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(54) **Safety ratchet device**

Sicherheitssperrklinke

Cliquet d'arrêt de sécurité

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(73) Proprietor: **STERTIL B.V.**
NL-9288 CA Kootstertille (NL)

(72) Inventors:
• **Fijnvandraat, Jan Willem**
NL-8629 PM Scharnegoutum (NL)

• **Berends, Jan**
NL-9285 ML Buitenpost (NL)

(74) Representative: **'t Jong, Bastiaan Jacobus**
Arnold & Siedsma,
Advocaten en Octrooigemachtigden,
Sweelinckplein 1
2517 GK Den Haag (NL)

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Description

The invention relates to a safety ratchet device for preventing an undesired relative movement of two members movable relative to one another in a lengthwise direction.

Such a safety ratchet device, as known from FR-A-2 143 627, is used for instance in vehicle lifting devices to prevent a lifted vehicle falling downward when a component of the lifting device gives way.

The invention has for its object to provide a safety ratchet device of the type specified above, the construction of which is simple and which requires no maintenance, without this adversely effecting reliable operation, and at the same time being fully fail-safe.

This object is achieved with the safety ratchet device as characterized in claim 1. The ratchet element stands on the support surface and, due to the gravity, automatically "falls" in the slanting position without the necessity of any positively acting member, such as a spring, to achieve this. As furthermore there are no pivots or such which could seize, the device is fully fail-safe during the full lifetime.

The location of the centre of gravity ensures at all times that when the urging means are inoperative the ratchet element tilts into the active position.

A very favourable embodiment is characterized in claim 2. The electromagnet can be coupled simply to a control device which controls the movement of the movable members. No separate control therefore need take place with the attendant risk of failure to place the ratchet element in the active position.

An economically very favourable embodiment is characterized in claim 3. Only a minimal number of workings and components is required to realize the safety ratchet device according to the invention.

With the further developed embodiment of claim 4 the advantage is achieved that fitting can take place in very simple manner. The electromagnet can be released and optionally exchanged with a few hand operations. The step of claim 5 gives additional certainty that the ratchet is held in the active position.

The invention will be further elucidated in the following description with reference to the embodiments shown in the figures.

- Figure 1 shows a partly broken away perspective view of a vehicle lifting device provided with a safety ratchet device according to the invention.
- Figure 2 shows a broken away perspective view according to arrow II of the vehicle lifting device in figure 1.
- Figure 3 shows a sectional side view according to arrow III in figure 2.
- Figure 4 is a partial side view on the ratchet element according to arrow IV in figure 3.

The vehicle lifting device 20 shown in figure 1 is a

so-called two-column lifting device and accordingly comprises two columns 21 and 22 in each of which is received a carriage 25 movable vertically up and downward. The carriages 25 bear on their bottom end arms on which a vehicle can be supported.

The carriages 25 are driven for vertical movement using hydraulic cylinders 23, 24. The cylinders engage directly between the columns 21, 22 and the carriages 25 and are connected such that synchronous operation is ensured.

To prevent undesired downward movement of the carriages 25, for example as a result of a disturbance in the hydraulic system of which the cylinders 21, 22 form part, a safety ratchet device is arranged which is shown in more detail in figure 2.

The ratchet device comprises a stop frame 26 which is fixed to the movable carriage 25. A ratchet element 31 is mounted on the stationary column 21.

The stop frame 26 comprises in this embodiment a series of protruded stop elements 27 defining a slanting front surface and a stop surface 28. The latter lies transversely of the relative movement of direction of the carriage 25 in relation to the column 21.

Instead of the stop frame 26 with protruded stop elements 27 a stop frame with holes could be used, wherein the upper boundaries of the holes form the stop surfaces.

Welded fixedly to the column 21 is a support element 29 which defines on the top side a support surface 30 facing toward the stop surfaces 28.

