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(54) Connecting element for connecting a frame to a suspension element such as a wire

(57) A connecting element (1) for connecting a frame to a suspension wire (3) comprises a wire conducting body (10) having clamping means for receiving and holding the suspension wire (3); and an engaging block (15) that is designed to be put in engagement with retaining strips (25, 26) arranged at a circumferential rim (2) of the frame.

The engaging block (15) has a rectangular circumferential surface (16), and, in an initial position, is inserted into a receiving space (27) which is partially enclosed by the retaining strips (25, 26), via an opening (28) between the retaining strips (25, 26). The engaging block (15) is put to an end position by means of a rotational movement, in which the engaging block (15) is no longer capable of moving beyond the retaining strips (25, 26). The thus obtained connection between the connecting element (1) and the frame is secured by tightening the engaging block (15) against the retaining strips (25, 26), wherein a portion of the engaging block (15) is positioned in the opening (28) between the retaining strips (25, 26).

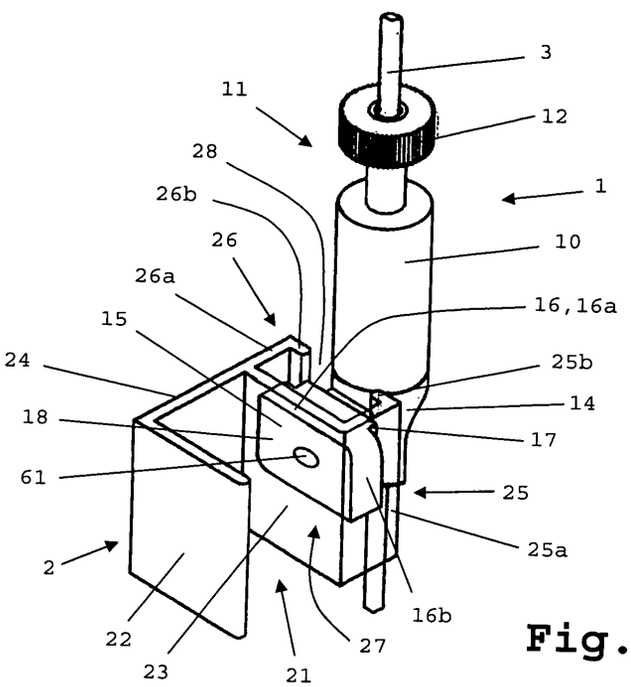

Fig. 1

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Description

[0001] The present invention relates to a connecting element for establishing a connection between a frame having retaining means on the one hand and a suspension element such as a wire on the other hand, comprising an engaging member that is designed to get at least partially received by the retaining means of the frame, in order to come in engagement with these retaining means.

[0002] In the following, the term "frame" is used to indicate a device having a holder for receiving and displaying objects such as posters, photos, or the like. In a well-known embodiment, the holder comprises a front plate and a back plate, wherein the objects to be displayed are clamped between the front plate and the back plate. In order to be capable of displaying inserted objects, the front plate is manufactured from a transparent material such as glass. Among others, the back plate serves for giving strength, and may be manufactured from hardboard, for example.

[0003] In many cases, the frame comprises a circumferential rim for rimming the holder. Such a circumferential rim can be provided with a groove for receiving a circumferential edge of both the front plate and the back plate, so that the front plate and the back plate are pressed against each other when the circumferential rim is arranged around the front plate and the back plate.

[0004] Various possibilities exist for positioning a frame. In the first place, it is possible to choose for positioning a frame on a basis, wherein a support connected to the frame is used for the purpose of supporting the frame on the basis in a stable manner. In the second place, it is possible to choose for hanging a frame against a wall, wherein a supporting element such as a screw, nail, hook or the like is used, which is attached to the wall or a ceiling, and which serves for supporting the frame. The present invention is in the context of hanging a frame.

[0005] For the purpose of hanging a frame, a large number of different constructions have been developed. In a simple construction, the frame comprises a receiving eye, and a screw, nail, or another suitable supporting element is arranged in a wall, after which the frame is hung against the wall by moving the receiving eye beyond a head of the screw or the nail, and subsequently letting it rest on a shank of the screw or the nail. In such a construction, the position of the frame against the wall is mainly determined by the position of the screw or the nail.

[0006] In view of the wish to be capable of varying the position of the frame against the wall, and to prevent damage of the wall by a supporting element, other constructions have been developed. In another known construction, a suspension wire and a suspension hook which is clamped on the suspension wire are used, wherein the suspension wire is attached to a supporting element on the one hand, and to the frame on the other hand, through the suspension hook. Usually, the frame is provided with a cord arranged at its back side, with which the frame can be hung on the suspension hook. In this construction, it is possible to choose a suitable position for the supporting element, so that it can be prevented that the wall gets damaged, indeed. In case of a fixed position of the supporting element, it is also possible to vary a height of the position of the frame against the wall, namely by varying the position of the suspension hook on the suspension wire.

[0007] It is an objective of the present invention to provide a connecting element having an engaging member, wherein the engaging member is adapted to come in engagement with retaining means provided on the frame, and wherein the connecting element is adapted to establishing such a secure connecting between the engaging member and the retaining means of the frame, that there is no chance of the engagement between the engaging member and the retaining means of the frame getting canceled in an undesired manner, for example under the influence of the weight of the frame.

[0008] The set objective is reached by means of a connecting element which comprises the following means besides the engaging member:

- tightening means which are adapted to fix a position of the connecting element with respect to the retaining means of the frame by tightening the engaging member against the retaining means when the engaging member is in engagement with the retaining means; and
- locking means which are adapted to prevent a rotation of the engaging member with respect to the retaining means of the frame when the engaging member is tightened against the retaining means by applying the tightening means.

[0009] The engaging member of the connecting element according to the present invention is designed to come in engagement with the retaining means of the frame. In a preferred embodiment, the engaging member is adapted to do so by means of a rotation. When such an embodiment is applied, the connecting element may be connected to the frame in a very simple manner. In order to establish the connection, all that is necessary is inserting the engaging member into the retaining means, and subsequently rotating the engaging member. The angle about which the rotation needs to take place in order to realize that the engaging member comes in engagement with the retaining means is dependent of the design of the engaging member and the retaining means, and can be 90°, for example.

