A bag packaging method by which a mouth portion of a thin plastic-made bag filled with articles can be sealed without creases is provided. While a bag 4 filled with articles is conveyed by a blade conveyor 6, at position opposed to a sirocco fan 13, air is blown from the sirocco fan 13 toward a mouth of the bag so that the mouth portion of the bag 4 is opened. Two mouth spreader bars 20 are moved to position in front of the bag 4 so opened. The mouth spreader bars 20 having an interval between them narrowed are inserted into the bag 4. Then, the mouth spreader bars 20 have the interval widened and are retracted. Thereby, the mouth portion is spread flat. Narrowing and widening of the mouth spreader bars 20 are done by cam followers 24 engaging with different cams while moving forward and backward. The mouth portion of the bag 4 spread flat is pinched and sealed by a sealer without generation of creases and folded and bound by a binder 60.
BAG PACKAGING METHOD

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to a bag packaging method for producing a bag package of articles by sealing a mouth portion of a thin soft plastic bag filled with articles.

[0003] 2. Description of the Prior Art

[0004] A bag packaging method for producing a bag package by filling articles in a plastic-made bag and then sealing a mouth portion of the bag is widely practised. However, while such a bag packaging method is carried out for packaging using a thick and comparatively strong plastic bag, under the present circumstances, such method is not practically used for packaging using a thin soft plastic bag.

[0005] The reason therefore is that once the thin soft plastic bag is filled with articles, even if the mouth portion thereof is desired to be sealed, the bag is very soft and weak so that it is extremely difficult to seal the mouth portion without generation of creases.

[0006] For example, in a marketed package using a thin plastic bag filled with sliced bread, buns, cookies or the like, the bag mouth portion is not sealed but, in many cases, the mouth portion is folded and bound being fitted with a plastic-made clip or being simply wound with a tape or cord.

[0007] Thus, as the mouth portion of the bag package using the thin plastic bag is not tightly closed by sealing, there is a problem that sweet smells come out of the bread or the like in the bag so that small insects are induced to enter the bag or dusts may come into the bag in the course of distribution. Especially, while such small insects or dusts stick to the mouth portion of the bag, if the clip or tape binding the mouth portion is detached, there is a large possibility that the insects or dusts come into the bag.

[0008] In order to avoid the above-mentioned problem, when the sliced bread or the like is put into the thin plastic bag, the mouth portion thereof is preferable to be sealed. However, the mouth portion of the bag is too weak to keep standing or, even if it is laid down, it is hardly spread flat without generation of creases. Hence, sealing of the mouth portion is difficult. Even if the sealing is done, creases are generated so that commercial value of the packaged articles will be largely reduced.

[0009] Recently, there is seen such a bag package as is made so that the mouth portion of the thin plastic bag filled with sliced bread or the like is once sealed and then bound by tape or cord. However, in such sealing of the mouth portion, there are seen many shortcomings such that many creases are generated in the sealed portion of the bag mouth portion and heating for the sealing is not uniformly done because of the creases of the sealed portion so that the sealed portion may partially melt to be broken or the mouth portion may open because of the insufficient sealing.

SUMMARY OF THE INVENTION

[0010] In view of the problems in the prior art, it is an object of the present invention to provide a bag packaging method by which a mouth portion of a thin plastic bag filled with articles to be packaged can be beautifully, securely and stably sealed without generation of creases.

[0011] In order to achieve the above-mentioned object, the present invention provides a bag packaging method comprising the steps of: while conveying a bag filled with articles and placed on a carrier conveyor, blowing air toward a mouth of the bag to thereby open a mouth portion of the bag; causing two mouth spreader bars to have an interval between them narrowed by a cam follower, provided on each of the mouth spreader bars, engaging with a cam; inserting the mouth spreader bars having the interval so narrowed into the bag having the mouth so opened; causing the mouth spreader bars to have the interval laterally widened by the cam follower engaging with another cam to thereby spread the mouth portion of the bag flat; retracting the mouth spreader bars having the interval so widened; and then causing a sealer to pinch and seal the mouth portion of the bag so spread flat.

