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(54) **Device for selectively lowering and raising a curtain**

(57) A device for selectively lowering and raising a blind comprises:

an elongate first housing;
a shaft mounted rotatably therein;
winding rollers connected to this shaft for winding up and unwinding respective cords;
control means for rotatingly driving the shaft;
wherein the control means comprise a toothed wheel unit which is coupled releasably to the housing and comprises:

an output toothed wheel coupled to the shaft;
an input toothed wheel coupled to a drive wheel;
a cord or the like trained over the drive wheel;
which two said toothed wheels co-act directly with each other and define a transmission ratio of 1:1.6
to 1:2.4, preferably 1:2;

and wherein the one end of each of the two cords is fixed, locked against relative rotation, to a relevant winding roller and the other end is fixed to a lower zone of the pleated blind or roller blind.

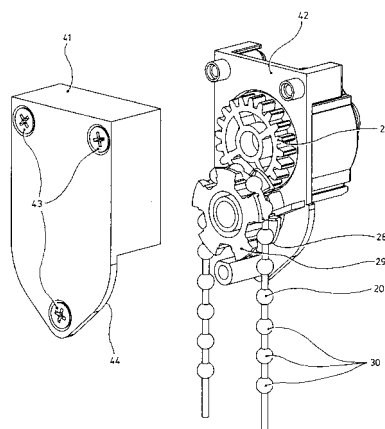


fig. 2

Description

[0001] The invention relates to a device for selectively lowering and raising a pleated blind, a roller blind or the like, which device comprises:

an elongate first housing which is adapted for fixing to a building construction, for instance to the upper horizontal part of a window frame;
 a shaft mounted rotatably in this first housing;
 at least two rotation-symmetrical winding rollers connected fixedly to this shaft and disposed coaxially thereto for winding up and unwinding respective cords;
 control means for rotatingly driving the shaft selectively in the one or the other direction, and thus winding up or unwinding the cords onto or from their respective winding rollers; and
 guide openings which are added to the respective winding rollers and disposed fixedly relative to the housing, and through which the cords extend, each of which guide openings is situated in the area of a relevant winding roller.

[0002] Such a device is known. In a known device the control means comprise a drive wheel which is coupled directly to the shaft and over which a cord is for instance trained in order to drive the drive wheel, and thereby the shaft, rotatingly in the one or the other direction in substantially non-slip manner by means of pulling force, for the purpose of selectively lowering and raising the blind.

[0003] The drawback of this known technique is that the force required to raise, and sometimes also to lower, a roller blind is quite great. A relatively great pulling force must therefore be exerted on the control cord, which is generally perceived as inconvenient by users and furthermore places a relatively heavy load on the coupling between the elongate first housing and the building construction.

[0004] It is further known to use a transmission in the form of a planetary system comprising toothed wheels with which a slowing of the drive wheel relative to the shaft can be realized in the order of 1:4. The drawback of this known technique is that it is usually perceived as inconvenient by a user that with the use of such a transmission a great length of the control cord must be displaced to lower or raise a blind. Depending on the diameter of the drive wheel, this ratio can be in the order of the reciprocal of said transmission ratio of 1:4, therefore around 4, wherein the relevant diameter of the drive wheel is thus not taken into account for the sake of concept definition. It is perceived by users as convenient that as a result of the slowing of 1:4 the force to be exerted is low.

[0005] The invention has for its object to provide a device which can be operated with a relatively small force, while the displacements required for raising or lowering a blind nevertheless remain limited.

[0006] According to the invention this object is realized with a device of the type stated in the preamble, wherein the control means comprise a toothed wheel unit coupled releasably to the housing, which toothed wheel unit comprises: an output toothed wheel coupled to the shaft; an input toothed wheel coupled to a drive wheel; a cord, rope, link chain, bead chain or the like, trained in substantially non-slip manner over the drive wheel for driving by pulling force and thus coupled thereto for driving; which two said toothed wheels co-act directly with each other and define a transmission ratio, i.e. the ratio of the rotation speed of the output toothed wheel and the rotation speed of the input toothed wheel, of 1:1.6 to 1:2.4, preferably 1:2; and wherein the one end of each of the two cords is fixed, locked against relative rotation, to a relevant winding roller and the other end is fixed to a lower zone of the pleated blind or roller blind.

