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(54) APPARATUS FOR FEEDING A FILM TO A MACHINE FOR PACKAGING ARTICLES

VORRICHTUNG ZUM ZUFÜHREN EINES FILMES ZU EINER MASCHINE ZUM VERPACKEN VON GEGENSTÄNDEN

APPAREIL ALIMENTANT EN FILM THERMOFORMABLE UNE EMBALLEUSE SOUS BLISTER OU ANALOGUE DES ARTICLES

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Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to packaging articles into so-called blister packs, that are obtained from a film of a heat-formable material.

[0002] In particular, the invention relates to an apparatus for feeding this heat-formable film to machines for packaging articles into blister packs.

DESCRIPTION OF THE PRIOR ART

[0003] It is known that working stations of machines producing blister packs, e.g. for packaging pharmaceutical products, must be fed with a heat-formable film.

[0004] This film is usually produced in reels, which are mounted on suitable carriers pins of the packaging machine. The film is unwound from the reel while being fed to the machine.

[0005] When the reel is run out, it is necessary to substitute it with a new one, removing the empty reel core from the carrier axle and mounting a new reel.

[0006] At present, this operation is performed manually by an operator and obviously, it requires interruption of the packaging process.

[0007] More recent packaging machines are provided with two reel carrier axles, used alternatively, so that the film is fed almost continuously.

[0008] In this case, the operator prepares a new reel on a carrier axle, when film is unwound from the other reel, and locates the leading edge of the new reel near a splicing station, in which the trailing edge of the run out reel and the leading edge of the new, full reel are then spliced automatically. The two edges are joined by an adhesive tape, previously prepared by the operator.

[0009] Likewise, the adjusting operations necessary to change the size of the film of heat-formable material from which the blister packs are obtained, are performed manually by the operator.

[0010] Document EP-A-0395027 describes an apparatus which has first and second loading means. First and second rolls of a strip-like material are loaded on the first and second loading means and a detection means detects an end indication tape adhered to a trailing end portion of the strip-like material of the rolls.

[0011] A cutting/unrolling means automatically unrolls the strip-like material from the rolls and cuts the leading and trailing end portions of the strip-like material to form the leading and trailing ends.

[0012] The unrolled strip-like material is guided along a predetermined path by a guide means and a joining station is arranged midway along the guide path. One of the strip-like materials is fed through the joining station by a feeding means and the leading end portion of the other strip-like material is stopped and stands by at the joining station.

[0013] When the trailing end of one strip-like material passes through the joining station, the leading end of the other standby strip-like material is joined to the trailing end of the one strip-like material by a joining means.

[0014] Also document GB-A-2181414 discloses a device for splicing webs of packaging material, in which the trailing end of a packaging strip wound off a used-up roll is spliced to the leading end of a packaging material coming from a new roll.

[0015] The device includes means for detecting proximity of the leading edge of a new strip when fed into the guide means. The trailing end of the used strip is cut by means located upstream of the guide means, and timing means are used to set the operating time lapse of pressure means according to the length of the splice as established by the cutting means.

SUMMARY OF THE INVENTION

[0016] The object of the present invention is to provide an apparatus that allows to feed, automatically and continuously, a film of heat-formable material to a machine for packaging articles in blister packs and the like.

[0017] Another object of the present invention is to provide an apparatus that can automatically set new reels of heat-formable film on the carrier axles and automatically remove the run out reel cores from the carrier axles.

[0018] A further object of the present invention is to provide an apparatus that automatically prepares the leading edge of the new film reel meanwhile locating it near the splicing station and that automatically applies the adhesive tape at the moment of splicing of the leading edge of the new film to the trailing edge of the run out film reel.

[0019] Still another object of the invention is to provide a heat-formable film feeding apparatus which performs automatically adjusting operations required during the film size change over.

[0020] The above mentioned objects are obtained by means of an apparatus for feeding a film of heat-formable material to a machine for packaging articles in blister packs or the like, said apparatus being characterised in that it includes:

- a first and a second curved guides, which are fed with respectively a first and a second film of a heat-formable material, to be fed one after the other to a packaging machine and unwinding from relative reels mounted on a first and a second reel carrier axles;

- driving means situated upstream and downstream of said curved guides respectively, and operated for advancing said films;

- first and second sensors situated in the region of the outlets of said curved guides respectively, downstream of said driving means, for detecting the
presence of the leading edges of said films to stop
said leading edges in a position, in which they are
ready to be fed to said packaging machine.

[0021] The claimed apparatus also includes a splicing
station, in which the leading edge and the trailing edge
of said first and second films, fed one after the other to
a packaging machine, are spliced.

[0022] The splicing station is equipped with:

sensor means, for detecting running out of said first
film and commanding thereafter the supply of said
second film;

da cutting group, featuring a blade operated cross-
wise to said films, so as to cut respectively, a termi-
nal part and a beginning part of said films;

first and second gripping means for clamping said
films against stationary stop means, respectively
downstream and upstream of the cutting line of said
cutting group;

a taping group, moving crosswise to said films on
the same plane as the cutting group and supporting
an applying roller, fed with adhesive tape taken from
a reel, said applying roller being carried in oscillat-
ing condition between a working position, in which
it touches said leading and trailing edges of said
films being spliced, and a rest position in which said
applying roller is located far from these edges of the
films;

said taping group being also equipped with cutting
means for severing the portion of adhesive tape to
be applied to the films edges.

