



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
27.01.2010 Bulletin 2010/04

(51) Int Cl.:
E05D 13/00 (2006.01)

(21) Application number: **08425507.4**

(22) Date of filing: **24.07.2008**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MT NL NO PL PT RO SE SI SK TR
Designated Extension States:
AL BA MK RS

(71) Applicants:
• **Perin SpA**
31018 Albina di Gaiarine (TV) (IT)
• **Giroto, Adriano**
31027 Spresiano (TV) (IT)

(72) Inventor: **Giroto, Adriano**
31027 Spresiano (IT)

(54) **Actuating device for sliding elements of furnitures**

(57) A driving mechanism is described for opening/closing sliding members like doors (20) or drawers of a piece of furniture (10) comprising a frame (11), a door (20) displaceable on the frame, a turnable member (14) rotatably mounted on the frame or on the door and having two circular sections (16, 18) with different diameters, connecting means (12) between said two sections and two respective anchoring points (13, 15) on the door or on the frame, the turnable member being arranged between the two anchoring points, and elastic means (17) mounted between a section and the relative connecting means, which are adapted to elastically bias the connecting means. To solve the problem of the loss of position of the cable, the driving mechanism is equipped with anti-slipping means (32, 34) for permanently restraining the connecting means on the respective section of the turnable member.

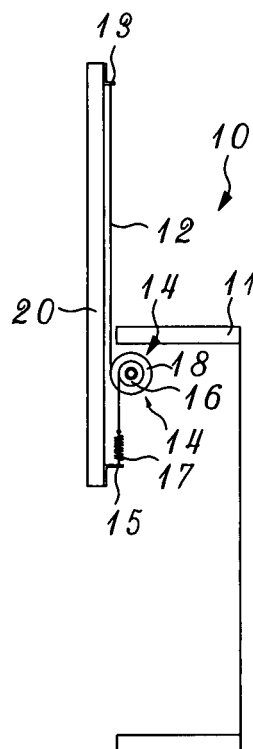


Fig. 1

Description

[0001] The present invention refers to a driving mechanism for opening/closing sliding members of furniture. With the driving mechanism members to be opened vertically, e.g. doors, or horizontally, e.g. drawers, can be moved.

[0002] For the vertical opening of doors of furniture, hereafter referred to as an example, lifting systems for the door are very common using counterweights, easily found on the market. The use of counterweights allows a balance of the door's weight, thereby making it possible to open it without heavy efforts. Although the counterweighted opening systems are simple from a constructive point of view, they take up a lot of space in the sides of the furniture, which must allot adapted containing vanes for the counterweights and the associated mechanism. As a consequence, there are both a construction of the furniture depending on the counterweighted mechanism, and a decrease for the useful internal space, as well as an esthetic appearance often resulting as a compromise between a pleasant design and constructive needs. An example of these systems is described in EP 0 210 431.

[0003] Another driving mechanism is that already patented by the Applicant, see fig. 1 and fig. 2.

[0004] A piece of furniture 10 comprises a frame 11 and a vertically sliding door 20 adapted to close the front opening thereof when it is closed (fig. 2). On a lateral internal wall of the frame 11 there is rotatably mounted a pulley 14 formed by two discs 16, 18 integral with each other, coaxially superimposed and the first having a radius lesser than the second. An inextensible cable 12 is fixed to the door 20 at an end point 13, winds around the disc 18, passes while winding on the disc 16 and connects to an extremity of a spring 17, whose other extremity is fixed to the door 20 at an end point 15. The spring 17 keeps the cable 12 tensioned.

[0005] As the door 20 lowers, the cable 12 sets in rotation the pulley 14. Since the cable 12 winds on the disc 18 and unwinds from the disc 16 with smaller radius, the distance between the points 13, 15 remaining however constant, the spring 17 progressively extends. The cable 12 therefore exerts a momentum on the pulley 14, which operates to withstand the weight of the door 12 and to make its lifting easier in the next opening phase.

[0006] Although the system works, some practical cunning is needed.

[0007] An unexpected problem found during fine tuning was that, with the passing of time and after a lot of opening/closing cycles, the correct working of the pulley 14 gets jeopardized because the cable 12 may lose its position relatively to the pulley 14 itself and thus the "positional memory" of the driving mechanism gets lost.

