

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11)

EP 1 131 530 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:

18.09.2002 Bulletin 2002/38

(21) Application number: **99972285.3**

(22) Date of filing: **11.11.1999**

(51) Int Cl.7: **E06B 9/15**, E06B 9/56

(86) International application number:
PCT/DK99/00620

(87) International publication number:
WO 00/029706 (25.05.2000 Gazette 2000/21)

(54) **A SCREENING ARRANGEMENT**

EINE FENSTERABSCHIRMVORRICHTUNG

UN ENSEMBLE STORE

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **12.11.1998 DK 981476**

(43) Date of publication of application:
12.09.2001 Bulletin 2001/37

(73) Proprietor: **VKR Holding A/S**
2860 Soeborg (DK)

(72) Inventors:
• **RITZ, Anders**
DK-5463 Harndrup (DK)

• **ULRIKSEN, Ulrik**
DK-6900 Skjern (DK)

(74) Representative:
Raffnsoee, Knud Rosenstand et al
Internationalt Patent-Bureau
Hoeje Taastrup Boulevard 23
2630 Taastrup (DK)

(56) References cited:
EP-A1- 0 371 527 **EP-A2- 0 145 628**
DE-A1- 2 947 501 **DE-A1- 19 600 949**
DK-B- 165 260 **FR-A1- 2 418 860**
FR-A1- 2 614 928 **US-A- 2 183 495**
US-A- 4 683 932

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

EP 1 131 530 B1

Description

[0001] The present invention relates to a screening arrangement comprising a flexible length of screening material, a tubular rod, along which one end of the length is fastened, and around which the length can be wound, and a driving device for moving the length towards or away from the tubular rod, said driving device comprising an input shaft driving a driver member in driving engagement with the length, and in which the tubular rod is connected with one end of a torsion spring.

[0002] DE 29 47 501 describes a roller shutter for screening of windows or doors, in which an armour consisting of articulated slats may be rewound around a tubular rod which is pivotally journaled on a shaft. When unwinding the armour, a torsion spring is stressed which is surrounded by the tubular rod, a driving device in the form of a toothed gear engaging the slats and moving the armour. When the armour is rewound, the toothed gear is rotated in the reverse direction of rotation, and the stressed spring rotates the tubular rod, whereby the armour is wound around it. When winding and unwinding the armour, the driver member therefore meets a decreasing and increasing load, respectively, which may be undesirable. A torsion spring with a comparatively small spring constant may in theory partially overcome the problem but is in practice very bulky.

[0003] FR 2 418 860 shows a marquise, in which a cloth may be brought forward and backwards by means of a driving device in the form of a continuous belt in engagement with the cloth. By retraction of the cloth, it is rolled around a shaft directly driven by the driving device. Between the winding shaft and the driving device a spring-loaded press roller is provided, which rolls on the cloth thereby keeping it stretched. In this way a comparatively uniform load on the driving device is obtained in connection with the winding and unwinding of the cloth. The press roller is, however, rather bulky, and this solution would be unsuitable, in particular for a roller shutter, in which the armour is comparatively thick. EP 0 145 628 further describes a roller shutter, in which a spring for winding the armour has been completely omitted.

[0004] The object of the present invention is to provide a simple and compact screening arrangement of the type described by way of introduction, by means of which a comparatively uniform load of the driving device is obtained by winding and unwinding of the cloth of screening material.

[0005] In view of this the screening arrangement according to the invention is characterized in that the other end of the torsion spring is connected with a drive shaft driven by the input shaft in such a manner that by rewinding and unwinding, the drive shaft has the same direction of rotation as the tubular rod.

[0006] In this manner, the relative speed between the drive shaft and the tubular rod is reduced, the tension of the torsion spring mounted therebetween varying less

during the winding and unwinding of the cloth of screening material, and a more uniform load on the driving device is consequently attained.

[0007] In a preferred embodiment the torsion spring is prestressed for putting a load on the tubular rod in the rewinding direction, when the length of screening material is in its rewound position. Hereby is ensured that the length is always stretched around the tubular rod with a view to an even winding and unwinding.

