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(54) Packaging machine with simulated cams

(57) A packaging machine comprises means (11) for forming a tube of slideable film (12) arranged around a sequence of products and is provided with a transverse welding station (14) of the tube with a pair of welding bars (15, 16). The welding station (14) comprises a first motor-driven movement unit (18) for moving the bars towards and away from one another in a normal direction to the sliding direction of the tube of film, and a second motor-driven movement unit (19) for moving the first motor-driven movement unit in a direction parallel to the sliding direction of the film. Electronic control means (20, 21, 22) commands the first and second movement unit in a synchronised manner to make the welding bars perform interpolated curves that simulate cam profiles.

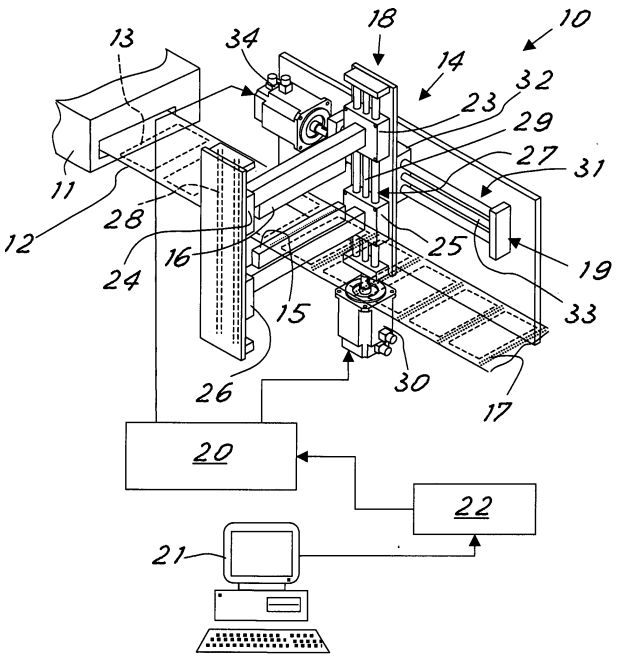

Fig.1

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Description

[0001] The present invention relates to a packaging machine of the type that comprises a horizontal packaging line along which the products are first enclosed in a tube of slideable film and then a transverse welding station carries out transverse welding of the tube of film to obtain the single packages.

[0002] In the prior art, the welding station comprises a pair of welding bars that extend transversely to the sliding direction of the film and are moved to be alternately closed against one another with the film between them. The movement of the bars is obtained with suitable motor-driven cams to make the bars perform a closed trajectory that accompanies the sliding of the film during welding and, between one weld and the next, enables the products arranged inside the tube of film to be passed over.

[0003] A similar known technique requires careful study of the shape of the cams to optimise the welding cycles and a variation in the welding pass or in the size of the product limits the packaging machine in terms of speed and packageability.

[0004] The general object of the present invention is to remedy the drawbacks mentioned above by providing a packaging machine that enables the cam movements of the welding bars to be simulated, enabling greater flexibility and a fast possibility of adaptation to different movements of the welding bars.

[0005] In view of this object it has been decided to make, according to the invention, a packaging machine comprising means for forming a tube of slideable film arranged around a sequence of products and provided with a transverse welding station of the tube that comprises a pair of welding bars extending transversely to the tube of film and which are moved to close at intervals on the tube of film on opposite sides with motion that is alternate and synchronised with the sliding of the film, characterised in that the welding station comprises a first motor-driven movement unit for moving the bars towards and away from one another in a normal direction to the sliding direction of the tube of film, and a second motor-driven movement unit for moving the first motor-driven movement unit in a direction parallel to the sliding direction of the film, electronic control means commanding the first and second movement unit in a synchronised manner to make the welding bars perform interpolated curves that simulate cam profiles.

[0006] In order to make the explanation of the innovative principles of the present invention and the advantages thereof with respect to the known art clearer, with the help of the enclosed drawings a possible embodiment applying these principles will be disclosed below by way of example. In the drawings:

- figure 1 shows a schematic view of a machine according to the invention;
- figure 2 shows an example of the trajectory of the welding bars obtained with the machine according to the invention;
- figure 3 shows further examples of possible trajectories that are obtainable with the machine according to the invention.

[0007] With reference to the figures, figure 1 shows, indicated generally by 10, a packaging machine comprising means 11 for forming a tube of film 12 that is slideable on a conveyor belt and arranged around a sequence of products 13 and provided with a transverse welding station 14 of the tube for obtaining the separation between successive packages.

[0008] The obtaining means of the tube is known and is easily imaginable by those skilled in the art and will not therefore be disclosed further.

