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(54) **SUPPORT DEVICE FOR A REEL, PACKAGING MACHINE HAVING A SUPPORT DEVICE FOR A REEL, METHOD FOR COUPLING A REEL TO A SUPPORT DEVICE AND METHOD FOR UNCOUPLING A REEL FROM A SUPPORT DEVICE**

(57) There is described a support device (25) for carrying a reel (11) having a tubular holder (26) and a web of packaging material (3) wound about the tubular holder (26). The support device (25) comprises a spindle (31) extending along a longitudinal axis (E), a first clamping group (32) and a second clamping group (33) connected to the spindle (31) and configured to clamp the reel (11) between one another. The first clamping group (32) being configured to laterally engage the reel (11) from a first side and the second clamping group (33) being configured to laterally engage the reel (11) from

a second side opposite to the first side. The second clamping group (33) comprises a locking device (34) controllable between an active configuration in which the locking device (34) is configured to engage the second side of the reel (11) for clamping the reel (11) in cooperation with the first clamping group (32) and a rest configuration in which it is possible to introduce the first clamping group (32) into the tubular holder (26) and to move the second clamping group (33) within the tubular holder (26).

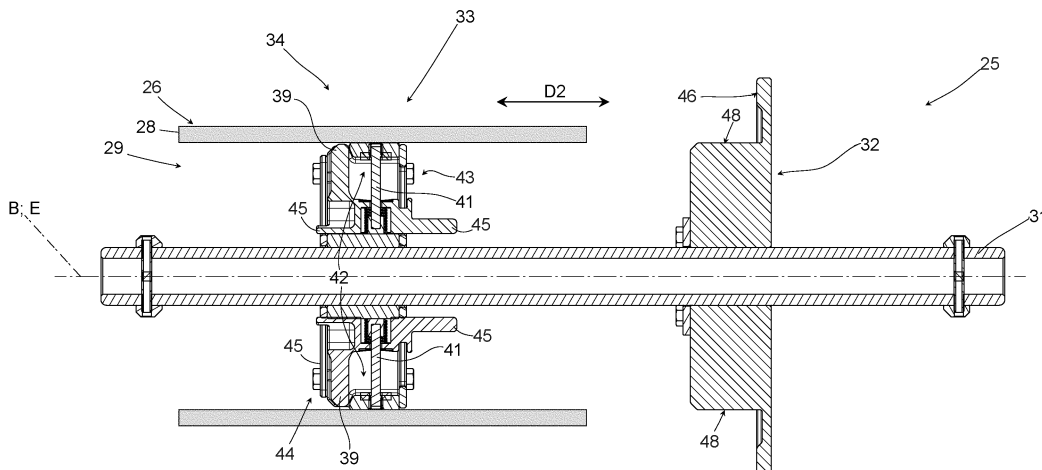


FIG. 6

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## Description

### TECHNICAL FIELD

**[0001]** The present invention relates to support device for carrying a reel comprising a tubular holder and a web of packaging material wound about the tubular holder. Advantageously, the support device is configured to allow placing the reel within a packaging machine and rotating the reel around a rotation axis.

**[0002]** The present invention also relates to a packaging machine, in particular a packaging machine for producing sealed packages of a pourable product, even more particular of a pourable food product, having a magazine unit comprising a support device for a reel.

**[0003]** Advantageously, the present invention also relates to a method for coupling a reel comprising a tubular holder and a web of packaging material wound about the tubular holder to a support device.

**[0004]** Advantageously, the present invention also relates to a method for uncoupling a tubular holder of an exhausted reel from a support device.

### BACKGROUND ART

**[0005]** As is known, many liquid or pourable food products, such as fruit juice, UHT (ultra-high-temperature treated) milk, wine, tomato sauce, etc., are sold in packages made of sterilized packaging material.

**[0006]** A typical example is the parallelepiped-shaped package for liquid or pourable food products known as Tetra Brik Aseptic (registered trademark), which is made by sealing and folding laminated strip packaging material. The packaging material has a multilayer structure comprising a base layer, e.g. of paper, covered on both sides with layers of heat-seal plastic material, e.g. polyethylene. In the case of aseptic packages for long-storage products, such as UHT milk, the packaging material also comprises a layer of oxygen-barrier material (an oxygen-barrier layer), e.g. an aluminum foil, which is superimposed on a layer of heat-seal plastic material, and is in turn covered with another layer of heat-seal plastic material forming the inner face of the package eventually contacting the food product.

**[0007]** Packages of this sort are normally produced on fully automatic packaging machines, which advance a web of packaging material through a sterilization apparatus for sterilizing the web of packaging material at a sterilization station and to an isolation chamber (a closed and sterile environment) in which the sterilized web of packaging material is maintained and advanced. During advancement of the web of packaging material through the isolation chamber, the web of packaging material is folded and sealed longitudinally at a tube forming station to form a tube having a longitudinal seam portion, the tube being further fed along a vertical advancing direction.

**[0008]** For completing the forming operations, the tube

is filled with a pourable product, in particular a pourable food product, and is transversally sealed and subsequently cut along equally spaced transversal cross sections within a package forming apparatus of the packaging machine during advancement along the vertical advancing direction.

**[0009]** Pillow packages are so obtained, each pillow package having a longitudinal sealing band, a top transversal sealing band and a bottom transversal sealing band.

**[0010]** A typical packaging machine comprises a magazine unit for hosting the web of packaging material, a conveying device for advancing the web of packaging material along a web advancement path and the tube formed from the web of packaging material along a tube advancement path, the sterilizing apparatus for sterilizing the web of packaging material prior to its formation into the tube, a tube forming and sealing device at least partially arranged within the isolation chamber and being configured to form the tube from the advancing web of packaging material and to longitudinally seal the tube, a filling device for filling the tube with the pourable product and the package forming apparatus adapted to form, transversally seal and cut individual packages from the tube of packaging material.

**[0011]** A typical magazine unit comprises at least one support device configured to carry a reel comprising a tubular holder and the web of packaging material wound about the tubular holder.

**[0012]** A typical support device comprises an elongated spindle and a first clamping group and a second clamping group connected to the elongated spindle. In use, the first clamping group and the second clamping group clamp the reel between one another, in particular by laterally engaging the tubular holder and the web of packaging material wound about the tubular holder.

**[0013]** In order to couple the reel to the support device an operator has to remove the second clamping group from the elongated spindle and to guide the spindle through the (hollow) tubular holder until the first clamping group laterally abuts against the reel. Afterwards, the operator mounts the second clamping group again to the elongated spindle and pushes the second clamping group into lateral abutment with the reel. Then, the operator has to fasten the second clamping group to the elongated spindle.

**[0014]** When the web of packaging material of a reel is exhausted, the operator has to unfasten the second clamping group from the elongated spindle so that it is possible to remove the tubular holder of the reel from the support device.

**[0015]** Even though the known solutions work satisfactorily well, a desired is felt in the sector to further improve the support devices, in particular so as to facilitate the coupling of reels to and the uncoupling of reels from the support devices.

## DISCLOSURE OF INVENTION

**[0016]** It is therefore an object of the present invention to provide an improved support device, which can be easily coupled to and uncoupled from a reel.

**[0017]** It is a further object of the present invention to provide an improved packaging machine having a support device for a reel.

**[0018]** It is a further object of the present invention to provide an improved method for coupling a reel to a support device.

**[0019]** It is another object of the present invention to provide an improved method for uncoupling a tubular holder of an exhausted reel from a support device.

