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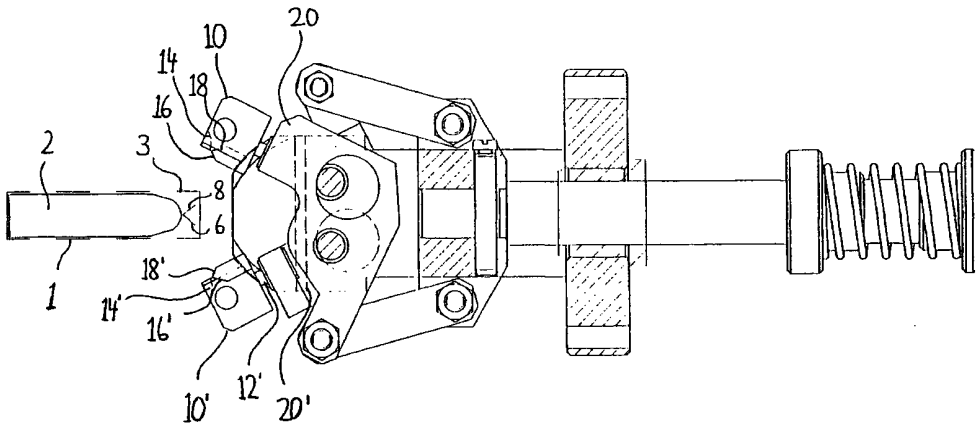
(54) Title: METHOD AND APPARATUS FOR CLOSING A PACKING TUBE



(57) Abstract: The present invention is directed to a method and an apparatus for closing a packing tube (1) around an essentially cylindrical packaged product (2), in particular a tampon for female hygiene, in which method the packing tube (2) which is made of a flexible packing film is arranged in tube shape around the packing product so that an open packing tube portion (3) is projecting beyond a free forward end of the packaged product. Then, a front portion of the packing film of the open forward projecting packing tube portion (3) is pressed together and joined by clamping jaws (10, 10') to form a first film sheet portion (6, 8), and the joined first film sheet portion (6, 8) is folded onto the packing tube (1) around the forward end of the packaged product and is joined therewith.

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Method and apparatus for closing a packing tube

The present invention relates to a method and an apparatus for closing a packing tube wrapped around an essentially cylindrical packaged product, in particular a tampon for feminine hygiene. Such packing tubes are made of a flexible, typically heat-sealable film which is first arranged in tube shape around the packaged product in a way such that a forward packing tube portion, still open, projects beyond the free forward end of the packaged product.

There are various products which have to be packed to preserve them before they are used for the intended purpose, in order to protect them against moisture or other harmful influences. Such products include for example tampons for feminine hygiene, which are packed individually in cylindrical packing tubes.

A method and an apparatus for producing such cylindrical packing tube are for example described in US Patent No. 4 583 964. In the described method the packing tube is made of a flexible, heat-sealable film which is wrapped around a winding spindle and heat-sealed to form a tube with an open end. Thus, at a first

stage the packing tube projects with an open forward end portion beyond the winding spindle. For closing this still open end of the packing tube, US patent No. 4 583 964 describes a gripping mechanism which clamps the forward end portion of the packing tube around a shaft introduced into the open forward end. The gripping mechanism has clamping jaws which are closed against the shaft with the projecting forward end of the packaging tube gripped inbetween. The gripped forward end portion of the packing tube is then rotated with respect to the winding spindle and the packing tube held thereon, in order to form a twist with a twist rosette and a twist neck. After the formation of the twist the clamping mechanism is opened and withdrawn, and a pressing head having a recess complementary to the forward end of the winding spindle is advanced against the twist and the winding spindle. The cylindrical outer edge of the twist rosette is thereby folded and finally pressed against the outer surface of the packing tube when the pressing head with its recess has completely received the forward end of the packing tube on the winding spindle. Then, the inner walls surrounding the recess of the pressing head are heated in order to melt the twist and to join the film material of the twist rosette with the film of the packing tube.

In other current methods, which are described in German Patent No. 1 995 600, a packaged product, for example the tampon, is already placed within the packing tube when the forwardly projecting, still open end of the packing tube has to be closed. Also in this method, a gripping mechanism is used to grip a forward end portion of the packing tube beyond the forward tip of the tampon. The gripping mechanism holding the forward end portion of the packing tube is then rotated with respect to the tampon and the packing tube surrounding it so that a twist is formed. In a similar way as described above, a pressing head is then used in order to fold the twist and the twist rosette onto the forward end portion of the packing tube around the tampon and to heat-seal the film material in order to form a dome-

shaped packing closure over the tampon tip.

While this was recognized advance in the art, there remain some disadvantageous. First, a complicated movement of the machine components is required in order to grip the forward end portion of the packing tube and to rotate it with respect to the rest of the packing tube. This combination of gripping and rotation movements requires rather complicated machine components in order to be carried out on an automatic apparatus suitable for mass-production. This makes the known apparatus rather complicated and costly with respect to manufacture, maintenance and operation.

