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(54) **Two-way barrier for preventing rats or other vermin from entering a sewage pipe system**

Zwei-Wege-Sperre gegen das Eindringen von Ratten oder anderem Ungeziefer in ein Abwasserrohrsystem

Barrière bidirectionelle pour empêcher les rats ou autres animaux indésirables d'entrer dans un système de tuyau pour eaux usées

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Description

[0001] The present invention relates to a barrier for preventing rats or other vermin from entering a sewage pipe system, said barrier comprising at least one shutter pivotally suspended in the barrier about a first axis and having a centre of gravity lying under the axis, and said shutter being pivotal between a first angular position in which the at least one shutter is forming a first relatively larger angle with the direction of flow and at least substantially barring the aperture of the barrier, and a second angular position in which the at least one shutter is forming a second relatively smaller angle with the direction of flow keeping the aperture of the barrier at least partly open.

BACKGROUND OF THE INVENTION

[0002] Numerous solutions exist for preventing vermin such as rats from entering specific sections of a sewage pipe system. Among others, the following prior art patent publications exist:

[0003] WO 92/21830 describes means for barring animals, in particular rats, from entering a network of tubes, for instance a section of a sewerage system, said means comprising a hatch or a body, which in a transition well is hinged at level with and covering the outlet from the network of tubes into the transition well. To ensure that the animals cannot by repeated attempts manipulate the hatch and thereby gain access to the blocked network of tubes, the transition well is constructed in such a way that the outlet from the network of tubes is placed higher than a possible level of liquid in the transition well, the outlet projecting somewhat into the well, that the well is provided with a cover placed immediately above the outlet from the network of tubes, in which cover the hatch or the body is hinged, and in that the cover is provided with guiding protrusions or similar means for ensuring that the mounting of the cover only can take place in a predetermined angular position.

[0004] WO 03/069082 describes a barrier serving for preventing a rat from entering a sewage pipe in the direction against the flow. The barrier comprises a first pivotal shutter and a second pivotal shutter located upstream of the first shutter. Both shutters are forming an acute angle with the direction of flow when they are in a first angular position, in which at least the first shutter is barring the aperture of the sewage pipe. From the first angular position, the first shutter can be swung to a second angular position, in which it is clear of the aperture of the sewage pipe. The two shutters are detachably locked to each other when they both are in their first angular position. The second shutter is simultaneously detachably locked to a fixed stop on the barrier. The rat can therefore not open the first shutter and thereby force the barrier. When the flow in the sewage pipe gets so strong that the rat cannot struggle its way upstream, the liquid pressure will force the second shutter towards a second angular position in relation to the first shutter, whereby the locking engagement between the second shutter and the stop is released. Then, the liquid pressure is allowed to force the first shutter to its second angular position, in which the liquid freely can flow through the sewage pipe but at such a force that the rat is not able to pass the barrier.

[0005] DE 699 005 C is considered to represent the closest prior art and describes a rat blockade to be inserted in a pipe, the rat blockade comprises two flaps, one behind the other, the two flaps being so coupled that by opening of the flap being placed behind with respect to a water flow direction, causes a fixation of the first flap. One flap is extended beyond its point of rotation and has a projecting edge, which with its most outlying edge abuts a stop on the other flap. Two stops are mounted on a carrier plate.

[0006] EP 1 826 326 A2 describes a barrier for preventing rats or other vermin from entering a sewage pipe system. The barrier has a shutter pivotally suspended in the barrier about an axis and having a centre of gravity lying under the axis. The shutter is pivotal between a first angular position in which the at least one shutter is forming a first relatively larger angle with the direction of flow and at least substantially barring the aperture of the barrier, and a second angular position in which the at least one shutter is forming a second relatively smaller angle with the direction of flow keeping the aperture of the barrier at least partly open. Preferably, a second shutter is placed upstream of a first shutter and is pivotally suspended about a second axis and having a centre of gravity located under the second axis.

[0007] Common to all the prior art solutions is the fact that the barrier is either an integrate part of the sewage pipe system and/or the barrier is absolutely dependent on at least one of the parameters of the sewage pipe system: the type, i.e. a circular inlet or outlet pipe or just a half-pipe in the bottom of a man-hole or an inspection-hole; or the size, i.e. the exact diameter or the circular pipe or of the exact width and length of the half-pipe; or the orientation, i.e. whether the inlet pipe leads to the outlet pipe directly across the bottom of the inspection-hole, or leads to the outlet pipe along an oblique orientation across the bottom of the inspection-hole.

SUMMARY OF THE INVENTION

[0008] It is an object of the present invention to provide a barrier for preventing vermin such as rats from entering a sewage pipe system, especially the section of the sewage pipe system leading to and from private households, but also for industrial sewage pipe systems such as at hospitals, and where the barrier is capable of being fitted easily and reliably to the sewage pipe system, without the need for professional skills and knowledge within sewer systems and by applying the same barrier both for inlets and outlets of the sewage pipe system.

[0009] This object is obtained by a barrier for prevent-

ing a rat or other vermin from entering a sewage pipe according to a first aspect of the invention, said barrier being mountable within the sewage pipe and said barrier comprising:

- a pipe section (34) installable in the sewage pipe,
- a support element (33), and
- at least a first shutter pivotally suspended within the support element for rotation about a first axis,

the first shutter having a centre of gravity lying under the first axis and being pivotal between
a first angular position in which the at least first shutter is forming an acute first angle with a direction of a sewage flow within the sewage pipe such that the first shutter and is at least substantially barring the aperture of the sewage pipe and the vermin cannot enter the sewage pipe, and a second angular position in which the at least first shutter is forming a second relatively smaller angle with the direction of sewage flow thus keeping the aperture of the barrier at least partly open such that the sewage flow may pass the barrier,
characterized in that
the first shutter can be suspended from the support element in two orientations such that the direction in which the barrier bars vermin from passing may be changed without changing the orientation of the support element.

[0010] Being able to alter the orientation of the at least first shutter between a first orientation and a second orientation in the barrier, i.e positioning the shutter in the one direction or the other direction in the barrier, results in the one and same barrier being applicable for sewage systems, nondependent on whether the vermin may enter one way or the opposite way according to a longitudinal extension of the barrier. The at least first shutter may always be positioned so that the vermin is prevented from entering without the need for different barriers with differently positioned shutters, one barrier for each way of possible entering of the vermin.

[0011] According to a preferred embodiment according to the invention, the barrier comprises

- a second shutter placed upstream of the first shutter and being pivotally suspended about a second axis and having a centre of gravity located under the second axis,
- a first part of a locking mechanism provided as part of the barrier when being positioned in the sewage pipe system, said first part of the locking mechanism being intended for engaging with a corresponding second part of the locking mechanism provided as part of the second shutter,
- where the second part of the locking mechanism, when the second shutter is pivoting in relation to the first shutter around the second axis, and when the first shutter is in the first angular position, will engage with the first part of the locking mechanism thereby preventing further pivoting of the first shutter, and
- where the second part of the locking mechanism, when the second shutter is pivoting in relation to the first shutter around the second axis, and when the first shutter is in the second angular position, which is substantially different from the first angular position, also will engage with the first part of the locking mechanism thereby preventing further pivoting of the first shutter.

[0012] The feature of the first shutter being capable of being locked in any position, or at least in a multitude of positions of the first shutter incurs great advantages. If the sewage pipe system is being flooded, the first shutter will open at least partly, possibly open fully.

[0013] A rat or other vermin may however still be able to withstand any minor or major flooding of sewage, and during such flooding try to force open the first shutter for entering the sewage pipe system on the other side of the first shutter. Such occurrence is prevented when the first shutter, when being in another angular position, where said other angular position is substantially different from the one angular position, also will engage with the first part of the locking mechanism thereby preventing further pivoting of the first shutter. In a preferred embodiment according to the second aspect of the invention, the second axis of the second shutter is being provided as part of the first shutter so that the second shutter is pivotally suspended from the first shutter, and where the second part of the locking mechanism, when the second shutter is pivoting in relation to the first shutter around the second axis will engage with the first part of the locking mechanism thereby preventing further pivoting of the second shutter in relation to the first shutter,

[0014] By the second shutter being the shutter controlling the locking of pivoting of the first shutter, the second shutter being the upstream shutter, and the second shutter thus being the shutter which the rat of the vermin will try to open first, the second shutter will be the safest shutter to control any locking of the first shutter, possibly together with the second shutter.

[0015] In a possible embodiment according to the second aspect of the invention, said first part of the locking mechanism is a saw-tooth-like part of the locking mechanism, and where the second part of the locking mechanism is a pawl-like part of the locking mechanism, and where the pawl-like part is intended for engaging with the saw-tooth-like part for preventing the further pivoting of the second shutter in relation to the first shutter.

[0016] A saw-tooth-like locking mechanism is advantageous when wanting to enable locking of the first shutter at different angular positions of the first shutter. The saw-tooth establishes at which angular positions the first shutter may be locked, each angular position being differentiated by the distance between each of the saw-teeth, and depending on the actual mechanical configuration of the locking mechanism in relation to the first shutter and the second shutter.

[0017] According to an embodiment of any aspect of

the invention, wherein the pipe section (34) comprises a first contact surface (4) and a second contact surface (5), whereby exerting a lateral force to either one of or both of the first contact surface and the second contact surface is obtained by a manually downwards applied force, and where diverting of the manually applied force is obtained by a linkage mechanism with a first lever arm being operated by the manually applied force, and a second lever arm operating either one of or both of the first contact surface and the second contact surface in a lateral direction.

[0018] According to another embodiment of any aspect of the invention, wherein the pipe section (34) comprises a first contact surface (4) and a second contact surface (5), whereby exerting a substantially vertical force to the contact surface, when the contact surface is intended for abutting a vertical part of the sewage pipe system, is obtained by a manually downwards applied force, and where diverting of the manually applied force is obtained by a linkage mechanism with a first lever arm being operated by the manually applied force, and second lever arm operating the contact surface in an upwards direction.

[0019] Applying a downwards force is easily done by any person, possibly by just using the weight of the person for exerting the lateral force or the downwards/upwards force to the first contact surface and/or the second contact surface. There is as such no need for an especially strong person for installing the barrier according to the invention into a sewage pipe system. Many private users as well as professional users will be capable of installing the barrier.

[0020] According to one embodiment of the invention, the pipe section of the barrier has one end intended for facing a pipe section of the sewage system, when the barrier is installed in the sewage system, and where an opposite end of the pipe section having an inclination leading from a top surface of the pipe section to a bottom surface of the pipe section 34, said inclination resulting in a top generatrix along the top surface is extending farther rearwards in relation to a sewage flow direction, when the barrier is installed in the sewage system, than an extension of a bottom generatrix along the bottom surface. This embodiment is in the case, where the blunt end of the pipe section of the barrier is directed downstream of the sewage flow.

[0021] According to an alternative embodiment of the invention, the pipe section (34) of the barrier has one end intended for facing a pipe section of the sewage system, when the barrier is installed in the sewage system, and where an opposite end of the pipe section having an inclination leading from a top surface of the pipe section to a bottom surface of the pipe section 34, said inclination resulting in a top generatrix along the top surface is extending farther forwards in relation to a sewage flow direction, when the barrier is installed in the sewage system, than an extension of a bottom generatrix along the bottom surface. This embodiment is in the case, where the blunt end of the pipe section of the barrier is directed upstream of the sewage flow.

[0022] The formation of the inclination between the top surface and the bottom surface of the pipe section results in the major advantage, that any sewer which may enter form a side pipe section of the sewage pipe system, where the barrier is installed, easily and with no limitation can enter the sewage pipe system and flow freely past the barrier, the barrier thus constituting no or at least just a minor hindrance towards the flow of sewer from an side pipe section.

[0023] According to second aspect of the invention, said barrier is comprising

- at least one shutter pivotally suspended in the barrier about a first axis and having a centre of gravity lying under the axis, and said shutter being pivotal between a first angular position in which the at least one shutter is forming a first relatively larger angle with the direction of flow and at least substantially barring the aperture of the barrier, and a second angular position in which the at least one shutter is forming a second relatively smaller angle with the direction of flow keeping the aperture of the barrier at least partly open, and where
- the section of the pipe is intended for entering at least one of an inlet or an outlet of the sewage pipe system and where said section of the pipe is being provided with a first contact surface for abutting a first circumferential extension of a sidewall of a sewage pipe, and a second contact surface for abutting a second circumferential extension of the sidewall of the sewage pipe, and
- where a distance is relatively smaller between said first contact surface and said second contact surface in a first configuration, in which first configuration no manually applied force is present between the first contact surface and the second contact surface, and
- where a distance is relatively larger between said first contact surface and said second contact surface in a second configuration, in which second configuration a repulsive force is present between the first contact surface and the second contact surface, and
- where said repulsive force is intended for forcing the first contact surface towards the first circumferential extension of a sidewall of a sewage pipe and for forcing the second contact surface towards the second circumferential extension of a sidewall of a sewage pipe.

[0024] A barrier as mentioned has the great advantage that the barrier may easily and quickly be installed by a non-professional person, without any specific skills within sewage systems. Also, a barrier as mentioned has the great advantage that the barrier may easily and quickly be installed by a person without any specific technical or physical skills. Thus, the barrier may be installed by almost any gown-up person living in a private household

or working in an industrial site, and wanting to install a barrier for vermin such as rats in an already established sewage pipe system of the private household or the industrial site.

[0025] The advantage of non-technical skills needed is due to the fact that the pipe section of the barrier has an initial configuration having a smaller cross-section in which initial configuration the only skill needed is to insert a pipe section of the barrier and having a relatively smaller cross-section into a pipe section of the sewage system and having a relatively larger cross-section. Such a skill, i.e. inserting a pipe having a relatively smaller cross-section into a pipe of relatively larger cross-section, is ordinary skills of any person.

[0026] The advantage of non-physical skills needed is due to the fact that the pipe section of the barrier exhibits the relatively smaller cross-section in a configuration being stable, i.e. a configuration needing no manually applied force to establish. Thus, when having to insert the pipe section of the barrier into the pipe section of the sewage system, only positional skills are needed.

[0027] There is no need for manually applying repulsive or attractive force during insertion of the pipe section of the barrier into the pipe section of the sewage system for thereby positioning the pipe section of the barrier in the pipe section of the sewage system.

[0028] Also, there is no need for manually applying repulsive or attractive force during insertion of the pipe section of the barrier into the pipe section of the sewage system for thereby maintaining a relatively smaller the cross-section of the pipe section of the barrier.

[0029] In a possible embodiment of the invention, said first contact surface is a contact surface provided at one lateral side of the barrier, and where said second contact surface is a contact surface provided at another lateral side of the barrier, and where a repulsive force applied between the first contact surface and the second contact surface is intended for providing abutment of the first contact surface and the second contact surface with diagonally opposite laterally orientated sections, respectively, of sidewalls of the sewage pipe system.

