

RETRACTABLE APPARATUS FOR PLACEMENT OF OBJECTS

Field of Invention

5 This invention relates to a retractable apparatus for the placement of objects on a support rod. The use of the assembly is particularly relevant for, though not exclusively so, cloth products, such as, for example, flags, clothing, bed linen and curtains.

10 Background

Dwellers in high rise apartments usually encounter several difficulties when it comes to drying their laundry. This is especially true in countries where clothes dryers are not ubiquitous in households. Even though most washing machines
15 nowadays have "spin-dry" functions, the laundered clothing would still be damp and some sunlight and airing would be required to remove the odour of semi-dried clothing. Hence, the laundered clothing would preferably be placed in the sun to dry/evaporate all moisture, and odour.

20 In order to do this, the laundered clothing would be draped on or otherwise attached to long poles and placed outdoors with the ends of the long poles inserted into hollow cylinders extending outwardly and upwardly from faces of external vertical walls of apartments. This became especially dangerous with large pieces of clothing and on windy days. The large clothing would "catch" the wind like sails and a
25 substantial force would be imparted to the poles. Poles made from aged wood, or fatigued metal, would fracture along the edges of the hollow cylinders because of the shear forces imparted by the wind. The fractured poles, and clothing, would be a hazard to those in the vicinity of the apartment block not under any shelter.

30 New apparatus to drape clothing for sunning and airing were conceived as a result of the shortcomings of the known method. One such apparatus utilises a pulley system with a scissor linkage at the ends of poles for draping clothing. The pulley system enables the lowering of the poles when clothing is to be draped and the

- raising of the poles when clothing are to be dried. Each of the poles has telescopic arms at each end to extend the length of the pole. However, only the telescopic portion of each pole is extendable outdoors through a window. The majority of the clothing will not be exposed to sunlight. To maintain the stability of the apparatus, the telescopic portion of each pole is relatively short compared to the length of the pole. This apparatus improves safety but does not allow a lot of the draped clothing to be aired and exposed to sunlight. The apparatus will also not be able to retract the telescopic portions of the poles that are outdoors in the event of rain.
- There are other designs of such apparatus available for use in apartment blocks. However, their shortfalls include the non-avoidance of rain and the limited exposure of draped clothing to sunlight.

Summary of Invention

- There is provided an apparatus, including: at least one guide rod fixedly mounted at a first end to a support board; at least one barrier fixedly mounted at a second end of the at least one guide rod; and at least one support rod rotatably mounted at a first end to the support board; wherein the at least one support rod passes through the at least one barrier and wherein the barrier and the support board are supporting structures for the at least one support rod. The apparatus may further include a mechanism for circular motion, wherein the mechanism allows for the movement of the at least one support rod in an arc while horizontal.
- The mechanism for circular motion may include: a mounting structure; at least one guide means traversing along the at least one guide rod; at least one beam adjoining the mounting structure to the at least one guide means; and at least one biasing means for controlling the rate of rotation of the mechanism for circular motion.
- It is preferable that the guide and support rods have a cross-sectional profile that are square, circular, or polygonal.

It is advantageous that the biasing means is may be hydraulic, elastomeric, electric, or spring systems. Preferably, the biasing means may include: at least one air compressor system; and at least one air cylinder. Preferably, the at least one air compressor system passes air into the at least one air cylinder.

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Advantageously, the apparatus further includes a device for the detection of liquid, and the liquid is water. The device may also preferably be connected to a controller.

10 It is preferable that the air compressor system includes at least one pressure relief valve. The pressure relief valve may release air when the air pressure in the compressor exceeds 100psi. Preferably, the air compressor system further includes at least one pressure switch, with the pressure switch acting as a safety device that cuts off the power supply to the compressor when the air pressure in the compressor exceeds 105psi.

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Preferably, that the air compressor system further includes at least one filter to capture particles of bigger than 10 microns. It is more preferable that the at least one filter captures particles between 10 to 20 microns.

20 Advantageously, the air compressor system further includes at least one pressure gauge to monitor pressure levels in the air compressor.

Description of Drawings

25 In order that the invention may be better understood and readily put into practical effect, there shall now be described by way of non-limitative example only preferred embodiments of the present invention, the description being in reference to the accompanying illustrative drawings in which:

30 Figure 1 shows a perspective view of the preferred embodiment in a "fully retracted" position;

Figure 2 shows a perspective view of the preferred embodiment in a "loading/unloading" position;

Figure 3 shows a perspective view of the preferred embodiment in a "semi-extended" position;

Figure 4 shows a perspective of the preferred embodiment in a "fully extended" position;

5 Figure 5 shows a schematic diagram of an air compressor system employed in a "motion-assisted" configuration of the preferred embodiment; and

Figure 6 shows a schematic diagram of the air compressor system employed in an "rain detection" configuration of the preferred embodiment.

