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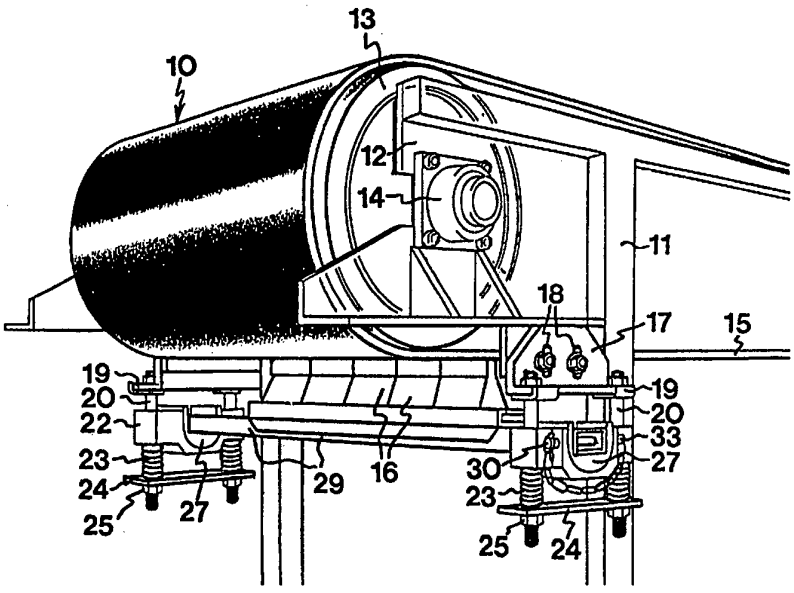
(54) Title: CONVEYOR BELT CLEANING DEVICE AND FASTENING DEVICE THEREFOR



(57) Abstract

A belt cleaning device (16) for cleaning a conveyor belt (15) is attached to a supporting beam (29). The supporting beam is at each end attached to a slide block (22). This is displaceably mounted on guides (20) and yieldably loaded in the direction of the conveyor belt for pressing the belt cleaning device against the conveyor belt. For easy mounting and dismounting, the supporting beam (29) is releasably mounted in a mounting block (27). This is in turn mounted for rotation about an axis extending in parallel with the supporting beam (29) and is lockable relative to the slide block. The slide block is to some extent pivotable relative to the guides (20) in a plane substantially in parallel with the supporting beam and the guides.

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CONVEYOR BELT CLEANING DEVICE AND FASTENING DEVICE THEREFOR

The present invention relates to a conveyor belt cleaning device and, intended therefor, a fastening device of the types as stated in the preamble to the appended claims 1 and 9, respectively.

US-A-5,197,587, US-A-4,249,650, US-A-4,825,996, EP-B-0 262 272 and EP-A-0 252 188 disclose cleaning devices for scraping off adhering remainders of the conveyed material from a conveyor belt. These cleaning devices comprise one or more scrapers, usually made of wear-resistant rubber, which are resiliently pressed against the conveyor belt either when this is still in contact with a conveyor belt drum or when it has advanced a certain distance away from the conveyor belt drum in the return run. When the conveyor belt cleaning device should be pressed against the conveyor belt during the return run, prior-art mounting and fastening devices suffer from various drawbacks. One drawback is that in many cases they do not function more than in one belt direction and therefore cannot be used in belt conveyors which are designed for operation with a reversible belt. A further drawback is that the known devices do not always exert a uniform pressure against the belt during the entire life of the belt scrapers, such that the pressure decreases with increasing wear if re-adjustment is not carried out at regular intervals. Many of the prior-art devices are besides disadvantageous by their requiring special measures to effect an adjustment of the pressure so as to obtain a uniform pressure across the entire width of the belt. One more drawback of several of the known devices is that it is difficult to replace damaged or worn-out belt scrapers without the entire device being more or less dismounted.

