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(54)

Combination type automatic dye- preparation/metering dyeing system

(57)

A combination type auto dye-preparation/metering dyeing system includes a liquid dispensing module (3) for metering a dye solution to be dispensed, a receptacle input module (5) for carrying receptacles (81), a rotary table module (2) for transferring each receptacle (81) to a weighing scale (80) to receive a predetermined amount of the dye solution dispensed by the liquid dispensing module (3), a standard concentration liquid preparation module (4) for preparing the desired dye solution for the liquid dispensing module (3), a receptacle output module (6) for receiving the receptacles (81) with the dispensed dye solution from the rotary table module (2), a dyeing module (7) for transferring the dye solution from the receptacles (81) to respective dyeing container (51), and a control unit (1) for controlling the operation of each part of the combination type auto dye-preparation/metering dyeing system. The combination of the system can be selectively set to fit the requirements of different clients.

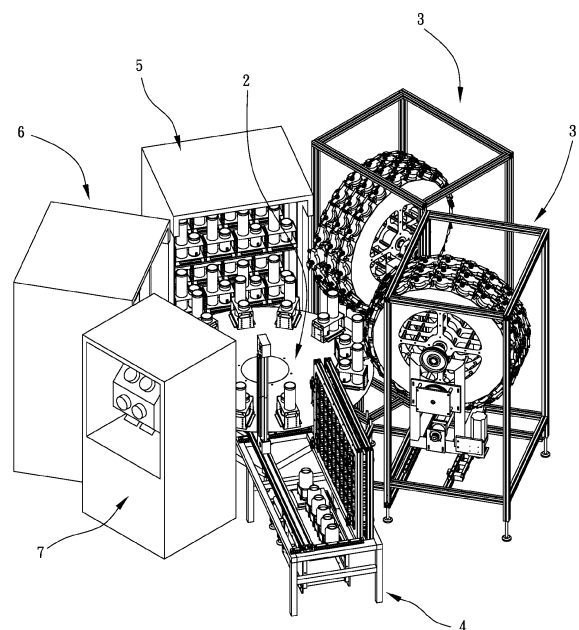


FIG. 1

Description

BACKGROUND OF THE INVENTION

1. Field of the Invention:

[0001] The present invention relates to metered dyeing system and more particularly, to a combination type automatic dye-preparation/metering dyeing system, which is a combination of modularized units selectively set subject to the user preferences and adapted for preparing the desired concentration of a dye solution, metering and dispensing the dye solution, and applying the dispensed dye solution to dye a fabric automatically.

2. Description of the Related Art:

[0002] In regular liquid metering modules, syringes and liquid storage receptacles are detachably arranged together. For example, in Taiwan Utility No. 392862, syringes are controlled to suck in a liquid from respective storage receptacles (according to the siphon principle), and then to eject the liquid into respective assigned dispensing receptacles. Because this liquid dispensing process requires several steps, the prepared liquid cannot be rapidly picked up and then immediately ejected into the target receptacles for dispensing, lowering the metering efficiency. Further, this multi-step liquid dispensing process can cause loss in a trace amount dispensing application.

[0003] Further, a conventional fabric dyeing technology needs to perform the following three processing processes:

1. Standard concentration liquid modulation: Normally, dyes are prepared in a powdered form to facilitate storage and delivery. Before the use of a dye, it is dissolved in a liquid. During application, a receptacle is placed on a weighing scale, and then the dye to be used is put into the receptacle and its weight is measured, and then a metered amount of cold or hot water is added to the receptacle to dissolve the measured dye, and then the receptacle is transferred to a mixing table to let the liquefied dye be well mixed, preventing precipitation.
2. Liquid metering: After preparation of the desired standard concentration, the receptacle carrying the liquefied dye is put in a dispensing table, enabling the liquefied dye to be dispensed into a dye receptacle subject to a predetermined formula for further dyeing application.
3. Dyeing: After the process of liquid metering, the metered liquefied dye and the prepared raw fabric are put in a steel dyeing cup of a dyeing machine for dyeing subject to a predetermined dyeing program.

[0004] The application of the aforesaid prior art fabric dyeing technology needs many persons to perform. Fur-

ther, due to numerous operating steps, it is difficult to control the timing of each operating step. Further, because several persons are in operation, the chance of errors and mistakes increases, imperceptibly wasting a lot of cost and time, but also causing management problems.

SUMMARY OF THE INVENTION

[0005] The present invention has been accomplished under the circumstances in view. It is therefore the main object of the present invention to provide a combination type automatic dye-preparation/metering dyeing system, which is a combination of modularized units selectively set subject to the user preferences and adapted for preparing the desired concentration of a dye solution, metering and dispensing the dye solution, and applying the dispensed dye solution to dye a fabric automatically.

[0006] To achieve this and other objects of the present invention, a combination type auto dye-preparation/metering dyeing system of the present invention comprises a control unit; a rotary table module comprising a plurality of electrical connectors, one electrical connector being electrically connected to the control circuit for transmitting a control signal provided by the control unit, a rotary table having at least one slot formed in a tabletop thereof, and at least one rack respectively mounted in each slot of the rotary table; a weighing scale provided at a bottom side relative to the rotary table module and electrically connected to one electrical connector of the rotary table module and controllable by the control unit to measure the weight of each object placed thereon; at least one receptacle respectively movably mounted in the at least one rack, each receptacle being movable relative to the respective rack through one slot of the rotary table and positionable on the weighing scale for weight measurement; and at least one liquid dispensing module provided above the rotary table module and electrically connected to one respective electrical connector of the rotary table module for dispensing a dye solution into each receptacle for enabling each receptacle with the dispensed dye solution to be measured by the weighing scale.

[0007] The combination type auto dye-preparation/metering dyeing system further comprises a standard concentration liquid preparation module disposed adjacent to the liquid dispensing module above the rotary table module and electrically connected to one electrical connector of the rotary table module, and controllable by the control unit to prepare a predetermined concentration of a dye solution and to supply the prepared dye solution to the liquid dispensing module.

[0008] The combination type auto dye-preparation/metering dyeing system further comprises a receptacle input module electrically connected to one electrical connector of the rotary table module and controllable by the control unit to transfer each receptacle to one respective rack of the rotary table module.

[0009] The combination type auto dye-prepara-

tion/metering dyeing system further comprises a receptacle output module electrically connected to one electrical connector of the rotary table module and controllable by the control unit to transfer each receptacle with the dispensed dye solution from one respective rack of the rotary table module to a predetermined place.

[0010] The combination type auto dye-preparation/metering dyeing system further comprises a dyeing module electrically connected to one electrical connector of the rotary table module and controllable by the control unit to receive each receptacle and the dispensed dye solution from the receptacle output module and to transfer the dispensed dye solution out of the respective receptacle into a predetermined container for dyeing a fabric therein.

[0011] Further, the rotary table comprises a plurality of elongated stop portions protruded from the tabletop at two opposite lateral sides of each slot and respectively defining therein a locating groove; each rack comprises two locating ribs respectively located at respective bottom sides of two opposite lateral sidewalls thereof and respectively coupled to the locating grooves in the elongated stop portions at two opposite lateral sides of one respective slot of the rotary table, and a vertically extending insertion hole; each receptacle is insertable through the vertically extending insertion hole of one rack, having a plurality of locating blocks protruded from the periphery thereof and stoppable inside the respective rack to support the respective receptacle in the respective rack in a suspended position where the respective receptacle protrudes over a bottom wall of the tabletop of the rotary table for resting on the weighing scale for enabling the weighing scale to measure the weight of the dye solution in the respective receptacle.

[0012] Preferably, the rotary table module further comprises a drive unit disposed beneath the rotary table and controllable by the control unit to rotate said rotary table.

[0013] Preferably, the rotary table module further comprises a lifting unit disposed beneath the rotary table and the drive unit and controllable by the control unit to move the tabletop of the rotary table up and down.

[0014] Further, the liquid dispensing module comprises: a wheel, a plurality of metering units, and a brake unit. The wheel is controllable to rotate by the control unit, comprising a wheel body, a wheel axle supporting the wheel body, and multiple transverse rows of accommodation chambers arranged around the periphery of the wheel body. The metering units are respectively mounted in the accommodation chambers of the wheel, each comprising a container mounted in one accommodation chamber and holding therein a dyeing solution, a syringe equipped with a plunger, a needle tube, and a multi-port valve. The multi-port valve comprises a first passage, a second passage and a third passage communicated with one another, a spherical valve body and a handle. The spherical valve body is mounted in the multi-port valve, defining therein a connection passage. The handle extends out of the multi-port valve, and op-

erable to rotate the spherical valve body, enabling the first passage, the second passage and the third passage to be connected to the container, the syringe and the needle tube respectively. The brake unit comprises a horizontally extending first brake and a vertically extending second brake. The horizontally extending first brake comprises a first power source, a first screw rod connected to and movable by the first power source, and a first clamp connected to one end of the first screw rod opposite to the first power source and adapted for clamping the multi-port valve of one metering unit in one accommodation chamber of the wheel and moving the multi-port valve and the respective metering unit out of the respective accommodation chamber. The vertically extending second brake comprises a second power source, a second screw rod connected to and movable by the second power source and a second clamp to one end of the second screw rod opposite to the second power source and adapted for clamping the plunger of the syringe of one metering unit and moving the clamped plunger relative to the respective syringe.

[0015] Preferably, the connection passage of the spherical valve body is a T-shaped passage.

[0016] Preferably, the first clamp is movable by the first power source through the first screw rod to drive the handle in rotating the spherical valve body in the multi-port valve between a first position where the connection passage connects the second passage to the syringe and the first passage to the feeding hole of the container and the third passage is blocked from the needle tube, and a second position where the connection passage connects the second passage to the syringe and the third passage to the needle tube, and the first passage is blocked from the feeding hole of the container.

[0017] Preferably, the liquid dispensing module further comprises a mounting framework and a support frame. The support frame comprises a horizontal base frame member, and two upright frame members located at the horizontal base frame member and adapted to support the wheel axle of the wheel. The mounting framework comprises two rails arranged in parallel in a wheel zone therein. The horizontal base frame member of the support frame comprises a plurality of sliding blocks fixedly located at a bottom side thereof and coupled to and movable along the rails.

[0018] Preferably, the liquid dispensing module further comprises a power unit connected to the support frame and adapted to move the support frame and the wheel along the rails.

[0019] Preferably, the liquid dispensing module further comprises a transmission unit adapted to rotate the wheel. The transmission unit comprises a motor mounted on the horizontal base frame member of the support frame and providing a motor shaft, and a belt transmission mechanism coupled between the motor shaft of the motor and the wheel axle of the wheel for enabling the wheel axle of the wheel to be rotated by the motor.

[0020] Preferably, the control unit is configured to con-

trol the operation of the brake unit, the first power source, the second power source and the motor of the transmission unit.

[0021] Preferably, the weighing scale is electrically connected to the control unit and adapted to provide each measured data to the control unit.

[0022] In one preferred embodiment of the present invention, the combination type auto dye-preparation/metering dyeing system comprises a control unit, a rotary table module, a liquid dispensing module, a standard concentration liquid preparation module, a receptacle input module, a receptacle output module and a dyeing module.

[0023] The standard concentration liquid preparation module carries a plurality of receptacles for holding different colors of dyes.

[0024] The standard concentration liquid preparation module is adapted to prepare an original dye solution for the liquid dispensing module. By means of the standard concentration liquid preparation module, the desired standard concentration of dye solution is automatically prepared and supplied to containers in a wheel of the liquid dispensing module. The rotary table module transfers each receptacle to the bottom side of the liquid dispensing module where the liquid dispensing module dispenses a metered amount of the dye solution into each receptacle, and the weighing scale measures the weight of each receptacle and the contained dye solution and displays the measured data. Further, the wheel can be continuously rotated to stir up the dye solution in each container. A multi-port valve with a respective syringe are arranged to draw the dye solution from one respective container and to eject the dye solution to each receptacle at the rotary table of the rotary table module.

[0025] Further, the dyeing module is controlled by a command from the control unit to receive each dye solution-contained receptacle from the receptacle output module, and to transfer each dye solution-contained receptacle to a container for dyeing a fabric therein.

[0026] Further, the receptacle input module holds the receptacles and then properly transfers the receptacles to the rotary table module.

[0027] Further, the receptacle output module can be used to receive the metered receptacles from the rotary table module for further output.

[0028] Further, the rotary table module provides electrical connectors for enabling all the modules or parts of the combination type auto dye-preparation/metering dyeing system to be selectively and electrically connected to the control unit. Further, the rotary table of the rotary table module is vertically movable. The rotary table can be lifted and then rotated to transfer the receptacles. Alternatively, the rotary table can be lowered and then rotated to have the selected receptacle be rested on the weighing scale. Further, the rotary table has a plurality of racks mounted in respective slots in the tabletop thereof for holding the receptacles.

[0029] Further, all the modularized parts can be ar-

ranged at different locations and electrically connected together by an electrical connector assembly.

[0030] Further, the user can selectively combine the modularized parts to set up the combination type auto dye-preparation/metering dyeing system subject to one's preference, allowing each modularized part to be separately used and saving the installation space and time.

[0031] When compared with prior art dyeing techniques, the invention exhibits advantages as follows:

Advantages		
	Prior art	The invention
1. Operator	Many	Few
2. Automation	Semi-auto	Full auto
3. Operating time	Medium	Short
4. Error rate	High	Low

[0032] Other advantages and features of the present invention will be fully understood by reference to the following specification in conjunction with the accompanying drawings, in which like reference signs denote like components of structure.

BRIEF DESCRIPTION OF THE DRAWINGS

[0033]

FIG. 1 is an oblique top elevational view of a combination type auto dye-preparation/metering dyeing system in accordance with the present invention.

FIG. 2 is an oblique top elevational view of the rotary table module of the combination type auto dye-preparation/metering dyeing system in accordance with the present invention.

FIG. 3 is an exploded view of a part of the present invention, illustrating the relative arrangement of the receptacles, racks and weighing scale of the rotary table module.

FIG. 4 is a side view of the rotary table module of the combination type auto dye-preparation/metering dyeing system in accordance with the present invention.

FIG. 5 is a schematic applied view of the present invention, illustrating the rotary table of the rotary table module rotated.

FIG. 6 is a schematic applied view of the present invention, illustrating the rotary table of the rotary table module lifted.

