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RACK FOR AIRING OR DRYING

FIELD OF INVENTION

5 The present invention relates to rack for the airing or drying of articles, such as laundered items, and particularly to such racks that are fitted to a structure. More particularly, but not exclusively, the present invention relates to a rack for fixing to the exterior wall of a building, adjacent a window or other opening through which laundered items can be hung out on the rack and later retrieved, by a user located inside the building.

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BACKGROUND

The invention has application to the airing and drying of clothes and similar laundered items and is particularly useful for occupants of high rise apartment buildings where the
15 only readily accessible outdoor space for the drying and airing of laundry is adjacent an opening, typically a window, at the exterior wall of the apartment.

European patent specifications Nos. EP 213280 and EP 305623 each describe a laundry drier with a pair of parallel telescopic arms which extend generally horizontally from a
20 wall attachment. A set of parallel laundry bars extends between respective pairs of the telescoping arm sections.

United States Patent No. 3,521,757 describes a collapsible laundry drier. A pair of arms are swung outwardly from an inoperative position parallel to a wall-mounted base member
25 to an operative position perpendicular to the wall and base member. A set of laundry-supporting bars, carried by sliders in respective grooves in the arms, may be manually pulled out sequentially from a storage position to a spaced apart parallel operative arrangement.

30 United States Patent No. 3,610,422 describes a clothes dryer with a pair of wings which are swung open from a wall-mounted housing. An extensible frame has a set of rods held in a parallel arrangement by a pair of arms which may be manually opened to an operative

configuration in which the rods are spaced apart and supported on the opened wings for carrying clothes to be dried.

5 The prior art racks include sets of horizontal laundry-supporting poles that are carried in a pair of end arms which extend perpendicularly from a wall-mounted attachment, e.g. adjacent a window. The poles are deployed by direct manipulation of the poles themselves. This is not easy when the poles are carrying a load of wet laundry. Any system that requires a user to lean out more than a minimal distance to deploy or adjust the poles, or to attach laundered items to the poles, increases the risk to a user who can easily
10 overbalance and fall from the window to the ground below.

SUMMARY OF INVENTION

It is one object of the present invention to provide a rack for airing or drying clothes or
15 laundered items which reduces at least some of the problems associated with the prior art, or to at least provide the public with a useful choice.

It is a second object of the present invention to provide a rack for airing or drying clothes or laundered items, the rack being for attachment to the exterior of a building and having a
20 series of carrier poles and an actuator by which the poles can be remotely and sequentially deployed, or to at least to provide the public with a useful choice.

) In broad terms the invention may be said to be a rack having a plurality of substantially elongate carrier elements, each said carrier element being supported at its respective ends
25 by a pair of substantially parallel support arms, the support arms being spaced apart from one another and adapted for fitting to a fixed structure, wherein each support arm has a moveable driving member, the driving members are coupled together to move substantially synchronously along the respective support arms, and the driving members are adapted to engage a respective end of each carrier element to move the carrier elements between a
30 first configuration in which the carrier elements are bunched relatively closely together and a second configuration in which the carrier elements are spread apart over a portion of the length of the support arms.

The support arms may be adapted for fitting to a fixed structure to support the elongate carrier elements in a substantially horizontal orientation.

5 The support arms may be adapted for fitting, optionally substantially perpendicularly, to the generally vertical face of a fixed structure.

Preferably, the elongate carrier elements are substantially straight and have a round cross-sectional shape.

10 At least a portion of one or more of the carrier elements may have a textured or knurled surface.

Preferably, the carrier elements are substantially parallel to one another and perpendicular to the support arms.

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Preferably, each driving member is an endless loop, the adaptation of the driving members includes a plurality of carriages, and each carriage is coupled to the endless loop and has an engagement member for engaging a respective end of one of the carrier elements.

20 Preferably, each endless loop is a chain, each carriage is coupled to a link of the chain, and each support arm has a pair of sprocket wheels around which the chain is passed.

One of the sprocket wheels in each support arm may be coupled to a respective drive shaft, the two drive shafts being coupled to a common driver.

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Alternatively, one of the sprocket wheels in each support arm may be coupled to a common drive shaft which is coupled to a driver.

The or each drive shaft may be coupled to the driver via a gearbox.

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Preferably, the driver is a handle which is mounted on a wheel or crank and located between the support arms.

Each support arm may have a guide rail and the carriages may be supported and guided by the guide rail.

