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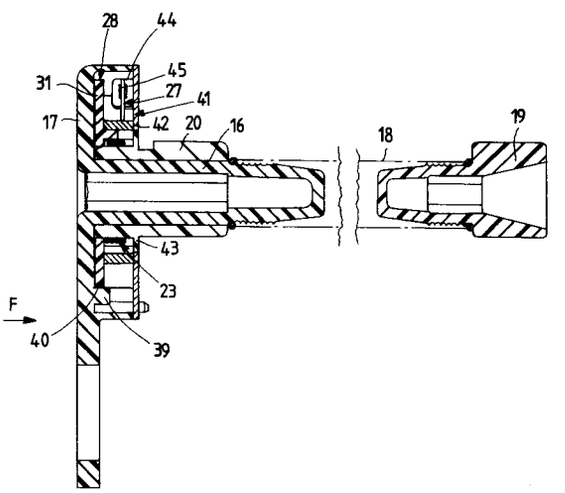
(54) Automatic tensioning and locking device for roller blinds and mosquito-curtains.

(57) An automatic tensioning and locking device for fabric and/or netting roller blinds and mosquito-curtains, to be associated with a roller box endpiece provided with a support pin for a winding roller in which a return spring and a drive bush for said roller interact between said roller and said support pin, about said drive bush there being wound a spiral spring the ends of which alternately abut against a cam unit which is rotatable coaxially with the drive bush and carries a pin which interacts with an elastically loaded stop element rockable at least between a position in which said fabric and/or netting can freely unwind, a position in which unwinding/rewinding are prevented with stoppage of said pin, and a position in which said fabric and/or netting can be wound.

Fig.2



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This invention relates to an automatic tensioning and locking device for roller blinds and mosquito-curtains.

In the various types of known roller blinds and mosquito-curtains various devices have been proposed for laterally guiding the fabric or netting in such a manner as not to allow even small apertures to be formed. Devices have also been applied to blinds and/or mosquito-curtains for tensioning the fabric or netting when completely unrolled to cover the corresponding window or opening. One of these known devices consists of a combination of mutually rotating parts installed in proximity to and/or on the support shaft for the fabric and/or netting winding roller. These parts are arranged at the required distance and in the required position on mounting the roller box on the window such as to determine a fixed limited extent of unwinding of the fabric and/or netting from the roller equal to the height of the window. The tensioning of the fabric and/or netting when in its maximum unwound position is determined by the upper locking of the fabric and/or netting by said device, which prevents rotation of the roller, and the lower locking by hooking elements acting on a bar situated at the free end of the fabric and/or netting and also acting as a gripping handle.

This device for adjusting the unwinding height of the fabric and/or netting therefore requires complicated setting-up during installation or mounting of the blind or mosquito-curtain, which is not always within the capacity of the final user.

A further problem of this known device is that both the roller support pins have to be used for its construction. In this respect, the first pin is surrounded by the spring for the return or rewinding of the fabric and/or netting, and the second pin supports and houses the device for adjusting the unwinding height of the fabric and/or netting. This arrangement of elements on both pins also results in complications during mounting and installation.

An object of the present invention is therefore to provide a device for tensioning unwound roller blinds and mosquito-curtains which does not require any setting by the installer of the blind or mosquito-curtain.

A further object is to enable this device to tension and lock the fabric and/or netting independently of the height of the window or opening to which it is applied.

These objects are attained according to the present invention by an automatic tensioning and locking device for fabric and/or netting roller blinds and mosquito-curtains, to be associated with a roller box endpiece provided with a support pin for a winding roller in which a return spring and a drive bush for said roller interact between said roller and said support pin, characterised in that about said drive bush there is wound a spring the ends of which alternately abut against a cam unit which is rotatable coaxially with the drive bush and carries a pin which interacts with an elastically loaded stop element rockable at least between a position in which said fabric and/or netting can freely unwind, a position in which unwinding/rewinding are prevented with stoppage of said pin, and a position in which said fabric and/or netting can be wound.

The structural and operational characteristics and advantages of an automatic tensioning and locking device for roller blinds and mosquito-curtains according to the present invention will be more apparent from the description given hereinafter by way of non-limiting example, with reference to the accompanying schematic drawings in which:

Figure 1 is a partial perspective view of a mosquito-curtain provided with the automatic tensioning and locking device of the present invention;

Figure 2 is a longitudinal section through the device on the line II-II of Figure 4;

Figure 3 is a section identical to that of Figure 2 in which the parts are exploded and rotated relative to each other;

Figure 4 is a side view in the direction of the arrow F of Figure 2 in which the roller box endpiece has been removed and a flange of the cam unit has been partially removed from the device of the invention, shown in its rest position;

Figure 5 is a view identical to that of Figure 4, in which the device is in the netting unwound position;

Figure 6 is a view identical to that of Figure 4, in which the device is in the position in which netting rewinding is prevented; and

Figure 7 is a view identical to that of Figure 4, in which the device is in the position in which netting unwinding is prevented.

