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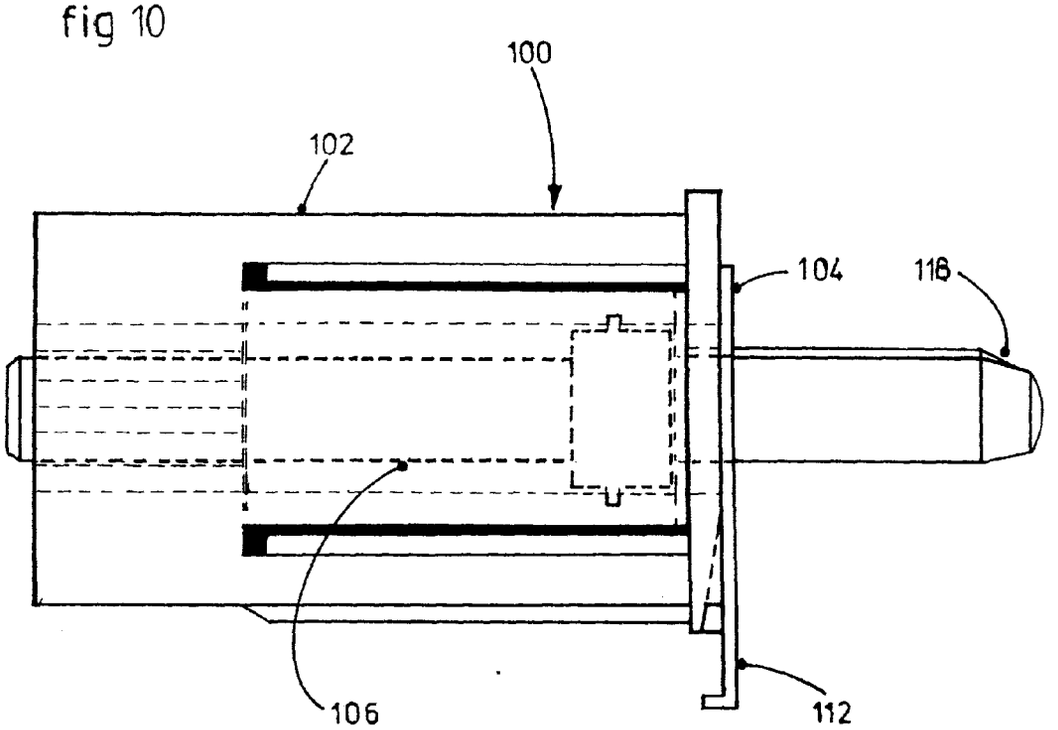
(54) Roller screen connector

(57) A roller screen connector (100) for releasably connecting said a first roller screen to an adjacent roller screen disposed in end to end relationship with said first roller screen. The connector (100) comprises a retaining member (106) adapted to extend within said two roller screens in such a way as to substantially prevent radial relative movement of the two roller screens, and a rotatable retraction member (104) for retracting the retaining means (106) from the adjacent roller screen to permit the adjacent roller screen to move radially relative to the first roller screen, whereby the adjacent roller screen can be disconnected from the first roller screen.

fig 10



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Description

This invention relates to a roller screen connector. The invention also relates to an end plug for a roller screen. The invention also relates to a roller screen incorporating a roller screen connector and/or an end plug, and to an assembly of a plurality of roller screens.

Roller screens generally comprise a hollow elongate shaft having a screen member wrapped around the outside thereof. The shaft is usually driven by spring unit, a gear or an electric motor. The shaft is driven from one end thereof, while the other end, which is passive, is supported via a plug fitted into the shaft. The plug is connected to a support bracket which is fixed to a wall, a window frame or a display casing (depending on the application of the roller screen). The arrangement between the shaft, the plug and the support bracket is such that the shaft can rotate relative to the support bracket.

Usually two support brackets are provided, one at each end of the shaft. In one arrangement, the passive end of the roller screen (ie the end that is not driven) is fitted to its bracket first, but this has the disadvantage that the other end has to be manoeuvred outwardly, then backwards, in order to secure the other end of the roller screen to its bracket. In some circumstances, this fitting method is not possible, because there is insufficient space to accommodate the required lateral movement. In order to deal with this problem there is another fitting arrangement which allows the drive end of the roller screen to be fitted first, with the passive end being fitted subsequently in one single horizontal or vertical movement, depending on the plane of the bracket. This alternative arrangement involves the use of a securing bearing, which is placed on the plug, and which is rotated by 90° to secure the plug to the bracket.

With all the systems currently available there is a significant amount of friction between parts of the roller screen that rotate relative to other parts during the raising or lowering of the screen member. This can be aggravated if the support bracket is slightly out of alignment with the end plug.

It is common to connect up a series of roller screens in such a way that they are driven by a single motor. For example, 5 or 6 roller screens, each 3 m long can be connected up and driven by one motor: the first roller screen would have the drive motor at one end, and an end plug at the other end; and the other roller screens would have an end plug at each end. There would be frictional losses in the region of each end plug, and the total frictional losses can substantially reduce the torque provided by the drive motor on the roller screens furthest away from the drive motor. This has the effect that the bottom rail of adjacent screen members are not at the same level when the roller screen is in an unrolled condition.

It is an aim of the present invention to provide a roller screen that solves the aforementioned problems. Broadly, we achieve this aim by providing a low friction connection between the roller screen and the roller screen support brackets.

One of the problems with arranging a plurality of roller screens in series is that, if there is a fault with one of the roller screens, it is usually necessary to remove at least some of, or even all of, the other roller screens before the faulty roller screen can be removed. We have now found a solution to this problem which allows a roller screen in a series of roller screens to be removed without removing any of the other roller screens. Broadly, we solve this problem by providing a roller screen connector which enables the adjacent roller screens to be disconnected without any axial displacement thereof.

According to one aspect of the invention we provide a roller screen connector for releasably connecting two adjacent roller screens disposed in end to end relationship, comprising a retaining means adapted to extend within said two roller screens in such a way as to substantially prevent radial or axial relative movement of the two adjacent roller screens, and retraction means for retracting the retaining means from one of said roller screens to permit relative radial movement of the roller screens. whereby said roller screens can be disconnected.

There are a number of possible arrangements for the retaining means and the retraction means. Preferably the retaining means is in the form of an elongate shaft that is adapted to extend into the hollow elongate shaft of each roller screen. The retraction means preferably includes an operating member, which can be moved by a user in order to cause the retraction of the connecting member. The arrangement is most preferably such that the retraction means is secured to the connecting member so that movement of the operating member directly drives movement of the connecting member.