FIG. 7 is a schematic applied view of the present invention, illustrating the rotary table of the rotary table module lowered.

FIG. 8 is an oblique top elevation of the liquid dispensing module of the combination type auto dye-preparation/metering dyeing system in accordance with the present invention.

FIG. 9 is a side view of the liquid dispensing module of the combination type auto dye-preparation/metering dyeing system in accordance with the present invention.

FIG. 10 is a top view of the liquid dispensing module of the combination type auto dye-preparation/metering dyeing system in accordance with the present invention.

FIG. 11 is an elevational view in an enlarged scale of the wheel and brake unit of the liquid dispensing module of the combination type auto dye-preparation/metering dyeing system in accordance with the present invention.

FIG. 12 corresponds to FIG. 11 when viewed from another angle.

FIG. 13 is a schematic applied view of the present invention, illustrating the relative positioning between the wheel and the bracket unit during operation of the liquid dispensing module.

FIG. 14 corresponds to FIG. 13, illustrating the first clamp of the horizontally extending first brake clamped on the multi-port valve and the second clamp of the vertically extending second brake clamped on the syringe.

FIG. 15 corresponds to FIG. 14, illustrating one receptacle moved with the brake unit out of the wheel.

FIG. 16 corresponds to FIG. 15, illustrating the spherical valve body rotated to the first position, the plunger lifted, and the dye solution drawn out of the container into the syringe.

FIG. 17 corresponds to FIG. 16, illustrating the spherical valve body rotated to the second position, the plunger lowered, and the dye solution ejected out of the syringe into the receptacle.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0034] Referring to FIGS. 1-3, a combination type auto dye-preparation/metering dyeing system in accordance with the present invention is shown. The combination type auto dye-preparation/metering dyeing system comprises a control unit 1, a rotary table module 2, a plurality of receptacles 81, and a liquid dispensing module 3. The rotary table module 2 is electrically connected to the control unit 1 by means of electrical connectors (not shown) thereof, allowing the control unit 1 to provide control signals to every connected unit or part. The combination type auto dye-preparation/metering dyeing system further comprises a weighing scale 80 disposed at one side relative to the rotary table module 2 and also at one side relative to the liquid dispensing module 3, and electrically connected to a respective electrical connector of the rotary table module 2 and the liquid dispensing module 3. Further, the rotary table module 2 is electrically connected to an external power supply for power input to provide all the component parts of the combination type auto dye-preparation/metering dyeing system with the necessary

working voltage. Further, the receptacles 81 are detachably and vertically movably joined to the rotary table module 2, and can be respectively placed on the weighing scale 80 and measured by the weighing scale 80. The liquid dispensing module 3 is adapted to meter the needed dye solution, for example, fabric dye solution. Further, the liquid dispensing module 3 is disposed at one side relative to the rotary table module 2 and electrically connected to one respective electrical connector of the rotary table module 2.

[0035] In one embodiment of the present invention, the combination type auto dye-preparation/metering dyeing system further comprises a standard concentration liquid preparation module 4 electrically connected to one respective electrical connector of the rotary table module 2.

[0036] The standard concentration liquid preparation module 4 is adapted to prepare an original dye solution for the liquid dispensing module 3. The standard concentration liquid preparation module 4 is disposed at one side relative to the rotary table module 2, comprising a rotary table, a dye supply mechanism, a plurality of receptacles, a conveyer, a weighing scale, a track, a mechanical arm unit, a liquid supply device. The dye supply mechanism is joined to one side of the rotary table, holding multiple dyes in respective compartments therein (see FIG. 1). The track is located on the rotary table. The mechanical arm device is mounted at and movable along the track. The conveyer is provided at the bottom side of the rotary table. The weighing scale is provided at the bottom side of the conveyer. The receptacles are arranged on the conveyer in proper order. The matching structure between the conveyer and the receptacles is same as the matching structure between the slots of the rotary table and the racks and receptacles that will be described latter. Thus, when the conveyer is lowered, the bottom ends of the receptacles are rested on the weighing scale and then measured by the weighing scale. Subject to a predetermined dye solution concentration, a mechanical arm is controlled to pick up a dye from the dye supply mechanism to each of the properly arranged receptacles at the conveyer, enabling the dye to be distributed into each receptacle. During distribution of the dye into one receptacle, the weighing scale measures the weight of the respective receptacle. When the weight of the respective receptacle at the rotary table of the rotary table module reaches a predetermined value, the mechanical arm stops the supply of the dye. Thereafter, the liquid supply device is controlled to supply a solvent to the dye in each receptacle, preparing the desired concentration of dye solution. Thereafter, the mechanical arm picks up all the receptacles with the contained dye solution from the conveyer and arranges them on the rotary table of the rotary table module. Thereafter, another mechanical arm transfers the receptacles with the contained dye solution to the liquid dispensing module 3. By means of the standard concentration liquid preparation module 4, the desired standard concentration of dye solution is automatically prepared and supplied to

the liquid dispensing module **3**. The rotary table module **2** transfers each receptacle **81** to the bottom side of the liquid dispensing module **3** where the liquid dispensing module **3** dispenses a metered amount of the dye solution into each receptacle **81**, and the weighing scale **80** measures the weight of each receptacle **81** and the contained dye solution and displays the measured data.

[0037] In one embodiment of the present invention, the combination type auto dye-preparation/metering dyeing system further comprises a receptacle input module **5** electrically connected to one respective electrical connector of the rotary table module **2**.

[0038] The receptacle input module **5** is electrically connected to the control unit **1**, and controlled by a control command from the control unit **1** to provide a number of receptacles **81** to the rotary table module **2**. The receptacle input module **5** uses a mechanical arm device (not shown) to transfer each receptacle **81** to the rotary table module **2**. As the structure and application of this kind of mechanical arm device is of the known art, no further detailed description in this field will be necessary.

[0039] In one embodiment of the present invention, the combination type auto dye-preparation/metering dyeing system further comprises a receptacle output module **6** electrically connected to one respective electrical connector of the rotary table module **2**.

[0040] The receptacle output module **6** is controlled by a command from the control unit **1** to receive each dye solution-contained receptacle **81** from the rotary table module **2** for output. The receptacle output module **6** can use a mechanical arm device to pick up each dye solution-contained receptacle **81** from the rotary table module **2**.

[0041] In one embodiment of the present invention, the combination type auto dye-preparation/metering dyeing system further comprises a dyeing module **7** electrically connected to one respective electrical connector of the rotary table module **2**.

[0042] The dyeing module **7** is controlled by a command from the control unit **1** to receive each dye solution-contained receptacle **81** from the receptacle output module **6**, and to transfer each dye solution-contained receptacle **81** to a container for dyeing a fabric therein. Further, the dyeing module **7** can use a mechanical arm device to transfer each dye solution-contained receptacle **81**.

[0043] In one preferred embodiment of the present invention, as shown in FIGS. 3 and 4, the rotary table module **2** of the combination type auto dye-preparation/metering dyeing system comprises a rotary table **90** having a plurality of slots **92** equiangularly formed in the tabletop **91** thereof and a plurality of elongated stop portions **93** respectively protruded from the tabletop **91** at two opposite lateral sides of each slot **92** and defining therein a respective locating groove, and a plurality of racks **94** detachably mounted at the tabletop **91** of the rotary table **90** corresponding to the slots **92**. The aforesaid receptacles **81** are respectively and vertically movably mounted in the racks **94**. When one rack **94** is moved with the

tabletop **91** of the rotary table **90** into vertical alignment with the weighing scale **80**, the respective receptacle **81** can be lowered to the weighing scale **80** and measured by the weighing scale **80**. Further, each rack **94** comprises two locating ribs **941** respectively located at respective bottom sides of two opposite lateral sidewalls thereof and respectively coupled to the locating grooves in the elongated stop portions **93** at two opposite lateral sides of one respective slot **92** of the rotary table **90**, and a vertically extending insertion hole **942**. Further, each receptacle **81** is insertable through the vertically extending insertion hole **942** of one rack **94** to protrude over the bottom wall of the tabletop **91** of the rotary table **90**, having a plurality of locating blocks **811** protruded from the periphery near the bottom end thereof and stoppable inside the respective rack **94** above the bottom end of the vertically extending insertion hole **942** of the respective rack **94**. Thus, when the rotary table **90** is lowered, the bottom end of the receptacle **81** in one rack **94** can be rested on the weighing scale **80**, enabling the weighing scale **80** to measure the weight of the dye solution in the receptacle **81**.

[0044] The rotary table module **2** further comprises a drive unit **95** disposed at the bottom side of the rotary table **90** and controllable by the control unit **1** to rotate the rotary table **90**.

[0045] The rotary table module **2** further comprises a lifting unit **96** arranged beneath the rotary table **90** and the drive unit **95** and controllable by the control unit **1** to move the rotary table **90** up and down.

[0046] Referring to FIGS. 5-7 and FIG. 3, the rotary table **90** is movable up and down by the lifting unit **96**. When the rotary table **90** is lifted, the drive unit **95** is controlled by the control unit **1** to rotate the rotary table **90** moving each receptacle **81** to a predetermined location, for example, the weighing scale **80**. Thus, when the rotary table **90** is lowered, the receptacle **81** can be placed on the weighing scale **80**, and the liquid dispensing module **3** can inject the prepared dye solution into the receptacle **81**, and at the same time, the weighing scale **80** measures the weight of the injected dye solution and provides the measured data to the control unit **1** so that the control unit **1** can control the liquid dispensing module **3** to stop from injecting the dye solution when the weight of the injected solution reaches a predetermined value.

[0047] Referring to FIGS. 8, 9, 10 and 12, the liquid dispensing module **3** comprises a mounting framework **10**, a wheel **20**, a support frame **30**, a power unit **40**, a plurality of metering units **50**, a brake unit **60**, and a transmission unit **70**. The wheel **20** is rotatably mounted in the support frame **30**. The power unit **40** is connected to the support frame **30** and adapted to move the support frame **30**. The support frame **30** is mounted inside the mounting framework **10**. The metering units **50** are movably mounted around the wheel **20**, each holding one respective receptacle and a liquid of a respective standard concentration in the receptacle. The transmission unit **70** is con-

trollable by a command from the control unit 1 to rotate the wheel 20, moving one assigned row of metering units 50 to one side of the brake unit 60.

[0048] Referring to FIGS. 8-10 again, the mounting framework 10 is formed by connecting aluminum profiles together, defining a wheel zone 11, a brake unit zone 12 for the mounting of the wheel 20 and the brake unit 60 respectively. Further, two parallel rails 111 are provided in the wheel zone 11 for guiding movement of the wheel 20 thereon.

[0049] Referring to FIGS. 9, 11 and 12, the wheel 20 comprises a wheel body 21, a wheel axle 22 supporting the wheel body 21, and rows of accommodation chambers 23 arranged around the periphery of the wheel body 21 for holding respective containers 51.

[0050] The support frame 30 comprises a horizontal base frame member 31, two upright frame members 32 located at the base frame member 31 in a parallel manner and adapted to support the wheel axle 22 of the wheel 20, and a plurality of sliding blocks 33 fixedly located at the bottom side of the horizontal base frame member 31 and coupled to and movable along the rails 111 in the wheel zone 11 of the mounting framework 10. When one particular standard concentration of dye solution is needed, the wheel 20 is rotated, subject to the control of the control unit 1, to a predetermined angular position where containers 51 in one particular row of accommodation chambers 23 that contained the desired standard concentration of dye solution are kept at the same elevation of the brake unit 60, and then the wheel 20 is moved with the support frame 30 along the rails 111 in the wheel zone 11 of the mounting framework 10 to an application position where the containers 51 in one particular row of accommodation chambers 23 that contained the desired standard concentration of dye solution are kept in alignment with the brake unit 60.

[0051] Referring to FIGS. 9, 10 and 12, the power unit 40 is mounted in the mounting framework 10 near one side of the support frame 30, and adapted to move the support frame 30 and the wheel 20 along the rails 111 in the wheel zone 11 of the mounting framework 10.

[0052] Referring to FIG. 9 and FIGS. 13-16, each metering unit 50 comprises a container 51, a syringe 52, a needle tube 53, and a multi-port valve 54.

[0053] The container 51 is accommodated in one accommodation chamber 23, holding a liquefied coloring agent, food, chemical or medicine. In this embodiment, each container 51 holds therein a predetermined concentration of dyeing solution. The container 51 is kept in fluid communication with the multi-port valve 54 for outputting the contained dyeing solution into the multi-port valve 54.

[0054] The syringe 52 is equipped with a plunger 521. The multi-port valve 54 comprises a first passage 5411, a second passage 5412 and a third passage 5413 disposed in fluid communication with one another, a spherical valve body 542, and a handle 5414. The first passage 5411 has its one end connected to a feeding hole 511 of

the container 51. The second passage 5412 has its one end connected to the syringe 52. The third passage 5413 has its one end connected to the needle tube 53 that is insertable into the container 51. The spherical valve body 542 defines therein a connection passage 5421. In this embodiment, the connection passage 5421 is a T-shaped passage. The spherical valve body 542 is mounted in the center of the multi-port valve 54. The handle 5414 is inserted through the multi-port valve 54, and operable by an external force to rotate the spherical valve body 542 the multi-port valve 54 between a first position where the connection passage 5421 connects the second passage 5412 to the syringe 52 and the first passage 5411 to the feeding hole 511 of the container 51 and the third passage 5413 is blocked from the needle tube 53, and a second position where the connection passage 5421 connects the second passage 5412 to the syringe 52 and the third passage 5413 to the needle tube 53, and the first passage 5411 is blocked from the feeding hole 511 of the container 51.

[0055] Referring to FIGS. 8-17, the brake unit 60 is mounted in the brake unit zone 12 of the mounting framework 10 and controllable by the control unit 1 to move toward the containers 51 in the row of accommodation chambers 23 in the application position. Further, the brake unit 60 comprises a horizontally extending first brake 61 and a vertically extending second brake 62. The horizontally extending first brake 61 comprises a first power source 611, a first screw rod 612, and a first clamp 613. The first power source 611 is connected to the first screw rod 612, and adapted to move the first screw rod 612. The first clamp 613 is connected to one end of the first screw rod 612 and adapted to clamp the multi-port valve 54. Thus, the first power source 611 can be controlled to move the first screw rod 612 forward, forcing the first clamp 613 to clamp the multi-port valve 54. Thereafter, the first power source 611 is controlled to move the first screw rod 612 backward, causing first clamp 613 to carry the metering unit 50 with the respective container 51 out of the wheel 20 to a position right above one receptacle 81 at the rotary table 90 that is kept in vertical alignment with the weighing scale 80 (see FIGS. 6-8). Thereafter, the first power source 611 is controlled to move the first screw rod 612 and the first clamp 613, forcing the handle 5414 to rotate the spherical valve body 542 in the multi-port valve 54, shifting the spherical valve body 542 from the first or second position to the second or first position to keep the connection passage 5421 in communication with the syringe 52 and the feeding hole 511 of the container 51, or in communication with the syringe 52 and the needle tube 53.

