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(71) Applicant: **TOPP S.p.A.**  
**36066 Sandrigo (Vicenza) (IT)**

(72) Inventor: **Cavalcante, Toni**  
**36031 Dueville VI (IT)**

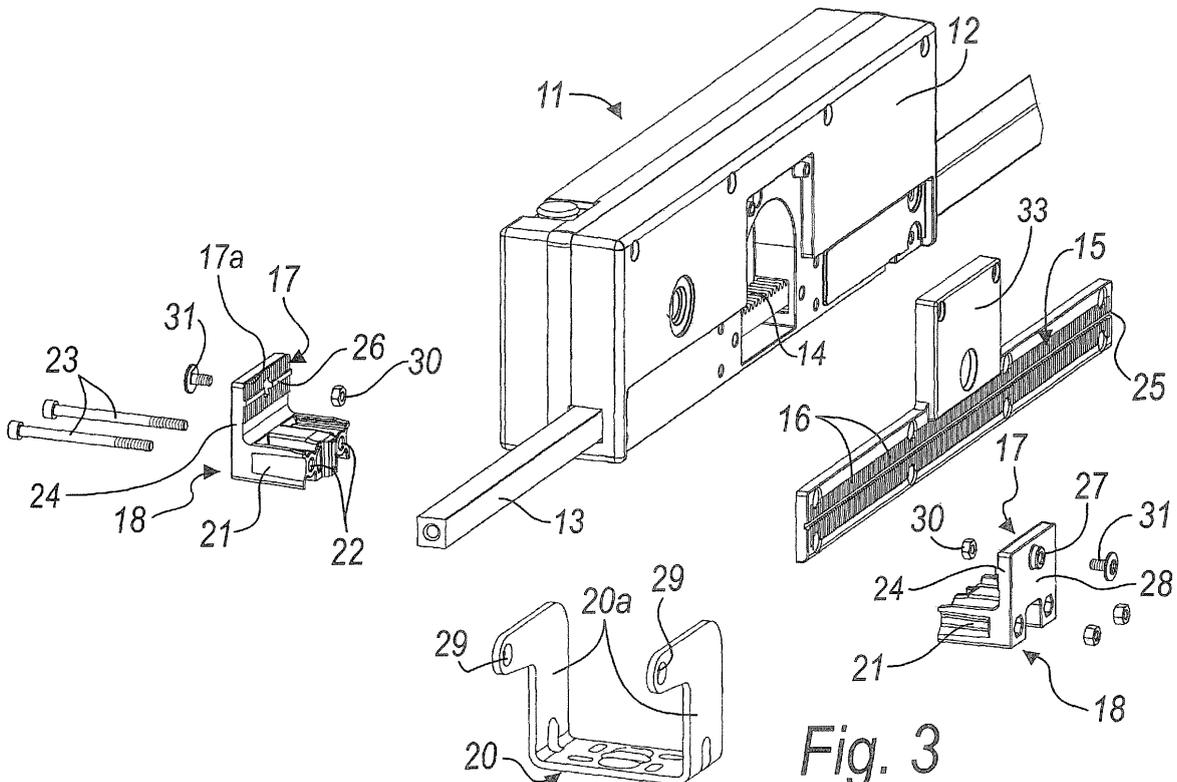
(74) Representative: **Modiano, Micaela Nadia**  
**Dr. Modiano & Associati SpA**  
**Via Meravigli 16**  
**20123 Milano (IT)**

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(54) **Device for adjusting the trim of a linear actuator for automating doors or windows**

(57) A device for adjusting the trim of a linear actuator for automating doors or windows, to be associated with the body (12) of a linear actuator (11). The device (10) comprises a pair of guides (15) provided with a series of grip protrusions; the guides are arranged on opposite sides of the body (12) of the actuator (11); a jaw (18) of

a clamp (19) is engaged, by means of a corresponding complementarily shaped fastening and grip surface (17) thereof, on each of the guides (15) so as to perform a translational motion, the clamp (19) being in turn designed to be coupled rotatably to a bracket (20) for fixing to the casing or to the leaf of a door or window.



**Fig. 3**

## Description

**[0001]** The present invention relates to a device for adjusting the trim of a linear actuator for automating doors or windows.

