(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 181 466 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
21.06.2017 Bulletin 2017/25

(51) Int Cl.:
B65B 53/02 *(2006.01)* ***B65B 11/10*** *(2006.01)*

(21) Application number: **16201372.6**

(22) Date of filing: **30.11.2016**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
MA MD

(30) Priority: **14.12.2015 IT UB20159834**

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(54) SYSTEM AND METHOD FOR A WRAPPING MACHINE

(57) _A System for a wrapping machine of the "sleeve" type to wrap hot sheets of packaging heat-shrink material around objects (**10a, 10b, 10c, etc.**) to be wrapped comprises: _first objects conveying means (**100**), _second objects conveying means (**200**), _third objects conveyor means (**300**), _sheets wrapping means (**400**), _control means (**500**), _sheets heater_feeder conveyor means (**600**) and _sheet receptor_feeder conveyor means (**700**), in which said sheet heater_feeder conveyor means (**600**) are able to heat the sheets of heat-shrink material; _in which said sheets heater_feeder conveyor means (**600**) are able to feed the heated hot sheets of heat-shrink material towards said sheets receptor_feeder conveyor means (**700**); _in which said sheet receptor_feeder conveyor means (**700**) are able to receive the heated hot sheets of heat-shrink material from said sheets heater_feeder conveyor means (**600**); _in which said sheet receptor_feeder conveyor means (**700**) are able to feed the received heated hot sheets of heat-shrink material towards the sheet wrapping means (**400**).

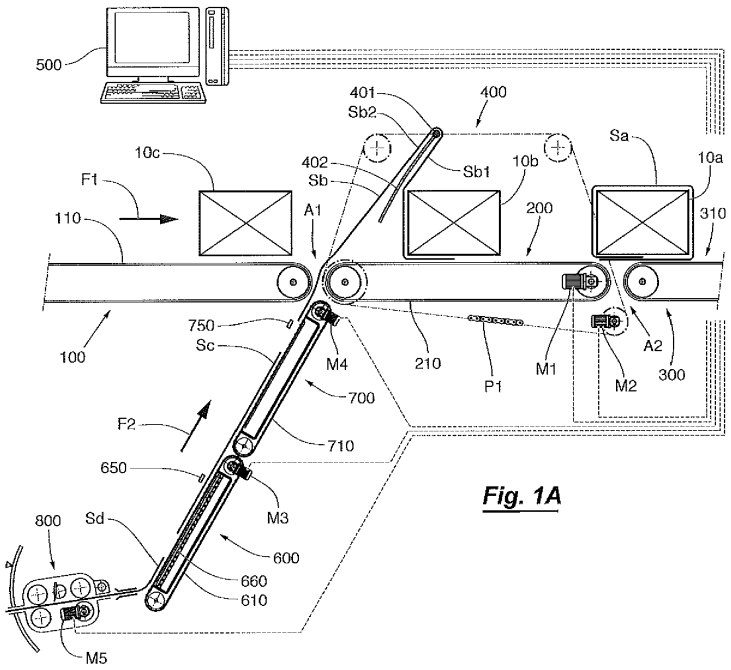


Fig. 1A

EP 3 181 466 A1

Description

Field of the Invention

[0001] _The present invention relates to a system and method for a wrapping machine used for wrapping objects by means of sheets of heat-shrink material.

Background of the Invention

[0002] _Currently, see patent EP_1.013.551, are known methods and systems for wrapping objects by means of hot sheets of heat-shrink material, in which, briefly, by means of said methods/systems each individual object is wrapped in succession by means of a respective sheet of heat-shrink material, in which said sheet has been previously heated to a temperature greater than the softening temperature of the heat-shrink material.

[0003] _These methods/systems have a number of drawbacks.

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

[0005] _A second drawback is due to the fact that they do not allow the uniformly and/or quickly heating of the sheet.

[0006] _A third drawback is due to the fact that they do not allow a good synchronization between the various operations to be performed and/or between between the various operating means.

[0007] _A fourth drawback is due to the fact that they do not allow the execution of a rapid format change in relation to the size of the sheet of material and/or in relation to the size of the objects to be packaged and/or in relation to the type of heat-shrink material of the sheet.

Object of the Invention

[0008] _The object of the present invention is therefore that to solve the above mentioned drawbacks.

[0009] _The invention, which is characterized by the claims, solves the problem of creating a system for a wrapping machine of the "sleeve" type able to wrap hot sheets of packaging heat-shrink material around objects to be wrapped, 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 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 objects 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: _sheets heater_feeder conveyor means and _sheets receptor_feeder conveyor means, by the fact that said sheet heater_feeder conveyor means are able to heat the sheets of heat-shrink material; by the fact that said sheets heater_feeder conveyor means are able to feed the heated and hot sheets of heat-shrink material towards said sheets receptor_feeder conveyor means; by the fact that said sheet receptor_feeder conveyor means are able to receive the heated and hot sheets of heat-shrink material from said sheets heater_feeder conveyor means; by the fact that said sheet receptor_feeder conveyor means are able to feed the received heated and hot sheets of heat-shrink material towards the sheet wrapping means.

[0010] _The invention, which is characterized by the claims, also solves the problem of creating a method for wrapping a product by means of a sheet of heat shrink material, in which said method is characterized by the fact of comprising in succession comprises: _a first station of sheets receiving_heating_feeding; _a second station of sheets receiving_feeding; _a third station of sheets receiving_wrapping; said method is also characterized by the fact of comprising the following operative steps: a)_positioning a sheet of heat-shrink material having a first temperature in the first station of sheet receiving_heating_feeding; b)_heating the sheet of heat-shrink material positioned in said first station of sheet receiving_heating_feeding to a second temperature having a value higher than the first temperature; c)_moving the heated and hot sheet from said first station of sheet receiving_heating_feeding to the second station of sheets receiving_feeding; d)_moving the heated and hot sheet from said second station of sheets receiving_feeding to the third station of sheets receiving_wrapping; e)_wrapping the heated and hot sheet around an object to be packagen the third station

of sheets receiving_wrapping.