Optionally, each of the carriages has a slider adapted for sliding along the guide rail, and the engagement member is provided by first and second jaws, the second jaw being pivotally hinged to the first jaw about a transverse axis which is substantially perpendicular to the general direction of the guide rail.

Each carriage may include a spring which biases the jaws towards a closed configuration.

The guide rail may include a plurality of ramp surfaces which are inclined to the general direction of movement of the carrier elements between the first bunched configuration and the second spread configuration.

Each second jaw may include a transverse extension.

Preferably, the jaws are opened and closed by engagement of the respective jaw extension on the inclined ramp surfaces during movement of the carriage along the guide rail.

Preferably, the support arms have a slot, and each end of the carrier elements includes an axial extension which extends through the slot to be engageable by a respective one of the carriages.

At least one end of each carrier element may have a transversely elongate projection having a width dimension substantially equal to the diameter of the axial extension, the projection lying in the slot of the respective support arm to prevent rotation of the elongate carrier element about its longitudinal axis.

Preferably, the axial extensions of the carrier elements are of various lengths and the carriage jaws in each support arm are transversely offset so that when the carrier elements are being moved from the spread configuration to the bunched configuration, the axial extensions of following carrier elements are longer than those of preceding carrier

elements, and the jaws of following carriages are transversely offset outwardly beyond the axial extensions of preceding carrier elements, so that the jaws of the following carrier elements can pass outwardly of the axial extensions of preceding carrier elements.

5 The invention may further be said to consist in any alternative combination of parts or features mentioned herein or shown in the accompanying drawings. Known equivalents of these parts or features which are not expressly set out are nevertheless deemed to be included.

10 **BRIEF DESCRIPTION OF DRAWINGS**

It will be appreciated that a rack may be implemented in various forms. A preferred embodiment of the invention will now be described, by way of example only and without intending to be limiting, with reference to the accompanying drawings of which:

15 Figure 1 shows a perspective view of a clothes rack according to the current invention, with carriers in a first, retracted, configuration,

Figure 2 shows a perspective view of the clothes rack of Figure 1, with the carriers in a third, intermediate, configuration,

20 Figure 3 shows a perspective view of the clothes rack of Figures 1 and 2, with the carriers fully deployed in a sixth, extended, configuration,

Figure 4 shows a diagrammatic side view of the clothes rack of Figures 1 to 3, showing the carriers in the first, retracted, configuration,

Figure 5 shows a diagrammatic side view of the clothes rack of Figures 1 to 3, showing the carriers in a second, intermediate, configuration,

25 Figure 6 shows a diagrammatic side view of the clothes rack of Figures 1 to 3, showing the carriers in the third, intermediate, configuration,

Figure 7 shows a diagrammatic side view of the clothes rack of Figures 1 to 3, showing the carriers in a fourth, intermediate, configuration,

30 Figure 8 shows a diagrammatic side view of the clothes rack of Figures 1 to 3, showing the carriers in a fifth, intermediate, configuration,

Figure 9 shows a diagrammatic side view of the clothes rack of Figures 1 to 3, showing the carriers fully deployed in the sixth, extended, configuration,

Figure 10 shows an end portion of a carrier,

Figure 11 shows a diagrammatic outer side view of mechanical details of a support arm when the carriers are in the extended configuration,

Figure 12 shows a diagrammatic plan view of the carriages on a guide rail,

Figure 13 shows a diagrammatic end view of a fourth carriage on the guide rail, as seen at D-D in Figure 12,

Figure 14 shows a diagrammatic end view of a third carriage on the guide rail, as seen at C-C in Figure 12,

Figure 15 shows a diagrammatic end view of a second carriage on the guide rail, as seen at B-B in Figure 12,

Figure 16 shows a diagrammatic end view of a first carriage on the guide rail, as seen at A-A in Figure 12, and

Figure 17 (being an expanded portion of the side view shown in Figure 11) shows an outer side view of a carriage on the guide rail.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Figures 1, 2 and 3 show a perspective view of a clothes rack according to the current invention. The rack has a pair of support arms 1 which are adapted for attachment to the generally vertical exterior surface of a wall (not shown in Figures 1 to 3, but shown as wall 2 in Figures 4 to 9). In a typical application the wall is the exterior wall of a building such as an apartment or condominium. The arms are spaced apart from one another and are substantially parallel. The arms are adapted to be attached approximately perpendicularly to the generally vertical wall surface. In a preferred embodiment the arms extend outward and slightly upward (as shown in Figure 11) from the wall surface to which they are attached. The arms may be joined by a flat plate 3 extending between their proximal ends 4, the flat plate providing a convenient platform for attachment to the exterior wall surface of the building.

