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(54) **Awning mechanism**

Markisenmechanismus

Mécanisme pour store

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Description

This invention relates to extendable and retractable awnings of the type commonly fitted above doors and windows. Such awnings conventionally consist of a fabric canopy and a supporting structure for the canopy. The supporting structure usually comprises an elongated chassis which in use is fixed in a horizontal position to the wall of the building or other structure on which the awning is to be installed. The chassis is associated with a roller for storing the awning fabric, a front bar to which the leading edge of the fabric is attached, and articulated arms connecting the chassis to the front bar so that the front bar can be displaced away from or towards the wall, thus extending or retracting the awning, respectively. In some cases no chassis is provided and the arms are simply mounted on separate horizontally-spaced end brackets. Although the arms are generally articulated in some cases other types of arms (e.g. rigid arms) are used. Where a chassis is included this may simply be an elongated metal bar to which the arms are clamped or alternatively may be a shaped extrusion (usually of aluminium) which also forms part of a housing for the fabric.

A winding mechanism (which may be motorized or manually operated) is provided to open and close the awning. In the open position, such awnings are always arranged to slope downwardly away from the wall. One reason for this is that it prevents rainwater from accumulating on the awning fabric. The arms are often spring-loaded towards the open position.

One type of conventional retractable awning is of the cassette type. In that case, when closed, the whole awning mechanism, including the fabric, is housed in an elongated rectangular box or cassette which is fitted horizontally above the door or window which the awning is to shield. The front face of the box forms the front bar mentioned above to which the leading edge of the awning fabric is attached. In the closed position, in which the awning fabric and mechanism are stored within the cassette, the front face forms a cover which closes the box, and the awning is completely enclosed within the cassette. As the awning is opened, the front face of the cassette is displaced outwardly, carrying the leading edge of the fabric with it and thus causing the awning fabric to unroll.

Another type of conventional awning, known as the blind box type, is similar except that instead of being housed in a cassette the awning mechanism and awning fabric are fitted into a horizontally-extending recess formed in the wall above the door or window to be shielded. Conventionally, the recess is 10 inches x 10 inches in cross-section. The front bar, to which the leading edge of the fabric is attached, is in this case shaped to form a cover for the recess when the awning is in the retracted position.

In both of these cases, as the awning is extended, it is necessary for the front bar forming a cover for the cassette or recess to move directly outwards for a short distance so as to clear the cassette or recess, before moving to a lower position to provide the desired angle of slope of the fabric when the awning is open. The mechanism must be locked in this lower position to prevent the awning from being blown up by gusts of wind.

Generally, the initial outwards movement of the front bar is horizontal, but this would not be the case if for example the awning is mounted on a sloping structure.

WO 8908175 discloses an adjustable tilting limiter for a roller blind in which the tilting limiter mechanism is incorporated in the region of the mounting tube and comprising a mounting trough open on one side and closed at the rear by a mounting plate with a pillow block in which the adjusting mechanism for the actual tilting mechanism is pivotally mounted. The mounting tube is connected to either side of the mounting trough by short tubular connecting pieces which can be connected telescopically to the actual mounting tube.

In the case of existing awning mechanisms, the awning is simply allowed to fall under gravity from the initial horizontal position to the final sloping position. This clumsy movement is noisy and puts an undesirable strain on the mechanism and could lead to early component failure, particularly as the size and therefore the strength of the components is limited by the space available to them. Locking of the mechanism in the lower position is generally ensured by a locking pin.

In contrast, this invention provides an awning mechanism in which the transition between the initial movement directly out of the recess or cassette to the desired angle of slope is accomplished smoothly and in a controlled manner.

According to the invention there is provided an awning mechanism comprising mounting means to be fixed to a wall or other structure to permit mounting of at least one supporting arm, the or each arm being pivotally attached to the mounting means so that it can move from a closed position in which it is parallel to the wall to an open position in which it extends outwardly and downwardly from the wall, the or each arm being fixed to the mounting means by a first joint which allows both outward pivotal movement about a first pivotal axis and downward rotational movement of the arm, but which does not allow the first pivotal axis to move horizontally relative to the mounting means, and a second joint spaced from the first joint in the vertical direction which allows outward pivotal movement of the arm about a second pivotal axis and downward rotational movement of the arm, the second pivotal axis being horizontally displacable relative to the first pivotal axis.

We also provide an awning incorporating such a mechanism.

The second joint acts as a control joint and positively controls the downward rotational movement of the arm as it is pivoted outwards.

