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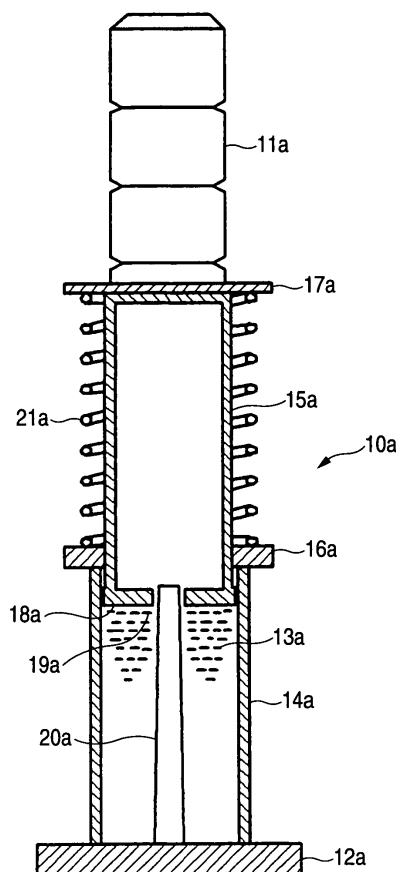
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(54) **SHOCK ABSORBING DEVICE FOR ELEVATOR**

(57) An object of the invention is to provide a buffer for elevator use, the height of which can be reduced and the pit depth of which is not necessarily increased and the structure of which can be simplified, even when the rated speed of an elevator is high.

In order to accomplish this object, the buffer for elevator use includes: an energy absorption type buffer (for example, an oil-filled buffer) for absorbing collision energy at the time of collision of a cage or a balance weight with the buffer, the energy absorption type buffer not capable of being restored to the initial state by itself when the collision energy is released, the energy absorption type buffer having restoring means; and an energy storage type buffer which is composed of an elastic body made of rubber and fixed in series to this energy absorption type buffer so as to absorb collision energy, the energy storage type buffer capable of being restored to the initial state by itself when the collision energy is released.

FIG. 1



Description

TECHNICAL FIELD

[0001] The present invention relates to a buffer for elevator use, which is arranged in a bottom portion of an elevator way, for lightening a shock and stopping a cage or a balance weight of the elevator when the cage or the balance weight has been lowered and passed the lowest floor.

BACKGROUND ART

[0002] Fig. 7 is an arrangement view showing an example of the conventional elevator. In Fig. 7, the winch 3, which has a drive sheave 2, and the deflector wheel 4 are arranged in an upper portion of the elevator way 1. The main rope 5 is wound round the drive sheave 2 and the deflector wheel 4. The cage 6 is hung from one end of the main rope 5, and the balance weight 7 is hung from the other end of the main rope 5. When the drive sheave 2 is rotated, the cage 6 and the balance weight 7 are elevated like a draw well.

[0003] When some problems are caused in the elevator, there is a possibility that the cage 6 or the balance weight 7 passes the lowest floor and further descends. Therefore, even when the problems are caused in the elevator, in order to lighten a shock caused between the cage 6 or the balance weight 7 and the bottom portion (pit) of the elevator way 1 and to stop the cage 6 safely, the cage buffer 8 and the balance weight buffer 9, which are buffers for elevator use, are arranged in the bottom portion of the elevator way 1.

[0004] Conventionally, there is provided an energy absorption type buffer or an energy storage type buffer for this buffer used for an elevator. According to the energy absorption type buffer, collision energy is absorbed. When this collision energy is released, it is impossible for the energy absorption type buffer to be restored to the initial state by itself. Therefore, a restoring means is provided and used together with the energy absorption type buffer. For example, an oil-filled buffer is used for this energy absorption type buffer. This energy absorption type buffer is used for absorbing a relatively high intensity of collision energy when a high speed elevator is operated.

[0005] The conventional oil-filled buffer includes: a cylindrical cylinder filled with hydraulic fluid which is vertically arranged in a bottom portion of the elevator way 1; a cylindrical plunger inserted into the cylinder being capable of reciprocating in the axial direction; an orifice hole formed in a bottom portion of the plunger; a long and slender conical member (control rod), the forward end portion of which is inserted into the orifice hole, vertically arranged in the bottom portion of the cylinder; and a restoring spring for elastically supporting and restoring the plunger.

[0006] In order to reduce a shock and noise generated

when the cage 6 or the balance weight 7 collides with the oil-filled buffer, a buffer member is provided at the top portion of the plunger.

[0007] Assume a case in which some problems are caused while the elevator is running and the cage 6 or the balance weight 7 collides with the buffer member located in an upper portion of the oil-filled buffer. Then, the plunger is pushed downward resisting an elastic force of the return spring. Therefore, hydraulic fluid in the cylinder is pushed downward by a lower face of the plunger and flows out from the orifice hole into the plunger. In this case, since the control rod is tapered, that is, since the diameter of the control rod is gradually increased when it comes downward, as the plunger descends, an area of the orifice hole, in which the hydraulic fluid flows, is decreased. Therefore, resistance given to the hydraulic fluid is gradually increased and the descending speed is decreased, so that the shock can be reduced. After that, when the cage 6 or the balance weight 7 is lifted and the load is removed, the plunger is pushed and returned to the initial position by a repulsion of the compressed return spring. Concerning this technique, for example, refer to Patent Documents 1 and 2.