**[0002]** Currently known linear actuators for automating doors or windows, of the rack bar type, of the threaded stem type or of the chain type, are fixed to the fixed frame of the door or window with which they are associated by means of a U-shaped bracket, the central part of which is to be fixed to the frame, while orientable clamps are pivoted at the free ends, so as to face each other symmetrically, and are each intended to slide in a corresponding guide with a dovetail cross-section which is jointly connected to the body of the actuator, in order to adjust the correct position of the actuator so as to allow optimum closure of the door or window when the bar, stem or chain are retracted at the end of the stroke.

**[0003]** Such a fixing device, although generally applied in all linear actuators and appreciated because of its possibility to adjust finely the position of the actuator, has aspects which can be perfected.

**[0004]** The orientable clamps, until they are fixed to the guides by fastening them with corresponding threaded elements, are in fact free to perform translational motions within the guides, thus entailing a certain difficulty in identifying the correct fixing position, and when a first one of the two clamps is fixed, the other one, which is still free, can perform a translational motion even imperceptibly with respect to the determined position and then be fixed inadvertently in an incorrect position; if the clamps are not fixed in a perfectly parallel manner, the actuator is oriented incorrectly with respect to the optimum direction that the pushing and traction forces to be applied to the leaf of the door or window must have.

**[0005]** The aim of the present invention is to provide a device for adjusting the trim of a linear actuator for automating doors or windows which is capable of obviating the drawbacks of known types of device.

**[0006]** Within this aim, an object of the present invention is to provide a trim adjustment device which allows to acquire a precise and stable position of the actuator during installation on a door or window.

**[0007]** Another object of the present invention is to provide a device which is easy and quick to fit both on the actuator and on the door or window, and is simple to adjust.

**[0008]** Another object of the present invention is to provide a device for adjusting the trim of a linear actuator for automating doors or windows which can be manufactured cheaply with known systems and technologies.

**[0009]** This aim and these and other objects, which will become better apparent hereinafter, are achieved by a device for adjusting the trim of a linear actuator for automating doors or windows, to be associated with the body of a linear actuator, characterized in that it comprises a pair of guides provided with a series of grip protrusions, said guides being arranged on opposite sides of the body

of the actuator, a jaw of a clamp being engaged, by means of a corresponding complementarily shaped fastening surface thereof, on each of said guides so as to perform a translational motion, said clamp being in turn designed to be coupled rotatably to a bracket for fixing to the casing or to the leaf of a door or window.

**[0010]** Further characteristics and advantages of the invention will become better apparent from the following detailed description of a preferred but not exclusive embodiment thereof, illustrated by way of non-limiting example in the accompanying drawings, wherein:

Figure 1 is a side view of a device according to the invention, applied to a linear actuator;

Figure 2 is a sectional front view of the device applied to the actuator as in Figure 1;

Figure 3 is an exploded perspective view of the device according to the invention;

Figure 4 is a sectional view of a detail of the device according to the invention.

**[0011]** With reference to the figures, a device for adjusting the trim of a linear actuator for automating doors or windows, according to the invention, is generally designated by the reference numeral 10.

**[0012]** The device 10 is to be associated with the body 12 of a linear actuator 11; the linear actuator 11 shown here, by way of non-limiting example of the types of actuator to which it is possible to apply the device 10 according to the invention, is of the type with a bar 13 and a rack 14.

**[0013]** The device 10 comprises a pair of guides 15 provided with a series of grip protrusions 16 arranged on opposite sides of the body of the actuator 12.

**[0014]** On each guide 15, a jaw 18 of a clamp 19 is engaged by means of a corresponding complementarily shaped fastening and grip surface 17 and performs a translational motion.

**[0015]** The clamp 19 in turn must be coupled rotationally to a bracket 20 for fixing to the casing or to the leaf of a door or window.

**[0016]** The guides 15 are arranged along a direction which is parallel to the direction of motion of the bar 13.

**[0017]** In the exemplary embodiment described here of the device 10, the grip protrusions 16 are constituted by a series of mutually parallel teeth which lie transversely to the longitudinal direction of the guides 15.

**[0018]** The jaws 18 are substantially L-shaped, and each one comprises a base portion 21 with two through holes 22 for a corresponding number of screws 23 for fixing to the opposite facing base portion of the other jaw.