The ratchet element 31 used in this embodiment rests with its bottom end 39 on the support surface 30. The bottom end 39 is rounded so that it can easily pivot on the support surface 30. The contact area is shifted towards the column, so that the center of gravity of the ratchet element 31 is positioned at the side of the stop surfaces 28 relative to the supporting surface 30.

The ratchet element 31 is held in place by means of a locking element 40 which is screwed to the wall of column 21 by means of a bolt 37. Due to the shoulder of the element 40 the ratchet element 31 cannot move away from the support 29. The opening 41 in ratchet element 31 which co-acts with the locking element 40 has considerably larger dimensions than the locking element 40 so that a very loose closure is obtained. In normal operation there is no or hardly any contact between the locking element 40 and the inner wall of hole 41.

The ratchet element 31 has an upper end surface 32 which can co-act with the stop surfaces 28. This co-action takes place when the ratchet element 31 is pivoted into the slanting active position shown in figure 2. This slanting active position is the rest position. The ratchet element 31 pivots automatically to the right because its centre of gravity as seen in figure 5 lies to the right of the contact point with the support 29. The safety ratchet device is thus normally active and is moved out of the active position by a specific action. The safety ratchet device is therefore fail-safe.

The movement out of the active slanting position shown in figure 2 to the retracted position shown in figure 3 in which the carriage 25 can move freely in relation to the column 21 takes place in this embodiment by means of an electromagnet 33. This latter is mounted simply by means of a bracket 34 and a bolt 35 engaging in a screw threaded hole 36 of the column 21. For the sake of clarity the fastening means 34, 35, 36 are shown in figure 3 rotated upward through 90° relative to figure 2.

The electromagnet 33 has a plunger 42 which is received for free movement in a channel of the electromagnet 33. When electromagnet 33 is energized the plunger 42 is pulled inward, that is, to the left as seen in figure 3.

According to a preferred feature the electromagnet 33 is of the type with a plunger loaded outward, that is, to the right as seen in figure 3, by spring means. This spring loading supports the bias brought about by the force of gravity which will normally hold ratchet element 31 in the slanting active position.

The plunger 42 has a head 43 and a portion 44 located thereunder with a smaller diameter. The ratchet element 31 is, as shown more clearly in figure 4, provided with a keyhole-like gripping opening 45 comprising a wide portion 46 and a slot-like portion 47 connecting thereto. The head of the plunger 42 can be pushed through the wide portion 46 of the opening, whereafter the thinner portion 44 of plunger 42 can be pushed into the slot-like portion 47 of the opening. The dimensioning of plunger 42 and opening 45 is again such that a very broad clearance results.

It will be apparent that due to the keyhole connection the electromagnet 33 can be released and removed very simply and if necessary replaced with a new one when damaged. It will also be apparent that the ratchet device is itself extremely simple in construction and comprises in addition to electromagnet 33 only one moving part, the ratchet element. The mounting of this safety ratchet device is also extremely simple and requires only a few operations.

The operation of the shown preferred embodiment of the ratchet device is electrical and can thus be connected in simple manner to the control of the drive of the lifting device.

The invention is not limited to the preferred embodiments shown in the figures. The urging means for example can also be mechanical or for instance hydraulic means. Nor of course is the application of the safety ratchet device limited to the use shown with a vehicle lifting device. In all situations where it is desired to enable blocking of two organs movable relative to one another in a longitudinal direction the device according to the invention can be used in the one or other embodiment.

Claims

1. Safety ratchet device for two members (25/21,22)

movable relative to one another in a longitudinal direction comprising a series of successive stop elements (27) in the longitudinal direction each defining a stop surface (28) in a plane transversely of the longitudinal direction on the one member (25), a support surface (30) on the other member (21, 22) facing toward the stop surfaces (28), a ratchet element (31) which lies loosely with one end (39) against the support surface (30) and which is pivotable between a slanting position in which another end can come into contact with a stop element and a retracted position in which the stop elements can pass freely, and urging means (33) for urging the ratchet element into the retracted position counter to a bias, **characterized in that**, the support surface (30) is facing upward and the stop surfaces (28) are facing downward, and in that in said retracted position the center of gravity of the ratchet element (31) is positioned at the side of the stop surfaces (28), relative to the contact area of the ratchet element (31) on the support surface (30), such that the bias is generated by gravity.