Figure 1 is a schematic view of a mosquito-curtain, indicated overall by 11, applied to a window frame indicated by 12. As is well known, the mosquito-curtain, or alternatively the blind, both of roller type, consists essentially of a roller box 13 containing a netting 14 or fabric sheet, guided slidingly along the longitudinal sides within suitable guides provided with seal brushes 15.

The netting 14 is wound on a roller, not shown, contained in the box 13 and supported on support pins 16, only one of which is shown, these being connected to its ends and secured to endpieces 17. A return spring shown schematically at 18 is interposed and interacts between the illustrated support pin 16 and the roller (not shown). The return spring 18 is of the spiral type, and is supported and fixed at that end facing the roller by a

bush 19 used both to load it to an extent sufficient for rewinding the netting 14 onto the roller and to position it over the other support pin, not shown. In addition, about the support pin 16 there is positioned a drive bush 20 which usually engages in a groove in the roller.

The bottom of the netting 14 is provided transversely with a bar 21 also acting as a handgrip and also guided laterally in the lateral guides 15. The ends of the bar 21 are used as elements for positioning the bar 21 at stop elements, shown schematically at 22 and positioned at the lower end of the lateral guides 15. Figure 2 also shows, positioned in correspondence with the endpiece 17, an automatic tensioning and locking device according to the invention for the netting of the roller mosquito-curtain. As will be seen hereinafter, this device consists essentially of a further spiral spring 23 wound about the drive bush 20 with its ends 24, 25 abutting alternately against a cam unit rotatable coaxially with the drive bush 20.

The cam unit comprises a pin 26 which interacts with an elastically loaded stop element 27 rockable at least between a position in which said fabric and/or netting can freely unwind, a position in which unwinding/rewinding are prevented with stoppage of said pin, and a position in which said fabric and/or netting can be wound.

Figures 3 and 4 show more clearly the structure of the cam unit, which consists of two elements indicated overall by 28 and 29 respectively. A first element 28 comprises a cylindrical portion 30 rigid with and projecting from a flange portion 31 of greater diameter. The cylindrical portion 30 is provided with a pair of diametrically opposing radial notches 32 and 33, one being larger than the other. The second element 29 also comprises a cylindrical portion 34 provided with a radially outward projecting cam portion 35 on which the pin 26 is provided. Arch-shaped recesses 36 and 37 are provided in the inner wall of the cylindrical portion 34 to house the ends 24 and 25 of the second spiral spring 23, which are free to rock. The cylindrical portion 34 of the second element 29 is able to receive in a coaxial position the cylindrical portion 30 of the first element 28 such that the flange portion 31 of the first element 28 and the cam portion 35 of the second element 29 are positioned on the distant opposing ends of the two elements 28 and 29.

The spring 23, with the elements 28 and 29 of the cam unit mounted in this manner, is seated on a cylindrical end portion 38 of the drive bush 20, which is housed coaxially within the cylindrical portion 30.

The endpiece 17 is of flattened prismatic box form to house the device of the present invention. On that outwardly facing major closed side from which said support pin 16 extends there is provided an inwardly projecting abutment tooth 39 arranged to engage with an arch-shaped perimetral recess 40 provided in the cylindrical portion 30 of the first element 28 of the cam unit. On its open other side which faces the roller there is provided a plate 41 which besides acting as a closure element also supports the stop element 27.

The plate 41 is perforated centrally at 42 to house a flange-shaped wall 43 provided on the drive bush 20 in an intermediate region thereof.

The plate 41 also carries, secured in a fixing eyelet 44, an end appendix 45 of the stop element 27, which in the illustrated embodiment consists of a hook element.

The hook element 27 is of C-shape, a base of which is provided with said appendix 45. On one free end on the open side of the C there is provided an inner abutment surface 46 for the pin 26, and on the other free end there is provided an outer slide surface 47 for the pin 26.

A hole 48 in the body of the hook element 27 secures one end of a spring 49, the other end of which is rigid with the plate 41. In this manner the hook element is normally maintained rotated towards the axis of the device.

The intermediate part of the body of the hook element 27 carries on its inside a deviator element 50 positioned in proximity to that end distant from the end provided with the appendix 45 and interacting with the pin 26.

