower gusset edges, except that they are turned over, i.e. positioned reversely. Each lower gripper 56 shown in Figure 15 may also be fitted with a spacer 162 to open up the gussets so that the upper grippers 114 can properly clamp on to the top portion of the gussets. The upper and lower grippers each comprise a gripper clamp base and a movable clamp foot. Grippers 114 shown in Figures 4 and 5 each include a gripper clamp base 120 and a movable clamp foot 122 movable to the phantom line position shown in Figure 5 for allowing the gripper to open in order that only the clamp base 120 may pass into the gusset of the sack and then the clamp foot 122 may close on the outer surface of the gusset to grip the gusset edge and carry it along. The clamp base 120 is a portion of a member 124 which is secured to the chain 116 by suitable pins 126. The movable gripper clamp foot 122 is attached to a cam follower rod 128 vertically reciprocable in member 124 and biased into clamping position by a spring 130. A cam follower roller 132 is journaled on the end of cam follower rod 128 and is positioned to contact stationary cams 134 on housing 136 at the position where the grippers must open for entering or leaving the gusset. In other words, there are stationary cams 134 on housing 136 for the upper gripper assemblies 112 where the grippers enter and then leave the sack travel path as shown in Figure 3. Similarly, but not shown, there are stationary cams on the surfaces of housings 138 and 140 around the sprockets for chains 54 to cam open the grippers 56 which grip the lower gusset edges Gel. As shown in Figure 15, the lower grippers 56 can comprise base clamp 120 and movable clamp 176 which also serves to support the sack end seal S. Figures 9, 10 and 11 show schematically how the two sets of grippers 56 and 114 grip and fold the bottom of the sack shown in Figure 13 to provide the folded bottom shown in Figure 14. First of all, the chains 116 for the upper gripper assemblies 112 are driven at a slower speed than the chains 54 carrying the lower grippers 56. This differential in speed is indicated by the size of the arrows in Figures 9-11, i.e. the lower grippers 56 travel the fastest. The chains are synchronized so that the grippers 56 and 114 grip the upper and lower gusset edges in the positions shown in Figures 3 and 9, 130

with the upper grippers 114 initially being the leading grippers and gripping adjacent the seal S while the grippers 56 follow and grip at a position adjacent the desired fold line. With the grippers gripping their respective edges as shown in Figure 9, the speed differential causes the upper grippers 114 to lag behind the lower grippers 56 as shown in the progression from Figures 9 to 11. Not only do the upper grippers lag behind in velocity, they also move upwardly relative to the plane of convenience as shown in Figures 9-11, due to the inclined mounting of the gripper assemblies 112, Figure 2.

This movement facilitates opening up and folding over of the bottom of the sack to create a folded bottom FB; the bottom fold is there but is not pressed down as the sack still contains some air from the airing station and HDPE does not fold in the same manner that Kraft paper folds.

The lower grippers may be suitably equipped with ancillary crease forming devices 160 shown in Figures 15, 16 and 17 which trail the lower grippers, engaging the exterior of the upper gusset edges behind the upper grippers and pulling a portion of the sack forwardly and below the folded bottom FB.

Each ancillary crease forming device 160 is hingedly mounted on the undersurface of gripper clamp base 120 by bracket 172 and is actuated by a bellcrank assembly comprised of spring-biased bolt 166, bellcrank 164 pivoted about pivot pin 168 and attached to bracket 172 by linkage 170. Cam follower roller 174 is journaled on the end of bellcrank 172 and positioned to contact a stationary cam (not shown) to effect opening and closing of the crease forming device 160. The crease forming device 160 is mounted so that in the open position, it extends above the upper gusset edges and in the closed position engages the upper surface of the upper gusset edge.

It will be understood that it is preferred, in order to form a so-called square bottomed sack, that the grasping or gripping action be applied by the lower grippers at points removed from the sealed sack end by a distance equal to the inlay dimension (depth) of the gussets to permit the requisite folding action to occur; whereas the upper grippers may grasp the upper edges of the gussets at points adjacent the sealed end and within a distance equal to the inlay dimension of the gussets. In other words, the upper grippers advantageously grasp the sack at points common with the lower grippers or forwardly thereof, preferably at a point in juxtaposition with the sealed extremity. In the event the apparatus is operated in a manner such that the sealed ends of the sacks form the trailing

portions of the sacks, the upper grippers will be caused to proceed at a faster rate than the lower grippers.

To facilitate the formation of regular, uniform folds the upper and lower grippers have their clamp base portions, which are inserted into the gussets, shaped generally as shown in Figures 3 and 4, i.e. triangular in plan (preferably a 45 degree triangle) with the perpendicular portion leading in the upper grippers and trailing in the lower grippers.

