

SPECIFICATION

A cable entry device

The invention relates to a cable entry device adapted to be fixed to a wall which has a hole through it provided for this purpose.

A prior art cable entry device includes:

- a threaded first part having a free end, a hole through it, at least one opening adapted to passing a cable through said hole, and a radial bearing surface facing away from said free end;

- a threaded second part adapted to be screwed onto said first part, said second part having a hole through it, at least one opening adapted for passing a cable through said hole, and an abutment surface adapted to bear against the wall to fix the device by clamping the wall between said abutment surface and said bearing surface; and

- cable holding means incorporated in said second part;

said threaded first and second parts respectively including respective threaded first and second portions adapted to cooperate with each other.

A device of the above type is described in the document FR-A-2 763 437 in the name of the applicant.

To fix the device to a wall, the first part is held in one hand on one side of the wall, in line with the hole, while with the other hand the second part is inserted into the hole to screw it onto the first part until the wall is clamped between them.

This type of device is entirely satisfactory, but it is difficult to use if the wall is accessible from only one side or if only one hand can be used.

The invention aims to resolve the drawbacks previously cited by proposing a cable entry device that is both practical and simple to use, especially if access

to the wall and/or the hole is difficult.

To this end, the invention proposes a cable entry device adapted to be fixed to a wall which has a hole through it provided for this purpose, said device including:

- a threaded first part having a free end, a hole through it, at least one opening adapted to passing a cable through said hole, and a radial bearing surface facing away from said free end;

- a threaded second part adapted to be screwed onto said first part, said second part having a hole through it, at least one opening adapted for passing a cable through said hole, and an abutment surface adapted to bear against the wall to fix the device by clamping the wall between said abutment surface and said bearing surface; and

- cable holding means incorporated in said second part;

said threaded first and second parts respectively including respective threaded first and second portions adapted to cooperate with each other;

in which device said first part takes the form of a base adapted to have its free end pushed blindly through said hole, said base including flexible teeth offset in the axial direction from said threaded first portion and which, when no force is applied to them, adopt a rest position in which they project in the radial direction from the base, and are adapted to retract elastically from said rest position, said teeth having a radial surface forcing said bearing surface, so that the wall can be clamped between said second part and said teeth and the device can be fixed to said wall blindly.

The above device has the particular advantage that it can be fixed to the wall blindly, by pushing the base into the hole, into which it is clipped by its teeth, and

then by screwing the second part onto the base until the wall is clamped between the abutment surface of the second part and the bearing surface of the teeth.

5 In a first embodiment said teeth are in one piece with the shank to form a one-piece assembly with it.

According to one feature the device includes means for braking or preventing free rotation of the base relative to said wall after the former is pushed into the hole, in particular when screwing the second part onto the base, and the device can therefore be fixed with one hand.

For example, said means take the form of an elastically compressible member covering at least part of said shank in the vicinity of the teeth at the end opposite the free end of the shank, said member being adapted to be compressed by a radial force.

20 The compressible member preferably takes the form of an annular bead surrounding the shank, adapted in particular to seal the junction between the base and the wall when the base is pushed into the hole and said bead is compressed between them.-

According to other features, the compressible member is:

- 25 - fixed permanently to the shank;
- molded around the shank; and
- made of an elastomer material.

The device can further include a second elastically compressible member extending radially around said shank and including:

- 30 - a first surface which faces the abutment surface of the second part when said second part is screwed onto the base; and
 - a second bearing surface which faces the bearing surface of the teeth,
- 35 said second compressible member being adapted to be

compressed by an axial force.

For example, the second compressible member takes the form of an annular radial skirt surrounding the shank, said skirt being adapted to be compressed between
5 the abutment surface of the second part and the wall to provide at least the seal between them.

The skirt can be fixed permanently to said base, being integral with the means for braking or preventing the base rotating in the wall when the former is pushed
10 into the hole.

According to other features:

- the first and second compressible members form a one-piece assembly;

- the second compressible member takes the form of
15 a flange in one piece with the first compressible member and situated at a distance from the teeth so that a free space is formed between the second bearing surface of the flange and the bearing surfaces of the teeth; and

- said one-piece assembly has a section in the
20 shape of an angle-iron.

In a second embodiment said teeth are attached, said device including to this end a ring fitted over the shank, said ring having on its periphery a series of axial projections bent outward to form said teeth.

