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(57) A screen (10) for an opening (11) comprising a plurality of elongate elements (12a-12q) pivotally connected together in a criss cross pattern to provide a generally rectangular assembly (12) which is foldable and unfoldable between an extended condition in which the screen (10) closes the opening (11), and a folded condition in which access may be gained through the opening (11), the screen (10) further comprising along each of two opposite sides, a side member (14,15), at least some of the elongate elements (12a-12q) each being retained at one end thereof relative to a respective side member (14,15) and being movable axially of the respective side member (14,15) during folding and unfolding of the screen (10), one of the side members (14) being fixed relative to the opening (11) and the other side member (15) being slidable across the opening (11) to effect folding and unfolding of the screen (10) wherein each side member (14,15) is, at least in the regions where the one ends of the elongate elements (12a-12q) are retained thereby, of re-entrant channel configuration and the retained ends of the respective elongate elements (12a-12q) each carry a guide means (32) which is entrapped in the re-entrant channel (14,15) along the entire extent of axial movement of the one end of the respective elongate element (12a-12q).

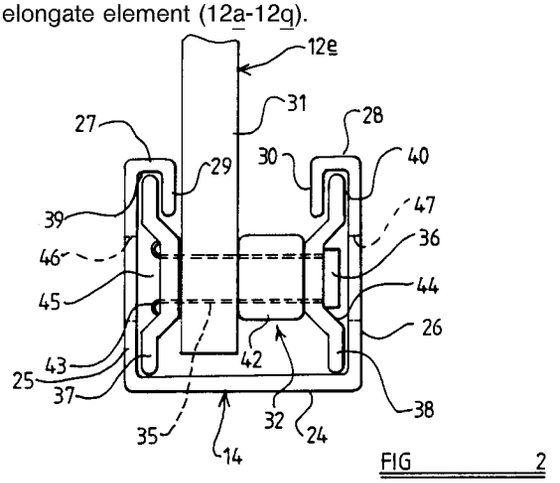

FIG 2

EP 0 599 343 A1

Description of Invention

This invention relates to a screen for an opening and more particularly but not exclusively to a security screen for an opening.

In British Patent No. 2161197 there is described a security screen which comprises a plurality of elongate elements pivotally connected in a criss cross pattern to provide a generally rectangular assembly which is foldable and unfoldable between an extended condition in which the screen closes an opening and a folded condition in which access may be gained through the opening. The screen further has along each of two opposite sides, a side member, at least some of the elongate elements each being retained at one end relative to a respective side member and being movable axially of the respective side member during folding and unfolding of the screen. However the means whereby the elongate elements are retained relative to their respective side members provides no significant obstacle to a determined intruder. The side members are of channel configuration, there being slots in each limb and an opening in the respective elongate element, through which an axle passes, the axle being retained by means of end caps on the axle. Once the end caps are removed, the axle can easily be released from engagement with the side member and elongate element thereby facilitating forcing access through the opening.

The object of the invention is to provide a new or improved screen.

According to one aspect of the invention we provide a screen for an opening comprising a plurality of elongate elements pivotally connected together in a criss cross pattern to provide a generally rectangular assembly which is foldable and unfoldable between an extended condition in which the screen closes the opening, and a folded condition in which access may be gained through the opening, the screen further comprising along each of two opposite sides, a side member, at least some of the elongate elements each being retained at one end thereof relative to a respective side member and being movable axially of the respective side member during folding and unfolding of the screen, one of the side members being fixed relative to the opening and the other side member being slidable across the opening to effect folding and unfolding of the screen wherein each side member is, at least in the regions where the one ends of the elongate elements are retained thereby, of re-entrant channel configuration and the retained ends of the respective elongate elements each carry a guide means which is entrapped in the re-entrant channel along the entire extent of axial movement of the one end of the respective elongate element.

Hence a more secure screen is provided.

The side members are preferably made by rolling whereby the side members can be made having a complex re-entrant configuration. In a preferred arrangement, each side member comprises a base having a pair of limbs extending therefrom, the free ends of the limbs being in-turned to provide front wall parts, the front wall parts themselves each being in-turned to provide lips which extend inwardly of the channel.

The limbs, front wall parts and lips may each provide a track for a guide means whereby the guide means can be moved along the channel and be retained by the channel.