[0008] The drive shaft and the driver member may by means of a suitable gearing be driven at such speeds relative to each other that the speed of rotation of the tubular rod during the entire rewinding or unwinding of the length is higher than the speed of rotation of the drive shaft. The relative speed of rotation of the tubular rod relative to the driver member will increase during the unwinding due to the diameter reduction of the rewound length. It is thus possible to let the tension of the torsion spring increase during the entire unwinding of the length of screening material, which is in particular an advantage in screening arrangements, in which the length is guided vertically or obliquely downwards during the unwinding, the weight of the length hanging down resulting in an increasing moment around the tubular rod. This moment may then approximately be compensated for by the torsion spring, whereby the load on the driving device may be kept comparatively constant during the winding and unwinding.

[0009] In screening arrangements, in which the length is unwound in horizontal direction, and in which the gravity therefore causes no increasing moment around the tubular rod, it may, however, be of advantage that the stress of the torsion spring does not increase during the entire unwinding, but that, on the contrary, it decreases at first and then increases, whereby smaller variation of the moment around the tubular rod is obtained. With a suitable prestress of the torsion spring, this may be attained, during the unwinding, by first letting the speed of rotation of the tubular rod be smaller and then bigger than the speed of rotation of the drive shaft.

[0010] In an advantageous embodiment the drive shaft and the driver member are driven by the input shaft by means of a toothed gearing. A toothed gearing is simple to manufacture and safe in operation.

[0011] In a further advantageous embodiment, the drive shaft is pivotally journaled in an end stopper which is fixed at one end of the tubular rod, and a disc is fixed at the end of the drive shaft positioned in the tubular rod, said disc being in sliding engagement with the interior wall of the tubular rod, and one end of the torsion spring is secured to the disc and its other end is secured to the end stopper.

[0012] In a further advantageous embodiment the driving device comprises a separate gear unit surrounded by a gear housing and having bayonet catches for connection with the drive shaft and the input shaft, as well as a drive wheel having driver members along its periphery and a central bayonet catch for shaft connec-

tion with one or several other drive wheels and the gear housing is provided with abutment members adapted to make the length abut on the drive wheel for engagement therewith.

[0013] Furthermore, the screening arrangement may advantageously be a roller shutter.

[0014] The invention will now be explained in detail in the following by means of examples of embodiments with reference to the schematic drawing, in which

Fig. 1 is a perspective view of a roller shutter according to the invention, mounted on a roof window, Fig. 2 a partially sectional view through the driving device according to the line II-II in Fig. 1, Fig. 3 an exploded view of a separate gear unit for the invention, Fig. 4 an axial sectional view of part of the tubular rod, whereby the drive shaft is inserted, and Fig. 5 a second embodiment of the gear device.

In Fig. 1 a per se known roof window 1 with a window frame 2 is shown, with which a window sash 3 is hingedly connected, said sash consisting of a top member 6, a bottom member 7 and two side members 8, 9 and carrying a window pane 4. The window 1 shown is placed such that the side members 8, 9 extend in the direction of the roof pitch.

[0015] On top of the window a roller shutter 5 according to the invention is mounted. The roller shutter 5 comprises an armour 14 consisting of a plurality of mutually hinge-connected slats 11, said armour being unwindable from a roller shutter box 10 mounted along the top member 6 for screening the clearing area of the window. The slats 11 thus extend perpendicularly to the side members 8, 9, and their ends are guided in guide rails 12 positioned along the side members 8, 9.

[0016] In Fig. 2 is shown how the armour 14 may be wound around a tubular rod 13 positioned within the roller shutter box 10 to expose the window clearing. It should be noted that in the figure only the exterior slats 11 are shown, the remaining slats being wound around the tubular rod 13, the innermost slat being fastened along the tubular rod 13. In parallel with the tubular rod 13 a shaft 15 is provided which carries two or more drive wheels in the form of gear wheels 16 in driving engagement with the armour 14, the teeth of the toothed gearing being in abutment in the interspaces between neighbouring slats 11. An abutment member 17 at the side of the armour facing away from the toothed wheel 16 keeps the slats in engagement with the toothed wheel 16. The slats 11 shown have a convex upper surface which abuts a corresponding concave form between two teeth of the toothed wheel 16.

