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HYDRAULIC BREAKER PROVIDED WITH AUTOMATIC LUBRICANT SUPPLY STRUCTURE

Abstract

A hydraulic breaker provided with an automatic lubricant supply structure is proposed. The automatic lubricant supply structure is configured to automatically supply a lubricant without a separate hose, using a working fluid, and is disposed in the body of the hydraulic breaker, and can be used without a separate external part.

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Background/Summary

CROSS-REFERENCE TO RELATED APPLICATIONS [0001] This application is a continuation of U.S. patent application Ser. No. 16/975,075 filed on Aug. 21, 2020, which is a U.S. National Stage Application of PCT/KR2018/006103 filed on May 29, 2018, which claims priority Korean Patent Application 10-2018-0057031 filed on May 18, 2018, the disclosures of which are incorporated herein by reference.

TECHNICAL FIELD
[0002] The present invention relates to a hydraulic breaker and, more particularly, to a hydraulic breaker provided with an automatic lubricant supply structure.
BACKGROUND ART
[0003] In general, a hydraulic breaker is an apparatus that is mounted on construction equipment such as an excavator and breaks an object such as a rock and concrete using a hitting force that is generated by moving up/down a piston that is an ascending/descending member using power such as hydraulic pressure.
[0004] According to hydraulic breakers of the related art, a worker has to periodically directly inject a lubricant to prevent a chisel that is hit by a piston moving up/down from being worn due to friction, so there is a problem that the work efficiency decreases. Further, since a worker must periodically directly inject a lubricant, as described above, when the timing to inject a lubricant is missed, a supporting portion is severely worn, which causes reduction of lifespan of the piston and the chisel and severe damage to the hydraulic breakers.
[0005] In order to solve these problems, hydraulic breakers that automatically supply a lubricant have been developed, and such hydraulic breakers have been disclosed in Korean Patent No. 10-0908218 (hereafter, referred to as a ‘patent document 1’) and Korean Patent No. 10-0468942 (hereafter, referred to as ‘patent document 2’).
[0006] First, the patent document 1 proposes a hydraulic breaker that automatically supplies a lubricant, in which an automatic lubricant supply apparatus is integrated with the hydraulic breaker.
[0007] According to the hydraulic breaker of the patent document 1, a ball blocks a supply channel when the hydraulic breaker is not operated, so a lubricant is not discharged even though a pressure plate presses the lubricant in a lubricant chamber. Further, when the hydraulic breaker is operated, a chisel applies a reacting force to a piston and the reacting force applied to the piston is transmitted to the lubricant chamber and presses the pressing plate together with an elastic force of an elastic member in the lubricant chamber, so the ball blocking the supply channel is pushed up and the lubricant is supplied into a front head through the supply channel.
[0008] As described above, according to the hydraulic breaker of the patent document 1, since the supply channel is opened and the lubricant is supplied every time the piston hits the chisel, the lubricant is automatically supplied.
[0009] However, according to the patent document 1, when the chisel is hit, elasticity is generated in the elastic member due to vibration, etc., and accordingly the lubricant is supplied. Therefore, if vibration is generated even though the hydraulic breaker is not operated (e.g., when the hydraulic breaker is carried by a truck, etc.), malfunction such as supply of the lubricant may occur in the lubricant supply mechanism.
[0010] The patent document 2 proposes an automatic lubricator that is separately attached to the body of a breaker.

[0011] The automatic lubricator of the patent document 2 is separately attached to a side of a body and a grease cartridge filled with grease is detachably coupled to the automatic lubricator.
[0012] Further, the automatic lubricator has a hydraulic pressure entrance that is connected to a hydraulic line of an excavator, so when high hydraulic pressure is supplied into the automatic lubricator through the hydraulic pressure entrance, a valve opens and the grease in the grease cartridge is supplied to a breaker through a grease outlet.
[0013] According to the patent document 2, unlike the patent document 1, since grease is automatically supplied by high hydraulic pressure, it is possible to solve the problem of malfunction in the patent document 1.
[0014] However, according to the patent document 2, since the automatic lubricator is attached to a breaker as a separate part, the automatic lubricator is exposed to the outside. Accordingly, there are problems that 1) the automatic lubricator may be broken by fragments of a rock when the rock is broken and 2) the size of a breaker increases, so it may not be easily mounted on an excavator.
[0015] Further, since the hydraulic pressure entrance and the hydraulic line of an excavator are connected through a hose, the hose structure becomes very complicated when the hydraulic lubricator is mounted on a breaker. This is because since a breaker has an intake line through which a working fluid flows into the breaker and a discharge line through which a working fluid is discharged from the breaker to an excavator, when a separate hose is added, at least three hoses are required.