Preferably the guide means comprises a roller mechanism including at least one roller and an axle which passes through an opening in an end in a respective elongate element thereby to retain the end of the elongate element in the channel. The guide means comprises a pair of rollers carried on the axle, each of the rollers being rotatable relative to the axle, or fixed relative to the axle as desired. In each case, the end of the elongate element is pivotable relative to the axle.

Alternatively, the guide means may comprise a slider pivotally secured to the end of a respective elongate element, such as a slider made of a suitably strong plastics material such as nylon.

In a preferred arrangement, the security screen comprises a further side member which in use is fixed relative to an opposite side opening of the other fixed side member. The slidable side member and the further side member may each carry components of a locking mechanism whereby the slidable side member can be locked to the further side member with the screen in its extended condition.

The screen may further comprise top and bottom members which at least receive and conceal the ends of the pivotally connected elongate elements at the respective top and bottom of the rectangular assembly of elongate elements. Preferably, the top and/or bottom member comprises a re-entrant channel configuration, the ends of the elongate elements being received in the re-entrant channel and the slidable side member carrying a guide means at at least one end thereof, which moves along the channel and is trapped in the channel, thereby to facilitate sliding of the slidable side member, and to retain the side member relative to the top and/or bottom member.

The invention will now be described with reference to the accompanying drawings in which:

FIGURE 1 is a perspective illustrative view of a screen in accordance with the invention,

FIGURE 2 is a sectional view on the line 2-2 of Figure 1,

FIGURE 3 is an exploded illustrative view of a modification,

FIGURE 4 is a sectional view on the line 4-4 of Figure 1.

Referring to the drawings, there is shown in figure 1, a security screen 10 which comprises an assembly 12 being a plurality of elongate elements 12a to 12q pivotally connected together as shown for example at 13 in a criss cross pattern to provide a generally rectangular assembly which is foldable and unfoldable between an extended condition in which the screen 10 closes an opening 11 in which it is mounted, and a folded condition in which access can be gained through the opening. In the example shown, the opening 11 is arranged to be completely closed by the screen 11 when the screen is in its extended condition, the opening being of generally corresponding rectangular shape. In another arrangement, the opening 11 may not be completely closed by the security screen 10, e.g. the screen 10 may not extend for the full height of the opening 11.

The security screen 10 is shown in figure 1 in a partially extended condition and further comprises a pair of side members 14 and 15 one along each of two opposite sides of the assembly 12 of elongate elements.

Side member 14 is fixed relative to the opening 11, for example by fasteners (not shown) and the other side member 15 is slidable across the opening 11 to effect folding and unfolding of the screen 10 between its extended and folded conditions.

The security screen 10 further comprises top and bottom members 17,18, respectively, which bound the top and bottom of the opening 11, and a further side member 19 which is secured to an opposite side of the opening 11 to side member 14.

The one ends of a pair 12a and 12b of elongate elements are connected together and fixed relative to side member 14 as indicated at 20 whilst the one ends of a further pair 12c,12d of elongate elements are connected together and to side member 15, as indicated at 21, the connections 20 and 21 permitting pivoting of the respective elongate elements, relative to each other and relative to the respective side members 14,15.

The one ends of another pair 12e,12f of elongate elements are retained by fixed side member 14, but are free to move axially of side member 14 as hereinafter explained.

The one ends of yet another pair 12g, 12h, of elongate elements are retained by side member 15 but again are free to move axially of side member 15 as hereinafter explained.

It will be appreciated that as the side member 15 is slid across the opening 11, the elongate elements will relatively pivot and the overall height of the generally rectangular assembly 12 of elongate elements will vary. Thus the top and bottom members 17,18, are sufficiently deep to receive and conceal the ends of the elongate elements at the top and bottom of the rectangular assembly 11, during the entire range of movement of the screen 10. Further, as the screen 10 is folded and unfolded, the axial positions of the ends of elongate elements 12e,12f and 12g,12h, relative to their respective side members 14,15, will vary.

Referring now to figure 2, there is shown a cross section through side member 14 along the line 2-2 of figure 1. The cross section of side member 15 is identical.

Side member 14 comprising a re-entrant channel configuration provided in this example by a base 24, a pair of generally parallel limbs 25,26, the free ends of the limbs 25,26, being in-turned to provide front wall parts 27,28, which are themselves in-turned to provide lips 29,30, which extend inwardly of the channel. An end 31 of elongate element 12e is shown received in the channel between the lips 29,30, the end 31 carrying a guide means 32 which in this example comprises a roller mechanism to facilitate movement of the end 31 of the elongate element 12e along the side member 14 during folding or unfolding the screen 10.