One object of the present invention therefore is to provide a belt cleaning device and a fastening device therefor and to eliminate one or more of the above-mentioned drawbacks of prior-art cleaning devices and fastening devices therefor. A special object is to achieve a cleaning device and a fastening device which are of simple and reliable design but which are yet self-adjusting in respect of pressure and distribution of pressure across the width of the belt. A further special object is to provide a belt cleaning device and a fastening device which function independently of the direction of the belt. One more object is to provide a belt cleaning device and a fastening device which permit quick and easy replacement of damaged or worn-out belt scrapers.

One or more of the above-mentioned objects are achieved if the known belt cleaning device and the known fastening device are designed as stated in claims 1 and 9, respectively. The subclaims define particularly preferred embodiments of the invention.

In short, the invention relates to a mounting device for mounting a belt scraper for cleaning a conveyor belt. The belt scraper is attached to a supporting beam. Each end of the supporting beam is attached to a slide block. This is displaceably mounted on guides and yieldably loaded in the direction of the conveyor belt for pressing the belt scraper against the conveyor belt. For easy mounting and dismounting, the supporting beam is releasably mounted in a mounting block. This is in turn mounted for rotation about an axis extending in parallel with the supporting beam and is lockable relative to the slide block. The slide block is to some extent pivotable relative to the guides in a plane extending substantially in parallel with the supporting beam and the guides.

The presently most preferred embodiment of a belt cleaning device and a fastening device therefor according to the invention will now be described in more detail as a non-restrictive example of the invention.

Fig. 1 is a perspective view of one end of a belt conveyor provided with this preferred example of a belt cleaning device and a fastening device therefor according to the invention.

Fig. 2 is a schematic view of one way of mounting the belt cleaning device and the fastening device therefor in the belt conveyor in Fig. 1.

Fig. 3 is an end view of the fastening device and its mounting parts.

Fig. 4 shows the fastening device and the mounting parts seen from the left in respect of Fig. 3.

Fig. 5 is a sectional view along line V-V in Fig. 4.

Fig. 6 is a sectional view along line VI-VI in Fig. 3.

Fig. 7 is a schematic view of an alternative way of mounting the belt cleaning device and the fastening device therefor.

Description of the Preferred Embodiment

Fig. 1 shows a belt conveyor 10, which comprises a supporting structure 11 having a projecting bracket 12 for the mounting of a deflecting drum or end roller 13 with bearings 14. Round this drum passes a conveyor belt 15. A belt scraper 16 is mounted below the lower run of the conveyor belt to be pressed against the downwardly directed surface of the conveyor belt.

Figs 2-6 illustrate in more detail how the preferred belt cleaning device and the fastening device according to the invention are designed. Figs 3-6 show only one mounting and fastening device, but the corresponding device at the other end of the belt cleaning device is designed correspondingly.

The fastening device comprises a mounting member 17 which is L-shaped when seen in an end view and which is formed with slotted mounting holes 18 and an outwardly directed mounting flange 19. Two guides 20 are attached to the flange in some suitable manner, for instance by the upper end of the guides being threaded and passed through a hole in the flange 19 to permit fastening by

means of a nut 21. A supporting yoke or slide block 22 is mounted on the guides. The holes 43 through which the guides extend are elongate as is apparent from Figs 4 and 6. The object of these elongate holes is to permit a certain inclination of the supporting yoke 22 and components attached thereto, in relation to the guides.

The slide block is loaded towards the flange 19 by means of compression springs 23 which are fitted between the lower side of the supporting yoke and a lower end stop 24. This extends between and joins the two guides 20 together and is attached to the guides in an adjustable manner, for instance by means of nuts 25. The springs 23 will thus press the belt scraper upwards and press it against the surface of the belt by a pressure which is determined by the spring properties and degree of compression. The degree of compression can be adjusted by raising and lowering the horizontal position of the mounting member 17 relative to the conveyor belt 15 and by adjusting the position of the end stop 24 relative to the flange 19 by selecting how far the nuts 25 are screwed onto the threaded lower ends of the guides 20.

A mounting block 27 is mounted in a recess 26 in the slide block 22. The recess and the mounting block have complementary sliding surfaces to make it possible for the mounting block to be turned or rotated in relation to the slide block 22.

