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(54) **DEVICE AND METHOD FOR CHANGING FROM CONTINOUS TO INTERMITTENT THE FORWARD MOVEMENT OF A FILM INTO A MACHINE FOR THE PRODUCTION OF BAGS FOR FLEXIBLE PACKAGING**

(57) Device (100) apt to change the forward movement of a film (12) into a machine (10) from continuous mode to intermittent mode for producing bags (1) for packaging and the like, comprising a dandy roll (20) mounted movably backwards and forwards between a feed calender (21) which operates in continuous mode and a transport calender (22) which operates in intermittent mode, the dandy roll (20) moving towards said transport calender (22) when the latter is operating, in order

to feed the film (12) and moving in the opposite direction when the transport calender (22) is stopped in order to recover the input film coming from the feed calender (21), wherein a servomotor (50) is provided for the movement of said dandy roll (20), and wherein at least one load cell (55) is provided along the path of the film (12) apt to continuously monitor the tension applied to the film (12) and to instantly change the torque applied to the motor (50).

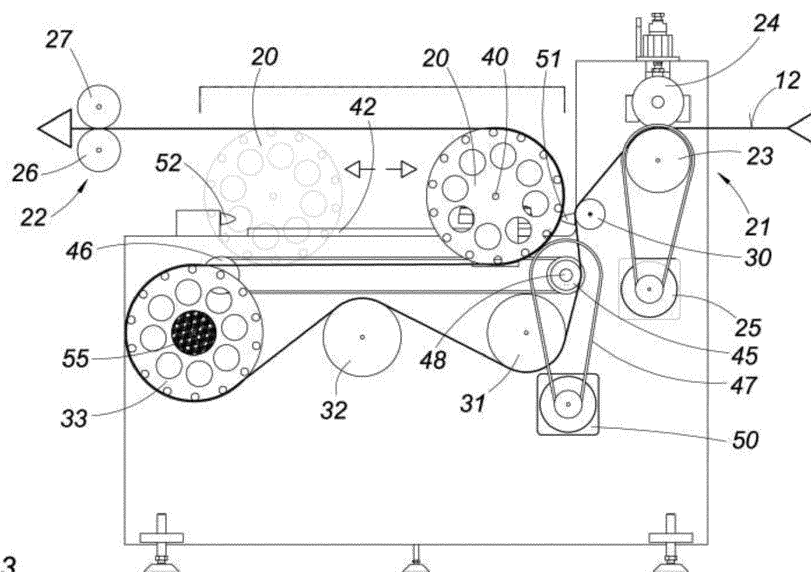


FIG. 3

Description

[0001] The object of the present invention is a device and a relative method for changing from continuous to intermittent the forward movement of a film into a machine for producing bags for flexible packaging, for containing foodstuffs for humans, animal feed, etc.

[0002] More particularly the bags in question are obtained from laminated and bonded films, for example polyester-aluminium-polyethylene, which are adequately shaped by means of longitudinal folding, formation of side gussets, longitudinal and transverse welds, folding of the base, etc.

[0003] The formation of these bags requires the welds to be repeated several times so as to use temperatures which do not degrade the film used. The welds must then be cooled by cooling bars. This aspect, together with other multiple processes which have to be performed on the bags (welds at 45° to form the square base, longitudinal welds, markings, perforations, punching for rounded corners, etc.) mean that a production line can reach considerable lengths, even over 25 metres.

[0004] These lines are made up of a first part in which the material to be processed is fed continuously through unwinders of the roll and drives which allow some operations to be performed which must necessarily be performed with the film in continuous movement, such as for example longitudinal folding and formation of gussets.

[0005] Subsequent operations, such as welding, punching, marking, etc. have instead to be performed with the film moving intermittently (start and stop), that is forward movement of the film and its stopping in order to perform the abovementioned operations.

[0006] In order to switch movement from continuous to intermittent, the following are used in sequence: a pair of motorized rollers (feed calender) which work in continuous mode, one or more compensation dandy rolls, one or more pairs of motorized rollers (transport calenders) with intermittent motion.

[0007] The function of the dandy roll is that of transferring material during the phase of forward movement of the film and accumulating material in arrival from the feed calender during the work phases, in which the film remains still.

[0008] In order to maintain the film fully taut during the various phases of processing there are normally two or more transport calenders in sequence, spaced and interspersed with various fittings with which the machine is provided, placed after the dandy roll for the purpose of interrupting the long section of the film, keeping it therefore always at a suitable tension.

[0009] In order to tension the material both during the forward movement and during the operations performed on the same, in particular welding, pneumatic pistons are normally used which push the dandy roll with a force proportional to the pressure of the air fed inside the same pistons. This pressure however does not remain constant: during the phase of forward movement the air in

the pistons compresses, whereas during the phase of stopping in which the dandy roll has to recover the film in arrival, the pressure tends to drop. This is because the feed of the dandy roll does not succeed in compensating fast the rapid movements of the dandy roll.