The horizontal relationship between the first and second pivotal axes is preferably adjustable (e.g. by pro-

viding for horizontal displacement of the second pivotal axes) and the selected relative position determines the angle of slope of the arm in the open position.

In fact, if the first and second pivotal axes are vertically aligned in the closed position, the arm will pivot directly outwards and will not change its slope. In a preferred construction, the mounting means is provided on an elongate chassis and preferably includes at any point along the length of the chassis where an arm is required a pair of horizontal bars of circular cross-section spaced apart in the vertical direction. Each pair of horizontal bars is associated with one of the articulated arms. To the lower bar of each pair of bars is fitted the first joint which comprises a first or lower sleeve which can rotate around the bar but which is fixed in the horizontal direction. This permits the downward rotation of the arm whilst fixing the arm relative to the chassis in the horizontal direction. In fact, the lower horizontal bar may be replaced by a simple pivot. The articulated arm is attached to the first or lower sleeve so that it can swing outwardly about a first pivotal axis. The upper circular cross-section bar carries the second joint which comprises a second or upper sleeve and the upper sleeve can both rotate around the bar and slide along it. The upper sleeve is connected to the articulated arm proper by a control arm rigid with the articulated arm in the plane in which the arm moves about the first pivotal axis so that it can swing outwards relative to the upper sleeve about a second pivotal axis. Preferably, the relative horizontal positions of the two sleeves can be adjusted by adjusting the effective length of the control arm, (e.g. by the installer) thus enabling the slope adopted by the articulated arm, and thus the slope of the awning fabric, to be selected.

The control arm is as rigid as possible with the articulated arm in the direction of pivotal movement of the articulated arm, and rigid cheek plates or other means may be provided on the inner end of the articulated arm to restrain any tendency of the control arm to move laterally. However, the pivotal axis of the control arm should be capable of slight movement relative to the pivotal axis of the articulated arm in a plane transverse to the plane of movement of the articulated arm about the first pivotal axis to allow the mechanism to accommodate without excessive stress the complexities of the swinging motion.

Each articulated arm preferably consists of elongated inner and outer parts connected by a hinge. The inner part of each articulated arm is connected to the chassis or other means of mounting the arm to a wall or other structure as described above and to the outer part of each articulated arm by a hinge. The outer part of each articulated arm is preferably pivotally connected a front bar to which the front surface of the blind fabric is attached. The articulated arms are preferably spring-biased towards the open position.

The chassis or other mountingmeans for the arms is preferably associated with a roller around which the fabric is stored when the awning is in the retracted position, and a housing for the roller. Where a chassis is provided this is preferably formed as an elongate aluminium extrusion having a part-cylindrical hollow portion which acts as a housing for the fabric roller.

An awning mechanism in accordance with the invention, and an awning incorporating it, will now be described by way of example only and with reference to the accompanying drawings, in which:

Fig.1 shows, partially broken away, an awning in accordance with the invention in an extended position;
Fig.2 shows, in perspective, the pivot mechanism for the arm in a partially-extended position;
Fig.3 shows, in front elevation, the pivot mechanism with the arm in the fully retracted position; and
Fig.4 is a plan view corresponding to Fig.3 in which the pivot mechanism with the arm in the fully extended position is shown in broken lines.
Fig.5 is a view corresponding to Fig.2 showing a variant of the pivot mechanism.

Fig.1 shows a cassette-type awning, in which the awning fabric and the supporting mechanism is fully enclosed within a cassette mounted in a horizontal position on a wall of a building above a door or window to be shielded. The cassette consists of a chassis 1 having wall mounting brackets 17 and a front bar 2 which is shaped so as to close the front of the cassette when the awning is fully retracted. When closed the awning fabric 7 is stored on a roller (not shown) within the chassis 1 and the leading edge of the fabric 7 is attached to the front bar 2. The front bar 2 is attached to the chassis by a pair of spaced articulated arms 3. Each arm 3 consists of an inner portion 4 and an outer portion 5 connected at a hinge 8. The inner end of the inner arm portion 4 is attached to the chassis by a joint means shown generally at 6. The outer end of each of the outer arms 5 is pivotally attached to the front bar 2. The arms house springs (not shown) which urge them in conventional manner towards the open position.

When the awning is opened, by virtue of the pivot mechanism which will be described in more detail below, the front bar 2 carrying the leading edge of the fabric 7 begins to move in a horizontal direction out from the chassis 1 and, as it clears the chassis, gradually moves downwardly as it moves outwardly relative to the chassis until, when the awning is fully extended, the awning fabric has achieved the desired angle of slope.

