(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 1 878 839 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
16.01.2008 Bulletin 2008/03

(51) Int Cl.:
E03F 7/02 *(2006.01)*

(21) Application number: **07012891.3**

(22) Date of filing: **02.07.2007**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC MT NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK YU

(30) Priority: **03.07.2006 NL 1032106**

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(54) **Sewer line system provided with an adjusting device**

(57) The present invention relates to a system of sewer lines, comprising:
- one or more sewer lines; and
- one or more devices arranged in a sewer line for adjusting the passage opening of a sewer line, the device comprising:

- a frame;
- a closing member arranged movably in the frame;
- drive means arranged close to the closing member for driving the closing member; and
- an actuating unit which is placed at a distance from the drive means and which can be operatively coupled to and uncoupled from the drive means for actuation thereof via one or more fluid conduits.

The invention also relates to a device for adjusting the passage opening of a sewer line for use in such a sewer line system.

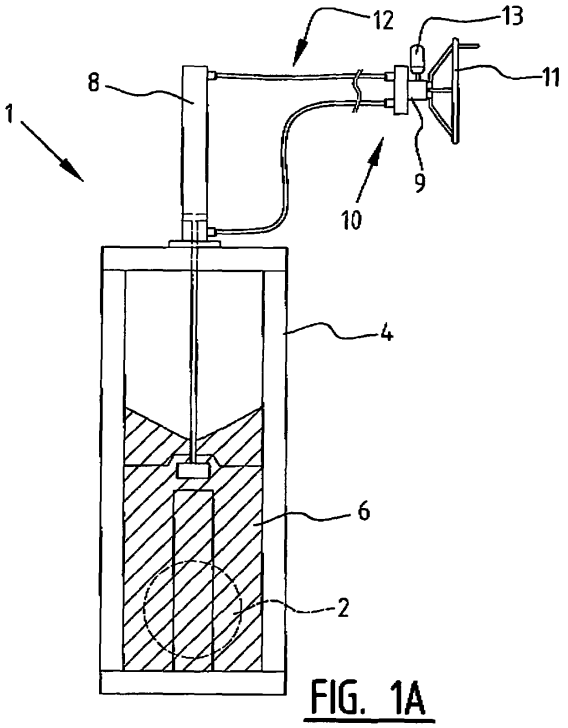

FIG. 1A

EP 1 878 839 A1

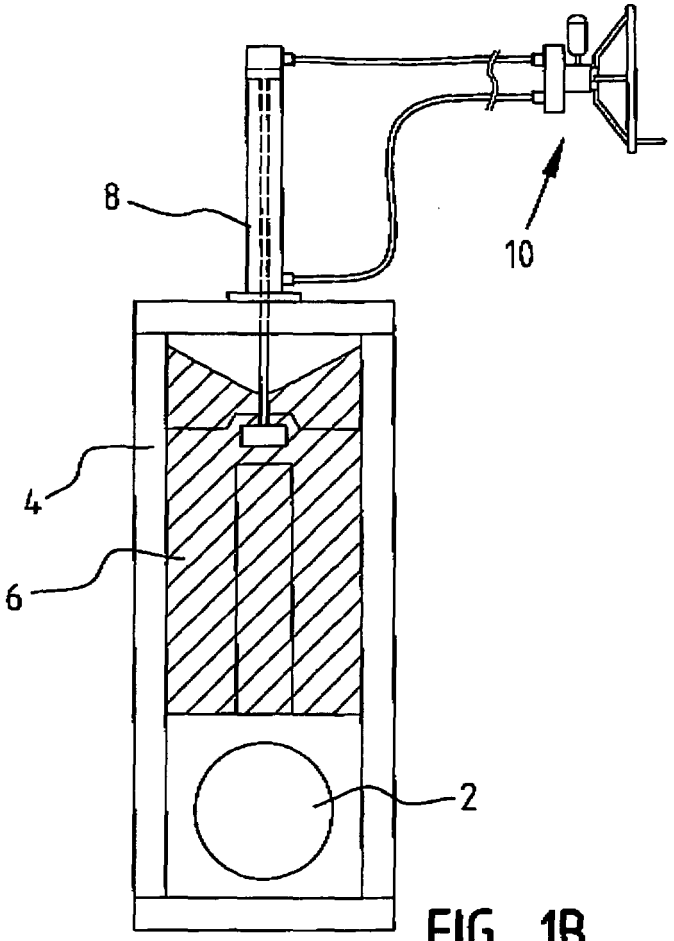

FIG. 1B

Description

[0001] The present invention relates to a system of sewer lines, comprising one or more sewer lines and one or more devices arranged in a sewer line for adjusting the passage opening of a sewer line. The invention also relates to a device for adjusting the passage opening of a sewer line.

