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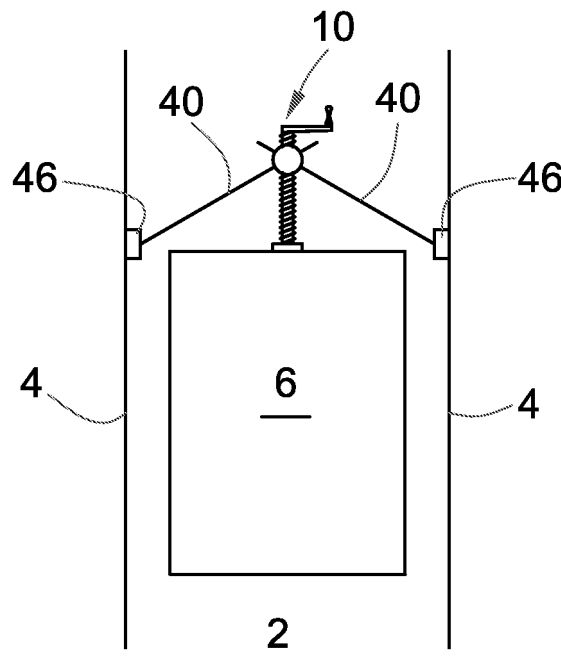
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(54) **Apparatus for moving elevator equipment**

(57) The apparatus comprises height adjustable means (20) configured for interconnecting a suspension point within the shaft (2) and the elevator equipment (6). Contrary to the prior art, the suspension point is provided by a length adjustable means (40) configured for engage-

ment with opposing walls (4) of the shaft (2) or opposing guide rails (50) within the shaft (2). Hence, the invention defines a localised solution that can be used conveniently at any position within the shaft (2) and is therefore independent of the position, and indeed the presence, of any lifting hooks within the shaft (2).

**FIG. 1**



## Description

**[0001]** The present invention relates to an apparatus for moving elevator equipment disposed within an elevator shaft and is particularly adapted for the release of a car stuck in the shaft.

**[0002]** Occasionally, an elevator car can become stuck within a shaft and it is necessary to release the car before the elevator can be returned to normal operation. Such a situation can occur if safety gear mounted on the car has been released to frictionally engage with the guide rails so as to bring the car to an abrupt emergency stop. The energy dissipated through this frictional engagement can in some instances cause the safety gear (and thereby the car) to stick to the guide rails. The common practise to affect the release of the car is to suspend it from a lifting hook located at a position above the car within the hoistway by a rope or cable and to then hoist the rope or cable so as to raise and thereby release the car. This procedure becomes cumbersome and time consuming if the nearest lifting hook is not within easy reach of the car roof.

**[0003]** The objective of the invention is to overcome this problem by providing an apparatus for moving elevator equipment disposed within a shaft according to claim 1. The apparatus comprises height adjustable means configured for interconnecting a suspension point within the shaft and the elevator equipment. Contrary to the prior art, the suspension point is provided by a length adjustable means configured for engagement with opposing walls of the shaft or opposing guide rails within the shaft. Hence, the invention defines a localised solution that can be used conveniently at any position within the shaft and is therefore independent of the position, and indeed the presence, of any lifting hooks within the shaft.

**[0004]** Preferably, the length adjustable means includes shoes for frictional engagement with the opposing walls of the shaft or opposing guide rails. Accordingly, the user does not have to make any special surface preparation before installing the apparatus. In a preferred embodiment, each shoe has a U-shaped housing defining a tapered channel to receive a blade of the guide rail, the channel being wider at its bottom than at its top, and further comprises a roller for insertion into the channel. This is a quick and effective way of securing the length adjustable means to the opposing guide rails.

**[0005]** In one embodiment, the length adjustment means includes a bar having opposing ends for insertion into sleeves provided on the opposing shoes. Each of the sleeves could be spring biased away from the bar towards the opposing guide rails or walls. Alternatively, a series of adjustment holes can be provided in the bars and a pin can be passed through the sleeve and one of the adjustment holes to fasten the bar to the sleeve.