Fig.2 shows the joint means 6 between the inner part 4 of the arm 3 and the chassis 1 in more detail.

The chassis is provided with upper and lower horizontal bars of circular cross-section, 9 and 10 respectively. First and second sleeves 12 and 11 respectively are fitted to bars 10 and 9. First or lower sleeve 12 is rotatable around bar 10 but is fixed so that it cannot move relative to the bar 10 in the horizontal direction. The inner arm portion 4 is attached to sleeve 12 by a

pivot having a pivotal axis 13 which allows the arm portion 4 to swing outwardly from the chassis 1.

A control arm 14 is fitted to the top surface of inner arm portion 4, and its inner end is mounted at pivot axis 15 to a second or upper sleeve 11, to allow the outward swinging movement of the arm portion 4. To achieve this the inner end of control arm 14 is divided into spaced parallel sections 14a and 14b between which a lug on upper sleeve 11 is pivotally attached. The joint between the control arm and the upper sleeve has to be strong enough to accommodate the large tensile forces between the control arm and the sleeve and to ensure that the two components remain aligned even at maximum displacement of the articulated arm, even when acting as a strut rather than a tie rod as in upward wind loading. Second or upper sleeve 11 is mounted on bar 9 so that it can both rotate around the bar and slide along it in a horizontal direction. Control arm 14 can be displaced longitudinally relative to arm portion 4 thus altering its effective length by unfastening and re-tightening adjustment bolts 16.

When the awning is closed, inner arm portion 4 is horizontal and lies parallel to and alongside the chassis 1. Outer arm portion 5 is folded back against inner arm portion 4 and the front bar 2 fits against the front edge of chassis 1, thereby forming with it a closed cassette in which the entire mechanism, including the fabric, is stored. To achieve the desired angle of slope of the awning fabric, the effective length of the control arm 14 is adjusted so that pivotal axis 15 of control arm 14 is horizontally displaced from the pivotal axis 13 by the appropriate distance. As a result of this, as the arm portion 4 is pivoted outwardly the control arm 14 forces the arm portion 4 to swing downwardly as shown in Fig.2. An angle of drop adjustable between, say, 0° and 55° may be easily provided. It is important that the control arm 14 should not be able to move relative to articulated arm portion 4 in the plane in which the arm portion 4 pivot about axis 13. For this purpose, rigid cheek plates 18 (only one of which is shown in broken lines in Fig.2) are fixed to the joint end of the arm portion 4 and abut opposite sides of the control arm 14. However, in order to accommodate the somewhat complex movement of the arm without imposing unacceptable stress on the mechanism, the pivot axis 15 should be able to move slightly axially relative to pivot axis 13. For this reason control arm 14 is made slightly springy and its end adjacent the pivot axis 15 is not restrained in the direction of that axis.

Fig.3 shows the inner arm portion 4 in the closed position in which it lies parallel to and alongside the chassis 1. The upper sleeve 11 is at its maximum horizontal displacement from the lower sleeve 12 in this position. As the arm portion 4 is swung outwardly, the sleeve 11 will move closer to the fixed sleeve 12 in the horizontal direction, as is shown in Fig.4.

Fig.4 shows, in plan, the sliding movement of the upper sleeve 11 along the associated bar 9 between the closed position in which the control arm 14 and the arm portion 4 lie parallel to the chassis 1 and the open position (shown by reference numerals 15', 4' and 14') where the arm portion 4 extends outwards generally perpendicular to the chassis 1.

In the variant shown in Fig.5, the control arm 14 is not divided at its upper end. Instead, two spaced lugs 17a, 17b are provided on upper sleeve 11 between which the inner end of control arm 14 is pivotally mounted.

Thus, in the mechanism described above, the awning fabric adopts the desired angle of slope gradually as the awning is opened and the angle of slope is closely controlled by the changing angle of the inner arm portion as is swings from the closed to the open position. This mechanism is substantially stronger and neater in operation than conventional mechanisms in which the awning is allowed to drop to the sloped position under gravity. Moreover, no separate locking mechanism is required to prevent the open awning from being blown upwards by gusts of wind. Any vertical motion (either upwards or downwards) by the awning fabric and hence the supporting arms is always constrained by the position of those arms in a horizontal plane. The arms could only be displaced upwards if they were to close against the action of their springs by means of which they are biased towards the open position. However, if subjected to very high wind loads the awning could potentially close in these circumstances thereby reducing the likelihood of its being damaged.

