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

(11) Publication number: **0 167 384**
B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication of patent specification: **07.02.90**

(51) Int. Cl.[5]: **E 01 C 11/22**

(21) Application number: **85304690.2**

(22) Date of filing: **01.07.85**

(54) Drain constructions.

(30) Priority: **03.07.84 GB 8416858**

(43) Date of publication of application:
08.01.86 Bulletin 86/02

(45) Publication of the grant of the patent:
07.02.90 Bulletin 90/06

(84) Designated Contracting States:
AT BE DE IT LU NL SE

(56) References cited:
BE-A- 866 874
GB-A-1 441 023

INTERNATIONAL CONSTRUCTION, vol. 17, no. 12, December 1978, page 11, Surrey, GB; "Surface drainage"

(73) Proprietor: **Selflevel Covers Aktiengesellschaft**
c/o Balfidor Treuhand AG P.O. Box 621
CH-4010 Basle (CH)

(72) Inventor: **Ferns, Derek**
Onen House Onen Monmouth
Gwent (GB)

(74) Representative: **Carter, Gerald et al**
Arthur R. Davies & Co. 27 Imperial Square
Cheltenham GL50 1RQ Gloucestershire (GB)

EP 0 167 384 B1

Courier Press, Leamington Spa, England.

Description

This invention relates to drain constructions of the kind generally used for collecting surface water from roadways, paths or other hard paved surfaces on which water or other liquids tend to collect.

Many drainage systems have been used including open gutters, formed by an open channel in the surface to be drained. The channel is often formed in a series of blocks, precast or cast *in situ*, arranged end-to-end. In many circumstances, however, is may be desirable to cover such a drainage channel with some form of grating in order to prevent entry of debris into the channel and also to provide minimum interruption to the continuity of the surface. This is often desirable on a roadway or other surface over which foot traffic or vehicles run. Installation of conventional drainage channels of the above-mentioned kind is expensive, and the use of gratings is also expensive, due to the cost of the actual grating itself and also the cost of seatings or other fixtures in which the grating is located.

Patent Specification GB—A—1 441 023 discloses an alternative form of assembly for use in drain construction and of the kind comprising an elongate, generally tubular conduit having, extending along the complete length thereof, an elongate opening which is narrower than the conduit and faces upwardly in use of the assembly, two spaced elongate wall members disposed along opposite sides of the opening and extending away from the opening so as to define between them a slot communicating, through the opening, with the interior of the conduit, and spacing means interconnecting the wall members to maintain them apart.

Such an assembly may be installed, in a drain construction, by forming a trench in the ground, locating the assembly within the trench with the slot defined by the wall members facing upwardly and the upper edges of the wall members substantially level with the surface of the ground, and then filling the trench up to ground level around the assembly with a material, e.g. a settable material such as concrete, which is such as to embed and support the assembly. With this arrangement any water on the top surface of the surrounding material, or any surrounding surface, may flow into the slot and thence down into the drainage conduit.

In the arrangement of GB—A—1 441 023, however, the conduit and wall members are formed from rigid metal and the lower edges of the wall members are permanently secured, for example by bolting or welding, to the edges of the conduit along each side of the elongate opening in the conduit. Not only is such an assembly costly to manufacture, but the permanent attachment of the conduit to the wall members means that the depth of the conduit below the surface of the ground is fixed and determined by the depth of the wall members and cannot be adjusted.

The present invention sets out to provide an improved drain assembly of the kind referred to above which is easier and cheaper to manufacture and where the conduit is not permanently secured to the wall members so that the position of the conduit in relation to the wall members, and hence the depth of the conduit below the ground surface, can be adjusted if required.

According to the invention, an assembly for use in drain construction and of the kind referred to above is characterised in that the conduit is formed of resiliently flexible material and is attached to the wall members by virtue of the two edges of the conduit, which define the opening therebetween, being engaged with parts of the respective wall members by the resilience of the conduit.

Adjustable spacing means may be provided between the elongate wall members.