[0008] The other conventional oil-filled buffer is composed in such a manner that a plurality of plungers, the diameters of which are formed so that they can be successively decreased small, are put into a cylinder filled with hydraulic fluid. Therefore, the plurality of plungers can be extended and contracted in the vertical direction by the hydraulic fluid. Further, return springs for returning the plurality of plungers to the initial positions are provided. In this oil-filled buffer in which the plurality of plungers are arranged in the multiple stage as described above, as compared with the aforementioned oil-filled buffer composed of one plunger, a height of the oil-filled buffer, which is needed for obtaining the same stroke, can be reduced. Concerning this technique, for example, refer to Patent Document 3.

[0009] The above explanations are made into the oil-filled buffer which is an energy absorption type buffer. However, the energy storage type buffer, which is another buffer for elevator use, absorbs collision energy, and when this collision energy is released, the energy storage type buffer is restored to the initial state by itself. For example, the energy storage type buffer is composed of an elastic body made of elastic material such as a spring or rubber. This energy storage type buffer is used for absorbing a relatively low intensity of collision energy in the case of a low speed elevator. An elastic body made of polyurethane can be compressed to 80% of the overall height, that is, a stroke of the buffer is 80% of the overall height. Therefore, at the time of collision with the cage 6 or the balance weight 7, the elastic body is compressed to 80% of the overall height so as to reduce a shock. After that, when the cage or the balance weight is lifted so that the load can be removed, the compressed elastic body is returned to the initial height, that is, the compressed elastic body is returned to the overall height. Concerning

this technique, for example, refer to Non-patent Document 1.

[0010]

Patent Document 1: Official gazette of JP-A-8-108984 (pages 4 and 5, Fig. 1)

Patent Document 2: Official gazette of JP-A-4-217577 (pages 4 to 6, Fig. 1)

Patent Document 3: Official gazette of JP-A-4-217577 (pages 2 to 5, Fig. 1)

Non-patent Document 1: Catalog of Elastogran Co. "Cellasto A cellular polyurethane elastomer" page 1

DISCLOSURE OF THE INVENTION

PROBLEMS THAT THE INVENTION IS TO SOLVE

[0011] The buffer for elevator use is designed so that a speed of the cage 6 or the balance weight 7 can be reduced by a predetermined deceleration in a predetermined stroke when the cage 6 or the balance weight 7 collides with the buffer at the speed of 1.15 times as high as the rated speed. Therefore, when the rated speed is raised, a stroke of the buffer for elevator use is extended.

[0012] In the case where the rated speed is high, in the above conventional oil-filled buffer composed of one plunger, the length of the plunger must be longer than the stroke of the oil-filled buffer. Further, since the cylinder must receive the entering plunger, the length of cylinder must be long corresponding to the length of the plunger. Accordingly, the height of the oil-filled buffer is increased. When the height of the oil-filled buffer is increased as described above, the depth of the pit of the elevator way must be increased. Accordingly, the following problems are encountered. Expenses needed for the construction work are raised. Further, since the oil-filled buffer is long, the working efficiency is deteriorated when the oil-filled buffer is brought in and installed.

[0013] On the other hand, in the oil-filled buffer, the plunger of which is composed by a multiple stage, with respect to the oil-filled buffer composed of one plunger, while a predetermined stroke is being maintained, the height of the oil-filled buffer can be reduced. Therefore, the problems described above are not caused. However, this oil-filled buffer is composed in such a manner that a plurality of plungers are put on each other and extended and contracted in the vertical direction via the hydraulic fluid. Therefore, the number of parts is increased and the manufacturing cost is raised.

[0014] As described above, in the energy storage type buffer, the stroke is 80% of the overall height. Therefore, while a predetermined stroke is being maintained, the height of the buffer can be reduced. However, the following problems may be encountered in this energy storage type buffer. For example, according to EN code (EN81-1: 1998) which is the European laws and ordinances, the energy storage type buffer can be applied only to an elevator, the rated speed of which is not more than 60

m/min. In this connection, according to EN code, the energy absorption type buffer can be applied to an elevator irrespective of the rated speed. However, when the energy absorption type buffer is applied to an elevator, the rated speed of which exceeds 60 m/min, the above problems may be encountered.

[0015] The present invention has been accomplished to solve the above problems. An object of the present invention is to provide a buffer for elevator use characterized in that: even when the rated speed of an elevator exceeds 60 m/min, the height of the buffer can be reduced and it is unnecessary to increase the depth of a pit; and the structure can be simplified.

15 MEANS FOR SOLVING THE PROBLEMS

[0016] In the buffer for elevator use of the present invention, an energy absorption type buffer and an energy storage type buffer are fixed to and combined with each other in series.

ADVANTAGE OF THE INVENTION

[0017] According to the present invention, the energy absorption type buffer and the energy storage type buffer are fixed to each other in series. Therefore, even when the rated speed of an elevator is high, it is possible to reduce the height of the buffer and the structure can be simplified.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018]

[Fig. 1] A view showing a buffer for elevator use in Embodiment 1 of the present invention.

[Fig. 2] A view showing a height of the conventional oil-filled buffer.

[Fig. 3] A view showing a height of the buffer for elevator use of Embodiment 1 of the present invention.

[Fig. 4] A view showing a buffer for elevator use in Embodiment 2 of the present invention.

[Fig. 5] A view showing a buffer for elevator use in Embodiment 3 of the present invention.

[Fig. 6] A view showing a buffer for elevator use in Embodiment 4 of the present invention.

[Fig. 7] An arrangement view showing an example of the conventional elevator.

