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(54) **A magnetic pull-push device of reduced transverse bulkiness for furniture**

(57) A magnetic push-pull device for an opening part of a piece of furniture comprises, at the front, a magnet (19) and a thrust pin (15) that is spring movable by a push-pull mechanism (17, 18) between a retracted position

and a position at which it projects beyond the magnet. The magnet (19) and thrust pin (15) are disposed in mutual side by side relationship and have complementary cross sections so that they together form a circumference.

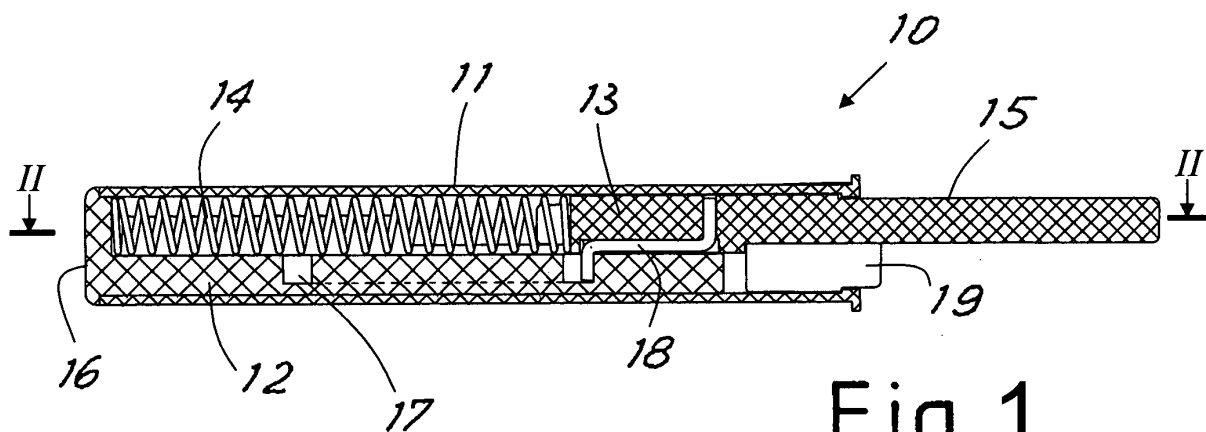


Fig. 1

Description

[0001] The present invention relates to a magnetic push-pull device of the type used in furniture to magnetically retain an opening part of the piece of furniture (generally a door) to the closed position until a manual thrust from the outside on the movable part releases a suitable spring pusher of the push-pull mechanism. Thus the pusher comes out of the device and pushes the furniture part to move away from the magnetic retainer. A new pressure on the push-pull mechanism locks the pusher to the retracted position again.

[0002] Devices of this type have been proposed in the art and they are made for being embedded into a hole in the piece of furniture, the pusher emerging from one extremity through a toroidal magnet axially pierced with a hole.

[0003] This type of device is described in the European Patent application EP 1598509, for example. While operation of this device is quite satisfactory, the minimum diameter of the device is greatly conditioned by the necessity for the pusher part passing through the magnet to be sufficiently strong. Above all if the pusher has a relatively long stroke, the part passing through the magnet and projecting from the device can easily become distorted due to external forces, thus breaking and being prevented from sliding. In addition, the toroidal magnet too must have some wall thickness in order to be able to provide a sufficient attraction force. In addition, a toroidal magnet is relatively expensive.

[0004] Other magnet and pusher arrangements have been previously proposed but they were found impractical as they were of great bulkiness, poor efficiency and non-immediate installation.

[0005] The general aim of the present invention is to obviate the above mentioned drawbacks by providing a magnetic push-pull device of reduced cost, reduced transverse bulkiness, simple installation and great sturdiness.

[0006] In view of the above aim, in accordance with the invention, a magnetic push-pull device for an opening part of a piece of furniture has been conceived which at the front comprises a magnet and a thrust pin which is spring movable by a push-pull mechanism between a retracted position and a position at which it projects beyond the magnet, characterized in that the magnet and thrust pin are disposed in mutual side by side relationship and have complementary cross sections so that they together form a circumference.