[0030] Manually or automatically applying a repulsive force between the first contact surface and the second contact surface results in the contact surfaces, from exhibiting a relative smaller mutual distance, now exhibit a relative larger mutual distance. The relatively larger mutual distance results in the contact surfaces coming into abutment with laterally orientated sidewalls of the pipe section of the sewage system, thereby fastening the barrier to the pipe section of the sewage system. The automatic appliance of a repulsive force may simply be one or more spring members provided as part of the barrier and the spring force of which is capable of being released, after the barrier has been installed.

[0031] The embodiment where the contact surfaces are positioned laterally and where the contact surfaces is in abutment with lateral sidewalls of the pipe section of the sewage system has the advantage that a bottom of the pipe section of the sewage system may be maintained free of any possibly obstructing parts of the barrier, when the barrier is installed in the pipe section of the sewage system.

[0032] Thereby, any flow of sewage water through the pipe section of the sewage system may take place totally un-obstructed by any parts of the barrier, except by the intended obstruction of the at least one shutter. However, the at least one shutter is only obstructing the flow of sewage water, and of any vermin such as rats trying to enter the pipe section, in an upstream direction, not in a downstream direction.

[0033] In a possible other embodiment of the invention, said first contact surface is a contact surface provided at a substantially vertical downwards side of the barrier, and where said second contact surface is a contact surface provided at a substantially vertical upwards side of the barrier, and where a repulsive force applied between the first contact surface and the second contact surface is intended for providing abutment of the first contact surface and the second contact surface with diagonally opposite substantially vertically downwards and upwards orientated sections, respectively, of sidewalls of the sewage pipe system.

[0034] Manually or automatically applying a repulsive force between the first contact surface and the second contact surface results in the contact surfaces, from exhibiting a relative smaller mutual distance, now exhibit a relative larger mutual distance. The relatively larger mutual distance results in the contact surfaces coming into abutment with upwards and downwards orientated sidewalls of the pipe section of the sewage system, thereby fastening the barrier to the pipe section of the sewage system. The automatic appliance of a repulsive force may simply be one or more spring members provided as part of the barrier and the spring force of which is capable of being released, after the barrier has been installed.

[0035] The embodiment where the contact surfaces are positioned downwards and upwards and where the contact surfaces is in abutment with downwards orientated and upwards orientated sidewalls of the pipe section of the sewage system may results in a bottom of the pipe section of the sewage system possibly being obstructed by parts of the barrier, when the barrier is installed in the pipe section of the sewage system.

[0036] However, preferably at least the downwards orientated contact surface will be designed for flush abutment with the bottom of the pipe section of the sewage system.

[0037] Thus, any flow of sewage water through the pipe section of the sewage system may take place practically un-obstructed by any parts of the barrier, except by the intended obstruction of the at least one shutter. However, the at least one shutter is only obstructing the flow of sewage water, and of any vermin such as rats trying to enter the pipe section, in an upstream direction, not in a downstream direction.

[0038] According to a possible embodiment of the bar-

rier, the first contact surface constitutes an integrate part of the pipe section of the barrier, and where the second contact surface constitutes an individual part of the pipe section, and said individual second contact surface being displaceable in relation to the first contact surface in a lateral direction in relation to a longitudinal extension of the pipe section.

[0039] The first contact surface being an integrate part of the pipe section of the barrier and the second contact surface being an individual part of the barrier has the advantage that it is only the second contact surface that need being forced towards the sidewall of the pipe section of the sewage system. The increase of the mutual distance between the first contact surface and the second contact surface is obtained by repulsive forcing only the second contact surface towards the sidewall. However, due to the fact that the mutual distance is increased, the first contact surface will be forced towards the sidewall as well, but not directly, but indirectly, by means of repulsive force.

[0040] Thus, the mechanical complexity of the barrier is limited because only the second contact surface has to be displaceable in relation to the pipe section of the barrier. Also, the repulsive force needed for forcing the second contact surface towards the sidewall of the sewage system may be lesser compared to repulsive forcing both the first contact surface and the second contact surface at the same time towards the sidewall of the pipe section of the sewage system.

[0041] According to a possible other embodiment of the barrier, the first contact surface constitutes an integrate part of the pipe section of the barrier, and where the second contact surface constitutes an integrate part of the pipe section, and said first contact surface and said second contact surface being displaceable in relation to each other in a lateral direction in relation to a longitudinal extension of the pipe section.

[0042] Both the first contact surface being an integrate part of the pipe section of the barrier and the second contact surface being an integrate part of the barrier has the advantage that it is possible to freely select which sections of the circumference of the pipe section of the barrier, which are to constitute the first contact surface and the second contact surface. The increase of the mutual distance between the first contact surface and the second contact surface is obtained by repulsive forcing, and thereby altering, the shape of the circumference of the pipe section of the barrier. The altering of the circumference must result in that the mutual distance between the first contact surface and the second contact surface is increased such that both the first contact surface and the second contact surface will be directly forced towards the sidewall of the pipe section of the sewage system.

[0043] The mechanical complexity of the barrier is even more limited because not any of the first contact surface and the second contact surface has to be displaceable in relation to the pipe section of the barrier. However, the repulsive force needed for forcing the first contact surface and the second contact surface towards the sidewall of the sewage system may be higher due to the need for actually altering the shape of the circumference of the pipe section of the barrier. However, the repulsive force needed depends on the choice of material, on the dimensions and on the construction of the pipe section of the barrier.

[0044] According to even a possible other embodiment of the barrier, the first contact surface constitutes an individual part of the pipe section of the barrier, and where the second contact surface constitutes an individual part of the pipe section, and said first contact surface and said second contact surface being displaceable in relation to each other in a lateral direction in relation to a longitudinal extension of the pipe section.

[0045] Both the first contact surface being an individual part of the pipe section of the barrier and the second contact surface being an individual part of the barrier has the advantage that no altering is needed of the shape of the circumference of the pipe section of the barrier for repulsive forcing the first contact surface and the second contact surface towards the sidewall of the pipe section of the sewage system. The increase of the mutual distance between the first contact surface and the second contact surface is obtained by repulsive forcing both the first contact surface and the second contact surface towards the sidewall. When the mutual distance is increased, both the first contact surface and the second contact surface will be forced directly towards the sidewall by means of repulsive force.

[0046] However, the mechanical complexity of the barrier may be increased because both the first contact surface and the second contact surface have to be displaceable in relation to the pipe section of the barrier. Possibly, the repulsive force needed for forcing the first contact surface and the second contact surface towards the sidewall of the sewage system may be lesser compared to repulsive forcing an integrate first contact surface and an integrate second contact surface at the same time towards the sidewall of the pipe section of the sewage system.

[0047] A possible barrier having the first contact surface and the second contact surface orientated laterally, either one of or both of the first contact surface and the second contact surface, when being an individual of the pipe section, is displaceable by means of manually applied force exerted on the first contact surface, and where the manually applied force is intended for being applied vertically downwards and being diverted laterally, when the contact surface is being provided at a lateral side of the barrier.

[0048] A vertically orientated force is easy to establish from a top of a man-hole or inspection-hole of a sewage pipe system and down into the manhole or inspection hole. None muscular strength as such is needed by the person applying the vertically orientated force, possibly only the weight of the person him- or her-self is needed for applying the vertically orientated force. By diverting

the vertically orientated force laterally, preferably by a lever arm of the barrier, the vertically orientated force is diverted laterally towards the first contact surface and/or the second contact surface, substantially without any loss of force occurring.

[0049] Another possible barrier having the first contact surface and the second contact surface orientated vertically, either one of or both of the first contact surface and the second contact surface, when being an individual of the pipe section, is displaceable by means of manually applied force exerted on the first contact surface, and where the manually applied force is intended for being applied vertically downwards and being directly applied to the contact surface, when the contact surface is provided at a substantially vertical downwards side of the barrier.

[0050] A vertically orientated force is easy to establish from a top of a man-hole or inspection-hole of a sewage pipe system and down into the manhole or inspection hole. None muscular strength as such is needed by the person applying the vertically orientated force, possibly only the weight of the person him- or her-self is needed for applying the vertically orientated force. By directing the vertically orientated force directly downwards, possibly without any lever arm of the barrier, the vertically orientated force is directed directly towards the contact surface without any loss of force occurring.

[0051] Even another possible barrier having the first contact surface and the second contact surface orientated vertically, either one of or both of the first contact surface and the second contact surface, when being an individual of the pipe section, is displaceable by means of manually applied force exerted on the first contact surface, and where the manually applied force is intended for being applied vertically downwards and being diverted oppositely, when the contact surface is provided at a substantially vertical upwards side of the barrier.

[0052] A vertically orientated force is easy to establish from a top of a man-hole or inspection-hole of a sewage pipe system and down into the manhole or inspection hole. None muscular strength as such is needed by the person applying the vertically orientated force, possibly only the weight of the person him- or her-self is needed for applying the vertically orientated force. By diverting the vertically orientated force oppositely and upwards, possibly by means of a lever arm of the barrier, the vertically orientated force is diverted oppositely towards the contact surface, substantially without any loss of force occurring.

BRIEF DESCRIPTION OF THE DRAWINGS

[0053] The invention will hereafter be described with reference to the drawings, where

Fig. 1 is a perspective view of an embodiment of a barrier according to the invention in a configuration before and during insertion of the barrier in a sewage pipe system,

Fig. 2 is a perspective view of the embodiment of a barrier according to the invention in a configuration after insertion and when the barrier is in use in a sewage pipe system,

Fig. 3 is a cross-section of the embodiment of the invention, with both shutters of the barrier in a fully closed position, barring the aperture of the barrier,

Fig. 4 is a cross-section of the embodiment of the invention, with both shutters of the barrier in a fully open position, keeping the aperture of the barrier fully open,

Fig. 5 is a cross-section of the embodiment of the invention, with both shutters of the barrier in a partly open position, keeping the aperture of the barrier partly open,

Fig. 6 is a cross-section of the embodiment of the invention, with the second shutter being pivoted in relation to the first shutter and locking both shutters of the barrier Fig. 7 is a plane view of the embodiment of the barrier with both shutters being in a second position of the barrier, and thus orientated another way,

Fig. 8 is a plane view of the embodiment of the barrier with both shutters being in the second position of the barrier, and thus orientated the other way.

DETAILED DESCRIPTION OF THE INVENTION

[0054] Fig. 1-2 are perspective and plane views of an embodiment of a barrier intended for being positioned in the bottom of a man-hole or inspection-hole of a sewage pipe system. The barrier is provided with two shutters, a first shutter 30 being pivotally suspended from a pipe section 34 via a support element 33 of the barrier, and a second shutter 31 being pivotally suspended from the first shutter 30.

[0055] The suspension of the first shutter 30 is arranged about an axis 32 such that the first shutter is having a centre of gravity lying under the axis 32. The first shutter 30 is pivotal between a first angular position in which the at least one shutter 30 is forming a first relatively larger angle v (see fig. 3) with the direction of flow of waste material and at least substantially barring the aperture of the barrier, and a second angular position in which the at least one shutter is forming a second relatively smaller angle w (see fig. 4) with the direction of flow of waste material and at least partly keeping open the aperture of the barrier.

[0056] The direction of flow of waste material through the aperture of the barrier is shown by an arrow.

[0057] The first shutter 30 is pivotally attached to a support element 33 being secured to a pipe section 34 of the barrier. The pipe section 34 of the barrier is pivotably connected to a mantle 8 of the barrier along two pivoting axes 9 extending in a longitudinal direction in relation to the pipe section and in relation to the mantle 8 of the barrier.

[0058] The suspension of the second shutter 31 from the first shutter 30 is also arranged about an axis 35 such that the second shutter 31 is having a centre of gravity lying under the axis 35. The second shutter 31 will, during normal use, pivot together with first shutter 30 because the second shutter 31 is suspended from the first shutter 30. However, the second shutter 31 may additionally or alternatively pivot independently of any pivoting of the first shutter 31 about the axis 35 from which the second shutter 31 is suspended, said axis 35 being supported in bearings (not shown) of the first shutter 31.

[0059] Thus, apart from the pivoting of the second shutter 31 together with the first shutter 30, when the first shutter 30 is pivoting, the second shutter 31 may furthermore pivot independently between a first position in relation to the first shutter, in which first position a lower part 36 of the second shutter 31 is resting on a lower part 37 the first shutter 30 (see fig. 5), and a second position in relation to the first shutter 30, in which second position the lower part 36 of the second shutter 31 is raised from the lower part 37 of the first shutter 30 (see fig. 6).

[0060] The second shutter 31 is having a cross-sectional area (see fig. 1 and fig. 2) blocking substantially the entire inside of the pipe section 34 of the barrier, when the first shutter 30 and the second shutter 31 are in the fully closed configuration. Side edges 38 of the second shutter 31 is directed rearwards in the upstream direction allowing the second shutter 31 to pivot together with the first shutter 30 without the second shutter 31 getting stuck inside the pipe section, even if the second shutter 31 is pivoted to a fully open configuration as shown in fig. 4.

[0061] The individual pivoting of the second shutter 31 takes place independently of any pivoting of the first shutter 30. The second shutter 31 may pivot in relation to the second shutter 30 in any situation where the first shutter 30 is also pivoting and also in situations where the first shutter 30 is not pivoting. Referring to fig. 5 and fig. 6, the technical effect of the second shutter will be explained. It is important to notice that the technical effect is present both in a situation where the first shutter 30 is also pivoting and also in a situation where the first shutter 30 is not pivoting.

[0062] The barrier is furthermore provided with a first contact surface 4 and a second contact surface 5. The contact surfaces 4,5 are provided at downwards oriented and upwards orientated sidewalls, respectively, of the pipe section 34 of the barrier. The contact surfaces 4,5 are intended for being forced outwards towards sidewalls of a full-circumference pipe of the sewage pipe system. In the embodiment shown, the outwards orientated contact surface 4,5 are integrate parts of the pipe section 34 of the barrier and has the shape of part of the circumference of a circular pipe.

[0063] In the embodiment shown, the one contact surface 4 is an individual part and is pivotally suspended around the axis 9 of the mantle 8 and the other contact surface 4 is an individual part and is pivotally suspended around the axis 9 of the mantle 8. The contact surfaces 4,5 may have other shapes such as concave, convex or even having the shape of a rod.

[0064] In the configuration shown in fig. 1-8, the contact surfaces 4,5 constitute the exterior dimensions of the pipe section 34 of the barrier. Thus, the one contact surface 4 constitutes one part of the outside the wall boundary of the pipe section 34 of the barrier and the other contact surface 5 constitutes another part of the outside the wall boundary of the pipe section 34 of the barrier. The contact surfaces may be pivoted between a collapsed configuration (see fig. 1) and an expanded configuration (see fig. 2), as will be explained later.

[0065] The collapsed configuration is the configuration during which the barrier is intended for being installed in the sewage pipe system. The expanded configuration is the configuration after which the barrier has been installed in the sewage pipe system.

[0066] In the configuration shown in fig. 2, the contact surfaces 4,5 is in the expanded state and constitute relatively larger exterior dimensions of a pipe section 34 of the barrier. The configuration where the contact surface constitutes the larger exterior dimensions of the pipe section 34 of the barrier is the configuration, as mentioned above, where the barrier has been installed in the sewage pipe system and is the configuration, where the barrier during use as a barrier.

