DESCRIPTION

Title of the Invention: PILLOW PACKAGING DEVICE

Technical Field

[0001] The present invention relates to a pillow packaging device that packages, with a film, an article to be packaged.

Background Art

[0002] For example, when vegetables, fruits, and the like are sold, it is widely practiced to package articles to be packaged, such as vegetables and fruits, with a film by using a pillow packaging device.

[0003] As this type of pillow packaging device, for example, Patent Literature 1 below discloses a horizontal pillow packaging device including a packaging device body including a center seal unit configured to seal both ends in a width direction of a belt-shaped film to each other and a top seal unit configured to seal front and rear portions of an article to be packaged, and a supply conveyor disposed upstream of the packaging device body and configured to supply the article to be packaged at appropriate timing.

[0004] This horizontal pillow packaging device includes a product detection sensor disposed upstream of the center seal unit and configured to detect a length of the article to be packaged, and a control device configured to calculate, based on the length of the article to be packaged calculated based on data detected by the product detection sensor, an operation pattern and an operation timing of sealing means of the top seal unit and a film length necessary for packaging, and control an operation of the sealing means based on the calculated operation pattern, operation timing, and necessary film length.

Citation List

Patent Literature

[0005] Patent Literature 1: Japanese Patent Application Laid-Open No. 2012-41073

Summary of Invention

Technical Problem

[0006] Meanwhile, the article to be packaged by the pillow packaging device may not have a uniform length, and there are cases where it is necessary to accommodate packaging of articles having different lengths.

[0007] The horizontal pillow packaging device of Patent Literature 1 is capable of accommodating articles to be packaged having different lengths. However, this horizontal pillow packaging device requires the product detection sensor configured to detect the length of the article to be packaged and the control device configured to calculate the operation pattern and the like of the top seal unit based on the length of the article to be packaged and control the operation of the sealing means, and thus has a complicated structure.

[0008] Accordingly, an object of the present invention is to provide a pillow packaging device that has a simple structure while being capable of reliably packaging an article to be packaged with a favorable appearance in accordance with a length of the article to be packaged.

Solution to Problem

[0009] In order to achieve the above object, the present invention provides a pillow packaging device that packages, with a film, an article to be packaged, the pillow packaging device including: a film supply unit configured to supply the film; a supply conveyor configured to supply the article to be packaged; a supply detection sensor configured to detect a leading end and a trailing end of the article to be packaged; a transport conveyor disposed downstream of the supply conveyor and configured to transport the article to be packaged; a center seal unit disposed on the transport conveyor and configured to cover, with the film, the article to be packaged and seal both end portions of the film in a width direction to each other; an end seal unit disposed downstream of the transport conveyor and configured to seal both end portions of the film in a longitudinal direction; an interval input unit configured to receive input of a suitably set interval between a trailing end of a preceding article to be packaged and a leading end of a following article to be packaged; a

transport conveyor operation unit configured to operate the transport conveyor when the supply detection sensor detects the leading end of the article to be packaged from a state in which the transport conveyor is stopped, and transport the article to be packaged by a distance corresponding to the interval when the trailing end of the article to be packaged passes the supply detection sensor and a detection signal from the supply detection sensor is cut off; and a control conveyor operation unit configured to stop the supply conveyor when, before the transport conveyor operation unit completes operation of the transport conveyor by the distance corresponding to the interval, the supply detection sensor detects the leading end of the following article to be packaged following the preceding article to be packaged.

[0010] According to the above invention, the transport conveyor operation unit operates the transport conveyor when the supply detection sensor detects the leading end of the article to be packaged from a stopped state of the transport conveyor, and operates the transport conveyor by the distance corresponding to the interval input by the interval input unit when the trailing end of the article to be packaged passes the supply detection sensor and the detection signal from the supply detection sensor is cut off. Therefore, even when the articles to be packaged to be packaged have different lengths and do not have a uniform length, the intervals between the articles to be packaged are aligned during a packaging process of the articles to be packaged, and the lengths of both end portions of the film in the longitudinal direction are secured regardless of whether the article to be packaged is long or short. As a result, the articles to be packaged are packaged with a favorable appearance regardless of whether the articles to be packaged are long or short.