25 The device preferably includes means for braking or preventing free rotation of the base relative to said wall after the former is pushed into the hole, in particular when screwing the second part onto the base.

To this end said ring includes, for example, a
30 series of axial projections each having longitudinal edges bent outward in pairs to form elastic claws adapted to be interengaged with the hole formed in the wall to brake or prevent free rotation of the base relative to the wall.

35 In one embodiment said shank has a polygonal

section portion adapted to receive said ring, which also has a polygonal section, to prevent them rotating relative to each other.

Said ring can be made of metal.

5 The device can further include an elastically compressible washer surrounding the shank, said washer being adapted to be compressed between the abutment surface of said head and the wall to provide the seal between them.

10 For example, the base further includes a shoulder situated at a distance from the teeth at the end opposite the first free end and forming a radial abutment surface that faces the bearing surfaces of the teeth so that a space is formed between the teeth and said shoulder, this
15 space being sufficiently large in the axial direction that, after pushing the base into the hole, said abutment-forming surface and the bearing surfaces of said teeth are on respective opposite sides of the wall, the means for braking or preventing free rotation of the base
20 relative to the wall after the former is pushed into the hole extending at least partly through this space.

To receive the head the base has, for example, a threaded portion extending from said shoulder toward said opening.

25 In one embodiment the device further includes a frustoconical elastic flexible membrane having:

- a first end fixed to said opening and defining a first mouth; and

30 - a second free end defining a second mouth facing toward the free end of the shank,

 said membrane extending, between its two mouths, across at least a portion of said hole, said membrane being adapted, by virtue of the combined choices of the material from which it is made and the dimensions of its
35 second mouth, to seal the connection to the cable.

The membrane is made of an elastomer material, for example, and can be molded into the base.

For example, the second part is a cylindrical head including:

- 5 - a bore which is at least partly threaded;
- a first end defining a first substantially circular opening and forming said abutment surface; and
- a second end opposite the first end and defining a second substantially circular opening.

10 In one embodiment the head further includes an elastic flexible membrane fixed to the second end of the head and forming a readily torn film blocking the second opening.

15 The film is circular, for example, and has in the vicinity of its center a weaker area which can be depressed to cause the film to start to tear.

 The film can be made of an elastomer material, being molded onto the head.

20 To retain the cable the device can further include an insert which is inserted into the bore in the head, said insert and the head being coaxial and said insert including:

- an annular portion; and
 - a plurality of elastic blades each including:
 - 25 - a first portion projecting axially from said annular portion toward the second opening; and
 - a second portion curved toward the first opening and toward the axis of the insert and extended by a free end forming a point adapted to interengage with
 - 30 the cable to retain it;
- the points together defining a free space around the axis of the insert sufficient for the cable to pass through.

 The insert is clipped into the head, for example, and trapped between:

- 35 - an inside radial projection at a distance from

the first end of the head; and

- an abutment at a distance from said projection;
and said insert is clipped into the head and trapped
between said projection and said abutment.

5 To fix it to the base the head has a threaded
portion extending between the first end and said radial
projections, for example.

For example, the threaded portion has an
interrupted thread and includes a plurality of threaded
10 sectors separated by sectors that are not threaded.

In one embodiment the head includes a series of
exterior beads extending in the axial direction and
adapted to facilitate grasping of said second part and
thereby manual fixing of the device to the wall, said
15 beads being in one piece with the film described above,
for example.

Other objects and advantages of the invention will
become apparent in the course of the following
description of preferred embodiments of the invention,
20 which description is given by way of non-limiting
illustrative example and with reference to the
accompanying drawings, in which:

- figure 1 is a sectioned elevation view of a first
embodiment of a cable entry device which can be fixed to
25 a wall blindly, and which includes two elastically
compressible members forming a one-piece assembly with a
section in the shape of an angle-iron; in this figure,
the device is shown in an intermediate position in which
the base has been pushed into the wall but the device has
30 not been fixed to the wall, because the head has not been
screwed fully onto the base;

- figure 2 is an elevation view of the base of the
device shown in figure 1;

- figure 3 is a partly sectioned perspective view
35 of the base shown in figure 2;

- figure 4 is a view similar to figure 1, in which the device has been fixed to the wall by screwing the head all the way onto the base;