A projection 51 extends from the outer surface of the intermediate part of the body of the hook element 27 to maintain the hook element 27 raised and spaced from the plate 41.

The automatic tensioning and locking device for blinds and/or mosquito-curtains according to the present invention operates in the following manner.

When the device has been installed in one endpiece at one end of the roller, for example of a mosquito-curtain, the netting 14 can be unwound from the roller contained in the roller box 13, on which it is wound.

The bar 21 is pulled downwards so that the netting descends within the lateral guides 15. During this stage the device, which was initially in the position shown in Figure 4, assumes the position of Figure 5, ie the unwinding of the netting 14 causes the roller and the drive bush 20 rigid with it to rotate. The drive bush 20 carries, rigidly wound about it, the spring 23 one end 24 of which abuttingly engages in the arched recess 36 to also rotate the second element 29 of the cam unit.

The pin 26 hence rotates, slides on the outer sliding surface 47 and engages against the inner abutment surface 46 of the hook element 27, to halt. The spring 23 wound about the drive bush 20 is hence compelled to open on account of the

continuing rotation of the bush 20, to enable unwinding of the netting 14 to continue. When the netting 14 has been completely lowered the bar 21 is at the end of its travel, hooked to the stop elements 22 within the guides 15.

Release of the bar 21 results in the operation of the return spring 18, the operation of the spring 49 acting on the hook-shaped stop element 27 and the return of the spring 23 on the drive bush 20 to its engagement state.

The pin 26 slides along that inner surface of the hook element opposite the surface 47 and becomes retainedly positioned within the hook element as shown in Figure 6. In this position, rewinding of the netting 14 onto the roller is prevented.

Any action tending to further unwind the netting 14 causes the pin 26 to move within the hook element 27 into an intermediate position in which unwinding of the netting is also prevented. In this position the rotation of the first cam element 28 brings the arch-shaped recess 40 into abutting contact with the tooth 39 to hence halt, with the spring 23 under torsion and the bush 20 locked.

In this latter position, shown in Figure 7, the netting can neither rewind nor further unwind, to hence remain taut and prevented from escaping from the lateral guides 15.

When it is required to move the netting from its working position by returning it to the roller box 13 it is necessary merely to disengage the bar 21 from the stop elements 22. This operation results in rotation of the cam unit, to move the pin 26 within the hook element 27.

The pin 26 slides against the intermediate part of the body of the hook element 27 until it interacts with the deviator element 50, which enables it to leave the hook element 27. Simultaneously the first element 28 of the cam unit also rotate until the arched recess 40 abuts against the abutment tooth 39 as shown in Figure 4. The arched recess 36 of the second element 29 of the cam unit moves into engagement with the end 24 of the spring 23. The spring 23 wound about the drive bush 20 is consequently obliged to open by the continuing rotation of the bush 20, to enable the winding of the netting 14 onto the roller to continue. During this stage the return spring 18 moves to determine this rewinding by overcoming the force of the spring 23.

It has hence been shown that the device of the present invention enables the blind and/or netting to be automatically locked and tensioned in its position of maximum unwinding, independently of the extent of this unwinding. Consequently no preparation is required on installing the blind or mosquito-curtain, as the device is self-adjusting.

Advantageously by means of the device of the present invention the lower bar can also be halted in any position along its possible unwinding path. This advantage is particularly useful in the case of a roller blind in which its lowering can be adjusted at will.

Claims

1. An automatic tensioning and locking device for fabric and/or netting roller blinds and mosquito-curtains, to be associated with a roller box endpiece provided with a support pin for a winding roller in which a return spring and a drive bush for said roller interact between said roller and said support pin, characterised in that about said drive bush there is wound a spiral spring the ends of which alternately abut against a cam unit which is rotatable coaxially with the drive bush and carries a pin which interacts with an elastically loaded stop element rockable at least between a position in which said fabric and/or netting can freely unwind, a position in which unwinding/rewinding are prevented with stoppage of said pin, and a position in which said fabric and/or netting can be wound.

2. A device as claimed in claim 1, characterised in that said cam unit consists of two elements coaxial with said drive bush, which interact with said spiral spring and said stop element.

3. A device as claimed in claim 2, characterised in that a first of said two elements comprises a cylindrical portion rigid with and projecting from a flange portion of greater diameter, said cylindrical portion being provided with a pair of diametrically opposing radial notches one of which is larger than the other, and into which the ends of said spiral spring are inserted in a freely rockable manner.

