



US 20170029150A1

(19) **United States**

(12) **Patent Application Publication**  
**Ehrmann et al.**

(10) **Pub. No.: US 2017/0029150 A1**

(43) **Pub. Date: Feb. 2, 2017**

(54) **THERMO-FORMING PACKAGING MACHINE**

*B65B 61/06* (2006.01)

*B65B 9/04* (2006.01)

(71) Applicant: **MULTIVAC Sepp Haggenmüller SE & Co. KG**, Wolfertschwenden (DE)

(52) **U.S. Cl.**  
CPC ..... *B65B 41/02* (2013.01); *B65B 9/04* (2013.01); *B65B 47/00* (2013.01); *B65B 61/06* (2013.01)

(72) Inventors: **Elmar Ehrmann**, Bad Gronenbach (DE); **Christian Lau**, Heimenkirch (DE)

(57) **ABSTRACT**

The invention relates to a thermo-forming packaging machine comprising a forming station, a loading station, a sealing station, a cutting station, and a film transport device with at least one clamp chain for transporting a lower film web in a direction of production. Unformed portions of the lower film web are movable in a horizontal film plane along the stations. A first chain guide device of an upper chain run of the clamp chain is provided in an upper chain guide plane in the region of the forming station, the sealing station, and the cutting station. A second chain guide device of the upper chain run of the clamp chain is provided in a lower chain guide plane in the region of the loading station. The lower chain guide plane is disposed lower than the upper chain guide plane.

(21) Appl. No.: **15/221,569**

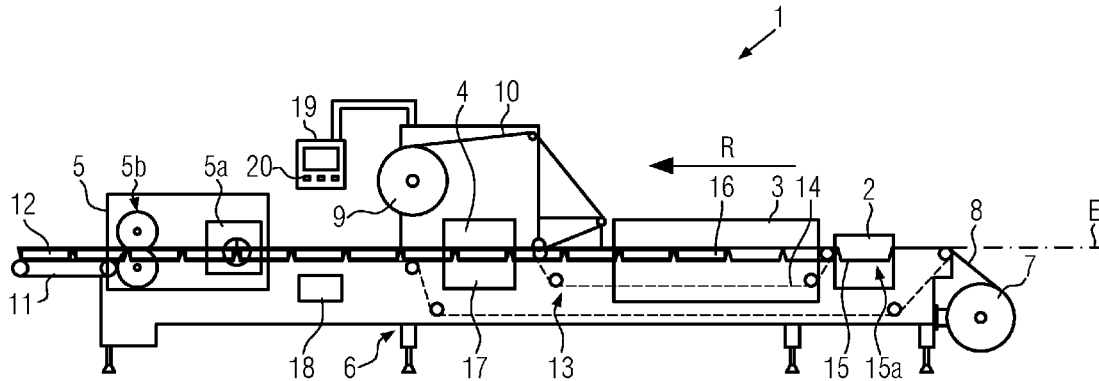
(22) Filed: **Jul. 27, 2016**

(30) **Foreign Application Priority Data**

Jul. 30, 2015 (EP) ..... 15179067.2

**Publication Classification**

(51) **Int. Cl.**  
*B65B 41/02* (2006.01)  
*B65B 47/00* (2006.01)