5 - figure 5 is a view similar to that of figure 4, but in which the wall is thicker than the wall shown in figure 4;

10 - figure 6 is a view similar to those of figures 1, 4 and 5, showing a different embodiment in which the head includes complementary holding members in the form of external beads;

 - figure 7 is an elevation view of the head of the device shown in figure 6;

 - figure 8 is a top view of the head shown in figure 7;

15 - figure 9 is a view similar to that of figures 4 to 6, showing a different embodiment in which the device includes two separate elastically compressible members;

20 - figure 10 is a view similar to figure 1, relating to a second embodiment in which the base of the device includes attached clipping teeth; a toothed metal ring is attached to the base;

 - figure 11 is a view of the base of the device shown in figure 10 in section taken along the line XI-XI in that figure;

25 - figure 12 is a top view of the metal ring shown in figures 10 and 11; and

 - figure 13 is a view in elevation of the ring shown in figures 10 to 12.

30 Figures 1, 4, 5, 6, 9, 10 show a cable entry device 1 adapted to be fixed blindly to a wall 2 by being pushed through a hole 3 formed through the wall 2.

 The device 1 is adapted to pass a cable 4 through the wall 2 by means of the hole 3 and in a sealed manner, this kind of device being also known as a cable gland.

35 A first embodiment of the device 1 is described

next with reference to figures 1 to 5.

The device 1 includes a hollow threaded base 5 adapted to be pushed into the wall 2 to clip it thereto and a hollow threaded head 6 adapted to be screwed onto the base 5 to fix the device 1 to the wall 2 by gripping the wall 2 between the base 5 and the head 6, as shown in figures 4 and 5.

The base 5 and the head 6 are relatively rigid components which in this example are made from a plastics material such as polypropylene or PVC.

The wall 2 has a substantially plane first face 7 and a second face 8 opposite and substantially parallel to the first face 7.

The hole 3, which has a circular section and an axis A, has a cylindrical edge surface 9 connecting the faces 7, 8.

The thickness of the wall 2, i.e. the distance between the first face 7 and the second face 8, and thus the longitudinal dimension of the edge surface 9 of the hole 3, is denoted e .

The base 5 is circular and has an axis A' which, when the base 5 is pushed into the hole 3, is substantially coincident with the axis A of the hole.

The base 5 includes a substantially cylindrical shank 10 which has a free end 11 forming a first free end of the base 5 and which is on the side of the second face 8 of the wall 2 when the base 5 is pushed into the hole 3.

The base 5 further includes flexible teeth 12 which, when no force is applied to them, adopt a rest position (see figure 1) in which they project radially from the shank 10, and which are able to retract elastically from this rest position to enable the base 5 to be clipped into the hole 3.

As can be seen in figures 1 and 2, the base 5 has

two teeth 12 which are symmetrical with respect to each other about the axis A'; each tooth is in one piece with the shank 10 and is delimited by a U-shaped notch 13 in the shank 10.

5 The teeth 12 have an inclined external surface 14 facing toward the free end 11 and a radial bearing surface 15 facing away from the free end 11.

10 The end of the base 5 opposite its free end 11 is extended, at a particular axial distance from the teeth, by a threaded end part 16 having an outside diameter greater than that of the shank 10, and the base 5 therefore has a substantially T-shaped section in elevation (see figure 2).

15 The threaded end portion 16 extends between, on the one hand, a shoulder where it joins onto the shank 10 and forming an annular radial abutment surface 17 which faces the bearing surfaces 15 of the teeth 12, and an end 18 forming a second free end of the base 5, at the end opposite the first free end 11.

20 The shank 10 also has a cylindrical part 19 forming a central portion of the base 5 in the space between the bearing surfaces 15 of the teeth 12 and the shoulder 17.

25 The external dimensions of the base 5, in particular its outside diameter at its first free end 11, the bearing surface 15 of the teeth 12, its central portion 19 and its end portion 16, as well as the longitudinal dimension of the central portion 19, are naturally chosen so that the base 5 can be pushed into the hole 3 and easily be clipped into the hole.

30 Accordingly, when the base 5 is pushed into the hole 3, the outside surfaces 14 of the teeth 12 come into contact with the edge surface 9 of the hole and are forced to retract in the radial direction.

35 Because of their inherent elasticity, the teeth 12 return to their rest position when they have passed

through the wall 2, their bearing surface 15 then facing the second face 8 of the wall 2.

