

## **【DESCRIPTION】**

### **【Invention Title】**

## **VIBRATING RIPPER**

### **【Technical Field】**

5           The present invention relates to a vibrating ripper, and more particularly, to a vibrating ripper having a rotating member which compensates for a change in length due to rotation of at least one connecting member for supporting a vibrating body within a limited amplitude range, thereby allowing the vibrating body to vibrate up and down.

### **10       【Background Art】**

          Generally, to crush rock at a construction site, a breaker iron core is installed on an arm of heavy equipment and hits and crushes the rock. However, since such a conventional breaker hitting method causes loud noise pollution, heavy equipment with low noise and high efficiency is required. Also, in a terrain consisting of only  
15   rocks, the rocks are crushed using a breaker. However, in the case of soft rocks, when the breaker is used, the rocks are not crushed, but a hole is drilled. Therefore, an apparatus which can not only perform a simple rock crushing operation like that of a breaker, but can also crush and dig in the ground while vibrating up and down in the manner of a breaker while equipped with an excavator blade for digging in the  
20   ground in the manner of an excavator is required.

          The present invention has proposed vibrating rippers disclosed in Korean Patent Registration Nos. 1158101, 0878296 and 0755017 and Korean Patent Publication No. 10-2009-0054513.

### **【Disclosure】**

**【Technical Problem】**

The present invention is directed to providing a vibrating ripper which is capable of supporting vibration generated from a vibration generating unit to vibrate up and down and also minimizing left and right movement of a vibrating body due to  
5 an external force applied laterally.

Also, the present invention is directed to providing a vibrating ripper which compensates for a change in length due to rotation of a connecting member for supporting a vibrating body, thereby allowing the vibrating body to vibrate up and down and also enhancing vibration quality of the vibrating body.

10 **【Technical Solution】**

One aspect of the present invention provides a vibrating ripper including a main body portion; a vibrating body coupled to the main body portion and a vibrating body support unit and configured to vibrate; and a ripper blade installed at the vibrating body, wherein the vibrating body support unit includes a rotating  
15 member which is rotatably installed at the vibrating body or the main body portion configured to support the vibrating body, and first and second connecting members which rotatably connect upper and lower sides based on a rotation center of the rotating member with the main body portion or the vibrating body to support the vibrating body with respect to the main body portion, and when the vibrating body  
20 vibrates with respect to the main body portion, the rotating member rotates, and thus a change in a coupling position between the vibrating body and the first and second connecting member according to vibration is compensated for.

In the present invention, the rotating member may be rotatably installed at the vibrating body in a direction perpendicular to a vibration direction, the first and

second connecting members may be respectively installed at both sides of the rotating member, and the vibrating body may vibrate up and down.

The vibrating ripper may further include a link cylinder which is rotatably installed between the vibrating body and the main body portion to move a blade  
5 connected to the vibrating body forward and backward.

Another aspect of the present invention provides a vibrating ripper wherein a rotating member is rotatably installed at a vibrating body, in which a ripper blade is installed at a lower portion thereof and a vibration generating unit is installed, in a direction perpendicular to a vibration direction, and first and second connecting  
10 members rotatably connect upper and lower sides of a rotation center of the rotating member with a main body portion and support the vibrating body to vibrate up and down with respect to the main body portion.

The vibrating body may further include the vibration generating unit, and one side of each of the first and second connecting members which is connected to the  
15 rotating member may be rotatably connected to vertical upper and lower portions of the rotation center.

Still another aspect of the present invention provides a vibrating ripper including a main body portion; and a vibrating body coupled to the main body portion and a vibrating body support unit and configured to vibrate, wherein the  
20 vibrating body support unit supports the vibrating body to vibrate with respect to the main body portion, and includes at least one rotating member which is rotatably installed at the vibrating body, and a first connecting member and a second connecting member which connect to one side of the main body portion and upper and lower sides based on a rotation center of the rotating member, and when the  
25 vibrating body vibrates up and down, the rotating member rotates, and a change in a

coupling position between the first and second connecting members and the vibrating body according to vibration is compensated for.

