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(54) WASHING MACHINE, HOLDING DEVICE, AND WASHING METHOD

WASCHMASCHINE, HALTEVORRICHTUNG UND WASCHVERFAHREN

MACHINE À LAVER, DISPOSITIF DE MAINTIEN ET PROCÉDÉ DE LAVAGE

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Description

Background of the invention

[0001] The invention relates to a washing machine for washing rugs.

[0002] The invention further still relates to a washing method.

[0003] The field of the invention is described in greater detail in the preambles of the independent claims of this application.

[0004] Automatic washing machines have been developed for washing rugs and similar textiles, in which the front edge of the rug to be washed is fed to receiving means of the washing machine, after which the washing machine takes control of the rug being washed and carries out its washing and drying. Drawbacks have been detected in the receiving means of current washing machines. Document US 3 643 277 A discloses a device for cleaning venetian blind slats that includes a housing having spaced opposite sidewalls defining an inlet opening for the slats respectively. A substantially horizontal slat passage plane is defined between the apertures within the housing and the clamping points of two pairs of superposed driving rolls having rubber-elastic surfaces and arranged adjacent the respective apertures and provide guiding means for the slats for delivering the slats between two horizontally spaced pairs of cleaning rolls.

Summary of the invention

[0005] It is an object of the invention to provide a novel and improved washing machine and washing method.

[0006] The features according to the solution of the invention are set forth in the independent claims.

[0007] Some embodiments are disclosed in the dependent claims.

[0008] The idea of the disclosed solution is that a washing machine comprises, in connection with its feed opening, an underpressure-operated holding device. An end of the washable textile product may in this case be held in place by suction and a suction force or effect formed by it until a user of the washing device has taken his hand away from the feed opening.

[0009] The advantage of the solution set forth is that the holding device does not comprise any dangerous machine parts. The holding device makes use of suction instead of pressing means, roll-nips, or sharp parts. In addition to safety, a further advantage is the simple structure of the solution, whereby it is durable, maintenance-free, and economical. Further, a receiving means based on suction will not damage the textile product in any way.

[0010] The idea of an embodiment is that said at least one holding device is immovable. When the holding device is an immovable machine element, its structure may be simple and durable. In addition, the holding device is continuously located at a predetermined place near the feed opening, making it easy to use.

[0011] The idea of one embodiment is that said at least one holding device comprises at least one suction port on the side of the bottom surface of the washable textile product.

[0012] A textile product typically comprises an upper surface layer with aesthetic patterns and designs, and a lower bottom layer that acts as the body of the textile product. The body layer at the bottom side is usually more dense and solid as regards its structure than the aesthetic surface layer. When the underpressure is exerted on the stiffer bottom layer, a strong enough holding force may be established to retain the textile product at the feed opening. Further, the washing machine may have, near the feed opening, a feed table to which the suction ports are formed.

[0013] The idea of an embodiment is that in connection with the feed opening there is at least one stopper against which a first end of the washable planar textile product may be parked. The mechanical stopper ensures the correct parking and direction of the washable textile, that is, the fact that the transfer run through the washing machine takes place straight. Pushing an end of a textile against the stopper is simple and intuitive. In addition, the mechanical stopper may have a simple structure and be durable. The stopper may be adapted to be movable so that the stopper may move out of the way of the textile product after the transfer device of the washing machine starts to move the textile product to the washing zone.

[0014] The idea of an embodiment is that the first end of the washable textile product is detected by one or more sensors or a measuring device to be sure of the location and position of the textile before it is taken inside the washing machine and starting the wash. So, a mechanical stopper may be replaced with sensors.

[0015] The idea of an embodiment is that said at least one holding device belonging to the washing machine is separate and functionally independent in relation to the transfer means.

[0016] The idea of an embodiment is that said at least one holding device belonging to the washing machine comprises at least two suction ports at a transverse distance from each other. In some cases there may be three, four or more suction ports.

[0017] The idea of an embodiment is that the suction ports of the holding device are elongated in shape and have their longitudinal axis transverse in relation to the feed direction of the textile product.