Claims

1. An awning mechanism comprising mounting means (17) to be fixed to a wall or other structure to permit mounting of at least one supporting arm (3), the or each arm being pivotally attached to the mounting means (17) so that it can move from a closed position in which it is parallel to the structure to an open position in which it extends outwardly and downwardly from the structure, characterised by the or each arm (3) being fixed to the mounting means by a first joint (10,12,13) which allows both outward pivotal movement about a first pivotal axis and downward rotational movement of the arm (4), but which does not allow the first pivotal axis to move horizontally relative to the mounting means (17), and a second joint (9,11,14) spaced from the first joint (10,12,13) in the vertical direction which allows outward pivotal movement of the arm (4) about a second pivotal axis and downward rotational movement of the arm, the second pivotal axis being horizontally displaceable relative to the first pivotal axis.

2. An awning mechanism according to claim 1 wherein the horizontal relationship between the first and second pivotal axes is adjustable whereby the se-

lected relative position when closed determines the angle of slope of the arm in the open position.

3. An awning mechanism according to claim 1 or 2, wherein the supporting arm (4) is connected to the second joint (9,11,14) by a control arm (14) which is rigid with the supporting arm (4) in the direction of pivotal movement of the supporting arm (4) about the first pivotal axis, but is capable of limited movement relative to the supporting arm (4) in a plane transverse to the plane of the movement of the supporting arm about the first pivotal axis.

4. An awning incorporating a mechanism as defined in any preceding claim.

Patentansprüche

1. Markisenmechanismus mit einer Montageeinrichtung (17) zur Befestigung an einer Wand oder einer anderen Struktur, um eine Montage mindestens eines Abstützarms (3) zu gestatten, wobei der oder jeder Arm schwenkbar an der Montageeinrichtung (17) befestigt ist, so daß er von einer geschlossenen Position, in welcher er parallel zu der Struktur ist, in eine offene Position, in welcher er sich auswärts und abwärts von der Struktur erstreckt, bewegbar ist, **dadurch gekennzeichnet,** daß der oder jeder Arm (3) an der Montageeinrichtung durch eine erste Verbindung (10, 12, 13) befestigt ist, die sowohl ein Auswärtsschwenkbewegung um eine erste Schwenkachse als auch eine Abwärtsrotationsbewegung des Arms (4) zuläßt, jedoch nicht die Bewegung der ersten Schwenkachse horizontal relativ zu der Montageeinrichtung (17) gestattet, und eine in vertikaler Richtung von der ersten Verbindung (10, 12, 13) beabstandete zweite Verbindung (9, 11, 14), welche eine Auswärtsschwenkbewegung des Arms (4) um eine zweite Schwenkachse und eine Abwärtsrotationsbewegung des Arms zuläßt, wobei die zweite Schwenkachse relativ zu der ersten Schwenkachse horizontal versetzbar ist.

2. Markisenmechanismus nach Anspruch 1, **dadurch gekennzeichnet,** daß das horizontale Verhältnis zwischen der ersten und der zweiten Schwenkachse anpaßbar ist, wobei die ausgewählte relative Position bei geschlossener Position den Neigungswinkel des Arms in offener Position bestimmt.

3. Markisenmechanismus nach Anspruch 1 oder 2, **dadurch gekennzeichnet,** daß der Abstützarm (4) mit der zweiten Verbindung (9, 11, 14) durch einen Kontrollarm (14) verbunden ist, der mit dem Abstützarm (4) in Richtung der Schwenkbewegung des Abstützarms (4) um eine erste Schwenkachse starr verbunden ist, jedoch zu einer begrenzten Bewegung relativ zu dem Abstützarm (4) in der Ebene senkrecht zu der Ebene der Bewegung des Abstützarms um die erste Schwenkachse fähig ist.