4. A device as claimed in claim 2, characterised in that a second of said two elements comprises a cylindrical portion provided with a radially outward projecting cam portion on which said pin is provided, in an inner wall of the cylindrical portion there being provided arch-shaped recesses arranged to house the ends of said spiral spring in a freely rockable manner.

5. A device as claimed in claim 1, characterised in that said spiral spring is seated on a cylindrical end portion of said drive bush which is housed coaxial with said cam unit.

6. A device as claimed in claim 1, characterised in that said endpiece is in the form of a flat

box having an open major side, and an outwardly facing closed major side from which there extends said support pin and on which there is provided an inwardly projecting abutment tooth arranged to engage a perimetral recess in an element of the cam unit, on said open side facing the roller there being located a plate which supports said stop element.

7. A device as claimed in claim 6 , characterised in that said plate is centrally perforated to house a flange-shaped plate provided on said drive bush in an intermediate region thereof.

8. A device as claimed in claim 1, characterised in that said endpiece is box-like and is closed by a plate to which said stop element, in the form of a hook element, is constrained, said constraint being achieved by a fixing eyelet into which an end appendix of said hook element is inserted.

9. A device as claimed in claim 8, characterised in that said hook element is of C-shape, a base of which is constrained to said plate by said appendix, on the open side of said C there being provided on one free end an inner abutment surface for said pin, on the other free end of said C there being provided an outer slide surface for said pin.

10. A device as claimed in claim 8, characterised in that to said hook element there is constrained one end of a further spring, the other end of which is rigid with said plate, said further spring maintaining said hook element rotated towards the axis of said device.

11. A device as claimed in claim 8, characterised in that an intermediate part of said hook element carries on its inside a deviator element arranged to enable said pin to escape from said hook element.

