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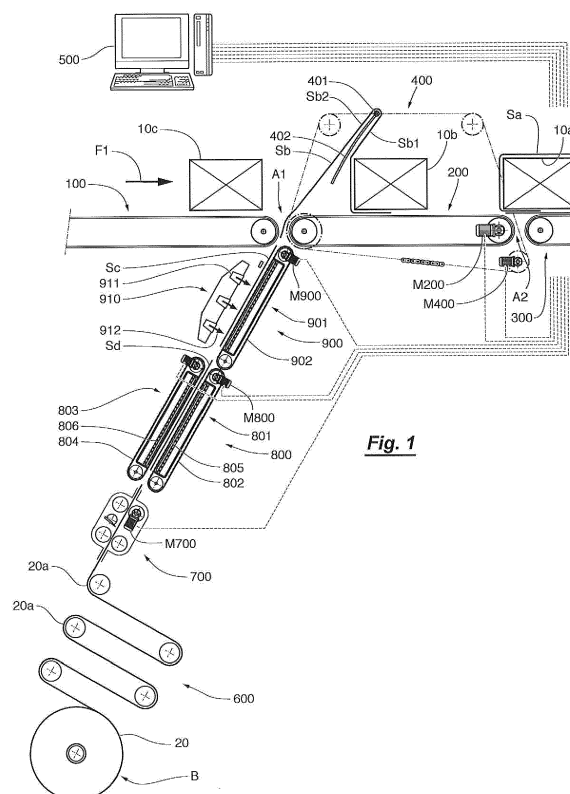
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(54) **WRAPPING MACHINE**

(57) _A system for a wrapping machine of the "sleeve" type to wrap hot sheets of packaging thermoshrink material around objects (**10a, 10b, 10c, etc.**) to be packaged, wherein said system comprises: >_first objects conveying means (100); >_second objects conveying means (200); >_third objects conveyor means

(300); >_sheets wrapping means (400); >_control means (500); >_tape heating_feeding means (600); >_cutting_feeding means (700); >_first sheets heating_feeding means (800); >_second sheets heating_feeding means (900).



Description

Field of Invention

[0001] _The present invention relates to a wrapping machine system for wrapping objects by means of hot sheets of heat-shrinkable material.

Background of the Invention

[0002] _At present time, see patent EP_1.013.551, systems for wrapping objects by sheets of heat shrinkable material are known wherein, summarily, by said systems, each individual object is wrapped one after the other by means of a respective sheet of heat-shrinkable material, wherein said sheet has been previously heated to a temperature higher than the softening temperature of the heat-shrinkable material.

[0003] _These methods have a number of drawbacks.

[0004] _A first drawback is due to the fact that they do not allow to operate at high operating speeds and, therefore, they do not allow to obtain a high wrapping productivity.

[0005] _A second drawback is due to the fact that said systems do not allow to get an uniform and/or rapid heating of the sheet.

[0006] _A third drawback is due to the fact that they do not allow to get a good synchronization between the various operations to be performed and a good execution of the same operations.

[0007] _A fourth drawback is due to the fact that such system do not allow to carry out a quick format change in relation to the size of the sheet of material and/or in relation to the size of the items to be packaged and/or in relation to the type of shrink material of which the sheet is composed.

[0008] _A fifth drawback is due to the fact that these system do not allow to get an easy execution of the cutting of the sheets.

[0009] _A sixth disadvantage is due to the fact that they do not allow to perform operations in relation to the temperature of the sheets during the winding phase.

Exposure of the Invention

[0010] _The purpose of the present invention is therefore to solve the aforementioned drawbacks.

[0011] _The invention, which is characterized by the claims, solves the problem of creating a system for a wrapping machine of the "sleeve" type to wrap hot sheets of packaging thermoshrinking material around objects to be packaged, wherein said system comprises: _first objects conveying means, wherein said first objects conveying means are able to move objects longitudinally in a spaced succession; _second objects conveying means, wherein said second objects conveyor means are positioned downstream and at a short longitudinal distance with respect to said first objects conveyor means

in order to form a first opening between said first and said second object conveyor means, wherein said second objects conveyor means are able to receive the objects arriving from said first objects conveyor means, and wherein said second objects conveyor means are able to move the same objects along a wrapping surface which has an inlet end and an outlet end; _third objects conveyor means, wherein said third objects conveyor means are arranged downstream and at a short longitudinal distance from the said second object conveyor means in order to form a second opening between said second and said third object conveyor means, wherein said third objects conveyor means are able to receive an unit comprising an object and a hot sheet arriving from said second objects conveyor means; _sheets wrapping means, wherein said sheet wrapping means are positioned in the vicinity of said second objects conveying means, wherein said sheet wrapping means comprise at least one suspended wrapping bar, wherein said suspended wrapping bar is oriented transversely with respect to the direction of advancement of the objects, in which said suspended wrapping bar is brought to move along an orbital path that passes through said first and said second opening, wherein said suspended wrapping bar transports the sheets of wrapping material; _control means, in which said control means are able to control, operate and synchronize the various operative means; in which said system is characterized by the fact that it comprises: _tape heating_feeding means; _cutting_feeding means; _first sheets heating_feeding means; _second sheets heating_feeding means; by the fact that said tape heating_feeding means are able to heat the downstream portion of a tape of heat-shrinkable material to a first temperature; by the fact that said tape heating_feeding means are able to feed said heated and hot downstream portion to the cutting_feeding means; by the fact that said cutting_feeding means are able to cut said heated and hot downstream portion in order to obtain a hot sheet; by the fact that said cutting_feeding means are able to feed said last hot sheet to the first sheet heating_feeding means; by the fact that said first heating_feeding means are able to heat said last hot sheet to a second temperature, in which said second temperature is greater than the first temperature, in order to obtain a hot sheet more heated; by the fact that said first sheet heating_feeding means are able to feed said last hot sheet to said second sheet heating_feeding means; by the fact that said second heating_feeding means are able to heat said last hot sheet to a third temperature, in which said third temperature is greater than the second temperature, in order to obtain a hot sheet more heated; characterized by the fact that said second sheet heating_feeding means are able to feed said last hot sheet to said sheets wrapping means, and characterized by the fact that the sheets wrapping means are able to wrap said last hot sheet around the object to be wrapped.