Brief Description of the Drawings

[0011] _Further characteristics and advantages of the present invention will be more clear by the description that follows of some preferred forms of practical embodiment, given herein by ways of not limiting example, made with reference to the figures of the accompanying drawings in which:

>_Figure 1 and 1A are schematic views of the system object of the present invention according to a first embodiment;
>_Figure 2 and 2A are schematic views of the system object of the present invention according to a second embodiment;
>_Figure 3 illustrates in particular the system of Fig. 1A and 1B;
>_Figure 4 illustrates a block diagram relating to the methods object of the present invention.

FIRST Embodiment of the System - Fig. 1 and 1A

[0012] _With reference to Figures 1 and 1A, they schematically illustrate a first embodiment of the wrapping machine of the "sleeve" type object of the present invention, in which the said system of machine is able to wrap the objects **10a, 10b, 10c,** etc., by means of a respective sheet of heat-shrink material, **Sa, Sb, Sc, etc.,** while said objects **10a, 10b, 10c, etc.,** reciprocally and longitudinally spaced between them, move longitudinally towards downstream and preferably with continuous motion, as indicated by arrow **F1.**

[0013] _This system substantially 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 longitudinal 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 said second object conveyor means **200** in order to form a second opening **A2** between said second **200** and said third **300** objects conveyor means, wherein said third objects conveyor means **300** are able to receive the objects **10a, 10b, 10c, etc.** arriving from said second objects conveyor means **200;** >_sheets wrapping means **400** 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; _sheets heater_feeder conveyor means **600,** which are controlled by said control means **500** and _sheet receptor_feeder conveyor means **700,** which are controlled by said control means **500.**

[0014] _With reference to said first **100,** said second **200** and said third **300** conveyor means, they, essentially, comprise a conveyor having a conveyor belt **110, 210, 310,** in which said conveyor means **100, 200, 300,** are preferably driven by a single motor **M1** and a mechanical connections, or by two or three motors, in which said single motor **M1** or said two or more motors are preferably brushless motors connected to the control unit **500,** such way as to be operated in a phase relationship with respect the other operating means.

[0015] _With reference to the sheets wrapping means **400** they, for example, may comprise one or more suspended transporting bars **401,** in which said bars **401** are brought to move along an orbit path **P1** that passes through said first **A1** and said second **A2** opening, wherein said suspended wrapping bars **401** are for example carried by a pair of chains driven by a servo motor **M2,** as for example a brushless motor, which is driven and controlled by the control means **500.**

[0016] _With reference to the sheet conveying_heating means **600,** better described hereinafter, they are able to receive sheets **Sd** of heat-shrink material, in entrance, as well as able to heat the sheets **Sd** of heat-shrink material, and also act to feed the heated and hot sheets **Sd** of shrink material towards the sheet receptor_feeder conveyor means **700,** with the direction of feed as indicated by the arrow **F2.**

[0017] _Said sheets heater_feeder conveyor means **600** are preferably actuated by a third servomotor **M3,** such as a brushless servo motor driven and controlled by said control means **500.**

[0018] _With reference to the sheet receptor_feeder conveyor means **700,** better described hereinafter, they are able to receive the heated and hot sheets **Sc** of shrink material arriving from said sheet conveying_heating means **600** means, as well as able to feed said heated and hot sheets **Sc** received of shrink material towards the sheets wrapping means **400,** with the direction of feed indicated by the arrow **F2.**

[0019] _Said sheet receptor_feeder conveyor means **700** are preferably actuated by means of a fourth servo-

motor **M4,** as for example a brushless servomotor driven and controlled by said control means **500.**

[0020] _Furthermore, said system also comprises sheet forming_feeding means **800**, such as for example a cutting_feeding unit **800,** which provides to cut a continuous strip of heat-shrink material in order to form the sheets that will be fed into the sheets heater_feeder conveyor means **600,** in which said sheet forming_feeding means **800** are driven by a motor/actuator **M5,** connected to and actuated by the control unit **500.**

FIRST Form System - Fig. 1 and 1A - FIRST embodiment of operating steps

[0021] _With reference to the system above described, in order to wrap a product by a sheet of heat-shrink material, as FIRST embodiment, it executes the following operating steps: a)_positioning a sheet **Sd** having a first temperature within said sheet heater_feeder conveyor means **600; b)**_heating said sheet **Sd** by said sheet heater_feeder conveyor means **600; c)** when said sheet **Sd** has reached and/or exceeded the softening temperature, moving said heated hot sheet having a temperature equal to or higher than the softening temperature by said sheet heater_feeder conveyor means **600** toward said sheets receptor_feeder conveyor means 700 in phase relation with respect to the operative steps provided to said sheets receptor_feeder conveyor means **700; d)**_positioning said sheet **Sc** having a temperature equal to or higher than the softening temperature within said sheets receptor_feeder conveyor means **700; e)**_feeding said heated hot sheet **Sc** having a temperature equal to or higher than the softening temperature by said sheets receptor_feeder conveyor means **700** towards the sheets wrapping means **400** in phase relation with respect to the operative steps provided for said sheets wrapping means 400; **f)**_wrapping said heated hot sheet **Sc** having a temperature equal to or higher than the softening temperature around the object to be wrapped by said sheets wrapping means **400.**

FIRST Form System - Fig. 1 and 1A - SECOND embodiment of operating steps

[0022] _With reference to the system above described, in order to pack a product by a sheet of heat-shrink material, as second embodiment, the following operating steps are executed : **a)**_positioning a sheet **Sd** having a first temperature within said sheet heater_feeder conveyor means **600; b)**_heating said sheet **Sd** by said sheet heater_feeder conveyor means **600; c)**_when said sheet Sd has reached and/or exceeded a pre-determined second temperature, moving said heated and hot sheet by said sheet heater_feeder conveyor means **600** towards said sheets receptor_feeder conveyor means **700** in phase relation with respect to the operative steps provided for said sheets receptor_feeder conveyor means **700; d)**_positioning said sheet **Sc** within said sheets receptor_feeder conveyor means **700; e)**_feeding said heated and hot sheet **Sc** by said sheets receptor_feeder conveyor means **700** towards the sheets wrapping means **400** in phase relation with respect to the operative steps provided for said sheets wrapping means **400; f)**_wrapping said heated and hot sheet **Sc** around the object to be wrapped by said sheets wrapping means **400.**

Features Regarding FIRST embodiment of the system - FIRST and SECOND embodiment of Operative Steps.

