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(54) MACHINE FOR WRAPPING PRODUCTS WITH AN EXTENSIBLE FILM

(57) When entering the machine for wrapping products with a stretch film, the article (1) passes a detector barrier (18) which detects its size and sends the information to a microprocessor controlling all the movements of the machine, positioning the article (1) correctly in the calculated place on the elevator (3), controlling the stroke of the film feeding clamp (17) to extract a specified amount of film from a film roll (4), calculated in accordance with the size of the article, (1) using side clamps (19) to stretch the film in a transverse direction. Also controlling the energizing and deenergizing of the brake for the film, and the movements of the folding mechanisms, in accordance with the dimensions of the article to be wrapped and the film used to produce a quality wrapped article with an optimum amount of film.

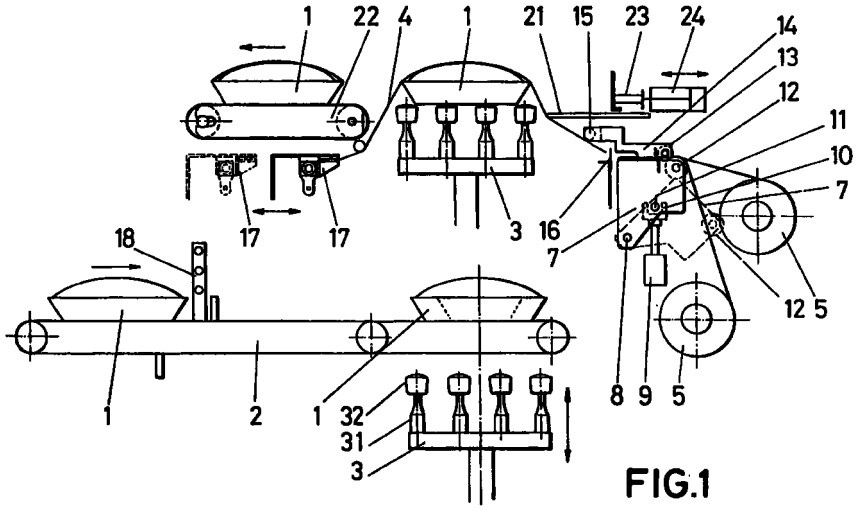

FIG.1

EP 1 036 738 A1

Description

OBJECT OF THE INVENTION

[0001] The invention is a machine for wrapping articles with stretch films, specifically designed to wrap products by using a portion of stretch film and sealing it under the product after wrapping it. The stretch film for the article to be wrapped is supplied from a roll and there are means to control the correct position of the article and the stretch film to be wrapped around it. Also for folding and final sealing of the stretch film underneath the article being wrapped.

[0002] The machine is of the type where the articles to be wrapped enter and leave on the same side with the aim of adding, if necessary, weighing and labelling equipment to the wrapping machine.

[0003] The aim of the invention is that of providing a wrapping machine for articles, such as trays containing products of any kind. By controlling all the devices and means which participate in the process with a programmable microprocessor. Consequently, depending on its size the article will be correctly placed on the elevator and the portion of stretch film required for the exact size of the article will be supplied and cut. This also means that the microprocessor of the machine controls placing the article on the elevator, depending on its size. Along with controlling the portion of the film needed for wrapping it, as well as the stretching, or tightening and appropriate synchronisation of the movements of all the mechanisms and elements which take part in the wrapping operation.

BACKGROUND OF THE INVENTION

[0004] Several kinds of machines for wrapping articles or products with stretch film are known, among them the machine described under US patent number 4501106. The latter is designed for wrapping trays containing certain products. These trays enter the machine by means of a feeding conveyor that Places them in a fixed position on an elevator, regardless of the tray size and the product size, which it contains. Then the elevator rises vertically with the tray until it reaches the surface of the film in which the tray is to be wrapped. The film is supplied from a roll and drawn from there with the help of a Film Feeding clamp. The machine has a film folding mechanisms to wrap the film under the tray laterally and transversely underneath and pass it on to a heated belt where final sealing takes place.

[0005] The machine described has a few faults, among them the following:

- The portion of the film which is fed with the help of the film feeding clamp is always the same, regardless of the tray size and the height of the product contained in it. The result is that when wrapping trays which are very high on the side opposite of the film roll and the amount of film available on that side is fixed, the film becomes over stretched. Thus the film must be very elastic with a heavy gauge or thickness to prevent breakage.

- The folding device feeds additional film for the long part of the film, i. e., the part which covers the base of the article, and removes it directly from the roll. While the folding device pushes the fed film under the tray, it at the same time pushes the tray against the rollers of the outfeed_conveyor, which along with the film being held in the clamp stop the package, thus increasing the pressure of the film against the tray and against the articles contained in it. This may occasionally cause damage to the tray and or the film itself and even to the articles if they are sufficiently delicate. Whatever the case, the excess pressure of the film produced by the very activity of the machine and more exactly by the wrapping system leads to a compulsory use of films with an oversized weight. (Caused by over-sizing dimensionally and or over thickness)

- The cutting blade of the film comes into operation at a fixed point during a machine cycle, regardless of the article size, since the blade movement comes from the general camshaft of the machine. This means that as the folding device of the machine always feeds an excess quantity of film from the roll, it often becomes an unnecessary waste of film. (Due to sizing, increase in thickness of the film, or the need to rewrap the article)

DESCRIPTION OF THE INVENTION

[0006] The machine referred to has been designed to solve all these problems. This is achieved by programming the different movements and operational phases, to vary based on the size of the article. By controlling the placement on the elevator of the article which is to be wrapped, as well as the size of the film required to wrap it. Also the movements of the film feeding clamp, the folding mechanisms and the cutting blade so that everything is controlled to work in accordance with the size of the article.

[0007] In order to be more precise, one of the characteristics of the invention is that in accordance with its size the article will be placed on the corresponding elevator in a position specified by the microprocessor, so that the film distribution in the wrapping process will achieve a controlled overlapping and sealing of the film on the bottom of the article for a better appearance and seal.

[0008] Consequently, on the basis of these characteristics, the most appropriate wrapping position is specified for each article, depending on its size and, to be more precise, its width.

[0009] Since the article can be placed in any posi-

tion on the elevator, it is possible to choose the best film distribution for the wrapping process.

[0010] The elevator itself, which traditionally consists of a series of supports with collapsible heads, designed to keep the articles in place when the elevating and wrapping operations are carried out. This has been redesigned by eliminating springs and any other mechanisms, necessary to reset the heads after they have been collapsed.

[0011] In fact, the body of the support is to be made of flexible plastic material and conveniently fixed to a head, also made of plastic, by means of a neck-like narrowing to cause the movements of collapsing and resetting necessary for the normal functioning of the folding mechanisms.

[0012] Another characteristic of the invention is that the film-feeding clamp has a variable longitudinal movement to extract a portion of the film in proportion to the corresponding transverse dimension (width) of the article ready to be wrapped. In each case the amount of film fed is just enough to complete the last fold of the folding operation.

[0013] The movement of the film-feeding clamp is variable in the direction of the product exit and moves below the sealing belt. This movement is very important because it makes it possible to control the final tightening of the film during the last folding operation.

[0014] In addition, the film-feeding clamp will tighten the film in proportion to its stretchable limits, and the tautness required to cut it.

[0015] The clamping action of the film-feeding clamp is performed in three areas, one central and two side sections. The film when being fed is clamped at the same time in all three areas. Subsequently it will be released, first the lateral areas for easier lateral folding, i. e., to allow the exterior film areas to be free and reduce over stretching the film during the process of folding them under the article, while the central part is held in place by the clamp until final folding.