**[0006]** In an alternative embodiment, the length adjustment means includes two interconnectable bars. The bars can be interconnected at a central hub. Preferably

the bars are accommodated in through holes in the hub. As before, each bar can have a series of adjustment holes and can be fastened to the hub by a pin passing through the hub and one of the adjustment holes. Advantageously, the through holes intersect within the hub. Hence each of the bars extends outwards and downwards from the hub to engage with the guide rail or shaft wall. The inclined angle each bar makes with the corresponding guide rail or wall helps enhance the friction therebetween especially when force is exerted on the apparatus. The force exerted through the interconnected bar arrangement has a horizontal as well as a vertical component at the opposing shaft walls or guide rails; the vertical component to overcome the weight and sticking force of the trapped elevator equipment, the horizontal component of the force ensures the shoes are held firmly in place against the opposing shaft walls or guide rails.

**[0007]** The length adjustable means can include a threaded hole, in which case the height adjustable means can be a threaded bolt for rotatable engagement with the threaded hole of the length adjustable means. Alternatively, a conventional lift device such as a chain block or a rope hoist can be used.

**[0008]** The invention is herein described by way of specific examples with reference to the accompanying drawings of which:

Figure 1 is a general diagrammatic overview of a lifting apparatus according to a first embodiment of the present invention;

Figure 2 is a partial plan view of the apparatus of Fig. 1;

Figure 3 is a perspective view of the of the hub of the apparatus shown in Figs. 1 and 2;

Figure 4 is a plan view of a lifting apparatus according to a second embodiment of the present invention;

Figure 5 is a partial, exploded view of an end shoe of the lifting apparatus of Fig. 4; and

Figure 6 is lateral cross-section through the end shoe of Fig. 5.

**[0009]** Fig. 1 illustrates a car 6 which is stuck within a shaft 2 of an elevator installation. A lifting apparatus 10 according to a first embodiment of the invention is erected on top of the car 6 to lift and thereby free the car 6. As shown in Fig. 2, the lifting apparatus 10 comprises a square thread bolt 20 having a flange 22 located at its lower end. The flange 22 is inserted into and retained in a space defined between an inner, upper collar 14 and an outer, lower collar 16 of a U-shaped retainer 12 mounted on the roof 8 of the car 6. The flange 22 and bolt 20 are freely rotatable with respect to the retainer 12. A handle 24 is secured to an upper end of the square thread bolt 20 to enable the user to manually rotate the bolt 20.

**[0010]** The bolt 20 passes through and engages a correspondingly threaded hole 28 provided in a hub 26. Accordingly relative rotation between the hub 26 and the bolt 20 causes the hub 26 to move along the length of

the bolt 20. Two structural tubes 40 are adjustably mounted within holes 30 provided through the hub 26 and extend outwards and downwards from either side of the hub 26 towards opposing walls 4 of the shaft 2. A shoe 46 is pivotally mounted on an end 44 of each tube 40. Each shoe has a toothed surface 48 to enhance the frictional engagement between the shoe 46 and the shaft wall 4.

**[0011]** Once the bolt 20 has been erected on the car roof 8, the tubes 40 are extended from the hub 26 until the shoes 46 engage with the opposing walls 4 of the shaft 2. In this position, each tube 40 is inclined to the normal N of the respective wall 4 at an angle  $\alpha$ . The tubes 40 are then secured to the hub 26 by retention pins 32 inserted through pin holes 34 in the hub 26 and adjustment holes 42 in the tubes 40 (as shown in Fig. 3).

**[0012]** The lifting apparatus 10 is now fully installed and in operation the user turns the handle 24 in an anti-clockwise direction causing the bolt 20 to move upwards within the hub 26. After the inherent initial slack in the system has been taken up, the lifting apparatus 10 builds up sufficient lifting force to firstly overcome the weight of the car and then, with further rotation of the handle 24, the lifting force is sufficient to overcome the force retaining the car 4 in its stuck position. The stuck car 4 is thereby released.

**[0013]** Fig. 4 shows a second embodiment of the present invention wherein a lifting apparatus 60 is secured between T-profile guide rails 50 mounted on the shaft walls 4 to release a car stuck within the shaft 2. Each guide rail 50 has laterally extending side flanges 52 and a transverse guide blade 54. The side flanges 52 are affixed to the corresponding side wall 4 through brackets (not shown). The transverse guide blades 54 extend into the shaft 2 to provide a guiding surface for the guide shoes or roller guides (not shown) provided on the car 6.

**[0014]** The lifting apparatus 60 comprises an intermediate bar 62 with telescopic end shoes 72 to engage with the opposing guide blades 54. A conventional lifting device 66 such as a chain block or rope hoist is installed between a lifting eye 64 on the intermediate bar 62 and fastening means 68 on the car 6.