[0011] In addition, only the supply detection sensor is necessary as a sensor, and the intervals between the articles to be packaged are aligned by a predetermined operation of the transport conveyor by the transport conveyor operation unit, whereby the structure of the pillow packaging device is simplified.

[0012] Therefore, it is possible to provide the pillow packaging device that has a simple structure yet is capable of reliably packaging the article to be packaged with a favorable appearance in accordance with the length of the article to be packaged.

[0013] In an embodiment of the pillow packaging device, the interval detection sensor

configured to detect the article to be packaged transported by the transport conveyor by the distance corresponding to the interval may be disposed downstream of the transport conveyor and upstream of the end seal unit, and the pillow packaging device may include an end seal operation unit configured to operate the end seal unit when the interval detection sensor detects the article to be packaged and the end seal unit is located at the interval.

[0014] According to the above aspect, in addition to the supply detection sensor and the transport conveyor operation unit, the interval detection sensor and the end seal operation unit having the above configuration are provided. Therefore, both end portions of the film in the longitudinal direction in a state in which the intervals between the articles to be packaged are aligned are appropriately sealed, and the articles to be packaged are reliably packaged with the film while the intervals between the articles to be packaged are stably maintained.

[0015] In the pillow packaging device according to the present invention, at least the transport conveyor operation unit may be configured to operate by sequence control.

[0016] According to the above aspect, at least the transport conveyor operation unit operates by sequence control that does not use a microcomputer or the like, and therefore a pillow packaging device having a simple structure and being less likely to fail is provided.

[0017] In an embodiment of the pillow packaging device, when the supply of the article to be packaged is detected by the supply detection sensor and the interval is detected by the interval detection sensor, the detection by the interval detection sensor may be prioritized.

[0018] According to the above aspect, since the detection by the interval detection sensor is prioritized, both end portions of the film in the longitudinal direction are reliably sealed by the end seal unit, and the article to be packaged is packaged without being caught.

[0019] In an embodiment of the pillow packaging device, the interval detection sensor may be configured such that a distance thereof relative to the end seal unit is adjustable.

[0020] According to the above aspect, the seal positions of both end portions of the film in the longitudinal direction by the end seal unit are suitably adjusted in accordance with the shape, thickness, or the like of the article to be packaged, and the convenience of the packaging device is improved.

Advantageous Effects of Invention

[0021] In the present invention, even when articles to be packaged have different lengths and do not have a uniform length, intervals between the articles to be packaged are aligned during a packaging process of the articles to be packaged, so that the articles to be packaged are packaged with a favorable appearance and the structure is simplified.

Brief Description of Drawings

[0022] FIG. 1 is an explanatory diagram illustrating an embodiment of a pillow packaging device according to the present invention.

FIG. 2 is an explanatory diagram illustrating a schematic configuration of the pillow packaging device.

FIG. 3 illustrates a packaging process by the pillow packaging device, and is an explanatory diagram of a first process of the packaging process.

FIG. 4 is an explanatory diagram of a second process of the packaging process.

FIG. 5 is an explanatory diagram of a third process of the packaging process.

FIG. 6 is an explanatory diagram of a fourth process of the packaging process.

FIG. 7 is an explanatory diagram of a fifth process of the packaging process.

FIG. 8 is a flowchart of the packaging process in the pillow packaging device according to the present invention.

Description of Embodiments

[0023] (Embodiment of Pillow Packaging Device)

Hereinafter, an embodiment of a pillow packaging device according to the present invention will be described with reference to FIGS. 1 to 8. FIGS. 1 and 2 illustrate schematic configuration diagrams of a pillow packaging device 10 (hereinafter, also simply referred to as a “packaging device 10”) according to the present invention.

