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(54) **Device for the height adjustment of a manhole cover**

(57) Device (1) for the height adjustment of a cover (2) for a manhole (3), the device being provided with a support frame (4) of the cover (2) which is suitable for sliding vertically in contact with an internal wall (6) of the manhole (3), and with a number of internally threaded tubular elements (8) which are arranged along the edge of the frame (4) and which are integral to the frame (4) itself, and, for each tubular element (8), with a respective threaded metal pin (9), which is engaged with the relative tubular element (8) in order to be manually activated from the outside of the manhole (3) itself in such a way as to raise the cover (2); an activating transmission (21) is coupled to all the pins (9), and is suitable for being activated by a single pin (9) in order to achieve the simultaneous activation of the pins (9) themselves.

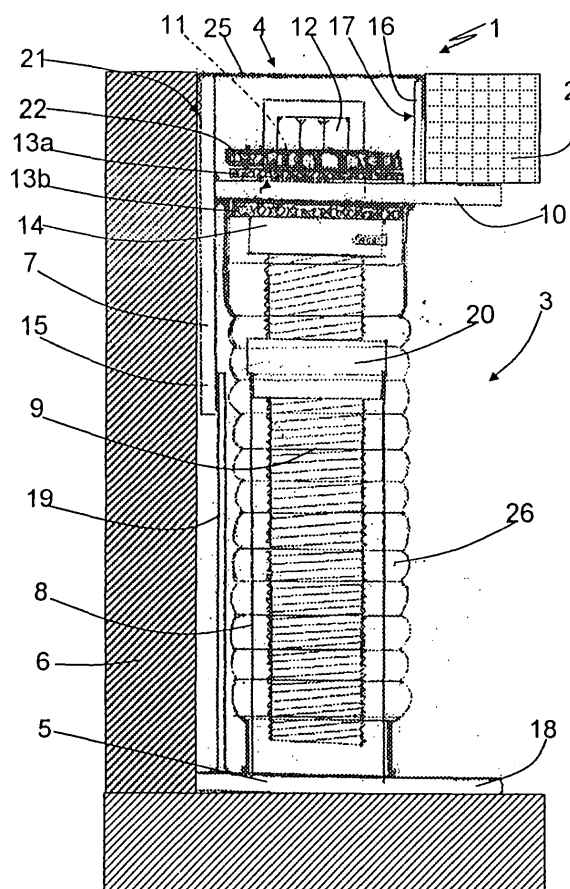


Fig. 1

Description

[0001] The present invention relates to a device for the height adjustment of a cover for a manhole.

[0002] The Italian patent application No. T02000U000032 for an utility model relates to a device for the height adjustment of a cover for a manhole, in which the device comprises a support frame for the cover which is suitable for sliding vertically in contact with an internal wall of the manhole, a number of internally threaded tubular elements which are arranged along the edge of the frame and which are integral to the frame itself, and, for each tubular element, a respective threaded metal pin, which is axially blocked against a base of the manhole, and which is engaged with the relative tubular element in order to be manually activated from the outside of the manhole itself in such a way as to raise the frame.

[0003] Even though the device described above has been found to be extremely valid for the height adjustment of covers for manholes, above all during the betterment of road surfaces, the use of the device itself has shown a disadvantage which might be to the detriment of its being used more widely. In fact, it has been found that the frame has a tendency to get stuck against the walls of the manhole, above all when the technician activating the device does not act with sufficient care, for example in the case that the individual pins are not rotated to the same extent in order to obtain a uniform raising of the frame itself.

[0004] The aim of the present invention is to produce a device for the height adjustment of a cover for a manhole which is free of the above-described disadvantage.

[0005] According to the present invention a device for the height adjustment of the cover for a manhole will be produced, the device comprising a support frame for the cover which is suitable for sliding vertically in contact with an internal wall of the manhole, a number of internally threaded tubular elements which are arranged along the edge of the frame and which are integral to the frame itself, and, for each tubular element, a respective threaded metal pin, which is engaged with the relative tubular element in order to be manually activated from the outside of the manhole itself in such a way as to raise the cover; the device being characterised by the fact of comprising an activating transmission which is coupled to all the pins and which is suitable for being activated by a single pin for the simultaneous activation of the pins themselves.