**[0020]** According to the present invention, there is provided a support device as claimed in claim 1.

**[0021]** Preferred embodiments are claimed in the dependent claims.

**[0022]** According to the present invention, there is also provided a packaging machine according to claim 12.

**[0023]** According to the present invention, there is also provided a method according to claim 13.

**[0024]** According to the present invention there is also provided a method according to claim 14.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0025]** A non-limiting embodiment of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 is a schematic view of a packaging machine for packaging a pourable product, with parts removed for clarity;

Figure 2 is a perspective view of a support device of the packaging machine of Figure 1, with parts removed for clarity;

Figure 3 is an enlarged perspective view of a detail of the support device of Figure 2, with parts removed for clarity;

Figure 4 is a front view of the detail of Figure 2, with parts removed for clarity; and

Figures 5 to 7 are cross sections that illustrate the steps of coupling a reel to the support device of Figure 2, with parts removed for clarity.

## BEST MODES FOR CARRYING OUT THE INVENTION

**[0026]** Number 1 indicates as a whole a packaging machine for producing sealed packages 2 of a pourable product, in particular a pourable food product, such as milk, milk drinks, yoghurt, yoghurt drinks, fruit juice, wine, tomato sauce, emulsions, beverages containing pulp, salt, sugar, etc.

**[0027]** In more detail, packaging machine 1 may be configured to produce packages 2 from a web of packaging material 3, preferentially a web of multilayer packa-

ging material.

**[0028]** More preferentially, web of packaging material 3 may have heat seal properties (i.e. portions of the multi-layer packaging material can be sealed to one another).

5 **[0029]** In further detail, web of packaging material 3 may comprise at least one layer of fibrous material, such as e.g. paper or cardboard, and at least two layers of heat-seal plastic material, e.g. polyethylene, interposing the layer of fibrous material in between one another.  
10 Preferentially, one of these two layers of heat-seal plastic material may define the inner face of packages 2 contacting the pourable product.

**[0030]** Moreover, web of packaging material 3 may also comprise a layer of gas- and light-barrier material, e.g. aluminum foil or ethylene vinyl alcohol (EVOH) film, preferentially being arranged between one of the layers of the heat-seal plastic material and the layer of fibrous material.

20 **[0031]** Preferentially, web of packaging material 3 may also comprise a further layer of heat-seal plastic material being interposed between the layer of gas- and light-barrier material and the layer of fibrous material.

**[0032]** Preferentially, web of packaging material 3 may comprise successively arranged patterns, each pattern  
25 defining a final graphical pattern of the respective package 2. In other words, packaging machine 1 operates, in use, such to guarantee that packages 2 comprise the respective pattern.

30 **[0033]** Furthermore, packaging machine 1 may be configured to produce packages 2 by forming a tube 4 from web of packaging material 3, longitudinally sealing tube 4, filling tube 4 with the pourable product and to transversally seal, and preferentially transversally cut tube 4.

35 **[0034]** According to some possible non-limiting embodiments, each package 2 may extend along a longitudinal axis A.

**[0035]** According to some possible embodiments, each package 2 may comprise at least a first transversal sealing band 5a arranged at a first end of package 2, and preferentially also a second transversal sealing band 5b arranged at a second end of package 2 opposite to the first end.

40 **[0036]** Preferentially, each first transversal sealing band 5a may be substantially spaced apart from the respective second transversal sealing band 5b along the respective longitudinal axis A.

**[0037]** Moreover, each package 2 may also comprise a longitudinal seam portion 6. Preferentially, each first transversal sealing band 5a and/or each second transversal sealing band 5b may be transversal, preferentially perpendicular, to the respective longitudinal seam portion 6.

45 **[0038]** With particular reference to Figure 1, packaging machine 1 may comprise:

- a magazine unit 10 configured to host at least one, reel 11 of web of packaging material 3 at a host

station 12; and

- a conveying device 13 configured to advance web of packaging material 3 along a web advancement path P.

**[0039]** According to some preferred non-limiting embodiments, conveying device 13 may be configured to advance web of packaging material 3 to a tube forming station 14, at which, in use, web of packaging material 3 is formed into tube 4, and configured to advance tube 4 along a tube advancement path Q.

**[0040]** According to some preferred non-limiting embodiments, packaging machine 1 may also comprise:

- a tube forming and sealing device 15 configured to form tube 4 from the, in use, advancing web of packaging material 3 and to longitudinally seal tube 4, preferentially at tube forming station 14;
- a filling device 16 for filling tube 4 with the pourable product; and
- a package forming unit 17 configured to transversally seal, and preferentially to transversally cut tube 4 for obtaining semi-finalized packs, preferentially package pouches. Preferentially, package forming unit 17 may also be configured to form tube 4.

**[0041]** In further detail, packaging machine 1 may also comprise an isolation chamber 18, preferentially delimiting an inner environment 19 from an outer environment 20. Preferentially, inner environment 19 may be a sterile environment, preferably containing a controlled atmosphere.

**[0042]** Preferentially, tube forming and sealing device 15 may be at least partially arranged within and configured to fold and longitudinally seal tube 4 within isolation chamber 18, preferentially inner environment 19.

**[0043]** Moreover, packaging machine 1 may also comprise a sterilizing unit configured to sterilize the, in use, advancing web of packaging material 3, preferentially the sterilization unit being arranged upstream of tube forming and sealing device 15 along web advancement path P and/or downstream of host station 12.

**[0044]** In more detail, conveying device 13 may be configured to advance tube 4 and any intermediates of tube 4 along tube advancement path Q, preferentially from tube forming and sealing device 15 to and/or at least partially within package forming unit 17. Preferentially, with the wording intermediates of tube 4 any configuration of web of packaging material 3 is meant prior to obtaining the tube structure and after folding of web of packaging material 3 by tube forming and sealing device 15 has started. In other words, the intermediates of tube 4 are a result of the gradual folding of web of packaging material 3 so as to obtain tube 4, preferentially by overlapping the (longitudinal) edges of web of packaging material 3 with one another.

**[0045]** According to some possible non-limiting embodiments, tube forming and sealing device 15 may be

arranged such that tube 4 may have a vertical orientation.

**[0046]** Preferentially, filling device 16 may comprise a filling pipe 23 being configured to direct, in use, the pourable product into tube 4. Preferentially, filling pipe 23 may, in use, be at least partially placed within tube 4 for feeding, in use, the pourable product into tube 4.

**[0047]** According to some preferred non-limiting embodiments, package forming unit 17 may comprise a plurality of, operative devices, each one configured to manipulate, preferentially to at least partially form, to at least transversally seal and to transversally cut, tube 4 for obtaining packages 2.

**[0048]** With particular reference to Figure 1, magazine unit 10 may be arranged upstream of isolation chamber 18 and/or tube forming and sealing device 15 and/or packaging forming unit 17.

**[0049]** With particular reference to Figures 1 to 4, magazine unit 10 comprises at least one support device 25 configured to carry at least one reel 11.

**[0050]** In more detail, each reel 11 may comprise a tubular holder 26 and web of packaging material 3 being wound about tubular holder 26.

**[0051]** Tubular holder may comprise a hollow body.

**[0052]** More specifically, tubular holder 26 may extend along a center axis B, and preferentially may have a cylindrical shape.

**[0053]** Support device 25 may engage with tubular holder 26 for carrying reel 11.

**[0054]** Additionally, magazine unit 10 may comprise a support structure for rotatably carrying support device 25 and such that, in use, support device 25 and reel 11 may rotate about a rotation axis C so as to unwind web of packaging material 3 from tubular holder 26.

**[0055]** In use, web of packaging material 3 of reel 11 gets exhausted.

**[0056]** In particular, an exhausted reel 11 comprises at least its tubular holder 26. Possibly, an exhausted reel 11 may also comprise some (minor) remaining portions of web of packaging material 3.

**[0057]** Moreover, support device 25 is removably coupled to support structure in order to load support device 25 carrying a new reel 11 and to remove support device 25 carrying an exhausted reel 11 (i.e. at least the respective tubular holder 26).