**[0019]** A plate-like portion 24 protrudes from the base portion 21, and the fastening and grip surface 17 is formed thereon; a series of teeth 17a, contoured so as to be interposed between the teeth of the guide 15, protrudes from said surface.

**[0020]** The guides 15 have a central slot 25 in which a rib 26, which protrudes from the fastening surface 17,

is intended to slide; the slot 25 and the rib 26 ensure the position of the jaws 18 with respect to the guides 15 transversely to the direction in which the guides 15 are extended.

**[0021]** The clamp 19 is coupled rotatably to the bracket 20 by means of a pair of collars 27, each of which protrudes from the outer face 28 of the plate-like portion 24 of a jaw 18, the collars 27 being inserted in corresponding holes 29 which are open onto the ends of the bracket 20.

**[0022]** A seat for a nut 30 is arranged within each collar 27, and a threaded element 31 is to be screwed therein, its recessed hexagonal head having such a diameter as to lock the walls 20a of the bracket 20 against the corresponding jaws 18.

**[0023]** The guides 15 are each provided on a faceplate 33 which is applied to the body 12 of the actuator 11 and can be removed from it.

**[0024]** The guides 15 can be replaced with other ones which are equivalent but are made of a different material or have a different tooth pitch, according to requirements.

**[0025]** The guides 15 can therefore be made of plastic material but also of metallic materials, such as for example aluminum, zinc-aluminum-magnesium alloy and the like.

**[0026]** The jaws 18 also can be made of different materials, such as for example plastic material, or metallic materials such as aluminum, zinc-aluminum-magnesium alloy and the like.

**[0027]** The operation of the device 10 according to the invention is as follows.

**[0028]** Once the bracket 20 has been fixed for example to the casing of the door or window, and once the jaws 18 have been closed partially, by means of the screws 23 and the respective bolts, below the box-like body 12 of the actuator 11, the collars 27 are inserted in the corresponding holes 29 on the bracket 20.

**[0029]** The walls 20a of the bracket 20 can move apart elastically, applying by means of their ends a pressure to the jaws 18 at the fastening and grip surfaces 17, preventing the unwanted return of the actuator body 12 to the preceding position, even when the jaws 18 are not completely fastened.

**[0030]** The walls 20a of the bracket 20, if the jaws 18 are engaged with the actuator body 12 but have the screws 23 loose, are in fact in the inactive position when the teeth 16 of the guides 15 are arranged alternately and perfectly complementarily with respect to the teeth 17a of the grip surfaces 17 of the jaws, and the walls 20a are not flexed outward.

**[0031]** When the actuator body 12 is pushed or pulled in order to adjust its position, tension is generated when the teeth 17a of the jaws 18 rise along the teeth 16 of the guides (the tip of the tooth of the jaw is at the top of the tip of the tooth of the guide), and it is at this moment that the bracket 20 has a spring-like function and tends to press the jaws 18 against the guides 15.

**[0032]** This occurs for each step that the system constituted by the jaws and the toothed guides is made to

perform.

**[0033]** The central lane of the guides and of the jaws causes the actuator body to move always correctly on the jaw/bracket assembly.

**[0034]** In order to determine the correct trim of the bar with a rack 13 it is sufficient to pull or push the body 12 of the actuator 11 so that the fastening and grip surfaces 17 snap forward or backward by one or more teeth with respect to the guides 15.

**[0035]** The couplings between the teeth 17a of the fastening surface 17 and the teeth 16 of the corresponding guides 15 cause the set trim to be kept stable and constant during completion of the mutual closure of the jaws 18 and during the locking of the jaw 19 to the bracket 20, by screwing the threaded elements 31.

**[0036]** In practice it has been found that the invention thus described solves the problem noted in devices for adjusting the trim of a linear actuator for automating doors or windows.

**[0037]** In particular, the present invention provides a trim adjustment device which allows to acquire a precise and stable position of the actuator during installation on a door or window by way of the toothed guides 15 and of the grip and fastening surfaces 17 of the jaws 18.

**[0038]** Further, the present invention provides a device which is easy and quick to fit both on the actuator and on the door or window and is simple to adjust, since in order to change the trim of the body 12 of the actuator 11 it is sufficient to loosen the jaws 18 and make the teeth of the guides 15 snap forward or backward with respect to the teeth of the fastening surfaces 17 of the jaws 18 and finally close the clamp 19 by tightening the jaws against each other by means of the screws 23.

