United States Patent [19]

Yamamoto

[11] **3,793,818**

[45] **Feb. 26, 1974**

[54] **DOFFING AND DONNING APPARATUS USABLE FOR TEXTILE MACHINES SUCH AS DRAW-TWISTERS**

[75] Inventor: **Yakichi Yamamoto,** Kanazawa, Japan

[73] Assignee: **Ishikawa Seisakusho Ltd.,** Ishikawa, Japan

[22] Filed: **Mar. 10, 1972**

[21] Appl. No.: **233,481**

[30] **Foreign Application Priority Data**

Dec. 2, 1971 Japan 46/98186

[52] **U.S. Cl.** **57/52**

[51] **Int. Cl.** **D01h 9/00**

[58] **Field of Search** ..... 57/52–54, 34 R

[56] **References Cited**

UNITED STATES PATENTS

3,686,847	8/1972	Vignon	57/52
3,370,411	2/1968	Schultz et al.	57/52
3,398,519	8/1968	Haussmann	57/52
3,550,368	12/1970	Marenco	57/52
3,609,952	10/1971	Chiari et al.	57/52
3,681,906	8/1972	Burgermeister et al.	57/52

Primary Examiner—John Petrakes

[57] **ABSTRACT**

Apparatus for doffing full cops mounted on spindles of a textile machine such as draw-twisters for synthetic fibers onto an intermittently circulatable conveyer mechanism of the zigzag pegs arrangement type and for donning of bare bobbins mounted on the conveyer mechanism onto the spindles by carrying them by pneumatically actuated resilient gripper assemblies which are moved along the prescribed routes by combination of vertical pantagraph motion of a lifting mechanism with horizontal pantagraph motion of a horizontal displacer mechanism.

5 Claims, 32 Drawing Figures

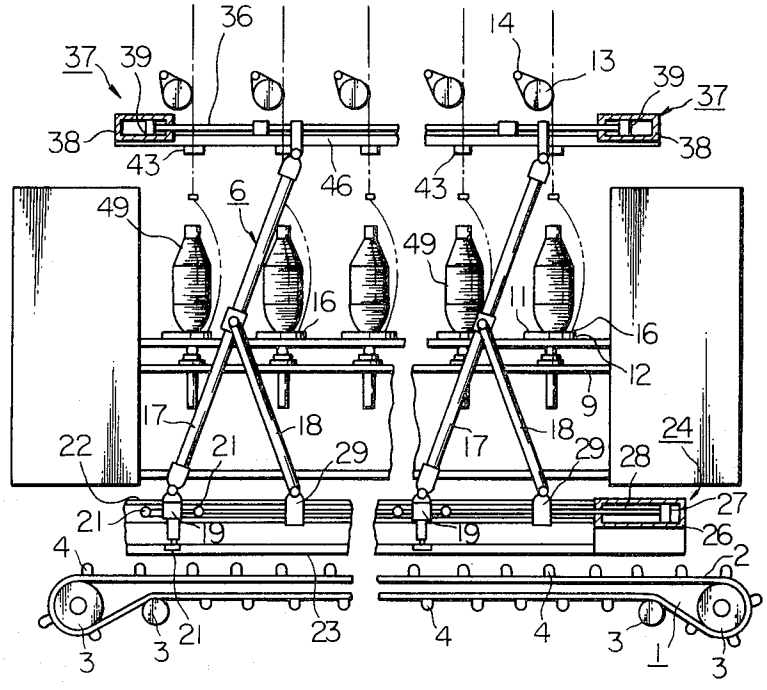


Fig. 1

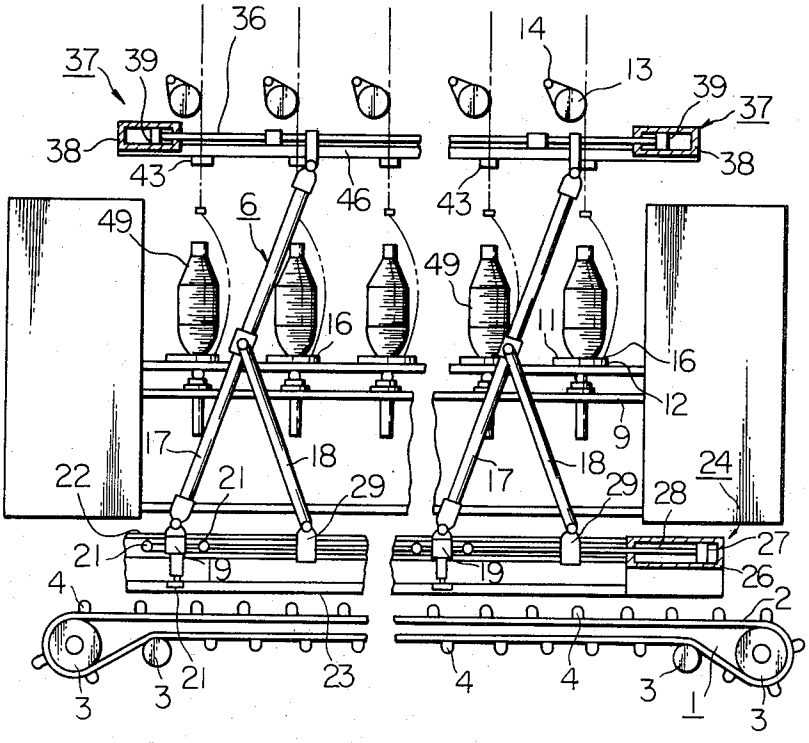

36
37
39
38
43
46
6
49
16
17
18
22
21
29
19
4
10
3
21
23
14
13
39
37
38
43
49
11
16
12
9
18
17
24
28
29
27
26
19
2
4
4
3
1
3