[0056] The vertically extending second brake 62 comprises a second power source 621, a second screw rod 622 and a second clamp 623. The second power source 621 is connected to the second screw rod 622, and adapted to move the second screw rod 622. The second clamp 623 is connected to one end of the second screw rod 622, and adapted to clamp the plunger 521 of the syringe

52 when the first clamp 613 is controlled to clamp the multi-port valve 54. After the second clamp 623 clamps the plunger 521 of the syringe 52, the second power source 621 is controlled to move the second screw rod 622, the second clamp 623 and the plunger 521 of the syringe 52, causing the syringe 52 to suck in the dye solution from the container 5, or to eject the dye solution out of the syringe 52 (see FIGS. 9 and 10).

[0057] Further, the aforesaid first power source 611 or second power source 621 can be a motor, hydraulic cylinder or pneumatic cylinder.

[0058] Referring to FIGS. 10-12, the transmission unit 70 comprises a motor 71 and belt transmission mechanism 72. The motor 71 is mounted on the base frame member 31 of the support frame 30, comprising a motor shaft 711. The belt transmission mechanism 72 is coupled between the motor shaft 711 of the motor 71 and the wheel axle 22 of the wheel 20, enabling the wheel axle 22 of the wheel 20 to be rotated by the motor 71.

[0059] As stated above, the wheel axle 22 of the wheel 20 is supported on the upright frame member 32 of the support frame 30 and rotatable by the motor 71 of the transmission unit 70 via the belt transmission mechanism 72. The receptacles 81 are carried in the racks 94 at the tabletop 91 of the rotary table 90 below the elevation of the brake unit 60, and adapted to receive the dye solution from the metering units 50 that are carried in the wheel 20.

[0060] Referring to FIGS. 11 and 12, when the motor 71 is started to rotate the belt transmission mechanism 72 and the wheel 20, the containers 51 are rotated with the wheel 20, causing the contained dye solution to be stirred up.

[0061] Referring to FIGS. 13-17, the metered output of the dye solution contained in each metering unit 50 is outlined hereinafter. Subject to a predetermined formula, the control unit 1 controls rotation and sliding movement of the wheel 20 to a predetermined position where one assigned metering unit 50 is kept right above the receptacle 81 that is kept in vertical alignment with the weighing scale 80. At this time, the needle tube 53 of the assigned metering unit 50 is aimed at the receptacle 81. Thereafter, the first power source 611 of the horizontally extending first brake 61 of the brake unit 60 is controlled to move the first screw rod 612 forward, forcing the first clamp 613 to clamp the multi-port valve 54, and then the first power source 611 is controlled to move the first screw rod 612 backward, causing the first clamp 613 to carry the to carry the metering unit 50 with the respective container 51 out of the wheel 20 to a position right above one receptacle 81 at the rotary table 90 that is kept in vertical alignment with the weighing scale 80 (see FIGS. 13-15). At the time the first clamp 613 clamps the multi-port valve 54, the first clamp 613 is rotated to shaft the connection passage 5421 of the spherical valve body 542 of the multi-port valve 54 into communication with the syringe 52 and the feeding hole 511 of the container 51. When metering, the second power source 621 is controlled to move the second clamp 623 in lifting the plunger

521 of the syringe 52, causing the syringe 52 to suck in the dye solution from the container 51 (see FIGS. 16 and 17).

[0062] Thereafter, the first power source 611 is controlled to move the first screw rod 612 and the first clamp 613 forward, forcing the handle 5414 to rotate the spherical valve body 542 in the multi-port valve 54 to the position where the connection passage 5421 of the spherical valve body 542 is kept in communication with the syringe 52 and the needle tube 53, i.e., the two opposite ends of the connection passage 5421 are respectively connected to the second passage 5412 and the third passage 5413. Thereafter, the second power source 621 is controlled to move the second screw rod 622 and the second clamp 623 in lowering the plunger 521 of the syringe 52 to eject the dye solution out of the syringe 52 through the needle tube 530 into the receptacle 81, and at the same time, the weighing scale 80 measures the weight and displays the measured data.

[0063] If the measured data indicated by the weighing scale 80 does not reach the desired value, i.e., the dye solution injected into the receptacle 81 does not reach the desired amount, the control unit 1 controls the second clamp 623 to lower the plunger 521 of the syringe 52, forcing the syringe 52 to eject the dye solution out of the container 51 to the receptacle 81 to the status where the measured data displayed on the weighing scale 80 reaches the predetermined value.

[0064] Except the application of the brake unit 60 to perform metered dispensing of a standard concentration of dye solution from the containers 51 in the respective accommodation chambers 23. The dispensing of the standard concentration of dye solution can also be done by labor.

[0065] As stated above, the liquid dispensing module 3 of the invention enables the wheel 20 to be rotated on the upright frame member 32, moving the containers 51 to stir up the contained dye solution and render it uniform. Further, by means of closing or opening the multi-port valve 54 and driving the brake unit 60 to operate the syringe 52, the dye solution output amount is accurately controlled. Further, the syringe 52 and the container 51 are joined together, facilitating dye solution input and output operations, and eliminating the drawback of the prior art technique that requires an extra step to move the syringe to the container. Therefore, the invention achieves automatic metering, enhances metering accuracy, and improves the operation efficiency and productivity.

[0066] Although particular embodiments of the invention have been described in detail for purposes of illustration, various modifications and enhancements may be made without departing from the spirit and scope of the invention. Accordingly, the invention is not to be limited except as by the appended claims.

Claims

1. A combination type auto dye-preparation/metering dyeing system, comprising:

a control unit (1);
 a rotary table module (2) comprising a plurality of electrical connectors, one said electrical connector being electrically connected to said control circuit (1) for transmitting a control signal provided by said control unit (1), a rotary table (90), said rotary table (90) comprising a tabletop (91) having at least one slot (92), and at least one rack (94) respectively mounted in each said slot (92);
 a weighing scale (80) provided at a bottom side relative to said rotary table module (2) and electrically connected to one said electrical connector of said rotary table module (2) and controllable by said control unit (1) to measure the weight of an object placed thereon;
 at least one receptacle (81) respectively movably mounted in said at least one rack (94), each said receptacle (81) being movable relative to the respective said rack (94) through one said slot (92) and positionable on said weighing scale (80) for weight measurement; and
 at least one liquid dispensing module (3) provided above said rotary table module (2) and electrically connected to one respective said electrical connector of said rotary table module (2) for dispensing a dye solution into each said receptacle (81) for enabling each said receptacle (81) with the dispensed dye solution to be measured by said weighing scale (80).

2. The combination type auto dye-preparation/metering dyeing system as claimed in claim 1, further comprising a standard concentration liquid preparation module (4) disposed adjacent to said liquid dispensing module (3) above said rotary table module (2) and electrically connected to one said electrical connector of said rotary table module (2) and controllable by said control unit (1) to prepare a predetermined concentration of a dye solution and to supply the prepared dye solution to said liquid dispensing module (3).
3. The combination type auto dye-preparation/metering dyeing system as claimed in claim 1, further comprising a receptacle input module (5) electrically connected to one said electrical connector of said rotary table module (2) and controllable by said control unit (1) to transfer each said receptacle (81) to each said rack (94) of said rotary table module (2).
4. The combination type auto dye-preparation/metering dyeing system as claimed in claim 1, further comprising

a receptacle output module (6) electrically connected to one said electrical connector of said rotary table module (2) and controllable by said control unit (1) to transfer each said receptacle (81) with the dispensed said dye solution from one respective said rack (94) of said rotary table module (2) to a predetermined place.

5. The combination type auto dye-preparation/metering dyeing system as claimed in claim 4, further comprising a dyeing module (7) electrically connected to one said electrical connector of said rotary table module (2) and controllable by said control unit (1) to receive each said receptacle (81) and the dispensed said dye solution from said receptacle output module (6) and to transfer the dispensed said dye solution out of the respective said receptacle (81) into a predetermined container for dyeing a fabric therein.
6. The combination type auto dye-preparation/metering dyeing system as claimed in claim 1, wherein said rotary table (90) comprises a plurality of elongated stop portions (93) protruded from said tabletop (91) at two opposite lateral sides of each said slot (92) and respectively defining therein a locating groove; each said rack (94) comprises two locating ribs (941) respectively located at respective bottom sides of two opposite lateral sidewalls thereof and respectively coupled to the locating grooves in the elongated stop portions (93) at two opposite lateral sides of one respective said slot (92) of said rotary table (90), and a vertically extending insertion hole (942); each said receptacle (81) is insertable through the vertically extending insertion hole (942) of one said rack (94), having a plurality of locating blocks (811) protruded from the periphery thereof and stoppable inside the respective said rack (94) to support the respective said receptacle (81) in the respective said rack (94) in a suspended position where the respective said receptacle (81) protrudes over a bottom wall of said tabletop (91) of said rotary table (90) for resting on said weighing scale (80) for enabling said weighing scale (80) to measure the weight of the dye solution in the respective said receptacle (81).
7. The combination type auto dye-preparation/metering dyeing system as claimed in claim 1, wherein said rotary table module (2) further comprises a drive unit (95) disposed beneath said rotary table (90) and controllable by said control unit (1) to rotate said rotary table (90).
8. The combination type auto dye-preparation/metering dyeing system as claimed in claim 1, wherein said rotary table module (2) further comprises a lifting unit (96) disposed beneath said rotary table (90) and

said drive unit (95) and controllable by said control unit (1) to move said tabletop (91) of said rotary table (90) up and down.

9. The combination type auto dye-preparation/metering dyeing system as claimed in claim 1, wherein said liquid dispensing module (3) comprises:

a wheel (20) controllable to rotate by said control unit (1), said wheel comprising a wheel body (21), a wheel axle (22) supporting said wheel body (21), and multiple transverse rows of accommodation chambers (23) arranged around the periphery of said wheel body (21);

a plurality of metering units (50) respectively mounted in said accommodation chambers (23) of said wheel (20), each said metering unit (50) comprising a container (51) mounted in one said accommodation chamber (23) and holding therein a dyeing solution, a syringe (52) equipped with a plunger (521), a needle tube (53), and a multi-port valve (54), said multi-port valve (54) comprising a first passage (5411), a second passage (5412) and a third passage (5413) communicated with one another, a spherical valve body (542) and a handle (5414), said spherical valve body (542) defining therein a connection passage (5421), said spherical valve body (542) being mounted in said multi-port valve (54), said handle (5414) extending out of said multi-port valve (54) and operable to rotate said spherical valve body (542) for enabling said first passage (5411), said second passage (5412) and said third passage (5413) to be connected to said container (51), said syringe (52) and said needle tube (53) respectively; and

a brake unit (60) comprising a horizontally extending first brake (61) and a vertically extending second brake (62), said horizontally extending first brake (61) comprising a first power source (611), a first screw rod (612) connected to and movable by said first power source (611) and a first clamp (613) connected to one end of said first screw rod (612) opposite to said first power source (611) and adapted for clamping the multi-port valve (54) of one said metering unit (50) in one said accommodation chamber (23) of said wheel (20), and moving the multi-port valve (54) and the respective metering unit (50) out of the respective said accommodation chamber (23), said vertically extending second brake (62) comprising a second power source (621), a second screw rod (622) connected to and movable by said second power source (621) and a second clamp (623) connected to one end of said second screw rod (622) opposite to said second power source (621) and adapted for clamping

the plunger (521) of the syringe (52) of one said metering unit (50) and moving the clamped plunger (521) relative to the respective syringe (52).

10. The combination type auto dye-preparation/metering dyeing system as claimed in claim 9, wherein said connection passage (5421) of said spherical valve body (542) is a T-shaped passage.

11. The combination type auto dye-preparation/metering dyeing system as claimed in claim 10, wherein said first clamp (62) is movable by said first power source (611) through said first screw rod (612) to drive said handle (5414) in rotating said spherical valve body (542) in said multi-port valve (54) between a first position where said connection passage (5421) connects said second passage (5412) to said syringe (52) and said first passage (5411) to said feeding hole (511) of said container (51) and said third passage (5413) is blocked from said needle tube (53), and a second position where said connection passage (5421) connects said second passage (5412) to said syringe (52) and said third passage (5413) to said needle tube (53), and said first passage (5411) is blocked from said feeding hole (511) of said container (51).

12. The combination type auto dye-preparation/metering dyeing system as claimed in claim 9, wherein said liquid dispensing module (3) further comprises a mounting framework (10) and a support frame (30), said support frame (30) comprising a horizontal base frame member (31) and two upright frame members (32) located at said horizontal base frame member (31) and adapted to support the wheel axle (22) of said wheel (20), said mounting framework (10) comprising two rails (121) arranged in parallel in a wheel zone (11) therein; said horizontal base frame member (31) of said support frame (30) comprises a plurality of sliding blocks (33) fixedly located at a bottom side thereof and coupled to and movable along said rails (121).

13. The combination type auto dye-preparation/metering dyeing system as claimed in claim 12, wherein said liquid dispensing module (3) further comprises a power unit (40) connected to said support frame (30) and adapted to move said support frame (30) and said wheel (20) along said rails (121).

14. The combination type auto dye-preparation/metering dyeing system as claimed in claim 12, wherein said liquid dispensing module (3) further comprises a transmission unit (70) adapted to rotate said wheel (20), said transmission unit (70) comprising a motor (71) mounted on said horizontal base frame member (31) of said support frame (30), said motor (71) com-

prising a motor shaft (711), and a belt transmission mechanism (72) coupled between said motor shaft (711) of said motor (71) and said wheel axle (22) of said wheel (20) for enabling said wheel axle (22) of said wheel (20) to be rotated by said motor (71).