[0016] Another uniqueness of this wrapping machine is the fact that it includes side clamps, which clamp the film when it is extended and taut in the longitudinal sense. These clamps can be moved laterally to stretch the film transversely. This can be programmed for the width of the film used and the length of the article to be wrapped. With regard to the film the distance of these side clamps is variable so as to be able to hold the film by its edges whatever the width of the film being fed from the roll. In the transverse stretching direction, however, the side clamps are in a controlled position so that the degree of prestretch is always the same, regardless of the film width.

[0017] A further uniqueness of the machine is that the corresponding film unwind has a brake incorporated for the activation and deactivation which is calculated according to the article which is to be wrapped. This brake remains activated until the top of the rising article touches the film. At this moment the brake becomes deactivated, but the article continues to rise and removes an additional amount of film from the roll. Then the brake is activated again before the elevator completes its stroke in order to obtain the tautness necessary for the film to be cut.

[0018] The exact time of the brake activation will be specified by the program in accordance with the article being wrapped, and the amount of film required. This ensures the optimum use of the lowest amount of film possible for each wrapping. In addition, tray and film breakage is avoided by not surpassing their limits of elasticity. This allows the wrapping to take place with optimum tautness for the best appearance and preparation of the wrapped article.

[0019] As regards to the wrapping process as such, it begins with the introduction of the side folding mechanism and a rear folding mechanism. This means that for side folding the tautness of the film is maintained by the timing of the mechanised film holding system which will be deactivated at the exact moment when the side folding mechanisms press on the film and the folding begins.

[0020] Activating the movement of the side clamps, that hold the pre-stretched film, can be programmed for both clamps to start their inward movement simultaneously with the side folding mechanisms and the side clamp closing and opening position being, programmed according to the length of the product to be wrapped. Folding of the last part of the film or the last folding, i. e., the portion of film situated between the feeding clamp and the sealing belt. With the article, now practically wrapped, it is moved to the sealing belt for final sealing. This is performed by pushing the article by means of an expelling device that causes it to advance toward this portion of the film. To accomplish this the feeding clamp has to release the film still held in its central area, while the movement of the expelling device and that of the clamp are synchronised by the microprocessor. Yet another uniqueness is the central folding device is incorporated in the expelling mechanism. This folding device carries out the last folding operation as the expelling mechanism transfers the article to sealing belt.

[0021] It is evident that the program of the microprocessor in the machine allows the automatic choice of the roll to be used in accordance with the length of the article that is to be wrapped, and its characteristics.

[0022] For the program to be able to control and determine the exact timing for the movement of each element in the machine, it is obviously necessary that the size of the article be detected before entering the machine, i. e., For this reason a photoelectric barrier has been installed on the Infeed belt to sense the size of the article and send it to the microprocessor to control all the means and devices referred to earlier in accordance with the size of the article or product detected.

[0023] With the machine designed like this, all articles within the parameters of the machine size range can be wrapped, including those of varying size and

shape. All kinds of films can be used and the amount used is optimized since the film is always uniformly stretched throughout the wrapping process, as is the precise portion of the film for each article to be wrapped.

[0024] It must be stated that the machine has means which allow the (leading edge) free end of the film from the rolls to be positioned rapidly and correctly in alignment with the corresponding film feeding device.

[0025] All in all the main operations performed by the machine and controlled by the microprocessor are the following:

- Selection of the film roll to be used in accordance with the size of the article.
- Transporting the article from a stable area of the infeed conveyor to a specific position on the elevator, depending on the width of the article to be wrapped.
- Deactivating the brake of the roll-unwind to feed the necessary film.
- Beginning the elevator stroke.
- By clamping, feeding, and stretching, the film from the selected roll. With the amount of film fed being variable according to the width of the article.
- Activating the brake of the roll-unwind to stretch the film at the end of the feeding stroke.
- Deactivating the brake of the roll-unwind after the initial phase of the ascending elevator stroke to remove additional film when required.
- Activating the brake of the roll-unwind near the end of the elevator stroke.
- Positioning the side clamps to hold the film by the edges and then prestretch it in a transverse direction synchronized with the action of the side folding mechanism.
- Cutting the film into a sheet from the roll synchronized with the central folding mechanism.
- Folding the portion of film cut, with the rear central folding mechanism.
- Ejecting the wrapped article moving it to the sealing area and sealing the overlapping film on the bottom of the article.

[0026] The controlled timing of all the movements and maneuvers described make it possible to wrap a large variety or articles in accordance with their size and shape allowing the use of stretch films with different properties.

[0027] It should be understood that the terms length and width have a particular meaning in the packaging field as they relate to a trayed product to be wrapped. The long dimension of the tray is normally called its length and the short dimension its width. The trayed product is, however, generally inserted with its long dimension entering first, so that the length of the trayed product is in the same direction as the width of the film, while its width, or transverse direction, is in the longitudinal direction of the film.

[0028] The heated sealing belt can be relocated and a transfer system for the article that will move it to lateral position upon exiting can be inserted prior to the sealing belt. This would be done to automate the removal of the trays, allow the installation of automated weighing-labelling equipment, or, an automated labelling device.

DESCRIPTION OF THE DRAWINGS

[0029] In order to complete the present description and for a better understanding of the invention, following one of its best practical examples, a set of drawings is attached as part of the description. Without being all embracing, these drawings illustrate the following:

Figure 1. - Is a schematic view of side elevation of the machine as a whole, object of the invention.

Figure 2. - This is a top view of the fed film which passes through a distributor comb by a corresponding comb of the film feeding clamp, the film passes between a pair of side clamps which clamp and stretch the film transversely.

Figure 3. - A view similar to that of the previous figure, with the side clamps moved outward and tightening the film.

Figure 4. - A front view of the article being wrapped in an elevated position, pushing against the film, being held on its sides, by the side stretching clamps and above them the side folding mechanisms.

Figure 5. - A view similar to that of the previous figure, in the process of side folding the film under the article.

Figure 6. - A top view of the side folding mechanisms and the central folding mechanism with the ejecting device.

Figure 7. - A side view showing the final sequence of wrapping the tray. From where, by means of the pushing device visible in the drawing, the wrapped article exits to the heated belt where the final wrap-

ping phase takes place as does the sealing of the film.

Figure 8. - A side view schematic of the side mechanisms folding the film under the ends of the article and folding the heads of the supports in order to allow a smooth transition of the article from the top of the lifter to the top of the folding mechanism.

Figure 9. - Longitudinal section of one of the elevator supports.

Figure 10. - A top view of the central folding mechanism with the ejecting device shown in the retracted and the extended position.

Figure 11. - Film feeding clamp (top view and side view of ends).

PREFERRED EMBODIMENT OF THE INVENTION

[0030] In view of the figures described, it can be observed how the invented machine is prepared for wrapping articles or products (2, e. g., trays containing any kind of products or articles (2) fed by means of an endless belt or a conventional infeed (2) to a conveniently situated elevator (3) on which each of the articles (1) is placed to be elevated and wrapped with a portion of film (4) from the roll (5). Figure 1 shows that the machine has two rolls (5), each with a particular type or size of film chosen in accordance with the type and or length of the article or product which is to be wrapped.

[0031] From the corresponding roll (5), the film (4) passes through a film distributor consisting of a comb (6) which as part of a general device can be tilted, and in turn includes means of positioning the free end of the film (4) into the distributor comb (6), both in the case of a new roll (5) when it is put in the machine and when the film needs to be reinserted.

