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(54) A method for transporting a wound package from a winding machine and an apparatus for effecting the same.

(57) A method for transporting a wound package (P) from a winding machine having a plurality of work stations (1) disposed consecutively in a longitudinal direction of a machine frame, comprises: storing a fully wound package (P) at a stock part (83, 84) of the work station (1) in the winding machine; moving a cassette (5) provided with a package receiver (5a) at a position corresponding to the stock part (83, 84) by means of a cassette moving car (4) in accordance with a cassette requiring signal transmitted from the cassette stock part (83, 84); transferring the fully wound package (P) from the package stock part (83, 84) to the package receiver (5a) in the cassette (5); and transporting the cassette (5) by means of the cassette moving car (4) after transfer.

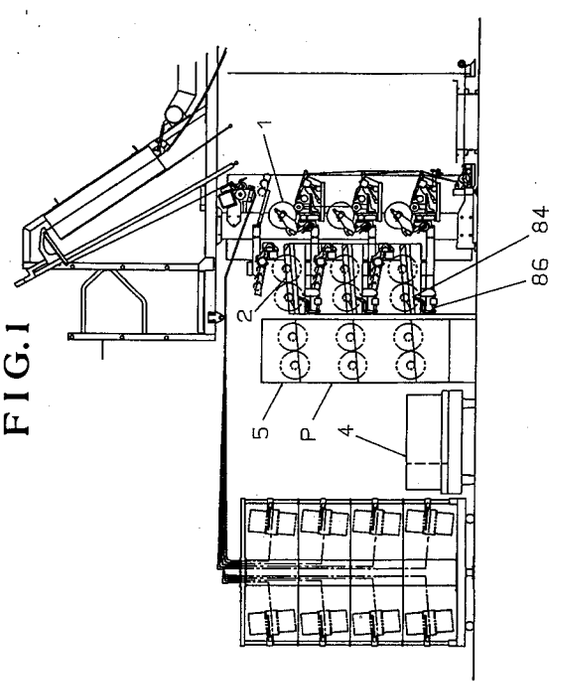


FIG.1

EP 0 560 278 A1

The present invention relates to a method for transporting wound packages from a winding machine having a plurality of work stations disposed consecutively in the longitudinal direction of a machine frame and an apparatus for effecting the same.

More specifically, the present invention relates to a method for transporting wound packages from a winding machine, such as a draw texturing machine (DTY), a draw twister (DT machine), a twisting machine, a double twister, a rewinding machine, a yarn winding machine, a film winding machine, a glass fiber winding machine, a metal cord winding machine, or an electric cord winding machine, wherein a plurality of work stations disposed consecutively in the longitudinal direction of a machine frame, and an apparatus for effecting the same.

Conventionally, in the highly automated machines among such winding machines, full packages wound in such winding machines are automatically doffed by means of a doffing apparatus which is movable in the longitudinal direction of the machine frames.

The full packages, which have been doffed by means of the doffing apparatus, are transferred, as disclosed in U.S. Patent No. 4,615,493, to a plurality of package transfer trucks which have been located near the winding machine, and a plurality of package transfer trucks are transferred by means of an automatic traction engine to the subsequent step so that the full packages are transported to the next step.

According to another method, which is disclosed in Japanese Patent Application Laid-open No. Sho 64-26745 or Japanese Patent Publication No. Sho 62-826, the full packages, which have been doffed by means of the doffing apparatus, are transferred to a belt conveyor disposed near the winding machine, and the full packages are transported by means of the movement of the belt conveyor to the outside of the winding machine, where the full packages are manually or by means of a transfer robot transferred to other package transfer trucks, and then, a plurality of package transfer trucks are moved by means of an automatic traction engine to the subsequent step.

In a winding machine, work stations are generally disposed consecutively in the longitudinal direction of the machine frames. When a method wherein package transfer trucks are moved by an automatic traction engine is applied to doffing operation in such a winding machine, a plurality of package transfer trucks which are connected to each other in a line are moved along the machine frame of the winding machine and are stopped to receive doffed full packages. Accordingly, it is impossible to selectively move only one truck located at intermediate position among many trucks connected in a line, and thus, a plurality of transfer trucks have to be successively discharged one by one. In other words, if full packages are randomly produced from a plurality of work stations disposed on the winding machine, the discharge of the transfer trucks is done only after a long standing by time wherein all the transfer trucks are loaded with full packages or the discharge is started when a part of the transfer trucks are loaded with full packages while remaining transfer trucks are empty. The method wherein package transfer trucks are moved by an automatic traction engine cannot be effectively used in either case.

In addition, since the package transfer truck generally requires a large turning radius, the radius of curvature at the corner portions have to be large when the package transfer trucks are moved by an automatic traction engine. Thus, efficiency of the floor space is low when a large number of winding machines are installed in a plant.

Further, the following disadvantages occur when the full packages are automatically transferred to other package transfer trucks by means of a transfer robot in the vicinity of the winding machine as described above.

Although a winding machine, including a draw texturing machine, is generally operated for 24 hours per a day, full packages have to be doffed and transferred to the subsequent step before the next winding packages become full and are doffed.

When a single transfer robot is prepared for a large number of winding machines, operating schedule of the transfer robot may be tight depending on the brands of the textured yarn and the texturing speeds of the winding machines. Accordingly, the single transfer robot cannot fully treat a plurality of winding machines when planned service times of the transfer robot for the winding machines are superimposed on each other, and manual transfer of the packages become necessary.

When transfer robots for automatically transferring full packages to other package transfer trucks are disposed for every winding machines in order to overcome such a problem, no financial advantages for installing transfer robots can be expected since the operating time of the transfer robots is very short compared with that of the winding machine, for example 10 hours. Further, it is ineconomic to install transfer robots in all the winding machines, because the installation space of the transfer robots becomes excessively large compared with the space of the plant.

Taking the above-described disadvantages inherent to the conventional machines into consideration, it is an object of the present invention to provide a method for transporting a wound package from a winding machine and an apparatus for ef-

fecting the same, by which the operational time for discharging full packages is not too tight, which enhances the efficiency in floor space and which affords financial merits.

According to the present invention, the object is achieved by a method for transporting a wound package from a winding machine having a plurality of work stations disposed consecutively in a longitudinal direction of a machine frame, characterized in that the method comprises:

storing a fully wound package at a stock part of the work station in the winding machine;

moving a cassette provided with a package receiver at a position corresponding to the stock part by means of a cassette moving car in accordance with a cassette requiring signal transmitted from the cassette stock part;

transferring the fully wound package from the package stock part to the package receiver in the cassette; and

transporting the cassette by means of the cassette moving car after transfer.

Further, according to the present invention, the object is achieved by an apparatus for transporting a wound package from a winding machine having a plurality of work stations disposed consecutively in a longitudinal direction of a machine frame, characterized in that each work station of the winding machine is provided with a stock part for stocking fully wound package, the package stock part is provided with means for discharging the fully wound package, a cassette provided with a package receiver correspondingly to the stock part is disposed outside of the machine frame, and a cassette moving car is disposed movably along the winding machine so that it moves the cassette in accordance with a cassette requiring signal transmitted from the cassette stock part and that it transports the cassette after transfer of the fully wound package from the package stock part to the cassette.

According to the present invention, a fully wound package is stored at a stock part of the work station in the winding machine, a cassette provided with a package receiver at a position corresponding to the stock part is moved by means of a cassette moving car in accordance with a cassette requiring signal transmitted from the cassette stock part, the fully wound package is transferred from the package stock part to the package receiver in the cassette, and the cassette is transported by means of the cassette moving car after transfer. Thus, according to the present invention, a full package can be selectively doffed and transported from a winding machine provided with a plurality of work stations, and transfer and transportion of package can be effectively performed even when full packages are randomly produced from a plurality of work stations in the winding machine.