The pair of arms 1 support opposite ends of a plurality of parallel rigid elongate carriers 5. The carriers are perpendicular to the support arms. In the preferred application, the rack is mounted to a generally vertical wall surface and the carriers are substantially horizontal.

There are four such carriers in the preferred embodiment shown in the figures. However, any suitable number of such carriers can be provided. The carriers are straight and preferably have round cross-sections, and may be rods, bars, poles, pipes or tubes, for example. The surface of at least some portions of the carriers may be textured, e.g. by knurling, to help retain items hung on, or clipped or pegged to, the carriers.

A drive wheel 6 with a handle 7 is coupled to the carriers by a mechanism to be described further below. The drive wheel 6 is may be rotated to move the carriers from a retracted or parked configuration, in which the carriers 5 are bunched together near the proximal or attachment end 4 of the support arms 1 as shown in Figure 1, through a series of an intermediate configurations, one of which is shown in Figure 2, to a fully deployed and extended configuration, in which the carriers are spaced apart and deployed away from the proximal end of the support arms as shown in Figure 3.

The drive wheel 6 is coupled through a gearbox 8 to a drive shaft or a pair of half shafts (not shown) in a housing 9, to synchronously drive mechanisms in each support arm and thereby move the carriers between the configurations as already described above.

Each support arm is a hollow box-like construction. Each support arm 1 has an inner wall 10 which has a longitudinally-aligned slot 11 in which the ends of the carriers slide. The slots provide support for the carriers and guide the carriers as they move between the extended and retracted configurations.

In a preferred installation, the rack is installed on an outside wall of a room in a building, just below a window. When the window is opened, the rack is accessible by a person standing in the room. The support arms 1 are nominated in this description as left support arm 1L and right support arm 1R, as would be seen by a user standing in the room and facing the rack fitted outside the window.

Figures 4 to 9 show diagrammatic side views of the clothes rack of Figures 1 to 3, showing the carriers in various configurations. These are diagrammatic cross-sectional views as

seen from the middle of the rack, looking outward (in the direction opposite to the views of Figures 1, 2 and 3) towards the left support arm 1L.

Figure 4 shows the clothes rack with the carriers 5 closely bunched together in a fully retracted, or parked, configuration. The carriers are drawn back to the proximal end 12 of the slot 11 in the left support arm 1L. In this configuration the handle 7 of the drive wheel 6 is readily accessible by a user standing inside a room at an open window outside and below which the rack is installed.

Figure 5 shows the clothes rack with the carriers in an intermediate second configuration, with a first carrier 5A moved slightly outwardly toward the distal end 13 of the left support arm 1L. The remaining carriers 5B, 5C, 5D remain in their retracted positions. In this configuration clothes may be readily arrayed on, or retrieved from, the first carrier 5A, by a user standing inside a room at an open window outside and below which the rack is installed.

Figure 6 shows the clothes rack with the carriers in an intermediate third configuration, with first carrier 5A and second carrier 5B moved outwardly toward the distal end 13 of the left support arm 1L. The remaining carriers 5C, 5D remain in their retracted positions. In this configuration clothes may be readily arrayed on, or retrieved from, the second carrier 5B, by a user standing inside a room at an open window outside and below which the rack is installed.

Figure 7 shows the clothes rack with the carriers in an intermediate fourth configuration, with first, second and third carriers 5A, 5B, 5C moved outwardly toward the distal end 13 of the left support arm 1L. The remaining carrier 5D remains in its retracted position. In this configuration clothes may be readily arrayed on, or retrieved from, the third or fourth carriers 5C, 5D by a user standing inside a room at an open window outside and below which the rack is installed.

Figure 8 shows the clothes rack with the carriers in an intermediate fifth configuration, with first, second and third carriers 5A, 5B, 5C moved further outwardly toward the distal

end 13 of the left support arm 1L. The remaining carrier 5D still remains in its retracted position. In this configuration clothes may be readily arrayed on, or retrieved from, the fourth carrier 5D by a user standing inside a room at an open window outside and below which the rack is installed.

