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(54) **Powered sliding door handling and stopping device**

Betätigungs- und Arretierungsvorrichtung einer angetriebenen Schiebetür

Dispositif d'entraînement et d'arrêt d'une porte coulissante motorisée

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Description

[0001] The present invention relates to an innovative powered sliding door handling and stopping device.

[0002] In the automatic door business the need for providing a mechanical stopping system for the door position so as to be able to stop the wings open or closed when necessary is known. In the prior art (for example US 6,189,265) it has therefore been proposed for a long time to equip automatic doors with mechanisms which stop sliding of the trucks supporting the door on the respective sliding guides.

[0003] But these mechanisms suffer from various disadvantages. For example, said known mechanisms are generally capable of stopping the wings in a predetermined position which it is necessary to identify by an accurate manual adjustment of the stopping devices. Changing the stopping position therefore requires another action for manual regulation of the device. In addition, these known stopping mechanisms often require new setting up and adjustments in case of settling of the wings. Lastly, known stopping mechanisms to be assembled on trucks or sliding guides for the trucks are not easy and fast to install.

[0004] GB 837,784 discloses a device wherein the stop mechanism acts on the motor rotation axle.

[0005] The general purpose of the present invention is to remedy the above mentioned shortcomings by making available a handling and stopping device for doors which would be easy and fast to install, have accurate and repeatable stopping action, and allow easy achievement of wing movement and stopping management in any desired position.

[0006] In view of this purpose it was sought to provide in accordance with the present invention handling and stopping device for a powered sliding door according to claim 1.

[0007] To clarify the explanation of the innovative principles of the present invention and its advantages compared with the prior art there is described below with the aid of the annexed drawings a possible embodiment thereof by way of non-limiting example applying said principles. In the drawings:

FIG 1 shows a diagrammatic view of a sliding door equipped with the innovative handling and stopping device,
FIG 2 shows a diagrammatic perspective view of a detail of the handling and stopping device of FIG 1,
FIG 3 shows a partial side elevation view of the detail of FIG 2,
FIG 4 shows a partial plan view of a variant embodiment of the device, and
FIG 5 shows a partial side elevation view of the variant of FIG 4.

[0008] With reference to the figures, FIG 1 shows a sliding door system designated as a whole by reference number 10 comprising a powered unit or device 11 moving by means for example of a belt transmission 12 a wing 13 suspended from guides 14 by means of appropriate trucks 15. The figure shows only one wing by way of example. It will be clear to those skilled in the art that the wings can even be two in number sliding in opposite directions and the motion transmission system can be appropriately sized in a known manner to operate both wings synchronously.

[0009] The power unit 11 comprises for example a direct current electric motor 16 which operates a reduction gear 17 to the output of which is connected the system 12 of kinetic transmission of movement to the wing. The reduction gear is the reversible type to allow manual sliding of the door when the motor is off.

[0010] The power unit 11 is also equipped with an electromechanical mechanism or device 18 for stopping rotation of the geared motor made up of the motor 16 and the reduction gear 17. Advantageously as clarified below, the stopping device 18 is arranged on the output shaft of the motor and hence upstream of the reduction gear 17. The reduction gear is the type with at least the first stage being a worm. This way, the motor output shaft can be connected to one end of the worm and the stopping mechanism to the other end of the worm as may be seen in the figures. For example, FIG 3 shows in broken lines with reference number 19 the end of the screw which is opposite the output shaft and connected to the stopping device.

[0011] As may be seen in FIG 2 and on the opposite side in FIG 3 the stopping device 18 comprises a clutch member 20 with front teeth integral with the worm 19 and engaged axially by complementary teeth 21 projecting from an axially sliding cursor 22 and moved by an electromagnet 23 against the action of a thrust spring 24 from the engaged position shown in FIG 3 to the disengaged position shown in FIG 2.

[0012] The cursor 22 is clamped against rotation, for example dragging on the bottom of a plate 25 supporting the mechanism advantageously shaped generally like the letter U. The supporting plate can also comprise a guiding projection 26 which engages with a seat 27 in the cursor 22.

