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(54) A device for securing a radiator to a foundation

(57) An apparatus for securing to a substrate such a radiator as has at least two somewhat spaced apart, substantially vertical surfaces, preferably a radiator which is composed of at least two radiator sections (1, 2), comprises a stand (8) which is securable in the substrate and is arranged to extend approximately vertically from the substrate and up between the vertical surfaces, a lower anchorage device (14) disposed on the stand for cooperating with a lower portion of the radiator, and an upper anchorage device (13) which is disposed on the stand above the lower anchorage device for cooperation with a portion of the radiator located over the lower portion of the radiator. According to the invention, the apparatus has an operating device (21) which extends from an actuator (22) located beneath the lower anchorage device (14) to the upper anchorage device (13); the actuator (22), the operating device (21) and the upper anchorage device (13) being functionally interconnected such that the upper anchorage device is switchable between an open position releasing the radiator and a locking position retaining the radiator under the action of the actuator.

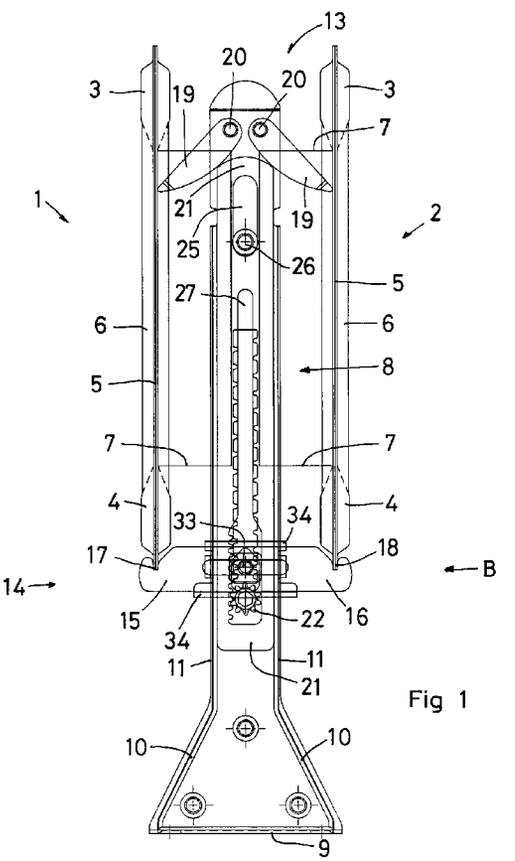

Fig 1

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Description

TECHNICAL FIELD

The present invention relates to an apparatus for securing to a substrate such a radiator as has at least two somewhat spaced apart, substantially vertical surfaces, preferably a radiator which is composed of at least two radiator sections, the apparatus comprising a stand securable in the substrate and arranged to extend approximately vertically from the substrate and up between the vertical surfaces, a lower anchorage device secured to the stand for cooperating with a lower portion of the radiator, and an upper anchorage device which is disposed on the stand above the lower anchorage device for cooperation with a portion of the radiator located over the lower portion of the radiator.

BACKGROUND ART

Radiators for water-borne heat can be designed as single section radiators or composite section radiators consisting of a banked number of sections forming double radiators, triple radiators etc. The single type radiator and each section in a multiple type radiator have upper and lower, substantially horizontal water conduits between which extend vertical water conduits. The spacing between the vertical water conduits is as standard 25, 33 or 40 mm. In multiple radiators, it is not uncommon that convector plates are disposed between the radiator sections, as a rule one set to each radiator section. Correspondingly, the single type radiator generally has convector plates on its rear side. The design of the convector plates may vary considerably from manufacturer to manufacturer, and consequently both dimensioning and positioning may vary. Furthermore, there are many designs and constructions in which the convector plates take up considerable space and are disposed close to one another, so that there may be extremely limited room for inserting, in a composite radiator, an anchorage apparatus between the radiator sections for securing the radiator in place.

Radiators of the type under consideration here are often provided with safety plates along their vertical edges and on the upper side. This means that if an anchorage for mounting the radiator on the substrate is concealed in between the radiator sections, it is inaccessible from the end walls and top of the radiator.

Furthermore, radiators are generally delivered ready-painted and packed in protective transport packaging to the worksite. In mounting in place of the radiator, the primary intention is to keep the protective packaging on the radiator, preferably also after the radiator has been mounted in place. Consequently, there is a considerable need in the art to be able to push the anchorage apparatus straight through the packaging at the underside of the radiator and secure it in the radiator without unnecessarily damaging or removing the packaging.

In publication DE 4 323 199 A1, there is disclosed an anchorage device intended for securing radiators of the type under consideration here. This anchorage device comprises a vertical tube which must be cut to measure, depending upon the design of the radiator employed. The anchorage device has lower anchorages for cooperating with the transverse pipes which interconnect the two radiator sections included in a double radiator. Furthermore, the device includes, in its upper end, a gauge block which is intended to be placed between the two radiator sections and urge outwardly against them.

The design disclosed in DE 4 323 199 is impractical and complicated to use, cannot be employed universally irrespective of the dimensions of the radiator and appearance of the convector plates, and in addition requires major intervention in the transport/protective packaging of the radiator in order to be put into use.

Publication WO 94/04875 discloses another type of anchorage device for the radiator design under consideration here. This anchorage device has a fixed and a pivotal clamping jaw which are designed so as to grasp about the lower, substantially horizontal water conduit of the radiator. The clamping jaws expand away from one another and are applied from inside against the radiator sections immediately above their lower water conduit.

The design according to WO 94/04875 is adjustable to suit the dimensions of the radiator and may function satisfactorily in many contexts in that no parts must be replaced depending upon the type of radiator or its dimensions, but does have certain limitations because of the convector plates which often occur in radiators of this type. In certain cases, the space available for using the anchorage device according to this prior art publication is quite simply too small.

PROBLEM STRUCTURE

The present invention has for its object to design the apparatus intimated by way of introduction such that it is universally applicable to different types of such radiators as have at least two somewhat spaced apart, substantially vertical surfaces, preferably radiators which consist of at least two radiator sections. The present invention further has for its object to design the apparatus such that it may be employed concealed in between the radiator sections or within a convector plate on a single type radiator, in that it may be inserted in through a hole in the packaging at the lower edge of the radiator and be mounted in place without the packaging, or any possible cover plates, first needing to be removed. The present invention yet further has for its object to realise an apparatus which is adjustable in the vertical direction so that a radiator may be mounted at different heights above the floor or substrate. Finally, the present invention still further has for its object to realise an apparatus which is not restricted in its field of use because of any particular design of the convector plates of the radiator involved, but which may be universally employed in the

vast majority of radiators of the type under consideration here.

SOLUTION

The objects forming the basis of the present invention will be attained if the apparatus intimated by way of introduction is characterized by an operating device which extends from an actuator located beneath the lower anchorage device to the upper anchorage device; the actuator, the operating device and the upper anchorage device being functionally interconnected such that the upper anchorage device is at least transferable from an open position releasing the radiator to a locking position retaining the radiator under the action of the actuator.

ADVANTAGES

This design and construction feature affords the major advantage that the anchorage apparatus according to the invention may be mounted in a radiator without its upper anchorage device needing to be accessed during the mounting operation. Hereby, it is possible quite simply to push the anchorage apparatus through the transport packaging at the lower edge of the radiator up between the two vertical surfaces or radiator sections which are included in the radiator, in order then simply to connected together the radiator and the anchorage apparatus under the action of the actuator.

Further advantages will be attained if the subject matter of the present invention is also given one or more of the characterizing features as set forth in appended Claims 2 to 14.

