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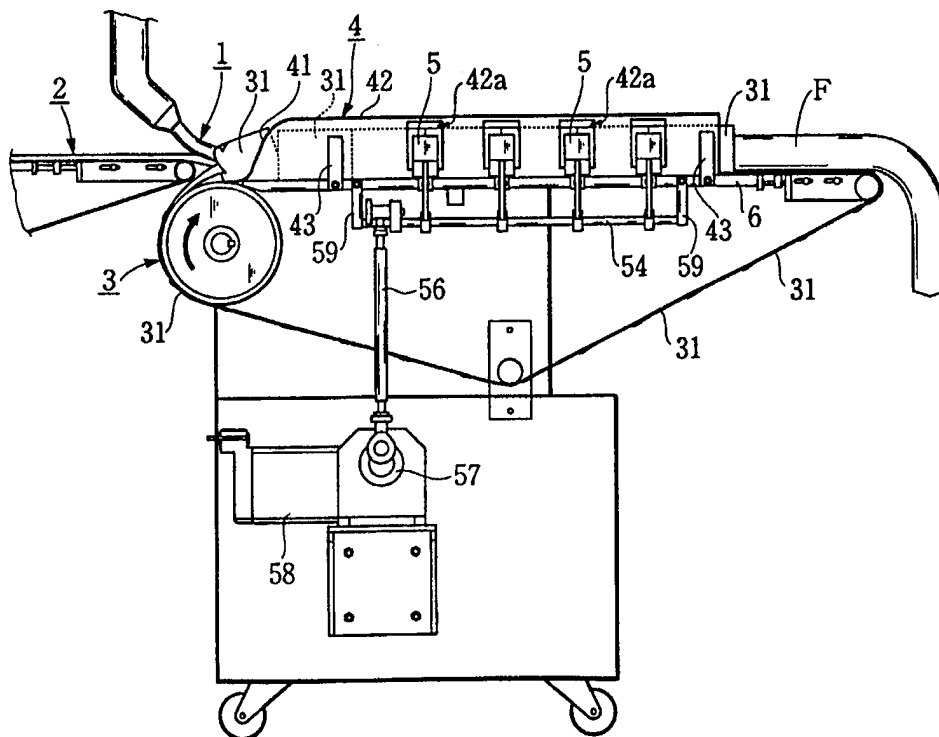
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(54) Title: A METHOD OF PRODUCING A CORED FOOD IN BAR SHAPE AND AN APPARATUS USED IN THE SAME

(57) Abstract

The present invention is to provide a method of continuously producing a cored food in bar shape by molding an outer skin material round in a space-saving manner and the apparatus used in the same method. For that purpose, the present invention adopts such method and apparatus as mounting an outer skin material on a carriage conveyor (3) whose belt portion comprises a number of belt pieces (31) arranged in the moving direction of the conveyor in such a manner that they are foldable towards the conveyor (3) independently from each other and placing an inner material upon said skin material, then raising both end portions (31a) and (31a) of each belt piece (31) through a pair of guides (4) so as to bend said outer skin

material (2) in gutterlike shape, and further intermittently compressing the outer skin material (2) bent in the gutterlike shape via the belt pieces (31) with compression molding members (5), thereby, surrounding as well as covering the inner material (1) with said outer skin material (2) so as to produce a cored food (F) in bar shape.



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DESCRIPTION

A METHOD OF PRODUCING A CORED FOOD IN BAR SHAPE AND AN APPARATUS
USED IN THE SAME

TECHNICAL FIELD

The present invention relates to a method of producing a cored food in bar shape and an apparatus used in the same, more specifically, it relates to said method and apparatus capable of continuously producing a cored food in bar shape formed by covering an inner material with an outer skin material.

BACKGROUND ART

Conventionally, as a method of mechanically producing a cored food in bar shape formed by covering such an inner material as sweet smashed bean paste with such an outer skin material as a flat and sticky pounded rice cake, such was generally well-known that two types of food materials are each continuously extruded for molding in bar shape from a telescopic nozzle consisting of a large nozzle and a small one.

However, with such conventional method as mentioned above, since the food materials are forcedly extruded from the nozzles by means of a screw pump, a vane pump and the like, stickiness inherent in glutinous substance contained in bread dough weakens, therefore, affecting the quality of the food materials as well as steamed glutinous or nonglutinous rice is not extruded for molding without affecting its granularity.

As another conventional method of producing a cored food in bar shape, it was well-known that an inner material is covered with a flatly extended outer skin material mounted on the belt conveyor by gradually rounding both sides of the conveyor belt portion in tubelike shape along a pair of guides.

However, with the latter conventional method as mentioned above, because it needs an extra belt transformation space long enough to transform both fringe sides of the conveyor belt portion from its original flat shape into tubelike shape, the apparatus as a whole can not help becoming large-scale in size.

Thus, the present invention is to provide a method of continuously producing a cored food in bar shape by spherically molding a flatly extended outer skin material in a space-saving manner and an apparatus used in the same method.

Also, the present invention is to provide a method of continuously producing a cored food in bar shape without affecting a food material by damaging its glutinous substance or smashing its granularity as well as an apparatus used in the same method.

DISCLOSURE OF THE INVENTION

In order to solve the above-mentioned inconveniences encountered with the prior arts, the present invention adopts a method of producing a cored food in bar shape made of at least two types of food materials and formed by covering an inner material with an outer skin material comprising the steps of mounting the outer skin material extended in flat shape on a carriage conveyor whose belt portion comprises a number of belt pieces aligned in the moving direction of the conveyor in such a manner that they are foldable towards the conveyor independently from each other and placing said inner material upon said outer skin material, then bending said skin material mounted on said belt pieces in gutterlike shape by raising both ends of each belt piece on the move along a pair of guides provided on both sides of the conveyor and intermittently compressing the outer skin material bent in gutterlike shape via the belt pieces with at least a pair of compression molding

members each provided on both sides of the conveyor in such a manner that said molding members swing back and forth with respect to the conveyor, thereby, covering said inner material with the outer skin material so as to continuously produce a cored food in bar shape.

Also, in order to solve the aforesaid inconveniences encountered with the prior arts, the present invention also adopts an apparatus of producing a cored food in bar shape made of at least two types of food materials and formed by covering an inner material with an outer skin material comprising a carriage conveyor whose belt portion comprises a number of belt pieces aligned in the moving direction of the conveyor in such a manner that they are foldable towards the conveyor independently from each other, a pair of guides provided on both sides of the conveyor which raise both ends of each belt piece on the move so as to bend said belt pieces in gutterlike shape and at least a pair of compression molding members each provided on both sides of the conveyor which swing back and forth with respect to the conveyor wherein while the outer skin and the inner material mounted on the outer skin are carried by the conveyor, said outer skin is bent in gutterlike shape by raising both ends of each belt piece along a pair of guides and intermittently compressed via the belt pieces with the compression molding members, thereby, covering said inner material with the outer skin material so as to continuously produce a cored food in bar shape.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a schematic side elevation view of the apparatus embodied in the present invention in practical use ; Figure 2 is a whole side elevation view of the apparatus embodied in the present invention; Figure 3 is a partial perspective view of the conveyor belt portion of the apparatus embodied in the present invention; Figure 4 is

a transverse sectional view of the conveyor belt portion; Figure 5 is a perspective view of the compression molding members of the apparatus embodied in the present invention; Figure 6 is a partial perspective view showing the funneled end portions of the guides of the apparatus embodied in the present invention; Figures 7 to 13 are partly sectional views showing the steps of producing a cored food in bar shape by means of the apparatus embodied in the present invention; Figure 14 is a schematic side elevation view of the apparatus embodied in the present invention in another practical use; and Figure 15 is a schematic side elevation view of an apparatus in modification of the apparatus embodied in the present invention.