[0010] This variation in the pressure causes a variation in the tension applied on the film in output from the dandy roll. On machines of a considerable length, in which the processes are performed in sequence, this variation in tension is detrimental in that micro slippage is created on the film transport calenders coming after the dandy roll.

[0011] This slippage means that the operations in sequence are not performed on the same portion of film and therefore the operator has to correct this slippage by moving the work stations in sequence in order to make the operations coincide. During the phase of starting and stopping of the machine, for product change, in which there is a variation in the speed of forward movement of the material and therefore a variation in the error due to the variable slippage, considerable product rejects are generated.

[0012] The object of the invention is that of eliminating the disadvantages of the prior art illustrated previously.

[0013] More particularly, an object of the present invention is that of providing a device for changing from continuous to intermittent the forward movement of a film into a machine for producing bags for flexible packaging, such as for foodstuffs for humans, animal feed, etc., which allows the tension on the film to be maintained constant, such as to have possible constant slippage of the film on the calenders, which does not need additional corrections after the initial set-up of the machine.

[0014] Another object of the invention is that of providing such a device which is simple and economical to produce, as well as highly reliable.

[0015] These objects are achieved by the device according to the invention which has the features of the appended independent claim 1.

[0016] Advantageous embodiments of the invention will be disclosed in the dependent claims.

[0017] Substantially, the device according to the invention, apt to change from continuous to intermittent the forward movement of a film into a machine for producing bags for packaging and the like, comprises at least one dandy roll mounted movably backwards and forwards between a feed calender which operates in continuous mode and a transport calender which operates in intermittent mode, the dandy roll moving towards the transport calender when the latter is operating in order to feed the film and moving in the opposite direction when the transport calender is stopped in order to recover the input film coming from the feed calender, wherein a servomotor is provided for the movement of said dandy roll, and wherein at least one load cell is provided along the path of the film apt to continuously monitor the tension applied to the film and to instantly change the torque applied to the motor.

[0018] The load cell is used to have a "closed loop" control of the tension, i.e. with feedback. The motor which moves the dandy roll will activate the appropriate correction, receiving the information from a PID (proportional-integrative-derivative) controller.

[0019] Further features of the invention will be made clearer by the following detailed description, referred to one of its embodiments purely by way of a non-limiting example, illustrated in the accompanying drawings, in which:

Figure 1 is a schematic perspective view of a possible bag which can be made with a machine incorporating the device according to the invention;

Figures 2a and 2b are respectively a side view and a plan view from above of a complete line for the production of these types of bags;

Figure 3 is a schematic view taken from the opposite side with respect to Figure 2a, showing the device according to the invention for changing from continuous to intermittent the forward movement of the film;

Figure 4 is a plan view from above of the device of Figure 3;

Figure 5 is a section view taken along plane V-V of Figure 4;

[0020] In Figure 1 a bag or sack 1 has been shown by way of example, apt to contain foodstuffs for humans, animal feed or other products, obtained from a laminate made up for example of polyester - aluminium - polyethylene.

[0021] The bag 1 has a folded base 2, an open mouth 3 and a pair of side gussets 4.

[0022] It is obtained from a laminate in tape form, which is initially folded longitudinally over itself, then the lateral parts are folded towards the interior in order to create the gussets 4, followed by longitudinal welds along the four edges 5, one of which serves to close the film in a tubular shape, while the others to increase the sealing of the bag. A transverse weld 6 is then formed in order to close the base 2 of the bag which could also be folded at 180° on itself and glued.

[0023] If necessary welds 7 at 45° can also be provided to determine a so-called square base. Naturally the type of bag illustrated in Figure 1 is purely an example, the device according to the invention being able to be used in any bags production line where it is foreseen to change the feeding of the film from continuous to intermittent.

[0024] Figures 2a and 2b illustrate schematically a line or machine, denoted overall by reference numeral 10, used for example for the production of the bag shown in Figure 1.

[0025] A laminated film 12 is unwound from a roll 11 and is made to move forwards continuously through a succession of stations SC₁ SC_n, and intermittently through a succession of stations SI₁.... SI_n.

[0026] The device 100 according to the invention is placed between the stations SC and SI, which allows a

continuous forward movement of the tape of film 12 to be changed into intermittent forward movement.

[0027] In the stations SC₁ ... SC_n, in which the film moves forwards continuously, operations are performed such as longitudinal folding and formation of the lateral gussets 4, whereas in the stations SI₁ ... SI_n in which the film moves forwards intermittently all the other operations are performed in which it is required for the film to be still, such as longitudinal trimming and welds, possible welds at 45°, transverse welding with several stages, stamping, transverse cutting, etc.

