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B8L LCD L24 L8B L8E L8G
F2E ENG
U1S S1872

(56) Documents cited
GB 1555621 A EP 0049066 A2 US 4856623 A
US 4531617 A

(58) Field of search
UK CL (Edition K) B8L LCD, F2E EF ENG
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(54) Bi-directional safety brake for elevator

(57) The brake (7) (Fig. 1) acts to stop an elevator (1) which is overspeeding in the upward or downward direction and comprises wedges (9) (Fig. 6), and wedge guides 10 which are relatively moveable in a vertical direction by the action of linkage 8 at the onset of overspeeding. This movement induces horizontal movement of the wedges (9) which engages the elevator guide rail to stop the elevator. The action of linkage 8 is caused by the difference in speed between the overspeeding elevator and the governor cable 5.

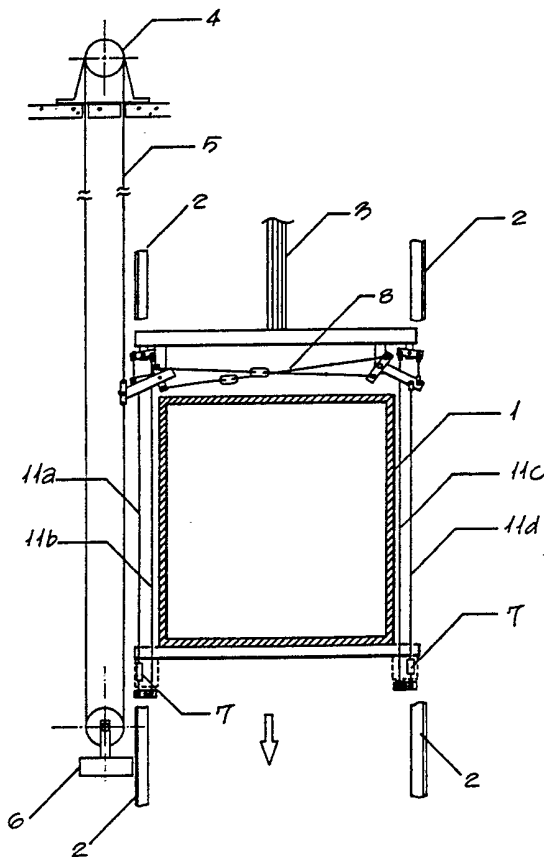


FIG 1

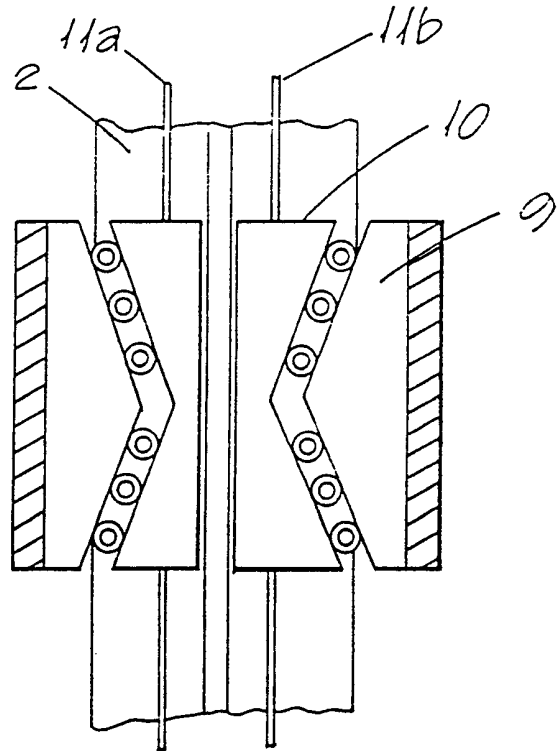


FIG 6

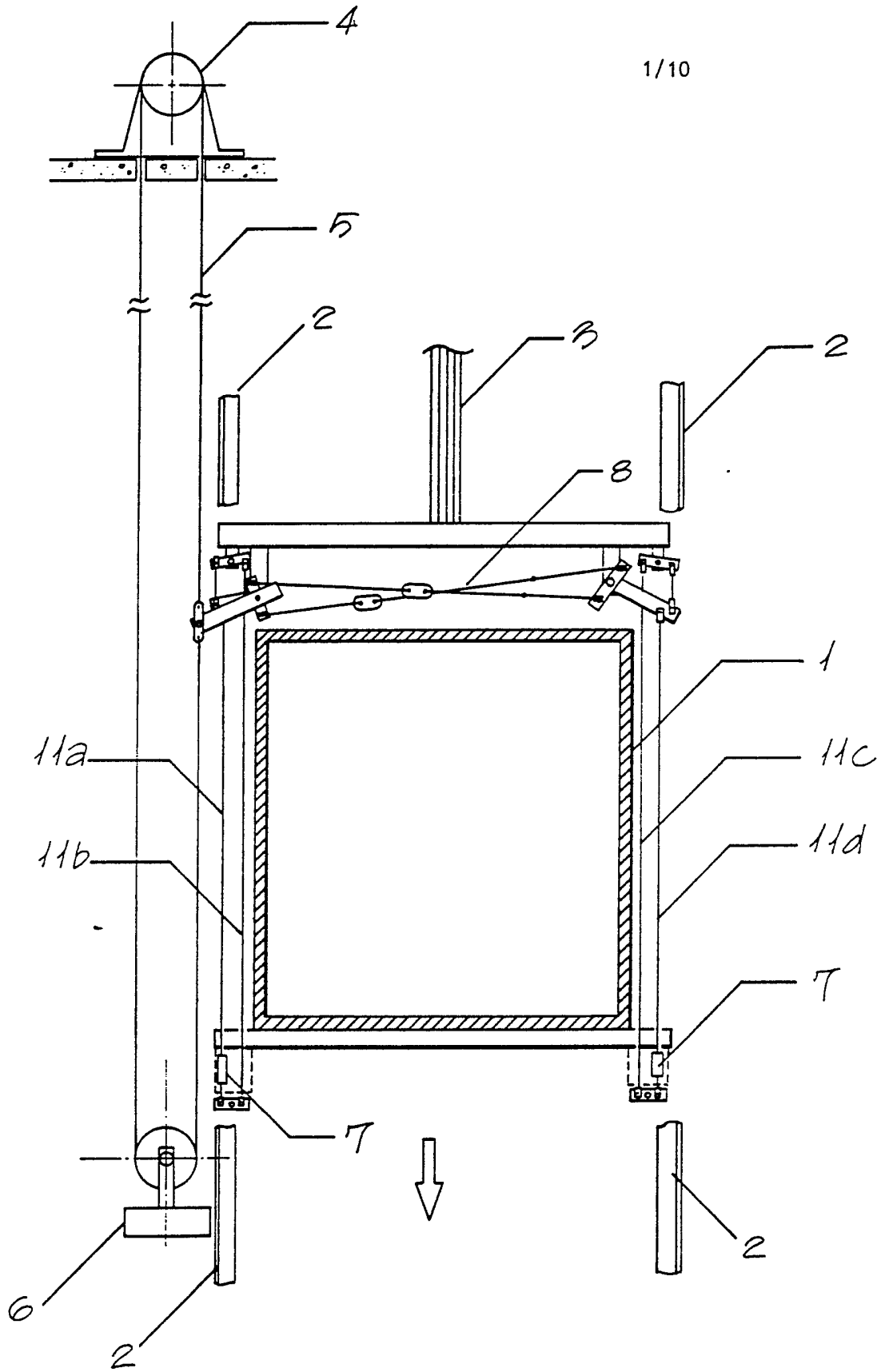


FIG 1

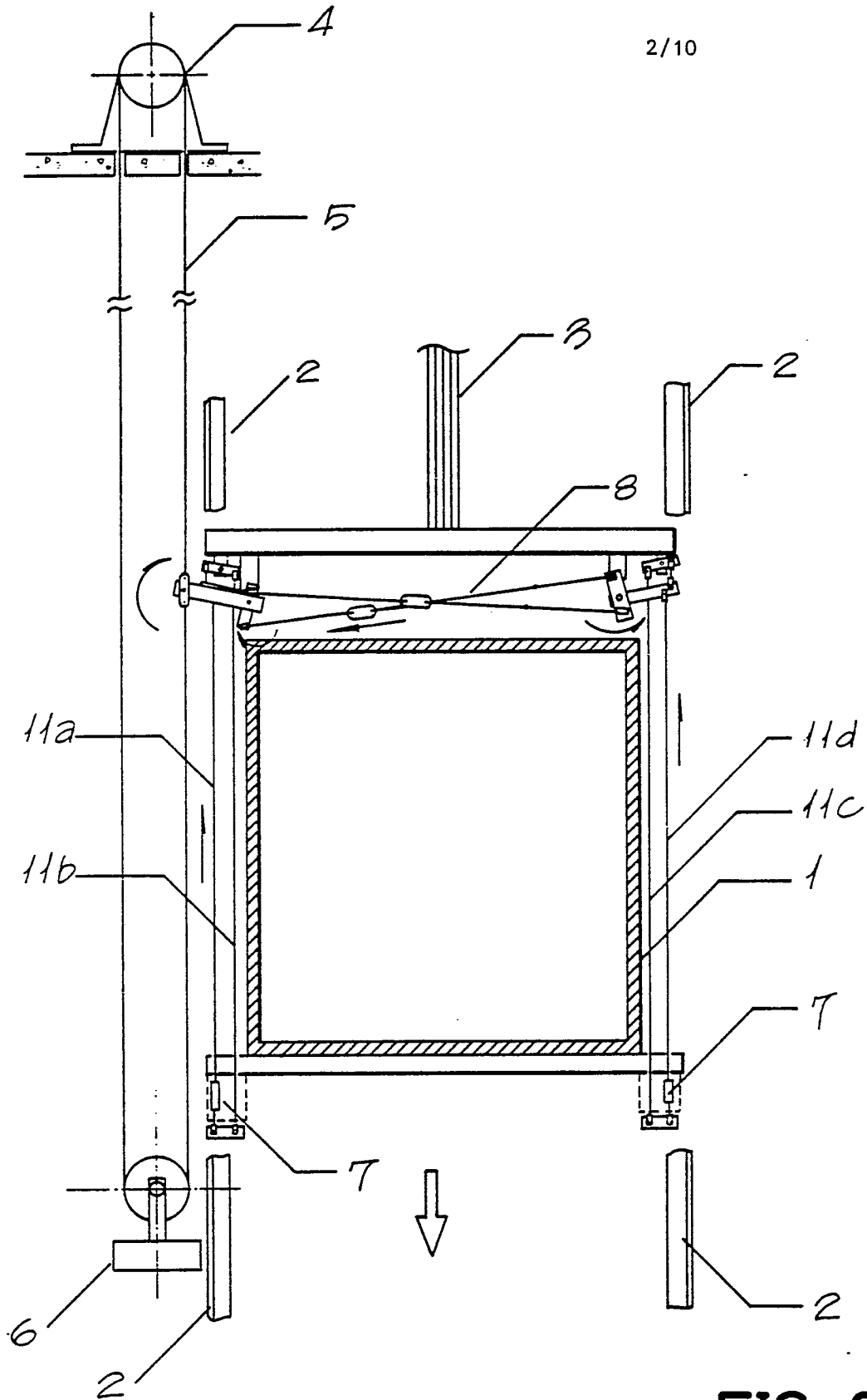


FIG 2

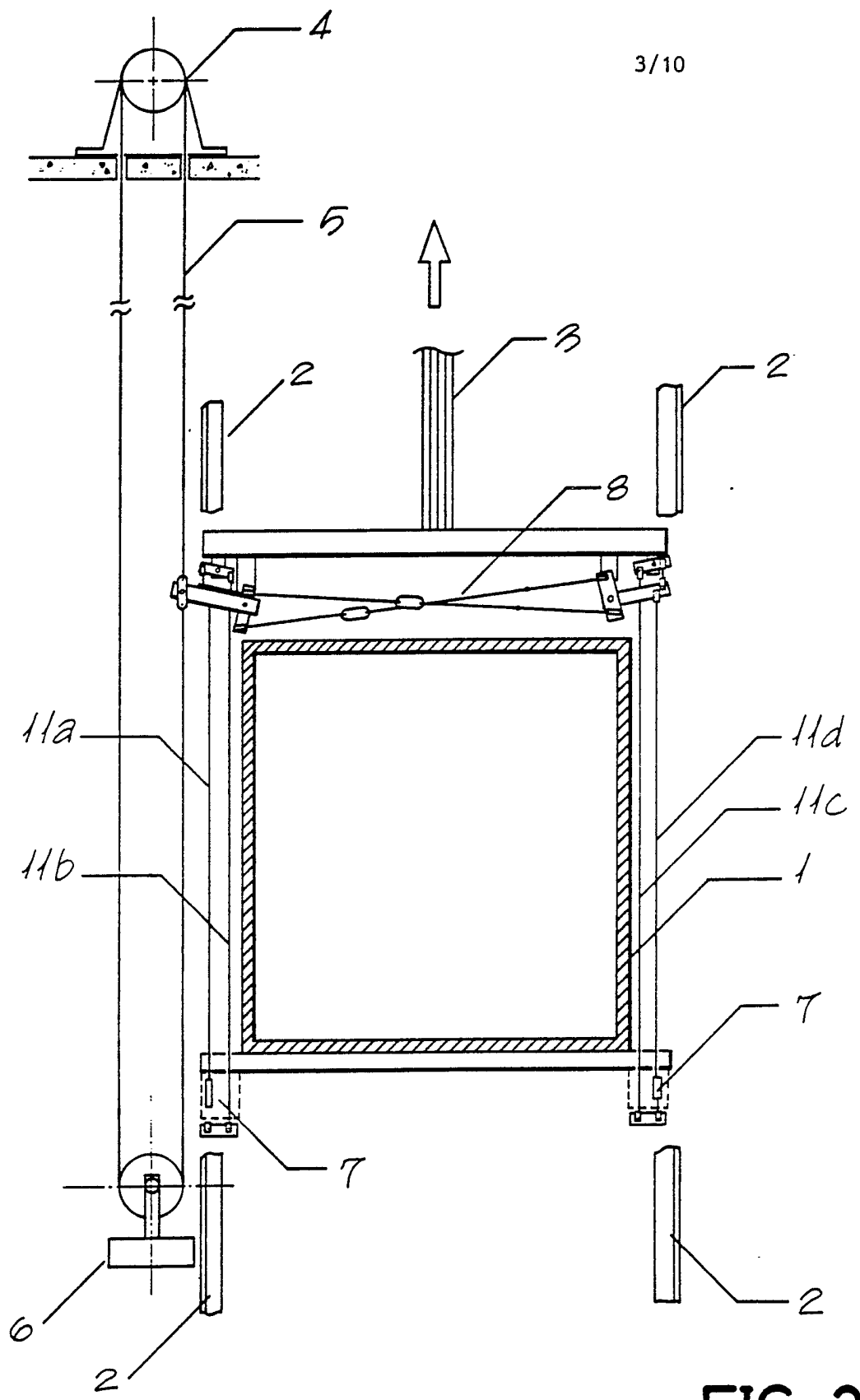
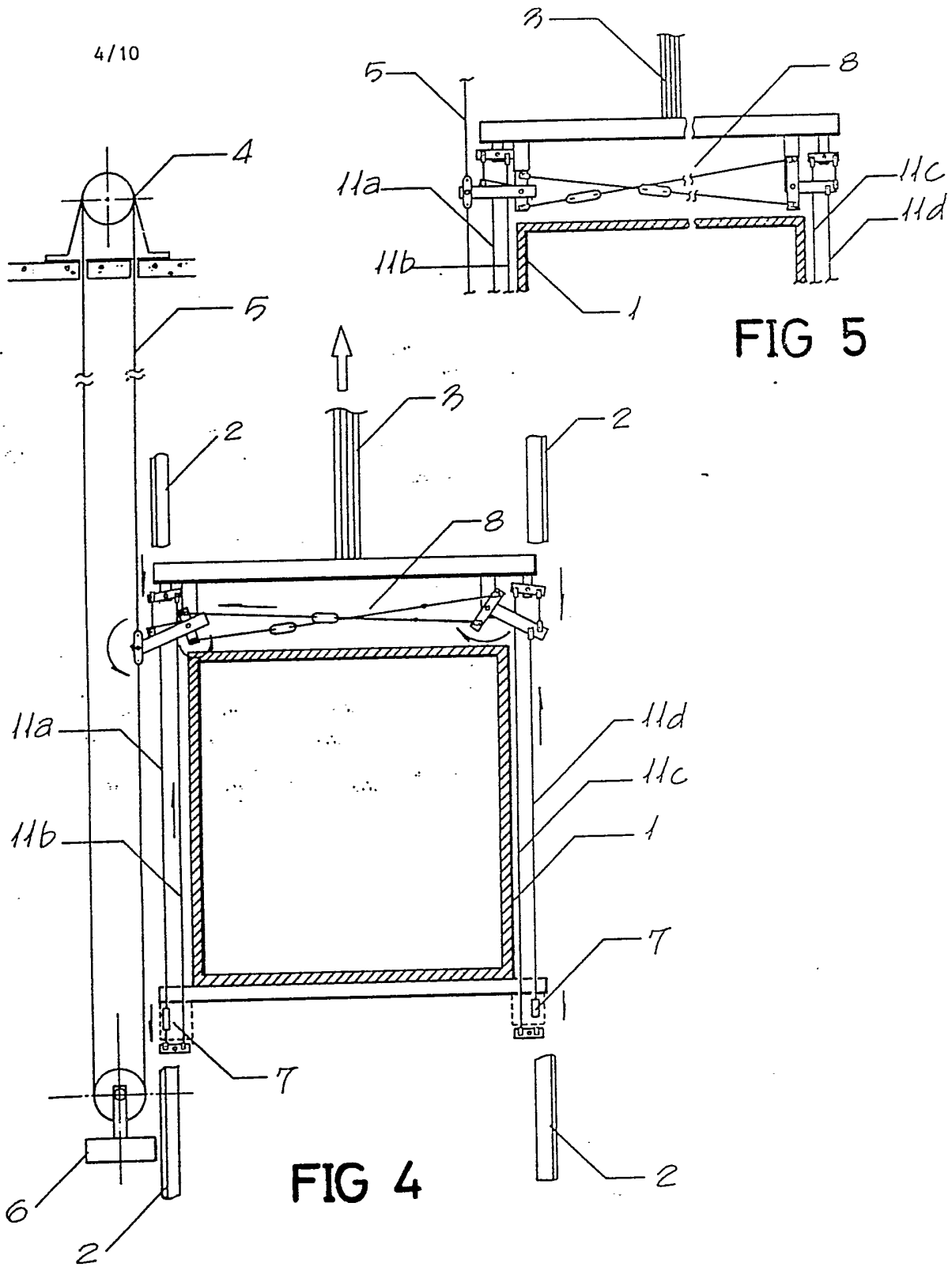