[0067] Pivoting of the contact surfaces 4,5 from the configuration, where the contact surfaces constitute relatively smaller exterior dimensions of the pipe section 34 of the barrier, to the configuration, where the contact surfaces 4,5 constitute the relatively larger exterior dimensions of the pipe section 34 of the barrier, is obtained by applying a repulsive force between the one contact surface 4 and the other contact surface 5. The repulsive force is applied by means of a vertically displaceable bushing 43 acting on lever arms 44,45 of each of the contacts surfaces 4,5.

[0068] The vertically displaceable bushing 43 is positioned in a raised position in the configuration where the contact surfaces 4,5 constitute the relatively smaller exterior dimensions of the pipe section 34 of the barrier, and the vertically displaceable bushing 43 is positioned in a lowered position in the configuration where the contact surfaces 4,5 constitute the relatively larger exterior dimensions of the pipe section 34 of the barrier. Thus, pivoting of the contact surfaces 4,5, around the axes 9, from the configuration where the contact surfaces 4,5 constitute the relatively smaller exterior dimensions of the pipe section 34 of the barrier to the configuration where the contact surfaces 4,5 constitute the relatively larger exterior dimensions of the pipe section 34 of the barrier may take place by lowering the bushing 43.

[0069] The bushing 43 is attached to a vertically extending post 46. The post 46 is intended for being operated by a manually or automatically operated rod (not shown) extending all the way from the pipe section 34 of the barrier to the top of the inspection-hole in the bottom of which the barrier is to be installed. The post 46 is pro-

vided with an interior screw thread and is furthermore capable of rotating around an exterior screw thread of a guide pin 47 extending from the mantle 8 of the barrier. Thus, rotating the post 46 around the guide pin 47 will result in also the bushing 43 sliding along the guide pin 47.

[0070] Therefore, if the post 46 is rotated, possibly and preferably clock-wise, from the top of the inspection-hole, the post 46 will slide downwards and also the bushing 43 will slide downward, i.e. will be lowered in relation to a raised position. And when the post 46 is sliding downwards, the lever arms 44,45 will provide a repulsive force to the contact surfaces 4,5, and the contact surfaces 4,5 will displace toward the sidewalls of the sewage pipe system and will secure the barrier to the full-circumference pipe in the bottom of the inspection hole of the sewage pipe system.

[0071] The mantle 8 is provided with a stop 40 intended for ensuring a sufficient but still not a too extensive insertion of the pipe section into a pipe section of the sewage pipe system. Too extensive insertion is disadvantageous if a bending of the sewage pipe system is present nearby or perhaps in immediate vicinity the position of insertion if the barrier. Alternatively, or possibly additionally, to a stop 40 the pipe section may be frusto-conically shaped (not shown) with the smallest diameter directed towards the pipe section of the sewage system. Depending on the conicity of the pipe section the barrier may thus be capable of being inserted into different pipe sections of the sewage system having different inner diameters. Accordingly, one barrier may be used in connection with different inner diameter pipe sections of the sewage system. The way of securing the barrier to the sewage pipe system may still be the same as the one described.

[0072] Fig. 5 and fig. 6 are cross-sections of the barrier in two different configurations of the second shutter 31. In both figures, the configuration of the first shutter 30 is the same. The technical effect of the second shutter will be explained with reference to fig. 5 and fig. 6.

[0073] It is important to notice that the technical effect of the second shutter 31 is present both in a situation where the first shutter 30 is also pivoting and also in a situation where the first shutter 30 is not pivoting, the latter being the situation shown in fig. 5 and fig. 6.

[0074] In fig. 5 the first shutter 30 is partly open leaving a small space beneath the first shutter 30 for allowing waste water and other sewage material to pass. However, the first shutter 30 could also be fully closed as shown in fig. 3 or fully open as shown in fig. 4, depending on the amount of sewage material and the size of the sewage material passing the first shutter 30.

[0075] A lower part 36 of the second shutter 31 is resting at a lower part 37 of the first shutter 30. In the configuration shown in fig. 5, the first shutter 30 and the second shutter 31 act as one shutter only, the second shutter 31 pivoting along with any pivoting of the first shutter 30 whenever the first shutter 30 is pivoting. The second shutter 31 is not pivoted in relation to the first shutter 31, and apart from the mass of the second shutter 31, the second shutter 31 is not in any way limiting or blocking the pivoting of the first shutter 30.

[0076] In fig. 6 the first shutter 30 is also partly open leaving a small space beneath the first shutter 30 for allowing waste water and other sewage material to pass. However, the first shutter 30 could also be fully closed as shown in fig. 3 or fully open as shown in fig. 4, depending on the amount of sewage material and the size of the sewage material passing the first shutter 30.

[0077] Contrary to the configuration shown in fig. 5, the lower part 36 of the second shutter 31 is raised from the lower part 37 of the first shutter 30, i.e. the lower part 36 of the second shutter 31 is not resting on the lower part 37 of the first shutter 30.

[0078] In the configuration shown in fig. 6, the first shutter 30 and the second shutter 31 act both combined and independently, the second shutter 31 pivoting along with any pivoting of the first shutter 30 whenever the first shutter is pivoting, but the second shutter 31 also being pivoted in relation to first shutter 30. Pivoting of the second shutter 31 in relation to the first shutter 30 takes place when a force is applied upstream at the lower part 36 of the second shutter 31.

[0079] Pivoting of the second shutter 31 in relation to the first shutter 30 will not take place just because of any sewage material passing along the pipe section 34 of the barrier in the direction of the arrow. Pivoting of the second shutter 31 in relation to the first shutter 30 may however take place because of a rat or other vermin trying to open the shutters 30,31 upstream from the shutters 30,31. The rat or other vermin trying to pass the shutters 30,31 will grasp or in any other way try to open the shutters 30, 31 by manipulating the second shutter 31, which is the shutter being positioned upstream.

[0080] Because of the second shutter 31 being pivoted in relation to the first shutter 30, when a force is applied upstream at the lower part 36 of the second shutter 31, a brace 48 being an integrate part of the second shutter 31 is brought into engagement with a ratchet mechanism 49 being an integrate part of the support element 33.

[0081] Therefore, when the second shutter 31 is pivoted as shown in fig. 6, the brace 48 together with the ratchet mechanism 49 will lock not only the pivoting of the second shutter 31 in relation to the support element 33, but will also lock the pivoting of the first shutter 30 in relation to the support element 33. Thus, locking the second shutter 31 towards pivoting, incurred by a rat or other vermin upstream of the shutters and trying to pass the shutters 30,31 and enter the sewage pipe system, is also locking the first shutter 30 towards pivoting. The rat or other vermin is thus prevented from entering the sewage pipe system from upstream of the system.

[0082] The limitation towards pivoting of the first shutter 30 and the second shutter 31 is provided in a technical reliable and an absolutely mutual relationship between the first shutter 30 and the second shutter 31. Thus, the limitation toward pivoting is not dependent on any parts of the barrier, which do not constitute part of the shutters

30,31 or the support element 33 from which the first shutter 30 is suspended. Any malfunction of other parts of the barrier will thus not impede the locking function of the first shutter 30 and the second shutter 31.

[0083] Fig. 1-6 show the embodiment with the first shutter and the second shutter being positioned so that the shutters allow flow of sewage from right to left in the plane of the drawing. As mentioned, such position of the shutters are established when the pipe section and thus the barrier are intended for being installed into a pipe section 50 constituting an outlet to the bottom of the man-hole or inspection-hole of the sewage pipe system.

[0084] Fig. 7 and fig. 8 show the embodiment, where the first shutter and the second shutter is positioned in an orientation, i.e. a position of the shutters in the one direction, so that the shutters allow flow of sewage from left to right in the plane of the drawing. Such orientation of the shutters are established when the pipe section and thus the barrier are intended for being installed into a pipe section 50 constituting an inlet to the bottom of the man-hole or the inspection-hole of the sewage pipe system.

[0085] The first shutter and the second shutter together with the support element are attached to a mantle 8 by means of a bolt 41 extending through a hole (not shown) in the mantle 8 and being screwed into a screw thread (not shown) provided in the support element 33. Thereby, the first shutter and the second shutter are capable of being positioned either in a first orientation in the barrier or in the other orientation in the barrier, depending on the possible entering of the vermin.

[0086] A first orientation of the shutters and the support element is the position shown in Fig. 1-6 and a second orientation of the shutters and the support element is the position shown in Fig. 7 and Fig. 8. Alternatively to securing the shutters and the support element in the first orientation or in the second orientation by means of a bolt, other means of securing may be used, such as a click-on mechanism, a bayonet mechanism, or any other mechanism suited for the purpose.

[0087] Thus, when the pipe section and thus the barrier are intended for being installed into a pipe section 50 constituting an outlet from the bottom of the inspection-hole of the sewage pipe system, the first shutter and the second shutter are positioned in the first orientation (see fig. 1-6), preventing rats and other vermin to enter the man-hole or the inspection-hole, as seen from left to right in the plane of the drawing.

[0088] And, when the pipe section and thus the barrier are intended for being installed into a pipe section 50 constituting an inlet to the bottom of the inspection-hole of the sewage pipe system, the first shutter and the second shutter are positioned in the second orientation, i.e. a position of the shutters in the other direction in the barrier, preventing rats and other vermin to enter the man-hole or the inspection hole, as seen from left to right in the plane of the drawing.

[0089] Changing the orientation of the first shutter and the second shutter as well as the support element 33 is accomplished before the barrier is installed in the man-hole by screwing out the bolt 41 from the support element 33 and extracting the bolt from the hole in the mantle 8, reversing half a full rotation the orientation of the first shutter and the second shutter around an axis through the screw thread of the support element, inserting the bolt through another hole (not shown) in the mantle 8 and screwing the bolt into the screw thread of the support element 33. The same steps apply vice versa.

[0090] The other hole in the mantle 8 is preferably provided so that the position of the first shutter and the second shutter is within the contact surfaces 4,5. The position of the first shutter and the second shutter is furthermore preferably provided so that the first shutter and the second shutter are positioned in the inlet to or in the outlet from the man-hole or the inspection-hole, when the barrier is positioned in the man-hole or inspection-hole.

[0091] If not, i.e. if the position of the first shutter and the second shutter is not provided so that the first shutter and the second shutter are positioned in the inlet to or in the outlet from the man-hole or the inspection-hole, the position of the first shutter and the second shutter must be positioned within the contact surfaces 4,5 in order to thereby prevent rats and other vermin from entering the man-hole or inspection-hole.

[0092] Installation of the barrier in a man-hole or inspection hole is preferably performed by a method of installation and by a subsequent use of the barrier as described in the flowing:

[0093] The barrier is firstly lowered into the inspection-hole and down to the bottom of the hole as shown with the arrow. When having reached the bottom of the hole, the pipe section 34 of the barrier is displaced laterally towards the pipe section of the sewage pipe system, as shown by the arrow, into which the barrier is to be installed.

[0094] In the embodiment shown, where the pipe section 34 of the barrier is directed upstream, the pipe section and thus the barrier are intended for being installed into a pipe section 50 constituting an outlet to the bottom of the inspection-hole of the sewage pipe system. During insertion of the pipe section 34 of the barrier, the contact surfaces 4,5 is in the configuration where the contact surfaces 4,5 constitute the relatively smaller exterior dimensions of the pipe section 34 of the barrier. Thus, the contact surfaces 4,5 is not in the way during insertion of the pipe section 34 of the barrier into the outlet pipe section 50 of the sewage system.

[0095] When the pipe section 34 of the barrier has been inserted into the outlet pipe section 50 of the sewage system, the contact surfaces 4,5 are activated by applying a repulsive force between the contact surfaces 4,5. The repulsive force is applied as described, i.e. by sliding the post 46 downwards, thereby pushing downwards the bushing 43, and via the lever arms 44,45 forcing the contact surfaces 4,5 outwards towards an inner circumference of the pipe section 50 of the sewage system. When

the contact surfaces 4,5 are forced outwards, a mutual distance between the contact surfaces 4,5 is increased when the contact surfaces 4,5 are forced outwards.

[0096] As mentioned, the mantle 8 is provided with a stop 41 intended for ensuring a sufficient, but still not a too extensive insertion of the pipe section into a pipe section of the sewage pipe system. When the pipe section 34 of barrier is inserted into the pipe section 50 of the sewage pipe system during the lateral displacement of the barrier, after having been lowered to the bottom of the inspection-hole, the stop 41 will limit the depth of insertion of the pipe section 34 into the pipe section 50.

[0097] The stop 40 is provided so that the insertion of the pipe section 34 into the pipe section 50 is sufficient for the upper contact surface to obtain a sufficient abutment with the inner surface of the pipe section 50. The stop 40 is not mandatory to the function and the advantages of the barrier, but the stop 40 is advantageous to any non-professional person installing the barrier.

[0098] The contact surfaces 4,5 constituting the pipe section 34 of the barrier has a blunt end facing the pipe section 50 of the sewage system. The opposite end 52 of contact surfaces 4,5 the pipe section 34 of the barrier is shaped having a cut-away leading from a topsurface 53 of the contact surfaces 4,5, downwards to a bottom surface 54 of the contact surfaces 4,5. The cut-away of the contact surfaces 4,5 results in the barrier limiting the flow of sewage as little as possible, when the sewage passes the barrier. As example, if the sewage enters from a side branch pipe section 55 of the sewage system (see fig. 11) the sewage may pass completely freely from the side branch pipe section 55 to the outlet pipe section 50 of the sewage system. Decreasing the limitation towards flow of sewage would not be the case if the contact surfaces 4,5 of the barrier had the same extension from the top surface along to the bottom surface.

[0099] In the embodiment shown, the cut-away is shown having a substantially rectangular shape from the top surface 53 of the contact surfaces 4,5, downwards to the bottom surface 54 of the contact surfaces 4,5. In alternative embodiments, the cut-away may be triangular, i.e. extending so that a hypotenuse of the triangle constitute a border between the contact surfaces 4,5 and the cut-away, thereby increasing the structural strength of the contact surfaces 4,5.

[0100] In the embodiments shown in fig. 1-8, the contacts surfaces constituting the exterior walls of the pipe section 34 of the barrier only extend along part of a full circumference and not extending along a bottom part of the circumference. This has the advantage that when the barrier is installed in the bottom of the inspection-hole of the sewage pipe system, the lower part of the pipe section of the sewage system is not in any way blocked by the pipe section of the barrier.

[0101] The extension of the pipe section of the barrier, i.e. whether the pipe section extends along perhaps the upper half the full circumference as shown, along perhaps the upper three quarters of a full circumference, or along more or less of a full circumference, depends on the actual application of use, i.e. the type and size of the pipe section of the sewage system, and also depends on the necessity of obtaining a satisfactory securing of the pipe section of the barrier along the inner circumference of the pipe section of the sewage system.

[0102] In the embodiments shown in fig. 6-8, the pipe section 34 of the barrier extends along at least part of a circular circumference. Other circumferences such as oval, triangular, square of other polygonal of non-polygonal shapes could also be envisaged. However, in any of the possible configurations of the pipe section of the sewage system and the barrier, it is advantageous to let the pipe section 34 only extend along part of a circumference, either circular, non-circular or polygonal.