Further, according to the present invention, when an administrative information of the work stations in the winding machine is data communicated to a host computer for an automatic package transfer and transportation use, and when administration of the cassettes and product control are done based on the information at investigation and packaging steps, the process can be controlled by the computer and a large amount of human labor can be saved.

Should any problem occur with respect to quality of the individual packages in the subsequent steps, appropriate administrative information can be fed back to the preceding steps by means of the computer, and the quality control level can be enhanced.

It is preferred that the package stock part of each work station in the winding machine can store two or more than two wound packages, because the degree of freedom with respect to movement of the cassettes to and from positions corresponding to the package stock parts by means of the cassette moving car becomes large.

Further it is preferred that the cassette used for the present invention is provided with a plurality of package receivers corresponding to the package stock parts of a plurality of the package stock parts, because a plurality of full packages can be simultaneously handled and because thus the number of movement of the cassette moving car can be reduced.

It is preferred that a winding machine having a plurality of work stations disposed consecutively in the longitudinal direction of a machine frame, to which machine the present invention is applied, comprises: a yarn treating device, a cradle turning device, an empty bobbin donning device and a package receiver, which are disposed at a winding portion of each work station of the winding machine; and a control means for operating the yarn treating device, the cradle turning device, the empty bobbin donning device and the package receiver when at least one of packages at the winding portions becomes a state to be changed, which means is disposed in the winding machine so that wound packages are automatically doffed from the winding machine without using a doffing apparatus which is movable in the longitudinal direction of the winding machine. Thus, running type doffing apparatus, which is complicated in construction and control, can be omitted, and doffing operation can be done taking into consideration the winding conditions.

The present invention will now be described in detail with reference to the accompanying drawings which show a preferable embodiment of the present invention, wherein:

Fig. 1 is a side view of an essential portion of an embodiment of the present invention;

Fig. 2 is an arrangement plan of the embodiment illustrated in Fig. 1;

Fig. 3 is a side view of an embodiment of a cassette used in the present invention;

Fig. 4 is an elevation of Fig. 3;

Fig. 5 is a flow chart for automatical transfer and transportation of packages according to the present invention;

Fig. 6 is an arrangement diagram of a system for automatical transfer and transportation of packages according to the present invention;

Fig. 7 is a side view of an essential portion of an embodiment of a work station in a winding machine wherein the present invention is carried out; and

Fig. 8 is an elevation of a cradle illustrated in Fig. 1 and is partially cross sectioned.

In a winding machine wherein the present invention is carried out, a plurality of work stations are disposed consecutively in the longitudinal direction of a machine frame, and each work station is provided with a plurality of winding portions vertically overlaid.

The present invention is carried out in a draw texturing machine (DTY machine) in the embodiment illustrated in Fig. 1, which shows winding portions 1, which are a part of the winding machine, a cassette 5 and a cassette moving car 4 located in front of the winding portion.

Fig. 7 shows a side view of one of winding portions 1, i.e., a work station. In Fig. 7, a yarn is processed in a draw texturing machine (DTY machine), and then after it is turned its direction at a turning guide 10, it is traversed to and fro in a direction perpendicular to a sheet on which Fig. 7 is drawn by a traverse guide 11a of a traverse device 11.

The yarn Y traversed by the traverse guide 11a reaches a friction roller 12 which is rotatably supported, and then it is wound onto a bobbin B, which is frictionally rotated by the friction roller 12, or onto a package of yarn layer P formed on the bobbin B. The bobbin B is rotatably supported by a cradle 13. A sensor 70, which is designated as SW12 in Fig. 9, is disposed near the friction roller 12 to detect entanglement of the yarn around the friction roller 12.

The cradle 13 is turnable about a cradle turning shaft 13d, and as illustrated in Fig. 8, it includes a rigid cradle arm 13a, which is integrally secured to the cradle turning shaft 13d, and a hinged cradle arm 13, which is swingable about a pivot 13c disposed on the cradle turning shaft 13d. Further, the cradle 13 is provided with bobbin holders 14 and a brake mechanism (not shown), which is installed in the rigid cradle arm 13a and the hinged cradle arm 13b and which operates to brake a bobbin when the cradle 13 exceeds a yarn winding region. A spring (not shown) is disposed in the hinged cradle arm 13b so as to always chuck the bobbin B.

The hinged cradle arm 13b has a cam follower 16 rotatably mounted at a lower end thereof, and the cam follower 16 engages with a cradle releasing cam 17. The cradle releasing cam 17 is supported turnably about a pin 17a which is fixed to the bracket disposed on a machine frame. A torsion coil spring 19 is disposed between the pin 17a and the cradle releasing cam 17 so that the lower portion of the releasing cam 17 is always urged to an eccentric pin 17b by means of the urging force of the torsion coil spring 19. The eccentric pin 17b serves as a stop so that the upper portion of the releasing cam 17 does not excessively move to the left in Fig. 8.

The releasing cam 17 has a cam follower 18 rotatably mounted at a lower end thereof. Thus, the cam follower 18 mounted on the releasing cam 17 becomes in contact with a releasing cam 35, only when the cam follower 16, mounted on the hinged cradle arm 13b, engages with the releasing cam 17 so that the cam surface of the releasing cam 17 receives a rightward force.

The urging force of the spring (not shown) disposed in the cradle 13 for chucking the bobbin B is larger than that of the torsion coil spring 19. Further, the releasing cam 35 has a recessed portion about a motor spindle 31a so that the cradle 13 chucks the bobbin B when the cam follower 18 of the releasing cam 17 drops into the recessed portion of the releasing cam 35 as illustrated by a dot and dash line in Fig. 8.

Referring to Fig. 7 again, a yarn sucking device 21 is disposed above the traverse device 11 and is actuated by an electro-magnetic solenoid which is designated by SOL 1 in Fig. 9, and the lower end of the sucking device 21 opens near yarn path extending from the turning guide 10 to the friction roller 12.

A yarn lifting guide 22 having an L shaped cross section is disposed along the upper surface of the traverse device 11 and is supported turnably about a pivot 22a. The yarn lifting guide 22 is turned about the pivot 22a by an electro-magnetic solenoid, which is designated by SOL 2 in Fig. 9, and a cam 23 disposed on the machine frame.

A yarn cutting device 24 is disposed above the yarn lifting guide 22, and it has a yarn engaging groove 24a (see Fig. 9) at an appropriate position. The yarn Y engaged in the groove 24a is cut by a cutter (not shown) of a scissors type which is actuated by an electro-magnetic solenoid (SoL 3 in Fig. 9).

Referring to Fig. 8 again, a small motor 31 (M1 in Fig. 9) for turning the cradle 13 is disposed on the machine frame. A motor spindle 31a of the cradle turning motor 31 has a gear 32 mounted thereon via a play mechanism 33, and at the same time, has a cam 35 integrally secured thereto. The gear 32 engages with a gear 34 (Fig. 7) mounted on the cradle turning shaft 13d.

The gear 34 is disposed within the cradle turning shaft 13d in such a manner that its center is aligned with the axis of the rotation of the cradle turning shaft 13d. As described above, the cam follower 16 illustrated in Fig. 8 engages with the releasing cam 17 at the chuck start position when the cradle is turned, and thereafter, it moves as it is in contact with the releasing cam 17 so that the hinged cradle 13b is released from the bobbin chucking condition. During this operation, due to the relationships between the releasing cams 17 and 35, the construction of which will be described later, the releasing cam 17 is not moved by the releasing cam 35.

Due to the above-described manner, in case that the play mechanism 33 is not actuated, when the cradle turning motor 31 is operated, the cradle 13 is turned about the cradle turning shaft 13d due to the gears 32 and 34, and the cam 35 is rotated together with the spindle 31a.

