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(54) SPINNING MACHINE HAVING AUTOMATIC DOFFING DEVICE

(57) The present invention provides a spinning machine comprising a plurality of rows of spinning stations arranged side by side, each of the spinning stations comprising a bobbin holder (2) for supporting a bobbin (1) and a winding device (2) for winding a yarn around the bobbin (1) to form a yarn package. The spinning machine further comprises an automatic doffing device (4) which is mounted on a frame of each of the spinning stations and capable of pushing a package full of yarn to a package transport channel. Since the spinning machine of the present invention is provided with the automatic doffing device (4), when the yarn is wound to achieve a full yarn and a bobbin clamping arm is opened, the yarn package drops off to the doffing device, and a supporting plate (41) of the doffing device (4) automatically turns over the dropped off yarn package and pushes it down to a package transport channel, without needing to push down the yarn package manually or by hands, thereby achieving an automatic operation.

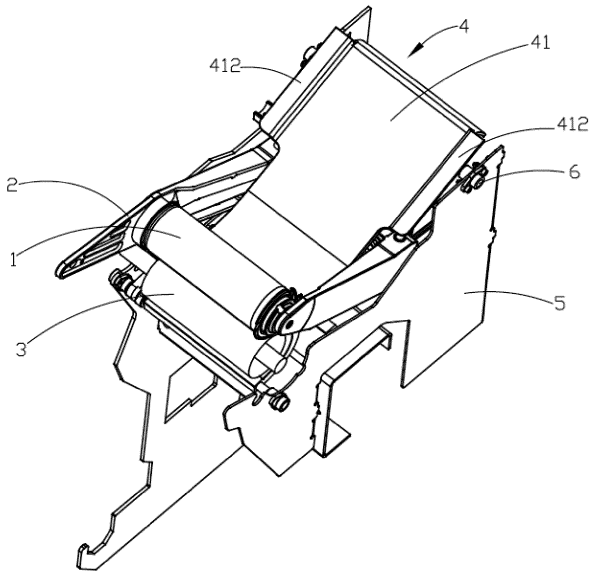

Fig. 1

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Description

[0001] The present invention relates to the field of spinning machines, and particularly to a spinning machine having an automatic doffing device.

[0002] In the existing spinning machine, after being spun, a yarn needs to be wound around an empty bobbin held by a bobbin clamping arm to form a yarn package. When the yarn on the bobbin is wound to a predetermined length to achieve a full yarn, it is necessary to remove the package full of yarn and replace it with a new empty bobbin to continue spinning.

[0003] In the existing semi-automatic spinning machine, after the bobbin is full of yarn, the bobbin clamping arms is forcedly opened by hands, and the package full of yarn is manually pushed down to a package delivery channel. This manner of manually pushing down the yarn package requires the workers to continuously inspect the full yarn stations, and manually open the bobbin clamping arm to push down the package full of yarn, which is inefficient and increases the labor intensity of the workers.

[0004] The existing full-automatic spinning machine adopts a touring service component which automatically moves to a full yarn station, and the bobbin clamping arm is opened by a mechanical structure provided on the touring service component to remove and replace the package with a new bobbin. But this kind of touring service component has a complex structure while it is only capable of handling one spinning station, so the cost is high.

[0005] An objective of the present invention is to provide a spinning machine having a doffing device capable of automatic doffing.

[0006] In order to achieve the above objective, the present invention provides a spinning machine, comprising a plurality of rows of spinning stations arranged side by side, each of the spinning stations comprising a bobbin holder for supporting a bobbin and a winding device for winding a yarn around the bobbin to form a yarn package, wherein a doffing device is mounted on a frame of each of the spinning stations, the doffing device comprises a pushing mechanism, and a cylinder is provided at a bottom portion of the pushing mechanism, the pushing mechanism being capable of catching the dropped off yarn package by the bottom portion, and being driven by the cylinder to rotate to push the yarn package from the spinning station to a package transport channel.

[0007] According to one embodiment of the present invention, the pushing mechanism is an arc-shaped sheet-like supporting plate, a tail end of which is provided with a protrusion for preventing the yarn package from dropping off.

[0008] According to one embodiment of the present invention, each of the spinning stations is provided with a fixed wallboard, and the pushing mechanism is pivotally fixed between adjacent two of the fixed wallboards.

