

A Clothes Dryer Of Cantilever Structure Having Turning Wheels

The present invention relates to an article of everyday use, and more particularly, to a clothes dryer of cantilever structure having turning wheels.

5 Various types of dryer are in use now, which can air a plurality of clothes but not suitable for a narrow dwelling. For instance, some dwellings in Hong Kong only occupy 30-40m², even smaller while shared by up to 5 or more people so that clothes dryers of cantilever structure are often used to air clothes with them being fixed outside the window. The traditional dryers are
10 merely square frame. A cloth has to be hung to a triangle top hook before it is hung onto the frame, therefore it is inconvenient to air and take clothes back. Also, the hanger and the hung clothes are often blown down by wind and lost. Therefore, there is a need for airing clothes conveniently by a clothes dryer of cantilever structure with hangers uneasy to be detached.

15 It is an objective of the present invention to provide a clothes dryer of cantilever structure comprising safety hooks, which can make full use of room to air much more clothes with ease.

The present invention is achieved by providing a cloth dryer in which a square or trapezoid frame of cantilever structure is provided as the supporter
20 of the clothes dryer, on two lateral rods arranged on two sides of the supporter are formed with guiding grooves in which safety hooks which are connected with each other by a rope to define a predetermined distance therebetween are fitted, a drawing assembly is provided in the center of the framework of the supporter, i.e. along the center line of the framework is provided with a central
25 rod in the back end of which a turning wheel assembly is set and in the front end a pulley is fixed, a rope surrounding the turning wheel assembly and the pulley is adaptable to move back and forth, the central rod is formed with a sliding groove to which a bow-shaped frame is attached, with the left and right ends of the bow-shaped frame being connected to the safety hooks located in
30 the foremost ends of the guiding grooves in the two lateral rods, a central point of the bow-shaped frame is connected with one point of the rope at such a appropriate position that when the turning wheel is turned back and forth, the bow-shaped frame moves back and forth and it can move up to the foremost end of the central rod, whereby the safety hooks located in the two lateral rods
35 are spread completely along the lateral rods, and the bow-shaped frame is moved to the predetermined position in the back end of the central rod, whereby the safety hooks are entirely pulled to a back position in the left and right ends of the bow-shaped frame. Thus, by operating the turning wheel fixed in the back end of the central rod, it is easy to push out and pull back the safety

hooks carrying the hanger on which clothes to be aired is hung, so that the dryer of the present invention can be used to air clothes conveniently. A clothes dryer of this type is the one which achieves the objective of the present invention.

5 The invention will be described in detail by referring to the drawings, in which

Fig.1 is a view showing the structure of the dryer of the present invention.

Fig.2 is a plane view of the dryer of the present invention.

Fig.3 is a view showing the shape of a plastic buckle—a part of the safty hook of the dryer of the present invention.

10 Fig.4 is a view showing the buckle retainer—a part of the safty hook of the dryer in the present invention.

Fig.5 is a cross section view showing the structure of the lateral rods of the dryer in the present invention.

15 Fig.6 is a view showing the assembly structure of the safety hooks of the dryer in the present invention.

Fig.7 is a view showing the structural feature of the turning wheel of the dryer in the present invention.

The structure of the present invention will be further described in detail with reference to the attached drawings.

20 Referring to Fig.1 which is the view of the structure of the dryer of the present invention. Said dryer mainly comprises a supporter 1, a drawing assembly 2, safety hooks 3, and rain shielding cloth 4. The main body of the supporter 1 is a square or trapezoid frame. In this embodiment, it is an isosceles trapezoid frame, with the two lateral rods 1-1 slightly inclined inward, the short side in the front slightly protruding outward and becoming arc-shaped, and the long side in the back, i.e. the bottom side being defined by a straight rod, whereby the framework of the main body is defined. Angled stands 1-4 with holes formed thereon for being attached to the wall by bolts to make the frame a cantilever structure are fixed on the side or bottom of the back ends of the two lateral rods 1-1. Oblique braces 1-5 made of metal plates are fixed on the side or top of the back ends of the two lateral rods 1-1. On the top of the oblique braces 1-5 is a scroll 1-6 in the form of a long round bar with rain shielding cloth 4 scrolled around it, which is parallelly arranged above or backward above the bottom side 1-3 of the frame.