**[0058]** Preferentially, the support structure may allow to carry at least two support devices 25, one next to the other, and each one carrying a respective reel 11. In particular, in use, one of the support devices 25 rotates about the respective rotation axis C, while the other support device 25 stands still waiting for a splicing action to be executed. In more detail, the rotating support device 25 carries the web of packaging material 3 being used and the stationary support device 25 carries the new web of packaging material 3, which shall be spliced to the web of packaging material 3 being used before the web of packaging material 3 being used is completely exhausted.

**[0059]** In further detail, each reel 11 may comprise two

lateral surface portions 27, preferentially spaced apart along a first direction D1 substantially parallel to, preferentially parallel to, center axis B.

**[0060]** Preferentially, each lateral surface portion 27 may be substantially perpendicular, in particular perpendicular, to center axis B.

**[0061]** Moreover, each tubular holder 26 may comprise and extend between two lateral rims 28 opposite to one another.

**[0062]** Additionally, each lateral rim 28 may delimit a respective opening 29 of the respective tubular holder 26.

**[0063]** In further detail, lateral surface portions 27 are formed from the respective lateral rims 28 and respective lateral edges of web of packaging material 3.

**[0064]** It must be noted that, in use, the amount of web of packaging material 3 decreases with time and accordingly the extension of each lateral surface portion 27 is reduced. It is clear that the extension of lateral rims 28 is not subject to any reductions in size, during use.

**[0065]** Additionally, each reel 11 may comprise an outer face 30 being radially displaced from center axis B. Preferentially, outer face 30 may correspond to a face of web of packaging material 3, which once the respective packages 2 are formed, defines the outer surface of the respective packages 2.

**[0066]** Preferentially, outer face 30 may comprise the successively arranged patterns.

**[0067]** With particular reference to Figures 2 to 7, support device 25 comprises a spindle 31 extending along a longitudinal axis E, a first clamping group 32 and a second clamping group 33 connected to spindle 31 and configured to clamp reel 11 between one another.

**[0068]** First clamping group 32 and second clamping group 33 may be secured to spindle 31, in particular such that first clamping group 32 and second clamping group 33 do not move, in use, along spindle 31.

**[0069]** According to some possible non-limiting embodiments, support device 25 may comprise securing elements configured to secure first clamping group 32 and/or second clamping group 33 to spindle 31. Possibly, at least some or all securing elements may allow to be loosened so as to allow to modify the relative position of first clamping group 32 and/or second clamping group 33 on spindle 31.

**[0070]** According to some preferred non-limiting embodiments, first clamping group 32 and second clamping group 33 may be coaxial to spindle 31.

**[0071]** In particular, first clamping group 32 and second clamping group 33 are configured to maintain a relative position of reel 11 with regard to spindle 31, i.e., in use, during rotation of reel 11 around rotation axis C, there is no lateral displacement of reel 11 along a direction parallel to rotation axis C.

**[0072]** Advantageously, first clamping group 32 may be configured to laterally engage reel 11, in particular the respective lateral surface portion 27, from a first side and second clamping group 33 may be configured to laterally engage reel 11, in particular the respective lateral surface

portion 27, from a second side opposite to the first side. In other words, first clamping group 32 and second clamping group 33 may be configured to engage reel 11 from opposite sides thereof.

**[0073]** More specifically, each one of first clamping group 32 and second clamping group 33 is configured to engage one respective lateral surface portion 27 for clamping the respective reel 11.

**[0074]** In further detail, first clamping group 32 and second clamping group 33 may be spaced apart from one another along a second direction D2 parallel to longitudinal axis E.

**[0075]** In particular, the distance between first clamping group 32 and second clamping group 33 may be determined by the length of tubular holder 26.

**[0076]** Advantageously, second clamping group 33 may comprise a locking device 34 configured to engage the second side of reel 11, preferentially the respective lateral surface portion 27.

**[0077]** In more detail, locking device 34 may be controllable between:

- an active configuration in which locking device 34 is configured to engage the second side of reel 11, preferentially the respective lateral surface portion 27, for clamping reel 11 in cooperation with first clamping group 32; and
- a rest configuration in which it is possible to introduce second clamping group 33 into and move second clamping group 33 within tubular holder 26, preferentially during a coupling step during which reel 11 is coupled to support device 25 and an uncoupling step during which reel 11 is uncoupled from support device 25.

**[0078]** In particular, thanks to locking device 34 it is possible to couple reel 11 to and uncouple reel 11 from support device 25 without the need of dismounting second clamping group 33 from spindle 31.

**[0079]** In Figure 5 spindle 31 and reel 11 are not coupled to one another yet. Additionally, locking device 34 is in the active configuration and it is not yet possible to introduce second clamping group 33 into tubular holder 26. Therefore, an operator controls locking device 34 in the rest configuration so that it is possible to introduce second clamping group 33 into tubular holder 26 and to move second clamping group 33 within tubular holder 26 (see Figure 6). At some point, second clamping group 33 exits from tubular holder 26 and locking device 34 is controlled again in the active configuration thereby guaranteeing that second clamping group 33 and first clamping group 32 clamp reel 11 between one another (see Figure 7). By controlling again locking device 34 in the rest configuration and by moving second clamping group 33 along the opposite direction it is possible to uncouple support device 25 and reel 11 from one another.

**[0080]** Moreover, movement of second clamping group 33 within tubular holder 26 may occur by moving

reel 11 and/or by moving second clamping group 33.

**[0081]** Additionally, second clamping group 33 is moved by moving support device 25 as a whole.

**[0082]** According to some preferred non-limiting embodiments, locking device 34 may be biased in the active configuration, i.e. locking device 34 is controlled automatically in the active configuration. This ensures that during a coupling step and while second clamping group 33 exits from tubular holder 26, locking device 34 automatically gets in the active configuration such that reel 11 becomes clamped between first clamping group 32 and second clamping group 33.

**[0083]** With particular reference to Figures 2 to 7, locking device 34 may comprise one or more, in particular at least two, more in particular exactly two, locking elements 39, each one being movable between a respective extracted position (see Figures 2 to 5 and 7) and a respective retracted position (see Figure 6).

**[0084]** Each locking element 39 may be configured to laterally engage reel 11, preferentially the respective lateral surface portion 27 when being in the extracted position and to laterally disengage from reel 11, preferentially lateral surface portion 27, when being in the retracted position.

**[0085]** Moreover, locking device 34 may be controlled in the active configuration and the rest configuration with locking elements 39 being in, respectively, the respective extracted positions and the respective retracted positions.

**[0086]** In further detail, locking elements 39 may be displaced from one another along a direction transversal, more specifically perpendicular to, to longitudinal axis E and/or spindle 31.

**[0087]** In particular, locking elements 39 may be opposite to one another with respect to longitudinal axis E and/or spindle 31.

**[0088]** According to some preferred non-limiting embodiments, a relative distance between locking elements 39 is larger when locking elements 39 are in the respective extracted positions than when locking elements 39 are in the respective retracted positions.

**[0089]** With reference to the specific embodiment shown, a maximum distance between the outermost portions of locking elements 39 may equal or may be smaller than an inner diameter of tubular holder 26 when locking elements 39 are in the extracted positions and may be larger than the inner diameter of tubular holder 26 when locking elements 39 are in the retracted positions.

**[0090]** Moreover, during control of locking elements 39 from the respective extracted positions to the respective retracted positions locking elements 39 move towards one another and during control of locking elements 39 from the respective rest positions to the respective extracted positions locking element 39 move away from one another.

**[0091]** According to some preferred non-limiting embodiments, each locking element 39 linearly moves between the respective extracted position and the respec-

tive retracted position.