Yet another aspect of the present invention provides a vibrating ripper including a main body portion; a vibrating body coupled to the main body portion  
5 and a vibrating body support unit and configured to vibrate; a vibration generating unit installed at the vibrating body; and a ripper blade installed at the vibrating body, wherein the vibrating body support unit includes a rotating member which is rotatably installed at the vibrating body or the ripper blade, first and second connecting members, both ends of which are rotatably connected to the main body  
10 portion and upper and lower sides based on a rotation center of the rotating member to support the vibrating body with respect to the main body portion, a sub-main body which is supported at the main body portion located at an upper side of the vibrating body by a first elastic support unit, a connecting member which extends from the vibrating body to the inside of the sub-main body, and a rotating shaft which is  
15 supported by the sub-main body and is rotatably installed at the connecting member.

#### 【Advantageous Effects】

The vibrating ripper of the present invention can suspend the vibrating body so that the vibrating body vibrates in one direction and also vibrates with a uniform amplitude even if a vibrating force of the vibrating body is increased. Also,  
20 because one side of each of the first and second connecting members is supported by a rotating body, stability of a supporting force of the vibrating body with respect to the main body portion can be achieved. Since the vibrating ripper of the present invention is supported by a rotating member installed at the vibrating body and the first and second connecting members connecting the rotating member with the main

body portion, vibration directivity can be limited to up and down directions, and vibration quality of the vibrating blade can be enhanced.

**【Description of Drawings】**

FIG. 1 is a partially cut-out perspective view of a vibrating ripper according  
5 to the present invention.

FIG. 2 is a front view illustrating another embodiment of the vibrating ripper according to the present invention.

FIG. 3 is a partially cut-out perspective view of the vibrating ripper of FIG. 2 having a rotating member according to the present invention.

10 FIGS. 4 and 5 are front views illustrating an installation state of the rotating member and first and second connecting members.

FIG. 6 is a partially cut-out perspective view illustrating another embodiment of the vibrating ripper having the rotating member according to the present invention.

15 FIG. 7 is a front view illustrating a front surface of the vibrating ripper illustrated in FIG. 6.

FIG. 8 is a partially cut-out perspective view of still another embodiment of the vibrating ripper according to the present invention.

FIG. 9 is a partially cut-out perspective view illustrating a portion of one embodiment of a rotating member restoring unit according to the present invention.

20 FIG. 10 is a partially cut-out perspective view illustrating still another embodiment of the vibrating ripper having the rotating member according to the present invention.

FIG. 11 is a partially cut-out perspective view of the vibrating ripper illustrated in FIG. 10.

FIG. 12 is a side cross-sectional view illustrating a portion of a vibrating body support unit illustrated in FIG. 10.

FIG. 13 is a partially cut-out perspective view illustrating yet another embodiment of the vibrating ripper according to the present invention.

5           FIG. 14 is a partially cut-out perspective view illustrating the vibrating ripper illustrated in FIG. 13.

FIG. 15 is a side view illustrating a state in which a vibrating body support unit and a stopper illustrated in FIG. 13 are installed.

#### **【Modes of the Invention】**

10           Exemplary embodiments of a vibrating ripper according to the present invention are illustrated in FIGS. 1 to 9.

Referring to the drawings, a vibrating ripper 10 according to the present invention includes a vibrating body 20, a main body portion 30 which supports the vibrating body 20, a vibrating body support unit 40 which supports the vibrating  
15   body 20 to vibrate with respect to the main body portion 30, and a ripper blade 100 which is installed at a lower surface side of the vibrating body 20.

The main body portion 30 may have a vibrating space portion 31 of the vibrating body 10. As illustrated in FIG. 1, a support bracket portion 32 for coupling with operation equipment may be formed at an upper side or a side surface  
20   side of the main body portion 30 and may include first and second support frame members 33 and 34 which extend to both sides to form the vibrating space portion 31, and a cover frame 35 which is supported by the first and second support frame members 33 and 34. The vibrating space portion 31 may not be partitioned separately in the main body portion 30. The main body portion 30 is not limited to

the above-described embodiment and may have any structure in which the vibrating body 20 is supported by the vibrating body support unit 40 to be capable of vibrating.

The vibrating body 20 is a member which is supported with respect to the main body portion 30 by the vibrating body support unit 40 to vibrate with a  
5 predetermined amplitude and may further include a vibration generating unit 200.