35 The two lateral rods on the sides of the frame are formed with guiding grooves which are fitted with a pluarity of safety hooks 3 moving back and forth due to forces from outside, safety hooks 3 on each side being connected with each other by a rope to define a predetermined distance therebetween.

A drawing assembly 2 is provided in the center of the framework of the

supporter 1, i.e. a central rod 2-1 is set between the centers of the bottom side 1-3 and the short side 1-2. A turning wheel assembly 2-2 comprising a turning wheel and a guiding wheel and provided at the rear end of the central rod 2-1 is connected to a pulley 2-3 fixed in the front end of the central rod by an encircling rope 2-4. The rope 2-4 begins to move around the turning wheel assembly 2-2 and the pulley 2-3 as the turning wheel assembly 2-3 turns. On the central rod 2-1 there is formed a sliding groove fitted with a bow-shaped frame 2-5 adaptable to move back and forth and whose left and right ends at the front portion thereof are connected to the safety hooks located in the foremost ends of the two lateral rods by, for example, tying, and whose a central point is connected to a propariate point of the rope 2-4 so that the bow-shaped frame 2-5 moves when the rope 2-4 moves. As the turning wheel turns back and forth, the rope 2-4 also moves, so does the bow-shaped frame 2-5, whereby the safety hooks associated with the frame are pushed out or pulled back along the lateral rods.

The rods of the framework such as the short side, the bottom side, the central rod 2-1 and the scroll 1-6 can be made of metal tubes of thin wall such as steel tubes of thin wall, aluminum alloy tube and section bars having other sections. These metal tubes and rods have enough stiffness and strength high to make up a cantilever structure. The tubes and rods in the present invention also can be made of plastics or engineering plastics tubes or rods which have sufficient stiffness and strength. The joints can be nylon angle heads, tee joints, bolt and nut, etc.

The angled stands 1-4 are made of metal plate, for example they can be melded or combined by 2mm thick steel plate. Sufficient stiffness and strength is necessary for the angled strands to support the weight of the rest parts of the dryer as well as the clothes to be aired and an inclined stress as well. When the angled stands are fixed to the wall, the bolts attached to the wall should be deep into the wall. The dryer according to the present invention with its two lateral rods being 1.5m long can air clothes up to 100kg.

Referring to Fig.2 which is the plane view of the dryer of the present invention, further illustrating the structure in Fig.1. As shown in Fig. 2, the supporter 1 of the embodiment has a framework in the form of an isosceles trapezoid whose two waists are lateral rods, whose short side 1-2 is an arc-shaped rod slightly protruding outward, whose bottom side 1-3 is a straight rod, and whose central rod 2-1 is provided along the center line of the trapezoid frame. The turning wheel assembly comprises a drawing mechanism including the driving wheel, guiding wheel, sliding wheel, rope 2-4 and the bow-shaped frame 2-5. Operating the turning wheel is similar to tuning a radio by turning

its drawing mechanism. The turning wheel can be a hand driving wheel or electric motor. Fig.2 clearly shows the oblique braces 1-5 which are made of laths and connect the frame with the scroll 1-6. In the scroll 1-6 are the mandrel 1-7 and two springs 1-8 at the two ends of the mandrel 1-7, with the outside end of the spring being fixed and the inside end of the spring being stretchable. An annular tube 1-9 is located within the spring to protect it and prolong its life-time. When the spring is extended, an elastic force is produced and the spring will be locked onto the annular tube gradually. The springs act to exert backward pulling forces if the rain shielding cloth 4 provided around the scroll is used so that the rain shielding cloth 4 can be drawn back when the turning wheel pulls the bow-shaped frame 2-5 back. Fig.2 also clearly shows the position and the rough structure of the two angled stands 1-4.

Fig.2 shows the guiding grooves opened in the two lateral rods 1-1 and a plurality of safety hooks 3 fitted into the guiding grooves, in which the bow-shaped frame is shifted to the foremost end and all of the safety hooks are evenly distributed.

Fig.2 also shows the structure in which the central rod 2-1 is formed with a sliding groove opened thereon. Additionally, the bow-shaped frame 2-5 can use a more convenient and simpler combination structure comprising a bow-shaped stand 2-5A and a straight rod thereon as shown in Fig.2. Of course, one piece integral structure can be used instead of the combination structure.