[0023] _With reference to the operating steps relating to the first and second embodiment above described, preferably, it is provided a phase relationship in which a subsequent heated and hot rear sheet **Sc** is transferred by said sheets heater_feeder conveyor means **600** towards said sheet receptor_feeder conveyor means **700,** a previous heated and hot sheet **Sb** is transferred by said sheet receptor_feeder conveyor means **700** towards said sheet wrapping means **400.**

[0024] _In this manner, the rear second heated and hot sheet **Sc** is disposed within said sheets receptor_feeder conveyor means **700** while the first front sheet **Sb** is taken over by the sheets wrapping means **400** for winding this latter around the product **10b** to be wrapped.

[0025] _Again with reference to the first and to the second embodiments described above, preferably, it is provided a phase relationship in which, while a previous heated and hot sheet **Sc** is transferred from said sheets heater_feeder conveyor means **600** towards said sheet receptor_feeder conveyor means **700,** a subsequent sheet **Sc** is inserted and positioned into said sheets heater_feeder conveyor means **600.**

[0026] _In this manner, a front sheet **Sc** is positioned on the sheets receptor_feeder conveyor means **700** in view of the subsequent step of feeding it to the sheets wrapping means **400** and the rear second sheet **Sd** is positioned on the second sheets heater_feeder conveyor means **600** for the execution of the heating.

[0027] _Again with reference to the first and to the second embodiment described above, preferably, a phase relationship is provided between said sheets heater_feeder conveyor means **600** said sheet receptor_feeder conveyor means **700** and said sheet wrapping means **400,** in which said phase relationship is intended to limit and/or obviate the stop time of said heated and hot sheet into said sheet receptor_feeder conveyor means **700,** in order to limit the cooling of said heated and hot sheet during its transfer from said sheets heater_feeder conveyor means **600** towards and until this said sheet wrapping means **400.**

SECOND Embodiment of the System - Fig. 2 and 2A

[0028] _With reference to Figure 2 and 2A it shows a

variant of embodiment of the system object of the present invention, in which said sheet receptor_feeder conveyor means **700** further comprise heating means **760.**

[0029] _With reference to said second embodiment of figure 2, in order to wrap a product, the following operating steps are executed: **a)**_positioning a sheet **Sd** having a first temperature within said sheet heater_feeder conveyor means **600; b)**_heating said sheet **Sd** a first time by said sheet heater_feeder conveyor means **600; c)**_when said sheet **Sd** has reached and/or exceeded a pre-determined second temperature moving said heated and hot sheet by said sheet heater_feeder conveyor means **600** towards said sheets receptor_feeder conveyor means **700** in phase relation with respect to the operative steps provided to said sheets receptor_feeder conveyor means **700; d)**_positioning said heated and hot sheet **Sc** within said sheets receptor_feeder conveyor means **700; e)**_heating said heated and hot sheet **Sc** a second time by said sheet heating means **760; f)**_when said sheet Sc has reached and/or exceeded a pre-determined third temperature moving said heated and hot sheet by said sheets receptor_feeder conveyor means **700** towards the sheets wrapping means **400** in phase relation with respect to the operative steps provided for said sheets wrapping means **400; g)**_wrapping said heated and hot sheet **Sc** around the object to be wrapped by said sheets wrapping means **400.**

[0030] _With reference to the operational steps above described, said third temperature may be equal and/or greater than the softening temperature of the heat-shrink material, in order to wrap an object and obtain the heat shrinkage of the sheet wound around the packed object without the heating of the unit (sheet wrapped and product) within a tunnel oven for the so-called heat-shrinkage.

Temperature Sensors Means

[0031] _With reference to figures 1A and 2A, the sheets heater_feeder conveyor means **600** can further comprise first temperature sensor means **650,** in which said first temperature sensor means **650** are able to detect/estimate the temperature of the sheet **Sc** of heat-shrink material positioned within said sheet heater_feeder conveyor means **600,** in which said first temperature sensor means **650** are connected with the control means **500** for the transmission of the relative signals regarding the temperature of the sheet **Sc.**

[0032] _Again with reference to figures 1A and 2A, said sheets receptor_feeder conveyor means **700 can** further comprise second temperature sensor means **750;** in which said second temperature sensor means **750** are able to detect/estimate the temperature of the sheet **Sc** of heat-shrink material positioned within said sheets receptor_feeder conveyor means **700,** in which said second temperature sensor means **750** are connected with the control means **500** for the transmission of the relative signals regarding the temperature of the sheet **Sc.**

Conveyors Means

[0033] _With reference to the sheets heater_feeder conveyor means **600,** preferably, they comprise a conveyor **600** comprising a transport belt **610** which is wound in a closed loop, in which said transport belt **610** configures an upper transport branch, in which along said upper transport branch the sheet of heat-shrink material **Sc/Sd** is positioned, and in which along said upper transport branch said sheet **Sc/Sd** of heat-shrink material is heated by said transport belt **610.**

[0034] _In this context, for example, the conveyor belt can be a hot belt heated by a heater **660** that provides to heat the same belt **610,** in which this latter transmit heat by thermal conduction to the heat-shrink material sheet **Sd.**

[0035] _With reference to the sheets receptor_feeder conveyor means **700,** they preferably comprise a conveyor **700** comprising a transport belt **710** of suction type which is wound in a closed loop, in which said transport belt **710** defines an upper transport branch, in which along said upper transport branch said sheet **Sc** of heat-shrink material is positioned, and in which, if it is required, along said upper transport branch said sheet **Sc** of heat-shrink material is heated by said transport belt **710.**

[0036] _In this context, for example, the conveyor belt **710** can be heated by a heater **760** that provides to heat the belt **710,** in which the latter transmits heat by thermal conduction to the sheet **Sc/Sd** of heat-shrink material.