Fig.1

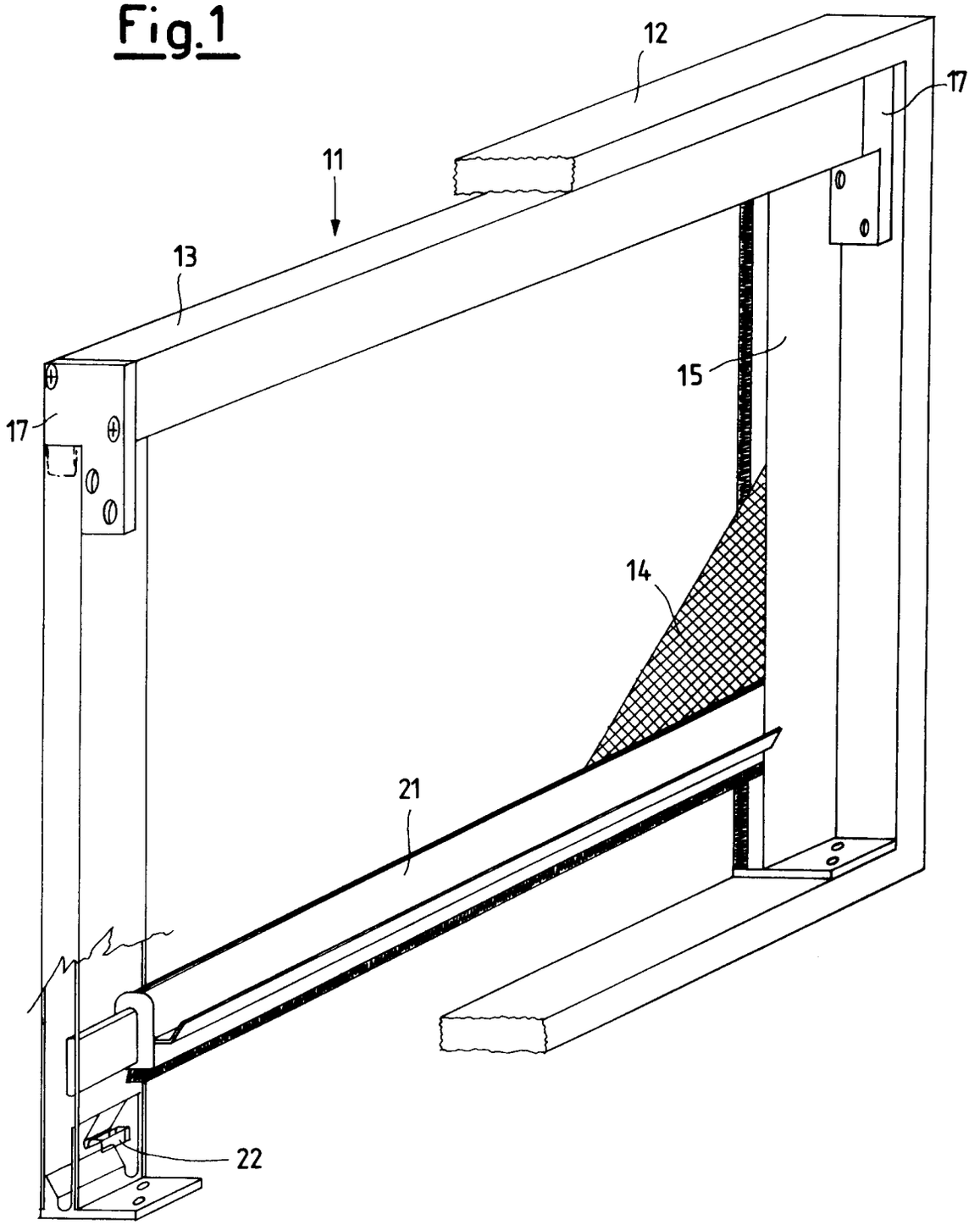

Fig.2

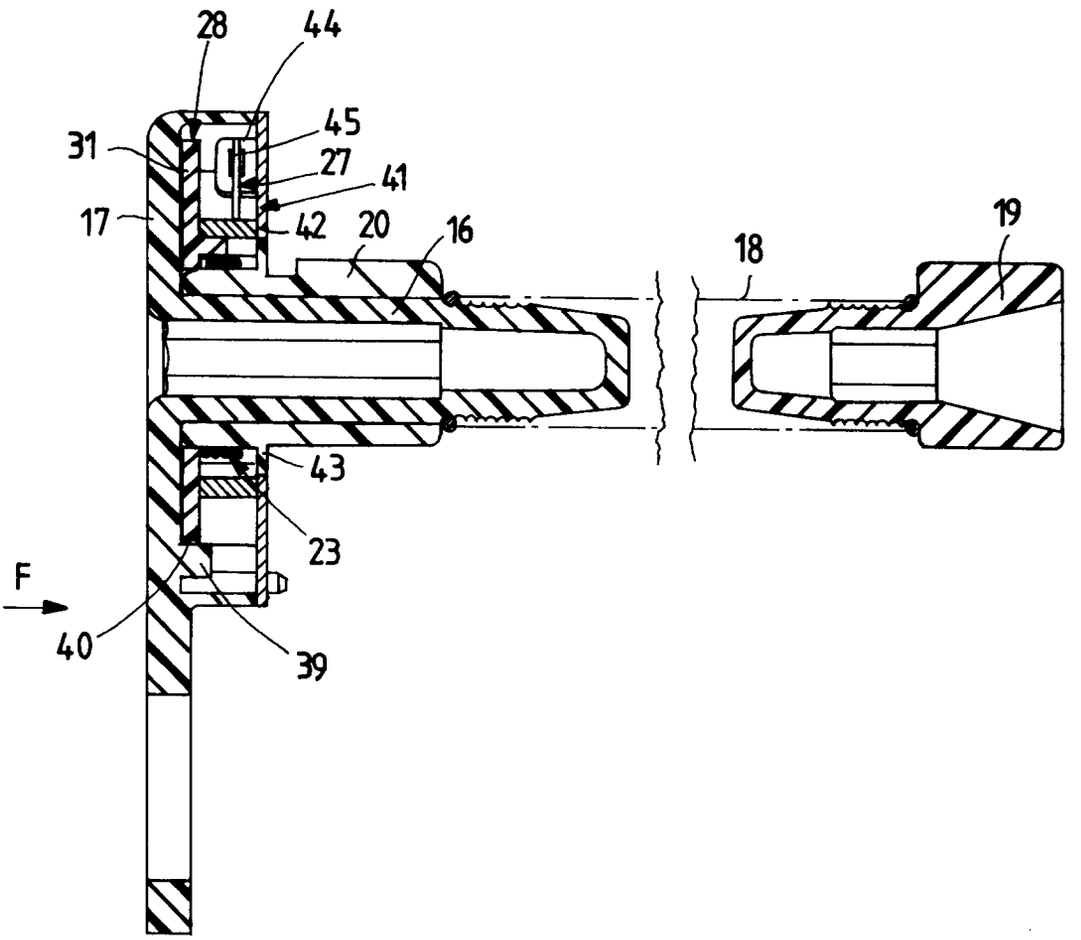

Fig.3