BEST MODE FOR CARRYING OUT THE INVENTION

Hereinafter, the present invention is in more details described on the basis of the accompanying drawings. What is indicated with (C) in Figure 1 is the apparatus of producing a cored food in bar shape embodied in the present invention. The apparatus continuously produces a cored food (F) in round and bar shape from an outer skin material (2) (e.g., bread dough) flatly extended by an outer skin molder (A) provided with plural rollers (r) · (r) · · and a bar-shaped inner food material (1) (e.g., sweet smashed bean paste) pushed out by an extruder (B) provided with a screw pump (p) and a vane pump (v), and then a cutting device (D) (e.g., such as disclosed in the Japanese Patent Application Laid-Open No.7-111884 filed by the present applicant) provided with plural shutters (s) · (s) · · shears off this continuous cored food (F) molded in round and bar shape by a certain length, thereby, efficiently producing a lump food (f) (such as a bun stuffed with sweet smashed bean paste).

The apparatus embodied in the present invention, as shown in

Figure 2, comprises a carriage conveyor (3) for carrying a flatly extended outer skin material (2) and a bar-shaped inner material (1), a pair of guides (4) and (4) provided on both sides of the conveyor (3) and eight compression molding members (5) provided four by four on both sides of the conveyor (3) in such a manner that one molding member (5) at one side opposedly faces the corresponding member (5) at the other side so as to make four pairs of them on the conveyor (3). Hereafter, each structural member of the apparatus is described in more details.

With the carriage conveyor (3) embodied in the present invention, as shown in Figure 3, the belt portion thereof comprises a number of belt pieces (31) · (31) · · aligned in the moving direction of the conveyor (3) in such a manner that they are foldable towards the conveyor (3) independently from each other. This belt portion is arranged in such a manner that a first belt piece (31) partly overlaps a second belt piece (31) adjacently located on the downstream side of the moving direction of the conveyor (3). Those belt pieces (31) are each lined on the central region (31b) thereof with the central portion (32) of a lining belt (32) and a V belt (33) is attached on the backside of this lining belt (32). In this case, instead of the lining belt (32) on the backside of which the V belt is attached, it does not matter either to adopt a timing belt.

For such structure as mentioned above, with the conveyor (3) embodied in the present invention, as shown in Figure 4, it becomes possible to raise both ends (31a) and (31a) of each belt piece (31) by folding said piece (31) independently from other adjacent belt pieces. When both ends of said belt piece (31) have been raised, gaps (t) arise between the backside of each belt piece (31) and a lining belt (32).

A pair of guides (4) and (4) embodied in the present invention, as shown in Figures 5 and 6, are opposedly fixed on a frame (6) provided

along the inner side of the conveyor (3) via support pieces (43). The end portions (41) and (41) of the guides (4) and (4) are formed in funneled shape in such a manner that the inclination of the guides gradually increases as they shift from the lie-down state to the upright state while the main body portions (42) and (42) of the guides (4) and (4) are each formed in "J" shape seen from their transverse section, and four openings (42a) are provided on each of said portions (42) so as to make four pairs of openings (42a) into and out of which the compression molding members (5) as mentioned below move.

For such structure as mentioned above, the guides (4) and (4), as shown in Figure 6, raise both ends (31a) and (31a) of each belt piece (31) on the move along the funneled end portions (41) and (41). Then, each belt piece (31) raised this way is kept bent by the main body portions (42) and (42) in gutterlike shape.

In the present embodiment, as shown in Figure 6, both ends (31a) and (31a) of a belt piece (31) are raised with said funneled end portions (41) and (41) in such a manner that the lower fringes of the end portions (41) and (41) are inserted into the aforesaid gaps (t) (refer to Figure 4) between each belt piece (31) and a lining belt (32) while said end portions (41) and (41) superpose both sides of the lining belt (32).

For this reason, there is no case where the lining belt (32) and the V belt (33) are raised together with both ends (31a) and (31a) of the belt piece (31) by the funneled end portions (41) and (41) even though they are raised in a rush, so that it makes it possible to securely bend the belt pieces (31) in gutterlike shape while it can prevent the conveyor (3) from idling. It should be noted that a belt piece (31) located on the most upstream of the conveyor (3) is defined with a broken line in order to demonstrate the gaps (t) in the drawing.

Furthermore, in the present embodiment, as mentioned above, the conveyor belt portion comprises belt pieces (31) arranged in the moving direction of the conveyor in such a manner that a first belt piece (31) partly overlaps a second adjacent belt piece (31) so that gaps (k) (refer to Figure 6) generated between a rising belt piece (31) and the adjacent belt piece (31) can be narrowed to the extent that they do not interrupt the outer skin material (2) from being bent in gutterlike shape. Without such contrivance to narrow said gaps (k), the outer skin material (2) may be clogged into those gaps (k) according to the type of the outer skin material (2) so that there occur some cases where the belt pieces can not be properly bent in gutterlike shape. The extent of the gap (k) depends on such factors as the funneled shape of the end portions (41) of the guides and the largeness of the overlapped space between two adjacent belt pieces. If this overlapped space is further enlarged, those gaps (k) may be dispensed with.

The compression molding members (5) • (5) • , as shown in Figure 5, are disposed in such a manner that four of them directly face as many openings (42a) provided on each of the aforesaid guides (4) and (4), said members (5) being pivotally mounted on said frame (6) by way of pivotal axes (52) so as to swing back and forth with regard to the conveyor (3). On the upper part of the compression molding members (5) respectively, a compression surface (51) (refer to Figure 10) fittable to the shape of the outer skin material (2) to be compressed for molding is provided.

While those compression molding members (5) are each structured in the form of bell crank, a parallel crank mechanism (53) is arranged between each compression molding member (5) and a common revolving shaft (54) pivotally connected on the frame (6) by way of pivotal members (59). With this mechanism, the driving force of a motor (58) is

transmitted to said common revolving shaft (54) via a crank (57), a connecting rod (56) and a lever (55) so that said shaft (54) revolves within a certain range of angle. Then, the revolving force of this shaft (54) is further transmitted to each compression molding member (5) through each parallel crank mechanism (53) so that each pair of the compression members (5) synchronously swings back and forth.

It should be noted that because said common revolving shaft (54) and each parallel crank mechanism (53) are fixed with screws, it makes the fixing angle of each parallel crank mechanism (53) with regard to the common revolving shaft (54) adjustable so that the swinging angle of each pair of the compression molding members (5) can be easily adjusted. Thus, for instance, it enables the outer skin material (2) to be compressed in stages from the upstream side of the conveyor to the downstream side thereof by varying the swinging angle of each pair of the compression molding members (5). The driving mechanism for the counterpart compression molding members (5) is not shown in Figure 5, but they are also driven by the motor (58) in the same way as shown in the drawing.

Then, in reference to Figures 7 to 13, the steps of continuously producing a cored food (F) in round and bar shape by means of the apparatus embodied in the present invention are more specifically described below.

Firstly, as shown in Figure 7, an outer skin material (2) (bread dough) preliminarily extended in flat shape by the aforesaid outer skin molder (A) (refer to Figure 1) is supplied on the belt pieces (31) on the move, and then a bar-shaped inner material (1) (sweet smashed bean paste) extruded by the extruder (B) (refer to Figure 1) is mounted on the central region of the outer skin material (2).