4. Markise mit einem Mechanismus nach einem der vorhergehenden Ansprüche.

Revendications

1. Mécanisme pour store comprenant des dispositifs de montage (17) destinés à se fixer à un mur ou autre structure pour permettre le montage d'au moins un bras de support (3), le bras ou chaque bras étant relié en pivotement au dispositif de montage (17) de façon qu'il puisse passer d'une position de fermeture dans laquelle il est parallèle à la structure, à une position d'ouverture dans laquelle il s'étend vers l'extérieur et vers le bas en partant de la structure,
caractérisé en ce que le bras ou chaque bras (3) est fixé au moyen d'une première articulation (10, 12, 13) qui permet à la fois un mouvement de pivotement vers l'extérieur autour d'un premier axe de pivotement et un mouvement de rotation vers le bas du bras (4), mais ne permet pas au premier axe de pivotement de se déplacer horizontalement par rapport au dispositif de montage (17), et une seconde articulation (9, 11, 14) espacé à la première articulation (10, 12, 13) dans la direction verticale qui permet un mouvement de pivotement du bras (4) vers l'extérieur autour d'un second axe de pivotement et un mouvement de rotation du bras vers le bas, le second axe de pivotement pouvant être déplacé horizontalement par rapport au premier axe de pivotement.

2. Mécanisme pour store selon la revendication 1, dans lequel la relation horizontale entre le premier axe de pivotement et le second axe de pivotement est réglable, de sorte que la position relative sélectionnée, à la fermeture, détermine l'angle d'inclinaison du bras dans la position d'ouverture.

3. Mécanisme pour store selon la revendication 1 ou 2, dans lequel
le bras de support (4) est relié à la seconde articulation (9, 11, 14) par un bras de commande (14) qui est rigidement solidaire du bras de support (4) dans la direction du mouvement de pivotement du bras de support (4) autour du premier axe de pivotement, mais peut effectuer un mouvement limité par rapport au bras de support (4) dans un plan transversal par rapport au plan du mouvement du bras de support autour du premier axe de pivotement.

4. Mécanisme pour store incorporant un mécanisme tel que défini dans l'une quelconque des revendica-

tions précédentes.