[0009] In order to achieve the above objective, the present invention provides a spinning machine, comprising a plurality of rows of spinning stations arranged side by side, each of the spinning stations comprising a bobbin holder for supporting a bobbin and a winding device for winding a yarn around the bobbin to form a yarn package, wherein the spinning machine further comprises an automatic doffing device which is mounted on a frame of each of the spinning stations and capable of pushing a package full of yarn to a package transport channel.

[0010] According to one embodiment of the present invention, the automatic doffing device comprises a pushing mechanism that can be mounted on the frame of the spinning machine and a driving mechanism that can be controlled by a control system to drive the pushing mechanism to rotate, the pushing mechanism being capable of catching the dropped off yarn package and being driven by the driving mechanism to rotate to move the yarn package.

[0011] According to one embodiment of the present invention, the pushing mechanism is an arc-shaped sheet-like supporting plate.

[0012] According to one embodiment of the present invention, a tail end of the sheet-like supporting plate is provided with a protrusion for preventing the yarn package from dropping off.

[0013] According to one embodiment of the present invention, the driving mechanism is a cylinder.

[0014] According to one embodiment of the present invention, the driving mechanism is a motor driven linkage mechanism.

[0015] According to one embodiment of the present invention, a fixed wallboard is provided between the adjacent stations, and the pushing mechanism is rotatably fixed to the wallboard between the adjacent stations by a pivot.

[0016] Since the spinning machine of the present invention is provided with the automatic doffing device, when the yarn is wound to achieve a full yarn and a bobbin clamping arm is opened, the yarn package drops off to the doffing device, and a supporting plate of the doffing device automatically turns over the dropped off yarn package and pushes it down to a package transport channel, without needing to push down the yarn package manually or by hands, thereby achieving an automatic operation. As compared with the full-automatic spinning machine adopting the touring unit, the spinning machine of the present invention has the advantages of a simple structure, a convenient maintenance and a low cost.

Fig. 1 is a partial structural diagram of a single station of a spinning machine of the present invention.

Fig. 2 is a partial structural diagram in which a bobbin and a winding roller are omitted to clearly illustrate a doffing device.

Fig. 3 is a partial structural diagram illustrating a doffing device of a spinning machine of the present invention as viewed from the back thereof.

Fig. 4 is a partial structural diagram of a doffing device of the present invention not turned over after a full yarn.

Fig. 5 is a partial structural diagram of a doffing device of the present invention turned over after a full yarn.

[0017] The present invention relates to a spinning machine having a winding mechanism for winding a spun yarn to form a yarn package, such as a rotor spinning machine, a winding machine or a twisting machine.

[0018] The spinning machine of the present invention usually comprises a plurality of rows of spinning stations arranged side by side. Please refer to Fig. 1, where a rotor spinning machine is taken as an example, and only a part of structure of one spinning station of the rotor spinning machine is illustrated for simplicity of illustration and description. As illustrated, the spinning machine of the present invention comprises a bobbin holder 2 for supporting a bobbin 1 and a winding mechanism for winding a yarn. In this embodiment, the winding mechanism 3 is a motor-driven winding roller that is rotated by a motor, thereby driving the bobbin 1 to rotate to wind the yarn around the bobbin 1. Other structures of the rotor spinning machine are not described in detail here.