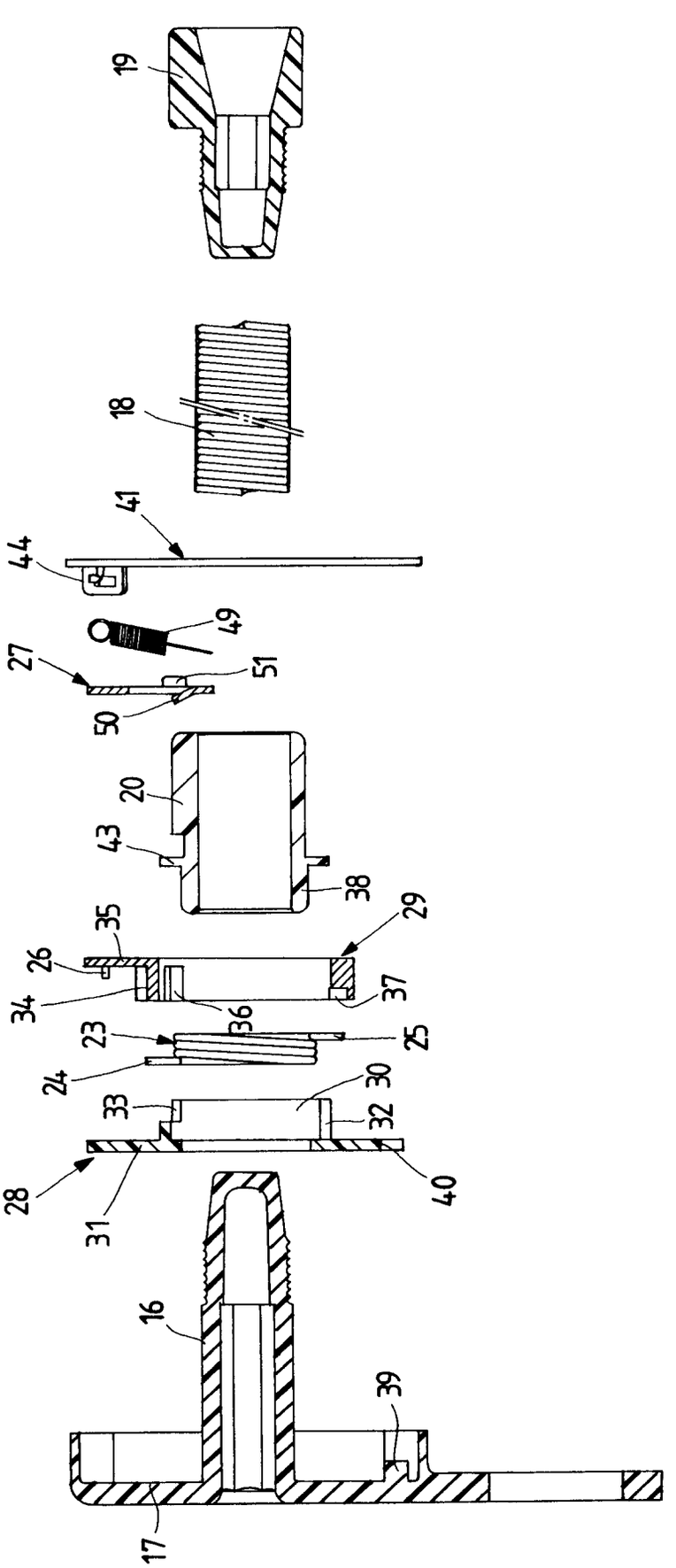
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Fig. 4