BRIEF DESCRIPTION OF THE DRAWINGS

[0023] Characteristics features of the invention will be
pointed out in the following, with particular reference to
the enclosed drawings, in which:

- Figure 1 is a plan view of a station, in which the heat-
formable film reels are loaded on the machine;

- Figure 2 is a vertical section view of a particular of
the loading station, taken along line II-II of Figure 1;

- Figures 3 and 4 show plan and section views of
the above mentioned loading station in another working
step, the section view being taken along line IV-IV
of Figure 3;

- Figure 5 is the same plan view of the loading station,
in a further working step;

- Figures 6 and 7 are section views of reel carriers,
taken along lines VI-VI of Figure 3 and VII-VII of Fig-
ure 5, respectively;

- Figure 8 is a schematic front view of the subject ap-
paratus;

- Figures 9a, 9b illustrate the same enlarged front
view of a particular of the apparatus in two charac-
teristic working configurations, that allow vision of
means for cutting an adhesive tape which keeps the
leading edge of a reel in adherence thereto;

- Figure 10 is a further front view of the apparatus in
a working step different from the one of Figure 8;

- Figures 11a and 11b illustrate section plan views of
a portion of the apparatus, in different working
steps, taken along the section line XI-XI of Figure 10;

- Figures 12a, 12b, 12c, 12d, 12e and 12f show a por-
tion of the schematic front view of the apparatus,
during subsequent splicing steps of the heat-form-
able films;

- Figure 13 is a section schematic view taken along
a plane crosswise to the film advancement direction
in the splicing station, with some parts removed and
others in section;

- Figure 14 is a schematic view according to the ar-
row W of Figure 13, of the splicing station, with
some parts removed and others in section;

- Figures 15 and 16 show the same views as in Fig-
ures 13, 14

do the above mentioned splicing station in another work-
ing step;

- Figures 17 and 18 show the same view as in Figure 15 of
the splicing station, in a further working step;

- Figure 19 shows an enlarged particular of Figure 18;

- Figures 20a, 20b illustrate schematic views of
means for driving the above mentioned film, in dif-
f erent working configurations;

- Figures 21a and 21b illustrate sectional views of the
particular of Figure 13 taken along the line XXI-XXI;

- Figures 22a and 22b show a plan view of the means
for adjusting the apparatus in accordance with the
size of the heat-formable film;
- Figure 23 is a transversal sectional view of other size adjusting means;

- Figure 24 shows a block diagram of electronic control means for the above mentioned adjusting means.

PREFERRED MODE OF CARRYING OUT THE INVENTION

[0024] With reference to the above mentioned figures, a station 1, in which the reels 2 of heat-formable film material 20 are loaded on the apparatus 10, from which the film 20 is fed to a machine for packaging articles into blister packs.

[0025] The reels 2 to be loaded are disposed in the station 1 arranged with vertical axis and on a pallet 3, that is located in a predetermined position in the station 1 (Fig. 1).

[0026] A device 4, situated in the loading station 1 for picking up the reels 2, is equipped with a gripping head 5 carried by a carriage 6 sliding on a horizontal cross-bar 7.

[0027] The cross-bar 7 moves on longitudinal side members 8.

[0028] The gripping head 5 is operated by suitable actuators which move it vertically to the carriage 6 and make it oscillate about a horizontal axis parallel to the side members 8.

[0029] The gripping head 5 is equipped with expansion means 9 which engage the reel 2 to be loaded onto the apparatus (Figures 2 and 6).

[0030] The device 4 picks the reels 2 from the pallet 3 and moves them to a cleaning device 11 equipped with a bell member 12 connected to known suction means (Figure 2).

[0031] The bell 12 is carried by an arm 13 connected crosswise to a vertical bar 14 which moves vertically and rotates about its axis. In this way, the bell is moved between a rest position and a working position coaxial with a pin 15 on which the reel 2 to be cleaned has been set. The gripping head 5 is operated by suitable actuators which move it vertically to the carriage 6 and make it oscillate about a horizontal axis parallel to the side members 8. The gripping head 5 is equipped with expansion means 9 which engage the reel 2 to be loaded onto the apparatus (Figures 2 and 6).

[0032] Then, the pick up device 4 puts the cleaned reels 2 on a reel carrying axle 16 of the apparatus 10.

[0033] Actually, the apparatus 10 has two reel carrying axles 16, arranged one beside the other, onto which the reels 2 to be used in sequence, are set, as will be explained in the following.

[0034] The station 1 is also provided with a chute 17 for discharging the cores 21 of the run out reels, after they have been extracted from the relative reel carrying axle 16.

[0035] More precisely, as shown in Figures 6 and 7, each reel carrier axle 16 includes a hub 18 equipped with expansion means 19, which lock the reel 2 when it is loaded on the apparatus.

[0036] The hub 18 extends from a shaft 28, rotatably supported by a tube 22, sliding through a sleeve 23 integral with a side 24 of the apparatus stationary frame (Figure 7). The rear ends of the tubes 22 of the two reel carrying axles 16 are fastened to a common plate 25 (see Figures 22a, 22b).

[0037] A pusher stop 26 is fixed to the front part of the sleeve 23 for expelling the core 21 of the run out reels 2, and is substantially formed by a cup guided by bars 27 passing longitudinally through the sleeve 23.

[0038] One of the bars 27 is fastened to the shaft of an actuator 29, e.g. a pneumatic cylinder, which makes the pusher 26 slide axially.

[0039] A friction roller 30, suitably driven by a motor, acts on the external part of each reel 2 mounted on each axle 16 of the apparatus 10 (Figure 8).

[0040] A friction roller 30 is supported by a swinging lever 31 pivoting on a pin 33, that is parallel to the reel carrier axes 16, and operated by an actuator 32.

[0041] The heat-formable film 20 is pulled by a pair of rollers 34,35, one of which is driven by motor means (Figures 8,10), so that it is unwound from the reels 2.

[0042] The driving rollers 34,35 direct the film 20, unwinding from the reels 2, respectively to a first and to a second curved guides 36,37, arranged on a common vertical surface.

[0043] The ripping device 40, situated upstream of the driving rollers 34,35, cuts off the portion 51 of adhesive tape, which normally keeps the leading edge of the film 20 in wound in adherence to the reel (see Figure 11a).

[0044] The ripping device 40, seen in detail in Figures 9a,9b, features a blade 41, carried by a parallel link 42 operated by an actuator 43, so that the blade is moved along the already mentioned vertical surface (Figure 8).

[0045] The blade 41 is bound to the parallel link via a lever 44 pivoted on a pin 45 of a connecting rod of the link 42. The lever 44 has a roller 46 following the path of a cam 47.

[0046] The lever 44 is yieldingly biased by a return spring 48 anchored to the connecting rod of the mechanism 42.

[0047] The cam 47 is fastened to a rocking lever 49, operated by an actuator not shown in the figures, so that the cam oscillates on the already mentioned vertical surface.