[0002] Sewers collect the waste water from, among other locations, houses and carry this to waste water treatment plants (WWTPs) where the water is purified. The water flowing through a sewer comprises waste water and is therefore contaminated to some extent. The draining of sewer water directly onto the surface water can have adverse consequences such as: extraction of oxygen from the water because this oxygen is necessary to break down the biological waste, associated odour nuisance, the occurrence of eutrophication which encourages, among other things, algal growth, public health hazards and the possible adverse effect on the ecosystem which results because links in the biological chain disappear due to the death of organisms.

[0003] When the supply of water to the sewer is so high that the sewer is unable to cope with it, for instance in the case of heavy rainfall, it may be necessary to empty the sewer line system by draining a part of the water located in the sewer line onto the surface water via a so-called overflow.

[0004] Because such an overflow has a contaminating effect on the surface water, the requirements in respect of the number of annually allowed overflows of sewer water onto the surface water are becoming increasingly strict. In order to enable control of the water management in a sewer line system, sewer systems are divided into compartments for selectively storing and buffering sewage water. This more intensive water management in the sewer results in an increase in the number of valves required in such a sewer line system.

[0005] Present valves are operated manually or - in the case of large and heavy valves to be operated - using auxiliary means such as for instance large drills. It is moreover frequently the case that valves for sewer line systems are placed at locations which are difficult to access or dangerous, such as for instance under a roadway. In the case these valves are placed under a roadway, for opening and closing thereof a manhole cover must be removed, after which the valve is adjusted by hand or with a tool specially suitable for the purpose. When this takes place on a road, it will have to be temporarily closed off. This can moreover result in dangerous situations. There is therefore a need for a system of sewer lines which is provided with one or more closing members which do not have the above stated problems.

[0006] An object of the present invention is to propose a system of sewer lines, comprising a device for adjusting the passage opening of a sewer line of the type stated in the introduction, wherein said problems are obviated and wherein convenience of operation in particular is improved.

[0007] The stated object is achieved with the system of sewer lines according to the invention, comprising one or more sewer lines and one or more devices arranged in a sewer line for adjusting the passage opening of a sewer line, the device comprising a frame, a closing member arranged movably in the frame, drive means arranged close to the closing member for driving the closing member, and an actuating unit which is placed at a distance from the drive means and which can be operatively coupled to and uncoupled from the drive means for actuation thereof via one or more fluid conduits.

[0008] Because the unit connected to the drive means for operation thereof comprises a separate unit, flexible placing of this unit is possible. The unit for operating the drive means can hereby be placed some distance from the closing member, whereby it is for instance possible to wholly or partially close a sewer line arranged under a roadway using the device according to the present invention, while the roadway no longer need be closed off temporarily for this purpose or hazardous situations for personnel no longer occur. Operation can take place according to the present invention with an actuating unit placed some distance from the closing device, wherein the actuating unit is placed for instance at the side of the road, where it is readily accessible for operative personnel.

[0009] In a preferred embodiment of the invention the actuating unit is a releasable actuating unit which can be operatively coupled to and uncoupled from the drive means. In the coupled position the actuating unit is operatively connected to the fluid conduits. The releasable actuating unit provides the option of reducing the number of actuating units required, this having a cost-saving effect. Each member of the operative personnel is preferably equipped with a releasable actuating unit which is carried by personnel and enables personnel to operate all closing members with suitable connecting points. Because only one actuating unit at a time is temporarily coupled to the connecting points, these latter can for instance be situated in the pavement under a removable cover or removable paving stone, whereby a very limited overall height suffices. The connecting point is readily accessible for operative personnel from for instance the pavement, and there is no obstruction for the traffic making use of the roadway under which the valve for operating is located. Reliability is also increased because the actuating unit is always carried and, in the case the actuating unit is faulty, it can be very quickly replaced with a working actuating unit. It is possible to envisage operative personnel having a spare actuating unit at their disposal. Maintenance of the releasable actuating unit can take place in the uncoupled state in a workplace.

[0010] In further preferred embodiments the releasable actuating unit comprises a combination of a frame with at least one connecting point, and/or a pump arranged in the frame, and/or a reservoir for storing fluid. A handwheel can be provided for driving of the pump,

although it is also possible to envisage this being done using an electric motor preferably forming part of the releasable actuating unit. By accommodating all active components in the releasable actuating unit an inexpensive and practical system is provided with which operative personnel, after coupling to the one or more fluid conduits, are able to operate the closing member. The pump is drivable via the handwheel or the electric motor. The reservoir for storing fluid is able to compensate differences in volume of the fluid present in the fluid conduits which occur when the closing member is moved to another position.

