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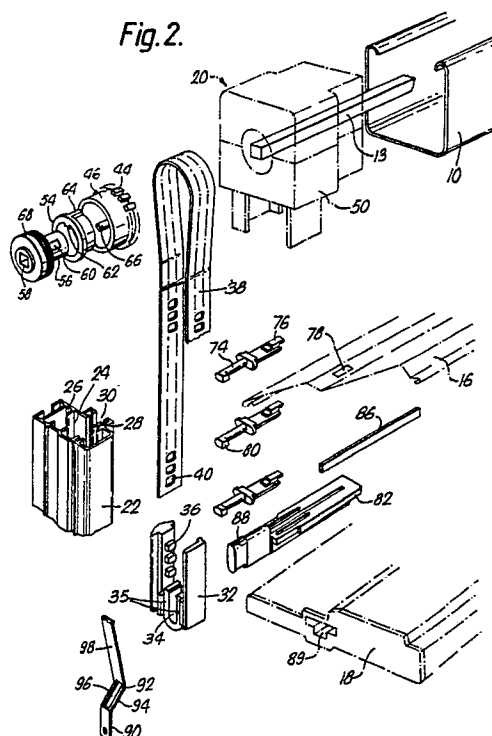
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54 **Venetian blind assembly.**

57 A venetian blind assembly particularly for external use, in which a flexible drive element (38) is driven by a drive member (46) and is guided in a side member (22) of the assembly, the tape carrying a slider (32) at its lower end, this being provided with an open-topped recess (34) in which is engaged the end (88) of a guide element (82) attached to the bottom rail (18). The end (88) can be disengaged from the recess (34) if the bottom rail and/or the slider are forced apart in the relevant direction. A latch (90) may be provided to prevent the bottom rail (18) from being raised manually when in its lowermost position. The slider (32) is used to flatten the latch in normal operation of the blind so that the latch is not operational.

Fig. 2.



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## VENETIAN BLIND ASSEMBLY

The present invention relates to venetian blind assemblies.

Venetian blinds are traditionally mounted on the inner side of a window, although it is also quite common for them to be mounted on the outside. A problem arises with these blinds on the outside insofar as they are subject to weather conditions which can adversely affect their performance. In particular wind, rain and most importantly snow can affect the satisfactory operation of a venetian blind.

One form of exterior venetian blind includes a conventional headrail and bottom rail and two side members which each include a guideway and a guide slot which extend generally longitudinally of each side member, each guide slot opening towards the other side member. A plurality of venetian blind slats extend generally horizontally between the side members and have pins extending laterally therefrom to be movable in the guide slots of the side member. A flexible drive element, for example in the form of a chain, is associated with and movable in each of the side members for raising and lowering the blind. A drive shaft extends longitudinally through the headrail and is rotatable about its axis, means being provided to rotate the drive shaft in each of two opposite rotational senses. A tilter is usually associated with the drive shaft and is adapted to tilt the slats by means of collapsible slat supporting means, such as cords or tapes.

While such blinds are generally satisfactory, in the adverse weather conditions mentioned above, the operation can be most unsatisfactory and can cause jamming of the bottom rail.

It is now proposed, according to the present invention, to provide a venetian blind assembly comprising a headrail, a bottom rail, two side members each including a guideway and a guide slot, extending longitudinally of each side member, each guide slot opening towards the other side member, a plurality of venetian blind slats extending generally horizontally between said side members, pins extending laterally from said slats and movable in the guide slots of the side members, a flexible drive element associated with and movable in each of the side members for raising and lowering the blind, a drive shaft extending longitudinally through the headrail and rotatable about its axis, means to rotate the drive shaft in each of two opposite rotational senses, a tilter driven by said drive shaft and adapted to tilt the slats, by means of collapsible slat supporting means, two drive members mounted one adjacent each end of the headrail and rotatable by the drive shaft, each flexible drive element extending up from its side

member to a separate one of the drive members to be driven thereby a slider movable in the guideway of each side member and attached to the associated drive element, a laterally extending guide element on each end of the bottom rail, positioned to extend through said guide slot and to engage the slider of the associated side member, an open-topped recess in each slider receiving the relevant guide element, each guide element being capable of disengaging from the open-topped recess of the associated slider when the bottom rail and/or the slider are forced in the relevant direction.