The elongate shaft of the retaining means is typically movable between two extreme positions: in an extended position the shaft will fully extend within both roller screens; and in a retracted position the shaft will be fully retracted from one of the roller screens.

In a preferred embodiment either the retaining means or the retraction means is provided with a projection adapted to engage in a groove provided in the other of the retaining means and the retraction means. The groove is configured such that, as the projection follows the groove, the retaining means and the retraction means move axially relative to one another. The arrangement is also such that, when the projection follows the groove, the retaining means rotates relative to the retraction means. The groove is typically helical, e.g., in the form of a screwthread. The configuration of the groove is preferably such that the retaining means can move from the extended position to the retracted position by relative rotation between the retaining means and the retraction means of less than one turn, and preferably about half a turn.

The retraction means is preferably in two parts, a

first of which is adapted to be secured to one of the roller screens so that relative movement between the first part and the roller screen is not permitted; and a second of which is rotatably mounted to the first part in such a way that axial movement of the first part relative to the second part is not permitted.

The projection may be provided on the second part of the retraction means, in which case the groove is provided on the connecting member. However, it is preferred that the projection is provided on the connecting member. and the groove is provided in an interior surface of the second part of the retraction means. There are preferably two or more projections: each projection may project into a separate groove, or there may be a common groove for all the projections.

Spring biasing may be provided to bias the connecting member into the extended position.

According to another aspect of the invention there is provided an end plug for a roller screen, said end plug comprising a shaft connector adapted to be secured to an elongate shaft of the roller screen, and a support connector adapted to be secured to a support for the roller screen, wherein the support connector is rotatably mounted to the shaft connector and a friction reducing means is provided between the support connector and the shaft connector.

The friction reducing means provides a low friction connection between the support connector and the shaft connector. The purpose of the friction reducing means is to reduce friction losses between the roller screen shaft and the support bracket for the roller screen shaft. This reduction in friction losses significantly improves the driving of the roller screen, particularly when several roller screens are provided in a series.

Advantageously, the friction reducing means comprises a bearing arrangement, such as a ball bearing arrangement or a roller bearing arrangement. Thus, the shaft and support connectors may define a chamber therebetween which receives a plurality of bearings, such as balls or rollers, in such a manner that the bearings are in engagement with the shaft and support connectors. This arrangement provides a very low friction connection between the shaft and support connectors.

It is especially preferred that the only contact between the shaft and support connectors is through the friction reducing means.

In the preferred embodiment, the support connector extends around the shaft connector and has an inner surface that is spaced from an outer surface of the shaft connector. The bearings are housed between the inner and outer surfaces. The outer surface of the shaft connector and the inner surface of the support connector may include a channel therein that receives the bearings, whereby the bearings are retained between the shaft and support connectors, and whereby the shaft connector is retained in position axially relative to the support connector.

It is preferred that the shaft connector is adapted to be secured within the shaft of the roller screen. Desirably, the outer surface of the shaft connector is provided with formations adapted to cooperate with corresponding formations on the shaft. Most preferably, the formations are such that the shaft connector can only be secured to the shaft in a single orientation.

Preferably, the support connector comprises a clamp that is adapted to be secured to the support bracket. It is preferred that the clamp is shaped such that it can be freely inserted into the support bracket by movement along a single axis, and can then be clamped to the support by rotating the clamp through an angle. The angle through which the clamp needs to be rotated depends upon the structure of the clamp and the support bracket, but it would usually lie between 45° and 135°, more usually between 80° and 100°, and would typically be around 90°.

The clamp preferably has a generally cylindrical surface having two planar connectors arranged at about 180° to one another, measured about the longitudinal axis of the plug; these planar connectors reduce the effective radius of the cylindrical surface. The support bracket can be provided with an opening sufficiently large to permit the reduced diameter portion of the cylindrical surface to pass therethough, but not large enough to permit the cylindrical portion to pass therethough; thus, once the clamp has been inserted through the opening, then rotated by about 90° in one direction, the clamp cannot be removed through the opening unless it is first rotated through about 90° in the opposite direction.

The shaft connector is preferably provided with a bore therein that is adapted to receive an alignment member. The purpose of the alignment member is to ensure alignment of two end plugs on adjacent roller screens. It is preferred that the alignment member also serves the function of transmitting torque from one roller screen to another.

In order to ensure that the alignment member can keep the end plug in the correct alignment, it is important that the alignment member is not rotatable relative to the end plug; this can be achieved by providing the bore and the alignment member with an appropriate shape. It is preferred that the bore in the first member is in the form of a regular polygon having at least three, preferably at least four sides. More preferably, the bore has the cross-sectional shape of a rectangular polygon having at least eight sides, and most preferably the bore has the shape of a regular polygon having twelve sides. This arrangement provides a plurality of different positions at which the alignment member can be fixed relative to the end plug, which means that the relative alignment of two end plugs on adjacent roller screens can be adjusted.

In one preferred embodiment, the bore has a cross-section of a shape corresponding to the cross-section of two identical squares having a coincident centre point in which one of the squares has been rotated by 45°

relative to the other square.

The alignment member can have a cross-section that corresponds with the cross-section of the bore of the shaft connector, so that the alignment member is a close fit with the bore. However, it is not essential that the cross-section of the alignment member and the bore are the same, provided that the alignment member can fit into the bore and can transmit torque from the alignment member to the shaft connector and vice versa.

In some circumstances it may be desirable for the alignment member to comprise two portions of different cross-section, the arrangement being such that one portion can be received in one end plug, and the other portion can be received in the adjacent end plug.

Whilst it is preferred that the roller screen connector is used in conjunction with the end plug described above, this is not essential. When the end plug is used, then the alignment member may be the same as the connecting member of the roller screen connector, and the features of the end plug described above may be integrated into the retraction means. For example, the shaft connector of the end plug may comprise the first part of the retraction means.

According to another aspect of the invention there is provided a roller screen for a window or other aperture, comprising an elongate shaft adapted to be secured to a support at opposite ends thereof; a flexible screen member partly rolled around the shaft, wherein the screen member can be withdrawn from the shaft to an extended position in which it can cover the window or other aperture; and (i) an end plug as described above disposed at one end or both ends of the shaft, and/or (ii) a roller screen connector as described above disposed between the roller screen and an adjacent roller screen. The end plug and/or roller screen connector may have any combination of the features of the invention described above.

It is preferred that drive means is provided at one end of the roller screen for driving the shaft in order to unroll and roll the screen member. The drive means is conveniently a motor, especially an electric motor.