[0006] The present invention will now be described with reference to the attached drawings, which illustrate various non-limiting forms of embodiment of the present invention, in which:

- FIGURE 1 is an elevated side view, with some parts in section and some parts removed for reasons of clarity, of a first preferred form of embodiment of a device for the height adjustment of a cover for a

manhole produced according to the present invention;

- FIGURE 2 is a view from above, on a reduced scale and with some parts removed for reasons of clarity, of the device shown in FIGURE 1;
- FIGURE 3 is an elevated side view, with some parts removed for reasons of clarity, of a second preferred form of embodiment of the device for the height adjustment of a cover for a manhole shown in FIGURE 1; and
- FIGURE 4 is a plan view, on a reduced scale and with some parts removed for reasons of clarity, of a third preferred form of embodiment of the device for the height adjustment of a cover for a manhole shown in FIGURE 1.

[0007] With reference to FIGURES 1 and 2, the number 1 refers to a device, in its entirety, for the height adjustment of a cover 2 arranged in such a way as to close a manhole 3.

[0008] The device 1 comprises a support frame 4 which in turn comprises a fixed portion 5 which is integral to a fixed internal wall 6 of the manhole 3, and a mobile support portion 7, which supports the cover 2 and which is coupled to the fixed portion 5 in an axially sliding manner in order to slide vertically in contact with the wall 6 itself.

[0009] The device 1 also comprises four internally threaded tubular elements 8 which are arranged along the edge of the frame 4 and which are integral to the fixed portion 5, and, for each tubular element 8, a respective threaded metal pin 9, which is engaged with the relative tubular element 8 and which is arranged through the mobile portion 7 in order to be manually activated from the outside of the manhole 3 itself in such a way as to raise the lid 2.

[0010] In particular, the mobile portion 7 comprises a plate 10 which is provided with a passing hole for each pin 9, which is provided with an hexagonal head 12, and which is axially coupled to the plate 10 by means of the interposition of two axial thrust block rolling bearings 13a and 13b, the first of which is blocked between the head 12 and the plate 10, while the second of which is blocked between the plate 10 and a ring nut/ferrule 14 which is integral to the pin 9. The mobile portion 7 also comprises a lateral cylindrical wall 15 which is arranged along the edge of the plate 10 and which is integral to the plate 10 itself, and a cylindrical baffle 16 which is arranged on the plate 10 at a determined distance from the wall 15 in order to define with the latter an annular housing 17 which extends along the edge of the frame 4.

[0011] The fixed portion 5 comprises an annular plate 18 which is arranged transverse to a longitudinal axis A of the manhole 3 and which is integral to the wall 6 of the manhole 3 itself, and a respective cylindrical wall 19 which is supported by the plate 18 and which is coupled in an axially sliding manner to the wall 15. Each tubular element 8 is at the bottom joined to the plate 18, and the

upper part is provided with a plug 20, which is internally threaded and which is engaged with a relative pin 9.

[0012] Finally, the device 1 comprises an activating transmission 21, which is arranged inside the housing 17, and which is coupled to all the pins 9, and which is suitable for being activated by a single pin 9 in order to activate the pins 9 themselves simultaneously.

[0013] The transmission 21 comprises, for each pin 9, a gearwheel 22, which is angularly coupled to the relative pin 9, and which is arranged between the relative head 12 and the relative bearing 13a, and which is provided with an annular element 23 which is angularly coupled to each gearwheel 22.

[0014] In the form of embodiment which is illustrated in FIGURE 1, the annular element 23 is defined by a chain which extends inside the housing 17 in such a way as to engage all the gearwheels 22, and the transmission 21 comprises, for each gearwheel 22, a chain tightener 24 which is arranged on the sides of the gearwheel 22 on the opposite side of the chain 23 in relation to the gearwheel 22 itself.

[0015] Finally, the device 1 comprises an annular cover 26 which is arranged in such a way as to close or be removed from the housing 17 in order to permit the access of the head 12 of at least one of the pins 9 in such a way as to act on the head 12 itself, for example by means of a socket head screw wrench, and simultaneously activate all the pins 9 themselves by means of the transmission 21.

[0016] With the aim of keeping the entire device 1 oiled, the housing 17 and each tubular element 8 are all internally filled with oiling grease, whose leakage from the tubular elements 8 is prevented by an extending bellows sleeve 26. Each sleeve 26 is arranged outside the relative tubular element 8 and is also connected to the plate 10 in such a way as to also protect the portion of the metal pin 9 which juts out from the relative plug 20.

[0017] In use, whenever it is necessary to adjust the height of the cover 2, once the cover 25 has been removed it is sufficient to use a suitable tool to act on one of the heads 12 of the pins 9 to rotate the pin 9 on itself in order to transmit, by means of the transmission 21, this rotating motion to all of the other pins 9. The contemporary rotation of the threaded pins 9 inside the relative tubular elements 8 will cause the translation along the axis A of the mobile portion 7 of the frame 4 and the consequent raising of the lid 2.