[0012] According to the bag packaging method of the present invention, while the bag filled with articles is placed on the carrier conveyor and is being conveyed, air is blown toward the mouth of the bag and thereby the mouth portion of the bag is opened. Then, the two mouth spreader bars having the interval between them narrowed are inserted into the bag having the mouth so opened. By the mouth spreader bars having the interval laterally (horizontally) widened, the mouth portion of the bag is also laterally spread. Thus, the mouth portion of the bag filled with the articles is spread flat. This mouth portion of the bag so spread flat is pinched and sealed by the sealer. Hence, the mouth portion of the bag is beautifully sealed without generation of creases and a tight seal is realized.

[0013] In the bag packaging method according to the present invention, each of the mouth spreader bars comprises the cam follower and when the mouth spreader bars move forward and backward relative to the mouth of the bag, the cam follower engages with different cams so that the mouth spreader bars can simply and quickly have the interval between them laterally narrowed and widened, respectively. Thus, the insertion of the mouth spreader bars having the interval narrowed into the mouth portion of the bag and the retraction of the mouth spreader bars having the interval widened from the mouth portion of the bag can be quickly done and the bag packaging velocity can be largely increased.

[0014] In this way, according to the bag packaging method of the present invention, even if the bag is made of a very thin and weak plastic film, the mouth of the bag can be securely opened and by the mouth spreader bars inserted thereinto, the mouth portion of the bag is spread flat and can be securely and quickly sealed without generation of creases.

[0015] In the bag packaging method according to the present invention, it is preferable that an air squeezer pushes the mouth portion of the bag spread flat by the mouth spreader bars and this bag is moved relative to the air squeezer so that air existing between the mouth of the bag and the articles filled in the bag is squeezed to be discharged outside and then the sealing of the mouth portion is carried out. By so doing, there remains no surplus air in the bag after sealed and this contributes to maintaining the articles in the bag fresh.
In this case, if the relative movement of the bag and air squeezer for discharging air is done by the retraction action of the mouth spreader bars inserted into the mouth portion of the bag and having the interval widened as well as by pushing out of a bottom portion of the bag for moving the bag, it is preferable because the air discharge can be done by the simple structure without providing complicated devices that would otherwise be needed for moving the bag and/or air squeezer for discharging air.

Also, in the bag packaging method according to the present invention, it is preferable that an air suction pipe is inserted together with the mouth spreader bars into the bag having the mouth opened so that air in the bag having the mouth portion spread flat by the mouth spreader bars is sucked out by the air suction pipe to be discharged outside and then the sealing of the mouth portion is carried out. Thereby, no surplus air remains in the bag and this contributes to maintaining the articles in the bag fresh.

**BRIEF DESCRIPTION OF THE DRAWINGS**

[0018] FIG. 1 is a plan view showing a construction of a bag packaging apparatus in which the bag packaging method of the present invention is applied to packaging of sliced bread.

[0019] FIG. 2 is a cross sectional view taken on line A-A of FIG. 1.

[0020] FIG. 3 is a cross sectional view taken on line B-B of FIG. 1.

[0021] FIG. 4 is an explanatory view showing a construction and function of mouth spreader bars used at position C-C of the apparatus of FIG. 1, wherein (a) shows a state that the mouth spreader bars spread a mouth portion of the bag and (b) shows a state that the mouth spreader bars have an interval between them narrowed.

[0022] FIG. 5 is an explanatory view of widening and narrowing actions of the mouth spreader bars in the order of state (a) to state (c).

[0023] FIG. 6 is an explanatory view of a construction and function of a pusher bar arranged being opposed to the mouth spreader bars in the order of state (a) to state (d).

[0024] FIG. 7 is a cross sectional view taken on line D-D of FIG. 1.

[0025] FIG. 8 is a side view showing another example of a carrier belt conveying the mouth portion of the bag.

**DESCRIPTION OF THE PREFERRED EMBODIMENTS**

Herebelow, the present invention will be concretely described based on an embodiment, as illustrated, in which the bag packaging method according to the present invention is applied to packaging of sliced bread using a thin plastic bag.

FIG. 1 is a plan view showing a construction of a bag packaging apparatus in which the bag packaging method of the present invention is applied to packaging of sliced bread. There, numeral 2 designates a feed conveyor by which a bag 4 from the previous filling step, filled with sliced bread 1 and having its mouth portion to be sealed, is conveyed in the direction of arrow 3, wherein the mouth portion is directed toward the upstream side. Numeral 6 designates a blade conveyor as a carrier conveyor on which the bag 4 filled with the sliced bread 1 is placed to be conveyed. Thus, the bag 4 that has been conveyed by the feed conveyor 2 is further conveyed in the direction of arrow 5, wherein the bag 4 has the mouth portion transversely directed relative to the direction of arrow 5.