50 DESCRIPTION OF THE REFERENCE NUMERALS AND SIGNS

[0019]

55	1	Elevator way
	2	Drive sheave
	3	Winch
	4	Deflector wheel

5	Main rope
6	Cage
7	Balance weight
8	Cage buffer
9	Balance weight buffer
10a, 10b, 10c	Oil-filled buffer
11a, 11c	Energy storage type buffer
12a, 12b	Mount
13a, 13b	Hydraulic fluid
14a, 14b	Cylinder
15a, 15b	Plunger
16a, 16b	Flange
17a, 17b	Spring receiver
18a, 18b	Bottom portion member
19a, 19b	Orifice hole
20a, 20b	Control rod
21a, 21b	Return spring
22, 23	Buffer material
24	Mount
25	Restriction body
26	Attaching plate
27	Bolt

BEST MODE FOR CARRYING OUT THE INVENTION

[0020] Referring to the drawings, the preferred embodiments of the present invention will be explained below.

EMBODIMENT 1

[0021] Fig. 1 is a view showing a buffer for elevator use of Embodiment 1 of the present invention. In Fig. 1, the energy storage type buffer 11a is fixed in series to an upper end portion of the oil-filled buffer 10a which is an energy absorption type buffer. Next, the structure of the oil-filled buffer 10a will be explained as follows. On the mount 12a, the cylinder 14a filled with hydraulic fluid 13a is vertically arranged. The cylindrical plunger 15a capable of reciprocating in the axial direction is inserted into the cylinder 14a. The flange 16a is fixed to an upper end portion of the cylinder 14a. The spring receiver 17a is fixed to an upper end portion of the plunger 15a.

[0022] The plunger 15a is provided with a bottom member 18a to close the bottom portion. At the center of the bottom member 18a, the orifice hole 19a is formed. The control rod 20a is vertically arranged on the mount 12a so that a forward end portion of the control rod 20a can be inserted into the orifice hole 19a. The control rod 20a is formed into a conical shape, the diameter of which is increased when it comes downward.

[0023] As restoration means for restoring the plunger 15a to the initial position after the plunger 15a has been pushed and lowered, between the flange 16a and the spring receiver 17a, the return spring 21a is provided which pushes and elastically supports the plunger 15a in the direction so that the plunger 15a can be protruded from the cylinder 14a.

[0024] The oil-filled buffer 10a is composed as de-

scribed above. The energy storage type buffer 11a is vertically arranged on the spring receiver 17a which is an upper end portion of this oil-filled buffer 10a. In this way, the buffer for elevator use is composed. The energy storage type buffer 11a is integrally made of rubber, for example, polyurethane. It is possible for the energy storage type buffer 11a to be compressed to 80% of the overall height. This compression is the same as the stroke of the energy storage type buffer 11a.

[0025] Next, operation will be explained as follows. While the elevator is normally running, the oil-filled buffer 10a and the energy storage type buffer 11a, which compose the buffer for elevator use, are respectively extended as shown in Fig. 1. Assume a case in which an abnormality is caused while the elevator is running and the cage 6 or the balance weight 7 collides with the buffer for elevator use. At this time, the cage 6 or the balance weight 7 collides with the energy storage type buffer 11a. Therefore, the energy storage type buffer 11a is compressed and reduces the shock given to it.

[0026] On the other hand, in the oil-filled buffer 10a, together with the compression of the energy storage type buffer 11a, the plunger 15a of the oil-filled buffer 10a is pushed down, resisting an elastic force generated by the return spring 21a. Therefore, hydraulic fluid 13a in the cylinder 14a is pushed by the bottom portion member 18a of the plunger 15a and flows out from the orifice hole 19a into the plunger 15a. Since the control rod 20a is tapered in such a manner that the diameter of the control rod 20a is gradually increased as it comes to the lower portion, when the plunger 15a is lowered, an area of the orifice hole 19a, in which hydraulic 13a fluid passes, is reduced. Accordingly, resistance given to hydraulic fluid 13a is gradually increased and the lowering speed of the plunger 15a is decreased, so that the shock can be reduced.

[0027] After that, when the cage 6 or the balance weight 7 is lifted and the load is removed from the buffer for elevator use, the height of the energy storage type buffer 11a, which is a body made of rubber, is returned from the compressed state to the initial extended state. On the other hand, in the oil-filled buffer 10a, the plunger 15a is pushed upward by a repulsion of the return spring 21a compressed, and hydraulic fluid 13a flows from the orifice hole 19a into the cylinder 14a. Therefore, the oil-filled buffer 10a is extended and returned to the initial state.

[0028] Next, explanations will be made for the height of the buffer for elevator use of this embodiment. Fig. 2 is a view showing the height of the conventional oil-filled buffer 10b composed of one plunger 15b, and Fig. 3 is a view showing the height of the buffer for elevator use of the present embodiment.

[0029] In Fig. 2, the mount 12b, the hydraulic fluid 13b, the cylinder 14b, the plunger 15b, the flange 16b, the spring receiver 17b, the bottom portion member 18b of the plunger 15b, the orifice hole 19b, the control rod 29b and the return spring 21b are the same as the corre-

sponding components shown in Fig. 1. In order to avoid the occurrence of collision between metals caused when the cage 6 or the balance weight 7 collides with the oil-filled buffer 10b, the buffer member 22 is provided in an upper portion of the spring receiver 17b. In this case, operation is the same as that of the oil-filled buffer 10a shown in Fig. 1.