With such a structure, because each slider includes an open-topped recess which receives the relevant guide element, should the bottom rail be blocked in its downward passage, e.g. by snow, then the guide element will disengage from its open-topped recess in the associated slider so that the slider can continue to move downwardly. This prevents jamming of the drive system, which is allowed to continue and complete its operating cycle, while the bottom rail remains in its temporarily blocked position. Any damage to the flexible drive element or other associated parts is thereby prevented, while restoring the blind to subsequent operation is made easier.

It is generally advantageous that the slats themselves are not in the fully closed position during raising and lowering of the blind, while tilting to the full closure position should remain possible in the fully lowered position of the blind. Furthermore, it would be advantageous if the slats in the lowered position of the blind could be returned to their open tilt position without immediately raising the blind and preferably, therefore, the drive members are driven by the drive shaft via a lost motion connection and this may comprise, adjacent each drive member, a first member driven directly by the drive shaft, a first abutment on each first member, an intermediate member positioned between each first member and its associated drive member, second and third abutments on said intermediate members and a fourth abutment on each drive member, the first and second abutments being engaged with one another after initial rotation of the first member, whereafter the intermediate member rotates with the first member and the third and fourth abutments are subsequently engageable with one another after further rotation of the first and intermediate members, whereafter the drive member rotates with these members.

Advantageously, a coil spring is interposed between said first member and said drive member, said coil spring having a radially extending end engageable with said first member and expansible

and contractable to act as a friction clutch between said first member and said drive member to induce additional friction in a rotational sense corresponding to the lowering movement of said bottom rail, while reducing friction in the reverse rotational sense.

In order to ensure the smooth operation of the flexible drive element, each side member is preferably of a continuous shaped profile which includes first and second tracks wherein said flexible drive element is capable of being moved under tension and compression and guided in the guide tracks of the associated side member, and wherein each flexible drive element extends up from the first guide track of its side member over a separate one of the drive members to be driven thereby and then down through the second guide track of that side member.

While the flexible drive element may take many forms, in a preferred construction, it comprises a tape made of a plastics material such as that sold by E.I. Du Pont de Nemour under the Trade Mark DYMETROL, this tape being provided with equally spaced apertures therein, and each drive member includes teeth drivingly engageable in these apertures. Each slider advantageously itself has projections engageable in the apertures to hold the slider in place with respect to the flexible drive element.

In order further to ensure smooth operation, the assembly includes, positioned at the top of each profiled side member, a support base having bearing surfaces for mounting the associated drive members, and guide surfaces shaped to guide smoothly the flexible drive element as it passes over the drive member.

In order to assist in the security of the building with which the venetian blind assembly of the invention is associated, advantageously the assembly further comprises latches mounted adjacent, but spaced from, the lower ends of the side members, said latches being positioned to engage the guide element therein when the bottom rail is in its lowermost position and which are effective, when the bottom rail is externally lifted out of the recess in the associated slider which is then being retained by its drive element, thereby to prevent the rail being lifted further, said slider when driven to raise or lower the bottom rail, normally retracting the latch to enable the bottom rail to be lifted and lowered by movement of the slider under the action of the drive element without obstruction from the latches.

In this way the blind will be retained against wind loads during adverse weather conditions and it will be difficult for a prospective burglar to break into the building because the latches will prevent the bottom rail from being raised and will allow the

venetian blind to act as a locked shutter.

Preferably, the latches each comprise a leaf spring extending vertically within the side member, the leaf spring being secured at one end to the side member and having a raised central portion at the junction of upper and lower ramps, and an aperture formed in the lower ramp, said aperture being engageable by the guide element on the end of the bottom rail adjacent thereto, when the bottom rail is manually raised, the two ramps normally being flattened towards the side member by the slider to enable the guide element to move past.

In order that the invention may more readily be understood, the following description is given, merely by way of example, reference being made to the accompanying drawings, in which:-

Figure 1 is a perspective view of a portion of one embodiment of venetian blind assembly according to the invention;

Figure 2 is an exploded perspective view of the embodiment shown in Figure 1; and

Figure 3 is an enlarged section through the lost motion connection of the assembly of Figures 1 and 2.