Numerals 7 designates a guide. When a bottom portion of the bag 4 having the sliced bread 1 conveyed by the feed conveyor 2 abuts on the guide 7, as shown in FIG. 2, the guide 7 functions to guide the bag 4 having the sliced bread 1 to be conveyed by the blade conveyor 6. Numerals 10 and 11 designate endless belt conveyors on which the mouth portion of the bag 4 is placed to be conveyed at the same velocity as the portion of the bag 4 where the sliced bread 1 is filled.

Incidentally, in order for the mouth portion of the bag 4 placed on the belt conveyors 10, 11 to be made flat so that a mouth opening of the bag, as will be described later, is smoothly carried out, it is preferable that a blower 8 for blowing air is provided above the belt conveyors 10, 11 to thereby press the mouth portion of the bag 4 against the belt conveyors 10, 11.

The belt conveyors 10, 11 are made preferably, but not limited to, of a material having an adhesive nature relative to the plastic-made bag (so that the thin plastic bag is kept adhering) and silicone belts, urethane belts or the like can be named. The belt conveyors 10, 11 are provided extending in parallel to each other with an interval maintained between them so as to run in the direction of arrows 12. A position relation of the feed conveyor 2, blade conveyor 6, guide 7 and bag 4 having the sliced bread 1 at a cross sectional position along line A-A of FIG. 1 is shown in a cross sectional side view of FIG. 2.

In FIG. 1, numeral 13 designates a sirocco fan arranged having its air blowing port directed to the mouth of the bag 4 having the sliced bread. While the bag 4 having a bottom face of the mouth portion placed on the belt conveyors 10, 11 is being conveyed, when the mouth of the bag 4 comes to the position in front of the sirocco fan 13, air is blown from the sirocco fan 13 toward the mouth so that the mouth portion of the bag 4 is opened, as shown in FIG. 3. In FIG. 3, numeral 14 designates an air cylinder that moves an air shutter 15 so that the air from the sirocco fan 13 is blown toward the mouth of the bag 4 or the air blowing is shut off.

When the mouth portion of the bag 4 is conveyed to the position opposed to the sirocco fan 13, air from the sirocco fan 13 that has been stopped to be blown until that time by the air shutter 15 is blown toward the mouth of the bag 4. It is to be noted that the air cylinder 14 operates the air shutter 15 in such way that as soon as the mouth opening action is completed with respect to one bag 4, the air blowing is shut off. Thereby, the mouth portion of the bag 4 before the mouth opening and after the mouth opening is prevented from being deformed by the air blowing from the sirocco fan 13 or the mouth that is already opened is prevented from being closed.

When the bag 4 is in the state that the bag 4 is in front of the sirocco fan 13, air is blown from the sirocco fan 13 toward the mouth of the bag 4 and the mouth portion of
the bag 4 is opened, mouth spreader bars 20 are moved to the position of that state, as shown by arrow 35, and are inserted into the bag 4 that is opened by the air blowing from the sirocco fan 13, as mentioned above. While the mouth spreader bars 20 inserted into the bag 4 are carrying out a mouth portion spreading action, as will be described later, the mouth spreader bars 20 together with the bag 4 are returned to position C-C, as shown by arrow 36.

[0034] Next, the mouth spreader bars 20 will be described. The mouth spreader bars 20 comprise a pair of bars 20. In FIG. 4 showing details thereof, the respective mouth spreader bars 20 are pivotally arranged around a pivotal center 21, as shown by arrow 22, and a spring 23 is provided at position below the pivotal center 21 so that the respective mouth spreader bars 20 are pulled toward each other. The mouth spreader bars 20 have their proximal ends fitted with cam followers 24 and when the mouth spreader bars 20 are advanced in the direction of arrow 25 and retracted in the direction of arrow 26, the cam followers 24 are moved along cam faces, as will be described later.

