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(54) Arrangement for adjustably positioning magnetic proximity sensors, in particular for lifts

(57) Arrangement for adjustably positioning magnetic proximity sensors, in particular for lift and similar installations, comprising a support body (2) adapted to engage a magnetic sensor (3), coupling means (4) adapted to slidably engage at least a runner member (5), fastening means (6) adapted to cooperate with the support body (2) to lock the magnetic sensor (3) in position relative to the body (2) and fasten the body (2) to the runner member (5); the coupling means (4) comprise grooves (7, 8) provided in the support body (2) in directions extending perpendicular to each other so that the runner member (5) and the support body (2) are associable with each other by means of the grooves (7, 8) along all directions.

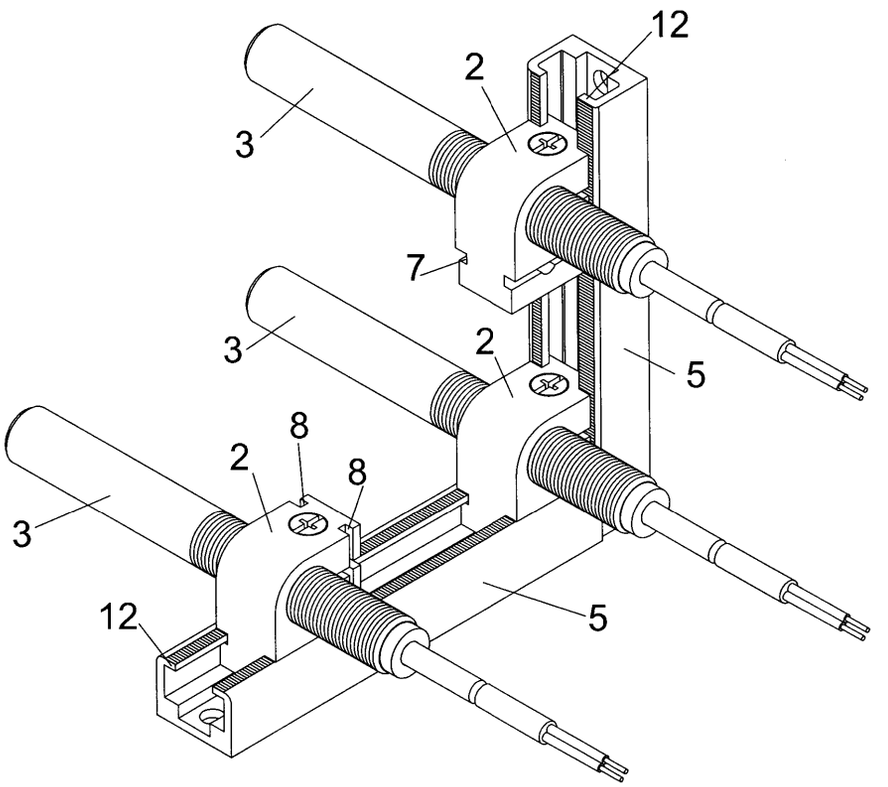

FIG. 6

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Description

[0001] The present invention refers to an arrangement for adjustably positioning magnetic proximity sensors, in particular for lifts and similar elevator apparatuses.

[0002] Arrangements of this kind are known in the art to comprise a support body made of plastics and generally constituted by a kind of sleeve, in which there is inserted a cylindrically shaped magnetic proximity sensor. This sleeve is provided with a through-hole, in which a screw of a diamagnetic material in inserted. This screw, by screwing into a corresponding nut, which is itself made of a diamagnetic material, tightens the sleeve, thereby clamping the sensor in position. Appropriate grooves are provided in the sleeve so as to allow the sleeve to slidably couple with a runner member. Of course, several sleeves may be inserted on the runner member, depending on the number of magnetic sensors that have to be used.

[0003] Once the sleeves are correctly positioned on the runner member, it is possible for the sensors to be inserted therein, while, by tightening the above-cited screw provided in the sleeve, the position of both the sleeve relative to the runner member and the sensor relative to the sleeve is finally secured.

[0004] The magnetic sensors must to be aligned at the same level, with respect to the cage of the lift, so as to deliver the necessary signals to the control logics and, in particular, to ensure that the signals themselves are indicative of the actual position of the lift cage.

[0005] The need arises in a number of cases for several sensors to be positioned not only in an in-line arrangement in the plane of the lift cage, but also in a vertical in-line arrangement, depending on the control strategy selected by the manufacturer of the lift plant itself in view of widening the control opportunities.