Second, a rather long portion of the packing tube has to project beyond the forward end of the inserted tampon in order to allow that a front end of this projecting portion is gripped and that a twist is formed between the gripped portion and the tip of the tampon. Thus, a rather high amount of packing film in the open, forward projecting end portion is needed for the sole purpose of closing the packing tube, and thus the packing film consumption of the known method is rather high. Another disadvantage associated with this rather large amount of packing film projecting beyond the forward end of the tampon is that by melting and heat-sealing the twist and the twist rosette this rather high amount of film material is left on the dome-shaped tip portion of the packing tube which can create hard balls of plastic at the front portion of the packing which in turn can lead to deformation of the packaged product, in particular to deformation and damage of the tampon.

A typical packing film material used in the known methods is cellulose hydrate or regenerated cellulose (known under the trade mark CELLOPHAN). It would be desirable to use other film materials, as for example polypropylene. Unfortunately, most, if not all, forms of polypropylene film are not suitable to be closed by the above described twisting methods.

Accordingly, it is an object of the present invention to provide a method and an apparatus for closing an open forward end of a packing tube projecting beyond the packaged product which requires less complicated movements of the packing apparatus components. In particular, it is an object of the present invention to avoid a rotating movement between packing tube and gripping mechanisms in order to form a twist.

It is a further object of the present invention to provide a method and an apparatus for closing the open end of a packing tube which requires a shorter projecting length of packing tube extending beyond the tip of the packaged product, and which therefore reduces the packing film consumption.

It is a further object of the present invention to provide a method and an apparatus for closing the open end of a packing tube which permit the use of a wider range of packaging films.

According to the present invention a front portion of the open, forward projecting packing tube portion is pressed together and joined by clamping jaws to form a film sheet. This joining or closing to a film sheet can be done by heat-sealing, if a heat-sealable film material is used, or by pressing, if the film material used has, at least in the area of the forward projecting end, a coating of a pressure sensitive adhesive. The film sheet is then folded over and laid onto the outer surface of the packing tube around the free forward end of the packaged product. This folded film sheet is then joined with the packing tube film, either by heat-sealing, or by pressing it onto the packing tube film, wherein in the latter case the film has to be coated with pressure sensitive adhesive.

With the method of the present invention the required movements of the tools for closing the forward end of the packing tube are considerably simplified since no twist needs to be formed and therefore no rotation between a gripping mechanism and the

remaining packing tube is needed. Instead a simple clamping operation and joining, either by heat-sealing or pressing in case of using an adhesive coated film, is performed in order to form a closed film sheet at the forward end of the packing tube. Subsequently, this film sheet is folded over and laid onto the outer surface of the packing tube surrounding the tip portion of the packaged product and joined therewith (again by heat-sealing or pressing).

Furthermore, the method and apparatus of the present invention need less packing tube length extending beyond the tip of the packaged product since no twist needs to be formed. Therefore, less packing film is needed in order to form the packaged product. It was found that with the present invention the overall amount of packing film needed to form the package can be reduced by about 10%.

It is a further advantage of the present invention that due to the reduced amount of packing film needed to form the closed package tip there is less danger that packing material accumulations are formed after closing, e.g. by heat-sealing, at the tip of the package, and therefore there is less danger that the packaged product, for example the tampon, is deformed or damaged by such material accumulations at the tip portion.

Another advantage of the present invention is that with the method and apparatus of the present invention also packing film materials such as polypropylene which could not be employed with the known twisting methods, can be used as packing film materials.

In a preferred embodiment the film sheet formed in a front portion of the forward projecting end of the packing tube is formed such that at least one essentially planar first sheet portion is created which is inclined against the longitudinal axis of the package tube. Due to this inclination the pressing

head, when advancing over the forward end of the packaged product, can easily fold the film sheet onto the packing tube around the forward end of the packaged product. It is particularly preferred to form two first film sheet portions which are symmetrical with respect to a plane including the longitudinal axis of the package tube and which are inclined in opposite directions against the longitudinal axis of the package tube. By this arrangement the pressing head when advancing over the free forward end of the packaged products folds the two first film sheet portions onto opposite hemispheres of the package tube. For example, if one first film sheet portion is inclined upwardly and the other downwardly, one film sheet portion will be folded onto the upper half and the other onto the lower half of the packing tube around the forward end of the packaged product. By this means a more uniform distribution of the film material folded and heat-sealed on the dome-shaped forward tip of the package is achieved.

In a preferred embodiment not only a front portion of the packing film is pressed together but also the packing film around a forward end portion of the packaged product. This can be achieved by adapting the clamping jaws to form, when closed, a recess of complementary shape to the forward end portion of the packaged product. Thus, the clamping jaws can be adapted to receive the forward end portion of the packaged product within the recess and to press portions of the packing film surrounding the forward end portion of the packaged product together. The film sheet surrounding the forward end portion of the packaged product can be in the form of a second essentially planar sheet portion.