FIG 3



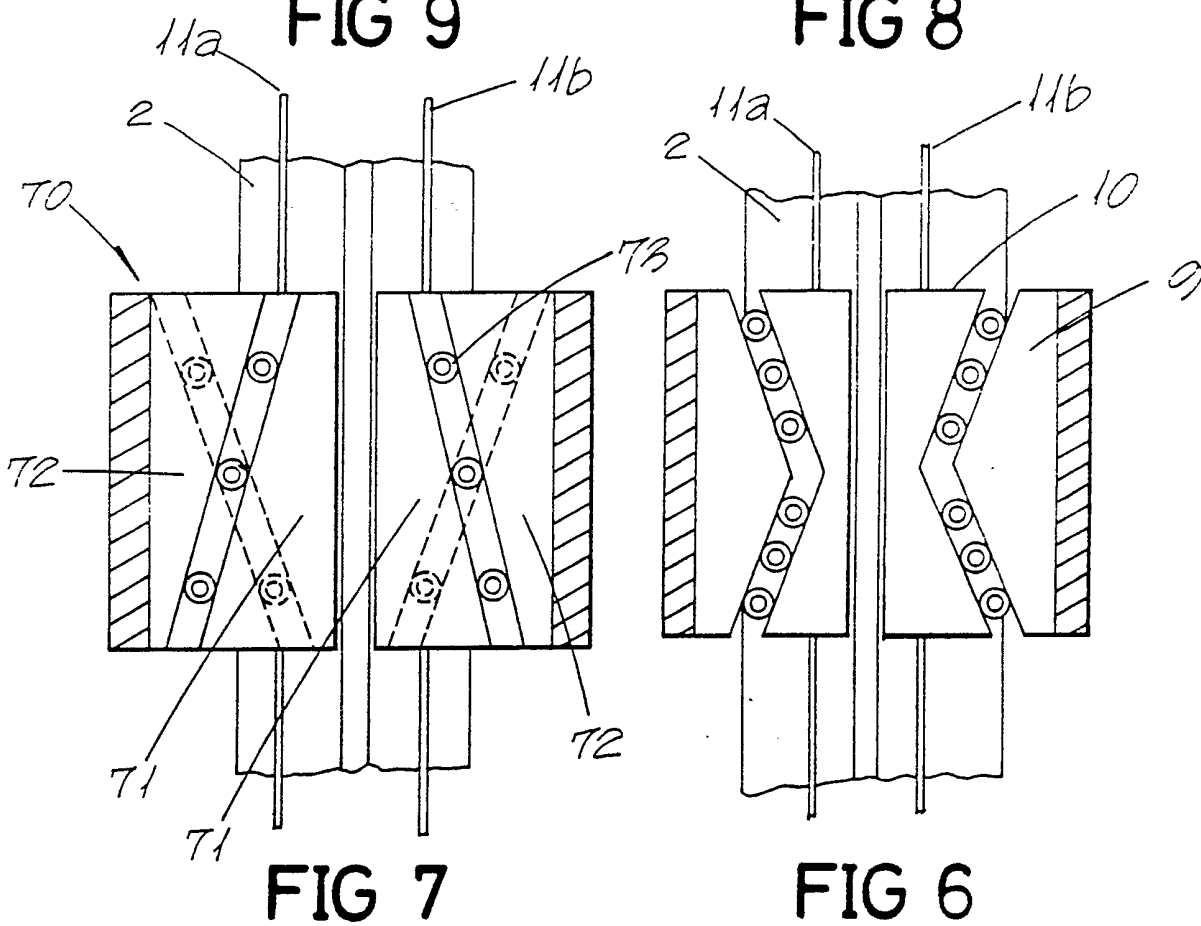