Referring to Fig.3 which is a view showing the shape of the plastic buckle 3-1 of the safety hook 3, illustrating further with reference to the front view in Fig.3A, the side view in Fig.3B and the bottom view in Fig.3C. The front view of Fig.3A shows that the top of the cavity of the buckle 3-1 for receiving a hanger is in the shape of a horn, which facilitates to put a hanger through, the following part is a long, thin and tilted neck portion, and next is the flat oval cavity. Hangers hung on the plastic buckle of this kind are hard to be blown off through the neck by wind and can only be taken off by hand. Therefore, it belongs to a safety hook 3 of great security.

As shown in Fig.3, the lower portion of the plastic buckle 3-1 is generally in the shape of the letter M whose middle stem A is higher and inserted into the guiding groove of the lateral rods 1-1. The lower portion is of length L, width D, depth h going into the guiding groove, in which the width D is close to but slightly smaller than the width of the guiding groove. Two hollow portions used to receive supporting tubes located between the two outside opposit projections shown in Fig. 3 for supporting and positioning and shown by dotted lines in the side view is denoted by the dimension h1 representing the depth of the parts of the hollow portions which are out of the guiding grooves.

It is also one feature of the plastic buckle of the safety hook according to the present invention to design the lower portion with two hollow portions. The top of the middle higher stem A provided with two projections (Fig. 3A) away from each other when extending narrows down to width D1(Fig.3B). In the middle of the stem A there is a slot M of width D2 for engaging the buckle retainer to connect the plastic buckle and the buckle retainer. Also, drawing rope 3-3 is wound in the slot M to make the safety hooks connect reflexibly with each other.

Referring to Fig.4 which is a view of the structure of the embodiment of the buckle retainer 3-5 of the safty hook 3 according to the present invention. The buckle retainer 3-5 is a H-shaped thick pad having a hole Φ in the center thereof. The short portion of the pad for engaging with the two projections (Fig. 3) on the top of the middle stem A of the M-shaped portion is shaped so that it is gradually enlarged when extending to facilitate the inserting of the projections on the top of the stem A. A tube pin is inserted into the hole Φ and the slot of the plastic buckle. The dimention Φ cooperates with the width D2 of the slot M, whereby the plastic buckle can be firmly connected to the buckle retainer.

Referring to Fig.5 which is the cross section view of the lateral rods 1-1 on the supporter 1 of the dryer according to the present invention. Fig.5 shows that the lateral rods of the embodiment shown in the Fig.5 are round tubes of thin wall having guiding grooves formed on the top thereof, guiding edges extending laterally and down and a cross supporting plate provided in the center thereof for supporting the safty hooks and defining the route of the safty hooks, as well as functioning as strengthening ribs. The buckle retainer 3-5 and the drawing rope 3-3 for connecting the safty hooks shown in the Fig. 4 are arranged into the space above the cross supporting plate of the lateral pods 1-1, the plastic buckles are arranged on the top surface of the guiding groove of the lateral rods.

Referring to Fig.6 which is a view of the structure and connection of safety hooks 3 according to the present invention. In Fig.6, two supporting tubes 3-2 associated with one plastic buckle 3-1 are fitted back and front into the two hollow portions of the M-shaped portion and fixed with respect to the plastic buckle 3-1 with the cooperating dimentions of pins 3-8 for the supporting tube which are inserted through the holes of the supporting tubes 3-2. The drawing rope 3-3 is wound in the slot M of the plastic buckle. The buckle retainers 3-5 are fitted in the guiding grooves of the lateral rods 1-1. Each plastic buckle 3-1 is inserted into the buckle retainer 3-5 using the projections of the M-shaped portion thereof. Another tube pin 3-4 is inserted

into the holes of the projection and the H-shaped portion. The length and width of the buckle retainer 3-5 are both larger than those of the guiding grooves in the lateral rods 1-1, therefore the buckle retainer 3-5 will not drop out of the lateral rod, nor will the plastic buckle. Thus, the safety hook 3 is obtained.