**[0039]** Moreover, the present invention provides a device for adjusting the trim of a linear actuator for the automation of doors or windows which can be manufactured cheaply with known types of systems and technologies.

**[0040]** The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims; all the details may further be replaced with other technically equivalent elements.

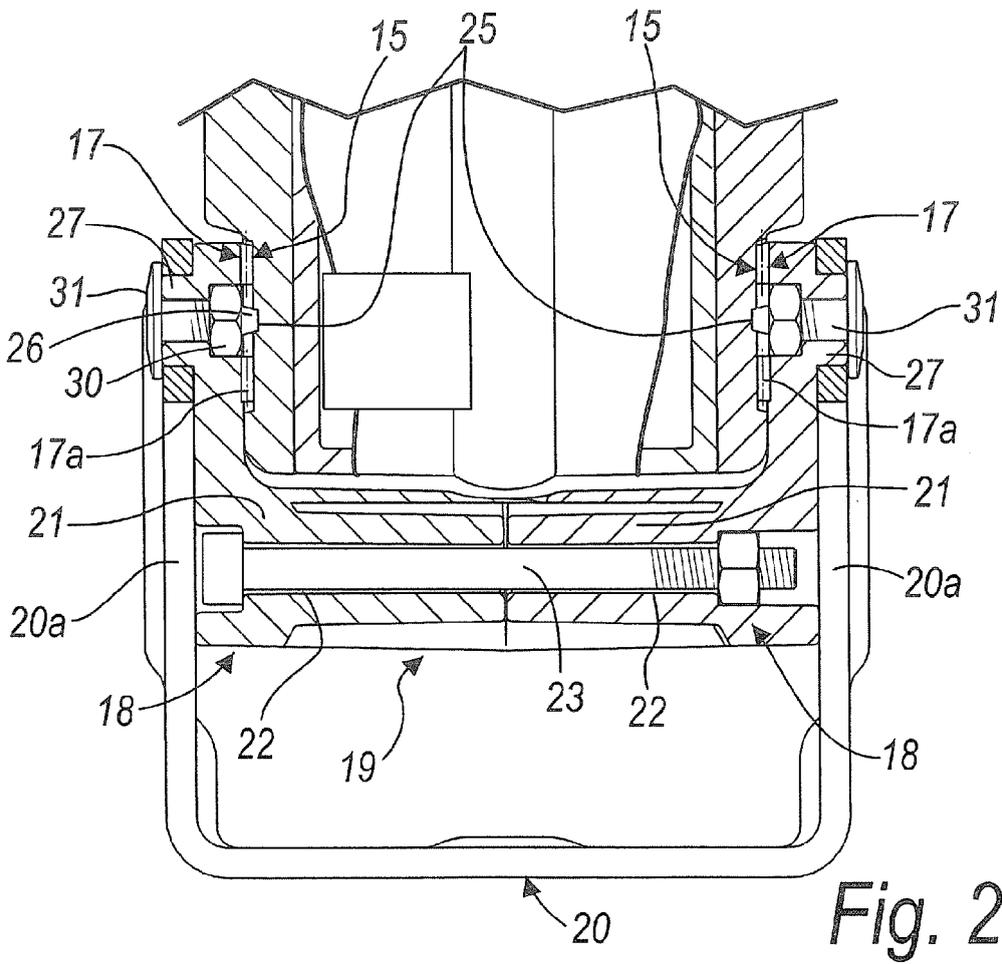
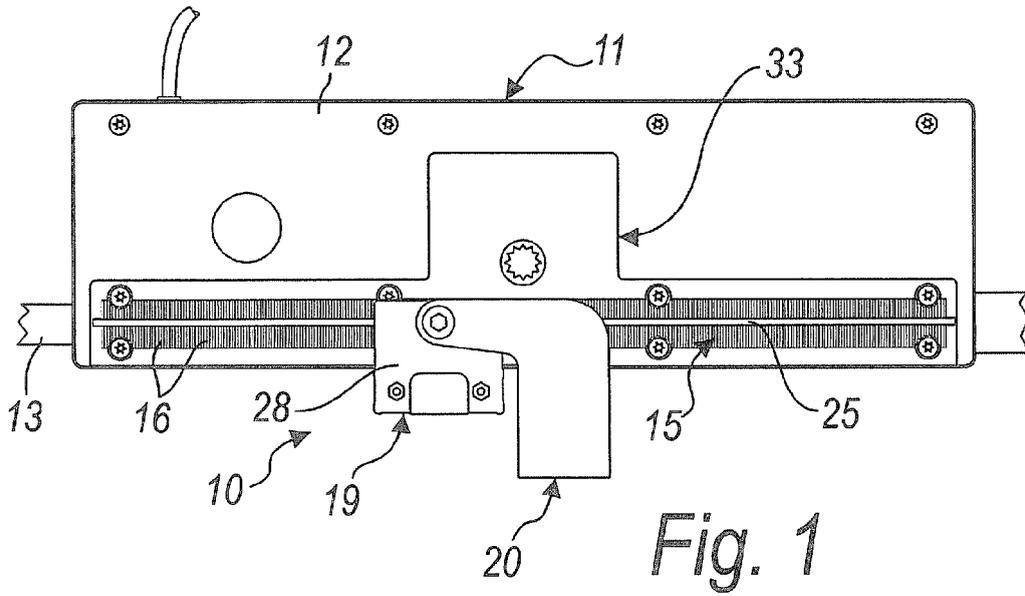
**[0041]** In practice, the materials employed, so long as they are compatible with the specific use, as well as the dimensions, may be any according to requirements and to the state of the art.