[0011] If the releasable actuating unit is drivable using an electric motor, this electric motor is carried together with the actuating unit by the operative personnel, and therefore preferably forms part of the actuating unit.

[0012] In a preferred embodiment of the present invention the device for adjusting the passage opening of a sewer line for use in a sewer line system comprises a flexible hydraulic hose as fluid conduit. Hydraulics provide a high performance to weight ratio whereby, via the flexible hydraulic hoses, a closing member can be actuated by means of the remotely placed actuating unit. The high performance to weight ratio is particularly desirable for operating relatively heavy valves for operating, and also provides the option of operating a closing member even over some distance. The use of flexible hydraulic hoses instead of rigid conduits provides the advantage that there is a greater freedom of choice in the placing of the actuating unit.

[0013] In a preferred embodiment of the device for adjusting the passage opening of a sewer line, the closing member is drivable by the drive means between a first position substantially blocking the passage opening and a second position leaving the passage opening substantially clear. By moving the closing member between these two extreme positions the passage opening of the sewer line can be left substantially wholly clear or completely closed, and the throughflow in the sewer line system can be adjusted in this manner.

[0014] According to a further preferred embodiment, the actuating unit for actuating the drive means comprises a hydraulic unit for hydraulically actuating the drive means. Due to the high performance to weight ratio of hydraulic systems it is also possible to adjust relatively large and heavy valves for operating, for which auxiliary means are normally used, by means of manual operation. A handwheel, which is driven manually, can for instance be applied for the purpose of manual operation.

[0015] In a further preferred embodiment the hydraulic unit comprises a hydraulic pump. A pump which actuates the hydraulic system can be driven manually by means of turning a handwheel.

[0016] In yet another preferred embodiment of the present invention, the hydraulic actuating unit is connected to the drive means via at least two hoses for transporting the hydraulic fluid. The use of hoses enables flexible placing of the actuating unit relative to the valve. The operative need therefore no longer operate the valve from above the valve, which is frequently positioned awkwardly and with poor access for operation, such as for instance in the middle of a roadway. Due to the use of flexible hoses a closing member according to the present invention can also be applied at locations with difficult access, without this detracting from the convenience of operation.

[0017] In the case of the hydraulic system an electric motor is preferably absent, since supplying an electric motor with electricity entails the necessary time-consuming operations and costs.

[0018] In a further preferred embodiment of the present invention the hydraulic system is provided with a biodegradable liquid, whereby even in the case a possible leakage occurs in the system no environmental contamination will be caused.

[0019] In a further preferred embodiment the closing member comprises a plate arranged slidably in the frame. The passage opening of the line is adjusted by sliding this plate up and downward in the frame between a first position substantially blocking the passage opening and a second position leaving the passage opening substantially clear.

[0020] In a further preferred embodiment of the invention the drive means comprise a hydraulically operated cylinder. This hydraulically operated cylinder is driven by the hydraulic unit.

[0021] In another further preferred embodiment of the invention the hydraulically operated cylinder is arranged outside the enclosed volume of the frame. Because the cylinder is mounted on the frame at its end close to the outlet opening of the cylinder rod, a robust construction is obtained.

[0022] In another further preferred embodiment of the present invention the hydraulically operated cylinder is arranged inside the enclosed volume of the frame. Due to placing of the hydraulically operated cylinder inside the enclosed volume, there are no parts protruding outside the frame, and this enables application at locations where a limited overall height is available.

[0023] An exemplary embodiment is further elucidated in the following description with reference to the drawing, in which:

Figure 1A shows a device for adjusting the passage opening of a sewer line, wherein the closing member is situated in a first position blocking the passage opening;

Figure 1B shows a device for adjusting the passage opening of a sewer line, wherein the closing member is situated in a second position leaving the passage opening substantially clear;

Figure 2 shows a preferred embodiment of a device for adjusting the passage opening of a sewer line, wherein the drive means are arranged outside the enclosed volume of the frame;

Figure 3 shows a further preferred embodiment of a

device for adjusting the passage opening of a sewer line, wherein the drive means are arranged inside the enclosed volume of the frame;

Figure 4 shows another further preferred embodiment of a device for adjusting the passage opening of a sewer line, wherein the drive means are arranged in an alternative manner outside the enclosed volume of the frame, and wherein a displacement of the closing member proportional to the stroke of the drive means is brought about by means of a lever mechanism; and

Figure 5 shows a perspective sectional view of a closing member which is arranged in a shaft under a roadway and which can be actuated from a distance via drive means using an actuating unit which can be coupled and uncoupled.