[0006] At the present time, such vertically aligned arrangement of the sensors is obtained by gluing or, anyway, attaching two sleeves upon each other or by using appropriate brackets that support the sensors in a vertical alignment relative to the sensors positioned therebelow by means of a sleeve and runner-member arrangement.

[0007] Anyway, all these positioning approaches share a major drawback in that they are rather labour-intensive and scarcely versatile.

[0008] In addition, with these positioning methods it proves rather complicated for the necessary accuracy to be obtained in aligning the sensors vertically, since the success of the related operation largely depends on the ability and skill of the people who actually glue the sleeves together and adjust the position of the support brackets.

[0009] Another major drawback lies in the fact that, in the case of sleeves glued together, the addition, the removal or the replacement of vertically aligned sleeves do not prove so easily done, since the sleeves are not interdependent relative to each other.

[0010] A further drawback lies in the fact that, when brackets are used to the purpose of providing such vertical alignment of the sensors, any variation that may possibly be required in the position of the sensors would unavoidably call for the bracket to be fastened in a different manner and, in some cases, the same bracket to be even modified.

[0011] It therefore is the object of the present invention to provide an arrangement for adjustably positioning magnetic proximity sensors, in particular for lifts and similar installations, which does away with the drawbacks and limitations of prior-art solutions.

[0012] Within this general object, it is a purpose of the present invention to provide an arrangement that is constructively simple and uses a reduced number of parts.

[0013] Another purpose of the present invention is to provide an arrangement that is effective in ensuring a maximum extent of safety.

[0014] Yet a further purpose of the present invention is to provide an arrangement that is highly reliable, relatively simple to manufacture and install, and is further capable of being produced at fully competitive costs.

[0015] According to the present invention, these aims, along with further ones that will be apparent from the following description, are reached in an arrangement for adjustably positioning magnetic proximity sensors, in particular for lifts and similar installations, that incorporates the features and characteristics as recited in the appended claims 1 et seq.

[0016] Features and advantages of the present invention will anyway be more readily understood from the description of an arrangement according to the present invention that is given below by way of non-limiting example with reference to the accompanying drawings, in which:

- Figure 1A is a perspective exploded view of a support body according to the present invention;
- Figure 1B is a similar perspective view as the one appearing in Figure 1, which however shows the support body in an assembled state thereof;
- Figure 2 is a perspective view of the arrangement according to the present invention, with the support body thereof adapted to be associated to the runner member along the first grooves;
- Figure 3 is a perspective view of the arrangement according to the present invention, with the support body thereof adapted to be associated to the runner member along the second grooves;
- Figure 4 is a perspective view of the arrangement according to the present invention, in which there is adapted to be mounted a magnetic proximity sensor;

- Figure 5 is a perspective view of the arrangement according to the present invention, in which a support body acts as a corner joint member between two perpendicular runner members associated thereto;

- Figure 6 is a perspective view of a structure for positioning magnetic proximity sensors, comprising a plurality of runner members.

[0017] With reference to the above-cited Figures, an arrangement for adjustably positioning magnetic proximity sensors, in particular for lifts or similar installations, according to the present invention, as indicated generally at 1 in the Figures, comprises a support body 2 adapted to engage a magnetic sensor 3, coupling means 4 adapted to slidably engage at least a guide member or runner 5, fastening means 6 adapted to cooperate with said support body 2 to secure both said magnetic sensor 3 in position relative to said support body 2 and said support body 2 relative to the guide member or runner 5.

[0018] According to the present invention, the coupling means 4 comprise grooves 7, 8 provided in said support body 2 and extending in mutually perpendicular directions, such that said runner member 5 and said support body 2 are capable of being associated with each other by means of said grooves 7, 8 along said directions.

[0019] With particular reference to Figures 1 to 3, in accordance with the present invention the support body 2 comprises a first arm 9 and a second arm 10 defining internally a cavity 11, in which the magnetic sensor 3 is capable of being removably inserted. In the embodiment being described by way of example, said cavity is constituted by a kind of cylindrical through-bore.

[0020] The coupling means 4 comprise a first pair of longitudinal grooves 7, which are provided to extend in a parallel arrangement on opposite sides of the second arm 10, and which extend over the entire length thereof along said second arm 10. Each groove of said first pair of grooves 7 is adapted to be slidably associated to a corresponding engagement edge 12 of the runner member 5, such that the support body 2 is constrained to slide along the runner element 5.