**[0042]** The disclosures in Italian Patent Application No. PD2007A000084 from which this application claims priority are incorporated herein by reference.

**[0043]** Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

## Claims

1. A device for adjusting the trim of a linear actuator for automating doors or windows, to be associated with the body (12) of a linear actuator (11), **characterized in that** it comprises a pair of guides (15) provided with a series of grip protrusions, said guides being arranged on opposite sides of the body (12) of the actuator (11), a jaw (18) of a clamp (19) being engaged, by means of a corresponding complementarily shaped fastening and grip surface (17) thereof, on each of said guides (15) so as to perform a translational motion, said clamp being in turn designed to be coupled rotatably to a bracket (20) for fixing to the casing or to the leaf of a door or window.
2. The device according to claim 1, **characterized in that** said guides (15) are extended along a direction which is parallel to the direction of motion of the bar (13).
3. The device according to the preceding claims, **characterized in that** the grip protrusions are constituted by a series of teeth (16) which are mutually parallel and lie transversely to the direction of extension of the guides (15).
4. The device according to one or more of the preceding claims, **characterized in that** said jaws (18) are substantially L-shaped and each one comprises a base portion (21) with through holes (22) for a corresponding number of screws (23) for fixing to the facing opposite base portion of the other jaw, a plate-like portion (24) extending from the base portion (21), the fastening and grip surface (17) being formed on said portion, a series of teeth (17a) protruding from said surface, said teeth being contoured so as to be interposed between the teeth (16) of the guide (15).
5. The device according to one or more of the preceding claims, **characterized in that** said guides (15) have a central slot (25) in which a rib (26) which protrudes from the fastening surface (17) is intended to slide, said slot (25) and said rib (26) being adapted to maintain the position of the jaws (18) with respect to the guides (15) transversely to the direction in which said guides (15) are extended.
6. The device according to one or more of the preceding claims, **characterized in that** said clamp (19) is coupled rotatably to the bracket (20) by means of a pair of collars (27), each of which protrudes from the outer face (28) of the plate-like portion (24) of a jaw (18), said collars (27) being inserted in corresponding holes (29) which are open onto the ends of the bracket (20), a seat for a nut (30) being provided within each collar (27), a threaded element (31) being designed to be screwed thereto, its hexagonal recessed head having such a diameter as to lock the walls (20a) of the bracket (20) against the corresponding jaws (18).
7. The device according to one or more of the preceding claims, **characterized in that** said guides (15) are each provided on a faceplate (33) which is applied to the body (12) of the actuator (11) and can be removed from it.
8. The device according to one or more of the preceding claims, **characterized in that** said guides (15) can be replaced with other ones which are equivalent but are made of a different material or have a different tooth spacing, according to requirements.
9. The device according to one or more of the preceding claims, **characterized in that** said guides (15) are made of plastic material or metallic materials, such as for example aluminum, zinc-aluminum-magnesium alloy, and the like.
10. The device according to one or more of the preceding claims, **characterized in that** the jaws (18) are made of plastic material or metallic materials such as aluminum, zinc-aluminum-magnesium alloy, and the like.
11. The device according to one or more of the preceding claims, **characterized in that** said walls (20a) of the bracket (20), when the teeth (17a) of the grip surfaces (17) rise on the teeth (16) of the respective guides (15) during the translational motion of the actuator body (12) with respect to said jaws (18), move apart elastically, applying by means of their ends a pressure to the jaws (18) at the fastening and grip surfaces (17), preventing the unwanted return of the actuator body (12) to the preceding position even when the jaws (18) are not fully fastened.