[0048] Oscillation of the cam 47, of limited width, causes rotation of the blade 41 between a position raised with respect to the reel and a lowered, ripping position, skimming the reel 2 as indicated with 41a in Figure 9b.

[0049] The rear part of the blade 41 features an extension 52 acting, together with a stationary, inclined, flat member 53, as a guide for the film 20, when the latter runs between the rollers 34,35.

[0050] This extension 52 features a rear indentation...
54, aimed at avoiding interference with the flat member 53 when the blade 41 is moving operated by the mechanism 42 (see Figures 11a, 11b).

[0054] At the outlet of the guides 36,37, the film 20, unwinding from the reels 2 due to the action of the respective pair of rollers 38,39, engages inlet parts of a stationary guide 55.

[0055] These inlet parts are convergent towards the only plane on which the film is fed to the machine. The feeding plane is horizontal and extends along a longitudinal axis of the packaging machine.

[0056] A first and a second sensor 56,57, e.g. photo-cells, are situated downstream of the two pairs of rollers 38,39 to detect the presence of a relative film 20 at the outlet of the guides 36,37.

[0057] Another sensor 58 is situated at the outlet of the guide 55, downstream of deviation means 59 operated by a relative actuator to act on the film 20 (Figure 8).

[0058] The film 20, fed to the packaging machine, passes through a splicing station, indicated with 60, in which there are also second deviation means 61.

[0059] Then, the film 20 is conveyed through a series of turn-about rollers 62 to a storage device 63 for continuous feeding of the film 20 to a forming station of the packaging machine (see again Figure 8), e.g. of the type disclosed in the Patent Application BO97A 000151 of the same Applicant.

[0060] This storage device 63 is substantially formed by a pair of side panels 93 enclosing the film 20 and situated on vertical planes longitudinal to the movement direction of the film 20. When the film 20 exits from between the panels, it turns about another turn-about roller 92.

[0061] The side panels 93 are carried by an adjustment group 94, described in detail in the following.

[0062] At the inlet of the splicing station 60, the film 20 is pulled by a further pair of rollers 64,65 situated downstream of the deviation means 59 and the sensor 58, and driven by motor means.

[0063] The splicing station 60, illustrated in detail in Figures 14 and 15, features a cutting group 66 equipped with a circular blade 67 carried by a horizontal bar 68, which is operated by known and not shown means to move along an axis crosswise to the film 20 advancement direction.

[0064] The circular blade 67 co-operates with a stationary counter-blade 69 situated within a slit 71 made in the lower part of a plate 70, that acts as a stop for the moving film 20 (Figures 21a, 21b).

[0065] First and second gripping means of the film 20, connected to the plate 70, are formed by a pair of horizontal strips 72,73, disposed crosswise to the film 20 advancement direction, respectively downstream and upstream of the slit 71 inside which the circular blade 67 runs (see again Figures 21a, 21b).

[0066] The strips 72,73 are operated by respective pairs of actuators 74,75 to move vertically.

[0067] It is to be pointed out that the above mentioned deviation means 61 are carried by a plate 70 downstream of the first strip 72 gripping the film 20 along the already mentioned film advancement direction A.

[0068] Moreover, the splicing station 60 features a taping group 76 equipped with an element 77 driven to move, on a plane transversal to the film 20 advancement direction, by a pair of guiding stems 78.

[0069] At its side, the moving element 77 carries a pin 79 supporting a roll 80 of adhesive tape, to be applied to the film 20.

[0070] Over the roll 80 of the adhesive tape, the moving element 77 carries an applying roller 81, better seen in Figure 19; this roller 81 features a series of radial channels 82, which are connected to known suction means, so as to keep on its outer surface the tape to be applied, obviously with its adhesive part turned outside.

[0071] The roll 80 of adhesive tape and the applying roller 81 are supported, with the axis parallel to the film 20 advancement direction, on a vertical cutting plane defined by the circular blade 67.

[0072] The applying roller 81 is carried by a rocker lever 83, which pivots on a pin 84 parallel to the axis of the roller 81 and which is moved by an actuator 85 mounted oscillating on the moving element 77.

[0073] A roller 86, acting on the adhesive tape unwinding from the roll 80, is carried by a lever 87 which pivots on a pin 88 parallel to the axis of the roll 80. A not shown actuator moves the lever 87.

[0074] Moreover, the upper part of the moving element 77 carries also a blade 90, that is operated by a relative actuator 91 to severe the part of the adhesive tape necessary for splicing the film 20.

[0075] Now operation of the described apparatus will be explained beginning from the step, in which a new reel 2 of heat-formable film 20 is loaded on the apparatus 10 to substitute a run out reel.

[0076] The reel 2 is taken from the pallet 3, situated in the loading station 1, by the gripping head 5 of the picking up device 4, moved by the carriage 6 along the cross-bar 7 moving on the longitudinal side members 8 (Figure 1).

[0077] The reel 2 taken from the pallet 3 is brought to the cleaning device 11 and set onto the pin 15 (Figure 2).

[0078] The cleaning device 11 includes the bell 12, that is carried by the transversal arm 13 and is raised by the bar 14 from the rest position and moved over the reel 2 to be cleaned, as shown with broken line 12a in Figure 4. Then the bell 12 is lowered to the working position covering the reel 2 and set in suction, so as to perform the cleaning operation.

[0079] During the reel 2 cleaning operation, the gripping head 5 of the pick up device 4 is moved to be lined up with the carrier axle 16 supporting the core 21 of the run out reel (Figure 3).

[0080] The core 21, released by the expansion means 19 of the hub 18 of the reel carrier axle 16, is locked by the expansion means 9 of the gripping head 5 axially introduced into this core 21 (Figure 6).
The removal of the core 21 from the hub 18 is facilitated by the pushing member 26, that is operated by the actuator 29 and slides axially through the sleeve 23, so as to push the core 21 outwards.

The pick up device 4 discharges the core 21 onto the chute 17 and transports the reel 2 from the cleaning station 11 to the above mentioned reel carrier axle 16 (Figure 5).

The reel 2 is fixed on the axle 16 by the expansion means 19 of the hub 18 (Figure 7).

It is to be pointed out that during the above mentioned steps, the packaging machine is fed with the film 20 unwinding from the reel 2 mounted on the other axle 16 beside, as schematically shown in Figure 8.