[0007] For better explaining the innovative principles of the present invention and the advantages it offers over the known art, a possible embodiment applying these principles will be described hereinafter by way of example, with the aid of the accompanying drawings. In the drawings:

- Fig. 1 is a diagrammatic side view in section of a magnetic push-pull device made in accordance with

the invention;

- Fig. 2 is a partly sectioned view taken along line II-II in Fig. 1;
- Fig. 3 is a front view of the device in Fig. 1;
- Fig. 4 is an exploded view of the device in Fig. 1.

[0008] With reference to the drawings, shown in Fig. 1 and generally denoted at 10 is a push-pull device for retaining to the closed position and opening by thrust, an opening part of a piece of furniture (a door, for example), not shown. At the front, device 10 comprises a magnetic retainer 19 and a thrust pin 15 that is spring movable by means of a push-pull mechanism between a retracted position and a position at which it projects beyond the magnet.

[0009] Device 10 comprises an outer cylindrical housing 11 in which a support insert 12 on which a pusher 13 slides is axially received, said pusher being moved by a spring 14 so that it projects to the front of the cylinder with a thrust pin 15. Spring 14 reacts between a rear portion of the support insert 12 forming a rear plug 16, and the rear portion of the pusher.

[0010] In the slide interface between pusher 13 and support 12 there is a push-pull mechanism so that alternately either the pusher is retained in the retracted position or the finger juts out to separate the furniture part from the magnetic retainer. The push-pull mechanism comprises a cam path 17 formed in the support and into which an S-shaped pin element 18 is fitted, according to a known bistable mechanism.

[0011] As clearly viewed from Fig. 2, the cam path forms a loop circuit for the pin element, with two stable positions at the extremities of the pusher stroke.

[0012] The first position (shown in Fig. 1 and Fig. 2) is that of the pusher emerging outwards, with the extremity of the S-shaped pin that after sliding within the cam path is now in a forward stable position 20 of the cam path.

[0013] In the other position, the pusher is retained with the free end of the pin 15 substantially close to the front end of the cylinder 11 so as to be slightly retracted relative to the front face of a magnetic element 19 disposed in side by side relationship with the pusher pin. In this position, the S-shaped pin 18 has its extremity within the cam path and is in a rear stable position 21 in the cam path. In this manner, when the thrust pin exerts a pressure towards the retracted position, the S-shaped pin alternately moves to one of the two stable end positions in the cam path, corresponding to the retracted or projecting positions of the thrust pin.

[0014] Shown in Fig. 3 is the front face of the device. Pin 15 of the pusher and magnet 19 are disposed in side by side relationship transversely of the movement axis of the pin and have complementary cross-section so as to form a circumference with each other. In particular, it is advantageous for them to be the two halves of the same circumference. In fact it was found that in this manner the best compromise exists between magnetic force and transverse sturdiness of pin 15, in relation to the

device diameter. The cost for manufacturing a magnet having a half-moon-shaped section is lower than that for a toroidal magnet.

[0015] For the sake of clarity, shown in Fig. 4 is the exploded view of device 10 with the parts disassembled. Clearly shown is the pusher step 22 stopping the outward pusher stroke by interfering with a corresponding step 23 on the inside of the front extremity of cylinder 11. The same step 23 interferes with a step 24 of the magnet to stop the forward stroke thereof. Assembling of the different parts of the device is very simple, since it is only necessary to mount pusher 13 on support 12, with suitable interposition of the S-shaped pin 18, insert spring 14 in place in seat 25 in the support and introduce all that into cylinder 11 from the back (with interposition of magnet 19) until the plug 16 stops against the rear extremity of the cylinder. The support also constitutes a retainer for the magnet trapped between the support and edge 23.