Referring first to Figure 1 and 2, there is illustrated an external venetian blind assembly including a conventional headrail 10 incorporating a tilter 12 driven in rotation by a drive shaft 13 (Figure 2) to operate tilt cords 14. A plurality of slats 16 are caused to tilt by the cords 14 and mounted below these is a bottom rail 18. A housing at each longitudinal end of the headrail 10 carrying a lifting mechanism is indicated by the general reference numeral 20. On the lefthand side as indicated and also on the righthand side (not shown) is a side member 22, the other side member being a mirror image of the side member shown in the drawing. Each side member is formed as an extrusion of metal, such as aluminium or an alloy, the extrusion having a constant cross-section. This cross-section includes a guideway 24, first and second guide tracks 26 and 28 and a guide slot 30, the latter opening in a direction to face the other side member. Longitudinally slidable within the guideway 24 is a slider 32 which can be formed of a plastics material and including an open-topped recess 34 and a number of projections 36. Guided within the first and second tracks 26, 28 is a flexible drive member 38 formed of a plastics material sold by E.I. Du Pont de Nemour under the Trade Mark DYMETROL, this being provided with a series of equally spaced apart apertures 40, the spacing of which is such as to enable the projections 36 to engage in the lowest three apertures 40. The spacing is also chosen so that the apertures can engage circumferentially spaced teeth 44 on a drive member 46 over which the flexible drive element 38 passes.

Drive member 46 is mounted within the lift mechanism housing 20 in a bearing 48 of a support base 50 engaged in the upper end of the side member, this being provided with guide surfaces 52 shaped to guide the tape smoothly into the tracks 26, 28.

Associated with the drive member 46 is an intermediate member 54 which is mounted for limited rotation within the drive member 46. Mounted within the intermediate member 54 is a first member 56 having a square cross-section opening 58 for engagement over the drive shaft 13. The first member 56 includes a first abutment 60 engageable with a second abutment 62 on the intermediate member. A third abutment 64 on the intermediate member is engageable with a fourth abutment 66 on the drive member 46. Surrounding the first member 56 is a coiled clutch spring 68 having a radially extending end 70 engageable in one of several slots 72 formed on the drive member 46.

Each slat 16 is provided at each end with a pin 74 having a clip 76 at one end to engage in an opening 78 of the slat, and at the other end with a rearwardly or forwardly extending arm 80. The pin 74 is dimensioned to engage in the guide slot 30, the arms 80 being used to restrain the pin in this slot.

In a similar way the bottom rail 18 is provided with a guide element 82 engaged in an opening 84 in the end of the bottom rail. The guide element 82 which may be provided with an additional reinforcement strip 86 which is formed with an end portion 88 shaped to pass through the guide slot 30 and engage in the open-topped recess 34 of the slider 32.

Adjacent the bottom of each side member 22, within the guideway 24, is a latch 90 in the form of a leaf spring secured at its lower end by a screw or the like (not shown), the leaf spring including a raised central portion 92 formed by a lower ramp 94, having an aperture 96 therein, and an upper ramp 98. The latch 90 is so positioned that, in normal operation, it is flattened by the slider 32 riding over the raised portion of the latch. In the lowermost position of the blind, the slider is below the latch with the upper end of the aperture 96 located immediately above the end portion 88 of the guide element 82.

The latch is designed as a general retaining device and also as an anti-theft device so that if somebody raises the external blind by grabbing the bottom rail 18 and raising it, because the slider 32 is positively held at the lower position, with the raised central portion 92 slightly above the recess 34 of the slider, the end portion 88 of the guide element 82 will engage in the aperture 96 and thereby be prevented from raised any further. However, if one then operates internally the drive mem-

ber 46, the drive element 38 will pull the slider 32 upwardly and the edge 35 of the recess 34 will engage the lower ramp 94 and thereby flatten the latch leaf spring to disengage the aperture 96 from the end of the guide element 88.

Drive to the tilter from the drive shaft 13 is provided by a conventional clutch arrangement which allows the drive shaft to continue to rotate after the slats have been fully tilted in either direction.

In operation of the assembly of the invention, assuming that the bottom rail 18 is initially at the lowered position with the slats tilted to their closed position, rotation of the drive shaft 13 in the direction of raising of the blind will cause the first member 56 to rotate thus allowing the tilter to operate to bring the slats to the horizontal, open position. Because of the lost motion connection provided by the abutments 60, 62, 64, 66, and the contraction of the clutch spring 68 in this rotational sense, there will be a rotation of the first member 56 of approximately one and a half turns before the drive member 46 starts to rotate. When this begins, the tape 38 will pull the slider upwardly on each side of the blind, and this will cause the bottom rail to be raised, thereby opening the blind.