The play mechanism 33 may be constructed with a mechanical clutch or an electro-magnetic clutch. It is preferred that in case of the actuation of the play mechanism 33, the rotation of the motor spindle 31a is not transmitted to the gear 32 even when motor spindle 31a is rotated while only the cam 35 integrally secured to the spindle 31a is rotated. Especially, the play mechanism 33 of the present embodiment has a construction which will be described in detail.

More specifically, in Fig. 8, the motor spindle 31a has a gear holder 80 secured thereto, and the releasing gear 35 is secured to the gear holder 80. When the cam 35 is rotated, the cradle releasing arm 17 which is engaging with the cam 35 is swung about the pin 17a. Further, the gear holder 80 has a key groove, which is formed with a key width of usual key tolerance, and a key 82 is secured to the key groove. Contrary to this, gear 32 which engages with the gear holder 80 has a key groove formed therein, the key width of which is wider than the width of the key 82 by a distance which corresponds to the free rotational distance required by the gear holder 80. Thus, the gear 32 is partially, i.e., for the distance corresponds to the above-described free rotational zone, not transmitted the rotational power though the gear holder 80 is rotated.

The motor spindle 31a has a plurality of knockers 81 as illustrated in Figs. 8 and 9, which actuate sensors for cradle positions including SW1 for detecting the winding position, SW2 for detecting the braking position, SW3 for detecting the package exhaust position, and sensors for motor positions including SW4 for detecting intermediate position of the motor and SW5 for detecting the backward position of the motor, respectively. The above-described sensors may be constructed with limit switches.

In Fig. 7, a bobbin receiver 83 is so disposed that it projects outwardly from a position where the cradle 13 is turned opposite to the friction roller 12, and it guides fully wound packages P doffed from the cradle 13. The bobbin receiver 83 has at the front end thereof, i.e., the left end in Fig. 7 and the right end in Fig. 9, a sensor SW9, for detecting whether or not a package exists, and a member 84 for discharging the full packages P on the bobbin receiver 83. The full package discharging member 84 comprises a stop 85, which is vertically movable between an upper position where its front end 85a abuts the full package P and a lower position where it allows free movement of the full package, and a fluid pressure cylinder 86 for vertically moving the stop 85. The bobbin receiver 83 and the member 84 for discharging the full package P on the bobbin receiver 83 constitute a package stock part of the present invention.

As illustrated in Fig. 7, a small motor 41 for driving an empty bobbin donning device is disposed on the machine frame above the cradle 13, and it has a sprocket 42 attached to a motor spindle thereof. An empty bobbin arm 51 is supported on the machine frame so that it is rotatable about a pivot 50, and it has a sprocket 52 integrally secured thereto. Chain 43 is engaged around the sprockets 42 and 52 so that the empty bobbin arm 51 is turned by the small motor 41 from a position corresponding to an empty bobbin supply rail 53 until it abuts with a mechanical stop (not shown). The chain 43 has springs 44 at intermediated portions thereof so that shock caused by the abutment of the empty bobbin arm 51 against the stop is damped.

In Fig. 9, SW6 designates a sensor for detecting a position for taking up a bobbin, SW7 designates a sensor for detecting a position for supplying a bobbin, and SW8 designates a sensor for detecting whether or not an empty bobbin exists on the empty bobbin supply rail 53.

In Fig. 7, a yarn gathering arm 61 is disposed between the traverse device 11 and the turning guide 10 in such a manner that it is swung by an electro-magnetic solenoid 62, which is designated by SOL 4 in Fig. 9, in a plane perpendicular to the yarn path, and accordingly, the gathering arm 61 moves the yarn Y, which has extended from the yarn turning guide 10 to the suction device 21, to a

position where a threading arm 63 can readily engages with the yarn Y.

The threading arm 63 illustrated in Fig. 7 is turned by the threading motor 64 which is designated by M3 in Fig. 9 at a position above the traverse device 11, and it threads the yarn Y, which has been gathered by the yarn gathering arm 62 to an appropriate position, onto an empty bobbin B. The threading arm 63 is made of an elastic member, such as a piano wire, formed in an L shape as illustrated in Fig. 9, and it has a yarn guide 63a rotatably mounted at an end thereof. It is preferred that the yarn guide 63a has a V shaped groove formed at the periphery thereof so that it can maintain the running position of the yarn Y.

A guide plate (not shown) provided with an inclined groove is securely disposed at a position between the end of the threading arm 63 and the center of rotation connected to the threading motor 64 so that when the threading arm 63 engages with the inclined groove, the yarn guide 63a disposed at the end of the threading arm 63 can be moved in parallel with the axis of the bobbin B. The relationships between the guide plate and the threading arm 64 are so selected that the threading arm engages with the inclined groove just before the yarn Y contacts with the bobbin B.

Since the threading arm 63 is made of an elastic member as described above, its end can move in a direction of the axis of the bobbin B, and accordingly, the yarn Y can surely be positioned to a position corresponding to a slit S formed on the bobbin B even when the position of the slit S may be varied due to the bobbin chucking condition by the bobbin holders 14 or preciseness of the formed slit S. When the threading arm 63 is made of an elastic member as described above, the position of the yarn guide returns to a certain position at the original stage wherein the yarn is engaged with the yarn guide of the threading arm.

In Fig. 9, SW10 designates a sensor for detecting the front end of the threading arm 63, and SW11 designates a sensor for detecting the rear end of the threading arm 63.

In this embodiment, the yarn sucking device 21, the yarn lifting guide 22, the yarn cutting device 24, the yarn gathering arm 61 and the yarn threading arm 63, which have been described above, constitute a yarn treating device.

Referring Fig. 1 again, wherein the yarn Y processed in the DTY machine is wound in a package by means of the winding portion 1, and the full package P is automatically discharged to the package stock part 2, which is constituted with the bobbin receiver 83 and the member 84 for discharging the full package P on the bobbin receiver as described above, and is stored there.

According to this embodiment, the cassette moving car 4 is moved the cassettes 5 provided with package receivers to a predetermined position before a predetermined number of the full packages, 2 packages in case of Fig. 1, are stored in one span of the winding machine, generally provided with four work stations, by a host computer for automatic package transfer and transportation use, which receives information which is transmitted from local computers installed in the winding machine based on a cassette requiring signal from the package stock part 2.

As illustrated in Figs. 3 and 4, the cassette 5 of this embodiment is provided with a plurality of pairs of bobbin receiving plates 5a which can be located corresponding to the bobbin receivers 83 of the package stock parts 2 on extension thereof. When the stop 85 of the member 84 for discharging the full package P is lowered by means of the fluid pressure cylinder 86 after the cassette 5 has been stopped at a predetermined position, the full package P which has been stored on the package stock part 2 rolls on the bobbin receiver 83 and the bobbin receiving plates 5a, and thus it is transferred from the former to the latter.

The cassette moving car 4 comprises a body 4a and two forks 4b which are movable forwardly and backwardly between the body 4a and the winding machine. The body 4a is provided with running wheels and a drive for rotating the wheels and is movable along guide rails disposed along the winding machine or along a cord 3 (see Fig. 2) which is disposed along the winding machine and which emits guide signal. The two forks 4b are inserted into holes 5b formed at the lower portion of the cassette 5.

The forks 4b of the cassette moving car 4 can be moved forwardly and backwardly by means of a mechanism which is well known in the technical field of the forklift truck so that they are inserted into the holes 5b of the cassette 5 as described above. The forks 4b can be moved vertically upon loading and unloading of the cassette 5. In place of vertical movement of the fork 4b, either one of or both of the body 4a of the cassette moving car 4 and the cassette 5 may be moved vertically so that their relative locational relationship is changed upon loading and unloading of the cassette 5.

According to the present embodiment, after the cassette moving 4 car has completed to locate an empty cassette 5 at a position corresponding to the work station to be serviced, then it starts to transfer another cassette based on the next command. The cassette moving car may wait loading onto a cassette 5 and transfer the cassette which has been located at a position corresponding to the work station to be serviced. In some cases, the above described methods may be used taking the con-

dition into consideration.