[0008] The present invention has the principal object to solve the before-mentioned problem.

[0009] This and other objects are solved by a driving mechanism for opening/closing sliding members like doors or drawers of a piece of furniture comprising:

- a frame;
- a door displaceable on the frame;
- a turnable member rotatably mounted on the frame or on the door and having two circular sections with different diameters;
- connecting means between said two sections and two respective anchoring points (13, 15) on the door or on the frame, the turnable member being arranged between the two anchoring points;
- elastic means mounted between a section and the relative connecting means which are adapted to elastically bias the connecting means;

characterized by comprising anti-slipping means for permanently restraining the connecting means on the respective section of the turnable member.

[0010] Now, with the invention, the loosening of the cable 12 on the pulley 14 is prevented.

[0011] Preferably the connecting means comprise a segment of flexible cable, of a flexible member or equivalent, and the turnable member is a pulley. Two cables, one for section, or a single segment of cable, which joins the two anchoring points and winds on the pulley passing from a section to the other, can be used.

[0012] Advantageously (it's simpler!) it is preferred to restrain the flexible member at one or more points on the pulley.

[0013] In any case, for the anti-slipping means a stop member adapted to be inserted in a corresponding cavity or hole of the pulley for fastening the cable therein, can be used, or a stop member for each segment of cable.

[0014] As a variant, the connecting means may be two racks and the anti-slipping means may be a corresponding toothing obtained on the surface of said two sections of the turnable member (e.g. a double toothed gear).

[0015] As anti-slipping means one could use also:

- a cable coated by gum (i.e. the anti-slipping means are associated to the connecting means and not to the turnable member);
- a bored plug equipped with a dowel adapted to block the flexible member and to be inserted in a hole obtained in the pulley. The dowel may be beveled, die-cast, coinjected on the cable, etc.;
- the co-injection of the pulley on the flexible member, or vice versa.

[0016] The solution with the dowel allows mounting the driving mechanism with the pulley "phased", i.e. in the right position with respect to the flexible member or cable. The drawback of having to find during assemblage the angular position of the turnable member is thus avoided, being said point established a priori.

[0017] As to variants, alone or in combination:

- the stop member is integral with the cable;
- the stop member is slidable on the cable and it is selectively blockable on a point thereof;

- the driving mechanism comprises adjusting means of the pulley's position with respect to the frame or the door;
- said adjusting means comprise a plate, whereon the turnable member is mounted, which is mountable with adjustable inclination on the frame or on the door, and preferably the plate is adjustable by means of slots obtained in it, wherein tightening screws to the frame or to the door are placed, a slot having a width greater than the screw-body so as to leave a mutual play therebetween;
- the driving mechanism comprises anti-slipping means associated to the connecting means;
- the driving mechanism comprises a cable coated by gum or by another high friction-coefficient material adapted to wind around the turnable member without slipping.

[0018] The advantages of the invention will be clearer from the following description of an exemplifying embodiment, illustrated in the attached drawing wherein:

fig. 1 shows a lateral schematic view of a known furniture equipped with a driving mechanism with a door open and lifted;

fig. 2 shows the furniture of fig. 1 with the door closed and lowered;

fig. 3 shows a three-dimensional view of some components of the driving mechanism according to the invention;

fig. 4 shows a zoomed view of fig. 3;

fig. 5 shows an exploded view of fig. 4;

fig. 6 shows a lateral view of a furniture according to the invention;

fig. 7 shows the furniture in fig. 6 with a door inclined.

[0019] Fig. 3 shows a pulley 14 having two sections 16, 18 with different diameter. On the sections 16, 18 winds a cable 12. Fig. 4 and 5 show how the cable 12 gets fixed on the pulley 14 in order not to make it slip. The cable 12 is inserted inside a hollow cylindrical plug 32, perpendicularly to its axis. Then the plug 32 is inserted in a cavity or superficial bore 30 in the pulley 14, with essentially complementary dimensions. Once inserted, the plug 32 slightly projects from the pulley 14, but the cable 12 arranges perfectly along its surface. The joint between plug and cavity 30 assures the stability of the anchoring point for the cable 12, while a dowel 34 is screwed in an internal thread of the plug 32 to block the cable on the plug 32. On the whole, then, the cable 12 is fixed to the plug without slipping, as it is the plug to the pulley 14. Note that it is enough to slack the dowel 34 to adjust the cable 12 on the pulley 14 and/or to pull the ends thereof towards a side or the other. The plug not necessarily must be extracted, and thus the anchoring point on the pulley stays fixed.