[0017] At one end of the roller shutter box 10, or possibly at both ends, a separate gear unit 18 is provided which is surrounded by a gear housing 19 and a cover 20. Fig. 3 shows the gear unit 18 disassembled, and it should be noted that the unit is here practically turned

upside down relative to its mounting position in Fig. 1. In the back wall 24 of the gear housing 19, a first toothed wheel 22 is journaled, said wheel being manufactured integrally with a bayonet catch 23 which through an aperture 25 in the back wall 24 may be connected with an input shaft not shown, said shaft being for instance driven by an electromotor or manually by means of a winding handle. The first toothed wheel 22 drives via an intermediate second toothed wheel 26 a third toothed wheel 21, which is integral with a drive wheel 16 journaled in an aperture 27 in the back wall 24. A central bayonet catch not shown for shaft connection with one or several other drive wheels 16 forms an integral part of said drive wheel 16. An abutment member 17, as shown in Fig. 2, forms an integral part of the side of the back wall 24 facing away and retains the armour 14 in engagement with the drive wheel 16. The second toothed wheel 26 further drives a fourth intermediate toothed wheel 28 driving a fifth toothed wheel 29. The toothed wheel 29 has a central bayonet catch 32 protruding through an aperture 30 in the back wall 24 and serving as connection for a drive shaft 31 for the tubular rod 13, see Fig. 4. All the toothed wheels are kept journaled between the back wall 24 in the gear housing 19 and a gear cover 36, and all members of the gear unit 18 may advantageously be manufactured from injection moulded plastic. The gear unit 18 is thus a separate unit which may easily be connected with the necessary shafts which are just inserted into the bayonet catches.

[0018] In Fig. 4 will be seen how the toothed wheel 29 by means of the bayonet catch 32 is connected with the drive shaft 31. The drive shaft 31 is kept pivotally journaled coaxially in the tubular rod 13, said shaft extending through an end stopper 33 which is fixed at one end of the tubular rod 13. Opposite the bayonet catch 32, the drive shaft 31 is provided with a disc 34 which is in sliding abutment on the interior side of the tubular rod 13 and thus keeps the drive shaft 31 centred in the tubular rod. A torsion spring 35 has been wound around the drive shaft 31, one end of which spring being secured to the disc 34 and the other end of which being secured to the end stopper 33. Other embodiments are of course possible; the drive shaft 31 may for instance at each end of the tubular rod 13 be pivotally journaled in an end stopper, and the spring may then be secured to one end stopper and the drive shaft.

[0019] In Fig. 3 the rotational directions of the toothed wheels during unwinding of the armour 14 are indicated by arrows, the armour being unwound from the tubular rod 13 by means of the drive wheel 16, which through the gear transmission is driven by the input shaft. Hereby the tubular rod 13 is turned with a rotational speed which increases as the diameter of the wound armour 14 is reduced, see Fig. 2. The drive shaft 31 has the same rotational direction as the tubular rod 13, and by suitable gearing of the mutually engaging toothed wheels it may be obtained that the drive shaft rotates more slowly than the tubular rod, whereby the torsion

spring 35 is stressed. When winding the armour 14, the course is the reverse, whereby the tension of the spring 35 is slackened. In this way the armour 14 is kept stretched during the winding and unwinding, but the tension of the spring may be limited, such that the spring tension will not increase substantially during the unwinding. In known roller shutters, in which the drive shaft 31 is stationary, the spring may for instance have 40 windings and be prestressed for 20 revolutions, following which it is tensioned further 8 - 10 revolutions during the unwinding. In the roller shutter according to the invention, the spring may during the unwinding be stressed a few revolutions, like for instance 2 - 3.

[0020] In Fig. 5 a second embodiment of the gear unit according to the invention has been indicated, a belt drive being in this connection used instead of a gear transmission. In the example shown, the wheel 21 which drives the drive wheels 16, and the wheel 29, which drives the drive shaft 31, have the same directions of rotation. It is therefore necessary to let the armour 14 extend above the drive wheel 16, contrary to the embodiment shown in Fig. 2, in which it extends below the drive wheel. Alternatively, the armour might also be wound the other way around the tubular rod.