[0032] Whatever the case, the device (7) can be tilted around the axis (8) and remains in its operating position by means of the action of an automatic actuator (9) the shaft of which has a support end (10) for a shaft (11) belonging to the general body of the device (7). The arrangement is such that when the actuator (9) is in operation, its shaft is extended and therefore pushed upwards, and supported by the actuator end (10), the special feature being that the distributor consists of a roller (12) pressing on a roller (13) when it is in the closed position described before, i. e., the device (7) pushed upwards by means of the actuator (9), which forces the film (4) to pass between the roller (12) and the roller (13).

[0033] When the free end of the film (4) is to be placed in the distributor comb (6) in order to put in a new roll of film, the actuator (9) is to be deactivated by retracting its shaft and therefore letting the device (7) tilt, which frees the film (4) from being pressed between the roller (12) and the roller (13) and allows for easy insertion and film changing.

[0034] The roller (13) is fitted on a support (14) which at the end opposite to that of the roller (13) holds another roller (15) which duly keeps the film (4) in position until it has been cut by the cutting blade (16), as shown in Fig. 1.

[0035] In addition, the machine has a film feeding clamp (17) which can be moved forward and backward and which is situated in the area opposite that of the rolls (5) below the sealing belt (22) so that the article (1) elevated by the elevator (3) remains under the film, held between the film feeding clamp (17) and the film distributor area described earlier.

[0036] In this way the article (1) which is to be wrapped enters the machine conveyed by the feeding belt mentioned before and passes by a sensor barrier (18) which checks the size of the article (1) and transmits the data to the corresponding microprocessor where the corresponding control orders are given for the movements of all the means and devices of which the machine consists.

[0037] The article (1) is placed on the elevator (3) in a position specified by the program according to the size of the article.

[0038] Then the film feeding clamp (17) feeds a variable portion of film (4) in proportion to the size of the article (1). In addition, it is pre-stretched depending on its characteristics, and it must be remembered that in accordance with the article to be wrapped the machine will choose either type of film from either roll (5).

[0039] As has been mentioned earlier, the movement of the film feeding clamp (17) is variable and its movement can be programmed in the exit direction of the product. This clamp moves underneath the sealing belt (22). By virtue of the programmed variation of the film feeding clamp movement, film stretching can be controlled in the final folding operation.

[0040] When the film is completely fed and stretched, the side clamps (19) hold the film (4) by the edges and execute transverse stretching programmed according the characteristics of the film. Such transverse stretching is always the same, regardless of the width of the initial film, i. e., the movement of the clamps (19) in the direction of stretching is always the same, while it is variable in its starting point and corresponds to the length of the tray and the width of the film.

[0041] When the elevation system is activated, i. e., the elevator (3), and the article (1), are elevated to the wrapping area shown in Fig. 1, during the ascending stroke of the elevator (3) an impulse counter sends the signals to the microprocessor which informs the program of the position reached by the lifter. When the tray, or its equivalent, i. e., the top part of the product contained in it, touches the film sheet (4), a brake in the corresponding roll-unwind is deactivated so as to feed some additional film from the roll (5). The brake is activated again just prior the article (1) reaching its highest

point of elevation so as to tighten the film for appropriate stretch and tautness in the cutting operation.

[0042] When this position is reached, side folding mechanisms and a rear folding device come into operation and execute the side folding as shown in Fig. 4 and 5 and the rear folding of the film under the article (1). This means that as soon as the side folding mechanisms (20) touch the film (4) and folding begins, the program deactivates the side clamps and side clamping sections of the film feeding clamp (19) to set the film free so that it can be folded and properly stretched.

[0043] The rear folding device (21) folds the portion of the film (4) between the article (1) and the cutting blade (16), while the cutting time takes place according to the size of the article (1) and the type of film, to properly stretch and cut the film.

[0044] When cutting has taken place, the central folding device (21) continues its forward movement and transports the article (1) to the sealing belt (22) with the aid of the exiting device mounted on it (21) so the film, can be now totally wrapped around the article (1), and is sealed by the belt (22) which has a heating means for the corresponding sealing action.

[0045] The exiting device mounted on the central folding device (21) executes pushing the article (1) towards the sealing belt. The exiting device is set into motion by an actuator (24), as shown schematically in Fig. 7.

[0046] As has been pointed out before, the central folding device is designed for folding the part of the film situated between the interior end of the article and the cutting blade and the transfer of the article to the sealing belt (22), while the last or final folding takes place.

[0047] The central folding device (23) (21 on fig 10) has a support body (38) with two cylindrical bearing mounts incorporated (39) on the sides to hold two sleeve bearings to make the movement of the device easy on the respective axes. As part of the support body (38), there is the central folding mechanism (21) and the exiting mechanism. The exiting mechanism consists of an actuator (24) and a scissoring mechanism (35) and (36) a pushing device (37), all of which is shown in Fig. 10.

[0048] The actuator (24) of the exiting element (23) is activated when the folding device (21) reaches the end of its stroke and the film feeding clamp (17) sets free the portion of the film situated between the clamp (center section) and the article (1). The opening of the clamp sections (17) are_programmed according to the article size and the characteristics of the film.

[0049] The final folding of the film portion (4) between the clamp (17) and the sealing belt (22) takes place by means of the pushing element or exiting device (23) as the film portion (4) remains between the back of the article (1) and the sealing belt itself (22) so that once the article is wrapped and placed on the belt (22), the folded film under the article (4) will be sealed as the belt (22) has the means for appropriate heat sealing.

[0050] As can be checked, the film feeding clamp (17) of the film portion (4) has a variable longitudinal movement according to the size of the product or article (1) to be wrapped. The clamp (17) feeds a length of film in proportion to the corresponding transverse dimension of the article (1) previously detected by the sensor barrier (18).

[0051] For feeding the film from the roll, the film feeding clamp (17) is divided into three parts, which operate in unison or in sequence. In order to feed the film from the roll, the clamp (17) holds the film all along its width. However, when it lets go it does so in sections, First the side sections of the clamp open to let go of the side edges of the film and prevent it from over stretching during the folding of the film held by the side sections. The central part of the film free end being held by the central section of the clamp, which is still retained or clamped until the final folding operation takes place.

[0052] To facilitate the movement of the clamping device (17), it is connected to a body (40), shown in Fig. 11, which has two cylindrical bearing mounts (41) at the ends for two sleeve bearings which allow its movement on the respective axes. A plate (42) is fitted to the supporting body (40) and on its top there is the clamping mechanism which consists of three sections. Two of these sections can move simultaneously when their actuator (43) is activated, while the central section is put into operation by its activator (44) when the microprocessor commands it to. The activator (44) activates the section (17') which operates in the center, when the microprocessor commands. The actuator (43) operates the side sections of the clamp (17'') situated at the ends, in response to a microprocessor command. For the feeding of the film the three clamping sections of which the clamp consists operate simultaneously for a positive grip across the entire free end. However, the side clamping sections let go of the film first, i. e., to make the side folding with out over stretching the film. The central clamping section, as has been mentioned before opens at the precise moment when the final folding operation begins.

[0053] The microprocessor of the machine is programmed to make the necessary calculations for the article (1) to be placed in a specified position on the elevator (3) according to the width of the article. It is necessary to place it in a specified and programmed position for the correct distribution of the film for wrapping different product dimensions. The special characteristic of all this is that the previously programmed control will only allow an article to be placed into the machine in relation to the position of the elevator (3) to prevent a new article from being introduced when the elevator is not situated at the bottom of its stroke.

[0054] The elevator (3) in turn consists of a base from where a large number of supports or rods emerge designed to maintain the articles in a stable position when the elevation and wrapping operations take place.

[0055] The rods each consist of a flexible body (31)

and a head (32). The head is made of injectable polyester or a similar material and the top surface of the head, on which the articles rest, is round so that the contact with the article continues to exist when the head leans over or collapses as it is being forced by the corresponding folding mechanism in the wrapping process. This allows a smooth transition of the article from the top of the elevator to the top of the folding mechanism as the film is folded under the article.