Preferably, the drive means has a drive shaft adapted to be secured to the elongate shaft. More preferably, the drive shaft is received within the elongate shaft.

It is a feature of the invention to provide the outer surface of the drive shaft with at least one drive formation thereon, the or each drive formation engaging with a corresponding formation on the inner surface of the elongate shaft. When the drive shaft rotates, the engagement of the or each drive formation with the or each formation on the elongate shaft causes the elongate shaft to rotate.

It is desirable that there are a plurality of drive formations spaced around the outer surface of the drive shaft. Most desirably, the drive formations are equi-spaced around the driven shaft; this enables the position of the motor to be adjusted about the axis of the drive shaft. For example, if there are four equi-spaced drive formations, each having a corresponding formation on the elongate shaft, then there are four different positions for the motor about the axis, each position being angularly displaced by 90° relative to the other positions. This arrangement is useful, because the drive motor will usually be provided with limit switches for limiting the amount by which the screen member can be unrolled, and it is advantageous to be able to rotate the motor to a position at which the limit switches are easily accessible.

This feature of the invention could be used without the specific configuration of the roller screen connector or of the end plug according to the invention.

It is possible to modify existing motors for use with the elongate shaft by providing an additional drive shaft portion that is fitted over the rest of the drive shaft. The drive shaft portion can be provided with the drive formations.

The elongate shaft is preferably provided with a plurality of strengthening formations extending at least partially along the length thereof. The strengthening formations preferably extend along a major part of the length of the elongate shaft, and preferably are provided on the inner surface of the elongate shaft. It is preferred that at least some of the strengthening formations are the formations that are engaged with the drive formations. It is preferred that at least some of the formations are the formations that cooperate with the formations on the end plug. The strengthening formations make the elongate shaft more rigid, and make it possible to use elongate shafts with smaller diameters whilst maintaining sufficient rigidity. As an example, the diameter of the elongate shaft may be reduced from about 50 mm to about 40 mm.

According to another aspect of the invention there is provided a roller screen assembly comprising a series of roller screens, as described above arranged, arranged end to end, wherein at least one of the roller screens at the end of the series is provided with the drive means at its free end. The roller screens of the roller screen assembly can be provided with any combination of the features of the roller screen described above.

Reference is now made to the accompanying drawings, in which:

Fig. 1 is an exploded side view of an embodiment of two roller screens according to the invention;
Fig. 2 is a side view of the roller screens shown in Fig. 1, in which the roller screens have been brought closer together:
Fig. 3 is a view along lines 3-3 of Fig. 1;
Fig. 4 is a view along lines 4-4 of Fig. 1;
Fig. 5 is a view along lines 5-5 of Fig. 1;
Fig. 6. is a side view of the end of the roller screen shown in Fig. 1, secured to a support bracket;
Fig. 7 is a view along lines 7-7 of Fig. 6;
Fig. 8 is a side view of an alignment member for connecting the two roller screens shown in Fig. 1;

Fig. 9 is a cross-sectional view, similar to Fig. 6, but inverted relative to Fig. 6;

Fig. 10 is a side view of a roller screen connector according to the invention;

Figs. 11 and 12 are a side view and end view respectively of a first part of an alignment means of the roller screen connector shown in Fig. 10;

Figs. 13 to 15 are a front view, a side view and an end view respectively of a second part of the alignment means of the roller screen connector shown in Fig. 10

Fig. 16 is a side view of a connecting member of the roller screen connector shown in Fig. 10; and

Fig. 17 is a view on lines 17-17 of Fig. 16.

In Figs. 1 and 2 there is shown a roller screen apparatus, which comprises two roller screens 10 and 10'.

The roller screens 10 and 10' each comprise an elongate hollow shaft 12 and 12', respectively, around which a screen member (not shown) is at least partially rolled. The shafts 12 and 12' are identical. The rightmost end of the roller screen 10 is provided with an end plug 14, and the leftmost end of the roller screen 10' is provided with an end plug 14'. The purpose of the end plugs 14 and 14' is to enable the roller screens 10 and 10' to be mounted to a support.

The end plug 14 comprises a shaft connector 16 and a support connector 18, the support connector 18 being rotatably mounted to the shaft connector 16. The shaft and support connectors 16 and 18 are mounted to one another by means of a ball bearing arrangement: the shaft connector 16 is provided with a channel-shaped outer surface 24 and the support connector is 18 provided with a channel-shaped inner surface 22 (see Fig. 9), and the inner and outer surfaces 22 and 24 are spaced to define a chamber 20 within which a plurality of balls 26 are provided. The balls act as bearings to provide a very low friction connection between the shaft and support connectors 16 and 18. The balls 26 may be made of any suitable material such as plastics or metal; typically the balls 26 are steel.

The shaft connector 16 is provided with a generally cylindrical portion 28 that is adapted to be received within the shaft 12. As shown in Figs. 4 and 5, the outer surface of the cylindrical portion 28 is provided with five projections 30 that are received within corresponding recesses 32 in the shaft 12. It will be noted that the projections 30 and recesses 32 are arranged irregularly, so that there is only one orientation at which the end plug 14 can be secured to the shaft 12. It will be appreciated that the recesses 32 could instead be projections, and the projections 30 could instead be recesses. The cylindrical portion 28 is a push-fit with the shaft 12

As shown in Figs. 3 and 4, the shaft connector 16 has an axially extending bore 34. The cross-section of the bore 34 is square. The end of the shaft connector 16 that faces away from the shaft 12, shown in Fig. 3, is provided with a marking in the form of an arrow 16a. The purpose of the arrow 16a is to provide an alignment marking to help with marrying up the adjacent roller screens 10 and 10'. It will be appreciated that the marking could be in a different form, for example it could be in the form of a dot.

The support connector 18 is in the form of a clamp that is adapted to be secured to a support bracket 36. The clamp 18 has a U-shaped channel 38 that is adapted to receive a correspondingly shaped part of the bracket 36. An inner surface 40 of the channel 38 is substantially cylindrical; however, the inner surface 40 has two planar portions 40a and 40b, which are shown in Figs. 3 and 4. The clamp 18 is also provided with an operating lever 42.