Fig. 2

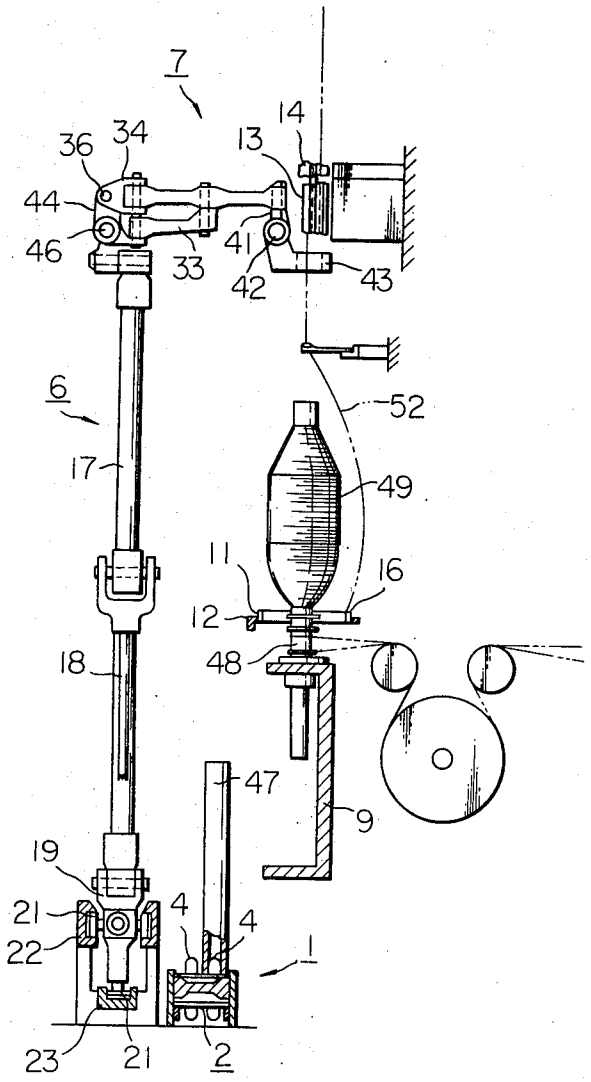

7
14
13
34
36
44
46
33
41
42
43
6
52
17
49
11
16
12
48
18
47
9
19
21
22
4
4
1
23
21
2