[0010] For example, the engaging member can be designed in such a way that a dimension of the engaging member in a first direction deviates from a dimension of the engaging member in a second direction, wherein the first and second direction are mutually different. In case of such a design, it can be realized that, in a first position,

the engaging member can be moved through an opening having certain dimensions, while, in a second position, the connecting member is retained by a rim of the opening, and, as a consequence, can not be moved through the opening. In this way, it is possible to insert the engaging member into a space which accessible by means of an opening, and subsequently retain it in that space, for example.

[0011] According to the invention, the connecting element comprises tightening means for putting the engaging member in a tightened condition by tightening it against the retaining means when it is in engagement with the retaining means, and locking means which are adapted to prohibiting a rotation of the engaging member with respect to the retaining means, in a tightened condition of the engaging member. As a consequence thereof, in the tightened condition of the engaging member, it can not happen that the engagement between the engaging member and the retaining means gets lost.

[0012] In a practical embodiment, the tightening means may comprise a bolt and an opening having thread for receiving the bolt, arranged in the engaging member. In that case, the engaging member can be put in the tightened condition by moving an end of the bolt toward a certain portion of the retaining means by means of a screwing motion, as a result of which the engaging member moves toward an opposite portion. In this way, it is possible to finally reach a condition in which the end of the bolt contacts the one portion, while the engaging member contacts the opposite portion.

[0013] In a preferred embodiment of the connecting element according to the present invention, the locking means are adapted to establishing an engagement between the engaging member and the retaining means of the frame, which is closed as a result of an interaction of the shapes of the engaging member and the retaining means, when the engaging member is tightened against the retaining means by applying the tightening means. As long as the engaging member has not been put in the tightened condition yet, the engaging member can be rotated with respect to the retaining means. However, as soon as the tightening means are applied, the engaging member is tightened against the retaining means, wherein the engaging member also comes in an engagement with the retaining means, which is closed as a result of an interaction of the shapes of the engaging member and the retaining means. In that case, rotation of the engaging member with respect to the tightening means is no longer possible, and the connection between the engaging member and the retaining means is secured.

[0014] In a practical embodiment, the locking means comprise two opposite recessed parts of a circumferential surface of the engaging member. As a result of the recessed location of these parts with respect to the other parts of the circumferential surface, it is prevented that these parts contact the retaining means when the engaging member is not in the tightened condition, while it can be realized that the recessed parts do come in contact with parts of the retaining means when the engaging member is put in the tightened condition by applying the tightening means.

[0015] When the connecting member according to the present invention is applied, it is not necessary that the frame is provided with extra components for the purpose of hanging the frame, because the retaining means can be an integral part of a circumferential rim of the frame.

[0016] A connecting element is known from EP 0 486 981, which is designed for hanging an object on a wire. A first portion of the connecting element is adapted to engage the wire, while a second portion of the connecting element is adapted to establishing a connecting to the object. More in particular, the second portion is provided with internal thread, so that a connecting bolt may be received in the second portion. In that case, a free end of the connecting bolt can be used for establishing a connection to the object concerned. In one of the shown possibilities, a nut is arranged at the free end of the connecting bolt, which nut is provided with a flange having an oval circumferential surface. Additionally, it is shown that the flange is designed to be put in engagement with an open rail located on a housing of a lighting apparatus. However, no additional means are provided for tightening the flange against parts of the rail. Moreover, additional means for locking a connecting between the flange and the rail are absent. It is due to the fact that the connecting element according to the present invention comprises tightening means and locking means as described in the foregoing that this connecting element deviates from the connecting element know from EP 0 486 981 to an important extent.

[0017] The present invention will be explained in more detail on the basis of the following description of the invention with reference to the drawing, in which equal reference signs indicate equal or similar components, and in which:

figure 1 shows a perspective view of a connecting element according to the present invention, a portion of a circumferential rim of a frame the connecting element is connected to, and a portion of a suspension wire the connecting element is connected to as well;

figure 2 shows a back view of the connecting element and the portion of the circumferential rim shown in figure 1;

figure 3 shows a perspective view of a supporting body and an engaging block of the connecting element;

figure 4 shows a perspective view of the engaging block and a portion of the supporting body of the connecting element connected thereto;

figure 5 shows a top view of the connecting element and a portion of the circumferential rim;

figure 6 also shows a top view of the connecting element and a portion of the circumferential rim,

wherein the engaging block of the connecting element is in a tightened condition;
figure 7 illustrates the way in which a frame can be hung against a wall by applying two connecting elements according to the present invention, two suspension wires and two supporting elements; and
figure 8 illustrates the way in which a connection between the connecting element according to the present invention and the circumferential rim of the frame is established.

[0018] Figures 1, 2, 5 and 6 show a connecting element 1 according to the present invention, as well as a portion of a circumferential rim 2 of a frame. Additionally, figure 1 shows a portion of a suspension wire 3 to which the connecting element 1 is attached, in a way which will be described in more detail below. For the sake of clarity, in figure 1, the connecting element 1 and the portion of the suspension wire 3 are completely shown, in spite of the fact that said connecting element 1 and said portion of the suspension wire 3 are partially located behind the shown portion of the circumferential rim 2.

Figure 7 shows, among other things, a frame 4 of which the circumferential rim 2 is part, wherein a display side of the frame 4 is depicted. For the sake of clarity, the circumferential rim 2 of the frame 4 is shown as being transparent, so that two connecting elements 1 and portions of two suspension wires 3, which are located behind the circumferential rim 2, are visible.

In the following, terms such as "top", "bottom", "front", "back", "outside" and "inside" are related to the orientation of the connecting element 1, the circumferential rim 2, the suspension wire 3 and the frame 4 as shown in figures 1 and 7. It will be clear that the choice for this orientation as a reference should not be understood such as to have a limiting effect.