The film 20, guided through the first curved guide 36, passes freely through the splicing station 60 and folds between the side panels 93 of the storage device 63 situated upstream of the forming station of the packaging machine.

The new reel 2, fixed on the reel carrier axle 16, is rotated by the friction roller 30 carried by the lever 31 set in contact with the reel 2.

At this moment, the device 40 is operated to sever the portion 51 of the adhesive tape which keeps the leading edge of the film 20 in adherence to the reel 2.

For this purpose, the actuator 43 operates the parallel link 42 that carries the oscillating blade 41, so as to bring the blade 41 close to the reel 2, as seen in detail in Figure 9a; in this situation, the cam 47 acts as a track for the roller 46.

Afterwards, the cam 47 is swung so that the blade 41 rotates to reach the lowered severing position 41a to skim the reel 2 (see Figure 9b).

In this position, the roller 46 is moved away from the cam 47, so that it does not hinder the action of the spring 48, that yieldingly biasses the blade 41 against the reel 2 (see again Figure 9b).

With the device 40 set in this configuration, rotation of the reel 2 in direction B provokes ripping of the portion 51 of the adhesive tape and detaching of the leading edge of the film 20 (Figure 10).

In particular, the leading edge of the film 20 first engages the blade 41 (Figurella) and then slides on the rear extension 52 of the blade 41, that acts as a guide for the film 20 to be introduced between the driving rollers 34,35 (Figures 10, 11b).

The film 20, pulled by the rollers 34,35, is introduced into the second curved guide 37, and when later it exits from the guide, it is taken between other driving rollers 38,39 and stopped in the region of the sensor 57, that detects the presence of the film.

In this wait position, the film 20 is ready to be fed to the packaging machine.

Inverse rotation of the mechanism 42 and the detachment of the friction roller 30 from the reel 2, brings the cutting off device 40 back to the rest position in suitable time relation with the introduction of the film 20 into the curved guide 37.

During the cutting step, the film 20 is clamped...
against the stop plate 70 by first and second gripping means, formed by strips 72, 73, situated respectively downstream and upstream of the slit 71 made in the plate 70.

[0109] The strips 72,73 are operated vertically by respective pairs of actuators 74,75 (Figures 15 and 16).

[0110] The leading and the trailing edges of the film 20 are spliced by the taping group 76, whose moving element 77 is operated crosswise to the film 20 advancement direction, along the guide stems 78.

[0111] During the adhesive tape application stroke, the applying roller 81 is brought to touch the edges of the film 20 being spliced because of the oscillation of the rocker lever 83, operated by the actuator 85, as seen in Figure 17.

[0112] The adhesive tape unwinds from the roll 80, carried by the moving element 77 and is held on the applying roller 81 by the radial channels 82 connected to suction means.

[0113] When the adhesive tape application stroke is completed, the applying roller 81 is moved away from the edges of the film 20 being spliced by inverse oscillation of the rocker lever 83 (Figure 18).

[0114] Afterwards, the blade 90 is operated to cut off the portion of the adhesive tape used for splicing the edges of the film 20 (Figure 19).

[0115] It is to be noted that, during the cutting action, the roller 86 carried by the swinging lever 87 acts on the adhesive tape unwinding from the roll 80, so as to keep the tape and avoid rewinding thereof on the roll 80 (Figure 19).

[0116] The described apparatus allows to feed, automatically and continuously, a film of heat-formable material to a machine packaging articles in blister packs and the like.

[0117] In particular, the apparatus automatically substitutes the run out reel of the heat-formable material with a new one, automatically prepares the leading edge of the new film reel near the splicing station and splices the edges without the operator’s intervention.

[0118] The film 20 size is changed by an adjustment device 100, acting simultaneously on the reel carrier axles 16.

[0119] This adjustment device 100 includes, as seen in Figures 22a,22b, a screw shaft 101 rotatably supported by a frame 102 with its axis parallel to the reel carrier axles 16.

[0120] The screw shaft 101 is rotated by a motor 103, linked to an encoder 104, and engages a threaded bushing 105, fastened to the plate 25, guided on shafts 106 of the frame 102.

[0121] The plate 25 supports also the tubes 22 of the two reel carrier axles 16.

[0122] The screw shaft 101 carries also a pulley 107, connected to a toothed belt 108 transmitting motion to another pulley 109 mounted on a shaft 110 of the adjustment groups 50 of the guides 36,37, as seen in Figure 7.

[0123] The guides 36,37 are preferably composed of a pair of central stationary section bars 111 and pairs of lateral section bars 112,113, supporting and containing bars, respectively.

[0124] These section bars are carried by relative support bodies 114 sliding on shafts 115, transversally fastened to the side 24 of the apparatus stationary frame.

[0125] The central section bars 111 are fastened to the shafts 115.

[0126] The support bodies 114 form respective internal threadings coupled with threaded portions 110a, 110b of the adjustment shaft 110.

[0127] The portions 110a,110b are respectively right-hand and left-hand threaded, so as to determine, when the adjustment shaft 110 rotates, symmetrical sliding of the support bodies 114 carrying the section bars 112,113, as indicated with broken lines 114a, relative to the position of minimum mutual distance between the above mentioned section bars 112,113.

[0128] Therefore, rotation of the screw shaft 101 (suitably multiplied and measured by an encoder 104) driven by the motor 103, determines translation of the plate 25, with the tubes 22 of the reel carrier axles 16 fastened thereto, so that the pushing means 26, against which the reels stop, are likewise moved.

[0129] This allows to maintain unmoved the median plane X of the reels 2, during the adjustment step, as seen in Figures 7, 22a and 22b, relative respectively to the reels of maximum and minimum size used by the packaging machine.

[0130] Simultaneously, operation of the screw shaft 101 controls, by transmission to a toothed belt 108, the rotation of the shaft 110 of the adjustment groups 50 of the curved guides 36,37, so as to cause a corresponding translation of the lateral section bars 112,113, respectively supporting and enclosing the film 20 to be fed.

[0131] Likewise, the storage device 63 for continuous feeding of the film 20 to the forming station of the packaging machine, is adjusted during the above mentioned step, in which the film 20 is stopped in the region of the splicing station 60.