[0020] A cunning for the piece of furniture of the invention is also the adjustment of the inclination of the door

20 (see fig. 6 e 7). In the assembly phase, because of the weight of the door 20 loading the mechanical play of guiding wheels (not shown), it is impossible for a perfect parallelism between door 20 and frame 11 to occur.

[0021] A compensation of the inclination is possible by using adjusting means of the position of the pulley with respect to the frame or the door, according to where the pulley is mounted.

[0022] Preferably the said adjusting means are carried out by rotatably pivoting the pulley 14 on a plate 40 and fastening the latter to the interior of the frame 11. The plate 40 presents fastening slots 44 wherein there are inserted tightening screws or equivalents. The slots 44 have a width greater than the body of the screws 42, and hence they leave some play around the body of the screws 42: this allows the plate 40, which ultimately supports the door 20, to be able to be slightly tilted with respect to the vertical in order to adjust the inclination of the door 20. Once the right inclination is achieved, the screws 42 are tightened and the plate 40 is integrally fixed to the frame 11.

[0023] Generally speaking, by acting on the inclination angle one can compensate the play of the guides and the imprecision of the fastening bores to the frame 11.

Claims

1. Driving mechanism for opening/closing sliding members like doors (20) or drawers of a piece of furniture (10) comprising:

- a frame (11);
- a door (20) displaceable on the frame;
- a turnable member (14) rotatably mounted on the frame or on the door and having two circular sections (16, 18) with different diameters;
- connecting means (12) between said two sections and two respective anchoring points (13, 15) on the door or on the frame, the turnable member being arranged between the two anchoring points;
- elastic means (17) mounted between a section and the relative connecting means, which are adapted to elastically bias the connecting means;

characterized by comprising anti-slipping means (32, 34) for permanently restraining the connecting means on the respective section of the turnable member.

2. Driving mechanism according to Claim 1, wherein the connecting means comprise a segment of flexible cable (12) and the turnable member is a pulley (14).

3. Driving mechanism according to Claim 2, wherein

the anti-slipping means comprise a stop member (32, 34) adapted to be inserted in a corresponding cavity or hole (30) of the pulley for fastening the cable therein.

4. Driving mechanism according to Claim 3, wherein the stop member is integral with the cable.

5
5. Driving mechanism according to Claim 3, wherein the stop member is slidable on the cable and it is blockable selectively on a point thereof.

10
6. Driving mechanism according to any of the preceding Claims, wherein the stop member is a hollow plug (32) having a lateral hole wherein the cable is inserted, the central cavity of the plug being threaded for screwing therein a dowel adapted to press on the cable to block it.

15
7. Driving mechanism according to any of Claims 1 to 6, wherein a single segment of cable joins the two anchoring points.

20
8. Driving mechanism according to Claim 1, wherein the connecting means comprise two racks and the anti-slipping means comprise a corresponding tooth-
ing obtained on the surface of said two sections.

25
9. Driving mechanism according to any of the preceding Claims, comprising adjusting means (40, 42, 44) of the pulley's position with respect to the frame or the door.