10 **Description of Preferred Embodiments**

To first refer to Figures 1 to 4, there is illustrated a preferred embodiment of the present invention employed for the draping of clothing for airing and sunning. Figures 1 to 4 shows a perspective view of the apparatus 20 in various positions of
15 operation in relation to a window frame 200. The apparatus 20 includes a mechanism 22 for circular motion. There is a support board 24 onto which a first guide rod 26 is fixedly mounted at a first end 28. In a preferred embodiment of the present invention, there is a second guide rod 30 that may also be fixedly mounted at a first end 32 to the support board 24. The guide rods 26, 30 may be made of a
20 stiff material such as, for example, metal, wood, plastics, composites and so forth. However, the surface of the material used for the guide rods 26, 30 should have low coefficient of friction. Materials which do not possess such properties may be coated with a low friction layer on its surface.

25 There may be at least one barrier 34 fixedly mounted on second ends 36, 38 of the first 26 and second 30 guide rods respectively. The barrier 34 should preferable also be made from a stiff material such as, for example, metal, wood, plastics, composites and so forth. The support board 24 should preferably also be made from a stiff material such as, for example, metal, wood, plastics, composites and so
30 forth. The support board 24 and the barrier 34 should have sufficient stiffness to ensure that when fixedly joined by the first 26 and second 30 guide rods, the resulting structure should be sufficiently rigid to form a main frame for apparatus 20.

The barrier 34 may have at least one opening 44 for the passage of at least one support rod 40. Each support rod 40 may pass through openings 44 in the barrier 34 and may be rotatably mounted in openings 46 on the support board 24. A first end 42 of the support rod 40 may be "locked" into opening 46 of the support board 24 such that the support rod 40 does not disengage from opening 46 of the support board 24. However, support rod 40 may still rotate within the opening 46 of the support board 24 and opening 44 of the barrier 34. As the support rods 40 are meant for the draping of clothing, having the support rods 40 rotate in the openings 44, 46 would facilitate the draping of clothing onto the support rods 40.

The support rods 40 and the guide rods 26, 30 may have different cross-sections, such as, for example, square, circular, or polygonal. The choice of the cross-sections of the support rods 40 and the guide rods 26, 30 may depend on the preference/requirements of the user.

The mechanism 22 for circular motion enables the movement of the apparatus 20 in an arc-like manner. The mechanism 22 includes a mounting structure 50 for the mounting of the apparatus 20 onto a ceiling of a room. It is preferable that the apparatus 20 is mounted in close proximity to an opening in the room, like a door or a window. The mechanism 22 also includes a first guide roller device 52 which allows the passage of the first guide rod 26. The first guide roller device 52 may slide along the first guide rod 26. The mechanism 22 also includes a second guide roller device 54 which allows the passage of the second guide rod 30. The second guide roller device 54 may slide along the second guide rod 26. In a preferred embodiment of the present invention, the first guide roller device 52 and the second guide roller device 54 may be joined via a first connector 56 and a second connector 58. It is preferable that guide roller devices 52, 54 may be self-lubricating such that any form of lubricant does not drip onto any of the support rods 40.

A first end 64 of a first beam 60 may be rotatably secured at an intermediate portion along the first connector 56. A second end 66 of the first beam 60 may also be rotatably secured to a first edge 68 of the mounting structure 50. A first end 70 of a second beam 62 may be rotatably secured at an intermediate portion along the

second connector 58. A second end 72 of the second beam 62 may also be rotatably secured to a second edge 74 of the mounting structure 50. The first beam 60, second beam 62, mounting structure 50 and guide roller devices 52, 54 form a four-bar linkage system. Hence, the mechanism 22 for circular motion is a four-bar linkage system.

In the preferred embodiment, a first end 78 of an actuator 76 may be attached to an intermediate length along the second beam 62. A second end 80 of the actuator 76 may be attached to a third edge 82 of the mounting structure 50. The actuator 76 may be a pneumatic ram (as shown) or may be hydraulic, elastomeric, electric, spring, or any other suitable drive system. The actuator 76 may also be a gas spring.