Fig. 3

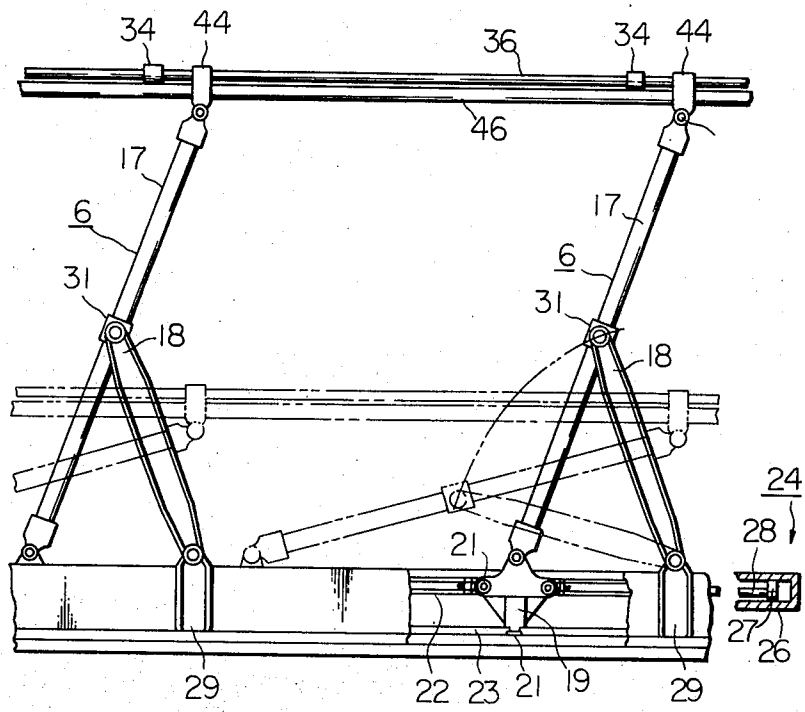

34
44
36
34
44
46
17
6
31
18
17
6
31
18
24
28
21
27
26
29
22
23
21
19
29

Fig. 4

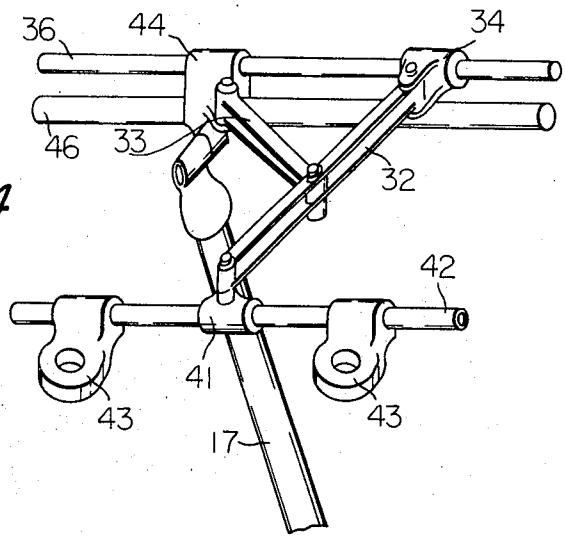

36
44
34
46
33
32
42
41
43
43
17

Fig. 5A

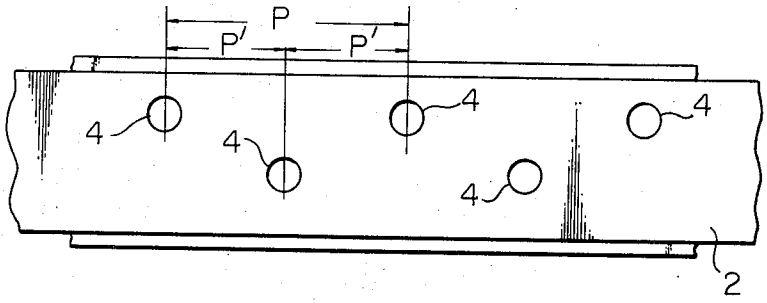


Fig. 5B

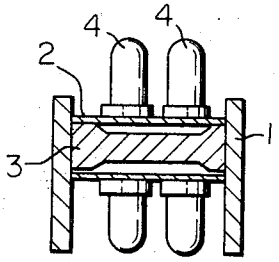


Fig. 6A

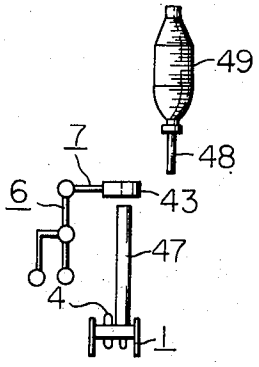


Fig. 6B

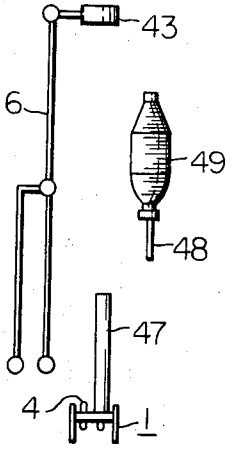


Fig. 6C

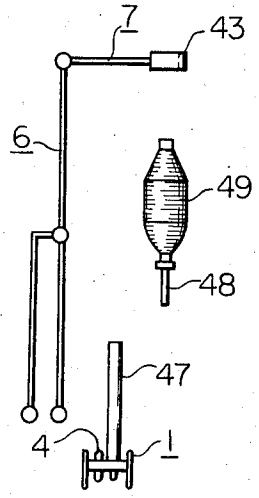


Fig. 6D

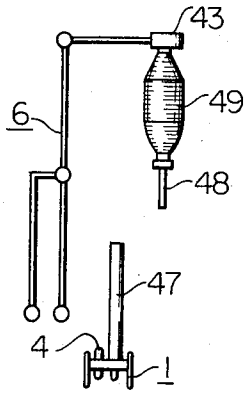


Fig. 6E

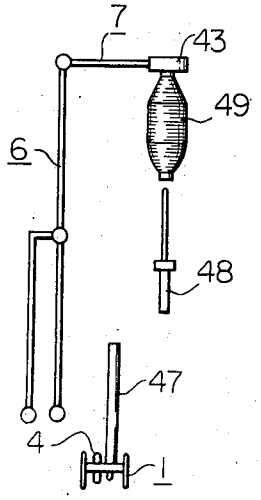


Fig. 6F

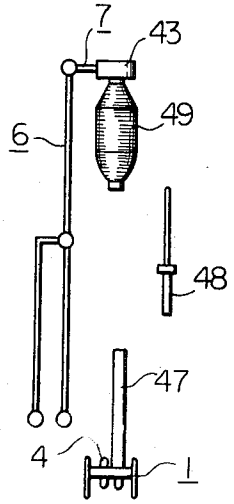


Fig. 6G

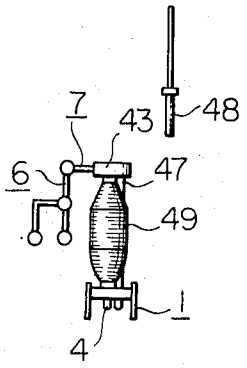


Fig. 6H

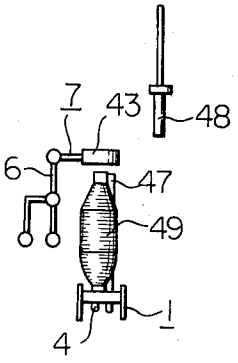


Fig. 6I

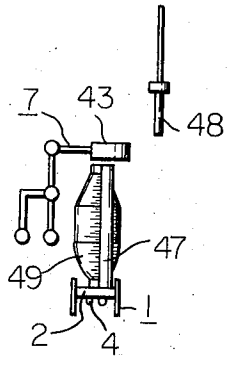


Fig. 6J

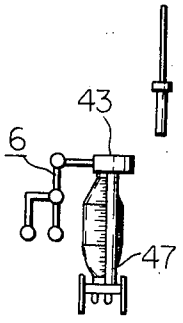


Fig. 6K

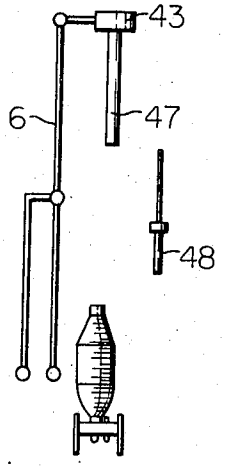


Fig. 6L

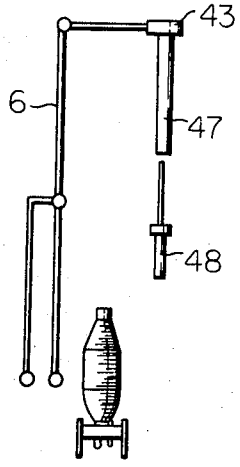


Fig. 6M

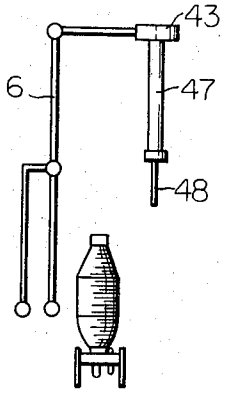