[0018] The idea of an embodiment is that the washing machine comprises a feeding table or similar planar surface on top of which the washable textile product may be adapted and which is provided with one or more suction ports to form a holding force.

[0019] The idea of an embodiment is that the washing machine is an automated planar washing machine for washing planar textile products, such as rugs. The washing machine may be adapted to work on the self-service principle.

[0020] The idea of an embodiment is that the washing

machine comprises at least one suction unit, which may be an underpressure pump, for example. Alternatively, the washing machine comprises a suction connection to connect it to a suction line.

[0021] The idea of an embodiment is that the washing machine comprises at least one door, hatch, or panel that opens and closes, whereby the washing machine may be protected all over by an enclosure or oversheath after an end of a textile product has been set to be held by means of suction and the washing machine is ready to start a washing cycle. In connection with the hatch or similar there may be a safety edge or similar safety element which, when detecting a user's hand in the feed opening, causes the hatch to open.

[0022] The idea of an embodiment is that instead of a washing machine, the disclosed holding device and its features may be applied to handle a planar textile product in a vacuum-cleaning machine or a dryer where a similar need exists to feed an end of a product being handled to the feed end of a machine and to release a user's grip before starting the processing program of the machine. In such a case, the vacuum-cleaning or dryer machine has, instead of a washing head, a suction head that is moved in relation to the textile product during the operation of the machine.

Brief description of the figures

[0023]

Some embodiments of the invention are described in greater detail in the accompanying drawings, in which Figure 1 schematically shows a washing machine,

Figure 2 schematically shows a feed end of a washing machine where the washable textile product is parked against a stopper and a holding force is exerted on the textile product by means of suction,

Figure 3 schematically shows the feed end of the washing machine according to Figure 2 after the textile product has been brought to be controlled by the washing machine and transferred to the washing zone by means of feeding means,

Figure 4 is a top view of a textile product whose first end, that is, the front edge is parked against a transverse stopper and on the bottom surface of which suction is exerted from the suction ports to keep it in place,

Figure 5 schematically shows an alternative arrangement at the feed end of the washing machine, where the end of a textile product is detected by means of sensors to make sure of its correct position and direction before moving on to automatic operation, and

Figure 6 is a simplified diagram showing phases of operating the washing machine and some technical features.

[0024] For reasons of clarity, some embodiments of the invention are illustrated in the Figures in a simplified form. Similar parts are indicated in the figures by the same reference numbers.

Detailed description of the invention

[0025] Figure 1 shows a planar washing machine 1 for washing planar textile products 2 such as rugs or similar furnishing textiles. The washing machine 1 comprises a body and it may be surrounded by an enclosure 3 to make the device safe. The textile product 2 may be fed into the washing machine 1 through a feed opening 4 where it is taken over by gripping means 5. The gripping means 5 may comprise one or more holding devices 6 which may include suction ports 7 which are shown in greater detail in Figures 2 and 3. An underpressure may be led to the suction ports 7 from a suction source SU. The washing machine further comprises feeding means 8, such as rollers, by means of which the textile product 2 may be moved forward in the washing machine. In the vicinity of the feed opening 4 there may be a transverse stopper 9 against which the end of the textile product 2 is adapted. The stopper 9 may be a mechanical member that may be adapted to be moved in the vertical direction so that it may be moved out of the way of the textile product 2 when the washing cycle is started. The actual washing may be performed by means of a washing head or washing unit WU. The washing head WU may comprise one or more rotating washing nozzles and one or more suction nozzles. Washing agent or washing liquid is fed with high pressure from a washing liquid unit LU, and a drying suction may be formed either with the same suction source SU or with a different suction source than the one to the holding device 6. The feed opening 4 may be closed with the hatch 10 which may be adapted to be movable in the vertical direction. The operation of the washing machine 1 may be controlled by a control unit CU. The control unit CU may automatically control the suction of the holding device 6, hatch 10, feeding means, washing head WU and generally the entire work cycle of the washing machine 1 after the end of the textile product 2 is under control of the holding device 6. The user may give commands to the control unit CU by means of a user interface UI and, on the other hand, the control unit CU may instruct the user to carry out preparatory measures for the washing and the feeding of the textile product to the washing machine 1. Figure 1 additionally shows a basket 11 or a groove to which the washable textile product 2 may be adapted and to which it is fed after it has been washed.

