The present invention relates to a process and device for the cyclic positioning of images over package troughs, said images being printed on a covering film.
PROCESS AND DEVICE FOR THE POSITIONING OF PRINTED IMAGES ON PACKAGE TROUGHS

[0001] The present invention relates to a process and device for the cyclic positioning of images over package troughs, said images being printed on a covering film.

[0002] Packages, particularly food packages, are becoming increasingly important today. These packages often consist of a package trough, in which the product to be packaged, for example food, is filled and onto which a covering film is sealed so that the product to be packaged is closed airtight. To seal the package troughs, they are fed cyclically by a servo chain drive system into the so-called scaling station, the covering film is sealed onto the package trough and the finished package is then fed onward by the servo chain drive system. As the covering film after sealing is permanently joined to the package trough, the covering film is unrolled cyclically from a roll during the onward feed of the finished package.

[0003] Employed increasingly today as the covering films are films printed with images which cover almost the entire cross-section of the package trough so as to make packages more appealing. As the images are almost the same size as the package trough onto which they are sealed, the images have to be positioned with a tolerance of ±0.5 mm. This proved to be impracticable in the past because, for instance, of the constant change in the filling level of the package troughs and thus in the required length of covering film as well as in the expansion behaviour of the film as a function of temperature or humidity.

[0004] The object is therefore to provide a process and a device by means of which images printed onto covering films can be precisely positioned over package troughs.

[0005] According to the invention, the object is achieved by a process for the cyclic precise positioning of printed images over package troughs, said images being printed on a covering film at a certain distance apart to retain an unprinted strip, using a device which consists of a first and a second photoelectric cell and a film brake arranged between the photoelectric cells, the covering film being sealed after positioning on the package trough, and the package thus obtained and hence the covering film being fed onward afterwards by a defined distance, wherein

[0006] at each stoppage of the film, preferably during scaling, it is ascertained whether the second photoelectric cell detects a strip and upon detecting a strip the first photoelectric cell is activated,

[0007] during the onward feed of the covering film, the first photoelectric cell triggers the film brake as soon as it has detected a strip between two passing images, so that the onward feed of the covering film is stopped at the position of the film brake and the covering film is stretched as a result of the ongoing forward feed of the package last sealed.

[0008] The covering film is any desired covering film known to the person skilled in the art, which is unrolled from a roll and printed with images. An image in the meaning of the invention is any desired printable representation of, for example, products, advertising slogans and/or company logos. The images are arranged at a certain distance apart so that there is always an unprinted strip between any two images. For the process according to the invention, only the unprinted strips which extend transversely to the direction of running of the covering film are relevant.

[0009] The covering film is sealed in the sealing station onto packaging troughs filled with product to be packaged. To this end the packaging troughs are fed cyclically, e.g. by a servo chain drive, into the sealing station, the covering film is sealed onto the package trough and the package thus obtained is fed onward by the servo chain drive by a precisely defined distance so that the subsequent packaging troughs can then be sealed. As the covering film is permanently joined to the packaging trough, the covering film is forcibly unrolled from the roll when the finished packaging is fed onward. A person skilled in the art will understand that this unrolling takes place cyclically.

[0010] After sealing, the packaging is cut apart in a cutting station.

[0011] According to the invention, the images are precisely positioned over the packaging troughs with the aid of a first and a second photoelectric cell and with a film brake which is arranged between the two photoelectric cells. In relation to the direction of running of the film, the second photoelectric cell is situated downstream of the film brake. At each stoppage of the covering film, preferably during the sealing of the covering film onto the packaging trough, the second photoelectric cell checks whether it can detect a strip aligned at right angles to the direction of running of the film and located between two images. If this is the case, the printed images have run forward and the first photoelectric cell is activated so that it in turn can trigger the film brake as soon as the first photoelectric cell has detected a strip between two passing images.

[0012] The film brake can be any film brake known to a person skilled in the art.

[0013] As a result of braking during onward feed, the covering film is stretched between the film brake and the package last sealed, with the result that the position of the image which is to be sealed next onto a packaging trough is set back in relation to the direction of running of the covering film. This process is repeated at each cycle and until the second photoelectric cell fails to detect a strip and resumed as soon as the second photoelectric cell detects another strip.

[0014] The point in time for the activation of the first photoelectric cell is freely selectable, although activation should take place when the covering film is already being fed onward, i.e., during the next cycle. The first photoelectric cell is preferably activated shortly before completion of the forward feed of the finished packaging and that of the covering film. Activation takes place preferably 40 to 100 mm and especially preferably 50 to 80 mm before completion of the forward feed of the covering film.