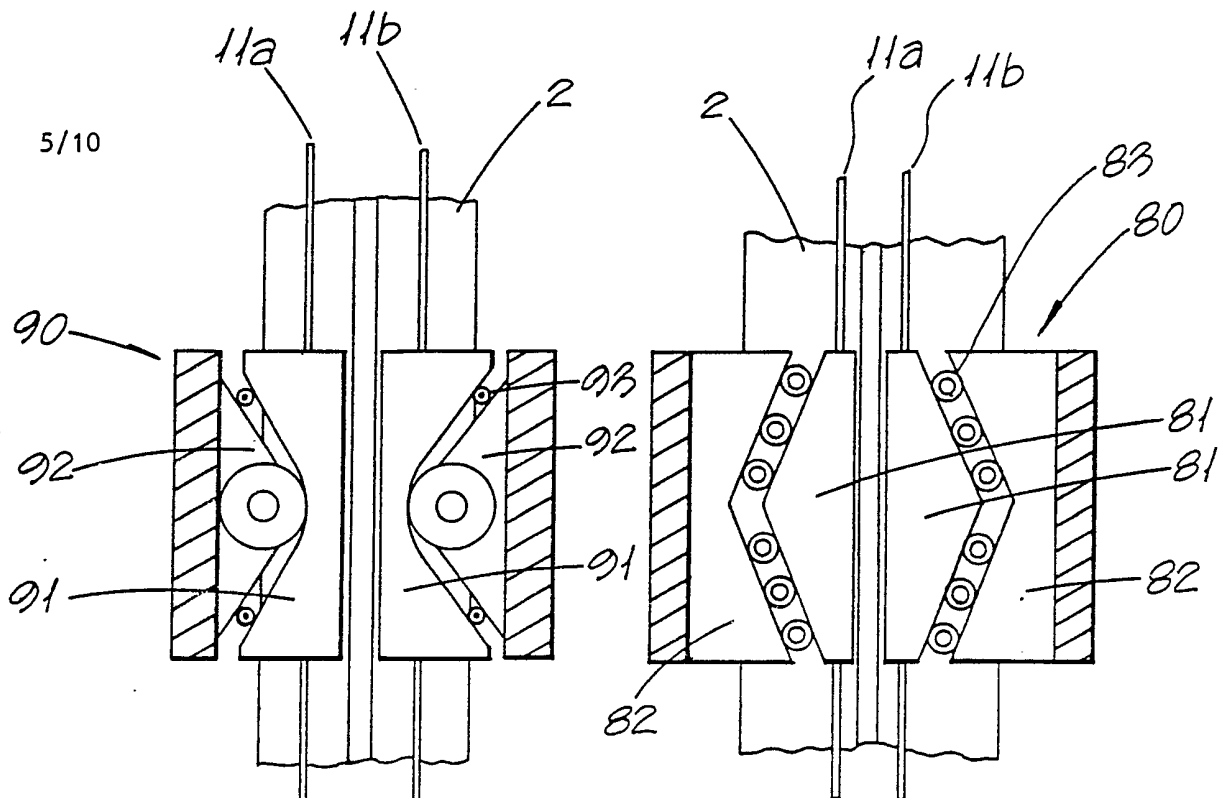
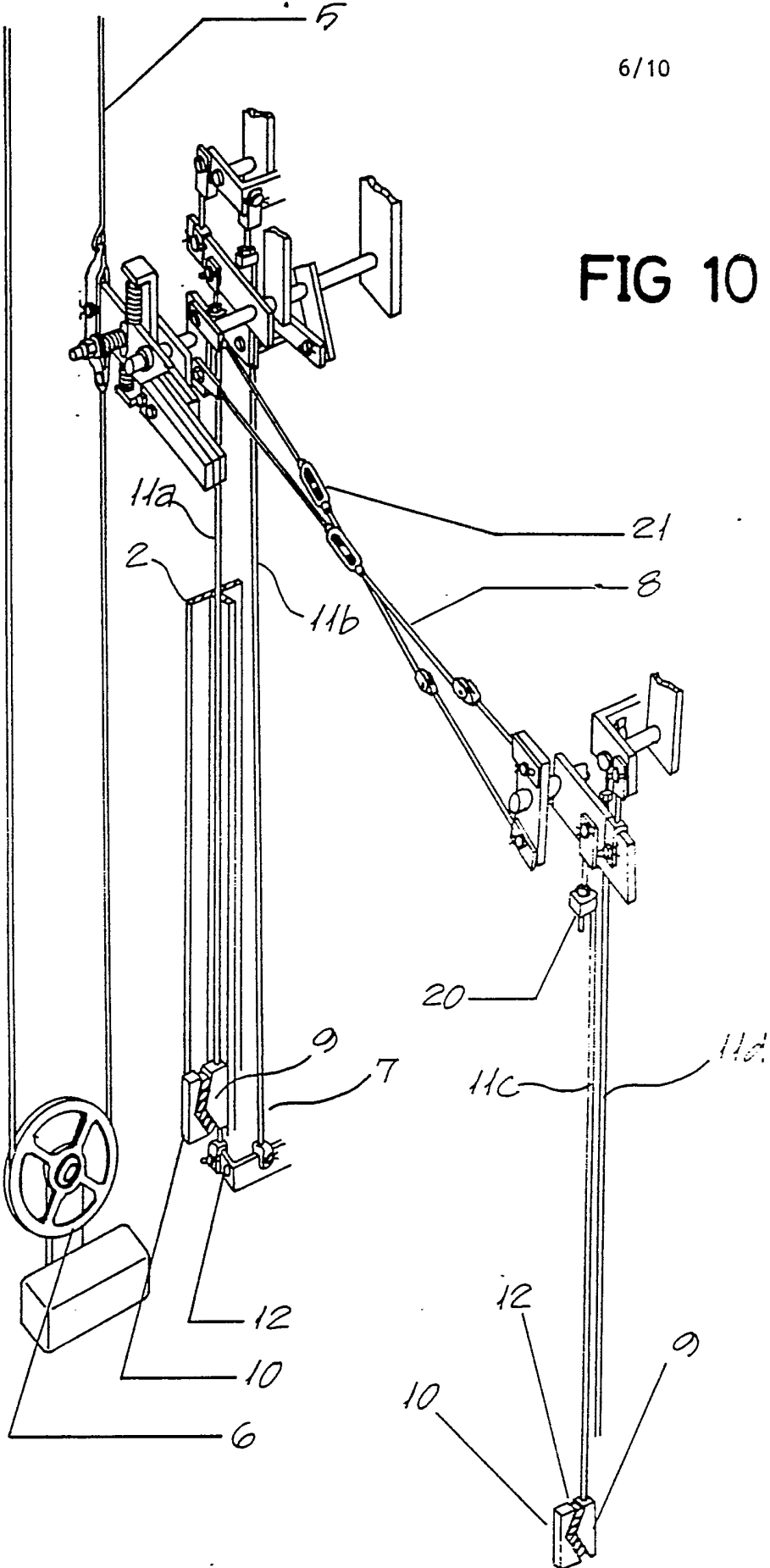