Fig. 6N

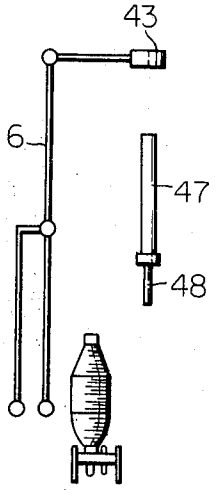


Fig. 60

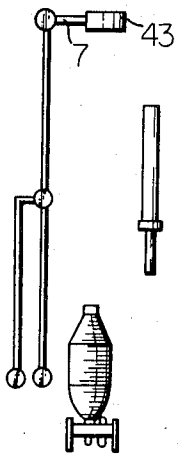


Fig. 6P

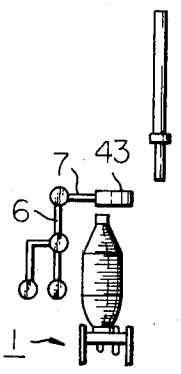


Fig. 7

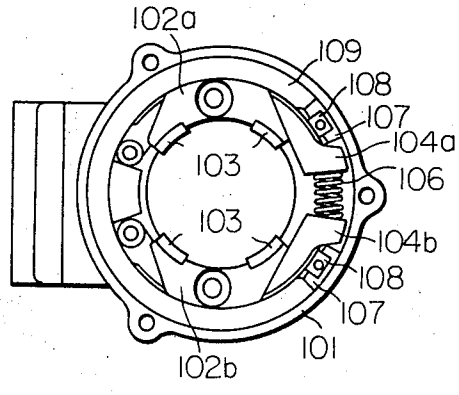


Fig. 8

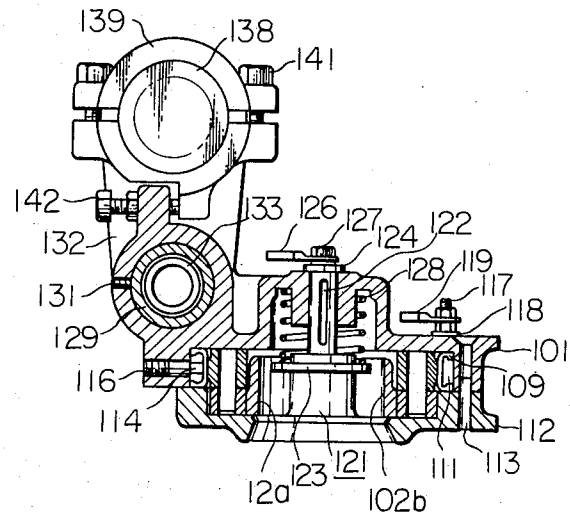


Fig. 9

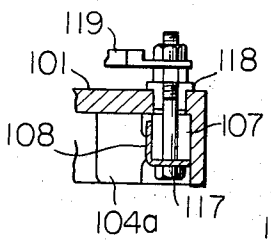


Fig. 10

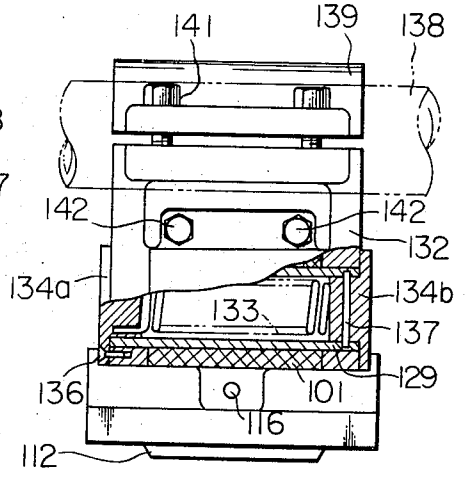


Fig. 11A

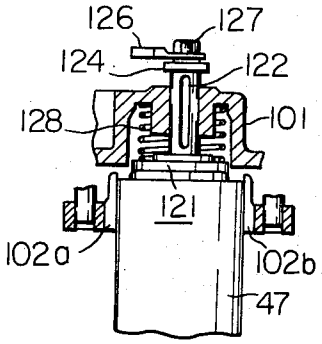


Fig. 11B

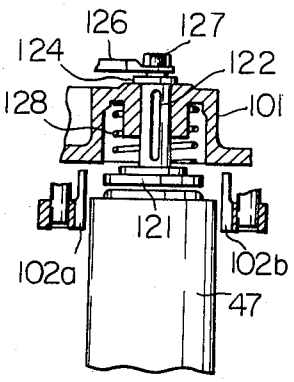


Fig. 12A

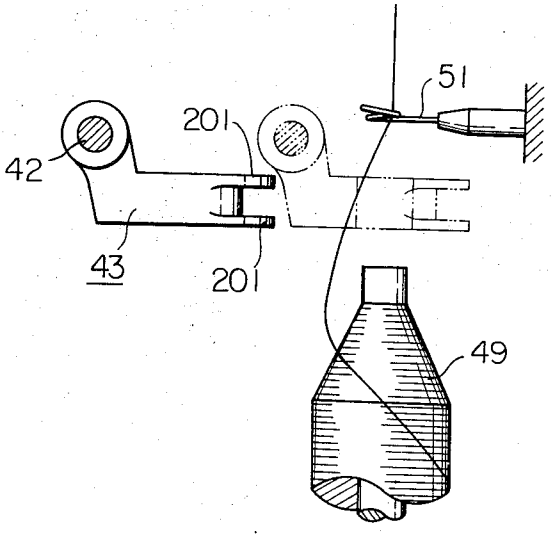


Fig. 12B

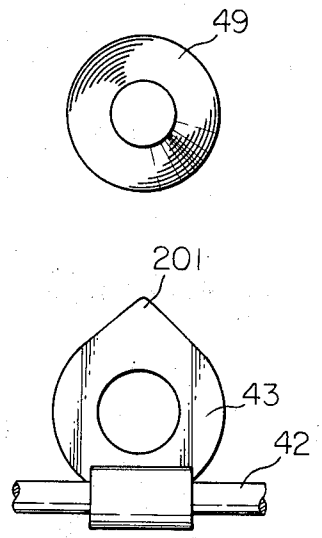


Fig. 12C

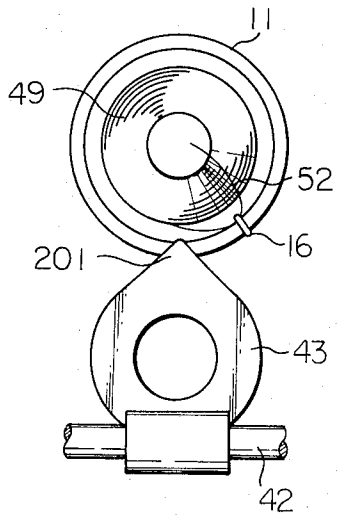
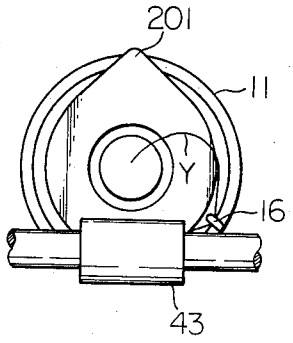


Fig. 12D



DOFFING AND DONNING APPARATUS USABLE FOR TEXTILE MACHINES SUCH AS DRAW-TWISTERS

The present invention relates to a doffing and donning apparatus usable for textile machines with large packages such as draw-twisters, e.g., especially draw-twisters for wools or synthetic fibers.