With this arrangement, movement in the surrounding material due to changes in temperature can be accommodated by allowing the wall members to move apart or towards each other as the surrounding material moves.

The adjustable spacing means may include spring means, such as a helical compression spring, interconnecting the wall members in a manner tending to urge the wall members apart. Alternatively, the adjustable spacing means may comprise a temperature responsive device connected between the wall members in a manner to adjust the spacing between the wall members in accordance with the ambient temperature. Preferably, the adjustable spacing means are enclosed in a protective sleeve extending between the wall members. The protective sleeve may comprise two telescoping parts between slide relatively to one another to accommodate relative movement between said wall members.

Since the generally tubular conduit is formed of flexible material, adjustment of the spacing between the wall members is accompanied by corresponding adjustment of the width of the opening in the conduit, said adjustment being permitted by flexure of the walls of the conduit.

There may be provided on each wall member a plurality of alternative locations for attachment of the conduit thereto, whereby the depth of the slot provided between the wall members, relative to the conduit, may be adjusted.

A location for attachment of the conduit to each wall member may be provided by at least one longitudinally extending groove along the outer surface of the wall member into which grooves are engageable the two edges of the conduit which define the aforesaid opening therein. The conduit may be formed of resiliently flexible plastics material, said edges of the conduit being retained in said grooves by the resilience of the conduit.

The conduit may be generally circular in cross-section.

The width of the slot defined by said wall members preferably increases as it extends towards the conduit.

The edge of each wall member remote from the

conduit may be provided with an outwardly extending flange, and each outwardly extending flange may be formed, on the surface thereof facing away from the conduit, with spaced grooves extending transversely to, and opening into, the slot defined by the wall members. Preferably, the bottom walls of said groves are inclined towards the conduit as they extend towards the slot defined between the wall members.

A number of the assemblies may be placed end-to-end so that the slots and internal drainage conduits are in communication.

The invention will now be described by way of example with reference to the accompanying drawings in which:

Figure 1 is a perspective view of a drain construction arranged in accordance with the present invention,

Figure 2 is a cross-sectional view of a spring spacer used in the drain construction.

The drain construction shown in the drawings includes an assembly comprising two generally angle section wall members 10 and 11 and a resilient conduit tube 12. The members 10 and 11 are preferably made from cast iron or plastics material and are of similar section. Each is provided along its upper edge with a tapering, shorter outwardly extending flange which is formed on its upper surface with spaced tapering grooves 13 to give a castellated effect at the upper edge of a slot defined between the members. This arrangement tends to dissipate energy in the flow of water across the assembly, thus encouraging the water to flow into the slot. The grooves taper outwardly so as to provide, in the base of each groove, a downward sloping surface leading into the slot.

The longer flanges of the members 10 and 11 extend downwardly but slot away from one another towards the lower ends so that the slot is of increasing width. On the external surface of each wall member, and near the lower edge thereof, is a series of spaced horizontal ridges and grooves 14, 15 which run lengthwise of the members 10 and 11 respectively.

The conduit tube 12, which is made from a resilient material such as, for example, plastics material, is of generally circular configuration but with an upwardly presented longitudinal opening. The edges of the tube which define the opening are engaged in one of the grooves 15 in the respective wall members 10 and 11. In the construction shown there are three such grooves 15 on each of the members and it is possible to engage the tube edges into any chosen pair. By this means the capacity of the drain is adjustable by regulating the depth of the slot and the cross-sectional area of the conduit 12 in relation to the width of the slot between the two members 10 and 11. The tube 12 is conveniently made initially as a complete tube which is split and the two sides separated in order to engage in the grooves 15 in the members 10 and 11 as shown.

To support the two members 10 and 11 and to space them apart there are a number of spacers which are positioned at intervals along the lengths of the members 10 and 11.