In reverse operation, that is with the drive shaft operated in the opposite rotational sense, gravity will pull the bottom rail and thus the slider on each side downwardly by an amount allowed by the drive element 38. Should there be some minor obstruction, caused, for example, by ice, the coil spring 68 will expand and produce sufficient friction to initially allow some continued movement of the drive member 46 with the first member 56 and thereby will provide a greater force, whereby the slider is positively urged downwardly in addition to the gravitational force. When the slider arrives at the lowermost position on the sill of the window, the lost motion connection will permit approximately one and a half turns of further rotation of the drive shaft, once the predetermined amount of friction provided by the expanding coil spring 68 has been exceeded, thereby producing sufficient lost motion to enable tilting in both directions without movement of the bottom rail.

On the other hand, should for some reason or the other the bottom rail be stopped, for example, as a result of a build up of snow on the sill on one side or the other, then this will prevent the bottom rail from dropping further, but the slider can continue to move downwardly with the end portion 88 of the guide element 82 lifting out of the open-topped recess 34, so that no damage occurs to the drive tape 38 or to the drive member 46 or its associated parts. Furthermore, no jamming of the bottom rail will be induced. If the snow or other obstruction is then cleared away, then the end of

the guide element 82 can be re-engaged in the recess 34 of the relevant slider and the blind can continue to operate properly.

## Claims

1. A venetian blind assembly comprising a headrail (10), a bottom rail (18), two side members (22) each including a guideway (24) and a guide slot, extending longitudinally of each side member, each guide slot (30) opening towards the other side member, a plurality of venetian blind slats (16) extending generally horizontally between said side members (72), pins (74) extending laterally from said slats and movable in the guide slots (30) of the side members (22), a flexible drive element (39) associated with and movable in each of the side members (22) for raising and lowering the blind, a drive shaft (13) extending longitudinally through the headrail (10) and rotatable about its axis, means to rotate the drive shaft (13) in each of two opposite rotational senses, a tilter (12) driven by said drive shaft (13) and adapted to tilt the slats (16), by means of collapsible slat supporting means (14), two drive members (46) mounted one adjacent each end of the headrail and rotatable by the drive shaft (13), each flexible drive element (38) extending up from its side member to a separate one of the drive members to be driven thereby, a slider (32) movable in the guideway (24) of each side member and attached to the associated drive element (38), a laterally extending guide element (82) on each end of the bottom rail, positioned to extend through said guide slot (30) and to engage the slider (32) of the associated side member, an open-topped recess (34) in each slider (32) receiving the relevant guide element, each guide element (82) being capable of disengaging from the open-topped recess (34) of the associated slider when the bottom rail (18) and/or the slider (32) are forced in the relevant direction.

2. An assembly according to claim 1, wherein said drive members (46) are driven by the drive shaft (13) via a lost-motion connection.

3. An assembly according to claim 2, wherein said lost-motion connection comprises, adjacent each drive member (46) a first member (56) driven directly by the drive shaft (13), a first abutment (60) on each first member (56), an intermediate member (54) positioned between each first member (56) and its associated drive member (46), second (62) and third abutments (64) on said intermediate members (54) and a fourth abutment (66) on each drive member (46), the first and second abutments being engaged with one another after initial rotation of the first member (56), whereafter the intermediate member (54) rotates with the first member and

the third and fourth abutments are subsequently engageable with one another after further rotation of the first and intermediate members, whereafter the drive member (46) rotates with these members.

4. An assembly according to claim 3, wherein a coil spring (68) is interposed between said first member (56) and said drive member (46), said coil spring having a radially extending end (70) engageable with said first member (56) and expandable and contractable to act as a friction clutch between said first member (56) and said drive member (46) to induce additional friction in a rotational sense corresponding to the lowering movement of said bottom rail, while reducing friction in the reverse rotational sense.

5. An assembly according to any preceding claim, wherein each side member (22) is of a continuous shaped profile which includes first and second guide tracks (26, 28), wherein said flexible drive element (38) is capable of being moved under tension and compression and guided in the guide tracks (26, 29) of the associated side member, and wherein each flexible drive element (38) extends up from the first guide track (26) of its side member over a separate one of the drive members (46) to be driven thereby and then down through the second guide track (20) of that side member.

6. An assembly according to any preceding claim, wherein the flexible drive element (30) is a plastics material drive tape provided with equally spaced apertures (40) therein, and wherein each drive member (46) includes teeth (44) drivingly engageable in said apertures (40).

