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(54) **FASTENING UNIT FOR SANITARY APPLIANCES**

(57) A fastening unit for a sanitary appliance (6) includes a body (1) with a bushing (3) with an external thread (4) and an external nut (5). Two meshing gear wheels (7, 8) forming a bevelled gear are rotating in sockets inside the body (1). The axis of rotation of the driven gear wheel (7) of the gear coincides with the axis of symmetry of the pin fastening the sanitary appliance (6). The axis of rotation of the driving gear wheel (8) is transverse to the axis of rotation of the driven gear wheel (7). The body (1) of the fastening unit of the sanitary appliance (6) includes a flat wall (2), under which the driving gear wheel (8) is located, and a cover (15). The axial opening (11) of the driven gear wheel (7) is provided with an internal thread mashing with the external thread of the pin fastening the sanitary appliance (6). Wall (2) of the body (1) is provided with a guide bushing (12) of the drive key (9), wherein a seal (13) of the drive key (9) is located inside the guide bushing (12).

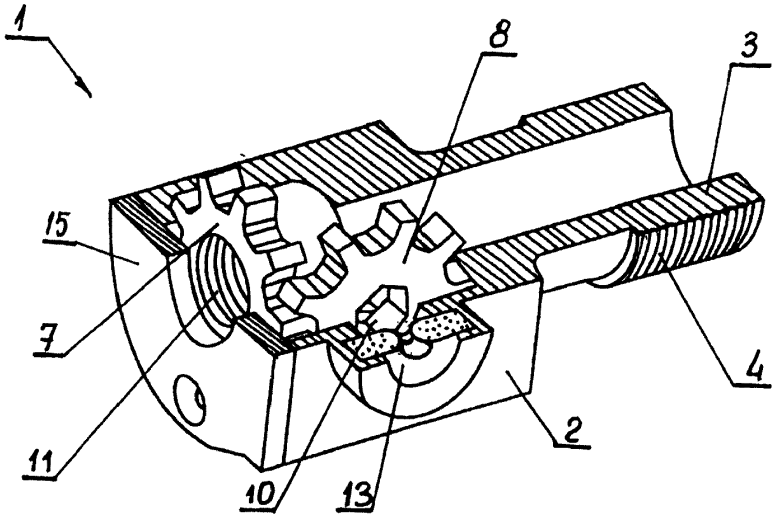

Fig. 7

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Description

[0001] The subject of the invention is a fastening unit for sanitary appliances installed on a vertical support, for example on a wall or a supporting frame installed on a wall The unit is particularly intended for fastening toilet seats or similar sanitary appliances, particularly made of ceramics.

[0002] There are known solutions of fastening units for sanitary appliances on vertical walls of buildings.

[0003] The solution disclosed in the European patent publication EP 1321589 discloses a fastening unit for sanitary appliances, including a housing consisting of two parts. At least one two-part bevel gear is placed inside the depression of the housing, where a nut is located inside the housing such that it rotates around its axis. Both gears are meshed in a socket of the body and utilise the force exerted on the nut. The body has an internal, bevelled surface comprising the clamping surface. The working nut of the gear has an external, bevelled surface comprising the clamping surface.

[0004] According to the solution disclosed in the international application WO 2018/065355, the solution disclosed therein applies to a system intended for installation on a wall of a wash basin or of a similar device, wherein the fastening unit body has a rear wall intended to be loaded, with an installation rail which may be permanently fixed to the wall. The device, installed on the wash basin, has a housing with water supply and water discharge connectors. The housing is completely closed in the front once the device is fixed to the wall.

[0005] According to another solution disclosed in the international application no. WO 2017/058284, a unit fixing the toiled module includes an adjusting element intended to be fixed onto a wall. The adjusting element is provided with a flange fixed to the wall and a push-in element, generally stretching from the inside of the device to the flange fixed to the wall. When the adjusting element is fixed onto the wall, a duct is formed between the wall and the push-in part. The fixing unit also includes a sealing element with a convex part, placed inside the duct of the adjusting element.

[0006] In the international patent application no. WO 2016/041624 another known solution of a fastening unit for sanitary appliances is disclosed, intended to fasten a ceramic sanitary unit including the main part with a collecting duct. The unit includes an element connecting with a threaded opening, intended to be fastened on a threaded pin and including an adjusting element supporting the connecting element such that the elements can be aligned. The supporting element is placed in the main part and can be adjusted in the direction transverse to the longitudinal axis. According to this known solution, the locking element is placed on the main part, wherein said locking element is automatically latched inside the undercut part of the connecting element.