When the number of the full packages P stored on the package receivers 83 of the span corresponding to the cassette 5 reaches a predetermined number, the member for discharging package disposed at the package stock part 2 is operated, i.e., the stop 85 of the member 84 for discharging full package P is lowered by means of the fluid pressure cylinder 86, based on a command from the computer installed in the winding machine, and the stored full packages P are transferred to the empty cassette 5. After completion of the transfer to the cassette, the information is transmitted from the computer installed in the winding machine to the host computer for automatic transfer and transportation use, and the cassette on which the full packages P are loaded is transported to the next step by means of the cassette moving car 4.

When the loading of the full packages P onto the cassette 5 is completed, the administrative information of respective work stations of the winding machine is data communicated to the host computer for package transfer and transportation use. The administrative information may be the number of the machine frame, the doffing time, the winding times for the respective packages, data regarding quality and so on. Based on the transmitted administrative information, defective packages are automatically distinguished in the subsequent investigating step, and in the packaging step, selection of small packages and labelling on the packages are automatically performed. Thus, the present inner labelling operation which is now manually done upon doffing from the winding machine for spindle control purpose, the present manual selection by weight and the present manual data inputting operation for labelling purpose at the packaging step, and some of the present investigating operation can be omitted or reduced, and accordingly, human labor can be remarkably saved.

If the package stock part of each work station in the winding machine can store two or more than two wound packages, the frequency for transporting the packages can be decreased, and the number of the prepared cassettes can be reduced.

Fig. 2 shows an arrangement plan wherein the locational relationship between the winding machines, cassettes 5 and the cassette moving car 2 are illustrated. Fig. 5 is a flow chart for the above-described automatical transfer and transportation of packages from the winding machine, and Fig. 6 is an arrangement diagram of a system for automatical transfer and transportation of packages for a plant wherein a plurality of winding machines are installed.

According to the present invention, a fully wound package is stored at a stock part of the work station in the winding machine, a cassette provided with a package receiver at a position corresponding to the stock part is moved by means of a cassette moving car in accordance with a cassette requiring signal transmitted from the cassette stock part, the fully wound package is transferred from the package stock part to the package receiver in the cassette, and the cassette is transported by means of the cassette moving car after transfer. Thus, according to the present invention, a full package can be selectively doffed and transported from a winding machine provided with a plurality of work stations, and transfer and transportation of package can be effectively performed even when full packages are randomly produced from a plurality of work stations in the winding machine.

Further, according to the present invention, when an administrative information of the work stations in the winding machine is data communicated to a host computer for an automatic package transfer and transportation use, and when administration of the cassettes and product control are done based on the information at investigation and packaging steps, the process can be controlled by the computer and a large amount of human labor can be saved.

Claims

1. A method for transporting a wound package (P) from a winding machine having a plurality of work stations (1) disposed consecutively in a longitudinal direction of a machine frame, characterized in that the method comprises:

storing a fully wound package (P) at a stock part (83, 84) of the work station (1) in said winding machine;

moving a cassette (5) provided with a package receiver (5a) at a position corresponding to said stock part (83, 84) by means of a cassette moving car (4) in accordance with a cassette requiring signal transmitted from said cassette stock part (83, 84);

transferring said fully wound package (P) from said package stock part (83, 84) to said package receiver (5a) in said cassette (5); and

transporting said cassette (5) by means of said cassette moving car (4) after transfer.

2. A method for transporting a wound package (P) from a winding machine according to claim 1, characterized in that an administrative information of the work stations (1) in said winding machine is data communicated to a host computer for an automatic package transfer and transportation use, and administration of

the cassettes (5) and product control are done based on said information at investigation and packaging steps.

3. A method for transporting a wound package (P) from a winding machine according to claim 1 or 2, characterized in that said package stock part (83, 84) of each work station (1) in said winding machine can store at least two wound packages (P).

4. A method for transporting a wound package (P) from a winding machine according to any one of claim 1 to 3, characterized in that each cassette (5) is provided with a plurality of package receivers (5a) corresponding to the package stock parts (83, 84) of a plurality of the work stations.

5. An apparatus for transporting a wound package from a winding machine having a plurality of work stations (1) disposed consecutively in a longitudinal direction of a machine frame, characterized in that each work station (1) of said winding machine is provided with a stock part (83, 84) for stocking fully wound package (P), said package stock part (83, 84) is provided with means (85, 86) for discharging said fully wound package (P), a cassette (5) provided with a package receiver (5a) correspondingly to said stock part (83, 84) is disposed outside of said machine frame, and a cassette moving car (4) is disposed movably along said winding machine so that it moves said cassette (5) in accordance with a cassette requiring signal transmitted from said cassette stock part (83, 84) and that it transports said cassette after transfer of said fully wound package (P) from said package stock part (83, 84) to said cassette (5).

6. An apparatus for transporting a wound package (P) from a winding machine according to claim 5, characterized by a host computer, to which an administrative information of the work stations (1) in said winding machine is data communicated for an automatic package (P) transfer and transportation use, and which performs administration of the cassettes (5) and product control based on said information at investigation and packaging steps.

7. An apparatus for transporting a wound package (P) from a winding machine according to claim 5 or 6, characterized in that said package stock part (83, 84) of each work station (1) in said winding machine is capable of storing at least two wound packages (P).

8. An apparatus for transporting a wound package (P) from a winding machine according to any one of claim 5 to 7, characterized in that each cassette (5) is provided with a plurality of package receivers (5a) correspondingly to the package stock parts (83, 84) of a plurality of work stations (1).