[0019] As described in the background art, in the existing semi-automatic rotor spinning machine, when the yarn is wound around the bobbin to a predetermined length to achieve a full yarn, the package full of yarn is pushed down to a package transport channel by hands. Please refer to Fig. 1 and in conjunction with Figs. 2 and 3, the spinning machine of the present invention is provided with a doffing device 4 for automatically pushing down the package full of yarn to a package transport channel (not illustrated). In this embodiment, the doffing device 4 of the present invention comprises a pushing plate 41 and a cylinder 42 that drives the pushing plate 41 to move. As illustrated, the pushing plate 41 is an arc-shaped supporting plate formed by a sheet-like plate, wherein a front end of the arc-shaped supporting plate is located below the bobbin 1; a protrusion 411 is provided at the front end of the arc-shaped supporting plate to prevent the yarn package from falling off the supporting plate; baffles 412 are formed on a rear end of the arc-shaped supporting plate by being bent upwards from two sides of a surface of the supporting plate and then bent laterally; two lugs 413 are formed to be protruded from a two sides of a bottom surface of the arc-shaped supporting plate near the rear end. A fixed wallboard 5 is provided between adjacent two of the stations of the spinning machine, and the pushing plate is pivotally fixed to the wallboard 5 between the adjacent two of the stations by a fixed shaft 6 extending through the lug 413 at a bottom portion of the arc-shaped supporting plate. As illustrated in Fig. 3, two lugs 414 are provided near a middle portion of the bottom surface of the arc-shaped supporting plate, and a fixed shaft 7 is provided at an end portion of a piston of the cylinder 42 to extend through the two lugs 414 at the middle portion of the bottom surface of the supporting plate, thereby connecting the cylinder 42 and the pushing plate 41 to each other. An opening (not numbered) is provided in a frame of the spinning machine, and one half of the cylinder 42 extends through the opening of the frame, at which opening the cylinder 42 is fixed to the frame of the spinning machine by a fixed member (not number). An air inlet pipe 8 at a bottom portion of the cylinder 42 is connected to a pneumatic control device (not illustrated) through the wallboard 5.

[0020] Please refer to Fig. 4, when the yarn is wound around the bobbin to achieve a full yarn state, the bobbin holder can be opened by hands or automatically, and the package 10 full of yarn will fall off from the bobbin holder 2, and drop onto the pushing plate 41 of the doffing device 4.

[0021] Please refer to Fig. 5, when the package full of yarn drops onto the pushing plate 41 of the doffing device 4, the piston of the cylinder 42 is driven to move by the pneumatic control device, and the piston of the cylinder 42 pushes up the pushing plate 41, so that the package 10 full of yarn rolls backwards and falls onto the package transport channel (not illustrated) of the spinning machine.

[0022] In the foregoing specific embodiment, the pushing plate 41 is an integrally formed arc-shaped supporting plate in one piece. In other embodiments, the pushing plate may also be a flat and straight plate. Alternatively, in other embodiments, the supporting plate may not be plate-shaped, but a structure consisting of several rods, or a hollow structure, etc. In the foregoing embodiment, the protrusion 411 at the front end of the pushing plate is a whole ridge along an edge of the pushing plate, and in other embodiments, it may also be a plurality of bumps provided at an interval or bumps provided only on two sides of the front end of the supporting plate. The pushing plate may be integrally formed of a plastic material or formed by bending a metal material.

[0023] In the foregoing embodiment, the pushing plate is driven to move by the cylinder 42, and in other embodiments, the pushing plate may also be driven to move by a motor through a linkage mechanism.

[0024] In the foregoing embodiment, the pushing plate 41 is fixed to the wallboards of the adjacent stations of the spinning machine by two pivots. In other embodiments, the pushing plate 41 may also be fixed by a single shaft, or the wallboard may not be adopted, but a structure, such as two fixing posts for fixing may be provided.

[0025] Those described above are just some specific embodiments of the technical solutions of the present invention, and it is impossible for the inventor to illustrate all the embodiments seriatim, and the scope of the claims of the present invention is not limited to the foregoing specific embodiments. Any change that can be made by a person skilled in the art based on the specific embodiments of the specification without paying a creative labor should fall within the scope of the claims of the present

invention.

Claims

1. A spinning machine, comprising a plurality of rows of spinning stations arranged side by side, each of the spinning stations comprising a bobbin holder for supporting a bobbin and a winding device for winding a yarn around the bobbin to form a yarn package, **characterized in that** a doffing device is mounted on a frame of each of the spinning stations, the doffing device comprises a pushing mechanism, and a cylinder is provided at a bottom portion of the pushing mechanism, the pushing mechanism being capable of catching the dropped off yarn package by the bottom portion, and being driven by the cylinder to rotate and to push the yarn package from the spinning station to a package transport channel.

2. The spinning machine according to claim 1, **characterized in that** the pushing mechanism is an arc-shaped sheet-like supporting plate, a tail end of which is provided with a protrusion for preventing the yarn package from dropping off.

3. The spinning machine according to claim 1, **characterized in that** each of the spinning stations is provided with a fixed wallboard, and the pushing mechanism is pivotally fixed between adjacent two of the fixed wallboards.