[0028] A description is now given of the device 100 according to the invention which allows the changing from continuous to intermittent of the forward movement of the film 12 with reference to Figures 3 to 5, in which Figure 3 is a view taken from the opposite side with respect to Figure 2a, that is with forward movement of the film from right to left.

[0029] The device 100 comprises a dandy roll 20, placed between a feed calender 21 of the film 12 and a transport calender 22, and moves forwards and backwards, as indicated by the arrows in Figure 3, synchronised with the operations that are performed in the stations downstream SI₁ ... SI_n. During the phase of forward movement of the film 12 the roll 20 moves forwards, yielding material, while during the phase of stopping of the film it moves in an opposite direction, recovering the input material. The speed with which the roll 20 moves is the resultant, i.e. the difference between the speed of the transport calender 22 and that of the feed calender 21. Naturally the transport calender 22 is actuated at a speed greater than the feed calender 21, having to recover the film remained upstream during the stopping phase.

[0030] The feed calender 21 comprises a motorized roller 23, actuated by a motor 25, and a counter roller 24.

[0031] Likewise, the transport calender 22 comprises a motorized roller 26 and a counter roller 27.

[0032] The film 12 in output from the feed calender 21 passes through a plurality of idle rollers 30, 31, 32, 33 before turning around the dandy roll 20 and going to the transport calender 22.

[0033] The ends of the shaft 40 of the dandy roll 20 are mounted on respective shoes 41 sliding on linear guides 42.

[0034] The shoes 41 are restrained by means of respective L-shaped brackets 43 (Figure 5) to a pair of toothed belts 44 each one wound around a respective pair of pulleys 45, 46.

[0035] One of the two pulleys, in the example shown the pulley 45 placed on one side of the machine, is actuated by a servomotor 50 by means of a belt 47, and is connected to the pulley 45 placed on the other side of the machine by means of a shaft 48, so that the torque of the servomotor 50 is transmitted simultaneously to both the lateral belts 44.

[0036] The maximum stroke of the dandy roll 20 is determined by two limit stoppers 51, 52 placed on each linear guide 42.

[0037] Figure 3 shows respectively by unbroken lines and dotted lines two possible positions assumed by the dandy roll 20, respectively during the phase of recovery of the film in input and of yielding of the film to the stations downstream.

[0038] The motor 50 which moves the dandy roll 20 supplies a torque proportional to the current which is supplied thereto, and therefore to the dandy roll 20 a force will be applied of driving of the film 12 proportional to the torque of the motor.

[0039] Along the section of the film 12 at least one load cell is provided, in particular in the embodiment illustrated two load cells 55 are provided on the axis of the idle roller 33 placed immediately upstream of the dandy roll 20 in order to monitor continuously the tension applied to the film 12 being processed and perform a "closed loop" control with PID (proportional-integrative-derivative) regulator.

[0040] The load cell could be installed also on the dandy roll 20 or on other successive rolls.

[0041] On the basis of the tension detected by the load cells 55, a control system, not shown, to be considered in itself known, instantaneously changes the torque applied to the motor 50, and therefore the movement of the system in order to maintain a constant tension on the film 12. When the tension decreases, more torque is supplied, whereas when the tension increases, less torque is supplied.

[0042] In this way, thanks to the motor drive used, it is possible to intervene instantaneously on the dandy roll 20, avoiding successive regulations of the various stations of the machine in order to compensate the slippage of the film after the setting of the machine.

[0043] From what is disclosed, the advantages of the invention appear clear.

[0044] Naturally the invention is not limited to the particular embodiment described previously and illustrated in the accompanying drawings, but numerous detail changes may be made thereto, within the reach of the person skilled in the art, without thereby departing from the scope of the invention, as defined by the appended claims.

Claims

1. Device (100) apt to change the forward movement of a film (12) into a machine (10) from continuous mode to intermittent mode for producing bags (1) for packaging and the like, comprising at least one dandy roll (20) mounted movably backwards and forwards between a feed calender (21) operating in continuous mode and a transport calender (22) operating in intermittent mode, the dandy roll (20) moving towards the transport calender (22) when the latter is operating, in order to feed the film (12) and moving in the opposite direction when the transport calender (22) is stopped in order to recover the input

film coming from the feed calender (21), **characterised in that** a servomotor (50) is provided for the movement of said dandy roll (20), and **in that** at least one load cell (55) is provided along the path of the film (12) apt to continuously monitor the tension applied to the film (12) and to instantly change the torque applied to the motor (50).

2. Device according to claim 1, **characterised in that** a PID regulator for a closed loop control is provided in combination with said at least one load cell.

3. Device according to claim 1 or 2, **characterised in that** said at least one load cell (55) is placed on an idle roller (33) for the guide of the film (12) located immediately upstream of the dandy roll (20) or on another roller.