Referring to Figure 5, there is shown a pneumatic system 100 preferably employed in a motion-assisted mode of the present invention. Using this configuration, a user may either extend or retract the apparatus 20 with the turn of a switch 112. An air compressor 102 is connected to an AC power supply 104 and is activated by the switch 112. A filter 106 may be incorporated into the air compressor 102 or the filter 106 may be a separate component. There may be more than one filter 106 employed in the pneumatic system 100. The filter 106 prevents undesirable particles, and moisture from the air from entering the compressor 102 and subsequently damaging the pneumatic system 100. The filter 106 may be rated to prevent particles of a size greater than 10 microns from entering the system 100. The filter 106 may be rated to filter particles of a size greater than 20 microns.

The pressure in the compressor 102 may be monitored via a pressure gauge 108 and a pressure release valve 110 releases some air from the compressor 102 when the air pressure exceeds a predetermined amount. The pressure release valve 110 may preferably be set to release air when the air pressure in the compressor 102 exceeds 100psi to prevent the rupturing of the compressor 102 vessel. There may also be a pressure switch 114 that acts as a back-up safety device. It will be activated to discharge air from the compressor 102 when the pressure relief valve 110 fails partially or completely. The pressure switch 114 may be set to only be

activated when the pressure in the compressor 102 exceeds a predetermined figure, such as, for example, 105psi.

When compressed air is required by the actuator 76, the air is passed through a selector valve 116 and an air flow control device 118 before filling up or emptying an air cylinder in the actuator 76. The selector valve 116 controls the exhausting of air from the air cylinder in the actuator 76 through an outlet when the switch 112 is turned to a negative rating. The air flow control device 118 would enable the control of the rate of air flow into and out of the air cylinder in the actuator 76 depending on the rating the switch 112 is selected to. Instead of ratings on the switch 112, the switch may have numbers or symbols that guide the user to maneuver the apparatus 20 to a preferred position.

Referring to Figure 1, there is shown the apparatus 20 in a "fully retracted" position. At this position, the rod of the actuator 76 may be fully extended such that apparatus 20 occupies a minimal amount of vertical space when apparatus 20 is mounted onto a ceiling.

Figure 2 shows the subsequent position of the apparatus 20 in a "loading/unloading" position when the switch 112 of the pneumatic system 100 is turned to a negative rating. Air is extracted from the cylinder of the actuator 76 forming a region of negative pressure such that the rod of the actuator 76 is forcibly driven into the cylinder of the actuator 76. The greater the negative rating the switch is turned to, the greater the flow of air extraction from the cylinder of the actuator 76. This causes the first beam 60 and the second beam 62 to rotate about the first edge 68 of the mounting structure 50, and the second edge 74 of the mounting structure 50 respectively. At this stage, the apparatus 20 would be positioned at a reachable level for the draping of clothing onto each of the support rods 40. The first beam 60, and the second beam 62 may preferably be nearly perpendicular and slightly past the vertical axis in a clockwise direction to the ground at this position.

The "semi-extended" apparatus 20 is positioned as shown in Figure 3 when air is forced into the cylinder of the actuator 76 from the "loading/unloading" position as

shown in Figure 2. In this instance, the switch 112 of the pneumatic system 100 is turned to a positive rating. The greater the positive rating the switch is turned to, the greater the flow of air introduced into the cylinder of the actuator 76. With air being introduced into the cylinder of the actuator 76 by the pneumatic system 100, the rod is pushed outwards from the cylinder of the actuator 76, causing the second beam 62 to move further away from the vertical axis. The first beam 60 correspondingly moves as part of a four-bar linkage in the mechanism 22 for circular motion. A portion of the support rods 40 may already be exposed as they protrude from the window frame 200. The position of the apparatus 20 shown in Figure 3 would be the final position if the switch 112 of the pneumatic system 100 was not turned to a sufficiently high rating.

The structure of guide rods 26, 30 and support rods 40 may experience a force generated by, for example, a hand, or an actuator and may move. The force generated may be a pushing or a pulling force. The structure of guide rods 26, 30 and support rods 40 may be guided by roller devices 52, 54 and may roll towards the first ends 28, 32 of the guide rods 26, 30 respectively. This would cause the apparatus 20 to be positioned at a “fully extended” position as shown in Figure 4. The structure of guide rods 26, 30 and support rods 40 may be able to support loads of at least 5kg, depending on the materials employed.