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Figure 9 shows the clothes rack with the carriers fully deployed in an extended sixth configuration, with all four carriers 5A, 5B, 5C, 5D moved outwardly toward the distal end 13 of the left support arm 1L. No carriers remain in the retracted position. In this configuration clothes on the carriers are fully extended outwards from the exterior wall of the building, in a drying or airing position.

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In all configurations, the handle 7 of the drive wheel 6 is readily accessible by a user standing inside a room at an open window outside and below which the rack is installed. Rotation of the wheel by use of the handle allows the position of the carriers to be readily adjusted.

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Figure 10 shows a perspective view of an end portion of one of the carriers 5. Each carrier has a central main body portion 15 which has a round or circular cross-sectional shape. At each end the carrier has an axial extension 14. The extensions 14 have a smaller diameter than the main central body portion 15 of the carrier. The axial extensions 14 are dimensioned to locate in the slots 11. The width of the slots 11 is smaller than the diameter of the main central body portion 15 of the carrier.

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The axial end extensions 14 of different carriers are of differing lengths, as will be explained further below. At one end of each carrier 5, the proximal end of the extension 14 includes a flat elongate key 16 having a width equal to the diameter of the rest of the extension. The key locates in the slot 11 of one of the support arms 1 to stabilise the carrier and prevent it from rotating about its axis. This stabilisation stops the carriers from rotating or rolling, such as when being deployed and retracted, and helps prevent clothes hung on the carriers from falling off.

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Figure 11 shows an outer side view of the right support arms 1R, with an access cover plate (not shown) removed to show internal mechanical details. It is to be understood that the left and right support arms are mirror images of one another. As explained above, with reference to Figures 1, 2 and 3, rotation of the drive wheel 6 is coupled via the gearbox 8 and through a drive shaft (the outer axial end 17 of which is seen in Figure 11) to a first sprocket wheel 18. The first sprocket wheel 18 drives a second sprocket wheel (hidden from view behind a third sprocket wheel 19 in Figure 11), located near the proximal end of the support arm, via an intermediate drive chain 20. The second sprocket wheel is on the same shaft as the third sprocket wheel 19 which drives an endless carriage drive chain 21 which extends along a major part of the length of the support arm 1R between the third sprocket wheel 19 and a fourth sprocket wheel 22 near the distal end 13 of the support arm 1R.

Adjustment of a lockable screw-threaded bolt 23 moves the fourth sprocket wheel 22 to adjust the tension in the carriage drive chain 21.

As explained above, the inner wall 10 of each support arm 1 has a guide slot 11 which supports and guides the ends of the carriers 5. The support arms also have an internal guide rail 24 on which carriages 25 run. The carriages 25 engage the axial extensions 14 of the carriers 5 as will be explained further below. The carriages 25 are attached to respective chain links at spaced locations along the length of the carriage drive chain 21.

The embodiment shown in Figure 11 has four carriages 25A, 25B, 25C, 25D on each of the chain drives in the left and right support arms to correspond respectively to the four carriers 5A, 5B, 5C, 5D.

Figure 12 shows a diagrammatic plan views of the four carriages 25A, 25B, 25C, 25D on a fragment of the guide rail 24 of the right support arm 1R. Figure 12 is orientated to show the guide rail with the proximal end 4 of the right support arm 1R at the top of the page and its distal end at the bottom of the page.

Figures 13, 14, 15 and 16 show diagrammatic end views of the four carriages 25D, 25C, 25B and 25A, respectively, on the guide rail 24, as respectively seen at D-D, C-C, B-B and A-A in Figure 12.

5 Figure 13 shows the fourth carriage 25D. The fourth carriage 25D has a jaw block with a lower jaw part 26D and an upper jaw part 27D. The upper jaw part is pivotally mounted to the lower jaw part. The fourth, innermost, carrier 5D is supported by location of the extension 14 and key 16 in the slot 11 in the support arm inner wall 10. When the fourth carrier 5D is away from its parked or retracted position, the outer end of the end
10 extension 14 of the fourth carrier 5D is held in a jaw aperture 40 (labelled as such in Figure 17) between the fourth carriage upper and lower jaw parts which are held closed by a spring 28 (seen best in Figure 17). The lower jaw part 26D of the fourth carriage jaw block slides in a groove 29 in the guide rail 24 and is attached to a link of the drive chain 21 by a clamp block 30D.