RELATED ART DOCUMENT

Patent Document

[0016] (Patent Document 1) Korean Patent No. 10-0908218
[0017] (Patent Document 2) Korean Patent No. 10-0468942

DISCLOSURE

Technical Problem

[0018] The present invention has been made in an effort to solve the problems described above and an objective of the present invention is to provide a hydraulic breaker provided with an automatic lubricant supply structure that automatically supplies a lubricant without a separate hose using a working fluid and can be used without a separate external part because it is installed in the body of the hydraulic breaker.

Technical Solution

[0019] In a hydraulic breaker provided with an automatic lubricant supply structure according to an aspect of the present invention, the automatic lubricant supply structure is disposed in a body to supply a lubricant using a working fluid, and a lubricant cartridge is detachably directly coupled to the automatic lubricant supply structure.
[0020] The automatic lubricant supply structure may include a cartridge coupler to which the lubricant cartridge is coupled and that communicates with a lubricant supply line, and the lubricant supply line may include: a working fluid line that communicates with a working fluid inlet of the body; a lubricant line configured to supply a lubricant to a chisel; and a supply valve that communicates with the working fluid line, the lubricant line, and the cartridge coupler, and supplies a lubricant in the lubricant cartridge to the chisel through the lubricant line, depending on whether a working fluid flows inside through the working fluid line.
[0021] The body may include a cylinder, a front head disposed under the cylinder, and a back head disposed over the cylinder, the cartridge coupler to which the lubricant cartridge is coupled may be disposed at the back head, and the cartridge coupler may be positioned in the same plane as the working fluid inlet of the cylinder.
[0022] The hydraulic breaker may further include a bracket coupled to the body, in which the bracket may include: a housing in which the cartridge coupler, the working fluid inlet, and the working fluid outlet of the body are accommodated; and a cover coupled to the housing and covering the cartridge coupler, the working fluid inlet, and the working fluid outlet.

[0023] The cover may have a cartridge insertion groove that communicates with a body seat hole of the cartridge coupler, an inlet connector that communicates with the working fluid inlet, and an outlet connector that communicates with the working fluid outlet.
[0024] The cartridge coupler, the working fluid inlet, and the working fluid outlet may be positioned on a rear surface of the body, and the housing may be positioned on a rear surface of the bracket to be positioned on the rear surface of the body when the bracket is coupled to the body.
[0025] The height of the housing may be larger than or the same as the protrusive heights of the cartridge coupler, the working fluid inlet, and the working fluid outlet.

Advantageous Effects

[0026] The hydraulic breaker provided with an automatic lubricant supply structure according to an aspect of the present invention described above has the following effects.
[0027] Since the automatic lubricant supply structure is operated by a working fluid, a lubricant is supplied only when the hydraulic breaker is operated. Accordingly, the problem of malfunction that a lubricant is supplied when a hydraulic breaker is not operated is solved, so an unnecessary waste of lubricant can be reduced.
[0028] Since the automatic lubricant supply structure is disposed in the body of the hydraulic breaker, it is possible to prevent the automatic lubricant supply structure from being damaged by fragments of rocks, etc. when breaking the rocks.
[0029] The structure of the body in which the automatic lubricant supply structure is disposed is simple and the space of the body is used, so it is possible to manufacture a compact hydraulic breaker.
[0030] Since there is no need for a separate hose in the lubricant supply line of the automatic lubricant supply structure, there is no need for a separate hose other than the supply hose and the discharge hose when connecting the hydraulic breaker to the hydraulic pump of an excavator. Accordingly, the hose structure is simplified, so free use of the hydraulic breaker mounted on an excavator is secured and high compatibility is secured in hydraulic connection between the excavator and the hydraulic breaker. Further, it is possible to prevent a specific hose from being damaged by rocks during breaking.
[0031] Since a lubricant is supplied by the lubricant cartridge that can be separated from the body, it is possible to simply supply a lubricant by replacing the lubricant cartridge.