In an alternative embodiment, when the switch 112 of the pneumatic system 100 is turned to a high positive rating, the movement of the first beam 60 and the second beam 62 may generate a force that would cause the first guide roller device 52 and the second guide roller device 54 to impact against the barrier 34. The reaction force from the barrier may cause the roller devices 52, 54 to roll towards the first ends 28, 32 of the guide rods 26, 30 respectively. The movement of the first 60 and second 62 beams may also aid the movement of the roller devices 52, 54 towards the first ends 28, 32 of the guide rods 26, 30 due to the momentum experienced by the structure of guide rods 26, 30 and support rods 40.

Figure 4 shows a “fully extended” apparatus 20 when the roller devices 52, 54 are at rest at first ends 28, 32 of the guide rods 26, 30 respectively. In such an instance,

the structure of guide rods 26, 30 and support rods 40 would be fully protruding from the window frame 200, thus enabling the sunning and airing of every item draped on or otherwise attached to, the support rods 40.

5 The sequence of turning the switch 112 of the pneumatic system 100 would only need to be reversed to fully retract the apparatus 20 to the position as shown in Figure 1. In order to retract the apparatus 20, whenever the switch 112 of the pneumatic system 100 was set at a positive or negative rating during the extension of the apparatus 20, the switch 112 should preferably be set to the identical rating,
10 albeit negative or positive respectively.

The structure of guide rods 26, 30 and support rods 40 may experience a force generated by, for example, a hand, or an actuator and may move. The force generated may be a pushing or a pulling force. The structure of guide rods 26, 30
15 and support rods 40 may be guided by roller devices 52, 54 and may roll towards the second ends 36, 38 of the guide rods 26, 30 respectively. This would begin the retraction process.

In an alternative embodiment, when the apparatus 20 is "fully extended" as shown
20 in Figure 4, the switch 112 should be turned to a high negative rating such that the rod of the actuator 76 is driven into the cylinder of the actuator 76. This enables the second beam 62 to move in an anti-clockwise direction. The first beam 60 also moves in an anti-clockwise direction as it forms part of the four-bar linkage of the mechanism 22. When this occurs, the roller devices 52, 54 impact against the
25 support board 24, creating a reaction force that causes the roller devices 52, 54 to traverse along the guide rods 26, 30 until they rest in close proximity to the second ends 36, 38 of the first 26 and second 30 guide rods respectively.

In the retraction process, the "semi-extended" position of the apparatus 20 shown in
30 Figure 3 is bypassed. The apparatus 20 would subsequently be positioned in the "loading/unloading" position as shown in Figure 2 once the switch 112 is turned to a high negative rating. However, the first beam 60, and the second beam 62 may preferably be nearly perpendicular and slightly past the vertical axis in an anti-

clockwise direction to the ground at this position. This may ensure that the apparatus 20 may be “fully retracted” like in Figure 1 once the switch 112 is turned to a high positive rating when the apparatus 20 is set in the “loading/unloading” position as shown in Figure 2.

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Referring to Figure 6, there is shown an alternative embodiment of the pneumatic system 150 preferably employed in a rain detection feature of the present invention. Using this configuration, a user may either extend or retract the apparatus 20 with the turn of a switch 162 and the apparatus would automatically retract when rain is encountered. A user may have a choice to program the apparatus 20 to retract either to the positions shown in Figure 1 or Figure 2. An air compressor 152 is connected to an AC power supply 154 and is activated by the switch 162. A filter 156 may be incorporated into the air compressor 152 or the filter 156 may be a separate component. There may be more than one filter 156 employed in the pneumatic system 150. The filter 156 prevents undesirable particles, and moisture from the air from entering the compressor 152 and subsequently damaging the pneumatic system 150. The filter 156 may be rated to prevent particles of a size greater than 10 microns from entering the system 150. The filter 156 may be rated to filter particles of a size greater than 20 microns.

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The pressure in the compressor 152 may be monitored via a pressure gauge 158 and a pressure release valve 160 releases some air from the compressor 152 when the air pressure exceeds a predetermined amount. The pressure release valve 160 may preferably be set to release air when the air pressure in the compressor 152 exceeds 100psi to prevent the rupturing of the compressor 152 vessel. There may also be a pressure switch 164 that acts as a safety device. It will be activated to cut off the power supply to the compressor 152 when the pressure relief valve 160 fails partially or completely. The pressure switch 164 may be set to only be activated when the pressure in the compressor 152 exceeds 105psi. The pressure switch prevents the compressor from being over pressurised.