[0056] The head (32) is hollow to minimize possible noises from the colliding of folding mechanisms with the supports.

[0057] The flexible body (31) is joined to the head (32) by grooving and tonguing or any other method. The body (31) is manufactured with polymerized polyurethane and has a neck-like narrowing for easy collapsing and vertical resetting with out the use of springs or other mechanical means.

[0058] In accordance with the above the operating cycle of the machine consists of the following phases or operations all of which are controlled by the microprocessor:

- The article is placed in a specific position on the elevator (3). The program of the microprocessor chooses the roll to be used according to the length of the article captured by the photoelectric barrier (18). In accordance with the measured width of the article, the program of the microprocessor calculates the length of the film required for wrapping the article in a transverse direction. Based on this information, the clamping system (17) takes the film from the corresponding roll and feeds a portion determined by the program.

[0059] With the control system of the machine it is possible to program the engagement or disengagement of a brake situated in relation to the unwinding of either roll (5). The brake will be engaged before the clamp feeds the whole length of the selected film, and remain engaged until the elevator puts the article in contact with the film.

[0060] When the film is completely fed and taut, side clamps (19) clamp the film and execute transverse stretching. The position of the side clamps vary according to the roll chosen so as always to hold the film by the most exterior edges and achieve optimum stretching according to the width and elastic properties of the film.

[0061] When the operations listed above have been carried out, the wrapping process of the article begins. The control system activates the elevation system by which the article is transported from the bottom of the stroke in the position specified on the elevator to the wrapping area. In the course of the upward stroke of the elevator with the article, an impulse counter in the elevator motor constantly informs the control system of the position of the article. With this information the previously programmed system control orders the following movements in accordance with the size of the article:

- Disengaging the roll-unwind brake at the point of the elevator stroke where the articles touch the film, which has been previously stretched.

- Engaging the roll-unwind brake at a calculated time of the upward stroke of the elevator before the point of its highest elevation.

- Moving the side clamps, which have previously stretched the film when the article passes upward beyond the level where the film is fed.

- Moving the film feeding clamp (17) of the film in the opposite direction from the film feeding.

[0062] These movements, controlled by the microprocessor program in accordance with the size of the article being wrapped, and previously defined when the article passed the sensor barrier (18) on the infeed (2). This allows film tautness or stretch to be controlled in order to optimize the amount of film to be used for each wrapping and prevent breakage.

[0063] The wrapping process continues with the folding mechanism (21), which carry out side folding and central folding. For side folding with a taut film, the machine microprocessor control of the machine commands the film holding systems to be opened at the precise instant when the side folding device touches the film and begins the folding process. Activating the movement of the side clamps (19), which hold the film and stretch it beforehand. They can be programmed to allow the clamps to move towards the edges of the article simultaneously with the side folding mechanism (20). The point where the side clamps are opened is determined by the program in accordance with the length of the article.

[0064] When cutting has taken place, the film portion between the blade and the roll remains held in the distributor which includes a pressure mechanism for the feeding of the film in the direction of the machine interior, but prevents the movement of the film in the opposite direction.

[0065] When the rear folding mechanism (21) has folded the part of the film between the article and the blade, the tool continues its stroke transporting the article in the direction of the sealing belt. For this movement to be possible, the device has been provided with an ejecting system (23-24) which becomes activated to perform the final folding operation.

[0066] As soon as the rear folding mechanism (21) which includes the ejecting system (23-24) reaches the end of its stroke and the ejecting system gets activated, the film feeding clamp (17) which has been holding the film during the wrapping process sets free the film portion situated between the clamp and the article.

[0067] The final folding operation of the film portion

between the film feeding clamp and the sealing belt is executed by the ejecting system itself in the course of its forward movement it folds the film portion between the article and the sealing belt. When this movement has been completed the rear-folding device has carried out its forward stroke and the film has been set free by the film-feeding clamp.

[0068] Then the wrapped article is placed on the heated sealing belt (22) where the folded film sheets are sealed against the underside of the article.

Claims

1. A machine for wrapping products with an stretchable film which is designed for wrapping articles (1) entering the machine by a feeding belt (2) which controls the placement of every article (1) on an elevator (3) the upward movement of which is preceded by placing the article (1) under a stretched and taut portion of film (4) positioned between a distributor comb following a roll (5) of film and a film feeding clamp (17) situated on the opposite side, with the machine having side folding mechanisms (20) and a central folding device (21), which can be moved to adapt to the film type and the length, width, and height of the article (1) which is finally moved to a heated sealing belt (22) when the final wrapping process of the product (1) with the film (4) takes place as well as the sealing process by heating the part underneath; characterised in that the article (1) can take up a variable position on the elevator (3), a position defined by a microprocessor according to the width of the article, while film feeding takes place via a film feeding clamp (17) which has a variable stroke mechanism in a longitudinal direction, in other words, the feeding of more or less film according to the corresponding parameter of the article to be wrapped, the film feeding clamp (17) remains underneath the sealing belt (22), and after that a longitudinal stretching of the film takes place and the feeding of an additional amount of film required and controlled by sequential engagement and disengagement of the roll-unwind (5) brake followed by transversal stretching of the film via clamps (20) of variable movement which hold the film close to the edges for various widths and fixed stroke movement in the direction of stretching, clamps which set the film free just when the folding mechanisms (20) come into operation and touch the film, while a central exiting and folding device (21-23-24) is ready for the last folding operation and for exiting the wrapped article to a sealing belt.

2. A machine for wrapping products with an stretch film, according to claim 1, characterised in that the film feeding clamp (17) has a variable movement in the exit direction of the product and moves underneath the sealing belt, which allows film tightening to be controlled in the final folding operation.

3. A machine for wrapping products with an stretch film, according to the above claims, characterised in that the roll-unwind (5) includes a brake for the energising and
de-energising process of which is controlled by the microprocessor so that the brake becomes de-energised first for the film feeding clamp (17) to feed the amount of film commanded by the microprocessor and then becomes energised until the article (1) being elevated touches the film (4) above it, at which time it is de-energised to obtain the calculated amount of film required and then energised again before the elevator reaches the top of its stroke to insure that the tightness of the film is optimum for cutting.

4. A machine for wrapping products with a stretch film, according to the above claims, characterised in that the film feeding clamp (17) has three clamping areas which operate simultaneously for clamping and sequentially for releasing the film, with the two exterior areas being the first to release the film corresponding to when the folding mechanisms (20) touch the film and begin side folding, while the central clamping area releases the film just when the final folding process begins.

5. A machine for wrapping products with a stretch film, according to the above claims, characterised in that the film feeding clamp (17) consists of a support (40) with tubular bearing mounts (41) for moving along the corresponding guiding axes and with a plate on which actuators (43) and (44) are installed, one of which actuates the areas of the exterior clips (17''), while the other actuates the central clamping area (17').

6. A machine for wrapping products with a stretch film, according to claim 1, characterised in that the exiting and central folding device (21-23-24) has a support body (38) with tubular bearing mounts (39) for its movement along the corresponding guiding axes and part of which is the mechanism as such (21) and a scissoring exiting mechanism (35-36) with a pushing device (37), an exiting mechanism (24) actuated by the controlling microprocessor.

7. A machine for wrapping products with a stretch film, according to claim 1, characterised in that the elevator has a large number of supports consisting of a body of flexible material (31), such as polymerised polyurethane, and a head (32), which is hollow, round and made of plastic material, such as injected polyester; body and head are joined by a neck-like narrowing for easy collapse in any direction and posterior (self) resetting.