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The upper jaw part of the fourth carriage has a horizontally-extending pin 31D which engages an inner ramp surface 32D. The inner ramp surface 32D is one ramp surface of three (an outer ramp surface 32B, a middle ramp surface 32C, and the inner ramp surface 32D) at one end of a multiple ramp block 33. The ramp block 33 has a sloping
20 surface 35 at its other end. The three ramp surfaces 32B, 32C, 32D, and the sloping surface all rise to a central plateau 34. The shape of the ramp block may be best appreciated from the outlines of the three ramp surfaces 32B, 32C, 32D, the plateau 34 and the sloping surface 35, as shown in the side view of Figure 11.

25 When the drive system is operated to return the carriers to their parked positions, the fourth carrier 5D moves towards its parked position and the distal end of the fourth carriage pin 31D engages the inner ramp surface 32D. As the fourth carriage 25D moves further towards the proximal end 4 of the support arm 1, the transversely extending pin 31D slides up the inner ramp surface 32D to lift the upper jaw part 27D about its pivot axis and open
30 the jaw block. The end extension 14 of the fourth carrier 5D is freed from the aperture in the jaw block, leaving the fourth carrier 5D in its parked or retracted position. The pin 31D of the fourth carriage jaw block rides over the top plateau 34 of the ramp block 33

and down the sloping surface 35 to close the jaw block. The fourth carriage 25D then continues to follow the movement of the drive chain 21, to move off the end of the guide rail 24 and toward and around the third sprocket wheel 19.

5 Figure 14 shows the third carriage 25C. The third carriage 25C has a jaw block with a lower jaw part 26C and an upper jaw part 27C. The upper jaw part is pivotally mounted to the lower jaw part. The third, intermediate, carrier 5C is supported by location of its extension 14 and key 16 in the slot 11 in the support arm inner wall 10. When the third carrier 5C is away from its parked or retracted position, the outer end of the end
10 extension 14 of the third carrier 5C is held in a jaw aperture 40 (labelled as such in Figure 17) between the upper and lower jaw parts 26C, 27C which are held closed by a spring 28 (seen best in Figure 17). The third carriage jaw block is attached to a slider block 36C. The slider block 36C slides in the groove 29 in the guide rail 24 and is attached to a link of the drive chain 21 by a clamp block 30C.

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The upper jaw part 27C of the third carriage has a horizontally-extending pin 31C which engages the middle ramp surface 32C of the multiple ramp block 33. When the drive system is operated to return the carriers to their parked positions, the third carrier 5C moves towards its parked position and the distal end of the third carriage pin 31C engages
20 the middle ramp surface 32C. As the third carriage 25C moves further towards the proximal end 4 of the support arm 1, the transversely extending pin 31C slides up the middle ramp surface 32C to lift the upper jaw part 27C about its pivot axis and open the jaw block. The end extension 14 of the third carrier 5C is freed from the aperture in the jaw block, leaving the third carrier 5C in its parked or retracted position.

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The pin 31C of the third carriage jaw block rides over the top plateau 34 of the ramp block 33 and down the sloping surface 35 to close the jaw block. The third carriage 25C then continues to follow the movement of the drive chain 21, to move off the end of the guide rail 24 and toward the third sprocket wheel 19.

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Figure 15 shows the second carriage 25B. The second carriage 25B has a jaw block with a lower jaw part 26B and an upper jaw part 27B. The upper jaw part is pivotally mounted to

the lower jaw part. The second, intermediate, carrier 5B is supported by location of its extension 14 and key 16 in the slot 11 in the support arm inner wall 10. When the second carrier 5B is away from its parked or retracted position, the outer end of the end extension 14 of the second carrier 5B is held in a jaw aperture 40 (labelled as such in Figure 17) between the second carriage jaw parts which are held closed by a spring 28 (seen best in Figure 17). The second carriage jaw block is attached, via an intermediate spacer block 37, to a slider block 36B. The slider block 36B slides in the groove 29 in the guide rail 24 and is attached to a link of the drive chain 21 by a clamp block 30B.