5 The wall 2 is therefore sandwiched between the teeth 12 and the end portion 16, with the edge surface 9 of the hole facing the central portion 19, as shown in figure 1.

To this end the central portion 19 of course has a longitudinal dimension greater than the thickness e of the wall 2.

10 Figure 1 shows the device 1 in an intermediate position in which, although it has been clipped into the hole 3, the base 5 is relatively free to move relative to the wall 2 in longitudinal translation.

15 The device 1 is fixed to the wall 2 by screwing the head 6 all the way onto the base 5 after pushing the free end 11 of the base 5 into the hole 3 and clipping it there.

20 The head 6 has a first end 20 forming an annular radial abutment surface which faces toward the bearing surfaces 15 of the teeth 12 when the head 6 is screwed onto the base 5.

25 Screwing the head 6 all the way onto the base 5 from the intermediate position moves the abutment surface 20 and the bearing surfaces 15 toward each other as far as a fixing position, shown in figures 4 and 5, in which the wall 2 is clamped between the abutment surface 20 and the bearing surface 15.

30 The base 5 must be prevented from rotating relative to the wall 2 to prevent the head 6 entraining the base 5 when it is screwed on, causing it to rotate about its axis A'.

35 To this end, the base 5 includes a belt 21 which surrounds the shank 10 in the vicinity of the teeth 12 at the end opposite the first free end 11 and covering the central portion 19.

The belt 21 is an elastically compressible member adapted to be compressed by an inwardly directed radial force and to expand in the absence of any such force by virtue of its inherent elasticity.

5 The belt 21 is made from an elastomer material and is permanently fixed to the shank 10, being molded around the latter to form an annular bead around it having a substantially cylindrical outside surface.

10 Here the material from which the belt 21 is made is chosen from thermoplastics elastomers having the following characteristics:

- Shore A hardness from 35 to 45, as measured by the method described in ASTM D 2240, and

15 - permanent deformation under pressure from 15% to 16%, as measured by method B described in ASTM D 395, at 23°C.

20 The geometry of the belt 21, in particular its radial dimension, is chosen so that, after the base 5 has been pushed through the hole 3, the belt 21 is interengaged with the edge surface 9 of the hole 3 and is compressed between said edge surface 9 and the central portion 19 of the base 5.

25 This produces a friction force between the belt 21 and the edge surface 9 of the hole 3 that prevents free rotation of the base 5 in the wall 2 so that the head 6 can be screwed on without it being necessary to hold the base 5.

30 By filling the space between the central portion 19 and the edge surface 9 of the hole 3, the belt 21 also seals the junction between the base 5 and the wall 2.

The device 1 further includes a second compressible member 22 in the form of an annular skirt or flange that extends in the radial direction around the shank 10.

35 The flange 22 is in one piece with the belt 21 and with it forms a one-piece assembly with a section in the

shape of an angle-iron, as can be seen in figures 1 to 5.

5 The flange 22 is near the shoulder 17 and at a distance from the teeth 12, and has a first radial bearing surface 23 facing toward the shoulder 17; when the head 6 is fixed to the base 5, this surface faces the abutment surface 20; it also has a second radial bearing surface 24 opposite the first surface 23 and facing the bearing surface 11 of the teeth 12.

10 A free space is thereby formed between the second bearing surface 24 and the bearing surfaces 15 of the teeth 12; when no axial force is applied to the flange 22, this space has an axial dimension d chosen to be greater than the thickness e of the wall 2.

15 The device 1 is therefore suitable for different wall thicknesses, as can be seen in figures 4 and 5, the wall 2 being in fact sandwiched between the teeth 12 and the flange 22.

20 The flange 22 is adapted to be compressed by an axial force; it is adapted to be compressed between the head 6 and the wall 2 so that, when the device 1 is fixed in position on the wall 2, the first and second bearing surfaces 23, 24 respectively bear against the abutment surface 20 of the head 6 and the first face 7 of the wall 2 (see figures 4 and 5).

25 When compressed in this way, the flange 22 firstly provides a seal at the junction between the head 6 and the wall 2 and secondly brakes unscrewing of the head 6 by acting like a lock-nut.