[0132] For this purpose, as seen in Figure 23, the adjustment group 94 features a screw shaft 116 rotated by an intermediate stationary support body 117 equipped with right-hand and left-hand respectively threaded portions 116a,116b, coupled with corresponding means 118 supporting the side panels 93.

[0133] The screw shaft 116 is rotated by a motor 119, so as to determine the symmetrical sliding of the means 118 supporting the side panels 93, as indicated with broken lines 93a, relative to the position of minimum mutual distance between the above mentioned side panels 93.

[0134] It is to be noted that, the upper parts of the support means 118 form respective spouts 96 turned inwards, aimed at guiding the edges of the film 20 pulled by the driving roller 92 on a horizontal outlet plane 95.

[0135] Figure 24 shows a block diagram of electronic means 120 for controlling the above mentioned adjust-
ment groups, where the numeral 121 indicates generally a motor which rotates the screw shaft 123 coupled to the member to be adjusted 124. The motor 121 is linked to an encoder 122.

[0136] The above mentioned control means 120 includes a programmable central processing unit 125, formed substantially by a microprocessor controlling a programmable logic system 126.

[0137] This system 126 controls the motor 121 via a relay 127, to which the limit stop sensors 128, 129 are connected, for safety.

[0138] The programmable logic system 126 receives signals sent by the encoder 122 and the a zero sensor 130.

[0139] The control means 120 can be operated by means of a keyboard 131, or e.g. a touch screen input device.

[0140] The above mentioned technical-functional features can be used in all similar solutions when considered with reference to the apparatus being the subject of the present invention.

[0141] According to what has been said hereintofore, the subject apparatus performs automatically adjusting operations required during the size change over for film of different dimensions to be fed to the packaging machine.

[0142] These adjustment operations are carried out with centralised commands sent by programmable logic means 120, and intervention of the operator is not needed to substitute parts or to perform other similar operations.

Claims

1. Apparatus for feeding a film of heat-formable material to a machine for packaging articles in blister packs or the like, said apparatus including:

   a first and a second curved guides (36,37), through which respectively a first and a second film (20) of a heat-formable material are fed, one after the other, to a packaging machine while they are unwound from relative reels (2) mounted on a first and a second reel carrier axles (16);

   driving means (34,35) situated upstream of said curved guides (36,37) and operated to direct the film (20) respectively to said first and second curved guides (36,37);

   other driving means (38,39) situated downstream of said curved guides (36,37), and operated to provoke advancement of said films (20) towards said packaging machine;

   first and second sensors (56,57) situated at the outlet of said curved guides (36,37) respectively, downstream of said other driving means (38,39), for detecting the presence of the leading edges of said films (20) and for stopping said films in a position in which they are ready to be fed to said packaging machine;

   said apparatus being characterized in that it further includes:

   a splicing station (60), in which the leading edge and the trailing edge of said first and second films (20) are spliced;

   said splicing station (60) being equipped with:

   another sensor means (58), situated at the outlet of said first guide (36) for detecting running out of said first film (20) to command consequently supply of said second film (20);

   a cutting group (66), featuring a blade (67) operated crosswise to said films (20) movement direction (A), so as to cut respectively, a terminal part (200) and beginning part (201) of said films (20);

   first and second gripping means (72,73) clamping said films (20) against stationary stop means (70), respectively downstream and upstream of a cutting line of said cutting group (66);

   a taping group (76), moving crosswise to said films (20) movement direction (A) on the same plane as the cutting group (66) and supporting an applying roller (81), fed with adhesive tape taken from a reel (80), said applying roller (81) being carried in oscillating condition between a working position in which it touches said leading and trailing edges of said films (20) being spliced, and a rest position in which said applying roller is located far from these edges of said films (20);

   said taping group (76) being also equipped with cutting means (90) for severing the portion of said adhesive tape to be applied to said films (20) edges.

2. Apparatus, according to claim 1, characterised in
that it includes a reels (2) loading station (1), with a device (4) for picking up said reels (2) equipped with a gripping head (5) carried by a carriage (6) sliding on a horizontal cross-bar (7), said cross-bar (7) moving along a direction parallel to said film advancement direction (A), with said gripping head (5) made vertically movable with respect to said carriage (6) and swingable about an axis parallel to said film advancement direction (A), to pick up the reels (2) to be loaded from support means (3) and to set the reels (2) on related reel carrier axles (16).

3. Apparatus, according to claim 2, characterised in that said loading station (1) includes a reels (2) cleaning device (11) equipped with a bell member (12) connected to suction means and carried by an arm (13) connected crosswise to a vertical bar (14), said vertical bar being moved vertically and rotated about its axis between a rest position and a working position in which it is coaxial with a pin (15) on which the reel (2) to be cleaned has to be set.

4. Apparatus, according to claim 1, characterised in that it includes a ripping device (40), situated upstream of said curved guides (36,37) for ripping a portion (51) of adhesive tape which normally keeps a leading edge of the film (20) in adherence to the reel (2), with said ripping device (40) featuring a blade (41) carried by a parallel link (42) longitudinal to the movement direction (A), said blade (41) being bound to said parallel link (42) via a lever (44) pivoted to said link (42) and equipped with a roller (46) following the path of a cam (47) due to the action of elastic means (48), with said cam (47) oscillating on the already mentioned vertical surface, thus causing rotation of said blade (41) between a raised position, with respect to the reel (2), and a lowered, ripping position, in which the blade (41) skims the reel (2) and said roller (46) is separated from said cam (47) to allow said elastic means (48) to push said blade against said reel (2).

5. Apparatus, according to claim 1, characterised in that said cutting group (66) is equipped with a circular blade (67) carried by a horizontal bar (68), which is operated to move crosswise to the film (20) advancement direction, with said circular blade (67) co-operating with a stationary counter-blade (69) situated within a slit (71) made in the lower part of a plate (70).

6. Apparatus, according to claim 5, characterised in that first and second gripping means (72,73) of the film 20 are formed by a pair of horizontal strips (72,73), disposed crosswise to the film (20) advancement direction (A), respectively downstream and upstream of the slit (71) of said plate (70), inside which the circular blade (67) runs, and operated by respective pairs of actuators (74,75) to move vertically.