[0030] The buffer for elevator use is designed so that the speed of the cage 6 or the balance weight 7 can be safely reduced at a predetermined deceleration when the cage 6 or the balance weight 7 collides with the buffer for elevator use at a speed which is 1.15 times as high as the rated speed. In this case, S is defined as a stroke of the buffer for elevator use. As shown in Fig. 2, the length of a portion in which the buffer material 22 conducts a stroke is S, and the length from the lower face of the bottom portion member 18b to the upper face of the mount 12b is the stroke of S. When the length from the lower end of the stroke portion of the buffer material 22 to the lower face of the bottom portion member 18b of the plunger 15b is defined as "a" and the thickness of the mount 12b is "b", the height L1 of the conventional oil-filled buffer 10b is expressed by the following expression.

$$L1 = 2S + a + b$$

[0031] On the other hand, concerning the buffer for elevator use of the present embodiment, as shown in Fig. 3, the elasticity characteristic is set by changing a shape of the energy storage type buffer 11a (for example, the length or the diameter) so that the stroke (the compression) of the energy storage type buffer 11a and the stroke of the oil-filled buffer 10a can be respectively 1/2 of the stroke S of the buffer, and resistance of hydraulic fluid is set by changing a gap formed between the orifice hole 19a of the oil-filled buffer 10a and the control rod 17a. In this case, as shown in Fig. 3, the stroke (the compression) of the energy storage type buffer 11a and the stroke (the stroke of the oil-filled buffer 10a) of the spring receiver 17a are respectively S/2. When "a" is defined as the length from the lower end of the stroke portion of the spring receiver 17a to the lower face of the bottom portion member 18a of the plunger 15a and "b" is defined as the thickness of the mount 12a and "c" is defined as the height or the diameter) of the energy storage type buffer 11a and by changing the gap between the orifice hole 19a of the oil-filled buffer 10a and the control rod 17a. Especially when the stroke (the compression) of the energy storage type buffer 11a is increased, it becomes possible to reduce the height of the buffer for elevator use.

[0032] As described above, when the energy storage type buffer 11a of a simple structure is fixed in series to an upper end portion of the oil-filled buffer 10a which is an energy absorption type buffer, the height of the overall buffer device can be downsized as compared with the conventional oil-filled buffer 10b which is composed of

one plunger 15b. Due to the foregoing, even in the case where the elevator is operated at a high rated speed exceeding 60 m/min, it is unnecessary to increase the depth of the pit of the elevator way 1. Accordingly, the construction work cost can be decreased.

[0033] Since one of the buffers is composed of the energy storage type buffer 11a, the structure of the buffer device can be made simple. In the conventional oil-filled buffer 10b, in order to avoid the occurrence of collision between metals caused when the cage 6 or the balance weight 7 collides with the oil-filled buffer 10b, the buffer member 22 is provided. However, in the present embodiment, the cage 6 or the balance weight 7 collides of the energy storage type buffer 11a at the time of compression, the height L2 of the buffer for elevator use is expressed by the following expression.

$$L2 = 3S/2 + a + b + c$$

In this case, since the energy storage type buffer 11a is compressed to 80% of the overall height as described before, the height "c" at the time of compression can be expressed as follows.

$$c = S/2/8$$

That is, the height "c" at the time of compression is small.

[0034] As described above, a difference between the height L1 of the conventional oil-filled buffer 10b and the height L2 of the buffer for elevator use of the present embodiment is approximately S/2 (half of the stroke). Accordingly, the height of the buffer for elevator use of the present embodiment can be reduced.

[0035] As described above, the stroke (the compression) of the energy storage type buffer 11a and the stroke of the oil-filled buffer 10a are the same, that is, the stroke (the compression) of the energy storage type buffer 11a and the stroke of the oil-filled buffer 10a are respectively set at 1/2 of the stroke S of the buffer. However, the strokes may be set to be different from each other by changing the shape (for example, the length with the energy storage type buffer 11a made of rubber. Therefore, it is unnecessary to provide the buffer member 22.

EMBODIMENT 2

[0036] Fig. 2 is a view showing a buffer for elevator use of Embodiment 2 of the present invention. In this embodiment, with respect to Embodiment 1, the energy storage type buffer 11c is fixed in series to the lower portion of the oil-filled buffer 10c. Like reference characters are used to indicate like parts in Figs. 1 and 4. In this embodiment, in order to avoid the occurrence of collision between metals caused when the cage 6 or the balance

weight 7 collides with the oil-filled buffer 11c, the buffer member 23 is provided in an upper portion of the spring receiver 17a. In the bottom portion of the energy storage type buffer 11c, the mount 24 is fixed. Since operation of this embodiment is the same as that of Embodiment 1, the explanations are omitted here.

[0037] Even in the structure of this embodiment, it is possible to provide the same effect as that of Embodiment 1. However, with respect to Embodiment 1, in order to avoid the occurrence of collision between metals caused when the cage 6 or the balance weight 7 collides with the oil-filled buffer 11c, the buffer member 23 must be provided.

EMBODIMENT 3

[0038] Fig. 5 is a view showing Embodiment 3 of the present invention. In this embodiment, with respect to Embodiment 1, the restriction body 25, which restricts a stroke of the energy storage type buffer 11a at a predetermined value (for example, an allowable stroke), is provided on the spring receiver 17a. Like reference characters are used to indicate like parts in Figs. 1 and 5. In this connection, the restriction body 25 is formed into a cylindrical shape and inserted outside the energy storage type buffer 11a.

[0039] When an abnormality is caused during the operation of an elevator and the cage 6 or the balance weight 7 collides with the buffer for elevator use, the energy storage type buffer 11a is compressed. The energy storage type buffer 11a can be compressed to 80% of the entire height. This compression is an allowable stroke. Therefore, when the energy storage type buffer 11a is compressed exceeding 80%, there is a possibility that the energy storage type buffer 11a is damaged. The elasticity characteristic of the energy storage type buffer 11a is set by determining its shape (for example, the length or the diameter) so that the compression of the energy storage type buffer 11a can be in an allowable stroke with respect to the assumed collision energy given when the elevator is operated at the specified speed. However, when an intensity of the collision energy exceeds an intensity of the previously assumed energy, the compression exceeds the allowable stroke. According to the present embodiment, the restriction body 25 interferes with the cage 6 or the balance weight 7 in this case. Therefore, the energy storage type buffer 11a is not compressed exceeding the allowable stroke. The other motions are the same as those of Embodiment 1.