When the belt pieces (31) on which the outer skin material (2) and

the inner material (2) have been mounted move so as to reach the aforesaid guides (4) and (4), both sides (31a) and (31a) of each belt piece (31) are raised by the funneled end portions (41) and (41) of the guides (4) and (4). By raising both sides (31a) and (31a) of each belt piece (31), the outer skin material (2) is formed in gutterlike shape in such a manner that the inner material (1) is surrounded with said skin material (2) (refer to Figures 8 to 10).

It is worth mentioning that the apparatus embodied in the present invention enables each belt piece (31) to rush into erection by the funneled end portions (41) and (41) of the guides (4) and (4). That is to say, the conveyor belt portion embodied in the present invention comprises a number of belt pieces (31) aligned in the moving direction of the conveyor in such a manner that they can be raised independently from each other. Accordingly, it becomes possible to make an extra space necessary to transform the conveyor belt portion performing bending operation on the outer skin material (2) from the original flat shape (refer to Figure 7) into the gutterlike shape (refer to Figure 10) far smaller in comparison with the prior arts, with the result that it can solve the problem of the prior arts once and for all where the apparatus of producing a cored food in bar shape can not help becoming large-scale in size for the purpose of securing said extra space.

Moreover, in the present embodiment, the gaps (k) (refer to Figure 6) generated between two adjacent belt pieces (31) are narrowed by partially overlapping one belt piece (31) on the other belt piece (31) so that even though the belt piece (31) rushes into erection, there is no case where the outer skin material (2) is clogged into those gaps (k) so as to interrupt each belt piece (31) from bending in gutterlike shape.

Furthermore, in the present embodiment, as mentioned above,

because the funneled end portions (41) superpose both sides of the lining belt (32) by inserting the lower fringes thereof into said gaps (t) (refer to Figures 4 and 8), when the outer skin material (2) is bent in gutterlike shape, neither the lining belt (32) nor the V belt (33) is raised together with the belt piece (31) even though the belt piece (31) rushes into erection, with the result that the outer skin material (2) can be securely bent in gutterlike shape.

The outer skin material (2) bent in gutterlike shape this way and the inner material (1) covered with this skin material (2) are carried by the carriage conveyor (3) so as to reach four pairs of the compression molding members (5). At this time, each pair of the compression members (5) repeatedly swinging back and forth with regard to the conveyor (3) intermittently compresses the outer skin material (2) bent in gutterlike shape through the belt pieces (31) so as to continuously form a cored food (F) in round and bar shape where the inner material (1) is covered with the outer skin material (2) (refer to Figures 10 to 12).

In Figures 10 to 12, although the state where a cored food (F) in bar shape is formed by compressing the outer skin material (2) just once with a pair of the compression molding members (5) is illustrated, but in use, each pair of the compression molding members (5) repeatedly swings back and forth with regard to the carriage conveyor (3) while intermittently compressing the outer skin material (2) as many times as required. Furthermore, in the case where there are provided plural pairs of the compression molding members (5) as disclosed in the present embodiment, it enables the outer skin material (2) to be compressed stepwise from the upstream side of the conveyor to the downstream side thereof by varying the swinging angle of each pair of the compression molding members (5) as mentioned above. The compression surfaces (51) of

each pair of compression molding members (5) synchronously swinging back and forth with regard to the conveyor can be also varied in shape.

The cored food (F) in bar shape formed by the compression molding members (5) is further carried with mounted on the belt pieces (31) through the guides (4) or the main body portions (42) and (42) thereof so as to hang down at the end portion of the conveyor (3) (refer to Figure 1) and reach a cutting device (D) for cutting operation. The instant that each belt piece (31) has gone through the main body portions (42) and (42), it restores its original plane shape owing to the self-weight and elastic recovery nature and rolls back through a belt pulley (refer to Figure 5).

In this way, in the present embodiment, the conveyor belt portion comprises a number of belt pieces (31) disposed in the moving direction of the conveyor so that each belt piece (31) quickly restores its original plane shape independently from adjacent belt pieces (31) owing to the self-weight and elastic recovery nature. Accordingly, it becomes possible to make an extra space necessary to transform the conveyor belt portion from the gutterlike shape (refer to Figure 12) into the original flat shape (refer to Figure 13) far smaller in comparison with the prior arts, with the result that also in this regard the apparatus can be manufactured in a space-saving manner.

The embodiment of the present invention has been substantially described up to here with a concrete example. However, it should be understood that the present invention is not limited to this embodiment, but it can be modified in various manners within the scope of the accompanying patent claims.

For instance, in the aforesaid embodiment, it has been described on the basis that bread dough is used as an outer skin material (2), but this material (2) is not necessarily limited to bread dough. If an

outer skin molder(A') capable of extending steamed nonglutinous rice in flat shape without affecting its granularity is combined with the apparatus embodied in the present invention as shown in Figure 14, it becomes possible to form a cored food (F) in bar shape whose outer skin material (2) is made of nonglutinous rice. That is to say, in the present invention, an outer skin material (2) is molded in gutterlike shape with the belt pieces (31) and is further intermittently compressed with the compression molding members (5) via the belt pieces (31) so as to continuously form a cored food (F) in bar shape without either smashing or scattering such steamed rice. According to the present invention, in combination with the cutting device (D), it becomes possible to efficiently produce such food product as a rice ball (f) while keeping its granularity intact as shown in Figure 14.

Also, in the present embodiment, the carriage conveyor (3) the belt portion of which comprises a number of belt pieces (31) each aligned in the moving direction of the conveyor and is suspended between the plural number of pulleys is adopted, but the present invention is not limited to this embodiment. As shown in Figure 15, it is also possible to adopt a carriage conveyor (3') structured in such a manner that its belt portion comprising a number of belt pieces(31) • (31) • • aligned in the moving direction of the conveyor is mounted on a sole pulley (30) of large diameter. In this modified embodiment, a pair of guides (4) and a frame (6) are formed in arc shape along the circumference of said pulley (30) wherein three compression molding members (5) • (5) • • are radially provided on the main body portion (42) of each guide (4) in such a manner that one molding member (5) at one side opposedly faces the corresponding member (5) at the other side so as to make three pairs of them on the conveyor (3'). What is indicated with a reference number (53a) in Figure 15 is a ball joint to

transmit the movement of the common revolving shaft (54) to the compression molding members (5) at both ends of said shaft in such a manner that those members can swing back and forth with regard to the conveyor. Not to change the subject, a housing for this modified apparatus is not illustrated in Figure 15. With this modified apparatus, as a cored food in bar shape (F) produced thereby directly drops from the terminal end of the guides due to its self-weight, a further streamlined structure can be realized.

As having been described up to here with embodiment, with the apparatus embodied in the present invention, an outer skin material mounted on a number of the belt pieces arranged in the moving direction of the conveyor in such a manner that they are foldable towards the conveyor independently from each other is molded by bending said pieces with the guides so that it can make the belt transformation space far smaller in comparison with the prior arts. Furthermore, the outer skin material is intermittently compressed by way of the belt pieces with the compression molding members swinging back and forth with regard to the conveyor, so that it becomes possible to efficiently produce a cored food in bar shape in a space-saving manner as well as it can prevent the glutinous substance and granularity of a food material from being damaged.

INDUSTRIAL APPLICABILITY

As having been mentioned above, the method of producing a cored food in bar shape and the apparatus used in the same embodied in the present invention is extremely useful for the production of a bread dough whose glutinous substance is not damaged at all as well as for that of a steamed rice food with its granularity intact.