8. A machine for wrapping products with a stretch film, according to claim 1, characterised in that the film distributor (4) of the respective roll (5) is associated with a positioning device for the free end of the film (4), a device which includes a tilting support (7) with a roller (12) and a wheel (13) through which the film (4) passes towards the respective comb (6) of the distributor; the supporting device (7) remains in an operating position where the film is pressed between the roller (12) and the roller (13) by means of a actuator (9) the rod of which has an end supporting a roller belonging to the support device (7), which allows tilting the device (7) by the actuator (9) which can be de-energised in order to position the free end of the film in the distributor.

9. A machine for wrapping products with a stretch film, according to claim 1, characterised in that the operating sequences of the machine, all of which are controlled by the microprocessor, are the following:

a) Positioning the article at a specific point on the elevator.
b) De-energising the roll-unwind brake to feed the film.
c) Starting the upward stroke of the elevator.
d) Energising the roll-unwind brake to tighten the film at the end of the feeding.
e) De-energising the roll-unwind brake at the time the article being elevated touches the film.
f) Energising the roll-unwind brake just prior to the end of the elevator stroke.
g) Moving and controlling the side clamps according to the width of the film.
h) Transversal stretching of the film.
i) Movement of the side clamps which stretch the film accompany the side folding mechanisms as far as the point where they touch the film and release.
j) Cutting the film.
k) Return movement of the film-feeding clamp when the article is elevated.
l) Final folding operation and exiting the article towards the sealing belt.