FIG.1

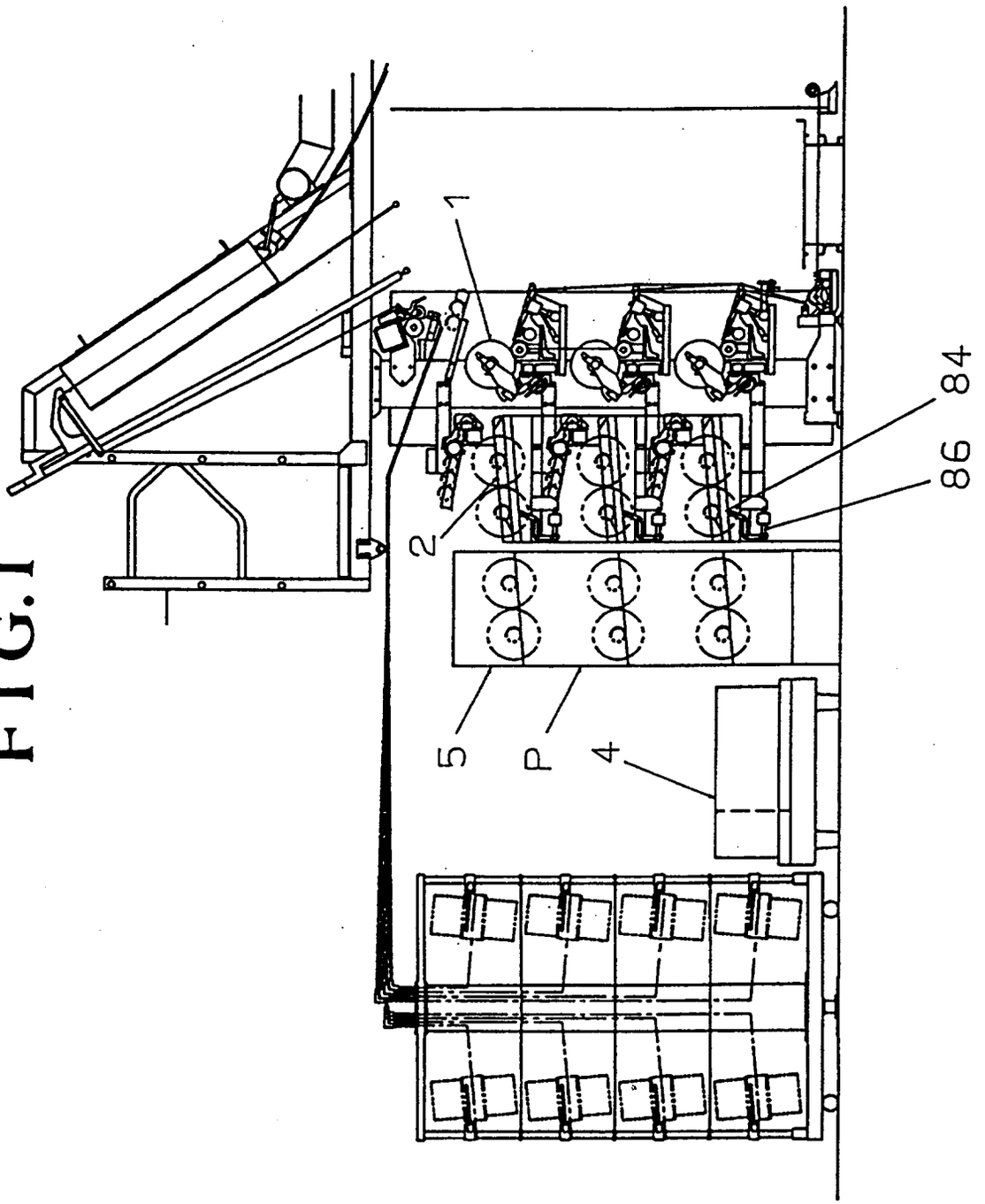


FIG.2

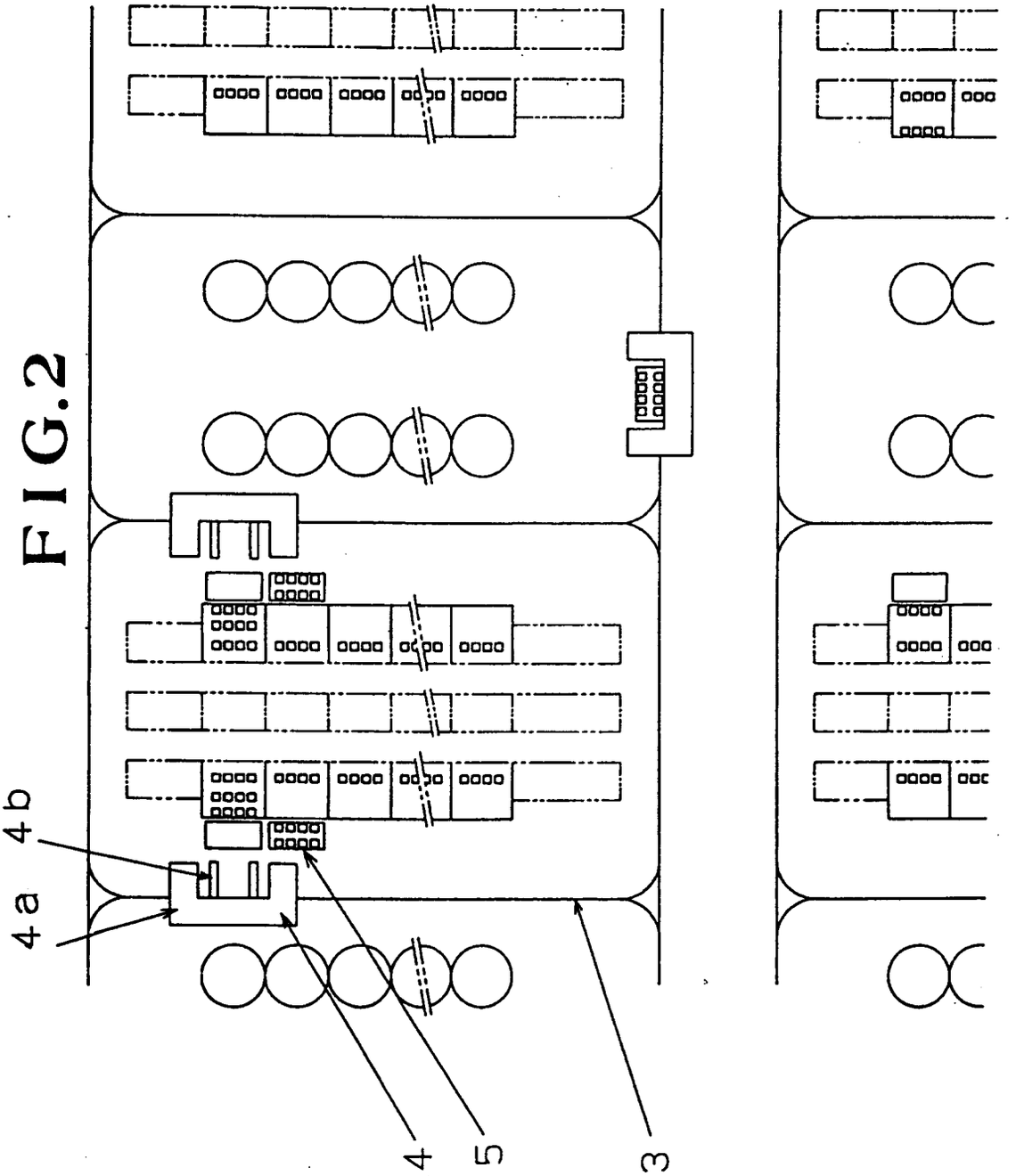


FIG.4

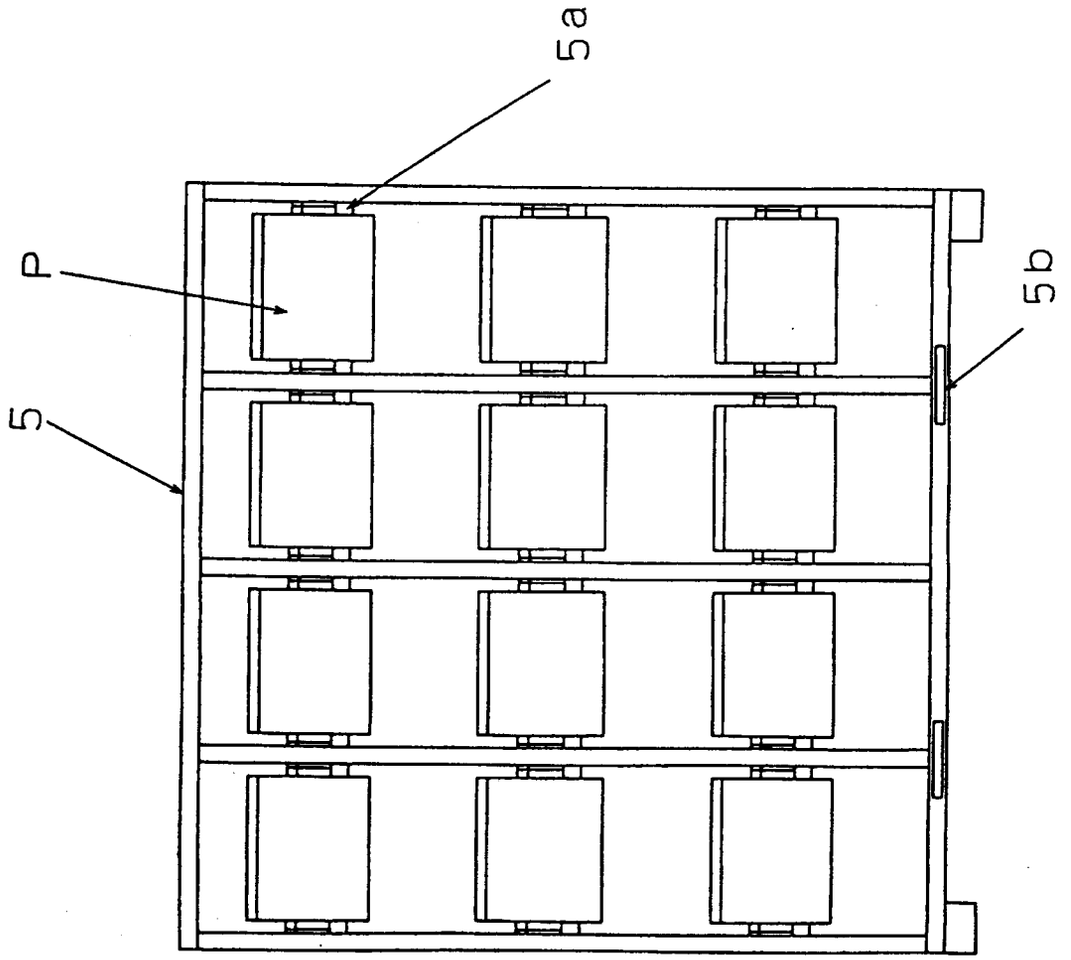