[0040] As described above, even when an intensity of collision energy is high, since the stroke of the energy storage type buffer 11a is restricted by the restriction body 25, the energy storage type buffer 11a is not compressed exceeding the allowable stroke. Therefore, the energy storage type buffer 11a is not damaged. The elasticity characteristic of the energy storage type buffer 11a must be set by determining its shape (for example, the length or the diameter) so that the compression of the

energy storage type buffer 11a can be in an allowable stroke with respect to the assumed collision energy given when the elevator is operated at the specified speed. However, it is substantially difficult for the elasticity characteristic to be set with respect to all the specified speeds, because it is too complicated. In this case, when the restriction body 25 is provided, the stroke of the energy storage type buffer 11a can be easily set.

[0041] In this connection, according to the present embodiment, the restriction body 25 is formed into a cylindrical shape. However, the present invention is not limited to the above specific embodiment. The restriction body 25 may be formed into a rectangular shape, a columnar shape or any other shapes. Further, the number of the restriction body is not limited to one, that is, a plurality restriction bodies may be provided. In the present embodiment, the restriction body 25 is inserted outside the energy storage type buffer 11a. However, a cavity portion may be formed inside the energy storage type buffer 11a, and the restriction body 25 may be provided inside the cavity portion.

EMBODIMENT 4

[0042] Fig. 6 is a view showing Embodiment 4 of the present invention. In this embodiment, with respect to Embodiment 1, the energy storage type buffer 11a and the oil-filled buffer 10a can be divided from each other. In Fig. 6, the attaching plate 26 is fixed to a lower face of the energy storage type buffer 11a. This attaching plate 26 is fixed to the spring receiver 17a by the bolts 27. Except for the above, like parts are used to indicate like parts in Figs. 1 and 6. Operation is the same as that of Embodiment 1.

[0043] In the case where the energy storage type buffer 11a is made of rubber such as polyurethane, generally speaking, the elasticity characteristic of rubber changes with age. Therefore, it is necessary to periodically replace the energy storage type buffer 11a made of rubber with a new one. In this case, according to the present embodiment, the energy storage type buffer 11a and the oil-filled buffer 10a can be divided from each other. Therefore, it is unnecessary to replace both the energy storage type buffer 11a and the oil-filled buffer 10a, that is, only the energy storage type buffer 11a can be replaced. Accordingly, the expenses necessary for the replacement can be reduced.

[0044] In Embodiments 1 to 4 described above, the energy storage type buffer is composed of a body made of rubber, the compression of which is 80% of the overall height. However, the present invention is not limited to the above specific embodiment. The energy storage type buffer may be composed of a body made of rubber, the compression of which is not less than 80% of the overall height or not more than 80% of the overall height. Instead of the rubber body, a cylindrical coil spring or a conical coil spring may be used. Especially when the conical coil spring is used, the height can be reduced as compared

with the cylindrical coil spring at the time of compression.

INDUSTRIAL APPLICABILITY

[0045] As described above, the buffer for elevator use of the present invention is suitably used for safely stopping the cage 6 or the balance weight 7 while a collision shock is being reduced when the cage 6 or the balance weight 7 descends passing the lowest floor.

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Claims

1. A buffer for elevator use, which is arranged in a bottom portion of an elevator way and under a cage or a balance weight, for reducing a shock caused when the cage or the balance weight collides with the buffer for elevator use, comprising: an energy absorption type buffer; and an energy storage type buffer fixed in series to this energy absorption type buffer.
2. The buffer for elevator use according to claim 1, wherein the energy storage type buffer is arranged in series to an upper portion of the energy absorption type buffer.
3. The buffer for elevator use according to claim 1 or 2, wherein a restriction body for restricting a stroke of the energy storage type buffer is arranged in the energy storage type buffer.
4. The buffer for elevator use according to one of claims 1 to 3, wherein the energy storage type buffer and the energy absorption type buffer are capable of being divided from each other.
5. The buffer for elevator use according to one of claims 1 to 4, wherein the energy storage type buffer is composed of a rubber body.