4. Device as claimed in claim 1, 2 or 3, **characterised in that** said dandy roll (20) is mounted on a pair of lateral shoes (41) sliding on respective linear guides (42), said shoes (41) being driven by respective toothed belts (44) driven by said servomotor (50).

5. Device according to claim 4, wherein said toothed belts (44) run around respective pairs of pulleys (45, 46), one of these pulleys (45) being actuated by the motor (50) by means of a belt (47) and being connected by means of a shaft (48) to the opposed pulley (45).

6. Device according to claim 4 or 5, **characterised in that** two limit stoppers (51, 52) are arranged on said linear guides (42), apt to limit the maximum stroke of the dandy roll (20).

7. Device according to any one of the preceding claims, wherein said feed calender (21) and transport calender (22) comprise a respective motorized roller (21), (26) and a respective counter roller (24), (27).

8. Method for changing from continuous to intermittent the forward movement of a film (12) into a machine (10) for producing bags (1) for flexible packaging using the device according to claim 1, wherein the film (12) exiting from a feed calender (21) continuously operating is passed over a plurality of idle rollers (31, 32, 33) having fixed axis and over a dandy roll (20) movable backwards and forwards towards a transport calender (22) which operates intermittently, **characterised in that** it provides continuous monitoring of the tension applied to the film (12) by means of at least one load cell (55) provided along the path of the film (12) with instantaneous variation of the torque applied to a **servomotor** (50) for movement of said dandy roll (20).

9. Machine (10) for the production of bags (1) for flexible

packaging from a laminate film (12), comprising a plurality of stations $SC_1 \dots SC_n$ apt to perform operations on the film with continuous forward movement and a plurality of stations $SI_1 \dots SI_n$ apt to perform operations on the film with intermittent forward movement, **characterised in that** a device (100) according to any one of claims 1 to 7 is provided between said stations $SC_1 \dots SC_n$ and said stations $SI_1 \dots SI_n$ to transform the forward movement of the film (12) from continuous mode to intermittent mode.

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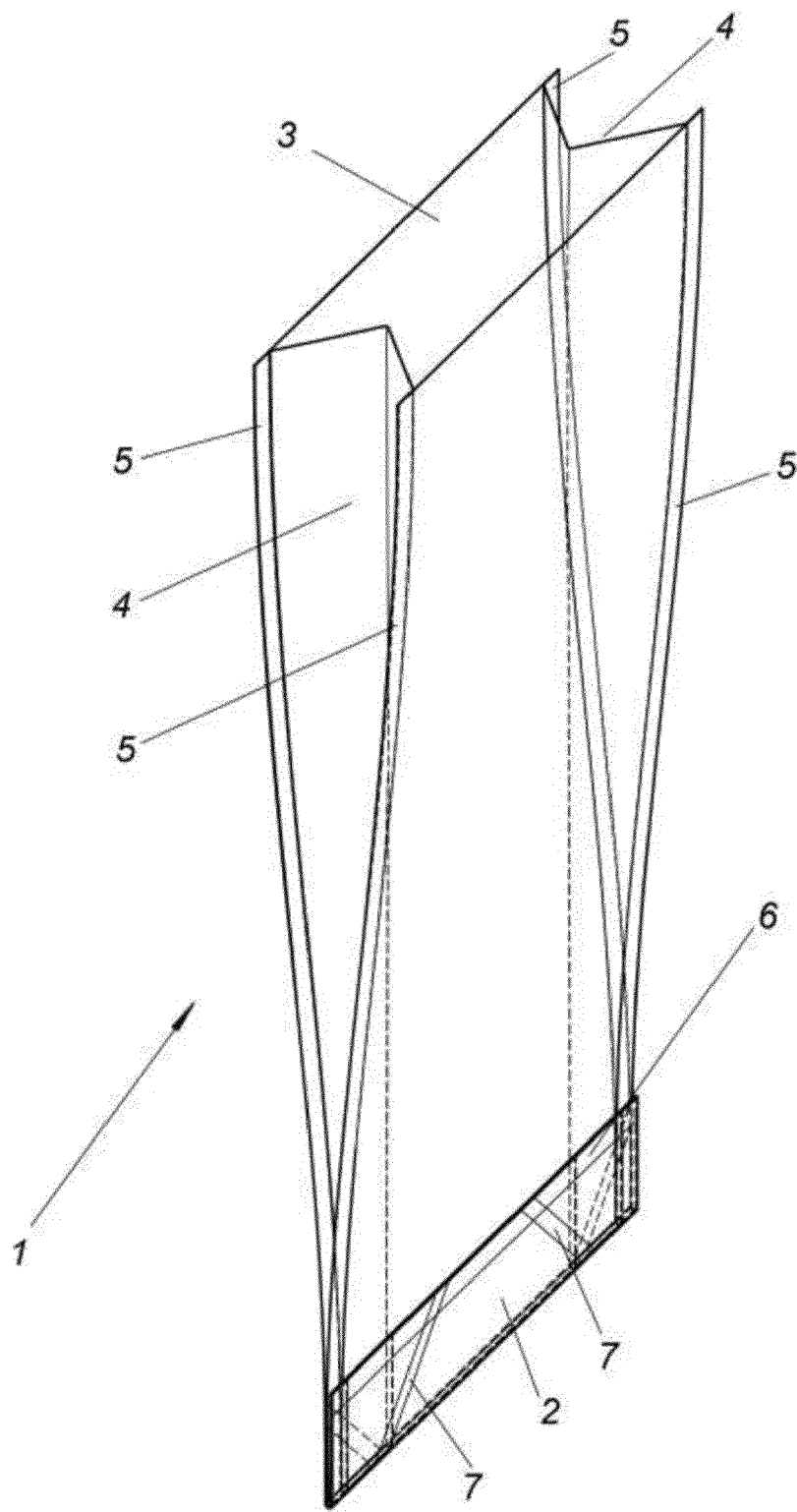