[0009] The welding station 14 comprises a pair of welding bars 15, 16 extending transversely to the tube of film and which are moved to close at intervals on the tube of film on opposite sides with motion that is alternate and synchronised with the sliding of the film, so as to obtain the transverse welding 17 between the products.

[0010] The welding station comprises a first motor-driven movement unit 18 for moving the bars towards and away from one another in a normal direction to the sliding direction of the tube of film.

[0011] The first unit is supported by a second motor-driven movement unit 19 for moving the first motor-driven movement unit in a direction parallel to the sliding direction of the film. Electronic control means 20 (of known type, for example suitable programmed microprocessor means) commands the first and second movement unit in a synchronised manner to make the welding bars perform interpolated curves that simulate set cam profiles. The cam profiles are selected by means of selecting means 21, from those stored in suitable electronic memory means 22. If necessary, the means 21, advantageously made in the form of a known microcomputer, can also enable a customised cam profile to be drawn that can be stored amongst the cam profiles from which to choose each time. Each profile can also have parameters that are modifiable by the user so as to draw the cam that is most suitable for the specific needs.

[0012] In the advantageous embodiment shown, the first unit 18 comprises bar-supporting carriages 23, 24 and 25, 26, which are motor-driven to slide along respective guides 27, 28 extending transversely to the sliding direction of the film. Each bar has a supporting carriage for each end.

[0013] A motor-driven screw, belt or anything else 29 engages one of the two carriages of each bar with opposite screw-nut screw couplings so as to move the bars towards or away from one another in a symmetrical manner through the motor-driven rotation of the screw (by means of an electric motor 30) in the two directions. Advantageously, the carriages on each end of the bars slide on a respective pair of parallel guides and the motor-driven screw is arranged between a pair of such parallel

guides.

[0014] The second motor-driven unit 19 comprises guides 31 parallel to the movement direction of the film, on which there slides a supporting carriage 32 of the first motor-driven unit. A motor-driven movement screw 33 is arranged parallel to the guides for engaging the supporting carriage 32 with a screw-nut screw coupling and moving it along the respective guides to the motor-driven rotation (by means of an electric motor 34) of the screw. Still advantageously, the guides 31 are two parallel guides, and the screw 33 is arranged between them.

[0015] By way of example of the operation of the machine, in figure 2 a possible trajectory 40 of a known cam is shown that can be selected in the memory 22 and which the bars can follow through interpolation of the control device 20 that commands the two motors 30 and 34 in a synchronised manner. In the movement portion with the bars against the film, the bars are moved at the same sliding speed as the film.

[0016] In figure 3 there are shown further possible selectable trajectories a)-e). For simplicity, in figure 3 the trajectories are shown only for the upper bars. The trajectories for the lower bars can simply mirror those shown.

[0017] At this point it is clear that the objects of the present invention have been reached.

[0018] With a machine made according to the principles of the present invention, it is possible, through the selecting means, to command which cam profile has to be simulated through interpolation by the transverse welding station. Changing the cam profiles to be followed is thus easy and very fast, without need for any real mechanical intervention. For the normal user of such machines it is easy to intervene on the machines according to the invention, as he only has to choose between "virtual" cam profiles as if he were choosing (or designing) the real cam profiles in a traditional machine.

[0019] Naturally, the above description of an embodiment applying the innovative principles of the present invention is given by way of example of such innovative principles and must not therefore be taken to limit the scope of what is claimed herein. For example, the machine may comprise any other known device for such types of machine, such as, for example, devices for delivering or packaging in a modified atmosphere.

Claims

1. Packaging machine comprising means (11) for forming a tube of slideable film (12) arranged around a sequence of products and provided with a transverse welding station (14) of the tube that comprises a pair of welding bars (15, 16) extending transversely to the tube of film and which are moved to close at intervals on the tube of film on opposite sides with motion that is alternate and synchronised with the sliding of the film, **characterised in that** the welding station (14) comprises a first motor-driven movement unit (18) for moving the bars towards and away from one another in a normal direction to the sliding direction of the tube of film, and a second motor-driven movement unit (19) for moving the first unit in a direction parallel to the sliding direction of the film, electronic control means (20, 21, 22) commanding the first and second movement unit in a synchronised manner to make the welding bars perform interpolated curves that simulate cam profiles.

2. Machine according to claim 1, **characterised in that** it comprises electronic memory means (22) in which several cam profiles are stored and that it comprises selecting means (21) for selecting a desired cam profile from these different cam profiles and sending it to the control means to have the interpolated curve performed that simulates this desired cam profile.

3. Machine according to claim 1, **characterised in that** the first unit (18) comprises supporting carriages (23, 24, 25, 26) of the bars that are motor-driven to slide along respective guides (27, 28) extending transversely to the sliding direction of the film and to the extension of the bars.