[0024] As illustrated in FIGS. 1 and 2, the packaging device 10 of the present embodiment packages an article to be packaged H with a film F, and mainly includes a film supply unit 20, a supply conveyor 25, a supply detection sensor 30, a transport conveyor 35, a center seal unit 40, an end seal unit 45, an interval input unit 50, an interval detection sensor 55, a

carry-out conveyor 60, a transport conveyor operation unit 65, and an end seal operation unit 70.

[0025] Examples of the article to be packaged H include vegetables, fruits, and the like, but are not particularly limited. In addition, the film F is made of a synthetic resin and is weld-sealable, and may be a film provided with a logo or pattern or a plain film.

[0026] The film supply unit 20 is configured to supply the film F, and includes a roll 21 around which the film F is wound, and a film forming unit 23 configured to form the film F into a bag shape that is open at front and rear sides in a supply direction and at an upper side. In addition, the film forming unit 23 includes a pair of substantially triangular plate-shaped members, and is disposed on both sides in a width direction of a spacer 24 disposed between the supply conveyor 25 and the transport conveyor 35.

[0027] The supply conveyor 25 is configured to supply the article to be packaged H at a predetermined speed, and is disposed at the most upstream side in the entire packaging device 10. The supply conveyor 25 includes, for example, a belt conveyor, a roller conveyor, or the like driven by predetermined drive means (a motor or the like). In the pillow packaging device of the present invention, “downstream” and “upstream” mean downstream and upstream in a process of packaging the article to be packaged H.

[0028] The supply detection sensor 30 is configured to detect a predetermined article to be packaged H supplied by the supply conveyor 25, and is disposed downstream of the supply conveyor 25 and upstream of the transport conveyor 35 and the spacer 24. The supply detection sensor 30 is electrically connected to a control unit (described later) of the transport conveyor operation unit 65, and, when detecting the leading end Ha of the article to be packaged H, outputs a detection signal to the control unit of the transport conveyor operation unit 65. The detection signal from the supply detection sensor 30 is also output to a supply conveyor operation unit for control thereof.

[0029] The supply detection sensor 30 includes, for example, a pair of left and right optical sensors disposed on both sides in a width direction of the supply conveyor 25, an ultrasonic sensor, a mechanical sensor such as a limit switch, or the like.

[0030] The supply conveyor 25 is controlled by a supply conveyor operation unit (not illustrated). The supply conveyor operation unit is associated with the operation of the

transport conveyor 35. Specifically, the supply conveyor operation unit controls the supply conveyor 25 to stop when the supply detection sensor 30 detects the leading end Ha of the following article to be packaged H before the transport conveyor operation unit 65 completes operation of the transport conveyor 35 by the distance corresponding to the interval G.

[0031] The transport conveyor 35 is configured to transport the article to be packaged H supplied by the supply conveyor 25 at a predetermined speed and at a predetermined timing, and is disposed downstream of the supply conveyor 25 with the spacer 24 interposed therebetween. The operation of the transport conveyor 35 is controlled by the transport conveyor operation unit 65.

[0032] The center seal unit 40 is configured to cover the article to be packaged H with the film F, draw out the film F from the roll 21, and seal both end portions of the film F in the width direction to each other, and is disposed above the transport conveyor 35. The center seal unit 40 of the present embodiment is configured to seal, by heat welding, an upper opening portion of the film F that is transferred in a bag shape having an open upper side by the film forming unit 23 of the film supply unit 20, thereby forming the film F into a bag shape having open front and rear sides.

[0033] The center seal unit 40 includes a plurality of rollers (not illustrated), and the plurality of rollers draw out the film F from the roll 21. A film drawing mechanism including the plurality of rollers for drawing out the film F from the roll 21 is driven and stopped at the same timing as the transport conveyor 35.

[0034] The end seal unit 45 is configured to seal both end portions of the film F in the longitudinal direction, and is disposed downstream of the transport conveyor 35 with a predetermined distance therebetween. As illustrated in FIG. 2, the end seal unit 45 of the present embodiment includes a pair of heat seal units 46 disposed above and below with the film F interposed therebetween.