[0013] To allow manual disengagement of the member 20, one or two flexible cable handling tie rods 28 reach the cursor 22 and have opposite ends connected to respective operating devices 29 of any known type to apply traction to the cable when necessary. The operating devices have for example a traction knob and can be arranged on one or both sides of the sliding door or in any preferred or appropriate position to allow manual release of the door when necessary.

[0014] Advantageously each tie rod 28 has a first cable clamp 30 for the traction effect on the cursor 22 and a second clamp 31 clamped on the intermediate section between the cursor and the sleeve 32 anchoring the sheath 33 of the tie rod. A spring 34 is fitted on the tie rod to push on the intermediate clamp 31 and keep the

cable under traction. As may be seen in FIG 3, when the mechanism is in engaging position, i.e. when the electromagnet is de-energized, the head clamp is advantageously withdrawn from the cursor so as to leave a certain amount of play for the normal handling of the cursor. For manual operation the cable must be pulled for a certain amount before it can act upon the cursor. In the advantageous embodiment shown the intermediate clamp in moving with the cable traction also acts on a microswitch 35 which in case of two cables can be common to both thanks to an appropriate mechanical coupling not shown. Thanks to the delay between movement of the clamps 30 and the cursor 22 the microswitch 35 can supply an electrical signal of the manual operation of the mechanism before actual disengagement. Another microswitch 36 can be provided arranged so as to be operated directly by movement of the cursor 30 to supply an electrical disengagement or engagement signal. The signals produced by the microswitches can be sent and managed by the electronic or electrical device 37 managing the sliding door. This device 37 is advantageously electronic with an appropriately programmed microprocessor and is not further discussed nor shown as it is readily imaginable to those skilled in the art on the basis of the prior art and the description given here of the present invention.

[0015] The management device 37 also receives door position signals from one or more sensors 38. The sensors can be for example simple limit switches which identify the open and closed positions and if desired one or more intermediate positions of the door. The management device will operate the stopping device as desired on the basis of the sensor signals. By appropriately positioning an intermediate position sensor it will be possible to stop the door in a selected position.

[0016] As an alternative or in addition, it can also be provided that the position sensor 38 be a continuous position sensor such as an encoder 38b installed in an appropriate position on the motor for example. This way, the management device can easily be programmed for operation of the stopping device in any desired position of the door without need for further mechanical adjustment.

[0017] The management device 37 will take care of stopping the device 18 by de-energizing the electromagnet 23 after turning off the motor 16 so as to avoid overloads and useless stress on the mechanical parts.

[0018] As an alternative or in addition a known sensor 39 for detection of a stopped motor condition commanding turning off of the motor when it detects this condition can be provided. For example, the sensor 39 can advantageously be a sensor of the motor's electrical input. In this manner, power to the motor will be shut off automatically with engagement of the stopping device 18.

[0019] FIG 4 shows a variant embodiment of the connection of the tie rods to the cursor bearing the front clutch and moved by the electromagnet. For ease of description the various members shown in FIG 4 are designated by the same numbers as the corresponding members shown in the preceding figures increased by 100.

[0020] Thus, the cursor 122 is moved by the electromagnet 123 against the action of a spring (not shown) to disengage the front clutch made up of the two parts 120 and 121 with the clutch 120 being connected to the motor as discussed above. The Bauden cables with sheath 133 and internal tie rod cable 128 reach an inlet sleeve 132 fastened at the rear to the supporting plate 125 and extending at the front with a tang 150 having guide passages for the cables 128. The bushing with tang can be realized in two superimposed halves for greater ease of realization of the cable guide passages.

[0021] As may be seen in FIG 5, on the tang 150 is fitted in a sliding manner a coupling member 151 having thrust springs 134 and with one end 152 ending in a T for sliding engagement in a purposeful seat 153 in the cursor 122. The cables 128 have ends fastened to a clamp 130 fitted in a seat 154 of the coupling member 151. In this manner the cables are kept under tension thanks to the thrust action of the springs 134 and the need for adjustment operations on this side of the cables is avoided.

[0022] When operated by the electromagnet, the cursor 122 runs freely on the end 152 of the coupling member. But when one of the two cables 128 is pulled, the entire member 151 shifts rearward (leftward in FIG 4) by sliding on the guide tang 150 while compressing the springs 134 and pulling with its end 152 the cursor 122. This disengages the stop manually.

