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(54) **LINEAR COMPRESSOR**

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(57) **ABSTRACT**

Disclosed herein is a linear compressor. In the present invention, an initial value control nut for controlling an initial position of a piston and a releasing protection nut for preventing the initial value control nut from releasing are combined in a bolt of a stator cover as a double nut method. The initial value control nut and the releasing protection nut are wound in the opposite direction. Therefore, it can prevent the initial value control nut from releasing, and can prevent the linear compressor from breaking down, thus improving the durability and the reliability.

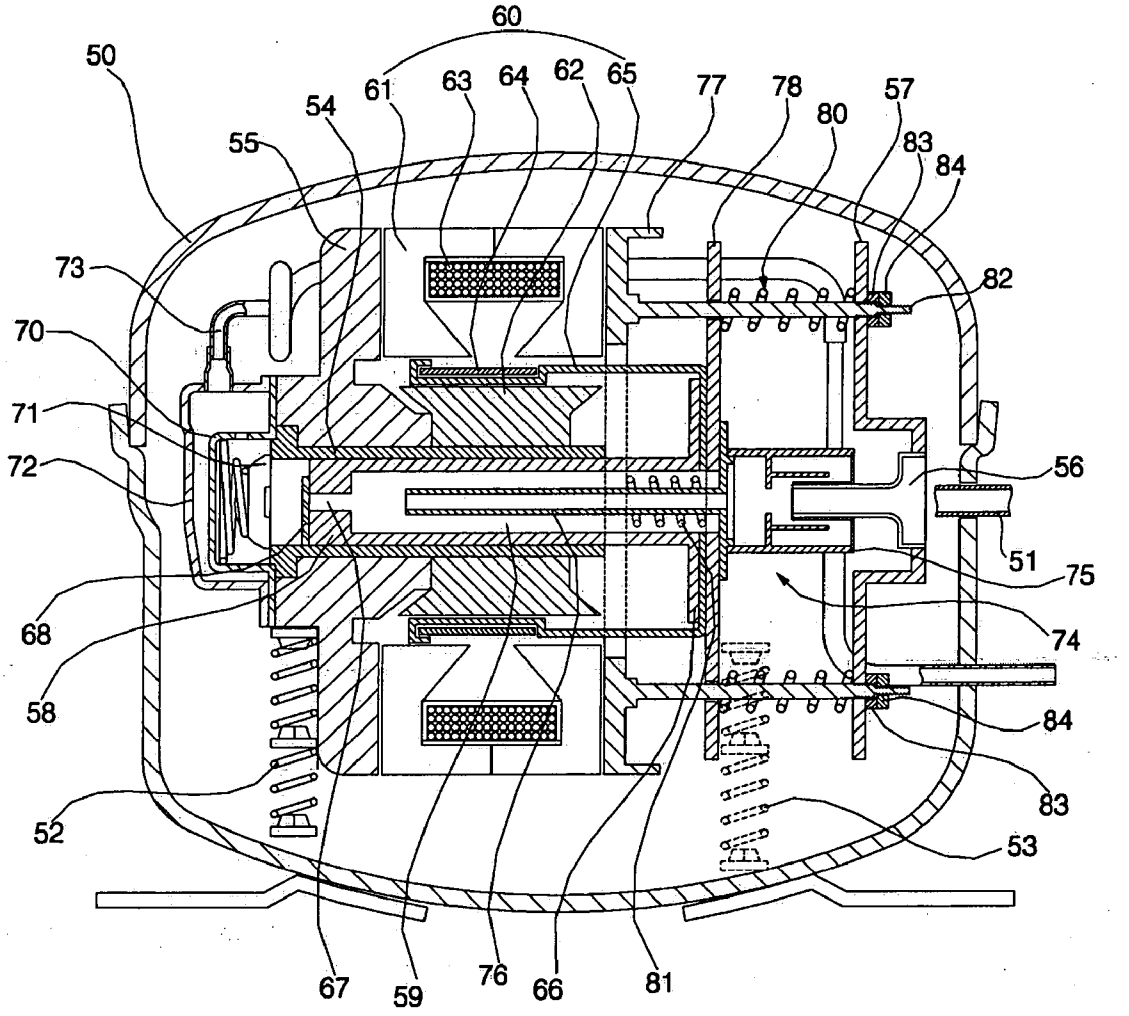

FIG. 1 (Prior Art)