[0035] When the pair of heat seal units 46 sandwich and heat-weld the film F, both end portions of the film F in the longitudinal direction are sealed. In addition, the end seal unit 45 includes a film cutter (not illustrated) and is capable of cutting the film F together with sealing both end portions of the film F in the longitudinal direction (see FIG. 7). The

operation of the end seal unit 45 is controlled by the end seal operation unit 70.

[0036] The interval input unit 50 is configured to receive input of an interval G (see FIGS. 2 and 6) between a trailing end Hb of a preceding article to be packaged H (preceding article to be packaged) and a leading end Ha of a following article to be packaged H (following article to be packaged). The interval G is suitably set in accordance with the length or the type of the article to be packaged H (for example, 15 cm or the like).

[0037] The interval detection sensor 55 is configured to detect the article to be packaged H transported by the transport conveyor 35 by the distance corresponding to the interval G (this will be described later), and is disposed downstream of the transport conveyor 35 and upstream of the end seal unit 45. In addition, the interval detection sensor 55 is disposed so as to be slidable in a front-rear direction relative to a lateral frame 56 of the packaging device 10, and is configured such that a distance thereof relative to the end seal unit 45 is adjustable.

[0038] The interval detection sensor 55 includes, for example, a pair of left and right optical sensors disposed on both sides in a width direction of the transport conveyor 35, an ultrasonic sensor, a mechanical sensor such as a limit switch, or the like.

[0039] Meanwhile, when supply of the article to be packaged H is detected by the supply detection sensor 30, the article to be packaged H may be detected by the interval detection sensor 55. In this case, the detection by the interval detection sensor 55 is prioritized.

[0040] The carry-out conveyor 60 illustrated in FIG. 2 is configured to carry out, from the packaging device 10 at a predetermined speed and at a predetermined timing, the article to be packaged H that is transported by the transport conveyor 35, has both end portions in the longitudinal direction sealed by the end seal unit 45, and is packaged in the bag-shaped film F, and the carry-out conveyor 60 is disposed downstream of the transport conveyor 35, the interval detection sensor 55, and the end seal unit 45. The carry-out conveyor 60 includes, for example, a belt conveyor, a drive roller conveyor, or the like driven by drive means such as a motor.

[0041] The transport conveyor operation unit 65 is configured to operate the transport conveyor 35 when the supply detection sensor 30 detects the leading end Ha of the article to be packaged H from a state in which the transport conveyor 35 is stopped, and to

transport the article to be packaged H by the distance corresponding to the interval G input by the interval input unit 50 when the trailing end Hb of the article to be packaged H passes the supply detection sensor 30 and the detection signal from the supply detection sensor 30 is cut off (immediately after the supply detection sensor 30 detects the trailing end Hb of the article to be packaged H).

[0042] The transport conveyor operation unit 65 of the present embodiment includes, for example, a drive unit 66 including a motor, a sprocket, a chain, or the like and configured to drive the transport conveyor 35, and a control unit (not illustrated) to which the interval G input to the interval input unit 50 is input and which is configured to operate the transport conveyor 35 at the above timing (when the supply detection sensor 30 detects the leading end Ha of the article to be packaged H from a state in which the transport conveyor 35 is stopped) based on the interval G.

[0043] The control unit of the transport conveyor operation unit 65 is electrically connected to the supply detection sensor 30, receives the detection signal from the supply detection sensor 30, and is also electrically connected to a control unit of the end seal operation unit 70 described later to receive a transport conveyor operation signal.

[0044] More specifically, the transport conveyor operation unit 65 starts and operates the transport conveyor 35 when a detection signal indicating the leading end Ha of the article to be packaged H is input from the supply detection sensor 30 to the control unit.