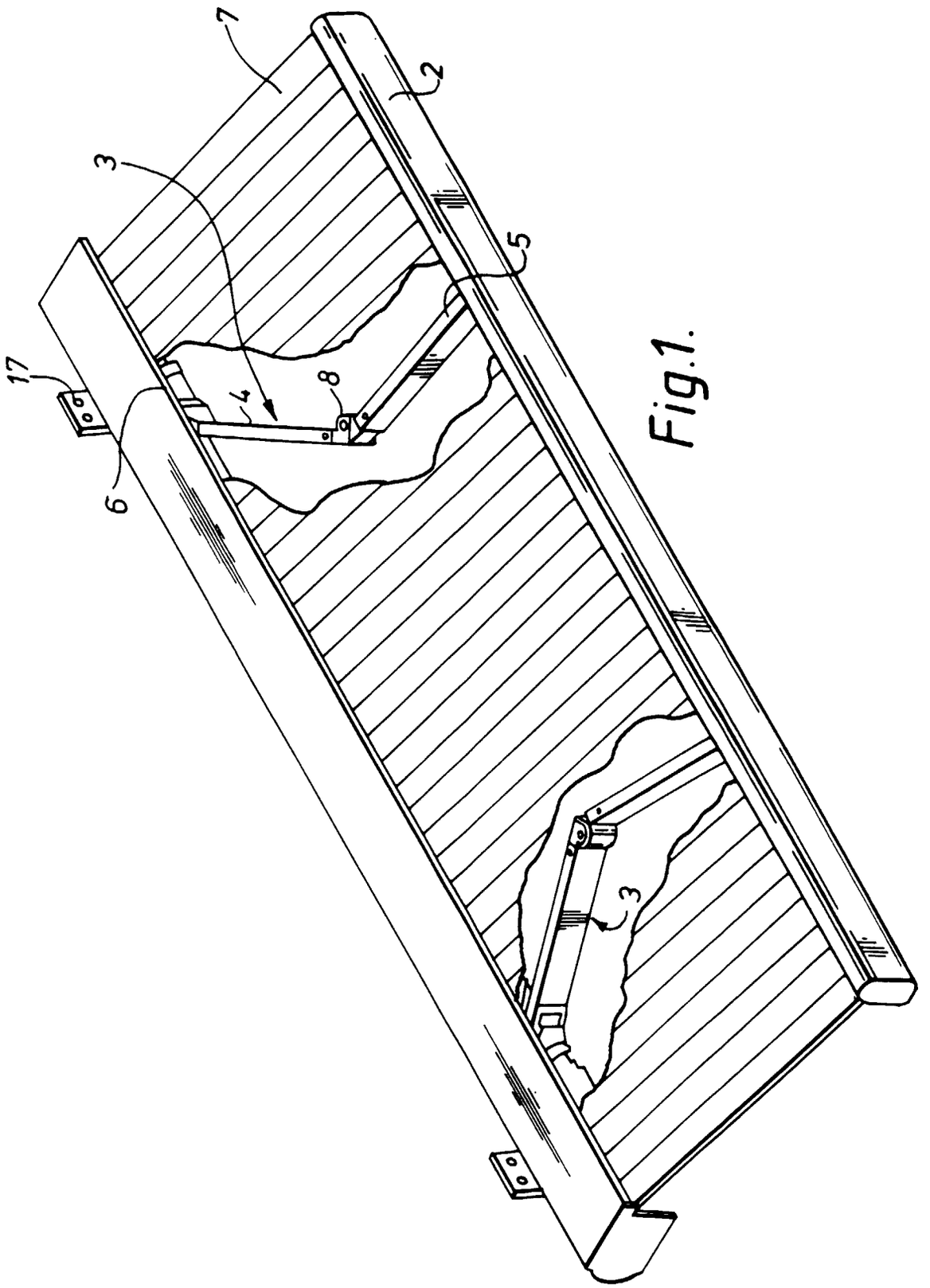


Fig.1.

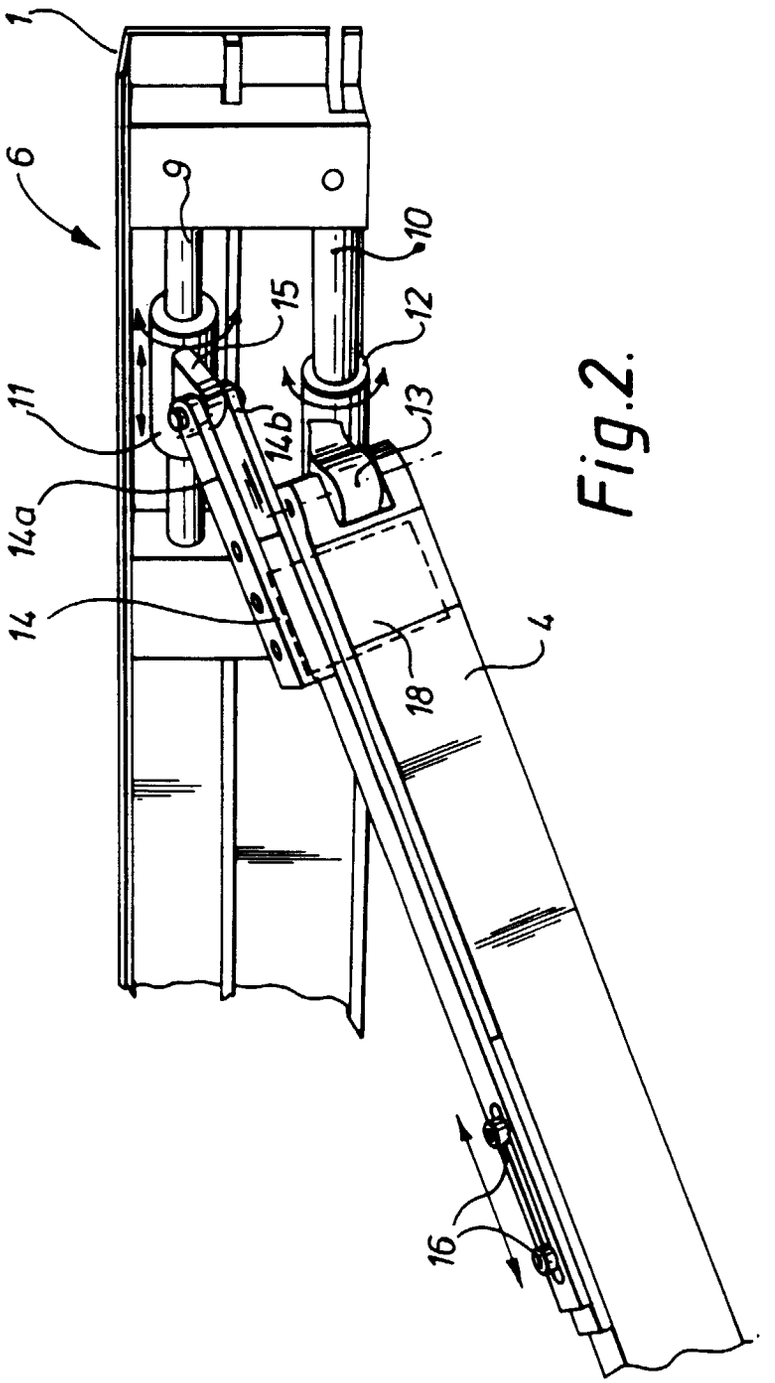


Fig.2.