4. A spinning machine, comprising a plurality of rows of spinning stations arranged side by side, each of the spinning stations comprising a bobbin holder for supporting a bobbin and a winding device for winding a yarn around the bobbin to form a yarn package, **characterized in that** the spinning machine further comprises an automatic doffing device which is mounted on a frame of each of the spinning stations and capable of pushing a package full of yarn to a package transport channel.

5. The spinning machine according to claim 4, **characterized in that** the automatic doffing device comprises a pushing mechanism that can be mounted on the frame of the spinning machine, and a driving mechanism that can be controlled by a control system to drive the pushing mechanism to rotate, the pushing mechanism being capable of catching the dropped off yarn package and being driven by the driving mechanism to rotate to move the yarn package.

6. The spinning machine according to claim 5, **characterized in that** the pushing mechanism is an arc-shaped sheet-like supporting plate.

7. The spinning machine according to claim 6, **characterized in that** a tail end of the sheet-like supporting plate is provided with a protrusion for preventing the yarn package from dropping off.

8. The spinning machine according to claim 5, **characterized in that** the driving mechanism is a cylinder.

9. The spinning machine according to claim 5, **characterized in that** the driving mechanism is a motor driven linkage mechanism.

10. The spinning machine according to claim 5, **characterized in that** a fixed wallboard is provided between the adjacent stations, and the pushing mechanism is rotatably fixed to the wallboard between the adjacent stations by a pivot.