[0007] Another disclosure is presented in the international patent application no. WO 2013/167186. A fastening system with a housing element, intended to fasten appliances onto walls, includes fixing surfaces, at least one housing element with an accepting part, at least one bolt protruding from the wall and placed inside the accepting part and at least one securing pin connected with the bolt through a duct in the accepting part. The housing element is cylindrical with at least one radially protruding locking element. The fixing surface is provided with at least one through opening and a locking, limiting element. The locking and limiting elements together form a rotary locking mechanism.

[0008] The disclosure known from the international application WO 2009/071178 discloses a fastening unit, in particular for sanitary appliances fixed to a wall, including: a longitudinal element used to fasten the sanitary appliance onto a support. This element may be placed in a generally vertical inlet opening, continuously passing through the top part of the sanitary appliance. The longitudinal element is provided with a nut on one end, used with the fixing bolt of the housing handle. A threaded roller is placed on the other end, which can be threaded into the adjusting support, wherein the longitudinal element is also provided with an external arm abutting an internal arm placed inside the inlet opening. The invention also includes a bushing preventing the longitudinal element from contacting the sanitary appliance.

[0009] Known solutions are focused on ensuring cooperation between the fastened ceramic element, for example a toilet seat, and elements on which this ceramic element is suspended. Such elements include, for example, the toiled cubicle wall or a frame installed on such a wall, including protruding, threaded pins used to install the supporting elements of the toilet seat. The known solutions intend to solve the problem of cooperation of said pins with openings provided in the toilet seat. The task of the invention is to ensure easy installation, as well as precise and permanent connection between the ceramic element in the form of a toilet seat with pins fastening this element onto a wall or onto a frame fixed on said wall.

[0010] According to the invention, the fastening unit of the sanitary appliance includes a body with a bushing with an external thread and an external nut installed on said bushing of the sanitary appliance. Two meshing gear wheels forming a bevelled gear are rotating in sockets inside the body. The rotation axis of the driven gear wheel coincides with the axis of symmetry of the pin fastening the sanitary appliance, with which the driven gear wheel cooperates. The axis of rotation of the driving gear wheel is transverse to the axis of rotation of the driven gear wheel. The body of the fastening unit for sanitary appliances includes a wall, under which the socket of the driving gear wheel is located with an axial opening intended for the drive key.

[0011] I According to the invention, the fastening unit is characterised in that the axial opening of the driven gear wheel includes an internal thread meshing with the external thread of the pin fastening the sanitary appli-

ance.

[0012] In a preferred embodiment of the invention, the fastening unit body wall includes a guide bushing of the drive key, wherein a drive key seal is located inside said guide bushing.

[0013] The drive key is preferably a hexagonal Allen key with a circumferential groove near its working end.

[0014] The design of the fastening unit for sanitary appliances according to the invention enables precise, permanent installation of a sanitary appliance thanks to the use of a bevelled gear with a driven gear wheel with an internal thread, meshed with the driving gear wheel. The solution according to the invention provides much shorter installation times thanks to the compact design of the fastening unit and eliminates the nut, which may result in the sanitary bowl detaching during use in the case of incorrect fastening or shifting during installation. Instead of the known, push-in joint, the solution according to the invention provides a threaded joint with a bevelled gear. A solution fastening the dedicated Allen key during periods of standstill is also proposed, preventing the key from being lost. The key is provided with a circumferential groove near its working end, matching the seal in the opening provided for the key.

[0015] The object of the invention has been presented in an embodiment in the attached drawing, in which individual figures of the drawing represent as follows:

Fig. 1 - view of the body from the side of the driven gear wheel,

Fig. 2 - view of the body from the side of the bushing fastening the sanitary appliance,

Fig. 3 - driven gear wheel,

Fig. 4 - driving gear wheel,

Fig. 5 - view of the sanitary appliance,

Fig. 6 - view of the Allen key,

Fig. 7 - a cross-section through the fastening unit.

Fig. 8 - nut fastening the sanitary appliance.

[0016] Fig. 1 presents an embodiment of the fastening unit for sanitary appliances, as seen from the side of the driven gear wheel 7. The unit includes a body 1 with a bushing 3. The bushing 3 is provided with an external thread 4, not shown in the figure, but shown in Fig. 7. The bushing 3 cooperates with the nut 5 presented in Fig. 8. The nut 5 is intended to fasten the bushing 3 in the opening provided in the housing of the sanitary appliance. The fastening location of the bushing 3 on the sanitary appliance 6, a toilet bowl in this particular embodiment, is schematically presented in Fig. 5.