The mounting block has a seat 28 for one end of a supporting beam 29, whose other end is attached to a corresponding mounting device at the other side edge of the conveyor belt. The seat 28 is such as to allow insertion and retraction of the supporting beam upwards in respect of the drawings, i.e. transversely of the longitudinal direction of the supporting beam. The supporting beam 29 is attached to the supporting yoke or slide block 22 by means of a locking pin 30, which is passed through throughholes 31, 32 and 33 in the supporting yoke 22, the mounting block 27 and the supporting beam 29, respective-

ly. The locking pin 30 is then locked by a locking stud 34 on the other side of the supporting yoke.

As will be apparent when comparing Figs 2 and 5, the actual belt scraper 16 is mounted as a unit on the supporting beam 29. To this end, use is made of a mounting section 35 having downwardly projecting flanges 36 which can be pushed down on each side of the supporting beam and attached thereto by means of bolts 37, 38. To facilitate the mounting operation, there is a slot 39 at one end of the mounting section, thereby making it possible to move the mounting section along the supporting beam to the shown correct position, in which the locking bolt 38 can be attached in order to position the belt scraper in the transverse direction of the conveyor belt.

In the embodiment shown, the belt scraper 16 comprises several juxtaposed scraping elements 40 whose base portions 41 are inserted in an undercut groove 42 in the upper face of the mounting section 35. A preferred embodiment of the actual belt scraper is disclosed in the above-mentioned US-A-5,197,587, which is incorporated herein by reference.

The inventive fastening and mounting device for the belt scraper makes it possible to mount the belt scraper by taking a few measures only. When a belt scraper 16 is to be mounted or dismounted, first the nuts 25 are screwed down as far as possible on the guides 20, such that the end stop 24 gets as far away from the flanges 19 as possible. If necessary, the supporting yoke 22 can be further pressed down against the action of the compression springs 23, for instance by wedges (not shown) being pressed in between the mounting flanges 19 and the supporting yoke 22. Then the locking studs 34 are removed at each end of the supporting beam 29 and the locking pins 30 are retracted such that the mounting blocks 27 can be turned to the required extent, e.g. through 25°. In this position, it is possible either to remove the entire supporting beam 29 with the attached belt scraper 16 or to

loosen only the belt scraper by loosening the bolt 37 and by moving the mounting section 35 to the right in respect of Fig. 2, such that it can be removed from the supporting beam. The mounting is carried out in the reversed order.

As is evident from what has been said above, the mounting and dismounting of the belt scraper is easy to accomplish and can besides be carried out also in narrow spaces, for instance if the belt scraper is mounted on the inside of a dust cover round the belt conveyor (for instance, as shown in Fig. 6).

By tightening the nuts 21 on each side of the belt, it can be ensured that the belt scraper exerts the same or substantially the same pressure across the entire width of the belt. By fastening the supporting beam 29 to the supporting yoke 22 by means of a through locking pin or bolt 30 at each end and owing to the selected design of the throughholes 43 for the guides 20, there is space for a slight inclination of the beam relative to the guides 20, such that the belt scraper stays correctly pressed against the belt even if, for one reason or another, the belt scraper should be worn-out more at one belt edge than at the other. By two guides 20 and a supporting yoke 22 guided by these being arranged at each end of the supporting beam 29, this will be able to efficiently withstand the tipping forces arising by the belt scraper being affected by the moving belt.

As mentioned above, the drawings illustrate a preferred embodiment of the cleaning device and the fastening device according to the invention. In this embodiment, the fastening bolts 30 have been passed through the supporting yoke 22, the mounting block 27 and the supporting beam 20. If desired, separate locking means can be used to lock the mounting block 27 relative to the supporting yoke 22 and to attach the supporting beam 29 to the supporting yoke 22.

In the embodiment shown, the mounting block 27 and the supporting yoke 22 are turnable relative to one another by their cooperating surfaces being designed as substantially circular-cylindrical slide bearing surfaces. Other designs of the bearing surface and other types of bearings can, however, also be used, if desired. Moreover, the loading device is designed as compression springs in the embodiments illustrated. However, other types of yieldable loading devices are also usable, for instance, a loading device in the form of a double-arm lever, whose one arm is connected to the slide block or supporting yoke 22 and whose other arm is loaded by means of weights or tension springs.