7. Apparatus, according to claim 1, characterised in that said taping group (76) is equipped with a roller (86), carried by a lever (87) which oscillates parallel to the axis of said roll (80), and acting on the adhesive tape unwinding from the roll (80), so as to reduce the tension during the cutting operation.

8. Apparatus, according to claim 1, characterised in that said splicing station (60) includes first and second deviation means (59,61) situated one after the other upstream of said cutting group (66) and acting respectively on said terminal part (200) and beginning part (201) of said film (20) being ejected.

9. Apparatus, according to claim 1, characterised in that it includes a storage device (63), situated downstream of said splicing station (60) and aimed at continuous feeding of the film (20), with said device (63) formed by a pair of side panels (93) enclosing said film (20) and arranged on surfaces longitudinal to the film (20) advancement direction (A) and carried by a group (94) adjusting the mutual distance of said panels (93).

10. Apparatus, according to claim 1, characterised in that it includes an adjustment device (100), equipped with a screw shaft (101) carried rotatably with its axis parallel to the reel carrier axles (16) and crosswise to said film (20) movement direction (A), and engaging a threaded bushing (105) joined to respective tubes (22) of the two reel carrying axles (16), which are fastened to respective means (26), against which the reels (2) stop.

11. Apparatus, according to claim 10, characterised in that said stop means (26) slide axially to said tubes (22) and are operated by respective actuators (29), so as to eject cores (21) of said run out reels (2).

12. Apparatus, according to claim 10, characterised in that said screw shaft (101) drives to rotate, by transmission means (108), respective shafts (110) of a first and a second adjustment group (50) of respective guides (36,37), with said guides (36,37) preferably equipped with lateral section bars (112,113), supporting and containing bars, respectively, carried by relative support bodies (114) sliding crosswise to said film (20) advancement direction (A) and forming respective internal threads coupled with portions (110a,110b) threaded in direction opposite to said shafts (110).
Patentansprüche

1. Vorrichtung zum Zuführen einer Folie aus thermoformbarem Material in eine Maschine zum Verpacken von Gegenständen in Blisterpackungen oder dgl., bestehend aus

- den gebogenen Führungen (36, 37) von gebogenen Antriebsmitteln (34, 35), bei deren Antrieb die Folie (20) jeweils der ersten bzw. der zweiten gebogenen Führung (36, 37) zugeführt wird;
- weiteren den gebogenen Führungen (36, 37) nachgeordneten Antriebsmitteln (38, 39), durch deren Antrieb die Folie (20) zur Verpackungsmaschine gefördert wird;
- ersten und zweiten Sensoren (56, 57), die jeweils am Ausgang der gebogenen Führungen (36, 37) stromab von den weiteren Antriebsmitteln (34, 35) angeordnet sind und das Vorhandensein der Einlaufkanten der Folie (20) detektieren und den Folienvorlauf in einer Stellung stoppen, in der die Folien zum Einzug in die Verpackungsmaschine bereit sind;
- einer Anklebevorrichtung (60), in der das Einlaufende und das Ablaufende der zu verbindenden Folien (20) berührt, und einer von den Enden der Folien (20) im Abstand liegenden Ruhestellung hin- und her beweglich ist;
- wobei die Klebeanordnung (76) außerdem Schneidmittel (90) zum Trennen des auf die Folienenden aufzubringenden Abschnittes des Klebebandes aufweist.

2. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, dass eine Ladestation (1) mit Vorratsrollen (2) vorgesehen ist, mit einer Vorrichtung (4) zum Aufnehmen der Rollen (2), die einen auf einem Schlitten (6) angeordneten Greifkopf (5) trägt, wobei sich der Schlitten auf einer horizontalen Querschiene (7) verschiebt, die sich parallel zur Vorschubrichtung (A) der Folie bewegt, wobei der Greifkopf (5) senkrecht in Bezug auf den Schlitten (6) bewegbar und um eine zur Vorschubrichtung (A) der Folie parallele Achse schwenkbar ist, um die Rollen (2) von Trägern (3) auf die jeweils zurvernetzten Achsen (16) der Rollenträger zu laden.

3. Vorrichtung nach Anspruch 2, dadurch gekennzeichnet, dass die Ladestation (1) eine Reinigungsvorrichtung (11) für die Rollen (2) enthält, die ein glockenartiges Teil (12) aufweist, das mit Saugmitteln verbunden ist und von einem senkrecht zu einer vertikalen Stange (14) vorgesehenen Arm (13) getragen ist, und dass die vertikale Stange vertikal verschiebbar und um ihre Achse zwischen einer Ruhestellung und einer Arbeitsstellung drehbar ist, in der sie koaxial zu einem Stift (15) liegt, auf den die zu reinigende Rolle (2) aufsetzbar ist.

4. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, dass eine Abreißvorrichtung (40) stromauf von den gebogenen Führungen (36, 37) vorgesehen ist, um einen Abschnitt (51) des Klebebandes, der sonst die Einlaufkante der Folie (20) auf der Rolle (2) hält, abzutrennen, dass die Abreißvorrichtung (40) ein Messer (41) aufweist, das auf einer Parallelführung (42) in Längsrichtung der Vorschubrichtung (A) angeordnet ist und das mit der Parallelführung (42) über einen an dieser angelenkten Hebel (44) verbunden ist, der eine Rolle (46) trägt, die auf einer von federnden Mitteln (48) beaufschlagten Kurvenscheibe (47) läuft, wobei die Kurvenscheibe (47) sich auf der bereits erwähnten senkrechten Fläche hin- und her bewegt und dadurch das Messer (41) zwischen einer bezüglich der Rolle (2) angehobenen Stellung und einer abgesenkenen Trennstellung ver dreht, in der das Messer (41) auf die Rolle (2) aufsetzt und die Rolle (46) von der Kurvenscheibe (47) hebt, sodass die federnden Mittel (48) das Messer gegen die Rolle (2) drücken.
schieben.

5. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet**, dass die Abschneidevorrichtung (66) ein Kreismesser (67) enthält, das auf einem horizontalen Stab (68) sitzt, der quer zur Vorschubrichtung der Folie (20) bewegbar ist, wobei das Kreismesser (67) mit einem ortsfesten Gegenmesser (69) zusammenwirkt, das in einem Schlitz (71) im unteren Teil einer Platte (70) angeordnet ist.