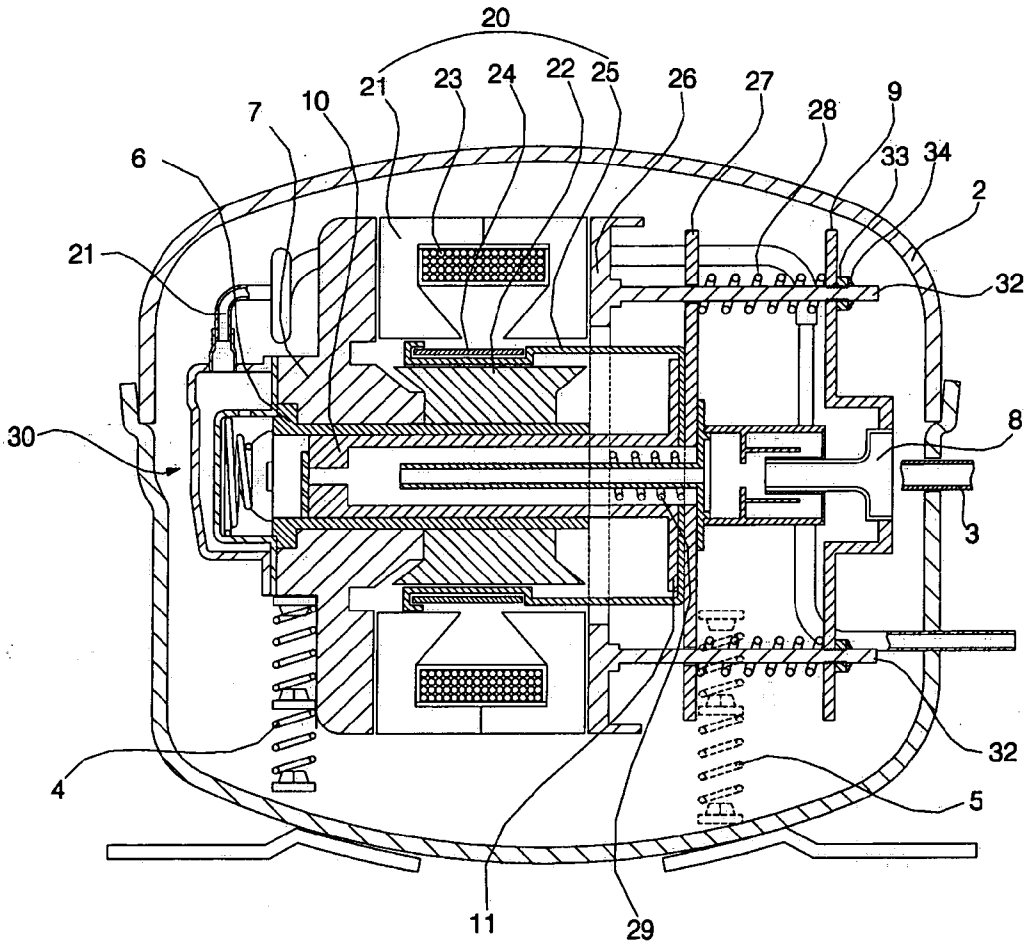

FIG. 2

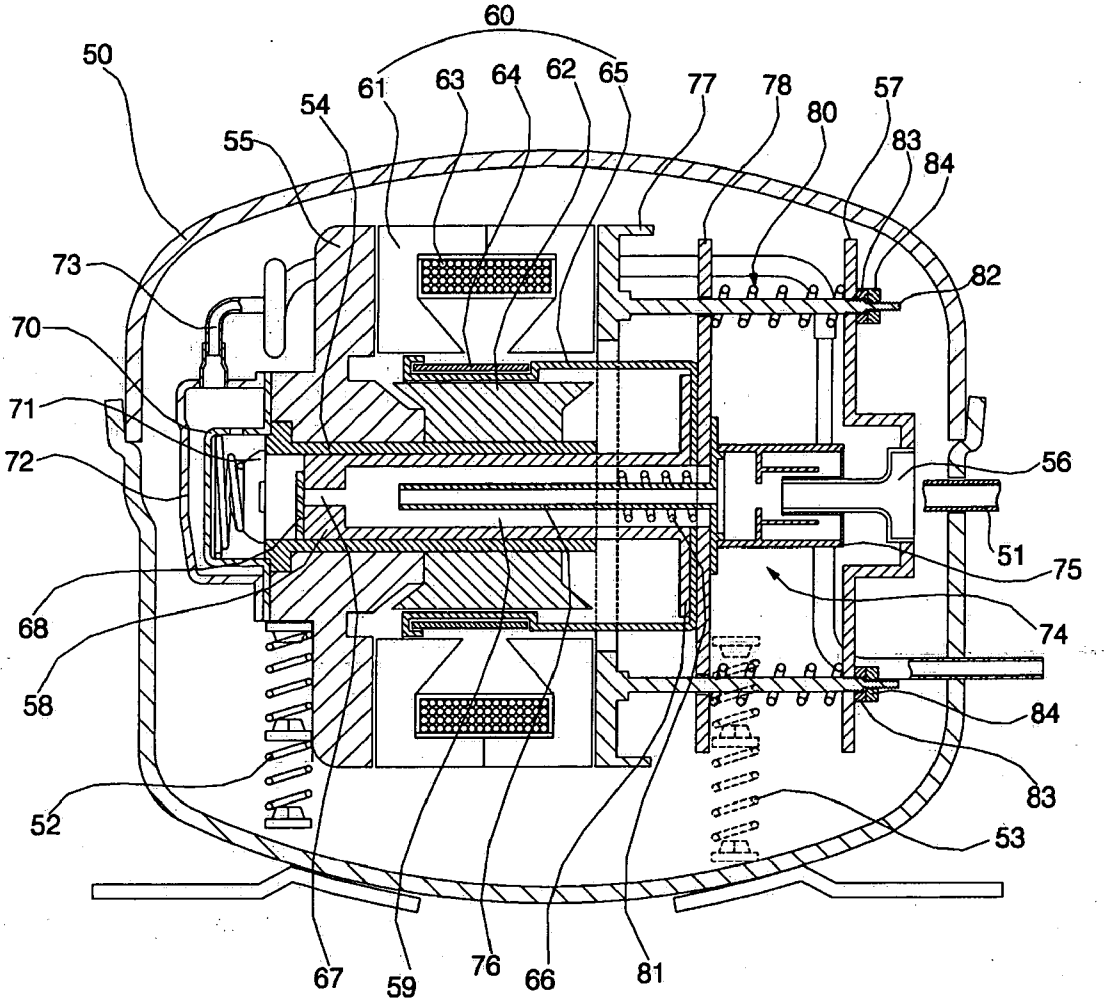
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FIG. 3