2. Safety ratchet device as claimed in claim 1, wherein the urging means comprise an electromagnet (33), a plunger (42) of which grips onto the ratchet element (31).
3. Safety ratchet device as claimed in claim 2, wherein the ratchet element (31) and the electromagnet (33) are mounted on either side of a wall (21) and the plunger (42) grips the ratchet element (31) through an opening in the wall.
4. Safety ratchet device as claimed in claim 2 or 3, wherein the plunger (42) of the electromagnet (33) comprises on its end a head (43) with a portion of smaller diameter (44) thereunder and the ratchet element (31) is provided with a keyhole-like gripping opening (45) with a wide portion (46) and a connecting slot-like portion (47), wherein the head (43) of the plunger (42) fits through the wide portion (46) and the portion of the plunger (42) with smaller diameter can be pushed with clearance into the slot-like portion (47).
5. Safety ratchet device as claimed in any of the claims 2-4, wherein the electromagnet (33) is of a type with a plunger (42) loaded outward by spring means.

Patentansprüche

1. Sicherheitssperrklinke für zwei in einer Längsrichtung relativ zueinander bewegliche Glieder (25/21, 22) mit einer Reihe von in Längsrichtung aufeinander folgenden Anschlagelementen (27), die an dem einen Glied (25) jeweils eine Anschlagfläche (28) in einer senkrecht zu der Längsrichtung liegenden

Ebene definieren, mit einer zu den Anschlagflächen (28) weisenden Auflagefläche (30) an dem anderen Glied (21, 22), mit einem Sperrelement (31), das mit einem Ende (39) lose gegen die Auflagefläche (30) anliegt und das zwischen einer Schrägstellung, in der ein anderes Ende in Kontakt mit einem Anschlagelement kommen kann, und einer zurückgezogenen Stellung, in der das Anschlagelement ungehindert passieren kann, verschwenkbar ist, und mit einem Vortriebsmittel (33) zum Vortreiben des Sperrelements (31) in die zurückgezogene Stellung entgegen einer Vorspannung, dadurch gekennzeichnet, daß die Auflagefläche (30) aufwärts weist und die Anschlagflächen (28) abwärts weisen und daß in der zurückgezogenen Stellung der Schwerpunkt des Sperrelements (31) bezüglich dem Kontaktbereich des Sperrelements (31) an der Auflagefläche (30) seitlich der Anschlagfläche (28) liegt, derart daß die Vorspannung durch Schwerkraft erzeugt wird.

2. Sicherheitssperrklinke nach Anspruch 1, bei der das Vortriebsmittel einen Elektromagnet (33) mit einem Tauchkern (42) umfaßt, wobei der Tauchkern (42) das Sperrelement (31) beaufschlägt.
3. Sicherheitssperrklinke nach Anspruch 2, bei der das Sperrelement (31) und der Elektromagnet (33) beidseitig einer Wandung (21) angeordnet sind und der Tauchkern (42) das Sperrelement (31) durch eine Öffnung in der Wandung beaufschlägt.
4. Sicherheitssperrklinke nach Anspruch 2 oder 3, bei der der Tauchkern (42) des Elektromagneten (33) an seinem Ende einen Kopf (43) mit einem Abschnitt kleineren Durchmessers (44) darunter aufweist, und in der das Sperrelement (31) mit einer schlüssellochähnlichen Eingrifföffnung (45) mit einem breiten Abschnitt (46) und einem schlitzförmigen Anschlußabschnitt (47) versehen ist, wobei der Kopf (43) des Tauchkerns (42) durch den breiten Abschnitt (46) paßt und der Abschnitt des Tauchkerns (42) mit kleinerem Durchmesser mit Luft in den schlitzförmigen Abschnitt (47) gedrückt werden kann.
5. Sicherheitssperrklinke nach einem der Ansprüche 2 bis 4, in der der Elektromagnet (33) von dem Typ mit durch ein Federmittel ausgelagertem Tauchkern (42) ist.