15. The combination type auto dye-preparation/metering dyeing system as claimed in claim 14, wherein said control unit (1) is configured to control the operation of said brake unit (60), said first power source (611), said second power source (621) and said motor (71) of said transmission unit (70).

16. The combination type auto dye-preparation/metering dyeing system as claimed in claim 9, wherein said weighing scale (80) is electrically connected to said control unit (1) and adapted to provide each measured data to said control unit (1).

Amended claims in accordance with Rule 137(2) EPC.

1. A combination type auto dye-preparation/metering dyeing system, comprising:

a control unit (1);

a rotary table module (2) comprising a plurality of electrical connectors, one said electrical connector being electrically connected to said control circuit (1) for transmitting a control signal provided by said control unit (1), a rotary table (90), said rotary table (90) comprising a tabletop (91) having at least one slot (92), and at least one rack (94) respectively mounted in each said slot (92);

a weighing scale (80) provided at a bottom side relative to said rotary table module (2) and electrically connected to one said electrical connector of said rotary table module (2) and controllable by said control unit (1) to measure the weight of an object placed thereon;

at least one receptacle (81) respectively movably mounted in said at least one rack (94), each said receptacle (81) being movable relative to the respective said rack (94) through one said slot (92) and positionable on said weighing scale (80) for weight measurement; and

at least one liquid dispensing module (3) provided above said rotary table module (2) and electrically connected to one respective said electrical connector of said rotary table module (2) for dispensing a dye solution into each said receptacle (81) for enabling each said receptacle (81) with the dispensed dye solution to be measured by said weighing scale (80),

characterized in that said liquid dispensing module (3) comprises

a wheel (20) controllable to rotate by said control unit (1), said wheel comprising a wheel body (21), a wheel axle (22) supporting said wheel body (21), and multiple transverse rows of accommodation chambers (23) arranged around the periphery of said wheel body (21);

a plurality of metering units (50) respectively mounted in said accommodation chambers (23) of said wheel (20), each said metering unit (50) comprising a container (51) mounted in one said accommodation chamber (23) and holding therein a dyeing solution, a syringe (52) equipped with a plunger (521), a needle tube (53), and a multi-port valve (54) and a brake unit (60).

2. The combination type auto dye-preparation/metering dyeing system as claimed in claim 1, wherein said multi-port valve (54) comprising a first passage (5411), a second passage (5412) and a third passage (5413) communicated with one another, a spherical valve body (542) and a handle (5414), said spherical valve body (542) defining therein a connection passage (5421), said spherical valve body (542) being mounted in said multi-port valve (54), said handle (5414) extending out of said multi-port valve (54) and operable to rotate said spherical valve body (542) for enabling said first passage (5411), said second passage (5412) and said third passage (5413) to be connected to said container (51), said syringe (52) and said needle tube (53) respectively.

3. The combination type auto dye-preparation/metering dyeing system as claimed in claim 1 or claim 2, wherein the brake unit (60) comprising a horizontally extending first brake (61) and a vertically extending second brake (62), said horizontally extending first brake (61) comprising a first power source (611), a first screw rod (612) connected to and movable by said first power source (611) and a first clamp (613) connected to one end of said first screw rod (612) opposite to said first power source (611) and adapted for clamping the multi-port valve (54) of one said metering unit (50) in one said accommodation chamber (23) of said wheel (20), and moving the multi-port valve (54) and the respective metering unit (50) out of the respective said accommodation chamber (23), said vertically extending second brake (62) comprising a second power source (621), a second screw rod (622) connected to and movable by said second power source (621) and a second clamp (623) connected to one end of said second screw rod (622) opposite to said second power source (621) and adapted for clamping the plunger (521) of the syringe (52) of one said metering unit (50) and moving the clamped plunger (521) relative to the respective syringe (52).

4. The combination type auto dye-preparation/me-
 tering dyeing system as claimed in any of claims 1 -
 3, further comprising a standard concentration liquid
 preparation module (4) disposed adjacent to said liq-
 uid dispensing module (3) above said rotary table
 module (2) and electrically connected to one said
 electrical connector of said rotary table module (2)
 and controllable by said control unit (1) to prepare a
 predetermined concentration of a dye solution and
 to supply the prepared dye solution to said liquid dis-
 pensing module (3).

5. The combination type auto dye-preparation/me-
 tering dyeing system as claimed in any of claims 1 -
 3, further comprising a receptacle input module (5)
 electrically connected to one said electrical connec-
 tor of said rotary table module (2) and controllable
 by said control unit (1) to transfer each said recep-
 tacle (81) to each said rack (94) of said rotary table
 module (2).

6. The combination type auto dye-preparation/me-
 tering dyeing system as claimed in any of claims 1 -
 3, further comprising a receptacle output module (6)
 electrically connected to one said electrical connec-
 tor of said rotary table module (2) and controllable
 by said control unit (1) to transfer each said recep-
 tacle (81) with the dispensed said dye solution from
 one respective said rack (94) of said rotary table
 module (2) to a predetermined place.

7. The combination type auto dye-preparation/me-
 tering dyeing system as claimed in claim 6, further
 comprising a dyeing module (7) electrically connect-
 ed to one said electrical connector of said rotary table
 module (2) and controllable by said control unit (1)
 to receive each said receptacle (81) and the dis-
 pensed said dye solution from said receptacle output
 module (6) and to transfer the dispensed said dye
 solution out of the respective said receptacle (81)
 into a predetermined container for dyeing a fabric
 therein.

8. The combination type auto dye-preparation/me-
 tering dyeing system as claimed in any of claims 1 -
 3, wherein said rotary table (90) comprises a plurality
 of elongated stop portions (93) protruded from said
 tabletop (91) at two opposite lateral sides of each
 said slot (92) and respectively defining therein a lo-
 cating groove; each said rack (94) comprises two
 locating ribs (941) respectively located at respective
 bottom sides of two opposite lateral sidewalls thereof
 and respectively coupled to the locating grooves in
 the elongated stop portions (93) at two opposite la-
 teral sides of one respective said slot (92) of said
 rotary table (90), and a vertically extending insertion
 hole (942); each said receptacle (81) is insertable
 through the vertically extending insertion hole (942)

of one said rack (94), having a plurality of locating
 blocks (811) protruded from the periphery thereof
 and stoppable inside the respective said rack (94)
 to support the respective said receptacle (81) in the
 respective said rack (94) in a suspended position
 where the respective said receptacle (81) protrudes
 over a bottom wall of said tabletop (91) of said rotary
 table (90) for resting on said weighing scale (80) for
 enabling said weighing scale (80) to measure the
 weight of the dye solution in the respective said re-
 ceptacle (81).

9. The combination type auto dye-preparation/me-
 tering dyeing system as claimed in any of claims 1 -
 3, wherein said rotary table module (2) further com-
 prises a drive unit (95) disposed beneath said rotary
 table (90) and controllable by said control unit (1) to
 rotate said rotary table (90).

10. The combination type auto dye-preparation/me-
 tering dyeing system as claimed in any of claims 1 -
 3, wherein said rotary table module (2) further com-
 prises a lifting unit (96) disposed beneath said rotary
 table (90) and said drive unit (95) and controllable
 by said control unit (1) to move said tabletop (91) of
 said rotary table (90) up and down.

11. The combination type auto dye-preparation/me-
 tering dyeing system as claimed in any of claims 2 -
 10, wherein said connection passage (5421) of said
 spherical valve body (542) is a T-shaped passage.

12. The combination type auto dye-preparation/me-
 tering dyeing system as claimed in claim 11, wherein
 said first clamp (62) is movable by said first power
 source (611) through said first screw rod (612) to
 drive said handle (5414) in rotating said spherical
 valve body (542) in said multi-port valve (54) be-
 tween a first position where said connection passage
 (5421) connects said second passage (5412) to said
 syringe (52) and said first passage (5411) to said
 feeding hole (511) of said container (51) and said
 third passage (5413) is blocked from said needle
 tube (53), and a second position where said connec-
 tion passage (5421) connects said second passage
 (5412) to said syringe (52) and said third passage
 (5413) to said needle tube (53), and said first passage
 (5411) is blocked from said feeding hole (511) of said
 container (51).

13. The combination type auto dye-preparation/me-
 tering dyeing system as claimed in any of claims 1 -
 12, wherein said liquid dispensing module (3) further
 comprises a mounting framework (10) and a support
 frame (30), said support frame (30) comprising a hor-
 izontal base frame member (31) and two upright
 frame members (32) located at said horizontal base
 frame member (31) and adapted to support the

wheel axle (22) of said wheel (20), said mounting framework (10) comprising two rails (121) arranged in parallel in a wheel zone (11) therein; said horizontal base frame member (31) of said support frame (30) comprises a plurality of sliding blocks (33) fixedly located at a bottom side thereof and coupled to and movable along said rails (121). 5

14. The combination type auto dye-preparation/measuring dyeing system as claimed in any of claims 1 - 13, wherein said liquid dispensing module (3) further comprises a power unit (40) connected to said support frame (30) and adapted to move said support frame (30) and said wheel (20) along said rails (121). 10

15. The combination type auto dye-preparation/measuring dyeing system as claimed in any of claims 1-14, wherein said liquid dispensing module (3) further comprises a transmission unit (70) adapted to rotate said wheel (20), said transmission unit (70) comprising a motor (71) mounted on said horizontal base frame member (31) of said support frame (30), said motor (71) comprising a motor shaft (711), and a belt transmission mechanism (72) coupled between said motor shaft (711) of said motor (71) and said wheel axle (22) of said wheel (20) for enabling said wheel axle (22) of said wheel (20) to be rotated by said motor (71). 15 20 25

16. The combination type auto dye-preparation/measuring dyeing system as claimed in claim 15, wherein said control unit (1) is configured to control the operation of said brake unit (60), said first power source (611), said second power source (621) and said motor (71) of said transmission unit (70). 30 35

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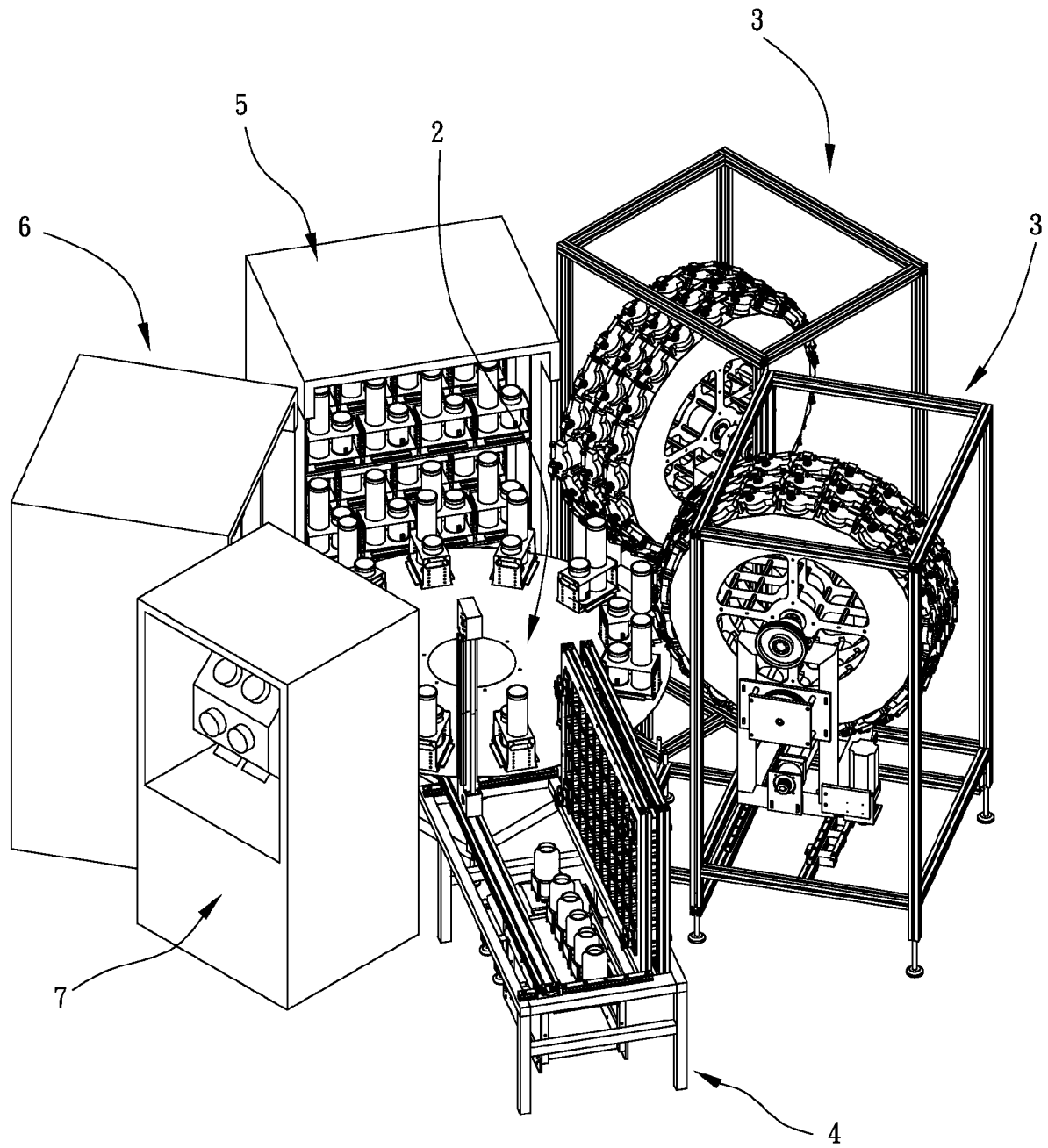