In a preferred embodiment the clamping jaws are pivotally mounted and arranged to be longitudinally movable, against a biasing force, in the direction towards the axis of the pivotal movement. By this arrangement the clamping jaws, when closing around the forward end portion of the packaged product, can

adapt to the actual position of the forward end of the packaged product by moving backwardly against the biasing force if necessary, to thereby accommodate length variations of the packaged products. Each clamping jaw can for example be attached to a rod which in turn is slidably received in a guiding cylinder of a pivot member. A spring force is acting on the rod to bias it into its extended position. This ability of the clamping jaw to move in a direction perpendicular to the pivot axis, i.e. in the longitudinal direction of the packaged product when the clamping jaws are closed, allows on the one hand that the clamping jaws can adapt to the position of the forward end of the packaged product, when the clamping jaws with their recess close around the forward end and are pressed to move slightly backward if the position of the forward end of the packaged product requires that. On the other hand this arrangement of the clamping jaws to be movable in the direction towards the pivot axis has the further advantage that the clamping jaws, when closing with their recess around the forward end of the packaged product, in most cases (i.e. whenever the forward end of the packaged product extends beyond a predetermined position) perform a slight backward movement, thereby tightening the packing film around the packaged product and thus improving the quality of the package.

In a preferred embodiment, which performs heat-sealing, the clamping surfaces of the clamping jaws are pre-heated already before they reach the closed position to thereby shorten the time needed for heat-sealing the pressed film sheets, in order to allow to increase the speed or processing rate of the packaged products. The pre-heating of the clamping surfaces is particularly advantageous if polypropylene is used as packing film because this material has a rather small temperature tolerance which means that it must not be overheated over the temperature needed for heat-sealing, or may be overheated only by a small fraction of about 10 % of the temperature needed for heat-sealing. For this reason the heat-sealing step cannot be

accelerated by increasing the heating power of the closed clamping jaws. Therefore, in principle a longer time would be needed for heat-sealing the polypropylene film by moderately heating it up to the heat-sealing temperature; this heat-sealing time can advantageously be shortened in accordance with the present invention if the clamping surfaces of the clamping jaws are already pre-heated before they press the packing film together.

The present invention can be used with all film materials useful in the field of packing technology. Among them are the already mentioned films of cellulose hydrate which can be non-coated or coated with lacquer. Furthermore, polymer coated cellulose hydrate films can be used, for example films with a coating of polyvinyl dichloride. However, also non-cellulose films of all kinds are suitable, for example polypropylene films. Generally, also composite films of all kinds can be used, for example combinations of cellulose hydrate films with co-extruded polypropylene (PPOS), with oriented polypropylene (PPO) or unoriented polypropylene (PPN). Furthermore, composite films of cellulose hydrate films and polyethylene films can be use, or any combinations of cellulose hydrate films with polyamide, polyester, polyethylene and/or polypropylene layers. In addition also plastic films with a metal coating, for example with a aluminum layer can be used. Furthermore, dry coated films and shrinking films can be used in connection with the invention. The packing films to be utilized in connection with the present invention should have a thickness in the range of 20 to 120 µm. In principle all films can be processed which can be sealed either by heat-sealing or which have a pressure sensitive coating in the area to be closed.

The invention will be described in the following in connection with an embodiment shown in the attached drawings, in which:

Figure 1 shows a schematical side view, partly in cross-section,

of the clamping jaws and their operating mechanism;

Figure 2 shows a front view of the clamping jaws in the closed position of Figure 1;

Figure 3 shows a side view of the clamping jaws and their operating mechanism as in Figure 1, but with the clamping jaws in the open position;

Figure 4 shows a front view of the clamping jaws in the open position of Figure 3;

Figure 5 shows a schematical front view of the packaged product with two inclined film sheet portions formed at the forward end.

In the following detailed description only the design and operation of the clamping jaws will be further described, whereas the design and operation of the pressing head, which is conventional, will not be further described. For joining the films, in the following embodiment reference is made to heat-sealing, in principle, however, also films can be used which are, at least in the areas to be joined, coated with pressure sensitive adhesive so that no heat-sealing step is needed.

Figure 1 shows the front part of the mounting and operating mechanism for the clamping jaws 10, 10' which are in their closed position. The clamping jaws 10, 10' are mounted on pivot member 20, 20', respectively, which are pivotally mounted and which are operated by a rod mechanism for periodically opening and closing them. The clamping jaws 10, 10' are shown in Figure 3 in their opened position.