[0007] In a preferred embodiment the device has the special feature that the toothed wheel unit comprises a second housing accommodating the toothed wheels. This housing can also be adapted to rotatably support the toothed wheels, and further has a function which is aesthetic and protects against dust and dirt.

[0008] In an embodiment in which the second housing comprises two housing parts coupled releasably to each other, the housing can be easily mounted and easily opened in the case of necessary maintenance, repair or replacement of components. The housing parts can be mutually coupled by means of one or more snap connections and/or screw connections.

[0009] An important aspect of the invention lies in the fact that the first and the second housing can be pushed together with respective complementary end parts with friction and/or clamping force so as to be thus coupled releasably to each other.

[0010] This latter variant is particularly practical in combination with an embodiment in which the first housing is an aluminium extruded profile. In this embodiment the second housing can have a number of protrusions, which fit clampingly, for instance by wedging action, or under friction in the free spaces of the aluminium profile forming the first housing.

[0011] The device preferably has the feature that the housing substantially consists of plastic, so that it can be manufactured by injection moulding.

[0012] This latter embodiment can have the special feature that the plastic is POM or ABS. Other plastics are also suitable. The stated plastics have superior technical qualities in respect of their mechanical strength and scratch resistance.

[0013] According to yet another aspect of the invention, the device has the feature that the toothed wheels consist of plastic, so that they can be manufactured by injection moulding.

[0014] This latter embodiment can have the special feature that the plastic is nylon, POM or ABS. According to a very practical aspect of the invention, the device has the special feature that the shaft is non-round, for instance has a square cross-section, and the output toothed wheel has a central, complementary hole.

[0015] The invention also relates to a toothed wheel unit for use as component of a device according to the above stated specifications, which toothed wheel unit comprises:

an output toothed wheel coupled to the shaft;

an input toothed wheel coupled to a drive wheel;

a cord, rope, link chain, bead chain or the like trained in substantially non-slip manner over the drive wheel for driving by means of pulling force and thus coupled thereto for driving;

which two said toothed wheels co-act directly with each other and define a transmission ratio, i.e. the ratio of the rotation speed of the output toothed wheel and the rotation speed of the input toothed wheel, of 1:1.6 to 1:2.4, preferably 1:2.

[0016] Said toothed wheel unit can also have the special features as stated as aspects of the total device of which the toothed wheel unit forms part.

[0017] The invention will now be elucidated with reference to the accompanying drawings. In the drawings:

Fig. 1 shows an exploded view of a device according to the invention;

Fig. 2 shows a perspective view of a toothed wheel unit, wherein the housing consisting of two parts is opened; and

Fig. 3 shows a perspective view of the toothed wheel unit of Fig. 2 from the other side.

[0018] Fig. 1 shows a device 1 for selectively lowering and raising a pleated blind 10. The device comprises an elongate first housing 1 which is embodied as an aluminium extruded profile and which can be fixed to a building construction by means of two brackets 11, 12. The device further comprises a shaft 3 which is rotatably mounted in first housing 2 and has a square cross-section, on which shaft two winding rollers 4 are fixedly arranged for winding up and unwinding respective cords 5. The upper end of one of the cords 5 is connected to respective winding rollers 4, while the lower end 13 is connected to a lower fixing eye 14 of pleated blind 10. The cords further extend through guide eyes 15, 16 respectively 17, 18 such that pleated or folded zones of the raised lower part come to lie over each other.

[0019] For rotating drive of shaft 3 use is made of a bead chain 20, which is held under tension with a freely rotating reversing roller under the influence of a weight 21. On the top side the bead chain co-acts with a toothed wheel unit 22 to be further described with reference to Fig. 2 and 3. This toothed wheel unit 22 can be inserted into an end of housing 2 and is thus connected releasably thereto through friction or by clamping.