[0045] Further, the transport conveyor operation unit 65 keeps operating the transport conveyor 35 to transport the article to be packaged H downstream on the transport line, and, when the trailing end Hb of the article to be packaged H passes the supply detection sensor 30 and the detection signal from the supply detection sensor 30 is cut off (when a detection signal indicating the trailing end Hb of the article to be packaged H from the supply detection sensor 30 is input to the control unit of the transport conveyor operation unit 65, and immediately after the supply detection sensor 30 detects the trailing end Hb of the article to be packaged H), causes the transport conveyor 35 to continue operating by the distance corresponding to the interval G input by the interval input unit 50.

[0046] When the supply detection sensor 30 does not detect the article to be packaged H, the transport conveyor operation unit 65 stops the transport conveyor 35 except when

operating the transport conveyor 35 by the distance corresponding to the interval G described above.

[0047] In addition, the transport conveyor operation unit 65 is configured to operate by sequence control that does not use a microcomputer or the like. The transport conveyor operation unit may be configured to operate by microcomputer control using a microcomputer or the like, or may be configured to operate by control combining sequence control and microcomputer control.

[0048] The end seal operation unit 70 is configured to operate the end seal unit 45 when the interval detection sensor 55 detects the article to be packaged H transported by the transport conveyor 35 by the distance corresponding to the interval G and the end seal unit 45 is located at the interval G. Specifically, even when the interval detection sensor 55 detects the article to be packaged H, the end seal operation unit 70 does not operate the end seal unit 45 when the end seal unit 45 is positioned at the article to be packaged H covered with the film F, and is configured so that the article to be packaged H is not sandwiched by the pair of heat seal units 46 and 46. When the end seal operation unit 70 operates, the transport conveyor 35 and the carry-out conveyor 60 stop.

[0049] The end seal operation unit 70 of the present embodiment includes, for example, a heat seal drive unit 71 including a lifting rod or the like that moves up and down by an air cylinder, an electric actuator, or the like and configured to move the pair of heat seal units 46, 46 toward and away from each other, and a control unit, not shown, configured to operate the end seal unit 45 at the above timing (when the interval detection sensor 55 detects the article to be packaged H and a sealing position of the end seal unit 45 corresponds to the interval G).

[0050] In addition, the control unit of the end seal operation unit 70 is electrically connected to the control unit of the transport conveyor operation unit 65, and is configured to output, to the control unit of the transport conveyor operation unit 65, an operation signal for prompting operation of the transport conveyor 35 when the interval detection sensor 55 detects the article to be packaged H and the end seal unit 45 is positioned at the article to be packaged H covered with the film F.

[0051] Further, similarly to the transport conveyor operation unit 65, the end seal operation

unit 70 is also configured to operate by sequence control that does not use a microcomputer or the like. The end seal operation unit may be configured to operate by microcomputer control using a microcomputer or the like, or may be configured to operate by control combining sequence control and microcomputer control.

[0052] (Operation of Pillow Packaging Device)

Next, an example of the operation of the packaging device 10 will be described with reference to FIGS. 3 to 8.

[0053] First, a desired interval G is input to the interval input unit 50 (step S1 in FIG. 8). At the same time, the film F is set in the film forming unit 23, and the film F is made ready to be supplied by the film supply unit 20. In addition, the positions of the end seal unit 45 and the interval detection sensor 55 are suitably adjusted. In this state, the pair of heat seal units 46 and 46 of the end seal unit 45 are separated from each other and are retracted from the film F (see the two-dot chain lines in FIGS. 2 and 7).

[0054] Next, the supply conveyor operation unit operates the supply conveyor 25 (step S2 in FIG. 8), and the preceding article to be packaged H (first article to be packaged) is placed on the supply conveyor 25. In this state, that is, in a state in which the supply detection sensor 30 does not detect the article to be packaged H, the transport conveyor 35 is stopped. It goes without saying that the supply conveyor 25 may be operated after the article to be packaged H is placed on the supply conveyor 25.