BRIEF DESCRIPTION OF THE ACCOMPANYING DRAWINGS

The present invention will now be described in greater detail hereinbelow, with particular reference to the accompanying Drawings. In the accompanying Drawings:

Figs. 1-4 show the apparatus according to the present invention in different adjustment positions, for cooperation with radiators of different dimensions, mounted in different vertical positions;

Fig. 5 shows, from above and partly in section, alternative placement possibilities for the apparatus according to the invention in a double type radiator;

Fig. 6 is a vertical view of a stand included in the apparatus according to the invention;

Fig. 7 shows the stand according to Fig. 6, seen in the direction of the arrow A in Fig. 6;

Fig. 8 shows an operating device included in the apparatus according to the invention;

Fig. 9 shows the stand according to Fig. 6 seen straight from above;

Fig. 10 shows a part of the apparatus according to the invention, on a larger scale, approximately according to the arrow B in Fig. 1;

Fig. 11 shows, in a view corresponding to that of Fig. 5, a first alternative for use of the apparatus according to the invention in a single type radiator; and

Fig. 12 shows, in a view corresponding to that of Fig. 11, a second alternative for use of the apparatus according to the invention in a single type radiator.

DESCRIPTION OF PREFERRED EMBODIMENT

In Fig. 1, the apparatus according to the invention is shown mounted in a double type radiator which is seen from the one short end. The mounting corresponds to alternative A in Fig. 5. The radiator has a first and second radiator section 1 and 2, respectively, which each have an upper, substantially horizontal water conduit 3 and a lower, substantially horizontal water conduit 4. Between the upper and lower water conduits 3 and 4, respectively, there extend radiator panels with substantially vertical water conduits 6. The spacing between the vertical water conduits 6 may vary, but more or less standardised spacings are 25, 33 and 44 millimetres.

On the insides of the radiator panels 5, these are provided with convector plates 7. The convector plates are vertical and are distributed along the length of the radiator. Their placing, design and dimensioning may vary considerably from one radiator manufacturer to another.

The anchorage apparatus according to the invention includes a stand 8 which extends upwardly from the floor or substrate, preferably at right angles thereto. At its lower end, the stand 8 has a footplate 9 by means of which the apparatus according to the invention may be secured to the substrate. Ideally, the stand 8 and the footplate 9 are of one-piece manufacture by pressing or joining of two sheet metal parts together. In order to increase the mechanical strength in the stand 8 and the footplate 9, these are provided with embossings 10 so that the footplate 9 has an outer edge portion which abuts against the substrate, and a slightly raised inner portion located inside the embossing. Correspondingly, the stand 8 has edge portions 11 where the sheet metal

material in both parts of which the stand is composed closely abut together, while the sheet metal material is spaced along other parts of the stand. The stand will hereby be hollow and have a longitudinal, inner space 12 which is vertical when the stand is in the position of use (Figs. 7 and 9).

At an upper portion of the stand 8, the apparatus according to the invention is provided with an upper anchorage device 13 for cooperation with the radiator. At a lower region a slight distance above the footplate 9, the stand 8 has a lower anchorage device 14 which is designed for cooperation with the lower edge portion of the radiator.

The lower anchorage device 14 is further adjustable in the lateral direction so that the apparatus according to the present invention can thereby be adjusted in response to the distance between the two radiator sections 1 and 2. The lower anchorage device 14 has laterally projecting carrier arms 15 and 16 which are transversely directed, preferably at right angles, to the longitudinal direction of the stand 8. The carrier arms 15 and 16 have upwardly directed recesses 17 and 18, respectively, for accommodating the lower edge portions of the radiator sections 1 and 2.

In addition to being adjustable in the lateral direction, the lower anchorage device 14 is also adjustable in the vertical direction along the stand 8 so that the anchorage device may thereby be placed both in the position shown in Fig. 1 and in the position shown in Fig. 2.

The upper anchorage device 13 includes two clamping devices or clamping arms 19 which are pivotally secured in the stand 8 and are expandable in the lateral direction, preferably outwardly pivotal in opposite directions from the stand 8 for positionally fixing abutment interiorly against two slightly spaced apart, substantially vertical surfaces on the radiator sections 1 and 2, for example their vertical conduits 6 or the strip-shaped portions therebetween in the radiator panels 5. The clamping arms 19 are disposed in between the two sheet metal parts of which the stand 8 is composed and are therefore placed in the inner accommodation space 12 of the stand 8. The clamping arms 19 are pivotal about shafts 20 which are transversely directed, preferably at right angles to the stand 8, and which extend in the longitudinal direction of both upper conduits 3 of the radiator. It will be particularly apparent from Figs. 2, 3 and 5 that the clamping arms 19 are extremely difficult to get at when the apparatus according to the invention is mounted in a radiator. In order, despite the slight space available in between the radiator sections 1 and 2, to be able to transfer the upper anchorage device 13 from an open position in which the radiator is free and in which the clamping arms 19 are pivoted in towards one another, possibly completely inside the contour of the stand 8, to a locking position in which the clamping arms 19 are expanded to abutment against the vertical surfaces, the apparatus according to the invention is provided with an operating device 21 for the upper anchorage device 13. The operating device 21 cooperates with an actuator 22 which is located beneath the lower anchorage device 14 and which, as a result, is easily accessible despite the presence of the radiator. This arrangement is such that the upper anchorage device 13, the operating device 21 and the actuator 22 are functionally interconnected in such a manner that the upper anchorage device 13 is, via the operating device, switchable between the open position and the locking position (and possibly vice versa), under the action of the actuator 22.

As was mentioned above, the stand 8 has a longitudinal, inner accommodation space 12. The operating device 21 is placed in this accommodation space and is designed as an elongate, strip or band shaped body (Fig. 8). The operating device 21 is displaceable in its longitudinal direction (up and down) in the accommodation space 12 and has, at its upper end, an actuation surface 23 which abuts against cam or ramp surfaces 24 on the lower or mutually facing sides of the clamping arms 19.

In its upper end, the operating device 21 has a longitudinally directed, elongate aperture 25 through which extends a connecting portion 26 such as a weld spot, a rivet or the like between the two parts of which the stand 8 is composed. It will be apparent from Fig. 1 that the operating device 21 is displaced to its upper end position, which is indicated by the fact that the connecting portion 26 is seated at the lower end of the aperture 25. In this position, both of the clamping arms 19 are outwardly pivoted to the maximum extent in the lateral direction away from one another. In Fig. 3, the operating device 21 is located approximately in its central position, and it will be apparent from this Figure that the clamping arms 19 have here been pivoted in a considerable distance towards one another. In the position according to Fig. 3, the apparatus according to the present invention is therefore adjusted for cooperation with a relatively narrow radiator.

If the operating device 21 is displaced further in a downward direction as compared with the position illustrated in Fig. 3, the clamping arms 19 will be pivoted in towards one another a further distance, possibly entirely within the contour of the stand 8 so that, in this position, the clamping arms may readily pass the lower conduits 4 of the radiator.

In Figs. 1-4 and 5, alternative A, the stand 8 has been shown in a position such that the clamping arms 19 are expanded towards the strip-shaped and vertical portions of the radiator sections 1 and 2 which are located between the vertical conduits 6 thereof. It will be apparent from alternative B in Fig. 5 that the stand 8 may, with just as great advantages, be placed in the radiator such that the clamping arms 19 are applied against the vertical water conduits 6 of the radiator sections 1 and 2. Both alternatives may be freely chosen, depending upon the desired mounting position of the stand 8.