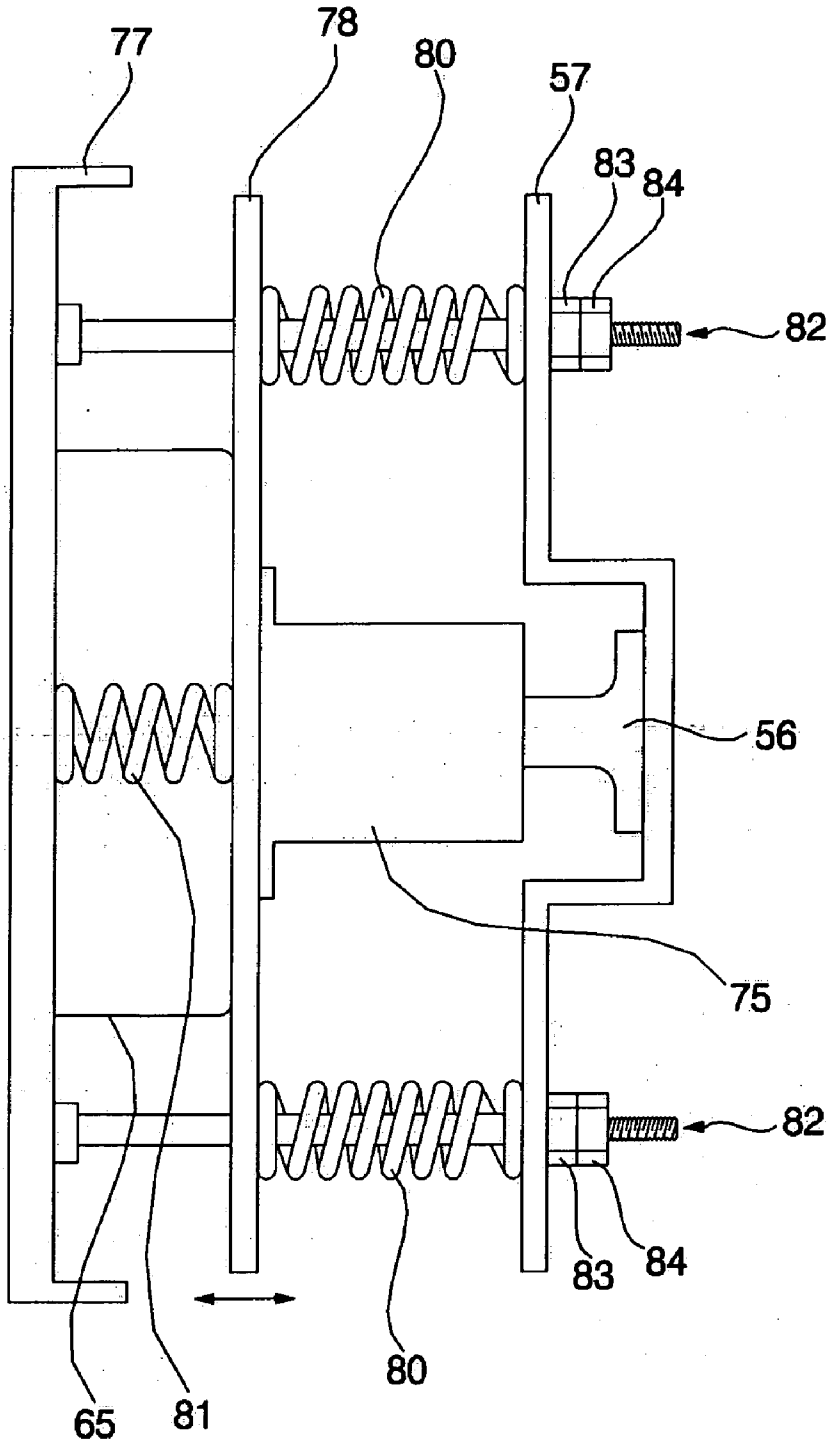


FIG. 4

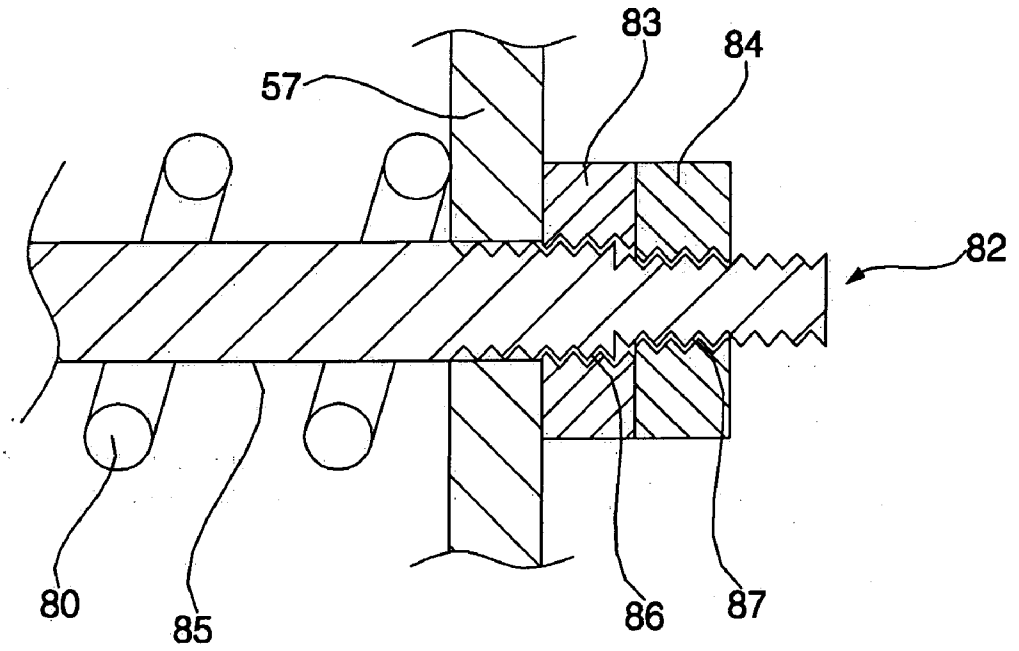


FIG. 5

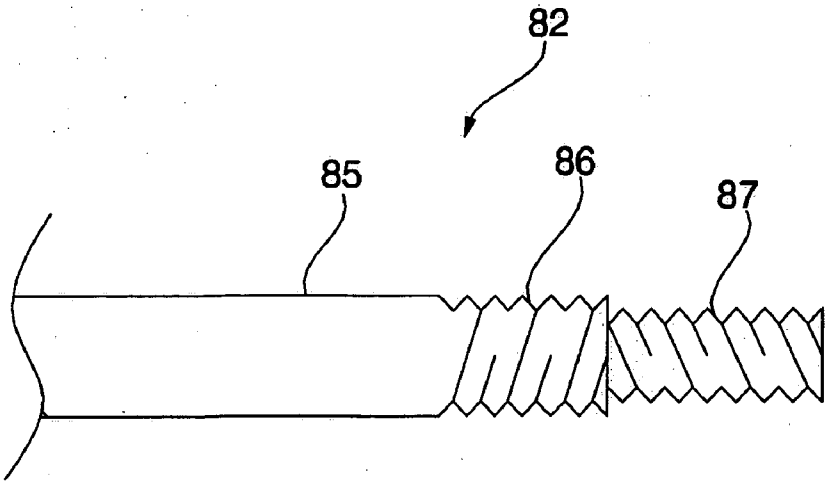


FIG. 6

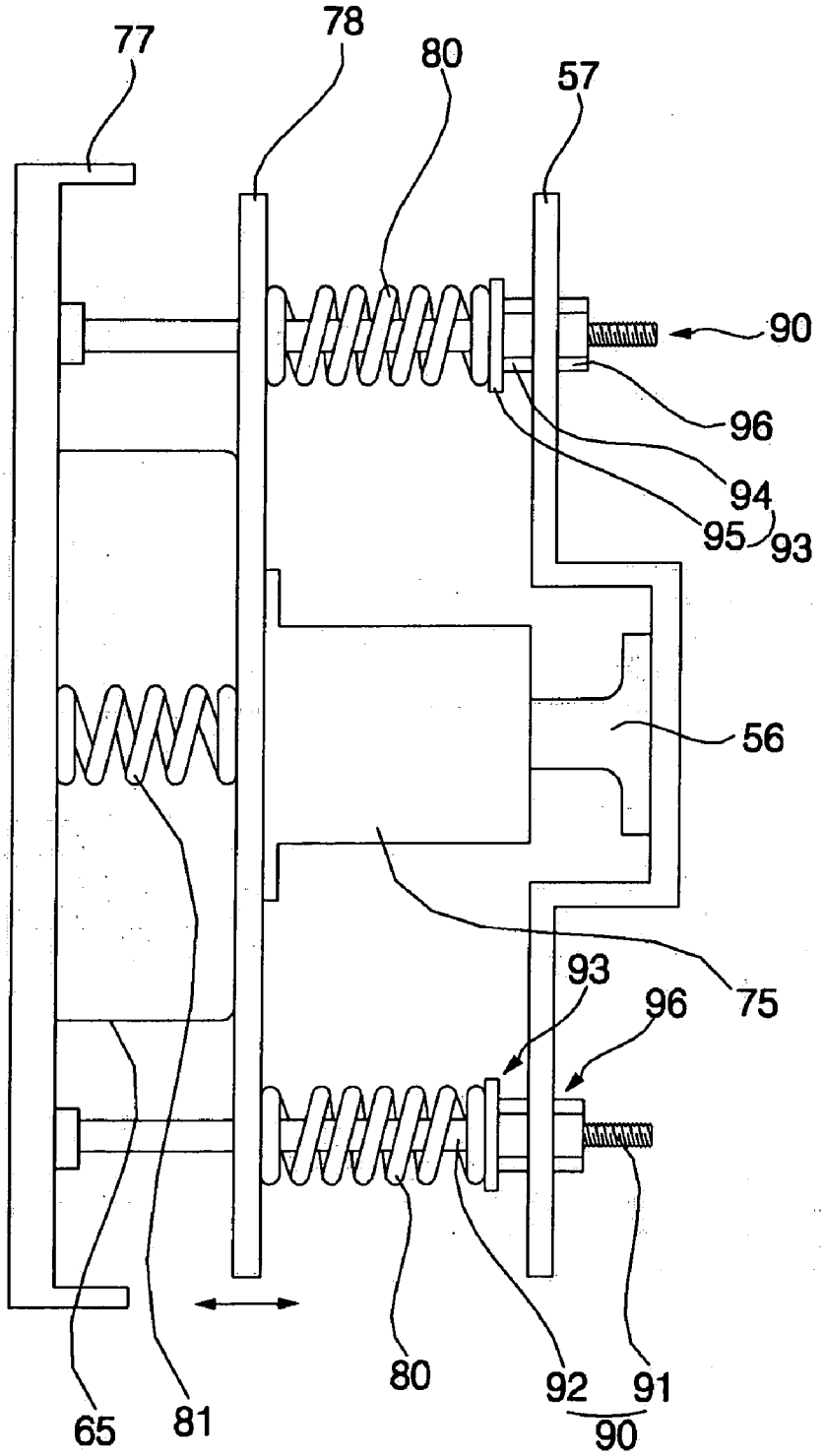


FIG. 7

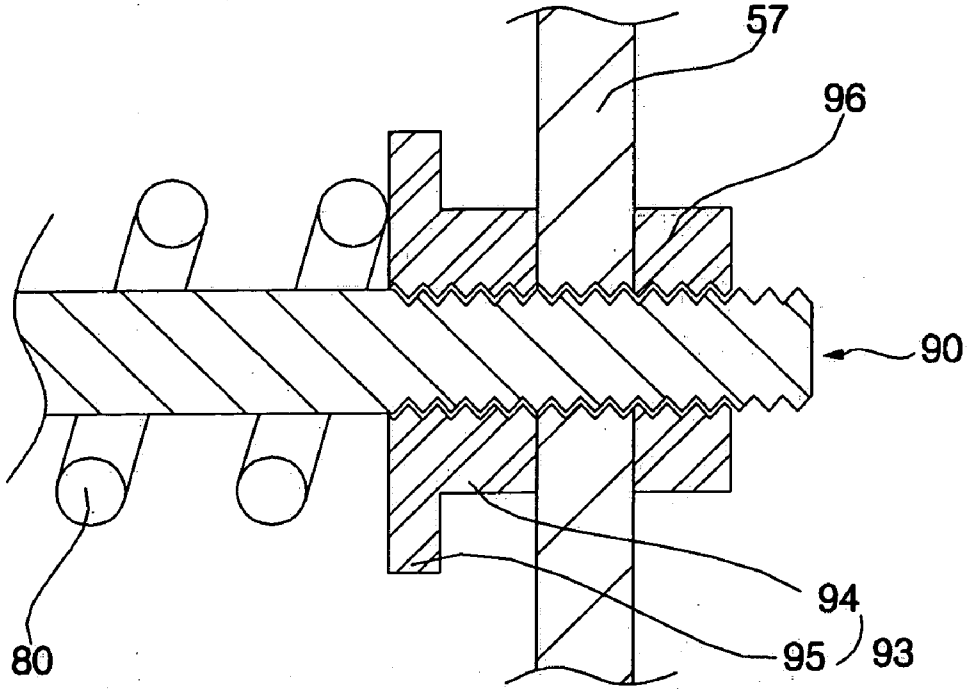
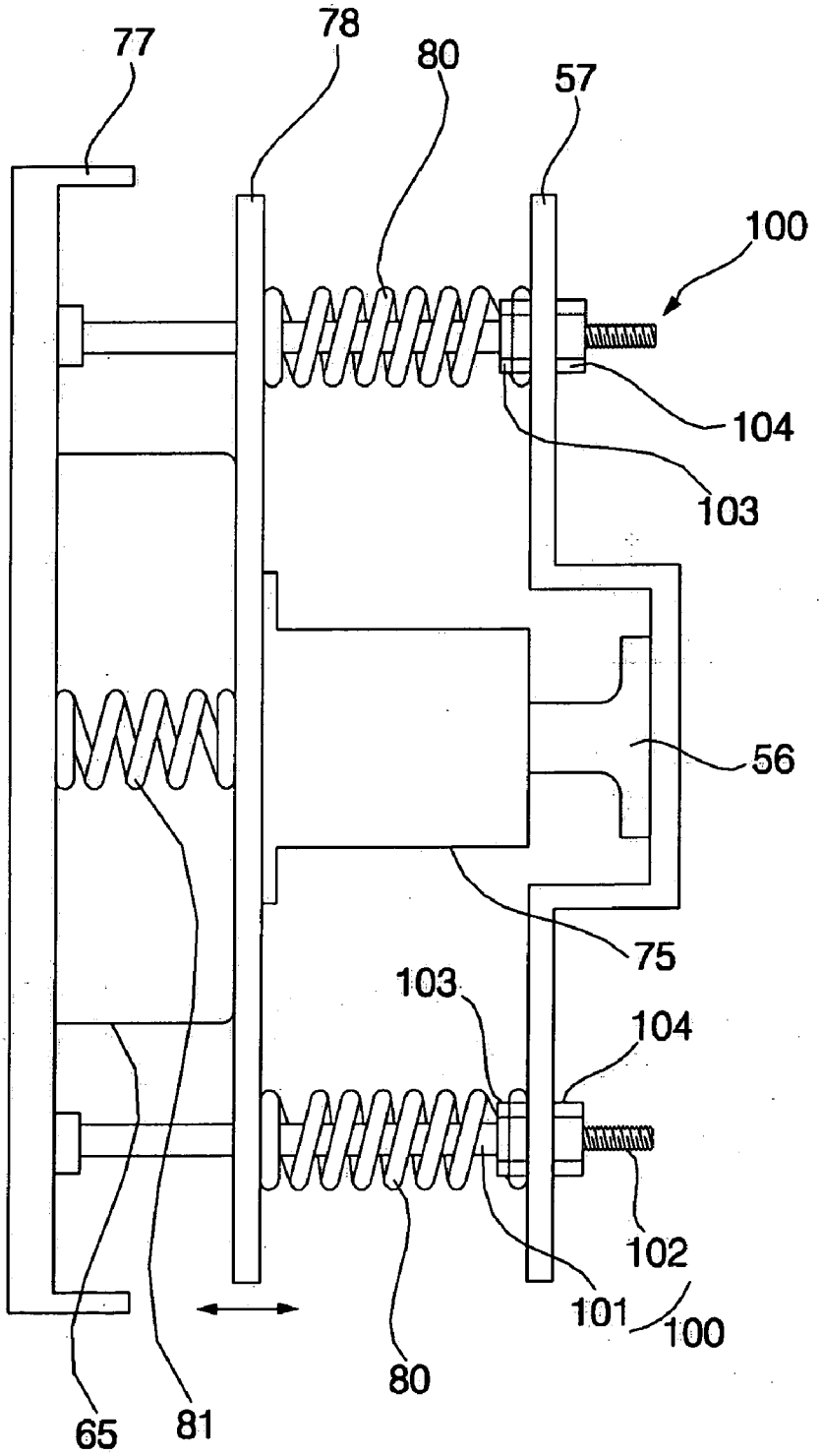


FIG. 8



LINEAR COMPRESSOR

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to a linear compressor, more particularly, wherein an initial value control nut is prevented from releasing, which controls an initial position of a piston. Thus, the linear compressor has an effect on improving the durability and the reliability.

[0003] 2. Description of the Related Art

[0004] Generally, a linear compressor is a machine to inhale, to compress, and to discharge fluid by linearly reciprocating a piston within a cylinder, by device of linear driving force of a linear motor.

[0005] **FIG. 1** shows the linear compressor, in accordance with the prior art.

[0006] The conventional linear compressor comprises a hermetic casing **2**, and a linear compression part positioned in the hermetic casing **2** to compress fluid(see **FIG. 1**).

[0007] An inlet **3** for inhaling fluid penetrates one end of the hermetic casing **2**, and a linear compression part is held by a main damper **4** and a subsidiary damper **5** set in the hermetic casing **2**, so as to absorb a shock.

[0008] The linear compression part includes a cylinder block **7** having the cylinder **6**, a back cover **9** provided with an inhale pipe **8**, the piston **10** which moves back and forth within the cylinder **6**, the linear motor **20** which drives the piston **10**, and an exhale part **30** placed in a front of the cylinder **6** to discharge fluid compressed in the cylinder **6**.

[0009] The exhale part **30** is connected to an exhale pipe **31** which guides fluid drained from the cylinder to the outside of the hermetic casing.

[0010] The linear motor **20** is divided by a stationary part and a movable part. The stationary part includes an outer stator **21**, an inner stator **22**, and a coil **23** with a magnetic field. The movable part includes a magnet **24** that linearly reciprocates by magnetic force around the coil **23**, and a magnet frame **25** which the magnet **14** is fastened to.

[0011] The cylinder block **7** is located in a front of the outer stator **21**, and a stator cover **26** is set in its rear.