[0055] Then, the supply conveyor 25 supplies the article to be packaged H to the transport conveyor 35 at a predetermined speed. Then, as illustrated in FIG. 3, when the leading end Ha of the article to be packaged H passes the supply detection sensor 30 and the supply detection sensor 30 detects the leading end Ha of the article to be packaged H, the transport conveyor operation unit 65 operates the transport conveyor 35 as illustrated in FIG. 4.

[0056] Further, when the trailing end Hb of the article to be packaged H passes the supply detection sensor 30 and the detection signal from the supply detection sensor 30 is cut off (immediately after the supply detection sensor 30 detects the trailing end Hb of the article to be packaged H), the preceding article to be packaged H is transported by the interval G input by the interval input unit 50 (step S3 in FIG. 8). At this time, the film F is also transferred by the interval G. In this case, a dimension between the trailing end Hb of the

preceding article to be packaged H and the leading end Ha of the following article to be packaged H is the interval G.

[0057] Then, when the supply detection sensor 30 no longer detects the article to be packaged H, the transport conveyor operation unit 65 stops the transport conveyor 35 and causes the article to be packaged H to stand by at that position. In the case of the present embodiment, the article to be packaged H is placed on the spacer 24 and the transport conveyor 35 and enters a standby state (see FIG. 4).

[0058] Thereafter, the supply conveyor 25 supplies the following article to be packaged H, and, as illustrated in FIG. 5, when the leading end Ha of the following article to be packaged H is positioned at the supply detection sensor 30, as illustrated in FIG. 6, the transport conveyor operation unit 65 operates the transport conveyor 35, and, when the trailing end Hb of the article to be packaged H passes the supply detection sensor 30, transports the following article to be packaged H by the distance corresponding to the interval G. At this time, the preceding article to be packaged H is also transported by the distance corresponding to the interval G. When the supply detection sensor 30 detects the leading end Ha of the following article to be packaged H before completion of operation of the transport conveyor 35 by the distance corresponding to the interval G, the supply conveyor 25 stops.

[0059] As a result, as illustrated in FIG. 6, the interval G between the trailing end Hb of the preceding article to be packaged H and the leading end Ha of the following article to be packaged H is maintained at the interval G input by the interval input unit 50.

[0060] Thereafter, the above operations, that is, (1) stopping of the transport conveyor 35 and standby of the article to be packaged H at that position, (2) supply of the following article to be packaged H and detection by the supply detection sensor 30, and (3) transport of the article to be packaged H by the interval G by the transport conveyor 35, are sequentially repeated, and the interval G between the trailing end Hb of the preceding article to be packaged H and the leading end Ha of the following article to be packaged H is maintained.

[0061] In addition, the article to be packaged H supplied to the transport conveyor 35 by the supply conveyor 25 is transported on the transport conveyor 35 together with the film

F having a bag shape in which front and rear ends and an upper side are open, and the center seal unit 40 seals both end portions of the film F in the width direction to each other (step S4 in FIG. 8).

[0062] Thereafter, the transport conveyor 35 transports the plurality of articles to be packaged H that have been center-sealed, the interval detection sensor 55 detects the article to be packaged H transported by the transport conveyor 35 by the distance corresponding to the interval G, and, when the interval G reaches a position aligned with the end seal unit 45 (see step S5 in FIG. 8), the transport conveyor 35 and the carry-out conveyor 60 stop, and the end seal operation unit 70 operates the end seal unit 45 (see FIG. 7).

[0063] Then, the pair of heat seal units 46, 46 of the end seal unit 45 move toward each other to sequentially seal both end portions of the film F in the longitudinal direction (see step S6 in FIG. 8), a pillow package in which the article to be packaged H is covered with the film F is manufactured, the pillow package is separated from the film F, and the carry-out conveyor 60 carries the pillow package out from the packaging device 10.

[0064] In step S5 in FIG. 8, even when the interval detection sensor 55 detects the article to be packaged H, when the end seal unit 45 is not positioned at the interval G and is positioned at the article to be packaged H, the transport conveyor 35 further transports the article to be packaged H (step S7 in FIG. 8) to position the end seal unit 45 at the interval G.