The operating device 21 has a further slot-shaped, elongate and longitudinally directed aperture 27 with a broadened portion 28 at its lower end. A row or rack of cogs 29 (Fig. 8) is provided along the one edge of the broadened portion 28, in which engages the actuator 22 - which is designed as a cog wheel. By rotation of the cog wheel 22, it is thus possible to displace the operating device 21 in its longitudinal direction so that this reciprocates vertically. The cog wheel 22 has hub portions which are accommodated in bores 30 so that the cog wheel is positionally fixed but rotary in the stand 8. The cog wheel has an engagement device such as an internal hexagon for cooperation with a wrench, spanner or the like.

The lower anchorage device 14 has a locking device which, in the locked state, positionally fixes both of the carrier arms 15 and 16 in the adjusted position so as thereby to secure the lateral adjustment setting. The locking device is further designed in such a manner as to lock the lower anchorage device 14 in the selected adjustment position in the vertical direction along the stand 8. Finally, the locking device is also designed in such a manner that, in its locked position, it also locks the upper anchorage device 13. This is preferably effected by locking of the operating device 21.

The locking device consists of a screw 33 which extends through the lower anchorage device, through longitudinal apertures 31 in the stand and through the longitudinal aperture 27 of the operating device 21, in order to cooperate with a nut 32 (Fig. 10) on the opposite side of the stand 8. In that the screw 33 presses together the two parts of which the stand 8 is produced, and the operating device 21 is located between these parts, the operating device 21 can be fixedly clamped interiorly in the stand.

The lower anchorage device 14 includes a substantially U-shaped rail 34 (Fig. 10) which abuts against the one side of the stand 8. The longitudinal direction of the U-shaped rail 34 is transversely directed in relation to the stand and is approximately horizontal. On each side of the stand, the U-shaped rail 34 has a guide heel 35, whereby the guide heels and the rail 34 straddle the stand in order to be able to be displaced up and down in the longitudinal direction thereof. The two carrier arms 15 and 16 are disposed between the sharks of the rail 34 so that they may be displaced between the shanks transversely of the stand. The carrier arms are provided with longitudinal apertures 36 through which the screw 33 extends, whereby the carrier arms 15 and 16 are urged towards one another and the rail 34 when the screw is tightened.

As will be apparent from Fig. 6, the elongate aperture 31 is provided with projecting teeth 37 along its opposing edges. The teeth 37 are disposed with uniform distribution and offset half a pitch in the vertical direction at opposing sides. The nut 32 has a portion which extends into the aperture 31 and this portion has recesses corresponding to the teeth 37 so that thereby the nut 32 may be placed in a large number of alternative vertical positions along the length of the stand 8. By using the teeth 37 and the corresponding recesses on the nut 32, it is possible to place the lower anchorage device 14 in a predetermined position in the vertical direction without, to this end, the screw 33 needing to be tightened.

DESCRIPTION OF ALTERNATIVE EMBODIMENTS

In the Figures, the actuation surface 23 and the cam or ramp surfaces 24 have been shown as gently arched, smooth surfaces. According to the present invention, it is possible that the cam or ramp surfaces be grooved, toothed or notched in which corresponding projections or corners on the operating device 21 may engage so that the clamping arms 19 are thereby prevented from being pivoted by a mechanical locking engagement with the operating device. In order to release this engagement, a positive downward drawing of the operating device is required.

A spring may possibly also be provided in the stand 8, the spring urging the operating device 21 in an upward direction. Hereby, the upper anchorage device 13 would be self-locking as soon as the operating device 21 is released in order to be displaceable under the action of the spring force.

According to the present invention, it is not necessary that the stand 8 be composed of two elongate, embossed sheet metal parts which form between them an accommodation space 12 for the operating device 21. As an alternative, the stand may have other profile, such as a U-shaped profile, in which the operating device is vertically reciprocal. In such an embodiment, the operating device may be designed so as to be of rectangular, square or circular cross section and only in its upper end does it need to be of a design which is suitable for cooperation with the clamping arms 19.

As an alternative to the cog rack 29 and cog wheel 22 of the clamping device 21, use may be made of a threaded pin on the operating device and a nut disposed on the pin, the nut being accommodated in a corresponding aperture in the stand 8 so that the nut may be rotated about the pin at the same time as it resides positionally fixed in the vertical direction in the recess in the stand.

Fig. 11 schematically shows one embodiment in which the present invention is applied to a single type radiator. In this embodiment, both of the substantially vertical surfaces against which the clamping arms 19 abut consist, on the one hand, of the vertical band or strip-shaped portion 5 of the radiator between its vertical conduits 6 and, on the other hand, of the bottom surface 38 of a portion of the convector plate of the radiator which is U-or V-shaped seen from above. Thus, the stand 8 is located interiorly inside the convector plate 7.

In Fig. 12, the stand 8 is disposed between two adjacent U- or V-shaped portions 39 of the convector plate 7, for which reason the clamping arms 19 abut against the water conduit 6 of the radiator and against a

backing portion 40 which, by means of screws 41 or by welding, is connected to the bottom surfaces 38 of the U- or V-shaped portions 39 of the convector plate 7.

The present invention may also be employed in a manner analogous with that applicable to Figs. 11 and 12 in the alternatives relating to double or multiple type radiators.

The present invention may be modified further without departing from the spirit and scope of the appended Claims.

Claims

1. An apparatus for securing to a substrate such a radiator as has at least two somewhat spaced apart, substantially vertical surfaces, preferably a radiator which is composed of at least two radiator sections (1, 2), the apparatus comprising a stand (8) which is securable in the substrate and is arranged to extend approximately vertically from the substrate and up between the vertical surfaces, a lower anchorage device (14) disposed on the stand for cooperating with a lower portion of the radiator, an upper anchorage device (13) which is disposed on the stand above the lower anchorage device for cooperation with a portion of the radiator located over the lower portion of the radiator, **characterized by** an operating device (21) which extends from an actuator (22) located beneath the lower anchorage device (14) to the upper anchorage device (13); the actuator (22), the operating device (21) and the upper anchorage device (13) being functionally interconnected such that the upper anchorage device is at least transferable from an open position releasing the radiator to a locking position retaining the radiator under the action of the actuator.

2. The apparatus as claimed in Claim 1, **characterized in that** the vertical surfaces are disposed on radiator sections (1, 2) included in a double type radiator.

3. The apparatus as claimed in Claim 1, **characterized in that** the vertical surfaces are disposed on a radiator and on a convector plate secured thereon.

4. The apparatus as claimed in Claim 1, **characterized in that** the vertical surfaces are disposed on a radiator and on a backing portion secured therein.

5. The apparatus as claimed in any of Claims 1 to 4, **characterized in that** the upper anchorage device (13) is also transferable from the locking position to the open position under the action of the actuator (22).

6. The apparatus as claimed in any of Claims 1 to 5, **characterized in that** the stand (8) has a longitudinally directed accommodation space (12) in which the operating device (21) is movably disposed in the longitudinal direction of the stand.

7. The apparatus as claimed in Claim 6, **characterized in that** the stand (8) comprises two elongate sheet metal parts which define the accommodation space (12) therebetween.

8. The apparatus as claimed in any of Claims 1 to 7, **characterized in that** the upper anchorage device (13) includes two clamping arms (19) which are pivotally secured in the upper end region of the stand (8) and which, in the locked position, are pivoted outwards in opposing directions from the stand.