[0018] By means of the above-described device 1, the frame 4 will no longer get stuck against the walls 6 of the manhole 3, as well as which the time necessary for the height adjustment will be much shorter in comparison to the time which is currently necessary to perform this operation because, as is clear from the above description, it is only necessary to act on a single pin 9.

[0019] The form of embodiment which is illustrated in FIGURE 3 relates to a device 1' which is similar to the device 1, from which the device 1' differs due to the fact that each gearwheel 22 is defined by a pulley, while the

annular element 23 is defined by a positive drive belt 23' which is engaged with each pulley.

[0020] The form of embodiment which is illustrated in FIGURE 4 relates to a device 1'' which is similar to the device 1, from which the device 1'' differs due to the fact that each gearwheel 22 is defined by a pulley, while the annular element 23 is defined by a rack 23'' which is engaged with each gearwheel 22.

[0021] The operation of the devices 1' and 1'' is the same as the operation of the device 1, and does not require any further explanation.

[0022] It is intended that the present invention should not be limited to the forms of embodiment herein described and illustrated, which are to be considered as examples of forms of embodiment for the height adjustment of a cover for a manhole and which might be subject to further modifications regarding the shape and arrangement of the parts, as well as to details pertaining to construction and assembly.

Claims

1. Device (1) (1') (1'') for the height adjustment of a cover (2) for a manhole (3), the device (1) (1') (1'') comprising a support frame (4) for the cover (2) which is suitable for sliding vertically in contact with an internal wall (6) of the manhole (3), a number of internally threaded tubular elements (8) which are arranged along the edge of the frame (4) and which are integral to the frame (4) itself, and, for each tubular element (8), a respective metal threaded pin (9), which is engaged with the relative tubular element (8) in order to be manually activated from the outside of the manhole (3) itself in such a way as to raise the cover (2); the device (1) (1') (1'') being **characterised by** the fact of comprising an activating transmission (21) which is coupled to all the pins (9) and which is suitable for being activated by a single pin (9) for the simultaneous activation of the pins (9) themselves.
2. Device according to Claim 1, **characterised by** the fact that the transmission (21) comprises a gearwheel (22) for each pin (9) which is angularly coupled to the relative pin (9), and an annular element (23) which is angularly coupled to each gearwheel (22).
3. Device according to Claim 2, **characterised by** the fact that the annular element is defined by a chain (23).
4. Device according to Claim 2, **characterised by** the fact that the annular element is defined by a rack (23'').
5. Device according to Claim 2, **characterised by** the

fact that the annular element is defined by a positive drive belt (23').

6. Device according to Claim 2, **characterised by** the fact that the frame (4) comprises a fixed portion (5) which is integral to the said internal wall (6) of the manhole (3), and a mobile support portion (7), which supports the cover (2) and which is coupled to the fixed portion (5) in an axially sliding manner; each tubular element (8) being integral to the fixed portion. (5), and each metal pin (9) being axially engaged in a rotating manner to the mobile portion (7).
7. Device according to Claim 6, **characterised by** the fact that the mobile portion (7) of the frame (4) comprises a plate (10) which is provided with a passing hole for each metal pin (9), which is axially coupled to the plate (10) itself by means of the interposition of at least one rolling bearing.
8. Device according to Claim 7, **characterised by** the fact of comprising two rolling bearings (13) for each pin (9) which are arranged along the pin (9) itself on either side of the plate (10).