6. Vorrichtung nach Anspruch 5, **dadurch gekennzeichnet**, dass erste und zweite Greifmittel (72, 73) für die Folie (20) aus einem Paar horizontaler Streifen (72, 73) bestehen, die quer zur Vorschubrichtung (A) der Folie (20) angeordnet sind, und in dieser Richtung jeweils vor bzw. nach dem Schlitz (71) in der Platte (70) liegen, in dem das Kreismesser (67) läuft, und die über zugeordnete Paare von Stellmitteln (74, 75) vertikal beweglich sind.

7. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet**, dass die Heftanordnung (76) eine auf einem Hebel (87) angeordnete Rolle (86) aufweist und dass sich der Hebel parallel zur Achse der Rolle (80) hin- und herbewegt und gegen das von der Rolle (80) abgewickelte Klebeband drückt, um die Spannung während des Schneidvorganges zu reduzieren.

8. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet**, dass die Anklebevorrichtung (60) erste und zweite Ablenkmittel (59, 61) enthält, die hinter der Abschneidevorrichtung (66) vorge schaltet sind und jeweils auf das Endstück (200) und das Anfangsstück (201) der austretenden Folie (20) einwirken.

9. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet**, dass eine der Anklebevorrichtung (60) nachgeordnete Vorratsanordnung (63) vorgesehen ist, die kontinuierlich Folie (20) zuführt, wobei die Vorratsanordnung (63) aus einem Paar die Folie (20) seitlich begrenzenden Platten gebildet ist und auf in Längsrichtung der Vorschubrichtung (A) der Folie (20) vorgesehenen Flächen angeordnet sind und sich auf einer den Abstand zwischen den Platten (93) einstellenden Anordnung (94) abstützen.

10. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet**, dass eine Einstellvorrichtung (100) mit einer Schraubenspindel (101) vorgesehen ist, deren Achse parallel zu den Achsen (16) der Rollenträger drehbar ist und quer zur Vorschubachse (A) der Folie (20), und die in eine Gewindebuchse (105) eingreift, die mit zugeordneten Hülsen (22) der beiden die Rollen tragenden Achsen (16) verbunden ist, welche an zugeordneten Mitteln (26) befestigt sind, an denen die Rollen (2) anschlagen.

11. Vorrichtung nach Anspruch 10, **dadurch gekennzeichnet**, dass die Anschlagmittel (26) in Achsrichtung der Hülsen (22) gleiten und über zugeordnette Steiggläder (29) zum Auswerfen der Kerne der leeren Rollen (2) bewegbar sind.

12. Vorrichtung nach Anspruch 10, **dadurch gekennzeichnet**, dass die Schraubenspindel (101) die Wellen (110) über ein Übertragungsglied (108) drehend antreibt, die zu einer ersten und einer zweiten Einstellvorrichtung (50) der zugeordneten Führungen (36, 37) gehören, dass die Führungen (36, 37) vorzugsweise seitliche Profilstäbe (112, 113) aufweisen und jeweils Stäbe aufnehmen, die auf zugeordneten Trägern (114) sitzen, welche quer zur Vorschubrichtung (A) der Folie (20) gleiten und jeweils mit einem Innengewinde versehen sind, das mit Abschnitten (110a, 110b) mit einem zu den Wellen (110) gegenläufigen Gewinde verbunden ist.

**Revendications**

1. Appareil pour acheminer un film de matériau thermoformable à une machine d'emballage d'articles en paquets sous blister ou analogues, ledit appareil comprenant :

   un premier et un second guides incurvés (36,37) au moyen desquels, respectivement, un premier et un second films (20) d'un matériau thermoformable sont acheminés, l'un après l'autre, à une machine d'emballage tandis qu'ils sont déroulés de bobines correspondantes (2) montées sur un premier et un second axes porte-bobine (16);

   des moyens d'entraînement (34,35) situés en amont desdits guides incurvés (36,37) au moyen desquels, respectivement, un premier et un second films (20) d'un matériau thermoformable sont acheminés, l'un après l'autre, à une machine d'emballage tandis qu'ils sont déroulés de bobines correspondantes (2) montées sur un premier et un second axes porte-bobine (16);

   des moyens d'entraînement (34,35) situés en amont desdits guides incurvés (36,37) et actionnés pour diriger le film (20), respectivement, vers lesdits premiers et second guides incurvés (36,37);

   d'autres moyens d'entraînement (38,39) situés en aval desdits guides incurvés (36,37) et actionnés pour provoquer l'avancement desdits films (20) vers ladite machine d'emballage;

   un premier et un second capteurs (56,57) situés à la sortie desdits guides incurvés (36,37), respectivement, en aval desdits autres moyens d'entraînement (38,39), pour détecter la présence des bords d'attaque desdits films (20) et pour arrêter lesdits films dans une position dans laquelle ils sont prêts à être acheminés à ladite machine d'emballage;

   ledit appareil étant caractérisé en ce qu'il comprend en outre :
Appareil selon la revendication 1, caractérisé en ce que ledit poste de chargement (1) comprend un dispositif (11) de nettoyage de bobines (2) équipé d'un élément en cloche (12) raccordé à un moyen d'aspiration et porté par un bras (13) raccordé transversalement à une barre verticale (14), ladite barre verticale étant déplacée verticalement et soumise à une rotation autour de son axe entre une position de repos et une position de travail dans laquelle elle est coaxiale avec une broche (15) sur laquelle la bobine (2) à nettoyer doit être ajustée.

Appareil selon la revendication 1, caractérisé en ce que ledit poste de chargement (1) comprend un dispositif (11) de nettoyage de bobines (2) équipé d'un élément en cloche (12) raccordé à un moyen d'aspiration et porté par un bras (13) raccordé transversalement à une barre verticale (14), ladite barre verticale étant déplacée verticalement et soumise à une rotation autour de son axe entre une position de repos et une position de travail dans laquelle elle est coaxiale avec une broche (15) sur laquelle la bobine (2) à nettoyer doit être ajustée.