The support bracket 36, which is shown in Figs. 6 and 7, has an L-shaped configuration. One leg 44 of the L is provided with an slot 46, which receives the clamp 18, and another leg 48 of the L is provided with an aperture 50 through which a fixing bolt or screw (not shown) may be passed. The purpose of the fixing bolt or screw is to secure the support bracket to a wall, or a window frame or a display casing. The slot 46 has an outer portion 62 and an inner portion 64, and the size of the inner portion 64 is larger than the size of the outer portion 62

The end of the shaft 12, remote from the end plug 14, is adapted to receive a drive shaft (not shown) of a drive motor (not shown) therein. The drive motor rotates the shaft 12 in order to roll and unroll the screen member. Fig. 5 shows that the inner surface of the shaft 12 is provided with four recesses 50; the recesses 50 are equi-spaced about the longitudinal axis of the shaft 12. The recesses 50 receive corresponding drive projections (not shown) that are provided on the outer surface of the drive shaft. It will be appreciated that the recesses 50 could instead be projections, and the drive shaft projections could instead be drive shaft recesses.

The recesses 32 and 50 extend along the entire length of the shaft 12, which enables it to be used either way round, and enables each end of the shaft 12 to receive either a drive motor or an end plug 14. The recesses 32 and 50 also act as strengthening formations, which add to the rigidity of the shaft 12, and help to prevent bending along the length of the shaft 12. Additional strengthening formations 52 are provided on the inner surface of the shaft 12,

The outer surface of the shaft 12 is provided with an alignment formation 54. The purpose of the alignment formation 54 is to enable the screen member to be centred to the square bore 34 in the end plug 14.

The end plug 14' comprises a shaft connector 16', which is substantially identical to the shaft connector 16 of the end plug 14. The end plug 14' is not provided with any part equivalent to the support connector 18 of the end plug 14. This is because only one support bracket is needed between the ends of the roller screens 10 and 10'. However, if two support brackets were desired, then it would, of course, be possible for the end plug 14' to

be identical to the end plug 14.

The adjacent end plugs 14 and 14' are secured together via an alignment member 56. The alignment member 56 serves to transmit torque from the roller screen 10 to the roller screen 10'. The alignment member 56 has a first portion 58 of square cross-section, which is adapted to be received as a push-fit in the bore 34 of the end plug 14. The alignment member 56 also has a second portion 60 of octagonal cross-section. which is adapted to be received as a push fit in the bore 34' of the end plug 14. The octagonal cross-section of the second portion 60 enables the end plug 14' to be secured to the second portion 60 at any one of eight discrete positions. This makes it possible to fine tune the alignment of the roller screen 10' relative to the roller screen 10. One of the problems with roller screen assemblies comprising a long series of the roller screens 10 and 10' is that the screen member of the roller screen furthest from the drive motor does not tend to unroll to the same position as the screen member of the roller screen containing the motor. The fine tuning permitted by the cross-sectional shape of the second portion 60 makes it possible to adjust the roller screens 10 and 10' to avoid this problem.

It will be appreciated that the cross-sectional shape of the second portion 60 could have more or fewer sides than an octagon. The advantage of having more sides is that the precision of the fine tuning can be increased. The disadvantage of having more sides is that the risk of slippage between the second portion 60 and the end plug 14' increases, and this would cause even greater problems with alignment. In practice, it is not usually desirable to have more than twelve sides to the second portion 60.

The way in which the roller screens 10 and 10' are assembled will now be described.

First the end of the roller screen 10 housing the drive motor is secured to a fixing bracket (not shown). The shaft portion 16 of the end plug 14 is pushed into the shaft 12, and is retained in place by friction (obviously, the end plug 14 could have been inserted before the end of the shaft 12 housing the drive motor was fixed to the fixing bracket).

The end plug 14 is moved towards the slot 46 of the fixing bracket 36. This movement can be substantially linear. The distance between the planar portions 40a and 40b of the inner surface 40 is small enough that the clamp 18 can pass through the outer portion 64 of the slot 46 into the inner portion 62 of the slot 46. When the clamp 18 is located within the inner portion 62, part of the bracket 36 will be disposed within the channel 38, so that the clamp 18 cannot be removed from the bracket by movement along the longitudinal axis of the roller screen 10. At this time the clamp 18 is rotated about its axis by about 90°. using the operating lever 42. Figure 7 shows the initial position of the clamp 18 in full lines. and shows the position of the clamp 18, after it has been rotated through about 90°, in dotted lines.

The size of the outer aperture 64 is too small to permit the cylindrical part of the inner surface 40 of the channel 38 to pass through it; this means that when the clamp 18 has been rotated through 90° it is no longer possible to remove it from the slot 46. Thus the end plug 14 is clamped to the fixing bracket 36, and the screen 10 has been clamped in position.

The first portion 58 of the alignment member 56 is then pushed into the bore 34, and is retained in position by friction. The end plug 14' is then pushed onto the second portion 60 of the alignment member 56. The arrow 16a' on the end plug 14' is arranged to be aligned with the arrow 16a on the end plug 14. The shaft 12' is then pushed onto the end plug 14', and is retained in position by friction. If it subsequently becomes necessary to adjust the angular position of the shaft 12' relative to the shaft 12 (for example, to ensure that the screen members unroll to the same position), then this can be achieved by means of the fine tuning provided by the cross-section of the second portion 60.

More of the roller screens 10' can be attached to the other end of the roller screen 10'. In general, there should be at least one of the end plugs 14 provided between each pair of adjacent roller screen 10'.

Reference is now made to Figs. 10 to 17, which show a roller screen connector 100 which is adapted to connect the two roller screens 10 and 10'. The connector 100 may incorporate all of the features of the end plug 14 described above. However, for clarity, not all of these features have not been shown in Figs. 10 to 17.

The roller screen connector 100 includes a shaft connector 102 which serves, inter alia, the same function as the shaft connector 16, i.e., it may have the support connector 18 connected to it by the friction reducing means, and the support connector may be connected to the support bracket 36. The roller screen connector 100 includes a retraction means comprising a rotatable member 104. and a retaining means comprising a retaining member 106 which is in the form of an elongate shaft. The shaft connector 102 is provided with projections 130 (like the projections 30 on the shaft connector 16), which enable the shaft connector 102 to be fixed to the roller screen shaft 12 by interengagement of the projections 130 and the recesses 32. The shaft connector 102 is not rotatable relative to the roller screen shaft 12. The shaft connector is also provided with a marking 102a, in the form of an arrow. The purpose of the marking 102a is the same as the marking 16a.

The rotatable member 104 is mounted to the shaft connector 102 in such a way that the it can rotate relative to the shaft connector 102, but cannot move axially relative to the shaft connector 102. The rotatable member 104 is provided with a hollow cylindrical body 108, the interior surface of which is provided with two substantially helical grooves 110. The rotatable member 104 also includes an operating member 112, which can be operated by a user in order to rotate the rotatable member 104 relative to the shaft connector 102.