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When compressed air is required by the actuator 76, the air is passed through a solenoid valve 166 and an air flow control device 168 before filling up or emptying

an air cylinder in the actuator 76. A water sensor 170 for the detection of rain may be installed in an exposed area such as, for example, a second end 41 of the support rod 40, the window frame 200, a roof of a building and the like. In the event of rain, the water sensor 170 may be activated and may send a signal to the controller 172. The controller 172 may subsequently send a set of instructions to an electronically operated solenoid valve 166. The solenoid valve 166 may then be powered by electrical induction and may be able to control the exhausting/introduction of air from/into the air cylinder in the actuator 76 such that the apparatus 20 is retracted from the position as shown in Figure 3 or Figure 4 to the positions shown in either Figure 1 or Figure 2. The solenoid valve 166 may be able to override the switch 162. The air flow control device 168 would enable the control of the rate of air flow into and out of the air cylinder in the actuator 76 depending on the rating the switch 162 is selected to or the control by the solenoid valve 166.

When an air compressor 100 is not be employed in the apparatus 20, a gas spring may be employed in place of the actuator 76 and the apparatus 20 may be moved about manually into the different positions as shown in Figures 1 to 4.

The apparatus 20 allows for the sunning and airing of all the items draped on the support rods 40 and the danger of support rods fracturing is minimised. The presence of the rain detection device also provides the user with confidence that the apparatus 20 would automatically retract once rain is detected, thus preventing clothing from being unnecessarily soiled in the rain when the clothing are outdoors.

The apparatus 20 should preferably be resistant to corrosion and degradation. Materials such as, for example, aluminum, and stainless steel may be used. When other metals are utilised, the metal parts may be powder-coated or painted to prevent oxidation and corrosion.

Whilst there has been described in the foregoing description preferred embodiments of the present invention, it will be understood by those skilled in the

technology concerned that many variations or modifications may be made to details of design or construction without departing from the present invention.

5 The present invention extends to all features disclosed either individually, or in all possible permutations and combinations.

Claims

1. An apparatus, including:
 - at least one guide rod fixedly mounted at a first end to a support board;
 - 5 at least one barrier fixedly mounted at a second end of the at least one guide rod; and
 - at least one support rod rotatably mounted at a first end to the support board; wherein the at least one support rod passes through the at least one barrier and wherein the barrier and the support board are supporting structures for the at
 - 10 least one support rod.
2. An apparatus as claimed in claim 1, further including a mechanism for circular motion, wherein the mechanism allows for the movement of the at least one support rod in an arc while horizontal.
- 15 3. An apparatus as claimed in claim 2, wherein the mechanism for circular motion includes:
 - a mounting structure;
 - at least one guide means traversing along the at least one guide rod;
 - 20 at least one beam adjoining the mounting structure to the at least one guide means; and
 - at least one biasing means for controlling the rate of rotation of the mechanism for circular motion.
- 25 4. An apparatus as claimed in any one of claims 1 to 3, wherein the guide rod has a cross-sectional profile selected from the group comprising: square, circular, and polygonal.
- 30 5. An apparatus as claimed in any one of claims 1 to 4, wherein the support rod has a cross-sectional profile selected from the group comprising: square, circular, and polygonal.

6. An apparatus as claimed in any one of claims 3 to 5, wherein the biasing means is selected from a group comprising: hydraulic, elastomeric, electric, and spring systems.
- 5 7. An apparatus as claimed in any one of claims 3 to 6, wherein the biasing means includes:
at least one air compressor system; and
at least one air cylinder,
wherein the at least one air compressor system passes air into the at least
10 one air cylinder.
8. An apparatus as claimed in claim 7, wherein the apparatus further includes a device for the detection of liquid.
- 15 9. An apparatus as claimed in claim 8, wherein the liquid is water.
10. An apparatus as claimed in claim 8, wherein the device is connected to a controller.
- 20 11. An apparatus as claimed in claim 7, wherein the air compressor system includes at least one pressure relief valve, wherein the pressure relief valve releases air when the air pressure in the compressor exceeds 100psi.
- 25 12. An apparatus as claimed in claim 11, wherein the air compressor system further includes at least one pressure switch, wherein the pressure switch acts as a safety device and cuts off the power supply to the compressor when the air pressure in the compressor exceeds 105psi.
- 30 13. An apparatus as claimed in claim 12, wherein the air compressor system further includes at least one filter to capture particles of bigger than 10 microns.
14. An apparatus as claimed in claim 13, wherein the at least one filter captures particles between 10 to 20 microns.

15. An apparatus as claimed in any one of claims 11 to 14, wherein the air compressor system further includes at least one pressure gauge to monitor pressure levels in the air compressor.