[0021] The two arms 9 and 10 are adapted to be tightened and clamped together by means of the fastening means 6 in such manner as to have the magnetic sensor locked in place within the cavity 11 in a pre-defined position. The fastening means 6 comprise a screw member adapted to engage a receptacle 13 that is defined on its whole by the first arm 9 and the second arm 10. The screw member is adapted to be screwed into said receptacle 13, the latter being possibly threaded accordingly, so as to bring the two arms 9 and 10 gradually closer to each other to eventually clamp the magnetic sensor 3 inside the cavity 11. In an advantageous manner, the screw member may be adapted to engage a threaded nut to be accommodated in a proper receptacle provided in the lower portion of the arm 10.

[0022] When screwed into the receptacle 13, the fastening means 6 are furthermore adapted to engage the second arm 10 at a point where said first pair of grooves 7 extend, in such manner as to practically deform the longitudinal contours of each groove of said first pair of grooves 7, thereby preventing the support body 2 from being able to displace relative to the runner member 5, and vice-versa, and locking the support body 2 itself in a pre-determined position along the runner member.

[0023] A second pair of parallel grooves 8 are provided in the support body 2 on opposite sides thereof. These grooves 8 extend in a direction that is perpendicular to the direction in which said first pair of grooves 7 extend. Each groove of said second pair of grooves 8 is adapted to be slidably associated to the corresponding engagement edge 12 of the runner member 5, such that the support body 2 is constrained to slide along the runner element 5.

[0024] More precisely, the second pair of grooves 8 extend in correspondence to the screw receptacle 13 on opposite sides relative to the support body 2 in the screwing/unscrewing direction of the fastening means 6. Each groove in this second pair of grooves 8 includes a first section extending along the first arm 9 and a second section extending along the second arm 10. These two sections are aligned such that each groove of this second pair of grooves 8 is adapted to slidably engage the engagement edge 12 of the runner member 5.

[0025] When screwed into the receptacle 13 to clamp the magnetic sensor 3, the fastening means 6 are adapted to deform the contours of the first and the second section of each groove of said second pair of grooves 8, thereby locking in place the support body 2 relative to the runner member 5 in a pre-determined position along the runner member 5.

[0026] This therefore makes it possible for the runner member 5 to be capable of being associated to either the first pair of grooves 7 or the second pair of grooves 8, depending on the actual needs. Furthermore, the support body 2 can be associated at the same time to two runner members 5 arranged perpendicular to each other along two pairs of grooves 7, 8. In this particular case, the support body 2 advantageously acts as an corner joint member between the two runner members 5 associated thereto, as this is best illustrated in Figure 5.

[0027] In an advantageous manner, by cooperating with the support body 2 via the screw receptacle 13 the fastening means 6 enable both the magnetic sensor 3 to be secured to the support body 2 and the support body 2 to be in turn secured to the respective perpendicularly arranged runner members 5.

[0028] It can moreover be readily appreciated that to these two runner members 5, so arranged perpendicularly via the support body 2, there can be associated other support bodies 2, so that, thanks to the first pair of grooves 7 and the second pair of grooves 8, the various

support bodies used in this way turn out to be aligned along the respective runner members 5. The support body 2 acting as an corner joint member between the two perpendicular runner members 5 turns in this way out as being perfectly aligned with the other support bodies 2 that may be possibly associated to the runner members 5.

[0029] In the case that a runner member 5 is secured - eg. horizontally - by using a support body 2 according to the present invention the possibility is given for a further runner member 5 to be secured in a vertical position, by coupling it to the pairs of grooves 7, 8 of the support body 2 that is not associated to the engagement edges 12 of the horizontally secured runner member 5. Further support bodies can be attached to the runner members 5 so that the magnetic sensors 3, which are clamped in the respective support bodies 2, turn out to be perfectly aligned both horizontally and vertically, regardless of the pair of grooves 7, 8 that are actually used for inserting the support bodies 2 in the respective runner members 5.

[0030] It can be further readily appreciated that, by using a plurality of support devices according to the present invention, the possibility is given for the runner members 5 to be combined in a wide variety of manners, thereby creating complex structures for positioning the magnetic sensors 3 accordingly, so as illustrated in Figure 6.

[0031] Fully apparent from the above description is therefore the ability of the the present invention to effectively reach the afore cited aims and advantages by providing an arrangement for adjustably positioning magnetic proximity sensors, in particular for lifts and similar installations, which enables to align the sensors vertically in a most simple and accurate manner.

[0032] A major advantage of the arrangement according to present invention lies in it being particularly simple from a construction point of view, as well as extremely reliable.

[0033] Another advantage of the arrangement according to present invention lies in the fact that it enables quite complex structures to be created for positioning ther magnetic proximity sensors in an extremely versatile manner.