Separator Mens

[0037] _With reference to the First and the Second system illustrated by the figures 1A and 2A, the wrapping bar **401** can be equipped with separating means **402,** which are able to prevent and/or limit the contact between the front portion **Sb1** and the rear portion **Sb2** of the heated and hot sheet **Sb** during the steps of wrapping of the sheet **Sb** around the product **10b.**

[0038] _Said separator means **402,** see fig. 3, may have the form of a pendant curtain, having one side supported by and associated to the wrapping bar **401,** wherein said curtain **402** is made by a material having low coefficient of friction and a low/zero grip with respect to the material of the sheet **Sb,** in order to enable the sheet **Sb** to slip over said curtain **402** during the winding phases.

FIRST Method with Single Heat - Fig. 4

[0039] _The present invention also relates to a first method for wrapping a product by means of a heat-shrink material sheet, in which, with reference to Fig. 4, said first method comprises positioned in succession _a first station **S1** of sheet receiving_heating_feedings, _a second station **S2** of sheets receiving_feeding, _a third station **S3** of sheets receiving_wrapping, in which said method comprises the following operative steps: **a)**_positioning a sheet of heat-shrink material having a

first temperature in the first station S1 of sheet receiving_heating_feedings; **b)**_heating the sheet of heat-shrink material positioned in said first station **S1** of sheet receiving_heating_feedings to a second temperature having a value higher than the first temperature; **c)**_moving the heated and hot sheet from said first station **S1** of sheet receiving_heating_feedings to the second station **S2** of sheets receiving_feeding; **d)**_moving the heated and hot sheet from said second station **S2** of sheets receiving_feeding to the third station **S3** of sheets receiving_wrapping; **e)**_wrapping the heated and hot sheet around an object to be wrapped in the third station **S3** of sheets receiving_wrapping.

[0040] _With reference to said first method, preferably, said second temperature has a value such as to maintain the sheet of heat-shrink material at a temperature equal to or greater than the softening temperature during the subsequent stages **c), d)** and **e),** in order to obtain, after the operations of wrapping of the heated and hot sheet around the product to be packaged, a heat-shrinkage against the product without a re-heating of the previous wrapped sheet, such as, for example, without the execution of a heating of the sheet into a heat shrinking tunnel.

SECOND Method with the First and Second Heating Means - Fig. 4

[0041] _The present invention also relates to a second method for packing of a product by means of a sheet of heat-shrink material, in which, with reference to Fig. 4, said second method comprises positioned in succession _a first station **S1** of sheet receiving_heating_feeding; _a second station **S2** of sheets receiving_heating_feeding; _a third station **S3** of sheets receiving_wrapping, in which said method comprises the following operative steps: **a)**_positioning a sheet of heat-shrink material having a first temperature in the first station **S1** of sheet receiving_heating_feedings; **b)**_heating the sheet of heat-shrink material positioned in said first station **S1** of sheet receiving_heating_feedings to a second temperature having a value higher than the first temperature; **c)**_moving the eheated and hot sheet from said first station **S1** of sheet receiving_heating_feedings to the second station **S2** of sheets receiving_heating_feeding; **d)**_heating the sheet of heat-shrink material positioned in said second station **S2** of sheets receiving_heating_feeding to a third temperature having a value higher than the second temperature; **e)**_moving the twince (two time) heated and hot sheet from said second station **S2** of sheets receiving_heating_feeding to the third station **S3** of sheets receiving_wrapping; **f)**_wrapping in the third station **S3** of sheets receiving_wrapping the hot and twice (two times) heated sheet around an object to be packaged.

[0042] _With reference to said second method, preferably, said third temperature has a value such as to maintain the sheet of heat-shrink material to a temperature equal to or greater than the softening temperature during the subsequent stages **e)** and **f),** in order to obtain, after the operations of wrapping of the heated and hot sheet around the product to be packaged, a heat-shrinkable of the sheet against the products without having to re-heat it, such as, for example, without the execution of a heating of the sheet into a heating shrinking tunnel.

[0043] _With reference to the above description by means of the systems/methods of the present invention the following results are obtained.

[0044] _The relative wrapping machine can operate with high operating speeds and, therefore, it is obtained a high wrapping productivity.

[0045] _The sheet of heat-shrink material can be heated uniformly, placing the same sheet in a lying manner on the heating floor of the sheets heater_feeder conveyor means **600,** acted to perform the heating of said sheet (stationary or in forward moving manner) through an optimal and programmable time period by the control of the motor **M3,** regardless of the wrapping operations.

[0046] _In fact, the wrapping operations are performed using a prior sheet **Sb** (previously heated) and by means of the sheet receptor_feeder conveyor means **700** and the sheet wrapping means **400,** actuated by the motors **M4** and **M2,** wherein said motors **M4** and **M2** can be operated independently with respect to the motor **M3** which drives said sheets heater_feeder conveyor means **600.**

[0047] _More particularly, the various operating means **100/200/300, 400, 600, 700** may be driven individually, and in an independent manner between each other by means of the control unit **500** and, therefore, by means of the systems/methods object of the present invention it is possible to set an optimal synchronization between said operating means **100/200/300, 400, 600, 700** in correlation with the various operations to be performed and, in addition, it is also possible to electronically perform a quick and easy change of size in relation to the size of the sheet of shrink material and/or in relation to the size of the object to be packaged and/or in relation to the type of heat-shrink material, as well as, the posibility of changing change the parameters regarding the heating of the sheet.

[0048] _The above description of the system and of the methods are provided purely by way of example and without restrictive intent and, therefore. it is evident that said systems and said methods can be subjected to all modifications or variations suggested by experience or by the use and within the scope of the following claims. _In this context, the following claims form an integral part of the above description.