4. Machine according to claim 3, **characterised in that** each bar has a supporting carriage for each end, a motor-driven screw (29) engaging one of the two carriages of each bar with opposite screw-nut screw couplings for moving the bars towards or away from one another in a symmetrical manner at the motor-driven rotation of the screw in the two directions.

5. Machine according to claim 3, **characterised in that** the carriages on each end of the bars slide on a respective pair of parallel guides (27, 28) and the motor-driven screw (29) is arranged between a pair of such parallel guides.

6. Machine according to claim 1, **characterised in that** the second motor-driven unit (19) comprises guides (31) parallel to the movement direction of the film, on which there slides a supporting carriage (32) of the first motor-driven unit, a motor-driven movement screw (33) being arranged parallel to the guides for engaging the supporting carriage (32) with a screw-nut screw coupling and moving it along the respective guides at the motor-driven rotation of the screw.

7. Machine according to claim 6, **characterised in that** the guides (31) are two parallel guides, and the screw (33) is arranged between them.

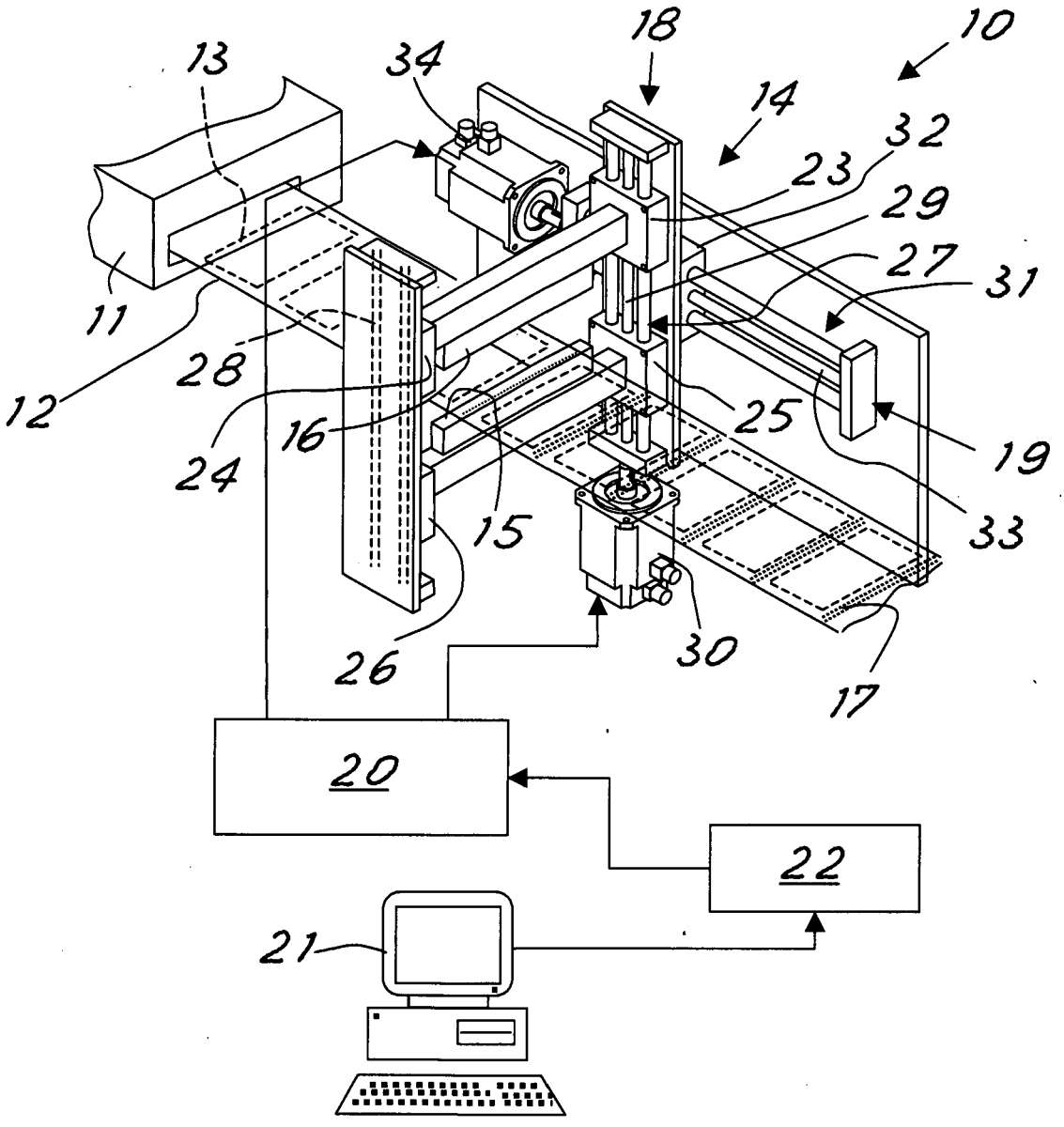
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Fig.1