Referring to Figure 2, each spacer comprises a helical compression spring 21, opposite ends of which abut plates 18, 19 on the inner surfaces of the wall members 10, 11 respectively. The spring is located by screws 22, 23 which project through the wall members and into the ends of the spring. It is protected against dirt and debris by two telescopically slidable tubes 16, 17 which surround the spring 21, the ends of the tubes being closed by the plates 18, 19.

The spring 21 permits the members 10 and 11 to move towards and away from one another as a result of movement or expansion of the material surrounding the assembly.

In an alternative arrangement the spacers may be temperature responsive piston and cylinder units containing fluid which is responsive to temperature change to tend to expand the unit, so as to keep the members 10, 11 apart while allowing some relative movement thereof.

As shown in Figure 1, in use the assembly is embedded in a body of material, indicated at 24, such as concrete or tarmc or construction material including polymer structures. The material is settable and provides a flat top surface. Any expansion or concentration of this material results in movement of the members 10 and 11 towards or away from one another and this is accommodated by the spring spacers.

Keying elements 25 are provided on the sides of the members 10 and 11 to lock them into the settable material 24.

The method of making the drain construction comprises assembling the members 10 and 11 and the tube 12 in correct relationship, as shown, the spring spacers being inserted at intervals along the length of the assembly. Further similar assemblies are placed end-to-end to provide a continuous drain. Typically, each assembly may have a length of one metre or longer. Connecting members (not shown) in the form of sleeves surrounding the tube 12 may be fitted to provide a water-tight or substantially water-tight seal beween adjacent lengths of the drain. In this way a complete drain, wich a continuous open slot and a continuous drainage conduit may be simply formed in minimum time.

The assemblies are placed in a prepared trench and are suspended by hooks 28 from battens 27 which are long enough to reach datum levels in the surrounding surface. The hooks 28 are adjustable in length, having adjustment nuts engaging threads on the upper ends thereof. The hooked lower ends engage the spring spacers already described.

Once the assemblies are in place, the trench is back-filled with settable material to the required level corresponding to the top surfaces of the flanges of the members 10 and 11.

Alternatively, the assembly may be initially below the required level, and the placing of the settable material may be such as to lift the assembly into the correct position so that its top

surface lies level with that of the settable material itself.

In order to prevent settable material dropping into the slot, this may be filled with boards or other components which are afterwards removed.

If it is desired that the slot should be discontinuous, bridge pieces are inserted at spaced positions along the length of the slot.

This assembly provides a continuous drain which may have a fall from one end to another. Longitudinal and transverse levels are taken into account. Any expansion or contraction of the settable material or its surrounding material as a result of changes in temperature, or other movement, is readily accommodated by movement of the members 10 and 11 under the influence of the spring spacers.

The spring or equivalent spacers may be used in other circumstances in bridge or road engineering where expansion is to be accommodated.

Claims

1. An assembly for use in drain construction comprising an elongate, generally tubular conduit (12) having, extending along the complete length thereof, an elongate opening which is narrower then the conduit and faces upwardly in use of the assembly, two spaced elongate wall members (10, 11) disposed along opposite sides of the opening and extending away from the opening so as to define between them a slot communicating, through the opening, with the interior of the conduit (12), and spacing means interconnecting the wall members to maintain them apart, characterised in that the conduit (12) is formed of resiliently flexible material and is attached to the wall members (10, 11) by virtue of the two edges of the conduit, which define the opening therebetween, being engaged with parts of the respective wall members by the resilience of the conduit.

2. An assembly according to Claim 1, characterised in that said spacing means (21) are adjustable.

3. An assembly according to Claim 2, characterised in that said adjustable spacing means include spring means (21) interconnecting the wall members (10, 11) in a manner tending to urge the wall members apart.

4. An assembly according to Claim 3, characterised in that said spring means comprise a helical compression spring (21).

5. An assembly according to Claim 2, characterised in that said adjustable spacing means comprise a temperature responsive device connected between the wall members (10, 11) in a manner to adjust the spacing between the wall members in accordance with the ambient temperature.