FIG. 1

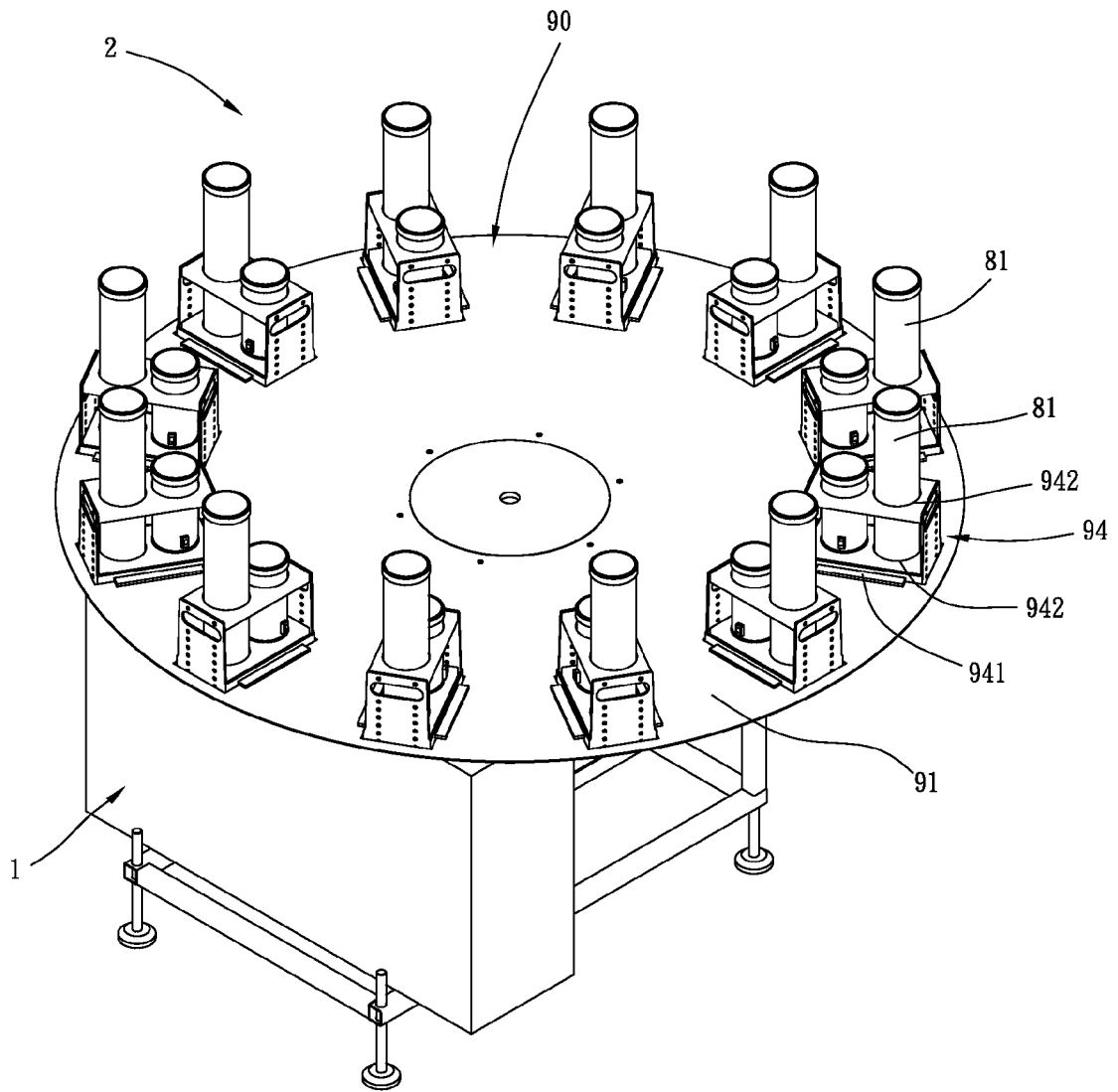


FIG. 2

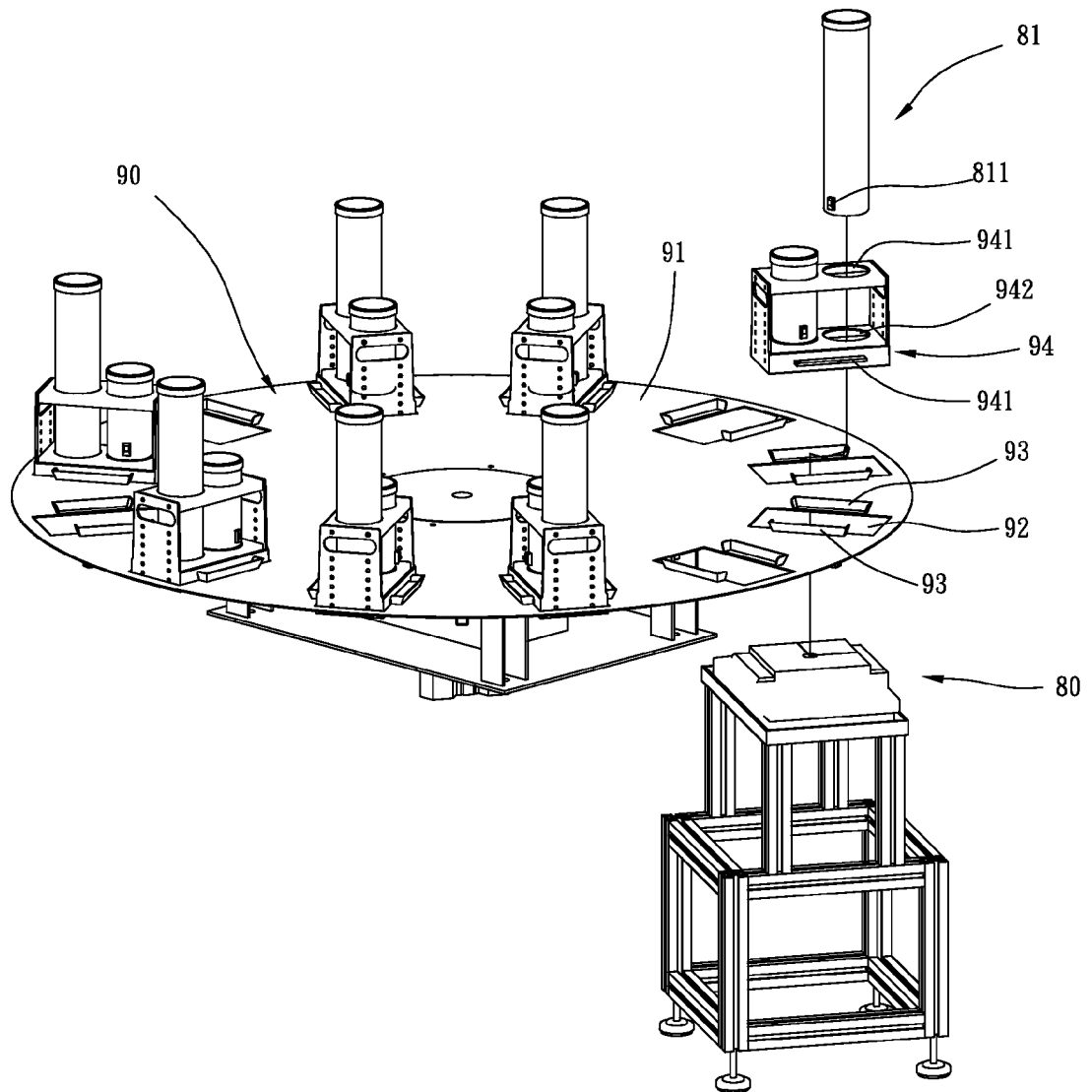


FIG. 3

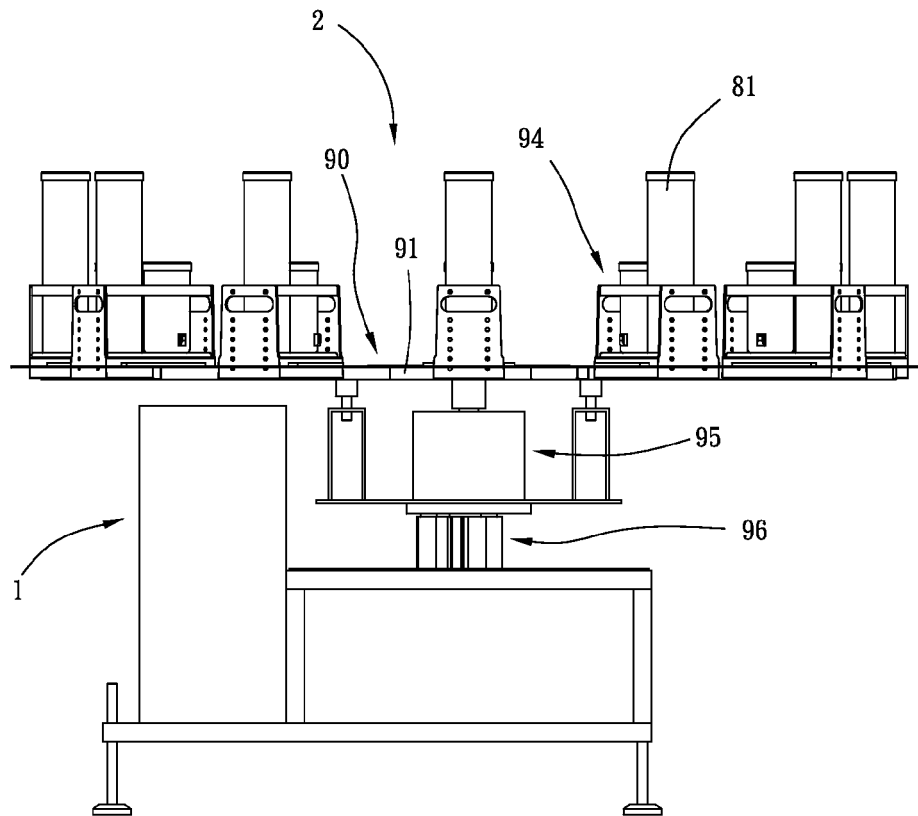


FIG. 4

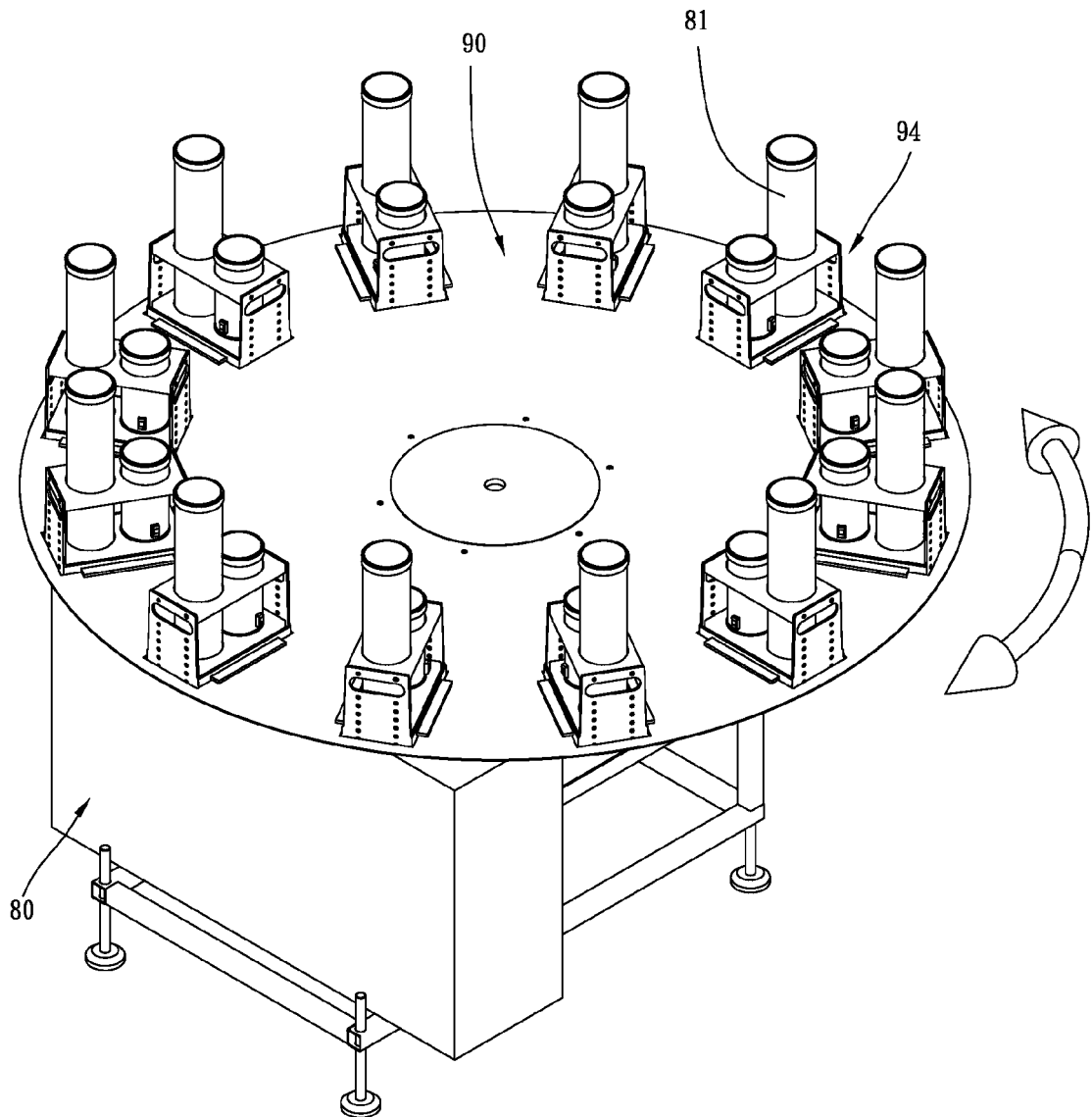


FIG. 5

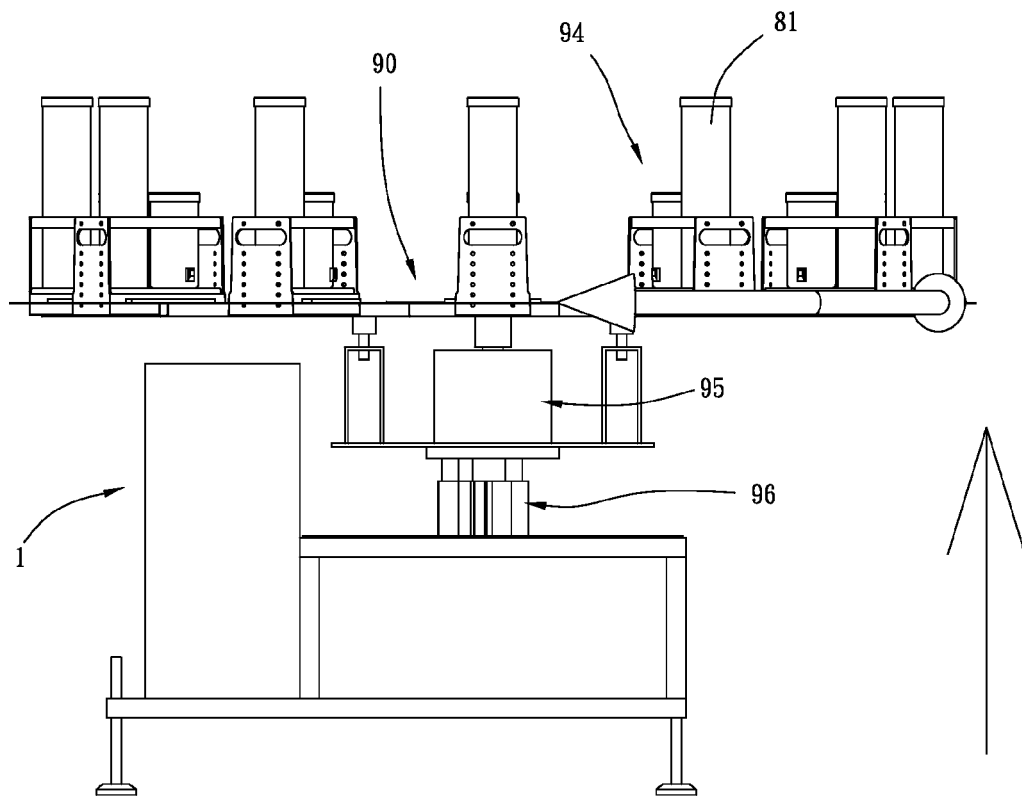


FIG. 6

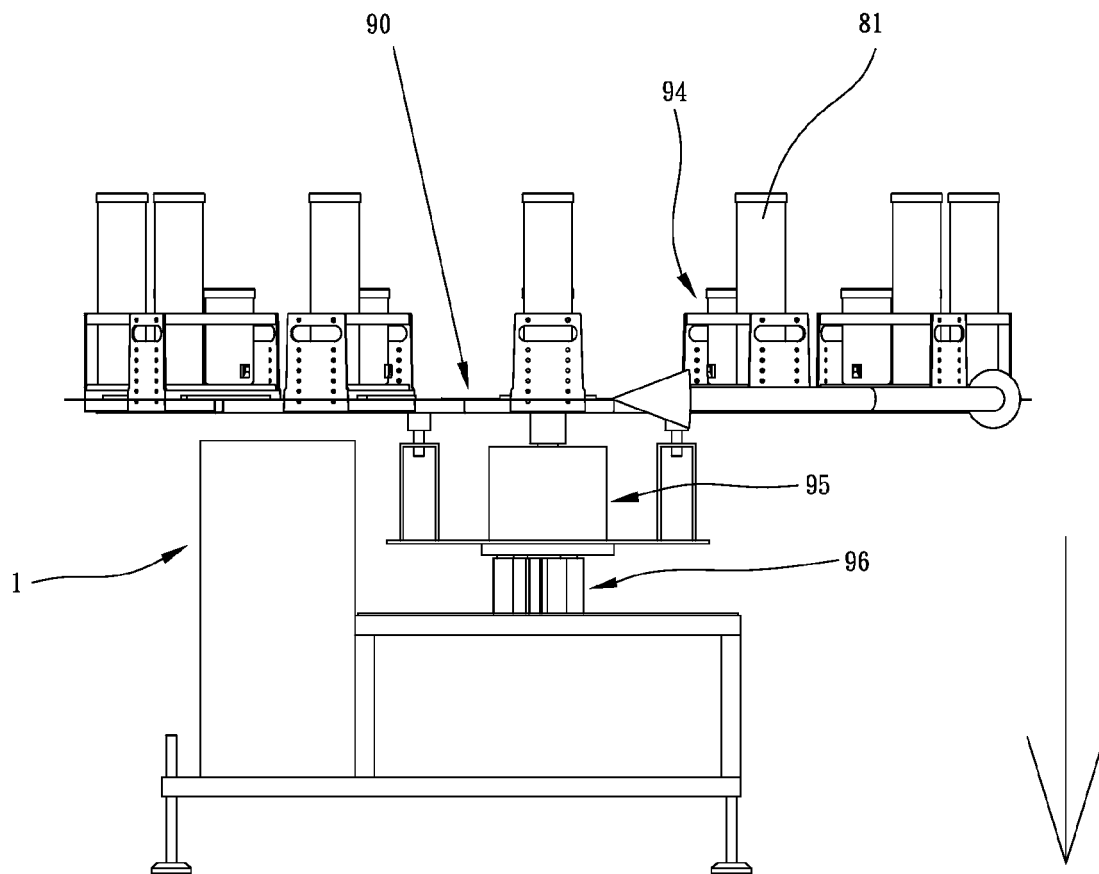