[0019] The connecting element 1 comprises a wire conducting body 10, which serves for establishing a connecting between the connecting element 1 and the suspension wire 3. Inside the wire conducting body 10, in a manner known per se, clamping means (not shown) are provided, which are capable of engaging and holding the suspension wire 3. In the shown example, an operating pen 11 for operating the clamping means is provided, wherein a head 12 of the operating pen 11 is located at a top side of the wire conducting body 10. Contact between the clamping means and the suspension wire 3 can be temporarily broken by pushing the head 12 of the operating pen 11 in the direction of the other part of the wire conducting body 10. For the purpose of receiving and conducting the suspension wire 3, the operating pen 11 is provided with a through-hole 13.

[0020] In figure 7, it is shown that the suspension wire 3 is attached to a supporting element 5 such as a screw, a nail or a hook, at a top end 31. The material of the suspension wire 3 may be chosen freely, wherein it is desirable to have material that is somewhat elastic, in view of a good connection between the suspension wire 3 and the connecting element 1. A suitable material for the suspension wire 3 is nylon. However, the suspension wire 3 can also be manufactured from steel, for example.

[0021] In figure 7, it can be seen that the frame 4 has a rectangular circumference, and that, as a consequence, the circumferential rim 2 comprises four circumferential parts, namely a top part 2a, a bottom part 2b and two side parts 2c.

The circumferential rim 2 is provided with a space 21 for receiving a front plate and a back plate of the frame 4, for example. At a front side, this space 21 is delimited by a front border 22 of the circumferential rim 2, and, at a back side, by a back border 23 of the circumferential rim 2, wherein the front border 22 and the back border 23 are located at a distance with respect to each other. An outer border 24 extends between the front border 22 and the back border 23 of the circumferential rim 2, which is connected to the front border 22 of the circumferential rim 2 over an angle of substantially 90° on the one hand, and which is connected to the back border 23 of the circumferential rim 2 over an angle of substantially 90° on the other hand.

At a back side of the back border 23 of the circumferential rim 2, an inner retaining strip 25 and an outer retaining strip 26 are extending, wherein both retaining strips 25, 26 have an L-shaped cross-section. Relatively long parts 25a, 26a of the retaining strips 25, 26 extend at a distance with respect to each other, substantially parallel to each other, while relatively short parts 25b, 26b of the retaining strips 25, 26 are oriented such as to face each other. In the shown example, the relatively long part 26a of the outer retaining strip 26 extends in the same plane as the outer border 24. A receiving space 27 is enclosed by the back side of the back border 23 and the two retaining strips 25, 26, which is only accessible via an opening 28 between the relatively short parts 25b, 26b of the retaining strips 25, 26.

[0022] At a bottom side of the wire conducting body 10 of the connecting element 1, a supporting body 14 and an engaging block 15 are present, wherein the supporting body 14 is connected to the bottom side of the wire conducting body 10, and wherein the engaging block 15 projects from the supporting body 14. The entirety of supporting body 14 and engaging block 15 is shown in figure 3.

The engaging block 15 has a rectangular circumferential surface 16, and the dimensions of the engaging block 15 are adapted to the dimensions of the opening 28 giving access to the receiving space 27, wherein a relatively small dimension of the engaging block 15 is smaller than a dimension of the opening 28 between the two opposite retaining strips 25, 26, and wherein a relatively large dimension of the engaging block 15 is larger than the dimension of the opening 28 between the two opposite retaining strips 25, 26. Because the relatively small dimension of the engaging block 15 is small-

er than the dimension of the opening 28 between the two opposite retaining strips 25, 26, it is possible to move the engaging block 15 between the retaining strips 25, 26 and insert the engaging block 15 into the receiving space 27. Because the relatively large dimension of the engaging block 15 is larger than the dimension of the opening 28 between the two opposite retaining strips 25, 26, it is possible to retain the engaging block 15 in the receiving space 27.

[0023] In the following, it will be explained in more detail how a connection between the connecting element 1 and the circumferential rim 2 of the frame 4 is established, wherein, among others, reference is made to figure 8.

In figure 8, an initial position of the connecting element 1 with respect to the circumferential rim 2 is diagrammatically depicted by means of dashed lines, while an end position of the connecting element 1 with respect to the circumferential rim 2 is depicted by means of continuous lines.

In the initial position, the engaging block 15 of the connecting element 1 has just been inserted in the receiving space 27, via the opening 28. In this position, relatively long parts 16a of the circumferential surface 16 of the engaging block 15 extend substantially parallel to the relatively long parts 25a, 26a of the retaining strips 25, 26. It is possible to insert the engaging block 15 from the outside into the receiving space 27, because a distance between the relatively long parts 16a of the circumferential surface 16 of the engaging block 15 is smaller than the distance between the relatively short parts 25b, 26b of the retaining strips 25, 26.

The connecting element 1 is put from the initial position to the end position by moving the connecting element 1 with respect to the circumferential rim 2. More in particular, the connecting element 1 is rotated with respect to a rotation axis extending perpendicular with respect to a front surface 18 and a back surface 19 of the engaging block 15. In figure 8, this rotational movement is diagrammatically depicted by means of an arrow.

In order to allow for the rotational movement of the engaging block 15 to take place in the receiving space 27, and to realize that this movement takes place in a smooth manner, at least two corner regions of the circumferential surface 16 are round. Because of this, collision between the corner regions of the circumferential surface 16 and the relatively long parts 25a, 26a of the retaining strips 25, 26 are prevented.

When the connecting element 1 has assumed the end position with respect to the circumferential rim 2, relatively short parts 16b of the circumferential surface 16 of the engaging block 15 extend substantially parallel to the relatively long parts 25a, 26a of the retaining strips 25, 26. In this position, a movement of the engaging block 15 in a direction substantially perpendicular to the front border 22 and the back border 23 of the circumferential rim 2 is prevented by the relatively short parts 25b, 26b of the retaining strips 25, 26. As a consequence, the engaging block 15 is not capable of moving out of the receiving space 27 in said direction.