CLAIMS

1. A method of producing a cored food in bar shape made of at least two types of food materials and formed by covering an inner material with an outer skin material comprising the steps of:

mounting the outer skin material formed in flat shape on a carriage conveyor whose belt portion comprises a number of belt pieces aligned in the moving direction of the conveyor in such a manner that they are foldable towards the conveyor independently from each other and then placing said inner material upon said skin material;

bending said skin material mounted on said belt pieces in gutterlike shape by raising both ends of each belt piece on the move along a pair of guides provided on both sides of the conveyor; and

intermittently compressing the outer skin material bent in gutterlike shape via the belt pieces with at least a pair of compression molding members provided on both sides of the conveyor in such a manner that they swing back and forth with respect to the conveyor, thereby, covering said inner material with the outer skin material so as to continuously produce a cored food in bar shape.

2. A method of producing a cored food in bar shape as claimed in claim 1 wherein the outer skin material is mounted on the carriage conveyor whose belt portion comprises the belt pieces arranged in such a manner that a first belt piece partly overlaps a second belt piece adjacently located on the downstream side of the carriage conveyor.

3. A method of producing a cored food in bar shape according to claims 1 or 2 wherein the outer skin material is mounted on the carriage conveyor whose belt portion comprises the belt pieces each arranged in such a manner that said belt piece is lined on the central region thereof with a central portion of a lining belt.

4. A method of producing a cored food in bar shape as in any one of

the preceding claims wherein the outer skin material is mounted on a carriage conveyor whose belt portion comprising a number of belt pieces is suspended on a single pulley.

5. A method of producing a cored food in bar shape as in any one of the preceding claims wherein the outer skin material is made of either steamed glutinous or nonglutinous rice extended in flat shape.

6. An apparatus of producing a cored food in bar shape made of at least two types of food materials and formed by covering an inner material with an outer skin material comprising:

a carriage conveyor whose belt portion comprises a number of belt pieces aligned in the moving direction of the conveyor in such a manner that they are foldable towards the conveyor independently from each other;

a pair of guides provided on both sides of the conveyor which raise both ends of said belt pieces respectively on the move so as to bend said belt pieces in gutterlike shape; and

at least a pair of compression molding members each provided on both sides of the conveyor which swing back and forth with regard to the conveyor,

wherein while the outer skin material extended in flat shape and the inner material mounted on the skin material are carried by the conveyor, said outer skin material is bent in gutterlike shape by raising both ends of each belt piece along a pair of guides and intermittently compressed via the belt pieces with the compression molding members, thereby, covering said inner material with the outer skin material so as to continuously produce a cored food in bar shape.

7. An apparatus of producing a cored food in bar shape as claimed in claim 6 wherein the belt pieces of the conveyor are arranged in such a manner that a first belt piece partly overlaps a second belt piece

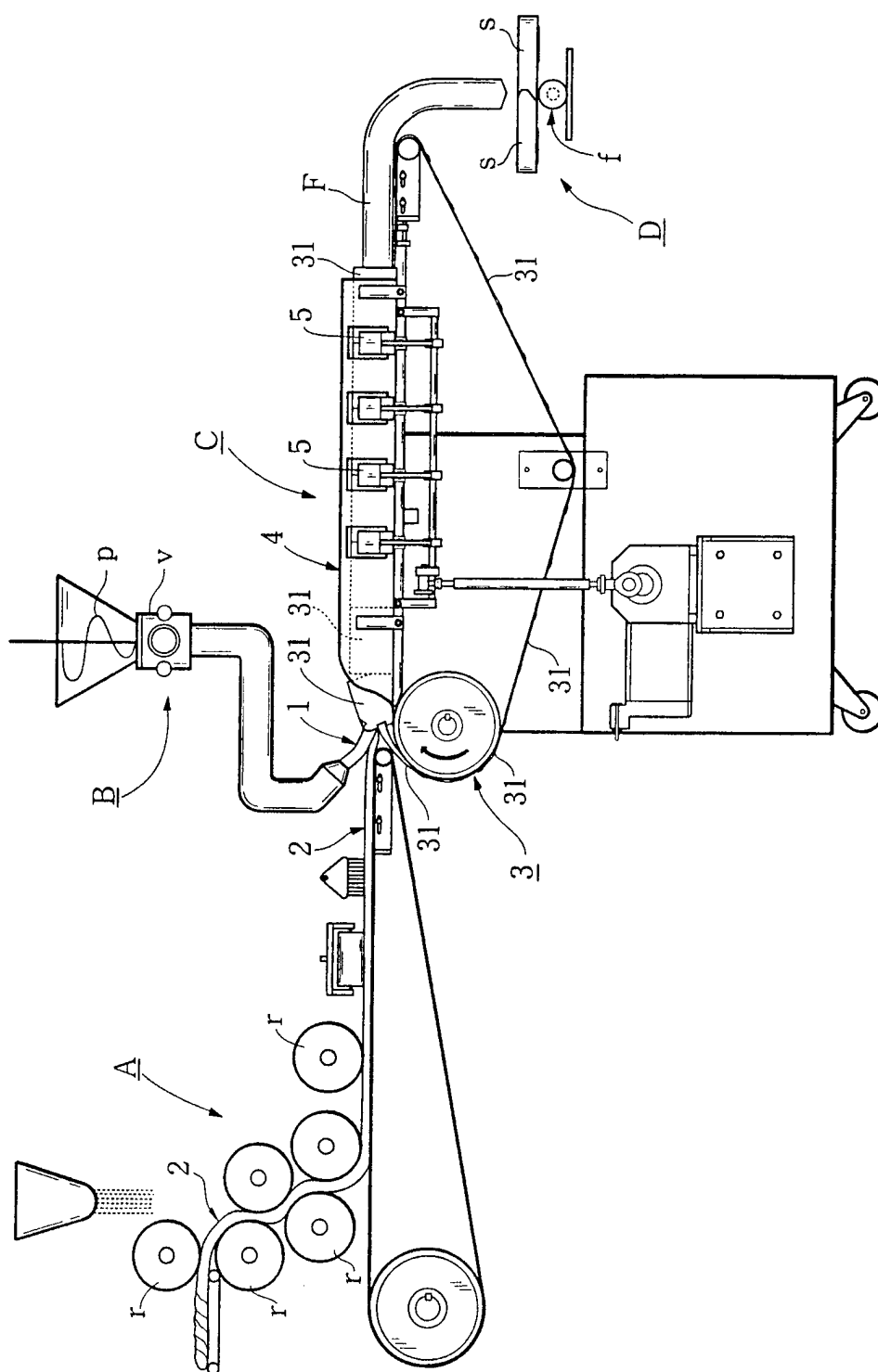
adjacently located on the downstream side of the carriage conveyor.

8. An apparatus of producing a cored food in bar shape according to claims 6 or 7 wherein the belt pieces of the conveyor are arranged in such a manner that each of them is lined on the central region thereof with a central portion of a lining belt.

9. An apparatus of producing a cored food in bar shape as in any one of claims 6 to 8 wherein a carriage conveyor is arranged in such a manner that its belt portion comprising a number of belt pieces aligned in the moving direction of the conveyor is suspended on a single pulley and a pair of guides as well as compression molding members are provided on the circumference of said pulley.