[0012] _The invention, which is characterized by the claims, solves the problem of creating a system for a

wrapping machine of the "sleeve" type to wrap hot sheets of packaging shrinking material around objects to be packaged, wherein said system comprises: **_first objects conveying means**, wherein said first objects conveying means are able to move objects longitudinally in a spaced succession; **_second objects conveying means**, wherein said second objects conveyor means are positioned downstream and at a short longitudinal distance with respect to said first objects conveyor means in order to form a first opening between said first and said second object conveyor means, wherein said second objects conveyor means are able to receive the objects arriving from said first objects conveyor means, and wherein said second objects conveyor means are able to move the same objects along a wrapping surface which has an inlet end and an outlet end; **_third objects conveyor means**, wherein said third objects conveyor means are arranged downstream and at a short longitudinal distance from the said second object conveyor means in order to form a second opening between said second and said third object conveyor means, wherein said third objects conveyor means are able to receive the unit comprising an object and a hot sheet arriving from said second objects conveyor means; **_sheets wrapping means**, wherein said sheet wrapping means are positioned in the vicinity of said second objects conveying means, wherein said sheet wrapping means comprise at least one suspended wrapping bar, wherein said suspended wrapping bar is oriented transversely with respect to the direction of advancement of the objects, in which said suspended wrapping bar is brought to move along an orbital path that passes through said first and said second opening, wherein said suspended wrapping bar transports the sheets of wrapping material; **_control means**, in which said control means are able to control, operate and synchronize the various operative means; in which said is characterized by the fact that it comprises: **_tape heating_feeding means**; **_cutting_feeding means**; **_sheets heating_feeding means**); characterized by the fact that said tape heating_feeding means are able to heat the downstream portion of the tape of heat-shrinkable material to a first temperature; characterized by the fact that said tape heating_feeding means are able to feed said heated and hot downstream portion to the cutting_feeding means; characterized by the fact that said cutting_feeding means are able to cut said heated and hot downstream portion to obtain a hot sheet; characterized by the fact that said cutting_feeding means are able to feed said last hot sheet to the first sheet heating_feeding means; characterized by the fact that said heating_feeding means are able to heat said last hot sheet to a second temperature, in which said second temperature is greater than the first temperature, in order to obtain a hot sheet more heated; characterized by the fact that said first sheet heating_feeding means are able to feed said last hot sheet to said sheets wrapping means; characterized by the fact that sheets wrapping means are able to wrap said last hot sheet around the object to

be wrapped.

Brief description of the Drawings

[0013] **_Further features and advantages of the present invention will be more evident from the following description of two preferred practical embodiments, provided here purely by way of example and without restrictive intent, made with reference to the accompanying drawings, in which:**

>_Figure 1 and 1A illustrate schematically a first embodiment of the system object of the present invention;

>_Figure 2 and 2A illustrate schematically a second embodiment of the system object of the present invention.

FIRST form of Embodiment

[0014] **_With reference to Figure 1, it illustrates a first embodiment of the system object of the present invention and, more particularly, a "sleeve" type packing machine system, wherein said system is designed to wrap hot sheets of shrinkable packaging material around objects **10a, 10b, 10c, etc.** to be packaged, wherein said objects **10a, 10b, 10c, etc.** move preferably with continuous motion from upstream to downstream as indicated by arrow **F1**, wherein said system substantially comprises: **>_first objects conveying means **100****; **>_second objects conveying means **200****; **>_third objects conveyor means **300****; **>_sheets wrapping means **400****; **>_control means **500****; **>_tape heating_feeding means **600****; **>_cutting_feeding means **700****; **>_first sheets heating_feeding means **800****; **>_second sheets heating_feeding means **900**.****

[0015] **_The first objects conveying means are able are able to move objects **10a, 10b, 10c, etc.** longitudinally in a spaced succession, from upstream to downstream, with respect to arrow **F1**.**

[0016] **_The second objects conveying means **200** are positioned downstream and at a short longitudinal distance with respect to said first objects conveyor means **100**, in order to form a first opening **A1** between said first **100** and said second **200** object conveyor means**

[0017] **_Said second objects conveyor means **200** are able to receive the objects **10a, 10b, 10c, etc.**, arriving from said first objects conveyor means **100**, as well as able to move the same objects **10a, 10b, 10c, etc.**, along a wrapping surface which has an inlet end and an outlet end.**

[0018] **_The third objects conveyor means **300** are positioned downstream and at a short longitudinal distance from said second object conveyor means **200**, in order to form a second opening **A2** between said second **200** and said third **300** object conveyor means.**

[0019] **_Said third objects conveyor means **300** are able to receive the units **10a_Sa** comprising an object **10a** and a hot sheet **Sa** arriving from said second objects**

conveyor means **200**.

[0020] _Sheets wrapping means **400** are positioned in the vicinity of said second objects conveying means **200**, and they comprise at least one suspended wrapping bar **401** oriented transversely with respect to the direction of advancement of the objects **10a, 10b, 10c, etc.**, in which said bar **401** is brought to move along an orbital path that passes through said first **A1** and said second **A2** opening, wherein said bar **401** transports the sheets **Sb** of wrapping material.

[0021] _The control means **500** are able to control, operate and synchronize the various operative means, **100, 200, 300, 400, 500, 600, 700, 800 e 900**, as better described hereinafter, and they may comprise a control unit programmable (CPU) or other similar devices, suitable for controlling and managing operating means, such as, for example, actuators, **M.200** (which preferably drives the means **100, 200** and **300** by mechanical connections), **M.400, M.900, M.800, M.700** able to operate individually and in an independent manner the above mentioned operating means **100, 200, 300, 400, 500, 600, 700, 800, 900**.

[0022] _The tape heating_feeding means **600** are positioned upstream with respect to the feeder cutting means **700**.

[0023] _Said tape heating_feeding means **600** are able to heat the front portion (downstream portion) **20a** of a tape **20** of heat-shrinkable material to a first temperature, as well as, able to feed said heated and hot downstream portion **20a** to the cutting_feeding means **700**, as for example hot rollers which heat up the belt **600** by contact. _The cutting_feeding means **700** are positioned upstream with respect to the first sheets heating_feeding means **800**.

[0024] _Said cutting_feeding means **700** are able to cut said heated and hot front portion (downstream portion) **20a** of heat-shrinkable material, in order to obtain a sheet **Sd** of heated and hot material, as well as able to feed said heated tape **20a** and/or said last heated and hot sheet **Sd** towards the first sheets heating_feeding means **800**.