30 The flange 22 applies to the head 6, on the one hand, a friction force through the intermediary of its first bearing surface 23, which bears on the abutment surface 20, and, on the other hand, by virtue of its inherent elasticity, a force normal to the first face 7 of the wall 2, which force tends to push the head 6 away from the wall 2 and to lock the respective threads of the
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head 6 and the base 5.

Moreover, when it is compressed between the head 6 and the wall 2, the second bearing surface 24 of the flange 22 exerts a friction force on the first face 7 of the wall 2. The flange 22 therefore constitutes a complementary brake to prevent free rotation of the base 5 relative to the wall 2.

The base 5 has a substantially cylindrical hole 25 through it, from the first end 11 to the second end 18, through which the cable 4 is passed.

To seal the junction between the base 5 and the cable 4, the base 5 further includes a frustoconical flexible elastic membrane 26 whose axis is the axis A'.

The membrane 26 has, on the one hand, a first end 27 fixed to the second end 18 of the base 5 and which defines a first mouth 28 through which the cable 4 is inserted into the base 5 and passed through the hole 25 through it.

The membrane 26 includes, on the other hand, a second free end 29 which defines a second mouth 30 facing toward the first end 11 of the base 5.

The membrane 26 extends between its two mouths 28, 30, across at least a portion of the hole 25, as can be seen in figures 1 and 2, 4 and 5.

The inside diameter of the second mouth 30 is chosen to be less than the outside diameter of the cable 4 so that, when the cable 4 is inserted into the hole 25, the second mouth 30 is distended and espouses the outside surface of the cable 4, thereby fulfilling its sealing function.

Here the membrane 26 is made of the same material as the belt 21 and the flange 22 and is molded onto the base at the same time as them.

The head 6 is described next.

As can be seen in figures 1, 4, 5, the head 6 takes

the form of a cap including a substantially cylindrical skirt 31 which has an axis A" which is substantially coincident with the axis A' of the base 5 when the head 6 is screwed onto it.

5 The skirt 31 has an outside surface 32 and an inside surface 33 forming a bore through the head 6.

 The bore 33 extends from the first free end 20, which forms a first circular opening 34 in the vicinity of which the bore has a threaded portion 35, to a second
10 free end 36, opposite the first free end 20.

 The second end 36 defines a second opening 37 which is essentially circular and whose diameter is sufficient for the cable 4 to pass through it.

 A flexible elastic membrane 38 is fixed to the
15 second end 36 to form an easily torn film blocking the second opening 37.

 This circular film 38 has a weaker area 39 in the vicinity of its center which is pushed inward, in particular when the cable 4 is inserted, to cause the
20 film 38 to start tearing.

 Here the film 38 is molded onto the head 6 and is made of the same material as the membrane 26.

 To retain the cable 4 in the head 6, the latter further includes an insert 40 fixed in the bore 33
25 coaxially with the head 6.

 The insert 40 has an annular portion 41 and a plurality of elastic blades 42 forming hooks, arranged in a star configuration, and each having a first portion 43 projecting axially from the annular portion 41 in the
30 direction of the second opening 37 of the head 6 and a radial second portion 44 curved inwardly and toward the first opening 20.

 Each radial portion 44 is extended by a free end 45 forming a point adapted to be interengaged with the
35 outside surface of the cable 4 to prevent it being

withdrawn from the head 6, the free ends 45 together defining around the axis of the insert 40 a free space 46 sufficient for the cable 4 to pass through.

5 To retain the insert 40 in the head 6, the head includes, on the one hand, at a distance from its first end 20, an annular bead 47 projecting from the inside surface 33, and, on the other hand, fins 48 projecting from the inside surface 33 near the second opening 37.

10 The head 6 has at its second free end 36 an annular radial end wall 49 defining the second opening 37 and the fins extend axially as far as the end wall 49.

The insert 40 is clipped into the head 6, in which it is trapped between the bead 47 and the fins 48.

15 The cable 4 can therefore be inserted without difficulty into the head by forcing the radial portions 44 of the blades 42 to flex outward. However, the blades 42 prevent unintentional withdrawal of the cable 4 by biting into its outside surface.

20 Figure 6 shows a first variant. This first variant differs from what is described above in that the head 6 has no fins and, instead of the bead 47 previously cited, includes clipping teeth 50 projecting radially from the inside surface 33. The insert 40 is clipped between the teeth 50 and the end wall 49.