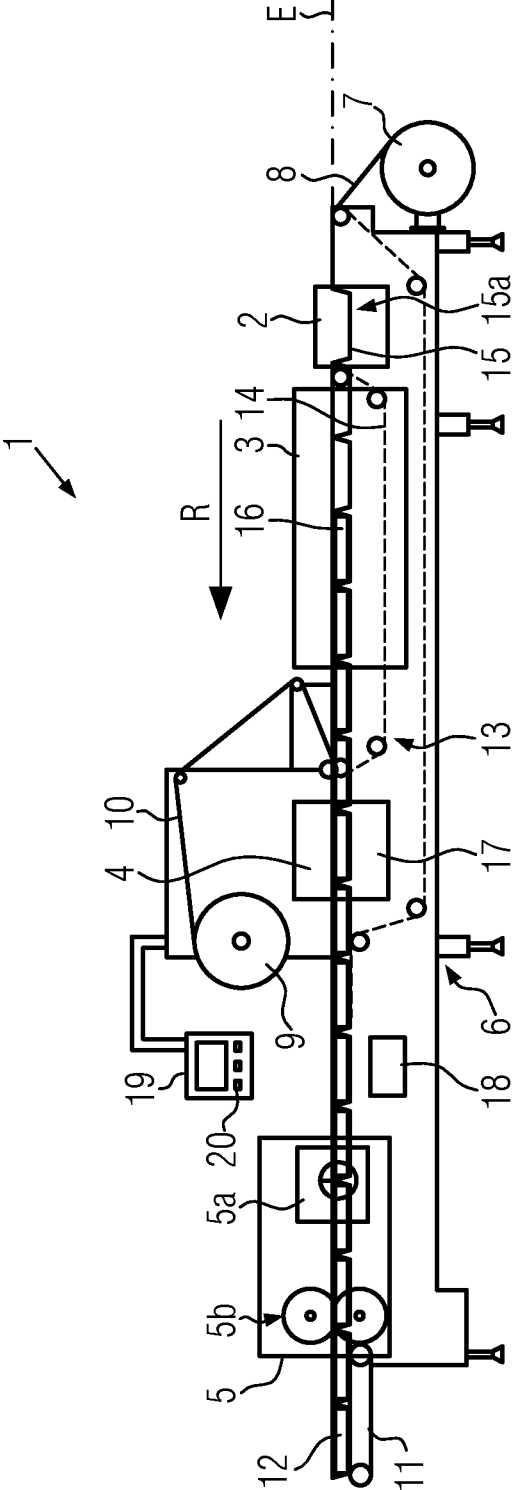


FIG. 1

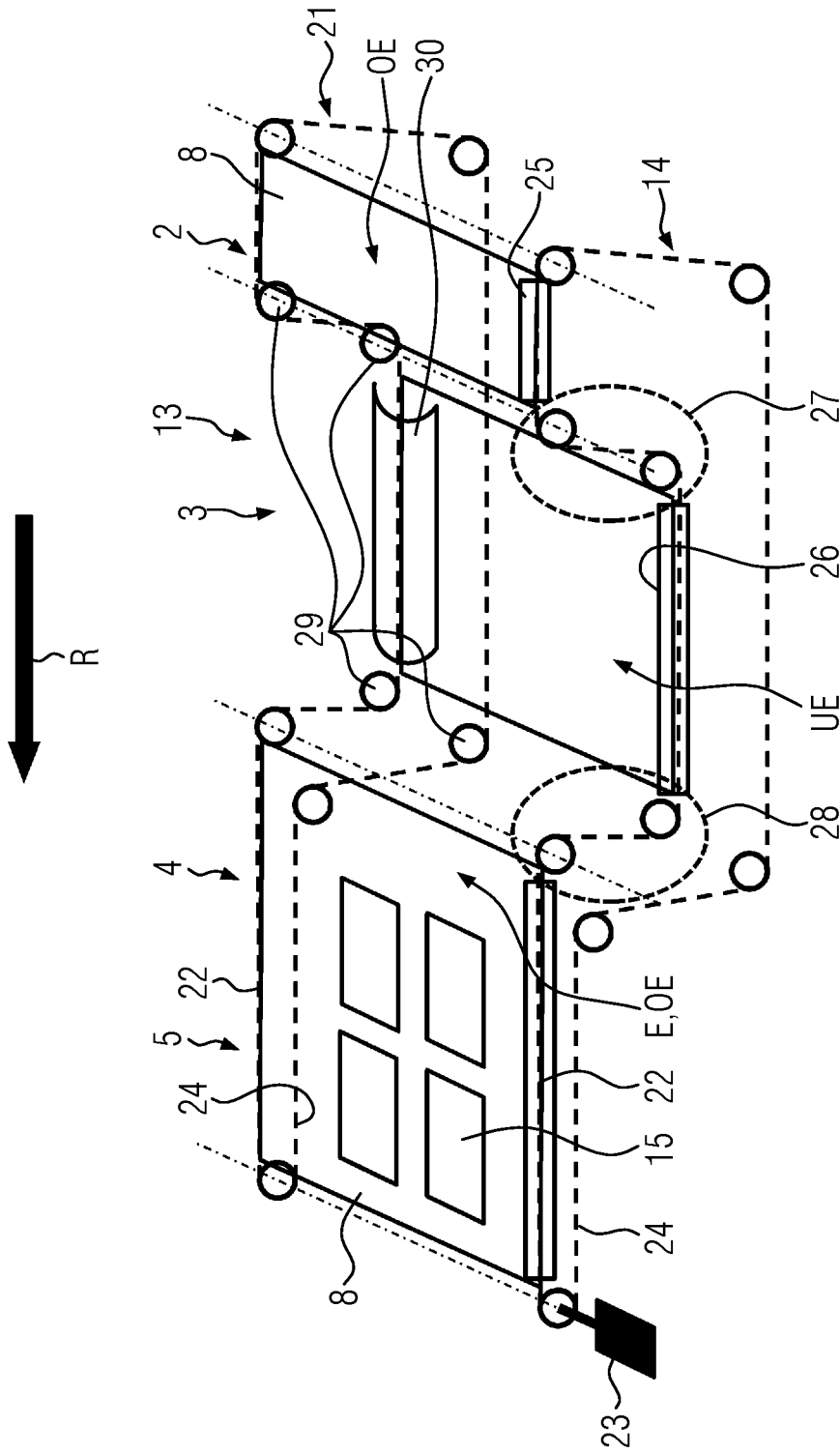


FIG. 2

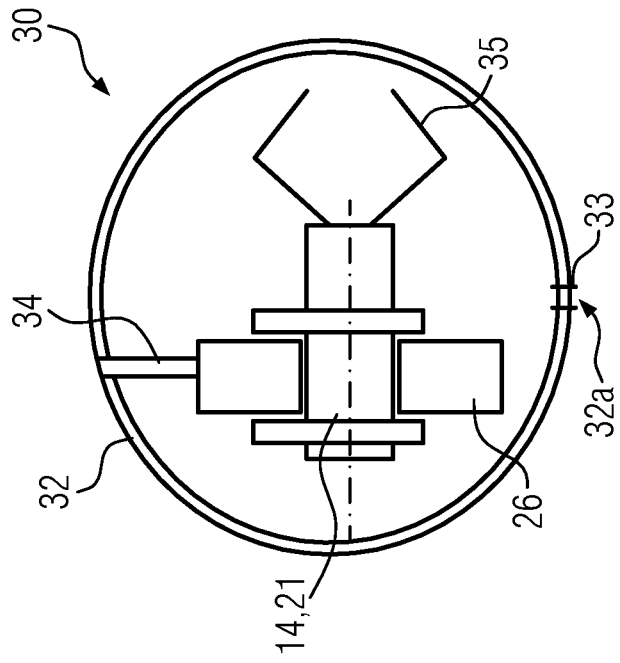


FIG. 4

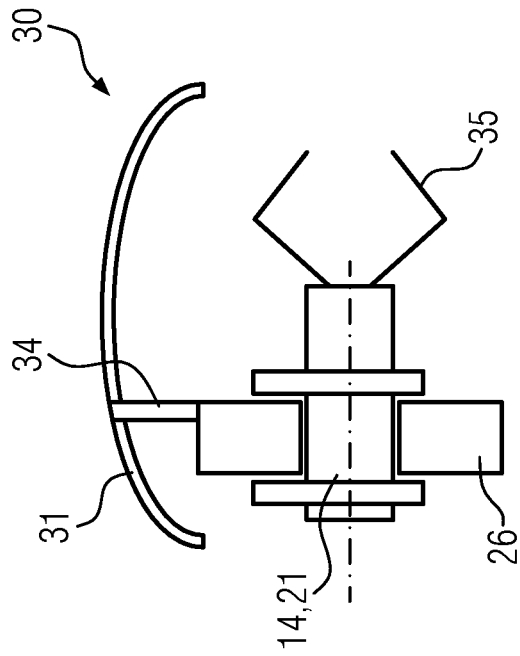


FIG. 3

## THERMO-FORMING PACKAGING MACHINE

### CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This Application claims priority to European Patent Application Number 15179067.2 filed Jul. 30, 2015, to Elmar Ehrmann and Christian Lau, currently pending, the entire disclosure of which is incorporated herein by reference.

### FIELD OF THE INVENTION

[0002] The invention relates to a thermo-forming packaging machine.