FIG. 1

FIG. 2a

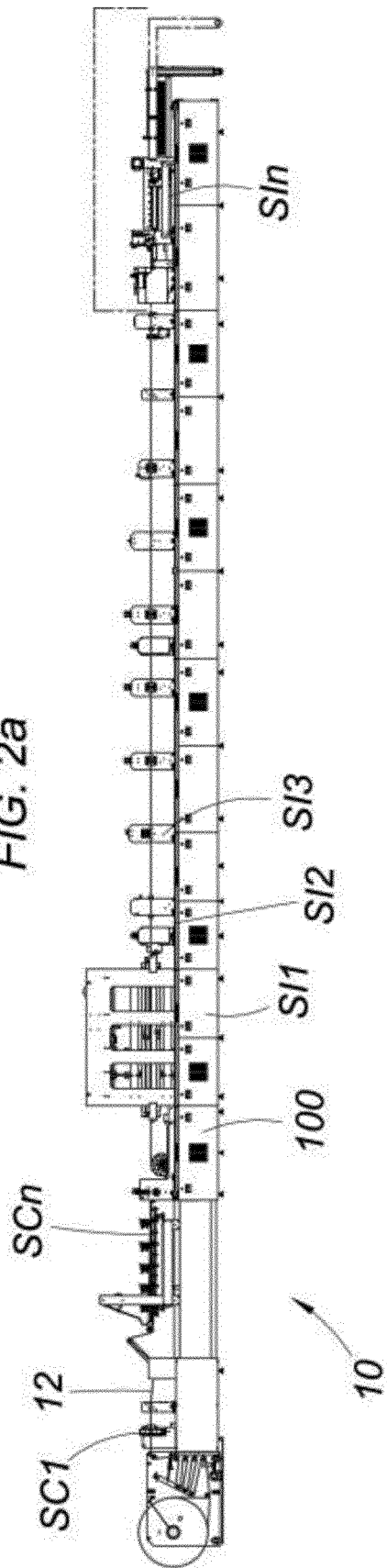
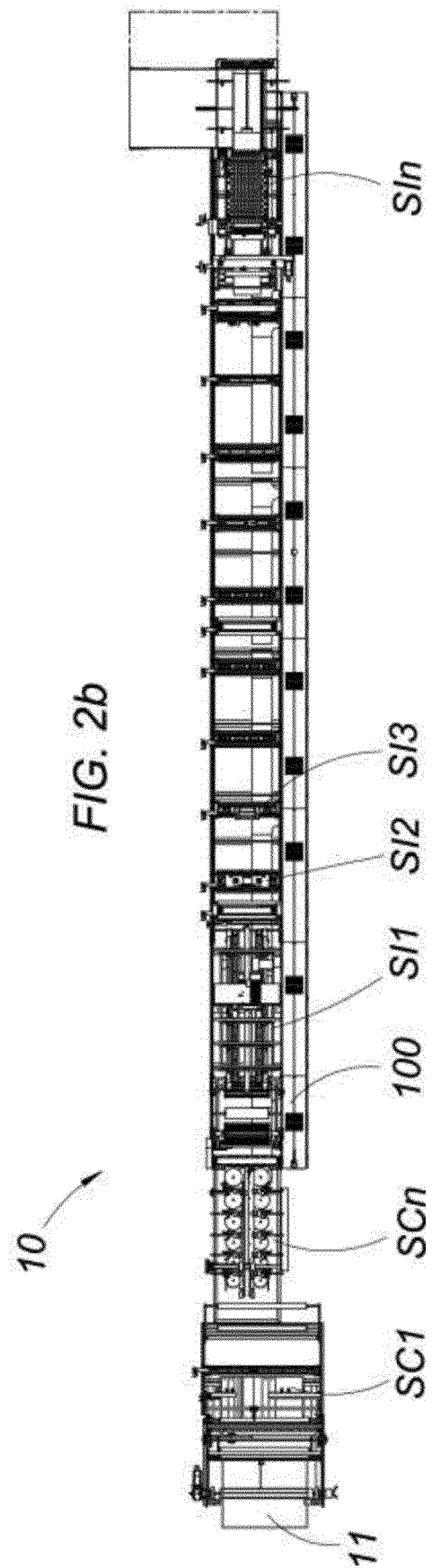