Following the bottom folding station, there is a deairing means 142, Figure 3, which in the embodiment shown, is a pair of brushes 144 positioned in a V with the apex of the V leading into the center of the folded bottom. These brushes press on the folded bottom sack and deair it.

Following the deairing means 142, there is a folded bottom pressing means 146, Figure 2. This pressing means includes a center pressing belt 148 trained over suitable rollers 150 and positioned in the center of the folded bottom sack and a pair of edge pressing belts 157 trained over rollers 154 and positioned along the edges of the folded bottom sack above the gussets. These belts are driven at a speed faster than the speed of the chains 54 so the sacks are taken away from the bottom folding station at a speed faster than they are folded and are quickly removed from the grippers as the lower grippers 54 are opened passing around the end sprockets. The folded bottom pressed sacks are now complete and are delivered to the stacker-collater 44 for stacking and collating whereafter they are passed to the wrapping and shipping station 46 for bundling and palletizing for shipment to grocery stores or the like.

A machine constructed in accordance with this invention has successfully formed grocery sacks of 3 mil HDPE with printing thereon at speeds well over 200 sacks/minute.

While the invention has been specifically described in a form suitable for making standard size, folded bottom, grocery sacks of HDPE, it is obvious that it could be used to form similar bags of different sizes and that other plastics material could be utilized instead of HDPE. The terms bag and sack are employed interchangeably herein without reference to differentiation in any trade usage based upon size.

WHAT I CLAIM IS:—

1. An apparatus for forming bags from a flattened tubular web of plastics material having at each lateral terminus thereof a longitudinal gusset integrally joined to the two faces of the flattened tubular web along respective first and second longitudinal folds, which comprises means for

with the upper grippers 114 initially being the leading grippers and gripping adjacent the seal S while the grippers 56 follow and grip at a position adjacent the desired fold line. With the grippers gripping their respective edges as shown in Figure 9, the speed differential causes the upper grippers 114 to lag behind the lower grippers 56 as shown in the progression from Figures 9 to 11. Not only do the upper grippers lag behind in velocity, they also move upwardly relative to the plane of convenience as shown in Figures 9-11, due to the inclined mounting of the gripper assemblies 112, Figure 2.

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portions of the sacks, the upper grippers will be caused to proceed at a faster rate than the lower grippers.

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WHAT I CLAIM IS:—

1. An apparatus for forming bags from a flattened tubular web of plastics material having at each lateral terminus thereof a longitudinal gusset integrally joined to the two faces of the flattened tubular web along respective first and second longitudinal folds, which comprises means for



- sealing and cutting said web into pre-determined lengths sealed at one end thereof; means for advancing said web and said sealed web lengths longitudinally; and
- 5 means for forming the sealed lengths into bags with folded bottoms comprising first and second gripping means for gripping the first and second folds of each advancing sealed web length respectively, the first
- 10 gripping means being engageable with the first folds of a sealed web length at a first distance from the sealed end thereof and the second gripping means being engageable with the second folds at a distance
- 15 from the sealed end substantially equal to or less than the first distance and means for advancing the first and second gripping means in the same general direction as the sealed web length, one at the same speed as the said length and the other at slower speed so that the sealed end becomes folded to form a folded bag bottom.
2. Apparatus according to claim 1
- 25 further including web-length inflating means for directing air into an open end of each cut and sealed web length prior to the bag bottom forming.
3. Apparatus according to claim 2
- 30 further including bag deflating means for deflating the bag following bottom forming, and pressing means for flattening the deflated bag.
4. Apparatus according to any of
- 35 claims 1 to 3 wherein each gripping means includes individually openable and closable travelling grippers mounted for movement along both sides of the path of the sealed web lengths.
- 40 5. Apparatus according to any of claims 1 to 4 including gripper guide and gusset opening means for opening the gussets of the web and guiding the first gripping means into the open gussets.
- 45 6. Apparatus according to claims 4 and 5 wherein the gripper for each first longitudinal fold comprises two portions operable to grip the first longitudinal fold therein and wherein said gripper guide and gusset opening means guide one said portion of the gripper into the gusset and the other said portion of the gripper below the web.
- 50 7. Apparatus according to any of claims 1 to 6 wherein said first gripping means includes spacer means to open said gussets for engagement of the second longitudinal folds by the second gripping means.
- 55 8. Apparatus according to any of claims 1 to 7 wherein the first gripping means travels at the same speed as the web lengths.
- 60 9. Apparatus according to any of claims 1 to 8 wherein said first gripping means includes trailing crease-forming devices for engaging the second longitudinal folds behind the second gripping means.
10. A process of forming a bag having a folded bottom from a length of flattened tubular web of thermoplastic material having at each lateral terminus thereof a longitudinal gusset integrally joined to the two faces of the flattened tubular web length along respective first and second longitudinal folds, the web length being open at one end and sealed at the other by a transverse seal, the process comprising engaging the first and second folds adjacent to the sealed end and advancing the engaged portions of said folds longitudinally in the same general direction at respective different speeds so that the sealed end becomes folded to a folded bag bottom.
11. A process of forming bags with folded bottoms, from a flattened tubular web of plastics material having at each lateral terminus thereof a longitudinal gusset integrally joined to the two faces of the flattened tubular web along respective first and second longitudinal folds, wherein said web is fed through a zone in which it is transversely sealed at spaced locations and transversely severed adjacent the sealed portions to form a series of longitudinally disposed sealed web lengths, one extremity thereof being sealed, and a bag bottom is folded into each sealed web length by a process including the steps of separately engaging the first and second longitudinal folds of a sealed web length at spaced points on each side of the sealed web length adjacent the sealed end thereof, causing the engaged portions of the first and second longitudinal folds to move at respective different longitudinal speeds in the same general direction so as to form a folded bag bottom at the sealed end, and releasing the resulting bag.
12. A process according to claim 11 wherein the first longitudinal folds are engaged at a distance from the sealed end approximately equal to the gusset depth, and the second longitudinal folds are engaged at points within said distance from the sealed end.
13. A process according to claim 11 wherein the first and second longitudinal folds are engaged at a distance from the sealed end approximately equal to the gusset depth.
14. A process according to any of claims 11 to 13 wherein prior to being engaged for folding, the sealed web length is flexed to render it more readily susceptible to the folding operation.
15. A process according to claim 14 wherein the web length is flexed by airing.
16. A process according to any of claims 11 to 15 wherein the engaged por-