### BACKGROUND OF THE INVENTION

[0003] DE 10 2006 006 523 A1 discloses a thermo-forming packaging machine with several transport devices in the form of transport chains, also referred to as clamp chains. A lower film web is transported in a front portion by a first clamp chain up to a transfer region and there received by a second clamp chain and transported along a rear portion of the thermo-forming packaging machine up to a cutting station. The disadvantage of such a thermo-forming packaging machine is that the clamp chain in the loading region or in a loading station, respectively, can be fouled by products and expensive cleaning can possibly result.

### SUMMARY OF THE INVENTION

[0004] One object of the present invention is to provide an improved thermo-forming packaging machine which minimizes fouling of clamp chains or the contamination of products by dirty clamp chains.

[0005] The thermo-forming packaging machine according to one embodiment of the present invention comprises a forming station, a loading station, a sealing station, a cutting station and a film transport device with at least one clamp chain for transporting a lower film web in a direction of production. Unformed portions of the lower film web may be movable in a horizontal film plane along the stations. A first chain guide device of an upper chain run of the clamp chain can be provided in an upper chain guide plane in the region of the forming station, the sealing station and the cutting station. The thermo-forming packaging machine according to one embodiment of the present invention is characterized in that a second chain guide device of the upper chain run of the clamp chain may be provided in a lower chain guide plane in the region of the loading station. This allows for a loading area without a clamp chain at the edge of the lower film web so that fouling of the clamp chain does not occur when filling or loading, for example, liquid or pasty products or marinated pieces of meat. For medical products, the risk of contamination of the products by lubricants at the clamp chain is reduced because the clamp chain does not come in contact with the lower film web in the region of the product feed.

[0006] The lower chain guide plane can be lower than an underside of trays formed into the lower film web to produce the greatest possible distance between the lower film web and the clamp chain.

[0007] The lower chain guide plane may be parallel to the upper chain guide plane thereby enabling a simple configuration.

[0008] In one embodiment, a first chain deflection device is provided downstream of the forming station in order to deflect the upper chain run from the upper chain guide plane to the lower chain guide plane. This ensures that the lower film web is securely held in the region of the forming station.

[0009] A second chain deflection device can be provided upstream of the sealing station in order to deflect the upper chain run from the lower chain guide plane to the upper chain guide plane. This ensures that the lower film web and/or the upper film web are securely held in the region of the sealing station.

[0010] The upper chain run, which may be oriented parallel to the film transport plane within the loading station, may be protected by a cover from above or enclosed by a tunnel in order to prevent fouling of the upper chain run of the clamp chain in the region of the loading station by product residues falling or dripping down at the side of the lower film web.

[0011] The lower chain run, which may be oriented parallel to the film transport plane within the loading station, may be protected against fouling by a cover from above or enclosed by a tunnel.

[0012] The tunnel can be configured as being, for example, made of one part or several parts and can comprise cleaning openings on its underside.

[0013] Other and further objects of the invention, together with the features of novelty appurtenant thereto, will appear in the course of the following description.

### DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

[0014] In the following, embodiments of the invention are explained by the following figures, where:

[0015] FIG. 1 is a schematic side view of a thermo-forming packaging machine according to one embodiment of the present invention;

[0016] FIG. 2 is a schematic perspective view of a film transport device according to one embodiment of the present invention;

[0017] FIG. 3 is a schematic sectional view of a lower chain guide device with a cover according to one embodiment of the present invention; and

[0018] FIG. 4 is a schematic sectional view of a lower chain guide device with a cover according to a further embodiment of the present invention.

### DETAILED DESCRIPTION OF THE INVENTION

[0019] The invention will now be described with reference to the drawing figures, in which like reference numerals refer to like parts throughout. For purposes of clarity in illustrating the characteristics of the present invention, proportional relationships of the elements have not necessarily been maintained in the drawing figures.

[0020] The following detailed description of the invention references specific embodiments in which the invention can be practiced. The embodiments are intended to describe aspects of the invention in sufficient detail to enable those skilled in the art to practice the invention. Other embodiments can be utilized and changes can be made without departing from the scope of the present invention. The present invention is defined by the appended claims and the

description is, therefore, not to be taken in a limiting sense and shall not limit the scope of equivalents to which such claims are entitled.