Clamping jaw 10 (10') is mounted via a rod 12 (12') on a pivot member 20 (20') in which the rod 12 (12') is slidably received. A spring force is acting on the rod 12 (12') to bias it to its forward, extended position as shown in Figure 1. During the

movement of the clamping jaws from their open position shown in Figure 3 to the closed position shown in Figure 1 the clamping jaw 10 (10') is, at the first part of the movement, guided on a guiding surface 22 (22'). In the second part of the closing movement the clamping jaw 10 (10') comes free of the guiding surface 22 (22') so that the clamping jaw 10 (10'), when approaching the closed position, is free to move backwardly, with the rod 12 (12') moving further into the pivot member 20 (20') against a biasing force. By this resilient mounting of the clamping jaws 10, 10', they are movable towards their respective pivot axes, i.e. to the right hand side in the representation of Figure 1, in order to be able to adapt to the actual position of the forward end of the packaged product which is received in a recess 14 of the clamping jaws 10, 10'.

The further linkage and rod mechanism shown in Figures 1 and 3 which is utilized to periodically open and close the pivot members 20, 20', when a new packaged product is moved into position, is not part of the present invention and will not be described in more detail here.

The design and operation of the clamping jaws 10, 10' can best be described in connection with Figures 3 and 4. The clamping jaws are formed with a recess 14 being located in the center of the clamping jaws (see Figure 4) and are therefore shown in dashed or phantom lines in Figure 3. The recess 14 is, when the clamping jaws 10, 10' are closed, of complementary shape to the dome-shaped forward end of the packaged product 2 so that the clamping jaws can be closed around a forward end portion of the packaged product 2.

Surrounding the recess 14 are second clamping surfaces 11, 11' which serve to press the packing film around a forward end portion of the packaged product received in the recess 14 in order to form an essentially planar second film sheet.

In the region of the clamping jaws 10, 10' which press the open, forward projecting tube portion 3 several clamping surfaces are provided in the clamping jaws in order to form first sheet portions in the portion 3 of teh packing tube projecting beyond the forward end of the packaged product. These first clamping surfaces include opposite clamping surfaces 16, 16' and 18, 18' which are symmetrically located with respect to a plane perpendicular to the second clamping surfaces 11, 11', wherein opposite clamping surface 16, 16' and 18, 18' each form an essentially planar film sheet portion 6 and 8 (see Figure 3 and 5) which are inclined in opposite direction with respect to the longitudinal axis of the packaged product. Thus, the open forward projecting end 3 of the package tube is formed by these first clamping surfaces 16, 16', 18, 18' into two essentially planar first film sheet portions 6, 8, being inclined in opposite directions with respect to the longitudinal axis of the packaged product, as schematically shown in the front view of Figure 5. These two oppositely inclined film sheets or "flaps" 6, 8 are connected by an inclined intermediate film portion. This inclined intermediate film portion is formed by the intermediate clamping surfaces which connect the first clamping surfaces 16 and 18, or 16' and 18', respectively.

In this preferred embodiment two first film sheet portions 6, 8 are formed in the region projecting beyond the forward tip of the packaged product. However, in principle a single essentially planar first film sheet can be formed which is preferably inclined against the longitudinal axis of the packaged product. However, it is preferred to form at least two first film sheet portions 6, 8 which allows to achive a more uniform distribution of the film material when the first film sheet portions 6, 8 are folded onto the packing film 1 around the packaged product 2. In principle, also more than two first film sheet portions could be formed.

In an alternative embodiment also shorter forms of clamping jaws

10, 10' which do not include a recess 14 could be used. In this case the clamping jaws would only press a front portion of the forwardly projecting packing tube portion 3 to form a pressed film sheet in front of the forward end of the packaged product, without enclosing the forward end of the packaged product and without pressing the packing film surrounding the forward end of the packaged product.

When carrying out a method of the present invention the packing tube 1 around the packaged product 2 has, in the initial phase as shown in Figure 3 by dashed lines of the packing film 1, an open forward end portion 3 which projects beyond the forward end of the packaged product 2. The packaged product 2 with the surrounding open packing tube 1 is held in the position shown in Figure 3 by a mechanism which is not shown. Starting at this position the operating mechanism of the clamping jaws 10, 10' moves the clamping jaws to a closed position as shown in Figure 1, whereby the forward end portion of the packaged product 2 is received in the recess 14 and the forward projecting open packing tube portion 3 is pressed together to form two inclined first film sheet portions 6, 8 in front of the packaged product 2, and a second film sheet portion around the dome-shaped forward end of the packaged product.

In a preferred embodiment the clamping surfaces 16, 16', 18, 18', 11, 11' are already pre-heated before the clamping jaws reach the closed position in order to introduce as much heat as possible in a short time period in order to achieve sealing of the first and second film sheet portions in the shortest possible time period without overheating the film material.

In a next station of the apparatus which is not shown in the Figures, the packaged product 2 with its closed film sheet end portions 6, 8 is moved in front of a pressing head which has a recess of complementary shape to the front end portion of the packaged product 2. This recess is moved over the front end

portion of the packaged product 2 to thereby fold the first film sheet portions 6, 8 onto the packing tube 1 around the forward end of the packaged product, wherein the film sheet portion 6 will be folded onto the lower half and the film sheet portion 8 will be folded onto the upper half of the packaged product 2. When the front portion of the packaged product is fully received within the recess, also the second film film sheet portions are pressed against the packing tube. The walls surrounding the recess of the pressing head are pre-heated in order to melt the packing film material to join the film sheet portions with the packing film around the packaged product by heat-sealing.