In the vibration generating unit 200, two rotating shafts each having an eccentric weight are installed in a housing in parallel, and gears which are engaged with the rotating shafts are installed on both. The eccentric weights installed at the driving shafts are installed in the same direction with respect to the rotating shafts to  
10 maximize vibration in up and down directions. An actuator which drives at least one of the two driving shafts is installed in the housing. A vibration generating unit having such a configuration is disclosed in Korean Patent Registration No. 0878296 which was filed and registered by the applicant.

As illustrated in FIGS. 1 to 3, the vibrating body support unit 40 is a member  
15 which supports the vibrating body 20 to be capable of vibrating with respect to the main body portion 30 and includes at least one rotating member 41 which is installed at the vibrating body 20 and first and second connecting members 50 and 60, one end of each of which is rotatably installed at an upper or lower side of a rotation center of the rotating member 41 to be deviated from the rotation center of the rotating  
20 member 41 and the other end of which is rotatably installed at the main body portion 30.

The rotating member 41 may be installed in a direction perpendicular to a vibration direction of the vibrating body 20 and may be installed at upper and lower portions of the main body portion 30 to be located on a vertical axial line. The  
25 rotating member 41 may pass through the vibrating body 20 so that the ends thereof

protrude to both sides and may be bearing-supported to rotate smoothly with respect to the vibrating body 20 in normal and reverse directions. In this case, it is preferable that an eccentric bearing be used as the bearing.

Meanwhile, the rotating member 41 may not pass through the vibrating body  
5 20 but may be installed at both of corresponding side surfaces of the vibrating body 20. In this case, it is preferable that centers of the rotating members 41 and 42 be located on the same axial line. Also, as illustrated in FIG. 1, the rotating member 41 may be installed at a separate bracket 21 which is formed at an upper side of the vibrating body 20. The drawing illustrates that the rotating member 41 is installed  
10 at the vibrating body 20. Furthermore, the rotating member 41 may be installed at the main body portion 30, and the vibrating body and the rotating member may be connected by the first and second connecting members, as described above.

The amplitude of the vibrating body 20 may be adjusted according to a coupling position of each of the first and second connecting members 50 and 60  
15 coupled to an upper side and a lower side of a horizontal line based on the rotation center of the rotating member 41 by a hinge shaft. That is, when the vibrating body becomes far from the first and second connecting members 50 and 60 and the rotation center of the rotating member 41 upward or downward, the amplitude of the vibrating body is increased, and when the vibrating body becomes close to the first  
20 and second connecting members 50 and 60 and the rotation center of the rotating member 41, the amplitude of the vibrating body is reduced.

As illustrated in FIGS. 1 to 5, one end of each of the first and second connecting members 50 and 60 of the vibrating body support unit 40 may be rotatably installed on the upper and lower sides of the rotation center of the rotating  
25 member 41 with second and fourth hinge shafts 52 and 62. The other end of each

of the first and second connecting members 50 and 60 is rotatably installed on the main body portion 30 with first and third hinge shafts 51 and 61. As illustrated in FIG. 4, the first and second connecting members 50 and 60 may be installed to maintain a horizontal state without rotating. As illustrated in FIG. 5, a connection  
5 portion between the first connecting member 50 and the main body portion 30 through the first hinge shaft 51 is located further up than a connection portion between the rotating member 41 and the second hinge shaft 52, and a connection portion between the second connecting member 60 and the main body portion 30 through the third hinge shaft 61 is located further up than a connection portion  
10 through the fourth hinge shaft 62 at the lower side of the rotation center of the rotating member 41.

In the embodiments, lengths of the first and second connecting members 50 and 60 may not be the same as each other but may be formed to be different from each other in consideration of a rotation angle of the rotating member 41 and the  
15 hinge-coupling positions of the first and second connecting members 50 and 60.

As illustrated in FIGS. 6 and 7, a tuning connection member 300, both ends of which are rotatably connected to the vibrating body 20 and the main body portion 30 to be tuned to the vibration, is further provided at a portion which is spaced a predetermined interval from the rotating member 41, e.g., at a vertical lower side of  
20 the rotating member 41. The tuning connection member 300 and the connection portion of the vibrating body 20 which is rotatably connected with the hinge shaft may not be located on a vertical axial line of the center of the rotating member 41 in consideration of rotation of the vibrating body when the vibrating body 20 is moved up and down.