6. An assembly according to any of Claims 3 to 5, characterised in that said adjustable spacing means are enclosed in a protective sleeve (16, 17) extending between the wall members (10, 11).

7. An assembly according to Claim 6, characterised in that the protective sleeve comprises two telescoping parts (16, 17) which may slide relatively to one another to accommodate relative movement between said wall members (10, 11).

8. An assembly according to any one of the preceding claims, characterised in that there are provided on each wall member (10, 11) a plurality of alternative locations (15) for attachment of the conduit thereto, whereby the depth of the slot provided between the wall members, relative to the conduit, may be adjusted.

9. An assembly according to any one of the preceding claims, characterised in that a location for attachment of the conduit to each wall member (10, 11) is provided by at least one longitudinally extending groove (15) along the outer surface of the wall member, into which grooves are engageable the two edges of the conduit (12) which define the aforesaid opening therein.

10. An assembly according to any one of the preceding claims, characterised in that the conduit (12) is formed from the resiliently flexible plastics material.

11. An assembly according to any one of the preceding claims, characterised in that the conduit (12) is generally circular in cross-section.

12. An assembly according to any one of the preceding claims, characterised in that the width of the slot defined by said wall members (10, 11) increases as it extends towards the conduit (12).

13. An assembly according to any one of the preceding claims, characterised in that the edge of each wall member (10, 11) remote from the conduit is provided with an outwardly extending flange.

14. An assembly according to Claim 13, characterised in that each outwardly extending flange is formed, on the surface thereof facing away from the conduit (12) with spaced grooves (13) extending transversely to, and opening into, the slot defined by the wall members (10, 11).

15. An assembly according to Claim 14, characterised in that the bottom walls of said grooves (13) are inclined towards the conduit (12) as they extend towards the slot defined between the wall members (10, 11).

Patentansprüche

1. Vorrichtung zur Verwendung in Entwässerungsanlagen, mit einem länglichen, im wesentlichen röhrenförmigen Kanal (12) mit einer sich entlang seiner gesamten Länge erstreckenden länglichen Oeffnung, welche schmäler als der Kanal ist und bei der Verwendung der Vorrichtung nach oben zeigt, zwei in Abstand von einander entlang der gegenüberliegenden Seiten der Oeffnung angeordneten länglichen Wandelementen (10, 11), welche sich von der Oeffnung weg erstrecken, um so zwischen ihnen einen Spalt zu begrenzen, welcher durch die Oeffnung mit dem Innern des Kanals (12) in Verbindung steht, und Abstandshaltern, welche die Wandelemente mit-

einander verbinden, um sie von einander getrennt zu halten, dadurch gekennzeichnet, dass der Kanal (12) aus nachgiebig flexiblem Material geformt ist und an den Wandelementen (10, 11) kraft der beiden Kanten des Kanals, welche die Oeffnung dazwischen begrenzen und mit Teilen des jeweiligen Wandelementes durch die Nachgiebigkeit des Kanals in Eingriff kommen, befestigt ist.

2. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, dass die Abstandshalter (21) einstellbar sind.

3. Vorrichtung nach Anspruch 2, dadurch gekennzeichnet, dass die einstellbaren Abstandshalter Federmittel (21) haben, welche die Wandelemente (10, 11) derart verbinden, dass sie versuchen die Wandelemente auseinander zu drücken.

4. Vorrichtung nach Anspruch 3, dadurch gekennzeichnet, dass die Federmittel eine Schraubenfeder (21) sind.

5. Vorrichtung nach Anspruch 2, dadurch gekennzeichnet, dass die einstellbaren Abstandshalter eine auf die Temperatur ansprechende Vorrichtung enthalten, welche zwischen den Wandelementen (10, 11) derart festgemacht ist, dass sie den Abstand zwischen den Wandelementen in Abhängigkeit von der Umgebungstemperatur einstellt.

6. Vorrichtung nach einem der Ansprüche 3 bis 5, dadurch gekennzeichnet, dass die einstellbaren Abstandshalter in einer Schutzhülse (16, 17) angeordnet sind, welche sind zwischen den Wandelementen (10, 11) erstreckt.