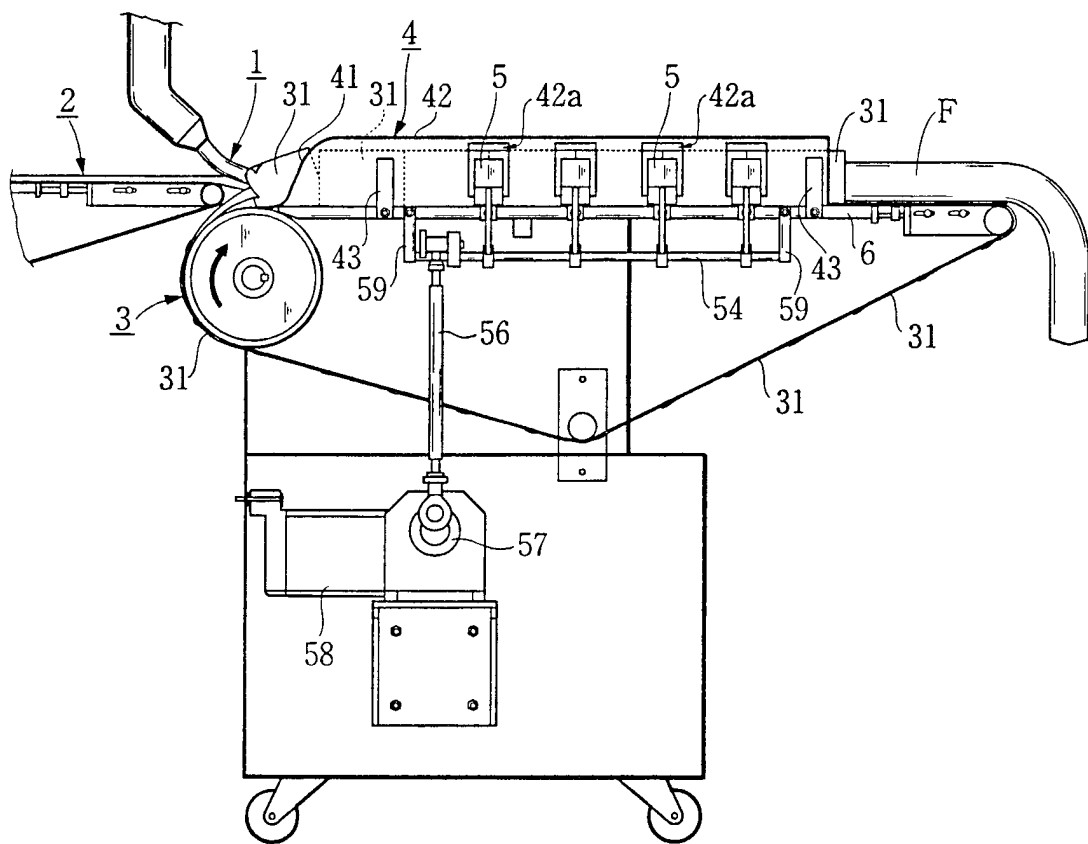
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FIG. 1



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FIG. 2



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FIG. 3

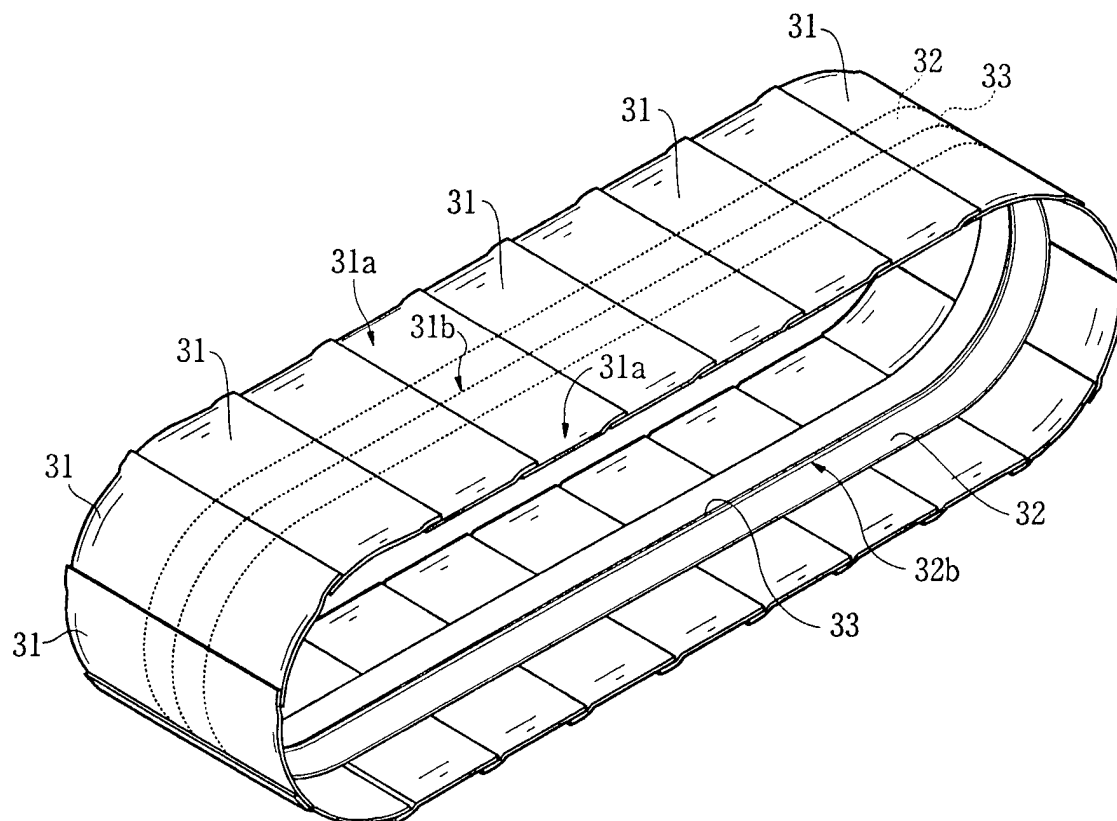
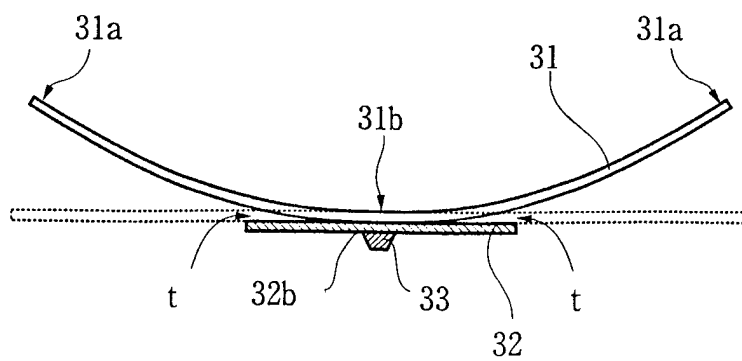
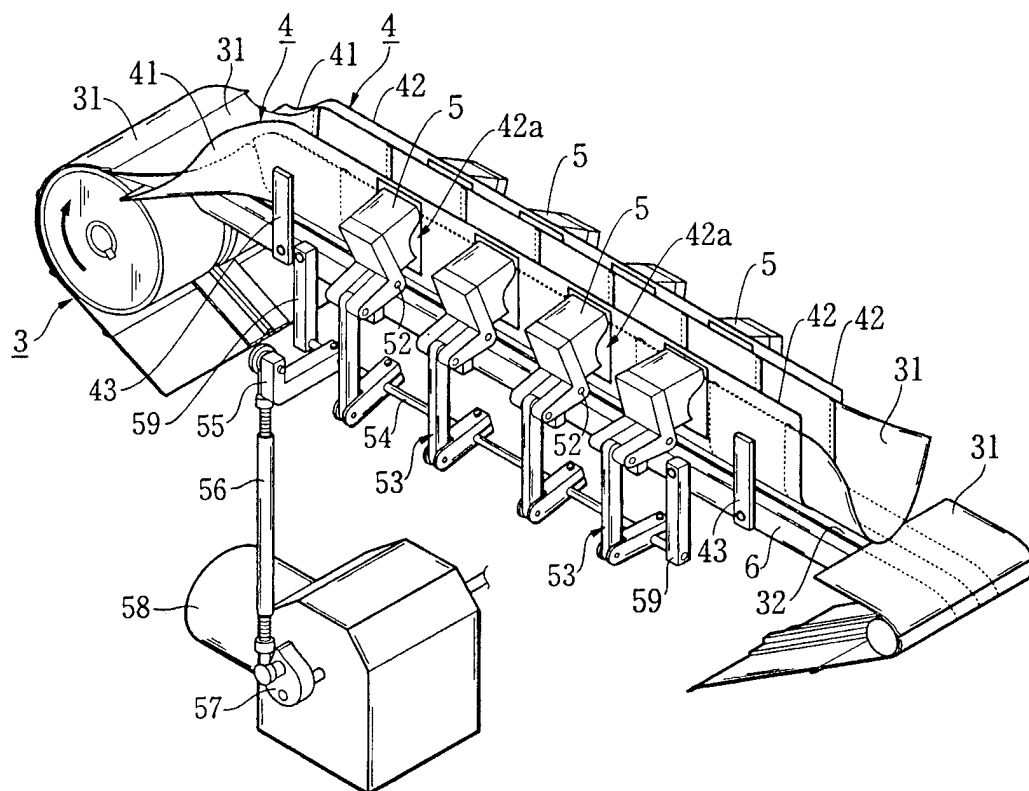