[0023] Advantageously the length of the end 152 is set so that when the cables are pulled the anchor integral with the cursor 122 does not complete the entire travel distance. This avoids attraction of the anchor by the permanent magnet inside the electromagnet.

[0024] On the contrary, when the cables are released the cursor 122 including the anchor must be subjected only to the repulsive thrust of the springs 134 with the resulting automatic resetting of the bolt.

[0025] It is now clear that the predetermined purposes have been achieved by making available a stopping device which does not act directly on the door nor on the trucks on which the door runs. With the device in accordance with the present invention, fast installation and setting and equally fast change in the stopped positions of the door are possible.

[0026] As may be seen in FIG 3, the stopping device can be directly and rapidly fastened on the geared motor without any action on the rest of the door mechanics.

[0027] Naturally the above description of an embodiment applying the innovative principles of the present invention is given by way of non-limiting example of said principles within the scope of the exclusive right claimed here. For example, the manual disengagement tie rods can act on the cursor with the interposition of intermediate members to allow for example different operation of the microswitches and/or a different handling clearance. The microswitches can be replaced by other sensors such as

optical for example.

Claims

1. Handling and stopping device for a powered sliding door (13) comprising a handling geared motor (16, 17) connected to a mechanism (12) for door sliding between an open and a closed position thereof, an electromechanical device (18) being connected to a rotation axle (40) of the geared motor for controlled stopping of the rotation of said axle (40) to stop the door (13) in a desired position, said electromechanical device (18) comprising a cursor (22) movable by means of an electromagnet (23), and against the action of a spring (24), between a stopped and a release position of the rotation of said axle (40), means for manual shifting of the cursor (22) toward the release position being present, **characterized in that** said means for manual shifting comprises at least one tie rod (28) connected to the cursor (22) for manual shifting thereof toward the release position, said tie rod (28) having one end (30) connected to the cursor (22) with axial play allowing traction movement on the tie rod (28) for a certain section before engagement and shifting of the cursor (22).

2. Device in accordance with claim 1 **characterized in that** it comprises a sensor or microswitch (35) operated by movement of the tie rod (28) along said section in such a manner as to supply an electrical signal of movement of the tie rod (28) before movement of the cursor (22) into the release position.

3. Device in accordance with claim 1 **characterized in that** said axle (40) is the axle of the motor (16) of the geared motor.

4. Device in accordance with claim 1 **characterized in that** between the axle (40) and the cursor (22) there is a clutch (20, 21) with front teeth for said stopping of the axle rotation.

5. Device in accordance with claim 1 **characterized in that** it comprises a sensor (39) for detection of a stopped position of the motor (16) and commanding turning off of the motor when it detects said stopped condition.

6. Device in accordance with claim 5 **characterized in that** said sensor (39) is a current sensor and said condition corresponds to a current input to the motor (16) indicating stopping of the motor.

7. Device in accordance with claim 1 **characterized in that** it comprises a sensor or microswitch (36) for signaling of the movement of said cursor (22) between the stopped position and the release position.

8. Device in accordance with claim 1 **characterized in that** it comprises at least one door position sensor (38, 38b) for detection of predetermined positions of the door (13) for operation of said electromechanical stopping device (18).

9. Device in accordance with claim 1 **characterized in that** at least one tie rod is connected to the cursor with the interposition of a coupling member (151) equipped with one end (152) for engagement of the cursor in the direction of movement thereof towards the release position and which upon traction of the at least one cable slides against the action of springs on a guide tang (150) for shifting the cursor towards the release position.

10. Device in accordance with claim 9 **characterized in that** the at least one tie rod runs in guiding passages made in said guide tang (150).

11. Device in accordance with claim 9 **characterized in that** the coupling member (151) comprises a clamp member (130) for fastening the end of the tie rod.

12. Device in accordance with claim 9 **characterized in that** the tie rods are two in number arranged parallel in the coupling member (151).