The tuning connection member 300 may be configured with a cylinder. It is preferable that a double-acting hydraulic cylinder be used as the cylinder. That is, a rod 302 which is connected to a piston 301 of a hydraulic cylinder is rotatably installed at the ripper blade 100 by a hinge shaft, and a cylinder 303 in which the piston 301 is installed to be movable forward and backward is rotatably installed at the main body portion 30.

Although the double-acting hydraulic cylinder has been described as an example of the tuning connection member 300, the present invention is not limited thereto, and the tuning connection member 300 may be configured with a single-acting cylinder and a link.

As illustrated in FIG. 8, the rotating member may be installed at each of the upper and lower sides of the vibrating body 20, and as described above, the first and second connecting members 50 and 60 may be installed on the rotating members 41 and 42, respectively.

At least one anti-vibration member 70 may be installed between the vibrating body 20 and the main body portion 30. In this case, the vibrating body 20 may be supported with respect to the main body portion by the anti-vibration member 70 and may be supported by a separate member from the main body portion 30.

The anti-vibration member 70 may be installed between the vibrating body 20 and the main body portion 30. The anti-vibration member 70 may be formed of an elastic rubber material or an elastic body such as an elastic spring, but is not limited thereto. The anti-vibration member 70 may amplify the vibration generated from the vibration generating unit 200 and may provide a restoring force for the vibration when the vibrating body 20 vibrates. The anti-vibration member 70 may be installed between an upper surface side of the vibrating body 20 and a lower surface

of the main body portion 30 and may be installed between the vibrating body 20 and the first support frame member 33 and between the vibrating body 20 and the second support frame member 34. The anti-vibration member 70 may be installed between the upper surface side of the vibrating body 20 and the lower surface of the main body portion 30 and between the vibrating body 20 and each of the first and second support frame members 33 and 34.

Meanwhile, as illustrated in FIG. 9, the main body portion 30 may further include a rotating member restoring unit 80 which restores the rotating member 30 to its original position when the rotating member 41 rotates. The rotating member restoring unit 80 may include a housing 82 which is installed at the main body portion 30 while surrounding a support shaft 81 of the rotating member and an elastic member 83 which is installed between an outer circumferential surface of the support shaft 81 of the rotating member and an inner circumferential surface of the housing 82 to restore rotation of the support shaft 81. At this time, the outer circumferential surface of the support shaft 81 may be formed to have a polygonal surface. The rotating member restoring unit is not limited to that of the above-described embodiment and may be formed so that a restoring protrusion is formed at the outer circumferential surface of the support shaft of the rotating member and an elastic spring is installed between the housing and the restoring protrusion. When the rotating member restoring unit is provided as described above, the anti-vibration member does not have to be installed between the main body portion 30 and the vibrating body 20.

FIGS. 10 to 14 illustrate another embodiment of the vibrating ripper according to the present invention. In the embodiment, the same reference

numerals as those in the previous embodiment indicate the same elements as those in the previous embodiment.

Referring to the drawings, a vibrating ripper 10 according to the present invention includes a vibrating body 20, a main body portion 30 which supports the vibrating body 20, a vibrating body support unit 40 which supports the vibrating body 20 to vibrate with respect to the main body portion 30, and a ripper blade 100 which is installed at a lower portion of the vibrating body support unit 40. The vibrating body 20 is a member which is supported with respect to the main body portion 30 by the vibrating body support unit 40 to vibrate with a predetermined amplitude as described in the previous embodiment and may further include a vibration generating unit 200.