7. An assembly according to claim 6, wherein each slider (32) has projections (36) engageable in said apertures (40) to hold said slider (32) in place with respect to said flexible drive element (38).

8. An assembly according to any preceding claim and further comprising, positioned at the top of each profiled side member (22), a support base (50) having bearing surfaces (48) for mounting the associated drive members (46), and guide surfaces (52) shaped to guide smoothly the flexible drive element (39) as it passes over the drive member (46).

9. An assembly according to any preceding claim, and further comprising latches (90) mounted adjacent, but spaced from, the lower ends of the side members (22), said latches (90) being positioned to engage the guide element (82) therein when the bottom rail (18) is in its lowermost position and which are effective, when the bottom rail is externally lifted out of the recess (34) in the associated slider (32) which is then being retained by its drive element (38), thereby to prevent the rail (18) being lifted further, said slider (32) when driven to raise or lower the bottom rail (19), normally retracting the latch (90) to enable the bottom

rail (18) to be lifted and lowered by movement of the slider (32) under the action of the drive element (38) without obstruction from the latches (90).

10. An assembly according to claim 9, wherein the latches (90) each comprise a leaf spring extending vertically within the side member, the leaf spring being secured at one end to the side member (22) and having a raised central portion (92) at the junction of upper (98) and lower (34) ramps, and an aperture (96) formed in the lower ramp (94), said aperture (96) being engageable by the guide element (82) on the end of the bottom rail (18) adjacent thereto, when the bottom rail (18) is externally raised, the two ramps (94,98) normally being flattened towards the side member by the slider (32) to enable the guide element (82) to move past.

11. An assembly according to any preceding claim, wherein said pins (74) associated with each slat (16) have forwardly or rearwardly extending arms (80) to restrain the pins in the guide slots (30).