[0103] The invention is described with reference to different embodiments. The description of the embodiments is however not to be construed as a limitation of the invention. Other embodiments as the ones described may be envisaged within the scope of protection.

Claims

1. A barrier for preventing a rat or other vermin from entering a sewage pipe, said barrier being mountable within the sewage pipe and said barrier comprising:

- a pipe section (34) installable in the sewage pipe,
- a support element (33), and
- at least a first shutter (30) pivotally suspended within the support element (33) for rotation about a first axis (32),

the first shutter (30) having a centre of gravity lying under the first axis (32) and being pivotal between a first angular position in which the at least first shutter (30) is forming an acute first angle with a direction of a sewage flow within the sewage pipe such that the first shutter (30) is at least substantially barring the aperture of the sewage pipe and the vermin cannot enter the sewage pipe, and
a second angular position in which the at least first shutter (30) is forming a second relatively smaller angle with the direction of sewage flow thus keeping the aperture of the barrier at least partly open such that the sewage flow may pass the barrier,
characterized in that
the first shutter (30) can be suspended from the pipe section (34) in two orientations such that the direction in which the barrier bars vermin from passing may be changed without changing the orientation of the pipe section (34).

2. A barrier according to claim 1, said barrier also comprising

- a second shutter (31) placed upstream of the first shutter (30) and being pivotally suspended about a second axis and having a centre of gravity located under the second axis,
- a first part of a locking mechanism provided as part of the barrier when being positioned in the sewage pipe system, said first part of the locking mechanism being intended for engaging with a corresponding second part of the locking mechanism provided as part of the second shutter (31),
- where the second part of the locking mechanism, when the second shutter (31) is pivoting in relation to the first shutter (30) around the second axis, and when the first shutter (30) is in the first angular position, will engage with the first part of the locking mechanism thereby preventing further pivoting of the first shutter (30), and
- where the second part of the locking mechanism, when the second shutter (31) is pivoting in relation to the first shutter around the second axis, and when the first shutter (30) is in the second angular position, which is substantially different from the first angular position, also will engage with the first part of the locking mechanism thereby preventing further pivoting of the first shutter (30).

3. A barrier according to claim 2, where said second axis of the second shutter (31) is being provided as part of the first shutter (30) so that the second shutter (31) is pivotally suspended from the first shutter, and where the second part of the locking mechanism, when the second shutter is pivoting in relation to the first shutter around the second axis will engage with the first part of the locking mechanism thereby preventing further pivoting of the second (31) shutter in relation to the first shutter (30),

4. A barrier according to any one of claims 2-3, where said first part of the locking mechanism is a sawtooth-like part of the locking mechanism, and where the second part of the locking mechanism is a pawl-like part of the locking mechanism, and where the pawl-like part is intended for engaging with the sawtooth-like part for preventing the further pivoting of the second shutter (31) in relation to the first shutter (30).

5. A barrier according to any of the preceding claims, wherein the pipe section (34) comprises a first contact surface (4) and a second contact surface (5), whereby exerting a lateral force to either one of or both of the first contact surface (4) and the second contact surface (5) is obtained by a manually downwards applied force, and where diverting of the manually applied force is obtained by a linkage mechanism with a first lever arm being operated by the manually applied force, and a second lever arm operating either one of or both of the first contact surface and the second contact surface in a lateral direction.

6. A barrier according to any of claims 1-4, wherein the pipe section (34) comprises a first contact surface (4) and a second contact surface (5), whereby exerting a substantially vertical force to the contact surface (4,5), when the contact surface (4,5) is intended for abutting a vertical part of the sewage pipe system, is obtained by a manually downwards applied force, and where diverting of the manually applied force is obtained by a linkage mechanism with a first lever arm being operated by the manually applied force, and second lever arm operating the contact surface in an upwards direction.

7. A barrier according to any of the preceding claims, where the pipe section (34) of the barrier has one end intended for facing a pipe section of the sewage system, when the barrier is installed in the sewage system, and where an opposite end of the pipe section (34) having an inclination leading from a top surface of the pipe section (34) to a bottom surface of the pipe section (34), said inclination resulting in a top generatrix along the top surface is extending farther rearwards in relation to a sewage flow direction, when the barrier is installed in the sewage system, than an extension of a bottom generatrix along the bottom surface.

8. A barrier according to any of claims 1-6, where the pipe section (34) of the barrier has one end intended for facing a pipe section of the sewage system, when the barrier is installed in the sewage system, and where an opposite end of the pipe section having an inclination leading from a top surface of the pipe section (34) to a bottom surface of the pipe section (34), said inclination resulting in a top generatrix along the top surface is extending farther forwards in relation to a sewage flow direction, when the barrier is installed in the sewage system, than an extension of a bottom generatrix along the bottom surface.

9. A barrier according to any of claims 1-4, said barrier comprising

- said barrier intended for being installed in the sewage pipe system, and where said barrier is being provided with a first contact surface (4) for abutting a first circumferential extension of a sidewall of a sewage pipe, and a second contact surface (5) for abutting a second circumferential extension of the sidewall of the sewage pipe, and
- where a distance is relatively smaller between said first contact surface (4) and said second contact surface (5) in a first configuration, in

which first configuration no manually applied force is present between the first contact surface (4) and the second contact surface (5), and
- where a distance is relatively larger between said first contact surface (4) and said second contact surface (5) in a second configuration, in which second configuration a repulsive force is present between the first contact surface (4) and the second contact surface (5), and
- where a manually or automatically applied repulsive force is intended for forcing the first contact surface (4) towards the first circumferential extension of a sidewall of a sewage pipe and for forcing the second contact surface (5) towards the second circumferential extension of a sidewall of a sewage pipe.

10. A barrier according to any of claims 5-6 and claim 9, where said first contact surface (4) is a contact surface provided at one lateral side of the barrier, and where said second contact surface (5) is a contact surface provided at another lateral side of the barrier, and where a repulsive force applied between the first contact surface and the second contact surface is intended for providing abutment of the first contact surface (4) and the second contact surface (5) with diagonally opposite laterally orientated sections, respectively, of sidewalls of the sewage pipe system.

11. A barrier according to any of claims 5-6 and claim 9, where said first contact surface (4) is a contact surface provided at a substantially vertical downwards side of the barrier, and where said second contact surface (5) is a contact surface provided at a substantially vertical upwards side of the barrier, and where a repulsive force applied between the first contact surface and the second contact surface is intended for providing abutment of the first contact surface and the second contact surface with diagonally opposite substantially vertically downwards and upwards orientated sections, respectively, of sidewalls of the sewage pipe system.

12. A barrier according to any of claims 5-6 and claims 9-11, where the first contact surface (4) constitutes an integrate part of the pipe section (34) of the barrier, and where the second contact surface (5) constitutes an individual part of the pipe section (34), and said individual second contact surface being displaceable in relation to the first contact surface in a lateral direction in relation to a longitudinal extension of the pipe section.

13. A barrier according to any of claims 5-6 and claims 9-11, where the first contact surface (4) constitutes an integrate part of the pipe section (34) of the barrier, and where the second contact surface (5) constitutes an integrate part of the pipe section (34), and said first contact surface and said second contact surface being displaceable in relation to each other in a lateral direction in relation to a longitudinal extension of the pipe section.

14. A barrier according to any of claims 5-6 and claims 9-11, where the first contact surface (4) constitutes an individual part of the pipe section (34) of the barrier, and where the second contact surface (5) constitutes an individual part of the pipe section (34), and said first contact surface and said second contact surface being displaceable in relation to each other in a lateral direction in relation to a longitudinal extension of the pipe section.

15. A barrier according to any of claims 5-6 and claims 9-14, where either one of or both of the first contact surface (4) and the second contact surface (5), when being an individual of the pipe section (34), is displaceable by means of manually applied force exerted on the first contact surface, and where the manually applied force is intended for being applied vertically downwards and being diverted laterally, when the contact surface is being provided at a lateral side of the barrier.

16. A barrier according to any of claims 5-6 and claims 9-14, where either one of or both of the first contact surface (4) and the second contact surface (5), when being an individual of the pipe section (34), is displaceable by means of manually applied force exerted on the first contact surface, and where the manually applied force is intended for being applied vertically downwards and being directly applied to the contact surface, when the contact surface is provided at a substantially vertical downwards side of the barrier.

17. A barrier according to any of claims 5-6 and claims 9-14, where either one of or both of the first contact surface (4) and the second contact surface (5), when being an individual of the pipe section (34), is displaceable by means of manually applied force exerted on the first contact surface, and where the manually applied force is intended for being applied vertically downwards and being diverted oppositely, when the contact surface is provided at a substantially vertical upwards side of the barrier.

Patentansprüche

1. Barriere zum Verhindern des Eindringens von Ratten und anderen Schädlingen in ein Kanalisationsrohr, wobei die Barriere in dem Kanalisationsrohr montierbar ist und die Barriere umfasst:

- einen Rohrabschnitt (34), der im Kanalisations-

rohr montierbar ist,
- ein Trägerelement (33) und
- mindestens eine erste Klappe (30), die im Trägerelement (33) drehbar um eine erste Achse (32) aufgehängt ist,

wobei die erste Klappe (30) einen Schwerpunkt aufweist, der sich unterhalb der ersten Achse (32) befindet, und drehbar ist zwischen
einer ersten Winkelposition, in der die mindestens erste Klappe (30) einen ersten, spitzen Winkel mit einer Richtung eines Abwasserflusses innerhalb des Kanalisationsrohrs bildet, sodass die erste Klappe (30) die Öffnung des Kanalisationsrohrs im Wesentlichen versperrt und die Schädlinge nicht in das Kanalisationsrohr eindringen können, und
einer zweiten Winkelposition, in der die mindestens erste Klappe (30) einen zweiten, verhältnismäßig kleineren Winkel mit der Richtung des Abwasserflusses bildet, sodass die Öffnung der Barriere mindestens teilweise offen ist, sodass der Abwasserfluss die Barriere passieren kann,
dadurch gekennzeichnet, dass
die erste Klappe (30) von dem Rohrabschnitt (34) in zwei Ausrichtungen aufgehängt werden kann, sodass die Richtung, in der die Barriere Schädlinge am Passieren hindert, geändert werden kann, ohne die Ausrichtung des Rohrabschnitts (34) zu ändern.

2. Barriere nach Anspruch 1, wobei die Barriere weiterhin umfasst

- eine zweite Klappe (31), die stromaufwärts von der ersten Klappe (30) angeordnet und drehbar um eine zweite Achse aufgehängt ist und einen Schwerpunkt aufweist, der sich unterhalb der zweiten Achse befindet,
- einen ersten Teil eines Arretiermechanismus, der als Teil der Barriere bereitgestellt ist, wenn diese im Kanalisationsrohrsystem angebracht ist, wobei der erste Teil des Arretiermechanismus zum Eingreifen in einen entsprechenden zweiten Teil des Arretiermechanismus vorgesehen ist, der als Teil der zweiten Klappe (31) bereitgestellt ist,
- wobei der zweite Teil des Arretiermechanismus, wenn die zweite Klappe (31) in Bezug zur ersten Klappe (30) um die zweite Achse dreht und wenn sich die erste Klappe (30) in der ersten Winkelposition befindet, in den ersten Teil des Arretiermechanismus eingreift und **dadurch** eine weitere Drehung der ersten Klappe (30) verhindert, und
- wobei der zweite Teil des Arretiermechanismus, wenn die zweite Klappe (31) in Bezug zur ersten Klappe um die zweite Achse dreht und wenn sich die erste Klappe (30) in der zweiten Winkelposition befindet, die sich wesentlich von der ersten Winkelposition unterscheidet, ebenfalls in den ersten Teil des Arretiermechanismus eingreift und **dadurch** eine weitere Drehung der ersten Klappe (30) verhindert.

3. Barriere nach Anspruch 2, wobei die zweite Achse der zweiten Klappe (31) als Teil der ersten Klappe (30) bereitgestellt ist, sodass die zweite Klappe (31) drehbar an der ersten Klappe aufgehängt ist, und wobei der zweite Teil des Arretiermechanismus, wenn die zweite Klappe in Bezug zur ersten Klappe um die zweite Achse dreht, in den ersten Teil des Arretiermechanismus eingreift und **dadurch** ein weiteres Drehen der zweiten Klappe (31) in Bezug auf die erste Klappe (30) verhindert.

4. Barriere nach einem der Ansprüche 2-3, wobei der erste Teil des Arretiermechanismus ein sägezahnähnliches Teil des Arretiermechanismus ist und wobei der zweite Teil des Arretiermechanismus ein sperrklinkenähnliches Teil des Arretiermechanismus ist und wobei das sperrklinkenähnliche Teil zum Eingriff in das sägezahnähnliche Teil vorgesehen ist, um ein weiteres Drehen der zweiten Klappe (31) in Bezug auf die erste Klappe (30) zu verhindern.

5. Barriere nach einem der vorhergehenden Ansprüche, wobei der Rohrabschnitt (34) eine erste Kontaktfläche (4) und eine zweite Kontaktfläche (5) aufweist, wobei das Ausüben einer lateralen Kraft auf entweder die erste Kontaktfläche (4) oder die zweite Kontaktfläche (5) oder beide Kontaktflächen mittels einer von Hand nach unten angelegten Kraft erreicht wird und wobei das Ablenken der von Hand angelegten Kraft durch einen Verbindungsmechanismus mit einem ersten Hebelarm, der von der von Hand angelegten Kraft betrieben wird, und einem zweiten Hebelarm, der entweder die erste Kontaktfläche oder die zweite Kontaktfläche oder beide Kontaktflächen in lateraler Richtung betreibt erreicht wird.

6. Barriere nach einem der Ansprüche 1-4, wobei der Rohrabschnitt (34) eine erste Kontaktfläche (4) und eine zweite Kontaktfläche (5) aufweist, wobei die Ausübung einer im Wesentlichen senkrechten Kraft auf die Kontaktfläche (4, 5), wenn die Kontaktfläche (4, 5) für das Anliegen an einem senkrechten Teil des Kanalisationsrohrsystems vorgesehen ist, durch eine von Hand nach unten angelegte Kraft erreicht wird und wobei die Ablenkung der von Hand angelegten Kraft durch einen Verbindungsmechanismus mit einem ersten Hebelarm, der von der von Hand angelegten Kraft betrieben wird, und einem zweiten Hebelarm, der die Kontaktfläche in Aufwärtsrichtung betreibt, erreicht wird.

7. Barriere nach einem der vorhergehenden Ansprüche, wobei der Rohrabschnitt (34) der Barriere ein

Ende aufweist, das dafür vorgesehen ist, einem Rohrabschnitt des Kanalisationssystems zugewandt zu sein, wenn die Barriere in dem Kanalisationssystem eingebaut ist, und wobei ein gegenüberliegendes Ende des Rohrabschnitts (34) eine Neigung aufweist, die von einer oberen Fläche des Rohrabschnitts (34) zu einer unteren Fläche des Rohrabschnitts (34) verläuft, wobei sich die Neigung, die in einer oberen Mantellinie entlang der oberen Fläche resultiert, weiter nach hinten in Bezug auf die Strömungsrichtung in der Kanalisation erstreckt, wenn die Barriere in dem Kanalisationssystem installiert ist, als eine Ausdehnung einer unteren Mantellinie entlang der untere Fläche.