Revendications

1. Dispositif de sécurité à rochets pour deux organes (25/21, 22) déplaçables l'un par rapport à l'autre dans une direction longitudinale, comprenant une série d'éléments d'arrêt (27) successifs dans la direction longitudinale définissant chacun une sur-

face d'arrêt (28) dans un plan transversal à la direction longitudinale de l'organe (25) considéré, une surface de support (30) sur l'autre élément (21, 22) orientée vers les surfaces d'arrêt (28), un élément (31) formant rochet qui est placé libre avec une extrémité (39) contre la surface de support (30) et qui peut pivoter entre une position inclinée dans laquelle une autre extrémité peut venir en contact avec un élément d'arrêt et une position rétractée dans laquelle les éléments d'arrêt peuvent passer librement, un moyen (33) de rappel pour rappeler l'élément formant rochet dans la position rétractée contre une poussée, caractérisé en ce que la surface de support (30) est orientée vers le haut et les surfaces d'arrêt (28) sont orientées vers le bas, et en ce que dans ladite position rétractée le centre de gravité de l'élément (31) formant rochet est positionné du côté des surfaces d'arrêt (28) par rapport à la zone de contact de l'élément (31) formant rochet sur la surface de support (30), de telle manière que la poussée est produite par gravité.

2. Dispositif de sécurité à rochets selon la revendication 1, dans lequel le moyen de rappel comprend un électroaimant (33) dont un plongeur (42) est en prise sur l'élément (31) formant rochet.
3. Dispositif de sécurité à rochets selon la revendication 2, dans lequel l'élément (31) formant rochet et l'électroaimant sont montés de chaque côté d'une paroi (21) et le plongeur (42) est en prise avec l'élément (31) formant rochet à travers une ouverture dans la paroi.
4. Dispositif de sécurité à rochets selon la revendication 2 ou 3, dans lequel le plongeur (42) de l'électroaimant (33) comprend à son extrémité une tête (43) avec une partie (44) de diamètre inférieur en dessous et l'élément (31) formant rochet est muni d'une ouverture de prise (45) en forme de trou de serrure avec une partie large (46) et une partie de liaison en forme de fente (47), dans lequel la tête (43) du plongeur (42) est insérée à travers la partie large (46) et la partie du plongeur (42) de diamètre inférieur peut être poussée avec du jeu dans la partie en forme de fente (47).
5. Dispositif de sécurité à rochets selon l'une quelconque des revendications 2 à 4, dans lequel l'électroaimant (33) est du type avec un plongeur (42) chargé vers l'extérieur par des moyens à ressorts.