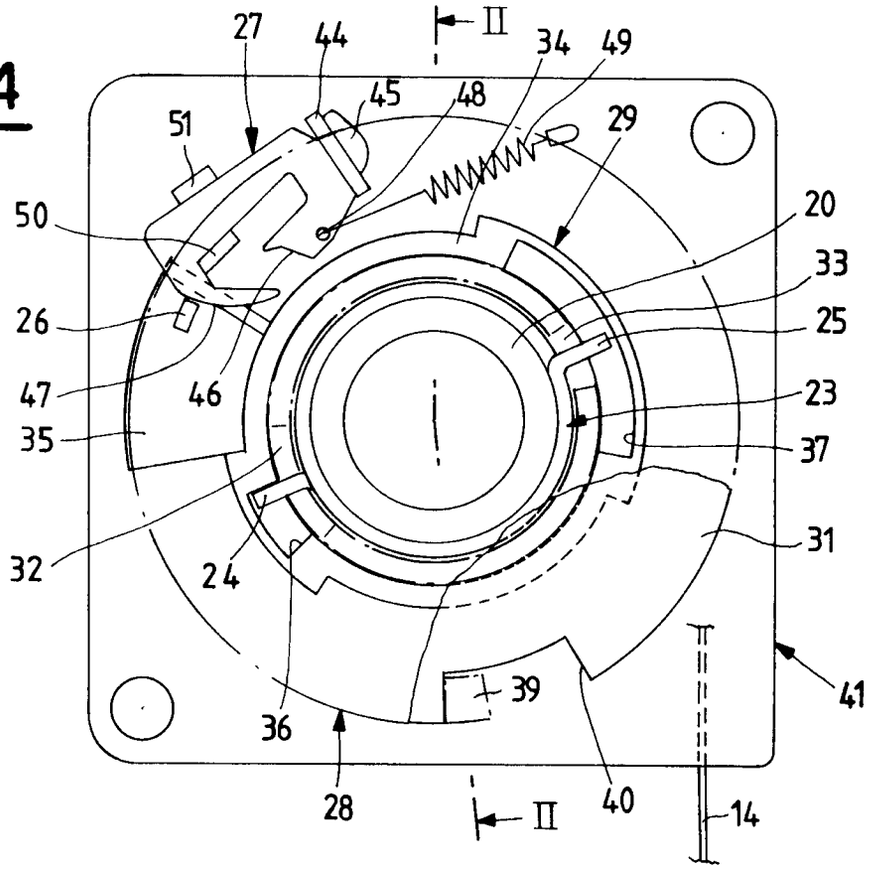
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Fig. 5

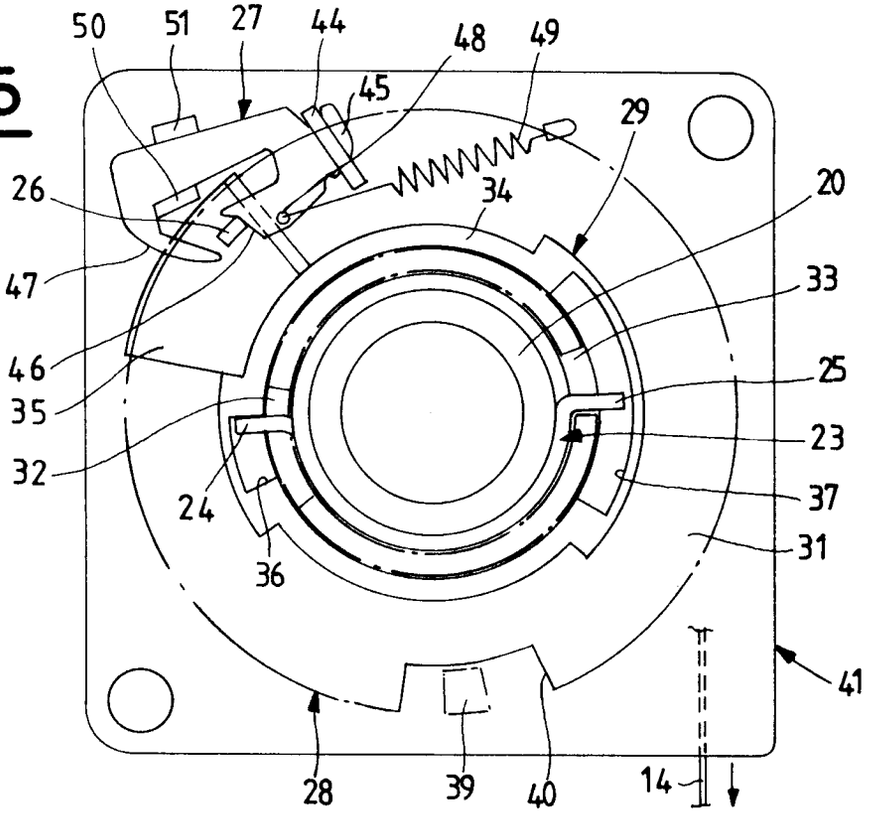
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Fig.6