FIG.3

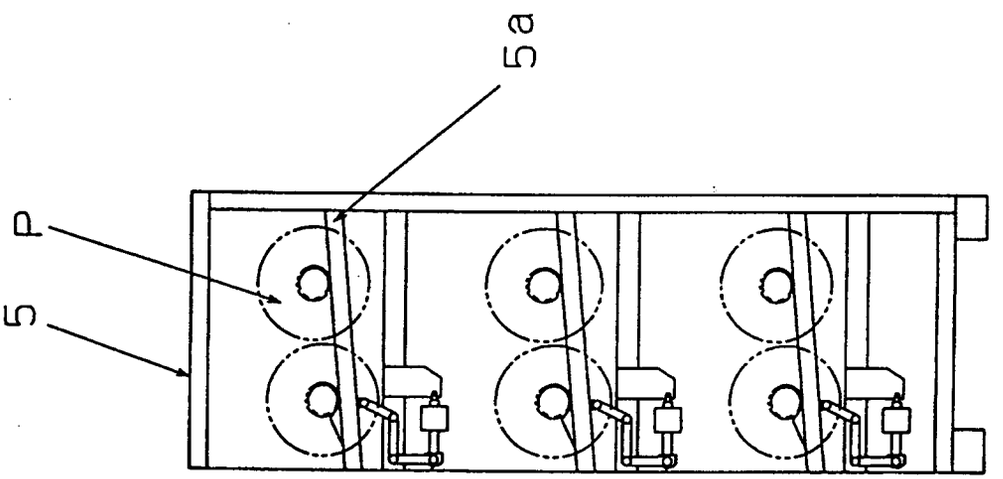
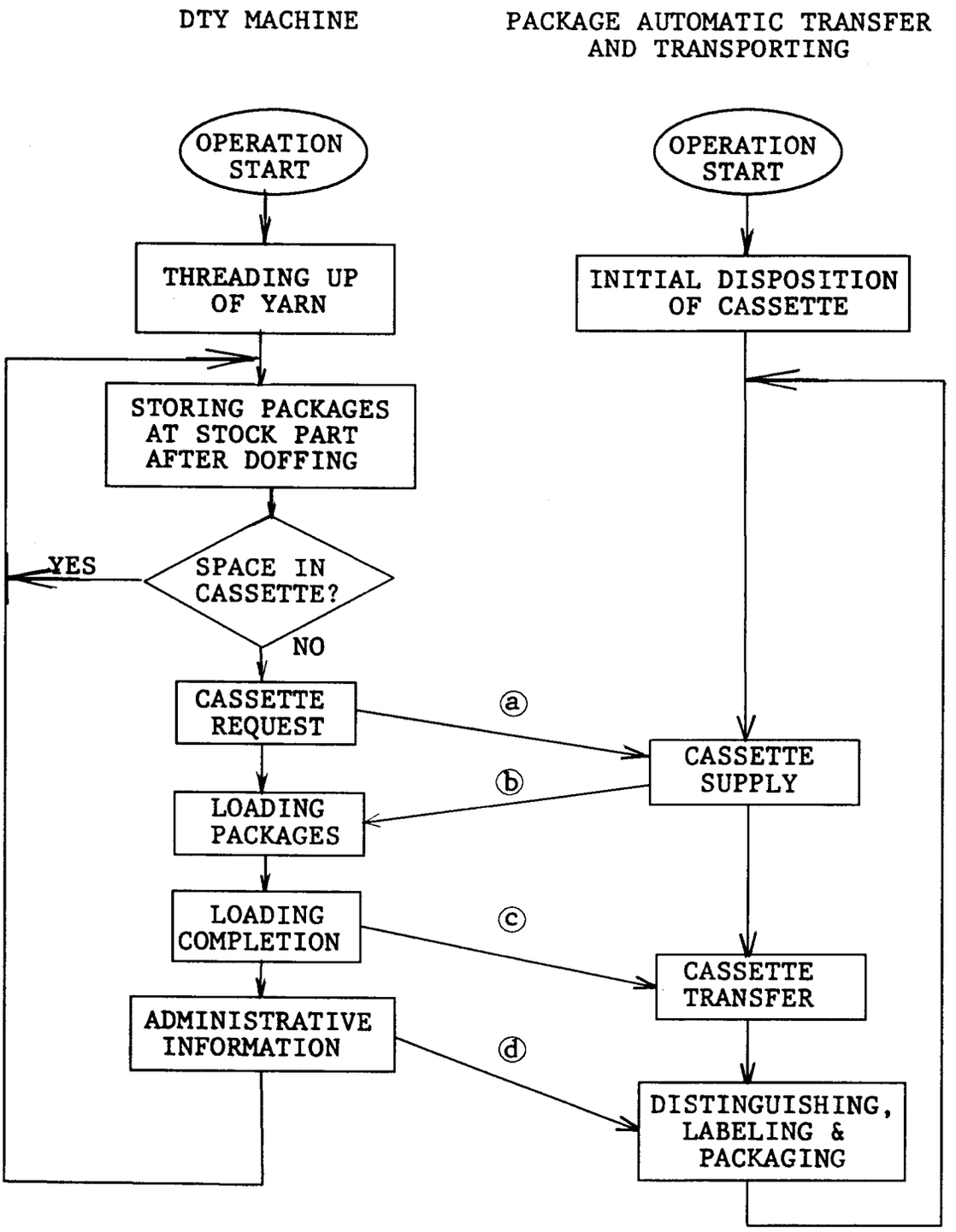
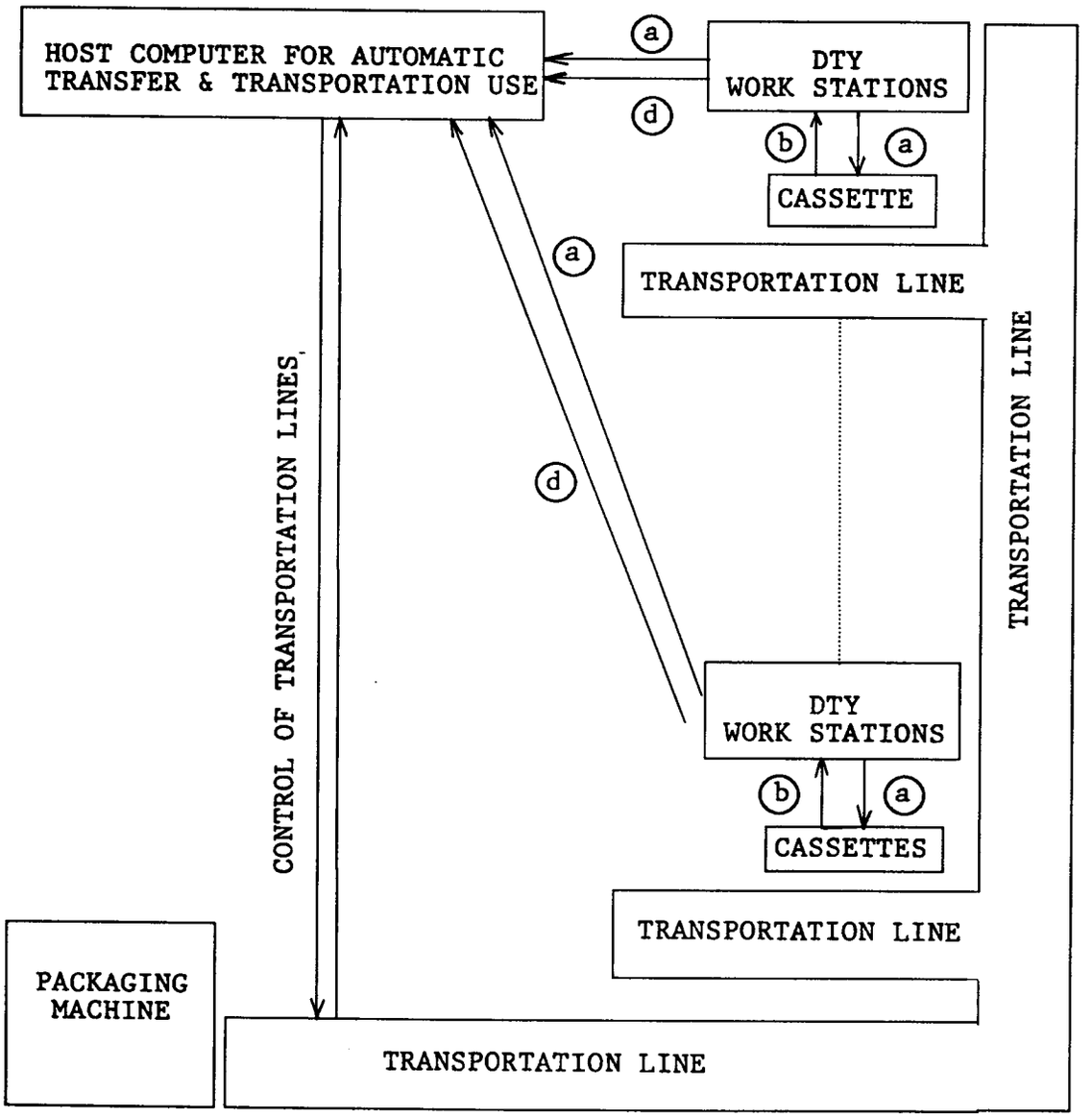