Claims

1. System for a wrapping machine of the "sleeve" type to wrap hot sheets of packaging heat-shrink 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 the objects (10a, 10b, 10c, etc.) 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: >_sheets heater_feeder conveyor means (600) and >_sheet receptor_feeder conveyor means (700), _**by the fact that** said sheet heater_feeder conveyor means (600) are able to heat the sheets of heat-shrink material; _**by the fact that** said sheets heater_feeder conveyor means (600) are able to feed the heated and hot sheets of heat-shrink material towards said sheets receptor_feeder conveyor means (700); _**by the fact that** said sheet receptor_feeder conveyor means (700) are able to receive the heated and hot sheets of heat-shrink material from said sheets heater_feeder conveyor means (600); _**by the fact that** said sheet receptor_feeder conveyor means (700) are able to feed the received heated hot sheets of heat-shrink material towards the sheet wrapping means (400).

2. System according to claim 1, **characterized in that** it comprises the following operative steps: **a)**_positioning a sheet (Sd) having a first temperature within said sheet heater_feeder conveyor means (600); **b)**_heating said sheet (Sd) by said sheet heater_feeder conveyor means (600); **c)**_when said sheet (Sd) has reached and/or exceeded the softening temperature, moving said heated and hot sheet having a temperature equal to or higher than the softening temperature by said sheet heater_feeder conveyor means (600) toward said sheets receptor_feeder conveyor means (700) in phase relation with respect to the operative steps provided to said sheets receptor_feeder conveyor means (700); **d)**_positioning said sheet (Sc) having a temperature equal to or higher than the softening temperature within said sheets receptor_feeder conveyor means (700); **e)**_feeding said heated hot sheet (Sc) having a temperature equal to or higher than the softening temperature by said sheets receptor_feeder conveyor means (700) towards the sheets wrapping means (400) in phase relation with respect to the operative steps provided for said sheets wrapping means (400); **f)**_wrapping said heated hot sheet (Sc) having a temperature equal to or higher than the softening temperature around the object to be wrapped by said sheets wrapping means (400).

3. System according to claim 1, **characterized in that** it comprises the following operative steps: **a)**_positioning a sheet (Sd) having a first temperature within said sheet heater_feeder conveyor means (600); **b)**_heating said sheet (Sd) by said sheet heater_feeder conveyor means (600); **c)**_when said sheet (Sd) has reached and/or exceeded a pre-determined second temperature, moving said heated and hot sheet by said sheet heater_feeder conveyor means (600) towards said sheets receptor_feeder conveyor means (700) in phase relation with respect to the operative steps provided to said sheets receptor_feeder conveyor means (700); **d)**_positioning said sheet (Sc) within said sheets receptor_feeder conveyor means (700); **e)**_feeding said heated and hot sheet (Sc) by said sheets receptor_feeder conveyor means (700) towards the sheets wrapping means (400) in phase relation with respect to the operative steps provided for said sheets wrapping means (400); **f)**_wrapping said heated hot sheet (Sc) around the object to be wrapped by said sheets wrapping means (400).

4. System according to one of the previous claims, **characterized by the fact that** it comprises a phase relationship in which while a subsequent heated and

hot rear sheet (Sc) is transferred by said sheets heater_feeder conveyor means (600) towards said sheet receptor_feeder conveyor means (700) a previous heated and hot sheet (Sb) is transferred by said sheet receptor_feeder conveyor means (700) towards said sheet wrapping means (400).

5. System according to one of the previous claims, **characterized by the fact that** it comprises a phase relationship in which while a previous heated and hot sheet (Sc) is transferred from said sheets heater_feeder conveyor means (600) towards said sheet receptor_feeder conveyor means (700) a subsequent sheet (Sc) is inserted and positioned into said sheets heater_feeder conveyor means (600).

6. System according to one of the preceding claims, **characterized in that it comprises** a phase relationship between said sheets heater_feeder conveyor means (600), said sheet receptor_feeder conveyor means (700) and said sheet wrapping means (400), in which said phase relationship is intended to limit and/or obviate the stop of said heated and hot sheet into said sheet receptor_feeder conveyor means (700).

7. System according to claim 1, **characterized by the fact that** said sheet receptor_feeder conveyor means (700) further comprise heating means (760) and **characterized in that** the following operational steps are executed: **a)**_positioning a sheet (Sd) having a first temperature within said sheet heater_feeder conveyor means (600); **b)**_heating said sheet (Sd) a first time by said sheet heater_feeder conveyor means (600); **c)**_when said sheet (Sd) has reached and/or exceeded a pre-determined second temperature moving said heated hot sheet by said sheet heater_feeder conveyor means (600) towards said sheets receptor_feeder conveyor means (700) in phase relation with respect to the operative steps provided to said sheets receptor_feeder conveyor means (700); **d)**_positioning said heated and hot sheet (Sc) within said sheets receptor_feeder conveyor means (700); **e)**_heating said heated and hot sheet (Sc) a second time by said sheet heating means (760); **f)**_when said sheet (Sc) has reached and/or exceeded a predetermined third temperature moving said heated hot sheet by said sheets receptor_feeder conveyor means (700) towards the sheets wrapping means (400) in phase relation with respect to the operative steps provided for said sheets wrapping means (400); **g)**_wrapping said heated hot sheet (Sc) around the object to be wrapped by said sheets wrapping means (400).

8. System according to claim 7, **characterized by the fact** that said third temperature is equal to and/or higher than the softening temperature.

9. System according to one of the preceding claims, **characterized by the fact that** said sheets heater_feeder conveyor means (600) further comprise first temperature sensor means (650), **by the fact that** said first temperature sensor means (650) are able to detect/estimate the temperature of the sheet (Sc) of heat-shrink material positioned within said sheet heater_feeder conveyor means (600), and **by the fact that** said first temperature sensor means (650) are connected with the control means (500).

10. System according to one of the preceding claims, **characterized by the fact that** said sheets receptor_feeder conveyor means (700) further comprise second temperature sensor means (750); **by the fact that** said second temperature sensor means (750) are able to detect/estimate the temperature of the sheet (Sc) of heat-shrink material positioned within said sheets receptor_feeder conveyor means (700); and **by the fact that** said second temperature sensor means (750) are connected with the control means (500).