[0026] Deviating from the schematic Figure 1, the textile product 2 being handled may first be run during the washing phase in the feed direction A (direction A is shown in Figure 4) and run in the opposite direction after washing, at the same as liquid is being sucked out of it to dry the product 2.

[0027] In Figure 2, the end of the textile product 2 is

manually placed against the mechanical stopper 9, and an underpressure S is applied to the suction port 7. The underpressure S affects the lower surface of the textile product 2 and forms a holding force F that keeps the end of the textile product 2 in place. The user may after this release his grip of the textile product 2 and take his hands away from the feed opening 4.

[0028] In Figure 3, the feeding means 8 have moved the textile product 2 further to the washing zone. In such a case, the stopper 9 has been moved out of the way of the textile product 2 and the hatch 10 closed.

[0029] Figure 4 shows a top view of the textile product 2, holding device 6, and stopper 9. The holding device 6 may comprise a feed table 12 or similar planar surface provided with suction ports 7. There may be two suction ports 7, sometimes more, or just one. The suction ports 7 may be elongated and may be directed transversely B in relation to the feed direction A.

[0030] The solution shown in Figure 5 differs from the previous solutions shown in Figure 1 to 4 in that instead a mechanical stopper the position and direction of the end of the textile product 2 is detected by means of one or more sensors 13 or a measuring device. The measurement data or signal produced by the sensor 13 is conveyed to the control unit CU.

[0031] The chart of Figure 6 shows details and features already discussed above in this application.

[0032] The following is set forth concerning the actual washing cycle. The washing machine washes the rug with the aid of one or more rotating washing heads. The washing agent used in the washing is water to which washing agent may have been mixed. Further, the washing machine sucks off the water left in the rug after the washing, drying the rug so that when the rug is taken out of the washing machine, no water will run out of it and it will dry fast.

[0033] During the washing, the washing head is moved back and forth over the rug being washed in the transverse direction in relation to the longitudinal direction of the rug. A washing head may comprise one or more spraying nozzles from which water or washing fluid may be sprayed to the rug. Further, the washing head has one or more suction ports by means of which liquid sprayed to the rug may be sucked out of the rug.

[0034] During the washing, the rug is moved in its longitudinal direction on rollers through the washing machine. The moving of the rug and the washing head may be automatically controlled by means of one or more control units.

[0035] The disclosed washing machine may be installed in a launderette where the customers themselves use the washing machine.

[0036] In some cases, features disclosed in this application may be used as such, regardless of other features. On the other hand, features disclosed in this application can be combined, if necessary, to form various combinations.