9. The apparatus as claimed in Claim 7 or 8, **characterized in that** the clamping arms (19) are pivotally disposed between the two sheet metal parts of the stand (8); **that** the arms have pivot shafts (20) which are transversely directed in relation to the sheet metal parts and are located in side-by-side relationship; **and that** the pivot arms (19) have mutually facing cam or ramp surfaces (24) against which the operating device (21) may be abutted from beneath for outward pivoting of the clamping arms to the locking position.

10. The apparatus as claimed in any of Claims 7 to 9, **characterized in that** the operating device (21) is in the form of an elongate, strip or band-shaped bar which, in its lower end region, has an elongate, longitudinally directed aperture (28) whose one longitudinal edge is provided with a cog rack or row (29); **and that** the actuator (22) comprises a cog wheel located in the aperture (28) in mesh with the cog rack, the cog wheel having at least one hub portion which is rotatably accommodated in a corresponding aperture (30) in one of the sheet metal parts of the stand (8).

11. The apparatus as claimed in any of Claims 9 or 10, **characterized in that** the operating device (21) has an arched upper portion (23) for sliding cooperation with the cam or ramp surfaces (24) of the clamping arms (19).

12. The apparatus as claimed in any of Claims 9 or 10, **characterized in that** the cam or ramp surfaces (24) are toothed, grooved or have mutually following projections; **and that** the operating device (21) has corner portions or projections engaging therein for locking the clamping or pivot arms (19) in their outwardly pivoted locking positions.

13. The apparatus as claimed in any of Claims 1 to 12, **characterized in that** the lower anchorage device (14) is adjustable in the vertical direction along the stand (8).

14. The apparatus as claimed in any of Claims 1 to 13, **characterized in that** the lower anchorage device (14) is adjustable in the lateral direction, transversely of the stand (8) depending upon the distance between the vertical surfaces, preferably the radiator sections (1, 2) of the radiator.

15. The apparatus as claimed in any of Claims 13 or 14, **characterized in that** the lower anchorage device (14) has a locking arrangement (32, 33) for locking of selected adjustment settings in both the vertical and the lateral directions.

16. The apparatus as claimed in Claim 15, **characterized in that** the locking arrangement (32, 33) is operative also to lock the upper anchorage device (13).

17. The apparatus as claimed in any of Claims 7 to 16, **characterized in that** both sheet metal parts of the stand (8) and the operating device (21) located therebetween have longitudinally directed, elongate apertures (31, 27, respectively); **that** a nut (32) is disposed on the one side of the stand (8), while the lower anchorage device (14) is disposed on the other; **and that** a screw (33) extends through the lower anchorage device (14), through the elongate apertures (31, 27) and engages with the nut whereby, on tightening of the screw, the lower anchorage device is lockable and the operating device is fixedly clampable between the sheet metal parts.

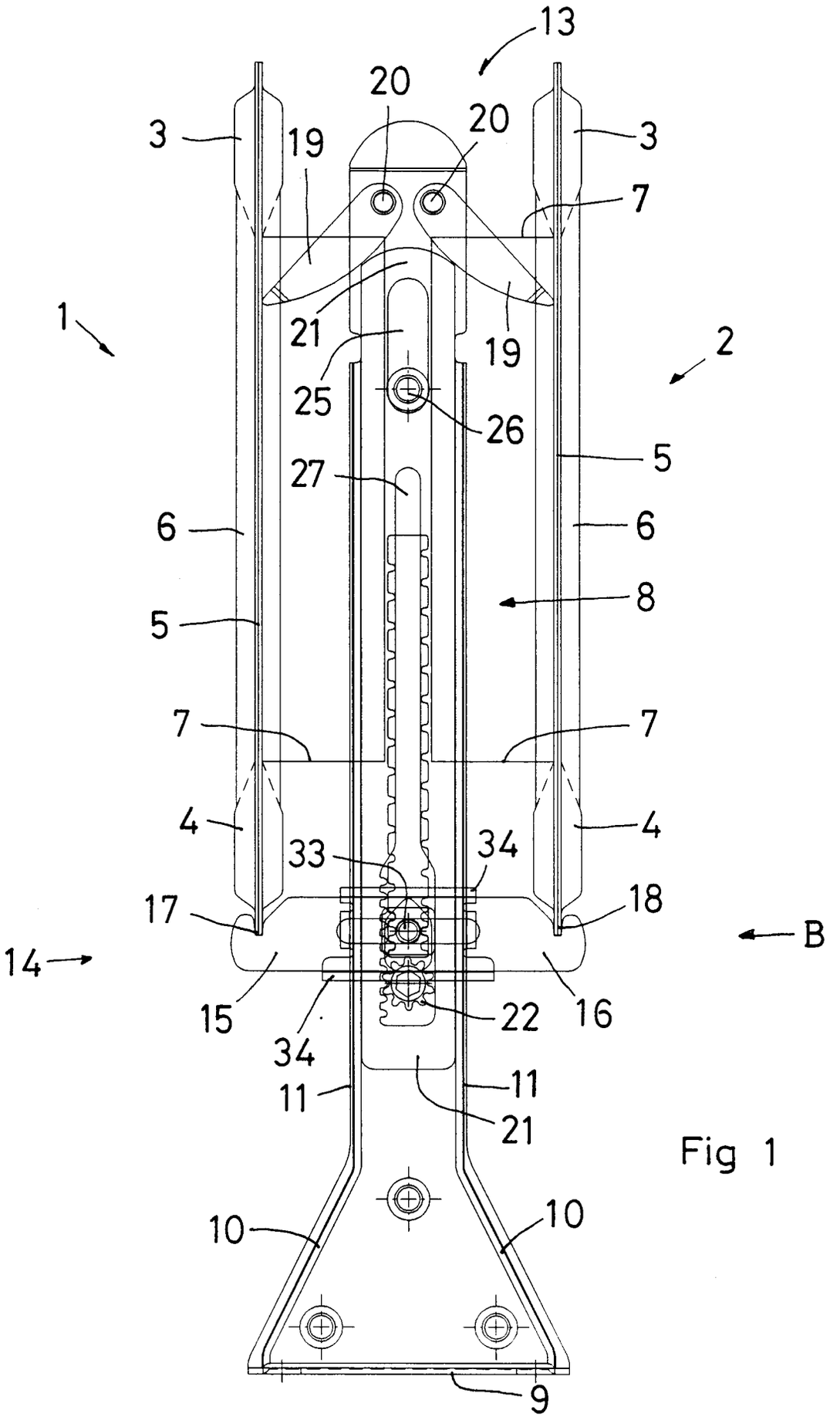
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Fig 1