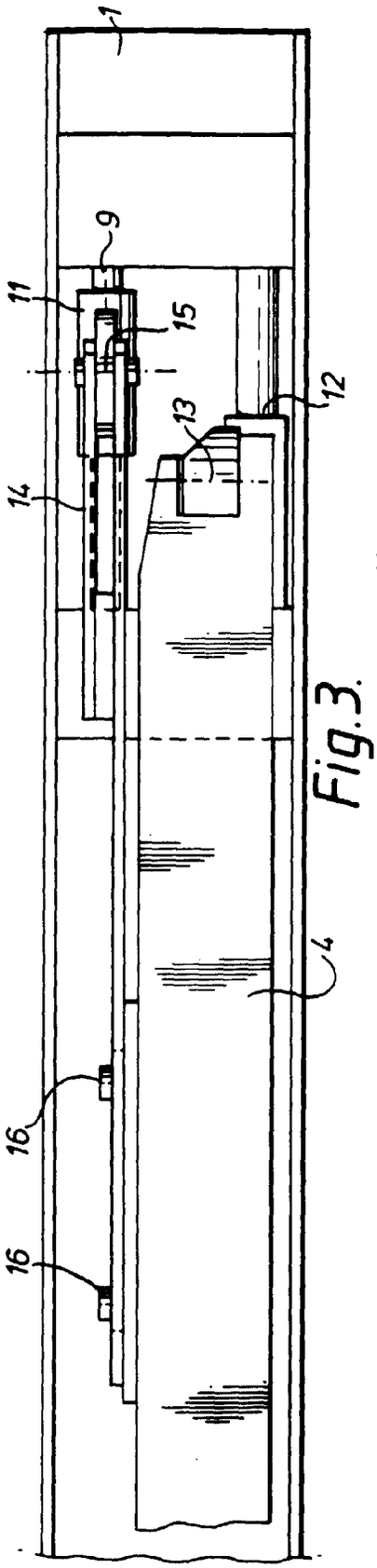


Fig.3.