11. System according to one of the preceding claims, **characterized by the fact that** said sheets heater_feeder conveyor means (600) comprises a conveyor comprising a transport belt (610) which is wound in a closed loop; **by the fact that** said transport belt (610) defines an upper transport branch; **by the fact that** along said upper transport branch the sheet of heat-shrink material is positioned; **by the fact that** along said upper transport branch said sheet of heat-shrink material is heated.

12. System according to claim 11, **characterized by the fact that** said transport belt (610) is of suction type.

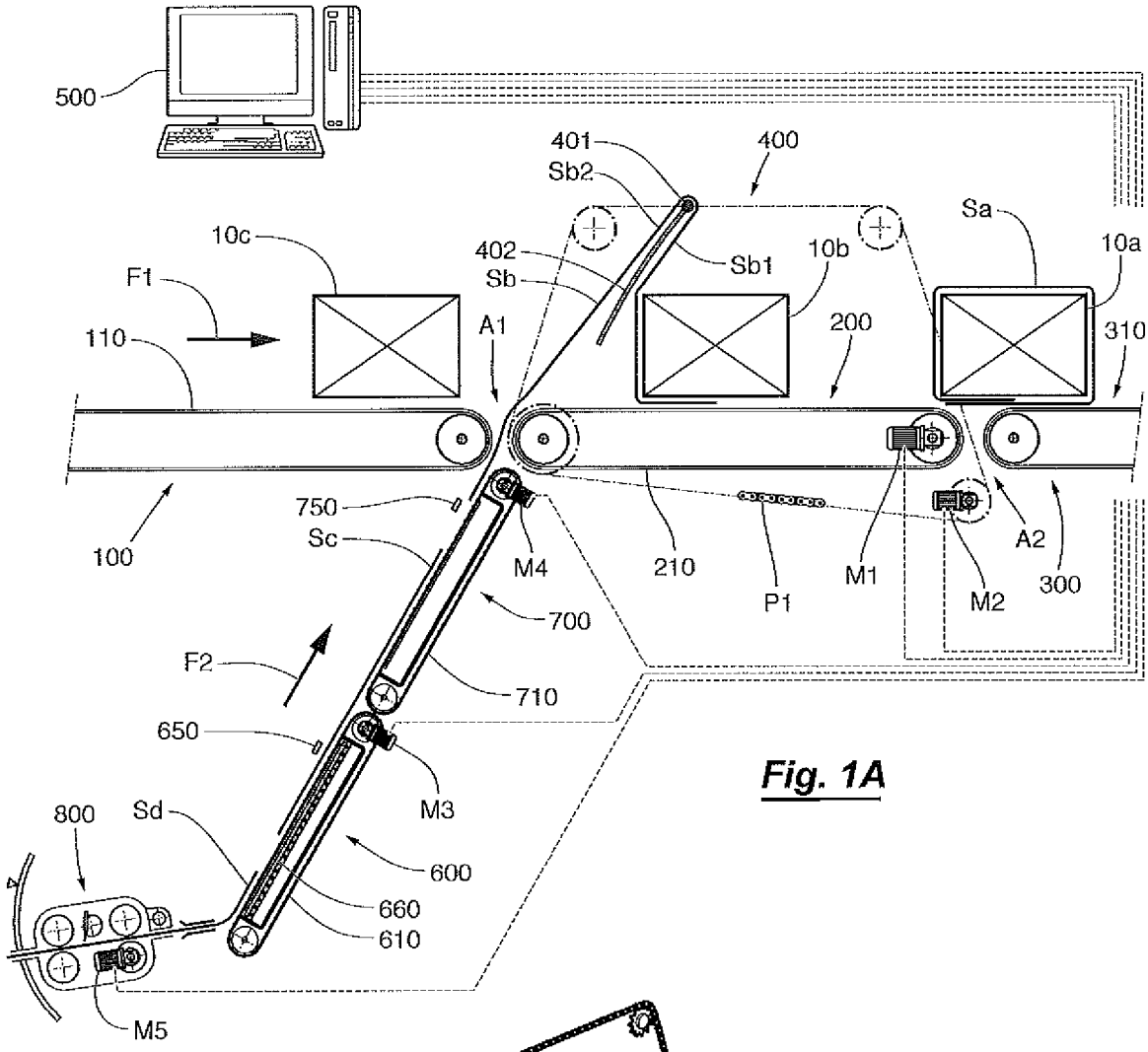
13. System according to one of the preceding claims, **characterized by the fact that** said sheets receptor_feeder conveyor means (700) comprise a conveyor comprising a transport belt (710) which is wound in a closed loop; **by the fact that** said transport belt (710) defines an upper branch of transport; **by the fact that** the sheet of heat-shrink material is positioned along said upper branch of transport.

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

15. System according to claim 14, **characterized by the fact that** said separator means (402) comprise an element with the shape of a pendant curtain having one side supported by the wrapping bar (401).

16. Method for wrapping a product by means of a sheet of heat shrink material **characterized by the fact that** it comprises: _a first station (S1) of sheet receiving_heating_feedings; _a second station (S2) of sheets receiving_feeding; _a third station (S3) of sheets receiving_wrapping; and **characterized by the fact that** said method comprises the following operative steps: **a)**_positioning a sheet of heat-shrink material having a first temperature in the first station (S1) of sheet receiving_heating_feedings; **b)**_heating the sheet of heat-shrink material positioned in said first station (S1) of sheet receiving_heating_feedings to a second temperature having a value higher than the first temperature; **c)**_moving the heated hot sheet from said first station (S1) of sheet receiving_heating_feedings to the second station (S2) of sheets receiving_feeding; **d)**_moving the hot heated sheet from said second station (S2) of sheets receiving_feeding to the third station (S3) of sheets receiving_wrapping; **e)**_wrapping in the third station (S3) of sheets receiving_wrapping the hot heated sheet around an object to be packaged.