7. Vorrichtung nach Anspruch 6, dadurch gekennzeichnet, dass die Schutzhülse aus zwei teleskopförmigen Teilen (16, 17) besteht, welche bezüglich zueinander gleiten können, um sich an die Relativbewegung zwischen den Wandelementen (10, 11) anzugleichen.

8. Vorrichtung nach einem der vorangehenden Ansprüche, dadurch gekennzeichnet, dass auf jedem Wandelement (10, 11) mehrere alternative Punkte (15) zur Befestigung des Kanals vorgesehen sind, wodurch die Tiefe des zwischen den Wandelementen gebildeten Spaltes bezüglich des Kanals einstellbar ist.

9. Vorrichtung nach einem der vorangehenden Ansprüche, dadurch gekennzeichnet, dass ein Punkt zur Befestigung des Kanals an jedem Wandelement (10, 11) durch wenigstens eine sich entlang der Aussenfläche des Wandelementes in Längsrichtung sich erstreckende Nut (11) gebildet wird, in welche die beiden Enden des Kanals (12), welche die oben genannte Oeffnung begrenzen, eingreifen können.

10. Vorrichtung nach einem der vorangehenden Ansprüche, dadurch gekennzeichnet, dass der Kanal aus eienm nachgiebig flexiblem Kunststoffmaterial hergestellt ist.

11. Vorrichtung nach einem der vorangehenden Ansprüche, dadurch gekennzeichnet, dass der Kanal (12) einen im wesentlichen kreisförmigen Querschnitt hat.

12. Vorrichtung nach einem der vorangehenden Ansprüche, dadurch gekennzeichnet, dass die Breite des von den Wandelementen (10, 11) begrenzten Spaltes in Richtung des Kanals zunimmt.

13. Vorrichtung nach einem der vorangehenden Ansprüche, dadurch gekennzeichnet, dass die vom Kanal abgewandte Kante jeden Wandelmentes (10, 11) mit einem sich nach aussen erstrekkenden Flansch versehen ist.

14. Vorrichtung nach Anspruch 13, dadurch gekennzeichnet, dass jeder sich nach auswärts erstreckende Flansch auf seiner von dem Kanal (12) abgewandten Oberfläche mit in Abstand angeordneten Nuten (13) geformt ist, welche sich quer zu dem von den Wandelementen (10, 11) begrenzten Spalt erstrecken und in diesen münden.

15. Vorrichtung nach Anspruch 14, dadurch gekennzeichnet, dass die Bodenwände der Nuten (13) in Richtung des Kanals (12) geneigt sind, so wie sie sich in Richtung des zwischen den Wandelementen (10, 11) begrenzten Spalt erstrecken.

Revendications

1. Assemblage destiné à être utilisé dans une construction de drainage, comprenant un canal (12) allongé, généralement tubulaire, ayant une ouverture allongée s'étendant le long de toute la longueur du canal et qui est moins large que le canal et est tournée vers le haut lors de l'utilisation de l'assemblage, deux élements de paroi (10, 11) allongés, espacés et disposés le long des côtés opposés de l'ouverture et s'éloignant de l'ouverture de sorte à définir entre eux une fente qui est en communication par l'ouverture avec l'intérieure du canal (12), et des moyens espaceur interconnectant les éléments de paroi pour les maintenir à distance, caractérisé en ce que le canal (12) est formé d'une matière élastiquement flexible et est attaché aux éléments de paroi (10, 11) au moyen des deux bords du canal qui définissent l'ouverture entre eux et qui sont engagés dans des parties de l'élément de paroi respectif par l'élasticité du canal.

2. Assemblage selon la revendication 1, caractérisé en ce que les moyens espaceur (21) sont ajustables.

3. Assemblage selon la revendication 2, caractérisé en ce que les moyens espaceur adjustables comprennent un moyen ressort (21) interconnectant les éléments de paroi (10, 11) d'une manière tendant à éloigner les éléments de paroi l'un de l'autre.