In the known simultaneous type doffing and donning systems, a converyer belt is arranged in parallel in front of the row of spindles on the machine, pegs are fixed on the belt surface in one alignment with intervening distances equal to half the distance between neighbouring spindles (spindle pitch) and bare bobbins are mounted on alternate pegs. In the doffing sequence, full cops on the spindles are dismounted therefrom and transferred onto empty pegs on the conveyer belt. After completion of the doffing, the conveyer belt is moved over a distance equal to half the spindle pitch so that the positions of the bare bobbins carried thereby are registered at the positions of spindles now empty. In the subsequent donning sequence, bare bobbins are dismounted from the conveyer belt and transferred onto the spindles on the machine.

In the above-described sequential operations, the full cops and bare bobbins must be coexistent on the conveyer belt during the period between the completion of doffing operation and the commencement of donning operation. In this connection, the recently growing demand for large packages, especially in the case of the draw-twisters for synthetic fibers, makes this coexistence of the full cops with bare bobbins on the conveyer belt a limitation for the maxium diameter of the cops built on the bobbins.

Further, most of the conventional doffing and donning apparatuses are inevitably accompanied by drawbacks such as complicated mechanical structure and expensive manufacturing cost resulting from such complicated mechanical structure.

The object of the present invention is to provide a doffing and donning apparatus of simplified structure which is adapted for handling of larger diameter of full cops than said limited diameter in the case of the coexistence of the full cops with bare bobbins on the conveyor belt.

In order to attain this object, the doffing and donning apparatus of the present invention includes an intermittently circulatable conveyer mechanism wherein pegs are mounted in two alignments in a zigzag arrangement. By this peg arrangement, the center distance between the pegs for a full cop and a bare bobbin becomes larger than in the case of the one line arrangement. This means that a larger diameter full cop can be used, than in the case of the latter arrangement, which has the above-mentioned limitation on the diameter of the full cop. Full cops and bare bobbins grasped by pneumatically operated gripper assemblies are doffed onto the conveyer mechanism and donned on the spindles by the combined pantagraph motions of the lifter and horizontal dispacer mechanisms carrying the gripper assemblies.

Further features and advantages of the present invention will be made clear from the ensuing description, reference being made to the accompanying drawings, wherein;

FIG. 1 is a partly sectional front view of the entire structure of the apparatus of the present invention,

FIG. 2 is a partly sectional side view of the apparatus shown in FIG. 1,

FIG. 3 is a schematic sketch for explaining the pantagraph motion of the lifting mechanism used in the apparatus shown in FIG. 1,

FIG. 4 is a perspective view of the horizontal displacer mechanism used in the apparatus shown in FIG. 1,

FIGS. 5A and 5B are plan and cross sectional views of the conveyer mechanism used in the apparatus shown in FIG. 1,

FIGS. 6A to 6P are explanatory schematic views for showing the doffing and donning operations performed on the apparatus shown in FIG. 1,

FIG. 7 is a bottom plan view of the gripper assembly used in the apparatus shown in FIG. 1,

FIGS. 8 and 9 are partly sectional side views of the gripper assembly shown in FIG. 7,

FIG. 10 is a partly sectional front view of the gripper assembly shown in FIG. 7,

FIGS. 11A and 11B are partly sectional explanatory views for showing the grasping mode of the gripper assembly shown in FIG. 7,

FIGS. 12A to 12D are explanatory side and plan views for showing the yarn separating mode of a gripper assembly having a yarn separator tongue.

Referring to FIGS. 1 and 2, a basic embodiment of the doffing and donning apparatus of the present invention used in combination with a draw-twister for synthetic fibers is shown. On the front lower side of the row of spindles on the machine, a bobbin and cop conveyer mechanism 1 is arranged in combination with an intermittent driving source (not shown) of known type.

The conveyer mechanism 1 includes an endless belt 2 guided for circulation by guide rollers 3. The endless belt 2 is provided with multiple upright pegs 4 mounted on its outer surface. The pegs 4 are mounted on the belt 2 in two longitudinal alignments as shown in FIGS. 5A and 5B. In each alignment, the pegs 4 are spaced from each other at a distance equal to the distance between neighbouring spindles on the machine. This distance is hereinafter referred to as the spindle pitch P. As is seen in FIG. 5A, pegs 4 of one alignment and pegs 4 of the other alignment are arranged alternately, i.e., the longitudinal distance between a peg 4 of one alignment and the nearest peg 4 of the other alignment is half the abovedefined spindle pitch. This distance is hereinafter referred to as the half spindle pitch P'. Further, the above-mentioned particular arrangement of the pegs is hereinafter referred to as the zig-zag pegs arrangement.

As is shown in FIG. 2, a lifting mechanism 6 of the cops and bobbins is located in front of the conveyer mechanism 1 and a horizontal displacer mechanism 7 of the cops and bobbins is disposed to the upper end portion of the lifting mechanism 6. On the machine side, the spindles 8 are mounted on the spindle rail 9, the rings 11 for the travellers 16 are mounted on the ring rail 12 and the drawing rollers 13 and the separator rollers 14 are mounted on the machine framework over the spindles 8 as in the case of the ordinary draw-twisters.