[0025] _The first sheets heating_feeding means **800** are positioned upstream with respect to the second sheets heating_feeding means **900**.

[0026] _Said first heating_feeding means **800** are able to heat said last heated and hot sheet **Sd** to a second temperature which is greater than the first temperature, in order to obtain a sheet **Sc** more heated, and they are also able to feed said last sheet **Sc** to said second heating_feeding means.

[0027] _The second sheets heating_feeding means **900** are positioned upstream with respect to the sheets wrapping means **400**.

[0028] _Said second sheets heating_feeding means **900** are able to heat said last heated and hot sheet **Sc** to a third temperature which is greater than the second temperature, in order to obtain a more heated sheet **Sb**, and they are also able to feed said last sheet **Sb** to the

wrapping means **400**.

[0029] _Said wrapping means **400** are able to receive the hot sheet **Sb** fed by the second sheets heating_feeding means **900** and able to wrap said last heated and hot sheet **Sb** around the object **10b** to be wrapped.

[0030] _With reference to this system, preferably, in order to pack an object, a packaging method is performed in which said method comprises the following steps: **a)** heating a front portion (downstream portion) **20a** of the tape **20** of heatshrinking material by said tape heating_feeding means **600**; **b)** when said front portion (downstream portion) **20a** has reached a determined first temperature, transferring of said heated and hot downstream portion **20a** from said tape heating_feeding means **600** to said cutting_feeding means **700**; **c)** cutting by said cutting_feeding means **700** of a downstream portion of the heated and hot continuous tape **20a**, in order to obtain a heated and hot sheet **Sd** having a desired longitudinal length; **d)** transferring the hot sheet **Sd** obtained in this manner from said cutting_feeding means **700** to said first sheets heating_feeding means **800**; **e)** heating said hot sheet **Sd** by said first sheets heating_feeding means **800** to a second temperature in order to obtain a heated and hot sheet **Sc** having a second temperature, in which said second temperature is greater than the first temperature; **f)** when said heated and hot sheet **Sc** has reached said determined second temperature, transferring by said first sheets heating_feeding means **800** said last heated and hot sheet **Sc** to said second sheets heating_feeding means **900**; **g)** heating said last hot sheet **Sc** by said second sheets heating_feeding means **900** to a third temperature in order to obtain a heated and hot sheet **Sb** having a third temperature, in which said third temperature is greater than the second temperature; **h)** when said last heated and hot sheet **Sb** has reached said determined third temperature, transferring by said second sheets heating_feeding means **900** said last heated and hot sheet **Sb** to said sheets wrapping means **400**; **i)** rapping said last hot sheet **Sb** around the object **10b** to be wrapped by said sheets wrapping means **400**.

Second Temperature

[0031] _Preferably, the second temperature is lower or slightly lower than the softening and/or shrinking temperature of the heat-shrinkable material but, for some types of materials and/or with particular thicknesses and/or for other reasons, said second temperature may also be greater of the softening and/or shrinking temperature of the heat-shrinkable material.

Third temperature

[0032] _Preferably, the third temperature is equal to or greater than the softening and/or shrinking temperature, or, it may be even higher, such as for example equal to

or greater than the welding temperature of the heat-shrinkable material. **FIRST** sheets heating_feeding means **800**

[0033] _With reference to said first sheets heating_feeding means **800**, they preferably comprise a first conveyor **801** and a second conveyor **803**.

[0034] _The first conveyor **801** is positioned below and to the right with respect to Fig. 1, and it comprises a hot transport belt **802** which upperly configures a first operating branch, in which said operative branch is able to heat and to transport the front portion (downstream portion) of the tape or the sheets **Sd** of hot tape which are fed by the cutting feeding means **700**.

[0035] _The second conveyor **803** is positioned above and to the left with reference to FIG. 1 and it comprises a hot conveyor belt **804** which upperly configures a second operative branch, in which said second operative branch is able to heat and to transport the front portion (downstream portion) of the tape or the sheets **Sd** of hot tape which are fed by the cutting feeding means **700**.

[0036] _By this structuring, the downstream portion **20a** of the hot tape or the hot sheets **Sd** is positioned between said first and said second transport branch, wherein said two branches are mutually counterfeited and approached between them, in order to perform the heating and feeding (transport and pull) execution of the same hot tape **20a** and/or of the sheet **Sd** towards downstream.

[0037] _Preferably, the hot conveyor belts **802** and **804** are heated by a respective heated assembly **805** and **806** positioned within the respective conveyor **801** and **803**.

[0038] _Furthermore, always preferably, the two conveyors **801** and **803** can be moved, spaced_out/approached, from each other, in order to decrease or increase the space between the two operating branches, so as to be able to adjust the space in relation to the thickness of the sheet and/or to allow a machine stop and/or for other reasons.

SECOND sheets heating_feeding means 900.

[0039] _The second sheets heating_feeding means **900** comprise a third conveyor **901** having a heat transport belt **902**, wherein said third conveyor **901** configures a heating and transport operating branch for the hot sheet **Sc** of heatshrink material, as for example a conveyor similar to conveyors **801** and **803** previously cited.

[0040] _Again second sheets heating_feeding means **900** may also further comprise a heater **910**, wherein said heater **910** is spaced and counterfeited with respect to said heating and transport operating branch of said third conveyor **901**.

[0041] Said further heater **910** is designed to heat the sheet **Sc** when they are lying on the heating and conveying branch of said third conveyor **901**, for example and preferably by means of a device having nozzles **911** able to create hot air blows **912** against said operating branch

for heating and conveying of the third conveyor **901** in order, for example, to heat the sheet **Sc** and to press the same sheet **Sc** against the transport operating branch of the conveyor **901** improving the transport of the same sheet **Sc**.

[0042] _Said hot air puffs **912** are preferably operated in phase relation with respect to the operating phases relating to the packaging and, for example, can be operated only when the sheet **Sc** is already present above the operating branch of the conveyor **901**, and they may also be deactivated on command to better perform the operations of wrapping and of receiving of the sheet.

[0043] _Said further heater **910** may comprise any device designed to heat the sheet **Sc**, by conduction and/or convection and/or radiation, without departing from the inventive concepts protected by the present invention.