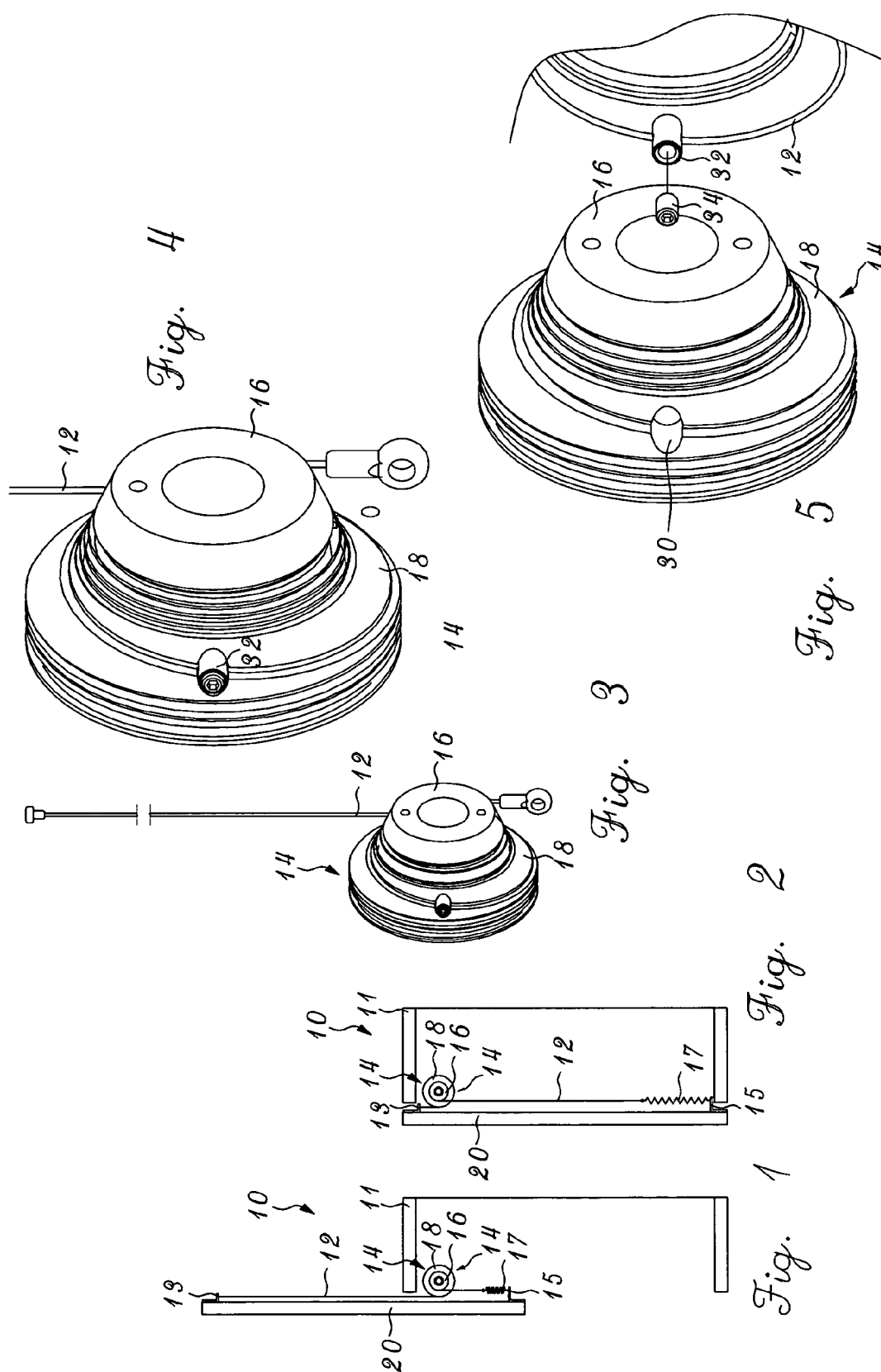
30
10. Driving mechanism according to Claim 9, wherein the adjusting means comprise a plate (40), whereon the turnable member is mounted, which is mountable with adjustable inclination on the frame or on the door.

35
11. Driving mechanism according to Claim 10, wherein the plate is adjustable by means of slots (44) obtained in it, wherein tightening screws (42) to the frame or to the door are placed, a slot having a width greater than the screw-body so as to leave a mutual play.

40
45
12. Driving mechanism according to any of the preceding Claims, comprising anti-slipping means associated to the connecting means.

50
13. Driving mechanism according to Claim 12, comprising a cable, coated by gum or by another high friction-coefficient material, adapted to wind around the turnable member without slipping.