CLAIMS

1. A belt cleaning device for cleaning conveyor belts (15), comprising a belt scraper (16) which is arranged on a supporting beam (29) and is connected to a yieldable loading device (23) for pressing the belt scraper against the conveyor belt, the loading device (23) being adapted to act against a slide block (22), on which the supporting beam (23) is mounted and which is slidably mounted on a guiding device means (20) for guiding the motions of the supporting beam (29) towards and away from the conveyor belt, c h a r a c t e r i s e d in that the supporting beam (29) is mounted in a mounting block (27), which is arranged on the slide block (22) and mounted for rotation about an axis extending in parallel with the supporting beam (29) and which is lockable relative to the slide block.

2. The device as claimed in claim 1, c h a r a c - t e r i s e d in that the slide block (22) and the guiding device (20) are interconnected by means of connecting members (43) which allow inclination of the supporting beam (29) in a plane extending substantially parallel with the supporting beam and the guides of the guiding device (20).

3. The device as claimed in claim 1 or 2, c h a r - a c t e r i s e d in that the connecting members (43) consist of throughholes (43) which are elongate in a direction in parallel with the supporting beam (29) and are formed in the slide block (22) for receiving the guides of the guiding device (20).

4. The device as claimed in claim 1, 2 or 3 c h a r a c t e r i s e d in that the guiding device (20) is attached to a bracket (17) which is mounted on the belt conveyor and has adjusting means (18) for adjusting the guiding device relative to the conveyor belt (15).

5. The device as claimed in any one of claims 1-4, c h a r a c t e r i s e d in that the mounting block (27)

has a seat (28) which is intended for the supporting beam (29) and which is formed to allow insertion of the supporting beam into the seat in a direction transversely of the supporting beam.

6. The device as claimed in any one of claims 1-5, c h a r a c t e r i s e d in that a locking device (30) is arranged for locking the mounting block (27) relative to the slide block (22).

7. The device as claimed in any one of claims 1-6, c h a r a c t e r i s e d in that a locking device (30) is arranged for locking the supporting beam (29) relative to the slide block (22).

8. The device as claimed in claims 6 and 7, c h a r a c t e r i s e d in that the locking devices (30) of the supporting beam (29) and the mounting block (27) consist of a common locking pin (30), which is insertable through opposite holes in the slide block (22), the mounting block (26) and the supporting beam (29).

9. A fastening device for belt scrapers, said device comprising an elongate supporting member for a belt scraper (16), a yieldable loading device (23) for pressing the belt scraper against a conveyor belt, and a slide block (22), on which the supporting member (29) is arranged and which is slidably mounted on a guiding device (20) for guiding the motions of the supporting member (29) towards and away from the conveyor belt, c h a r a c t e r i s e d in that the supporting member (29) is mounted in a mounting block (27), which is arranged on the slide block (22) and mounted for rotation about an axis extending in parallel with the longitudinal direction (29) of the supporting member and which is lockable relative to the slide block.

10. The fastening device as claimed in claim 9, c h a r a c t e r i s e d in that the slide block (22) and the guiding device (20) are interconnected by means of connecting members (43) which allow inclination of the supporting member (29) in a plane extending substantially

in parallel with the longitudinal axis of the supporting member and the guides of the guiding device (20).

11. The fastening device as claimed in claim 9 or 10, c h a r a c t e r i s e d in that the connecting members (43) consist of throughholes (43) which are elongate in a direction in parallel with the supporting member (29) and are formed in the slide block (22) for receiving the guides of the guiding device (20).

12. The device as claimed in any one of claims 9-11, c h a r a c t e r i s e d in that the mounting block (27) has a seat (28) which is intended for the supporting beam (29) and which is formed to allow insertion of the supporting beam into the seat in a direction transversely of the supporting beam.

13. The fastening device as claimed in any one of claims 9-12, c h a r a c t e r i s e d in that a locking device (30) is arranged for locking the mounting block (27) relative to the slide block (22).