Description

DESCRIPTION OF DRAWINGS

[0032] FIG. **1** is a view showing a hydraulic breaker provided with an automatic lubricant supply structure according to an exemplary embodiment of the present invention.
[0033] FIG. **2** is a cross-sectional view taken along line A-A′ of FIG. **1**.
[0034] FIG. **3** is a rear view of the hydraulic breaker of FIG. **1**.
[0035] FIG. **4** is a cross-sectional view taken along line B-B′ of FIG. **1**.
[0036] FIG. **5** is a cross-sectional view showing a pump spool that has been moved in the state of FIG. **4**.
[0037] FIG. **6** is a cross-sectional view showing a check valve that has been opened in the state of FIG. **5**.
[0038] FIG. **7** is a schematic view of the automatic lubricant supply structure in the hydraulic breaker provided with an automatic lubricant supply structure according to an exemplary embodiment of the present invention.
[0039] FIG. **8** is a view showing the hydraulic breaker provided with an automatic lubricant supply structure according to an exemplary embodiment of the present invention and a bracket that is coupled to the hydraulic breaker.

[0040] FIGS. **9** and **10** are views the assembly of the bracket of FIG. **8** and the hydraulic breaker of FIG. **8**.
[0041] FIG. **11** is a view showing a first modified example of the hydraulic breaker provided with an automatic lubricant supply structure according to an exemplary embodiment of the present invention.
[0042] FIG. **12** is a view showing a second modified example of the hydraulic breaker provided with an automatic lubricant supply structure according to an exemplary embodiment of the present invention.

MODE FOR INVENTION

[0043] The following description provides only the principle of the present invention. Accordingly, those skilled in the art may implement of the principle of the present invention and various apparatuses included in the concept and range of the present invention even though they are not explicitly described or shown herein. All conditional terminologies and embodiments described herein should be understood as being definitely intended only on the purpose of understanding the concept of the present invention without limiting the specifically stated embodiments and states.
[0044] The objectives, features, and advantages of the present invention described above will be clearer through the following detailed description relating to the accompanying drawing, so the spirit of the present invention could be easily implemented by those skilled in the art.
[0045] Hereafter, a hydraulic breaker **10** provided with an automatic lubricant supply structure **200** according to an exemplary embodiment of the present invention is described.
[0046] FIG. **1** is a view showing a hydraulic breaker provided with an automatic lubricant supply structure according to an exemplary embodiment of the present invention, FIG. **2** is a cross-sectional view taken along line A-A′ of FIG. **1**, FIG. **3** is a rear view of the hydraulic breaker of FIG. **1**, FIG. **4** is a cross-sectional view taken along line B-B′ of FIG. **1**. FIG. **5** is a cross-sectional view showing a pump spool that has been moved in the state of FIG. **4**, FIG. **6** is a cross-sectional view showing a check valve that has been opened in the state of FIG. **5**, FIG. **7** is a schematic view of the automatic lubricant supply structure in the hydraulic breaker provided with an automatic lubricant supply structure according to an exemplary embodiment of the present invention, FIG. **8** is a view showing the hydraulic breaker provided with an automatic lubricant supply structure according to an exemplary embodiment of the present invention and a bracket that is coupled to the hydraulic breaker, and FIGS. **9** and **10** are views the assembly of the bracket of FIG. **8** and the hydraulic breaker of FIG. **8**.
[0047] As shown in FIGS. **1** to **3**, and **7**, a hydraulic breaker **10** according to an exemplary embodiment of the present invention may include a body **100**, a piston **124** reciprocating in the body **100**, a working fluid channel **126** formed in the body **100** for a working fluid reciprocating the piston **124** to flow therethrough, a control valve **125** controlling flow of the working fluid, a chisel **112** configured to be hit by the piston **124**, and an automatic lubricant supply structure **200** disposed in the body **100**.
[0048] In the hydraulic breaker **10**, the automatic lubricant supply structure **200** that supplies a lubricant using a working fluid is disposed in the body **100**, and a lubricant cartridge **210** is detachably coupled to the automatic lubricant supply structure **200**.
[0049] In other words, the lubricant cartridge **210** is detachably directly coupled to the automatic lubricant supply structure **200**, without using a hose in a lubricant supply line.
[0050] The body **100** may be assembled by combining a cylinder **120**, a front head **110** disposed under the cylinder **120**, and a back head **130** disposed over the cylinder **120**.
[0051] In other words, the front head **110**, the cylinder **120**, and the back head **130** are positioned upward from the bottom, and the front head **110**, the cylinder **120**, and the back head **130** may be fastened to one another by long bolts B.
[0052] The chisel **112** for breaking rocks is disposed in a first hollow **111** formed in the front head **110**.