FIG 10



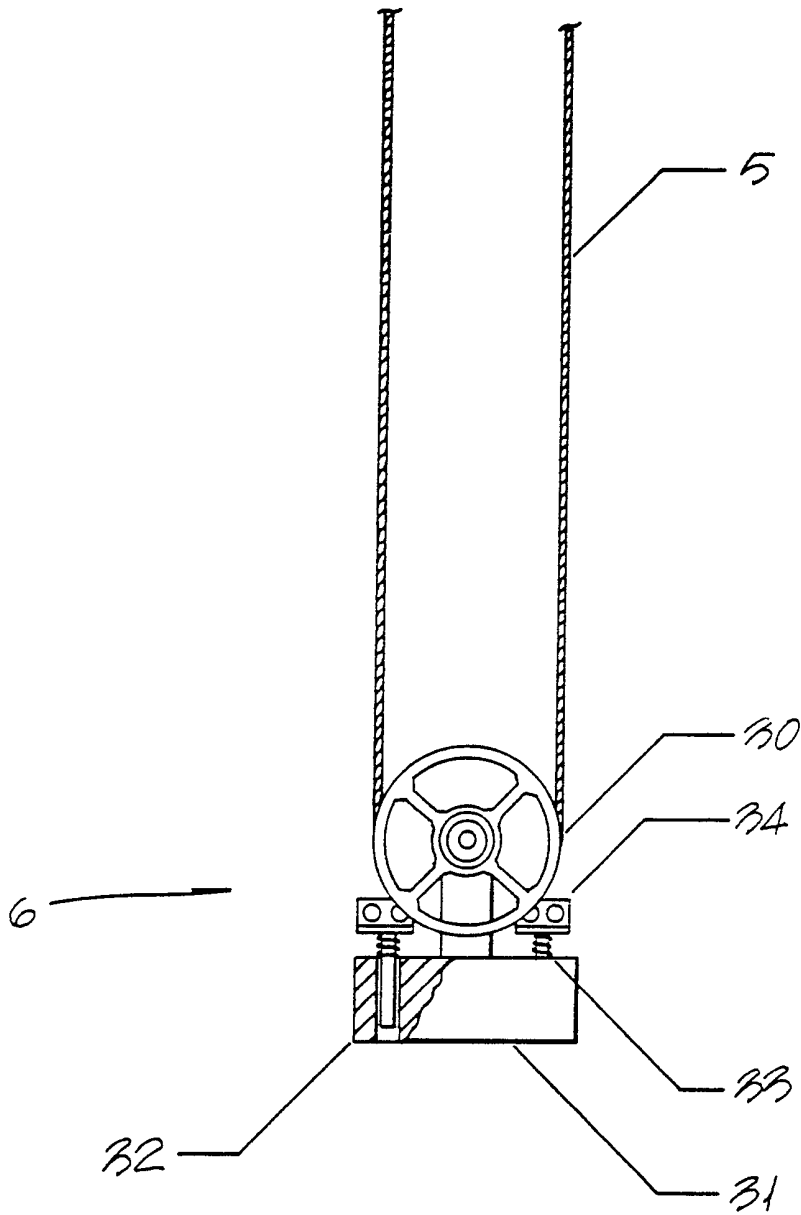


FIG 11

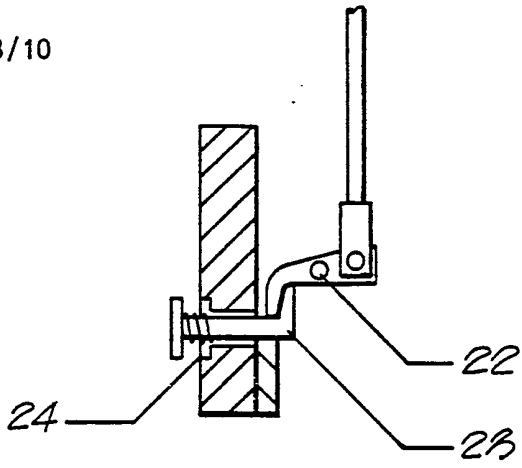


FIG 12c

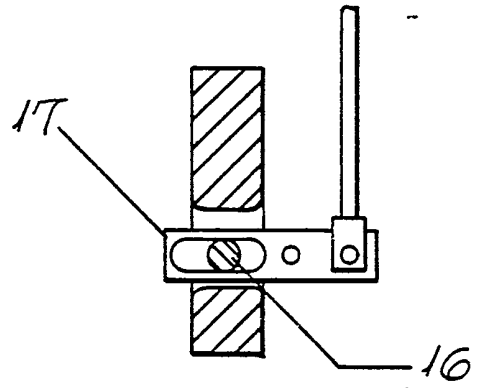


FIG 12b

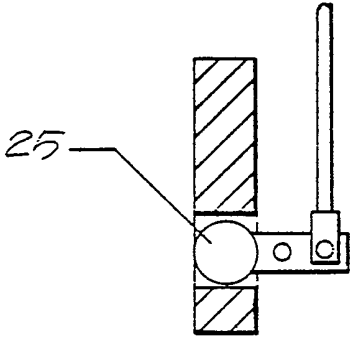


FIG 12d

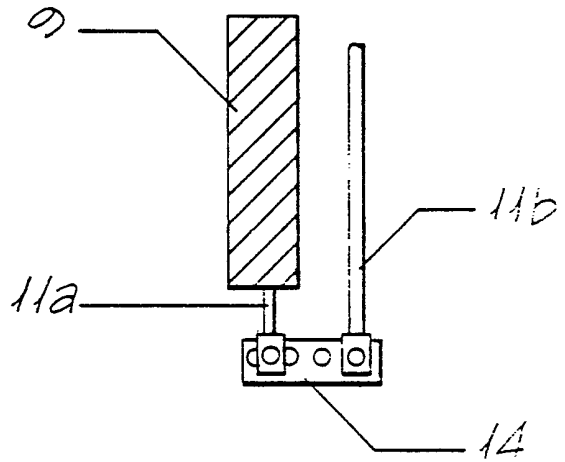


FIG 12a

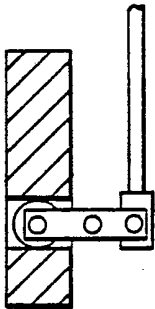


FIG 12e

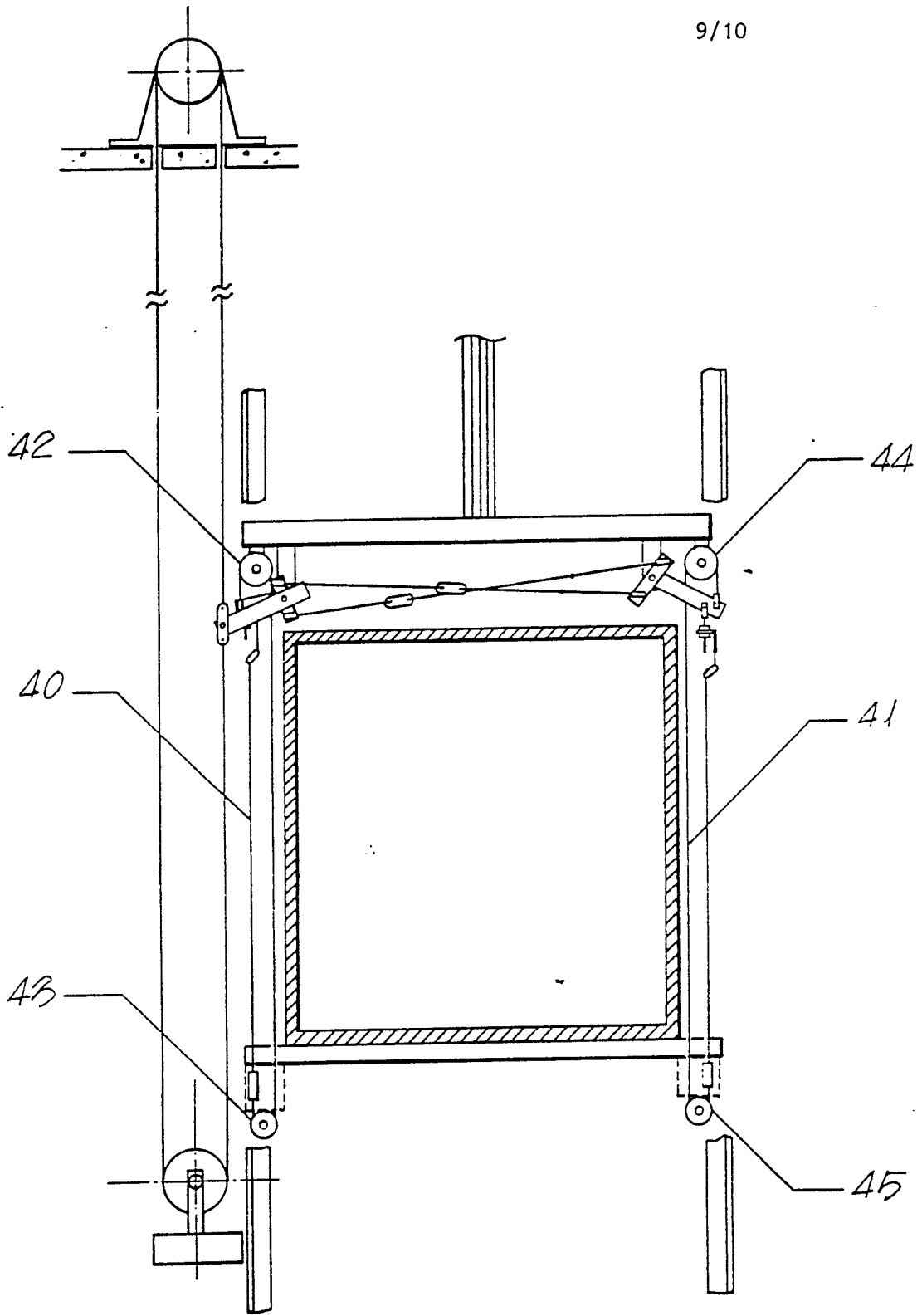


FIG 13

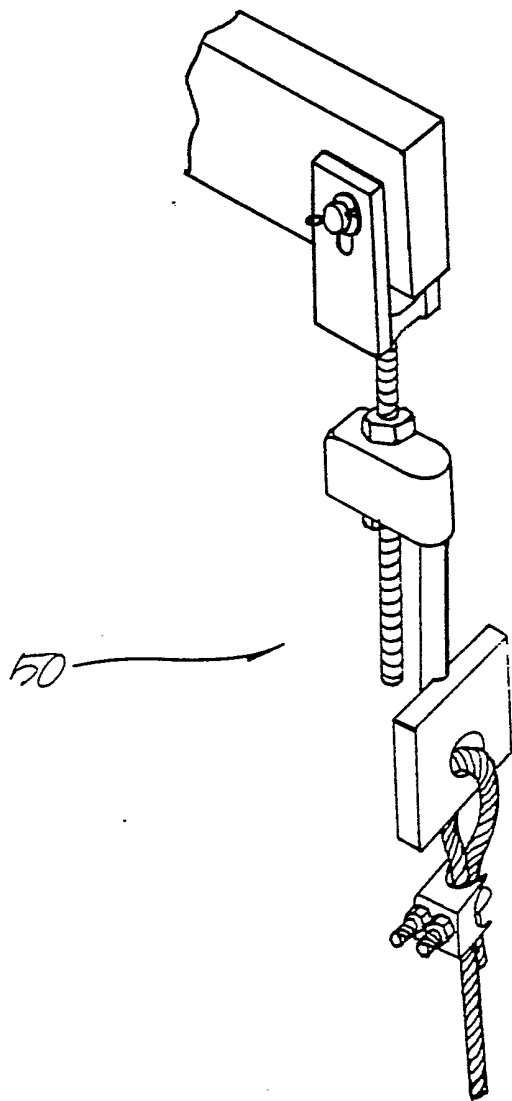


FIG 14

SAFETY BRAKES FOR ELEVATORS

The present invention relates to safety brakes for elevators.

Conventional elevators include safety brakes for preventing the elevator car from descending too quickly.

5 A disadvantage with conventional elevators is that they do not include safety brakes for preventing the elevator car ascending too quickly, and on occasion elevator cars have hit the top of the elevator shaft at speeds causing accidents.

10 The invention provides a safety brake for an elevator, characterized in that the brake is bi-directional, that is to say the brake can prevent overspeeding in both the upward and the downward directions.

The invention will now be described more particularly with
15 reference to the accompanying drawings which show, by way of example only, a first arrangement of elevator including one particular construction of brake according to the invention, and which also show further constructions of brake according to the invention, and a second arrangement
20 of elevator. In the drawings :-

Figure 1 is an elevation of the first arrangement of elevator, shown travelling downwardly at normal speed;