14. The fastening device as claimed in any one of claims 9-13, c h a r a c t e r i s e d in that a locking device (30) is arranged for locking the supporting member (29) relative to the slide block (22).

15. The fastening device as claimed in claims 13 and 14, c h a r a c t e r i s e d in that the locking devices (30) of the supporting beam (29) and the mounting block (27) consist of a common locking pin (30), which is insertable through opposite holes in the slide block (22), the mounting block (26) and the supporting beam (29).

FIG I

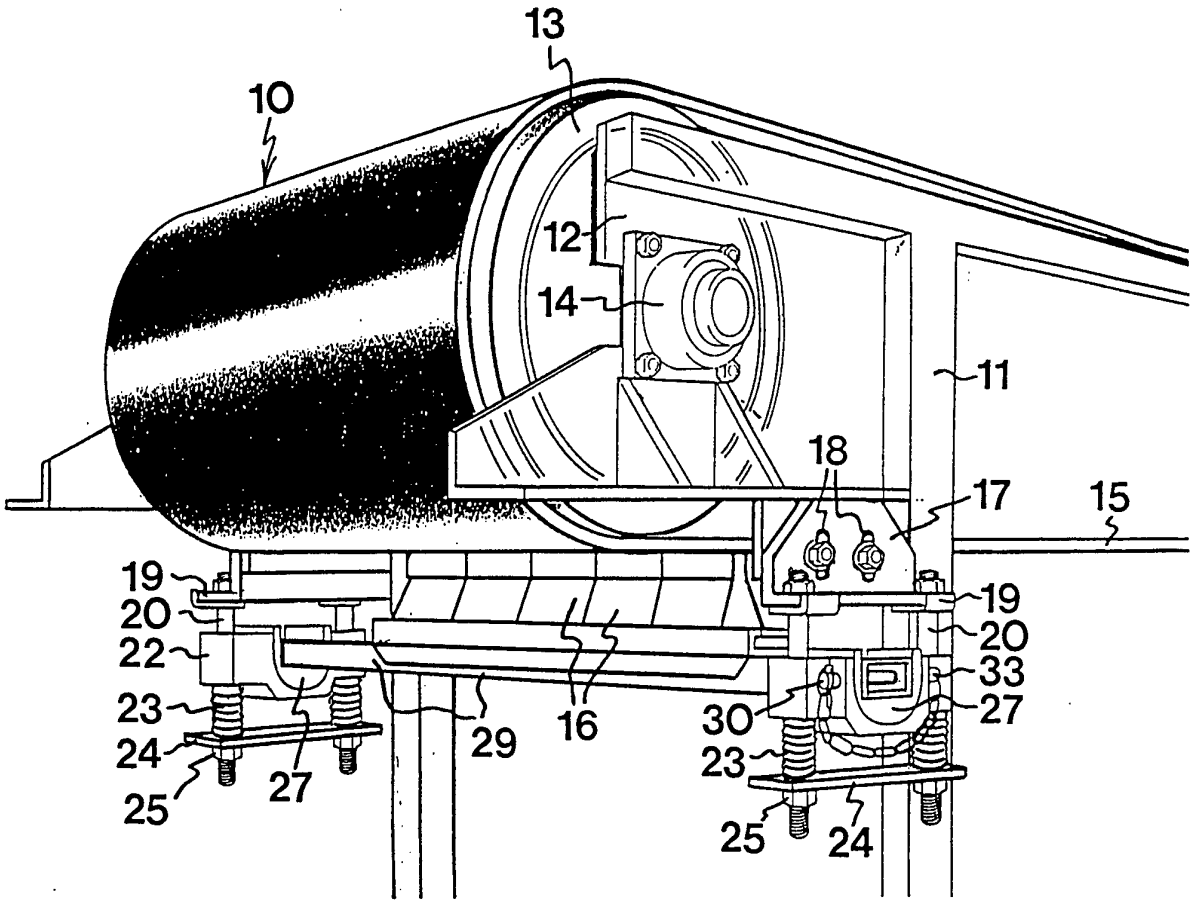
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FIG 2