[0024] According to an important aspect of the present invention, the connecting element 1 is provided with means for fixing the engaging block 15 in the receiving space 27, in the end position of the connecting element 1 with respect to the circumferential rim 2. For example, the connecting element 1 is provided with a threaded opening 61 having thread, which extends through the supporting body 14 and the engaging block 15, and with a bolt 6 arranged in said threaded opening 61. A part of a shank of the bolt 6 is diagrammatically shown in figure 6. Furthermore, the circumferential surface 16 of the engaging block 15 is provided with two opposite recessed parts 17, which extend in a direction in which a short axis of the rectangular engaging block 15 is extending, and which are located at a side with which the engaging block 15 is connected to the supporting body 14. The thus obtained stepped appearance of the engaging block 15 is clearly visible in figure 4.

[0025] In the following, it will be explained how the engaging block 15 is fixed in the receiving space 27, especially on the basis of figures 5 and 6.

In figure 5, it can be seen that the engaging block 15 fits entirely in the receiving space 27. As long as the front surface 18 of the engaging block 15 contacts the back border 23 of the circumferential rim 2, it is possible for a rotation of the engaging block 15 to take place in the receiving space 27. In the position of the engaging block 15 shown in figure 5, the circumferential rim 2 is supported on the basis of frictional forces acting at the places where the circumferential surface 16 of the engaging block 15 contacts the relatively long parts 25a, 26a of the retaining strips 25, 26.

In the end position of the connecting element 1, by screwing tighter the bolt 6 in the direction of the back border 23 of the circumferential rim 2, the engaging block 15 is moved away from the back border 23, until the back surface 19 of the engaging block 15 comes in contact with the relatively short parts 25b, 26b of the retaining strips 25, 26. By screwing the bolt 6 somewhat further, the engaging block 15 is put in a tightened condition, in which it contacts the relatively short parts 25b, 26b under the influence of pressure.

In the tightened condition of the engaging block 15 in the receiving space 27, the circumferential rim 2 is not only supported on the basis of frictional forces acting at places where the circumferential surface 16 of the engaging block 15 contacts the relatively long parts 25a, 26a of the retaining strips 25, 26, but also on the basis of frictional forces acting at places where the back surface 19 of the engaging block 15 contacts the relatively short parts 25b, 26b of the retaining strips 25, 26. By putting the engaging block 15 in the tightened condition, the contacting surface between the engaging block 15 and the retaining strips 25, 26 is increased, and a better fixation of the engaging block 15 in the receiving space 27 is obtained.

[0026] A mutual distance between the recessed parts 17 of the circumferential surface 16 of the engaging block 15 is adapted to the dimension of the opening 28 between the two opposite retaining strips 25, 26 in such a way that a portion of the engaging block 15 having the recessed parts 17 is capable of moving in the opening 28 in an exact fitting manner. Due to this, it is achieved that, in the tightened condition of the engaging block 15, the recessed parts 17 of the circumferential surface 16 contact the relatively short parts 25b, 26b of the retaining strips 25, 26. Consequently, in the tightened condition of the engaging block 15, a rotation of the engaging block 15 is not only prevented on the basis of frictional forces; in the tightened condition, such a rotation can not take place at all, because the portion of the engaging block 15 having the recessed parts 17 is locked in the rotation plane, between the relatively short parts 25b, 26b of the retaining strips 25, 26. On the basis of the foregoing, it will be clear that when the engaging block 15 is tightened against the relatively short parts 25b, 26b with the help of the bolt 6, a secure connection between the connecting element 1 and the circumferential rim 2 of the frame 4 is obtained, wherein rotation of the connecting element 1 with respect to the circumferential rim 2 is impossible.

[0027] In stead of a bolt 6 and a threaded opening 61, it is also possible that a spring or other suitable tensioning means are used.

[0028] When the connecting element 1 is in the end position with respect to the circumferential rim 2, and the engaging block 15 is tightened against the retaining strips 25, 26 by means of the bolt 6, the position of the connecting element 1 with respect to the circumferential rim 2 is fixed. When the position of the connecting element 1 with respect to the suspension wire 3 is fixed as well, by means of clamping means which are located in the wire conducting body 10 of the connecting element 1, a connection between the frame 4 on the one hand and the suspension wire 3 on the other hand is obtained. This connection can be released, on the one hand by screwing the bolt 6 out of the threaded opening 61 and moving the connecting element 1 back from the end position to the initial position with respect to the circumferential rim 2, and, on the other hand, by releasing the action of the clamping means on the suspension wire 3. In practice, in many cases, it will not be necessary to release both the connection between the connecting element 1 and the circumferential rim 2 and the connection between the connecting element 1 and the suspension wire 3. For the purpose of positioning the frame 4 in a direction along the suspension wire 3, it can be sufficient to only release the connection between the connecting element 1 and the suspension wire 3.

[0029] With the help of the connecting element 1 according to the present invention, it is possible to realize a secure connection between the frame 4 on the one hand and the suspension wire 3 on the other hand, wherein the position of the connecting element 1 with respect to both the suspension wire 3 and the circumferential rim 2 of the frame 4 is fixed in all directions. When the connecting element 1 according to the present invention is applied, it is also possible to release a connection that has been once established in a simple manner, so that the frame 4 can be put to a desired position in a simple manner.

It is not necessary that the relatively large dimension of the engaging block 15 corresponds to a distance between the relatively long parts 25a, 26a of the retaining strips 25, 26, but it is advantageous, because due to this, it can be achieved that, in the end position of the connecting element 1 with respect to the circumferential rim 2, the relatively short parts 16b of the circumferential surface 16 of the engaging block 15 contact inner surfaces of said long parts 25a, 26a of the retaining strips 25, 26. As has already been described in the above, in such a case, in the end position of the connecting element 1 with respect to the circumferential rim 2, a movement of the engaging block 15 is counteracted by frictional forces acting at places where the relatively short parts 16b of the circumferential surface 16 of the engaging block 15 on the one hand and the inner surfaces of the relatively long parts 25a, 26a of the retaining strips 25, 26 on the other hand are contacting each other. According to an advantageous option, the relatively short parts 16b of the circumferential surface 16 of the engaging block 15 is roughened, in order to increase the friction between the relatively short parts 16b of the circumferential surface 16 of the engaging block 15 on the one hand and the inner surfaces of the relatively long parts 25a, 26a of the retaining strips 25, 26 on the other hand. For example, grooves may be arranged on the relatively short parts 16b of the circumferential surface 16 of the engaging block 15.