[0024] The preferred embodiments as shown in figures 1-5 comprise: a closing device 1 for adjusting the passage opening of a sewer line 2, device 1 comprising a frame 4, a closing plate 6 arranged movably in frame 4, an actuator 8 arranged close to closing plate 6 for the purpose of driving closing plate 6, and an actuating unit 10 which is placed at a distance from actuator 8 and which is operatively coupled to actuator 8 for actuating thereof via one or more hoses or conduits 12, preferably flexible hydraulic hoses.

[0025] Figure 1A shows a closing device 1 for adjusting the passage opening of a sewer line 2, wherein a closing plate 6 is situated in a first position blocking the passage opening. Actuator 8, which in this preferred embodiment is a hydraulic cylinder, is connected to closing plate 6 for driving thereof between the first position, shown in figure 1A and substantially blocking the passage opening, and a second position shown in figure 1B and leaving the passage opening substantially clear. The distance between the above stated first and second positions, i.e. the blocking and opening position, is determined in a preferred embodiment by the stroke length of cylinder 8. The sliding movement is in this way bounded by the stroke of the cylinder 8 itself.

[0026] The hydraulically operated cylinder forming actuator 8 is operatively coupled via one or more hoses to the actuating unit 10 placed some distance from the cylinder. In the shown preferred embodiment this actuating unit 10 comprises a hydraulic pump 9 with handwheel 11. A supply tank 13 is preferably also arranged for the purpose of storing hydraulic oil which, in the case of a closed hydraulic circuit, is used particularly to compensate differences in cylinder volume between the positions of cylinder 8 corresponding to the respective opened and closed positions of closing plate 6. Other embodiments can also be envisaged, wherein driving of pump 9 takes place in a manner other than by means of a handwheel 11, such as for instance via a lever.

[0027] In a preferred embodiment of the present invention the hose is a hydraulic hose. By giving this hydraulic hose a flexible form the actuating unit 10 can be placed flexibly some distance from cylinder 8. It is of course also possible to use pipe conduits instead of flexible hoses, though this will adversely affect the freedom of placing provided by a flexible connection by means of hoses.

[0028] Owing to the one or more hoses 12 operatively coupling actuating unit 10 to cylinder 8 it is possible to place actuating unit 10 at a location where it is readily and safely accessible to operative personnel. It is thus possible for instance to place a closing plate 6 at a location with difficult access, while actuating unit 10 is however placed in readily accessible manner some distance from closing plate 6. This distance can for instance vary from a few metres, such as for instance more than 5 metres, to tens of metres, such as for instance 10, 15, 20 or 25 metres, or even more. One example is the operation of a closing plate 6 of a slide valve placed under a roadway from an actuating unit 10 placed at the side of the road.

[0029] In a preferred embodiment of the invention use is made of hydraulics. Hydraulic systems have the advantage that the performance to weight ratio is higher than in for instance pneumatic systems, whereby it is possible, among other things, to actuate cylinder 8 for the purpose of driving closing plate 6 by means of a manually driven actuating unit 10, such as for instance by means of a handwheel 11. Although a hydraulic system is recommended, it will be apparent to the skilled person that the same principle can also be realized pneumatically.

[0030] In a further preferred embodiment of the invention the hydraulic system is provided with a biodegradable liquid, so that even in the case leakage occurs in the system no environmental contamination will take place.

[0031] Figure 2 shows a preferred embodiment of a device 1 for adjusting the passage opening of a sewer line 2, wherein cylinder 8 is arranged outside the enclosed volume of frame 4. This construction corresponds to the situation shown in figures 1A and 1B, with the understanding that the side where the hydraulic cylinder forming the actuator is arranged is now situated on the side of sewer line 2. A limited overall height can be taken into account by interchanging the hydraulic cylinder 8 between the sides of frame 4 shown respectively in figures 1 and 2. Figure 2 shows a position blocking the passage opening of a sewer line, wherein hydraulic cylinder 8 is mounted on the underside and in this way limits the distance required by device 1 to the top side of sewer line 2.

[0032] A further preferred embodiment of a device 1 for adjusting the passage opening of a sewer line 2 is shown in figure 3, wherein cylinder 8 is arranged inside the enclosed volume of frame 4. The overall height of device 1 is hereby reduced further.