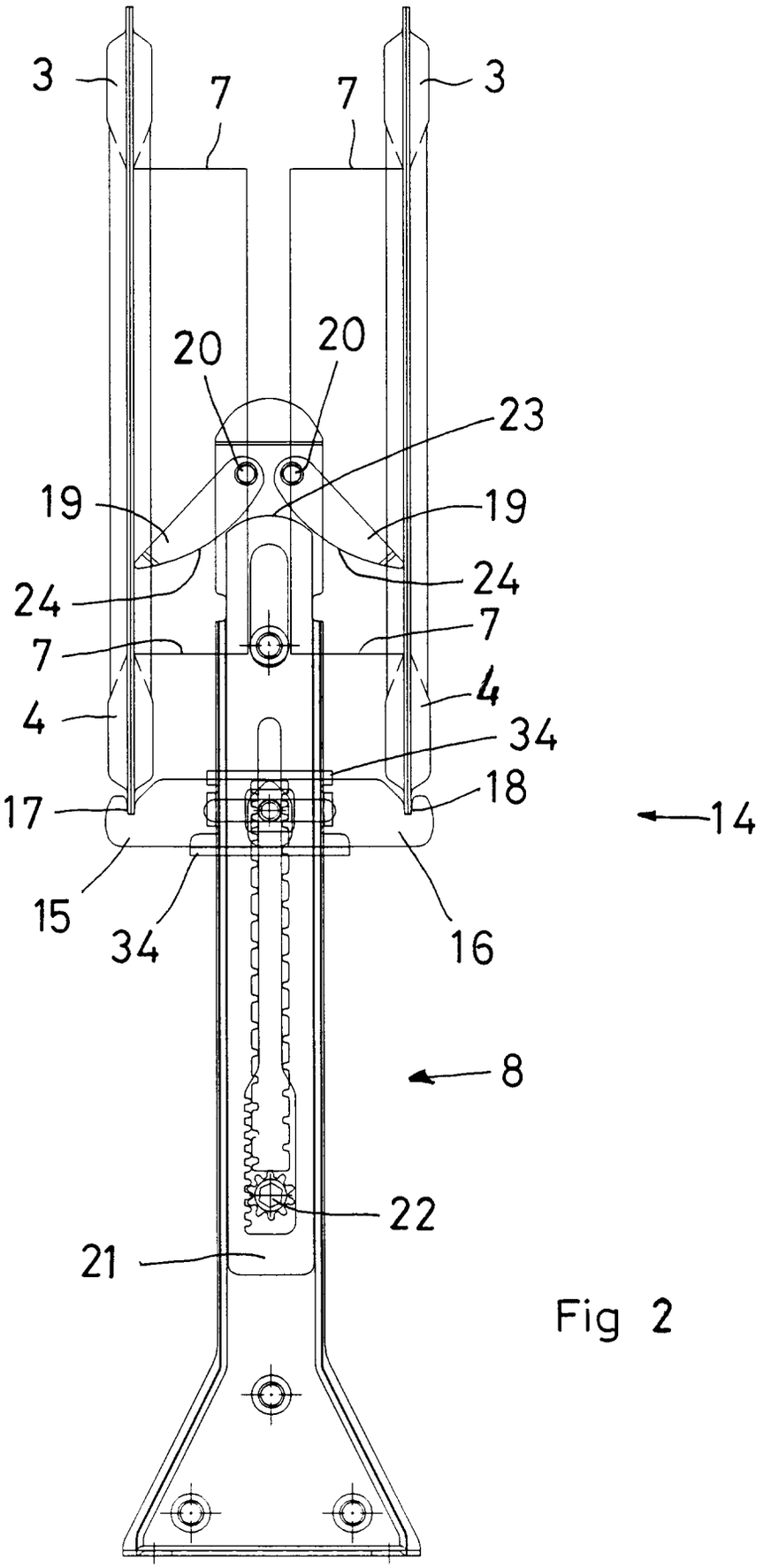

Fig 2

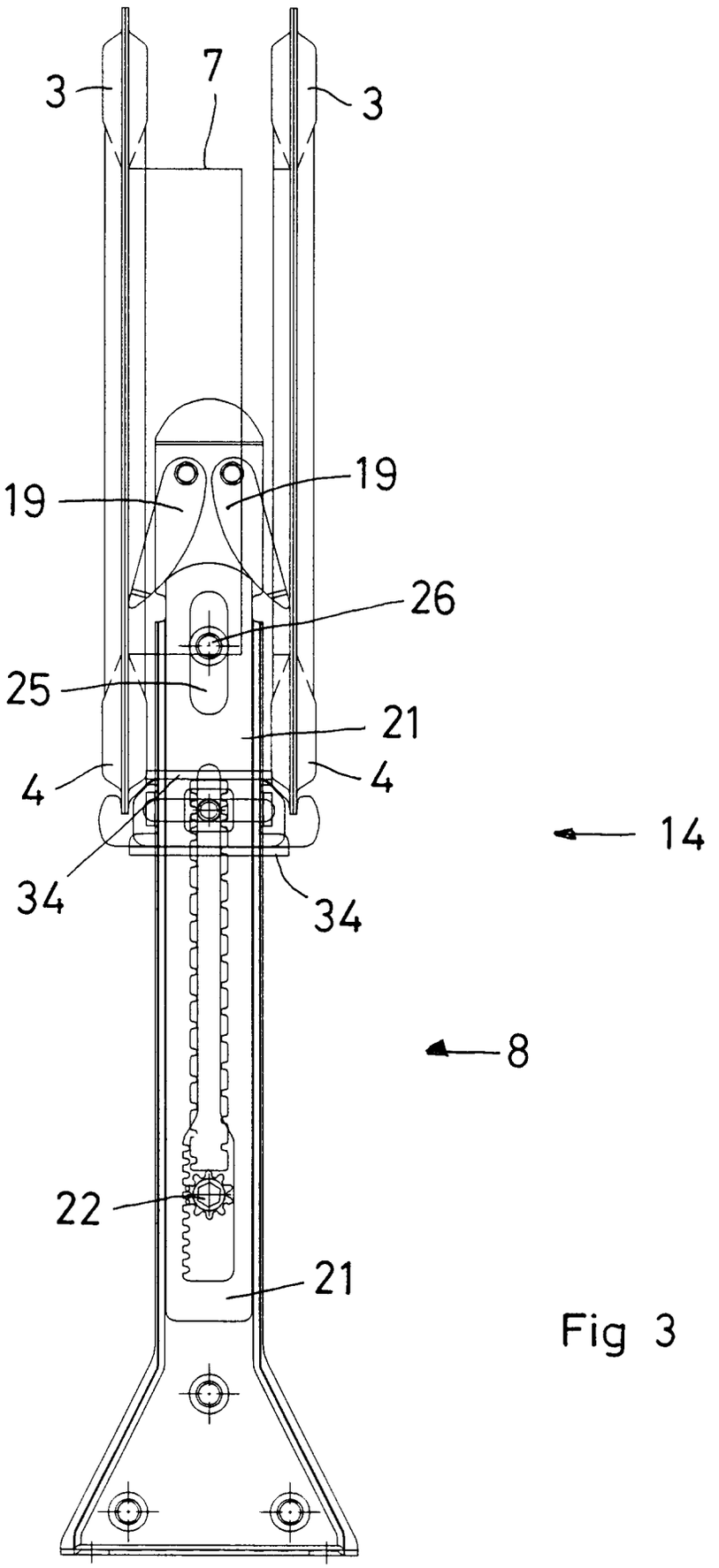

Fig 3

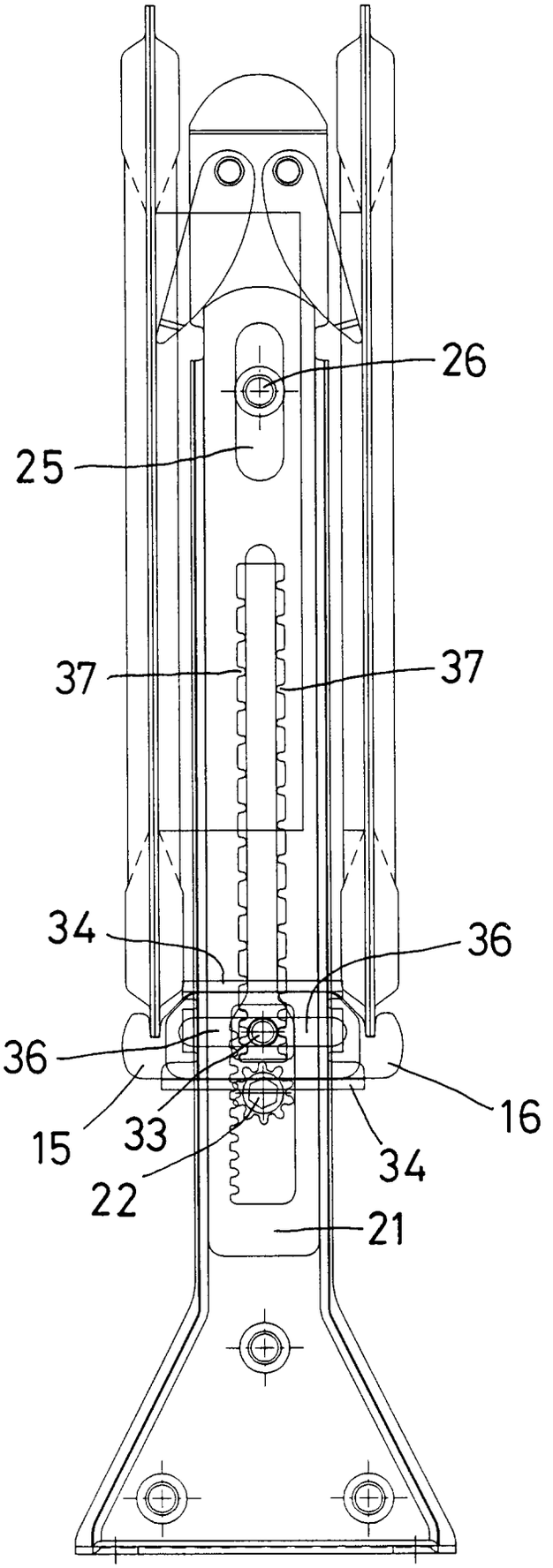

Fig 4

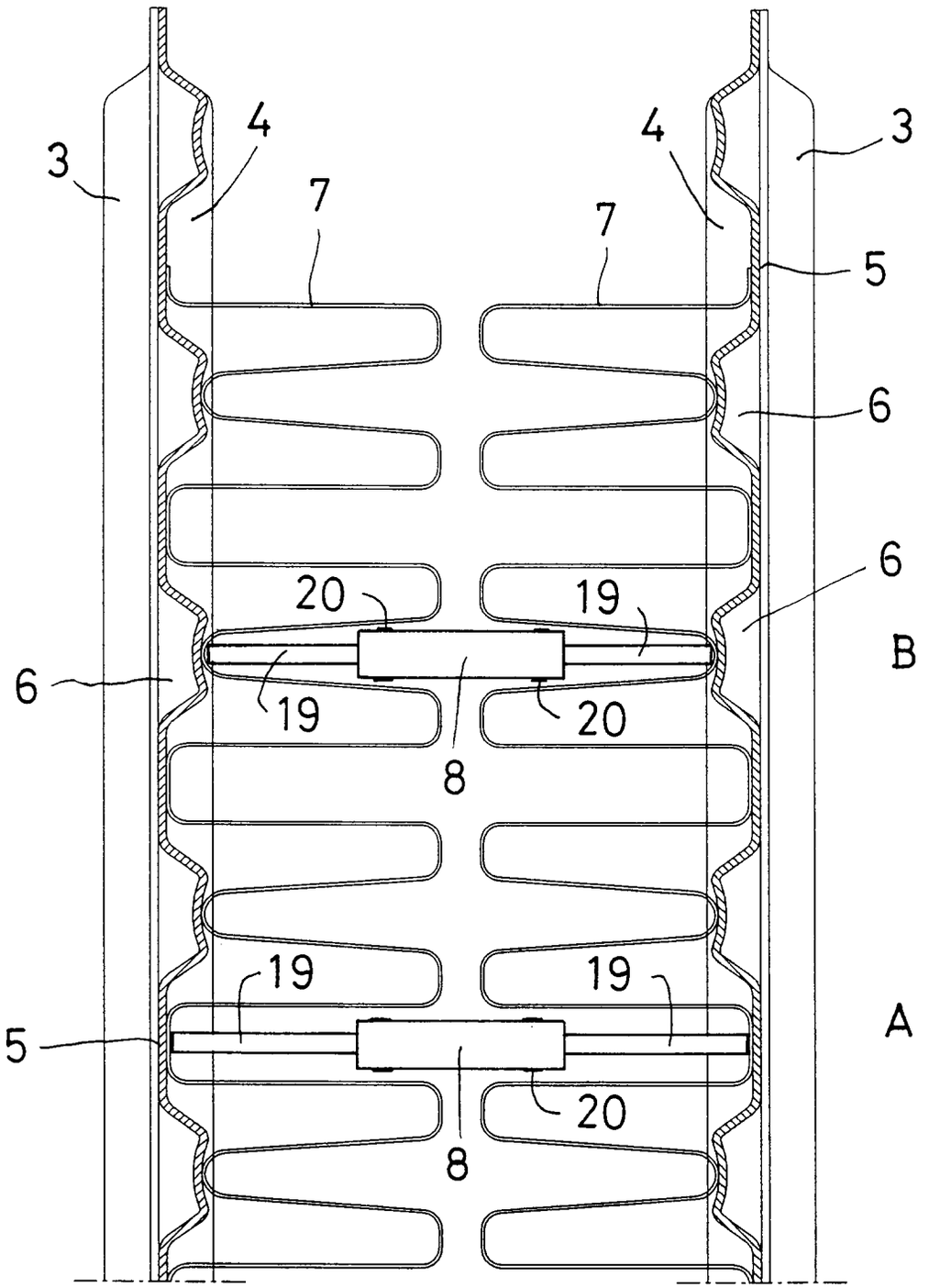

Fig 5

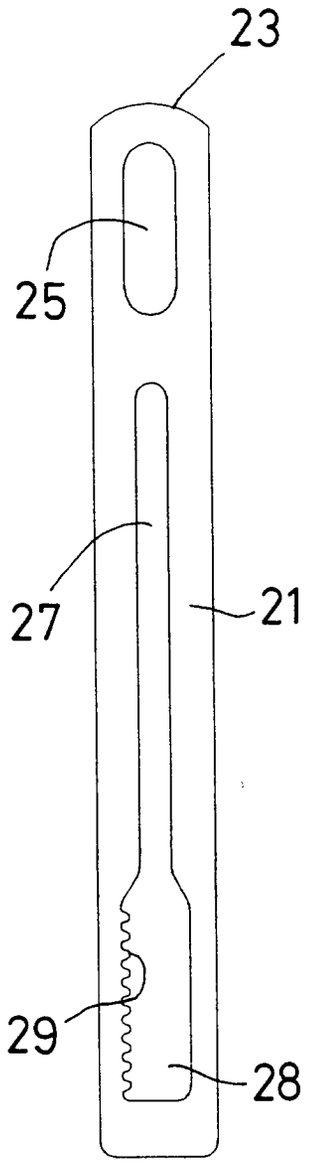

Fig 8