[0030] Furthermore, it is not necessary that the distance that is present between the recessed parts 17 of the circumferential surface 16 of the engaging block 15 is adapted to the dimension of the opening 28 between the two opposite retaining strips 25, 26 in such a way that the portion of the engaging block 15 having the recessed parts 17 is capable of moving between the retaining strips 25, 26 in an exact fitting manner. Within the scope of the present invention, it is possible that the indicated portion of the engaging block 15 is received in the opening 28 with more play than shown in figure 6. However, this is not preferred at all, because in that case, it is possible that limited rotation of the engaging block 15 takes place in the receiving space 27, wherein a skewness of the connecting element 1 with respect to the circumferential rim 2 may result.

[0031] In accordance with that which is shown in figure 7, the suspension wire 3 is normally substantially vertically oriented. As a consequence, the wire conducting body 10 of the connecting element 1 also normally extends in a substantially vertical direction. In the shown example, the relatively short parts 16b of the circumferential surface 16 of the engaging block 15 extend in a

direction substantially parallel to a longitudinal direction of the wire conducting body 10, while the relatively long parts 16a of the circumferential surface 16 of the engaging block 15 extend in a direction substantially perpendicular to said longitudinal direction of the wire conducting body 10. Since the relatively short parts 16b of the circumferential surface 16 of the engaging block 15 extend substantially parallel to the relatively long parts 25a, 26a of the retaining strips 25, 26 in the end position of the connecting element 1 with respect to the circumferential rim 2, the circumferential rim 2 is substantially vertically oriented when the wire conducting body 10 of the connecting element 1 is substantially vertically oriented. This means that the shown connecting element 1 is suitable for engaging the side parts 2c of the circumferential rim 2 of the frame 4. However, within the scope of the present invention, it is also possible that the relatively long parts 16a of the circumferential surface 16 of the engaging block 15 extend in a direction substantially parallel to a longitudinal direction of the wire conducting body 10, while the relatively short parts 16b of the circumferential surface 16 of the engaging block 15 extend in a direction substantially perpendicular to said longitudinal direction of the wire conducting body 10. In that case, the circumferential rim 2 is substantially horizontally oriented when the connecting element 1 is in the end position with respect to the circumferential rim 2 and the wire conducting body 10 of the connecting element 1 is substantially vertically oriented, and the connecting element 1 is suitable for engaging the top part 2a of the circumferential rim 2 of the frame 4.

[0032] In the case of the possibilities described in the preceding paragraph for the orientation of the rectangular engaging block 15 with respect to the longitudinal direction of the wire conducting body 10, it is assumed that the engaging block 15 is fixedly connected to the supporting body 14. However, an embodiment of the connecting element 1 in which it is possible to temporarily release the engaging block 15 and subsequently fix it with respect to the supporting body 14 is also feasible, so that the connecting element 1 may be adapted to the orientation of the retaining strips 25, 26 with which the engaging block 15 needs to be put in engagement in a simple manner. In such an embodiment, for example, the supporting body 14 is provided with several threaded openings, and the engaging block 15 is provided with a single threaded opening, so that it is possible to fix the engaging block 15 in different orientations with respect to the supporting body 14 by means of a bolt. In this respect, it is noted that it is possible to apply the bolt 6 which is applied for tightening the engaging block 15 against the retaining strips 25, 26 of the frame 4 also for the purpose of fixing the engaging block 15 with respect to the supporting body 14. Furthermore, in such an embodiment, surfaces over which the supporting body 14 and the engaging block 15 are contacting each other are preferably provided with teeth, so that said surfaces need to be moved away from each other first, before they can be rotated with respect to each other.

[0033] In figure 7, it is shown how a frame 4 can be hung against a wall 7 when two connecting elements 1 according to the present invention, two suspension wires 3 and two supporting elements 5 are applied. Each of the connecting elements 1 is connected to a side part 2c of the circumferential rim 2 of the frame 4 on the one hand and to a suspension wire 3 on the other hand. A top end 31 of each suspension wire 3 is connected to a supporting element 5, wherein each supporting element 5 rests on a top side 71 of the wall 7.

[0034] When the connecting element 1 according to the present inventio is applied, the frame 4 is suspended in a secure manner. It is not possible to remove the frame 4 from the connecting elements 1 without screwing the bolt 6 out of the threaded opening 61 and moving the connecting element 1 from the end position to the initial position with respect the side part 2c of the circumferential rim 2 by rotating the connecting element 1 and the side part 2c a quarter turn with respect to each other per connecting element 1. Moreover, the engaging block 15 of the connecting element 1 is retained by the retaining strips 25, 26, which are an integral part of the circumferential rim 2. Such a construction is more robust than a construction in which a connecting element is retained by additional means, which may break off the frame 4.

The application of the connecting element 1 according to the present invention offers relatively many possibilities for adjusting the position of the frame 4 with respect to the wall 7, because it is possible to change both the position of the connecting element 1 with respect to the suspension wire 3 and the position of the connecting element 1 with respect to the frame 4.

[0035] It will be clear to a person skilled in the art that the scope of the present invention is not limited to the examples discussed above, but that several amendments and modification thereof are possible without deviating from the scope of the invention as defined in the appended claims.

For example, an embodiment of the connecting element 1 according to the present invention in which the engaging block 15 is rotatable with respect to the other components of the connecting element 1 is feasible. In such an embodiment, for the purpose of establishing a connection between the connecting element 1 and the circumferential rim 2 of a frame 4, it is not necessary that all of the connecting element 1 is rotated a quarter turn with respect to the circumferential rim 2; it is sufficient that only the engaging block 15 is rotated, while the position of the other components of the connecting element 1 with respect to the circumferential rim 2 does not need to be changed.

It will be clear that when the connecting element 1 is connected to a side part 2c of the circumferential rim 2 of a frame 4, it is not necessary that the connecting element 1 is oriented with the head 12 of the operating

pen 11 at the top side and the supporting body 14 with the engaging block 15 at the bottom side. In principle, it is also possible that the connecting element 1 is oriented the other way round, i.e. with the supporting body 14 with the engaging block 15 at the top side and the head 12 of the operating pen 11 at the bottom side. Usually, the clamping means in the wire conducting body 10 are designed in such a way that the weight of the frame 4 is used for the purpose of tightening the clamping means around the suspension wire 3. In such a case, the orientation of the connecting element 1 is related to the action of the clamping means.