[0017] Fig. 2 presents the same fastening unit according to Fig. 1, viewed from the side of the bushing 3.

[0018] Two meshing gear wheels 7, 8 forming a bevelled gear are rotating in sockets inside the body 1. The relative position of these wheels 7, 8 is presented in Fig. 7 depicting a cross-section through the body 1 of the fastening unit. The body is made of plastic. As shown in this Fig. 7, the axis of rotation of the driven gear wheel 7 of the gear coincides with the axis of symmetry of the body 1 with the bushing 3. This axis of symmetry coincides with the axis of symmetry of the threaded pin fastening the sanitary appliance 6 to a wall or to a frame. This known fastening thread is not presented in the attached figures. The sanitary appliance 6 is usually fastened on two known pins, one on the left side and one on the right side of the sanitary appliance 6. Two fastening units according to the invention are required to fasten this appliance 6 to a wall or a frame, not presented in the figure.

[0019] The axis of rotation of the driving gear wheel 8 is transverse to the axis of rotation of the driven gear wheel 7. This driven gear 7 should be understood in this patent disclosure as the wheel cooperating with the known pin fastening the sanitary appliance 6 to the wall or to the frame. The wheel 7 is driven by the driving gear wheel 8, rotated using an Allen key 9. The driven gear wheel 7 is presented in an embodiment in Fig. 3, while the driving gear wheel 8 is presented in Fig. 4. The relative position of both gear wheels 7, 8 is presented in Fig. 7. The gear wheels are made of steel provided with a galvanic coating protecting against corrosion.

[0020] The body 1 of the fastening unit for a sanitary appliance 6 includes in this embodiment a flat wall 2, under which the driving gear wheel 8 provided with an axial opening 10 for the Allen key 9 is placed inside a socket of said body. The body 1 is closed with a removable cover 15. The cover 15 is presented schematically in Fig. 1, Fig. 2 and Fig. 7. The cover 15 is installed on the body using known screws.

[0021] The axial opening 11 of the driven gear wheel 7 is provided with an internal thread mashing with the external thread of the known pin fastening the sanitary appliance 6, not presented in the figure.

[0022] The flat wall 2 of the body 1 of the fastening unit includes in this embodiment a guide bushing 12 of the Allen key 9. The seal 13 of the Allen key 9 is located inside said guide bushing 12.

[0023] The drive key of the driving gear wheel 8 is provided in this embodiment as a hexagonal Allen key 9. This key is presented in an embodiment in Fig. 6. The Allen key 9 is provided with a circumferential groove 14 near its working end.

[0024] In this embodiment, the fastening unit according to the invention has its bushing placed inside the fastening opening of the ceramic sanitary appliance 6 and locked using nuts 5. Fig. 5 schematically presents the position of the fastening unit only on one side of the appliance 6, whereas a ceramic sanitary appliance is usually fastened using two such units, on the left side and

on the right side of the appliance. The opening in the bushing 5 together with the sanitary appliance 6 is then placed on the fastening pin, not presented in the figure, installed in the wall of the room or on the known frame.

[0025] The Allen key 5 is inserted into the opening of the guide bushing 12 and used to rotate the driving gear wheel 8, causing the meshed, driven gear wheel 7 to rotate, the internal thread of which cooperates with the external thread of the known pin, not shown in the figure, fastening the sanitary appliance to the wall or to the frame. The wheel 8 is rotated until the desired position of the sanitary appliance 6 is reached. These operations are repeated on the other side of the sanitary appliance 6, fastening the second fastening unit connected with the sanitary appliance 6, on the second known fastening pin.

[0026] Once the sanitary appliance is fastened on two known fastening pins using two fastening units according to the invention, the Allen keys 9 remain inserted into the openings in seals 13 cooperating with circumferential grooves 14 in those keys 9. This solutions prevents the loss of dedicated Allen keys 9 when the sanitary appliance 6 needs to be removed, usually after many years of use, and replaced with a new appliance.