The roller mechanism comprises an axle 35 which has an integral head 36 at one end and carries a pair of rollers 37,38, which roll along the side member 14, in respective tracks 39,40 provided by the limbs 25,26, front wall parts 27,28, and lips 29,30, respectively. The axle 35 further carries a spacer 42 and passes through an opening provided in the end 31 of the elongate element 12e.In another example, where the height of the screen 10 is greater, the ends of a pair of elongate elements may be pivotally interconnected in the re-entrant channel side member 14 by the axle 35 of a guide means, in which case the space shown occupied by spacer 42 would be occupied by the end of the other of the pair of elongate elements. Thus the end 31 of the elongate element 12e, or the connected ends of the pair of elongate elements is or are captively retained by the re-entrant channel configuration of the side member 14, whilst being free axially to move relative to the side member 14 as the screen 10 is moved between its folded and unfolded conditions.

In this example, the end of the axle 35 remote from head 36 is splayed outwardly as indicated at 43, the head 36 and splayed end 43 being received in respective recesses 44,45, provided in the respective rollers 37,38. Thus the entire guide means 32 provides an assembly in which the axle 35 is not free to move along its own axis.

The ends of each of the elongate elements 12f,12g and 12h are each retained captively by

their respective side members 14,15, in the same manner as end 31 of elongate element 12e.

The fixings 20,21, can be achieved for example by a bolt or other fastener simply passing through the channels 14,15, from one side to the other.

Preferably though, the fixings 20,21, are such that there is no access to the fixings from one side (e.g. outside) of the screen 10, for added security. In one example, there may be provided inside the channels 14, 15, a pair of rectangular plates which correspond in cross sectional configuration to the rollers 37,38, but at least one of the plates being fixed by rivets for example, or other fastenings to one wall 25 or 26 of the channel. The ends of the respective elongate elements 12a, 12b, or 12c,12d, being received between the plates and connected thereto by an axle like axle 35 for example.

The guide means 32 may be received by their respective side members 14,15, by sliding in from one end during assembly of the security screen 10, i.e. prior to the ends of the side members 14,15, becoming unaccessible. Alternatively if desired, at least the guide means 32 slidable in side member 14 can be assembled on site, for example, after the side member 14 has been secured relative to the opening 11 and after top and/or bottom members 17,18, have been secured relative to the side members 14,19, and/or relative to the opening 11. Assembly of the guide means 32 on site can be achieved because the side member 14 has in each limb 25,26, thereof, openings 46,47, which are axially displaced from the positions the guide means 32 will occupy when the screen 10 is in its fully extended condition closing the opening 11. Thus the rollers 37,38, spacer 42 and end 31, of the elongate element 12e can be located in their relative positions as seen in figure 2, and the axle 35 inserted through a respective opening 47 in limb 26, through each of the components. The ends of the axles 35 remote from the heads 36 can then be displaced using suitable tools which can access the ends of the axles 35 through the openings 46,47.

Other arrangements to facilitate assembling a guide means 32 from within the respective side member 14 are possible. For example, in the arrangement of figure 3, a roller 38a is provided rigidly and integrally with a spacer 42a and axle 35a, such that the spacer 42a and axle 35a will rotate with the roller 38a.

Roller 37a is secured relative to the axle by a headed fastener 34a, the head of which is received in a recess 45a of the roller 37a and the shaft of which is received in a threaded bore 50 within the axle part 35a.

The roller 37a may be rotatable relative to axle 35a or keyed thereto as in the example shown, but in each case, the rollers 37a,38a, spacer 42a and axle 35a, will rotate relative to the end of a respective elongate element as the end of the elongate element moves axially of the side member 14. The axle 35a is passed through an opening in a limb of the respective side member and passes through an opening in one end of the elongate element received in the respective re-entrant channel formation of the side member, and then the axle 35a and roller 37a are connected together as described.

Arrangements which permit assembly of a guide means from one side only of the side member 14 are possible, in the event that access cannot be gained to both sides of the side member 14.

If desired, the guide means for side member 15 may be arranged to be assembled on site, similarly to the guide means 32,32a described.