[0012] The piston **10** receives linear driving force from the magnet **24**, and linearly reciprocates within the cylinder **6**. It is in the shape of a cylinder, which is open at its rear. An inhale passage where fluid is entered is provided therein. A flange **11** is provided in its rear, so as to be fastened to the magnet frame **25**.

[0013] In a rear of the magnet frame **25**, a spring supporting member **27** is placed to gear with the magnet frame **25**. The spring supporting member **27** has a main spring for elastically supporting linear reciprocation of the piston **10**.

[0014] The spring supporting member **27** is disposed between the stator cover **26** and the back cover **9**, being fastened to the magnet frame **25**. The main spring includes a 1st main spring **28** between the spring supporting member **27** and the back cover **9**, and a 2nd main spring **29** between the spring supporting member **27** and the stator cover **26**.

[0015] A bolt **32** protruded toward the back cover **9** is equipped in the stator cover **26**, so as to penetrate the spring supporting member **27** and the back cover **9**.

[0016] The spring supporting member **27** and the back cover **9** respectively have a through hole to make the bolt **32** penetrate. After the bolt **32** penetrates the spring supporting member **27** and the back cover **9**, it is combined with an initial value control nut **33** in a rear of the back cover **9**, which controls an initial position of the piston **10**.

[0017] The conventional linear compressor with the above construction operates in the following sequence.

[0018] In operation of the linear motor **20**, the magnet **24** linearly reciprocates, its linear driving force is delivered to the piston **10** through the magnet frame **25**. The piston **10** moves back and forth within the cylinder **6**.

[0019] When the piston **10** linearly reciprocates within the cylinder **6**, fluid within the hermetic casing **2** is inhaled into the inhale pipe **8** of the back cover **9**, is compressed in the cylinder **6** by the piston **10**, and is discharged to the outside of the hermetic casing **2** through the exhale part **30** and the exhale pipe **31**.

[0020] The piston **10** is supported by the 1st main spring **28** and the 2nd main spring **29**, when the piston **10** moves back and forth.

[0021] When the piston **10** is assembled to move back and forth within the cylinder **6**, the piston **10** should occupy its initial position appropriately. The initial position of the piston **10** is controlled, after inserting the spring supporting member **27**, the 1st main spring **28** and the back cover **9**, in regular order, into the bolt **32**, and combining with the initial value control nut **33** in the rear of the back cover **9**.

[0022] The back cover **9** pushes the 1st main spring **28**, depending on an extent that the initial value control nut **33** is wound. As the spring supporting member **27** is transferred by the elasticity of the 1st main spring **28**, the position of the piston **10** combined with the spring supporting member **27** is controlled.

[0023] However, in the conventional linear compressor, the initial value control nut **33** is easily released by a vibration and the shock. When the initial value control nut **33** becomes released, the piston **10** changes its initial position, resulting in influencing on compressibility. Furthermore, a separation of the initial value control nut **33** brings a mishap to the linear compressor.

[0024] In order to prevent the initial value control nut **33** from releasing, the initial value control nut **33** is combined with the bolt **32**, and is fixed by welding **34**. In that case, a restriction still remains that the initial value control nut **33** comes to released, caused by the trouble in welding.

SUMMARY OF THE INVENTION

[0025] Accordingly, it is an aspect of the present invention to provide a linear compressor, wherein an initial value control nut for controlling an initial position of a piston is not released, so that the initial position of the piston is not changed, thereby enhancing not only compressibility but also the durability and the reliability.

[0026] The foregoing and other aspects are achieved by providing the linear compressor, based on the present inven-

tion, which comprises a stator cover fastened to a linear motor, a back cover positioned at a regular interval from the stator cover, the piston which linearly reciprocates by the linear motor, a spring supporting member mounted between the stator cover and the back cover, so as to gear with the piston, a main spring mounted between the spring supporting member and the back cover to elastically hold linear reciprocation of the piston, a connection device equipped in the stator cover to penetrate the spring supporting member and the back cover, an initial value control device combined with the connection device in a back of the back cover, so as to control the initial position of the piston, and a releasing protection device combined with the connection device, so as to prevent the initial value control device from releasing.

[0027] The connection device is protruded in the stator cover toward the back cover, which is a bolt having a screw thread. The initial value control device is the initial value control nut combined with the bolt. The releasing protection device is a releasing protection nut combined with the bolt which is combined with the initial value control nut.

[0028] Either the initial value control nut or the releasing protection nut is a right screw and the rest is a left screw.

[0029] The bolt includes a rod which penetrates the spring supporting member, a main screw prolonged from the rod and provided with the screw thread to combine with the initial value control nut, and a subsidiary screw prolonged from the main screw and provided with the screw thread to combine with the releasing protection nut.

[0030] The main screw and the subsidiary screw have a different diameter.

[0031] According to an aspect of the present invention, the linear compressor comprises the stator cover fastened to the linear motor, the back cover positioned at a regular interval from the stator cover, the piston which linearly reciprocates by the linear motor, the spring supporting member mounted between the stator cover and the back cover, so as to gear with the piston, the main spring mounted between the spring supporting member and the back cover to elastically hold linear reciprocation of the piston, the connection device equipped in the stator cover to penetrate the spring supporting member and the back cover, the initial value control device combined with the connection device between the main spring and the back cover, so as to control the initial position of the piston, and a fixing device which allows the connection device and the back cover to be fastened to each other in the back of the back cover.

[0032] The connection device is protruded in the stator cover toward the back cover, which is the bolt having the screw thread. The fixing device is a lock nut combined with the bolt in the back of the back cover.

[0033] The initial value control device is the initial value control nut combined with the bolt, between the main spring and a front of the back cover.

[0034] The initial value control nut includes a connection portion combined with the bolt, and a sheet portion radially protruded in the connection portion to support the main spring.

[0035] According to an aspect of the present invention, the linear compressor comprises the stator cover fastened to the linear motor, the back cover positioned at a regular interval from the stator cover, the piston which linearly reciprocates by the linear motor, the spring supporting member mounted between the stator cover and the back cover, so as to gear with the piston, the main spring mounted between the spring supporting member and the back cover to elastically hold linear reciprocation of the piston, the bolt equipped in the stator cover to penetrate the spring supporting member and the back cover, the main nut positioned in the main spring to be combined with the bolt, and the subsidiary nut combined with the bolt in the back of the back cover.

[0036] In the linear compressor of the present invention having the above-mentioned construction, the initial value control nut which controls the initial position of the piston and the releasing protection nut which prevents the initial value control nut from releasing are combined in the bolt of the stator cover as a double nut method, so that it is capable of preventing the initial value control nut from releasing, and of preventing the linear compressor from being out of order. Thus, the durability and the reliability of the linear compressor are enhanced.

[0037] As either the initial value control nut or the releasing protection nut is the right screw, and the rest is the left screw, the initial value control nut and the releasing protection nut are wound in the opposite direction, thus enlarging an effect of preventing the initial value control nut from releasing.

[0038] An inside diameter of the releasing protection nut is smaller than that of the initial value control nut, thus enlarging the effect of preventing the initial value control nut from releasing.

[0039] The linear compressor of the present invention having the above-mentioned construction comprises the initial value control nut which controls the initial position of the piston between the main spring and the back cover, and the lock nut fastened to the bolt of the stator cover and the back cover in the back of the back cover. The initial value control nut and the lock nut are combined as the double nut method, therefore it prevents the initial value control nut from releasing, and enhances the durability and the reliability.

[0040] After the initial position of the piston is adjusted by the initial value control nut, the back cover is installed in the bolt by the nut. Hereby, an installation of the back cover becomes easy.