List of designations used in the figures

[0027]

1. Body
2. Flat body wall
3. Bushing
4. External thread
5. Nut
6. Sanitary appliance
7. Driven gear wheel
8. Driving gear wheel
9. Drive key
10. Drive key opening
11. Driven wheel opening
12. Guide bushing
13. Seal
14. Circumferential groove
15. Body cover

Claims

1. A fastening unit of a sanitary appliance, including a body with a bushing with an external thread and an external nut for fastening of the sanitary appliance on said bushing, wherein two meshing gear wheels are rotating in sockets provided inside the body, comprising a bevelled gear, wherein the rotation axis of the driven gear wheel of the gear coincides with the axis of symmetry of the pin fastening the sanitary appliance the driven gear wheel cooperates with, while the axis of rotation of the driving gear wheel is transverse to the axis of rotation of the driven wheel, wherein the body of the fastening unit of the sanitary appliance has a wall, under which the driving gear wheel is located and which is provided with an axial opening for the drive key and which is closed with a cover, **characterised in that** the axial opening (11) of the driven gear wheel (7) is provided with internal thread meshing with the external thread of the pin fastening the sanitary appliance (6),

2. A fastening unit according to claim 1, **characterised in that** the body (1) is provided with an opening, into which the guide bushing (12) of the drive key (9) is inserted, wherein the seal (13) of the drive key (9) is located inside the guide bushing (12).

3. A fastening unit according to claim 1 or 2, **characterised in that** the drive key (9) is a hexagonal Allen key with a circumferential groove (14) near its working end.