[0036] It is not necessary that the connecting element 1 has a block-shaped member such as the shown engaging block 15. Other members having other shapes are feasible, which, in a first position with respect to the circumferential rim 2, may be inserted into the receiving space 27, and which, after a rotation with respect to the circumferential rim 2 has taken place, assume a second position with respect to the circumferential rim 2, in which it is not possible to move the member beyond the relatively short parts 25b, 26b of the retaining strips 25, 26, and in which the member might contact the inner surfaces of the relatively long parts 25a, 26a of the retaining strips 25, 26. For example, the member may be shaped like a rod.

[0037] It is possible that the entire circumferential rim 2 is provided with retaining strips 25, 26, as shown in figure 7. That does not alter the fact that it is also possible that only the side parts 2c of the circumferential rim 2 comprise retaining strips 25, 26, for example. Apart from that, the frame 4 can also be provided with retaining strips 25, 26 at another place than the circumferential rim 2. In an alternative embodiment, the retaining strips 25, 26 are interrupted at certain places, so that the engaging block 15 of the connecting element 1 may be slid in the receiving space 27 enclosed by the retaining strips 25, 26, at the location of an interruption. When the engaging block 15 is initially oriented in such a way with respect to the retaining strips 25, 26 that the relatively short parts 16b of the circumferential surface 16 of the engaging block 15 extends parallel with respect to the relatively long parts 25a, 26a of the retaining strips 25, 26, it is no longer necessary that the engaging block 15 is rotated. Therefore, in such an embodiment, it is not necessary that the engaging block 15 is designed such as to be capable of moving between the retaining strips 25, 26 in a certain position. In that case, the various parts 16a, 16b of the circumferential surface 16 of the engaging block 15 may have the same length, for example.

When a connecting element 1 such as described on the basis of the figures is applied, a detachable connection between the retaining strips 25, 26 of the frame 4 and the connecting element 1 is obtained. This is an advantage, because in that case, it is possible, during positioning of the frame 4 with respect to the wall 7, to not only displace the connecting element 1 with respect to the suspension wire 3, but also with respect to the retaining strips 25, 26. However, that does not alter the fact that it is possible that the connecting element 1 comprises another engaging member, for example an elastic member which is compressed under the influence of a force and which may be moved between the retaining strips 25, 26, and which springs outward as soon as it is entirely present in the receiving space 27. Such an engaging member is snapped in the receiving space 27, as it were, and can not be moved out of the receiving space 27 in a direction perpendicular to the relatively short parts 25b, 26b of the retaining strips 25, 26, under normal conditions.

[0038] In the foregoing, a connecting element 1 for connecting a frame 4 to a suspension wire 3 is described, comprising a wire conducting body 10 having clamping means for receiving and holding the suspension wire 3; and an engaging block 15 that is designed to be put in engagement with retaining strips 25, 26 arranged at a circumferential rim 2 of the frame 4.

The engaging block 15 has a rectangular circumferential surface 16, and, in an initial position, is inserted into a receiving space 27 which is partially enclosed by the retaining strips 25, 26, via an opening 28 between the retaining strips 25, 26. By means of a rotational movement, the engaging block 15 is put to an end position in which the engaging block 15 is no longer capable of moving beyond the retaining strips 25, 26. When the connecting element 1 is in the end position, a connection between the connecting element 1 and the frame 4 is realized, which is secured by tightening the engaging block 15 against the retaining strips 25, 26, with the help of a bolt 6. Because the circumferential surface 16 of the engaging block 15 is provided with recessed parts 17 which are contacting the retaining strips 25, 26 in a tightened condition of the engaging block 15, while a portion of the engaging block 15 having the recessed parts 17 is located in an opening 28 between the retaining strips 25, 26, a connection which is closed as a result of an interaction of the shapes of the engaging block 15 and the retaining strips 25, 26 is obtained in the tightened condition, as a result of which rotation of the engaging block 15 with respect to the retaining strips 25, 26 is impossible.

Claims

1. Connecting element (1) for establishing a connection between a frame (4) having retaining means (25, 26) on the one hand and a suspension element (3) such as a wire on the other hand, comprising:

   - an engaging member (15) that is designed to get at least partially received by the retaining means (25, 26) of the frame (4), in order to come in engagement with these retaining means (25, 26);
   - tightening means (6, 61) which are adapted to

fix a position of the connecting element (1) with respect to the retaining means (25, 26) of the frame (4) by tightening the engaging member (15) against the retaining means (25, 26) when the engaging member (15) is in engagement with the retaining means (25, 26); and

- locking means which are adapted to prevent a rotation of the engaging member (15) with respect to the retaining means (25, 26) of the frame (4) when the engaging member (15) is tightened against the retaining means (25, 26) by applying the tightening means (6, 61).

2. Connecting element (1) according to claim 1, wherein the locking means are adapted to establishing a engagement which is closed as a result of an interaction of the shapes of the engaging member (15) and the retaining means (25, 26) of the frame (4) when the engaging block (15) is tightened against the retaining means (25, 26) by applying the tightening means (6, 61).

3. Connecting element (1) according to claim 1 or 2, wherein the locking means comprise two opposite recessed parts (17) of a circumferential surface (16) of the engaging member (15).

4. Connecting element (1) according to any of claims 1-3, wherein the tightening means comprise a bolt (6) and an opening (61) having thread for receiving the bolt (6), arranged in the engaging member (15).

5. Connecting element (1) according to any of claims 1-4, wherein the engaging member (15) is adapted to come in engagement with the retaining means (25, 26) of the frame (4) by means of a rotation with respect to said retaining means (25, 26).

6. Connecting element (1) according to any of claims 1-5, wherein a dimension of the engaging member (15) in a first direction deviates from a dimension of the engaging member (15) in a second direction, which first and second direction are mutually different.