**[0092]** According to some preferred non-limiting embodiments, each locking element 39 may be radially movable and/or movable along a direction transversal to spindle 31 and/or the longitudinal axis E between the respective extracted position and the respective retracted position.

**[0093]** According to some preferred non-limiting embodiments, each locking element 39 may comprise a respective engagement surface 40 configured to engage reel 11 with the respective locking element 39 being positioned in the respective extracted position.

**[0094]** In particular, each engagement surface 40 faces first clamping group 32.

**[0095]** With particular reference to Figures 4 to 7, locking device 34 may further comprise one or more, in particular at least two, more in particular exactly two, biasing elements 41, each one being coupled to and/or interacting with one respective locking element 39 and being configured to bias the respective locking element 39 in the extracted position.

**[0096]** In other words, biasing elements 41 guarantee that locking device 34 is kept in the respective active configuration.

**[0097]** Each biasing element 41 may be elastically deformable. Biasing elements 41 may be, for example, springs.

**[0098]** According to some preferred non-limiting embodiments, second clamping group 33 may comprise one respective housing space 42 for each locking element 39.

**[0099]** Preferentially, each locking element 39 may be linearly moveably arranged within the respective housing space 42.

**[0100]** More specifically, each housing space 42 may be at least partially delimited by two sliding surfaces spaced apart from one another. Additionally, each locking element 39 comprises two lateral engagement surfaces, each one engaging one respective sliding surface. In particular, interaction between sliding surfaces and lateral engagement surfaces define the linear movement of locking elements 39 when moving between the respective extracted position and the respective retracted positions.

**[0101]** According to some preferred non-limiting embodiments, locking device 34 may comprise at least a first control assembly 43, preferentially also a second control assembly 44, coupled to locking elements 39 and being configured to allow control of locking elements 39 from the respective extracted positions to the respective retracted positions.

**[0102]** With particular reference to Figures 2 to 7, first control assembly 43 and second control assembly 44 may be associated to opposite sides of second clamping group 33. In particular, in this way, first control assembly 43 and second control assembly 44 are approachable from different sides, which is advantageous in order to render control of locking elements 39 from the extracted positions to the retracted positions comfortable and in-

dependent on whether reel 11 needs to be coupled or uncoupled from support device 25.

**[0103]** When controlling locking elements 39 from the extracted positions to the retracted positions for coupling reel 11 to support device 25, second control assembly 44 needs to enter tubular holder 26 (see for example Figures 5 and 6) and cannot be handled by an operator, whereby first control assembly 43 is easily accessible and can be operated by an operator during insertion of second clamping group 33 into tubular holder 26. On the other side, when reel 11 is coupled to support device 25, first control assembly 43 sits within tubular holder 26 and is not accessible, while second control assembly 44 can be operated by an operator (see Figure 7).

**[0104]** In particular, operation of first control assembly 43 and second control assembly 44 allows to counter-act the force generated by biasing elements 41.

**[0105]** In further detail, each one of first control assembly 43 and second control assembly 44 comprises two respective control elements 45, each one integrally connected to one respective locking element 39.

**[0106]** Control elements 45 of first control assembly 43 and of second control assembly 44 are configured to be engaged by an operator so as to operate, respectively, first control assembly 43 and second control assembly 44.

**[0107]** According to some preferred non-limiting embodiments, each control element 45 may axially protrude, e.g. from the respective locking element 39 as shown with regard to control elements 45 of first control assembly 43.

**[0108]** When reverting to second control assembly 44 one notes that the respective control elements 45 are configured so as to define together with the respective locking elements 39 an indentation.

**[0109]** It is clear that the specific arrangements of control elements 45 of first control assembly 43 may be applied similarly by second control assembly 44 or vice versa.

**[0110]** According to some preferred non-limiting embodiments, first clamping group 32 may comprise an engagement surface 46 configured to engage reel 11, preferentially the respective lateral surface portion 27, for clamping reel 11 between engagement surface 46 and engagement surface 40.

**[0111]** In particular, engagement surface 46 and engagement surface 40 may face one another.

**[0112]** With particular reference to Figures 2 to 7, each one of first clamping group 32 and second clamping group 33 may comprise a respective support surface 47 configured to carry tubular holder 26.

**[0113]** More specifically, each support surface 47 may comprise a plurality of surface portions 48, in the specific case shown four, angularly displaced from one another about longitudinal axis E.

**[0114]** Moreover, the respective surface portions 48 may be equally and angularly spaced apart from one another about longitudinal axis E.

**[0115]** In the specific case shown, each support sur-

face 47 may be formed by discretely arranged surface portions 48. Alternatively, support surfaces 47 could have an annular shape.

**[0116]** In both cases, support surface 47 lies on an annular imaginary surface, preferentially an imaginary cylinder. Preferentially, a size of the imaginary surface corresponds to an inner size of tubular holder 26.

**[0117]** More specifically, a radius of the imaginary surface corresponds to an inner radius of tubular holder 26.

**[0118]** According to some preferred non-limiting embodiments, locking elements 39 may be flush with support surface 47 when being placed in the retracted positions.

**[0119]** In use, packaging machine 1 forms packages 2 filled with the pourable product.

**[0120]** In more detail, conveying device 13 advances web of packaging material 3 from magazine unit 10, preferentially to host station 12.

**[0121]** In further detail, conveying device 13 advances web of packaging material 3 from host station 7 to forming station 10 at which web of packaging material 3 is formed into tube 4. During advancement of web of packaging material 3 support device 25 rotates about rotation axis C.

**[0122]** Conveying device 13 further advances tube 4 along tube advancement path Q to package forming unit 17. During advancement of tube 4, filling device 16 fills tube 4 with the pourable product.

**[0123]** Preferentially, during advancement of web of packaging material 3 along web advancement path P web of packaging material 3 is sterilized at the sterilization station.

**[0124]** Package forming unit 13 forms and transversally seals tube 4 and, preferentially, also transversally cuts tube 4 so as to obtain packages 2.

**[0125]** Additionally, during operation, each reel 11 gets exhausted. In order to avoid interruption of production, a new web of packaging material 3 is spliced to web of packaging material 3 being used.

**[0126]** Additionally, repeatedly one feeds new reels 11 into magazine unit 10.

**[0127]** Therefore, one needs to repeatedly couple reels 11 to and uncouple reels 11 from support device 25.

**[0128]** Such operations may be done outside of magazine unit 10.

**[0129]** The method for coupling a respective reel 11 to one respective support device 25 comprises the steps of:

- providing the respective support device 25; and
- supplying a new reel 11 having the respective tubular holder 26 and the respective web of packaging material 3 wound about the respective tubular holder 26.

**[0130]** Additionally, the method comprises the steps of:

- controlling locking device 34 in the rest configuration;
- inserting second clamping group 33, preferentially through a respective opening 29, into tubular holder 26; and

- pushing second clamping group 33 through and at least partially out of tubular holder 26, preferentially until locking device 34 exits through the opposite opening 29; and
- controlling locking device 34 back to the active configuration after finishing to push second clamping group 33 through tubular holder 26, preferentially after exiting of locking device 34 through the opposite opening 29.

**[0131]** In more detail, during the step of controlling locking device 34 in the respective rest configuration, the respective locking elements 39 are moved in the respective retracted positions. More specifically, first control assembly 43 is operated so as to move locking elements 39 in the retracted positions.

**[0132]** Moreover, during the step of inserting and the step of pushing, one moves support device 25. Alternatively or in addition, one moves reel 11.

**[0133]** Typically, it is advisable to move support device 25 as reel 11 has a significant weight.

**[0134]** Additionally, during the step of pushing, locking elements 39 abut against tubular holder 26, in particular an inner surface of tubular holder 26, and, therefore, cannot move back to the extracted positions.