FIG.5



ⓐ : Stock part is full of packages (a cassette is required).
ⓑ : Preparation of cassette is completed (loading of packages is possible).
ⓒ : Packages are loaded (transportion of cassette is possible).
ⓓ : Information on packages

FIG.6



(a) : Stock part is full of packages (a cassette is required).
(b) : Preparation of cassette is completed (loading of packages is possible).
(c) : Packages are loaded (transportion of cassette is possible).
(d) : Information on packages

FIG.7

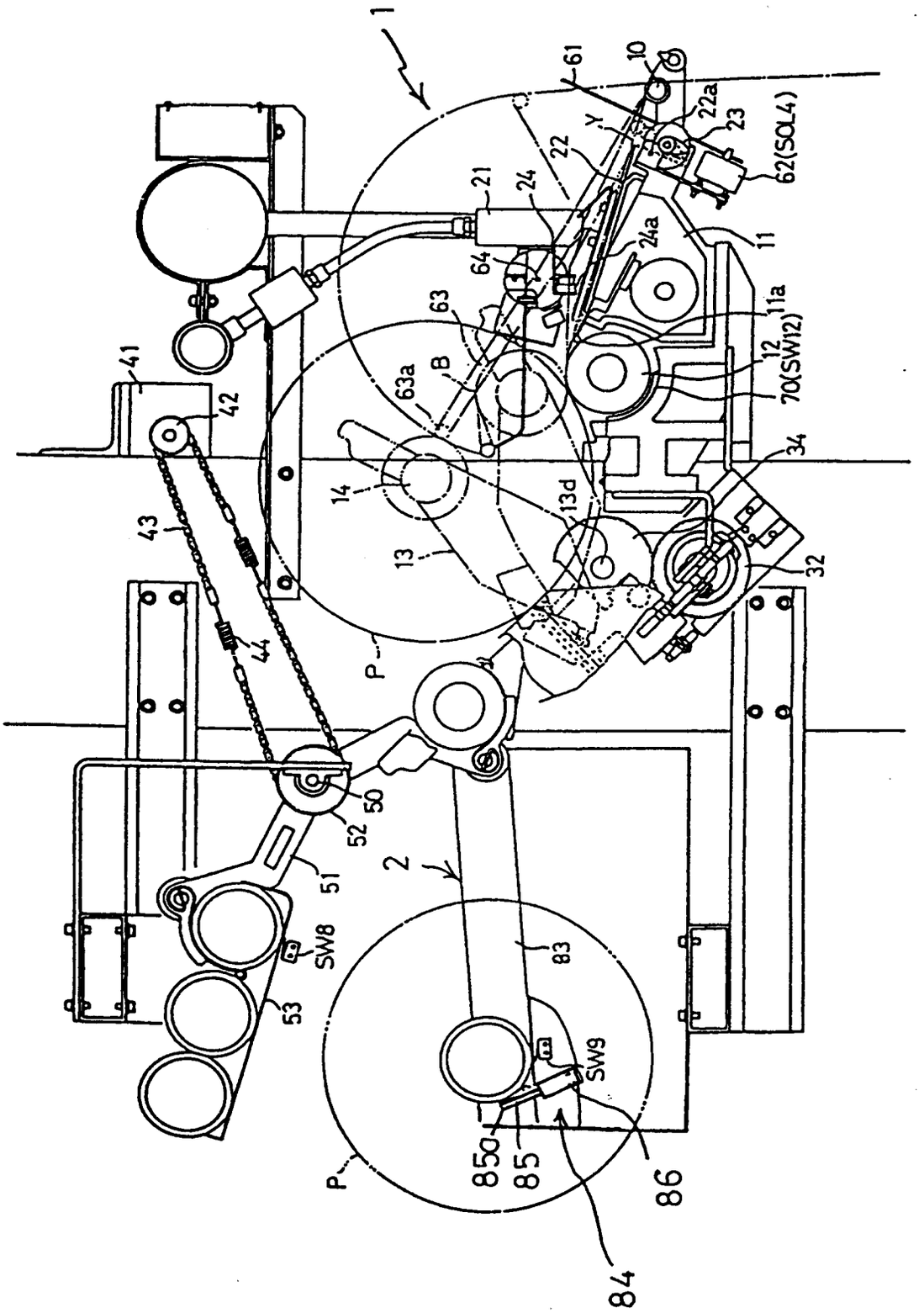

1
61
10
22a
23
62(SOL4)
Y
22
21
24
24a
11
64
63
11a
12
70(SW12)
63a
B
41
42
34
14
13d
43
13
32
44
P
50
52
51
2
SW8
83
53
SW9
85a
85
86
84