[0021] It is furthermore possible to design the screening arrangement without a driving input shaft, in which case it can be wound and unwound by merely pushing or pulling the bottom slat 11. The wheel 16, which is termed drive wheel above, would then instead be driven by the armour 14 and via the gear transmission drive the drive shaft 31, where it would be possible to wind and unwind the armour around the tubular rod 13 in the same manner as described above.

[0022] The invention has been exemplified by means of a roller shutter, but many other screening arrangements, like roller blinds, marquises, Venetian blinds, garage gates and the like, likewise fall within the scope of the present invention. The length 14 of screening material need not consist of slats, but may for instance be cloth or the like, and the drive wheel 16 may for instance be replaced by a continuous belt in contact with the length of screening material.

Claims

1. A screening arrangement (5) comprising a flexible length (14) of screening material, a tubular rod (13), along which one end of the length is fastened, and around which the length can be wound, and a driving device for moving the length towards or away from the tubular rod, said driving device comprising an input shaft driving a driver member (16) in driving engagement with the length (14), and in which the tubular rod (13) is connected with one end of a torsion spring (35), **characterized in that** the other end of the torsion spring (35) is connected with a drive shaft (31) driven by the input shaft in such a

manner that by rewinding and unwinding, the drive shaft has the same direction of rotation as the tubular rod (13).

2. A screening arrangement (5) according to claim 1, **characterized in that** the torsion spring (35) is prestressed for putting a load on the tubular rod (13) in the rewinding direction, when the length (14) of screening material is in its rewound position.
3. A screening arrangement (5) according to claim 1 or 2, **characterized in that** the drive shaft (31) and the driver member (16) are driven at such speeds relative to each other that the speed of rotation of the tubular rod (13) during the entire rewinding or unwinding of the length (14) is higher than the speed of rotation of the drive shaft (31).
4. A screening arrangement (5) according to any of the preceding claims, **characterized in that** the drive shaft (31) and the driver member (16) are driven by the input shaft by means of a toothed gearing.
5. A screening arrangement (5) according to any of the preceding claims, **characterized in that** the drive shaft (31) is pivotally journaled in an end stopper (33), which is fixed at one end of the tubular rod (13), that a disc (34) is fixed at the end of the drive shaft (31) positioned in the tubular rod (13), said disc being in sliding engagement with the interior wall of the tubular rod (13), and that one end of the torsion spring (35) is secured to the disc (34) and that its other end is secured to the end stopper (33).
6. A screening arrangement (5) according to any of the preceding claims, **characterized in that** the driving device comprises a separate gear unit (18) surrounded by a gear housing (19) and having bayonet catches for connection with the drive shaft (31) and the input shaft, as well as a drive wheel (16) having driver members along its periphery and a central bayonet catch for shaft connection with one or several other drive wheels and that the gear housing (19) is provided with abutment members (17) adapted to make the length (14) abut on the drive wheel (16) for engagement therewith.
7. A screening arrangement (5) according to any of the preceding claims, **characterized in that** the screening arrangement (5) is a roller shutter.

Patentansprüche

1. Abschirmvorrichtung (5) umfassend eine flexible Bahn (14) von Abschirmmaterial, eine rohrförmige Stange (13), entlang welcher das eine Ende der Bahn befestigt ist, und um welche die Bahn aufge-

rollt werden kann, sowie eine Antriebseinrichtung zum Bewegen der Bahn zu der rohrförmigen Stange hin oder von dieser weg, wobei die Antriebseinrichtung eine Eingangswelle umfasst, die ein Mitnehmerorgan (16) in treibendem Eingriff mit der Bahn (14) treibt, und wobei die rohrförmige Stange (13) mit dem einen Ende einer Torsionsfeder (35) verbunden ist, **dadurch gekennzeichnet, dass** das andere Ende der Torsionsfeder (35) mit einer Antriebswelle (31) verbunden ist, die von der Eingangswelle derart getrieben ist, dass sie bei Aufrollen und Abrollen dieselbe Drehrichtung wie die rohrförmige Stange (13) aufweist.