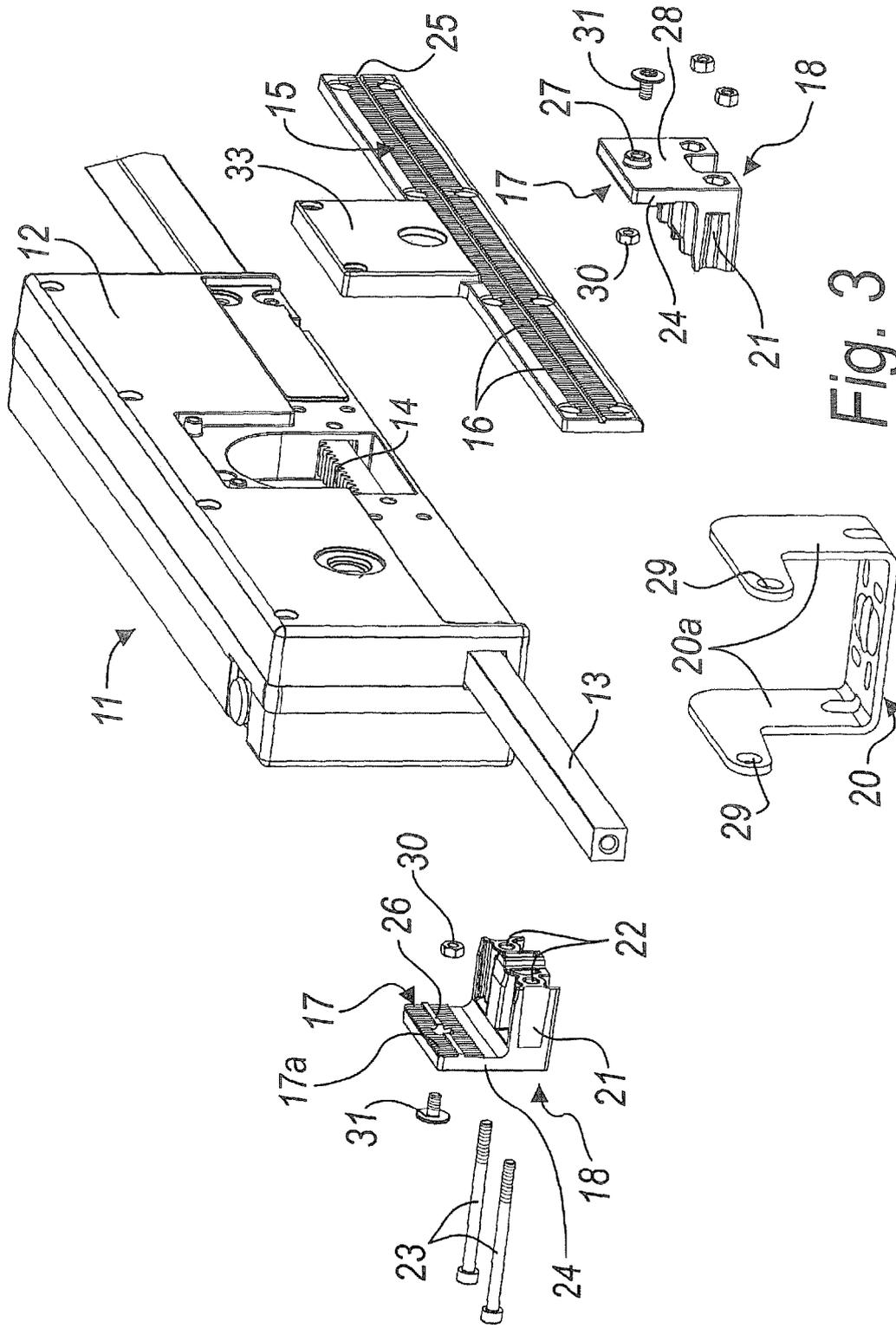


Fig. 3

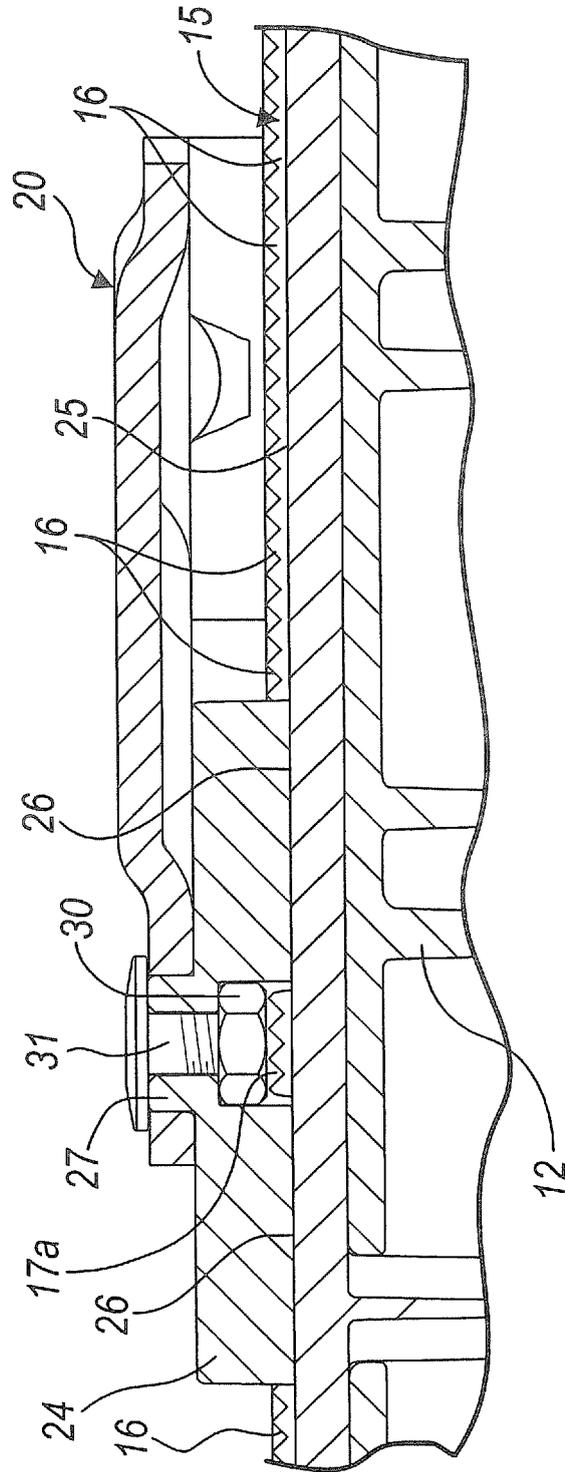


Fig. 4



DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 0 325 094 A (ULTRAFLEX SRL [IT]) 26 July 1989 (1989-07-26) * column 3, line 7 - line 24; figure 6 *	1-11	INV. E05F15/12 E05F15/10
A	EP 0 463 452 A (ULTRAFLEX SRL [IT]) 2 January 1992 (1992-01-02) * figure 1 *	1-11	
P,A	EP 1 785 570 A (TOPP S P A [IT]) 16 May 2007 (2007-05-16) * paragraph [0031] - paragraph [0034]; figures 3,4 *	1-11	
			TECHNICAL FIELDS SEARCHED (IPC)
			E05F
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
Munich		11 June 2008	Di Renzo, Raffaele
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**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 08 15 1557

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

11-06-2008

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EP 1785570	A	16-05-2007	NONE	

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

**REFERENCES CITED IN THE DESCRIPTION**

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