Appareil selon la revendication 1, caractérisé en ce que ledit poste de chargement (1) comprend un dispositif (11) de nettoyage de bobines (2) équipé d'un élément en cloche (12) raccordé à un moyen d'aspiration et porté par un bras (13) raccordé transversalement à une barre verticale (14), ladite barre verticale étant déplacée verticalement et soumise à une rotation autour de son axe entre une position de repos et une position de travail dans laquelle elle est coaxiale avec une broche (15) sur laquelle la bobine (2) à nettoyer doit être ajustée.

2. Appareil selon la revendication 1, caractérisé en ce qu'il comprend un poste (1) de chargement de bobines (2), avec un dispositif (4) pour prélever lesdites bobines (2) équipé d'une tête de préhension (5) transportée par un chariot (6) glissant sur une traverse horizontale (7), ladite traverse (7) se déplaçant le long d'une direction parallèle à ladite direction d'avancement (A) des films, ladite tête de préhension (5) pouvant être déplacée verticalement par rapport audit chariot (6) et pouvant osciller autour d'un axe parallèle à ladite direction d'avancement (A) des films, afin de prélever les bobines (2) à charger sur le moyen de support (3) et d'ajuster les bobines (2) sur des axes porte-bobine correspondants (15).

3. Appareil selon la revendication 2, caractérisé en ce que ledit poste de chargement (1) comprend un dispositif (11) de nettoyage de bobines (2) équipé d'un élément en cloche (12) raccordé à un moyen d'aspiration et porté par un bras (13) raccordé transversalement à une barre verticale (14), ladite barre verticale étant déplacée verticalement et soumise à une rotation autour de son axe entre une position de repos et une position de travail dans laquelle elle est coaxiale avec une broche (15) sur laquelle la bobine (2) à nettoyer doit être ajustée.

4. Appareil selon la revendication 1, caractérisé en ce qu'il comprend un dispositif d'arrachage (40) situé en amont desdits guides incurvés (36,37) pour arracher une partie (51) de ruban adhésif qui maintient normalement un bord d'attaque du film (20) collé à la bobine (2), ledit dispositif d'arrachage (40) portant une lame (41) acheminée par une liaison parallèle (42) longitudinalement à la direction de déplacement (A), ladite lame (41) étant reliée à ladite liaison parallèle (42) via un levier (44) articulé à ladite liaison (42) et équipée d'un rouleau (46) suivant le trajet d'une came (47) en raison de l'action de moyens élastiques (48), ladite came (47) oscillant sur la surface verticale déjà mentionnée, ce qui a pour effet de provoquer la rotation de ladite lame (41) entre une position relevée, par rapport à la bobine (2), et une position d'arrachage abaissée, dans laquelle la lame (41) affleure la bobine (2) et ledit rouleau (46) est séparé de ladite lame (47) pour permettre audit moyen élastique (48) de pousser ladite lame contre ladite bobine (2).

5. Appareil selon la revendication 1, caractérisé en ce que ledit groupe de coupe (66) est équipé d'une lame circulaire (67) portée par une barre horizontale (68) qui est actionnée pour se déplacer transversalement à la direction d'avancement du film (20), ladite lame circulaire (67) coopérant avec une contre-lame stationnaire (69) située dans une fente (71) ménagée dans la partie inférieure d'une plaque (70).

6. Appareil selon la revendication 5, caractérisé en ce que le premier et le second moyens de préhension (72,73) du film 20 sont formés par une paire de bandes horizontales (72,73) disposées en travers de la direction d'avancement (A) du film (20), respectivement en aval et en amont de la fente (71) de ladite plaque (70), à l'intérieur de laquelle la lame circulaire (67) se déplace, et actionnée par des paires respectives de commandes d'actionnement (74, 75) pour se déplacer verticalement.

7. Appareil selon la revendication 1, caractérisé en ce
que ledit groupe d’application de ruban adhésif (76) est équipé d’un rouleau (86) porté par un levier (87) qui oscille parallèlement à l’axe dudit rouleau (80) et agissant sur le ruban adhésif pour le dérouler du rouleau (80) de manière à réduire la tension au cours de l’opération de coupe.

8. Appareil selon la revendication 1, caractérisé en ce que ledit poste de jonction (60) comprend un premier et un second moyens de déviation (59,61) situés l’un après l’autre en amont dudit groupe de coupe (66) et agissant respectivement sur ladite partie de fin (200) et ladite partie de départ (201) dudit film (20) qui est éjecté.

9. Appareil selon la revendication 1, caractérisé en ce qu’il comprend un dispositif de stockage (63), situé en aval dudit poste de jonction (60) et visant à acheminer en continu le film (20), ledit dispositif (63) étant formé par une paire de panneaux latéraux (93) enfermant ledit film (20) et aménagé sur les surfaces longitudinales par rapport à 1a direction d’avancement (A) du film (20) et porté par un groupe (94) ajustant la distance mutuelle desdits panneaux (93).

10. Appareil selon la revendication 1, caractérisé en ce qu’il comprend un dispositif d’ajustement (100) équipé d’un arbre fileté (101) porté en rotation avec son axe parallèle aux axes porte-bobine (16) et transversalement à ladite direction de déplacement (A) dudit film (20), et s’engageant sur une douille filetée (105) jointe à des tubes respectifs (22) des deux axes porte-bobine (16), qui sont fixés à des moyens respectifs (26), contre lesquels les bobines (2) s’arrêtent.

11. Appareil selon la revendication 10, caractérisé en ce que lesdits moyens d’arrêt (26) glissent axialement vers lesdits tubes (22) et sont actionnés par des commandes d’actionnement respectives (29) de manière à éjecter les mandrins (21) desdits bobines épuisées (2).

12. Appareil selon la revendication 10, caractérisé en ce que ledit arbre fileté (101) est entraîné pour faire tourner, par un moyen de transmission (108), des arbres respectifs (110) d’un premier et d’un second groupes d’ajustement (50) de guides respectifs (36,37), lesdits guides (36,37) étant de préférence équipés de barres de section latérales (112,113) supportant et contenant des barres, respectivement, portées par des corps de support correspondants (114) glissant en travers de ladite direction d’avancement (A) dudit film (20) et formant des filets internes respectifs couplés à des parties (110a, 110b) filetés dans le sens opposé auxdits arbres (110).
FIG. 22a