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*Fig.1.*

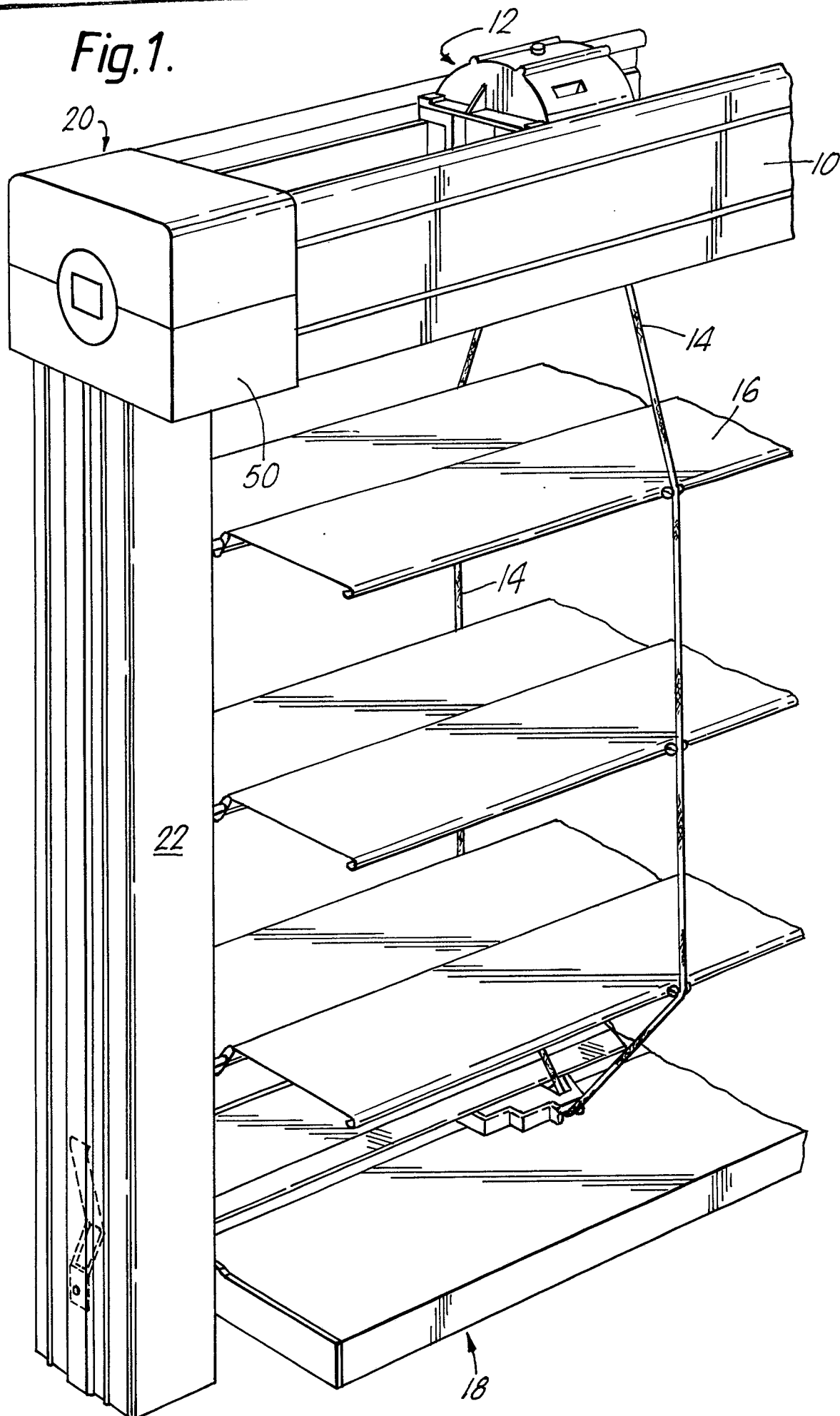
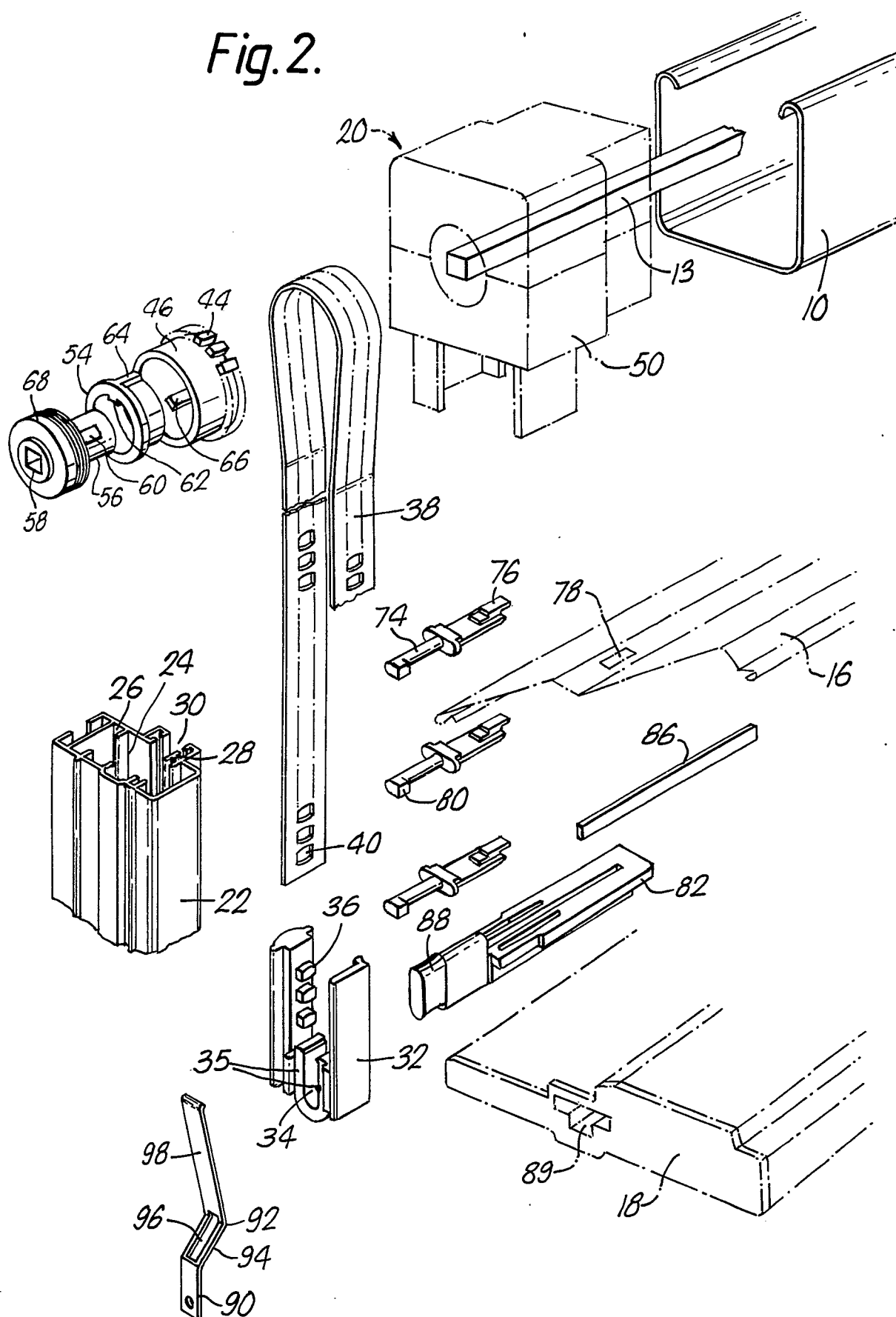