BRIEF DESCRIPTION OF THE DRAWINGS

[0041] These and other objects and advantages of the present invention will become apparent and more readily appreciated from the following description of the embodiments of the invention, taken in conjunction with the accompanying drawings of which:

[0042] **FIG. 1** is a sectional view of a linear compressor, according to the prior art;

[0043] **FIG. 2** is a sectional view of the linear compressor, according to a 1st embodiment of the present invention;

[0044] **FIG. 3** is a lateral view of an initial value control device and a releasing protection device, according to the 1st embodiment of the present invention;

[0045] **FIG. 4** is an enlarged sectional view of the initial value control device and the releasing protection device, according to the 1st embodiment of the present invention;

[0046] **FIG. 5** is a lateral view of a connection device, according to the 1st embodiment of the present invention;

[0047] **FIG. 6** is a lateral view of the initial value control device and a fixing device of the linear compressor, according to a 2nd embodiment of the present invention;

[0048] **FIG. 7** is an enlarged sectional view of the initial value control device and the fixing device, according to the 2nd embodiment of the present invention;

[0049] **FIG. 8** is a lateral view of the initial value control device and the fixing device of the linear compressor, according to a 3rd embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0050] Reference will now be made in detail to the embodiments of the present invention, examples of which are illustrated in the accompanying drawings, wherein like reference numerals refer to the like elements throughout. The embodiments are described below in order to explain the present invention by referring to the figures.

[0051] **FIG. 2** shows a linear compressor, according to a 1st embodiment of the present invention, **FIGS. 3 and 4** show an initial value control device and a releasing protection device, according to the 1st embodiment of the present invention, and **FIG. 5** shows a connection device, according to the 1st embodiment of the present invention.

[0052] As referring to FIGS. **2** to **5**, the linear compressor, in accordance with the 1st embodiment of the present invention comprises a hermetic casing **50**, and a linear compression part positioned in the hermetic casing **50** to compress fluid.

[0053] One end of the hermetic casing **50**, an inlet **51** for inhaling fluid is installed through. The linear compression part is suspended by a main damper **52** and a subsidiary damper **53** in the hermetic casing **50**, so as to absorb a shock.

[0054] The linear compression part includes a cylinder block **55** provided with a cylinder **54**, a back cover **57** provided with an inhale pipe **56** facing the inlet **51**, a piston **58** which moves back and forth in the cylinder **54**, a linear motor **60** which generates driving force to make the piston **58** linearly reciprocate, and an exhale part positioned in a front of the cylinder **54**, so as to discharge fluid compressed in the cylinder **54**.

[0055] The linear motor **60** is divided by a stationary part and a movable part. The stationary part includes an outer stator **61**, an inner stator **62**, and a coil **63** with a magnetic field. The movable part includes a magnet **64** which linearly reciprocates by magnetic force around the coil **63**, and a magnetic frame **65** fastened to the magnet **64**.

[0056] The piston **58** is fastened to the magnet frame **65**, in order to deliver linear driving force of the magnet **64** to the piston **58**. One end of the piston **58** is inserted into the cylinder **54**, and the other is fastened to the magnet frame **65**.

[0057] The piston **58** is in the shape of a cylinder, which is open at its rear. An inhale passage **59** where fluid is entered is provided therein. A flange **66** is provided in its rear, so as to be fastened to a front of the magnet frame **65**.

[0058] In a front of the piston **58**, an inhale port **67** for making fluid inhale into a compression chamber of the cylinder **54** is formed, and an inhale valve **68** for opening and closing the inhale port **67** is installed.

[0059] The exhale part includes an inner exhale cover **70** fastened to the cylinder block **55** and provided with an exhale hole, an exhale valve **71** supported in the inner exhale cover **70** by a spring to open and close the compression chamber of the cylinder **54**, and an outer exhale cover **72** positioned at a regular interval from the outside of the inner exhale cover **70**. An exhale pipe **73** is connected to the outer exhale cover **72**, which guides fluid drained from the cylinder **54** to the outside of the hermetic casing **50**.

[0060] A muffler **74** for reducing a noise is installed between a rear of the piston **58** and the inhale pipe **56** of the back cover **57**. The muffler **74** includes a muffler body **75** placed in the rear of the piston **58**, and an entry pipe **76** prolonged from the muffler body to be inserted into the piston **58**.

[0061] The cylinder block **55** is located in a front of the outer stator **61**, and a stator cover **77** for covering the outer stator **61** is set in a rear of the outer stator **61**. The back cover **57** is spaced apart from the stator cover **77** by predetermined distance.

[0062] A spring supporting member **78** is installed between the stator cover **77** and the back cover **57**, in order to gear with the piston **58** and the magnet frame **65**. The spring supporting member **78** is combined with a back of the magnet frame **65**.

[0063] The spring supporting member **78** has a main spring to elastically hold linear reciprocation of the piston **58**.

[0064] The main spring includes a 1st main spring **80** arranged between the spring supporting member **78** and the back cover **57**, and a 2nd main spring **81** arranged between the spring supporting member **78** and the stator cover **77**. The 1st main spring **80** is disposed in upper and lower sides of the hermetic casing **50**, while the 2nd main spring **81** is disposed in right and left sides of the hermetic casing **50**.

[0065] The connection device is equipped in the stator cover **77**, which penetrates the spring supporting member **78** and the back cover **57**, and allows the stator cover **77** to combine with the spring supporting member **78** and the back cover **57**.

[0066] One end of the connection device is fastened to the stator cover **77**, and the other is protruded toward the back cover **57**, which is a bolt **82** having a screw thread in its circumference.

[0067] A through hole is formed in the spring supporting member **78**, where the bolt **82** is penetrated, so as to slide a front and rear direction in the bolt **82** by gearing with the piston **58**, when the piston **58** moves back and forth.

[0068] In a rear of the back cover **57**, there are the initial value control device combined with the bolt **82** for controlling an initial position of the piston **58**, and the releasing protection device combined with the bolt **82** for preventing the initial value control device from releasing.

[0069] The initial value control device is an initial value control nut **83** combined with the bolt **82**, and the releasing

protection device is a releasing protection nut **84** combined with the bolt **82** which is combined with the initial value control nut **83**.

[**0070**] As shown in **FIG. 5**, either the initial value control nut **83** or the releasing protection nut **84** is a right screw, and the rest is a left screw. An example that the initial value control nut **83** is the right screw that is combined in a right direction in rotating, and the releasing protection nut **84** is the left screw that is combined in a left direction in rotating is described below.

[**0071**] The bolt **82** includes a rod **85** which penetrates the spring supporting member **78**, a main screw **86** prolonged from the rod **85** and provided with the screw thread, so as to combine with the initial value control nut **83**, and a subsidiary screw **87** prolonged from the main screw **86** and provided with the screw thread, so as to combine with the releasing protection nut **84**.

[**0072**] The main screw **86** has the screw thread to be wound in the right direction, and the subsidiary screw **87** has the screw thread to be wound in the left direction.

[**0073**] As shown in **FIG. 5**, the main screw **86** and the subsidiary screw **87** have a different diameter. The diameter of the subsidiary screw **87** is desirable to be smaller than that of the main screw **86**.

[**0074**] An inside diameter of the initial value control nut and the releasing protection nut **84** are respectively faced to an outside diameter of the main screw **86** and the subsidiary screw **87**.

[**0075**] A process of the linear compressor, according to the 1st embodiment of the present invention is described in the following.

[**0076**] When the linear motor **60** is in operation, the magnet **64** linearly reciprocates, and its linear motion is transmitted to the piston **58** through the magnet frame **65**. The piston **58** linearly reciprocates within the cylinder **54**.