FIG. 2b



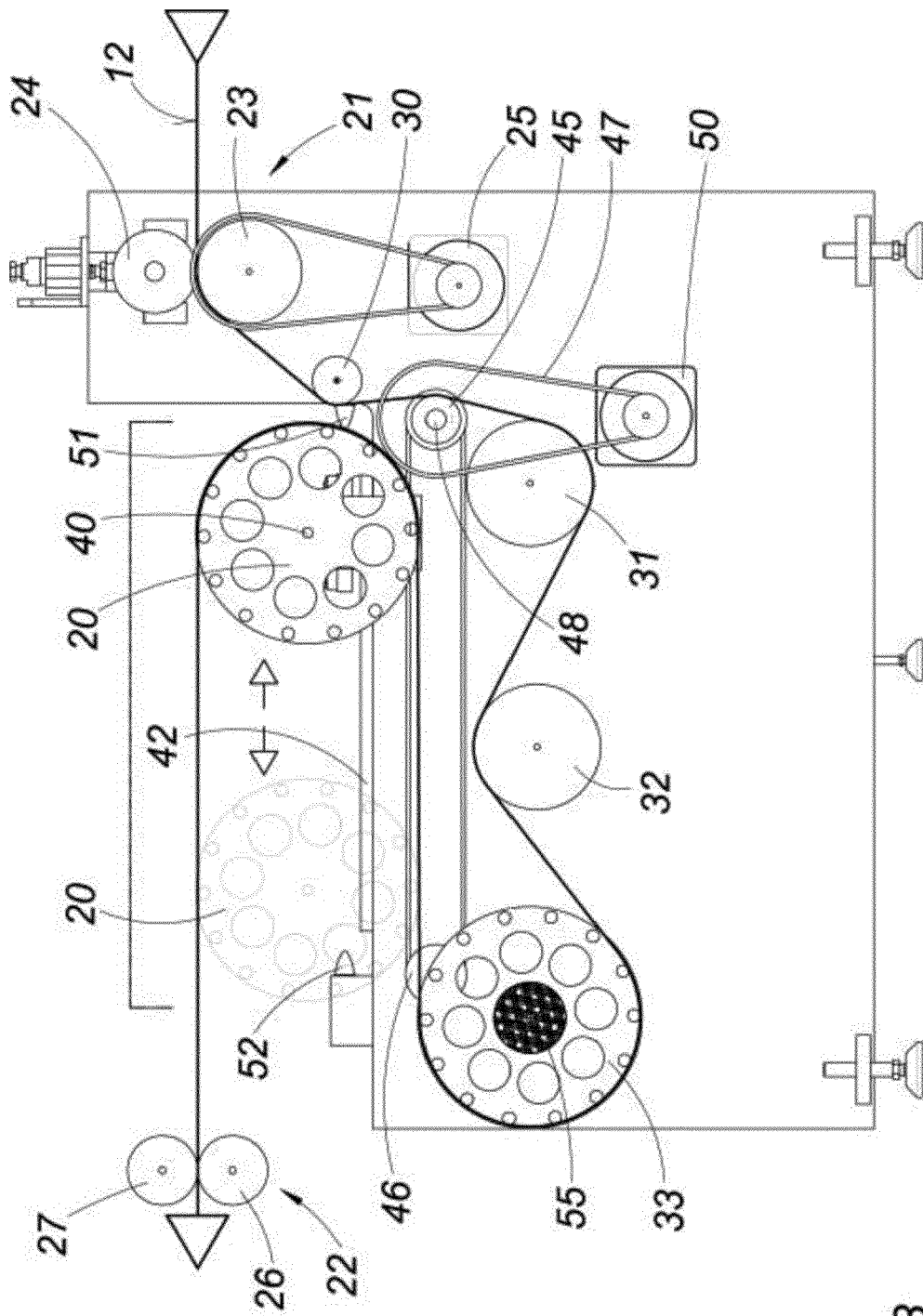


FIG. 3

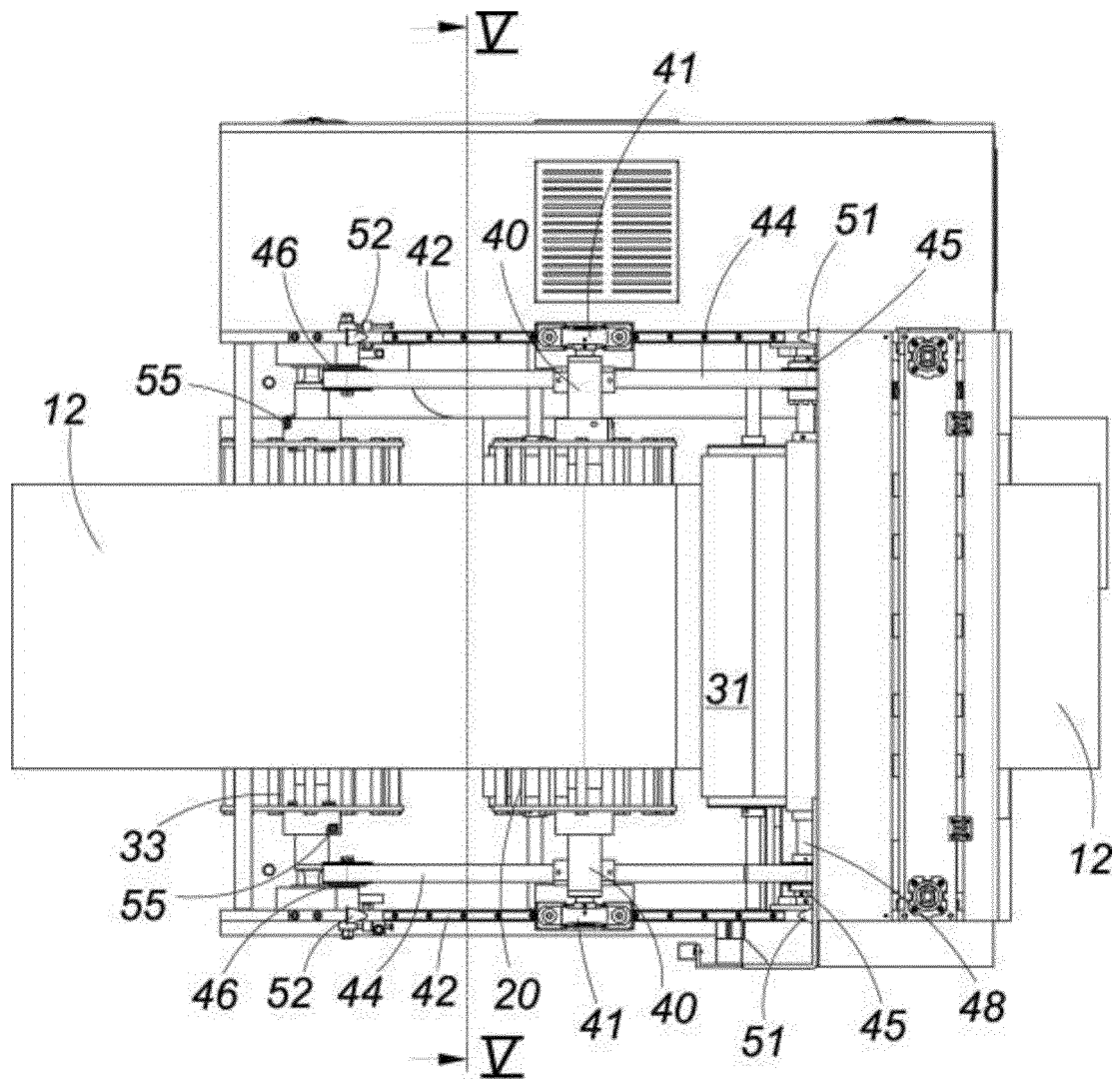


FIG. 4

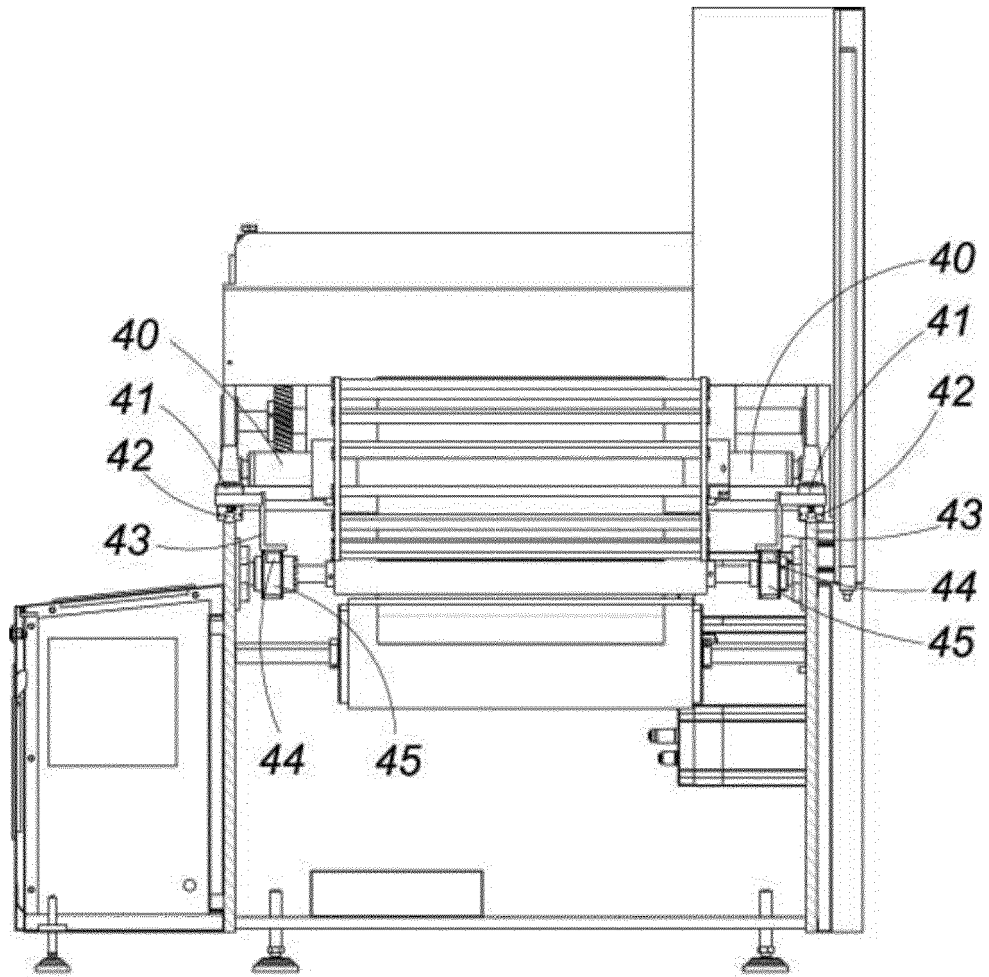


FIG. 5



EUROPEAN SEARCH REPORT

Application Number
EP 18 17 2312

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 2 700 498 A1 (TOYO SEIKAN GROUP HOLDINGS LTD [JP]) 26 February 2014 (2014-02-26) * abstract; figures 1,3,4 * * paragraph [0020] * * paragraphs [0078] - [0084] * * the whole document *	1-9	INV. B65H23/188 B65H23/04 B65H20/24
A	US 2015/102152 A1 (DUEHRING DOUGLAS N [US] ET AL) 16 April 2015 (2015-04-16) * abstract; figure 1 * * paragraphs [0011] - [0036] *	1-9	
A	JP 3 623544 B2 (KAO CORP) 23 February 2005 (2005-02-23) * abstract; figure 1 * * the whole document *	1-9	