As illustrated in FIGS. 10 to 12, the vibrating body support unit 40 is a member which supports the vibrating body 20 to be capable of vibrating with respect to the main body portion 30 and includes at least one rotating member 41 which is installed at the ripper blade 100 and first and second connecting members 50 and 60, one end each of which is rotatably installed at an upper or lower side of a rotation center of the rotating member 41 to be deviated from the rotation center of the rotating member 41 and the other end of which is rotatably installed at a cover frame 35 of the main body portion 30. Each of the first and second connecting members 50 and 60 may be configured with a link member and may be supported by a first hinge shaft 51 and a third hinge shaft 61 which are installed at the cover frame 35. An installation structure of the rotating member 41 may be the same as that in the previous embodiment. That is, the rotating member 41 may be installed in a direction perpendicular to a vibration direction of the vibrating body 20 and may be installed at upper and lower portions of the main body portion 30 to be located on a

vertical axial line. The rotating member 41 may pass through the vibrating body 20 or the ripper blade 100 so that the ends thereof protrude to both sides and may be bearing-supported to rotate smoothly with respect to the vibrating body 20 in normal and reverse directions. As illustrated in FIG. 12, it is preferable that an eccentric bearing 45 be used as the bearing. Meanwhile, the rotating member 41 may be rotatably installed at the vibrating body 20.

A sub-main body 110, both sides of which are supported on the main body portion 30 by a first elastic support unit 120, is installed at an upper side of the vibrating body 20, a connecting member 111 extends from the vibrating body 20 toward the sub-main body 110, and a connection between the sub-main body 110 and the connecting member 111 may be achieved by a rotating shaft 113 which is rotatably installed at the connecting member 111 in a direction parallel to the rotating member 41 and both ends of which are supported by the sub-main body 110. The connecting member 111 may be supported by a bearing which is supported by the rotating shaft 113, and the bearing may be an eccentric bearing. Here, the eccentric bearing, which is installed at the rotating shaft 113 and supports the connecting member 111, may limit rotation of the rotating member 41 when the vibrating body 20 vibrates. However, a stopper which is not illustrated in the drawings and limits the rotation of the rotating member may be installed separately.

A first elastic member 115 which provides a reaction force, performs an elastic support operation and also absorbs a shock may be installed between an upper side of the connecting member 111 and an upper surface side of the sub-main body 110. A second elastic member 116 which performs the elastic support operation to provide the reaction force and also to absorb the shock like the first elastic member 115 is installed between the upper surface side of the sub-main body 110 and a lower

surface of the main body portion 30 corresponding thereto. Each of the first and second elastic members 115 and 116 may be configured with a member capable of providing elastic force, such as elastic rubber, a shock absorber or an elastic spring.

Although not illustrated in the drawings, the second elastic member may be installed at a side surface of the sub-main body and a side surface of the main body portion corresponding thereto. The side surface of the sub-main body 110 and the side surface of the main body portion 30 at which the second elastic member is installed may be installed to be inclined.

As illustrated in FIGS. 10 and 12, a tuning connection member 117 which tunes the sub-main body 110 to the main body portion 30 may be installed between the sub-main body 110 and the main body portion 30. A hydraulic cylinder may be used as the tuning connection member 117, but the present invention is not limited thereto. A connecting member, a shock absorber and an actuator which may be moved forward and backward may also be used.

FIGS. 12 to 14 illustrate still another embodiment of the vibrating ripper according to the present invention. The same reference numerals as those in the previous embodiments indicate the same elements as those in the previous embodiments.

Referring to the drawings, a vibrating ripper 10 according to the present invention includes a vibrating body 20, a main body portion 30 which supports the vibrating body 20, a vibrating body support unit 40 which supports the vibrating body 20 to vibrate with respect to the main body portion 30, and a ripper blade 100 which is installed at a lower portion of the vibrating body support unit 40.

The vibrating body support unit 40 is a member which supports the vibrating body 20 to be capable of vibrating with respect to the main body portion 30, and a

vibrating body bracket 131 is installed at an upper side of the vibrating body 20, and one rotating member 41 is rotatably installed at the vibrating body bracket 131. One end of each of first and second connecting members 50 and 60 is rotatably installed at an upper or lower side of a rotation center of the rotating member 41 to  
5 be deviated from the rotation center of the rotating member 41 and the other end of each of first and second connecting members 50 and 60 is rotatably installed at the main body portion 30. The rotating member 41 may be supported by the vibrating body bracket 131 through an eccentric bearing 45.