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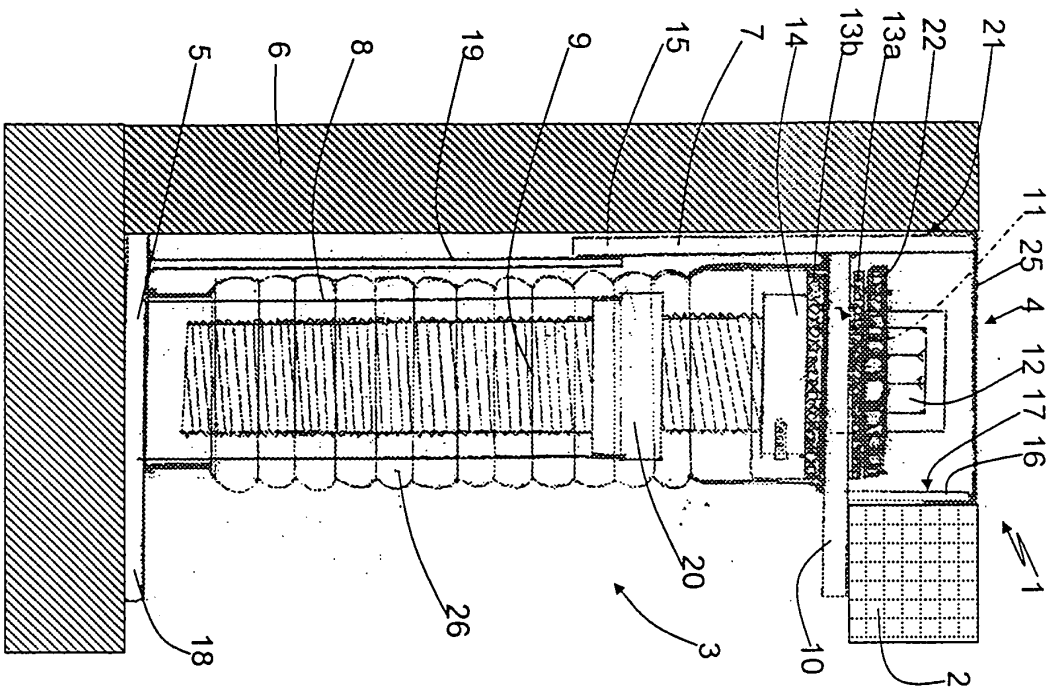