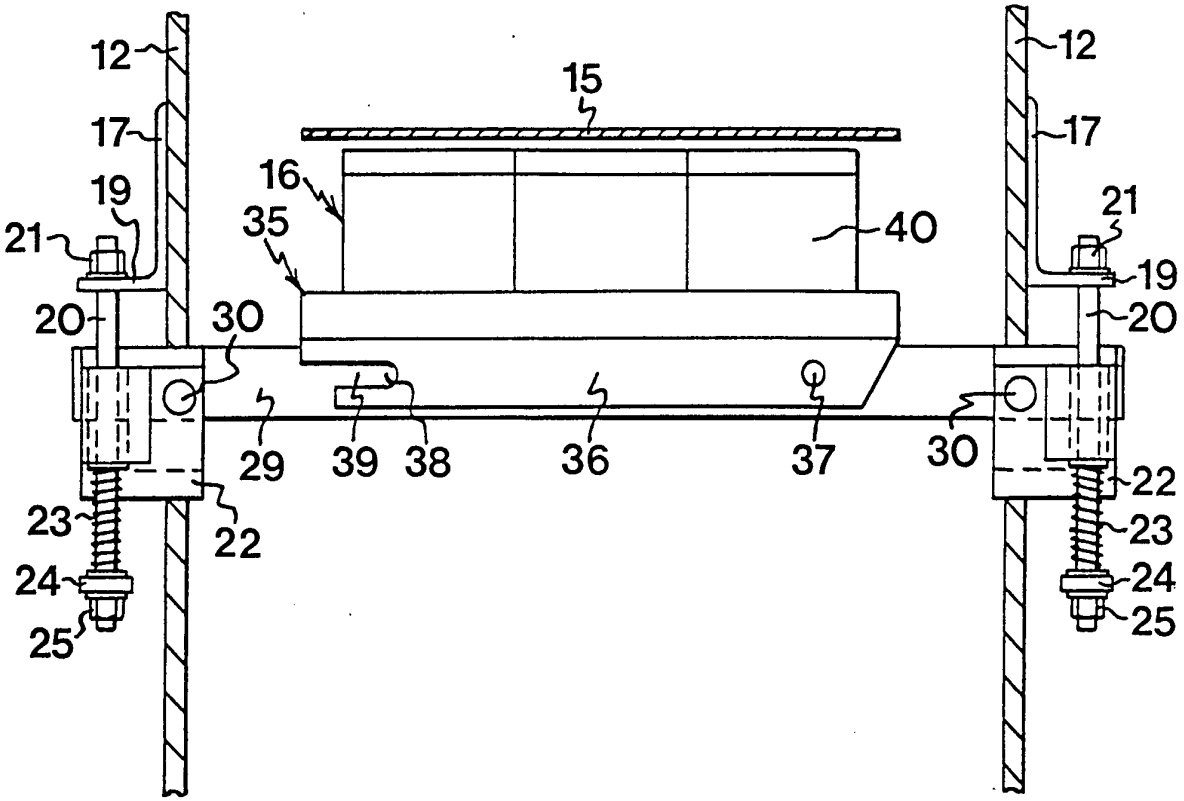
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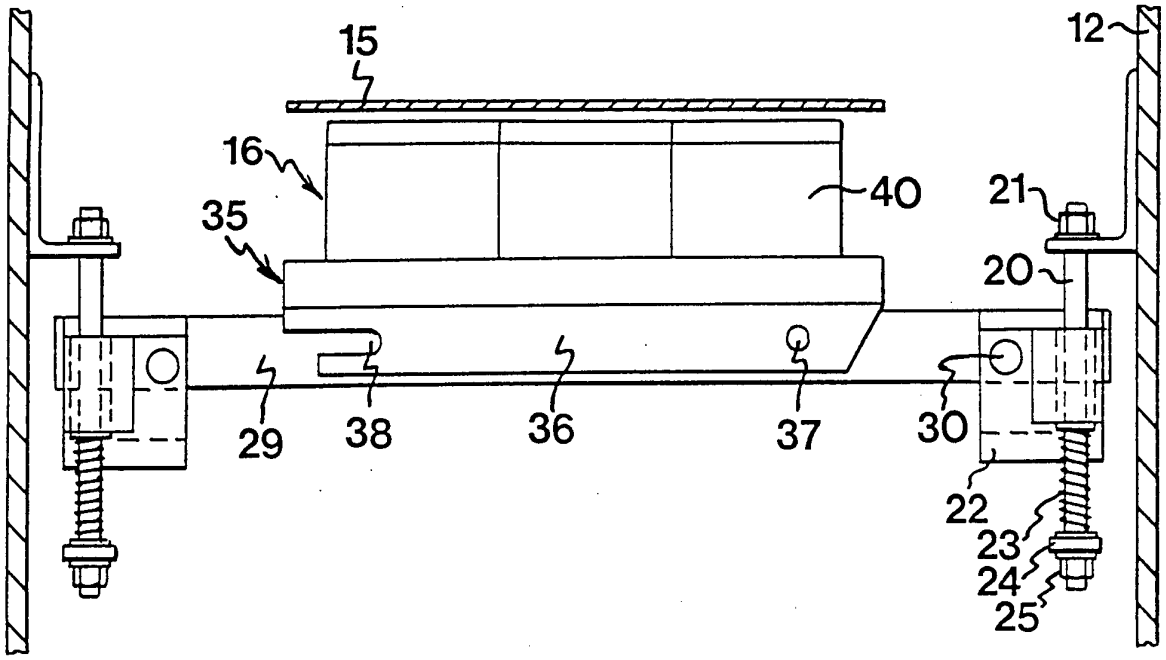