In another embodiment, the guide means, instead of comprising roller arrangements, may comprise sliders arranged to slide in their respective re-entrant channel configuration side members 14,15, the sliders being pivotally secured to the ends of their respective elongate elements 12a-12q.

In a preferred embodiment, the top and bottom members 17,18, each also comprise a re-entrant channel configuration which may be of a similar cross sectional configuration to the side member 14 shown in figure 2, or of an alternative re-entrant channel configuration. Preferably though the channels of the top and bottom members 17,18, are deeper than the channels of side members 14,15, as shown in figure 4, to permit up and down movement of the ends of the respective elongate elements 12d, 12k as the security screen 10 is folded and unfolded.

The slidable side member 15 carries at its lower end an insert 55 which has a part 56 which projects upwardly into the member 15, and a part 57 which projects downwardly into the channel of the bottom member 18. The downwardly projecting part 57 has a width W substantially the same as the thickness of a pair of elongate elements 12a-12q and thus substantially fills the space between a pair of inwardly extending lips 29b,30b of the channel member 18.

The upwardly extending part 56 is preferably of channel shape such that channel opening P of side member 15 is not obstructed throughout the full length of the member 15.

At the lower end of the downwardly extending part 57 there is an opening 58 through which passes an axle 59 for a pair of rollers 60.

Thus the side member 15 is guided during its sliding movement, in the channel bottom member 18 by the rollers 60 and is retained relative to bottom member 18.

At its upper end, the side member 15 carries another insert 61 which has a part 62 which projects downwardly into member 15, and a part 63

which projects upwardly into the channel of the top member 17 and substantially fills the space between a pair of inwardly extending lugs 29a,30a.

Again the downwardly extending part 62 is generally channel shaped such that channel opening P is not obstructed, and upwardly extending part has a slot 65 which receives an axle 66 which carries a pair of rollers 67. Thus the side member 15 is guided in the top channel member 17 during sliding, by rollers 67 and is retained relative to the top member 17. The slot 65 is provided so that in the event that the member 15 when moved across the opening 11, is not kept vertical, there is no risk of the rollers 67 jamming in the member 17.

The rollers 60,67 (and elongate elements 12a-12q) are preferably slid into their respective bottom and top members 18,17 from one end, e.g. prior to securing the members 18,17 to fixed side member 19.

Further modifications may be made without departing from the scope of the invention. For example, the re-entrant channel configurations of at least the side members 14,15, and where appropriate the top and bottom members 17,18, need not comprise inturned lips such as indicated at 29 and 30 in figure 2. Any other suitable re-entrant channel configuration cross section may be provided so long as the respective guide means 32,32a,32b are retained in their channels whilst permitting axial movement of the guide means relative to the respective side/top/ or bottom member 14,15,17,18.

In practice, it will be appreciated that the side member 15 will carry one part of a lock L which interengages with a keeper secured relative to side member 19 such that the security screen 10 can be locked in its extended condition.

It will be appreciated that the security screen 10 described provides a significant deterrent and real degree of security against forced entry through the opening 11, where the opening 11 comprises a door or window for example.

However, when the security screen is folded open, the screen does not provide any significant obstacle to access through the opening 11.

The features disclosed in the foregoing description or the accompanying drawings, expressed in their specific forms or in terms of a means for performing the disclosed function, or a method or process for attaining the disclosed result, or a class or group of substances or compositions, as appropriate, may, separately or in any combination of such features, be utilised for realising the invention in diverse forms thereof.

Claims

1. A screen (10) for an opening (11) comprising a plurality of elongate elements (12a-12q) pivotally connected together in a criss cross pattern to provide a generally rectangular assembly (12) which is foldable and unfoldable between an extended condition in which the screen (10) closes the opening (11), and a folded condition in which access may be gained through the opening (11), the screen (10) further comprising along each of two opposite sides, a side member (14,15), at least some of the elongate elements (12a-12q) each being retained at one end thereof relative to a respective side member and being movable axially of the respective side member (14,15) during folding and unfolding of the screen (10), one of the side members (14) being fixed relative to the opening (10) and the other side member (15) being slidable across the opening to effect folding and unfolding of the screen characterised in that each side member (14,15) is, at least in the regions where the one ends of the elongate elements (12a-12q) are retained thereby, of re-entrant channel configuration and the retained ends of the respective elongate elements (12a-12q) each carry a guide means (32) which is entrapped in the re-entrant channel (14,15) along the entire extent of axial movement of the one end of the respective elongate element (12a-12q).