The retaining member 106 serves to align the two roller screens 10 and 10' in the proper end-to-end relationship, and also serves to retain the screens 10 and 10' in the said relationship. The retaining member also serves to transmit torque from the roller screen 10 to the roller screen 10'. Thus, the retaining member 106 is similar to the alignment member 56, and can serve the function of the alignment member 56. When the roller screen connector 100 is used, it is not necessary to use the alignment member 56. The retaining member 106 shown in the drawings has a different external cross-section to the alignment member 56 shown in the drawings. However, it will be appreciated that it would be possible for the external cross section of the retaining member 106 to be the same as the alignment member 56, and vice versa. The external cross-section of the retaining member 106 is configured to match the internal cross-section of a bore 134 provided in the shaft connector 102. This cross section corresponds to the cross-section of two overlapping squares in which one of the squares has been rotated by 45° relative to the other of the squares. It will be clear from Figs. 11 and 12 that the shaft connector 102 also has a bore 136. which has is substantially cylindrical and which has a greater cross-sectional area than the bore 134. The bore 136 receives the hollow cylindrical body 108.

The retaining member 106 includes a collar 114 fixed thereto; the collar is fixed against rotational movement relative to the shaft of the retaining member 106. The collar 114 is provided with projections 116. When the roller screen connector 100 is assembled, as shown in Fig 10, a respective one of the projections 116 extends into a respective one of the grooves 110.

When the roller screen connector 100 is in position connecting the two roller screens 10 and 10' the connector 100 is configured as in Fig. 10 with an end 118 of the retaining member 106 extending into the shaft of the roller screen 10'. The arrangement is such that the retaining member 106 can transmit torque from the screen 10 to the screen 10' (or vice versa). The retaining member 106 can also prevent any substantial axial or radial movement of the screen 10 relative to the screen 10'.

The end 118 of the retaining member 106 is provided with an inverted V-shaped formation 118a, that can be aligned with the marking 102a on the shaft 102 to enable the installer to locate the mating points when bringing the two screens 10 and 10' together. This arrangement is desirable, because vision of the aligning arrows is somewhat obscured when the screens 10 and 10' come together.

In the prior art, if it was desired to remove the screen 10', it would be necessary first to remove the screen 10. However, with the present invention it is necessary only to turn the operating member 112, which causes the projections 116 to follow the path of the grooves 110, which, in turn, draws the retaining member 106 into the rotatable member 102, so that the end 118 is retracted from the screen 10'. When the retaining member 106 has been retracted, the screen 10' can be moved radially relative to the screen 10 and can easily be removed. The screen 10' can be refitted by carrying out these steps in reverse.

It will be appreciated that modifications may be made to the invention described above. For example, the first portion 58 of the alignment member 56 may also have the same cross sectional shape as the second portion 60. Furthermore, the bores 34 and 34' of the end plugs 14 and 14' may be provided with a cross-section that corresponds to. and is a close fit with, the cross-section of the first and second portions 58 and 60 of the alignment member 56. Other modifications are. of course, possible.

Claims

1. A roller screen connector (100) for releasably connecting said a first roller screen (10) to a second roller screen (10') disposed adjacent to the first roller screen (10) in end to end relationship therewith, comprising retaining means adapted to extend within the first and second roller screens (10,10') in such a way as to substantially prevent radial relative movement therebetween, and retraction means for retracting the retaining means (106) from the second roller screen (10') to permit the second roller screen (10') to move radially relative to the first roller screen (10), whereby the second roller screen (10') can be disconnected from the first roller screen (10).

2. A connector (100) according to claim 1, wherein the retaining means includes an elongate retaining member (106) which is adapted to extend into the first and second roller screens (10,10'), and the retraction means includes an operating member (112) which can be moved by a user in order to cause the retraction of the retaining member (106).

3. A connector (100) according to claim 2, wherein the retaining member (106) is movable between an extended position in which it extends at least partially within the first and second roller screens (10,10'), and a retracted position in which the it is fully retracted from the second roller screen (10').

4. A connector (100) according to claim 2 or 3, wherein either the retraction means or the retaining means is provided with a projection (116) adapted to engage in and follow a groove (110) provided in the other of the retraction means and the retaining means, the groove (110) being configured such that. as the projection (116) follows the groove, the retraction means and the retaining means move axially relative to one another and the retaining means rotates relative to the retraction means.

5. A connector (100) according to claim 4, wherein the groove (110) is helical, and the configuration of the groove (110) is such that the retaining member (106) can move from the extended position to the retracted position by relative rotation between the retraction means and the retaining member (106) of less than 360°.

6. A connector (100) according to any one of claims 2 to 5, wherein the retraction means includes a rotatable member (104) which is adapted to be rotatably mounted to the first roller screen (10) in such a way that axial movement of the first roller screen (10) relative to the rotatable member (104) is not permitted, and wherein the operating member (112) is part of the rotatable member (104).

7. A connector (100) according to claim 6, when dependent upon claim 4 or 5, wherein the projection (116) is provided on the retaining member (106) and the groove (110) is provided in an interior surface of the rotatable member (104) of the retraction means.

8. A connector (100) according to any preceding claims, further comprising an end plug (14), said end plug (14) comprising a shaft connector (102) adapted to be secured to an elongate shaft (12) of the first roller screen (10), and a support connector (18) adapted to be secured to a support (36) for the first roller screen (10), wherein the support connector (18) is rotatably mounted to the shaft connector (102) and a friction reducing means is provided between the support connector (18) and the shaft connector (102).

9. A connector (100) according to claim 8, wherein the friction reducing means comprises a bearing arrangement. the shaft and support connectors (102.18) define a chamber (20) therebetween which receives a plurality of bearings (26) in such a manner that the bearings (26) are in engagement with the shaft and support connectors (102,18), the support connector (18) extends around the shaft connector (102) and has an inner surface (22) that is spaced from an outer surface (24) of the shaft connector (102), the bearings (26) are housed between the inner and outer surfaces (22,24), and the outer surface (24) of the shaft connector (102) and the inner surface (22) of the support connector (18) include a channel therein that receives the bearings (26), whereby the bearings (26) are retained between the shaft and support connectors (102,18), and whereby the shaft connector (102) is retained in position axially relative to the support connector (18).

10. A connector (100) according to claim 1 or 2, wherein the shaft connector (102) is adapted to be secured within the shaft (12) of the first roller screen (10), the outer surface (24) of the shaft connector (102) is provided with formations (130) adapted to cooperate with corresponding formations (32) on the elongate shaft (12) of the first roller screen (10), and the formations (30) are configured such that the shaft connector (102) can only be secured to the elongate shaft (12) in a single orientation.