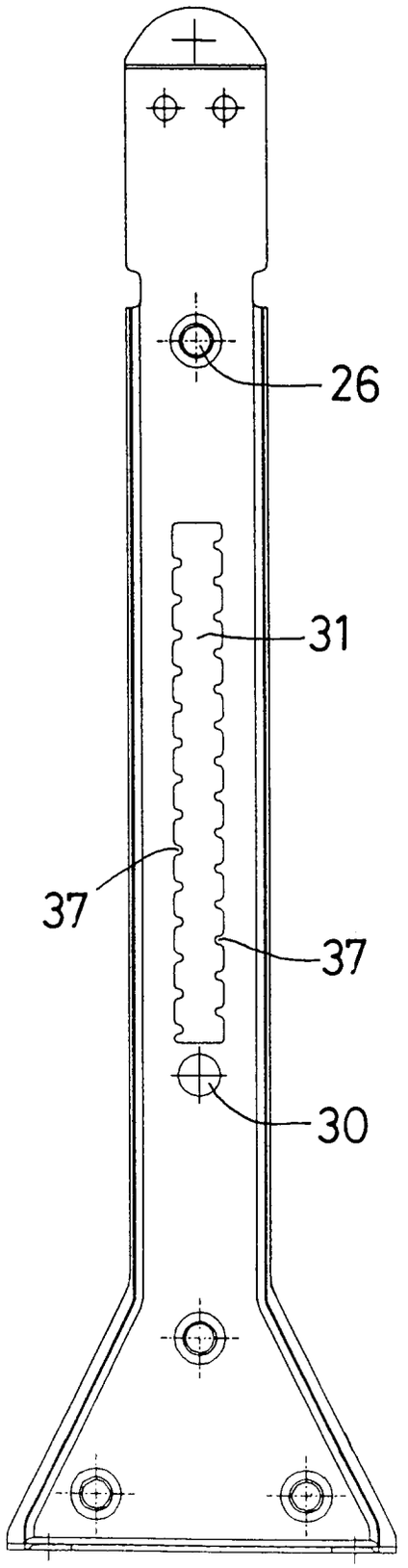

Fig 6

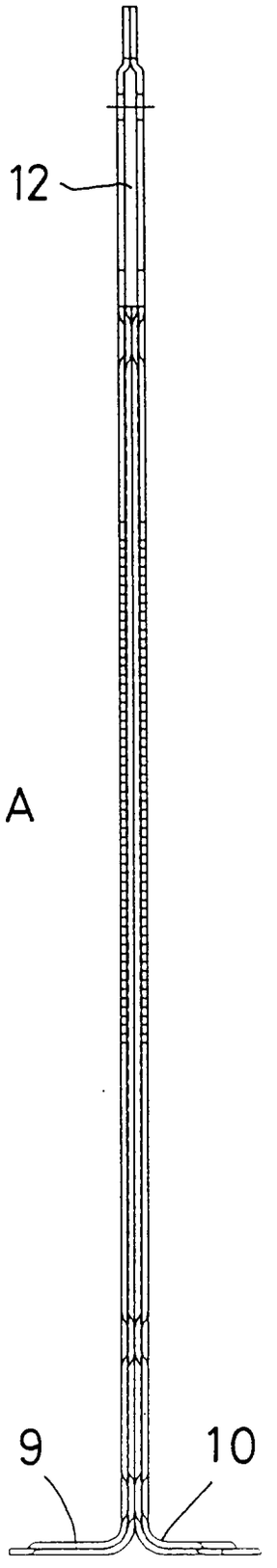

Fig 7

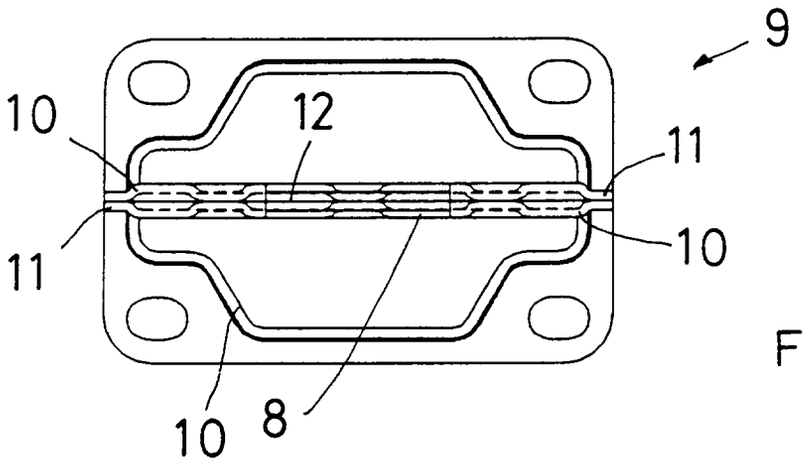

Fig 9

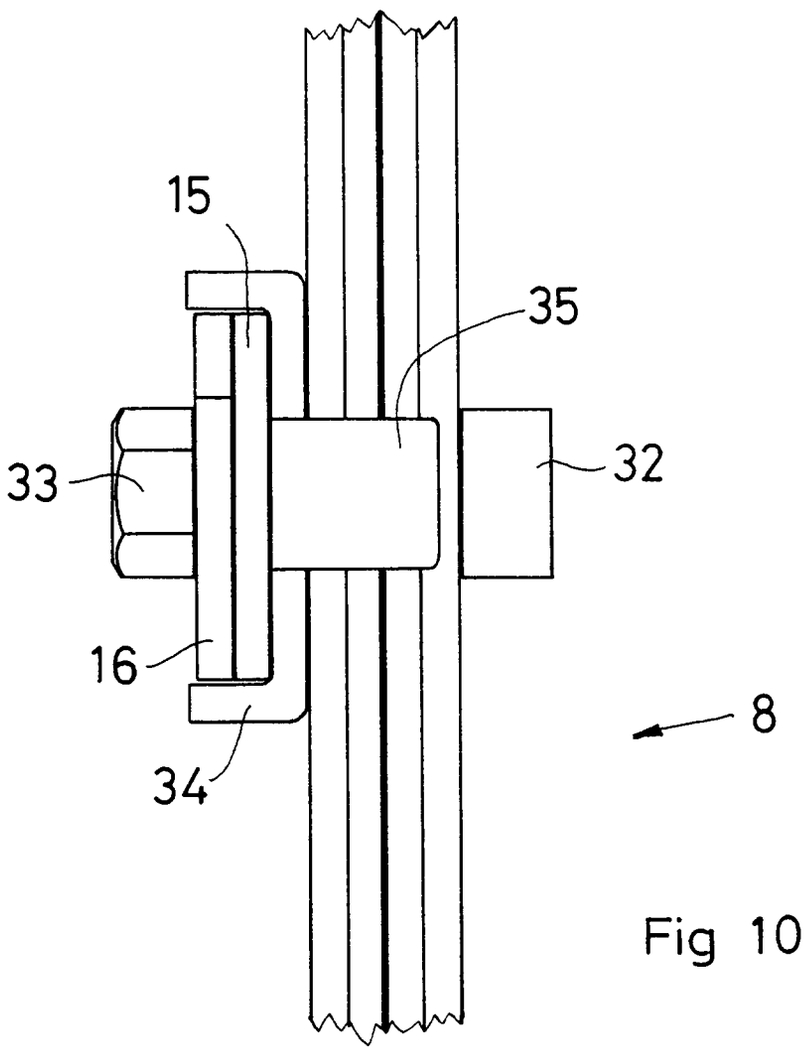

Fig 10

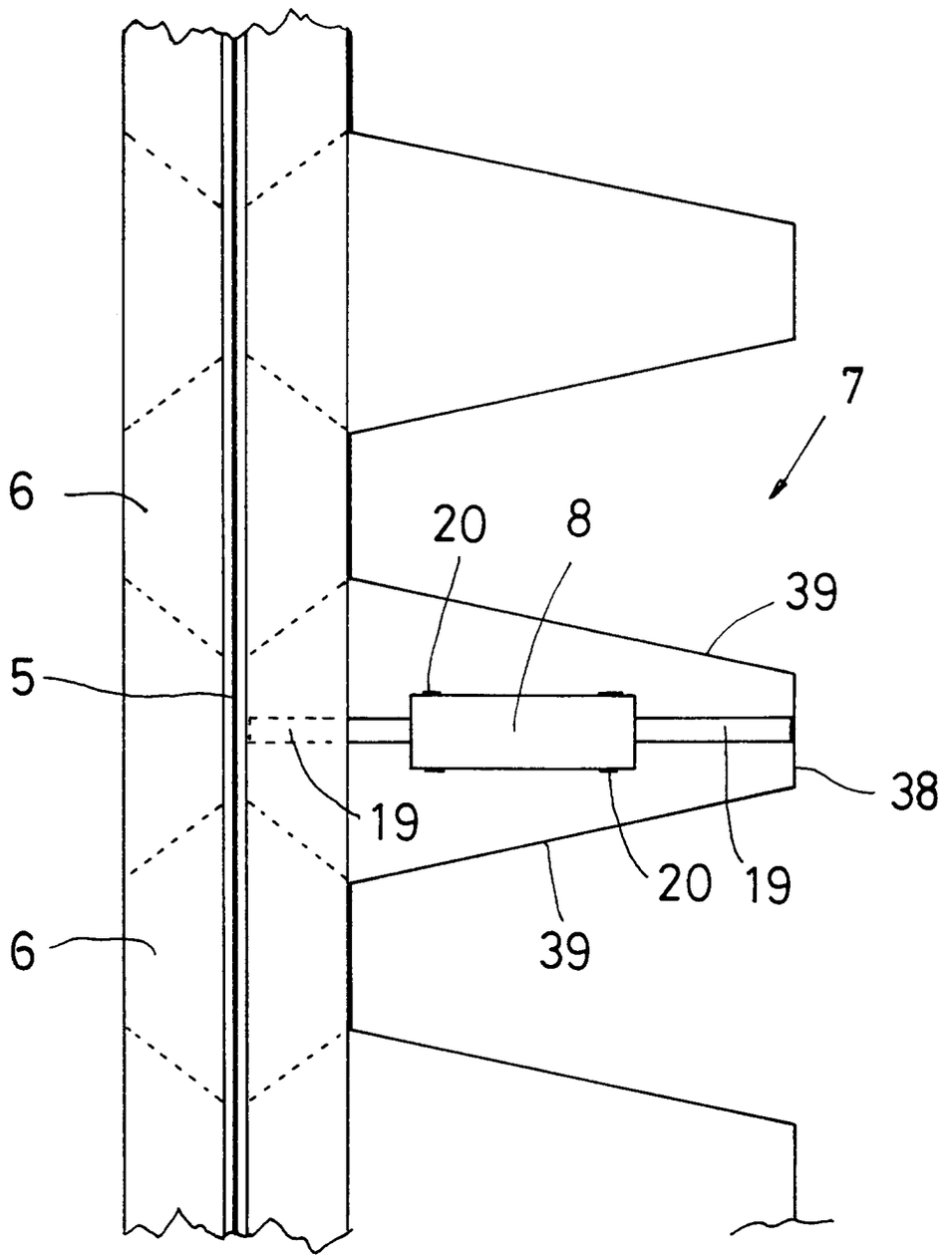

Fig 11

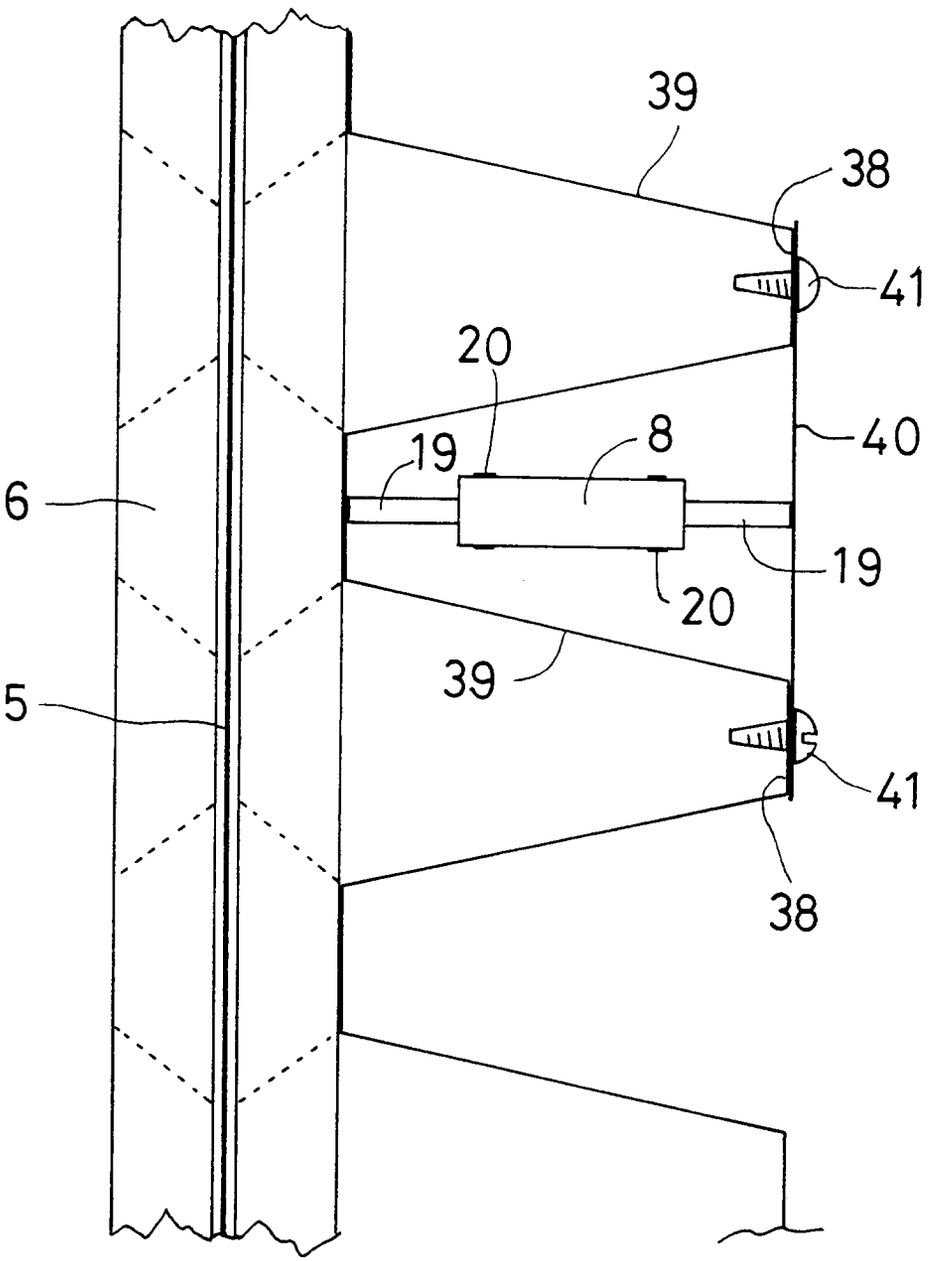

Fig 12

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 95 20 3515.2

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.6)
A	DE, A1, 2362192 (CHRISTOPEIT, HORST), 19 June 1975 (19.06.75) * page 2 - page 3, figure 1 * --	1-17	F24D 19/02
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A	WO, A1, 404875 (INDUSTRI AB SIGARTH), 3 March 1994 (03.03.94) -----	1-17	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
STOCKHOLM	18 April 1996	INGER LÖFVING

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