8. Barriere nach einem der Ansprüche 1-6, wobei der Rohrabschnitt (34) der Barriere ein Ende aufweist, das dafür vorgesehen ist, einem Rohrabschnitt des Kanalisationssystems zugewandt zu sein, wenn die Barriere in dem Kanalisationssystem eingebaut ist, und wobei ein gegenüberliegendes Ende des Rohrabschnitts (34) eine Neigung aufweist, die von einer oberen Fläche des Rohrabschnitts (34) zu einer unteren Fläche des Rohrabschnitts (34) verläuft, wobei sich die Neigung, die in einer oberen Mantellinie entlang der oberen Fläche resultiert, weiter nach vorne in Bezug auf die Strömungsrichtung in der Kanalisation erstreckt, wenn die Barriere in dem Kanalisationssystem installiert ist, als eine Ausdehnung einer unteren Mantellinie entlang der untere Fläche.

9. Barriere nach einem der Ansprüche 1-4, wobei die Barriere umfasst

- dass die Barriere zur Montage in einem Kanalisationsrohrsystem vorgesehen ist, wobei die Barriere mit einer ersten Kontaktfläche (4) zum Anliegen an einer ersten Umfangsverlängerung einer Seitenwand eines Kanalisationsrohrs und einer zweiten Kontaktfläche (5) zum Anliegen an einer zweiten Umfangsverlängerung der Seitenwand des Kanalisationsrohrs versehen ist und
- wobei ein Abstand zwischen der ersten Kontaktfläche (4) und der zweiten Kontaktfläche (5) in einer ersten Konfiguration verhältnismäßig kleiner ist, wobei in der ersten Konfiguration keine von Hand angelegte Kraft zwischen der ersten Kontaktfläche (4) und der zweiten Kontaktfläche (5) vorhanden ist, und
- wobei ein Abstand zwischen der ersten Kontaktfläche (4) und der zweiten Kontaktfläche (5) in einer zweiten Konfiguration verhältnismäßig größer ist, wobei in der zweiten Konfiguration eine abstoßende Kraft zwischen der ersten Kontaktfläche (4) und der zweiten Kontaktfläche (5) vorhanden ist, und
- wobei eine von Hand oder automatisch angelegte abstoßende Kraft vorgesehen ist, um die erste Kontaktfläche (4) zur ersten Umfangsverlängerung einer Seitenwand eines Kanalisationsrohrs zu zwingen und um die zweite Kontaktfläche (5) zur zweiten Umfangsverlängerung einer Seitenwand eines Kanalisationsrohrs zu zwingen.

10. Barriere nach einem der Ansprüche 5-6 und Anspruch 9, wobei die erste Kontaktfläche (4) eine Kontaktfläche ist, die an einer lateralen Seite (6) der Barriere vorgesehen ist, und wobei die zweite Kontaktfläche (5) eine Kontaktfläche ist, die an einer anderen lateralen Seite der Barriere vorgesehen ist, und wobei eine abstoßende Kraft, die zwischen der ersten Kontaktfläche und der zweiten Kontaktfläche angelegt wird, zur Bereitstellung des Anliegens der ersten Kontaktfläche (4) und der zweiten Kontaktfläche (5) an diagonal gegenüberliegenden lateral ausgerichteten Abschnitten der Seitenwände des Kanalisationssystems vorgesehen ist.

11. Barriere nach einem der Ansprüche 5-6 und Anspruch 9, wobei die erste Kontaktfläche (4) eine Kontaktfläche ist, die an einer im Wesentlichen senkrecht nach unten gerichteten Seite der Barriere vorgesehen ist, und wobei die zweite Kontaktfläche (5) eine Kontaktfläche ist, die an einer im Wesentlichen senkrecht nach oben gerichteten Seite der Barriere vorgesehen ist, und wobei eine abstoßende Kraft, die zwischen der ersten Kontaktfläche und der zweiten Kontaktfläche angelegt wird, zur Bereitstellung des Anliegens der ersten Kontaktfläche und der zweiten Kontaktfläche an diagonal gegenüberliegenden im Wesentlichen senkrecht nach unten bzw. noch oben gerichteten ausgerichteten Abschnitten der Seitenwände des Kanalisationssystems vorgesehen ist.

12. Barriere nach einem der Ansprüche 5-6 und einem der Ansprüche 9-11, wobei die erste Kontaktfläche (4) einen festen Bestandteil des Rohrabschnitts (34) der Barriere darstellt und wobei die zweite Kontaktflache (5) einen separaten Bestandteil des Rohrabschnitts (34) darstellt und wobei die separate zweite Kontaktfläche in einer lateralen Richtung in Bezug auf eine längliche Verlängerung des Rohrabschnitts zur ersten Kontaktfläche verschiebbar ist.

13. Barriere nach einem der Ansprüche 5-6 und einem der Ansprüche 9-11, wobei die erste Kontaktfläche (4) einen festen Bestandteil des Rohrabschnitts (34) der Barriere darstellt und wobei die zweite Kontaktflache (5) einen festen Bestandteil des Rohrabschnitts (34) darstellt und wobei die erste Kontaktfläche und die zweite Kontaktfläche in einer lateralen Richtung in Bezug auf eine längliche Verlängerung des Rohrabschnitts zueinander verschiebbar sind.

14. Barriere nach einem der Ansprüche 5-6 und einem der Ansprüche 9-11, wobei die erste Kontaktfläche (4) einen getrennten Bestandteil des Rohrabschnitts (34) der Barriere darstellt und wobei die zweite Kontaktflache (5) einen getrennten Bestandteil des Rohrabschnitts (34) darstellt und wobei die erste Kontaktfläche und die zweite Kontaktfläche in einer lateralen Richtung in Bezug auf eine längliche Verlängerung des Rohrabschnitts zueinander verschiebbar sind.

15. Barriere nach einem der Ansprüche 5-6 und einem der Ansprüche 9-14, wobei entweder die erste Kontaktfläche (4) oder die zweite Kontaktfläche (5) oder beide Kontaktflächen, wenn diese einen getrennten Teil des Rohrabschnitts (34) darstellen, mittels einer von Hand angelegten Kraft verschiebbar sind, die auf die erste Kontaktfläche ausgeübt wird, und wobei die von Hand angelegte Kraft senkrecht nach unten ausgeübt und lateral abgelenkt werden soll, wenn die Kontaktfläche an einer lateralen Seite der Barriere vorgesehen ist.

16. Barriere nach einem der Ansprüche 5-6 und einem der Ansprüche 9-14, wobei entweder die erste Kontaktfläche (4) oder die zweite Kontaktfläche (5) oder beide Kontaktflächen, wenn diese einen getrennten Teil des Rohrabschnitts (34) darstellen, mittels einer von Hand angelegten Kraft verschiebbar sind, die auf die erste Kontaktfläche ausgeübt wird, und wobei die von Hand angelegte Kraft senkrecht nach unten und direkt auf die Kontaktfläche ausgeübt werden soll, wenn die Kontaktfläche an einer im Wesentlichen senkrecht nach unten gerichteten Seite der Barriere vorgesehen ist.

17. Barriere nach einem der Ansprüche 5-6 und einem der Ansprüche 9-14, wobei entweder die erste Kontaktfläche (4) oder die zweite Kontaktfläche (5) oder beide Kontaktflächen, wenn diese einen getrennten Teil des Rohrabschnitts (34) darstellen, mittels einer von Hand angelegten Kraft verschiebbar sind, die auf die erste Kontaktfläche ausgeübt wird, und wobei die von Hand angelegte Kraft senkrecht nach unten ausgeübt und in die entgegengesetzte Richtung abgelenkt werden soll, wenn die Kontaktfläche an einer im Wesentlichen nach oben gerichteten Seite der Barriere vorgesehen ist.

Revendications

1. Barrière pour empêcher un rat ou autre animal nuisible d'entrer dans un tuyau d'égout, ladite barrière pouvant être montée dans le tuyau d'égout et ladite barrière comprenant :

- une section tuyau (34) pouvant être installée dans le tuyau d'égout,
- un élément de support (33), et
- au moins un premier obturateur (30) pouvant être suspendu pivotant dans l'élément de support (33) pour rotation autour d'un premier axe (32),

le premier obturateur (30) ayant un centre de gravité situé sous le premier axe (32) et pivotant entre
une première position angulaire dans laquelle le ou les premiers obturateurs (30) forment un premier angle aigu avec une direction d'un écoulement d'égout dans le tuyau d'égout de sorte que le premier obturateur (30) barre au moins sensiblement l'ouverture du tuyau d'égout et que l'animal nuisible ne puisse pas entrer dans le tuyau d'égout, et
une seconde position angulaire dans laquelle le ou les premiers obturateurs (30) forment un second angle relativement inférieur avec la direction d'écoulement d'égout, maintenant ainsi l'ouverture de la barrière au moins partiellement ouverte de sorte que l'écoulement d'égout puisse passer la barrière,
caractérisé en ce que
le premier obturateur (30) peut être suspendu de la section tuyau (34) selon deux orientations de sorte que la direction dans laquelle la barrière empêche l'animal nuisible de passer puisse être modifiée sans modifier l'orientation de la section tuyau (34).

2. Barrière selon la revendication 1, ladite barrière comprenant également

- un second obturateur (31) placé en amont du premier obturateur (30) et suspendu pivotant autour d'un second axe et ayant un centre de gravité situé sous le second axe,
- une première partie d'un mécanisme de verrouillage fournie en tant que de partie de la barrière lorsqu'elle est positionnée dans le système de tuyau d'égout, ladite première partie du mécanisme de verrouillage étant destinée à venir en prise avec une seconde partie correspondante du mécanisme de verrouillage fournie en tant que partie du second obturateur (31),
- où la seconde partie du mécanisme de verrouillage, lorsque le second obturateur (31) pivote par rapport au premier obturateur (30) autour du second axe, et lorsque le premier obturateur (30) se trouve dans la première position angulaire, viendra en prise avec la première partie du mécanisme de verrouillage, ce qui permettra d'empêcher le premier obturateur (30) de pivoter davantage, et
- où la seconde partie du mécanisme de verrouillage, lorsque le second obturateur (31) pivote par rapport au premier obturateur autour du second axe, et lorsque le premier obturateur (30) se trouve dans la seconde position angu-

laire, qui est sensiblement différente de la première position angulaire, viendra également en prise avec la première partie du mécanisme de verrouillage, ce qui permettra d'empêcher le premier obturateur (30) de pivoter davantage.

3. Barrière selon la revendication 2, où ledit second axe du second obturateur (31) est fournie en tant que partie du premier obturateur (30) de sorte que le second obturateur (31) soit suspendu pivotant au premier obturateur, et où la seconde partie du mécanisme de verrouillage, lorsque le second obturateur pivote par rapport au premier obturateur autour du second axe, vient en prise avec la première partie du mécanisme de verrouillage, ce qui permet d'empêcher le second obturateur (31) de pivoter davantage par rapport au premier obturateur (30).

4. Barrière selon l'une quelconque des revendications 2 et 3, où ladite première partie du mécanisme de verrouillage est une partie de type dents de scie du mécanisme de verrouillage, et où la seconde partie du mécanisme de verrouillage est une partie de type cliquet du mécanisme de verrouillage, et où la partie de type cliquet est destinée à venir en prise avec la partie de type dents de scie pour empêcher le second obturateur (31) de pivoter davantage par rapport au premier obturateur (30).

5. Barrière selon l'une quelconque des revendications précédentes, dans laquelle la section tuyau (34) comprend une première surface de contact (4) et une seconde surface de contact (5), moyennant quoi l'application d'une force latérale à la première surface de contact (4) et/ou la seconde surface de contact est obtenue par une force appliquée manuellement vers le bas, et où la déviation de la force manuellement appliquée est obtenue par un mécanisme de transmission pourvu d'un premier bras de levier actionné par la force manuellement appliquée, et d'un second bras de levier actionnant la première surface de contact et/ou la seconde surface de contact dans une direction latérale.

6. Barrière selon l'une quelconque des revendications 1 à 4, dans laquelle la section tuyau (34) comprend une première surface de contact (4) et une seconde surface de contact (5), moyennant quoi l'application d'une force sensiblement verticale à la surface de contact (4,5), lorsque la surface de contact (4,5) est destinée à être contiguë à une partie verticale du système de tuyau d'égout, est obtenue par une force appliquée manuellement vers le bas, et où la déviation de la force appliquée manuellement est obtenue par un mécanisme de transmission pourvu d'un premier bras de levier actionné par la force manuellement appliquée, et d'un second bras de levier actionnant la première surface de contact vers le haut.

7. Barrière selon l'une quelconque des revendications précédentes, où la section tuyau (34) de la barrière comporte une extrémité destinée à faire face à une section tuyau du système d'égout, lorsque la barrière est installée dans le système d'égout, et où une extrémité opposée de la section tuyau (34) présente une inclinaison partant d'une surface supérieure de la section tuyau (34) jusqu'à une surface inférieure de la section tuyau (34), ladite inclinaison donnant lieu à une génératrice supérieure le long de la surface supérieure s'étendant plus loin vers l'arrière par rapport à une direction d'écoulement d'égout, lorsque la barrière est installée dans le système d'égout, qu'une extension d'une génératrice inférieure le long de la surface inférieure.

8. Barrière selon l'une quelconque des revendications 1 à 6, où la section tuyau (34) de la barrière comporte une première extrémité destinée à faire face à une section du système d'égout, lorsque la barrière est installée dans le système d'égout, et où une extrémité opposée de la section égout a une inclinaison partant d'une surface supérieure de la section tuyau (34) jusqu'à une surface inférieure de la section tuyau (34), ladite inclinaison donnant lieu à une génératrice supérieure le long de la surface supérieure s'étendant plus loin vers l'avant par rapport à une direction d'écoulement d'égout, lorsque la barrière est installée dans le système d'égout, qu'une extension d'une génératrice inférieure le long de la surface inférieure.

9. Barrière selon l'une quelconque des revendications 1 à 4, ladite barrière comprenant

- ladite barrière destinée à être installée dans le système de tuyau d'égout, et où ladite barrière est pourvue d'une première surface de contact (4) destinée à être contiguë à une première extension circonférentielle d'une paroi latérale d'un tuyau d'égout, et d'une seconde surface de contact (5) destinée à être contiguë à une seconde extension latérale de la paroi latérale du tuyau d'égout, et
- où une distance est relativement inférieure entre ladite première surface de contact (4) et ladite seconde surface de contact (5) dans une première configuration, dans laquelle première configuration aucune force manuellement appliquée n'étant présente entre la première surface de contact (4) et la seconde surface de contact (5), et
- où une distance est relativement supérieure entre ladite première surface de contact (4) et ladite seconde surface de contact (5) dans une seconde configuration, dans laquelle seconde configuration une force de répulsion étant présente entre la première surface de contact (4)

et la seconde surface de contact (5), et
- où une force de répulsion manuellement ou automatiquement appliquée est destinée à pousser la première surface de contact (4) vers la première extension circonférentielle d'une paroi latérale d'un tuyau d'égout et à pousser la seconde surface de contact (5) vers la seconde extension circonférentielle d'une paroi latérale d'un tuyau d'égout.