[0015] In a preferred embodiment of the device according to the invention, the first photoelectric cell is displaceable along the x axis (see FIG. 3). As a result of this displacement, it is possible to change the time of strip detection. If the photoelectric cell is displaced in the direction opposite to that of film running, the time of strip detection is brought forward, while with the said that the covering film after actuation of the film brake is stretched more because the remaining forward feed of the covering film is longer. If the photoelectric cell is displaced in the same direction as that of film
In a preferred embodiment, printing marks are printed on the covering film between any two images. These marks are then used instead of the strips for the positioning of the images. Positioning is then performed by analogy with strip positioning.

The advantage of the process according to the invention is that images can be positioned on covering films very simply and with great precision with a deviation of \( \leq 0.5 \) mm. The process can be performed with very little effort and is proven to be extremely rugged. In spite of film changes and machine stoppages, trouble-free use of the process according to the invention has been possible over a very long period.

The present invention is also directed to a device for the cyclic precise positioning of images printed onto a covering film over package troughs, using a first and a second photoelectric cell and a film brake arranged between the two photoelectric cells.

The film brake can be any film brake known to a person skilled in the art.

In relation to the direction of covering film running, the second photoelectric cell is situated downstream of the film brake. In relation to the direction of film running, the second photoelectric cell is preferably arranged immediately upstream of the sealing device or downstream of the sealing device.

In a preferred embodiment, the second photoelectric cell detects the position of a strip and/or printing mark at each stoppage of the covering film, preferably during scaling, and, depending thereon, optionally activates the first photoelectric cell which in turn, if activated, triggers the film brake as soon as it has detected a strip and/or printing mark between two passing images.

The point in time for the activation of the first photoelectric cell is freely selectable, although activation should take place when the covering film is already being fed onward, i.e., during the next cycle. The first photoelectric cell is preferably activated shortly before completion of the forward feed of the finished packages and that of the covering film. Activation takes place preferably 40 to 100 mm and especially preferably 50 to 80 mm before completion of the forward feed of the covering film.

In a preferred embodiment of the process according to the invention, the first photoelectric cell is displaceable along the x-axis (see FIG. 3). As a result of this displacement, it is possible to change the time of strip detection. If the photoelectric cell is displaced in the direction opposite to that of film running, the time of strip detection is brought forward, with the result that the covering film after actuation of the film brake is stretched more because the remaining forward feed of the covering film is longer. If the photoelectric cell is displaced in the same direction as that of film running, the time of strip detection is delayed and the covering film is consequently stretched less after actuation of the film brake.

The detection hysteresis of the second photoelectric cell, though especially preferably of both photoelectric cells, is preferably \(< 0.4 \) mm, highly preferably \(< 0.25 \) mm and especially preferably \(< 0.15 \), measured at a standard distance of 9.5 mm between the lens and film.

The device according to the invention is advantageously controlled by a stored program control (SPC). Equally preferred is control by a personal computer or microprocessor.

The advantage of the device according to the invention is that images can be positioned on covering films very simply and with great precision with a deviation of \(< 0.5 \) mm. The device is very easy to construct and has proven to be extremely rugged. In spite of film changes and machine stoppages, trouble-free use of the device according to the invention has been possible over a very long period.

The present invention is also directed to a film brake with three rolls about which the film runs and two braking means. In relation to the direction of film running, the rolls are arranged in sequence, the middle having a different direction of rotation than the two outer rolls. The two outer rolls preferably cooperate with the two braking means. The middle roll preferably has a displaceable bearing.

The braking means are preferably driven pneumatically or electrically.

In a preferred embodiment, the film brake according to the invention is activated by the first photoelectric cell of the device according to the invention to position images on package troughs.

The film brake according to the invention is simple and inexpensive to produce. The film brake has a very short response time. Any slipping of the film through the film brake is excluded. The film brake according to the invention was found to be extremely rugged.

The invention is explained in the following with reference to FIGS. 1 to 4. This is merely an explanation by way of example and does not limit the general idea of the invention.

FIG. 1 shows a covering film which is printed with images.

FIG. 2 shows a covering film printed with images and having additional printing marks.

FIG. 3 shows a sealing station with the positioning device according to the invention.

FIG. 4 shows the film brake according to the invention.

FIG. 1 shows a covering film 1 onto which the images 3 are printed. The images 3 are printed at a certain distance apart on the covering film, thus yielding strips 2 at right angles to the direction of film running (indicated by the arrow). The strips oriented in the same direction as film running are irrelevant to the present invention.

The covering film according to FIG. 2 is essentially the same as the covering film according to FIG. 1, the covering film according to FIG. 2 having printing marks in addition.

FIG. 3 shows a sealing station with the positioning device according to the invention. The package troughs 4
filled with product to be packaged are fed cyclically by a servo chain drive into the sealing station where they are sealed in the sealing device 11 with a covering film 1. After sealing, the finished packages 8 are fed onward by the servo chain drive to a cutting station (not illustrated) cyclically, in each case by a defined distance. The covering film 1 is cyclically unrolled from the roll 17 as a result of the onward feed of the packages 8.