A sub-main body 110 which is supported on the main body portion 30 by a  
10 first elastic support unit 120 is installed at an upper side of the vibrating body 20, and a first elastic member 115 which provides a reaction force, performs an elastic support operation and also absorbs a shock may be installed between an upper side of the vibrating body bracket 131 and an upper surface side of the sub-main body 110. A separate elastic member (not shown) which performs the elastic support operation  
15 to provide the reaction force and also to absorb the shock, like the second elastic member 116, is installed between the upper surface side of the sub-main body 110 and a lower surface of the main body portion 30 corresponding thereto, or a side surface of the sub-main body 110 and a side surface of the main body portion 30 corresponding thereto.

20 A tuning connection member (not shown), both ends of which are rotatably connected to the vibrating body 20 and the main body portion and which is tuned to vibration, may be further provided at a portion which is spaced a predetermined interval from the rotating member 41, e.g., at a vertical lower side of the rotating member 41. The tuning connection member may be configured with the hydraulic  
25 cylinder or the link, as described above. Both ends of the tuning connection

member may be rotatably connected to the sub-main body and the main body portion and may also be rotatably connected to the ripper blade and the main body portion. The tuning connection member may be configured with the cylinder as described in the previous embodiments.

5           A stopper 140 which limits rotation of the rotating member 41 is installed at the vibrating body bracket 131 or the sub-main body 110. As illustrated in FIGS. 13 and 14, the stopper 140 is in contact with at least one first connecting member 50 or second connecting member 60 and limits a rotating position of the rotating member 41. However, the present invention is not limited thereto, and the stopper  
10   140 may be in contact with an extending link portion 41a of the rotating member 41 and may limit the rotating position of the rotating member 41.

          The stopper 140 may include a stopper shaft 141 which extends from the vibrating body bracket 131 or the sub-main body 110 toward the first connecting member 50 or an upper side of the extending link portion 41a of the rotating member  
15   41, an elastic member 142 which is installed along an outer circumferential surface of the stopper shaft 141, and an outer circumferential ring 143 which is installed on an outer circumferential surface of the elastic member 142. The outer circumferential ring 143 may be formed of a metal ring. Meanwhile, the elastic member 142 may be formed to be eccentric or may have an eccentric bearing.  
20   However, the present invention is not limited thereto, and the stopper may have any structure which can gradually reduce a rotating reaction force of the rotating member 41 and thus can limit the rotating position of the rotating member 41. For example, the stopper may be configured with an elastic member or may be configured with only an elastic member for absorbing the shock installed at the outer circumferential  
25   surface of the stopper shaft.

In the vibrating ripper 10 according to the present invention having the above-described configuration, the vibrating body 20 vibrates up and down due to driving of the vibration generating unit installed at the vibrating body 20.

In the vibrating ripper 10 that uses a length compensating member using  
5 rotation according to the present invention, the vibrating body 20 vibrates up and down due to driving of the vibration generating unit installed on the vibrating body 20 or the vibration generating unit installed on an attachment coupled to the vibrating body.

In this process, an action of the vibrating body support unit 40 which supports  
10 the vibrating body 20 is as follows.

When the vibrating body 20 is moved upward by an action of the vibration generating unit, a change amount in a length due to rotation of each of ends of the first and second connecting members 50 and 60 as the vibrating body 20 is moved up while the rotating member 41 installed at the vibrating body 20 or the ripper blade  
15 100 rotates is compensated for. That is, when the vibrating body 20 which is supported with respect to the main body portion 30 by the first and second connecting member 50 and 60 vibrates vertically upward, each of the ends of the first and second connecting members 50 and 60 follows an arc trace due to the rotation of the first and second connecting members 50 and 60. At this time, a movement  
20 amount of each of the ends of the first and second connecting members 50 and 60 toward the main body portion 30 while the rotating member 41 rotates is compensated for. Therefore, the vibrating body 20 may vibrate in the vibrating space portion 31 of the main body portion 30. In particular, since the rotating member 41 is supported by the eccentric bearing 45, a change in a position of each of  
25 the ends when the first and second connecting members 50 and 60 are rotated along

the arc is compensated for. That is, while the rotating member 41 rotates, each of the ends of the first and second connecting members 50 and 60 which connect the main body portion 30 and the rotating member 41, i.e., the rotating member 41, absorbs a change in a length of a connection portion. When the vibrating body 20 is moved downward from an uppermost portion (a top dead point) or is moved from a lowermost portion (a bottom dead point) to the uppermost portion, problems may occur due to inertia of the vibrating body 20. The eccentric bearing 45 moves the position of the rotating member 41 and thus compensates for or absorbs the problems.