[0044] _In addition, said heater **910** can be moved, spaced_out/approached, in a distanced/approachable manner with respect to the heating and transport operating branch of the third conveyor **901**, in order to space_out/approach said heating device **910** with respect to the heating and conveying operating branch of the third conveyor **901**, in order to adjust the distance in relation to the size and/or type of the packaging material, or to spaced_out/approach said heating device **910** during the execution of the packaging operations, for example, to manage and optimize the execution of the picking operations and of the wrapping the sheet.

SECOND form of Embodiment - Figure 2

[0045] _With reference to Figure 2, it illustrates a second embodiment of a system to wrap objects, in which, in short, with respect to the first embodiment, this second embodiment does not comprises the use of the first sheets heating_feeding means **800**.

[0046] _More particularly this second embodiment, see fig. 2, comprises: _first objects conveying means **100.1**; _second objects conveying means **200.1**; _third objects conveyor means **300.1**; _sheets wrapping means **400.1**; _control means **500.1**; _tape heating_feeding means **600.1**; _cutting_feeding means **700.1**; _sheets heating_feeding means **900.1**.

[0047] _With reference to the first objects conveying means **100.1**, to the second objects conveying means **200.1**, to the third objects conveyor means **300.1**, to the sheets wrapping means **400.1** and to the control means **500.1**, to the tape heating_feeding means **600.1** and to the cutting_feeding means **700.1**, they are substantially the same with respect to previously described means having the same prefix as reference numbers and, therefore, it is not provided any detailed description recalling what has already been described above.

[0048] _Said tape heating_feeding means **600.1** are able to heat the front portion **20a.1** of the tape **20.1** of heat-shrinkable material to a first temperature, and they are also able to feed said heated and hot front portion **20a.1** to the cutting_feeding means **700.1**.

[0049] _The said cutting_feeding means **700.1** are able to cut said heated and hot front portion (downstream portion) **20a.1** in order to obtain a hot sheet **Sc.1**, and they are also able to feed the hot portion **20a.1** and said last heated and hot sheet **Sd.1** to sheets heating_feeding means **900.1**.

[0050] _Said heating_feeding means **900.1** are able to heat said last heated and hot sheet **Sc.1** to a second temperature which is greater than the first temperature, in order to obtain a hot sheet **Sb.1** more heated, and they are also able to feed said last hot sheet **Sb.1** to said sheets wrapping means **400.1**.

[0051] _The wrapping means **400.1** are able to wrap said last heated and hot sheet **Sb.1** around the object **10b.1** to be wrapped.

[0052] _With reference to this system, preferably, in order to wrap an object, a wrapping process is performed which comprises the following steps: **a)** _heating the front portion (downstream portion) **20a.1** of the tape **20.1** of heatshrinking material by said tape heating_feeding means **600.1**; **b)** _when said front portion (downstream portion) **20a.1** has reached a determined first temperature, transferring said heated and hot front portion (downstream portion) **20a.1** from said tape heating_feeding means **600.1** to said cutting_feeding means **700.1**; **c)** _cutting by said cutting_feeding means **700.1** a downstream portion of the heated and hot continuous tape **20a.1**, in order to obtain a heated and hot sheet **Sc.1** having a desired longitudinal length; **d)** _transferring the last hot sheet **Sc.1** obtained in this manner from said cutting_feeding means **700.1** to said sheets heating_feeding means **900.1**; **e)** _heating said hot sheet **Sc.1** by said sheets heating_feeding means **900.1** to a second temperature in order to obtain a heated and hot sheet **Sb.1** having a second temperature, in which said second temperature is greater than the first temperature; **f)** _when said last heated and hot sheet **Sb.1** has reached said determined second temperature, transferring by said sheets heating_feeding means **900.1** said hot last heated sheet **Sb.1** to said sheets wrapping means **400.1**; **g)** _wrapping said last hot sheet **Sb.1** around the object **10b.1** to be wrapped by said sheets wrapping means **400.1**.

[0053] _Preferably, the second temperature is equal to or greater than the softening and/or shrink temperature, or it may be even higher, such as for example equal to or greater than the welding temperature of the same material.

Sheets heating_feeding means 900.1.

[0054] _The heating means **900.1** comprise a conveyor **901.1** having a hot conveyor belt **902.1**, wherein said conveyor **901.1** forms a respective heating and transport operating branch for the sheet **Sc.1**, such as for example a conveyor similar to the conveyors **801**, **803** and **901** of the first embodiment.

[0055] _Said heating means **900.1** can also further

comprise a heater **910.1**, wherein said heater **910.1** is arranged spaced and counterfeited with respect to said heating and conveying operating branch of said conveyor **901.1**.

5 [0056] _Said additional heater **910.1** is designed to heat the sheets **Sc.1** when they are lying on the heating and transport operating branch of said third conveyor **901.1**, for example by means of a device having nozzles **911.1** able to create hot air blows **912.1** against said operating branch for heating and conveying of the conveyor **901.1** in order to, for example, heat and press the same sheet **Sc.1** against the transport operating branch of the conveyor **901.1** improving the transport of the same sheet **Sc.1**.

10 [0057] _Said hot air puffs **912.1** are preferably operated in phase relation with respect to the operating phases relating to the packaging and, for example, can be operated only when the sheet **Sc.1** is already present above the operating branch of the conveyor **901.1**, and they may be also deactivated on command to better perform the operations for wrapping or for receiving of the sheets.

15 [0058] _Said further heater **910.1** may comprise any device designed to heat the sheet **Sc.1**, by conduction and/or convection and/or radiation, without departing from the inventive concepts protected by the present invention.

20 [0059] _In addition, said heater **910.1** can be made movable, space_out/approach with respect to the heating and transport operating branch of the third conveyor **901.1**, in order to spaced_out/approach said heating device **910.1** with respect to the heating and conveying operating branch of the third conveyor **901.1**, in order to adjust the distance in relation to the size and/or type of the packaging material, or to space_out/approach said heating device **910.1** in phase relation with the packaging operating steps, such as for managing and optimizing the execution of the operations of wrapping of the sheet.

First Temperature

30 [0060] _With reference to the first and second embodiments, preferably, said first temperature is greater than the ambient temperature and, again preferably, lower or slightly lower than a temperature which would not allow to cut said tape **20/20.1**, as for example a temperature between a minimum of 60°C and a maximum of 110°C and, in any case, a first temperature that allows to easily cut the heated tape without complications.