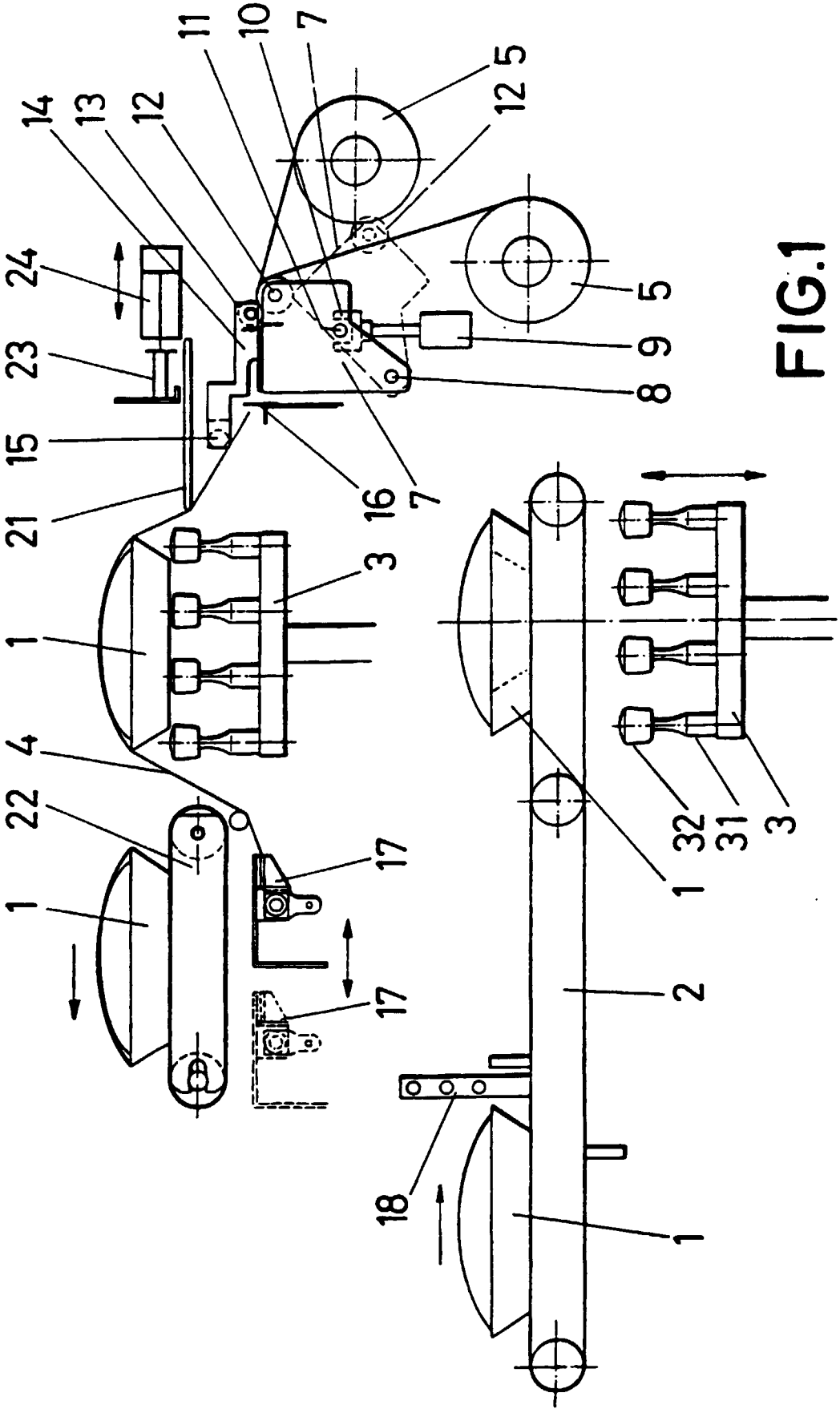

FIG.1

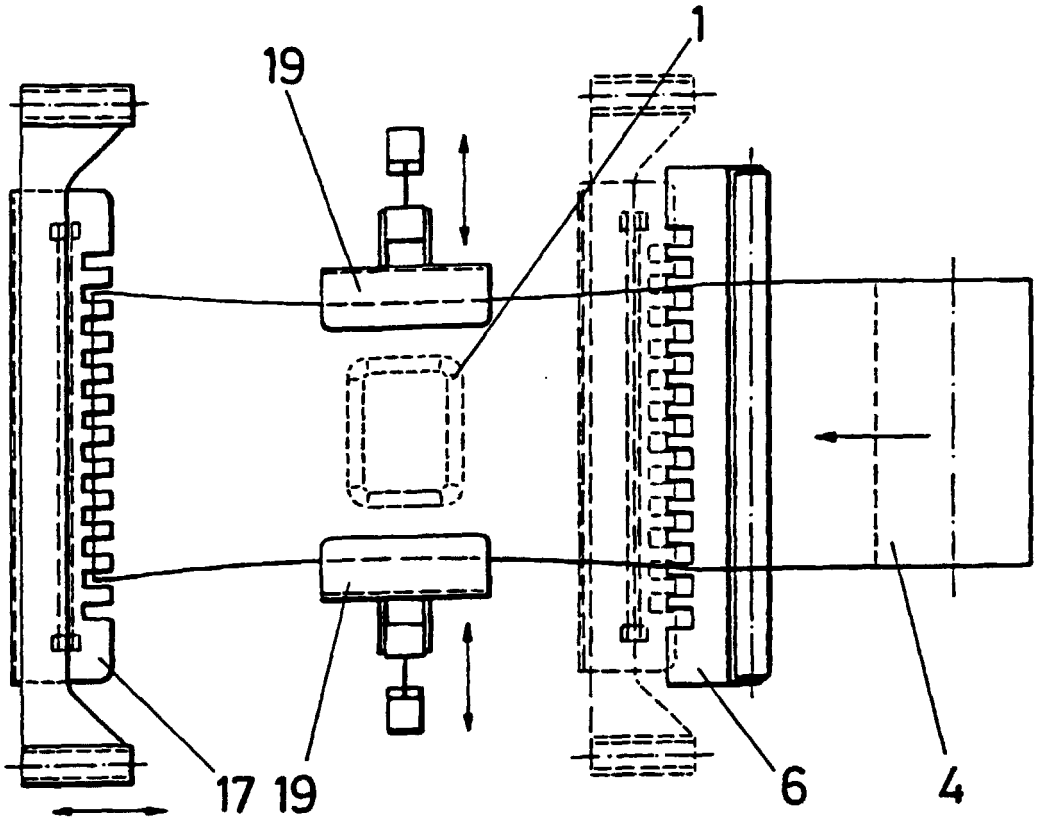

FIG.2

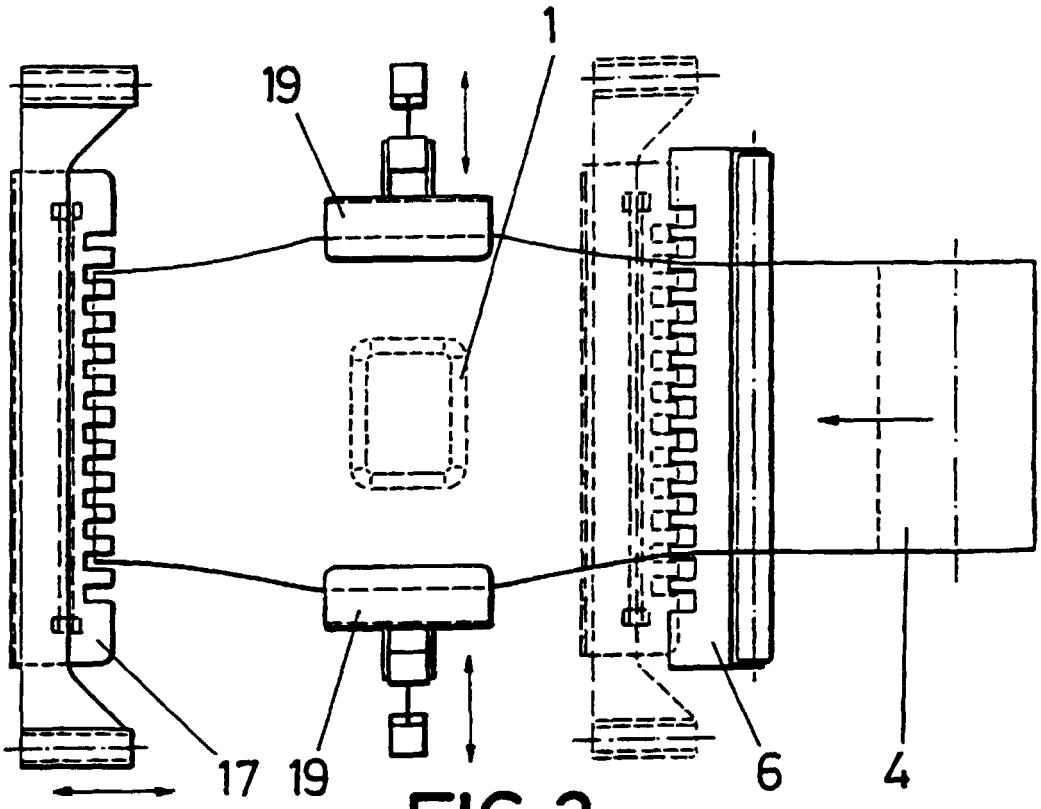

FIG.3

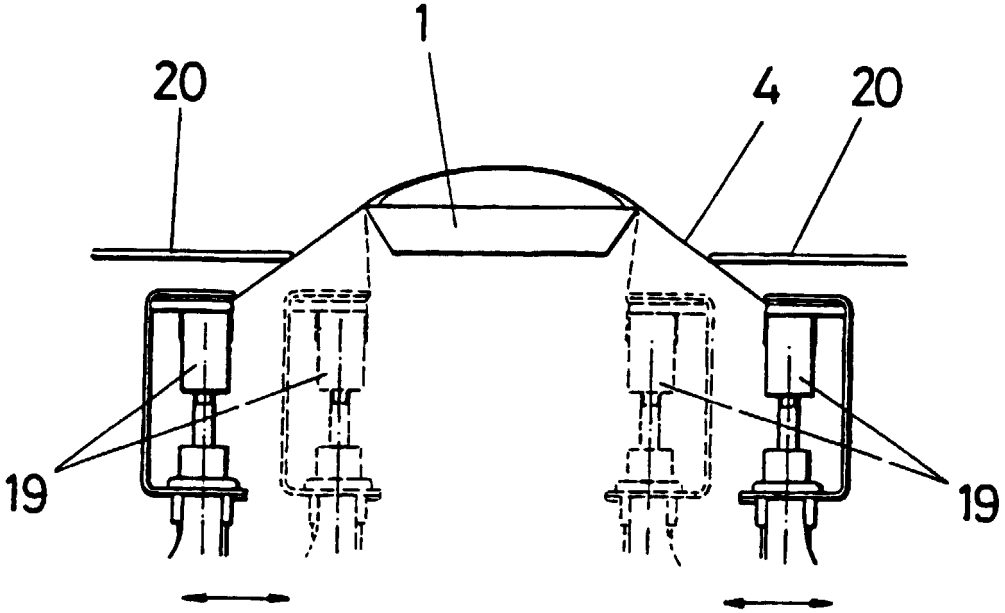

FIG.4

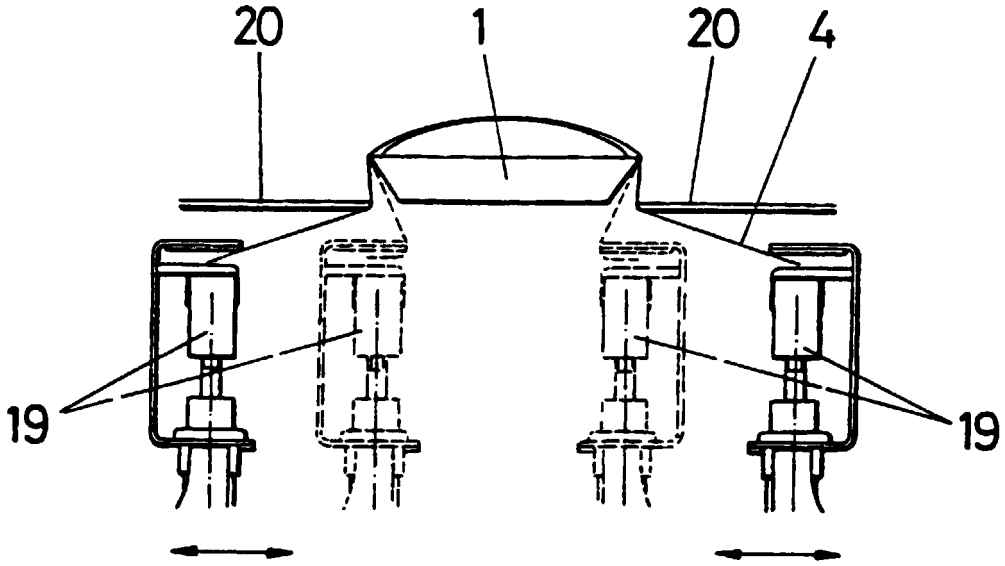

FIG.5

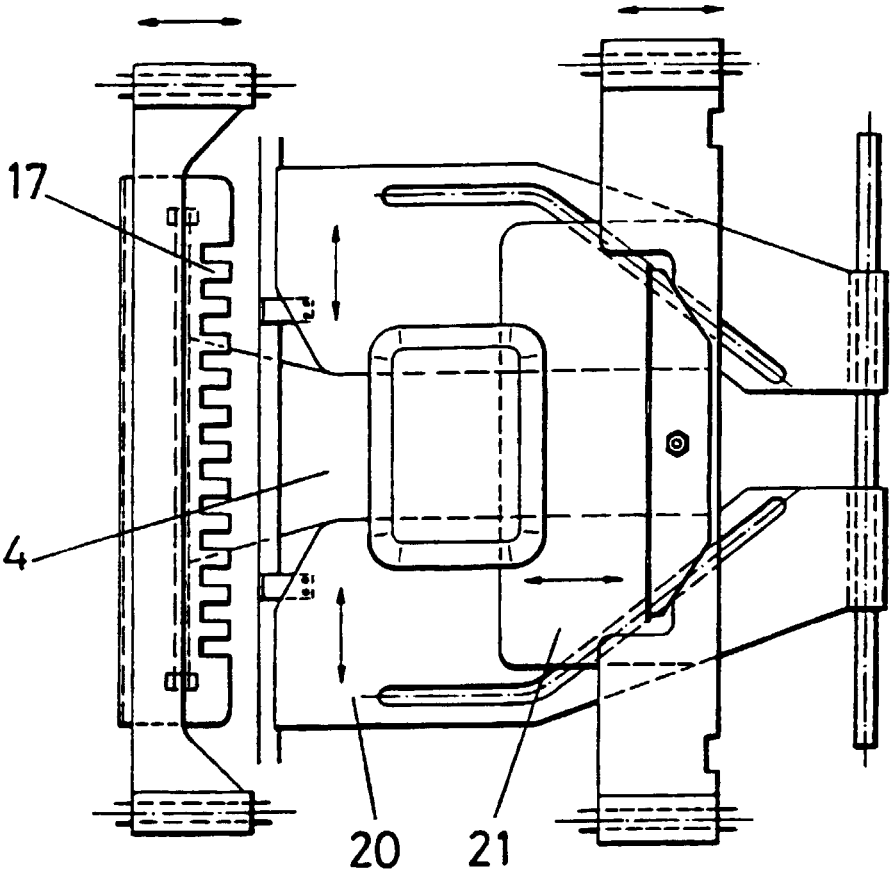

FIG.6

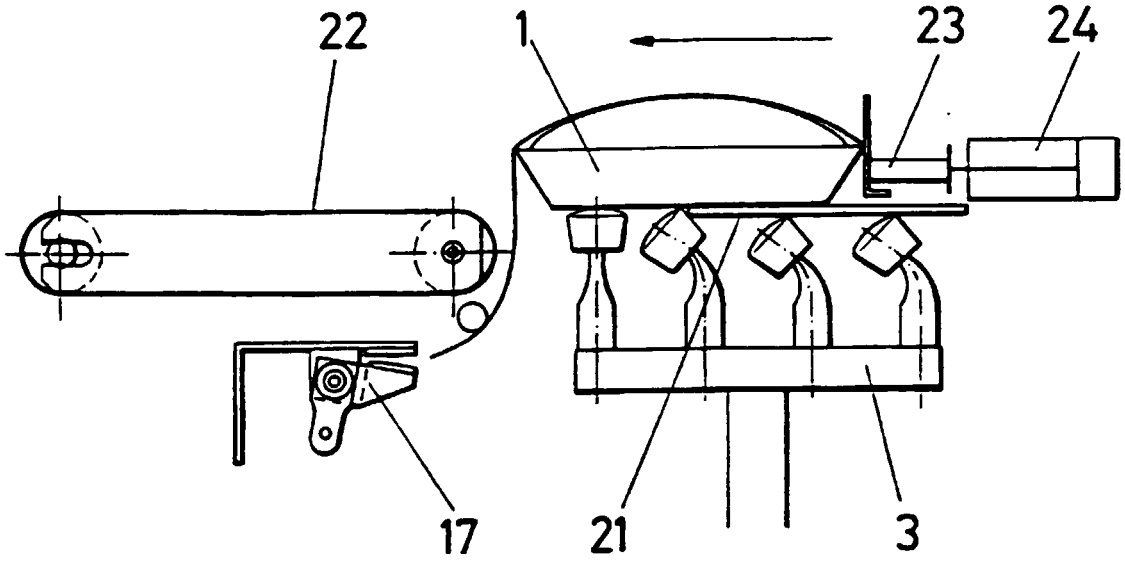

FIG.7

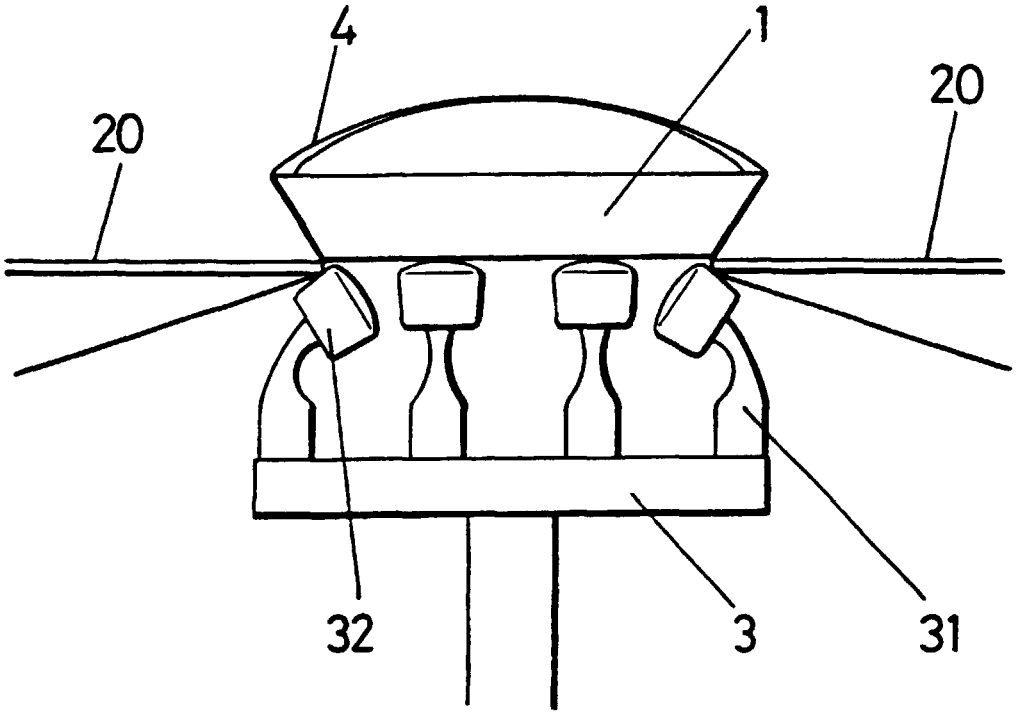

FIG.8

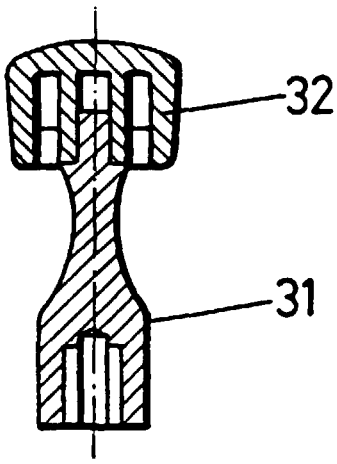

FIG.9

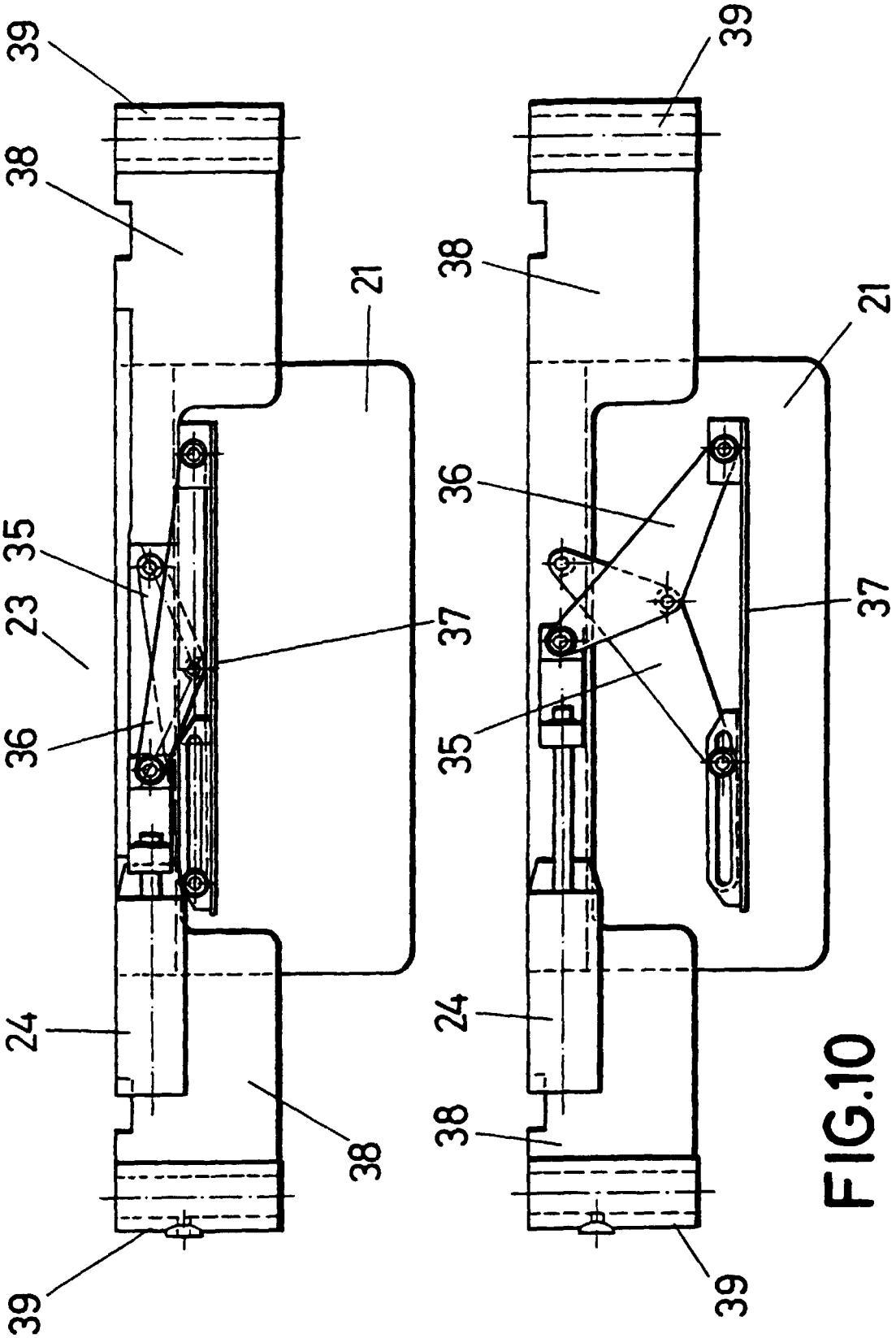