[0037] The drawings and their description are intended only to illustrate the idea of the invention. The details of the invention may vary within the scope of the claims. This application further discloses a solution in which the machine meant for washing, vacuum-cleaning, drying or similar treatment of a planar textile product comprises at least one control unit in communication with at least one user interface. The user interface may be, for example, a touch screen or a display panel that a user may use to give commands or information to the machine, and on which the control unit may further show guidance pictures and instructions. Alternatively, the user interface is on the screen of an electronic terminal device, such as a mobile phone, handheld computer, tablet computer, or similar computer The user selects on the user interface the function to be performed by the machine and pays for the selected function, or instead of paying, acknowledges the function in some way. The machine then goes to a standby mode to receive the feed end of the planar textile product being handled at the feed opening of the machine. The user interface is adapted to instruct the user to place the feed end correctly to the feed opening. The machine activates gripping means to temporarily keep the feed end in place at the feed opening so that the user may release his grip of the textile product. The user interface may give an indication to the user about the fastening of the feed end, the reaching of the correct parking position and adequate straightness as well as give other instructions relating to the coupling either visually or by audio, or both. The user interface may ask the user to take his hands away from the feed opening, and may also receive detection data from sensors possibly placed in connection with the feed opening. The control unit may thus close access to the feed opening from the outside of the machine. When the conditions affecting the user safety of the machine have been met, the automatic function program of the machine commences. The user interface may indicate the program duration, its current stage, remaining duration of the program, and give an alarm when the program ends or, if need be, before it ends. Furthermore, the user interface may provide an indication is the textile product fed in is for some reason unsuitable for the selected function program and the reason for this. Paying for the use may be carried out with a remote payment device, service, or online feature. The selection of the function program of the machine, paying, and other selections and preparations making use of the user interface may be performed first, and then the textile product being handled is placed in a planar form to the feed opening of the machine. The feed opening, as seen from the front, is substantially rectangular. The user interface may comprise a graphical user interface having graphical symbols and signs to guide the user intuitively so that anyone regardless of the language, experience, or age is able to use the machine. It is furthermore mentioned that one machine may comprise a washing apparatus, vacuuming apparatus, brushing apparatus, dry-blowing apparatus and spraying apparatus of a conditioner/finishing agent, or just one or more of the afore-

mentioned apparatuses, whereby the control unit and user interface have means to select the respective function program and to run automatically several function programs possibly to be performed successively.

Claims

1. A planar washing machine for washing planar textile products, the planar washing machine (1) comprising:

   a feed opening (4) for feeding the textile product (2) into the washing machine (1); transfer means (8) for transferring the textile product (2) in the washing machine (1); at least one washing head (WU) for washing the textile product (2); and gripping means (5) for gripping the textile product (2), **characterised in that**
   the gripping means (5) comprise at least one holding device (6) for holding the washable textile in place at the feed opening (4);
   said holding device (6) comprises at least one suction port (7) for exerting suction (S) on the textile product (2) in order to establish a holding force (F).

2. A washing machine as claimed in claim 1, **characterised in that** said at least one holding device (6) is immobile.

3. A washing machine as claimed in claim 1 or 2, **characterised in that** said at least one holding device (6) comprises at least one suction port (7) on the side of the bottom surface of the washable textile product (2).

4. A washing machine as claimed in any one of the preceding claims 1 to 3, **characterised in that** there is, in connection with the feed opening (4), at least one stopper (9) against which a first end of the washable planar textile product (2) may be parked.

5. A washing method for washing planar textile products with a planar washing machine (1) according to one of the preceding claims, **characterised in that**: an end of a textile product (2) is fed into the feed opening (4) of the washing machine, the end of the textile product (2) is kept in place by means of suction, the textile product (2) is transferred in the feed direction with the transfer means (8) of the washing machine, and the textile product (2) is washed with the washing head (WU) of the washing machine.

Patentansprüche

1. Ebene Waschmaschine zum Waschen ebener Textilprodukte, wobei die ebene Waschmaschine (1) umfasst:

   eine Zuführöffnung (4) zum Zuführen des Textilprodukts (2) in die Waschmaschine (1); Übertragungsmittel (8) zum Übertragen des Textilprodukts (2) in der Waschmaschine (1); mindestens einen Waschkopf (WU) zum Waschen des Textilprodukts (2); und Greifmittel (5) zum Greifen des Textilprodukts (2); **dadurch gekennzeichnet, dass**
   die Greifmittel (5) mindestens eine Haltevorrichtung (6) zum Halten der waschbaren Textilie an Ort und Stelle an der Zuführöffnung (4) umfassen;
   wobei die Haltevorrichtung (6) mindestens eine Saugöffnung (7) zum Ausüben von Ansaugung (S) auf das Textilprodukt (2) umfasst, um eine Haltekraft (F) herzustellen.

2. Waschmaschine nach Anspruch 1, **dadurch gekennzeichnet, dass** die mindestens eine Haltevorrichtung (6) unbeweglich ist.

3. Waschmaschine nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** die mindestens eine Haltevorrichtung (6) mindestens eine Saugöffnung (7) auf der Seite der unteren Fläche des waschbaren Textilprodukts (2) umfasst.