[0035] Numeral 28 designates an air cylinder that moves a piston bar 29 forward and backward. The piston bar 29 has its distal end fitted with a lateral bar 30. The lateral bar 30 has its both end portions pivotally connected to the pivotal centers 21 of the mouth spreader bars 20.

[0036] C1 designates advance cams along which the cam followers 24 are guided when the mouth spreader bars 20 are advanced in the direction of arrow 25. C2 designates a retraction cam along which the cam followers 24 are guided when the mouth spreader bars 20 are retracted in the direction of arrow 26.

[0037] The retraction cam C2 is formed by a rectangular plate and the cam followers 24 are guided along both side faces of the retraction cam C2. Each of the advance cams C1 is constructed by two portions, one being a cam portion 32 that does not move being fixed to a machine frame or the like, the other being a cam portion 31 that is pivotally provided around a pin 34 provided at a rear end of the cam portion 32. The cam portion 31 is pulled toward the air cylinder 28 by a spring 33 to be so urged that an end of the cam portion 31 on the opposite side of the pivotal center of the pin 34 abuts on a side face of the retraction cam C2.

[0038] Next, function of the mouth spreader bars 20 narrowed and widened by the cams C1, C2 will be described with reference to FIG. 5.

[0039] In state (a) of FIG. 5, the piston bar 29 is retracted by the air cylinder 28 so that the mouth spreader bars 20 are on a retracted position, the cam followers 24 of the mouth spreader bars 20 abut on the side faces of the retraction cam C2 and the mouth spreader bars 20 have an interval between them widened. In state (b) of FIG. 5, the piston bar 29 is slightly elongated from the state (a) so that the cam followers 24 begin to ride on the cam portions 31 of the advance cams C1 from the side faces of the retraction cam C2 and the mouth spreader bars 20 begin to be narrowed. As the piston bar 29 is further elongated and the cam followers 24 are moved on the cam portions 31, an interval between distal ends of the mouth spreader bars 20 is narrowed corresponding to the position on inclination of the cam portions 31. When the cam followers 24 are moved onto the cam portions 32, arranged in parallel to each other, from the cam portions 31, the interval between the distal ends of the mouth spreader bars 20 is further narrowed, as shown in state (c) of FIG. 5. The mouth spreader bars 20 having their distal ends so narrowed are advanced in the direction of arrow 25 to be inserted into the mouth portion of the bag 4 that is opened by the air blowing from the sirocco fan 13, as mentioned above.

[0040] In state (d) of FIG. 5, the piston bar 29 is further elongated, the cam followers 24 are disengaged from the mutually parallel cam portions 32 and further from the advance cams C1 and abut on the side faces of the retraction cam C2 and the distal ends of the mouth spreader bars 20 are kept widened by the cam C2 and spring 23. Thereby, the mouth portion of the bag 4 is laterally (horizontally) spread flat. Then, as shown by state (e) of FIG. 5, the piston bar 29 is retracted in the direction of arrow 26 and the mouth spreader bars 20 kept widened by the cam followers 24 abutting on the side faces of the retraction cam C2 are also retracted. Thus, the mouth spreader bars 20 are returned to the state (a) of FIG. 5. By these movements, the mouth portion of the bag 4 is laterally spread to be formed flat. Thereafter, the same actions are repeated.

[0041] When the cam followers 24 abutting on the side faces of the retraction cam C2 are to be retracted, the cam portions 31 of the advance cams C1 are rotationally lifted around the pin 34 against an activating force of the spring 33, as shown by broken lines of the state (e) of FIG. 5, and thus the cam followers 24 keeping abutting on the side faces of the retraction cam C2 can be retracted without being influenced by the cam portions 31.

[0042] In this way, the cam followers 24 engage with different cams between the advancing time and retracting time and thereby both of the narrowing action of the mouth spreader bars 20 to be inserted into the bag and the widening action of the mouth spreader bars 20 necessary for laterally spreading the mouth portion of the bag can be quickly carried out.