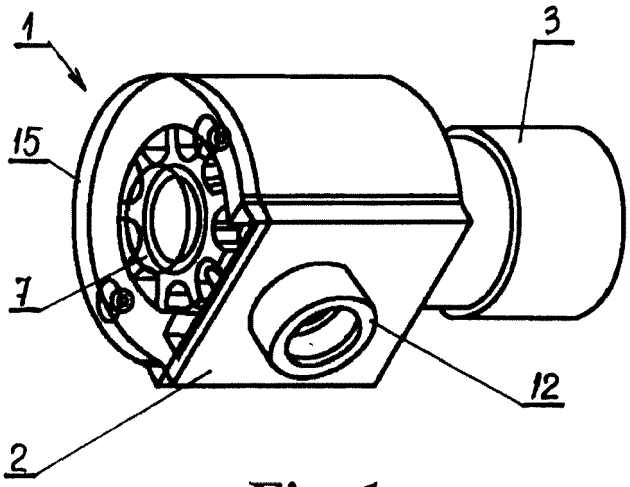

Fig. 1

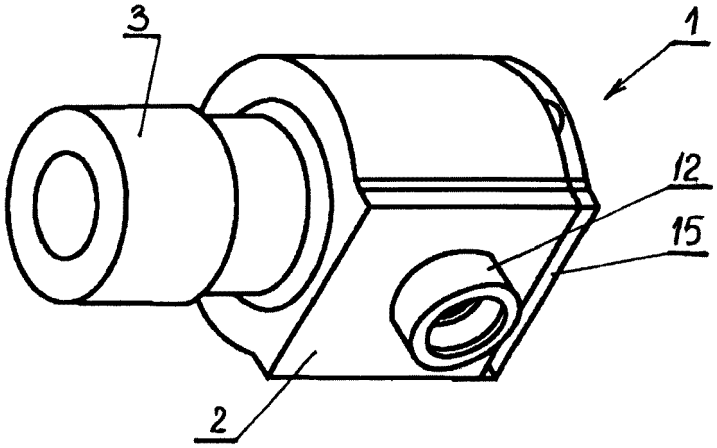

Fig. 2

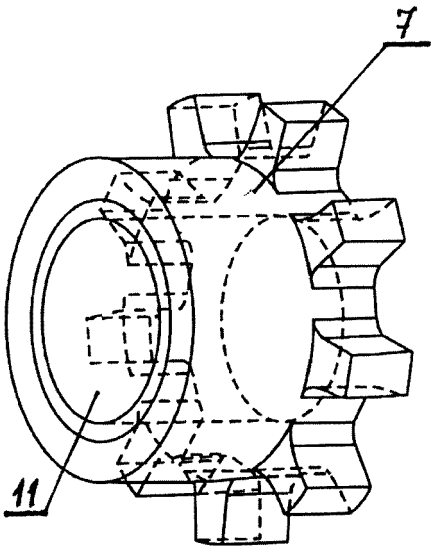

Fig. 3

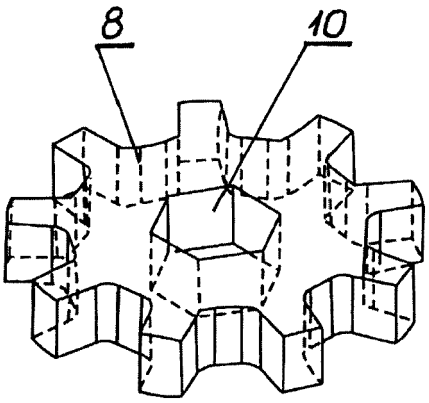

Fig. 4

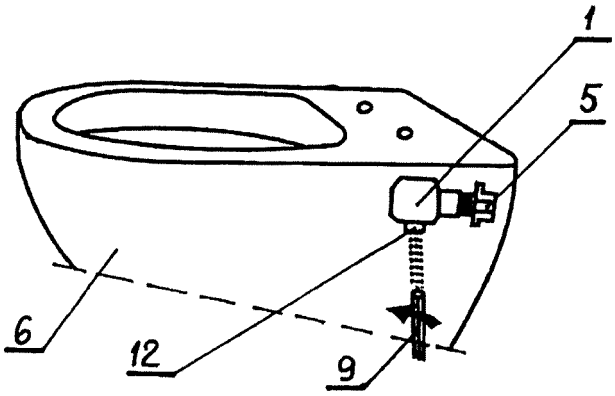

Fig. 5

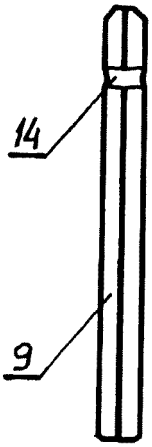

Fig. 6

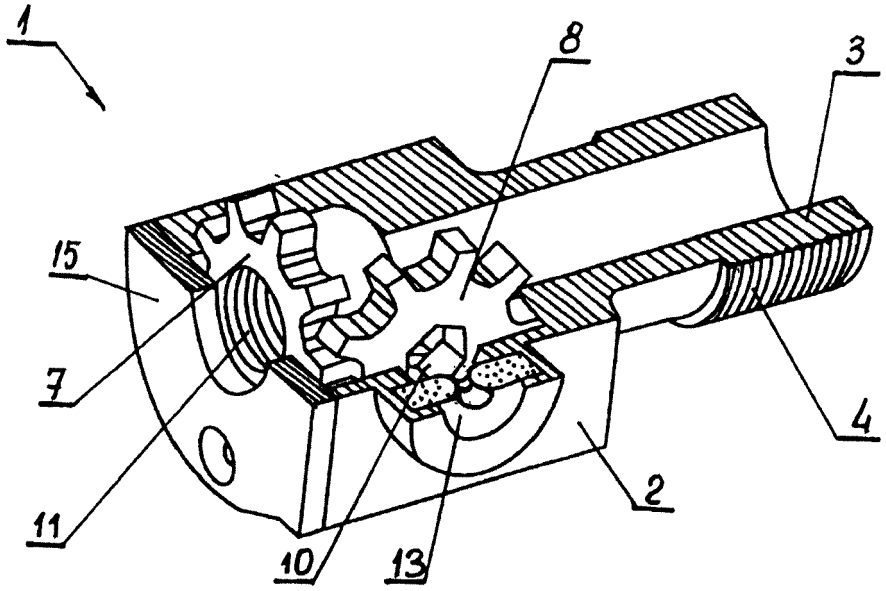

Fig. 7

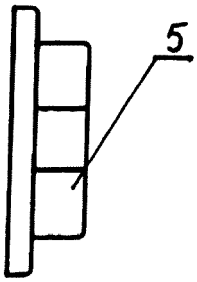

Fig. 8

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EUROPEAN SEARCH REPORT

Application Number
EP 19 46 0047

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,P	EP 3 498 926 A1 (XIAMEN R&J PRECISION TECH CO LTD [CN]) 19 June 2019 (2019-06-19)	1-3	INV. E03D11/14
Y,P	* abstract; figures 5,6 *	1-3	E03C1/322
Y	DE 20 2012 104847 U1 (SANITEC OY [FI]) 22 March 2013 (2013-03-22) * figures 3,4 *	1-3	

TECHNICAL FIELDS SEARCHED (IPC)
E03D
E03C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	3 February 2020	Flygare, Esa

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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EPO FORM 1503 03.82 (P04C01)

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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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03-02-2020

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 3498926 A1	19-06-2019	NONE	
DE 202012104847 U1	22-03-2013	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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- WO 2018065355 A **[0004]**
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- WO 2016041624 A **[0006]**
- WO 2013167186 A **[0007]**
- WO 2009071178 A **[0008]**