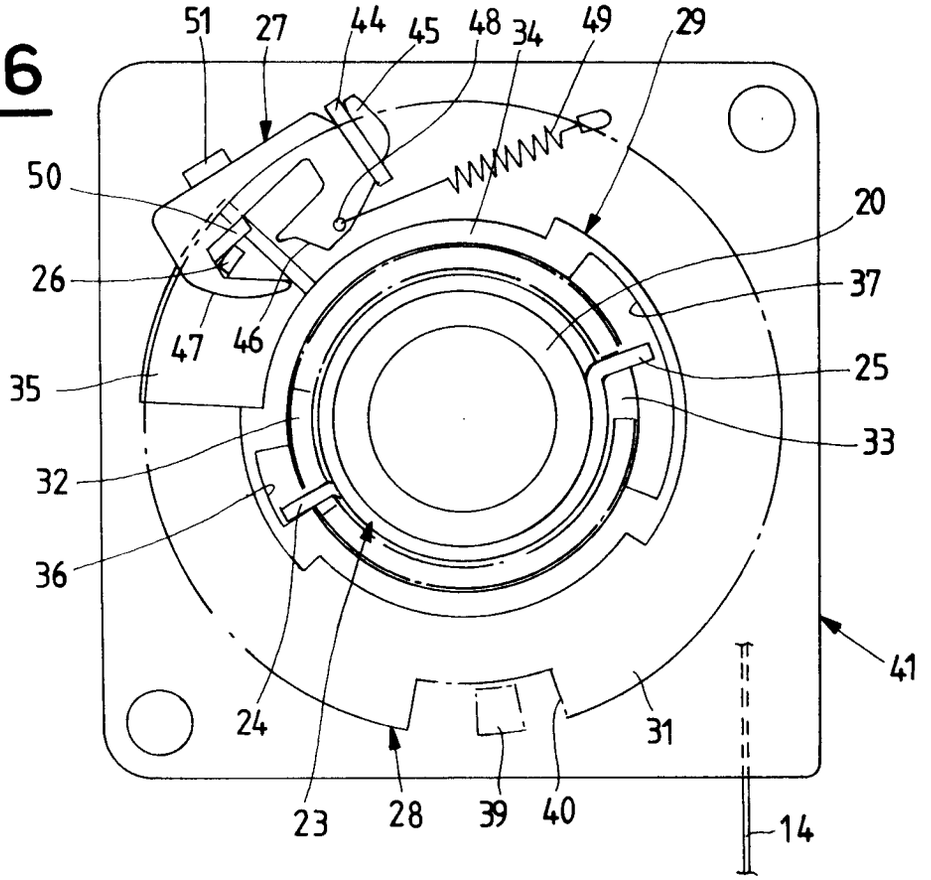
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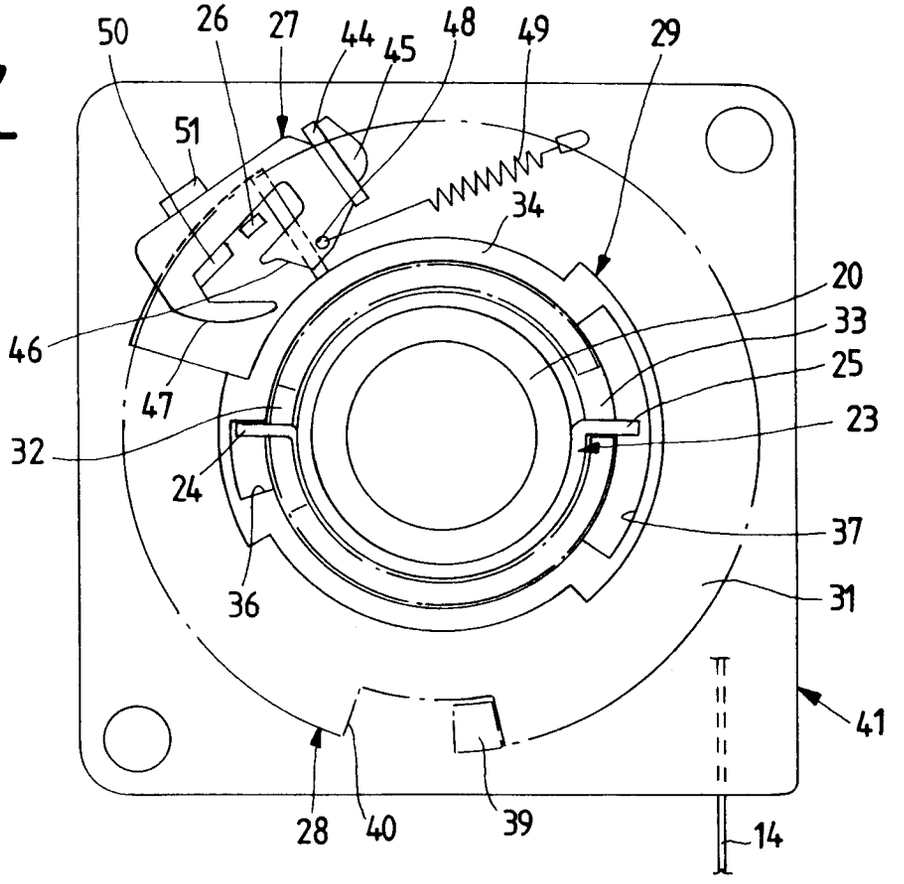
Fig.7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