35 [0061] _More in particular said first temperature will be selected in relation to the type of packaging material, in relation to the thickness of the same material, as well as in relation to the cutting means which will be used.

Heating_feeding means 600

40 [0062] _Still with reference to the first and second embodiments, preferably, the tape heating_feeding means **600/600.1** comprise a path for the tape having a snake

like shape.

Sheets wrapping means 400

[0063] _With reference to the first and second embodiments, preferably, the sheets wrapping means **400/400.1** comprise separating means **402/402.1**, in which said separating means **402/402.1** are able to preventing and/or limiting the contact between the front portion **Sb1/Sb1.1** and the rear portion **Sb2/Sb2.1** of the heated and hot sheet **Sb/Sb.1** during the steps of wrapping of the hot sheet **Sb/Sb.1** around the product **10b/10b.1**.

[0064] _Again preferably, said separator means **402/402.1** comprise a curtain-shaped element **402/402.1** associated with the wrapping bar **401/401.1** and, moreover, if necessary, said separator means **402/402.1** may be hot in order to heat the sheet **Sb2/Sb.1** during the transport and wrapping operations of the same sheet **Sb2/Sb2.1**.

Advantages

[0065] _With reference to the above description by the system object of the present invention, with respect to the known art, the following results are obtained.

[0066] _The tape cutting steps used to obtain the sheet are improved, as the cutting takes place with a tape having a temperature slightly lower than the softening and/or shrinking temperature, and therefore a temperature in which said tape is still rigid and it is not sticky/soggy.

[0067] _The heating process to obtain the hot sheet is improved, as said heating takes place by means of two or more distinct and separate steps of heating (as first step the downstream portion of the tape is heated and then the cutted hot sheet is heated the by one or more steps), allowing to modulate the heating by means of a plurality of separate individual heat steps until the desired temperature is reached.

[0068] _The heating times of the sheet are improved and reduced, as the sheet obtained after cutting is not at room temperature but at a higher temperature, preferably at a temperature slightly lower than the softening and/or shrinking temperature.

[0069] _The lengths of the path or of the paths for heating of the sheet are improved and reduced, as the sheet obtained after cutting is not at the room temperature but at a higher temperature.

[0070] _The wrapping steps are improved, as during said steps the sheet can be heated, for example in order to maintain and/or increase the temperature for the same sheet.

[0071] _The characteristics relating to the change of format in relation to the size of the sheet and/or in relation to the dimensions of the objects to be wrapped are improved, as it is possible to operate on a plurality of operating steps (and not on a single phase) in order to obtain the segment heated to the desired temperature.

[0072] _The characteristics relating to the change in setting in relation to the type and/or thickness of the wrapping film material are improved, as it is possible to operate on a plurality of operating steps (and not on a single operating phase) in order to obtain the sheet heated at the temperature desired.

[0073] _The wrapping operations are improved, as during said operations the operating means can be operated independently of each other, in order to optimize the wrapping operations.

[0074] _The wrapping operations are improved, as during said operations the sheet in course of wrapping can be heated, for example in order to maintain and/or increase the temperature for the same sheet.

[0075] _The characteristics relating to the size change in relation to the size of the sheet and/or in relation to the dimensions of the objects to be wrapped are improved, as it is possible to operate on a plurality of operating means in order to obtain the sheet heated to the desired temperature.

[0076] _The characteristics relating to the change in setting in relation to the type and/or thickness of the packaging film material are improved, as it is possible to operate on a plurality of operating means in order to obtain the sheet heated to the desired temperature.

Claims

1. System for a wrapping machine of the "sleeve" type to wrap hot sheets of packaging thermoshrinking material around objects (**10a, 10b, 10c, etc.**) to be packaged, wherein said system comprises: >_first objects conveying means (**100**), wherein said first objects conveying means (**100**) are able to move objects (**10a, 10b, 10c, etc.**) longitudinally in a spaced succession; >_second objects conveying means (**200**), wherein said second objects conveyor means (**200**) are positioned downstream and at a short longitudinal distance with respect to said first objects conveyor means (**100**) in order to form a first opening (**A1**) between said first (**100**) and said second (**200**) object conveyor means, wherein said second objects conveyor means (**200**) are able to receive the objects (**10a, 10b, 10c, etc.**) arriving from said first objects conveyor means (**100**), and wherein said second objects conveyor means (**200**) are able to move the same objects (**10a, 10b, 10c, etc.**) along a wrapping surface which has an inlet end and an outlet end; >_third objects conveyor means (**300**), wherein said third objects conveyor means (**300**) are arranged downstream and at a short longitudinal distance from the said second object conveyor means (**200**) in order to form a second opening (**A2**) between said second (**200**) and said third (**300**) object conveyor means, wherein said third objects conveyor means (**300**) are able to receive an unit comprising an object (**10a**) and a hot sheet (**Sa**) arriving from

said second objects conveyor means (200); >_sheets wrapping means (400), wherein said sheet wrapping means (500) are positioned in the vicinity of said second objects conveying means (200), wherein said sheet wrapping means (400) comprise at least one suspended wrapping bar (401), wherein said suspended wrapping bar (401) is oriented transversely with respect to the direction of advancement of the objects (10a, 10b, 10c, etc.), in which said suspended wrapping bar (401) is brought to move along an orbital path that passes through said first (A1) and said second (A2) opening, wherein said suspended wrapping bar (401) transports the sheets (Sa, Sb, Sc) of wrapping material; >_control means (500), in which said control means (500) are able to control, operate and synchronize the various operative means; **characterized by the fact that** it comprises: >_tape heating_feeding means (600); >_cutting_feeding means (700); >_first sheets heating_feeding means (800); >_second sheets heating_feeding means (900); **by the fact that** said tape heating_feeding means (600) are able to heat the downstream portion (20a) of a tape (20) of heat-shrinkable material to a first temperature; **by the fact that** said tape heating_feeding means (600) are able to feed said heated and hot downstream portion (20a) to the cutting_feeding means (700); **by the fact that** said cutting_feeding means (700) are able to cut said heated and hot downstream portion (20a) in order to obtain a hot sheet (Sd); **by the fact that** said cutting_feeding means (700) are able to feed said last hot sheet (Sd) to the first sheet heating_feeding means (800); **by the fact that** said first heating_feeding means (800) are able to heat said last hot sheet (Sd) to a second temperature, in which said second temperature is greater than the first temperature, in order to obtain a hot sheet (Sc) more heated; **by the fact that** said first sheet heating_feeding means (800) are able to feed said last hot sheet (Sc) to said second sheet heating_feeding means (900); **by the fact that** said second heating_feeding means (900) are able to heat said last hot sheet (Sc) to a third temperature, in which said third temperature is greater than the second temperature, in order to obtain a hot sheet (Sb) more heated; **characterized by the fact that** said second sheet heating_feeding means (900) are able to feed said last hot sheet (Sb) to said sheets wrapping means (400) and **characterized by the fact that** the sheets wrapping means (400) are able to wrap said last hot sheet (Sb) around the object (10b) to be wrapped.