[0033] Figure 4 shows another further preferred embodiment of device 1 for adjusting the passage opening of sewer line 2, wherein cylinder 8 is arranged substantially parallel to a side of frame 4. By means of a lever mechanism, which can be designed such that the re-

quired forces are reduced or, in contrast hereto, a small stroke of cylinder 8 is converted into a large stroke of closing plate 6 (shown situation), closing plate 6 can be moved inside frame 4, while the placing of hydraulic cylinder 8 has no adverse effect on the overall height of device 1.

[0034] In a further preferred embodiment a closing device 1 arranged under a roadway 19 in a shaft 18 for the purpose of adjusting the passage opening of a sewer line 2 is connected by means of fluid conduits 12 to connecting points 15a, 15b arranged in pavement 20. These connecting points 15a, 15b are preferably situated in a unit 17 which can be closed with a cover 14, and which in the closed position protects connecting points 15a, 15b from dirt, weather influences and vandalism. An actuating unit 10 as already specified above can be coupled to and uncoupled from connecting points 15a, 15b for the purpose of actuating closing plate 6 in the coupled position via fluid conduits 12 and cylinder 8.

[0035] Because actuating unit 10 is always carried by personnel, this also prevents the possibility of closing device 1 being operated by unauthorized persons for the purpose of sabotage.

[0036] Actuating unit 10 preferably comprises a reservoir 13 in which fluid, such as preferably a biodegradable liquid, can be stored. Owing to this reservoir 13 the actuating unit 10 is able to compensate differences in volume in the fluid present in fluid conduits 12 which occur when closing plate 6 is moved to a different position.

[0037] The closing device 1 shown in figure 5 relates to the embodiment of figure 3 which - just as the embodiment of figures 2 and 4 - has the further advantage that only a small overall height is required under roadway 19 for the shaft 18 with closing device 1.

[0038] Although they show preferred embodiments of the invention, the above described embodiments are intended only to illustrate the present invention and not to limit in any way whatsoever the specifications of the invention. The scope of the invention is therefore defined solely by the following claims.

Claims

1. System of sewer lines, comprising:

- one or more sewer lines; and
- one or more devices arranged in a sewer line for adjusting the passage opening of a sewer line, the device comprising:
- a frame;
- a closing member arranged movably in the frame;
- drive means arranged close to the closing member for driving the closing member; and
- an actuating unit which is placed at a distance from the drive means and which can be operatively coupled to and uncoupled from the drive means for actuation thereof via one or more fluid conduits.

2. Device for adjusting the passage opening of a sewer line for use in a sewer line system as claimed in claim 1, wherein the actuating unit comprises a releasable actuating unit which can be operatively coupled to and uncoupled from the drive means.

3. Device as claimed in claim 2, wherein the releasable actuating unit comprises at least one connecting point.

4. Device as claimed in either of the claims 2 or 3, wherein the actuating unit comprises a reservoir for storing fluid.

5. Device as claimed in any of the claims 2-4, wherein the actuating unit comprises a pump.

6. Device as claimed in claim 5, wherein the actuating unit comprises a handwheel for driving the pump.

7. Device as claimed in claim 5, wherein the actuating unit comprises an electric motor for driving the pump.

8. Device as claimed in any of the claims 2-7, wherein the fluid conduit comprises a flexible hydraulic hose.

9. Device as claimed in any of the claims 2-8, wherein the closing member is drivable by the drive means between a first position substantially blocking the passage opening and a second position leaving the passage opening substantially clear.

10. Device as claimed in any of the claims 2-9, wherein the actuating unit comprises a hydraulic unit for hydraulically actuating the drive means.

11. Device as claimed in claim 10, wherein the hydraulic actuating unit comprises a hydraulic pump.

12. Device as claimed in claim 10 or 11, wherein the hydraulic actuating unit is connected to the drive means via at least two hoses for transporting the hydraulic fluid.

13. Device as claimed in any of the claims 10-12, wherein the hydraulic system is provided with biodegradable liquid.

14. Device as claimed in any of the claims 2-13, wherein the closing member comprises a plate arranged slidably in the frame.

15. Device as claimed in any of the claims 2-14, wherein the drive means comprise a hydraulically operated cylinder.

16. Device as claimed in claim 15, wherein the hydraulically operated cylinder is arranged outside the enclosed volume of the frame.

17. Device as claimed in claim 15, wherein the hydraulically operated cylinder is arranged inside the enclosed volume of the frame.

18. System of sewer lines as claimed in claim 1, comprising a device for adjusting the passage opening of a sewer line according to any of the claims 2-17.