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tions of the first and second longitudinal folds are caused to move in planes spaced from one another.

17. A process according to claim 11 wherein the web and sealed web lengths are advanced longitudinally with the first longitudinal folds extending below the second and including the steps of: severing said web adjacent and forwardly of the sealed portions to form the series of discrete sealed web lengths, the leading ends thereof being sealed; engaging by releasably gripping the first longitudinal folds of each sealed web length, sequentially, at a distance from the sealed end substantially equal to the gusset depth and transporting said sealed web lengths thereby into a folding zone at a first speed; engaging by releasably gripping the second longitudinal folds of each sealed web length, sequentially, directly adjacent the sealed end thereof, and forwarding said gripped portions of the second longitudinal folds at a second speed slower than the first speed, whereby transverse folds are formed in each face and gusset of each sealed web length adjacent the gripping region to define a folded bag bottom therein; and then releasing the longitudinal second folds of each resulting bag, transporting the latter sequentially to a pressing station, and there pressing the folds in the bags.

18. A process according to claim 11 including the steps of:

- a) controllably feeding the web to a sealing zone at a feeding speed;
- b) heat sealing the moving web across the width of the web while advancing it at a speed slightly less than the feeding speed so that the seals are not torn apart;
- c) transversely cutting the web in synchronism with and adjacent the seals to create individual sealed web lengths;
- d) moving the individual sealed web lengths through airing opening, bottom folding, and de-airing zones;
- e) controlledly opening the individual

sealed web lengths by blowing air into them as they move through the airing zone;

f) folding the bottoms of the individual sealed web lengths as they move through the folding zone by gripping the second longitudinal folds of the sealed web lengths and moving the gripped portions of the second longitudinal folds forward at a slower speed than the first longitudinal folds;

g) removing the air from the resulting individual folded bottom bags as they move through the de-airing zone;

h) taking away the individual folded bottom bags from the de-airing zone and simultaneously pressing the bottom fold therein.

19. A process according to claim 17 wherein each sealed web length is at least partially inflated prior to effecting the bottom folding thereof.

20. Apparatus for forming bags, the apparatus being substantially as hereinbefore described with reference to the drawings accompanying the provisional specification.

21. Apparatus for forming bags, the apparatus being substantially as hereinbefore described with reference to the drawings accompanying the provisional specification and the accompanying drawings.

22. A process for forming bags, the process being substantially as hereinbefore described with reference to the drawings accompanying the provisional specification.

23. A process for forming bags, the process being substantially as hereinbefore described with reference to the drawings accompanying the provisional specification and the accompanying drawings.

24. A bottom-folded gusseted bag obtained by a process according to any of claims 11 to 19, 22 and 23.

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