4. Assemblage selon la revendication 3, caractérisé en ce que les moyens ressort sont un ressort de compression (21).

5. Assemblage selon la revendication 2, caractérisé en ce que les moyens espaceur adjustables comprennent un moyen répondant à la température et connecté entre les éléments de paroi (10, 11) d'une manière à ajuster l'espacement entre les éléments de paroi en accord avec la température ambiante.

6. Assemblage selon l'une quelconque des revendications 3 à 5, caractérisé en ce que les

moyens espaceur ajustables sont enfermés dans une douille protectrice (16, 17) s'étendant entre les éléments de paroi (10, 11).

7. Assemblage selon la revendication 6, caractérisé en ce que la douille protectrice comprend deux parties télescopiques (16, 17) qui peuvent glisser l'une par rapport à l'autre pour adapter le mouvement relatif entre les éléments de paroi (10, 11).

8. Assemblage selon l'une quelconque des revendications précédentes, caractérisé en ce que plusieurs endroits alternatifs (15) pour la fixation du canal sont prévus sur chaque élément de paroi (10, 11), de sorte que la profondeur de la fente réalisée entre les éléments de paroi peut être ajustée par rapport au canal.

9. Assemblage selon l'une quelconque des revendications précédentes, caractérisé en ce qu'un endroit de fixation du canal à chaque élément de paroi (10, 11) est réalisé par au moins une fente (15) s'étendant longitudinalement le long de la surface extérieure de l'élément de paroi et dans laquelle les deux bords du canal (12), qui définissent ladite ouverture, peuvent être engagés.

10. Assemblage selon l'une quelconque des revendications précédentes, caractérisé en ce que le canal est formé d'une matière plastique élastiquement flexible.

11. Assemblage selon l'une quelconque des revendications précédentes, caractérisé en ce que le canal (12) a une section généralement circulaire.

12. Assemblage selon l'une quelconque des revendications précédentes, caractérisé en ce que la largeur de la fente définie entre les éléments de paroi (10, 11) augmente en direction du canal (12).

13. Assemblage selon l'une quelconque des revendications précédentes, caractérisé en ce que le bord de chaque élément de paroi (10, 11) éloigné du canal est pourvu d'un flasque s'étendant vers l'extérieur.

14. Assemblage selon la revendication 13, caractérisé en ce que chaque flasque s'étendant vers l'extérieur est formé sur sa surface éloignée du canal (12) avec des rainures (13) espacées s'étendant transversalement à la fente définie par les éléments de paroi (10, 11) et débouchant dans ladite fente.

15. Assemblage selon la revendication 14, caractérisé en ce que les parois de fond desdites rainures (13) sont inclinées en direction du canal (12) dans leur progression vers la fente définie entre les deux éléments de paroi (10, 11).