[0020] As Fig. 3 shows particularly clearly, protrusions 23, 24 are provided for this purpose which can be inserted into the cavities of profile 2. On the underside clamping takes place by means of a clamping lip 25. When mounted on housing 2 of toothed wheel unit 22, shaft 3 is placed into co-action with a square hole 26 which forms part of an output toothed wheel 27. The output toothed wheel 27 is driven by an input toothed wheel 28 which is formed integrally with a drive wheel 29, which has peripherally arranged partitions extending more or less radially and forming cavities into which fit the beads 30 of bead chain 20. These beads 30 are mutually connected in known manner in tensively strong yet freely movable manner.

[0021] Fig. 2 and 3 show that the toothed wheel unit comprises a housing consisting of two parts 41 42 respectively. These housing parts 41 and 42 can be mutually connected by means of screws 43. Prior to closing of housing 41, 42 in this manner, the bead chain 20 must be trained over drive wheel 29. Housing part 41 has an opening 44 on the underside for passage of bead chain 20.

[0022] The directly connected toothed wheels 27, 28 have numbers of teeth which are in a ratio of respectively 2:1. By causing drive wheel 29, and thereby the input toothed wheel 28, to rotate by exerting a pulling force on one side or on the other side of bead chain 20, the output toothed wheel 27 is also set into rotation, although the rotation speed thereof is half that of the input toothed wheel. This is an important aspect of the invention and ensures that raising and lowering of blind 10 takes place with relatively little force and also with only a slightly increased displacement of the bead chain relative to the lower zone of blind 10.

[0023] The end of housing 2 remote from toothed wheel unit 22 is covered with a cover plate 44.

[0024] For the sake of completeness, it is noted with reference to Fig. 1 that the structure is drawn in exploded view for the sake of clarity. The unit 4, 3, 4 is accommodated in the inner space 45 of profile 2. The profile has an opening 46 extending in longitudinal direction or is otherwise provided with openings for passage of cords 5.

Claims

1. Device for selectively lowering and raising a pleated blind, a roller blind or the like, which device comprises:

an elongate first housing which is adapted for fixing to a building construction, for instance to the upper horizontal part of a window frame;
a shaft mounted rotatably in this first housing;
at least two rotation-symmetrical winding rollers connected fixedly to this shaft and disposed coaxially thereto for winding up and unwinding respective cords;
control means for rotatingly driving the shaft selectively in the one or the other direction, and thus winding up or unwinding the cords onto or from their respective winding rollers; and
guide openings which are added to the respective winding rollers and disposed fixedly relative to the housing, and through which the cords extend, each of which guide openings is situated in the area of a relevant winding roller;

wherein the control means comprise a toothed wheel unit coupled releasably to the housing, which toothed wheel unit comprises:

an output toothed wheel coupled to the shaft;
an input toothed wheel coupled to a drive wheel;
a cord, rope, link chain, bead chain or the like, trained in substantially non-slip manner over the drive wheel for driving by pulling force and thus coupled thereto for driving;
which two said toothed wheels co-act directly with each other and define a transmission ratio, i.e. the ratio of the rotation speed of the output toothed wheel and the rotation speed of the input toothed wheel, of 1:1.6 to 1:2.4, preferably 1:2; and

wherein the one end of each of the two cords is fixed, locked against relative rotation, to a relevant winding roller and the other end is fixed to a lower zone of the pleated blind or roller blind.

2. Device as claimed in claim 1, wherein the toothed wheel unit comprises a second housing accommodating the toothed wheels.

3. Device as claimed in claim 1, wherein the second housing comprises two housing parts coupled releasably to each other.

4. Device as claimed in claim 1, wherein the first and the second housing can be pushed together with respective complementary end parts with friction and/or clamping force so as to be thus coupled releasably to each other.

5. Device as claimed in claim 1, wherein the first housing is an aluminium extruded profile.

6. Device as claimed in claim 1, wherein the housing substantially consists of plastic.

7. Device as claimed in claim 6, wherein the plastic is POM or ABS.

8. Device as claimed in claim 1, wherein the toothed wheels consist of plastic.

9. Device as claimed in claim 8, wherein the plastic is nylon, POM or ABS.

10. Device as claimed in claim 1, wherein the shaft is non-round, for instance has a square cross-section, and the output toothed wheel has a central, complementary hole.