[0043] As described above, by being moved forward and backward (in the directions of arrows 25, 26) relative to the mouth of the bag 4 having the sliced bread, the respective mouth spreader bars 20 are displaced, as shown by arrow 22, so that the interval between the two mouth spreader bars 20 is narrowed and widened. When the mouth spreader bars 20 come to the position in front of the sirocco fan 13, as shown by arrow 35 (FIG. 1), the mouth spreader bars 20 having the interval between their distal ends narrowed, as shown by (b) of FIG. 4 or (c) of FIG. 5, are inserted into the bag 4 having the mouth largely opened by the air blowing by the sirocco fan 13, as shown in FIG. 3. Then, while the mouth spreader bars 20 together with the bag 4 are being moved, as shown by arrow 36 (FIG. 1), the cam followers 24 engage with the side faces of the cam C2. Thereby, the mouth spreader bars 20 have the interval of their distal ends widened, as shown by (a) of FIG. 4 or (d) of FIG. 5, and the mouth portion of the bag 4 is laterally spread. In this state, the mouth spreader bars 20 are retracted in the direction of arrow 26 to be drawn out of the bag 4.

[0044] At position C-C of FIG. 1, an air squeezer 41 is provided to be moved up and down. As shown in FIG. 1 or (a) of FIG. 4, when the air squeezer 41 is moved down, it slightly pushes down the mouth portion of the bag 4 that has been spread flat by the mouth spreader bars 20. While the air
squeezer 41 is moved down, when the mouth spreader bars 20 having their distal ends widened, as shown in (a) of FIG. 4, are retracted in the direction of arrow 26 to be drawn out of the bag 4, the bag 4 having the sliced bread is pulled to be moved in the direction of arrow 42. By this movement of the bag 4, air in a non-filled space 43 of the bag 4 is squeezed to be discharged outside by the air squeezer 41 that is stopped at that time.

[0045] On the other hand, at position C-C of FIG. 1 opposed to the mouth spreader bars 20, an air cylinder 44 comprising a pusher bar 45 is provided. When the pusher bar 45 is pushed out by the air cylinder 44, a bottom of the bag 4 having the sliced bread is pushed out toward the mouth spreader bars 20. Operation of the pusher bar 45 to push the bottom of the bag 4 is synchronized with the action of the mouth spreader bars 20 to pull the bag 4 in the direction of arrow 26, as described with respect to FIG. 4, so that the above-mentioned action to squeeze the air in the bag 4 by the air squeezer 41 is assisted.

[0046] The air squeezing action of the air in the bag 4 by the mouth spreader bars 20, air squeezer 41 and pusher bar 45 is shown in FIG. 6. In state (a) of FIG. 6, the mouth spreader bars 20 having their distal ends narrowed are moved in the direction of arrow 35 to the position in front of the bag 4 having the mouth opened by the sirocco fan 13 and are inserted into the bag 4. In state (b) of FIG. 6, the mouth spreader bars 20 inserted into the mouth portion of the bag 4 have their distal ends widened. In state (c) of FIG. 6, the mouth spreader bars 20 having their distal ends fully widened are moved in the direction of arrow 36 and returned to the position C-C of FIG. 1. As the mouth spreader bars 20 having their distal ends widened are retracted, the bag 4 is pulled and, at the same time, the bottom of the bag 4 having the sliced bread is pulled toward the mouth spreader bars 20 by the pusher bar 45 pushed out by the air cylinder 44. By these movements, the air in the bag 4 is squeezed by the air squeezer 41 to be discharged out of the mouth portion of the bag 4.

[0047] In state (d) of FIG. 6, the air discharge from the bag 4 is completed, the air cylinder 44 is retracted in the direction of arrow 25 and the mouth spreader bars 20 are about to be drawn out of the bag 4.

[0048] Now, returning to FIG. 1, numeral 50 designates a sealer comprising an air cylinder 51 moving the sealer 50 up and down and sealer receiver 52, as shown in FIG. 7. Numeral 53 designates an endless belt provided above the belt conveyors 11 so as to be moved at the same velocity and in the same direction as the belt conveyors 11. The mouth portion of the bag 4 spread flat on the belt conveyors 10, 11 by the mouth spreader bars 20 is pinched between the endless belt 53 and belt conveyors 11 and, while maintained flat, is sealed by the sealer 50.

[0049] Sealing of the mouth portion of the bag 4 is carried out while the bag 4 placed on the belt conveyors 10, 11 is being conveyed. Hence, the sealer 50 and sealer receiver 52, while effecting the sealing action of the mouth portion of the bag 4 pinched between the sealer 50 and sealer receiver 52, move at the same velocity as the bag 4 and, upon completing the sealing, loosen the pinching of the bag 4 and quickly return to the original position. These movements are repeated. This type of sealer is generally known. As an appropriate sealer of known construction can be used for practicing the present invention, description thereof will be omitted.