In the case in which the vibrating body 20 is moved down, when the vibrating body 20 vibrates vertically downward, the first and second connecting members 50 and 60 are rotated in the reverse direction, and each of the ends of the first and second connecting members 50 and 60 follows the arc trace. At this time, while the rotating member 41 rotates, ends of the first and second connecting members 50 and 60 move away from the main body portion 30, and the change amount thereof is absorbed by the rotating member. Therefore, the vibrating body 20 vibrates up and down.

Meanwhile, an operation of the vibrating ripper as illustrated in FIGS. 10 and 15 is also substantially the same as that in the previous embodiment. Since the rotating member 41 is installed at the upper portion of the vibrating body 30, and the tuning connection member 300 is installed at the ripper blade 100 or the sub-main body 110, the rotation of the main body portion due to an external force applied to the vibrating body 20 and the ripper blade 100 can be prevented, and since the stopper 140 which is in contact with the first connecting member 50 or the second connecting member is installed at the sub-main body 110, the rotating portion of the rotating member 41 can be limited.

In this process, since the connecting member 111 installed at the upper side of the vibrating body 20 is supported by the sub-main body 110 through the bearing, distortion of the vibration due to excessive rotation of the rotating member 41 which is supported by the first and second connecting members 50 and 60 can be prevented  
5 when the vibrating body 20 is moved up and down. Also, since the sub-main body 110 is supported on the main body portion 30 by the first elastic support unit 120, the vibration of the vibrating body 20 can be prevented from being transmitted to the main body portion 30.

In particular, since the first and second elastic members 115 and 116 are  
10 installed between the sub-main body 110 and the connecting member 111 and between the sub-main body 110 and the main body portion 30, transmission of the vibration generated from the vibrating body 20 from being transmitted to the main body portion 20 can be reduced, and the vibration can also be prevented from being transmitted to an excavator boom which supports the main body portion 30.

15 Since the tuning connection member 300 is installed between the sub-main body 110 and the main body portion 30, the ripper blade can be prevented from being rotated when the external force is applied to the vibrating body 20 and the ripper blade 100.

As described above, the vibration acting on the vibrating body 20 is  
20 transmitted to the ripper blade 100 and crushes rocks, and the vibration applied to the vibrating body 20 and the ripper blade 100 is concentrated on an end side of the ripper blade 100, and thus a crushing force of the rocks and an excavating force can be increased. In particular, when the vibrating body vibrates downward, an inertial force due to a weight of the vibrating body 20 and a weight of the ripper blade 100

acts on the end of the ripper blade 100, and thus the crushing force can be further enhanced.

Although a few embodiments of the present invention have been shown and described, they are merely illustrative, and it will be apparent that those skilled in the art can make various modifications and changes thereto within the scope of the invention defined by the claims. Therefore, the true scope of the present invention should be defined by the technical spirit of the appended claims.

#### **【Industrial Applicability】**

The vibrating ripper that uses the length compensating member using rotation according to the present invention may be used variously by being applied to attachments of an excavator and heavy equipment.

## **【CLAIMS】**

### **【Claim 1】**

A vibrating ripper comprising:

a main body portion;

5 a vibrating body coupled to the main body portion and a vibrating body support unit and configured to vibrate; and

a vibration generating unit installed at the vibrating body,

wherein the vibrating body support unit includes a rotating member which is rotatably installed at the vibrating body or the main body portion configured to  
10 support the vibrating body, first and second connecting members, both ends of which are rotatably connected to the main body portion or the vibrating body and upper and lower sides based on a rotation center of the rotating member to support the vibrating  
body with respect to the main body portion, and a ripper blade which is installed at the vibrating body, and when the vibrating body vibrates with respect to the main  
15 body portion, the rotating member rotates, and thus a change in a coupling position between the vibrating body and the first and second connecting member is compensated for.