10. Barrière selon l'une quelconque des revendications 5 et 6 et la revendication 9, où ladite première surface de contact (4) est une surface de contact disposée sur un côté latéral de la barrière, et où ladite seconde surface de contact (5) est une surface de contact disposée sur un autre côté latérale de la barrière, et où une force de répulsion appliquée entre la première surface de contact et la seconde surface de contact est destinée à permettre l'aboutement de la première surface de contact (4) et de la seconde surface de contact (5) avec des sections à orientation latérale et diagonalement opposées, respectivement, de parois latérales du système de tuyau d'égout.

11. Barrière selon l'une quelconque des revendications 5 et 6 et la revendication 9, où ladite première surface de contact (4) est une surface de contact disposée sur un côté descendant sensiblement vertical de la barrière, et où ladite seconde surface de contact (5) est une surface de contact disposée sur un côté ascendant sensiblement vertical de la barrière, et où une force de répulsion appliquée entre la première surface de contact et la seconde surface de contact est destinée à permettre l'aboutement de la première surface de contact et de la seconde surface de contact avec des sections diagonalement opposées et à orientation sensiblement verticale vers le bas et vers le haut, respectivement, de parois latérales du système de tuyau d'égout.

12. Barrière selon l'une quelconque des revendications 5 et 6 et des revendications 9 à 11, où ladite première surface de contact (4) constitue une partie intégrée de la section tuyau (34) de la barrière, et où la seconde surface de contact (5) constitue une partie individuelle de la section tuyau (34), et ladite seconde surface de contact individuelle pouvant être déplacée par rapport à la première surface de contact dans une direction latérale par rapport à une extension longitudinale de la section tuyau.

13. Barrière selon l'une quelconque des revendications 5 et 6 et des revendications 9 à 11, où ladite première surface de contact (4) constitue une partie intégrée de la section tuyau (34) de la barrière, et où la seconde surface de contact (5) constitue une partie intégrée de la section tuyau (34), et ladite première surface de contact et ladite seconde surface de contact pouvant être déplacées l'une par rapport à l'autre dans une direction latérale par rapport à une extension longitudinale de la section tuyau.

14. Barrière selon l'une quelconque des revendications 5 et 6 et des revendications 9 à 11, où ladite première surface de contact (4) constitue une partie individuelle de la section tuyau (34) de la barrière, et où la seconde surface de contact (5) constitue une partie individuelle de la section tuyau (34), et ladite première surface de contact et ladite seconde surface de contact pouvant être déplacées l'une par rapport à l'autre dans une direction latérale par rapport à une extension longitudinale de la section tuyau.

15. Barrière selon l'une quelconque des revendications 5 et 6 et des revendications 9 à 14, où ladite première surface de contact (4) et/ou ladite seconde surface de contact (5), qui sont des parties individuelles de la section tuyau (34), peuvent être déplacées à l'aide d'une force manuellement appliquée exercée sur la première surface de contact, et où la force manuellement appliquée est destinée à être appliquée verticalement vers le bas et déviée latéralement, lorsque la surface de contact est disposée sur un côté latéral de la barrière.

16. Barrière selon l'une quelconque des revendications 5 et 6 et des revendications 9 à 14, où ladite première surface de contact (4) et/ou ladite seconde surface de contact (5), qui sont des parties individuelles de la section tuyau (34), peuvent être déplacées à l'aide d'une force manuellement appliquée exercée sur la première surface de contact, et où la force manuellement appliquée est destinée à être appliquée verticalement vers le bas et directement appliquée à la surface de contact, lorsque la surface de contact est disposée sur un côté descendant sensiblement vertical de la barrière.

17. Barrière selon l'une quelconque des revendications 5 et 6 et des revendications 9 à 14, où ladite première surface de contact (4) et/ou ladite seconde surface de contact (5), qui sont des parties individuelles de la section tuyau (34), peuvent être déplacées à l'aide d'une force manuellement appliquée exercée sur la première surface de contact, et où la force manuellement appliquée est destinée à être appliquée verticalement vers le bas et déviée à l'opposé, lorsque la surface de contact est disposée sur un côté ascendant sensiblement vertical de la barrière.