11. A connector (100) according to claim 8, 9 or 10, wherein the support connector (18) comprises a clamp (18) that is adapted to be secured to the support (36), and the clamp (18) is shaped such that it can be freely inserted into the support (36) by movement along a single axis, and can then be clamped to the support (36) by rotating the clamp (18) through an angle.

12. A connector (100) according to any preceding claim, wherein the shaft connector (102) is provided with a bore (34) therein, the bore (34) being adapted to receive an alignment member (56) which is adapted to align the end plug (14) with an end plug (14') on the second roller screen (10') and is adapted to transmit torque from said first roller screen (10) to the second roller screen (10'); and wherein the bore (34) and the alignment member (56) are shaped so that the alignment member (56) is not rotatable in the bore (34).

13. A roller screen (10) for a window or other aperture, comprising an elongate shaft (12) adapted to be secured to a support (36) at opposite ends thereof; a flexible screen member partly rolled around the shaft (12), wherein the screen member can be withdrawn from the shaft (12) to an extended position in which it can cover the window or other aperture; and a connector (100) according to any preceding claim disposed at one end or both ends of the shaft (12).

14. A roller screen (10) according to claim 13, further comprising drive means provided at one end of the roller screen (10) for driving the shaft (12) in order to unroll and roll the screen member, wherein the drive means has a drive shaft adapted to be secured to the elongate shaft (12), the drive shaft and the elongate shaft (12) each being provided with at least one cooperating formation (50) such that rotation of the drive shaft causes rotation of the elongate shaft (12) by means of engagement of the or each cooperating formation of the drive shaft with a respective one of the or each cooperating formation (50) on the elongate shaft (12).

15. A roller screen (10) according to claim 14, wherein there are a plurality of drive shaft formations equi-

spaced around the outer surface of the drive shaft, whereby the position of the motor can be adjusted about the axis of the drive shaft.

16. A roller screen (10) according to claim 15, when dependent upon claim 3, wherein the elongate shaft (12) is provided with a plurality of strengthening formations (32,50) extending at least partially along the length thereof, and at least some of the strengthening formations (32, 50) are the formations (32) that cooperate with the formations (30) on the end plug (14).

17. A roller screen assembly comprising a plurality of roller screens according to claim 14, 15 or 16, wherein said roller screens are arranged end to end in a series. and wherein at least one of the roller screens at the end of the series is provided with the drive means at its free end.

fig1

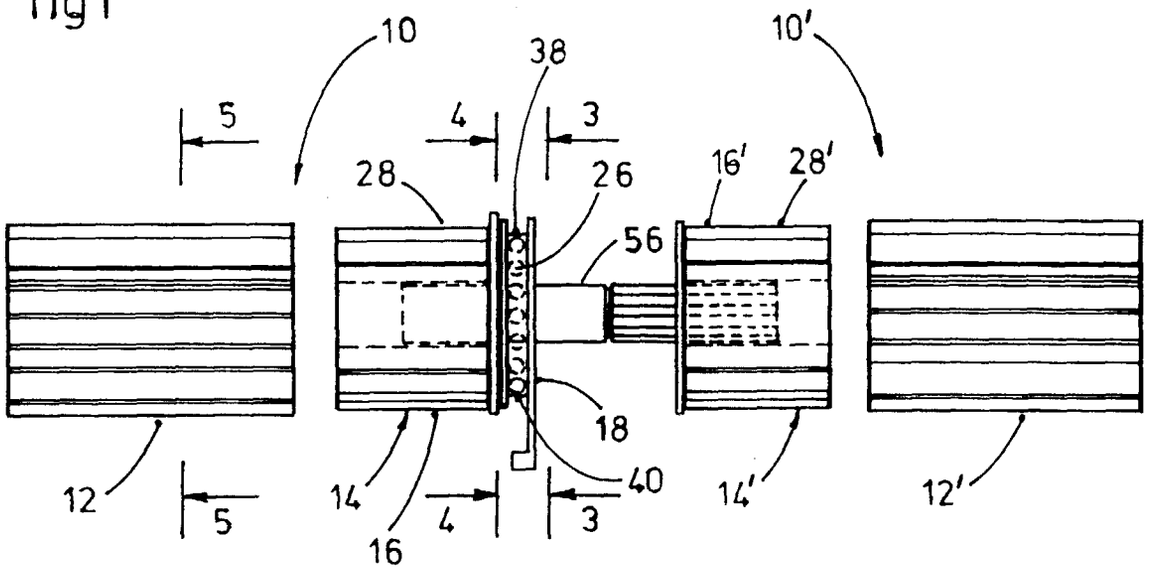
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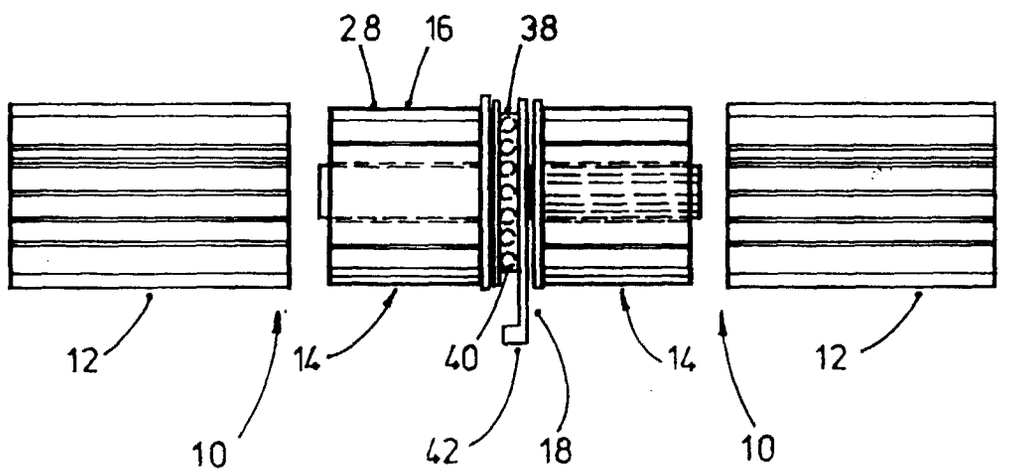
fig2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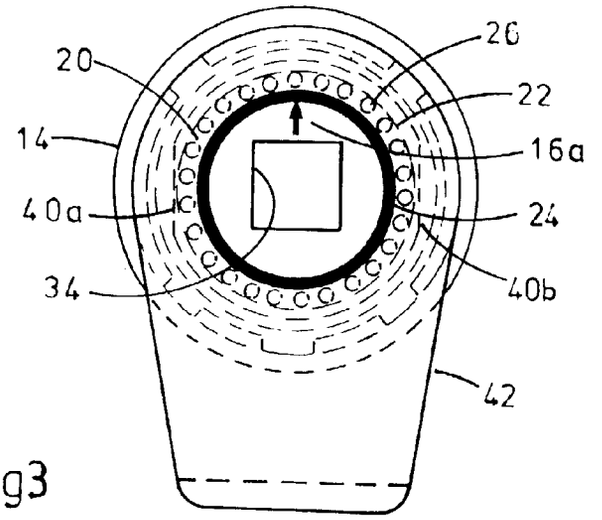