[0053] A working fluid inlet **121** and a working fluid outlet **122** are formed through the rear surface of the cylinder **120**, and the piston **124** moving up and down in the cylinder **120** is disposed in a second hollow **123** formed in the cylinder **120**.
[0054] The control valve **125** that controls the flow of a working fluid, which flows in the body **100** through the working fluid inlet **121**, to a lower chamber **124***a* or an upper chamber **124***b* is disposed in the cylinder **120**.
[0055] In detail, when the control valve **125** is closed and a working fluid is supplied through the working fluid inlet **121**, the working fluid flows to the lower chamber **124***a* through the working fluid channel **126**. On the contrary, when the control valve **125** is opened and a working fluid is supplied through the working fluid inlet **121**, the working fluid flows to the upper chamber **124***b*.
[0056] When a working fluid flows to the lower chamber **124***a*, the piston **124** is moved up. When the piston **124** is moved up to the top dead center, the control valve **125** allows the working fluid to flow to the upper chamber **124***b*, whereby the piston **124** is moved down.
[0057] In other words, the piston **124** is controlled to repeatedly move up and down by the control valve **125**. When the piston **124** moves down, the bottom of the piston **124** hits the top of the chisel **112**, and the chisel **112** moves down and breaks the ground by the hitting force.
[0058] A gas chamber **131** connected with a hole in the cylinder **120** is formed in the back head **130** and is filled with nitrogen gas. The nitrogen gas in the gas chamber **131** serves to attenuate shock when the piston **124** reacts upward after hitting the chisel **112**.
[0059] As described above, the operation of the hydraulic breaker **10** is achieved by a working fluid.
[0060] A hydraulic pump and a hydraulic tank of equipment such as an excavator are connected to the working fluid inlet **121** and the working fluid outlet **122** of the hydraulic breaker **10** to send a working fluid into the body **100** of the hydraulic breaker **10** and discharge a working fluid from the body **100**.
[0061] In this case, the hydraulic pump and the working fluid inlet **121** are connected by a supply hose and a high-pressure working fluid provided from the hydraulic pump through the supply hose flows into the working fluid inlet **121**. The hydraulic tank and the working fluid outlet **122** are connected by a discharge hose and a low-pressure working fluid discharged from the working fluid outlet **122** through the discharge hose flows to the hydraulic tank.
[0062] The automatic lubricant supply structure **200**, as shown in FIGS. **1**, **3**, and **7**, includes a cartridge coupler **220** to which the lubricant cartridge **210** is coupled, and a lubricant supply line communicating with the cartridge coupler **220**.
[0063] The lubricant cartridge **210** has a body **211** in which a lubricant is kept, and an injection port **213** formed on the bottom of the body **211**.
[0064] Threads (not shown) may be formed on the injection port **213** and may be thread-fastened to threads (not shown) formed in a body seat hole **221** of the cartridge coupler **220**.
[0065] A body seat hole **221** in which the body **211** of the lubricant cartridge **210** is seated and an injection port seat hole **223** in which the injection port **213** of the lubricant cartridge **210** is seated may be formed in the cartridge coupler **220**. In this case, the body seat hole **221** and the injection port seat hole **223** may communicate with each other.
[0066] The cartridge coupler **220** may be formed on the rear surface of the back head **130**, so the cartridge coupler **220** is positioned in the same plane as the working fluid inlet **121** and the working fluid outlet **122** of the cylinder **120**.
[0067] The body seat hole **221** and the injection port seat hole **223** of the cartridge coupler **220** may be formed to have a depth in the direction of a plane that is perpendicular to the rear surface of the back head **130** (that is, may be formed to have a depth in the front-rear direction of the hydraulic breaker **10**). Accordingly, when the body **211** of the lubricant cartridge **210** is seated in the body seat hole **221** of the cartridge coupler **220** and the injection port **213** of the lubricant cartridge **210** is thread-fastened in the injection port seat hole **223** of the cartridge coupler **220**, the body **211** of

the lubricant cartridge **210** protrudes rearward from the hydraulic breaker **10**, like the working fluid inlet **121**.