As shown in Figure 3 the clamping jaws 10, 10' abut against guiding surfaces 22, 22' which guide the clamping jaws 10, 10' during a first part of their closing movement. The guiding surfaces 22, 22' are shaped such that at a certain point of the closing movement the clamping jaws 10, 10' get free of the guiding surfaces when closing further and are held by the biasing force against their rods 12, 12' in their extended position. When reaching the final stage of closing movement the clamping jaws 10, 10' are thus free to move into the direction of their pivotal axes (i.e. to the right side in Figure 1) against the biasing force. This elastically resilient mounting of the clamping jaws 10, 10' permits that, when their recess 14 closes around the dome-shaped forward end of the packaged product 2, they adapt to the actual position of the forward end of the packaged product and thus adapt to length variations of the packaged product. Furthermore, this elastically resilient mounting scheme of the clamping jaws 10, 10' has the effect that, since the clamping jaws will be arranged to slightly move backwards in case of the average product size, in most cases the clamping jaws when closing around the packaged product move slightly backwards thereby tightening the packing film around the packaged product and thus improving the quality of the packing.

Claims

1. A method for closing a packing tube (1) around an essentially cylindrical packaged product (2), in particular a tampon for female hygiene, in which method the packing tube (2) which is made of a flexible packing film is arranged in tube shape around the packing product so that an open packing tube portion (3) is projecting beyond a free forward end of the packaged product, wherein

   a front portion of the packing film of the open forward projecting packing tube portion (3) is pressed together and joined by clamping jaws (10, 10') to form a first film sheet portion (6, 8), and

   the joined first film sheet portion (6, 8) is folded onto the packing tube (1) around the forward end of the packaged product and is joined therewith.

2. A method according to claim 1, in which the first film sheet portion is joined by heat-sealing.

3. A method according to claim 1, in which a packing film is used which, at least in the first film sheet portion is coated with a pressure sensitive adhesive, and which is joined thereby when pressed together.

4. A method according to claim 1 or 2, in which the folded first film sheet portion is joined with the packing tube by heat-sealing.

5. A method according to any preceding claim, in which method the first film sheet portion (6, 8) is pressed together in the portion (3) projecting beyond the forward end of the packaged product (2) to form at least one essentially planar first sheet portion (6, 8), said at least one planar first

film sheet portion (6, 8) being disposed at an angle with respect to the longitudinal axis of the package tube (1).

6. A method according to claim 5, in which method two first film sheet portions (6, 8) are formed in the portion (3) projecting beyond the forward end of the packaged product (2), said two first film sheet portions (6, 8) being disposed symmetrical with respect to a plane (A) including the longitudinal axis of the package tube (1) and being inclined in opposite directions with respect to the longitudinal axis of the packing tube (1).

7. A method according to any preceding claim, wherein in the pressing step also the packing film around a forward end portion of the packaged product is pressed together by said clamping jaws (10, 10'), said clamping jaws, when closed, forming a recess (14) of complementary shape to the forward end portion of the packing product for receiving the forward end portion of the packaged product therein and for pressing portions of the packing film surrounding the forward end portion of the packaged product together.

8. A method according to claim 7, in which method the film sheet portion surrounding the forward end portion of the packaged product is pressed in such a way as to form a second essentially planar film sheet portion in the region around the packaged product.

9. A method according to claim 8, in which method the pressing and closing of the packing film is performed by two clamping jaws (10, 10') having at their ends essentially planar second clamping surfaces (11, 11') surrounding the recess (14) for receiving the forward end of the packaged product and being, in the closed state, parallel to the longitudinal axis of the packing tube to form the second essentially planar film sheet portion, and first clamping surfaces (16,

16', 18, 18') being disposed at an angle with respect to the second clamping surfaces (11, 11') to form said at least one first film sheet portion (6, 8).

10. A method according to any of the claims 7 to 9, in which method the clamping jaws (10, 10') are pivotally mounted and arranged to be longitudinally movable against a biasing force in the direction towards the axis of the pivotal movement so that the clamping jaws (10, 10'), when closing around the forward end portion of the packaged product, can adjust to the position of the forward end of the packaged product (2) to thereby accommodate length variations of the packaged products.

11. A method according to claim 9 or 10, wherein the second and first clamping surfaces (11, 11', 16, 16', 18, 18') are pre-heated already before the clamping jaws are in the closed position to thereby shorten the time needed for heat-sealing the pressed film sheet portions.

12. A method according to claim 2 or any of the preceding of the claims 4 to 11, in which method the folding and heat-sealing of the pressed film sheet portions is achieved by means of a pressing head comprising a recess having a shape complementary to the free forward end portion of the packaged product, the recess being advanced to and over the forward end portion of the packaged product and the surrounding packing tube to thereby fold and press the film sheet portions onto the packing film surrounding the forward end of the packaged product, the pressing head further being heated so that its wall portions surrounding the recess melt and heat-seal the folded film sheet portions onto the packing tube.