Patentansprüche

1. Betätigungs- und Arretiervorrichtung für eine angetriebene Schiebetür (13), die einen Betätigungsgetriebemotor (16, 17), der mit einem Mechanismus (12) zum Schieben einer Tür zwischen einer offenen und einer geschlossenen Stellung derselben verbunden ist, eine elektromechanische Vorrichtung (18) umfasst, die mit einer Rotationsachse (40) des Getriebemotors zum geregelten Arretieren der Rotation der Achse (40) verbunden ist, um die Tür (13) in einer gewünschten Stellung zu arretieren, wobei die elektromechanische Vorrichtung (18) einen Gleitzeiger (22), der mittels eines Elektromagneten (23) und gegen die Wirkung einer Feder (24) zwischen einer arretierten und einer gelösten Stellung der Rotation der Achse (40) beweglich ist, Mittel zum manuellen Verschieben des Gleitzeigers (22) zu der vorliegenden gelösten Stellung umfasst, **dadurch gekennzeichnet, dass** das Mittel zum manuellen Verschieben mindestens eine Verbindungsstange (28) umfasst, die mit dem Gleitzeiger (22) zum manuellen Verschieben desselben zur gelösten Stellung verbunden ist, wobei die Verbindungsstange (28) ein Ende (30) aufweist, das mit dem Gleitzeiger (22) mit einem axialen Spiel verbunden ist, das vor einem Eingreifen und Verschieben des Gleitzeigers (22) eine Traktionsbewegung an der Verbindungsstange (28) für einen bestimmten Abschnitt erlaubt.

2. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** sie einen Fühler oder Mikroschalter (35) umfasst, der durch eine Bewegung der Verbindungsstange (28) entlang des Abschnitts in einer solchen Weise betätigt wird, dass ein elektrisches Signal einer Bewegung der Verbindungsstange (28) vor einer Bewegung des Gleitzeigers (22) in die gelöste Stellung bereitgestellt wird.

3. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die Achse (40) die Achse des Motors (16) des Getriebemotors ist.

4. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** zwischen der Achse (40) und dem Gleitzeiger (22) eine Kupplung (20, 21) mit vorderen Zähnen zum Arretieren der Achsenrotation vorhanden ist.

5. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** sie einen Fühler (39) zur Detektion einer arretierten Stellung des Motors (16) und zum Befehlen eines Ausschaltens des Motors, wenn er den arretierten Zustand detektiert, umfasst.

6. Vorrichtung nach Anspruch 5, **dadurch gekennzeichnet, dass** der Fühler (39) ein Stromfühler ist und der Zustand einem Eingangsstrom des Motors (16) entspricht, der das Arretieren des Motors anzeigt.

7. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** sie einen Fühler oder Mikroschalter (36) zum Signalisieren der Bewegung des Gleitzeigers (22) zwischen der arretierten Stellung und der gelösten Stellung umfasst.

8. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** sie mindestens einen Türstellungsfühler (38, 38b) zur Detektion von vorbestimmten Stellungen der Tür (13) zum Betätigen der elektromechanischen Arretiervorrichtung (18) umfasst.

9. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** mindestens eine Verbindungsstange mit dem Gleitzeiger über die Zwischenschaltung eines Kupplungselements (151) verbunden ist, das mit einem Ende (152) zum Eingreifen des Gleitzeigers in der Bewegungsrichtung desselben zur gelösten Stellung ausgestattet ist und das bei Traktion des mindestens einen Kabels gegen die Wirkung von Federn auf einer Führangel (150) zum Verschieben des Gleitzeigers zu der gelösten Stellung gleitet.

10. Vorrichtung nach Anspruch 9, **dadurch gekennzeichnet, dass** die mindestens eine Verbindungsstange durch in der Führangel (150) gebildete Führungskanäle verläuft.

11. Vorrichtung nach Anspruch 9, **dadurch gekennzeichnet, dass** das Kupplungselement (151) ein Befestigungselement (130) zum Fixieren des Endes der Verbindungsstange umfasst.

12. Vorrichtung nach Anspruch 9, **dadurch gekennzeichnet, dass** die Anzahl der Verbindungsstangen zwei beträgt und sie parallel im Kupplungselement (151) angeordnet sind.