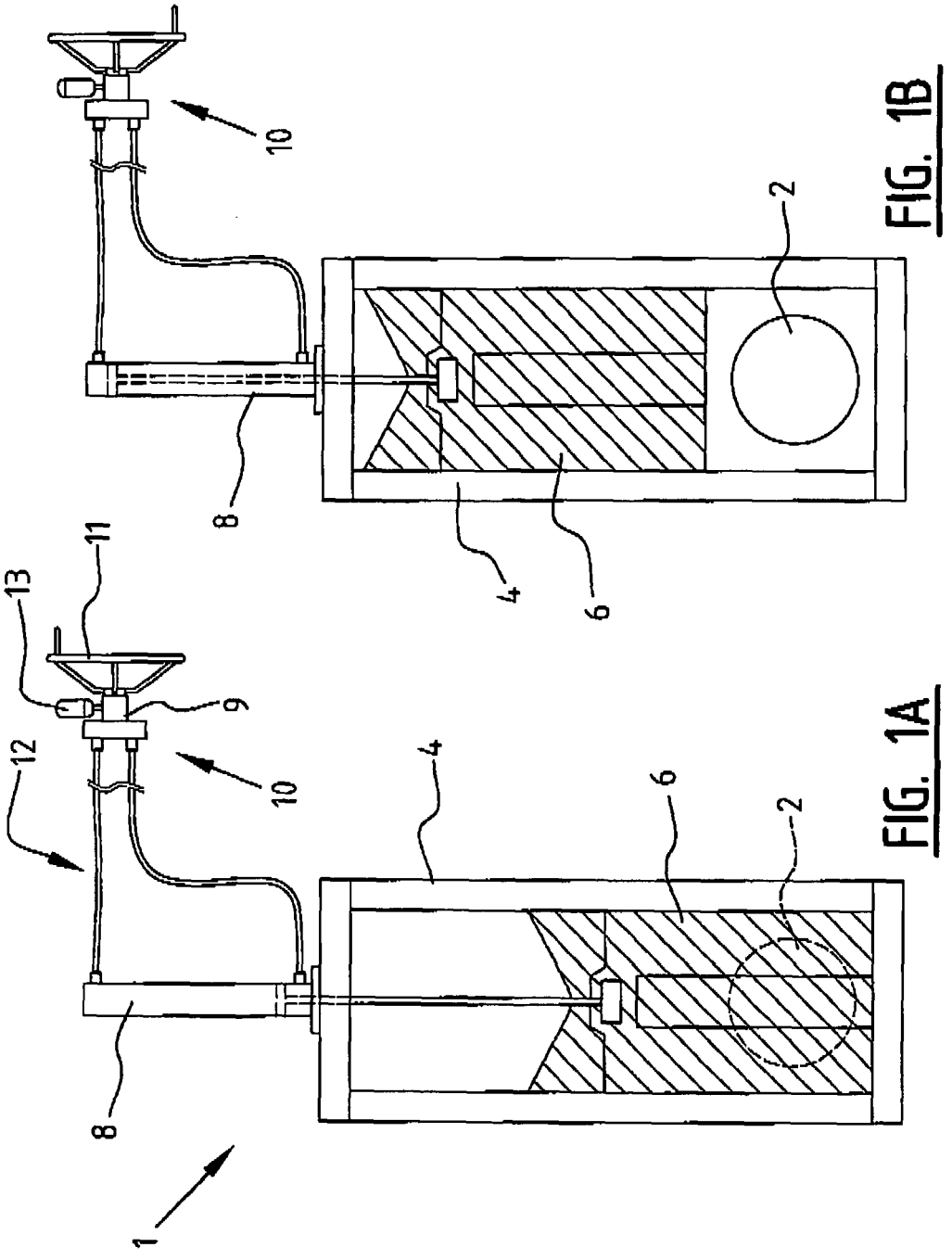

FIG. 1B

FIG. 1A

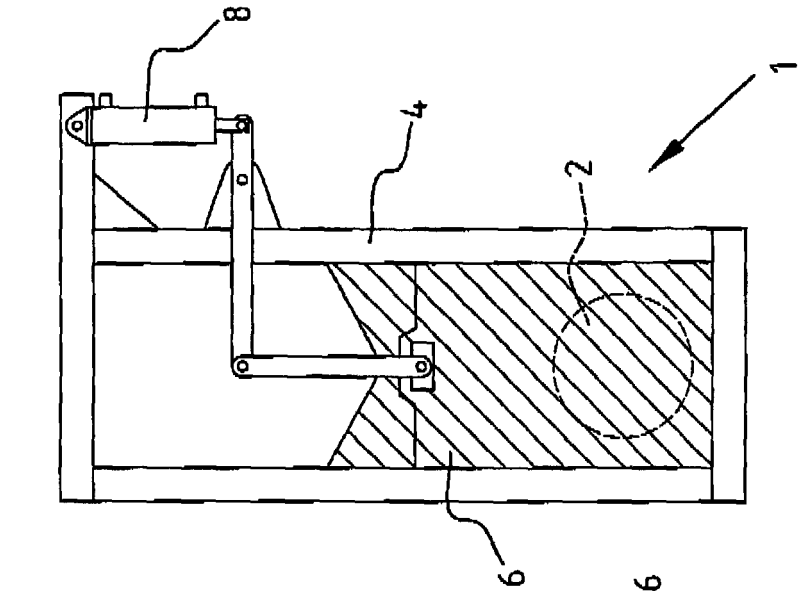

FIG. 4

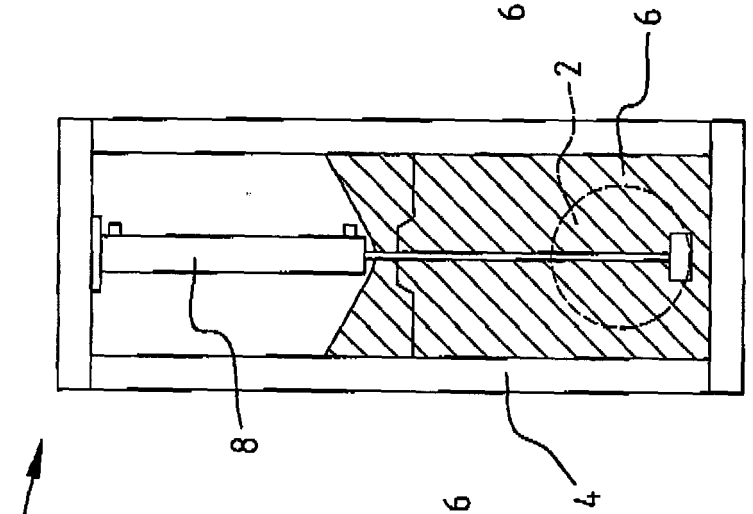

FIG. 3

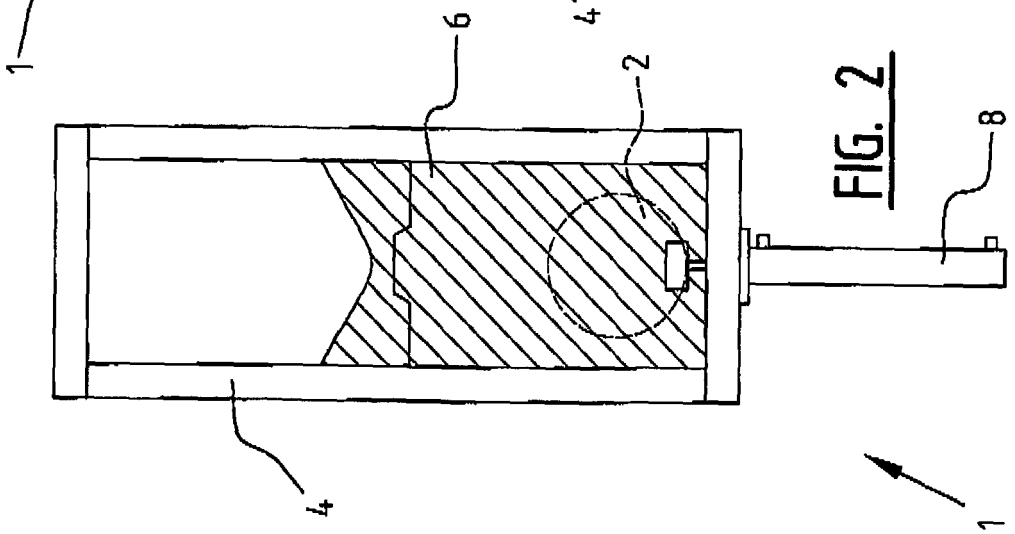

FIG. 2

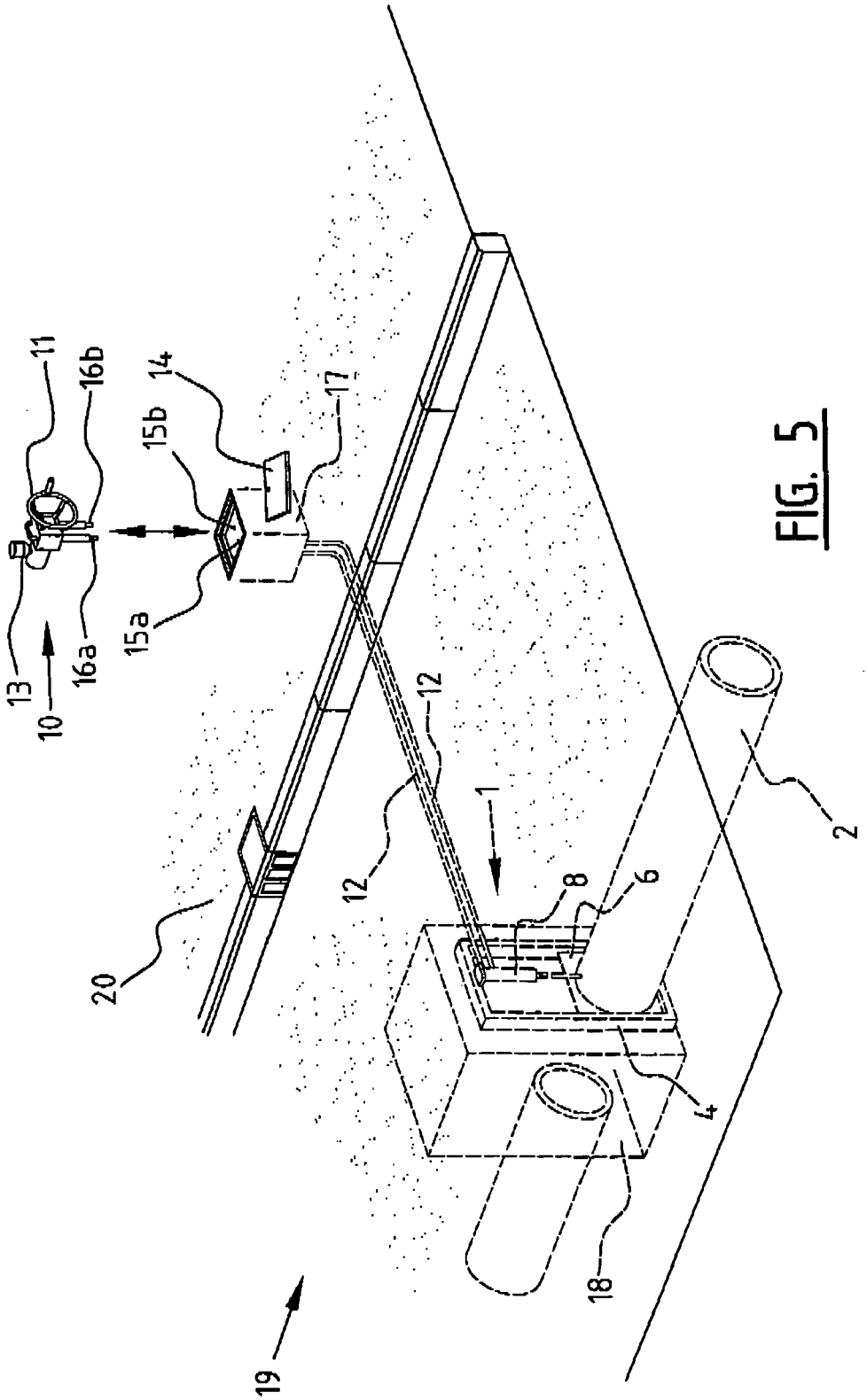

FIG. 5

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EUROPEAN SEARCH REPORT

Application Number
EP 07 01 2891

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	FR 2 483 977 A1 (EAU GAZ ASSAIN [FR]) 11 December 1981 (1981-12-11) * page 2, line 8 - line 38; figures * -----	1-3,9, 10,12, 15,16,18	INV. E03F7/02
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A X	DE 14 84 355 A1 (NEYRPIC ATELIERS NEYRET BEYLIE) 26 March 1970 (1970-03-26) * page 6 - page 9; figures * -----	1,18 2,3, 8-10, 12-17	
A X	US 2003/026659 A1 (WU CHUN-CHING [TW]) 6 February 2003 (2003-02-06) * the whole document * -----	1,8,18 2-7,9-16	TECHNICAL FIELDS SEARCHED (IPC) E03F E02B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	15 October 2007	Van Bost, Sonia

CATEGORY OF CITED DOCUMENTS

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