5 Figure 2 is a similar view, but showing the elevator immediately after the brake has been activated to prevent downward overspeeding;

Figure 3 is an elevation of the elevator shown travelling upwardly at normal speed;

10 Figure 4 is a similar view, but showing the elevator immediately after the brake has been activated to prevent upward overspeeding;

Figure 5 shows on a larger scale a fragmentary view of a detail of the elevator at rest;

15 Figure 6 is an elevation of one preferred construction of brake according to the invention;

Figures 7, 8 and 9 are views similar to Figure 6 of alternative constructions of brake according to the invention;

20 Figure 10 is a perspective view of the use of brakes in accordance with Figure 6, illustrating the brake activation mechanism of the elevator shown in Figures 1 to 5; and

Figure 11 is an elevation of a detail of the brake activation system of Figure 10;

25 Figure 12a shows on a larger scale the construction of a particular mechanism which forms part of the elevator, and Figures 12b, 12c, 12d and 12e show alternative constructions;

Figure 13 is a view similar to Figure 1 to 4 showing the second arrangement of elevator safety system; and

5 Figure 14 is a perspective view on a much larger scale of a detail of the second arrangement.

Referring now to the drawings, the elevator comprises essentially an elevator car 1, guide rails 2 for guiding the car in its upward and downward motion, and a rope 3 for raising and lowering the elevator car.