[0050] Numeral 54 designates a sealed portion of the bag 4 and numeral 60 a binder. The binder 60 functions to fold and bind the sealed portion of the bag 4 having the mouth portion sealed, as mentioned above. As the binder 60, an appropriate binder of known construction can be used for practicing the present invention, description thereof will be omitted.

[0051] According to the bag packaging apparatus of the construction as illustrated, the bag 4 filled with the sliced bread is sealed to be packaged, as follows. That is, as shown in FIG. 1, when the bag 4 having therein the sliced bread 1 is conveyed in the direction of arrow 5 by the blade conveyors 6 and comes to position B-B where the sirocco fan 13 is arranged, air blowing is effected from the sirocco fan 13 toward the mouth of the bag 4 placed on the belt conveyors 10, 11. Thereby, the mouth of the bag 4 is opened, as shown in FIG. 3. When the mouth spreader bars 20 having their distal ends narrowed, as shown by (b) of FIG. 4, are moved, as shown by arrow 35, to the position of the bag 4 where the mouth is opened by the air blowing from the sirocco fan 13, as shown in FIG. 3, the mouth spreader bars 20 are inserted into the mouth portion of the bag 4. The mouth spreader bars 20 having their distal ends laterally (horizontally) widened by the cam followers 24 engaging with the cam C2, as shown by (d) of FIG. 5, are moved in the direction of arrow 36 together with the bag 4 and are returned to the position C-C of FIG. 1.

[0052] When the mouth spreader bars 20 together with the bag 4 come to the position C-C of FIG. 1, the air squeezer 41 is moved down and slightly pushes down the mouth portion of the bag 4. Then, the mouth spreader bars 20 having their distal ends widened are retracted. Thereby, as shown by (a) of FIG. 4, the mouth portion of the bag 4 is spread flat and the bag 4 is pulled toward the mouth spreader bars 20. Narrowing and widening of the interval between the two mouth spreader bars 20 are as described with respect to FIG. 5.

[0053] As soon as the mouth spreader bars 20 are retracted, the air cylinder 44 is elongated and the pusher bar 45 pushes out the bottom of the bag 4. This action is sequentially shown by (e) and (d) of FIG. 6. Thereby, the bag 4 having therein the sliced bread 1 is moved in the direction of arrow 42, as shown in FIG. 4, and the air in the non-filled space 43 in front of the sliced bread 1 in the bag 4 is squeezed by the air squeezer 41 to be discharged outside.

[0054] In this way, the mouth portion of the bag 4 spread flat on the belt conveyors 10, 11 are pinched and sealed between the sealer 50 and sealer receiver 52 so that the sealed portion 54 is securely formed air tight. The bag 4 together with the sliced bread so sealed is sent to the binder 60 and the portion on the mouth side of the bag is appropriately folded and bound.

[0055] Sealing of the bag 4 by the sealer 50 is preferable to be so made that while the sealing of the mouth portion of the bag 4 is achieved sufficiently tight by adhesion, when a consumer wants to take out the packaged sliced bread, the sealing can be easily peeled off by hand. One example of such sealing is disclosed by the Japanese laid-open patent.
While the present invention has been specifically described based on the embodiment as illustrated, as a matter of course, the present invention is not limited to the embodiment but may be added with various modifications in the concrete structure and construction without departing from the scope of the claims of the present invention.

For example, in the embodiment, while the air discharging operation before the sealing of the bag 4 having the sliced bread is carried out by the air squeezer 41 moving up and down so that the air in the non-filled space 43 in the bag 4 is squeezed to be discharged outside as well as by the air cylinder 44 elongating the pusher bar 45 so that the bag 4 is moved toward the mouth spreader bars 20, according to the kind of packaged articles, the air discharge may be strongly carried out by suction of air. As one example thereof, as shown in (e) of FIG. 6, an air suction pipe 27 is provided to be inserted into, and drawn out of, the mouth portion of the bag 4 together with the mouth spreader bars 20 and the air discharge of the bag 4 can be done by this air suction pipe 27.