**[0015]** As shown in Fig. 5, an exploded view of section A in Fig. 4, the intermediate bar 62 is received in a sleeve 74 provided in each end shoe 72. The end shoes 72 are extended outwards from the intermediate bar 62 until they partially envelope the blade 54 of the respective guide rail 50 and adjustment pins 76 are then inserted through the sleeves 74 and adjustment holes 70 in the intermediate bar 62 to lock the arrangement between the opposing guide rails 50.

**[0016]** Fig. 6 is a cross-section through line B-B of Fig. 5 and shows how each end shoe 72 envelopes and subsequently engages with its corresponding guide rail 50. The housing 78 is generally U-shaped having a first end limb portion 78a and a second tapered limb portion 76b defining a channel 80 therebetween. The guide rail blade

54 is accommodated within this channel 80 which is broader at the bottom than at the top. To secure the locked arrangement of intermediate bar 62 and end shoes 72 to the guide rails 50, a captive roller 86 is inserted through the bottom of the channel 80 alongside the guide rail blade 54. As the roller 86 is moved upwards along an inclined surface 84 of the second tapered limb portion 76b of the housing 76, it comes to a point where the channel 80 is only sufficient in width to accommodate the roller 86 and the guide rail blade 54. At this point the roller 86 and the guide rail blade 54 frictionally engage and become wedged in the channel 80 and any downward motion of the locked arrangement of intermediate bar 62 and end shoes 72 relative to the guide rail 50 is prevented. Preferably, the inner surface 85 of the first limb portion 78 has a high coefficient of friction.

**[0017]** With the lifting apparatus 60 installed as discussed above, the user operates the lifting device 66 to lift and release the trapped car 6. To dismantle the lifting apparatus 60, the user pulls down on a winged nut 90 connected to an axle 88 of the roller 86, thereby unfastening the end shoe 72 from the guide rail 50.

**[0018]** In the embodiments described above it is assumed that the car 6 is of the self-supporting type. However it will be apparent to those skilled in the art that the invention can equally be employed for cars supported in a frame wherein the lifting apparatus would be attached to the upper yoke of the car frame rather than the car roof.

**[0019]** It will also be understood that the invention can be used to release a stuck counterweight, or indeed any equipment within the elevator shaft 2.

**[0020]** Furthermore, it will be realised that individual components of the two embodiments described in detail above can be combined to give further variants of the invention. For example, the end shoe housings 78 of the second embodiment could be used to secure the interconnected bars 40 of the first embodiment to the guide rails 50. In another example, the intermediate bar 62 of the second embodiment could have a threaded hole to engage with the threaded bar 20 of the first embodiment.

## Claims

1. An apparatus (10;60) for moving elevator equipment (6) disposed within a shaft (2) comprising:

height adjustable means (20;66) configured for interconnecting a suspension point within the shaft (2) and the elevator equipment (6)

## CHARACTERISED IN THAT

the suspension point comprises a length adjustable means (40;62,72) configured for engagement with opposing walls (4) of the shaft (2) or opposing guide rails (50) within the shaft (2).

2. An apparatus according to claim 1, wherein the

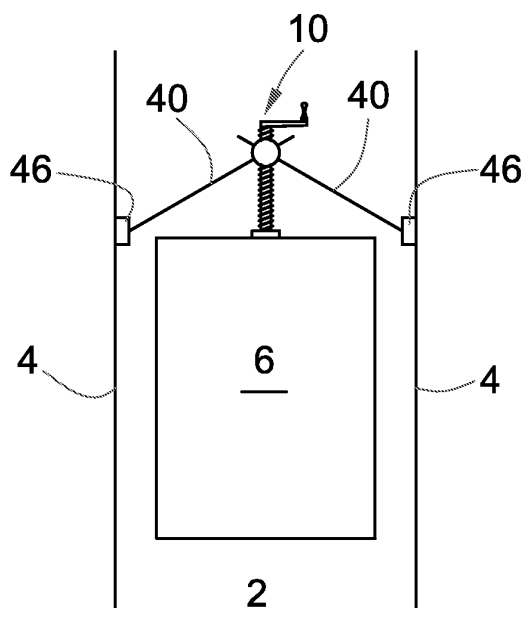
length adjustable means (40;62,72) includes shoes (46;72) for frictional engagement with the opposing walls (4) or opposing guide rails (50).