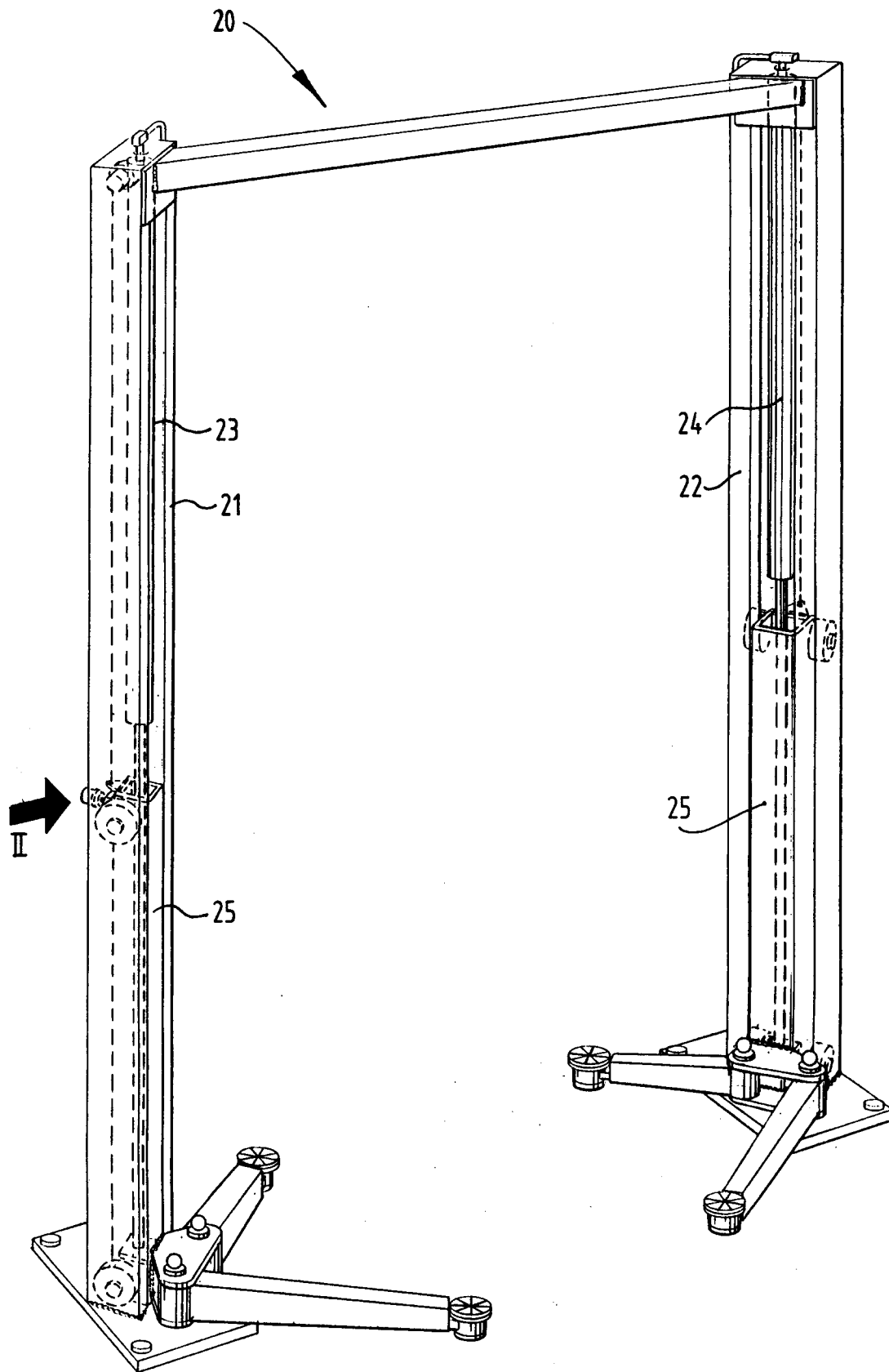


FIG. 1