FIG. 4



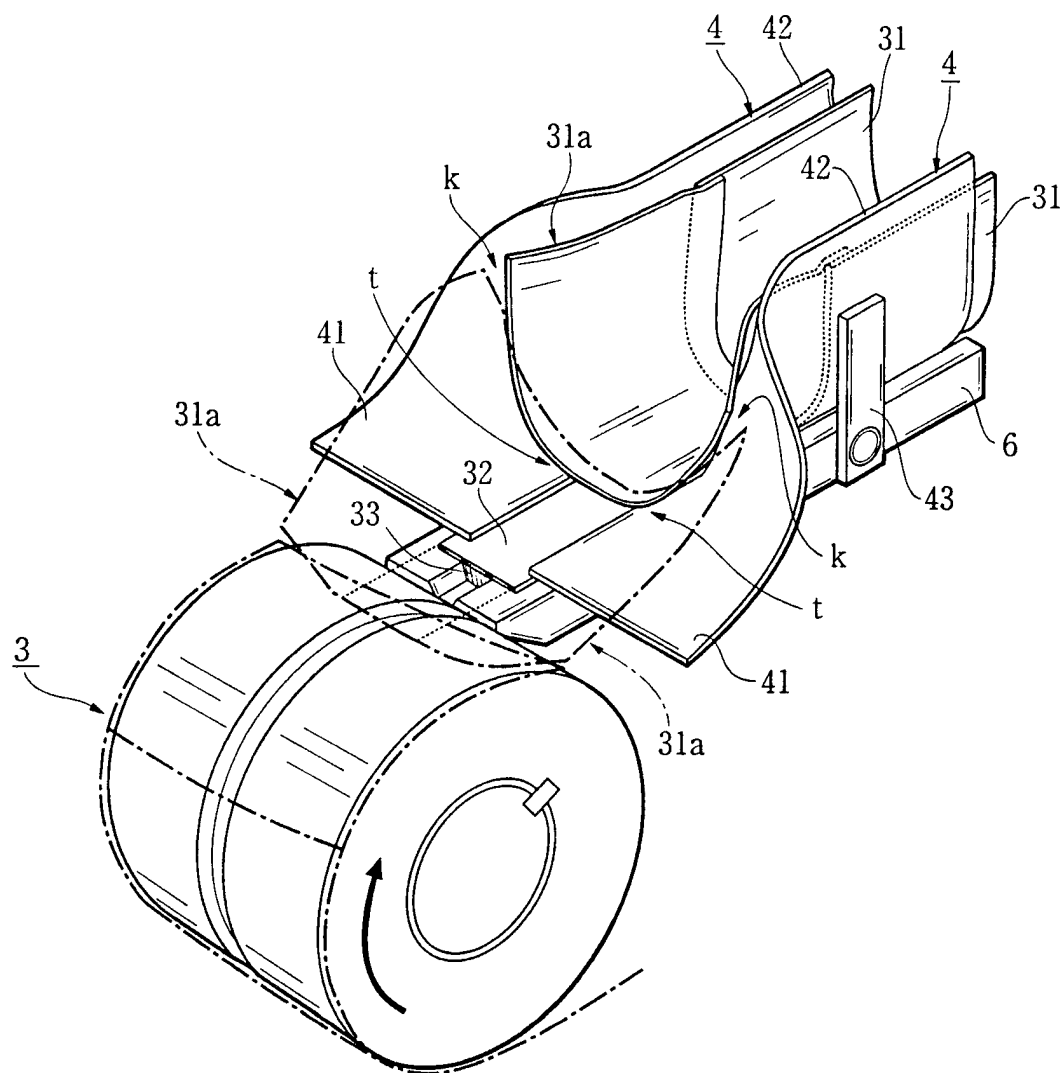
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FIG. 5



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FIG. 6



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FIG. 7

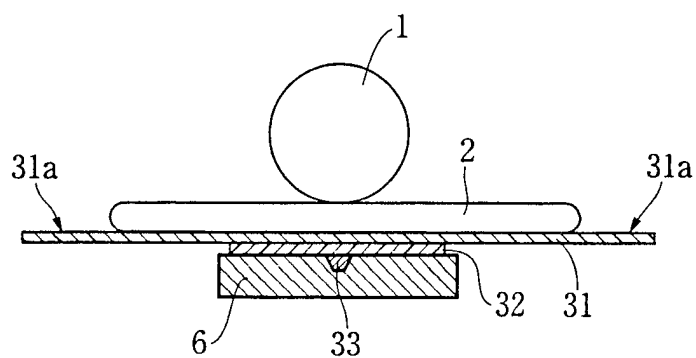


FIG. 8

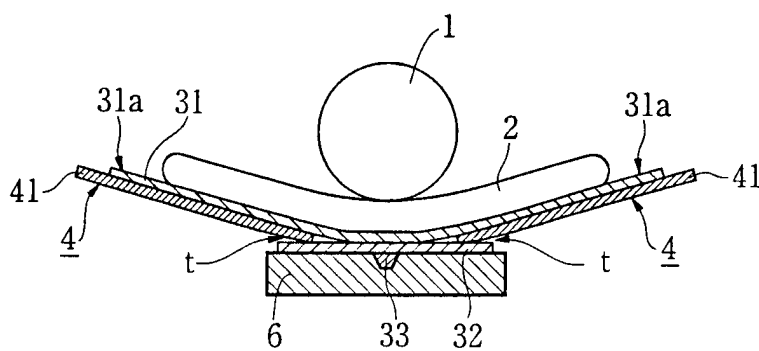
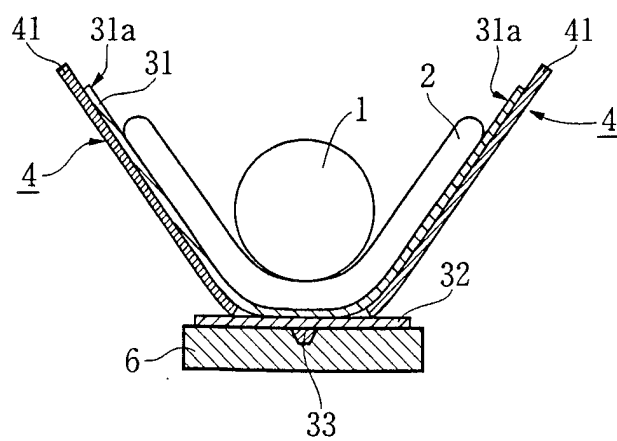