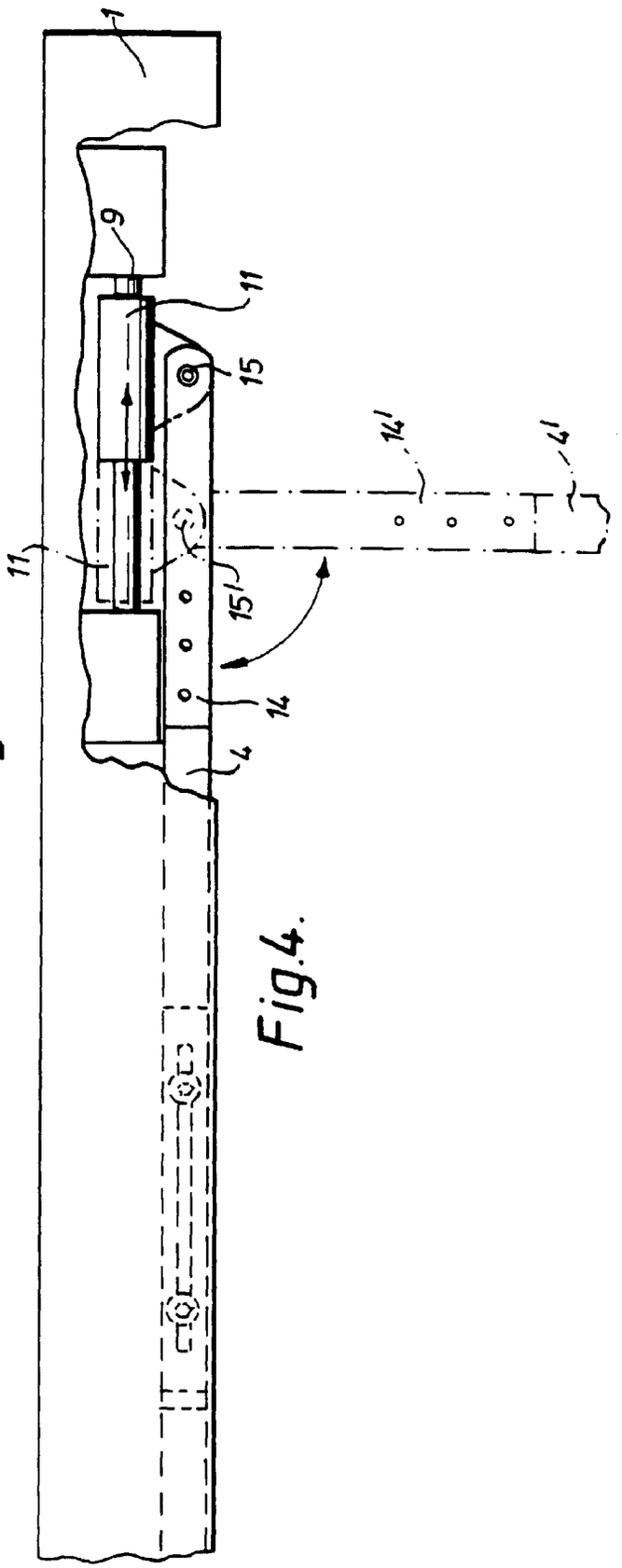


Fig.4.

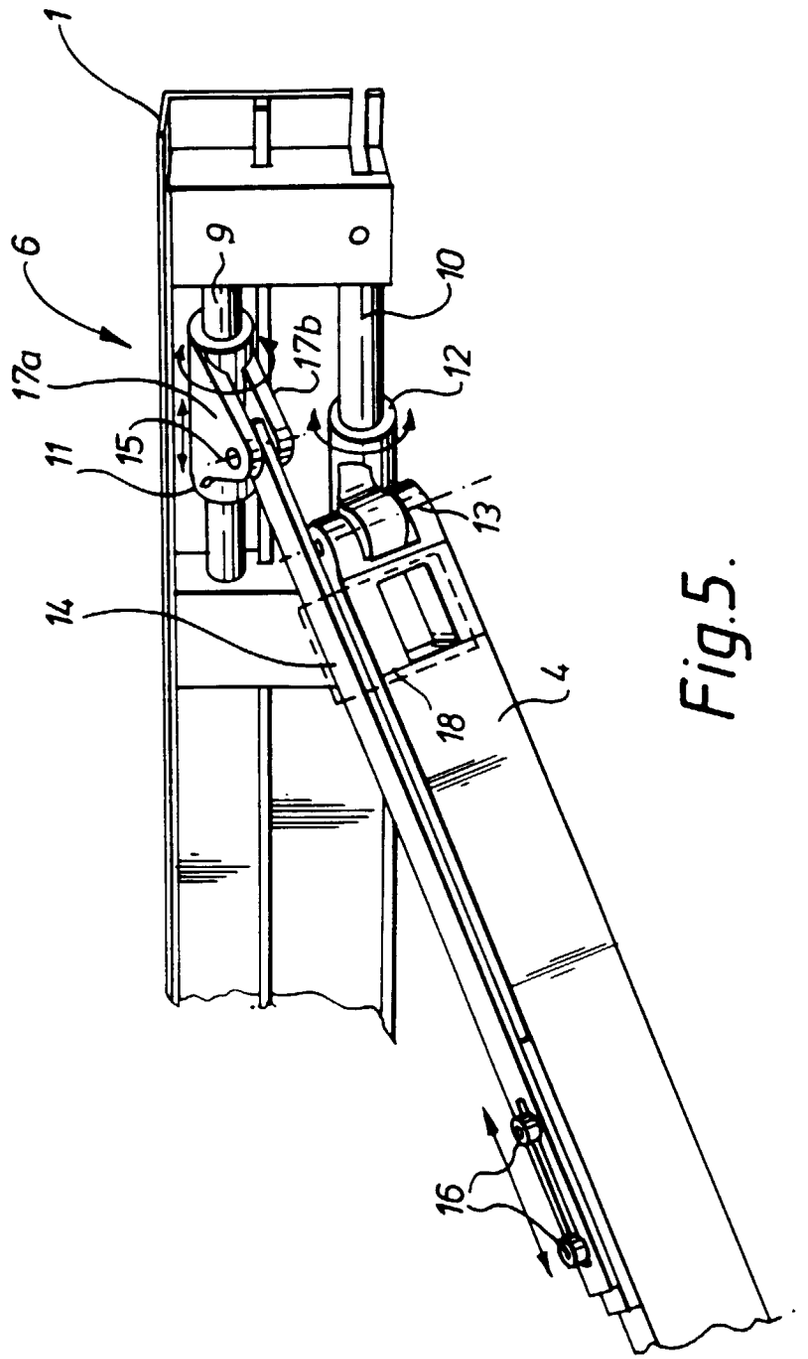


Fig.5.