Also, in the embodiment, while one sirocco fan 13 is provided at the position B-B for opening the mouth of the bag 4, a plurality of such sirocco fans 13 may be employed, in place thereof, mouth spreader bars of such structure that an interval between the bars arranged in parallel to each other is widened and narrowed may be employed.

Also, in the embodiment, while the belt conveyors 10, 11 conveying the mouth portion of the bag 4 having the sliced bread are made of an adhesive material relative to the plastic-made bag 4 so that holding of the mouth portion of the bag spread flat thereon is securely carried out, the belt conveyors 10, 11 may be made of generally obtainable materials of belt conveyor. Or in order for the mouth portion of the bag to be securely held, as the carrier belt, such a belt as has openings through which air is sucked out may be used. Or, as shown in FIG. 8, there is employed a vacuum chamber 17 having suction holes 16 and the belt conveyors 10, 11 or chains are arranged to run on the vacuum chamber 17. Thereby, air suction force acts on the mouth portion of the bag through the suction holes 16 and through between the carrier belts and the mouth portion of the bag can be conveyed being securely held.

Also, in the embodiment, while the air cylinder 44 and pusher bar 45 are statically provided at the position C-C of FIG. 1, they may be constructed to be movable between the positions B-B and C-C together with the mouth spreader bars 20 so that while the mouth spreader bars 20, air cylinder 44 and pusher bar 45 are moving together, both functions to spread the mouth portion of the bag flat and to discharge the air, as shown in FIG. 6, can be done.

Also, in the embodiment, which the mouth spreader bars 20 are described as constructed movably in the directions of arrows 35, 36, the mouth spreader bars 20 may be provided at a static position so as to correspond to the position of the air cylinder 44 on line C-C of FIG. 1.

As described above, the present invention provides a bag packaging method by which air is blown toward a mouth portion of a bag filled with articles to thereby open the bag, two mouth spreader bars having an interval between them narrowed are inserted into the bag so opened, the two mouth spreader bars having the interval laterally (horizontally) widened spread the mouth portion of the bag flat and are retracted and then the mouth portion of the bag so spread flat is pinched and sealed.

According to the bag packaging method of the present invention, the two mouth spreader bars are used in which widening and narrowing actions of the interval between the bars are quickly done by two different cams, the mouth portion of the bag filled with articles is quickly spread flat and held on the carrier belts and the mouth portion of the bag so spread flat is pinched and sealed by a sealer. Hence, even if the bag is made of a very thin and weak plastic film, the sealing can be done without generation of creases.

What is claimed is:

1. A bag packaging method comprising the steps of:
   while conveying a bag filled with articles and placed on a carrier conveyor, blowing air toward a mouth of said bag to thereby open a mouth portion of said bag,
   causing two mouth spreader bars to have an interval between them narrowed by a cam follower, provided on each of said mouth spreader bars, engaging with a cam,
   inserting said mouth spreader bars having the interval so narrowed into said bag having the mouth so opened,
   causing said mouth spreader bars to have the interval laterally widened by said cam follower engaging with another cam to thereby spread the mouth portion of said bag flat,
   retracting said mouth spreader bars having the interval so widened, and then
   causing a sealer to pinch and seal the mouth portion of said bag so spread flat.

2. A bag packaging method as claimed in claim 1, comprising the steps of:
   causing an air squeezer to push the mouth portion of said bag so spread flat by said mouth spreader bars,
   moving said bag relative to said air squeezer by the retraction of said mouth spreader bars to thereby cause said air squeezer to squeeze air existing between the mouth of said bag and the articles filled in said bag to be discharged outside, and then
   carrying out the sealing of the mouth portion of said bag.

3. A bag packaging method as claimed in claim 2, comprising the step of:
   carrying out the movement of said bag relative to said air squeezer by the retraction of said mouth spreader bars.
as well as by pushing out a bottom portion of said bag to thereby carry out the discharge of said air.

4. A bag packaging method as claimed in claim 1, comprising the steps of:

inserting an air suction pipe together with said two mouth spreader bars into said bag having the mouth so opened, causing said air suction pipe to suck out air in said bag having the mouth portion so spread flat by said mouth spreader bars to be discharged outside, and then carrying out the sealing of the mouth portion of said bag having the air so discharged outside.