55



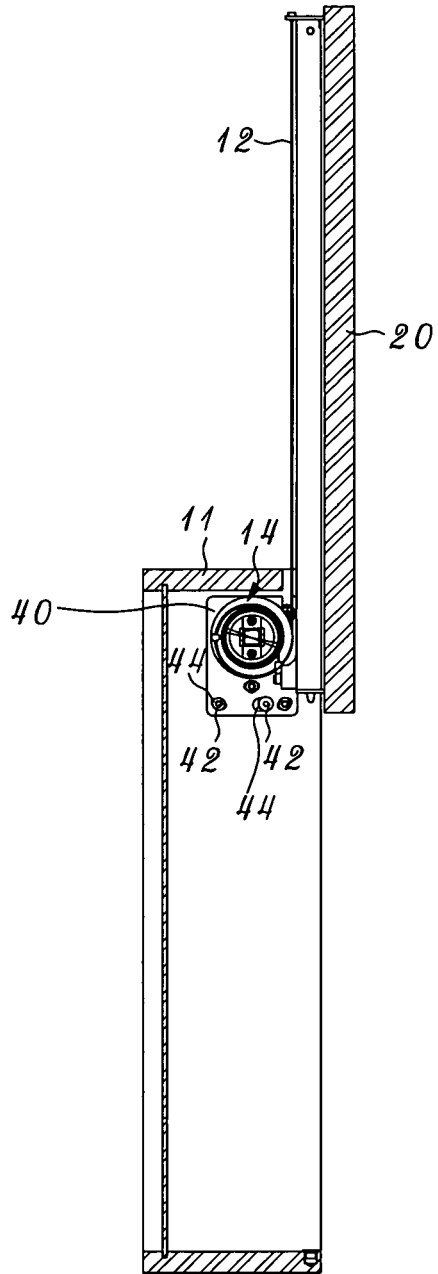


Fig. 6

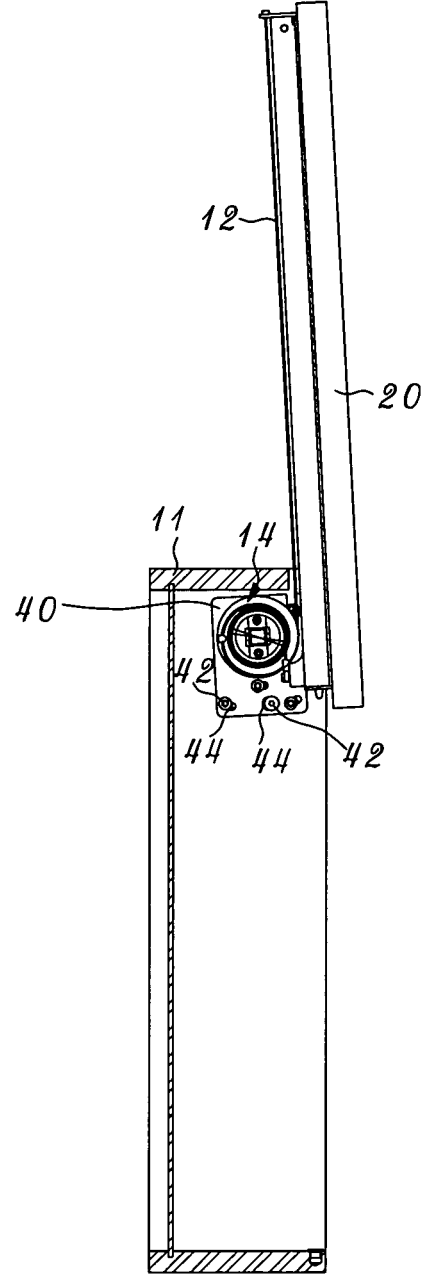


Fig. 7



EUROPEAN SEARCH REPORT

Application Number
EP 08 42 5507

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 1 074 686 A (GIOVANNETTI ANTONIO [IT]) 7 February 2001 (2001-02-07)	1-4,12	INV. E05D13/00
A	* paragraph [0009] - paragraph [0011]; claim 1; figures 1-4 *	5-11,13	
A	----- US 1 975 627 A (ANSTISS GEORGE P) 2 October 1934 (1934-10-02) * the whole document *	1-13	
			TECHNICAL FIELDS SEARCHED (IPC)
			E05D E05F E06B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 19 December 2008	Examiner Balice, Marco
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

3
EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 08 42 5507

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.

19-12-2008

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
EP 1074686	A	07-02-2001	IT	MI991743 A1	05-02-2001

US 1975627	A	02-10-1934	NONE		

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- EP 0210431 A [0002]