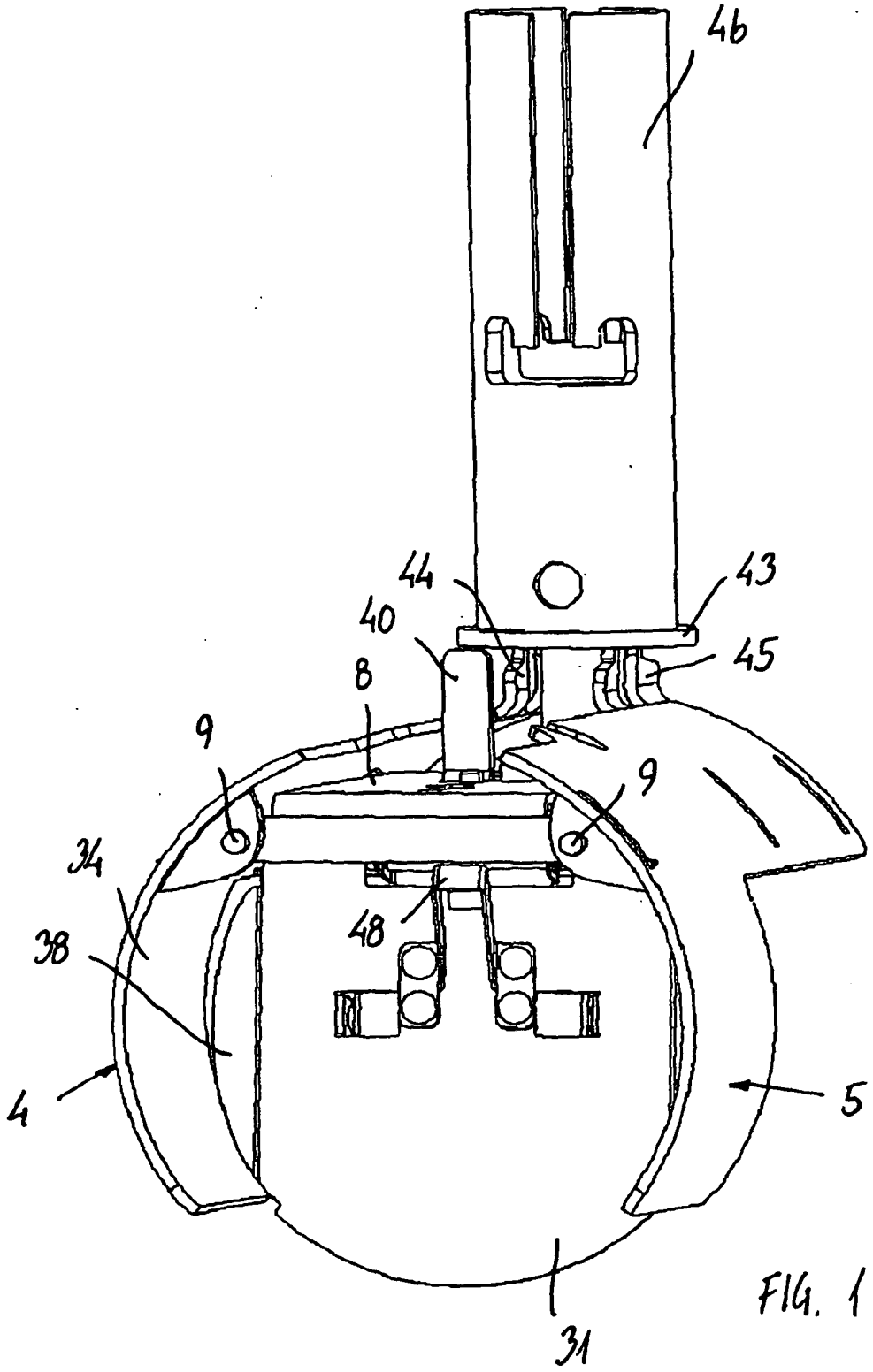


FIG. 1

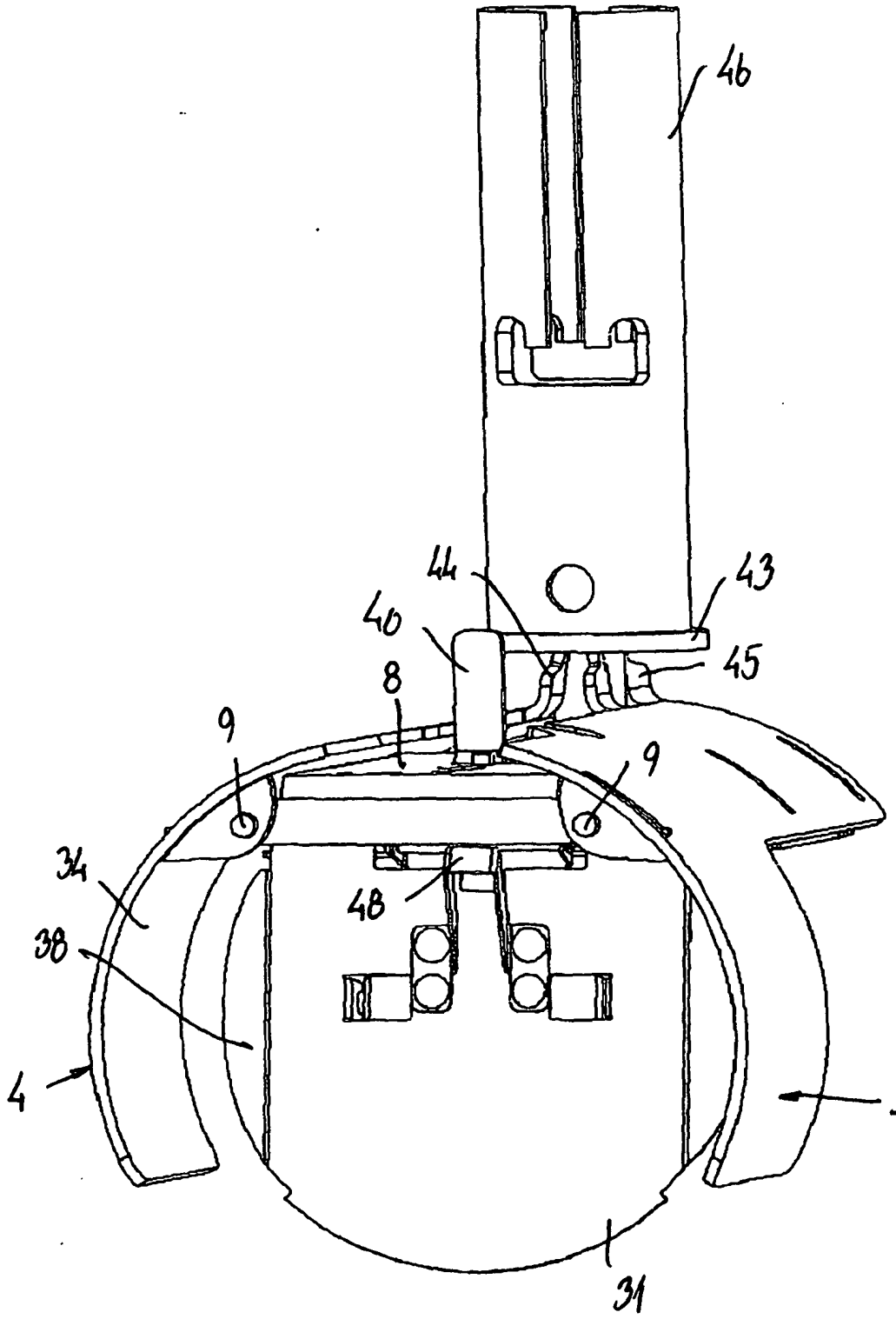


FIG. 2

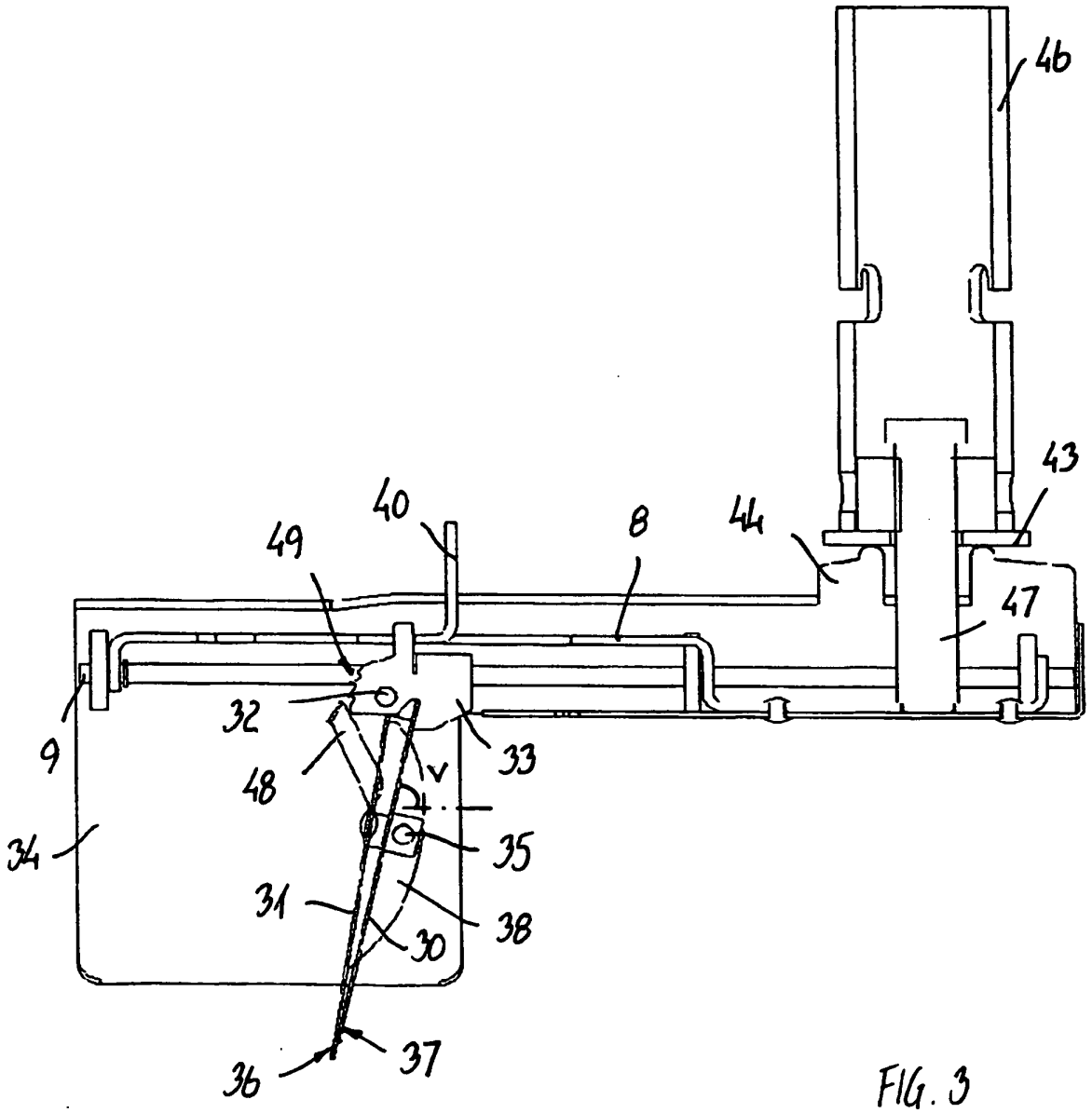


FIG. 3

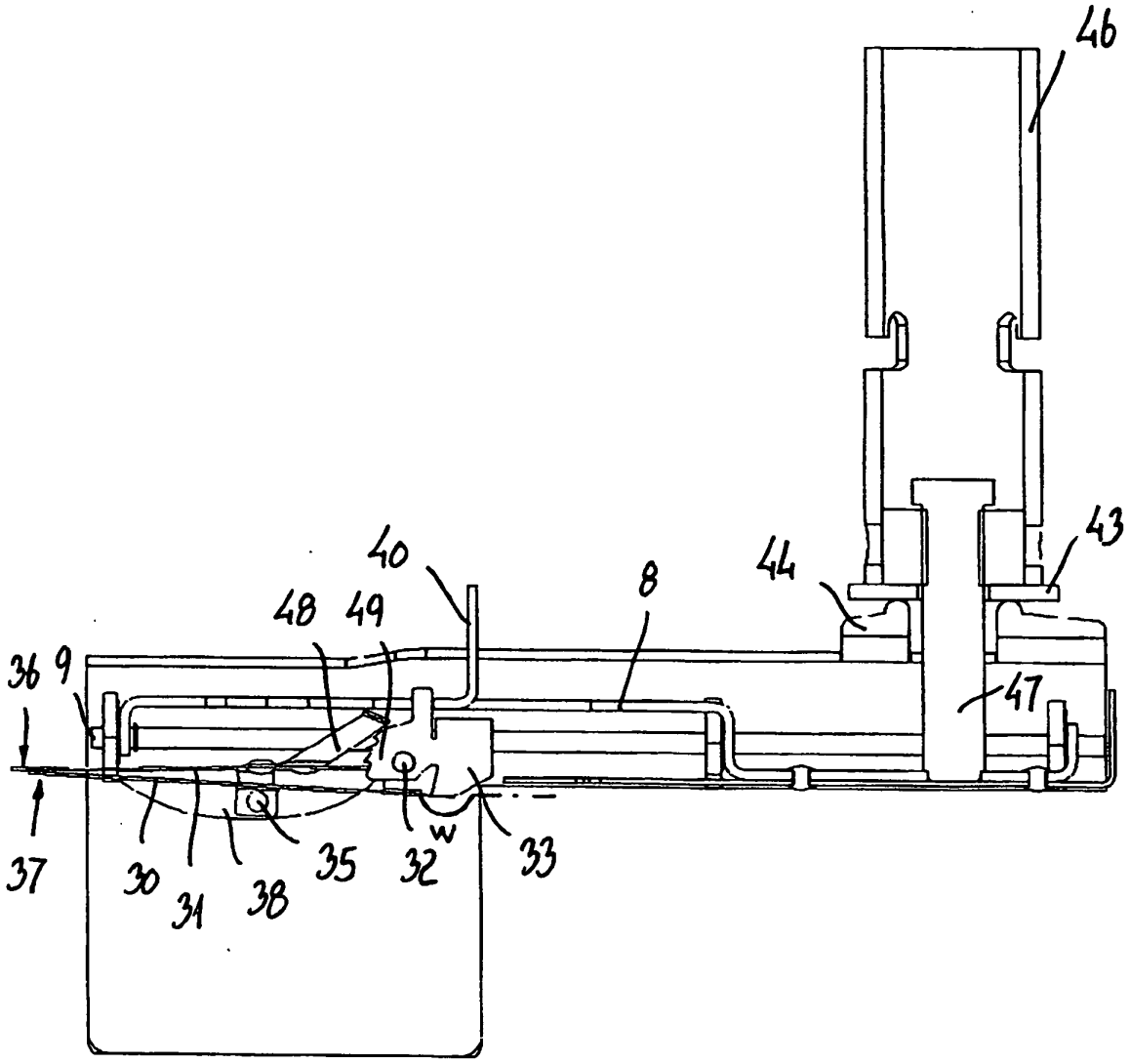


FIG. 4

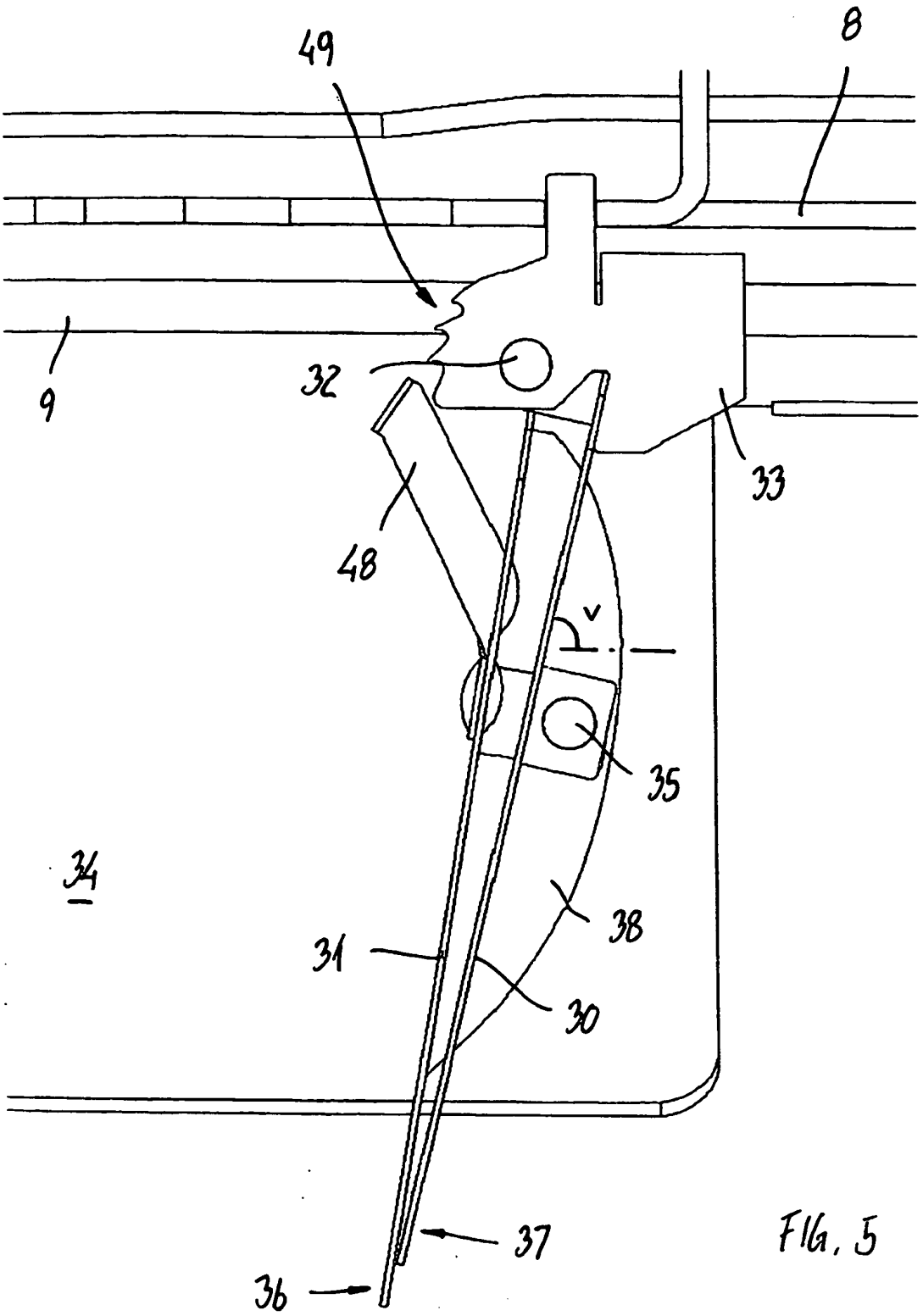


Fig. 5

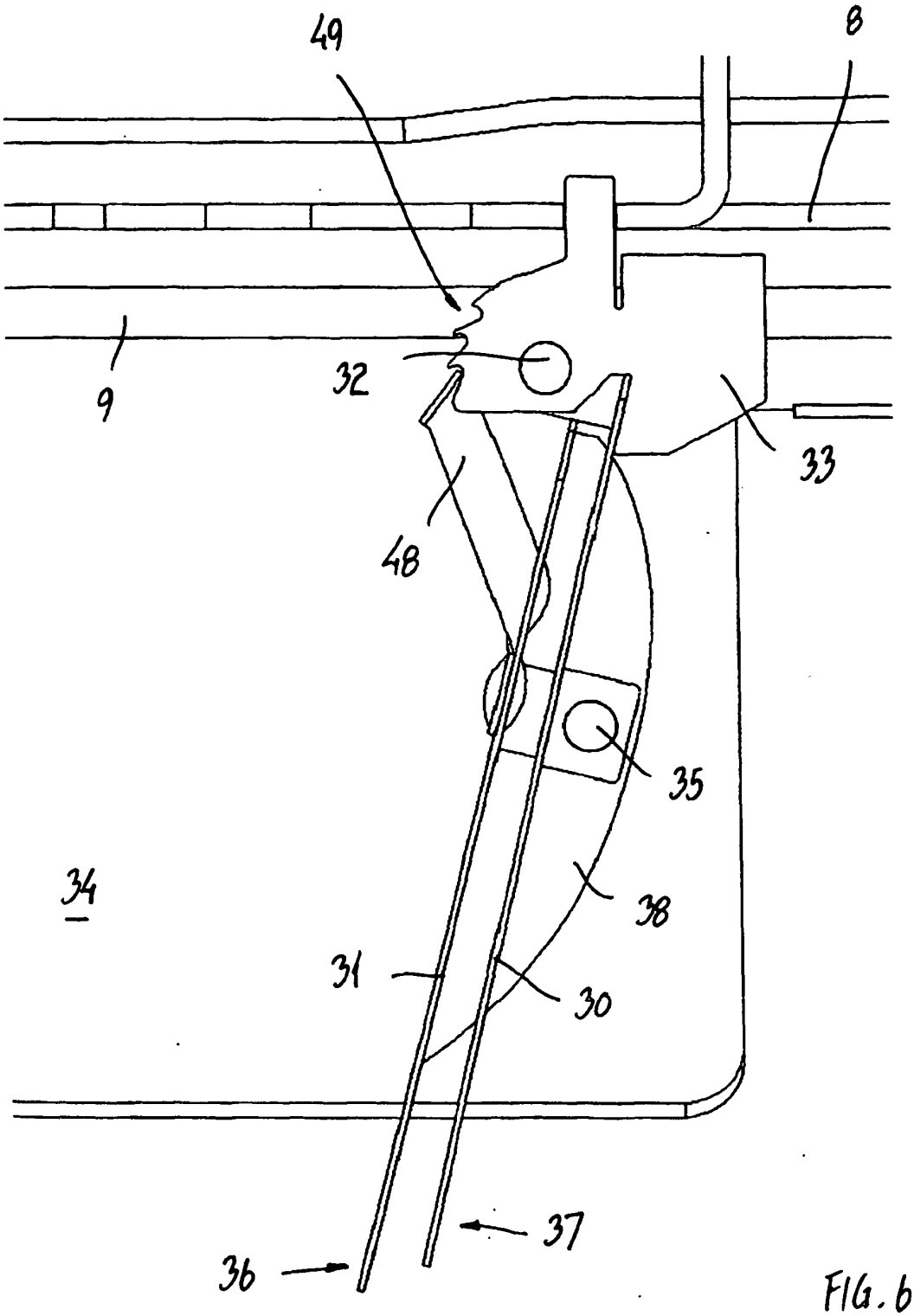


FIG. 6