The construction of the lifting mechanism 6 is hereinafter explained in detail. As is seen from FIGS. 1, 2 and 3, the construction of the lifting mechanism 6 is based on a vertical pantagraph type arrangement which includes a main link 17 and an auxiliary link 18 combined with the former. The main link 17 is pivoted at its lower

end to a movable supporter block 19 which includes one or more rollers 21 rotatably disposed thereto. A pair of guide rails 22 and 23 run in front of the machine in parallel to the running direction of the conveyer mechanism 1 and the rollers 21 of the supporter block 19 are movably received in between the two guide rails 22 and 23. A piston mechanism 24 is located on one end of the guide rails 22 and 23, which includes a pressure cylinder 26 connected to a given pressure drive source (not shown), a piston 27 received in the cylinder 26 and an operator rod 28 connected to the piston 27. The other end of the operator rod 28 connected to the piston 27. The other end of the operator rod 28 is linked to the supporter blocks 19. The auxiliary link 18 is pivoted at its lower end to a stationary supporter block 29 fixed on the guide rails 22 and 23. The upper end of the auxiliary link 18 is pivoted to a bracket 31 disposed to the stem of the main link 17. Upon reciprocal generation of the piston mechanism 24, the disposition of the lifting mechanism 6 changes from the one shown by solid lines to the one shown by chain-and-dot lines in FIG. 3 and vice versa. In other words, the lifting mechanism 6 performs so-called pantagraph motion in the vertical direction.

Detailed construction of the horizontal displacer mechanism 7 is shown in FIG. 4, wherein the construction is based on a horizontal pantagraph type arrangement which includes a main link 32 and an auxiliary link 33 combined with the former. The main link 32 is pivoted at its one end to a holder bracket 34 which is firmly mounted on a slidable shaft 36. As is shown in FIG. 1, piston mechanisms 37 are located on both ends of the shaft 36, each of which includes a pressure cylinder 38 connected to a given pressure drive source (not shown) and a piston 39 received in the cylinder and connected to the end of the shaft 36. The other end of the main link 32 is pivoted to a bracket 41 fixedly mounted on a rod 42 which runs parallel to the slidable shaft 36 and carries a plurality of gripper assemblies 43. The auxiliary link 33 is pivoted at its one end to the mid portion of the main link 32 and at the other end to a bracket 44 freely mounted on the slidable shaft 36. This bracket 44 holds a shaft 46 which extends parallel to the slidable shaft 36. The main link 17 of the lifting mechanism 6 is pivoted at its upper end to the bracket 44.

Upon reciprocal generation of the piston mechanism 37, the slidable shaft 36 reciprocates longitudinally and the horizontal displacer mechanism 7 is provided with the so-called horizontal pantagraph motion in a reciprocal fashion so as to register the axial centers of the gripper assemblies 43 with those of the spindles on the machine and pegs 4 of the conveyor mechanism 1.

As is clear from the foregoing description, the gripper assemblies 43 are given a vertical movement caused by the vertical pantagraph motion of the lifting mechanism 6 and a horizontal movement caused by the horizontal pantagraph motion of the horizontal displacer mechanism 7. Time sequential actuation of the operations of the respective machine elements is carried out by a suitable driving and piloting mechanism including, for example, limit switches disposed relative to the travelling courses of the elements.

The doffing and donning operations carried out on the apparatus of the present invention are hereinafter explained in time sequential order in detail, reference being made to FIGS. 6A to 6P.

In the disposition shown in FIG. 6A, bare bobbins 47 are mounted on pegs 4 on the spindle side, pegs 4 on the other side are in a position coinciding with the position of spindles 48 on the machine and the centers of gripper assemblies 43 are registered with those of bare bobbins 47.

With the vertical pantagraph motion of lifting mechanism 6, gripper assemblies 43 are lifted with their centers being registered with those of bare bobbins 47 as shown in FIG. 6B. Building of the cops is already completed and full cops 49 rest on respective spindles 48.

In this lifted disposition of gripper assembly 43, horizontal displacer mechanism 7 starts its horizontal pantagraph motion so that the centers of gripper assemblies 43 are regisered with those of spindles 48, i.e., gripper assemblies 43 come right above full cops 49 on the machine as shown in FIG. 6C.

Next, lifting mechanism 6 again starts its pantagraph motion so as to lower gripper assemblies 43 towards full cops 49 and, upon arrival at the level of the tops of full cops 49, gripper assemblies 43 are pneumatically energized so as to firmly grasp the tops of full cops 49. (see FIG. 6D)

After completion of the grasping action, lifting mechanism 6 restarts its reverse pantagraph motion and full cops 49 grasped by gripper assemblies 43 are brought to a prescribed level being dismounted upwards from spindles 48 as shown in FIG. 6E.

While keeping this level, horizontal displacer mechanism 7 restarts its reverse pantagraph motion so as to register the centers of full cops 49 with those of pegs 4 of conveyor mechanism 1. FIG. 6F illustrates the disposition just after completion of this registration in the horizontal position.

After completion of the registration, lifting mechanism 6 restarts its pantagraph motion so as to mount full cops 49 onto pegs 4 of conveyer mechanism 1 as shown in FIG. 6G. When full cops 49 are stably mounted on pegs 4, gripper assemblies 43 are pneumatically de-energized so as to release full cops 49 from the grasp and, thereafter, are lifted to some extent by the restarted pantagraph motion of lifting mechanism 6. (see FIG. 6H)

By the foregoing operations, the full cops 49 on the machine are perfectly doffed onto the conveyor mechanism 1 and the entire arrangement is now ready for commencement of the donning process.