FIG 7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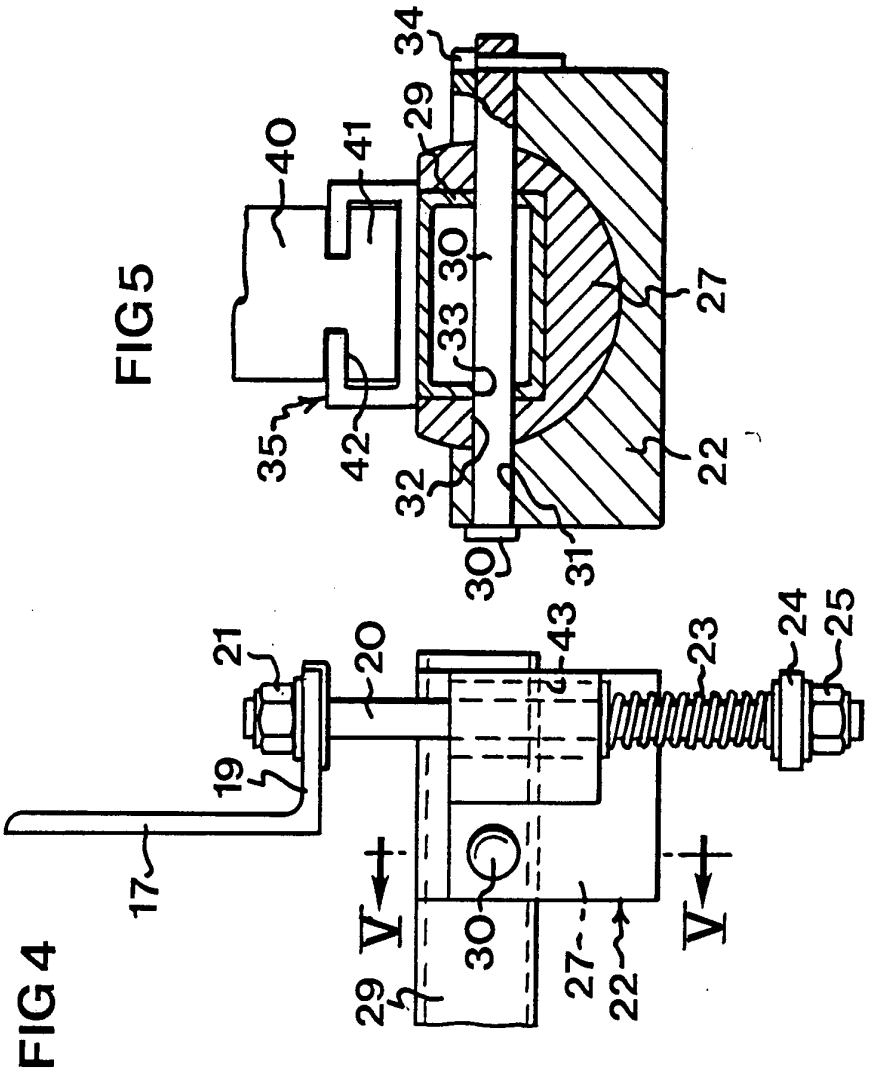