17. Method for wrapping a product by means of a sheet of heat shrink material **characterized by the fact that** it comprises: _a first station (S1) of sheet receiving_heating_feeding; _a second station (S2) of sheets receiving_heating_feeding; _a third station (S3) of sheets receiving_wrapping; and **characterized by the fact that** said method comprises the following operative steps: **a)**_positioning a sheet of heat-shrink material having a first temperature in the first station (S1) of sheet receiving_heating_feedings; **b)**_heating the sheet of heat-shrink material positioned in said first station (S1) of sheet receiving_heating_feedings to a second temperature having a value higher than the first temperature; **c)**_moving the hot sheet from said first station (S1) of sheet receiving_heating_feedings to the second station (S2) of sheets receiving_heating_feeding; **d)**_heating the sheet of heat-shrink material positioned in said second station (S2) of sheets receiving_heating_feeding to a third temperature having a value higher than the second temperature; **e)**_moving the hot heated at least two times sheet from said second station (S2) of sheets receiving_heating_feeding to the third station (S3) of sheets receiving_wrapping; **f)**_wrapping in the third station (S3) of sheets receiving_wrapping the hot sheet heated at least two times around an object to be packaged.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210
M1
A2
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F2
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M3
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Sd
600
660
610
M5

Fig. 1A

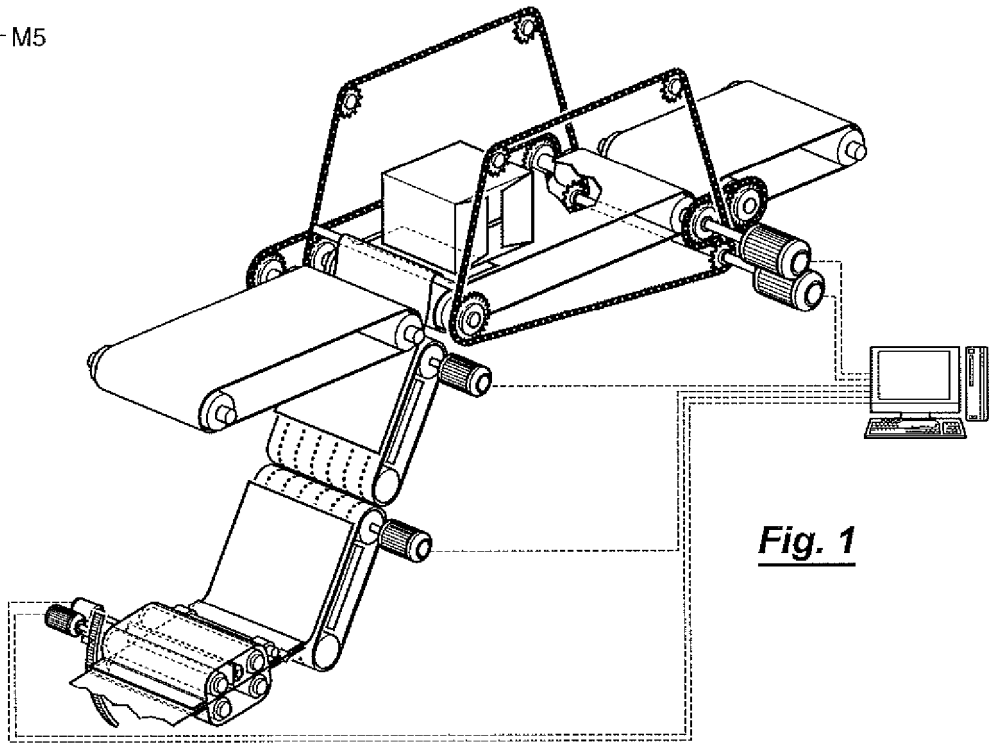
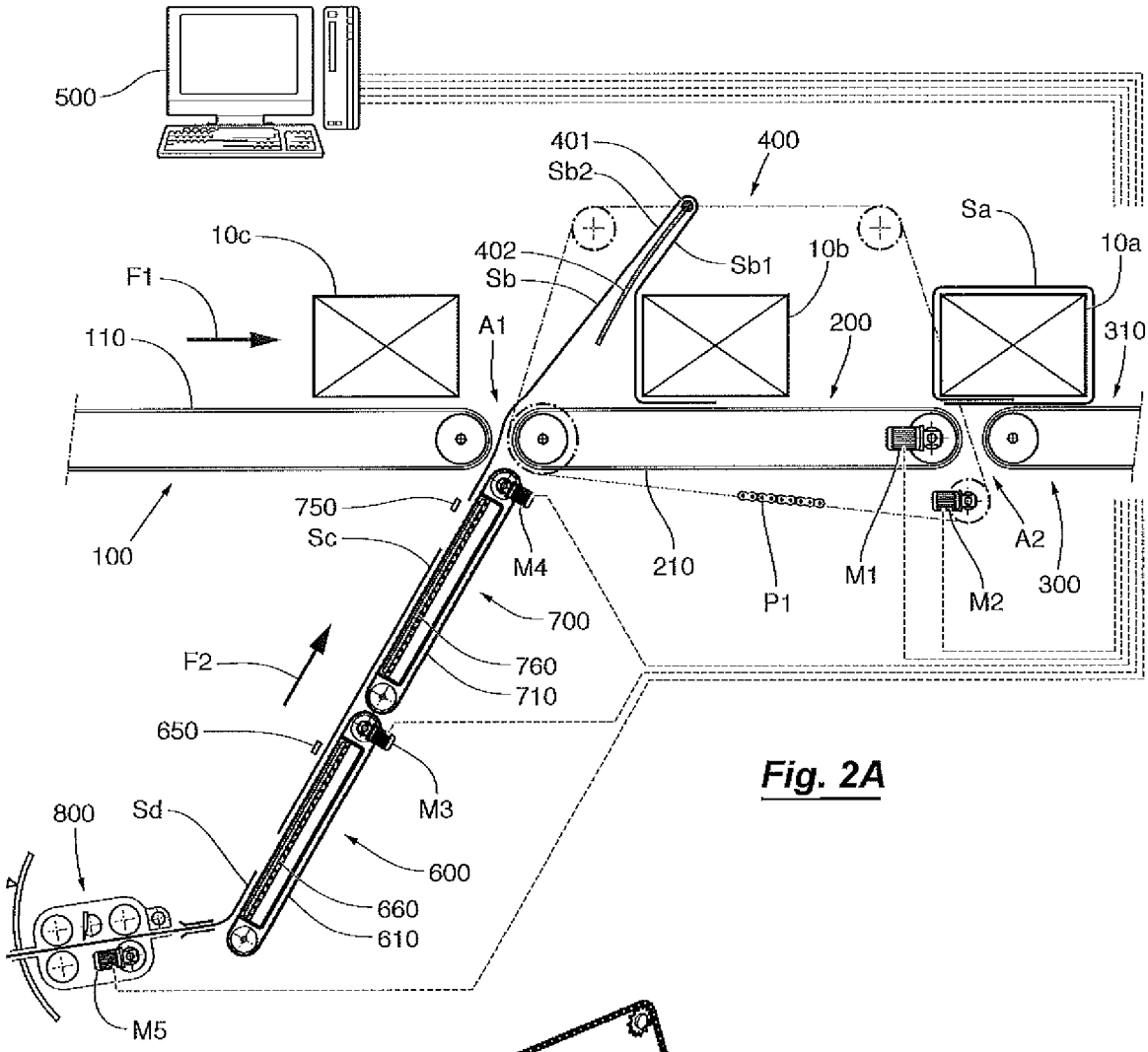