[**0077**] When the piston **58** linearly reciprocates within the cylinder **54**, fluid in the hermetic casing **50** is inhaled into the inhale pipe **56** of the back cover **57**, is compressed in the cylinder **54** by the piston **58**, and is discharged to the outside of the hermetic casing **50** through the inner and the outer exhale cover **70**, **72** and the exhale pipe **73**.

[**0078**] When the piston **58** moves backward, the spring supporting member **78** moves backward together with the piston **58**, and the 1st main spring **80** becomes compressed. When the piston **58** moves forward, the spring supporting member **78** moves forward, and the 2nd main spring **81** becomes compressed.

[**0079**] Linear reciprocation of the piston **58** is elastically held by the elasticity of the 1st and the 2nd main spring **80**, **81**.

[**0080**] A method of adjusting the initial position of the piston **58** is as follows.

[**0081**] After the spring supporting member **78**, the 1st main spring **80** and the back cover **57**, in regular order, are inserted into the bolt **82** fastened to the stator cover **77**, the initial value control nut **83** is combined with the main screw **86** of the bolt **82** in the rear of the back cover **57**.

[**0082**] As the initial value control nut **83** is combined with the main screw **86** of the bolt **82**, the initial value control nut **83** pushes the 1st main spring **80** through the back cover **57**.

[**0083**] While the spring supporting member **78** combined to gear with the piston **58** is moved by the elasticity of the 1st main spring **80**, the initial position of the piston **58** is decided.

[**0084**] According to an extent that the initial value control nut **83** is combined with the bolt **82**, the initial position of the piston **58** is controlled.

[**0085**] After the initial position of the piston **58** is adjusted, the releasing protection nut **84** is combined with the subsidiary screw **87** of the bolt **82**.

[**0086**] The initial value control nut **83** and the releasing protection nut **84** are combined in the bolt **82** as a double nut method, and the initial value control nut **83** and the releasing protection nut **84** are wound in the opposite direction. Thus, it can prevent the initial value control nut **83** from releasing.

[**0087**] In describing a 2nd embodiment of the present invention, the identical reference number is conferred upon the same construction with the 1st embodiment of the present invention, referring to **FIG. 2**, and a detailed explanation is omitted.

[**0088**] **FIGS. 6 and 7** show the initial value control device and a fixing device of the linear compressor, according to the 2nd embodiment.

[**0089**] As referring to **FIGS. 6 and 7**, the linear compressor, according to the 2nd embodiment of the present invention comprises the stator cover **77** fastened to the linear motor **60**, the back cover **57** spaced apart from the stator cover **77** by predetermined distance, the piston **58** which linearly reciprocates by the linear motor **60**, the spring supporting member **78** installed between the stator cover **77** and the back cover **57**, so as to gear with the piston **58**, the 1st main spring **80** mounted between the spring supporting member **78** and the back cover **57** to elastically support linear reciprocation of the piston **58**, the connection device equipped in the stator cover **77** to penetrate the spring supporting member **78** and the back cover **57**, the initial value control device combined with the connection device between the 1st main spring **80** and the back cover **57**, so as to control the initial position of the piston **58**, and the fixing device which allows the connection device and the back cover **57** to be fastened to each other in the rear of the back cover **57**.

[**0090**] The 2nd main spring **81** is further comprised, which elastically holds linear reciprocation of the piston **58**, by being installed between the spring supporting member **78** and the stator cover **77**.

[**0091**] One end of the connection device is fastened to the stator cover **77**, and the other is protruded toward the back cover **57**, which is the bolt **90** having the screw thread in its circumference.

[**0092**] The initial value control device is the initial value control nut **93** combined with the bolt **90**, between the 1st main spring **80** and a front of the back cover **57**.

[**0093**] The initial value control nut **93** includes a connection portion **94** having the screw thread in its circumference,

so as to combine the bolt **90**, and a sheet portion **95** radially protruded in the connection portion **94**, so as to support the 1st main spring.

[**0094**] The fixing device is a lock nut **96** combined with the bolt **90** which penetrates the back cover **57** in the rear of the back cover **57**.

[**0095**] The bolt **90** includes the rod **91** penetrating the spring supporting member **78**, a screw **92** prolonged from the rod **91** and provided with the screw thread to combine with the initial value control nut and the lock nut.

[**0096**] The method of adjusting the initial position of the piston in the linear compressor, according to the 2nd embodiment of the present invention is as follows.

[**0097**] After the spring supporting member **78** and the 1st main spring **80**, in regular order, are inserted into the bolt **90** fastened to the stator cover **77**, the initial value control nut **93** is combined with the bolt **90**.

[**0098**] As the initial value control nut **93** is combined with the bolt **90**, the initial value control nut **93** pushes the 1st main spring **80**. While the spring supporting member **78** combined to gear with the piston **58** is moved by the elasticity of the 1st main spring **80**, the initial position of the piston **58** is decided.

[**0099**] The spring supporting member **78** has a regular interval from the back cover **57** by the initial value control nut **93**, the initial position of the piston **58** combined with the spring supporting member **78** is decided.

[**0100**] Thereafter, the back cover **57** is set in the bolt **90**, and the lock nut **96** is combined with the bolt **90** in the rear of the back cover **57**.

[**0101**] As the initial value control nut **93** and the lock nut **96** are combined in the bolt **90** as the double nut method, it can prevent the initial value control nut **93** from releasing by mutual pushing power between the initial value control nut **93** and the lock nut **96**.

[**0102**] Without defining the above embodiment, a spacer may be used for the initial value control device, which allows the spring supporting member **78** to be parted from the back cover **57** by predetermined distance.

[**0103**] In describing a 3rd embodiment of the present invention, the identical reference number is conferred upon the same construction with the 1st embodiment of the present invention, referring to **FIG. 2**, and a detailed explanation is omitted.

[**0104**] **FIG. 8** shows the initial value control device and the fixing device of the linear compressor, according to the 3rd embodiment.

[**0105**] As shown in **FIG. 8**, the linear compressor, according to the 3rd embodiment of the present invention comprises the stator cover **77** fastened to the linear motor **60**, the back cover **57** spaced apart from the stator cover **77** by predetermined distance, the piston **58** which linearly reciprocates by the linear motor **60**, the spring supporting member **78** installed between the stator cover **77** and the back cover **57**, so as to gear with the piston **58**, the 1st main spring **80** mounted between the spring supporting member **78** and the back cover **57** to elastically support linear reciprocation of the piston **58**, the connection device equipped in the stator cover **77** to penetrate the spring supporting member **78** and the back cover **57**, the initial value control device combined with the connection device and equipped in the 1st main spring **80**, so as to control the initial position of the piston **58**, and the fixing device which allows the connection device and the back cover **57** to be fastened to each other in the rear of the back cover **57**.

[**0106**] The 2nd main spring **81** is further comprised, which elastically holds linear reciprocation of the piston **58**, by being installed between the spring supporting member **78** and the stator cover **77**.

[**0107**] One end of the connection device is fastened to the stator cover **77**, and the other is protruded toward the back cover **57**, which is the bolt **100** having the screw thread in its circumference.

[**0108**] The outside diameter of the initial value control device is smaller than the inside diameter of the 1st main spring **80**, and the initial value control device is the initial value control nut **103** combined with the bolt **100**.

[**0109**] The fixing device is the lock nut **104** combined with the bolt **100** in the rear of the back cover **57**.

[**0110**] The bolt **100** includes the rod **101** penetrating the spring supporting member **78**, the screw **102** prolonged from the rod **101** and provided with the screw thread to be combined with the initial value control nut **103** and the lock nut **104**.