2. System according to claim 1, **characterized by the fact that** it comprises the following steps: a)_heating a downstream portion (20a) of the tape (20) of heat-shrinking material by said tape heating_feeding means (600); b)_when said downstream portion

(20a) has reached a determined first temperature, transferring said heated and hot downstream portion (20a) from said tape heating_feeding means (600) to said cutting_feeding means (700); c)_cutting by said cutting_feeding means (700) a downstream portion of the heated and hot continuous tape (20a), in order to obtain a heated and hot sheet (Sd) having a desired longitudinal length; d)_transferring the hot sheet (Sd) obtained in this manner from said cutting_feeding means (700) to said first sheets heating_feeding means (800); e)_heating said hot sheet (Sd) by said first sheets heating_feeding means (800) to a second temperature in order to obtain a heated and hot sheet (Sc) having a second temperature, in which said second temperature is greater than the first temperature; f)_when said heated and hot sheet (Sc) has reached said determined second temperature, transferring by said first sheets heating_feeding means (800) said last heated and hot sheet (Sc) to said second sheets heating_feeding means (900); g)_heating said last hot sheet (Sc) by said second sheets heating_feeding means (900) to a third temperature in order to obtain a heated and hot sheet (Sb) having a third temperature, in which said third temperature is greater than the second temperature; h)_when said last heated and hot sheet (Sb) has reached said determined third temperature, transferring by said second sheets heating_feeding means (900) said last heated and hot sheet (Sb) to said sheets wrapping means (400); i)_wrapping said last hot sheet (Sb) around the object (10b) to be wrapped by said sheets wrapping means (400).

3. System according to claim 1 or 2, **characterized by the fact that** said second temperature is lower than the softening and/or shrinking temperature of the heat-shrinking material.
4. System according to anyone of the claims from 1 to 3, **characterized by the fact that** said third temperature is equal or greater than the softening and/or shrinking temperature of the heat-shrinking material.
5. System according to anyone of the claims from 1 to 4, **characterized by the fact that** said third temperature is equal or greater than the welding temperature of heat-shrink material.
6. System according to anyone of the claims from 1 to 5, **characterized by the fact that** said first sheets heating_feeding means (800) comprise: >_a first conveyor (801) having a heat transport belt (802), wherein said first conveyor (801) configures a first operating branch of heating and transport for the hot sheet (Sd) of heatshrinking material and >_a second conveyor (803) having a heat transport belt (804), in which said second conveyor (803) configures a sec-

ond transport operating branch which is in front of said operating branch and **by the fact that** the hot sheets (**Sd**) of heat-shrinkable material are disposed between said first conveying branch and said second conveying branch in order to perform the heating and the feeding operations for the same sheets (**Sd**).

7. System according to anyone of the claims from 1 to 6, **characterized by the fact that** said second sheets heating_feeding means (**900**) comprise a third conveyor (**901**) having a heat transport belt (**902**), wherein said first conveyor (**901**) configures a operating branch of heating and transport for the hot sheet (**Sd**) of heatshrink material.
8. System for a wrapping machine of the "sleeve" type to wrap hot sheets of packaging shrinking material around objects (**10a.1, 10b.1, 10c.1, etc.**) to be packaged, wherein said system comprises: >_first objects conveying means (**100.1**), wherein said first objects conveying means (**100.1**) are able to move objects (**10a.1, 10b.1, 10c.1, etc.**) longitudinally in a spaced succession; >_second objects conveying means (**200.1**), wherein said second objects conveyor means (**200.1**) are positioned downstream and at a short longitudinal distance with respect to said first objects conveyor means (**100.1**) in order to form a first opening (**A1.1**) between said first (**100.1**) and said second (**200.1**) object conveyor means, wherein said second objects conveyor means (**200.1**) are able to receive the objects (**10a.1, 10b.1, 10c.1, etc.**) arriving from said first objects conveyor means (**100.1**), and wherein said second objects conveyor means (**200.1**) are able to move the same objects (**10a.1, 10b.1, 10c.1, etc.**) along a wrapping surface which has an inlet end and an outlet end; >_third objects conveyor means (**300.1**), wherein said third objects conveyor means (**300.1**) are arranged downstream and at a short longitudinal distance from the said second object conveyor means (**200.1**) in order to form a second opening (**A2.1**) between said second (**200.1**) and said third (**300.1**) object conveyor means, wherein said third objects conveyor means (**300.1**) are able to receive the unit comprising an object (**10a.1**) and a hot sheet (**Sa.1**) arriving from said second objects conveyor means (**200.1**); >_sheets wrapping means (**400.1**), wherein said sheet wrapping means (**400.1**) are positioned in the vicinity of said second objects conveying means (**200.1**), wherein said sheet wrapping means (**400.1**) comprise at least one suspended wrapping bar (**401.1**), wherein said suspended wrapping bar (**401.1**) is oriented transversely with respect to the direction of advancement of the objects (**10a.1, 10b.1, 10c.1, etc.**), in which said suspended wrapping bar (**401.1**) is brought to move along an orbital path that passes through said first (**A1.1**) and said second (**A2.1**) opening, wherein said suspended