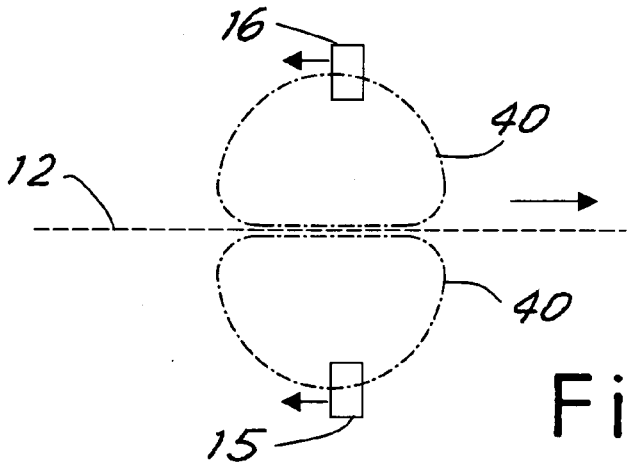

Fig.2

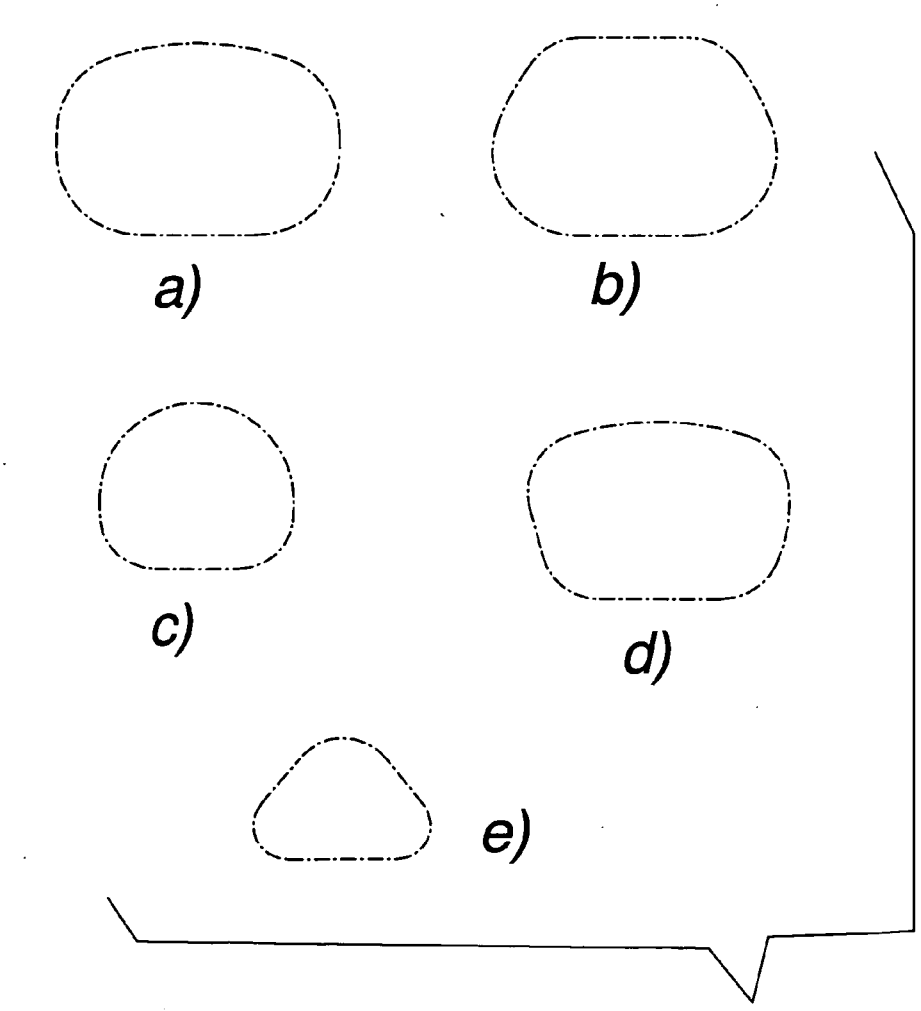

Fig.3

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EUROPEAN SEARCH REPORT

Application Number
EP 06 00 6339

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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TECHNICAL FIELDS SEARCHED (IPC)

B65B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	23 May 2006	Grentzius, W

CATEGORY OF CITED DOCUMENTS

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