Revendications

1. Dispositif d'entraînement et de blocage pour porte coulissante motorisée (13), comprenant un moteur à engrenage (16, 17) raccordé à un mécanisme (12) pour faire coulisser une porte entre une position ouverte et une position fermée, un dispositif électromécanique (18) étant connecté à un axe de rotation (40) du moteur à engrenage pour un blocage commandé de la rotation dudit axe (40) afin de bloquer la porte (13) dans une position souhaitée, ledit dispositif électromécanique (18) comprenant un curseur (22) qui peut être déplacé à l'aide d'un électroaimant (23), et à l'encontre de l'action d'un ressort (24), entre une position bloquée et une position de libération de la rotation dudit axe (40), un moyen pour déplacer manuellement le curseur (22) vers la position de libération étant présent, **caractérisé en ce que** ledit moyen de déplacement manuel comprend au moins un tirant (28) raccordé au curseur (22) pour son déplacement manuel vers la position de libération, ledit tirant (28) ayant une extrémité (30) raccordée au curseur (22) avec un jeu axial permettant un mouvement de traction sur le tirant (28) sur une certaine section avant engagement et déplacement du curseur (22).

2. Dispositif selon la revendication 1, **caractérisé en ce qu'**il comprend un capteur ou un microrupteur (35) actionné par un mouvement du tirant (28) le long de ladite section de manière à émettre un signal électrique de mouvement du tirant (28) avant un mouvement du curseur (22) en position de libération.

3. Dispositif selon la revendication 1, **caractérisé en ce que** ledit axe (40) est l'axe du moteur (16) du moteur à engrenage.

4. Dispositif selon la revendication 1, **caractérisé en ce qu'**entre l'axe (40) et le curseur (22), il y a un embrayage (20, 21) avec des dents avant pour ledit blocage de la rotation de l'axe.

5. Dispositif selon la revendication 1, **caractérisé en ce qu'**il comprend un capteur (39) pour détecter une position bloquée du moteur (16) et commander la coupure du moteur lorsqu'il détecte ledit état arrêté.

6. Dispositif selon la revendication 5, **caractérisé en ce que** ledit capteur (39) est un capteur de courant et ledit état correspond à une entrée de courant dans le moteur (16), indiquant le blocage du moteur.

7. Dispositif selon la revendication 1, **caractérisé en ce qu'**il comprend un capteur ou un microrupteur (36) pour signaler le mouvement dudit curseur (22) entre la position bloquée et la position de libération.

8. Dispositif selon la revendication 1, **caractérisé en ce qu'**il comprend au moins un capteur de position de porte (38, 38b) pour détecter des positions prédéterminées de la porte (13) pour actionner ledit dispositif de blocage électromécanique (18).

9. Dispositif selon la revendication 1, **caractérisé en ce qu'**au moins un tirant est raccordé au curseur avec l'interposition d'un élément de couplage (151) muni d'une extrémité (152) pour engager le curseur dans le sens de son mouvement vers la position de libération et qui, lors d'une traction de l'au moins un câble, coulisse à l'encontre de l'action de ressorts sur un tenon de guidage (150) pour déplacer le curseur vers la position de libération.

10. Dispositif selon la revendication 9, **caractérisé en ce que** le au moins un tirant passe dans des passages de guidage pratiqués dans ledit tenon de guidage (150).

11. Dispositif selon la revendication 9, **caractérisé en ce que** l'élément de couplage (151) comprend un élément de fixation (130) pour fixer l'extrémité du tirant.

12. Dispositif selon la revendication 9, **caractérisé en ce que** les tirants sont au nombre de deux ménagés parallèlement dans l'élément de couplage (151).