[0068] In other words, when the lubricant cartridge **210** is coupled to the cartridge coupler **220**, the lubricant cartridge **210** protrudes rearward from the hydraulic breaker **10** in the same way as the working fluid inlet **121** and the working fluid outlet **122**.

[0069] As shown in FIGS. **3** and **7**, the lubricant supply line serves to selectively supply a lubricant to the chisel **112**, depending on whether a working fluid flows inside, and may include a working fluid line **230** that communicates with the working fluid inlet **121** of the body **100**, a lubricant line **240** for supplying a lubricant to the chisel **112**, and a supply valve **250** that communicates with the working fluid line **230**, the lubricant line **240**, and the cartridge coupler **220** and supplies a lubricant in the lubricant cartridge **210** to the chisel **112** through the lubricant line **240**, depending on whether a working fluid flows inside through the working fluid line **230**.

[0070] The working fluid line **230** is formed through the cylinder **120** and the back head **130** and has one end that communicates with the working fluid inlet **121** and another end that communicates with the supply valve **250**.

[0071] The working fluid line **230** serves to operate the supply valve **250** by supplying the working fluid, which flows into the body **100** through the working fluid inlet **121**, to the supply valve **250**.

[0072] The lubricant line **240** is formed through the back head **130**, the cylinder **120**, and the front head **110**, and has one end that communicates with the supply valve **250** and another end that communicates with a lubricant injection port **260**.

[0073] The lubricant line **240** function as a passage through which the lubricant supplied from the supply valve flows to the lubricant injection port **260**.

[0074] The lubricant injection port **260** connects the first hollow **111** formed in the front head **110** to the lubricant line **240**, and accordingly, the lubricant flowing through the lubricant line **240** can be supplied to the chisel **112** through the first hollow **111**.

[0075] As shown in FIGS. **3**, **4**, and **7**, the supply valve **250** is disposed in the back head **130** and communicates with the working fluid line **230**, the lubricant line **240**, and the cartridge coupler **220**. The supply valve **250** serves to supply the lubricant in the lubricant cartridge **210** to the chisel **112** through the lubricant line **240**, depending on whether a working fluid flows inside through the working fluid line **230**.

[0076] The supply valve **250** may include a first chamber **271** that has a first hole **281** that communicates with the working fluid line **230**, a pumping spool **272** that is operated by a working fluid in the first chamber **271**, a lubricant inlet **273** that connects the injection port seat hole **223** and the supply valve **250**, a check valve **274** that has a second hole **285** that communicates with the lubricant line **240**, and a second chamber **275** that communicates with the lubricant inlet **273** and the check valve **274**.

[0077] The first hole **281** that communicates with the working fluid line **230** is formed in the first chamber **271**.

[0078] The first chamber **271** serves to provide a space that is filled with a working fluid when the working fluid in the working fluid line **230** flows into the first chamber **271** through the first hole **281**.

[0079] The pumping spool **272** has a pressing surface **282** on a side (the left side in FIG. **4**) and a protruding end on another side (the right side in FIG. **4**).

[0080] If a working fluid flows into the first chamber **271** and rises in the first chamber **271**, the pressing surface **282** of the pumping spool **272** is pressed by the working fluid and an end **283** of the pumping spool **272** is moved to another side (the right side in FIG. **4**). The end **283** of the pumping spool **272** is positioned in the second chamber **275** in this way.

[0081] The pumping spool **272** has a pumping spool spring **284** and the pumping spool spring **284** serves to move the end **283** of the pumping spool **272** to a side (the left side in FIG. **4**), that is, serves to return the pumping spool **272** to the initial position using an elastic restoring force.