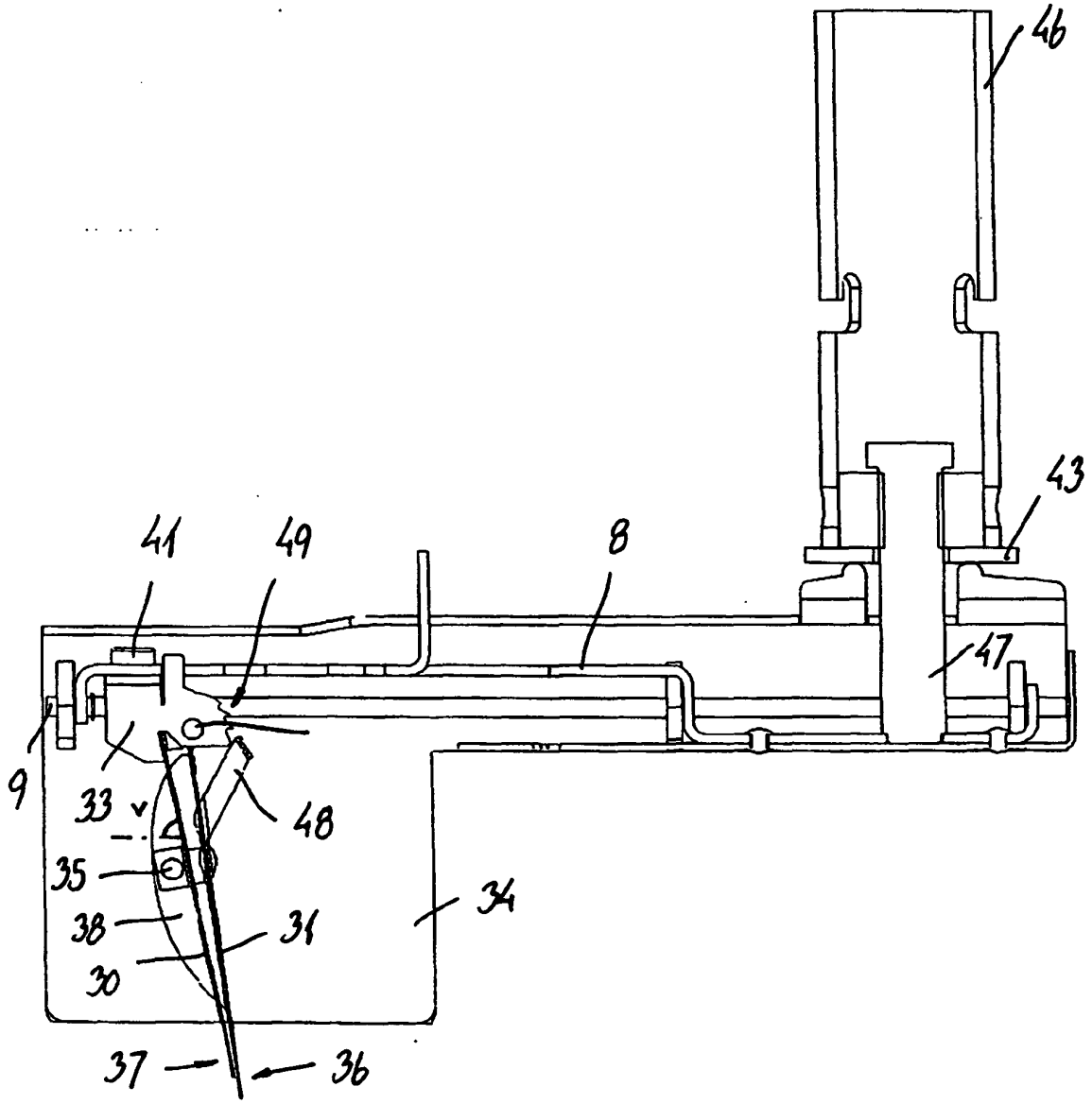


FIG. 7

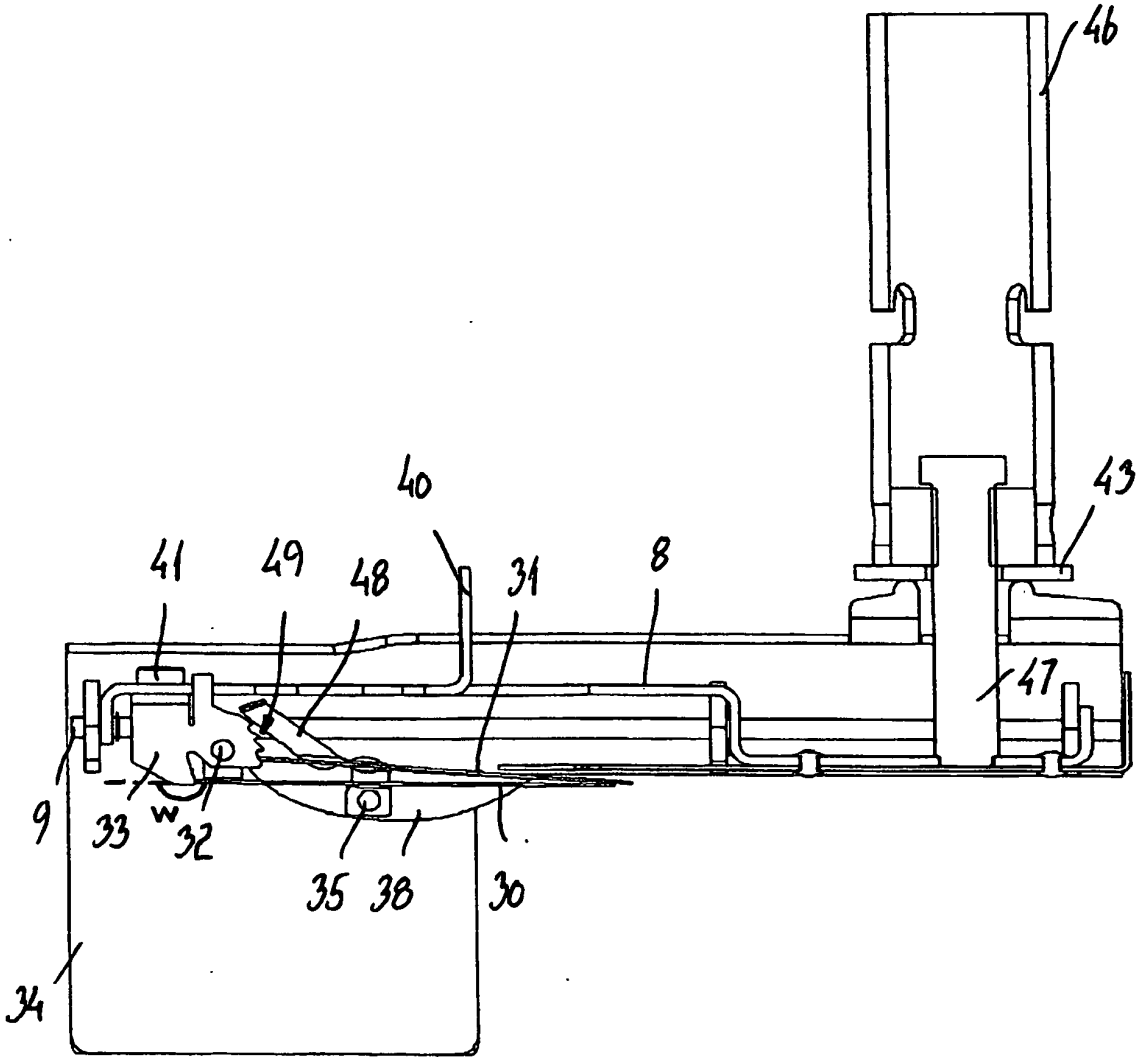


FIG. 8

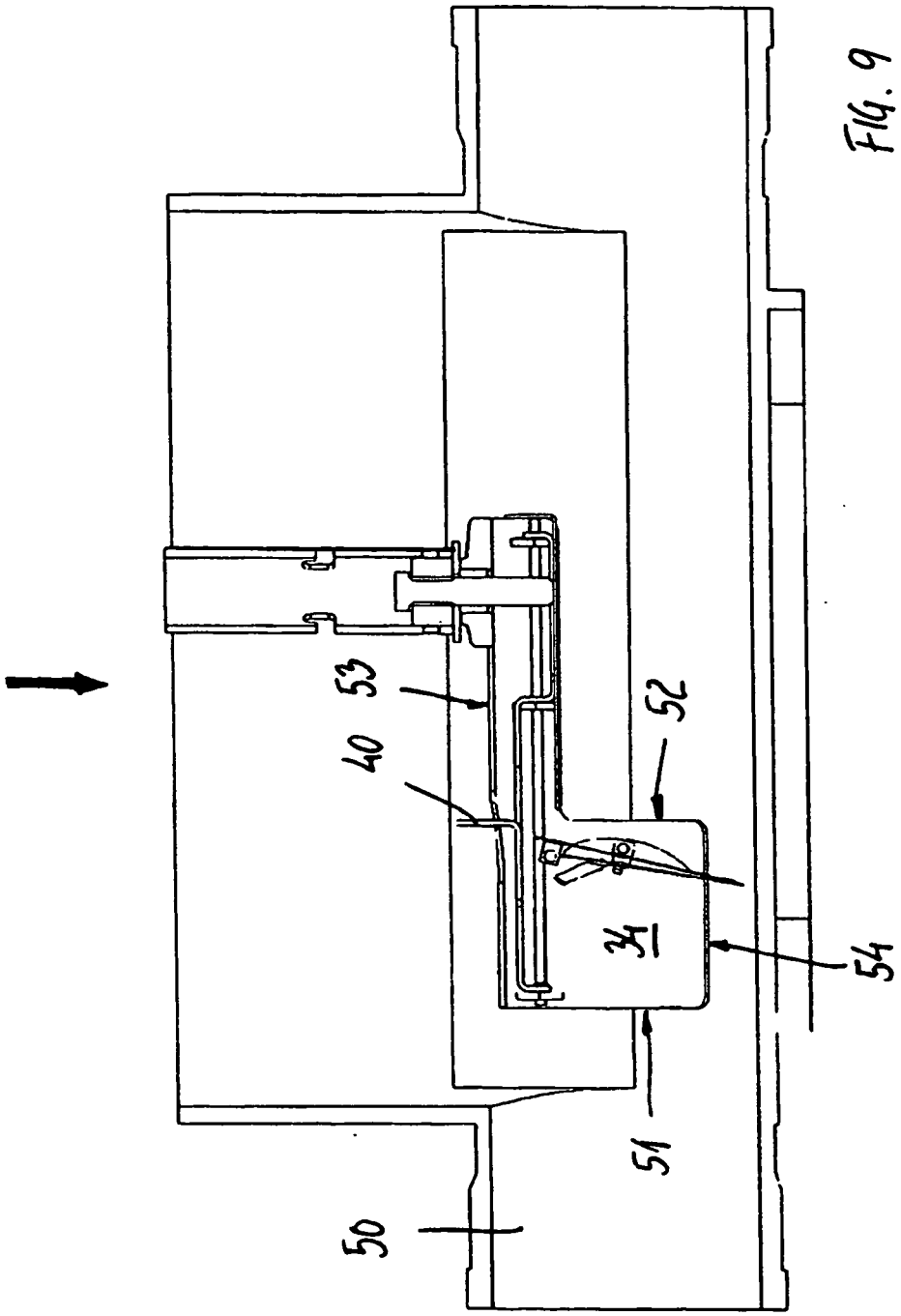


FIG. 9

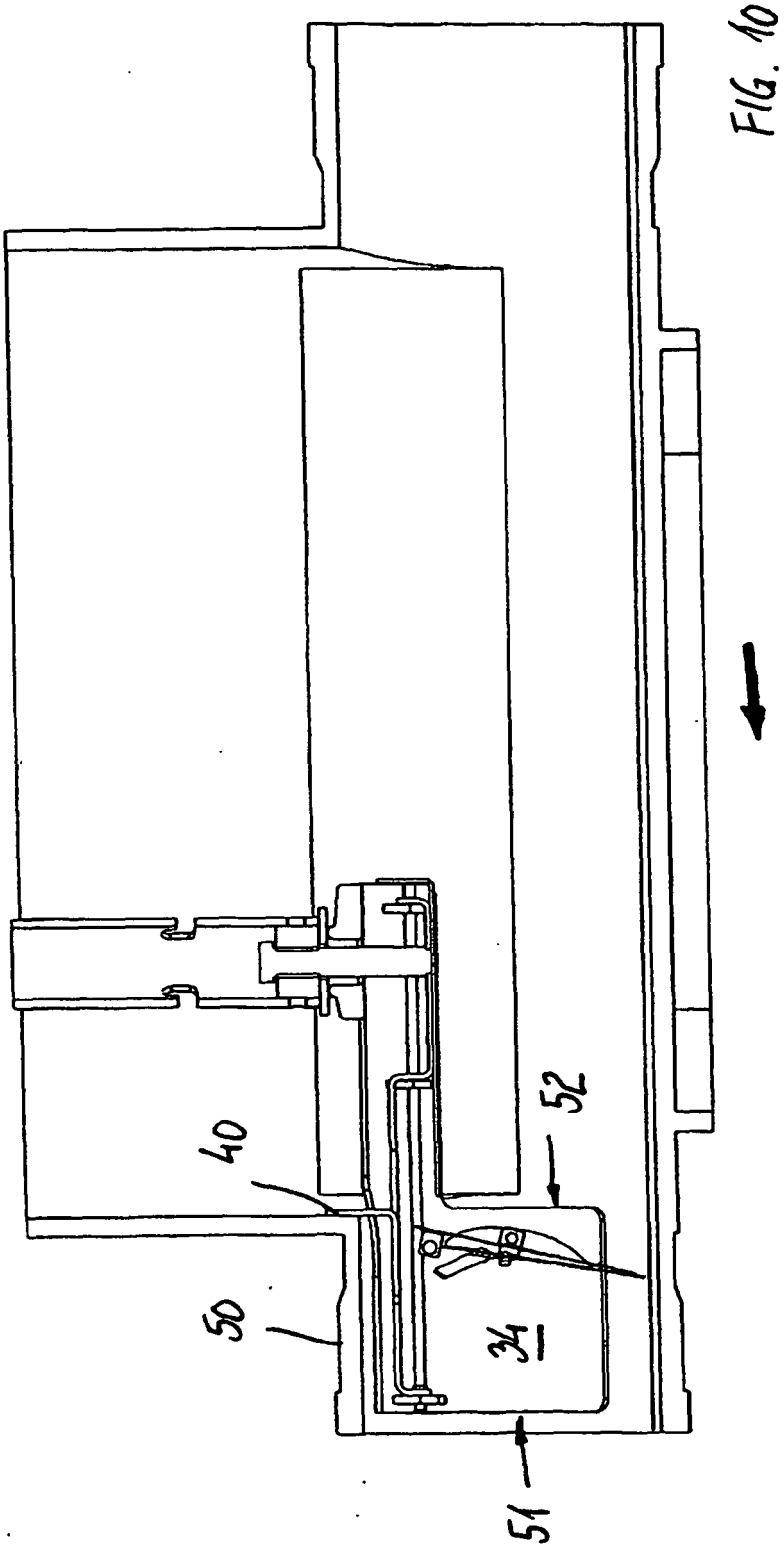
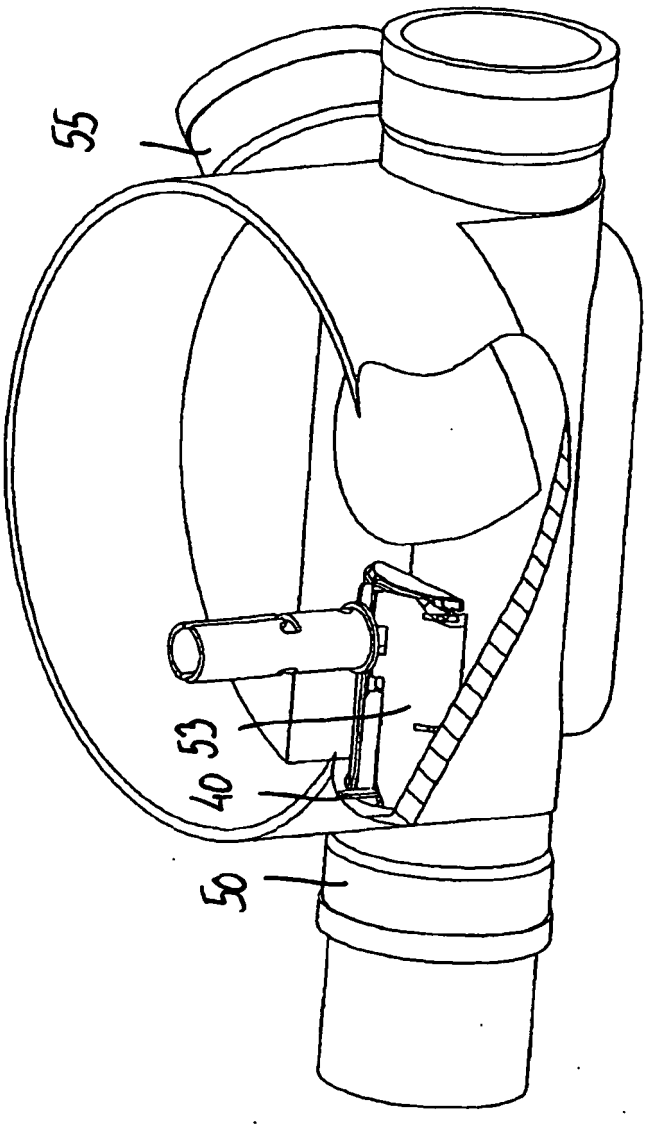


FIG. 10

FIG. 11



REFERENCES CITED IN THE DESCRIPTION

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