[**0111**] The method of adjusting the initial position of the piston in the linear compressor, according to the 3rd embodiment of the present invention is as follows.

[**0112**] After the spring supporting member **78** and the 1st main spring **80**, in regular order, are inserted into the bolt **100** fastened to the stator cover **77**, the initial value control nut **103** is combined with the bolt **100**.

[**0113**] When the back cover **57** is inserted into the bolt **100** combined with the initial value control nut **103**, the 1st main spring is supported by the back cover **57**.

[**0114**] An assembling position of the back cover **57** is decided, depending on the extent that the initial value control nut **103** is combined with the bolt **100**, and the back cover **57** pushes the 1st main spring **80**. The spring supporting member **78** is moved, and the initial position of the piston **58** is decided.

[**0115**] Thereafter, the lock nut **104** is combined with the bolt **100** that penetrates the back cover **57**, releasing is protected by mutual pushing power of the initial value control nut **103** and the lock nut **104** in the front and the rear of the back cover **57**. Furthermore, an initial position of the back cover **57** is firmly fixed.

[**0116**] The operational effects of the linear compressor, according to the present invention are described in the following.

[**0117**] As apparent from the above description, in the linear compressor of the present invention, the initial value control nut for controlling the initial position of the piston and the releasing protection nut for preventing the initial value control nut from releasing are combined in the bolt of the stator cover as the double nut method, so that it is possible to prevent the initial value control nut from releas-

ing, and to prevent the linear compressor from breaking down, thereby enhancing the durability and the reliability.

[0118] As apparent from the above description, either the initial value control nut or the releasing protection nut is the right screw, and the rest is the left screw. Furthermore, the initial value control nut and the releasing protection nut are wound in the opposite direction, resulting in enlarging an effect of preventing the initial value control nut from releasing.

[0119] As apparent from the above description, the inside diameter of the initial value control nut is smaller than that of the releasing protection nut, resulting in enlarging the effect of preventing the initial value control nut from releasing.

[0120] As apparent from the above description, the linear compressor, in accordance with the present invention comprises the initial value control nut for controlling the initial position of the piston between the main spring and the back cover, and the lock nut for fastening the bolt of the stator cover and the back cover in the rear of the back cover, the initial value control nut and the lock nut are combined as the double nut method. With this configuration, it can prevent the initial value control nut from releasing, and can prevent the linear compressor from breaking down, thus improving the durability and the reliability.

[0121] As apparent from the above description, the back cover is mounted in the bolt by the nut, after the initial position of the piston is adjusted by the initial value control nut. The back cover can be easily installed.

[0122] Although a few embodiments of the present invention have been shown and described, it would be appreciated by those skilled in the art that changes may be made in this embodiment without departing from the principles and spirit of the invention, the scope of which is defined in the claims and their equivalents.

[0123] The present disclosure relates to subject matter contained in Korean Application Nos. 10-2004-0081694, filed on Oct. 13, 2004, and 10-2004-0088791, filed on Nov. 3, 2004, the contents of which are herein expressly incorporated by reference in their entireties.

What is claimed is:

1. A linear compressor comprising:

a stator cover fastened to a linear motor;

a back cover spaced apart from the stator cover by predetermined distance;

a piston which linearly reciprocates by the linear motor;

a spring supporting member installed between the stator cover and the back cover, so as to gear with the piston;

a main spring mounted between the spring supporting member and the back cover to elastically hold linear reciprocation of the piston;

a connection device equipped in the stator cover to penetrate the spring supporting member and the back cover;

an initial value control device combined with the connection device in a rear of the back cover, so as to control an initial position of the piston; and

a releasing protection device combined with the connection device, so as to prevent the initial value control device from releasing.

2. The linear compressor as set forth in claim 1, wherein the connection device is a bolt protruded in the stator cover toward the back cover and provided with a screw thread.

3. The linear compressor as set forth in claim 2, wherein the initial value control device is an initial value control nut combined with the bolt by screwing.

4. The linear compressor as set forth in claim 3, wherein the releasing protection device is a releasing protection nut combined with the bolt by screwing, said bolt being combined with the initial value control nut.

5. The linear compressor as set forth in claim 4, wherein either the initial value control nut or the releasing protection nut is a right screw, and the rest is a left screw.

6. The linear compressor as set forth in claim 4, wherein the bolt includes a rod penetrating the spring supporting member, a main screw prolonged from the rod and provided with the screw thread to combine with the initial value control nut, and a subsidiary screw prolonged from the main screw and provided with the screw thread to combine with the releasing protection nut.

7. The linear compressor as set forth in claim 6, wherein the main screw and the subsidiary screw have a different diameter.

8. The linear compressor as set forth in claim 7, wherein the main spring further includes a spring arranged between the spring supporting member and the stator cover to elastically support linear reciprocation of the piston.

9. A linear compressor comprising:

a stator cover fastened to a linear motor;

a back cover spaced apart from the stator cover by predetermined distance;

a piston which linearly reciprocates by the linear motor;

a spring supporting member installed between the stator cover and the back cover, so as to gear with the piston;

a main spring mounted between the spring supporting member and the back cover to elastically hold linear reciprocation of the piston;

a connection device equipped in the stator cover to penetrate the spring supporting member and the back cover;

an initial value control device combined with the connection device between the main spring and the back cover, so as to control an initial position of the piston; and

a fixing device which allows the connection device and the back cover to be fastened to each other in a rear of the back cover.

10. The linear compressor as set forth in claim 9, wherein the connection device is a bolt protruded in the stator cover toward the back cover and provided with a screw thread.

11. The linear compressor as set forth in claim 10, wherein the fixing device is a lock nut combined with the bolt in the rear of the back cover.

12. The linear compressor as set forth in claim 11, wherein the initial value control device is an initial value control nut combined with the bolt by screwing, between the main spring and a front of the back cover.

13. The linear compressor as set forth in claim 12, wherein the initial value control nut includes a connection portion combined with the bolt, and a sheet portion radially protruded in the connection portion to support the main spring.

14. The linear compressor as set forth in claim 13, wherein the bolt includes a rod penetrating the spring supporting member, a screw prolonged from the rod and provided with the screw thread to combine with the initial value control nut and the lock nut.

15. The linear compressor as set forth in claim 14, wherein the main spring further includes a spring arranged between the spring supporting member and the stator cover to elastically support linear reciprocation of the piston.

16. A linear compressor comprising:

a stator cover fastened to a linear motor;

a back cover spaced apart from the stator cover by predetermined distance;

a piston which linearly reciprocates by the linear motor;

a spring supporting member installed between the stator cover and the back cover, so as to gear with the piston;

a main spring mounted between the spring supporting member and the back cover to elastically hold linear reciprocation of the piston;

a connection device equipped in the stator cover to penetrate the spring supporting member and the back cover;

an initial value control device combined with the connection device by being placed in the main spring, so as to control an initial position of the piston; and

a fixing device which allows the connection device and the back cover to be fastened to each other in a rear of the back cover.

17. The linear compressor as set forth in claim 16, wherein the connection device is a bolt protruded in the stator cover toward the back cover and provided with a screw thread.

18. The linear compressor as set forth in claim 17, wherein an outside diameter of the initial value control device is smaller than an inside diameter of the main spring, said initial value control device being an initial value control nut combined with the bolt by screwing.

19. The linear compressor as set forth in claim 18, wherein the fixing device is a lock nut combined with the bolt in the rear of the back cover.

20. The linear compressor as set forth in claim 19, wherein the main spring further includes a spring arranged between the spring supporting member and the stator cover to elastically support linear reciprocation of the piston.

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