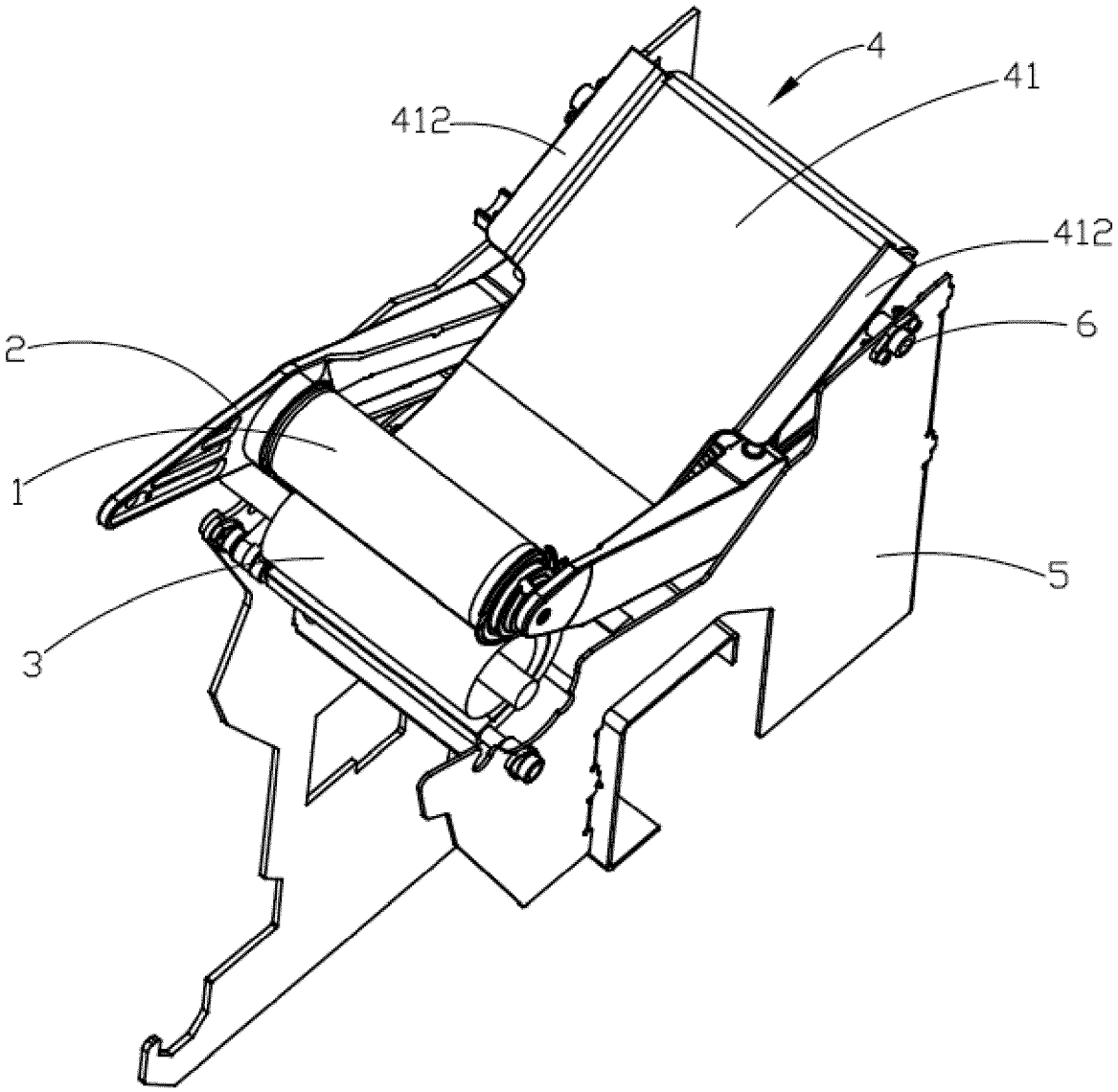

Fig. 1

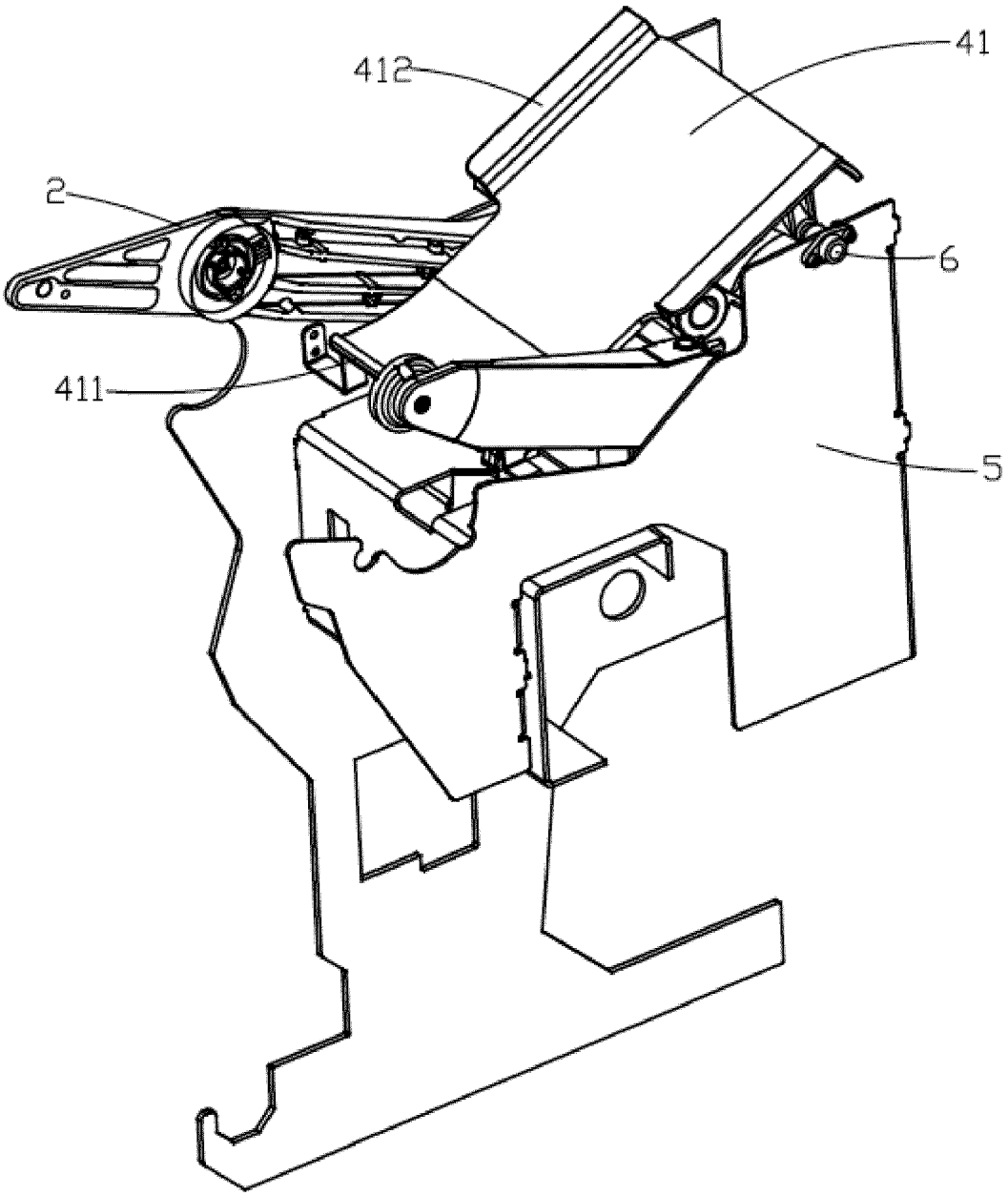

Fig. 2

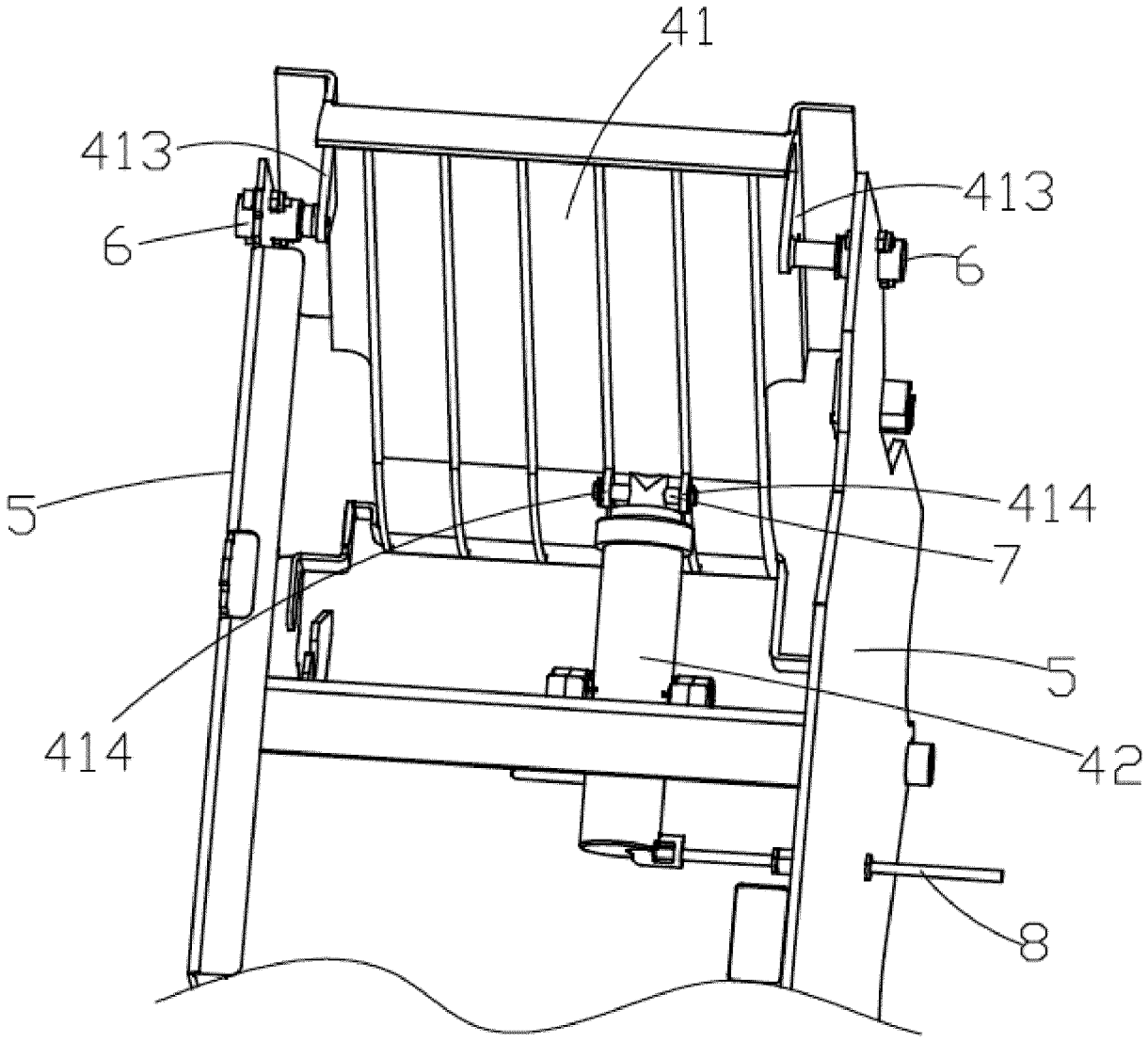