4. Waschmaschine nach einem der vorhergehenden Ansprüche 1 bis 3, **dadurch gekennzeichnet, dass** in Verbindung mit der Zuführöffnung (4) mindestens ein Stopper (9) vorhanden ist, gegen den ein erstes Ende des waschbaren ebenen Textilprodukts (2) geparkt werden kann.

5. Waschverfahren zum Waschen ebener Textilprodukte mit einer ebenen Waschmaschine (1) nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass**:
   ein Ende eines Textilprodukts (2) in die Zuführöffnung (4) der Waschmaschine zugeführt wird, wobei das Ende des Textilprodukts (2) mittels Ansaugung an Ort und Stelle gehalten wird, das Textilprodukt (2) mit dem Übertragungsmittel (8) der Waschmaschine in der Zuführrichtung übertragen wird und das Textilprodukt (2) mit dem Waschkopf (WU) der Waschmaschine gewaschen wird.

Revendications

1. Machine à laver planaire pour laver des articles textiles planaires, la machine à laver planaire (1) comprenant :
   une ouverture d'alimentation (4) pour amener l'article textile (2) dans la machine à laver (1) ; des

moyens de transfert (8) pour transférer l'article textile (2) dans la machine à laver (1) ; au moins une tête de lavage (WU) pour laver l'article textile (2) ; et des moyens de préhension (5) pour saisir l'article textile (2), **caractérisée en ce que** :

les moyens de préhension (5) comprennent au moins un dispositif de support (6) pour supporter le textile lavable en place au niveau de l'ouverture d'alimentation (4) ;
ledit dispositif de support (6) comprend au moins un orifice d'aspiration (7) pour exercer l'aspiration (S) sur l'article textile (2) afin d'établir une force de support (F).

2. Machine à laver selon la revendication 1, **caractérisée en ce que** ledit au moins un dispositif de support (6) est immobile.

3. Machine à laver selon la revendication 1 ou 2, **caractérisée en ce que** ledit au moins un dispositif de support (6) comprend au moins un orifice d'aspiration (7) du côté de la surface inférieure de l'article textile lavable (2).

4. Machine à laver selon l'une quelconque des revendications 1 à 3, **caractérisée en ce qu'**il y a, conjointement avec l'ouverture d'alimentation (4), au moins une butée (9) contre laquelle une première extrémité de l'article textile planaire lavable (2) peut être stationnée.

5. Procédé de lavage pour laver des articles textiles planaires avec une machine à laver planaire (1) selon l'une des revendications précédentes, **caractérisé en ce que** :
une extrémité d'un article textile (2) est amenée dans l'ouverture d'alimentation (4) de la machine à laver, l'extrémité de l'article textile (2) est maintenue en place au moyen de l'aspiration, l'article textile (2) est transféré dans la direction d'alimentation avec les moyens de transfert (8) de la machine à laver, et l'article textile (2) est lavé avec la tête de lavage (WU) de la machine à laver.