FIG.10

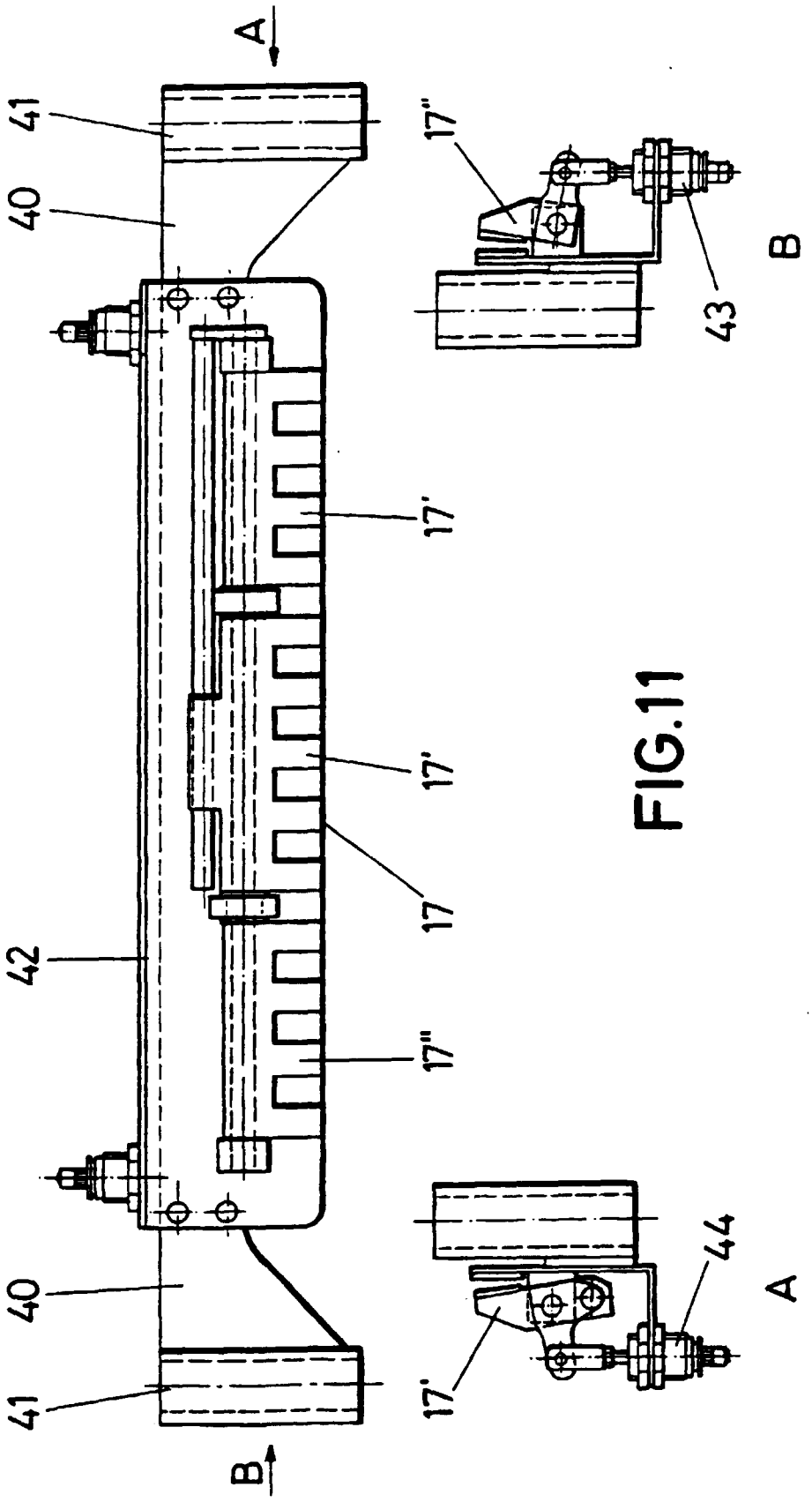

FIG.11

INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES 98/00198

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 : B65B 11/54, 59/00
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 : B65B

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

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	US 4862670 A (DENDA) 05 September 1989 (05.09.89)	

☒ Further documents are listed in the continuation of box C. ☒ Patent family members are listed in annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
01 February 1999 (01.02.99)	03 February 1999 (03.02.99)
Name and mailing address of the ISA/S.P.T.O. European Patent Office	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (July 1992)

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Information on patent family members

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