FIG.8

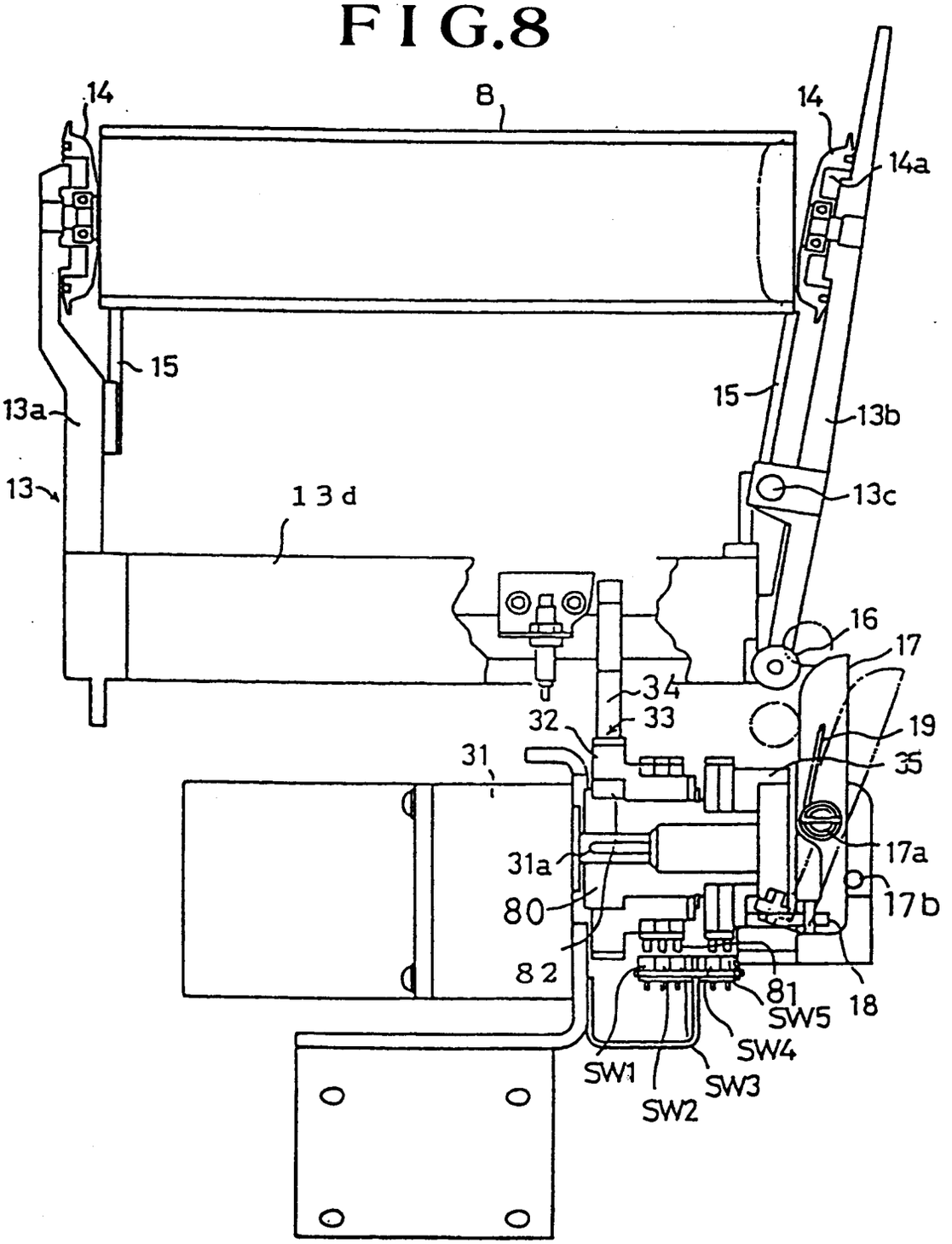
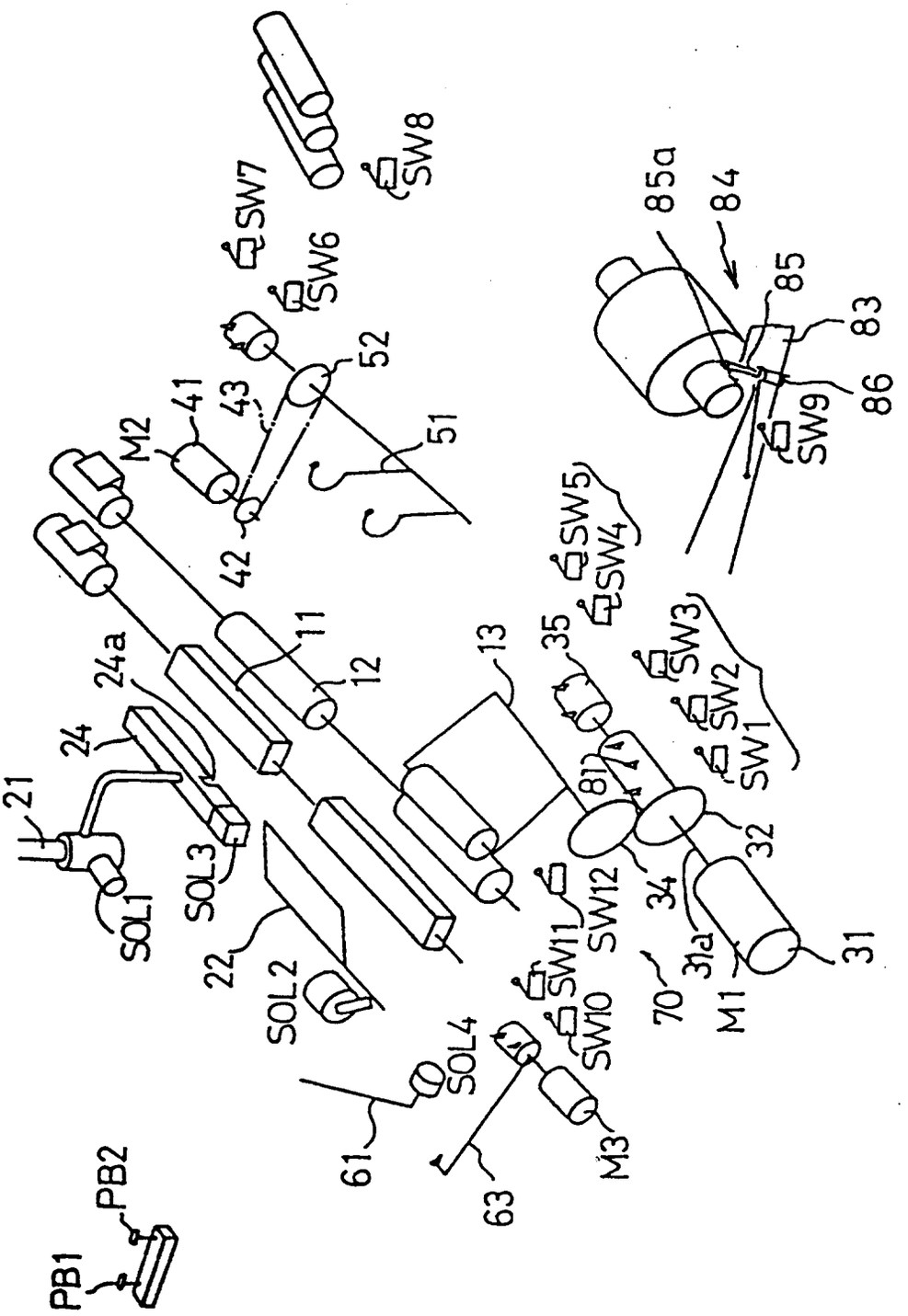

14
8
14
14a
15
15
13a
13b
13
13d
13c
16
17
34
32
33
19
31
35
17a
31a
80
17b
82
81
18
SW5
SW4
SW1
SW3
SW2

FIG.9


PB1
PB2
SOL1
SOL2
SOL3
SOL4
M1
M2
M3
SW1
SW2
SW3
SW4
SW5
SW6
SW7
SW8
SW9
SW10
SW11
SW12
21
22
24
24a
11
12
13
31
31a
32
34
35
41
42
43
51
52
61
63
70
81
83
84
85
85a
86

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EUROPEAN SEARCH REPORT

Application Number

EP 93 10 3747

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	DE-A-3 931 882 (ZINSER) * the whole document * ---	1,3,5,7	B65H67/04 B65H67/06
A,D	US-A-4 615 493 (TERANISHI ET AL.) * figures 1-8,33 * -----	1,2,5,6	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

B65H
D01H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	01 JULY 1993	RAYBOULD B.D.J.

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