3. An apparatus according to claim 2, wherein each shoe (72) has a U-shaped housing (78) defining a tapered channel (80) to receive a blade (54) of the guide rail (50), the channel (80) being wider at its bottom than at its top, and further comprising a roller (86) for insertion into the channel. 5  
10
4. An apparatus according to claim 2 or claim 3, wherein the length adjustment means includes a bar (62) having opposing ends for insertion into sleeves (74) provided on the opposing shoes (72). 15
5. An apparatus according to claim 4, wherein the bar (62) has a series of adjustment holes (70) at either end and is fastened to each sleeve (74) by a pin (76) passing through the sleeve (74) and one of the adjustment holes (70). 20
6. An apparatus according to claim 2 or claim 3, wherein the length adjustment means includes two interconnectable bars (40) each having one of the shoes (72) pivoted to one of its ends (44). 25
7. An apparatus according to claim 6 further comprising a hub (26) having through holes (30) for accommodating the bars (40) wherein each bar (40) has a series of adjustment holes (42) and is fastened to the hub (26) by a pin (32) passing through the hub (26) and one of the adjustment holes (42). 30
8. An apparatus according to claim 7, wherein the through holes (30) intersect in the hub (26). 35
9. An apparatus according to any preceding claim, wherein the length adjustable means further includes a threaded hole (28) and the height adjustable means comprises a threaded bolt (20) for rotatable engagement with the threaded hole (28) of the length adjustable means. 40
10. An apparatus according to any of claims 1 to 8, wherein the height adjustable means (66) is a chain block or rope hoist. 45