FIG. 9



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FIG. 10

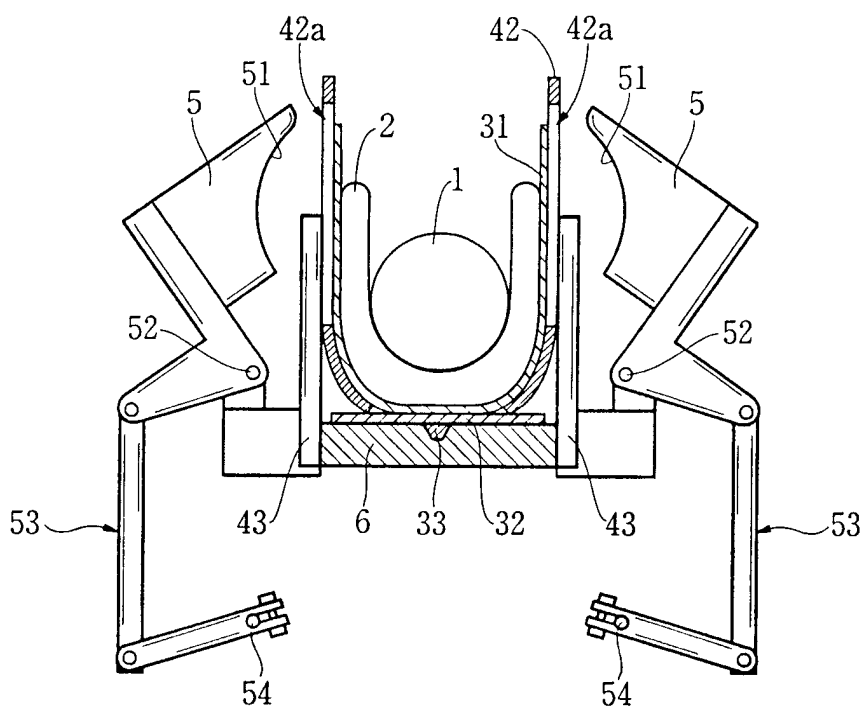
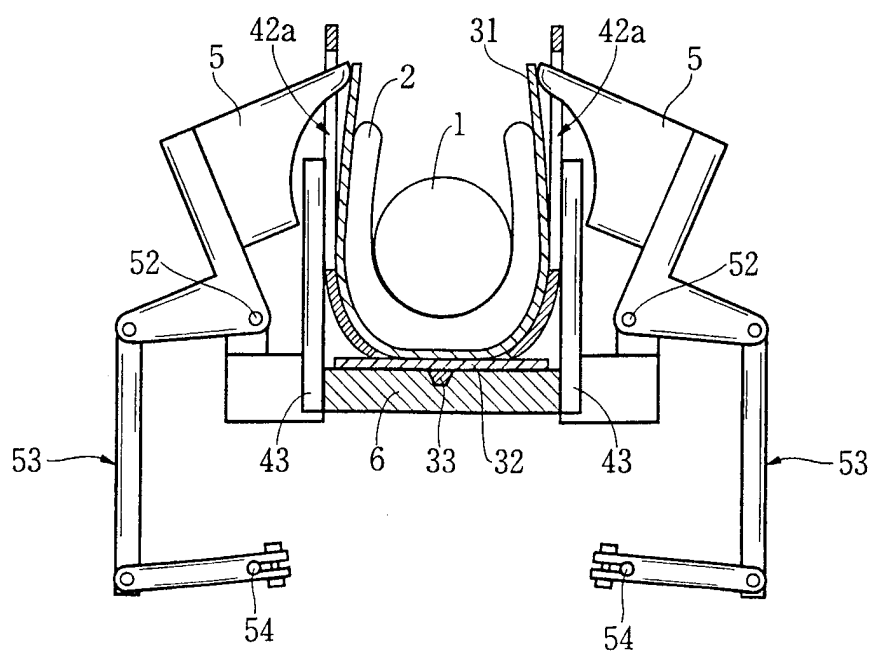