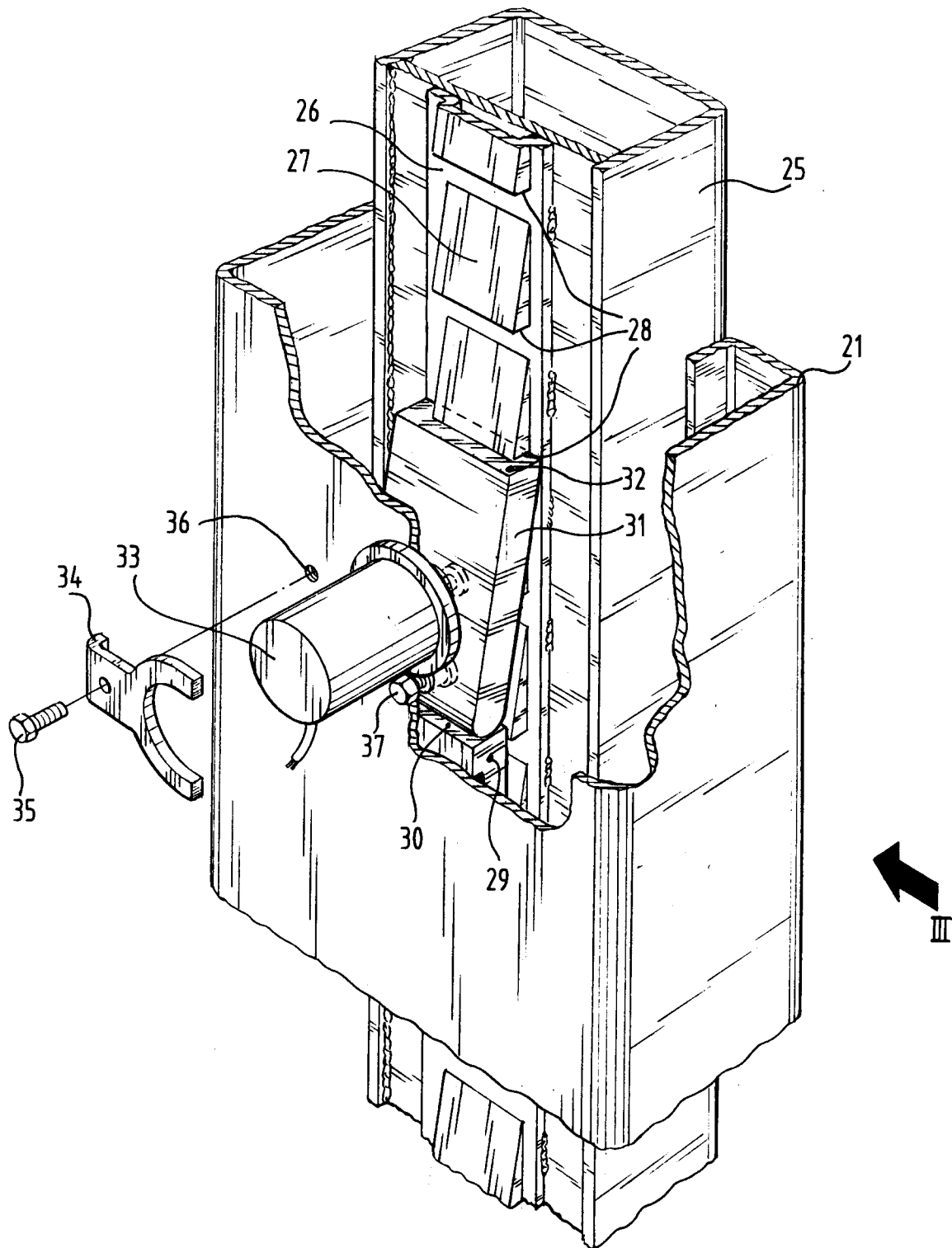


FIG. 2

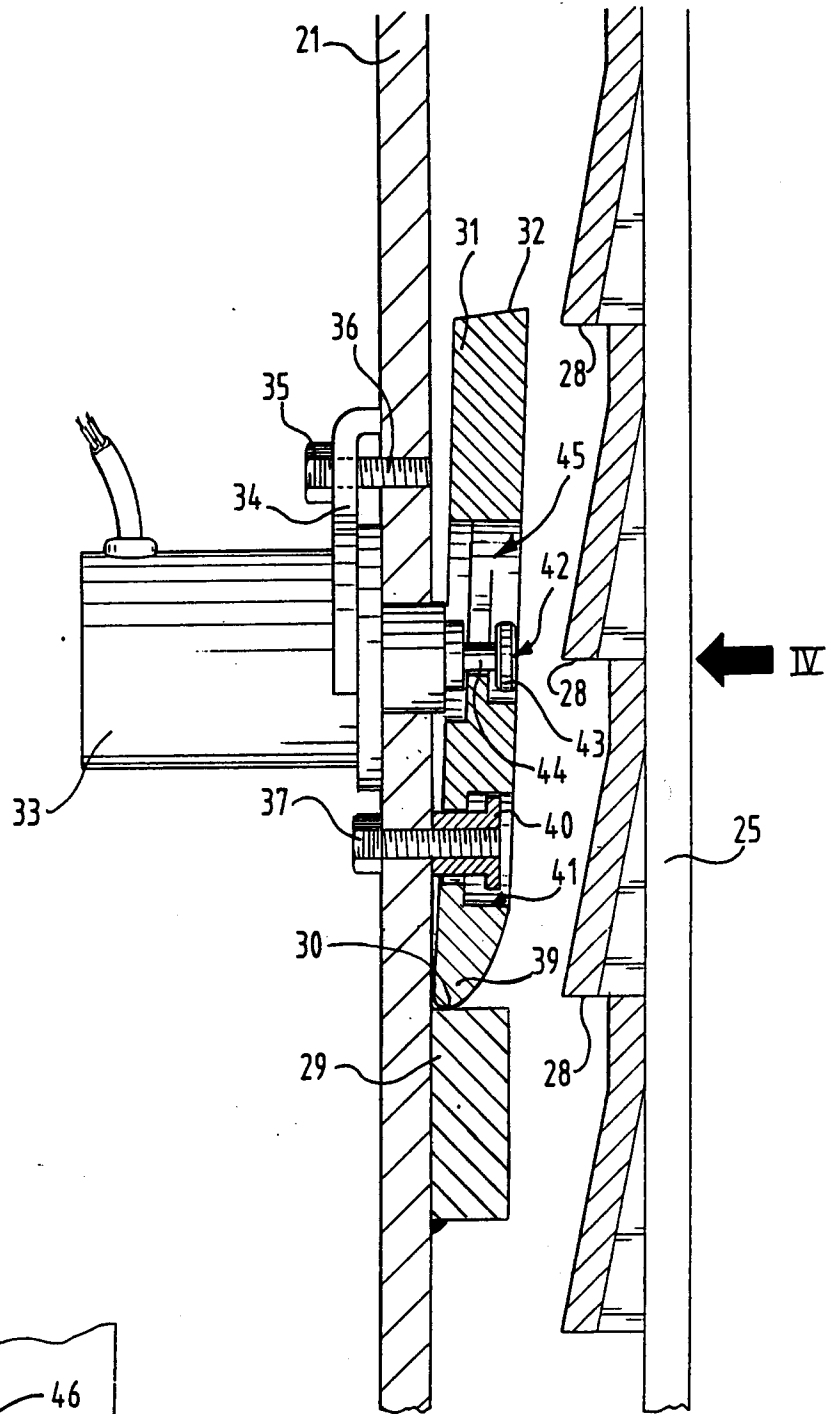


FIG. 3

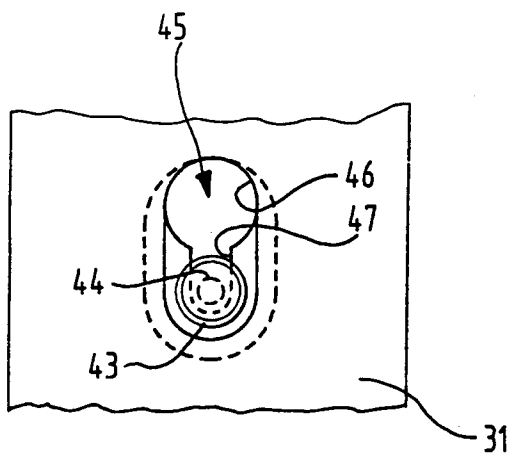


FIG. 4