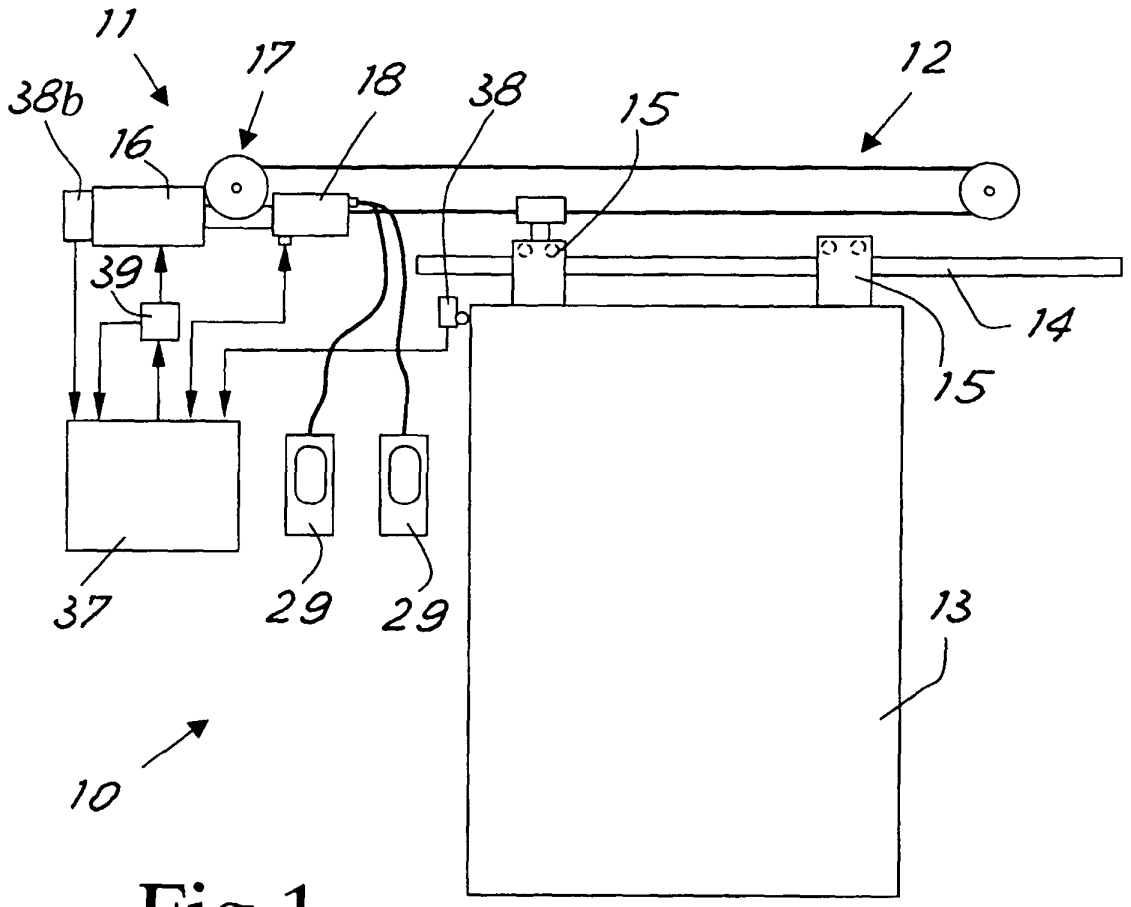

11
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38b
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Fig.1