[0082] Hereafter, the operation process of the automatic lubricant supply structure **200** of the hydraulic breaker **10** according to an exemplary embodiment of the present invention is described with reference to FIGS. **3** to **7**.
[0083] When the hydraulic breaker **10** is started by starting a hydraulic pump of an excavator, high-pressure working fluid pumped up from the hydraulic pump flows into the body **100** of the hydraulic breaker **10** through the supply hose and the working fluid inlet **121**.
[0084] As described above, some of the high-pressure working fluid flowing in the body **100** flows to the working fluid channel **126** or the control valve **125** and takes part in up/down movement of the piston **124**, and the other of the high-pressure working fluid flows into the first chamber **271** through the working fluid line **230** and the first hole **281**.
[0085] When high-pressure working fluid flows in the first chamber **271**, the high-pressure working fluid presses the pressing surface **282** of the pumping spool **272**, whereby, as shown in FIG. **5**, the end **283** of the pumping spool **272** is moved to another side, that is, the right side. This is because the pressing force of the high-pressure working fluid is larger than the elastic restoring force of the pumping spool spring **284** of the pumping spool **272**.
[0086] In this case, the second chamber **273** has been filled with a lubricant that has been kept in the body **211** of the lubricant cartridge **210** through the injection port **213** of the lubricant cartridge **210** and the lubricant inlet **273**.
[0087] Accordingly, as shown in FIG. **5**, as the end **283** of the pumping spool **272** is moved to the left side, the end **283** pushes the lubricant out of the second chamber **275** and a ball **287** of the check valve **274** is moved to another side, that is, the right side by the pressing force of the lubricant, as shown in FIG. **6**, whereby the check valve **274** is opened.
[0088] As the check valve **274** is opened, the lubricant in the second chamber **275** flows to the lubricant line **240** through the second hole **285** and is injected into the first hollow **111** of the front head **110** through the lubricant injection port **260**, whereby the lubricant is supplied between the chisel **112** and the inner surface of the front head **110**, that is, the inner surface of the first hollow **111**.
[0089] If when the operation of the hydraulic breaker **10** is stopped by stopping the operation of the hydraulic pump of the excavator, inflow of a high-pressure working fluid to the first chamber **271** is stopped, so the end **283** of the pumping spool **272** is moved left and returned to the initial position by the elastic restoring force of the pumping spool spring **284**.
[0090] As the end **283** of the pumping spool **272** is returned to the initial position (the position in FIG. **4**), the pressing force of the lubricant in the second chamber **275** is removed, so the ball **287** of the check valve **274** is also moved left and returned to the initial position (the position in FIGS. **4** and **5**) by the elastic restoring force of the check valve spring **286**, whereby the check valve **274** is closed. Therefore, supply of a lubricant through the lubricant line **240** is stopped.
[0091] The hydraulic breaker **10** provided with an automatic lubricant supply structure **200** having the configuration described above in accordance with an exemplary embodiment of the present invention has the following effects.
[0092] Since the automatic lubricant supply structure **200** is operated by a working fluid, a lubricant is supplied only when the hydraulic breaker **10** is operated. Accordingly, it is possible to solve the problem of malfunction in the hydraulic breakers of the related art that a lubricant is supplied when a hydraulic breaker is not operated, thereby being able to reduce an unnecessary waste of lubricant.
[0093] Since the automatic lubricant supply structure **200** is disposed in the body **100** of the hydraulic breaker **10**, it is possible to prevent the automatic lubricant supply structure **200** from being damaged by fragments of rocks, etc. when breaking the rocks, unlike the hydraulic breakers of the related art. The built-in structure of the body of the automatic lubricant supply structure **200** is simple and the space of the body **100** is used, so it is possible to manufacture a compact hydraulic breaker **10**.

[0094] Since the automatic lubricant supply structure **200** is disposed in the body **100** of the hydraulic breaker **10**, there is no need for a separate hose in the lubricant supply line, so there is no need for a separate hose other than the supply hose and the discharge hose when connecting the hydraulic breaker **10** to the hydraulic pump of an excavator. Accordingly, the hose structure is simplified, so free use of the hydraulic breaker **10** mounted on an excavator is secured and high compatibility is secured in hydraulic connection between the excavator and the hydraulic breaker **10**.

[0095] Further, it is possible to prevent a separate hose from being damaged by rocks generated in breaking.

[0096] Since a lubricant is supplied by the lubricant cartridge **210** that can be separated from the body **100**, it is possible to simply supply a lubricant by replacing the lubricant cartridge **210**.

[0097] The hydraulic breaker **10** according to an exemplar embodiment of the present invention described above may further include a bracket **300** that is coupled to the body **100**, as shown in FIGS. **8** to **10**.

[0098] The bracket **300** includes: a housing **310** formed on the rear surface of the bracket **300** and accommodating the cartridge coupler **220**, the working fluid inlet **121**, and the working fluid outlet **122** of the body **100**; and a cover **330** coupled to the housing **310** and covering the cartridge coupler **220**, the working fluid inlet **121**, and the working fluid outlet **122**.