2. A screen according to claim 1 characterised in that the side members (14,15) are made by rolling and have a complex re-entrant configuration.

3. A screen according to claim 1 or claim 2 characterised in that each side member (14,15) comprises a base (24) having a pair of limbs (25,26) extending therefrom, the free ends of the limbs (25,26) being in-turned to provide front wall parts (27,28), the front wall parts (27,28) themselves each being in-turned to provide lips (29,30) which extend inwardly of the channel.

4. A screen according to claim 3 characterised in that the limbs (27,28), front wall parts (27,28), and lips (29,30) each provide a track for the respective guide means (32) whereby the guide means (32) can move along the channel and be retained by the channel.

5. A screen according to any one of the preceding claims characterised in that each of the guide means (32) comprises a roller mecha-

nism including at least one roller (37,38; 37a,38a) and an axle (35,35a) which passes through an opening in an end in a respective elongate element (12a-12q) thereby to retain the end of the elongate element (12a-12q) in the channel.

6. A screen according to claim 5 characterised in that the guide means (32) comprises a pair of rollers (37,38) carried on the axle (35), each of the rollers (37,38) being rotatable relative to the axle (35), or fixed relative to the axle (35), the end of the elongate element (12a-12q) being pivotable relative to the axle (35).

7. A screen according to any one of the preceding claims, characterised in that the security screen (10) comprises a further side member (19) which in use is fixed relative to an opposite side of the opening (11) to the fixed side member (14).

8. A screen according to claim 7 characterised in that the slidable side member (15) and the further side member (19) each carry components of a locking mechanism (L) whereby the slidable side member (15) can be locked to the further side member (19) with the screen (10) in its extended condition.

9. A screen according to any one of the preceding claims characterised in that the screen (10) comprises top and bottom members (17,18) which at least receive and conceal the ends of the pivotally connected elongate elements (12a-12q) at the respective top and bottom of the generally rectangular assembly (10) of elongate elements.

10. A screen according to claim 9 characterised in that the top and/or bottom member (17,18) comprises a re-entrant channel configuration, the ends of the elongate elements (12a-12q) being received in the re-entrant channel and the slidable side member (15) carrying a guide means (58-60) at at least one end thereof, which moves along the channel (18) and is trapped in the channel, thereby to facilitate sliding of the slidable side member (15), and to retain the movable side member (15) relative to the top (17) and/or bottom members (18).