The upper jaw part of the second carriage has a horizontally-extending pin 31B which engages the outer ramp surface 32B of the multiple ramp block 33. When the drive system is operated to return the carriers to their parked positions, the second carrier 5B moves towards its parked position and the distal end of the second carriage pin 31B engages the outer ramp surface 32B. As the second carriage 25B moves further towards the proximal end 4 of the support arm 1, the transversely extending pin 31B slides up the outer ramp surface 32B to lift the upper jaw part 27B and open the jaw block. The end extension 14 of the second carrier 5B is freed from the aperture in the jaw block, leaving the second carrier 5B in its parked or retracted position. The pin 31B of the second carriage jaw block rides over the top plateau 34 of the ramp block 33 and down the sloping surface 35 to close the jaw block. The second carriage 25B then continues to follow the movement of the drive chain 21, to move along the guide rail 24 toward the third sprocket wheel 19.

Figure 16 shows the first carriage 25A. The first carriage 25A has a jaw block with a lower jaw part 26A and an upper jaw part 27A. The upper jaw part is pivotally mounted to the lower jaw part. The lower jaw part slides in a groove 29 in the guide rail 24. The first, outermost, carrier 5A is supported by location of the extension 14 and key 16 in the slot 11 in the inner wall 10 of the support arm 1. The outer end of the end extension 14 of the first carrier 5A is held in a jaw aperture 40 (labelled as such in Figure 17) between the upper and lower jaw parts which are held closed by a spring 28 (seen best in Figure 17). The first carriage jaw block is attached to a link of the drive chain 21 by a clamp block 30A.

When the drive system is operated to return the carriers to their parked positions, the first carrier 5A moves towards its parked position. The upper jaw part 27A of the first carriage 25A has no pin so is not lifted from the closed jaw position. The outer end of the end extension 14 of the first carrier 5A remains retained in the aperture in the jaw when the first carrier 5A is in its parked or retracted position.

Rotation of the drive wheel 6 to move the carriers 5 from their extended configuration (as shown in Figures 3 and 9), through intermediate configurations (as shown in Figures 8, 7, 6 and 2, then 5), to their parked configuration (as shown in Figures 1 and 4), successively brings the fourth carrier 5D, third carrier 5C, second carrier 5B and first carrier 5A into their parked positions.

The jaw block of the third carriage 25C is offset transversely (to the left as seen in Figures 12 and 14) from the groove 29 in the guide rail 24 by being attached to the outer side face of the slider 36C which is located in the groove. The jaw block therefore clears the outer end of the extension 14 of the fourth carrier 5D when the carriers are being moved to their retracted configuration.

Similarly, the jaw block of the second carriage 25B is offset transversely (to the left as seen in Figures 12 and 15) even further by spacer block 37 and therefore clears the outer ends of the extensions 14 of the third carrier 5C and the fourth carrier 5D when the carriers are being moved to their retracted configuration.

The jaw block of the first carrier 5A remains engaged with its extension 14, even when the carriers are fully parked, and does not need to clear the extensions of the other carriers 5B, 5C or 5D. Therefore, the jaw block of the first carrier is not offset from the groove 29 in the guide rail 24.

As noted above, and as may be best appreciated from a comparison of Figures 13 to 15, the axial end extensions 14 of the carriers 5 are of differing lengths. The extensions 14 of the first and fourth carriers 5A, 5D are shortest, the extension 14 of the second carrier 5B is the longest, and the extension 14 of the third carrier 5C is of an intermediate length. The

differing lengths allow the distal ends of the extensions 14 to be engaged in the differently offset jaw blocks of the corresponding carriages 25.

The multiple ramp block 33 is shown in plan view at the top left corner of Figure 12, and in end view in each of Figures 13 to 16. For clarity of explanation, the outlines of each of the three ramp surfaces 32B, 32C, 32D, the plateau 34 and the sloping surface 35, are shown in the side view of Figure 11.

The ramp surfaces 32 are arranged to open the upper jaw parts 27 to release the carrier extensions 14 when the carriers 5 are being retracted, and to close the upper jaw parts 27 when the retracted carriers 5 are being re-engaged for their deployment to the extended configuration. As can be seen from the side view of Figure 11, the three ramp surfaces 32B, 32C, 32D are offset (at least at the height at which the pins 31 engage the ramp surfaces) from one another along the direction of travel of the carriages 25 so that the second, third and fourth carriers 5B, 5C, 5D are disengaged at different, but adjacent, locations for their respective retracted positions.

Similarly, the common sloping surface 35 of the ramp block 33 is arranged to close the jaw blocks after releasing the carrier extensions when the carriers are being retracted, and to open the jaws prior to re-engaging the end extensions 14 of the retracted carriers 5 for their deployment to the extended configuration.