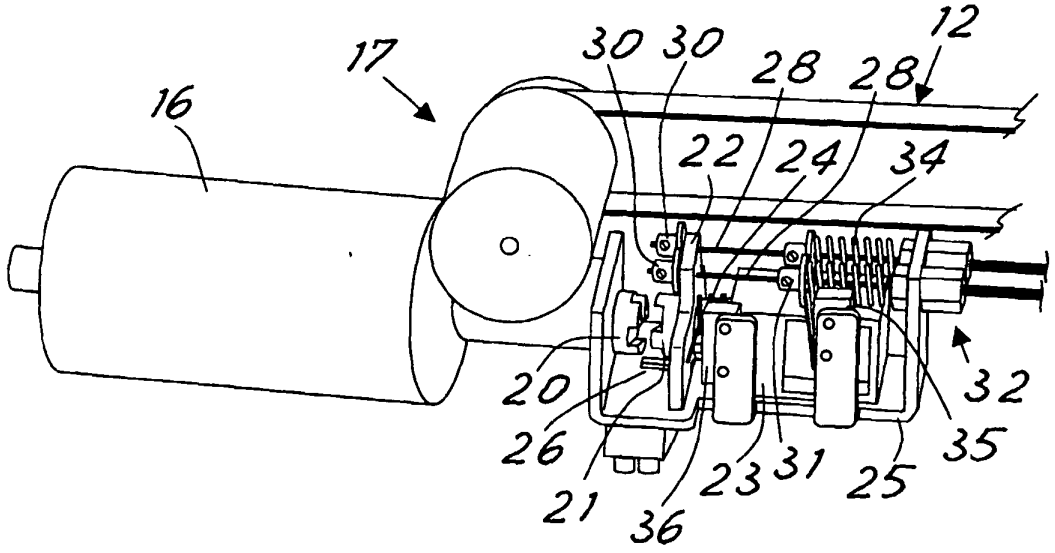

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Fig.2

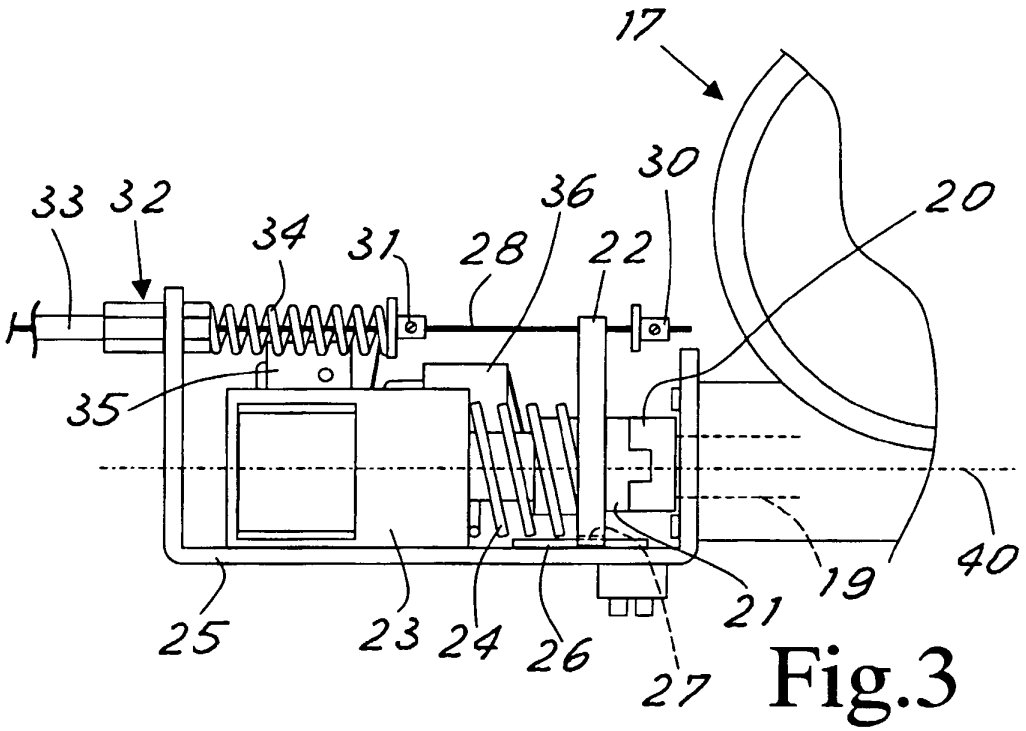

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Fig.3