[0016] The support can be locked in the cylinder in different ways. For instance, it can be glued, joined by ultrasonic welding, making them both of plastic material, or also merely pressure fitted therein. The cylinder on its front extremity has an annular projecting edge 26 enabling stopping of the cylinder sinking into a suitable hole formed in the piece of furniture, said hole completely receiving the device, with minimum bulkiness, to make the magnet and pusher suitably project, so that they can conveniently act on the door of the piece of furniture. Therefore the device can be used in a built-in (embedded) condition with ease.

[0017] At this point it is apparent that the intended purposes are achieved by providing a magnetic push-pull device of minimum bulkiness, reduced cost and satisfactory sturdiness, while enabling a great axial length and a corresponding long stroke of the thrust pin against the door.

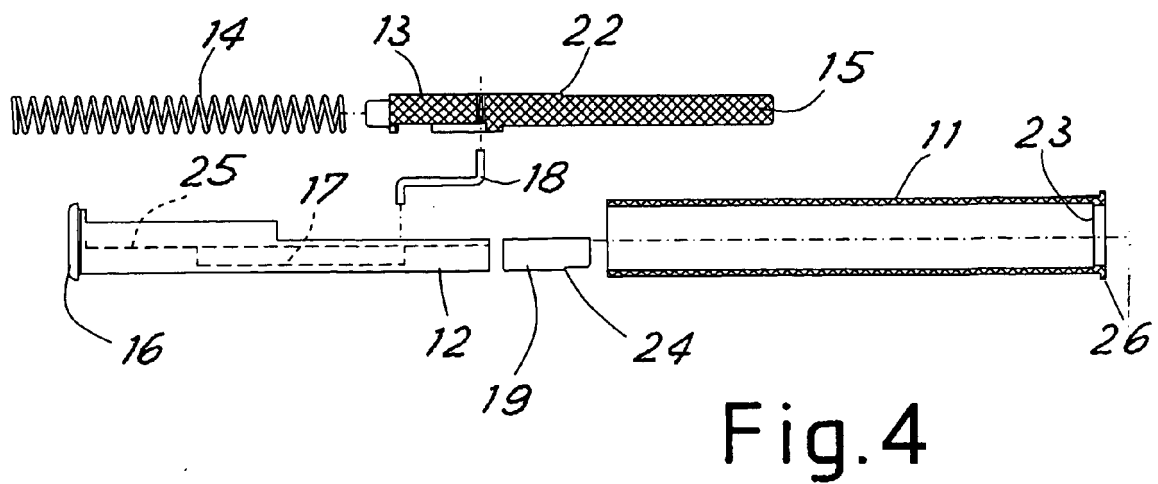
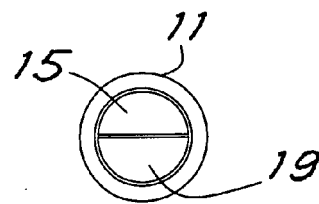
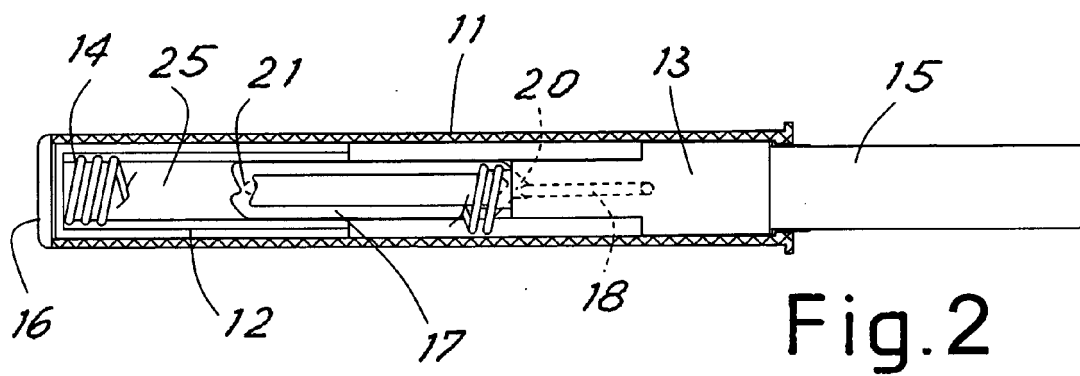
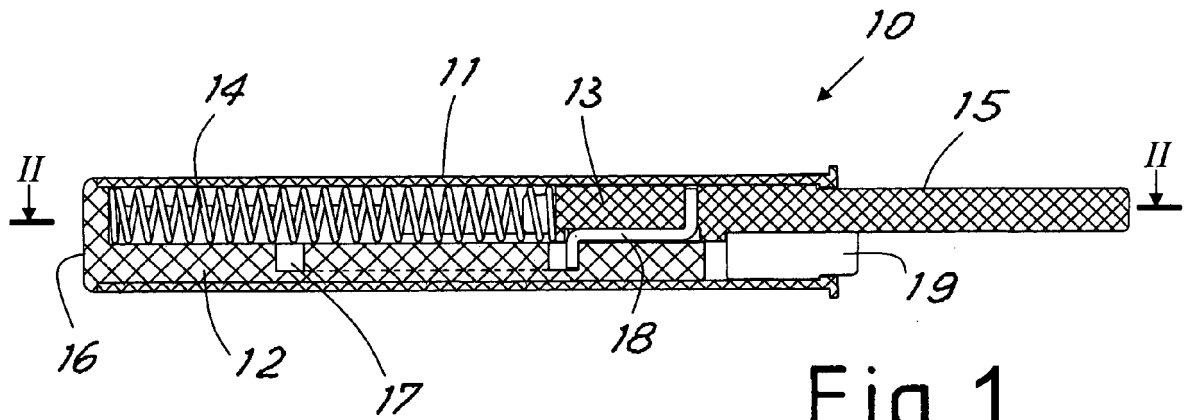
[0018] Obviously, the above description of an embodiment applying the innovative principles of the present invention is only given by way of example and must not be considered as a limitation of the scope of the patent rights herein claimed.