[0034] It shall be appreciated that the arrangement according to the present invention is subject to a number of modifications and may be embodied in a number of different manners without departing from the scope of the present invention as defined in the appended claims. It should be also appreciated the materials used, as well as the sizing thereof, may each time be selected so as to more appropriately meet the particular requirements or suit the particular application.

Claims

1. Arrangement for adjustably positioning magnetic proximity sensors, in particular for lift and similar installations, comprising a support body (2) adapted to engage a magnetic sensor (3), coupling means (4) adapted to slidably engage at least a runner member (5), fastening means (6) adapted to cooperate with said support body (2) to lock said magnetic sensor (3) in position relative to said body (2) and fasten said body (2) to said runner member (5), **characterized in that** said coupling means (4) comprise grooves (7, 8) provided in said support body (2) in directions extending perpendicular to each other so that said runner member (5) and said support body (2) are associable with each other by means of said grooves (7, 8) along all directions.

2. Arrangement according to claim 1, **characterized in that** said support body (2) comprises a first arm (9) and a second arm (10) defining internally a cavity (11), in which there is adapted to be removably engaged said magnetic sensor (3).

3. Arrangement according to claim 2, **characterized in that** said coupling means (4) comprise first grooves (7), which are provided parallel to each other on opposite sides of said second arm (10) and extend along said arm (10) all over their length.

4. Arrangement according to any of the preceding claims or a combination thereof, **characterized in that** said arms (9, 10) are adapted to be tightened together by means of fastening means (6), so as to clamp the sensor (3) and lock it in place within the cavity (11) in a pre-defined position.

5. Arrangement according to any of the preceding claims or a combination thereof, **characterized in that** said fastening means (6) comprise a screw member adapted to engage a receptacle (13) that is jointly defined by the first arm (9) and the second arm (10).

6. Arrangement according to any of the preceding claims or combination thereof, **characterized in that** said fastening means (6) are adapted to engage said second arm (10) in correspondence to said first grooves (7) so as to deform said first grooves (7), thereby locking the support body (2) in a pre-determined position along the runner member (5).

7. Arrangement according to claim 1, **characterized in that** said coupling means (4) comprise second grooves (8) provided on opposite sides of the support body (2), said second grooves (8) extending in a direction that is perpendicular to the direction in which said first grooves (7) extend.

8. Arrangement according to claim 7, **characterized**

in that said second grooves (8) comprise a first section provided along the first arm (9) and a second section provided along the second arm (10).

9. Arrangement according to any of the claims 7 and 8 or a combination thereof, **characterized in that** said fastening means (6) are adapted to deform the contours of the first and the second section of said second grooves (8) to lock the support body (2) relative to the runner member (5) in a pre-determined position along the runner member (5).

10. Arrangement according to any of the preceding claims or combination thereof, **characterized in that** said support body (2) is associable to two runner members (5) arranged perpendicularly relative to each other along said first and said second grooves (7, 8), said support body (2) acting as a corner joint member between said two runner members (5) associated thereto.

11. Arrangement according to any of the preceding claims or combination thereof, **characterized in that** said fastening means (6) are adapted to cooperate with said support body (2) via the screw receptacle (13) to enable the magnetic sensor (3) to be secured to the support body (2) and the support body (2) to be secured to said two perpendicularly arranged runner members (5).

12. Arrangement according to any of the preceding claims or combination thereof, **characterized in that** a plurality of support bodies (2) are associable, by means of said first and second grooves (7, 8), to the two perpendicularly arranged runner members (5) to provide a structure for positioning magnetic sensors (3) that comprises a plurality of runner members (5).

13. Arrangement according to any of the preceding claims or combination thereof, **characterized in that** the magnetic sensors (3) associable to the respective support bodies (2) are aligned along each one of the runner members (5), regardless of the grooves (7, 8) that are actually used to associate the support bodies (2) to the respective runner members (5).