[0099] The housing **310** is positioned on the rear surface of the bracket **300** and a housing groove **311** is formed at the center of the housing **310**.

[0100] The height of the housing **310** is larger than or the same as the protrusive heights of the cartridge coupler **220**, the working fluid inlet **121**, and the working fluid outlet **122**.

[0101] Accordingly, as shown in FIG. **9**, when the bracket **300** is coupled to the body **100**, the housing **310** is positioned on the rear surface of the body **100**.

[0102] Further, since the housing groove **311** is formed, the cartridge coupler **220**, the working fluid inlet **121**, and the working fluid outlet **122** can be easily accommodated in the housing **310**.

[0103] The cover **330** is coupled to the housing **310** and serves to cover the cartridge coupler **220**, the working fluid inlet **121**, and the working fluid outlet **122**.

[0104] The cover **330** has a cartridge insertion groove **331** that communicates with the body seat hole **221** of the cartridge coupler **220**, an inlet connector **333** that communicates with the working fluid inlet **121**, and an outlet connector **335** that communicates with the working fluid outlet **122**.

[0105] When the cover **330** is coupled to the housing **310**, the inlet connector **333** communicates with the working fluid inlet **121** and the outlet connector **335** communicates with the working fluid outlet **122**. In this case, the supply hose described above is connected to the working fluid inlet **121** and the discharge hose is connected to the working fluid outlet **122**.

[0106] Further, when the cover **330** is coupled to the housing **310**, the lubricant cartridge **210** may be inserted by the cartridge insertion groove **331**. Accordingly, even though the cover **330** is coupled, the lubricant cartridge **210** can be easily coupled to the cartridge coupler **220**.

[0107] As described above, since the cartridge coupler **220** is formed on the rear surface of the body **100**, that is, the rear surface of the back head **130**, the housing **310** may be formed to have a position corresponding to the cylinder **120** and the back head **130** of the body **100**.

[0108] Further, as described above, since the cartridge coupler **220** is positioned in the same plane as the working fluid inlet **121** and the working fluid outlet **122** of the cylinder **120**, that is, is positioned on the rear surface of the body **100**, the cartridge coupler **220** can be easily accommodated in the housing **310** of the bracket **300**. Accordingly, when the bracket **300** is coupled to the body **100**, the cartridge coupler **220**, the working fluid inlet **121**, and the working fluid outlet **122** are prevented from being exposed outside the hydraulic breaker **10**. Therefore, it is possible to prevent damage to the cartridge coupler **220**, the working fluid inlet **121**, and the working fluid outlet **122**.

[0109] Hereafter, various modified examples of the hydraulic breaker **10** provided with the

automatic lubricant supply structure **200** according to an exemplary embodiment of the present invention are described.

[0110] FIG. **11** is a view showing a first modified example of the hydraulic breaker provided with an automatic lubricant supply structure according to an exemplary embodiment of the present invention and FIG. **12** is a view showing a second modified example of the hydraulic breaker provided with an automatic lubricant supply structure according to an exemplary embodiment of the present invention.

[0111] Although the cartridge coupler **220** of the automatic lubricant supply structure **200** is disposed at the back head **130** in the description of the hydraulic breaker **10** provided with the automatic lubricant supply structure **200** according to an exemplary embodiment of the present invention, a cartridge coupler **220**′ may be disposed at the cylinder **120**, as shown in FIG. **11**, or a cartridge coupler **220**″ may be disposed at the front head **110**, as shown in FIG. **12**.

[0112] A hydraulic breaker **10**′ according to a first modified example shown in FIG. **11** has a cartridge coupler **220**′ at the cylinder **120**. In this case, a working fluid line of the automatic lubricant supply structure may be formed in the cylinder **120** and a lubricant line may be formed through the cylinder **120** and the front head **110**. Further, a supply valve may be disposed in the cylinder **120**.

[0113] A hydraulic breaker **10**″ according to a second modified example shown in FIG. **12** has a cartridge coupler **220**″ at the front head **110**. In this case, a working fluid line of the automatic lubricant supply structure may be formed through the cylinder **120** and the front head **110**, and a lubricant line may be formed in the front head **110**. Further, a supply valve may be disposed in the front head **110**.