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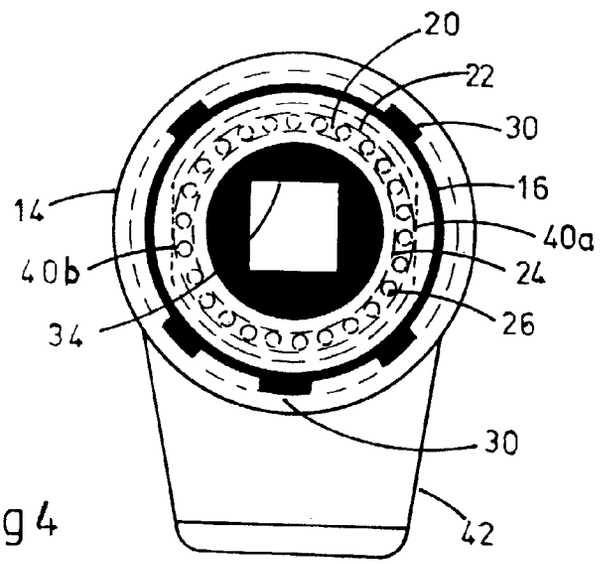

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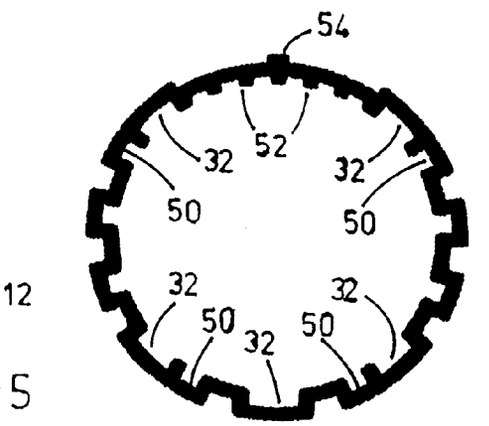

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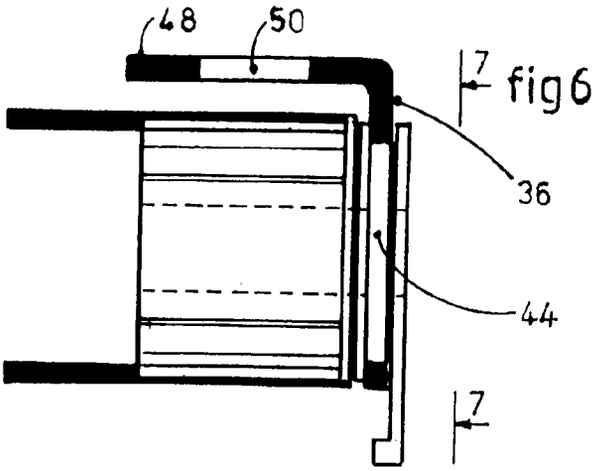

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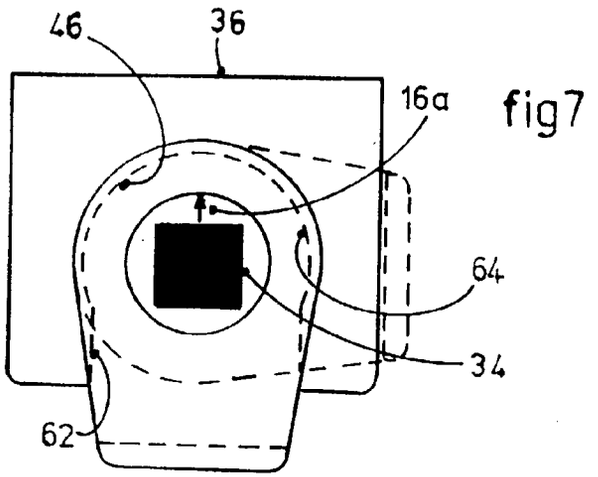

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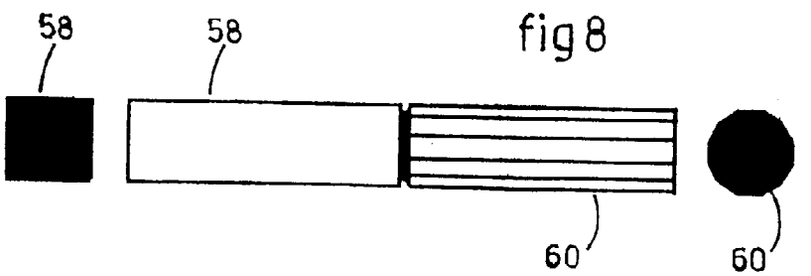