**[0135]** According to some preferred non-limiting embodiments, during the step of controlling locking device 34 back to the active configuration, biasing elements 41 bias locking elements 39 back to the extracted positions.

**[0136]** Moreover, afterwards, reel 11 is clamped between first clamping group 32 and second clamping group 33.

**[0137]** Then, one places support device 25 together with reel 11 in magazine unit 10.

**[0138]** Before complete exhaustion of web of packaging material 3 being used, the new web of packaging material 3 of the new reel 11 is spliced to the web of packaging material 3 in use.

**[0139]** Afterwards, one needs to remove the exhausted reel 11 and eventually to place a new reel 11 within magazine unit 10.

**[0140]** Then one wants to uncouple at least the respective tubular holder 26 from support device 25. It may also occur that some remaining portions of web of packaging material 3 are still connected to tubular holder 26. In such a case, one detaches tubular holder 26 together with the remaining web of packaging material 3 from support device 25.

**[0141]** The method for uncoupling tubular holder 26 from support device 25 comprises the steps of:

- controlling locking device 34 in the respective rest configuration;
- forcing second clamping group 33 into tubular holder 26, in particular through the respective opening 29; and
- pushing second clamping group 33 through and out of tubular holder 26.

**[0142]** In more detail, during the step of controlling locking device 34 in the rest configuration, the respective locking elements 39 are moved in the respective retracted positions. More specifically, second control assembly 44 is operated so as to move locking elements 39 in the retracted positions.

**[0143]** Once second clamping group 33 has exited from the respective opening 29, locking device 34 is biased back to the active configuration.

**[0144]** The advantages of support device 25 according to the present invention will be clear from the foregoing description.

**[0145]** In particular, support device 25 allows to couple reel 11 to and uncouple a reel 11 from support device 25 in an easy manner.

**[0146]** Additionally, by locking device 34 being biased in the active configuration, one ensures clamping of reel 11.

**[0147]** Moreover, first control assembly 43 and second control assembly 44 allow an easy operation of locking device 34 both when a reel 11 is coupled to support device 25 and when a reel 11 needs to be coupled to support device 25.

**[0148]** Clearly, changes may be made to packaging machine 1, and/or support device 25 and/or the methods as described herein without, however, departing from the scope of protection as defined in the accompanying claims.

## Claims

1. Support device (25) for carrying a reel (11) having a tubular holder (26) and a web of packaging material (3) wound about the tubular holder (26);

wherein the support device (25) comprises a spindle (31) extending along a longitudinal axis (E), a first clamping group (32) and a second clamping group (33) connected to the spindle (31) and configured to clamp the reel (11) between one another;

wherein the first clamping group (32) is configured to laterally engage the reel (11) from a first side and the second clamping group (33) is configured to laterally engage the reel (11) from a second side opposite to the first side;

wherein the second clamping group (33) comprises a locking device (34) controllable between:

- an active configuration in which the locking device (34) is configured to engage the second side of the reel (11) for clamping the reel (11) in cooperation with the first clamping group (32); and
- a rest configuration in which it is possible to introduce the second clamping group (32)

- into the tubular holder (26) and to move the second clamping group (33) within the tubular holder (26).
2. Support device according to claim 1, wherein the locking device (34) is biased in the active configuration.
  3. Support device according to claim 1 or 2 wherein the locking device (34) comprises one or more locking elements (39), each locking element (39) being movable between a respective extracted position and a respective retracted position;
 

wherein each locking element (39) is configured to laterally engage the reel (11) when being in the extracted position and to laterally disengage from the reel (11) when being in the retracted position;

wherein the locking device (34) is controlled in the active configuration and the rest configuration with each locking element (39) being in, respectively, the respective extracted position and the respective retracted position.
  4. Support device according to claim 3, wherein each locking element (39) is radially movable and/or movable along a direction transversal to the spindle (31) and/or the longitudinal axis (E) between the respective extracted position and the respective retracted position.
  5. Support device according to claim 3 or 4, wherein the locking device (34) further comprises one or more biasing elements (41), each biasing element (41) interacting with one respective locking element (39) and being configured to bias the respective locking element (39) in the extracted position.
  6. Support device according to any one of claims 3 to 5, wherein the second clamping group (33) comprises one respective housing space (42) for each locking element (39);
 

wherein each locking element (39) is linearly movably arranged within the respective housing space (42).
  7. Support device according to claim 6, wherein each housing space (42) is at least partially delimited by two sliding surfaces spaced apart from one another; wherein each locking element (39) comprises two lateral engagement surfaces, each one engaging one respective sliding surface.
  8. Support device according to any one of claims 3 to 7, wherein the locking device (34) comprises at least a first control assembly (43) coupled to the one or more locking elements (39) and being configured to allow control of the locking elements (39) from the respective extracted positions to the respective retracted positions.
  9. Support device according to claim 8, wherein the first control assembly (43) comprises two control elements (45), each one integrally connected to one respective locking element (39); wherein each control element (45) is configured to be engaged by an operator so as to allow operation of the first control assembly (43).
  10. Support device according to claim 9, wherein each control element (45) axially protrudes from the respective locking element (39).
  11. Support device according to any one of claims 8 to 10, and further comprising a second control assembly (44) coupled to the locking elements (39) and being configured to allow control of the locking elements (39) from the extracted position to the retracted position; wherein the first control assembly (43) and the second control assembly (44) are associated to opposite sides of the second clamping group (44).
  12. Support device according to any one of the preceding claims, wherein each one of the first clamping group (32) and the second clamping group (33) comprises a support surface (47) configured to carry the tubular holder (26) .
  13. Support device according to claim 12, wherein each support surface (47) comprises a plurality of surface portions (48) angularly displaced from one another about the longitudinal axis (E).
  14. A packaging machine (1) for producing sealed packages (2) of a pourable product comprising:
    - an isolation chamber (18) separating an inner environment (19) from an outer environment (20);
    - a tube forming and sealing device (15) at least partially arranged within the isolation chamber (18) and configured to form and longitudinally seal a tube (4) from a web of packaging material (3) at a tube forming station (14) ;
    - a filling device (16) for filling the tube (3) with the pourable product;
    - a package forming unit (17) configured to manipulate the tube (3) for forming the packages (2);
    - a conveying device (13) for advancing the web of packaging material (3) along a web advancement path (P) from a host station (12) to the tube forming station (14) and for advancing the tube (3) along a tube advancement path (Q) to the

package forming unit (13); and  
 a magazine unit (10) for storing at least one reel  
 (11) having a tubular holder (26) and a web of  
 packaging material (3) wound about the tubular  
 holder (26); 5  
 wherein the magazine unit (10) comprises at  
 least one support device (25) according to any  
 one of the preceding claims.

**15.** Method for coupling a reel (11) to a support device 10  
 (25) ;  
 the method comprising the steps of:

- providing a support device (25) according to 15  
 any one of claims 1 to 13;
- supplying a reel (11) having a tubular holder  
 (26) and a web of packaging material (3) wound  
 about the tubular holder (26);
- controlling the locking device (34) in the rest 20  
 configuration;
- inserting the second clamping group (33) into  
 the tubular holder (26);
- pushing the second clamping group (33)  
 through the tubular holder (26); and
- controlling the locking device (34) back to the 25  
 active configuration after finishing to push the  
 second clamping group (33) through and at least  
 partially out of the tubular holder (26).