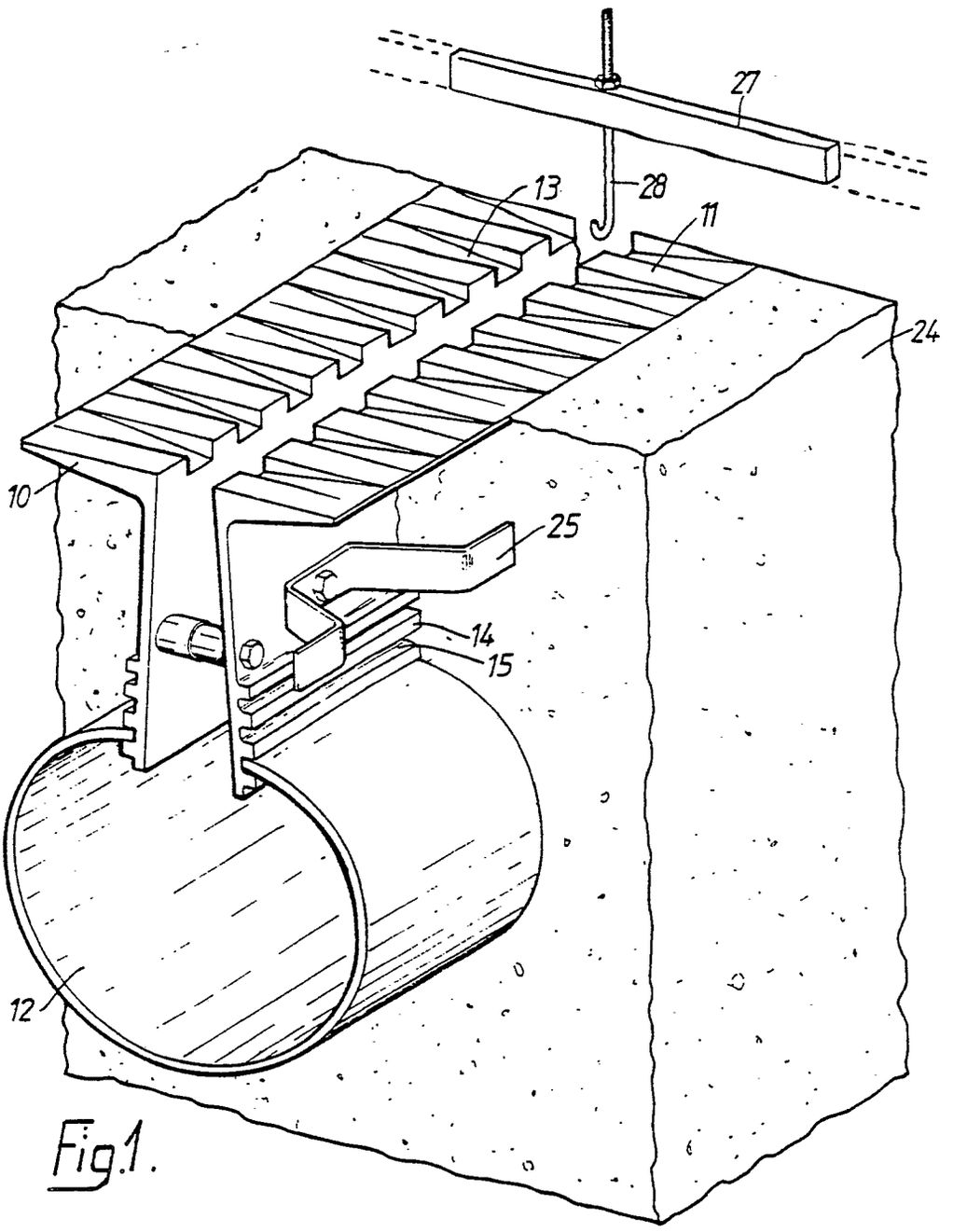

Fig.1.

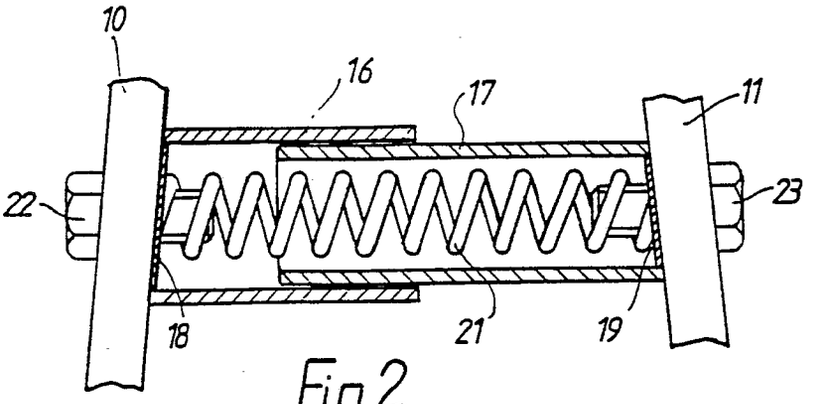

Fig.2.