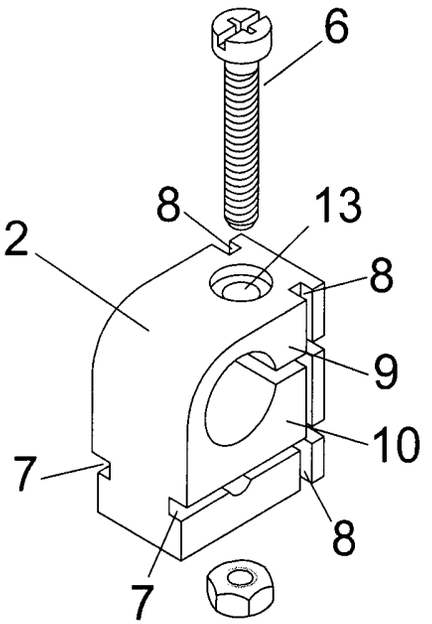

FIG. 1A

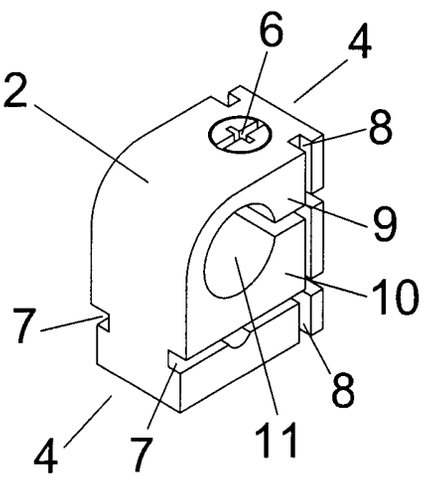