[0065] The present embodiment includes the following method for manufacturing a pillow package. Specifically, the method is a method for manufacturing a pillow package by packaging an article to be packaged with a film, the method including: a film supply unit configured to supply the film; a supply conveyor configured to supply the article to be packaged; a supply detection sensor configured to detect supply of the article to be packaged; a transport conveyor disposed downstream of the supply conveyor and configured to transport the article to be packaged; a center seal unit disposed on the transport conveyor and configured to cover the article to be packaged with the film and seal both end portions of the film in the width direction to each other; an end seal unit disposed downstream of the transport conveyor and configured to seal both end portions of the film in the longitudinal direction; and an interval input unit configured to receive input of an

interval between a trailing end of a preceding article to be packaged and a leading end of a following article to be packaged. The transport conveyor is stopped in a state in which the supply detection sensor does not detect the article to be packaged, the transport conveyor is operated when the supply detection sensor detects the leading end of the article to be packaged from a state in which the transport conveyor is stopped, and the article to be packaged is transported by a distance corresponding to the interval when the trailing end of the article to be packaged has passed the supply detection sensor and a detection signal from the supply detection sensor is cut off (immediately after the supply detection sensor detects the trailing end of the article to be packaged).

[0066] In the above method for manufacturing a pillow package, an interval detection sensor configured to detect the article to be packaged transported by the transport conveyor by the distance corresponding to the interval is disposed downstream of the transport conveyor and upstream of the end seal unit, and the end seal unit is configured to operate when the interval detection sensor detects the article to be packaged and the end seal unit is located at the interval.

[0067] (Operation and Effect)

Next, the operation and effect of the packaging device 10 having the above-described configuration will be described.

[0068] According to the packaging device 10 having the above configuration, the transport conveyor operation unit 65 is configured to operate the transport conveyor 35 when the supply detection sensor 30 detects the leading end Ha of the article to be packaged H from a state in which the transport conveyor 35 is stopped, and to cause the transport conveyor 35 to continue operating by the distance corresponding to the interval G when the trailing end Hb of the article to be packaged H passes the supply detection sensor 30 and the detection signal from the supply detection sensor 30 is cut off (immediately after the supply detection sensor 30 detects the trailing end Hb of the article to be packaged H).

[0069] In addition, when the supply detection sensor 30 detects the leading end Ha of the following article to be packaged H before completion of operation of the transport conveyor 35 by the distance corresponding to the interval G (during continued operation of the transport conveyor 35 by the distance corresponding to the interval G and before

completion of the operation), a supply conveyor operation unit (not illustrated) stops the supply conveyor 25.

[0070] Therefore, even when articles to be packaged H to be packaged have different lengths and are not uniform in length, the interval G between adjacent articles to be packaged H and H can be aligned during a packaging process of the articles to be packaged H, and therefore lengths of both end portions of the film F in the longitudinal direction can be suitably secured regardless of whether the article to be packaged H is long or short.

[0071] As a result, the article to be packaged H is packaged with a favorable appearance regardless of whether the article to be packaged H is long or short. In particular, it is possible to prevent degradation of the appearance caused by both end portions of the bag-shaped film F in the longitudinal direction being excessive relative to the length of the article to be packaged H.

[0072] In addition, in this packaging device 10, the only sensor necessary for aligning the interval G between adjacent articles to be packaged H and H is the supply detection sensor 30, and the interval G between the articles to be packaged H and H is aligned by the predetermined operation of the transport conveyor 35 by the transport conveyor operation unit 65 as described above, whereby the structure of the packaging device 10 is simplified.

[0073] As described above, it is possible to provide the packaging device 10 that has a simple structure yet is capable of reliably packaging the article to be packaged H with a favorable appearance in accordance with the length of the article to be packaged H.