Fig. 1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P1
M1
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M5

Fig. 2A

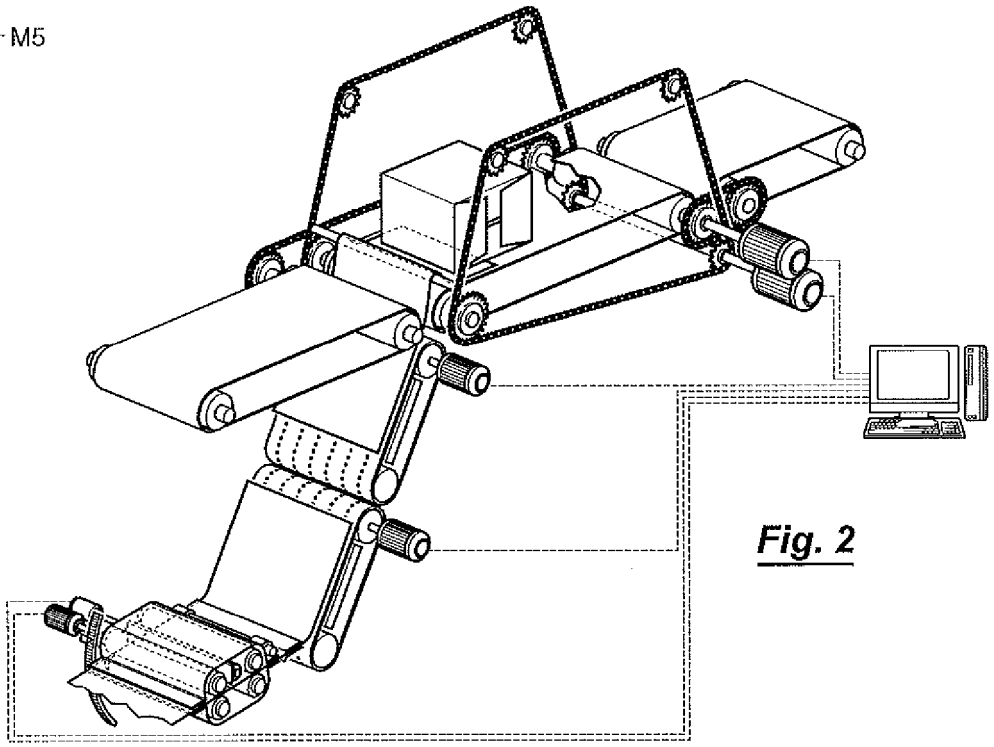


Fig. 2

Fig. 3

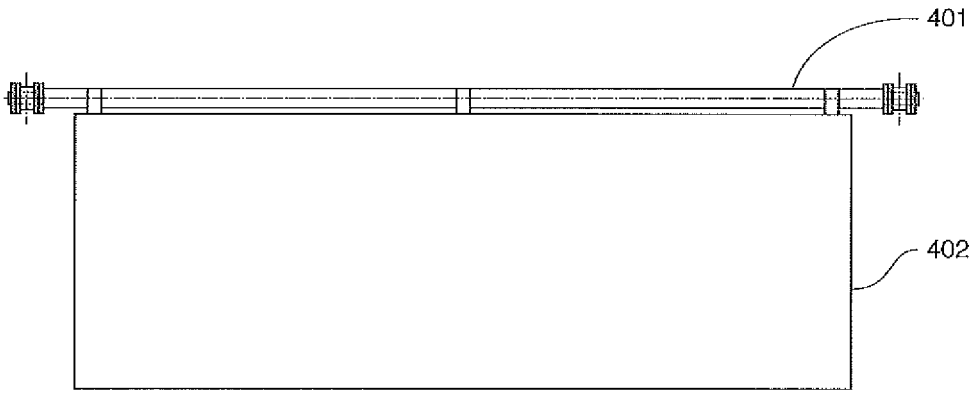
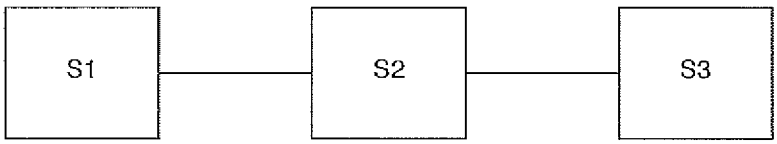


Fig. 4



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EUROPEAN SEARCH REPORT

Application Number
EP 16 20 1372

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X,D	EP 1 013 551 A2 (BAUMER SRL [IT]) 28 June 2000 (2000-06-28)	1-8,	INV.
A	* paragraphs [0021] - [0042]; figures 1,2 *	14-16 9-13,17	B65B53/02 B65B11/10

TECHNICAL FIELDS SEARCHED (IPC)

B65B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	27 February 2017	Lawder, M

CATEGORY OF CITED DOCUMENTS

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27-02-2017

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		IT BO980706 A1	22-06-2000
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