[0021] FIG. 1 shows a schematic view of a thermo-forming packaging machine 1 according to one embodiment of the present invention. Thermo-forming packaging machine 1 can comprise a forming station 2, a loading station 3, a sealing station 4, a cutting station 5 with a transverse cutting device 5a and a longitudinal cutting device 5b, which are arranged in this sequence in a direction of production R on a machine frame 6. On the inlet side, a supply roll 7 may be disposed on machine frame 6 from which a lower film web 8 is drawn off. In the region of sealing station 3, a material storage 9 may be provided from which an upper film web 10 is drawn off. Thermo-forming packaging machine 1 on the outlet side may comprise a removal device 11 in the form of a transport belt with which the completed and separated packages 12 are removed. Furthermore, thermo-forming packaging machine 1 can comprise a film transport device 13 that grips lower film web 8 and cyclically transports it onward in a main processing cycle in a film plane E in the direction of production R. Film transport device 13 can be realized, for example, by one or more clamp chains 14 disposed laterally of lower film web 8.

[0022] In the embodiment illustrated, forming station 2 is configured as a thermoforming station in which trays 15 are formed into lower film web 8 by thermoforming. Forming station 2 can be designed such that several trays can be formed next to one another in the direction perpendicular to the direction of production R. Products 16 are in loading station 3 inserted into trays 15, or trays 15 are filled with product 16, respectively. Trays 15 comprise an underside 15a.

[0023] Sealing station 3 can comprise a sealable chamber 17 in which the atmosphere in trays 15 can prior to sealing be replaced, for example, by flushing with a gas using an exchange gas or an exchange gas mixture.

[0024] Transverse cutting device 5a may be designed as a punch that severs lower film web 8 and upper film web 10 between adjacent trays 15 in a direction transverse to the direction of production R. Transverse cutting device 5a can operate in such a manner that lower film web 8 is not separated across the entire width, but is, for example, not severed at least in one edge region. This allows for controlled farther transport through film transport device 13. Longitudinal cutting device 5b may be configured as a blade assembly with which lower film web 8 and upper film web 10 are severed between adjacent trays 15 and at the side edge of lower film web 8, so that separated packages 12 result downstream of longitudinal cutting device 5b.

[0025] Thermo-forming packaging machine 1 can further comprise a controller 18. Controller 18 may control and monitor the processes running in thermo-forming packaging machine 1. A display device 19 with controls elements 20 may be used for visualizing or influencing the processes occurring in thermo-forming packaging machine 1 to or by an operator, respectively.

[0026] FIG. 2 shows a schematic view of film transport device 13 with a first clamp chain 14 and a second clamp chain 21 disposed parallel thereto which are configured to hold lower film web 8 on both sides in the regions of forming station 2, sealing station 4 and cutting station 5 and transport it along the direction of production R. Horizontal film plane

E is defined by the non-formed regions, namely outside the trays 15, of lower film web 8. This film plane E is also given in the region of loading station 3, even if clamp chains 14, 21 in that region do not hold lower film web 8.

[0027] Clamp chains 14, 21 may each comprise an upper chain run 22 which can be moved in the direction of production R by way of a motorized drive 23 at the end of film transport device 13. In analogy, clamp chains 14, 21 comprise a lower chain run 24 which is moved against the direction of production R from the end back to the start.

[0028] A first chain guide device 25 can be provided in an upper chain guide plane OE in the regions of forming station 2, sealing station 4 and cutting station 5. A second chain guide device 26 can be provided in the region of loading station 3 in a lower chain guide plane UE that is disposed lower than the upper chain guide plane OE. A first chain deflection device 27 can be provided at the transition from first chain guide device 25 of forming station 2 to second chain guide device 26 of loading station 3, and a second chain deflection device 28 can be provided at the transition from second chain guide device 26 to first chain guide device 25. Upper chain run 14 can be deflected there by way of several deflection wheels 29 from a horizontal direction to, for example, a vertical direction and vice versa, so that the chain path that is schematically shown is feasible.

[0029] A cover 30 may be provided at second chain guide device 26 in lower chain guide plane UE to protect upper chain run 14 within loading station 3 against product residues coming from above.