13. An apparatus for carrying out a method according to any of the preceding claims, said apparatus comprising:

a clamping device having at least two clamping jaws (10, 10') for pressing an open, forward projecting portion (3) of a packing tube (1) together and for closing the compressed portion to form a film sheet portion (6, 8); and

a pressing head having a recess adapted to be advanced over a front tip portion of the packaged product and the surrounding packing tube to thereby fold the compressed film sheet portions over the packing tube surrounding the front tip portion of the product.

14. An apparatus according to claim 13, wherein the apparatus comprises:

a heating device for heating the clamping jaws in order to be able to close the pressed film sheet portion by heat-sealing,

a heating device for heating the pressing head, which is adapted to melt the folded film sheet portions in order to join them with the packing tube.

15. An apparatus according to claim 13 or 14, wherein said clamping jaws (10, 10') have indentations at their forward ends which, in the closed position of the clamping jaws, form a recess (14) of complementary shape to the forward end portion of the packing product, planar second clamping surfaces (11, 11') adjacent to the indentations in the forward end of the clamping jaws, and inclined first clamping surfaces (16, 16', 18, 18') located beyond the recess (14) for forming at least one essentially planar first film sheet portion (6, 8) beyond the forward end of the packaged product.

16. An apparatus according to claim 15, in which the clamping jaws (10, 10') are pivotally mounted for opening and closing, which mounting of the clamping jaws includes means for allowing movements of each clamping jaw in the direction towards its pivot axis, which means include a rod (12, 12') attached to the clamping jaw (10, 10') and being slidably received in a pivot member (20, 20'), wherein spring means are provided to bias the rod (12, 12') to an extended position at the pivot member, so that the attached clamping jaw (10, 10') is biased to an extended position.

17. An apparatus according to any of the claim 13 to 16, in which the opening and closing mechanism of the clamping jaws (10, 10') include guiding surfaces (22, 22') which guide each clamping jaw (10, 10') in a first part of its closing movement in its extended position and which are shaped in such a way that each clamping jaw, when approaching the closed position, is free to move in a direction towards the pivotal axis of the pivot member (20, 20') against a biasing force.

18. Apparatus according to any of the claims 13 to 17, including control means for controlling the heating device which is adapted to pre-heat the clamping surfaces of the clamping jaws (10, 10') already before the clamping jaws are closed around the packing tube.

19. Apparatus according to any of the claims 13 to 18, wherein the mechanism for opening and closing the clamping jaws (10, 10') is arranged such that the clamping jaws are moved to an open position if operation of the apparatus is stopped.