### **【Claim 2】**

The vibrating ripper of claim 1, wherein the rotating member is rotatably  
20 installed at the vibrating body in a direction perpendicular to a vibration direction, the first and second connecting members are respectively installed at both sides of the rotating member, and the vibrating body vibrates up and down.

### **【Claim 3】**

A vibrating ripper,

wherein a rotating member is rotatably installed at a vibrating body, at which a ripper blade is installed, in a direction perpendicular to a vibration direction, first and second connecting members rotatably connect upper and lower sides of a rotation center of the rotating member with a main body portion and support the vibrating body to vibrate up and down with respect to the main body portion, and a vibration generating unit is installed at the vibrating body.

**【Claim 4】**

The vibrating ripper of any one of claims 1 to 3, comprising a rotating member restoring unit which is installed at the vibrating body or the main body portion and the rotating member and restores rotation of the rotating member to an original position thereof.

**【Claim 5】**

The vibrating ripper of claim 1 or 3, further comprising a tuning connection member, both ends of which are rotatably connected to the vibrating body and the main body portion to be spaced a predetermined interval from the rotating member and to be tuned to vibration.

**【Claim 6】**

The vibrating ripper of claim 1 or 3, comprising the rotating member in which at least one elastic body is installed between the vibrating body and the main body portion.

**【Claim 7】**

A vibrating ripper comprising:  
a main body portion;

a vibrating body coupled to the main body portion and a vibrating body support unit and configured to vibrate;

a vibration generating unit installed at the vibrating body; and

a ripper blade installed at the vibrating body,

5            wherein the vibrating body support unit includes a rotating member which is rotatably installed at the vibrating body or the ripper blade, first and second connecting members, both ends of which are rotatably connected to the main body portion and upper and lower sides based on a rotation center of the rotating member to support the vibrating body with respect to the main body portion, a sub-main body  
10          which is supported on the main body portion located at an upper side of the vibrating body by a first elastic support unit, a connecting member which extends from the vibrating body to the inside of the sub-main body, and a rotating shaft which is supported by the sub-main body and rotatably installed at the connecting member.

**【Claim 8】**

15            The vibrating ripper of claim 7, wherein an eccentric bearing is installed at a coupling portion between the connecting member and the rotating shaft installed at the sub-main body.

**【Claim 9】**

20            The vibrating ripper of claim 7, wherein a first elastic member is installed between an upper side of the vibrating body of the connecting member and the sub-main body corresponding thereto, and a second elastic member is installed between an upper surface of the sub-main body and the main body portion or between a side surface of the sub-main body and the main body portion corresponding thereto.

**【Claim 10】**

A vibrating ripper comprising:  
a main body portion;  
a vibrating body coupled to the main body portion and a vibrating body support unit and configured to vibrate;

- 5        a vibration generating unit installed at the vibrating body; and  
a ripper blade installed at the vibrating body,

wherein the vibrating body support unit includes a sub-main body which is installed at an upper side of the vibrating body by a first elastic support unit, a shaft support portion which extends from the vibrating body toward the sub-main body, a  
10       rotating member which is rotatably installed at a vibrating body support unit, first and second connecting members, both ends of which are rotatably connected to the main body portion and upper and lower sides based on a rotation center of the rotating member, and a stopper which is installed at the vibrating body bracket or the sub-main body to limit a rotating position of the rotating member.

15       **【Claim 11】**

The vibrating ripper of claim 10, wherein a first elastic member is installed between an upper side of the vibrating body bracket and the sub-main body, and a second elastic member is installed between an upper surface of the sub-main body and the main body portion or between a side surface of the sub-main body and an  
20       upper surface of the main body portion corresponding thereto.

**【Claim 12】**

The vibrating ripper of claim 10, wherein the stopper comprises a stopper shaft which extends from the vibrating body bracket or the sub-main body toward the first connecting member or an upper side of an extending link portion of the rotating

member, and an elastic member layer which is installed along an outer circumferential surface of the stopper shaft.

**【Claim 13】**

5 The vibrating ripper of claim 10, wherein the stopper serves to limit rotation of the first connecting member or the rotating member from the vibrating body or the sub-main body and has an elastic member which absorbs a shock when in contact with the first connecting member.