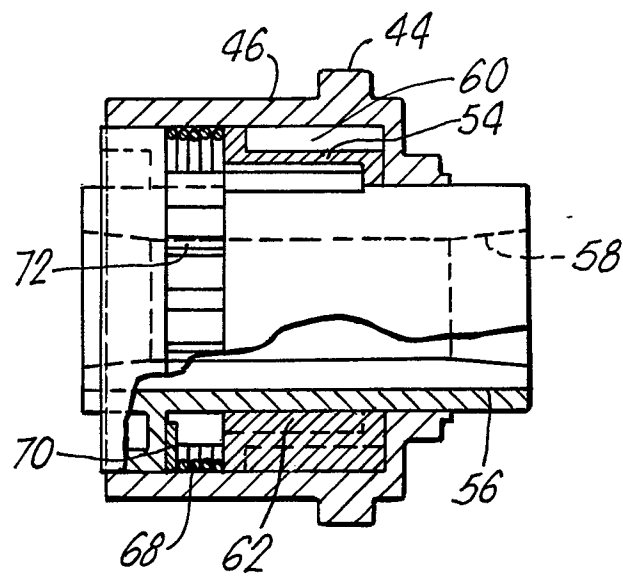
Fig. 2.





Neu eingereicht / Newly filed  
Nouvellement déposé

*Fig.3.*





| 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.3) |
| A                                                                                                                                                                                                                       | US-A-2 639 766 (PRATT)<br>* Column 4, lines 43-46,60-62; column 6, lines 30-40; figure 15 *<br>--- | 1                                                                                                                                                                                                                                                                                     | E 06 B 9/32                                   |
| A                                                                                                                                                                                                                       | DE-A-3 037 701 (AMNSLER)<br>* Page 5, paragraphs 1,2; pages 10,11 *<br>---                         | 1                                                                                                                                                                                                                                                                                     |                                               |
| A                                                                                                                                                                                                                       | DE-A-2 657 004 (GROSS)<br>* Page 8, paragraph 2 *<br>---                                           | 2                                                                                                                                                                                                                                                                                     |                                               |
| A                                                                                                                                                                                                                       | US-A-4 199 019 (FREI)<br>* Column 1, lines 13,14,37-43 *<br>-----                                  | 1                                                                                                                                                                                                                                                                                     |                                               |
|                                                                                                                                                                                                                         |                                                                                                    |                                                                                                                                                                                                                                                                                       | TECHNICAL FIELDS SEARCHED (Int. Cl.3)         |
|                                                                                                                                                                                                                         |                                                                                                    |                                                                                                                                                                                                                                                                                       | E 06 B 9/00                                   |
| The present search report has been drawn up for all claims                                                                                                                                                              |                                                                                                    |                                                                                                                                                                                                                                                                                       |                                               |
| Place of search                                                                                                                                                                                                         | Date of completion of the search                                                                   | Examiner                                                                                                                                                                                                                                                                              |                                               |
| THE HAGUE                                                                                                                                                                                                               | 30-05-1989                                                                                         | KUKIDIS S.                                                                                                                                                                                                                                                                            |                                               |
| CATEGORY OF CITED DOCUMENTS                                                                                                                                                                                             |                                                                                                    | T : theory or principle underlying the invention<br>E : earlier patent document, but published on, or after the filing date<br>D : document cited in the application<br>L : document cited for other reasons<br>.....<br>& : member of the same patent family, corresponding document |                                               |
| X : particularly relevant if taken alone<br>Y : particularly relevant if combined with another document of the same category<br>A : technological background<br>O : non-written disclosure<br>P : intermediate document |                                                                                                    |                                                                                                                                                                                                                                                                                       |                                               |