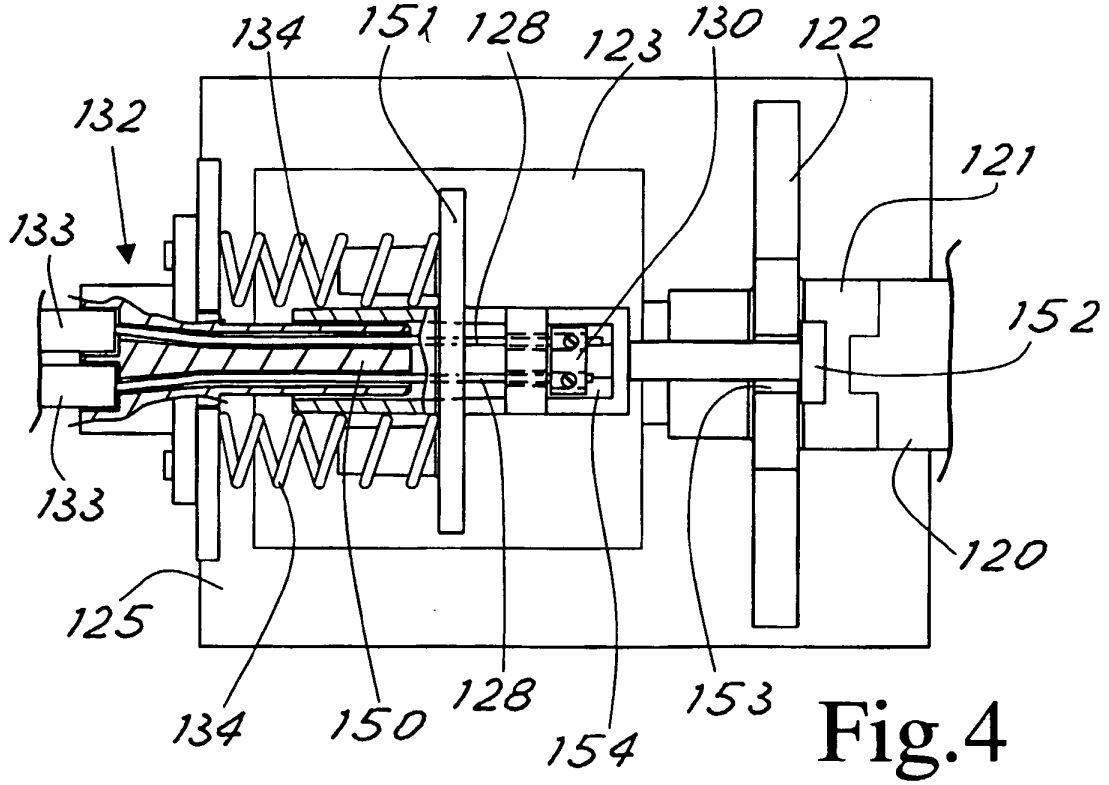

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Fig.4

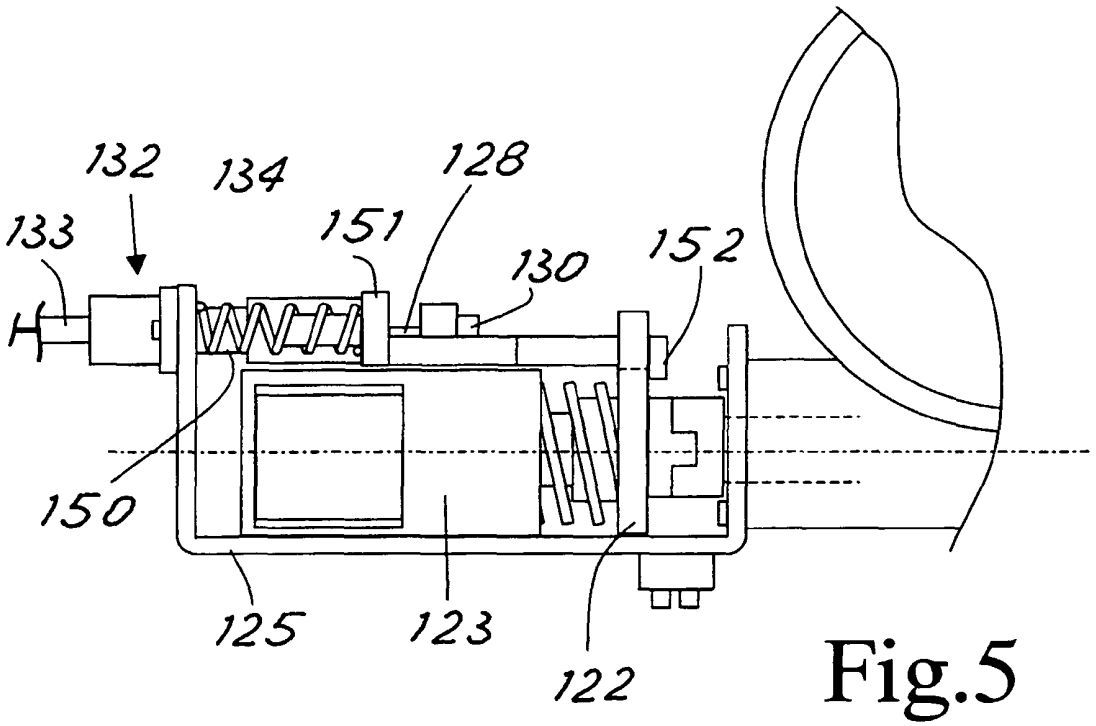


Fig.5

REFERENCES CITED IN THE DESCRIPTION

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