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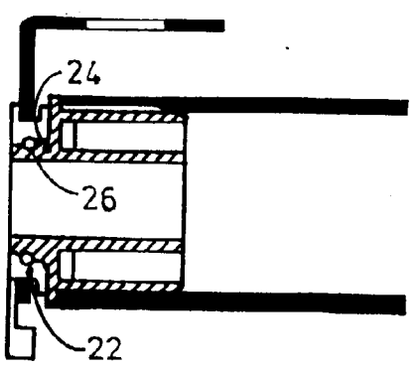
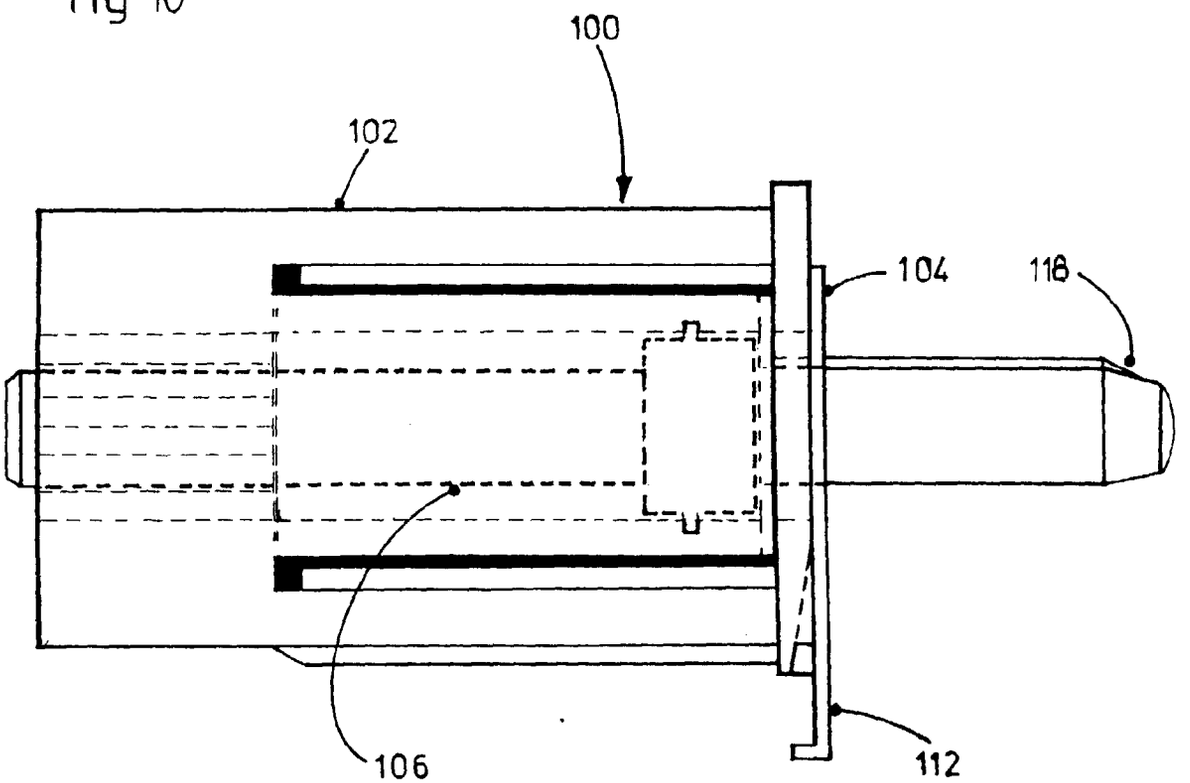
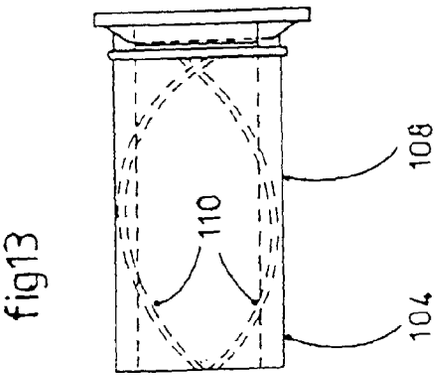


fig9

fig 10





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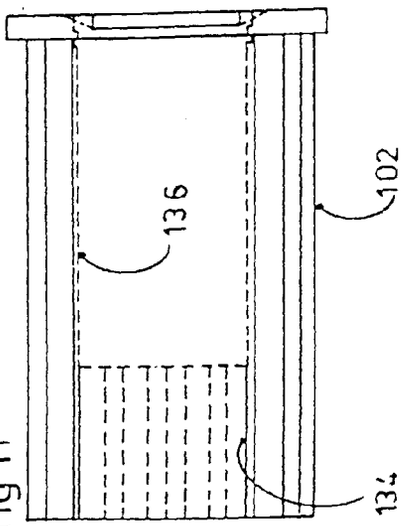

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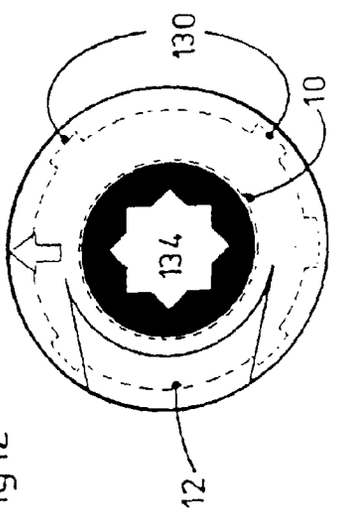

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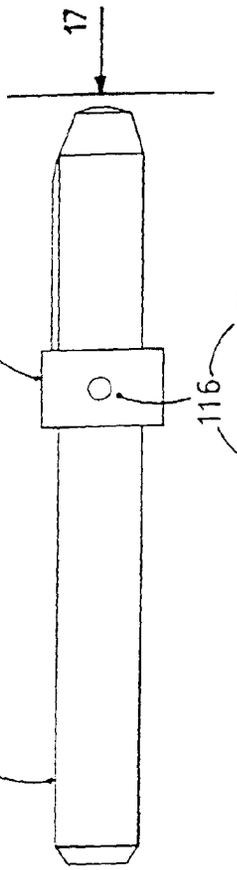

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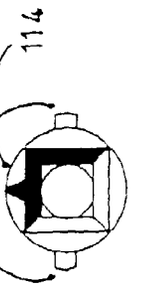

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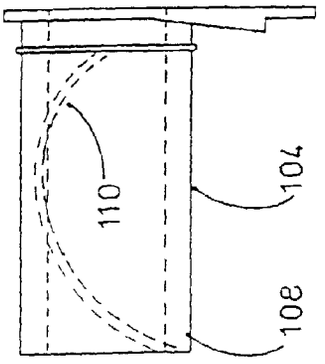

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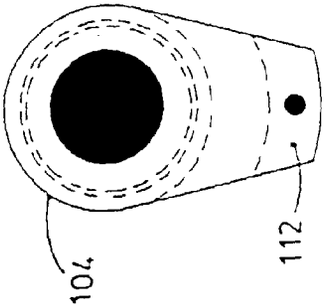

fig14

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 98 30 2900

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X Y	EP 0 301 666 A (MADO NEDERLAND B.V.) 1 February 1989 * column 2, line 27 - column 4, line 34 *	1-3 8-10	E06B9/174
Y	NL 7 402 062 A (HAMEL B.V. TE ROTTERDAM) 18 August 1975 * page 5, line 19 - page 6, line 28; figure 2 *	8-10	
A	DE 93 18 455 U (HÜPPE FORM) 27 January 1994 * the whole document *	1	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

E06B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
MUNICH	24 June 1998	Knerr, G

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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