Fig. 3

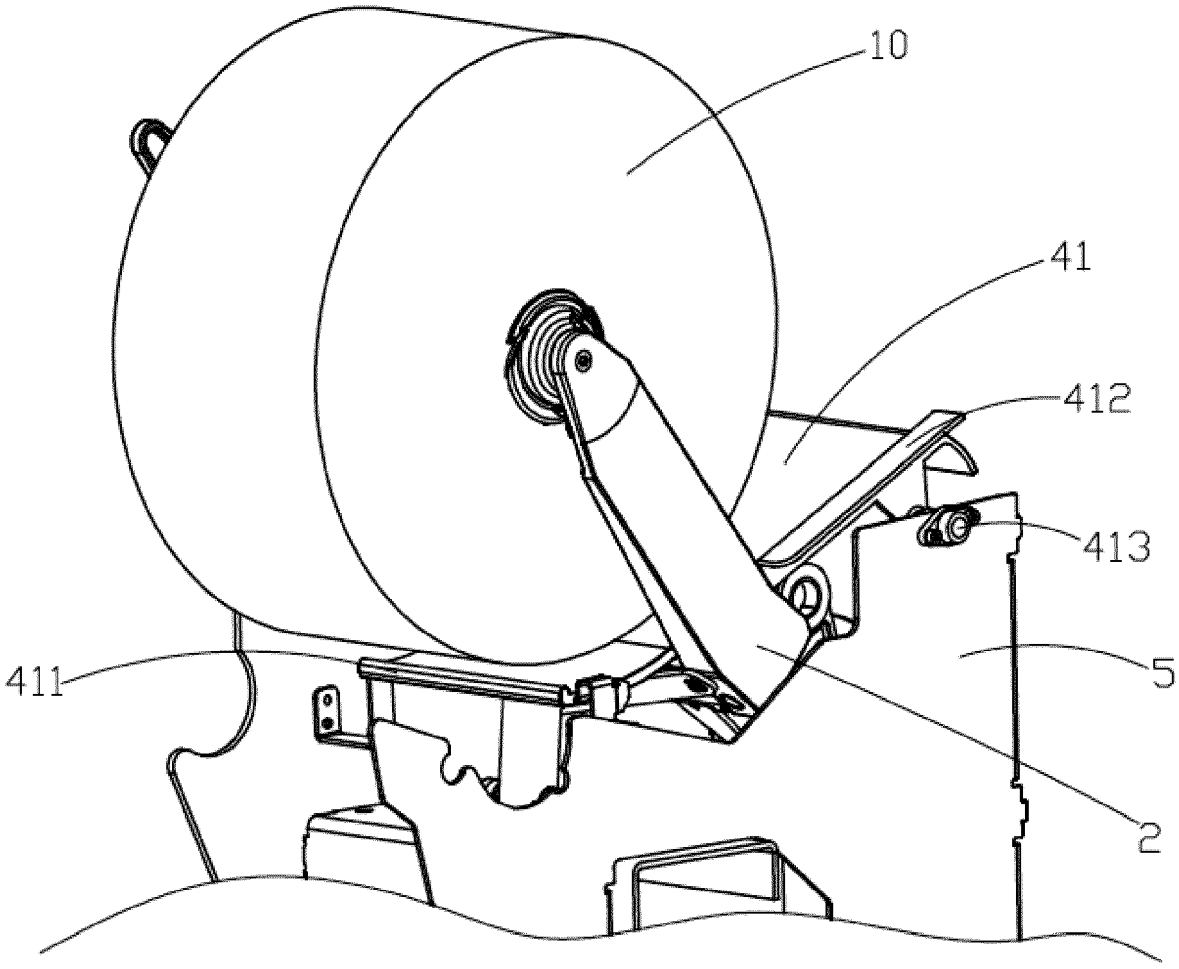

Fig. 4

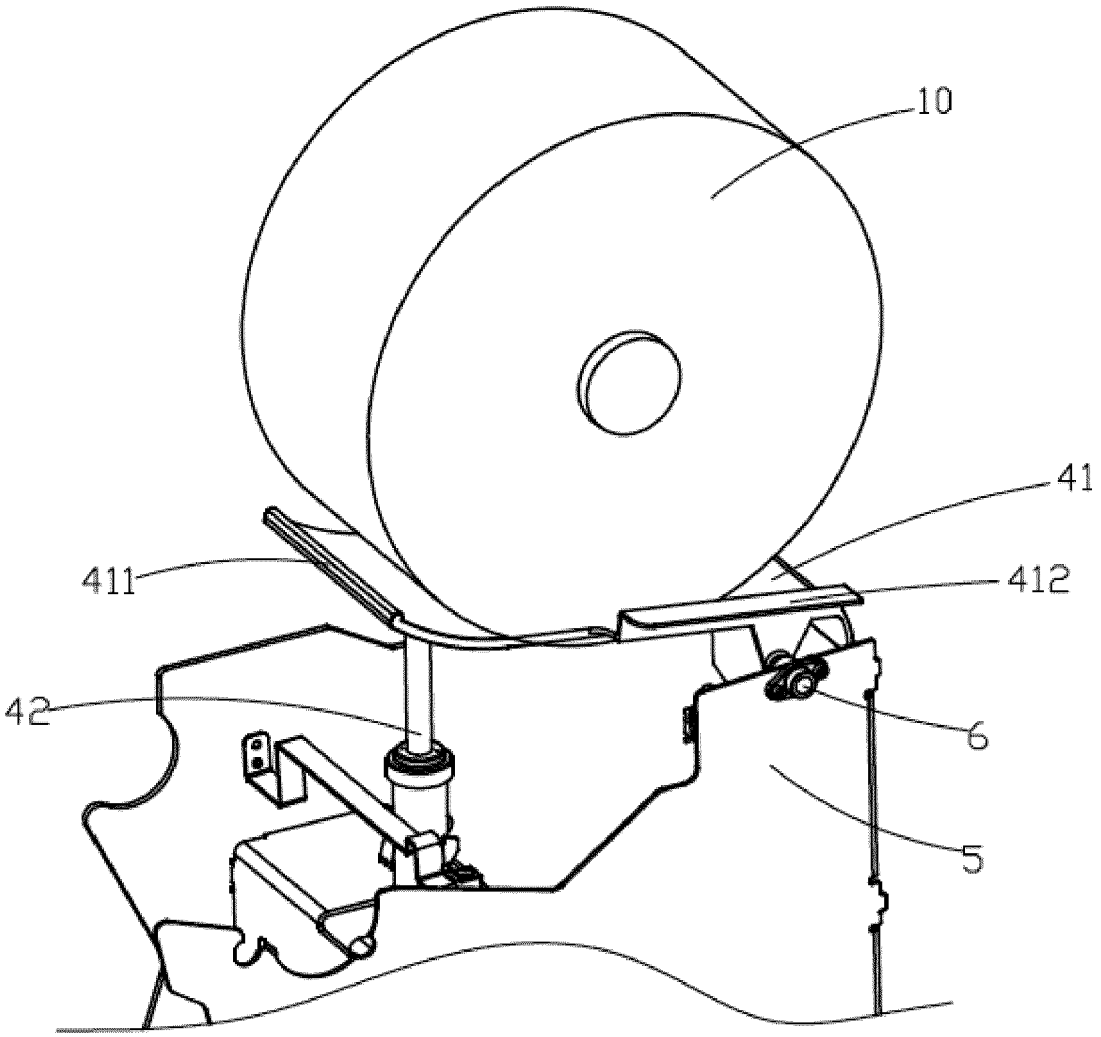

Fig. 5

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EUROPEAN SEARCH REPORT

Application Number
EP 19 20 8569

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	31 March 2020	Lemmen, René

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