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FIG. 1



**FIG. 3**

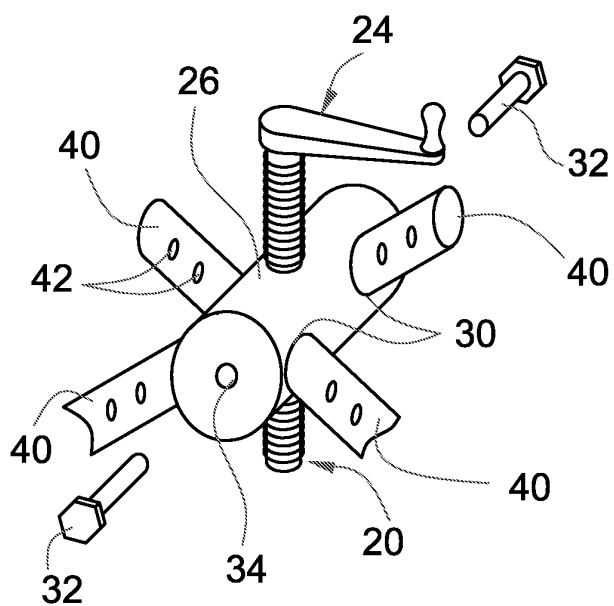


FIG. 2

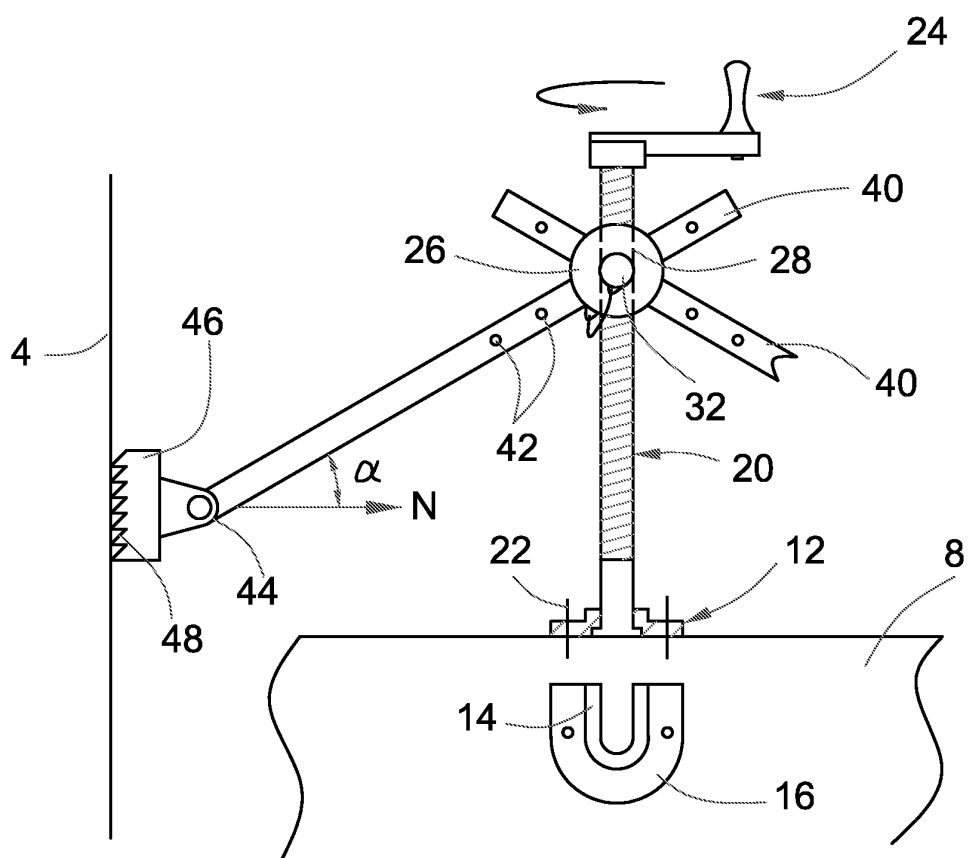


FIG. 4

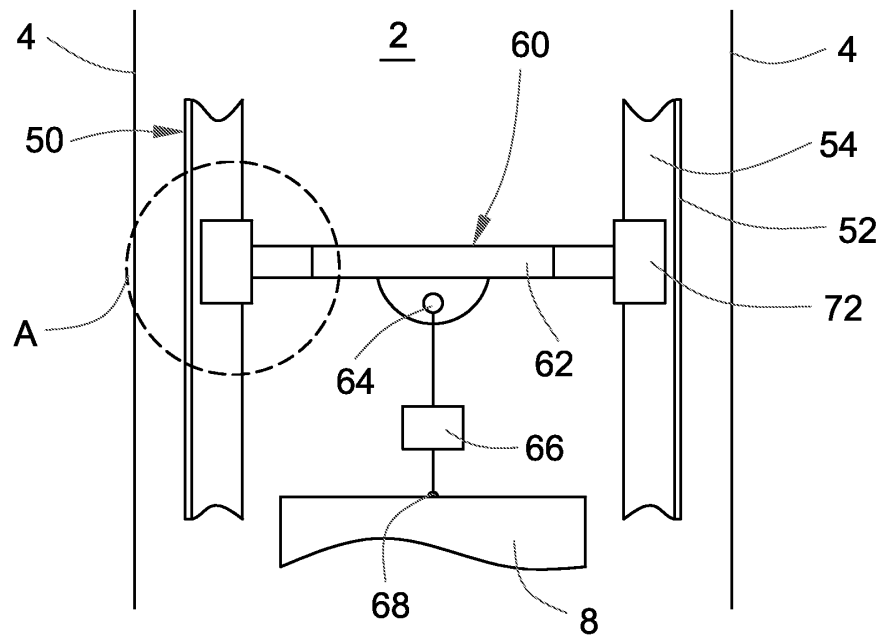


FIG. 6

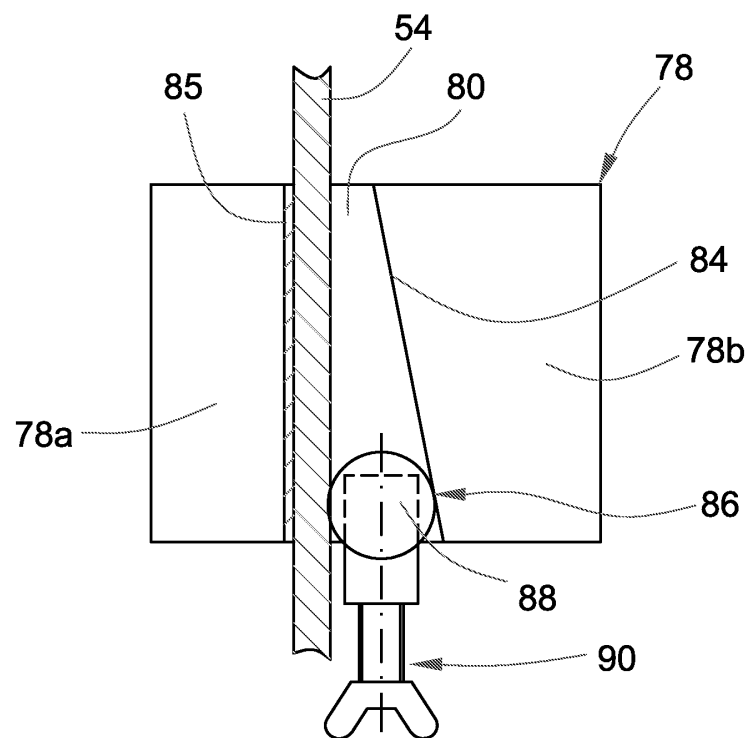
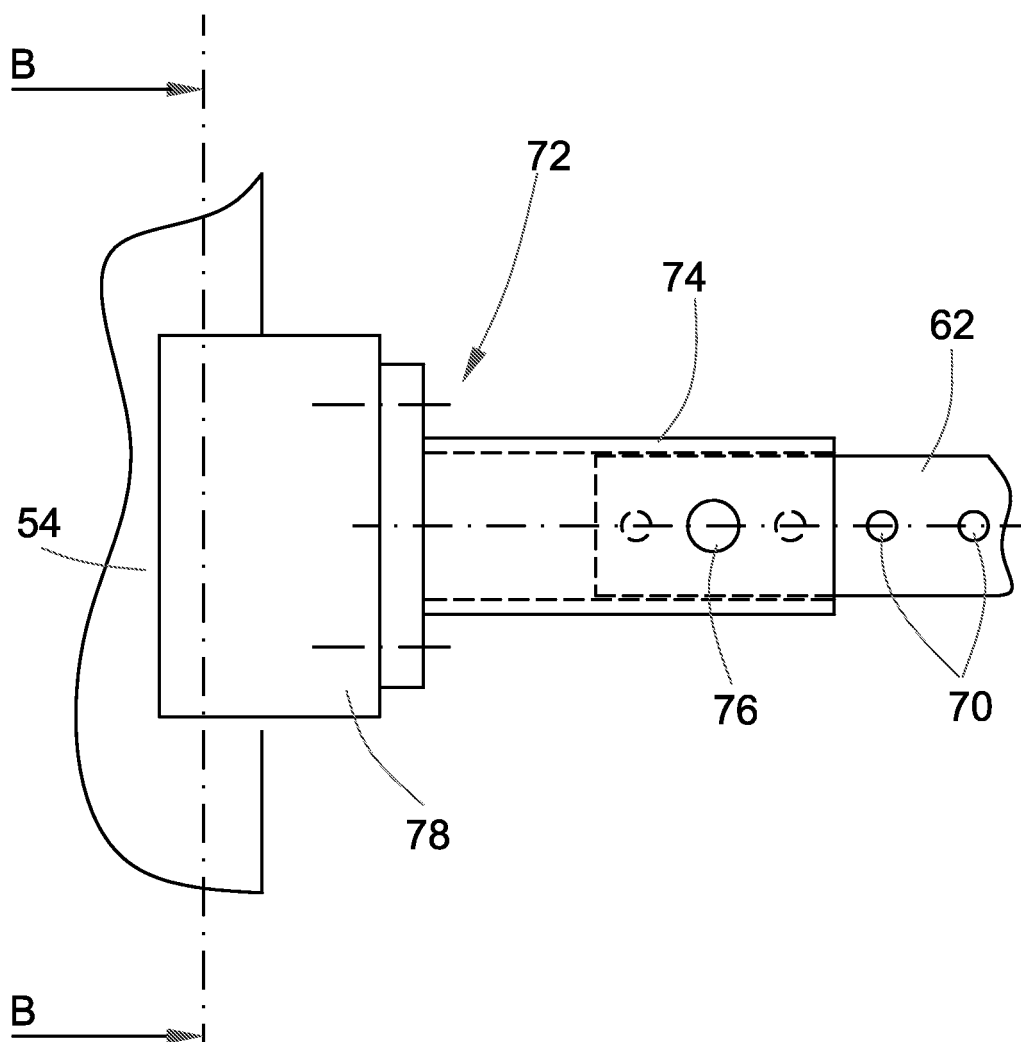


FIG. 5





European Patent  
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# EUROPEAN SEARCH REPORT

Application Number  
EP 05 10 5960

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Place of search		Date of completion of the search	Examiner
The Hague		25 November 2005	Nelis, Y
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ..... & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT  
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on  
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