The first carrier 5A may be brought into contact with the second carrier 5B to tightly constrain the bunched carriers against the proximal end 12 of the slot 11 in the inner wall 10 of the support arm 1, and to thereby provide a positive end stop for movement of the carriers to the parked or retracted configuration. Similarly, the engagement of the extension 14 of the fourth carrier 5D against the distal end 38 of the slot 11 in the inner wall 10 of the support arm 1 provides a positive end stop for movement of the carriers to the fully deployed extended configuration. Alternatively, a stop block may be fixed to the drive chain and arranged to abut fixtures on the support arm to provide end stop functions.

Figure 17 is an outer side view of a carriage 25 on the guide rail 24. The lower jaw part 26 rides on the top side of the guide rail 24 in the case of the second and third carriages 25B, 25C, and in the groove 29 (shown as a dashed line in Figure 17) in the case of the first and fourth carriages 25A, 25D (as shown by dotted line). The upper jaw part 27 is pivotally mounted to the lower jaw part 26 by transverse pivot 39. The upper and lower jaw parts are shaped to leave an aperture 40 when the jaw parts are closed. Figure 17 shows the end extension 14 of a carrier retained in the jaw aperture 40. A pin 31 extends transversely outwardly from the upper jaw part near its distal end. A wire spring 28 (only a tail piece being seen in Figure 17) is coiled about the pivot pin to urge the upper jaw part 27 toward its closed position (as shown) on the lower jaw part 26. The lower jaw part 26 is attached to the carriage drive chain 21 by a clamp block 30 (not seen in Figure 17). In the case of the second carriage this attachment is via intermediate spacer block 37 and slider block 36B (not seen in Figure 17), and in the case of the third carriage this attachment is via a slider block 36C (not seen in Figure 17).

In summary, the parallel carriers 5 are sequentially moved from the bunched retracted configuration as shown in Figure 1 to the fully deployed extended configuration as shown in Figure 3, by rotating the drive wheel 6 in one direction, and are returned to the retracted configuration by rotating the drive wheel 6 in the opposite direction. Clothes may be conveniently hung on or retrieved from the carriers while they are relatively close to an operator standing inside a window at which the clothes rack is fitted. The operator does not need to lean out excessively from the window nor need to support an excessive weight of clothes when hanging out or retrieving clothes, ensuring a higher degree of operator safety than with clothes racks of the prior art.

The foregoing describes the invention including preferred forms thereof. Alterations and modifications as will be obvious to those skilled in the art are intended to be incorporated within the scope of the invention as defined in the accompanying claims.

List of features labelled in the drawings

1. support arm
2. wall
- 5 3. flat plate
4. proximal end of support arm
5. carrier element (5A-5D)
6. drive wheel
7. handle
- 10 8. gearbox
9. drive-shaft housing
10. inner wall of support arm
11. slot
12. proximal end of slot
- 15 13. distal end of (left) support arm
14. extension of carrier
15. central body portion carrier
16. key
17. end of drive shaft
- 20 18. first sprocket wheel
19. third sprocket wheel
20. intermediate drive chain
21. carriage drive chain
22. fourth sprocket wheel
- 25 23. chain tension adjuster bolt
24. guide rail
25. carriage (25A-25D)
26. lower jaw part (26A-26D)
27. upper jaw part (27A-27D)
- 30 28. spring (28A-28D)
29. groove in guide rail
30. clamp block (30A-30D)

- 31. pin (31A-31D)
- 32. ramp surface (31B-32D)
- 33. ramp block
- 34. plateau
- 5 35. sloping surface
- 36. slider block (36B-36C)
- 37. intermediate spacer block
- 38. distal end of slot
- 39. jaw pivot
- 10 40. jaw aperture

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CLAIMS

1. A rack having a plurality of substantially elongate carrier elements (5), each said carrier element being supported at its respective ends by a pair of substantially parallel support arms (1), the support arms being spaced apart from one another and adapted for fitting to a fixed structure (2), wherein each support arm has a moveable driving member (21), the driving members are coupled together to move substantially synchronously along the respective support arms, and the driving members are adapted to engage a respective end of each carrier element (5) to move the carrier elements between a first configuration (Figure 1) in which the carrier elements are bunched relatively closely together and a second configuration (Figure 3) in which the carrier elements are spread apart over a portion of the length of the support arms.