[0030] FIG. 3, in a sectional view in the direction of production R of second chain guide device 26, shows a first variant of cover 30 in the form of a generally U-shaped cover hood 31, so that product residues and cleaning agents can easily drain off the side. Cover hood 31 can be mounted, by way of a support 34, to second chain guide device 26. Cover hood 31 can alternatively be attached to machine frame 6.

[0031] FIG. 4 shows a sectional view of a second variant of cover 30 in the form of a tubular tunnel 32. Tunnel 32 on its underside 32 may comprise several cleaning openings 33 through which cleaning liquid in the interior of tunnel 32 can drain away more easily. The connection between tunnel 32 and second chain guide device 26 may be realized by way of support 34. Here as well, tunnel 32 can alternatively be attached to machine frame 6.

[0032] When clamp chain 14, 21 at first chain deflection device 27 leaves upper chain guide plane OE, then lower film web 8, which had until then been held or clamped by it, may be released, for example, by opening clamps 35. When clamp chain 14, 21 at second chain deflection device 28 again reaches the upper chain guide plane OE, it may again grip lower film web 8, in particular by closing clamps 35.

[0033] From the foregoing, it will be seen that this invention is one well adapted to attain all the ends and objects hereinabove set forth together with other advantages which are obvious and which are inherent to the structure. It will be understood that certain features and sub combinations are of utility and may be employed without reference to other features and sub combinations. This is contemplated by and is within the scope of the claims. Since many possible embodiments of the invention may be made without departing from the scope thereof, it is also to be understood that all matters herein set forth or shown in the accompanying drawings are to be interpreted as illustrative and not limiting.

[0034] The constructions and methods described above and illustrated in the drawings are presented by way of example only and are not intended to limit the concepts and principles of the present invention. Thus, there has been shown and described several embodiments of a novel invention. As is evident from the foregoing description, certain aspects of the present invention are not limited by the particular details of the examples illustrated herein, and it is therefore contemplated that other modifications and applications, or equivalents thereof, will occur to those skilled in the art. The terms “having” and “including” and similar terms as used in the foregoing specification are used in the sense of “optional” or “may include” and not as “required”. Many changes, modifications, variations and other uses and applications of the present construction will, however, become apparent to those skilled in the art after considering the specification and the accompanying drawings. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention which is limited only by the claims which follow.

What is claimed is:

1. Thermo-forming packaging machine comprising:

a forming station;

a loading station;

a sealing station;

a cutting station;

a film transport device with at least one clamp chain for transporting a lower film web in a direction of production, wherein unformed portions of the lower film web are movable in a horizontal film plane along the forming station, the loading station, the sealing station, and the cutting station;

a first chain guide device of an upper chain run of the clamp chain, wherein the first chain guide device is provided in an upper chain guide plane in the region of the forming station, the sealing station, and the cutting station; and

a second chain guide device of the upper chain run of the clamp chain, wherein the second chain guide device is provided in a lower chain guide plane in the region of the loading station;

wherein the lower chain guide plane is disposed lower than the upper chain guide plane.

2. Thermo-forming packaging machine according to claim 1, wherein the lower chain guide plane is disposed lower than an underside of trays formed into the lower film web.

3. Thermo-forming packaging machine according to claim 1, wherein the lower chain guide plane is parallel to the upper chain guide plane.

4. Thermo-forming packaging machine according to claim 1 further comprising a first chain deflection device provided downstream of the forming station to deflect the upper chain run from the upper chain guide plane to the lower chain guide plane.

5. Thermo-forming packaging machine according to claim 4 further comprising a second chain deflection device provided upstream of the sealing station in order to deflect the upper chain run from the lower chain guide plane to the upper chain guide plane.

6. Thermo-forming packaging machine according to claim 1, wherein the upper chain run, which within the loading station is oriented parallel to the film transport plane, is protected by a cover provided above the upper chain run or a tunnel enclosing the upper chain run.

7. Thermo-forming packaging machine according to claim 6, wherein the tunnel is configured as being made in one part or several parts.

8. Thermo-forming packaging machine according to claim 6, wherein the tunnel comprises cleaning openings on its underside.

9. Thermo-forming packaging machine according to claim 1, wherein the lower chain run, which within the loading station is oriented parallel to the film transport plane, is protected by a cover provided above the lower chain run or a tunnel enclosing the lower chain run.

\* \* \* \* \*