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FIG. 1

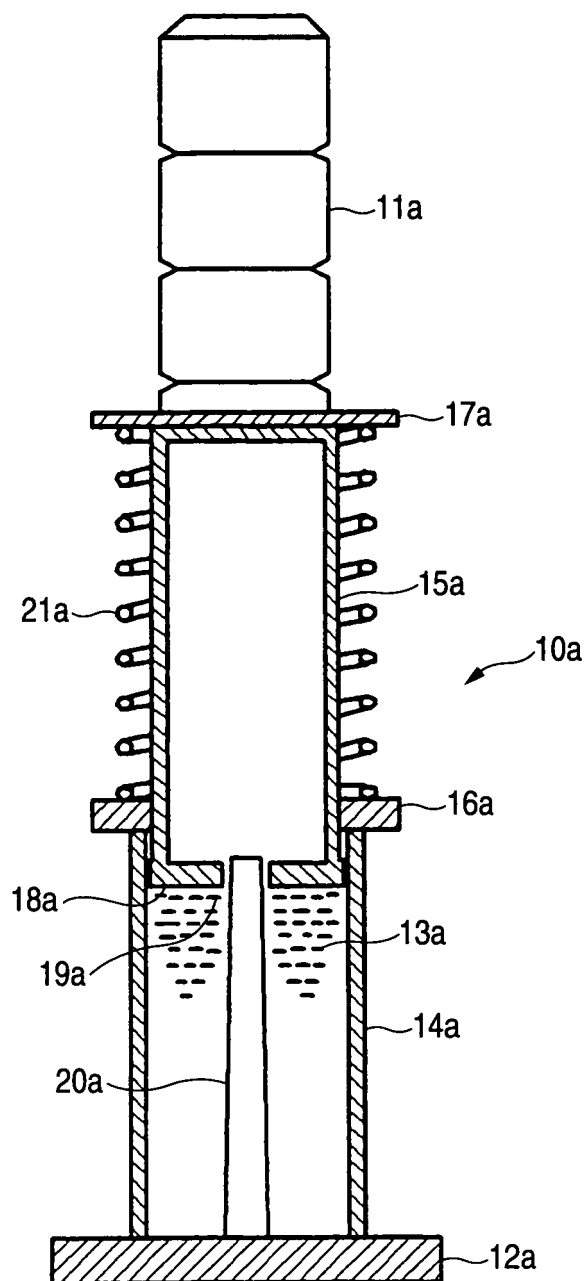


FIG. 2

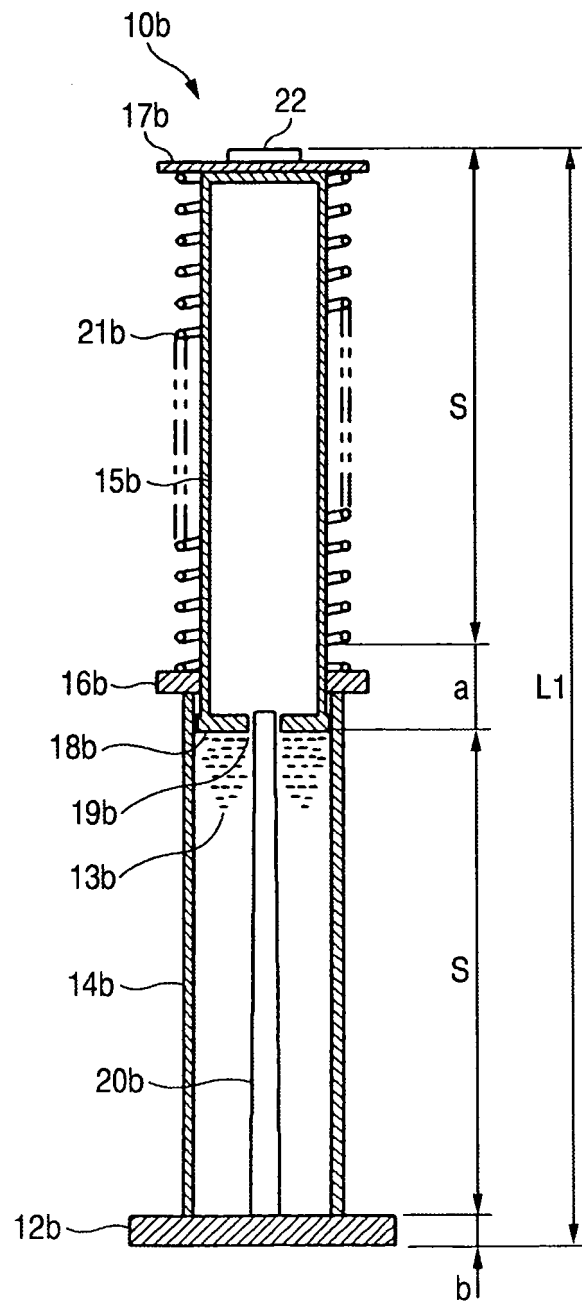


FIG. 3

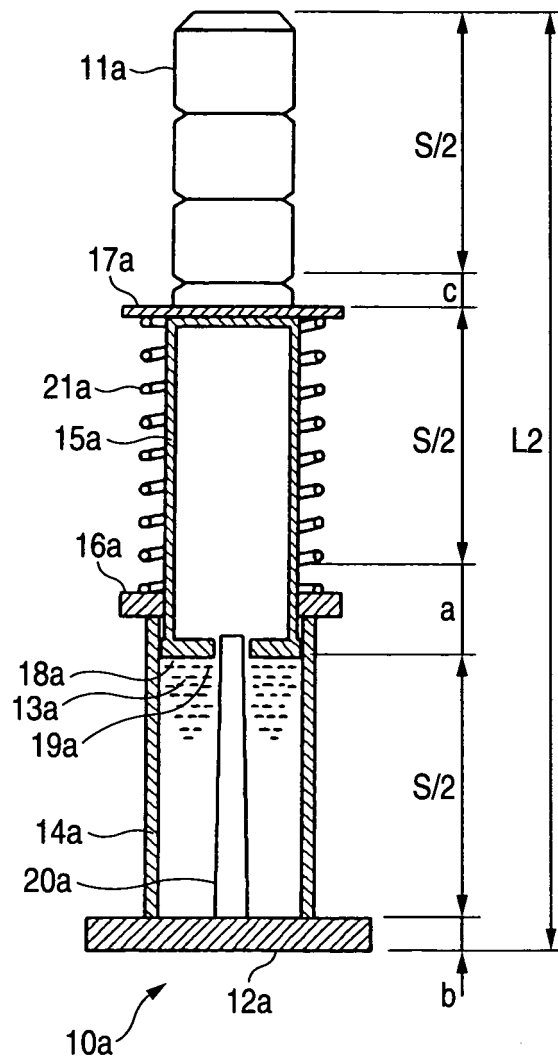


FIG. 4

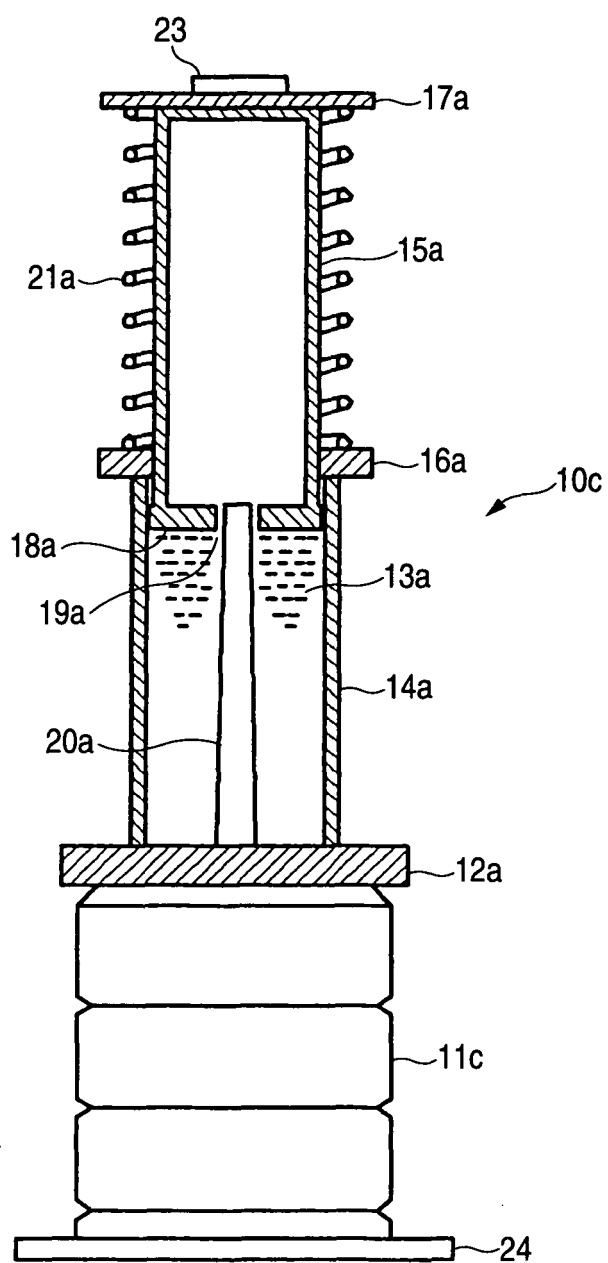


FIG. 5

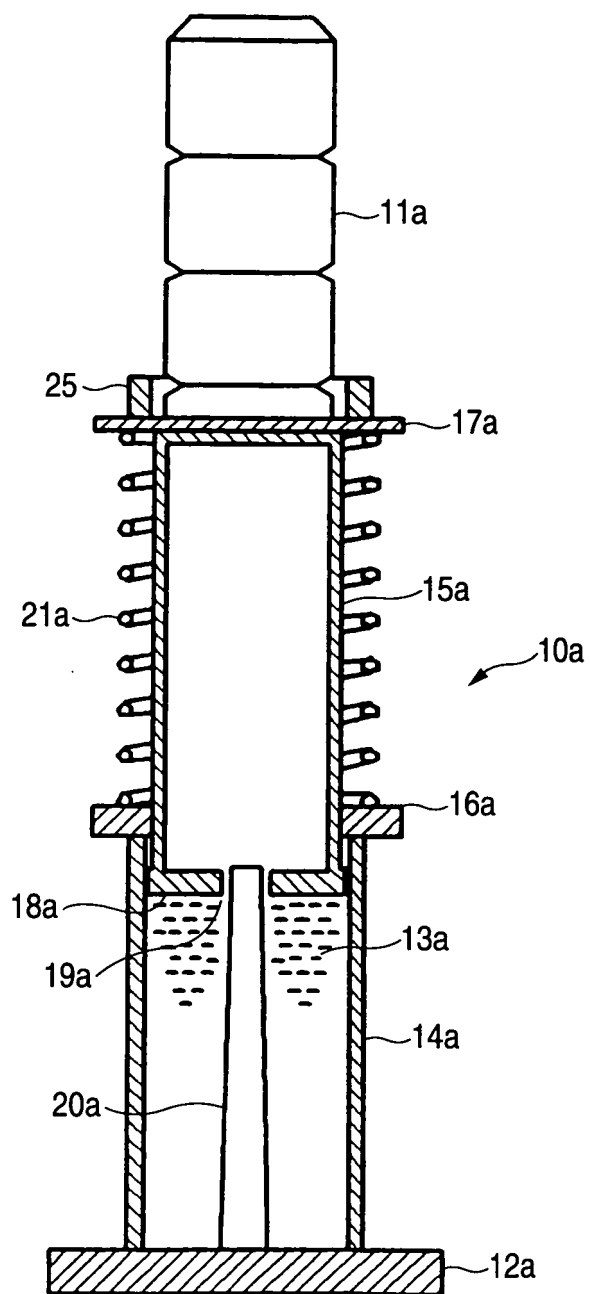


FIG. 6

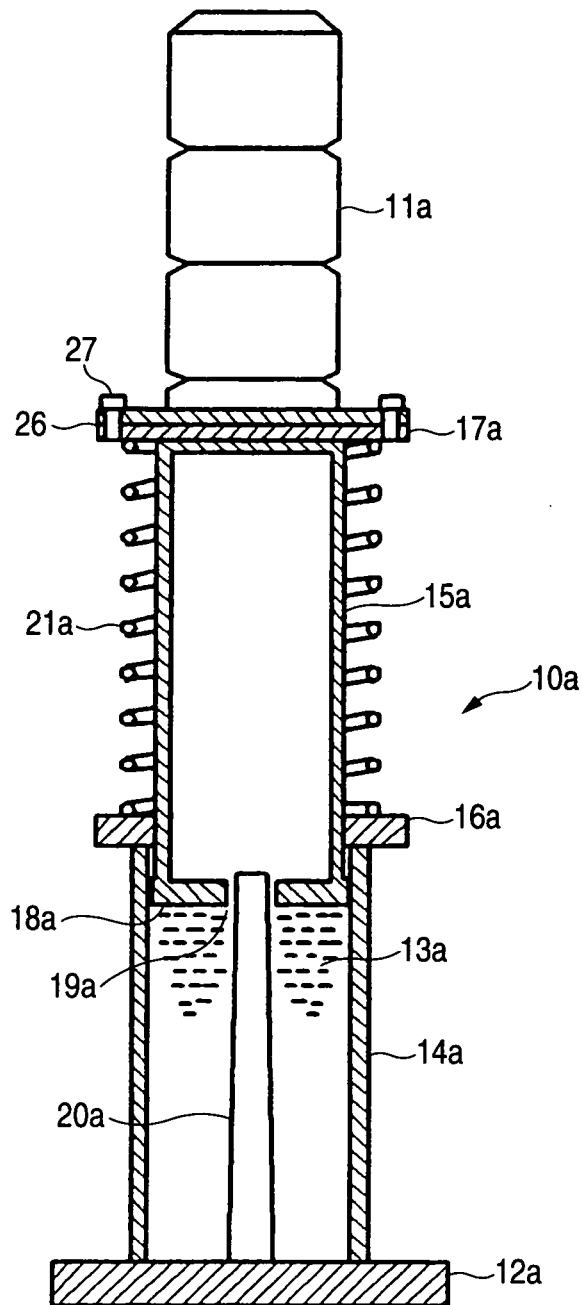
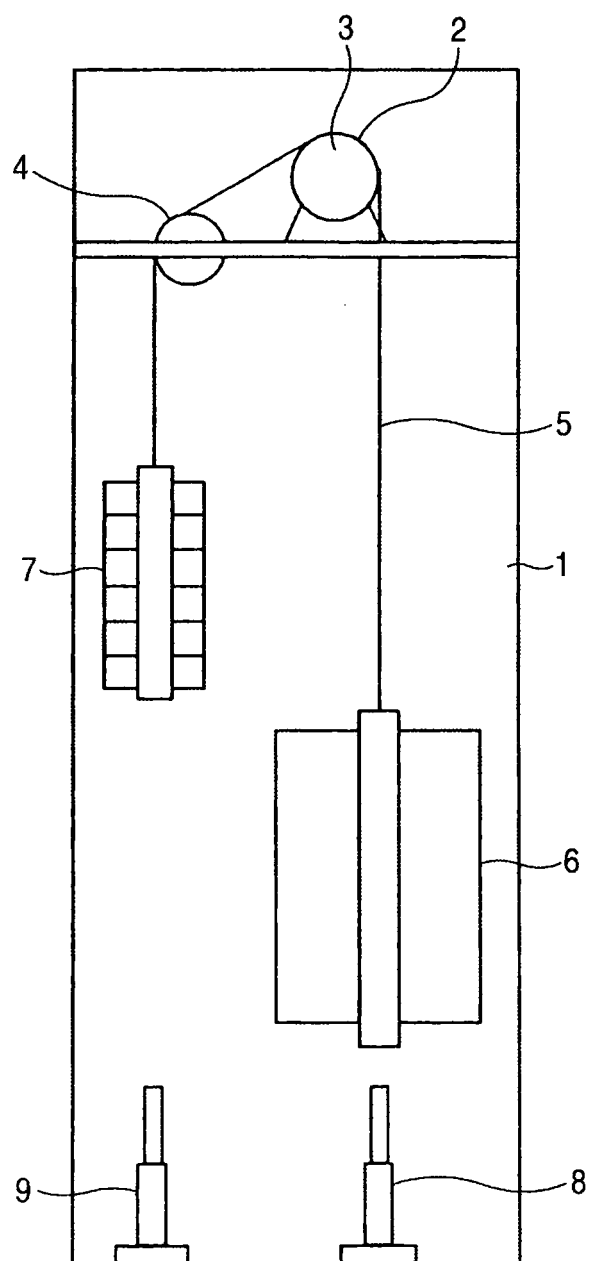


FIG. 7



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2004/013731

A. CLASSIFICATION OF SUBJECT MATTER Int.Cl. ⁷ B66B5/28		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) Int.Cl. ⁷ B66B5/28		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2005 Kokai Jitsuyo Shinan Koho 1971-2005 Toroku Jitsuyo Shinan Koho 1994-2005		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	JP 2000-302353 A (Toshiba Corp.), 31 October, 2000 (31.10.00), Pay attention to Par. Nos. [0029] to [0032], [0042]; Fig. 1 (Family: none)	1-2, 4 3, 5
X Y	JP 2001-240338 A (Hitachi, Ltd.), 04 September, 2001 (04.09.01), Pay attention to Par. Nos. [0018] to [0019]; Fig. 2 (Family: none)	1, 4 3, 5
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☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.		
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Date of the actual completion of the international search 20 June, 2005 (20.06.05)		Date of mailing of the international search report 05 July, 2005 (05.07.05)
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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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