FIG. 1B

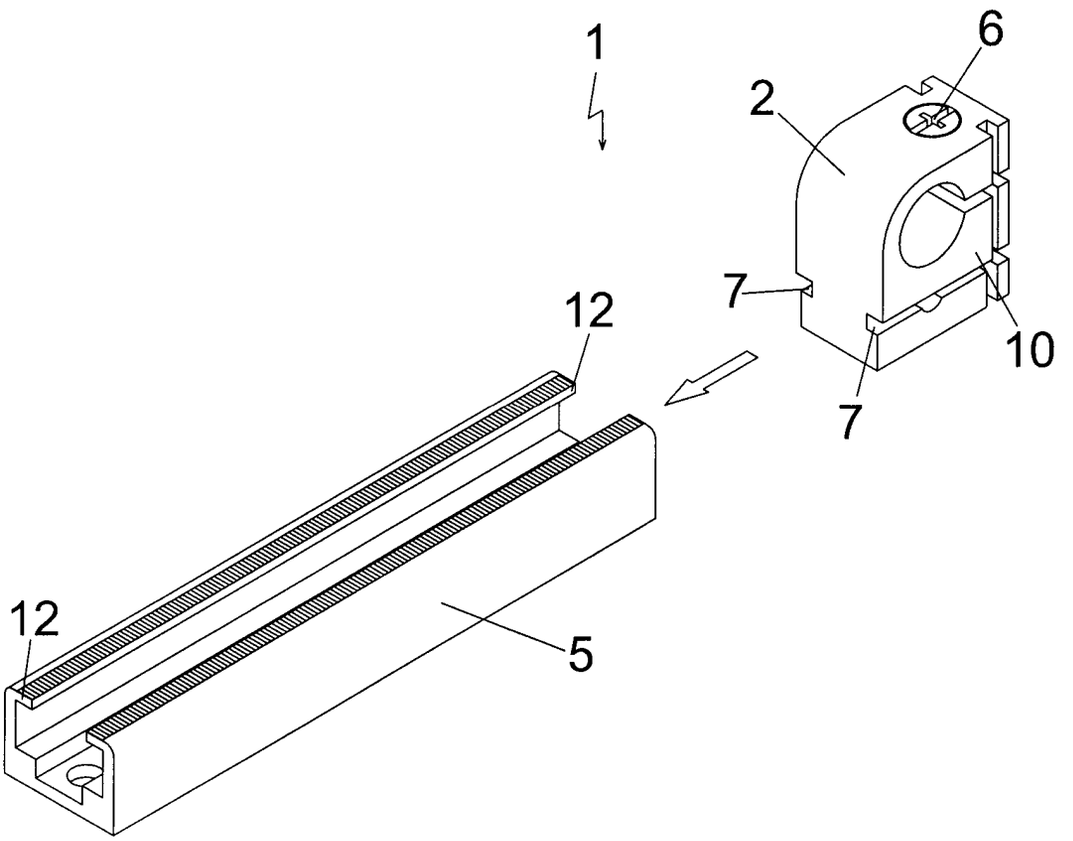

FIG. 2

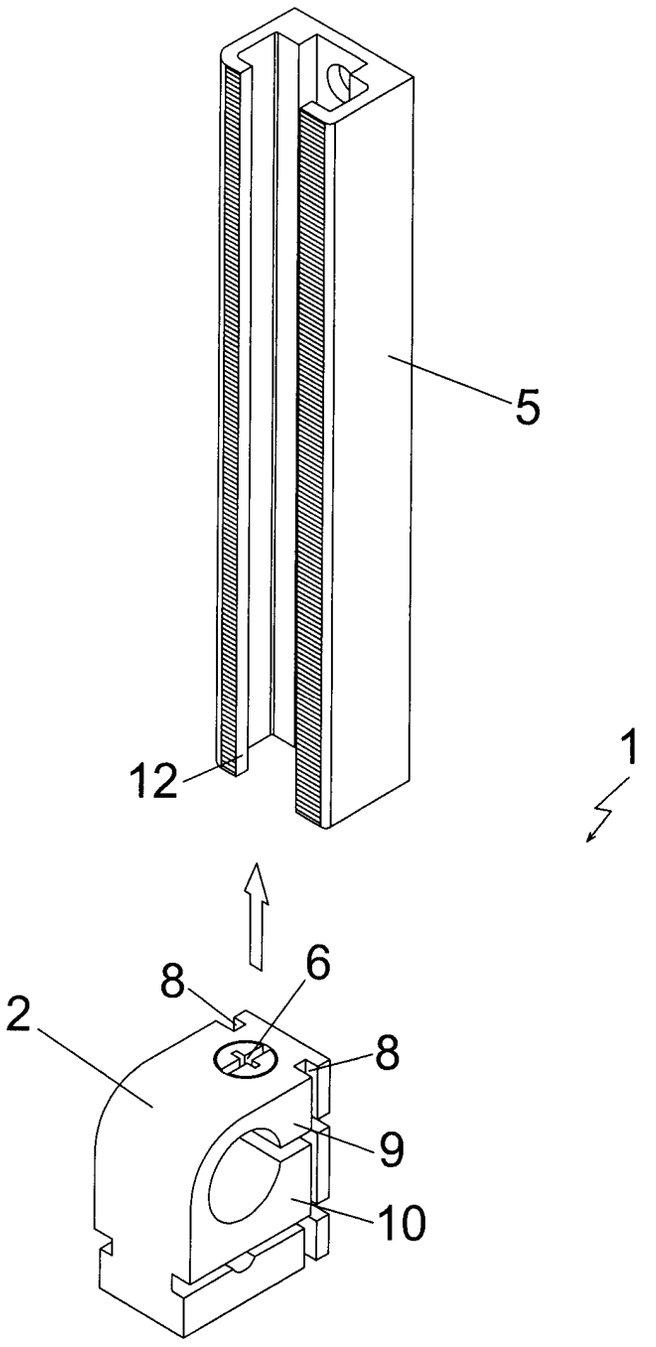