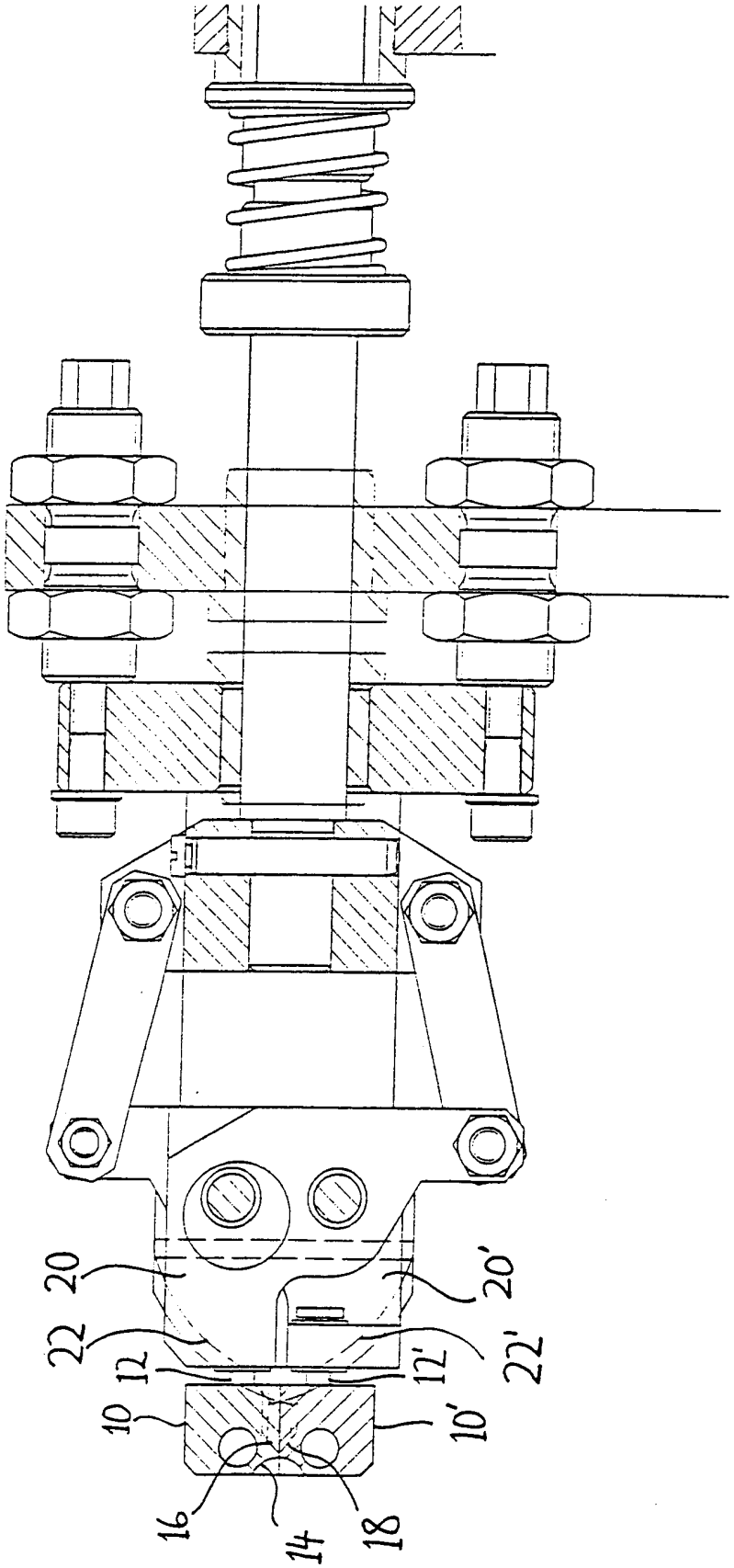


Fig. 1

Fig. 2

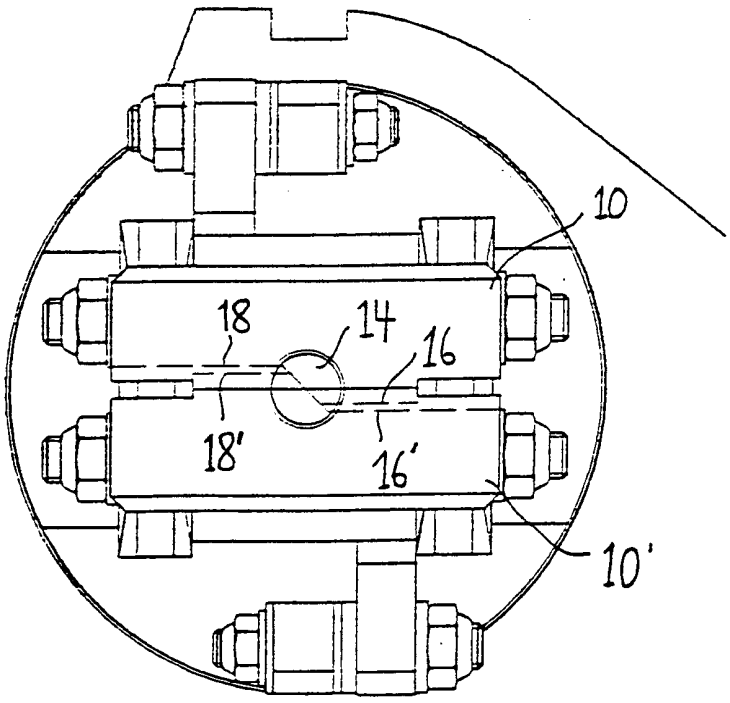
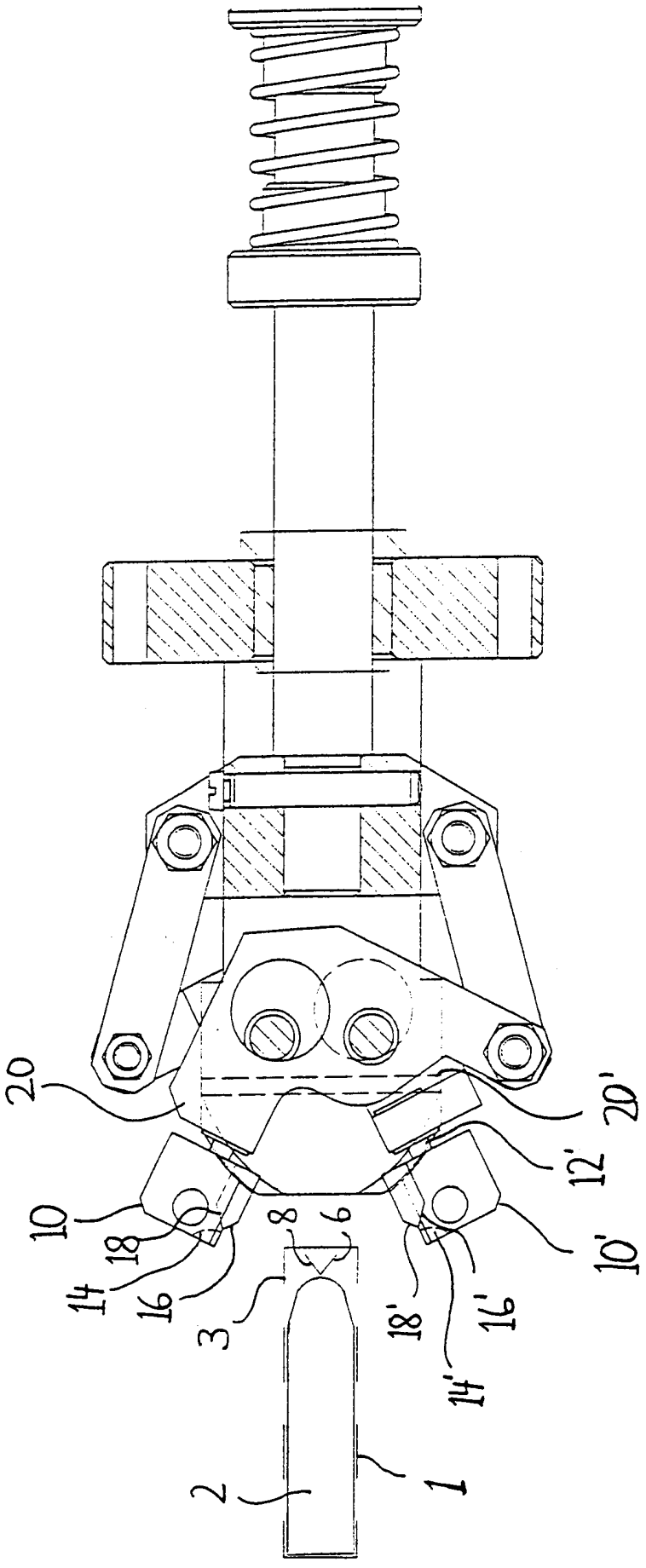