25 Figures 6 to 8 show a second variant in which the head 6 includes complementary holding means to facilitate gripping the head 6 and to increase the clamping torque that can be applied to it when screwing it onto the base 5.

30 The complementary holding means take the form of a series of exterior beads 51 extending axially along the outside surface 32 of the head 6.

35 To simplify the fabrication of the head, the beads 51 are molded onto the head 6 at the same time as the film 38, with which they are in one piece.

Figure 9 shows a third variant.

This variant differs from what is described above in that the second compressible member 22 takes the form of a washer 22' rather than a flange, the washer 22' being threaded over the shank 10, but separate from it.

To this end, the shank 10 includes, between the central portion 19 and the shoulder 17, a shoulder 52 adapted to receive the washer 22' when it is threaded over the base.

The washer 22' has the same functions as the flange previously described except for braking or preventing rotation of the base 5.

In a fourth variant, shown in figure 6, the belt 21 has a frustoconical outside surface so that it can adapt to holes with slightly different diameters, thereby providing some tolerance when making the hole 3.

In a different variant, the belt is a strip attached to the shank by being threaded over it and retained on it by virtue of its inherent elasticity.

In a variant that is not shown the head 6 has an interrupted screwthread, the threaded portion 35 of the head 6 consisting of a plurality of uniformly threaded angular sectors arranged around the circumference of the inside surface 33 and separated by sectors that are not threaded.

In another variant that is not shown the threaded part of the head has a double thread and includes two interleaved threads, which makes clamping quicker and prevents excessive clamping of the head on the base while it is being screwed on.

The base can of course include more than two teeth.

The dimensions and the materials of the belt 21, the flange 22 or the washer 22' can of course be different from those cited above by way of example.

In particular, the person skilled in the art can

choose for the belt 21 a material that is more or less compressible and a larger or smaller outside diameter, according to whether the aim is to brake or prevent rotation of the base 5 in the hole 3.

5 A second embodiment of the device 1 is described next with reference to figures 10 to 13. It should be noted that some of the variants that have just been described can equally be applied to this second embodiment.

10 The second embodiment differs from the first embodiment essentially in respect of the following points: firstly, the design of the clipping teeth of the base 5; secondly, the design of the means for braking or preventing free rotation of the base 5 in the wall 2;
15 thirdly, the design of the second elastic member 22.

Parts common to the first embodiment are naturally identified by the same references as previously.

20 The base 5 includes a toothed metal ring 53 fitted over the shank 10 and surrounding the central portion 19, being prevented from rotating relative thereto.

25 The ring 53 has a continuous base part 54 with a polygonal profile in cross section and one end 55 of which, facing toward the first free end 11 of the base, bears against a shoulder 56 on the shank 10, facing the opposite way.

The central portion 19 has a polygonal profile in cross section complementary to that of the ring 53, as is apparent in figure 11.

30 The ring 53 is stamped from sheet steel with two opposite ends 57, 58 and then bent to shape until its ends 57, 58 are facing each other.

35 When the ring 53 is in position on the base 5, the ends 57, 58 abut on respective opposite sides of a projection 59 on the shank 10, extended in the axial direction.

This prevents the ring 53 rotating on the shank 10.

The base part 54 has a plurality of adjacent areas 60 forming the sides of the polygon.

5 The ring 53 further includes alternating first and second series of axial projections 61, 62 extending from the base part 54 toward the threaded part 16, each axial projection originating from one area 60.

10 The projections 61 of the first series are bent outward to form the clipping teeth 12 of the base 5. Each projection 61 has two branches 61a, 61b forming a V-shaped profile in a cross section plane (see figure 12).

15 Each projection 61 further has a free end 63 with a V-shaped profile in an elevation plane (see figure 13), defining two points 63a, 63b adapted to interengage with the second face 8 of the wall 2 and bite into it, as is apparent in figure 10.

Thus the teeth 12, which have some elasticity, have a two-fold function of clipping the base 5 and braking free rotation thereof relative to the wall 2.

20 The projections 62 of the second series have two opposite longitudinal edges 62a, 62b bent outward to form elastic claws adapted to interengage with the edge surface 9 of the hole 3 when the base 5 is pushed into it.

25 By biting into the edge surface 9, the claws 62a, 62b break or even prevent free rotation of the base 5 in the wall 2 so that the head 6 can be screwed on.