FIG. 3

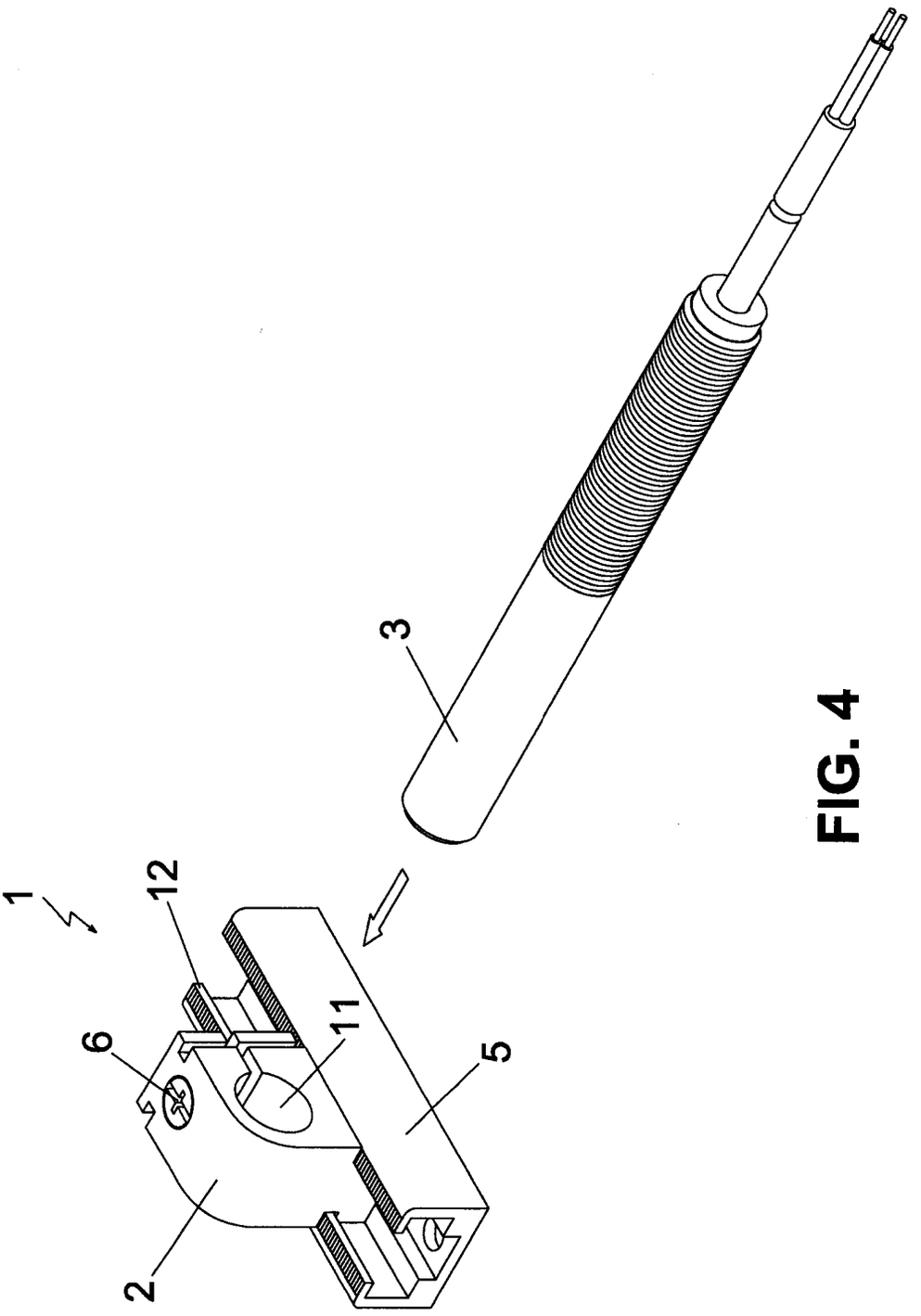

FIG. 4