FIG. 7

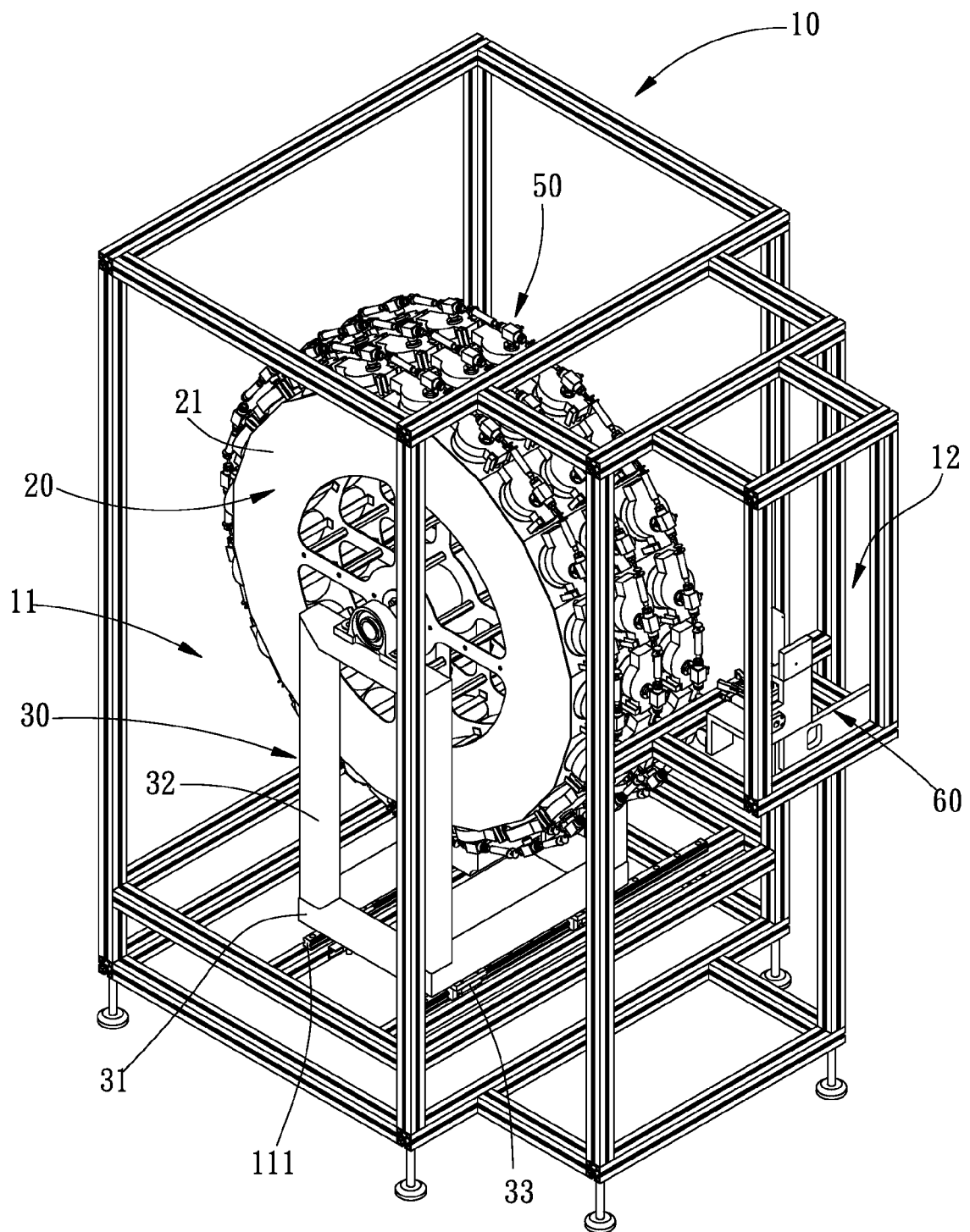


FIG. 8

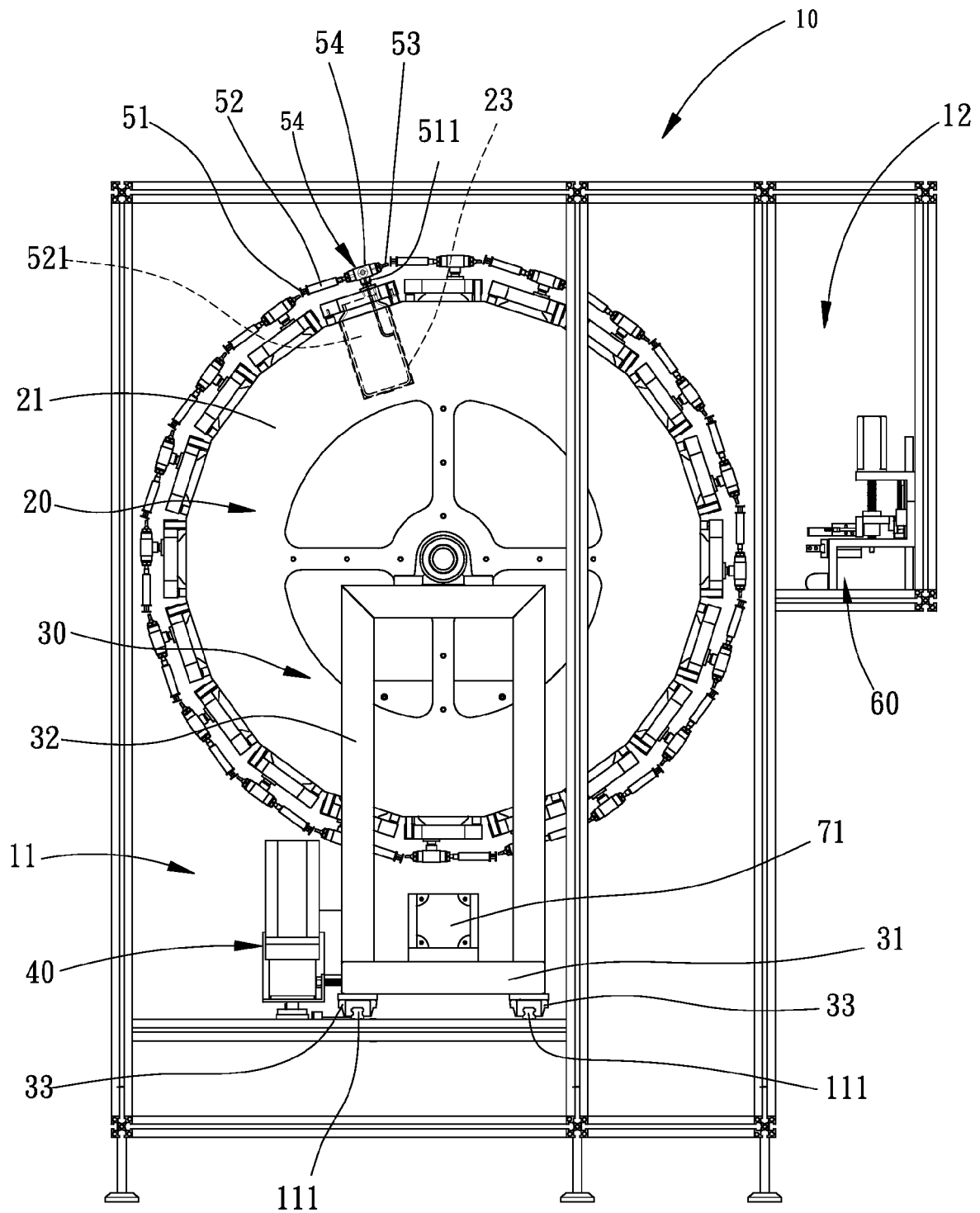


FIG. 9

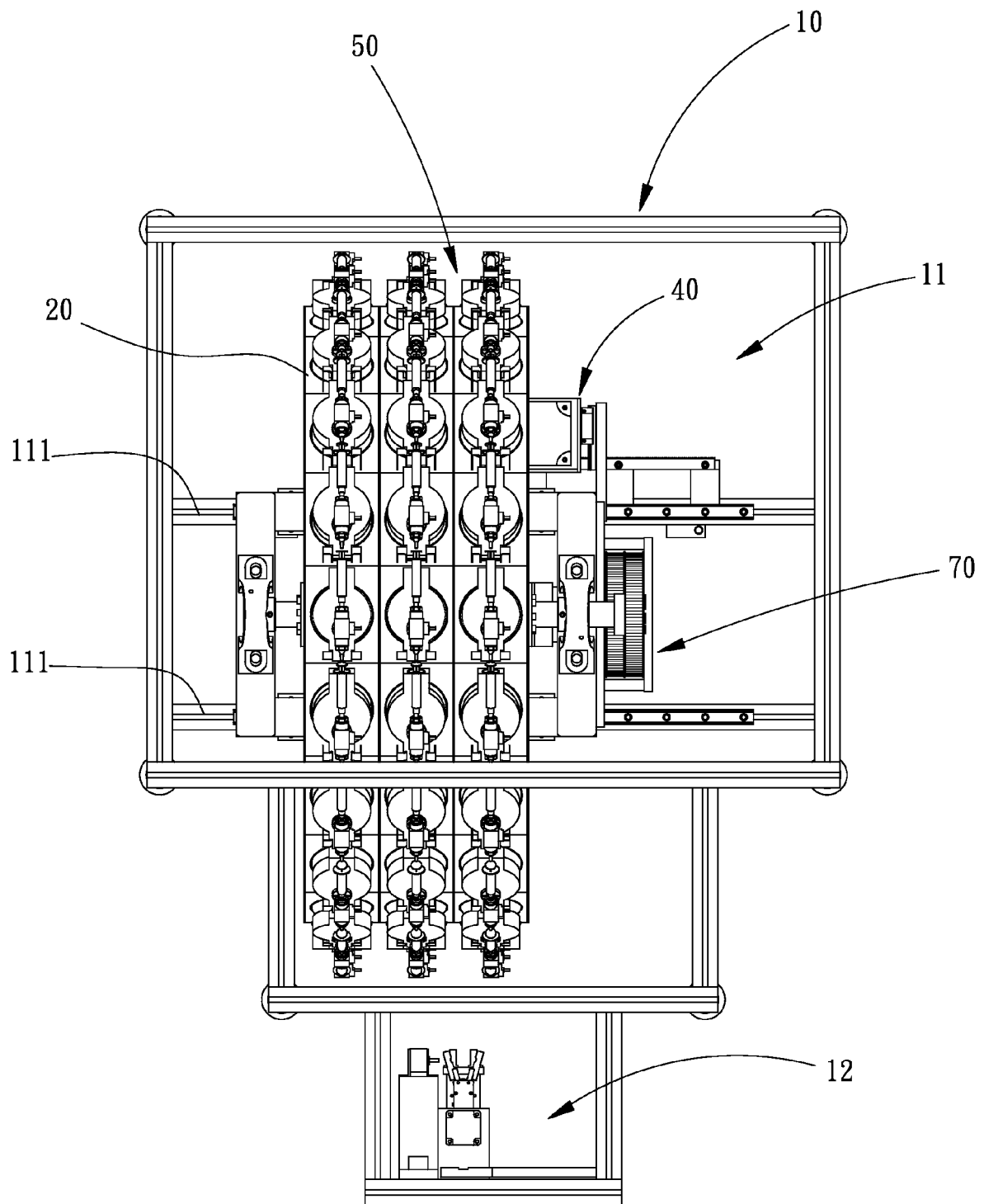


FIG. 10

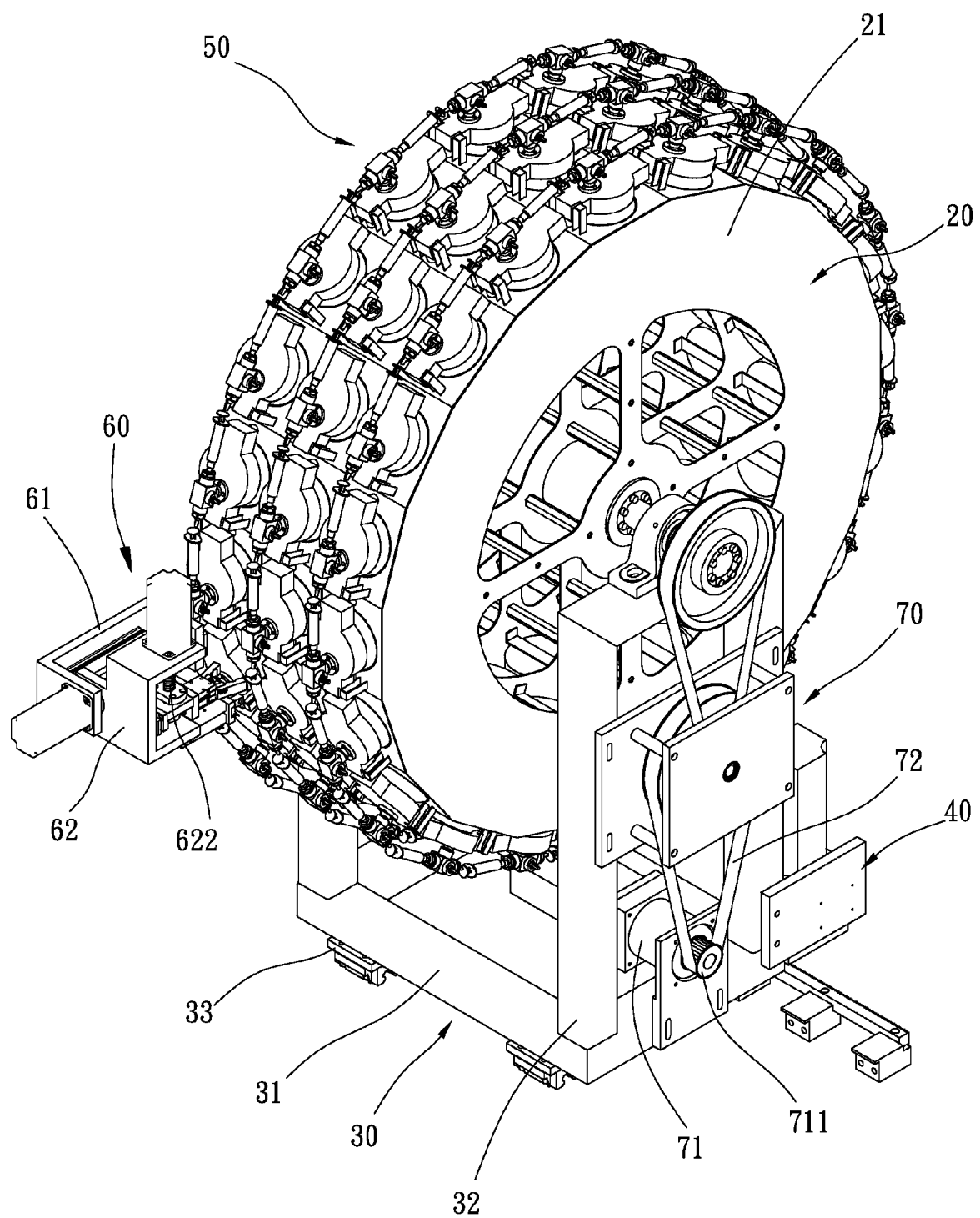


FIG. 11

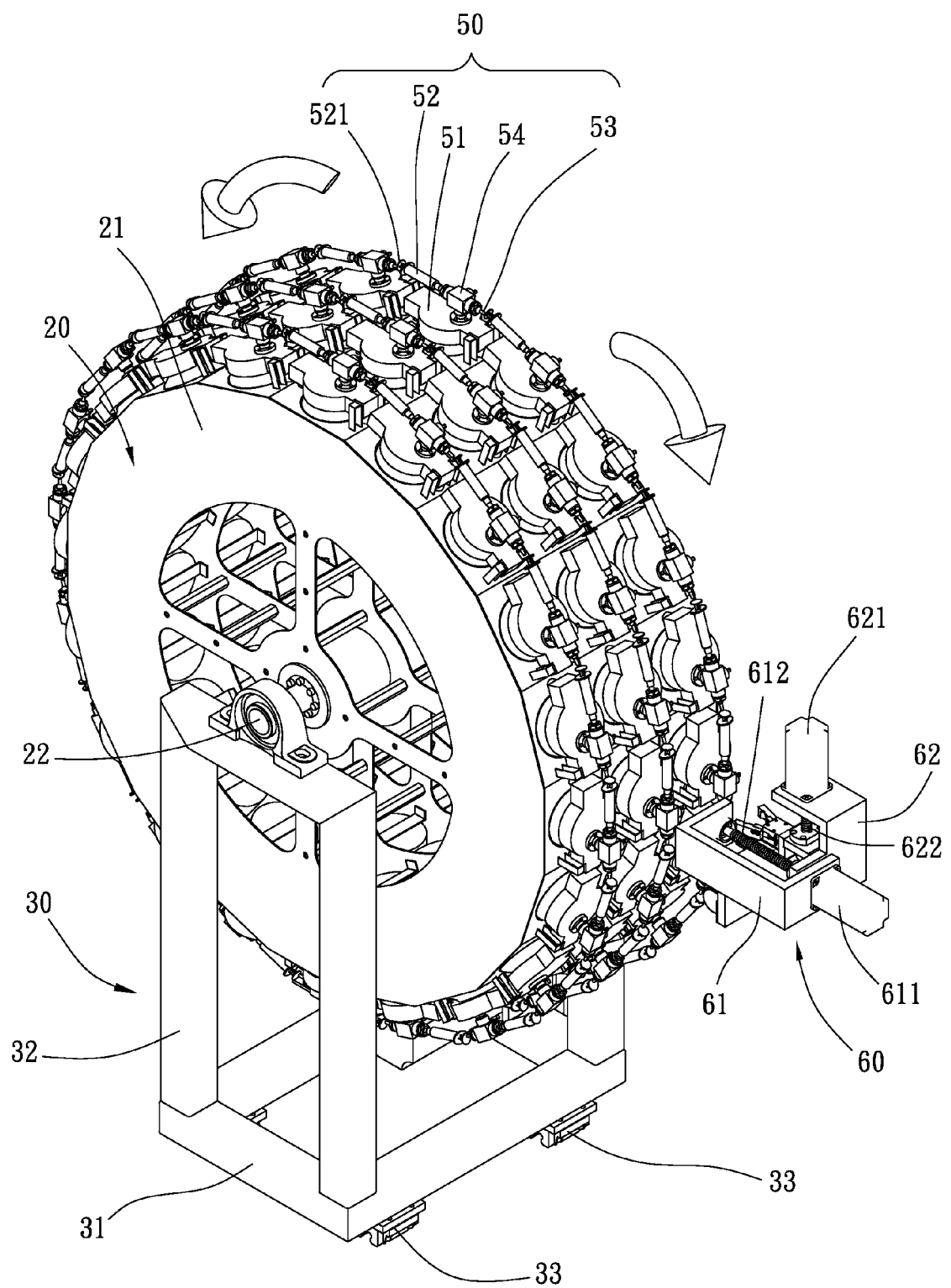


FIG. 12