**16.** Method for uncoupling a tubular holder of an ex- 30  
 hausted reel (11) from a support device (25) accord-  
 ing to any one of claims 1 to 13;  
 the method comprising the steps of:

- controlling the locking device (34) in the rest 35  
 configuration;
- forcing the second clamping group (33) into the  
 tubular holder (26);
- pushing the second clamping group (33)  
 through and out of the tubular holder (26). 40

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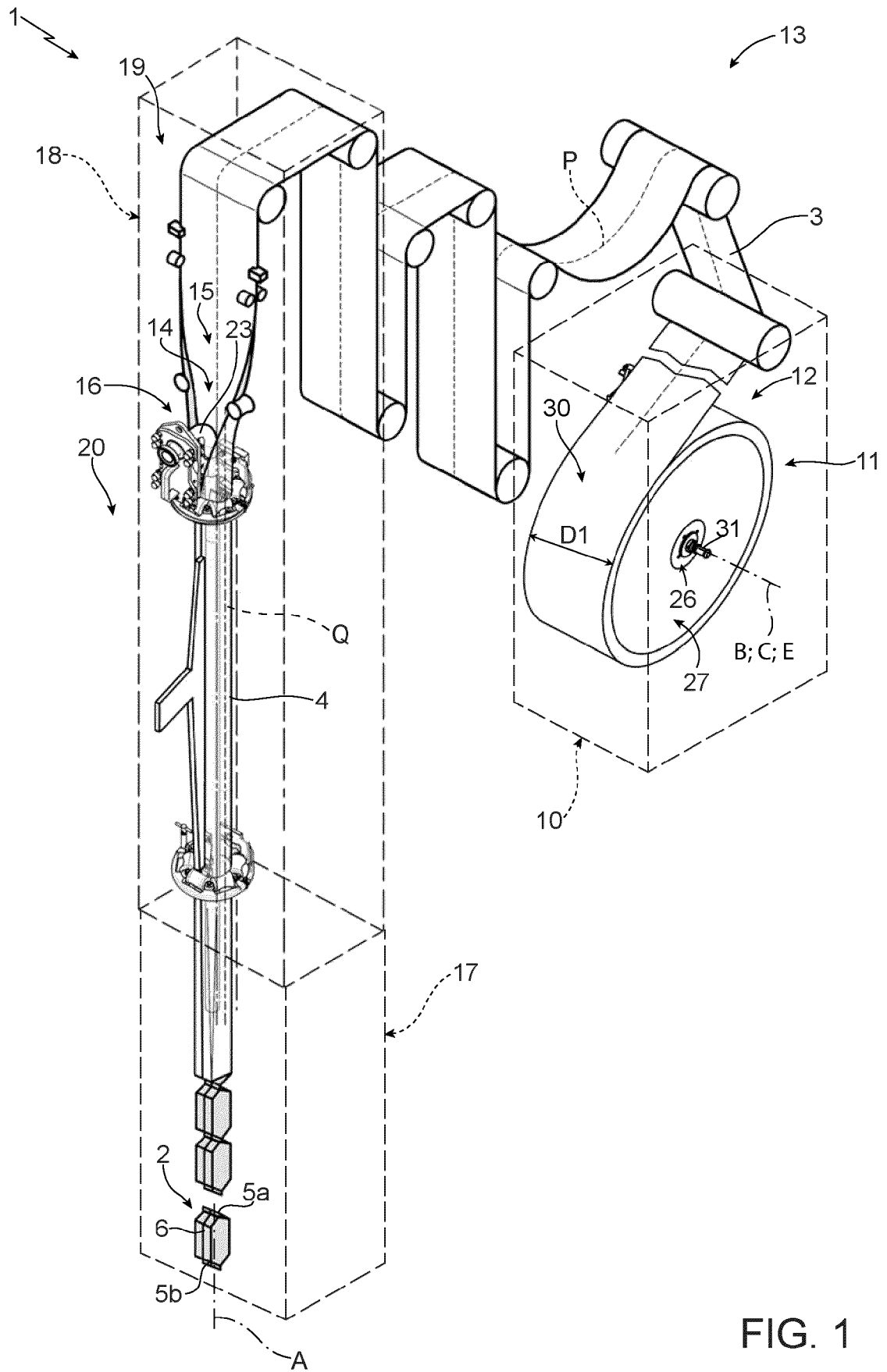