wrapping bar (**401.1**) transports the sheets (**Sb.1**) of wrapping material; >_control means (**500.1**), in which said control means (**500.1**) are able to control, operate and synchronize the various operative means; **characterized by the fact that** it comprises: >_tape heating_feeding means (**600.1**); >_cutting_feeding means (**700.1**); >_sheets heating_feeding means (**900.1**); **characterized by the fact that** said tape heating_feeding means (**600.1**) are able to heat the downstream portion (**20a.1**) of the tape (**20.1**) of heat-shrinkable material to a first temperature; **characterized by the fact that** said tape heating_feeding means (**600.1**) are able to feed said heated and hot downstream portion (**20a.1**) to the cutting_feeding means (**700.1**); **characterized by the fact that** said cutting_feeding means (**700.1**) are able to cut said heated and hot downstream portion (**20a.1**) to obtain a hot sheet (**Sc.1**); **characterized by the fact that** said cutting_feeding means (**700.1**) are able to feed said last hot sheet (**Sc.1**) to the first sheet heating_feeding means (**900.1**); **characterized by the fact that** said heating_feeding means (**900.1**) are able to heat said last hot sheet (**Sc.1**) to a second temperature, in which said second temperature is greater than the first temperature, in order to obtain a hot sheet (**Sc.1**) more heated; **characterized by the fact that** said first sheet heating_feeding means (**900.1**) are able to feed said last hot sheet (**Sc.1**) to said sheets wrapping means (**400.1**); **characterized by the fact that** sheets wrapping means (**400.1**) are able to wrap said last hot sheet (**Sb.1**) around the object (**10b.1**) to be wrapped.

9. System according to claim 08, **characterized by the fact that** it comprises the following steps: a)_heating a downstream portion (**20a.1**) of the tape (**20.1**) of heatshrinking material by said tape heating_feeding means (**600.1**); b)_when said downstream portion (**20a.1**) has reached a determined first temperature, transferring said heated and hot downstream portion (**20a.1**) from said_tape heating_feeding means (**600.1**) to said cutting_feeding means (**700.1**); c)_cutting by said cutting_feeding means (**700.1**) a downstream portion of the heated and hot continuous tape (**20a.1**), in order to obtain a heated and hot sheet (**Sc.1**) having a desired longitudinal length; d)_transferring the last hot sheet (**Sc.1**) obtained in this manner from said cutting_feeding means (**700.1**) to said sheets heating_feeding means (**900.1**); e)_heating said hot sheet (**Sc.1**) by said sheets heating_feeding means (**900.1**) to a second temperature in order to obtain a heated and hot sheet (**Sb.1**) having a second temperature, in which said second temperature is greater than the first temperature; f)_when said last heated and hot sheet (**Sb.1**) has reached said determined second temperature, transferring by said sheets heating_feeding means

(900.1) said hot last heated sheet (Sb.1) to said sheets wrapping means (400.1); g) wrapping said last hot sheet (Sb.1) around the object (10b.1) to be wrapped by said sheets wrapping means (400.1).

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10. System according to anyone of the claims 08 to 09, **characterized by** the fact that said second temperature is equal or greater than the softening and/or shrinking temperature of the heat-shrinking material.

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11. System according to anyone of the claims from 08 to 10, **characterized by the fact that** said second temperature is equal or greater than the welding temperature of heat-shrink material.

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12. System according to anyone of the claims from 08 to 11, **characterized by the fact that** said sheets heating_feeding means (900.1) comprises a third conveyor (901.1) having a heat transport belt (902.1), wherein said first conveyor (901.1) configures a operating branch of heating and transport for the hot sheet (Sc.1) of heatshrinkable material.

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13. System according to any one of the previous claims, **characterized by the fact that** said first temperature is greater than the room temperature and **by the fact that** said first temperature is little lower than a temperature which would not allow to cut said hot tape (20a/20a.1).

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14. System according to one of the preceding citations, **characterized by the fact that** said first temperature is between a minimum of 40°C and a maximum of 70°C.

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15. System according to one of the preceding claims, **characterized by the fact that** said sheets wrapping means (400/400.1) comprise separating means (402/402.1), in which said separating means (402/402.1) are able to preventing and/or limiting the contact between the front portion (Sb1/Sb1.1) and the rear portion (Sb2/Sb2.1) of the heated and hot sheet (Sb/Sb.1) during the steps of wrapping of the hot sheet (Sb/Sb.1) around the product (10b/10b.1).