Claims

1. A magnetic push-pull device for an opening part of a piece of furniture, which at the front comprises a magnet (19) and a thrust pin (15) that is spring movable by a push-pull mechanism (17, 18) between a retracted position and a position at which it projects beyond the magnet, **characterized in that** the magnet (19) and thrust pin (15) are disposed in mutual side by side relationship and have complementary cross sections so that they together form a circumference.
2. A device as claimed in claim 1, **characterized in that** the cross-sections of the pin and magnet con-

stitute the two halves of the circumference.

3. A device as claimed in claim 1, **characterized in that** it comprises a cylindrical housing (11) in which a support element (12) is contained which extends axially and on which a pusher (13) ending at the front with the thrust pin (15) slides, a thrust spring (14) for urging the pusher to the position at which the pin (15) projects being present between pusher and support, and the push-pull mechanism being interposed between pusher (13) and support (12) in the slide interface.
4. A device as claimed in claim 3, **characterized in that** the push-pull mechanism comprises a cam path (17) laterally formed in the support and an S-shaped pin (18) one extremity of which slides along the cam path and the other extremity of which is pivotally mounted to the pusher so that when the thrust pin (15) is submitted to the pressure towards its retracted position, the S-shaped pin (18) alternately reaches one of two stable end positions (20, 21) in the cam path (17) corresponding to the retracted and projecting positions of the thrust pin (15).
5. A device as claimed in claim 3, **characterized in that** the support (12) forms a plug (16) by its rear end, for rear closure of the cylindrical housing (11).





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 07 02 1769

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 4 249 761 A (NISHIMURA TAMOTSU [JP]) 10 February 1981 (1981-02-10) * column 1, line 61 - column 2, line 4; figures 1,2,4 *	1	INV. E05C19/16
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			TECHNICAL FIELDS SEARCHED (IPC)
			E05C
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 28 February 2008	Examiner Lassen, Steen D.
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EPO FORM 1503 03.82 (P04C01)

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

EP 07 02 1769

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
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28-02-2008

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