30 The head includes an integral brake washer 22" in the form of an elastically compressible ring inserted in a complementary annular housing 64 formed in the first end 20 of the head 6, as is apparent in figure 10.

Obviously the brake washer 22" has the same functions as the washer 22' described above.



CLAIMS

1. A cable entry device adapted to be fixed to a wall which has a hole through it provided for this purpose, said device including:

5 - a threaded first part having a free end, a hole through it, at least one opening adapted to passing a cable through said hole, and a radial bearing surface facing away from said free end;

10 - a threaded second part adapted to be screwed onto said first part, said second part having a hole through it, at least one opening adapted for passing a cable through said hole, and an abutment surface adapted to bear against the wall to fix the device by clamping the wall between said abutment surface and said bearing surface; and

15 - cable holding means incorporated in said second part;

20 said threaded first and second parts respectively including respective threaded first and second portions adapted to cooperate with each other;

25 in which device said first part takes the form of a base adapted to have its free end pushed blindly through said hole, said base including flexible teeth offset in the axial direction from said threaded first portion and which, when no force is applied to them, adopt a rest position in which they project in the radial direction from the base, and are adapted to retract elastically from said rest position, said teeth having a radial surface forcing said bearing surface, so that the wall can be clamped between said second part and said teeth and the device can be fixed to said wall blindly.

30 2. A cable entry device according to claim 1 wherein said teeth are in one piece with the shank to form a one-piece assembly with it.

35 3. A cable entry device according to claim 2,



including means for braking or preventing free rotation of the base relative to said wall after the former is pushed into the hole, in particular when screwing the second part onto the base.

5 4. A cable entry device according to claim 3 wherein said means take the form of an elastically compressible member covering at least part of said shank in the vicinity of the teeth at the end opposite the free end of the shank, said member being adapted to be
10 compressed by a radial force.

5. A cable entry device according to claim 4, wherein said compressible member takes the form of an annular bead surrounding the shank.

15 6. A cable entry device according to claim 5, wherein said annular bead is further adapted to seal the connection between the base and the wall when the base is pushed into the hole and said bead is compressed between them.

20 7. A cable entry device according to any of claims 4 to 6, wherein said compressible member is fixed permanently to the shank.

8. A cable entry device according to claim 7, wherein said compressible member is molded around the shank.

25 9. A cable entry device according to any of claims 4 to 8 wherein said member is made of an elastomer material.

30 10. A cable entry device according to any of claims 4 to 9, further including a second elastically compressible member extending radially around said shank and including:

- a first surface which faces the abutment surface of the second part when said second part is screwed onto the base; and

35 - a second bearing surface which faces the bearing



surface of the teeth,
said second compressible member being adapted to be
compressed by an axial force.

11. A cable entry device according to claim 10
5 wherein said second compressible member takes the form of
an annular radial skirt surrounding the shank, said skirt
being adapted to be compressed between the abutment
surface of the second part and the wall to provide at
least the seal between them.

10 12. A cable entry device according to claim 11
wherein said skirt is fixed permanently to said base.

13. A cable entry device according to any of
claims 10 to 12 wherein said second compressible member
is integral with the means for braking or preventing the
15 base rotating in the wall when the former is pushed into
the hole.

14. A cable entry device according to claim 13,
wherein the first and second compressible members form a
one-piece assembly.

20 15. A cable entry device according to claim 14,
wherein the second compressible member takes the form of
a flange in one piece with the first compressible member
and situated at a distance from the teeth so that a free
space is formed between the second bearing surface of the
25 flange and the bearing surfaces of the teeth.

16. A cable entry device according to claim 15,
wherein said one-piece assembly has a section in the
shape of an angle-iron.

17. A cable entry device according to claim 1
30 wherein said teeth are attached, said device including to
this end a ring fitted over the shank, said ring having
on its periphery a series of axial projections bent
outward to form said teeth.

18. A cable entry device according to claim 17,
35 further including means for braking or preventing free



rotation of the base relative to said wall after the former is pushed into the hole, in particular when screwing the second part onto the base.

5 19. A cable entry device according to claim 18 wherein said ring includes a series of axial projections each having longitudinal edges bent outward in pairs to form elastic claws adapted to be interengaged with the hole formed in the wall to brake or prevent free rotation of the base relative to the wall.