2. Abschirmvorrichtung (5) nach Anspruch 1, **dadurch gekennzeichnet, dass** die Torsionsfeder (35) in der aufgerollten Stellung der Abschirmmaterialbahn (14) zum Belasten der rohrförmigen Stange (13) in der Aufrollrichtung vorgespannt ist.
3. Abschirmvorrichtung (5) nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** die Antriebswelle (31) und das Mitnehmerorgan (16) im Verhältnis zueinander mit derartigen Geschwindigkeiten angetrieben sind, dass die Drehgeschwindigkeit der rohrförmigen Stange (13) unter dem ganzen Aufrollen oder Abrollen der Bahn (14) grösser ist als die Drehgeschwindigkeit der Antriebswelle (31).
4. Abschirmvorrichtung (5) nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Antriebswelle (31) und das Mitnehmerorgan (16) durch die Eingangswelle mit Hilfe von Zahnradantrieben betrieben werden.
5. Abschirmvorrichtung (5) nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Antriebswelle (31) in einem Endpfropfen (33), der an einem Ende der rohrförmigen Stange (13) befestigt ist, drehbar gelagert ist, dass an dem in der rohrförmigen Stange (13) befindlichen Ende der Antriebswelle (31) eine Scheibe (34) befestigt ist, die an der Innenwand der rohrförmigen Stange (13) gleitend anliegt, und dass das eine Ende der Torsionsfeder (35) an der Scheibe (34) und das andere Ende an dem Endpfropfen (33) befestigt ist.
6. Abschirmvorrichtung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Antriebseinrichtung eine separate Getriebeeinheit (18) umfasst, die von einem Getriebegehäuse (19) umschlossen ist und Bajonettverschlüsse zur Verbindung mit der Antriebswelle (31) und der Eingangswelle aufweist, sowie ein Triebgrad (16), das entlang seinem Umkreis Mitnehmerorgane und einen zentralen Bajonettverschluss für Wellenverbindung mit einem oder mehreren Treibgraden aufweist, und dass das Getriebegehäuse (19) mehrere

Gegenhaltelemente (17) aufweist, die zum Halten der Bahn (14) gegen das Triebgrad (16) zum Eingreifen mit diesem vorgesehen sind.

7. Abschirmvorrichtung (5) nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Abschirmvorrichtung (5) ein Rolladen ist.

10 Revendications

1. Arrangement d'écran (5) comprenant une bande flexible (14) de matériau d'écran, une canne tubulaire (13), le long de laquelle l'un bout de la bande est fixé et autour de laquelle la bande peut être enroulée, et un dispositif de commande pour approcher ou éloigner la bande de la canne tubulaire, dispositif de commande qui comprend un arbre d'entrée faisant actionner un élément d'entraînement (16) en prise d'entraînement avec la bande (14), et où la canne tubulaire (13) est reliée à l'un bout d'un ressort de torsion (35), **caractérisé en ce que** l'autre bout du ressort de torsion (35) est relié à un arbre d'entraînement (31) actionné par l'arbre d'entrée si bien que lors de l'enroulement et du déroulement, l'arbre d'entraînement a la même direction de rotation que la canne tubulaire (13).
2. Arrangement d'écran (5) selon la revendication 1, **caractérisé en ce que** le ressort de torsion (35) est précontraint pour placer une charge sur la canne tubulaire (13) dans la direction d'enroulement, lorsque la bande (14) de matériau d'écran est dans sa position enroulée.
3. Arrangement d'écran (5) selon la revendication 1 ou 2, **caractérisé en ce que** l'arbre d'entraînement (31) et l'élément d'entraînement (16) sont actionnés à telles vitesses l'un par rapport à l'autre que la vitesse de rotation de la canne tubulaire (13) lors de l'enroulement ou du déroulement entiers de la bande (14) est supérieure à la vitesse de rotation de l'arbre d'entraînement (31).
4. Arrangement d'écran (5) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** l'arbre d'entraînement (31) et l'élément d'entraînement (16) sont actionnés par l'arbre d'entrée au moyen d'une transmission à pignons dentés.
5. Arrangement d'écran (5) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** l'arbre d'entraînement (31) est logé à pivotement dans un butoir (33) fixé à l'un bout de la canne tubulaire (13), **en ce qu'un** disque (34) est fixé au bout de l'arbre d'entraînement (31) positionné dans la canne tubulaire (13), disque qui est en prise glissante avec la paroi intérieure de la canne tubulaire

(13), et **en ce que** l'un bout du ressort de torsion (35) est fixé au disque (34), et **en ce que** son autre bout est fixé au butoir (33).