11. Toothed wheel unit for use as component of a device as claimed in any of the foregoing claims, which toothed wheel unit comprises:

an output toothed wheel coupled to the shaft;
an input toothed wheel coupled to a drive wheel;
a cord, rope, link chain, bead chain or the like trained in substantially non-slip manner over the drive wheel for driving by means of pulling force and thus coupled thereto for driving;

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which two said toothed wheels co-act directly with each other and define a transmission ratio, i.e. the ratio of the rotation speed of the output toothed wheel and the rotation speed of the input toothed wheel, of 1:1.6 to 1:2.4, preferably 1:2.

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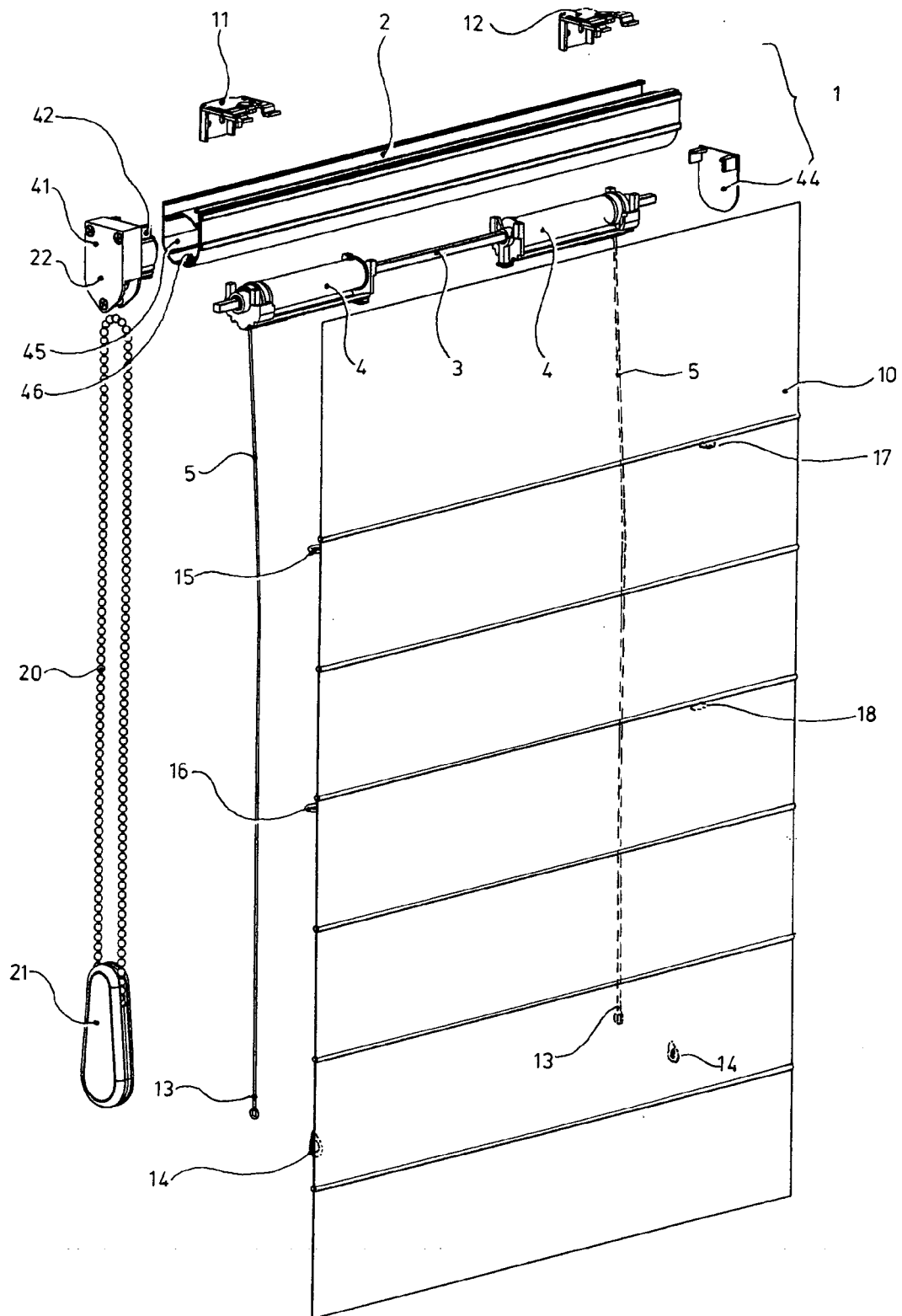