Fig. 1

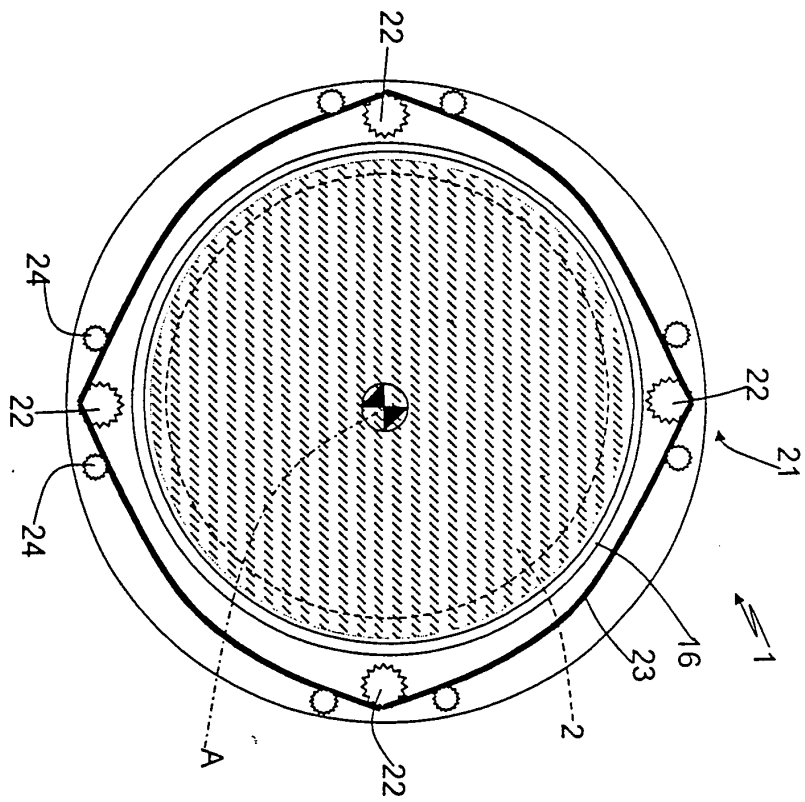


Fig. 2

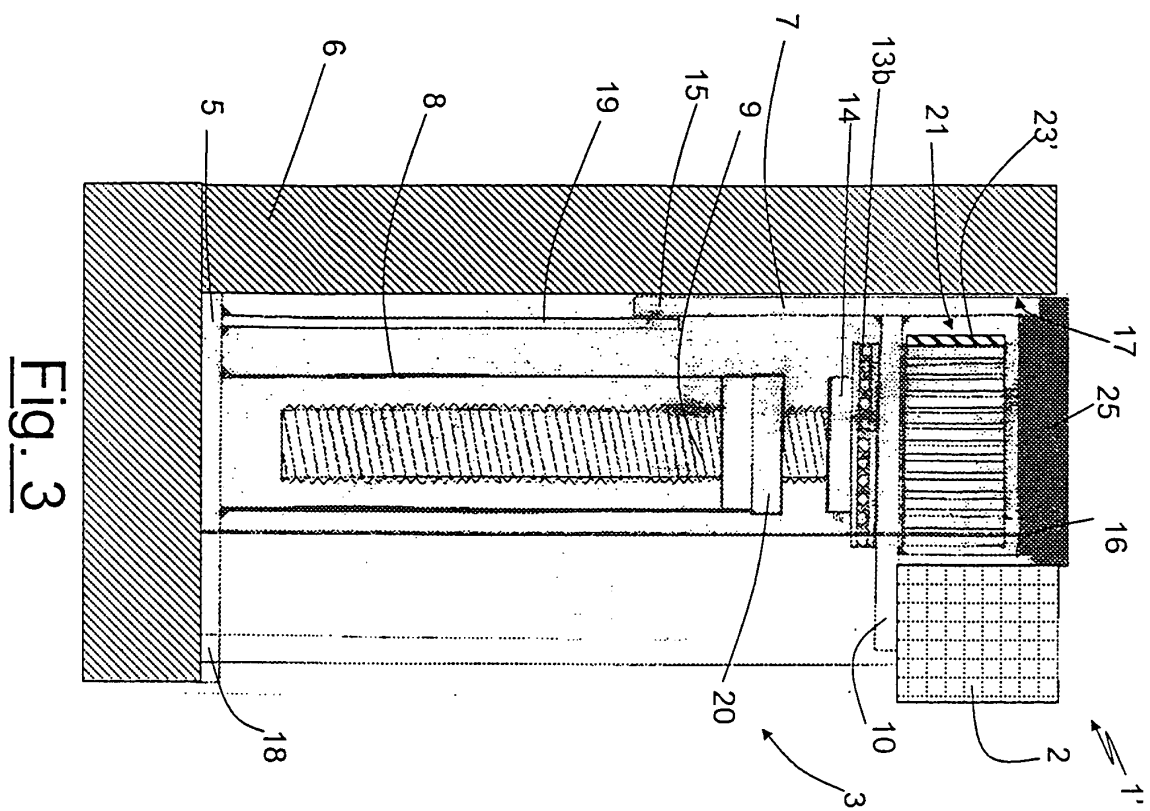


Fig. 3

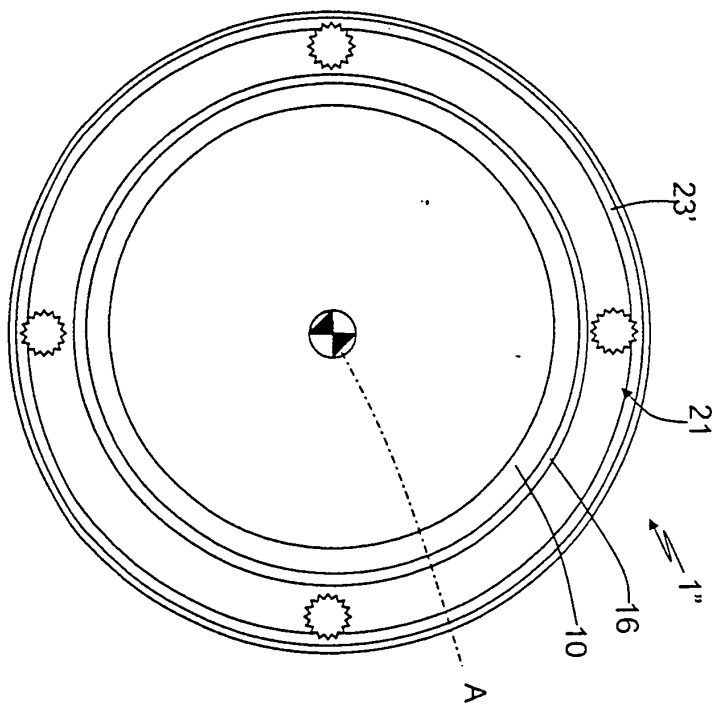


Fig. 4



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EUROPEAN SEARCH REPORT

Application Number
EP 03 00 9127

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)
A	EP 1 031 663 A (SCHWARZ GOTTFRIED ;EBNER EUGEN (DE); SCHWARZ WALTER (DE)) 30 August 2000 (2000-08-30) * paragraphs '0020!-'0025!,'0030!; figures 2,3,8 *	1	E02D29/14
A	PATENT ABSTRACTS OF JAPAN vol. 1997, no. 10, 31 October 1997 (1997-10-31) -& JP 09 158182 A (NAGANO YUKI KK;SABOU TECHNO:KK), 17 June 1997 (1997-06-17) * abstract *	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
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The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
THE HAGUE		8 July 2003	De Neef, K
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			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 03 00 9127

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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08-07-2003

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