The donning process is carried out in the following sequence. Prior to commencement of the donning process, the endless belt 2 of the conveyor mechanism 1 moves over a distance equal to the half spindle pitch P' so that the positions of bare bobbins 47 are registered with those of the spindles 48 on the machine. After the positions of the bare bobbins 47 are settled, horizontal displacer mechanism 7 restarts its pantagraph motion so that the centers of gripper assemblies 43 are registered with those of corresponding bare bobbins 47 on endless belt 2 as shown in FIG. 6I. While keeping this registration, lifting mechanism 6 lowers the gripper assemblies into engagement with the tops of bare bobbins 47 by its vertical pantagraph motion and gripper assemblies 43 are pneumatically energized so as to firmly grasp the tops of bare bobbins 47. (see FIG. 6J)

Grasping bare bobbins 47, gripper assemblies 43 are moved upwards by the vertical pantagraph motion of lifting mechanism 6 being dismounted from pegs 4 on belt 2 to a level so that the ends of bare bobbin 47 so

lifted are positioned slightly higher than the tops of spindles **48** on the machine. This disposition is shown in FIG. **6K**. Following this lifting, horizontal displacer mechanism **7** performs the horizontal pantagraph motion for registration of centers of bare bobbins **47** with the centers of spindles **48** on the machine as shown in FIG. **6L**. After this registration of centers, lifting mechanism **6** restarts its vertical pantagraph motion, bare bobbins **47** are mounted on spindles **48** and gripper assemblies **43** are pneumatically de-energized so as to release bare bobbins **47** from their grasp. (see FIG. **6M**) After this bobbin mounting is finished, lifting mechanism **6** moves gripper assemblies **43** upwardly away from bare bobbins **47** now mounted on spindles **48** as shown in FIG. **6N**. In the lifted condition shown in FIG. **60**, the horizontal displacer **7** performs its pantagraph motion so that gripper assemblies **43** are brought to the position shown in FIG. **6P**, i.e., the position shown in FIG. **6A**, for the subsequent doffing motion. After completion of the donning operation, the conveyer mechanism **1** carries the full cops **49** mounted thereon to a station wherein they are collected from the conveyer mechanism **1** in the known manner.

As already described, grasping of the full cops and bare bobbins is performed by gripper assemblies **43**, one for every spindle, which are pneumatically energized and deenergized at prescribed timings. One typical example of such gripper assembly **47** is shown in FIGS. **7** to **10**.

As is seen in FIGS. **7** and **8**, the gripper assembly includes an upper casing **101** having a cylindrical portion opening downward in the drawing. In the cylindrical portion, a pair of gripper segments **102***a*, **102***b*, each having a pair of gripper shoes **103**, are disposed symmetrically with respect to the center of curvature of the circular portion of the cylindrical portion. The gripper segments **102***a*, **102***b* are pivoted to respective holder arms **104***a* and **104***b* which are curved in conformity with the circle of the cylindrical portion of the upper casing **1**. The holder arms **104***a* and **104***b* are pivoted to the casing at their one ends and are repelled from each other by a compression spring **106** which is interposed between the outwardly projected free ends of the holder arms **104***a* and **104***b*. In order to limit this repulsion, a pair of stoppers **107** are fixed on the internal wall of the cylindrical portion of the upper casing **101** at positions whereon the back shoulders of the outwardly projecting free ends of the holder arms **104***a*, *104b* abut the stoppers **107** when repelled by the spring **106**. A metal contact **108** is disposed in combination with the respective stopper **107**. An elongated flexible tube **109** is inserted circularly between the internal wall of the cylindrical portion of the upper casing **101** and the outer faces of the holder arms **104***a*, **104***b*. A partly omitted ring **111** is embraced by the tube **109** as shown in FIG. **8**. An under casing **112** is fixed to the upper casing **101** from underside by set bolts **113** so that the tube **109** is pressed air tight between the upper and under casings **101** and **112**. (see FIG. **8**) The ring **111** is provided with a transverse hole **114** which communicates to an air inlet **116** formed in the upper casing **101**. The aforementioned stopper **107** is made of electroinsulating material. The metal contacts **108** are fixed to the upper casing **101** by set screws **117** via electroinsulating bushes **118** and electric terminals **119** are connected thereto. A pressor **121** is slidably disposed axially through the upwardly protruding boss part of the upper casing **101**. This pressor **121**, which is made up of an electroinsulating material, is provided with a lock member **122** formed on its stem and a diametral flange **123** formed underside of the lock member **122** for the prevention of free axial rotation. On the upper end of the pressor **121** are a metal contact **124** and an electric terminal **126** fixed by a set screw **127**. A compression spring **128** is interposed between the upper inner surface of the boss part of the upper casing **101** and the flange **123**.

As is shown in FIGS. **8** and **10**, a pipe **129** is fixed through one end portion of the upper casing **101** by a set screw **131**. This pipe **129** is rotatably engaged with a bracket **132**. A spiral spring **133** is inserted inside the pipe **129** with its both ends inserted into holes formed on caps **134***a* and **134***b* covering the two ends of the pipe **129**. One of the caps **134***a* is fixed to the bracket **132** by a screw **136** so as to hold the pipe **129** whereas the other of the caps **134***b* is fixed to the pipe **129** by a pin **137** and is slidable about the bracket **132**.

The bracket **132** is firmly mounted on a supporter shaft **138** via a fixer block **139** and set bolts **141**. The mounting position of the bracket **132** on the supporter shaft **138** can be adjusted longitudinally along the shaft **138** by adjuster screws **142**. By the spring force of the spring **133**, the upper casing **101** is continuously urged clockwise in FIG. **8** and this turning tendency is limited by the adjuster screws **42**.

In operation, highly pressured air is introduced at first into the gripper assembly via air inlet **116**. The pressured air so supplied is further brought into flexible tube **109** through transverse hole **114** of ring **111** so as to inflate tube **109** towards the inside. By this inflation of tube **109**, gripper segments **102***a* and **102***b* are pivotally urged inwardly overcoming the repulsive force of spring **106** and gripper shoes **103** grasp the top of bobbin **47** firmly as shown in FIG. **11A**. In this disposition, spring **105** of pressor **121** is kept in a compressed condition being in pressure contact with the top end of bobbin **47**.