7. Connecting element (1) according to any of claims 1-6, wherein the engaging member (15) is block-shaped and comprises a substantially rectangular circumferential surface (16), and wherein at least two corner regions of the circumferential surface (16) are round.

8. Connecting element (1) according to any of claims 1-7, comprising a conducting body (10) having a through-hole (13) for receiving the suspension element (3), wherein the engaging member (15) has a relatively large dimension in a direction substantially perpendicular to a longitudinal direction of the through-hole (13), and wherein the engaging member (15) has a relatively small dimension in a direction substantially parallel to the longitudinal direction of the through-hole (13).

9. Assembly of at least one connecting element (1) according to any of claims 1-8 and a frame (4) having retaining means (25, 26) for receiving the engaging member (15) of the connecting element (1).

10. Assembly according to claim 9, wherein the retaining means (25, 26) of the frame (4) are an integral part of a circumferential rim (2) of the frame (4).

11. Assembly according to claim 9 or 10, wherein the locking means of the connecting element (1) comprise two opposite recessed parts (17) of a circumferential surface (16) of the engaging member (15), wherein a receiving space (27) is partially enclosed by a back side of a back border (23) of a circumferential rim (2) of the frame (4) and the retaining means (25, 26) of the frame (4), which is exclusively accessible via an opening (28) between two parts (25b, 26b) of the retaining means (25, 26), wherein a dimension of the engaging member (15) between the two recessed parts (17) of the circumferential surface (16) is substantially equal to a dimension of the opening (28) between the two parts (25b, 26b) of the retaining means (25, 26).