[0114] Although the cartridge couplers **220**, **220**′, and **220**″ are positioned only on the rear surface of the body **100** in the description of the embodiment and modified examples, the cartridge couplers **220**, **220**′, and **220**″ may be positioned on the front surface, the right surface, the left surface, the upper surface, and the lower surface, depending on the design, the use, etc. of the hydraulic breakers **10**, **10**′, and **10**″.

[0115] Although the present invention was described through preferred embodiments, those skilled in the art may change or modify the present invention in various ways within a range not departing from the spirit and scope of the present invention described in the following claims.

TABLE-US-00001 <Description of the Reference Numerals in the Drawings> 10, 10′, 10″: hydraulic breaker 100: body 110: front head 111: first hole 112: chisel 120: cylinder 121: working fluid inlet 122: working fluid outlet 123: second hole 124: piston 124a: lower chamber 124b: upper chamber 125: control valve 126: working fluid channel 130: back head 131: gas chamber 200: automatic lubricant supply structure 210: lubricant cartridge 211: body 213: injection port 220: cartridge coupler 221: body seat hole 223: injection port seat hole 230: working fluid line 240: lubricant line 250: supply valve 260: lubricant injection port 271: first chamber 272: pumping spool 273: lubricant inlet 274: check valve 275: second chamber 281: first hole 282: pressing surface 283: end 284: pumping spool spring 285: second hole 286: check valve spring 287: ball 300: bracket 310: housing 311: housing groove 330: cover 331: cartridge insertion groove 333: inlet connector 335: outlet connector

Claims

1. A hydraulic breaker comprising: a bracket; a body coupled to an inside of the bracket; a piston provided in the body and reciprocating by a working fluid; a chisel provided in the body and configured to be hit by the piston; a cartridge coupler to which a lubricant cartridge is detachably directly coupled; a working fluid inlet connected to a hydraulic pump by a supply hose, wherein a high-pressure working fluid provided from the hydraulic pump through the supply hose flows into the working fluid inlet; a working fluid outlet connected to a hydraulic tank by a discharge hose,

wherein a low-pressure working fluid discharged from the working fluid outlet through the discharge hose flows to the hydraulic tank; an automatic lubricant supply structure being configured to supply a lubricant from the lubricant cartridge using the working fluid; and a supply valve being configured to supply the lubricant to the lubricant injection port in response to a pressure of the working fluid, wherein the automatic lubricant supply structure comprises: a working fluid line disposed in the body, the working fluid line having one end communicating with the working fluid inlet and another end communicating with the supply valve; and a lubricant line disposed in the body and configured to supply the lubricant to the lubricant injection port, the lubricant line having one end communicating with the supply valve and another end communicating with the lubricant injection port.

2. The hydraulic breaker of claim 1, wherein the supply valve includes: a first chamber having a first hole that communicates with the working fluid line and filled with the working fluid through the first hole; a second chamber communicating with a lubricant inlet and filled with the lubricant of the lubricant cartridge through the lubricant inlet; a pumping spool provided between the first chamber and the second chamber and moved in one direction by the pressure of the filled working fluid in the first chamber so that the pumping spool pushes the filled lubricant in the second chamber; and a check valve provided on one side of the second chamber and having a second hole that communicates with the lubricant line, and wherein the second chamber is provided between the pumping spool and the check valve, and the check valve is opened by a pressure of the filled lubricant in the second chamber.

3. The hydraulic breaker of claim 1, wherein the body includes a cylinder, a front head disposed under the cylinder, and a back head disposed over the cylinder, the cartridge coupler is disposed at the back head, and the cartridge coupler is positioned in the same plane as the working fluid inlet of the cylinder.

4. The hydraulic breaker of claim 2, wherein the working fluid inlet and a working fluid outlet of the body are accommodated in the housing; and the cover covers the working fluid inlet and the working fluid outlet.

5. The hydraulic breaker of claim 4, wherein the cover has a cartridge insertion groove that communicates with a body seat hole of the cartridge coupler, an inlet connector that communicates with the working fluid inlet, and an outlet connector that communicates with the working fluid outlet.

6. The hydraulic breaker of claims 2, wherein the cartridge coupler, the working fluid inlet, and the working fluid outlet are positioned on a rear surface of the body, and the housing is positioned on a rear surface of the bracket to be positioned on the rear surface of the body when the bracket is coupled to the body.

7. The hydraulic breaker of claim 6, wherein a height of the housing is larger than or the same as protrusive heights of the cartridge coupler, the working fluid inlet, and the working fluid outlet.