Referring Fig.7 which shows the turning wheel which is a driving wheel of the drawing assembly of the dryer according to the present invention, this structure also adapts to a guiding wheel or a sliding wheel. Features of this structure are shown with the perspective view in Fig. 7A, partial cross section view in the Fig. 7B and the view of distribution of slip preventing stoppers in the Fig. 7C. Components such as the turning wheel, the guiding wheel, sliding wheel and rope are used so as to draw the bow-shaped frame 2-5 and then pull out and take back the safety hook 3. Nevertheless, such a wheel with groove has a disadvantage in that it is susceptible to slip, causing the rope to fail to move as the wheel turns and the drawing operation ineffective. Accordingly, it is necessary to increase the friction force between the rope and the wheel with groove, for example, by coating rosin powder. However, the present invention is a dryer, a clean and effective way is necessary. Therefore, a structure in which protruding slip preventing stoppers 2-6 are provided along the sides of the grooves of the wheel with groove such as the turning wheel, guiding wheel and sliding wheel is used to increase the friction between the wheel and the rope during the drawing operation. It is at least on the driving turning wheel that the slip preventing stoppers 2-6 must be provided. As shown in the Fig. 7A, the slip preventing stoppers 2-6 may be arranged on the inner sides of the groove in a staggered way. Fig.7 shows slip preventing stoppers 2-6 are provided radially along the wheel and its groove. Fig.7 shows slip preventing stoppers are evenly distributed in the each side of the groove along the circumference with a central angle α . For instance, if the central angle α is 22.5° , 16 slip preventing stoppers may be provided along each side. The slip preventing stoppers may have their outer bases M 1.6-2mm long, inner bases N 1-1.2mm long, a height K approximate 3mm and a thickness D approximate 1-1.2mm. The size of the slip preventing stoppers varies with the size of the turning wheel and the structure of its groove. The slip preventing stoppers can be made of such materials as plastics, engineering plastics and wear-resisting rubber. The slip preventing stoppers can be made interally with the turning wheel using, for example, engineering plastics, alternatively they can made by sticking process.

Therefore, one feature of the dryer of the present invention is in that the driving wheel, whatever it is hand turning wheel or the turning wheel driven by motor or by pulling a rope, adopts a turning wheel structure with the slip

preventing stoppers provided.

In addition, the dryer of the present invention can be used to air sheets. The sheet to be aired is put between the hand turning wheel and the bow-shaped frame 2-5, with the part of it on the front end of the central rod tied to the bow-shaped frame and the part on the rear end of the central rod tied to the plastic buckle located in the rear end. When operating the hand turning wheel, the bow-shaped frame moves forward and the sheet is stretched out; and when the bow-shaped frame is moved backward, the sheet is pulled towards the rear end to be taken back. The above is another application of the present invention. For reasons of keeping clean, there is provided a cloth cover between the hand turning wheel on the central rod and the bow-shaped frame 2-5 to keep the sheet which is hung on the cover from be stained by the dirt on the central rod.

When in use, the plastics buckles on each lateral rod of the dryer can be used to hang clothes and the rain shielding cloth 4 is used for shielding rain or sun. Rope loops can be formed on the two front corners of the rain shielding 4 and hitched up to the two front ends of the bow-shaped frame when used. Alternatively, a hook can be simply provided at the middle of the front edge of the rain shielding cloth and in use, the rain shielding cloth is pulled to the middle of the front edge of the bow-shaped frame and covering the aired clothes as the bow-shaped frame moves forward. When the bow-shaped frame moves backward, the rain shielding cloth can automatically scroll back due to the springs in the scroll.

The structure of the dryer of the present invention is made clear by the above description. Besides, it can be made larger or smaller. Turning the wheel forward, the aired clothes will move to the front along the lateral rods. Turning the wheel backward, the aired clothes will be drawn back along the lateral rods easily and safely. It is particularly suitable for people living in a narrow dwelling.