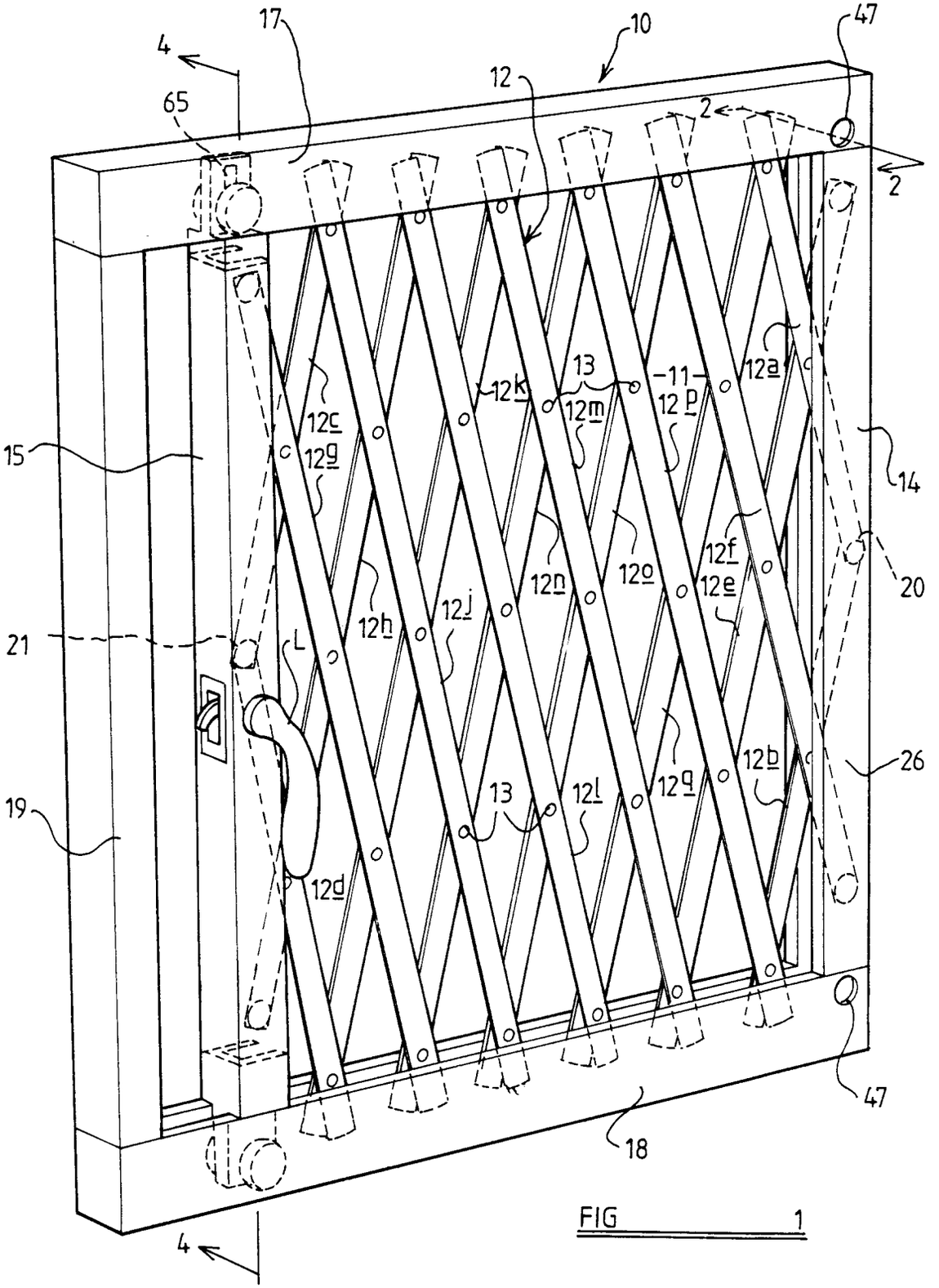
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FIG 1

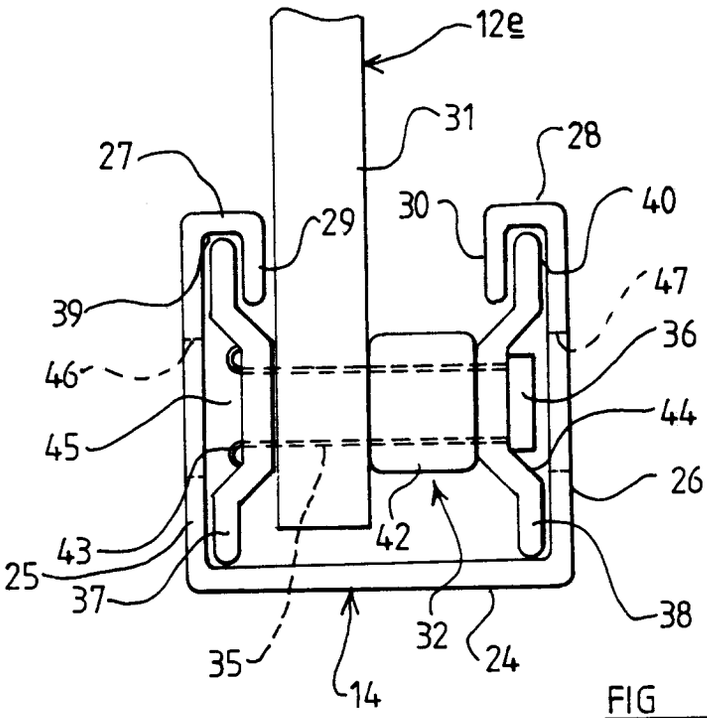
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FIG 2