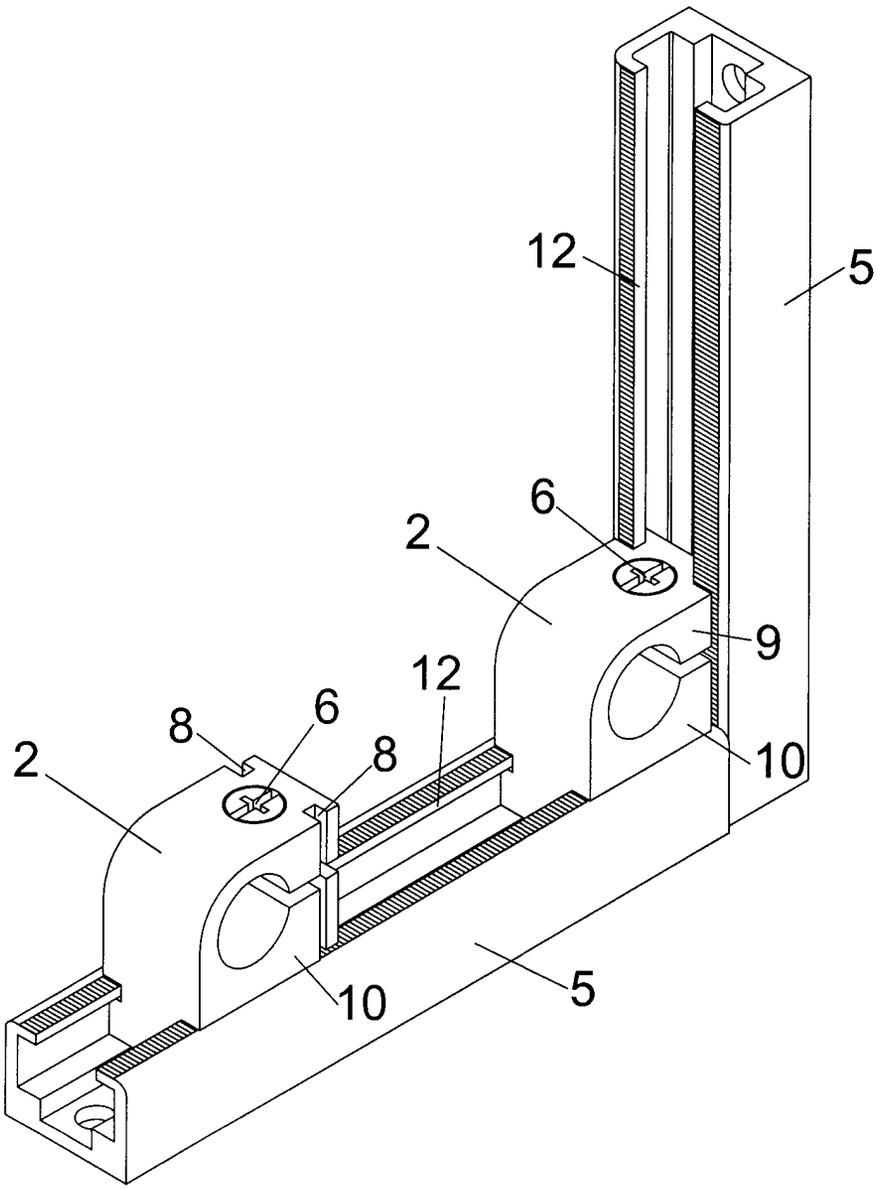

FIG. 5

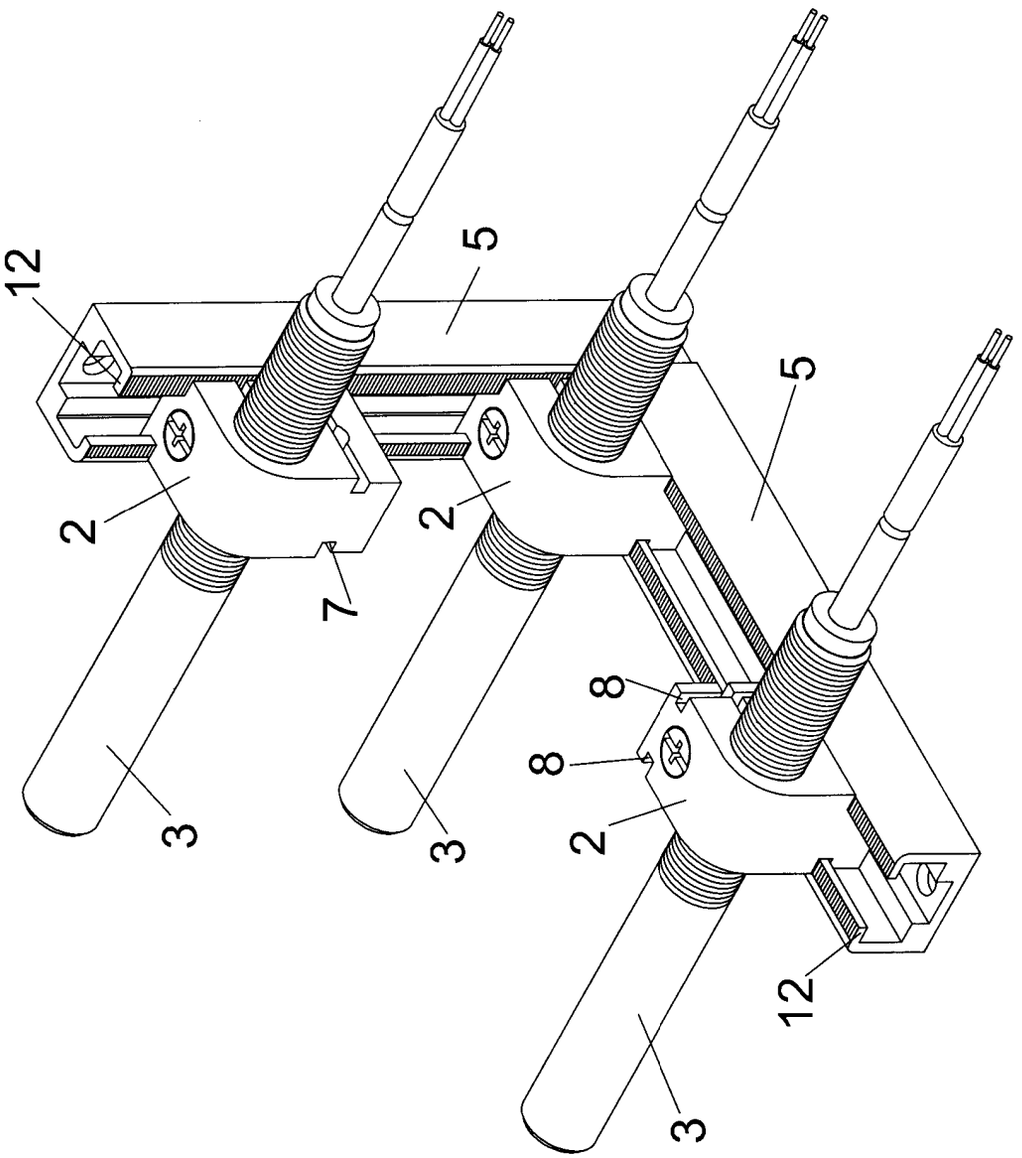

FIG. 6