FIG 5

FIG 4

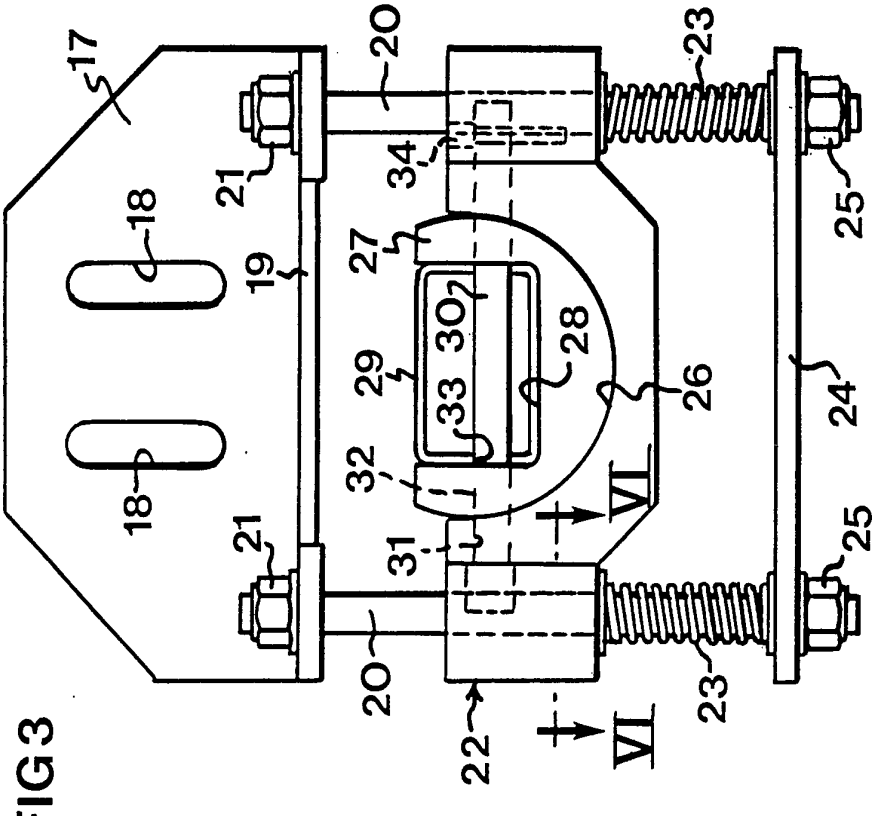

FIG 3

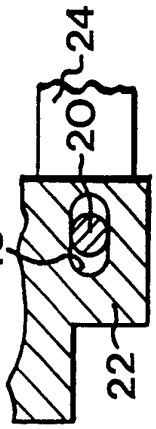

FIG 6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 96/00760

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: B65G 45/12
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

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IPC6: B65G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A		2-15
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Y	GB 2005620 A (ORBIS ENGINEERING LIMITED), 25 April 1979 (25.04.79)	1
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A	US 4036351 A (REITER), 19 July 1977 (19.07.77)	1-15
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[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	AU 48971/79 B (NODA ELECTRIC INDUSTRIAL CO., LTD), 22 January 1981 (22.01.81) -- --------	1-15

INTERNATIONAL SEARCH REPORT

Information on patent family members

05/09/96

International application No.
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