2. A rack as claimed in claim 1, wherein the support arms (1) are adapted for fitting to a fixed structure (2) to support the elongate carrier elements (5) in a substantially horizontal orientation.

3. A rack as claimed in claim 1 or claim 2, wherein the support arms (1) are adapted for fitting to the generally vertical face of a fixed structure (2).

4. A rack as claimed in any one of claims 1 to 3, wherein the support arms (1) are adapted for fitting substantially perpendicularly to the generally vertical face of a fixed structure (2).

5. A rack as claimed in any one of claims 1 to 4, wherein the elongate carrier elements (5) are substantially straight and have a round cross-sectional shape.

6. A rack as claimed in any one of claims 1 to 5, wherein at least a portion of one or more of the carrier elements has a textured or knurled surface.

7. A rack as claimed in any one of claims 1 to 6, wherein the carrier elements (5) are substantially parallel to one another and perpendicular to the support arms (1).

8. A rack as claimed in any one of claims 1 to 7, wherein each driving member (21) is an endless loop, the adaptation of the driving members includes a plurality of carriages (25), and each carriage is coupled to the endless loop and has an engagement member (26, 27) for engaging a respective end of one of the carrier elements (5).

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9. A rack as claimed in claim 8, wherein each endless loop is a chain (21), each carriage (25) is coupled to a link of the chain, and each support arm (1) has a pair of sprocket wheels (19, 22) around which the chain is passed.

10. A rack as claimed in claim 9, wherein one of the sprocket wheels (19) in each support arm (1) is coupled (20) to a respective drive shaft, the two drive shafts being coupled to a common driver.

11. A rack as claimed in claim 9, wherein one of the sprocket wheels (19) in each support arm (1) is coupled (20) to a common drive shaft (17) which is coupled to a driver (7).

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12. A rack as claimed in claim 10 or claim 11, wherein the or each drive shaft (17) is coupled to the driver (7) via a gearbox (8).

13. A rack as claimed in any one of claims 10 to 12, wherein the driver is a handle (7) which is mounted on a wheel (6) or crank and located between the support arms (1).

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14. A rack as claimed in any one of claims 8 to 13, wherein each support arm (1) has a guide rail (24) and the carriages (25) are supported and guided by the guide rail.

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15. A rack as claimed in claim 14, wherein each of the carriages (25) has a slider adapted for sliding along the guide rail, and the engagement member is provided by first (26) and second (27) jaws, the second jaw being pivotally hinged to the first jaw about a transverse axis (39) which is substantially perpendicular to the general direction of the guide rail (24).

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16. A rack as claimed in claim 15, wherein each carriage (25) includes a spring (28) which biases the jaws (26, 27) towards a closed configuration.

17. A rack as claimed in claim 16, wherein the guide rail (24) includes a plurality of ramp surfaces (32, 35) which are inclined to the general direction of movement of the carrier elements (5) between the first bunched configuration and the second spread configuration.

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18. A rack as claimed in claim 17, wherein each second jaw (27) includes a transverse extension (31).

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19. A rack as claimed in claim 18, wherein the jaws (26, 27) are opened and closed by engagement of the respective jaw extension (31) on the inclined ramp surfaces (32, 35) during movement of the respective carriage (25) along the guide rail (24).

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20. A rack as claimed in any one of claims 15 to 19, wherein support arms (1) have a slot (11), and each end of the carrier elements (5) includes an axial extension (14) which extends through the slot to be engageable by a respective one of the carriages (25).

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21. A rack as claimed in claim 20, wherein at least one end of each carrier element (5) has a transversely elongate projection (16) having a width dimension substantially equal to the diameter of the axial extension (14), the projection (16) lying in the slot (11) of the respective support arm (1) to prevent rotation of the respective elongate carrier element (5) about its longitudinal axis.

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22. A rack as claimed in claim 20 or 21, wherein the axial extensions (14) of the carrier elements (5) are of various lengths and the carriage jaws (26, 27) in each support arm (1) are transversely offset so that when the carrier elements (5) are being moved from the spread configuration to the bunched configuration, the axial extensions (14) of following carrier elements (5) are longer than those of preceding carrier elements, and the jaws (26, 27) of following carriages are transversely offset outwardly beyond the axial extensions (14) of preceding carrier elements (5), so that the jaws (26, 27) of the following carrier elements (5) can pass outwardly of the axial extensions (14) of preceding carrier elements (5).

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