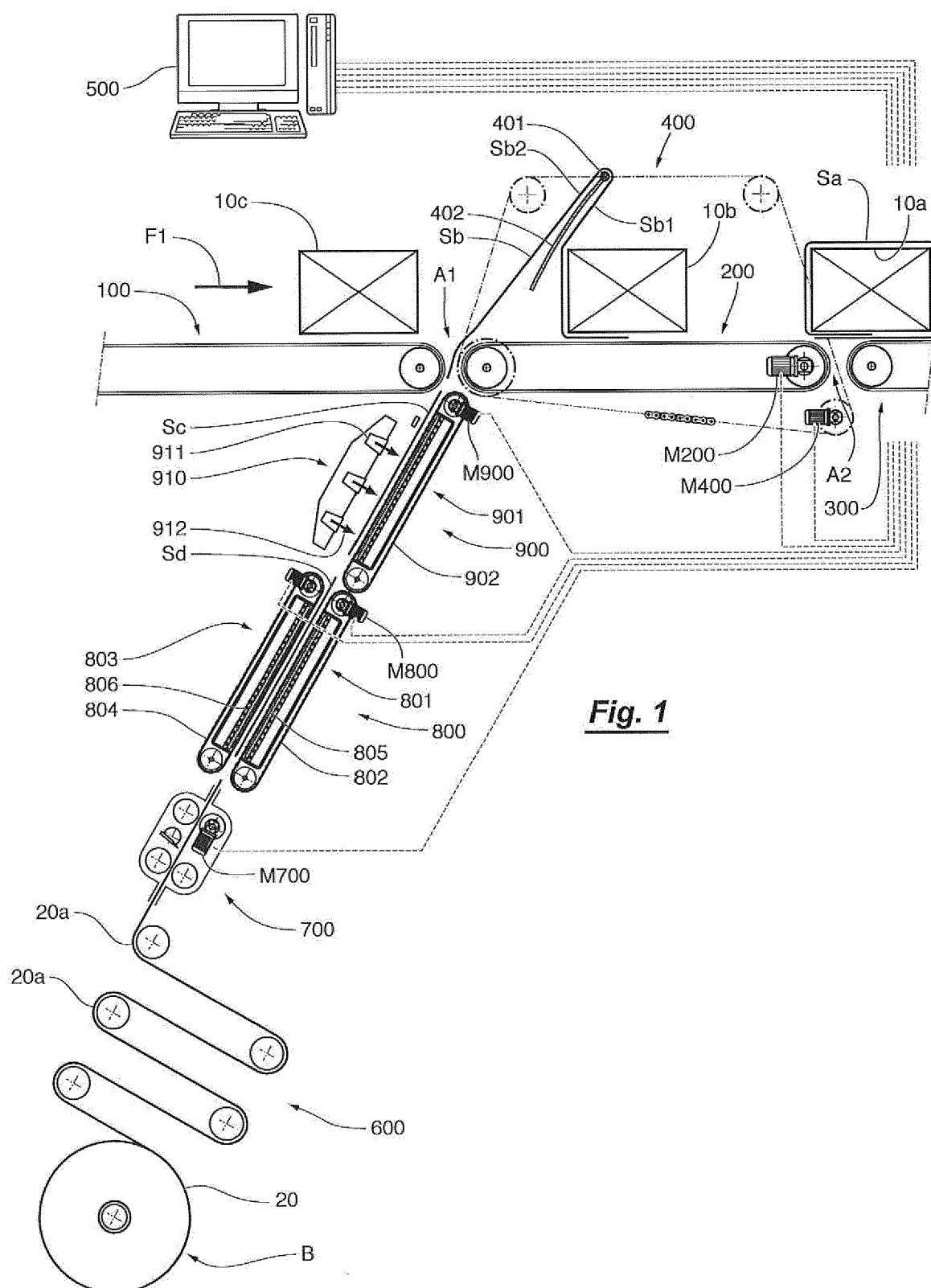
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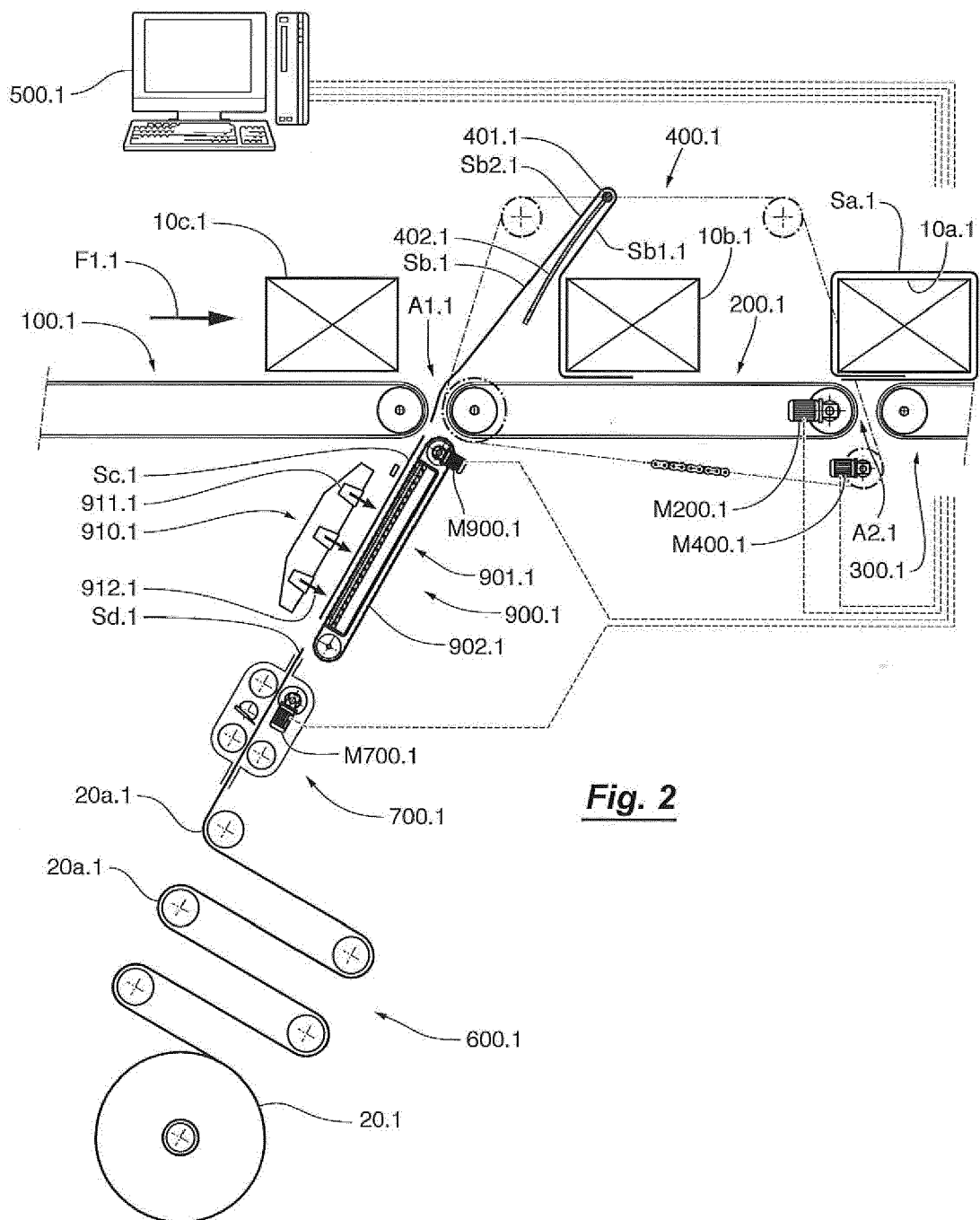
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16. System according to claim 15, **characterized by the fact that** said separator means (402/402.1) are hot and thus able to heat the sheet (Sb2/Sb.2) during the transport and the wrapping of the same sheet (Sb2/Sb2.1).

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EUROPEAN SEARCH REPORT

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DOCUMENTS CONSIDERED TO BE RELEVANT			
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A	* paragraph [0054] - paragraph [0079]; figure 12A *	1-7	

Y	EP 2 495 178 A1 (KRONES AG [DE]) 5 September 2012 (2012-09-05)	8-16	
A	* paragraph [0020] - paragraph [0025] *	1-7	

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A	* paragraph [0075] - paragraph [0096]; figure 4 *	1-7	

The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			B65B
Place of search		Date of completion of the search	Examiner
Munich		6 March 2018	Yazici, Baris
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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