[0074] In addition, in the present embodiment, the interval detection sensor 55 configured to detect the article to be packaged H transported by the transport conveyor 35 by the distance corresponding to the interval G is disposed downstream of the transport conveyor 35 and upstream of the end seal unit 45, and the packaging device 10 includes the end seal operation unit 70 configured to operate the end seal unit 45 when the interval detection sensor 55 detects the article to be packaged H and the end seal unit 45 is located at the interval G.

[0075] According to the above aspect, in addition to the supply detection sensor 30 and the transport conveyor operation unit 65, the interval detection sensor 55 and the end seal operation unit 70 having the above configuration are provided. Therefore, both end

portions of the film F in the longitudinal direction in a state in which the interval G between adjacent articles to be packaged H and H is aligned are appropriately sealed, and the article to be packaged H is reliably packaged with the film F while the interval G between the articles to be packaged H and H is stably maintained.

[0076] Further, in the present embodiment, at least the transport conveyor operation unit 65 is configured to operate by sequence control.

[0077] According to the above aspect, at least the transport conveyor operation unit 65 operates by sequence control that does not use a microcomputer or the like, and therefore the packaging device 10 having a simple structure and being less likely to fail is provided.

[0078] In addition, in the present embodiment, when supply of the article to be packaged H is detected by the supply detection sensor 30 and the interval G is detected by the interval detection sensor 55, detection by the interval detection sensor 55 is prioritized.

[0079] According to the above aspect, since detection by the interval detection sensor 55 is prioritized, both end portions of the film F in the longitudinal direction are reliably sealed by the end seal unit 45, and the article to be packaged H is packaged without being caught (so that the article to be packaged H is not caught in sealed portions of both end portions of the film F in the longitudinal direction).

[0080] Further, in the present embodiment, the interval detection sensor 55 is configured such that a distance thereof relative to the end seal unit 45 is adjustable.

[0081] According to the above aspect, the seal positions of both end portions in the longitudinal direction of the film F by the end seal unit 45 are suitably adjusted in accordance with the shape, thickness, or the like of the article to be packaged H, and the convenience of the packaging device 10 is improved.

[0082] The present invention is not limited to the embodiment described above, and various modified embodiments are possible within the scope of the gist of the present invention, and such embodiments are also included in the scope of the present invention.

Description of Reference Numerals

[0083] 10: pillow packaging device

20: film supply unit

25: supply conveyor

30: supply detection sensor

35: transport conveyor

40: center seal unit

45: end seal unit

50: interval input unit

55: interval detection sensor

60: carry-out conveyor

65: transport conveyor operation unit

70: end seal operation unit

H: article to be packaged

F: film

G: interval

CLAIMS

[Claim 1] A pillow packaging device that packages, with a film, an article to be packaged, the pillow packaging device comprising:

a film supply unit configured to supply the film;

a supply conveyor configured to supply the article to be packaged;

a supply detection sensor configured to detect a leading end and a trailing end of of the article to be packaged;

a transport conveyor disposed downstream of the supply conveyor and configured to transport the article to be packaged;

a center seal unit disposed on the transport conveyor and configured to cover, with the film, the article to be packaged and seal both end portions of the film in a width direction to each other;

an end seal unit disposed downstream of the transport conveyor and configured to seal both end portions of the film in a longitudinal direction;

an interval input unit configured to receive input of a suitably set interval between a trailing end of a preceding article to be packaged and a leading end of a following article to be packaged;

a transport conveyor operation unit configured to operate the transport conveyor in a case where the supply detection sensor detects the leading end of the article to be packaged from a state in which the transport conveyor is stopped, and transport the article to be packaged by a distance corresponding to the interval in a case where the trailing end of the article to be packaged passes the supply detection sensor and a detection signal from the supply detection sensor is cut off; and

a control conveyor operation unit configured to stop the supply conveyor in a case where, before the transport conveyor operation unit completes operation of the transport conveyor by the distance corresponding to the interval, the supply detection sensor detects the leading end of the following article to be packaged following the preceding article to be packaged.

[Claim 2] The pillow packaging device according to Claim 1,

wherein at least the transport conveyor operation unit is configured to operate by sequence control.