6. Arrangement d'écran (5) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** le dispositif de commande comprend une unité d'engrenage séparée (18) entourée d'un boîtier d'engrenage (19) et présentant des douilles à baïonnette pour liaison avec l'arbre d'entraînement (31) et l'arbre d'entrée, ainsi qu'une roue motrice (16) présentant des éléments d'entraînement le long de sa périphérie et une douille à baïonnette centrale pour une liaison d'arbre avec une ou plusieurs autres roues motrices, et **en ce que** le boîtier d'engrenage (19) est pourvu d'éléments d'appui (17) adaptés à faire la bande (14) s'appuyer sur la roue motrice (16) pour engagement avec celle-ci.
7. Arrangement d'écran (5) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** l'arrangement d'écran (5) est un volet roulant.

25

30

35

40

45

50

55

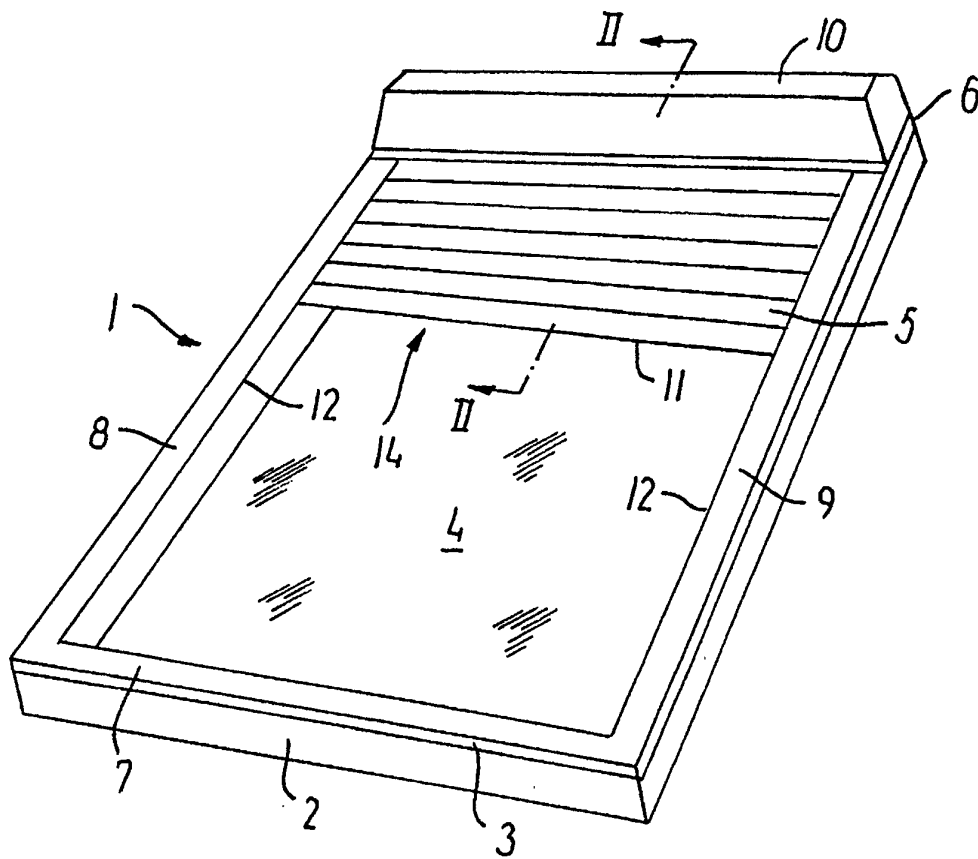


FIG. 1

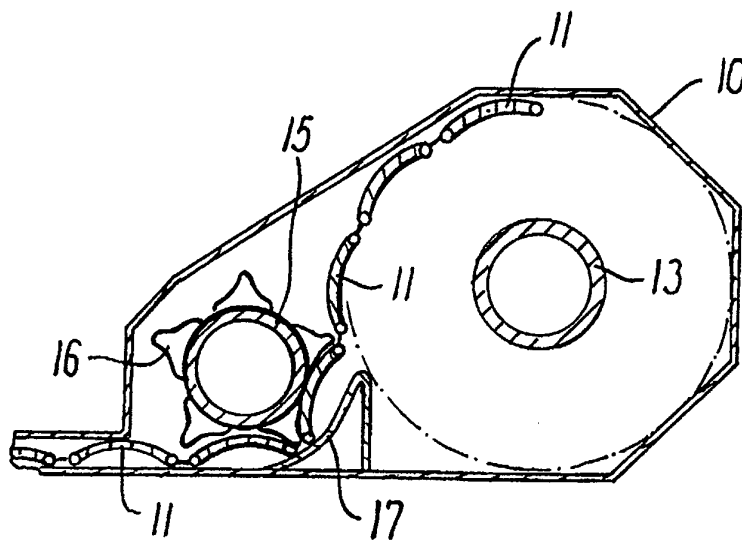


FIG. 2

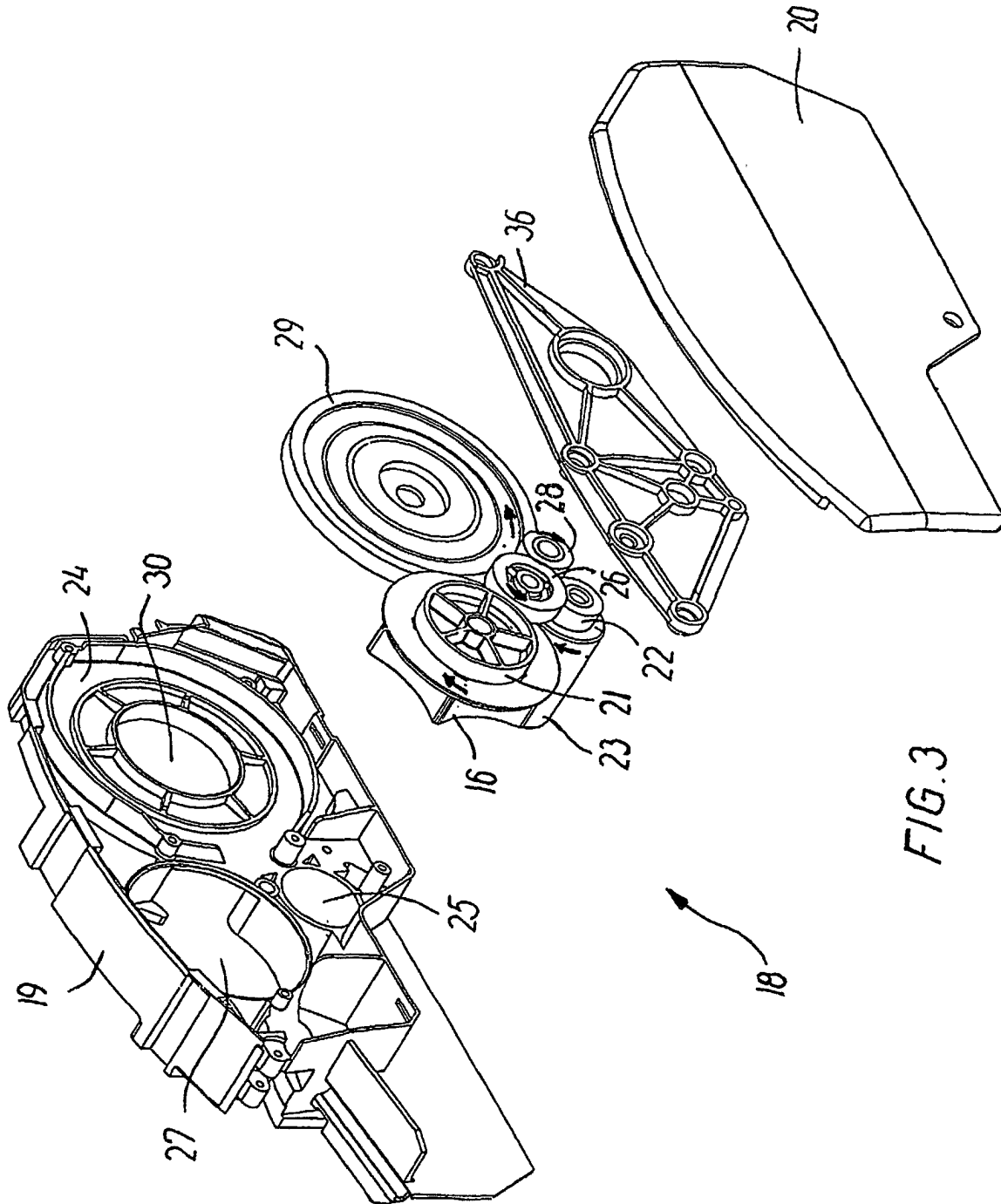


FIG. 3

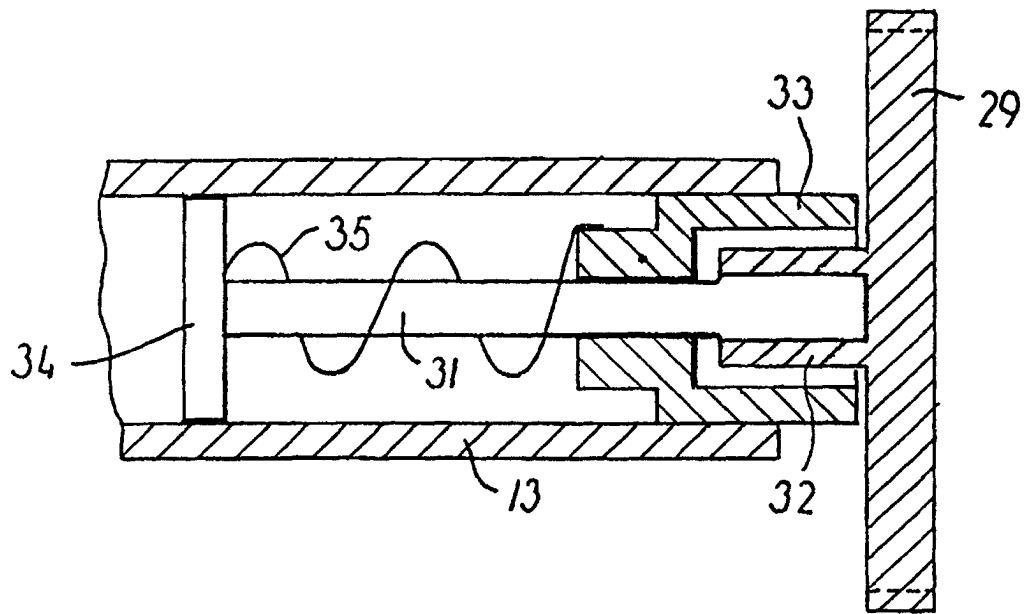


FIG. 4

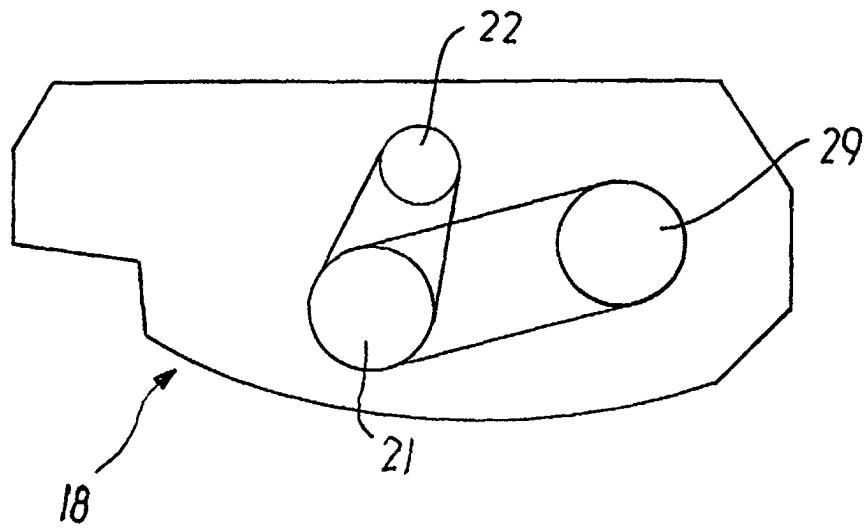


FIG. 5