Fig. 3



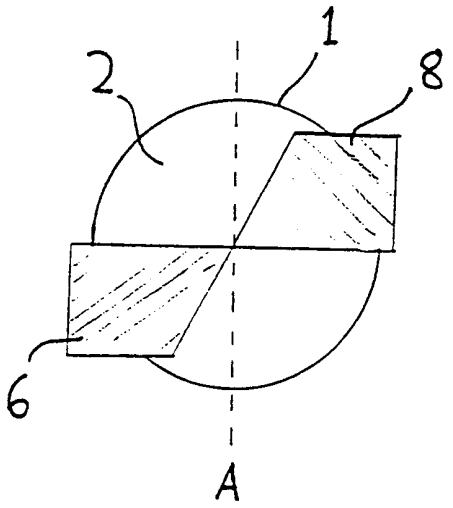
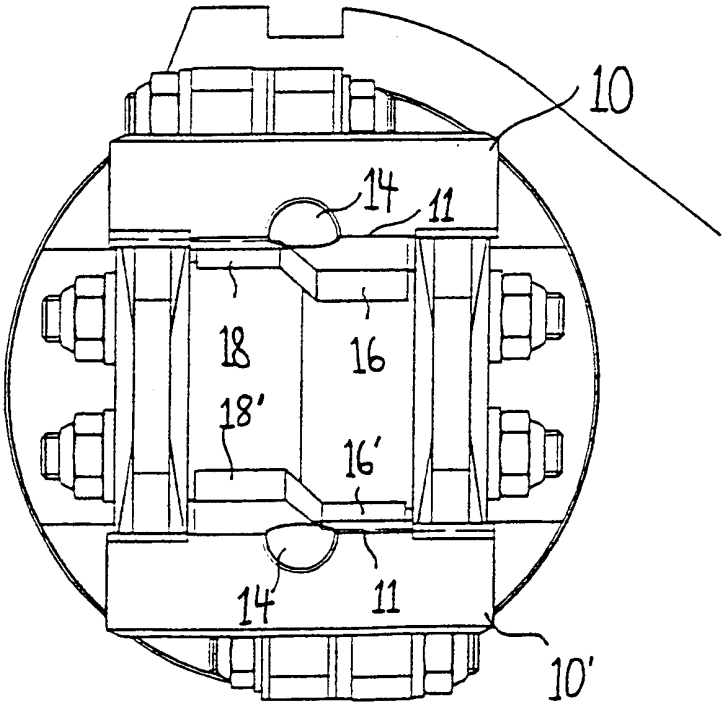


Fig. 5

Fig. 4



INTERNATIONAL SEARCH REPORT

Int ational Application No
PCT/EP 00/11163

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B65B51/00

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 7 B65B A61F

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)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 351 692 A (QUELETTE) 28 September 1982 (1982-09-28) abstract; figures 3,5,6	1,13
A	US 4 583 964 A (J & J) 22 April 1986 (1986-04-22) cited in the application abstract; figures 1-10	1,13

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
2 April 2001	09/04/2001

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Claeys, H

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INTERNATIONAL SEARCH REPORT

Information on patent family members

In. .ational Application No
PCT/EP 00/11163

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