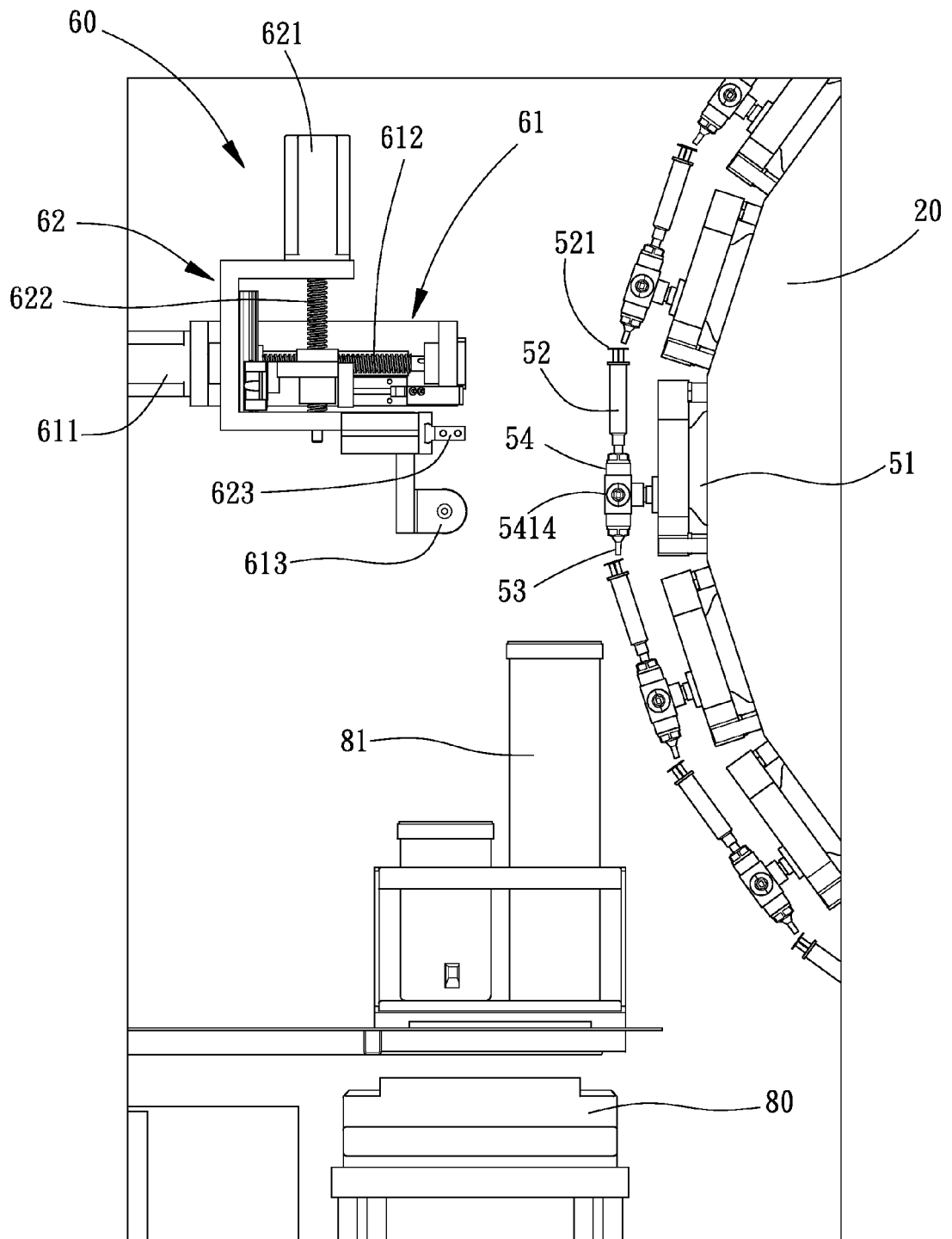


FIG. 13

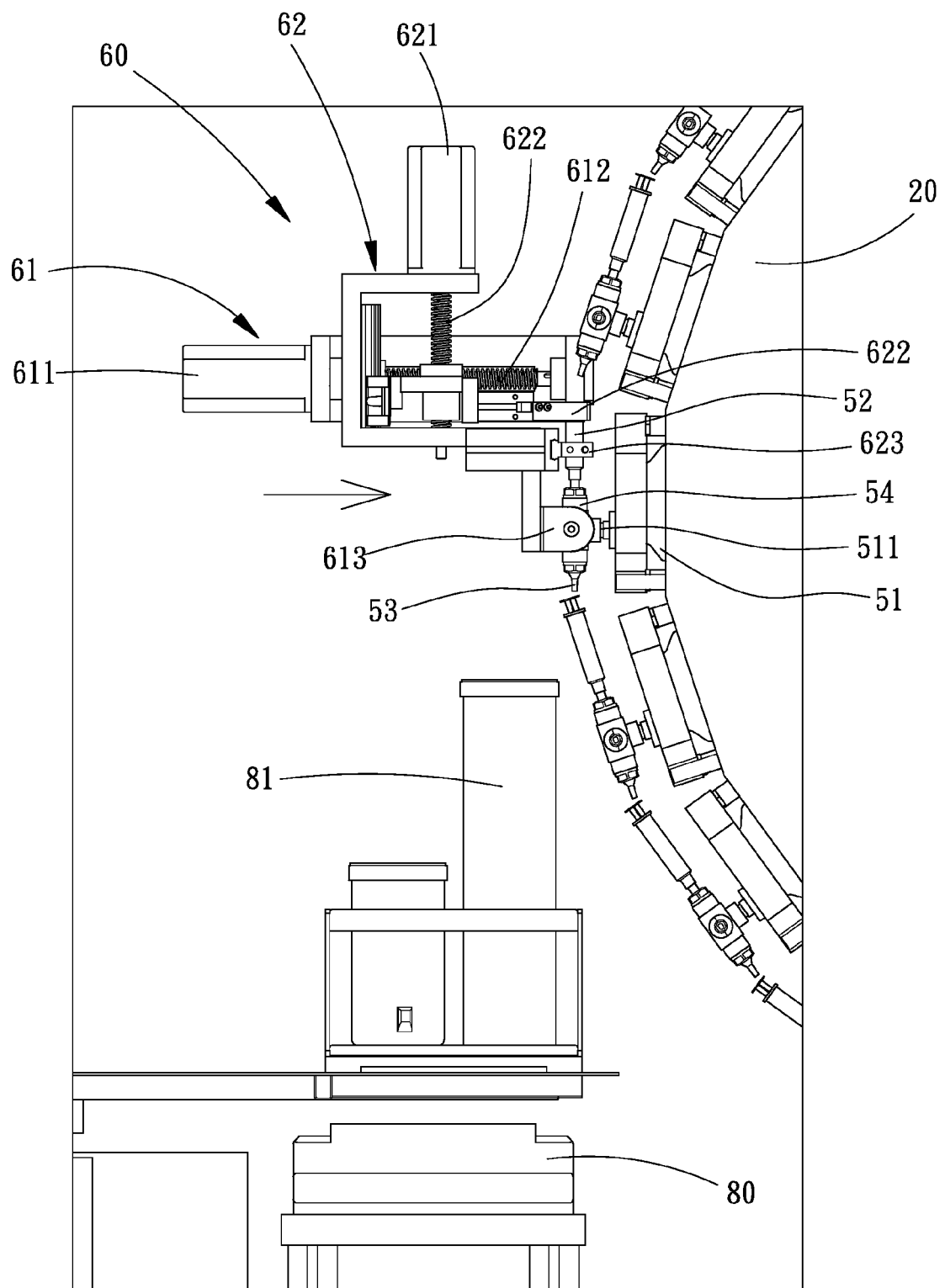


FIG. 14

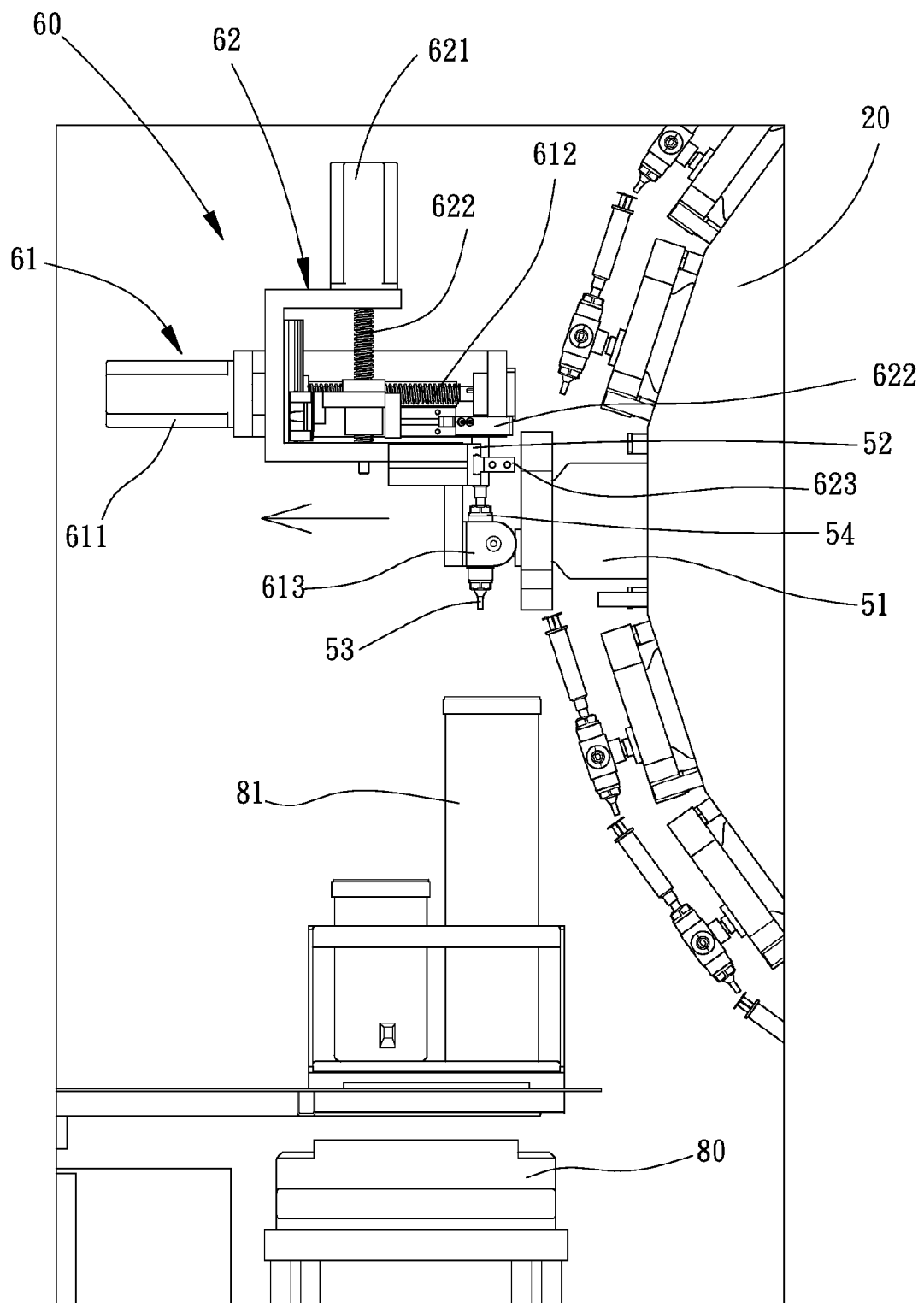


FIG. 15

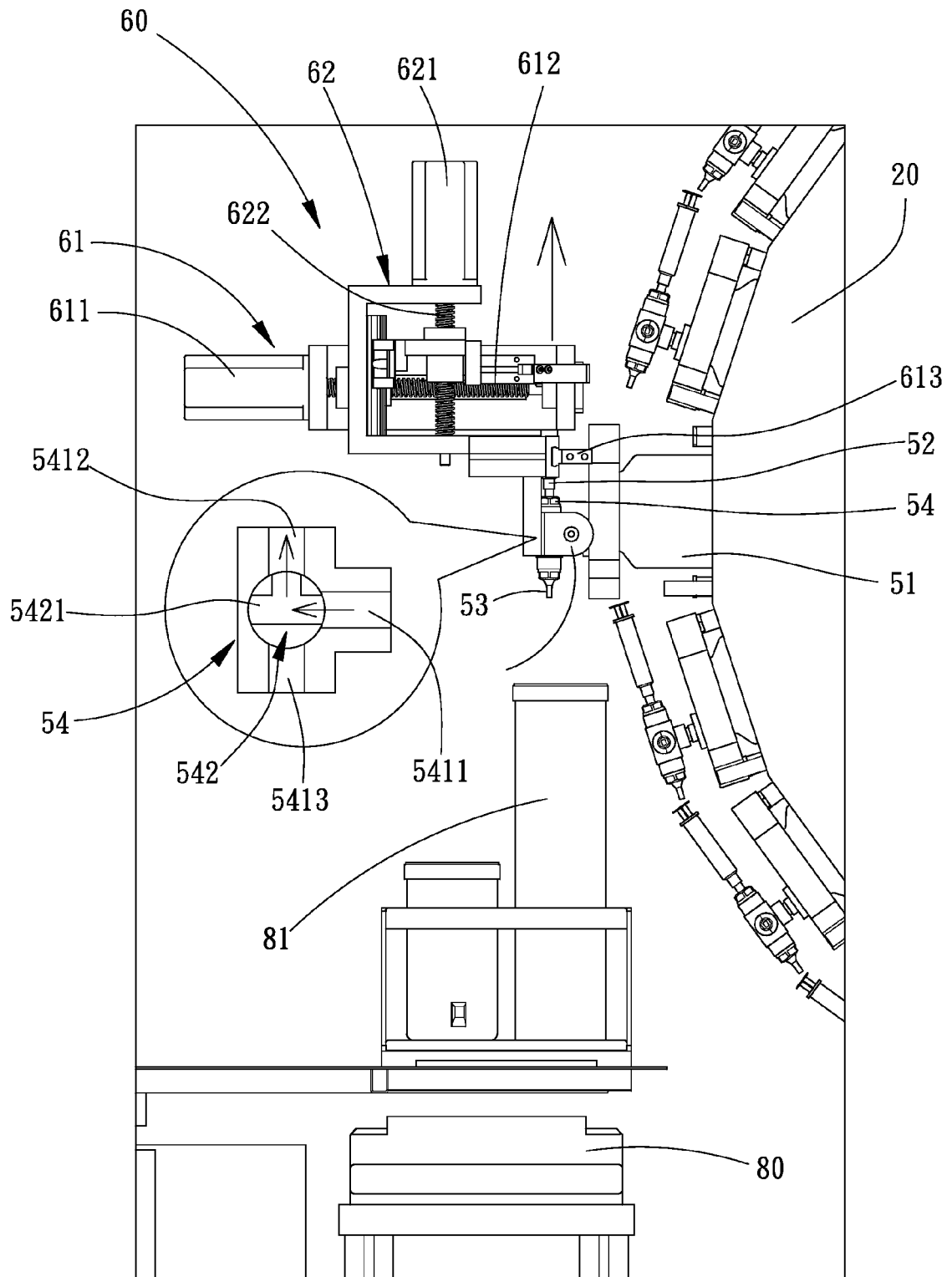


FIG. 16

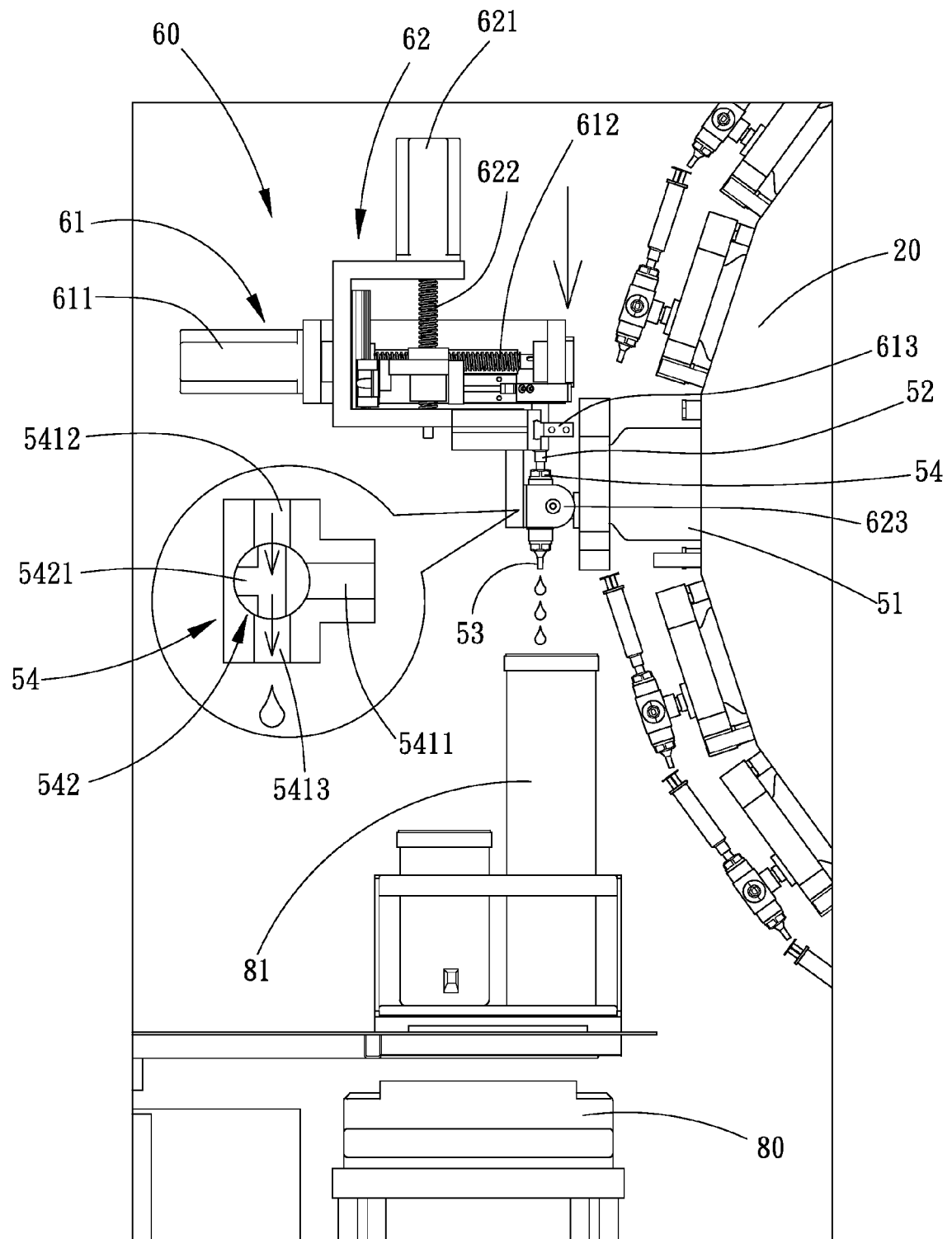


FIG. 17



EUROPEAN SEARCH REPORT

Application Number
EP 13 16 3348

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A	----- EP 1 174 535 A2 (TECNORAMA SRL [IT]) 23 January 2002 (2002-01-23) * column 5, line 45 - column 7, line 25; figures 10-13 *	1,7,8,16	
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