A	WO 2004/113206 A2 (SPECIALTY SYSTEMS ADVANCED MAC [US]; ST GERMAIN PATRICK C [US]; LANGRE) 29 December 2004 (2004-12-29) * abstract; figure 1 * * the whole document *	1-9	TECHNICAL FIELDS SEARCHED (IPC) B65H
A	EP 1 249 418 A2 (PRITTIE ALLAN R [CA]) 16 October 2002 (2002-10-16) * abstract; figure 2 * * paragraphs [0022] - [0032] * * the whole document *	1-9	
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 26 September 2018	Examiner Piekarski, Adam
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

EPO FORM 1503 03.82 (P04C01)

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ON EUROPEAN PATENT APPLICATION NO.**

EP 18 17 2312

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 2700498 A1	26-02-2014	CN 103492168 A	01-01-2014
		EP 2700498 A1	26-02-2014
		JP 5880808 B2	09-03-2016
		JP 2012224027 A	15-11-2012
		US 2014045666 A1	13-02-2014
		WO 2012144319 A1	26-10-2012

US 2015102152 A1	16-04-2015	EP 3057899 A1	24-08-2016
		US 2015102152 A1	16-04-2015
		WO 2015056116 A1	23-04-2015

JP 3623544 B2	23-02-2005	JP 3623544 B2	23-02-2005
		JP H08217020 A	27-08-1996

WO 2004113206 A2	29-12-2004	EP 1638872 A2	29-03-2006
		TW 200510237 A	16-03-2005
		US 2004262361 A1	30-12-2004
		WO 2004113206 A2	29-12-2004

EP 1249418 A2	16-10-2002	EP 1249418 A2	16-10-2002
		JP 2003026359 A	29-01-2003
		US 2002148876 A1	17-10-2002