What is claimed is:

1. A clothes dryer of cantilever structure, characterized in that it comprises a supporter (1), a drawing assembly (2), safety hooks (3), and rain shielding cloth (4), wherein

the supporter (1) comprises a square or trapezoid frame, angled stands (1-4) attached on the side or bottom of the rear ends of lateral rods (1-1) on the two sides of the frame to fixed the dryer to a wall, oblique braces (1-5) extending outside and upward fixed on the side or top of the back ends of the two lateral rods (1-1), guiding grooves formed on the two lateral rods, and a plurality of safety hooks (3) fitted into the guiding grooves and connected with each other by a rope,

a drawing assembly (2) is provided in the center of the framework of the supporter (1) and comprises a central rod (2-1) provided between the centers of the bottom side (1-3) and the short side (1-2), a turning wheel assembly (2-2) provided at the rear end of the central rod (2-1), a pulley (2-3) fixed at the front end of the central rod, the turning wheel assembly being connected to the pulley by an encircling rope (2-4), a sliding groove formed on the central rod (2-1), a bow-shaped frame (2-5) adaptable to move back and forth fitted into the sliding groove, the left and right ends at the front portion of the bow-shaped frame (2-5) being connected to the safety hooks located in the foremost ends of the two lateral rods and a central point of the bow-shaped frame (2-5) being connected to the rope (2-4) so that the bow-shaped frame (2-5) moves when the rope (2-4), whereby the safety hooks associated with the frame are pushed out or pulled back along the lateral rods.

2. The dryer as claimed in claim 1, characterized in that a scroll (1-6) with rain shielding cloth (4) around it is parallelly provided above the bottom side (1-3) of the framework.

3. The dryer as claimed in claim 1, characterized in that the safety hook (3) comprises a plastic buckle (3-1), a supporting tube (3-2), the drawing rope (3-3), a tube pin (3-4), and a buckle retainer (3-5), wherein the drawing rope (3-3) is hitched up to the supporting tube (3-2), a supporting tube pin (3-8) goes through the hole of the supporting tube (3-2) of the plastic buckle (3-1) to fix the supporting tube (3-2), the drawing rope is connected to the plastic buckle (3-1) and the latter is inserted into the buckle retainer (3-5), and another tube pin (3-4) is inserted into the hole in the projection on the lower portion of the safety hook (3) and the hole in the buckle retainer (3-5), whereby the safety



hook 3 is formed.

4. The dryer as claimed in claim 1 or 2, characterized in that the plastic buckle (3-1) of the safety hook (3) has a hollow upper portion of cavity structure and a M-shaped lower portion, the top of the cavity of the upper portion is in the shape of a horn, the following part is a long, thin and tilted neck portion, and next is the flat oval cavity.

5. The dryer as claimed in claim 1, characterized in that the components of the safety hook (3) are made of nylon.

6. The dryer as claimed in claim 1, characterized in that the lateral rods (1-1) provided on two sides of the frame of the supporter (1) are made of round aluminum alloy tube of thin wall having guiding grooves formed on the top thereof, guiding edges extending laterally and down and a cross supporting plate provided in the center thereof.

7. The dryer as claimed in claim 1, characterized in that the rods of the supporter (1) are made of metal such as metal tubes or sections, particularly aluminum alloy tubes or section bars.

8. The dryer as claimed in claim 1, characterized in that angle heads and tees that join the rods of the supporter (1) are made of nylon.

9. The dryer as claimed in claim 1, characterized in that the angled stands 1-4 are made by welding 2mm thick steel plate.

10. The dryer as claimed in claim 1, characterized in that the turning wheel of the drawing assembly (2) can be replaced by an electric motor.

11. The dryer as claimed in claim 1, characterized in that the tube parts of the dryer can be made of non-metal materials such as plastics and engineering plastics.

12. The dryer as claimed in claim 1, characterized in that slip preventing stoppers are provided in the inner side of the groove of the turning wheel.

13. The dryer as claimed in claim 1 or 12, characterized in that the slip preventing stoppers are evenly distributed in the two inner sides of the groove



along the circumference in a staggered way with a central angle α .

14. The dryer as claimed in claim 1 or 12, characterized in that the slip preventing stoppers of the turning wheel can be made of plastics or wear-resisting rubber.

15. The dryer as claimed in claim 1, characterized in that the turning wheel in the turning wheel assembly (2) can be a hand turning wheel or a hand pulling one.

16. The dryer as claimed in claim 2, characterized in that springs (1-8) are provided at the two ends of the scroll (1-6).

17. The dryer as claimed in claim 16, characterized in that an annular tube (1-9) is provided in the spring (1-8).

18. The dryer as claimed in claim 1, characterized in that there is a cloth cover covering the central rod (2-1) to keep the dirt from staining the aired sheets.