[0039] The positioning device according to the invention consists of a first and a second photoelectric cell (5, 6) and of a film brake 7 arranged between the photoelectric cells. In relation to the direction of running of the covering film, the second photoelectric cell 6 is immediately upstream of the sealing device 11. The covering film runs with the printed side directly past the photoelectric cells 5, 6 and wraps itself partly around the rolls of film brake 7. The photoelectric cells 5, 6 are products of Visolux Elektronik GmbH, Prinzenstr. 85, 10969 Berlin and have a detection hysteresis of 0.1 mm, measured at a distance of 9.5 mm between the lens and film. The positioning according to the invention is controlled by an SPC.

[0040] During sealing, the SPC inquires whether the second photoelectric cell 6 detects a strip 2 or a printing mark 9. If this is the case, the system knows that the image has run forward. During the next onward feed of the covering film 1 and 60 to 70 mm before completion of the forward feed of the sealed packages 8 and thus of the covering film, the photoelectric cell 5 is activated by the SPC. The first photoelectric cell 5 in turn activates the film brake 7 as soon as it has detected a strip 2 or a printing mark 9 between two passing images 3. The onward feed of the covering film 1 is stopped abruptly by the film brake 7 at the brake's position, while the forward feed of the packages 8 still continues briefly, causing the covering film 1 to be stretched between the package 8 last sealed and the film brake 7. Consequently, the images are pulled back somewhat in relation to the direction of running of the covering film 1. This process is repeated until the second photoelectric cell 6 fails to detect a strip 2 or printing mark 9 during the stoppage of the covering film 1. If the second photoelectric cell 6 does not detect a strip 2 or printing mark 9, the first photoelectric cell 5 and thus the film brake are not activated during the next cycle.

[0041] FIG. 4 shows the film brake 7 according to the invention with three rolls 12-14 and two brake discs 15 and 16 which interact with the rolls 12 and 14. The roll 13 has a replaceable bearing, so that the angle of wrap of the covering film on the rolls can be adjusted. The brake discs are driven by two pneumatic cylinders. The film brake according to the invention is activated by the first photoelectric cell 5.

1. A process for the cyclic precise positioning of printed images (3) over package troughs (4), said images (3) being printed on a covering film (1) at a certain distance apart to retain an unprinted strip (2), using a device (10) which consists of a first and a second photoelectric cell (5, 6) and a film brake (7) arranged between the photoelectric cells (5, 6), the covering film (1) being sealed after positioning on the package trough (4) and the package (8) thus obtained and hence the covering film (1) being fed onward afterwards by a defined distance, wherein at each stoppage of the film, preferably during sealing, it is ascertained whether the second photoelectric cell (6) detects a strip (2) and upon detecting a strip the first photoelectric cell (5) is activated,
during the onward feed of the covering film (1), the first photoelectric cell (5) triggers the film brake (7) as soon as it has detected a strip (2) between two passing images (3), so that the onward feed of the covering film (1) is stopped at the position of the film brake (7) and the covering film (1) is stretched as a result of the ongoing forward feed of the package (8) last sealed.

2. The process according to claim 1, characterized in that the first photoelectric cell (5) is displaced along the x axis in order to change the time of strip (2) detection.

3. The process according to claim 1 or 2, characterized in that a printing mark (9), which is used for the positioning of the images (3), is printed on the strip (2).

4. A device (10) for the cyclic precise positioning of printed images (3) over package troughs (4), said images (3) being printed on a covering film (1), using a first and a second photoelectric cell (5, 6) and a film brake (7) arranged between the photoelectric cells (5, 6).

5. The device according to claim 4, characterized in that the second photoelectric cell (6) detects the position of the strip (2) and/or printing mark (9) at each stoppage of the covering film (1) and, depending on this, optionally activates the first photoelectric cell (5) which in turn, if activated, triggers the film brake (7) as soon as it has detected a strip (2) and/or printing mark (9) between two passing images (3).

6. The device according to claim 4 or 5, characterized in that the second photoelectric cell (6) is replaceable arranged immediately upstream of the sealing device (11).

7. The device according to any of claims 4 to 6, characterized in that the first photoelectric cell (5) is pivotable about the z axis in order to change the time of detection of a strip (2) and/or printing mark (9).

8. The device according to any of claims 4 to 7, characterized in that detection hysteresis of at least the second photoelectric cell (6) is <0.4 mm, preferably <0.25 mm and especially preferably <0.15 mm.

9. The device according to any of claims 4 to 8, characterized in that the device is controlled by an SPC.

10. A film brake having three rolls (12 to 14) and two braking means (15, 16) which cooperate with the rolls (12, 14), the rolls (12, 14) having a different direction of rotation than the roll (13).

11. The film brake according to claim 10, characterized in that the roll (13) has a replaceable bearing.

12. The film brake according to claim 10 or 11, characterized in that the braking means (15, 16) are driven pneumatically or electrically.

13. The film brake according to any of claims 10 to 12, characterized in that the film brake is activated by the first photoelectric cell (5).