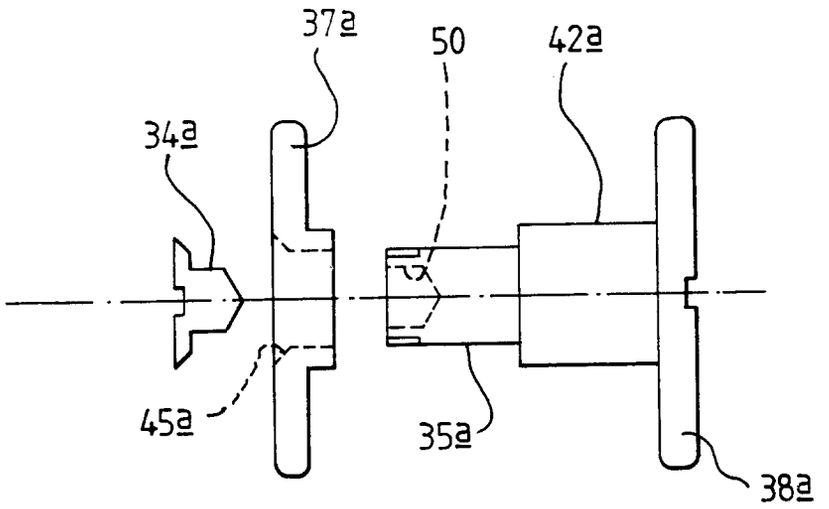
37a
50
42a
34a
45a
35a
38a

FIG 3

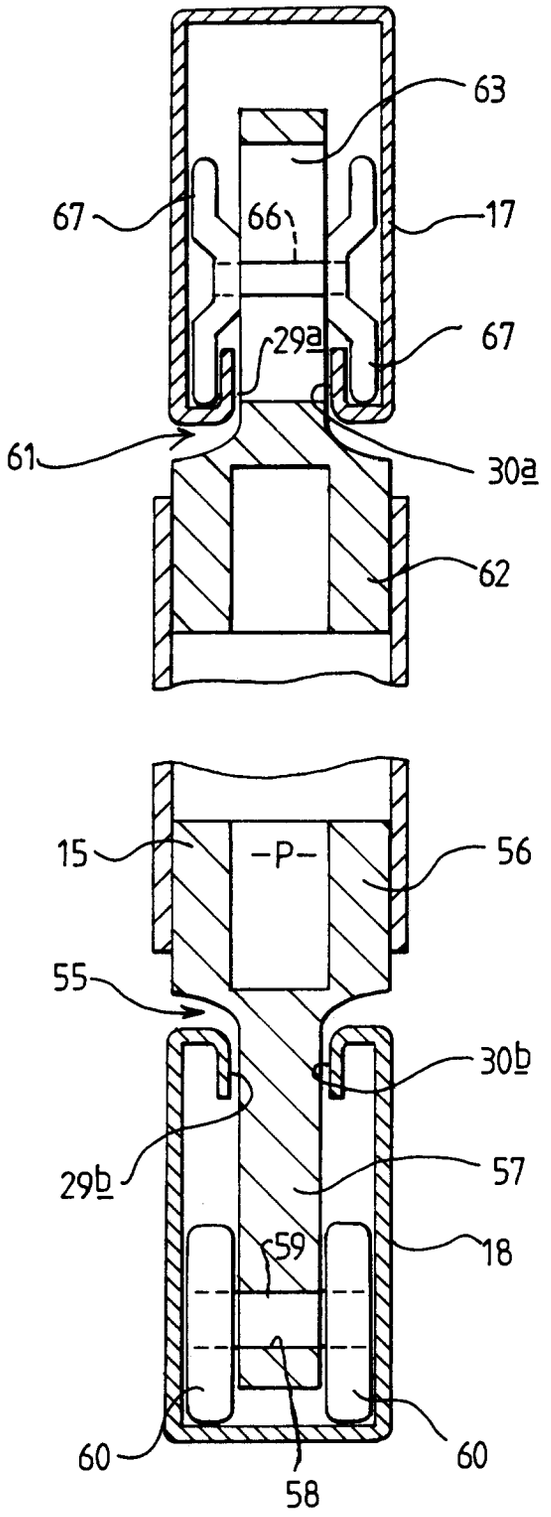

FIG 4

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 93 11 9117

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.5)
Y	GB-A-2 224 073 (GALVIN) * page 5, line 15 - page 7, line 12 * * page 12, line 5 - page 13, line 19; figures *	1,2,5-10	E06B9/06
A		3,4	
Y	AU-B-596 065 (GINKS) * page 4, line 15 - page 5, line 32 *	1,2,5-10	
A	GB-A-1 273 114 (QUINONES ET AL) * the whole document *	1-10	
A	US-A-3 417 805 (KAUFMAN) * the whole document *	1-10	

TECHNICAL FIELDS SEARCHED (Int.Cl.5)

E06B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	10 March 1994	Kukidis, S

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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