Upon relief of the air pressure, gripper segments **102***a* and **102***b* resume their initial disposition due to the replusive force of spring **106** relieving bobbin **147** from the grasp of gripper shoes **103** and bobbin **47** is urged downwards by pressor **121** as shown in FIG. **11B**. In this disposition, full cops **49** are easily mounted on pegs **104** of conveyor mechanism **101** and bare bobbins **47** are easily mounted on spindles **48** on the machine. Uncontrolled axial turning of the bobbin is prevented by pressure contact of same with pressor **121**.

Regarding this mounting of the bobbin, if the bobbin is not successfully mounted on the spindle **48**, the metal contact **124** is prevented from making contact with the upper casing **101**, i.e., kept in a disposition similar to that shown in FIG. **11A** and, therefore no electric connection is established between the two elements. In other words, this combination of the metal contact **124** with the upper casing **101** establishes a kind of on-off switch. Therefore, by connecting this switch like combination with a suitable control circuit of the doffing and donning operations, troubles caused by unsuccessful mounting of bobbins and/or cops can be effectively prevented.

In a similar way, the combination of the metal contact **108** with the holder arm **104***a* in FIG. **9** establishes a kind of on-off switch. Due to this switch mechanism, disposition of the gripper segments **102***a* and

102*b* can be always electrically sensed. That is, possible malfunction in the bobbin grasping action can be electrically sensed so as to obviate undesirable propagation of the trouble.

If the upper casing **101** is subjected to an upwardly directed force of a magnitude higher than a certain value in the disposition shown in FIG. **8**, the cap **134***b* and the pipe **129** turn with the upper casing **101** and, thereby, the spiral spring **133** is torsionally stressed. By this torsional stress of the spring **133**, the upper casing **101** is turned counterclockwise in FIG. **7**.

In the actual prosecution of the simultaneous doffing operation using the apparatus of the present invention, it is desirable to prevent the yarns of spindle units from possible mutual entanglement which causes yarn breakages in the subsequent draw-twisting operation. For this purpose, the apparatus of the present invention may advantageously be provided with yarn separators such as shown in FIGS. **12**A to **12**D.

As is clearly shown in FIGS. **12**A and **12**B, a pair of up and down separator tongues **201** extend from the gripper assembly **43** towards the full cop **49** in position on the spindle. The tongues **201** are so shaped that, when seen from upper side, the gripper assembly **43** is heart shaped as shown in FIG. **12**B.

These separator tongues **201** operate in the following fashion. At the stage of full cops doffing, gripper assembly **43** registers its center at the center of full cop **49** on spindles at a level between full cop **49** and a yarn guide **51** as shown by dot and chain lines in FIG. **12**A. This disposition corresponds to that shown in FIG. **12**D. Provided that the traveller **16** rests at a position on the right hand side of the center of the gripper assembly **43** (see FIG. **12**C), the yarn **52** is pushed counterclockwise in FIG. **12**C by contact with the right hand side fringe of the tongue **201** as the gripper assembly **201** advances from the position in FIG. **12**B to that in FIG. **12**D. When the traveller **16** rests on the left hand side, the yarn **52** is pushed clockwise in FIG. **12**C by the left hand side fringe of the tongue **201**.

What is claimed is:

1. Doffing and donning apparatus usable for textile machines having a row of spindles comprising, in combination, a conveyor mechanism including an endless belt mounted to circulate in front of said row of spindles and in parallel with said row of spindles, a plurality of pegs disposed on said belt in two parallel rows in such a manner that a peg in one peg row is spaced longitudinally along said belt from the nearest peg in the other peg row at a distance equal to half the spindle pitch of said row of spindles; a drive mechanism coupled to said conveyor mechanism to intermittently drive said belt; a pantograph lifting mechanism mounted in front of said row of spindles; a first pneumatic driving mechanism coupled to said lifting mechanism for providing same with a vertical pantograph motion; a horizontal pantograph displacer mechanism mounted on the upper end of said lifting mechanism; a second pneumatic driving mechanism coupled to said horizontal displacer mechanism for providing same with a horizontal pantograph motion; gripper assemblies, one for each spindle unit, mounted on said horizontal displacer mechanism, a a third pneumatic driving mechanism connected to said gripper assemblies for actuation thereof; and a pilot mechanism for actuating and piloting operations of said mechanisms in determined sequence.

2. A doffing and donning mechanism as claimed in claim **1**, wherein each of said gripper assemblies includes a circular upper casing, an under casing coupled to said upper casing to define a room; a pair of bow-shaped gripper segments pivoted inside said upper casing, each gripper segment having gripper shoes fixed on its internal surface, an interposed spring positioned to resiliently repel said segments from each other; an inflatable flexible tube inserted between the internal wall of said upper casing and said gripper segments; and means connected to said inflatable flexible tube for supplying pressured air thereto from a pneumatic supply source.

3. Doffing and donning apparatus as claimed in claim **2**, further comprising a pressor axially and slidably disposed inside of said upper casing, and means coupled to said pressor for resiliently urging said pressor towards said under casing.

4. Doffing and donning apparatus as claimed in claim **2**, wherein said upper casing is provided with at least one yarn separator tongue protruding radially from its periphery.

5. A doffing and donning apparatus for use with a textile machine having a row of spindles, said apparatus comprising horizontal guide rollers, a belt mounted on said guide rollers, a plurality of pegs mounted on said belt in two longitudinal rows, the pegs of each row being spaced a distance of one-half the pitch of said spindles from the pegs of the other row in the longitudinal direction of said belt, a vertical pantograph lifting assembly mounted adjacent said belt, a horizontal pantograph displacing assembly mounted on the top of said vertical lifting assembly, a plurality of grippers on said horizontal displacing assembly, and spaced apart the same distance as said spindles, means for intermittently driving said belt, drive means coupled to said grippers, first control means coupled to said lifting assembly for lifting and lowering said displacing assembly, and a second control means coupled to said displacing assembly for selectively aligning said grippers with said row of spindles and said rows of pegs.

* * * * *