10 The elevator safety mechanism comprises a governor 4, a governor rope 5, a tension adjuster 6 for the governor rope, safety brakes 7 for stopping the elevator car in the event of overspeeding, and a mechanical linkage 8 mounted on the elevator car 1 and connecting the governor rope 5
15 to the safety brakes 7.

Referring to Figure 1 the elevator car 1 is shown moving downwardly at normal speed, and the governor rope 5 moves at the same speed.

Referring to Figure 2, as the elevator car 1 starts to
20 overspeed downwardly the governor rope 5 is prevented by the governor 4 from overspeeding, and therefore moves more slowly than the elevator car 1, thereby tripping the linkage 8 and activating the safety brakes 7.

Referring to Figures 3 and 4, these are similar to Figures 1 and 2, except that they illustrate normal speed and overspeed in the upward direction.

5 Figure 5 shows the rest position of the linkage 8 when the elevator is not in use.

Referring to Figure 6, one construction of brake will now be described. The brake comprises essentially two parts, a wedge 9 and a wedge guide 10. The wedge guide 10 is mounted in a fixed position relative to the elevator car 1.
10 The wedge 9 is mounted so as to be movable vertically upwardly or downwardly relative to the elevator car 1, and is connected to the linkage 8 by means of pull rods 11a, 11b in the case of the left hand brake and 11c, 11d in the case of the right hand brake.

15 During normal operation of the elevator, that is to say when the elevator car 1 is travelling upwardly or downwardly at normal speed, the wedges 9 and wedge guides 10 are in register with one another as shown in the drawings. However, as shown in Figure 2, if the elevator
20 car 1 overspeeds downwardly thereby operating the linkage 8, then this causes the pull rods 11a and 11d to move the wedges 9 vertically upwardly relative to the wedge guides 10. A set of rollers 12 are provided between the wedge guides 10 and the wedges 9 to permit this relative
25 movement. As the wedges 9 move up relative to the wedge

guides 10, the wedges 9 also move horizontally outwardly as a result of the complementary shape of the wedges 9 and wedge guides 10, and engage the elevator car guide rails 2, so as to prevent further movement of the elevator car

5 1. Similarly, as shown in Figure 4, if the elevator car 1 overspeeds downwardly this causes the pull rods 11b and 11c to move upwardly and wedges 9 to move downwardly and horizontally outwardly.

Figures 7, 8 and 9 show alternative constructions of brake

10 70, 80, 90 respectively, in each case consisting of a fixed wedge guide 71, 81, 91, a movable wedge 72, 82, 92, and a set of rollers 73, 83, 93.

Referring now to Figure 10, certain features of the system may be seen more clearly. These include the push-pull rod

15 adjustment mechanism 20 and the linkage adjustment turn buckles 21.

Referring now to Figure 11, the tension adjuster 6 for the governor rope 5 comprises a tensioning pulley 30, a weight 31 attached to the tensioning pulley to maintain tension

20 in the pulley, the weight being vertically movable upwardly or downwardly along guide pins 32, and compression springs 33 on the guide pins between fixed limit brackets 34 and the weight, for biasing the weight against upward movement.

Referring to Figure 12a, there is shown on a larger scale the arrangements for connecting the push rods 11a and 11b to the wedge 9. Figures 12b, 12c, 12d and 12e show alternative mechanisms.

5 Referring to Figure 13 there is shown an alternative arrangement in which the push rods 11a, 11b, 11c and 11d are replaced by ropes 40, 41 on pulleys 42, 43, 44, 45.

Referring to Figure 14, there is shown on a larger scale a particular mechanism illustrated in Figure 13, namely the
10 adjustment mechanism generally designated 50 for tensioning the ropes 40 and 41.

C L A I M S

1. A safety brake for an elevator, characterized in that the brake is bi-directional, that is to say the brake can prevent overspeeding in both the upward and the downward directions.

- 5 2. A safety brake according to claim 1 comprising in combination a wedge element and a wedge guide element which are vertically movable relative to one another, and which are of complementary shape such that
10 relative vertical movement in either the upward or downward direction relative to an initial position causes horizontal expansion of the combination thereby activating the brake.

3. An elevator including a safety brake according to claim 1 or claim 2.

- 15 4. A safety brake substantially as herein described with reference to and as shown in any of the accompanying drawings.

5. An elevator substantially as herein described with
20 reference to and as shown in any of the accompanying drawings.

Patents Act 1977
 Examiner's report to the Comptroller under
 section 17 (The Search Report)

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Relevant Technical fields

- (i) UK Cl (Edition K) B8L (LCD) F2E (EF,ENG)
- (ii) Int Cl (Edition 5) B66B, F16D

Search Examiner

D C CROUCH

Databases (see over)

- (i) UK Patent Office
- (ii)

Date of Search

18 March 1991

Documents considered relevant following a search in respect of claims

1-5

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X	GB 1,555,621 (DAVID) see for example Figure 6 and page 4 lines 77-122	1
X	EP A2 0,049,066 (ABEX) see for example page 2 lines 15-19, 27-31	1
X	US 4,856,623 (ROMIG) see for example column 5 lines 19-39	1
X	US 4,531,617 (MARTIN) see for example column 6 lines 33-65	1

SF2(p)

Category	Identity of document and relevant passages - 9 -	Relevant to claim(s)

Categories of documents

X: Document indicating lack of novelty or of inventive step.

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A: Document indicating technological background and/or state of the art.

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E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

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