FIG. 1

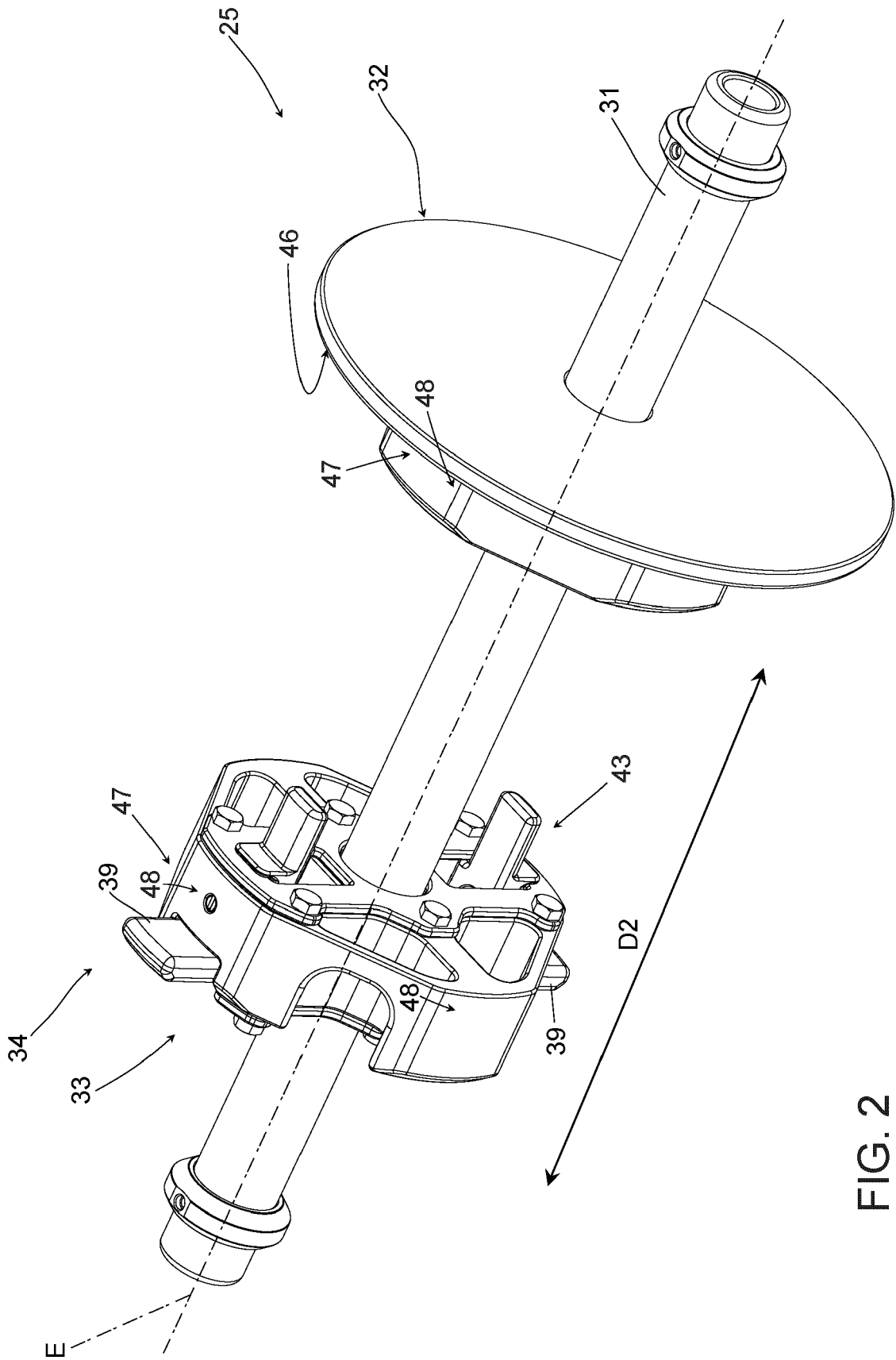


FIG. 2

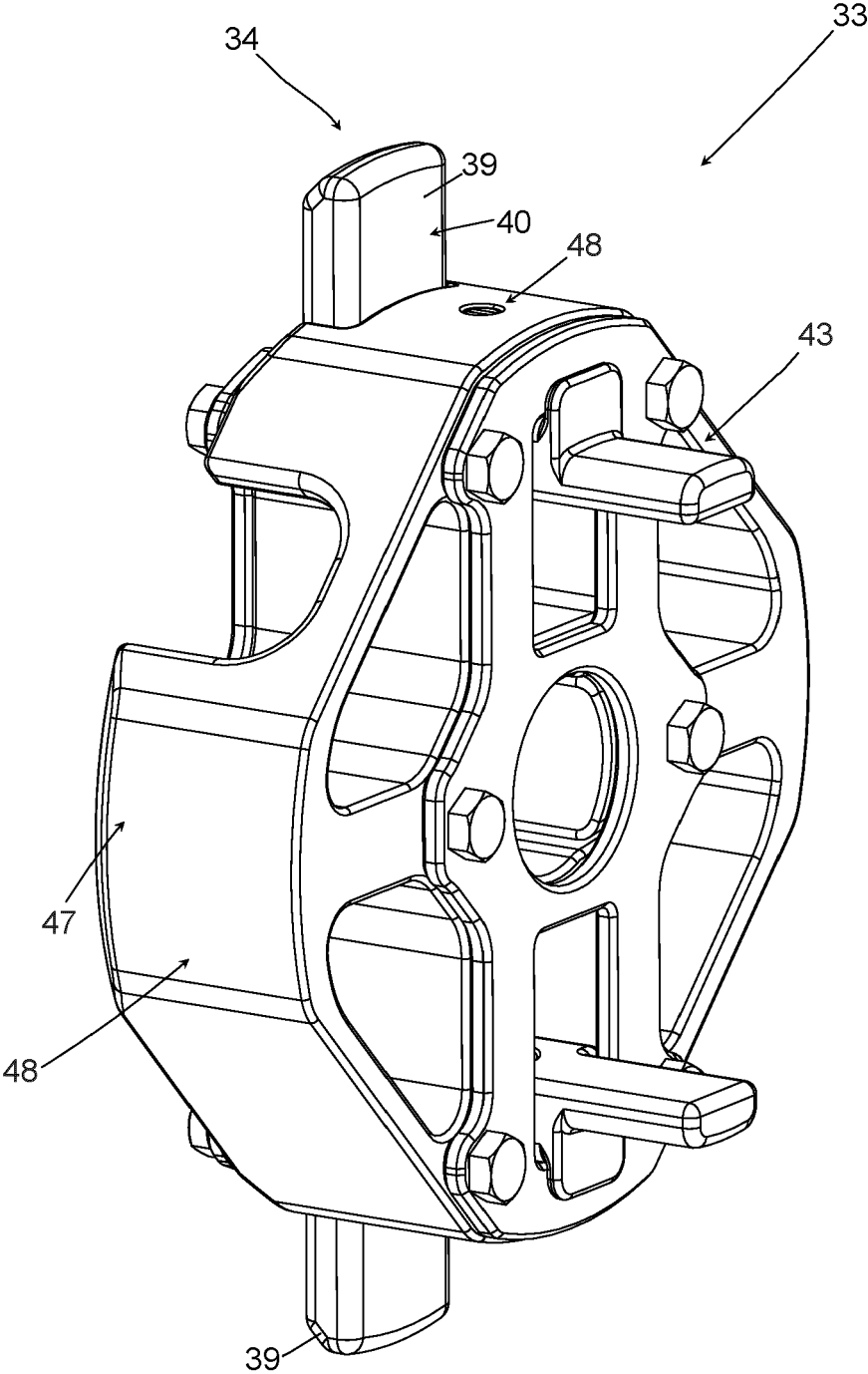


FIG. 3

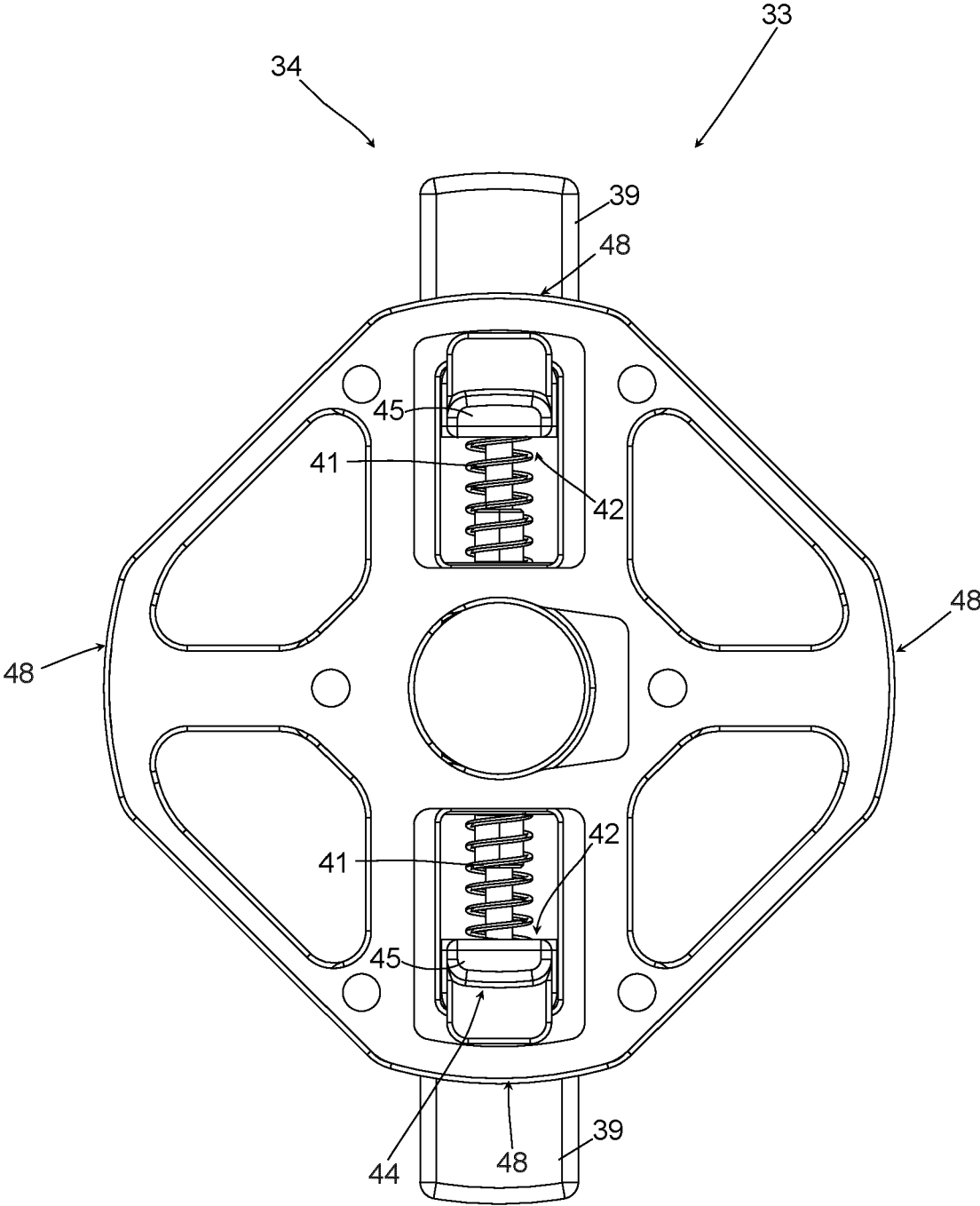


FIG. 4

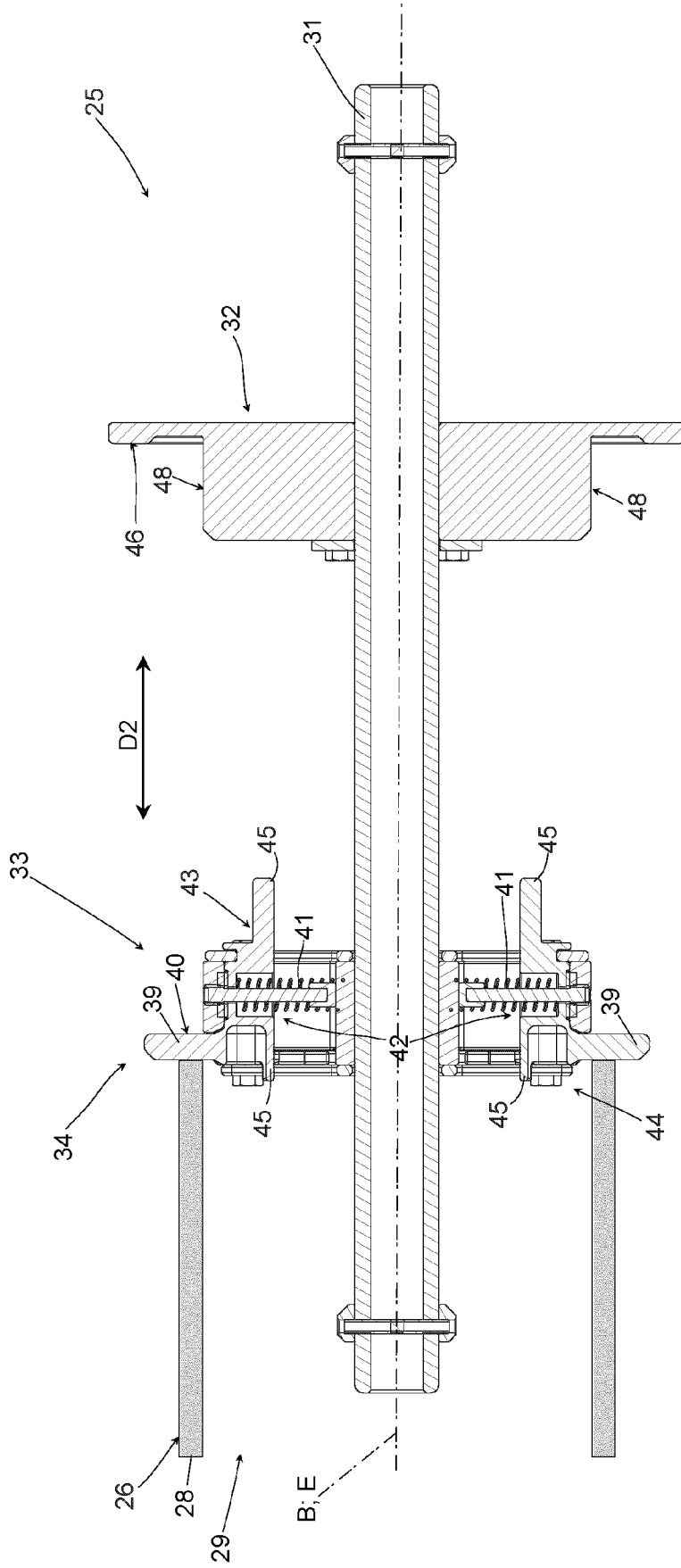


FIG. 5

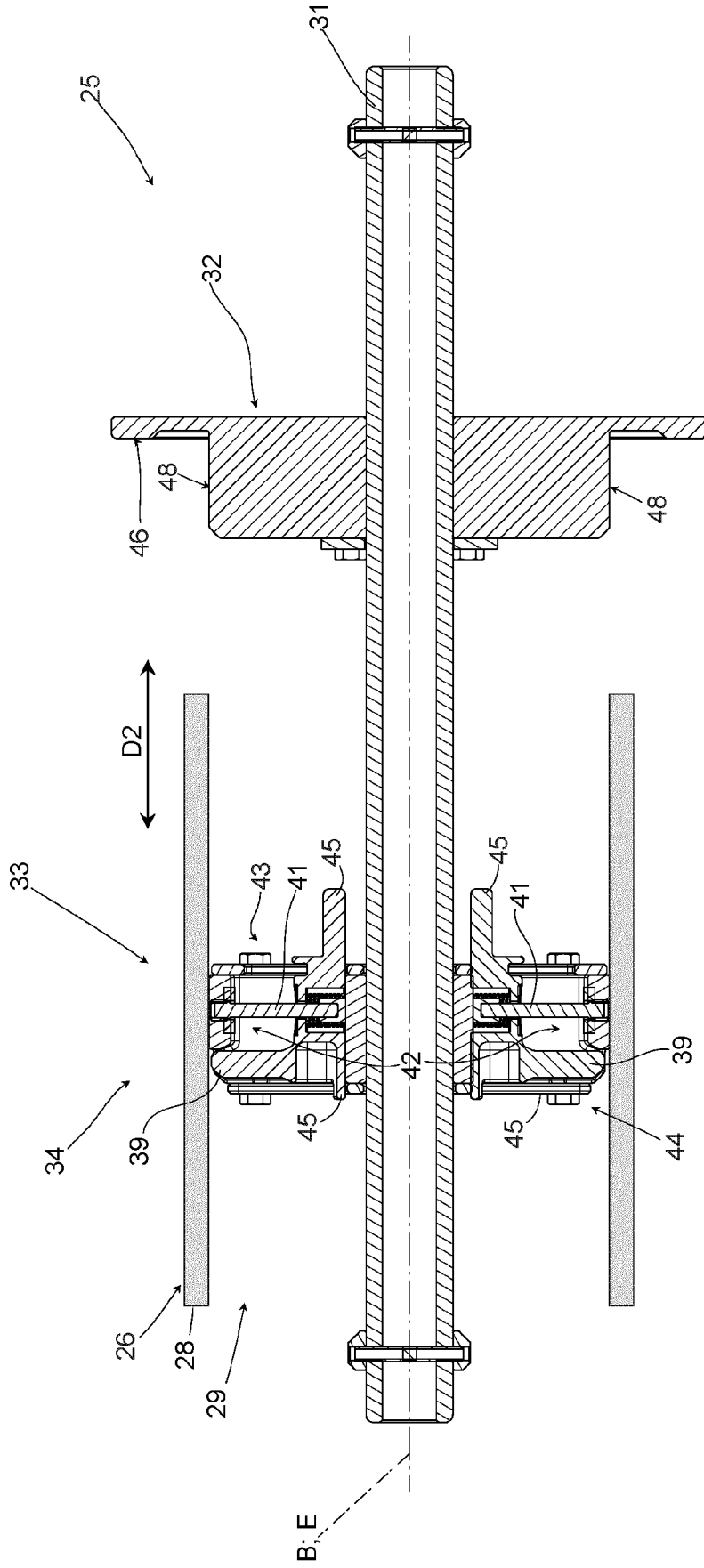


FIG. 6





EUROPEAN SEARCH REPORT

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|  |   |   | B65H                                    |
| The present search report has been drawn up for all claims   |   |   |   |
| Place of search<br><b>The Hague</b>  |   | Date of completion of the search<br><b>6 December 2024</b>  | Examiner<br><b>Haaken, Willy</b>        |
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