FIG. 11



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FIG. 12

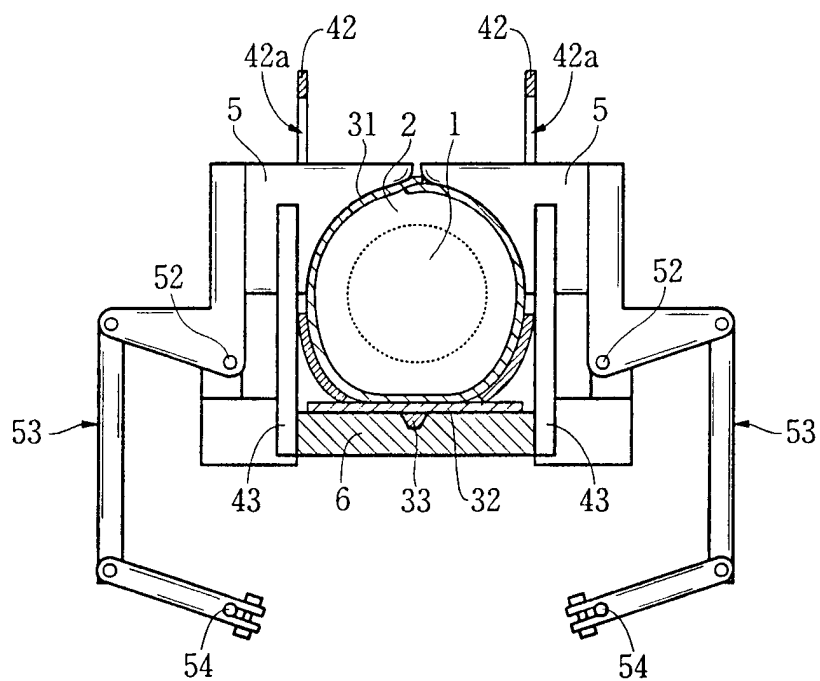


FIG. 13

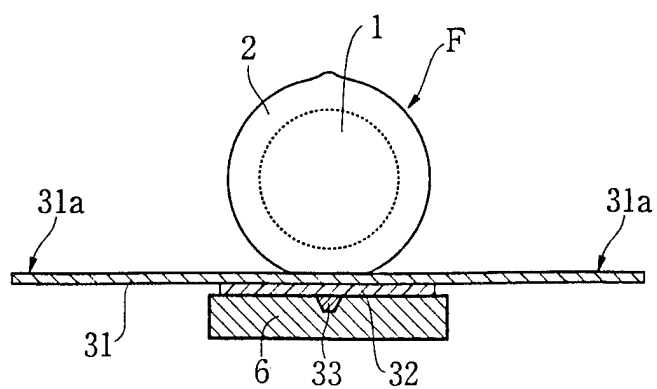
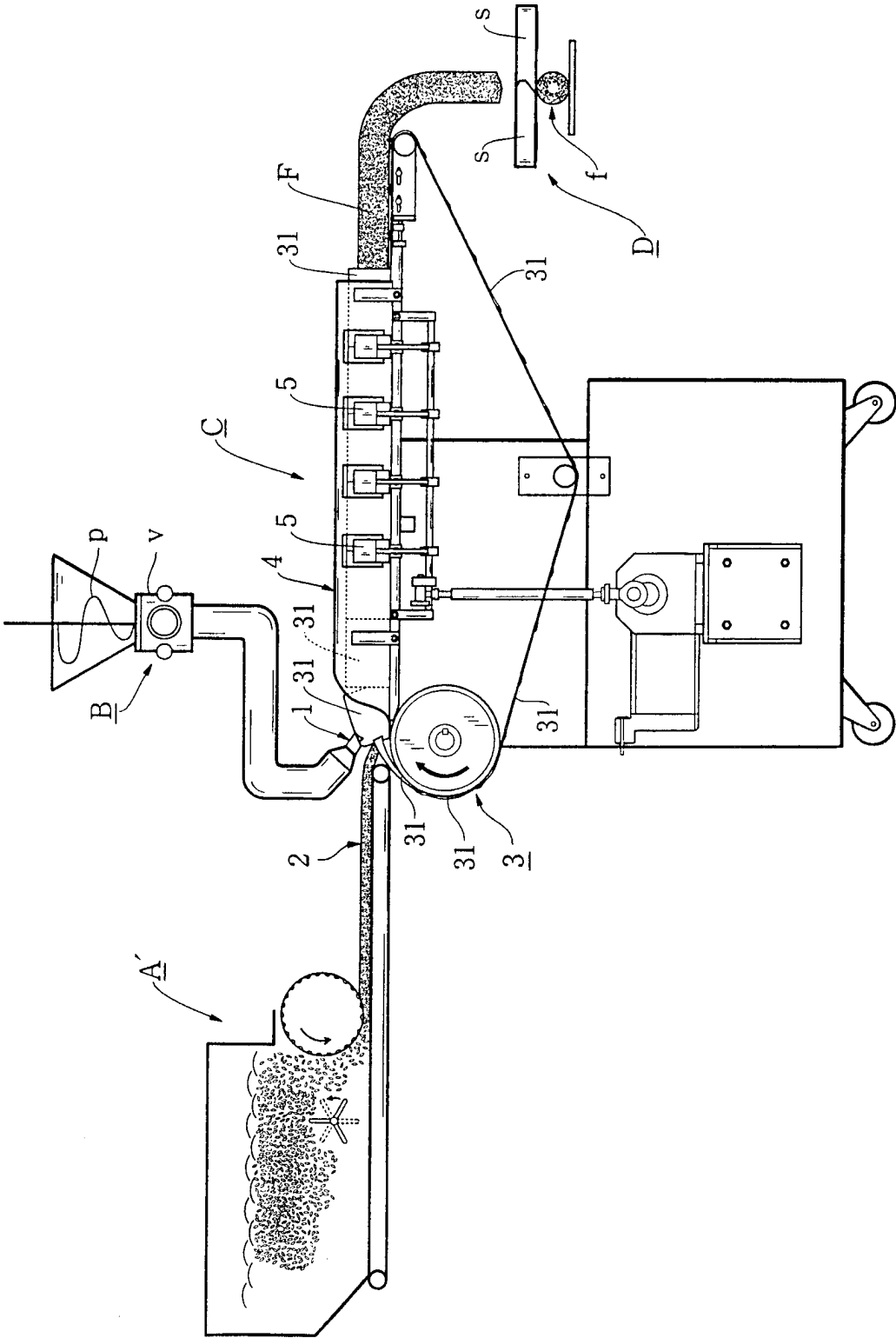
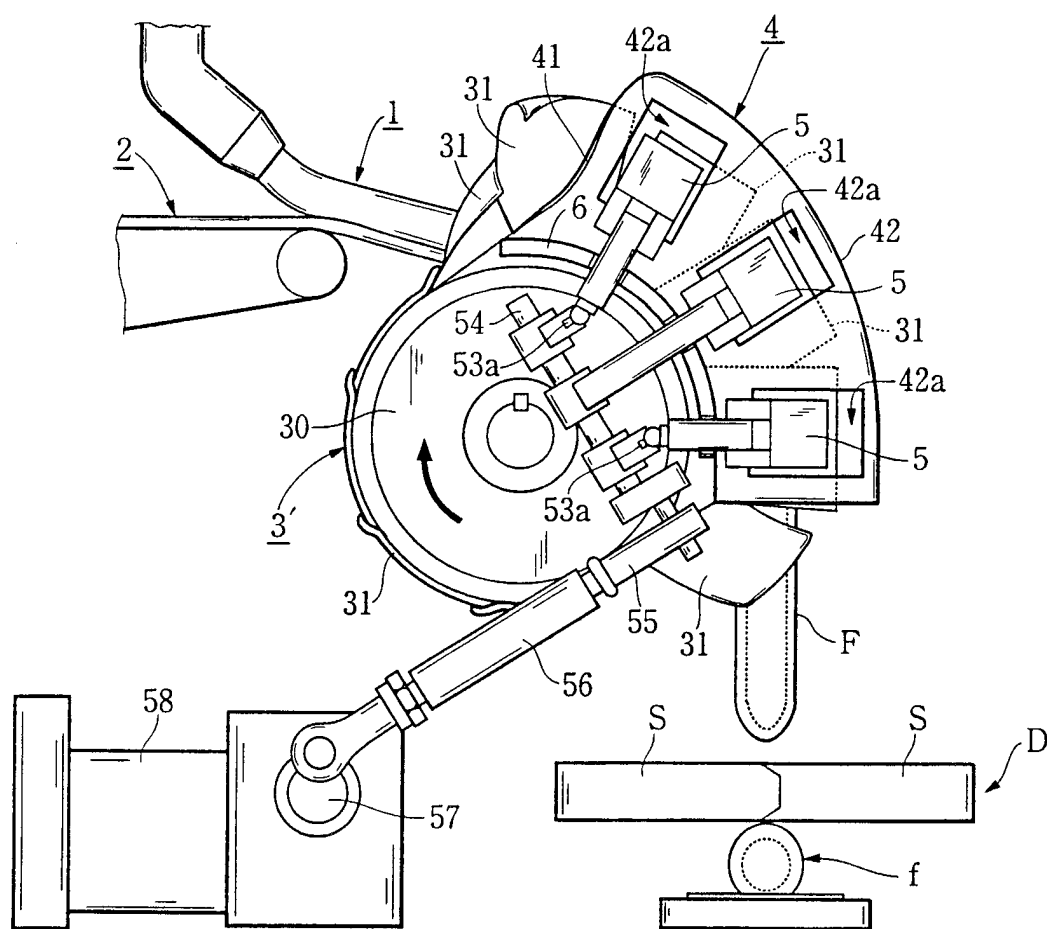


FIG. 14



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FIG. 15



INTERNATIONAL SEARCH REPORT

International Application No

PCT/JP 97/04231

A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 A23L1/164 A23P1/08 B65G17/10 B65G17/02 B65G15/08
A21C9/06 A21C9/08

According to International Patent Classification(IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 A21C B65G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2 960 045 A (K.PENTZLIN) 15 November 1960 ---	
A	DE 89 06 356 U (BARTHELS & LÜDERS GMBH) 19 October 1989 ---	
A	US 4 799 875 A (THOMPSON DANIEL T) 24 January 1989 -----	

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

2 February 1998

Date of mailing of the international search report

19/02/1998

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/JP 97/04231

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2960045 A	15-11-60	NONE	
DE 8906356 U	19-10-89	NONE	
US 4799875 A	24-01-89	AU 2922189 A CA 1317510 A EP 0397714 A WO 8905583 A	19-07-89 11-05-93 22-11-90 29-06-89