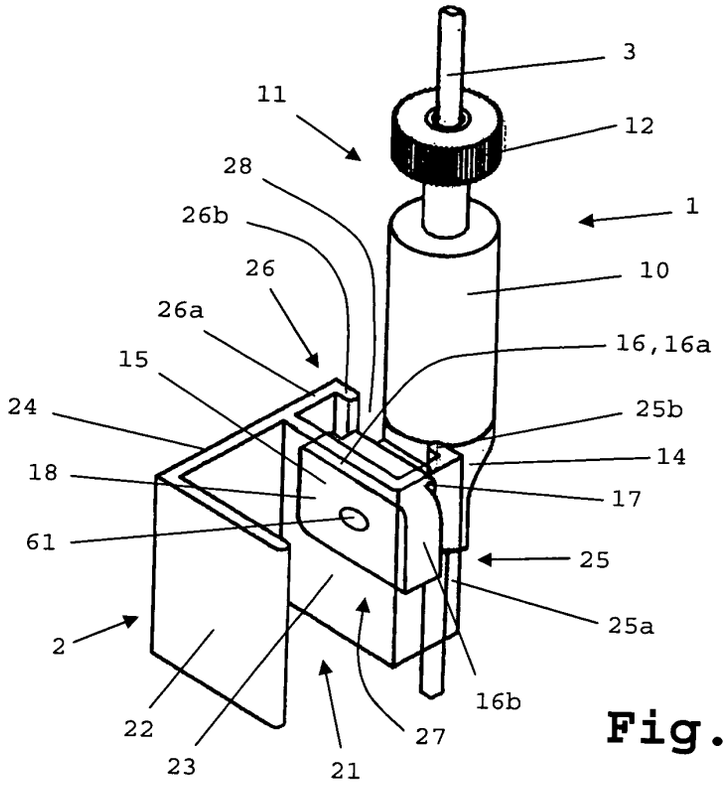


Fig. 1

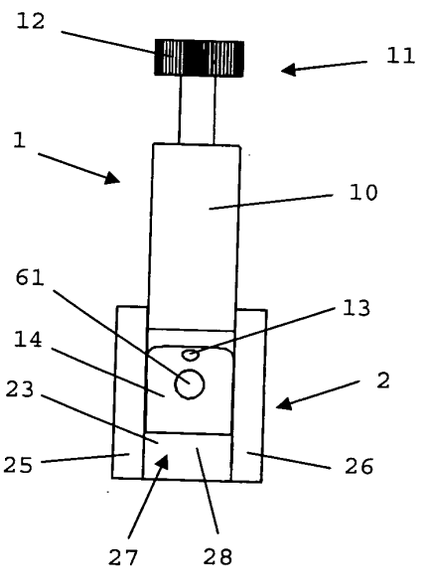


Fig. 2

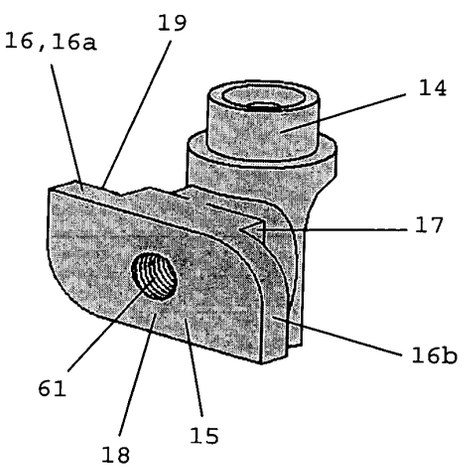


Fig. 3

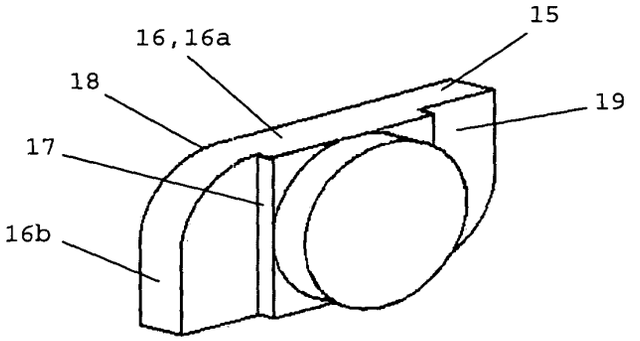


Fig. 4

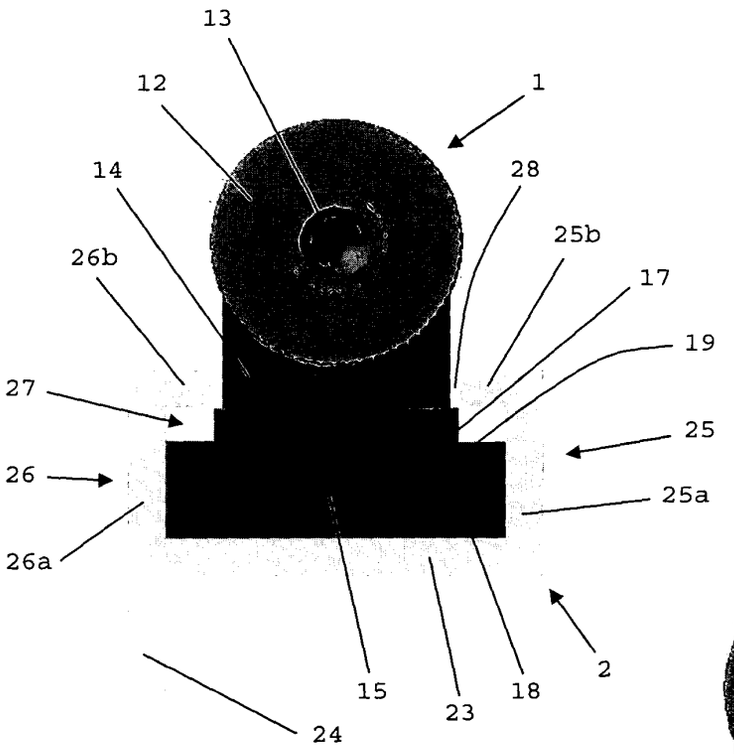


Fig. 5

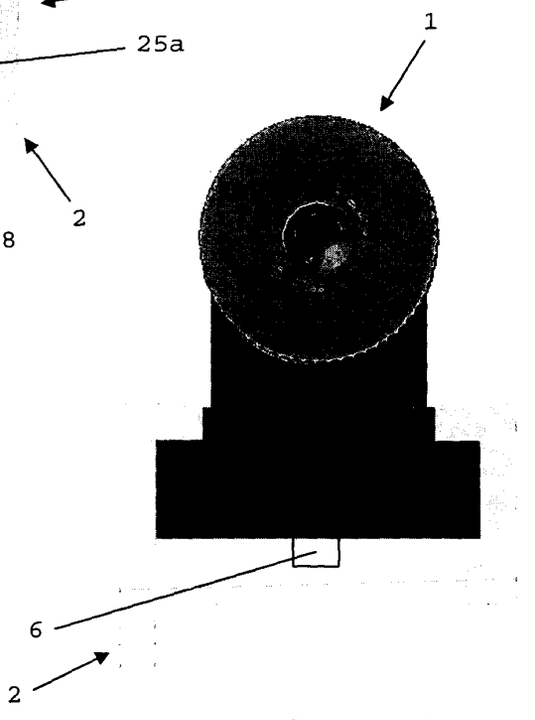


Fig. 6

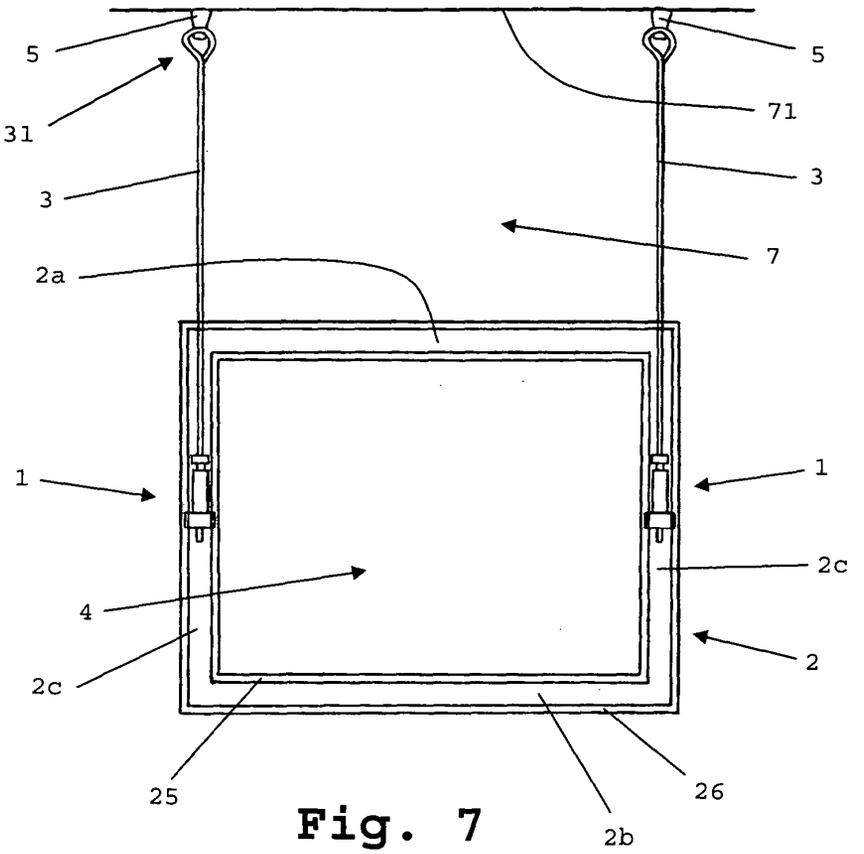
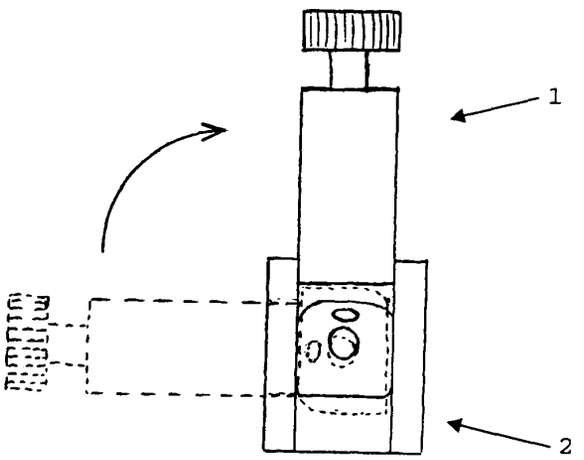


Fig. 7

Fig. 8



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Application Number
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