10 20. A cable entry device according to any of claims 17 to 19 wherein said shank has a polygonal section portion adapted to receive said ring, which also has a polygonal section, to prevent them rotating relative to each other.

15 21. A cable entry device according to any of claims 17 to 20 wherein said ring is made of metal.

20 22. A cable entry device according to any of claims 17 to 21, further including an elastically compressible washer surrounding the shank, said washer being adapted to be compressed between the abutment surface of said second part and the wall to provide the seal between them.

25 23. A cable entry device according to any of claims 1 to 22, wherein the base includes a shoulder situated at a distance from the teeth at the end opposite the first free end and forming a radial abutment surface that faces the bearing surfaces of the teeth so that a space is formed between the teeth and said shoulder, this space being sufficiently large in the axial direction that, after pushing the base into the hole, said abutment-forming surface and the bearing surfaces of said teeth are on respective opposite sides of the wall.

30 24. A cable entry device according to claim 23, including means for braking or preventing free rotation
35 of the base relative to the wall after the former is



pushed into the hole, said means extending at least partly through the space formed between said teeth and said shoulder.

5 25. A cable entry device according to claim 23 or claim 24, wherein the base has a threaded portion extending from said shoulder toward said opening.

26. A cable entry device according to any of claims 1 to 25, further including a frustoconical elastic flexible membrane having:

- 10 - a first end fixed to said opening and defining a first mouth; and
- a second free end defining a second mouth facing toward the free end of the shank,

15 said membrane extending, between its two mouths, across at least a portion of said hole, said membrane being adapted, by virtue of the combined choices of the material from which it is made and the dimensions of its second mouth, to seal the connection to the cable.

20 27. A cable entry device according to claim 26, wherein said membrane is made of an elastomer material.

28. A cable entry device according to claim 26 or claim 27, wherein said membrane is molded into the base.

25 29. A cable entry device according to any of claims 1 to 28, wherein the second part is a cylindrical head including:

- a bore which is at least partly threaded;
- a first end defining a first substantially circular opening and forming said abutment surface; and
- a second end opposite the first end and defining
30 a second substantially circular opening.

30 30. A cable entry device according to claim 29, wherein the head further includes an elastic flexible membrane fixed to the second end of the head and forming a readily torn film blocking the second opening.

35 31. A cable entry device according to claim 30,



wherein said film is circular and has in the vicinity of its center a weaker area which can be depressed to cause the film to start to tear.

5 32. A cable entry device according to claim 30 or claim 31, wherein said film is made of an elastomer material.

 33. A cable entry device according to any of claims 30 to 32, wherein said film is molded onto the head.

10 34. A cable entry device according to any of claims 29 to 33, further including an insert which is inserted into the bore in the head, said insert and the head being coaxial and said insert including:

- 15 - an annular portion; and
 - a plurality of elastic blades each including:
 - a first portion projecting axially from said annular portion toward the second opening; and
 - a second portion curved toward the first opening and toward the axis of the insert and extended by
 - 20 a free end forming a point adapted to interengage with the cable to retain it;
- the points together defining a free space around the axis of the insert sufficient for the cable to pass through.

25 35. A cable entry device according to claim 34 wherein the head further includes:

- an inside radial projection at a distance from its first end; and
 - an abutment at a distance from said projection;
- and said insert is clipped into the head and trapped
- 30 between said projection and said abutment.

 36. A cable entry device according to any of claims 29 to 35, wherein the head has a threaded portion extending between the first end and said radial projections.

35 37. A cable entry device according to claim 36,



wherein said threaded portion has an interrupted thread and includes a plurality of threaded sectors separated by sectors that are not threaded.

38. A cable entry device according to claim 36,
5 wherein said threaded portion has a double thread and
includes two interleaved threads.

39. A cable entry device according to any of claims 1 to 38, wherein the head includes a series of exterior beads extending in the axial direction and adapted to facilitate grasping of the head and thereby manual fixing of the device to the wall.

40. A cable entry device according to any of claims 30 to 33, wherein said second part includes a series of exterior beads extending in the axial direction and adapted to facilitate grasping of said second part and thereby manual fixing of the device to the wall, said beads being in one piece with said film.

41. A cable entry device adapted to be fixed to a wall blindly substantially as hereinbefore described with reference to the accompanying drawings.

42. A cable entry device substantially as hereinbefore described with reference to the accompanying drawings.