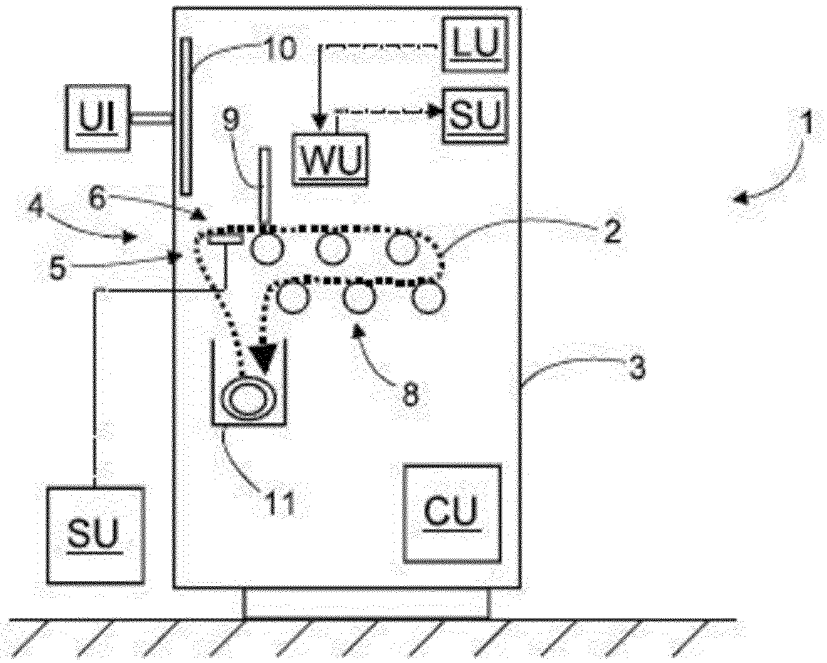

FIG .1

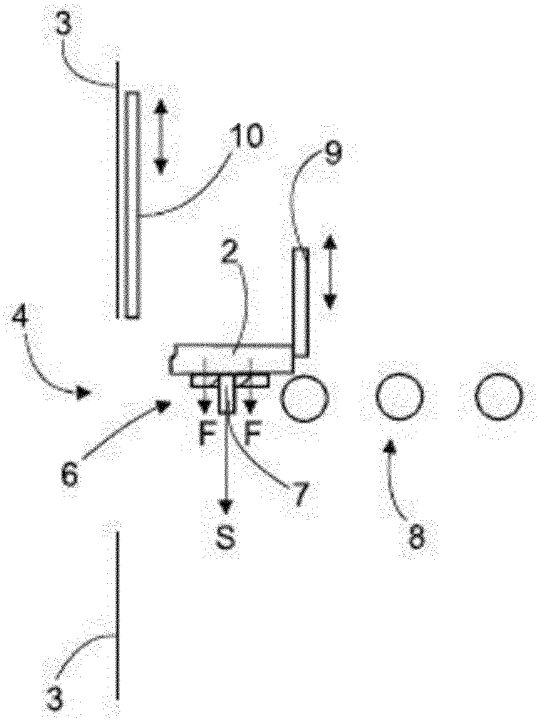

FIG .2

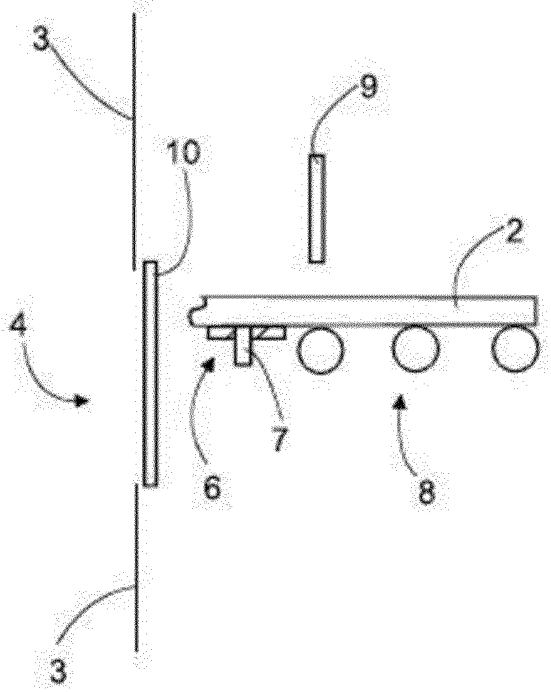

FIG .3

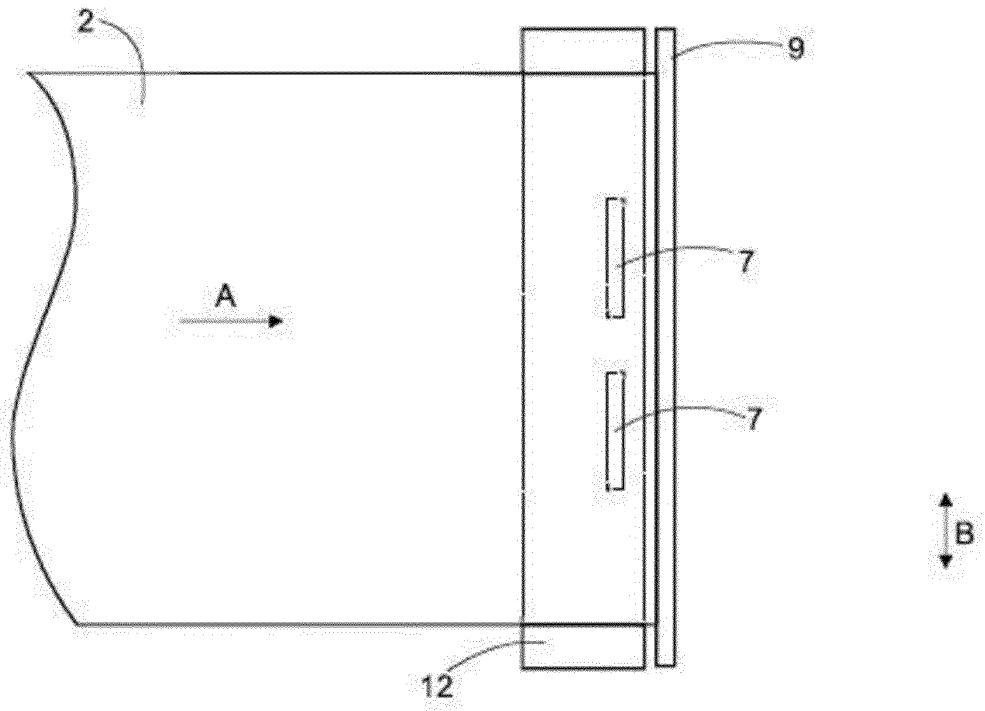

FIG .4

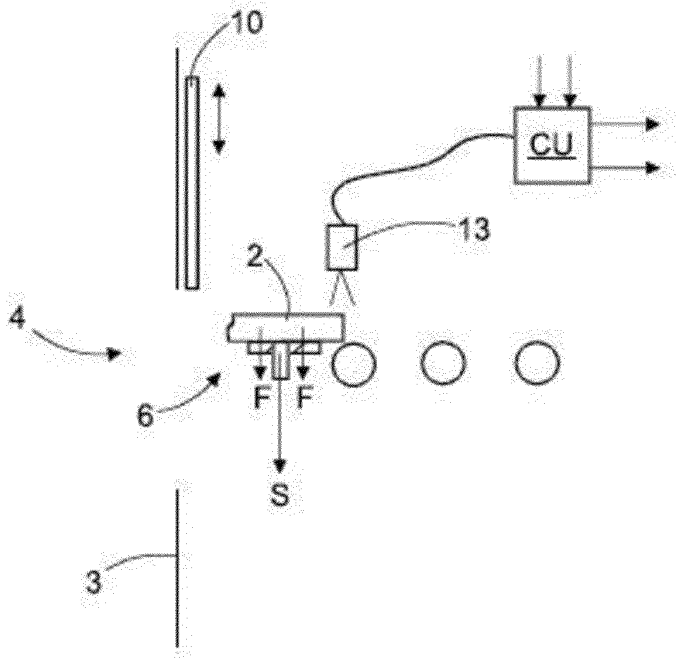

FIG .5

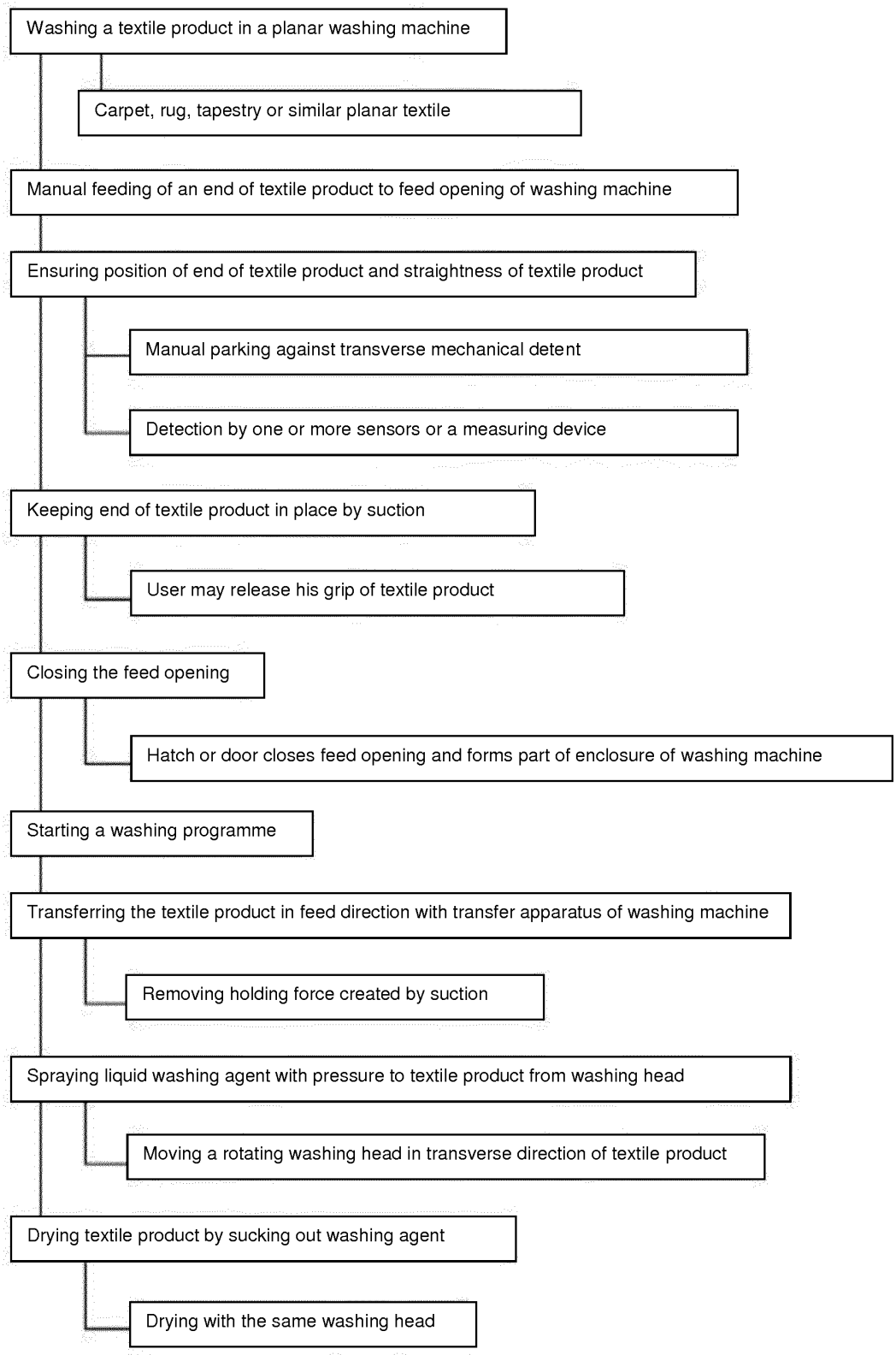
Washing a textile product in a planar washing machine
Carpet, rug, tapestry or similar planar textile
Manual feeding of an end of textile product to feed opening of washing machine
Ensuring position of end of textile product and straightness of textile product
Manual parking against transverse mechanical detent
Detection by one or more sensors or a measuring device
Keeping end of textile product in place by suction
User may release his grip of textile product
Closing the feed opening
Hatch or door closes feed opening and forms part of enclosure of washing machine
Starting a washing programme
Transferring the textile product in feed direction with transfer apparatus of washing machine
Removing holding force created by suction
Spraying liquid washing agent with pressure to textile product from washing head
Moving a rotating washing head in transverse direction of textile product
Drying textile product by sucking out washing agent
Drying with the same washing head

FIG .6

REFERENCES CITED IN THE DESCRIPTION

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