fig.1

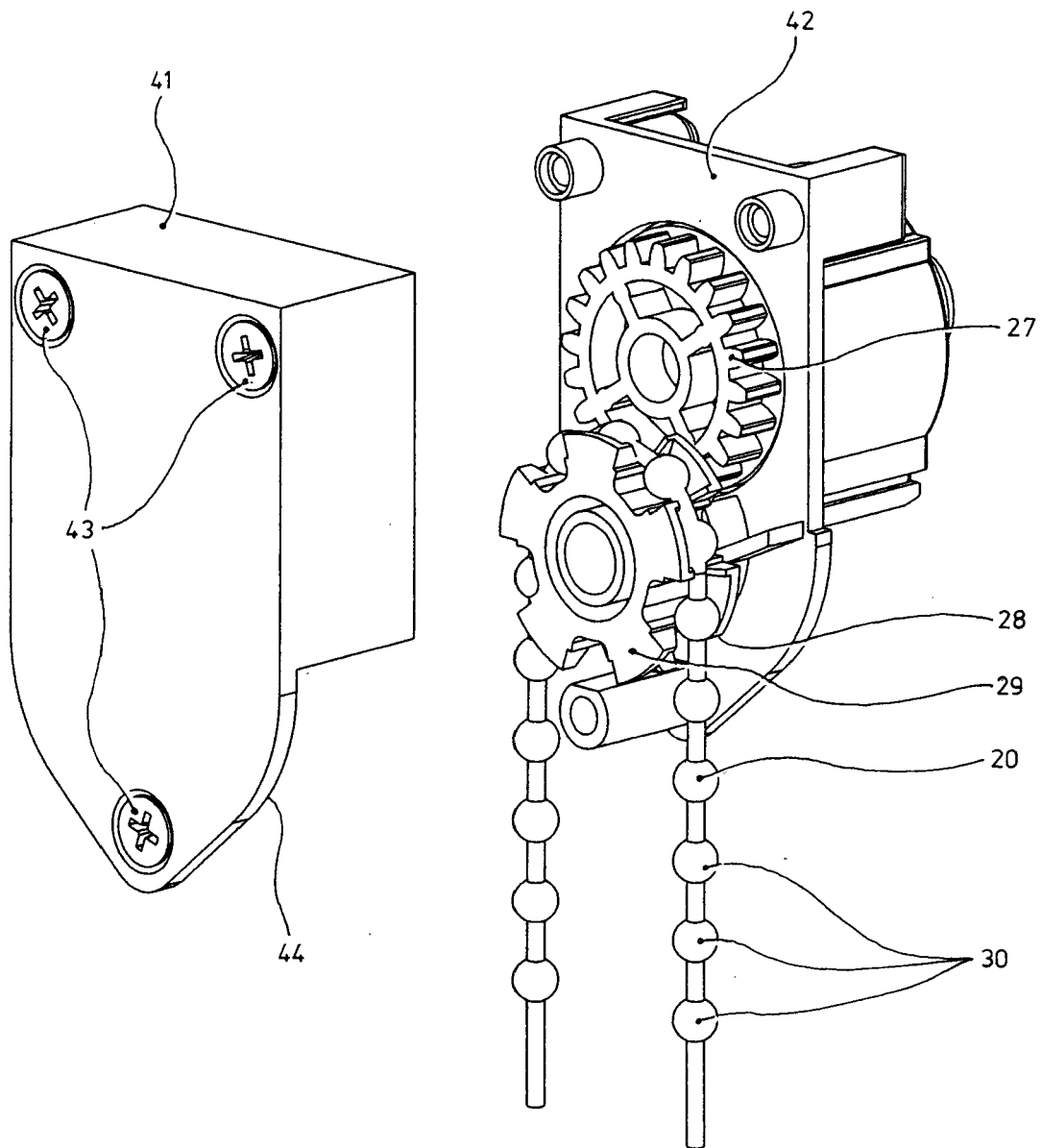


fig.2

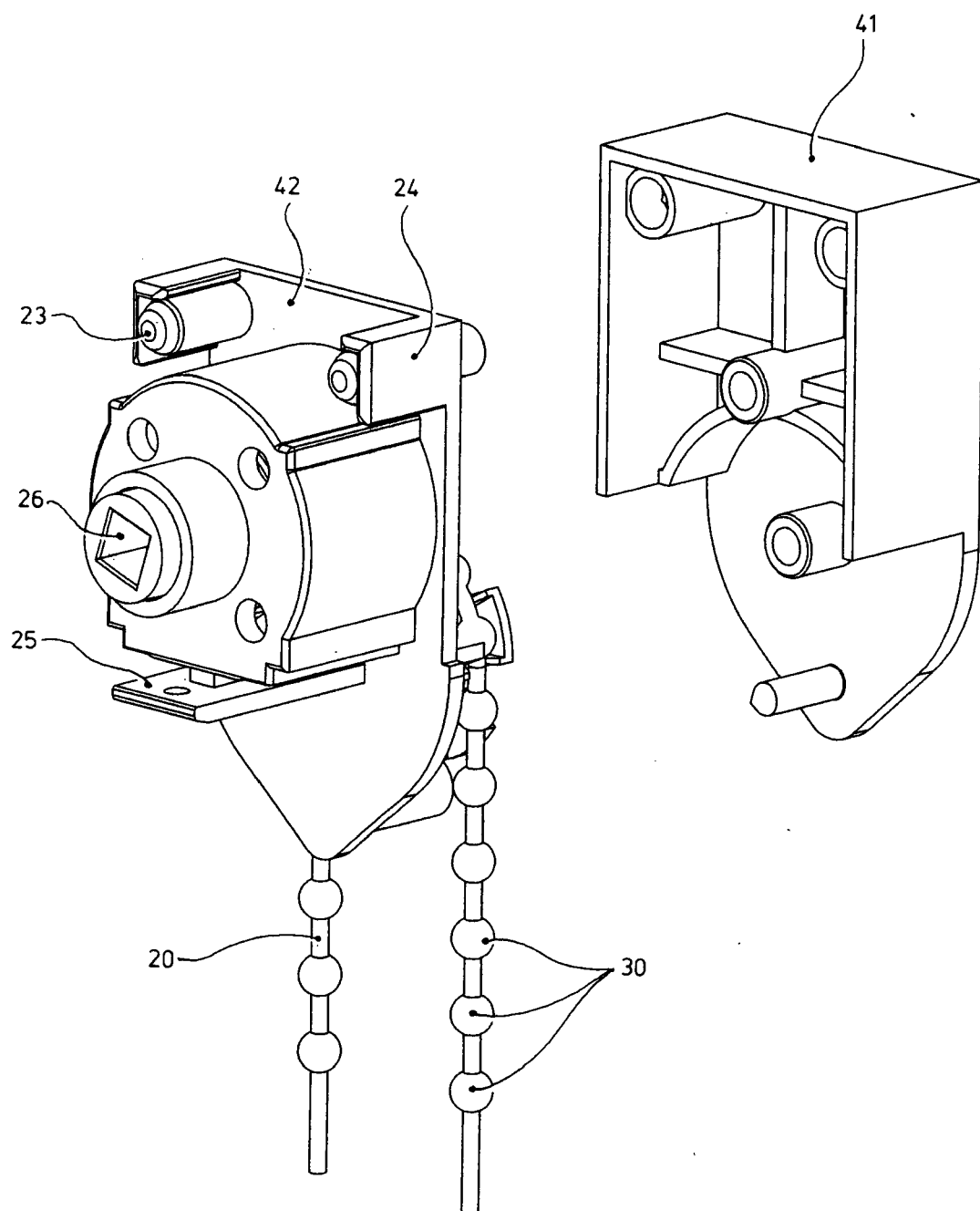


fig. 3



DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
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Place of search Munich		Date of completion of the search 21 March 2005	Examiner Kofoed, P
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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