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(54) **ELECTRIC HAMMER**

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(57) **ABSTRACT**

An electric hammer can collect dust without using an external dust collection device. An electric hammer includes a motor, a body incorporating the motor, a striker assembly operable in response to the motor being driven to strike a bit attached along a striking axis, a dust collection fan rotatable in response to the motor being driven, a dust collection channel having a suction port being open toward a tip of the bit to generate a suction force in the suction port in response to rotation of the dust collection fan, and a dust collector located on the dust collection channel to collect dust sucked through the suction port.

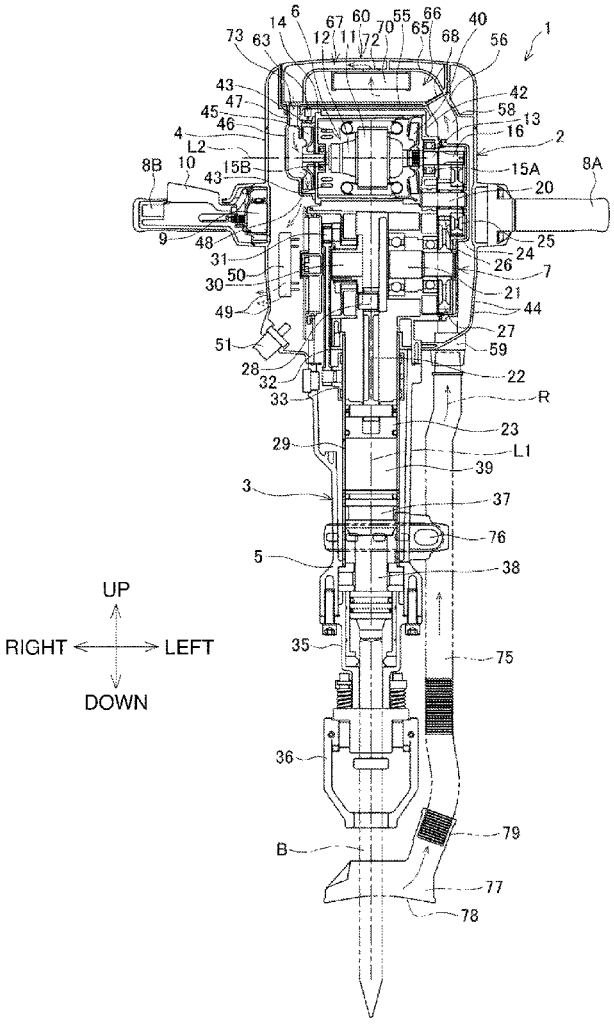

FIG. 1

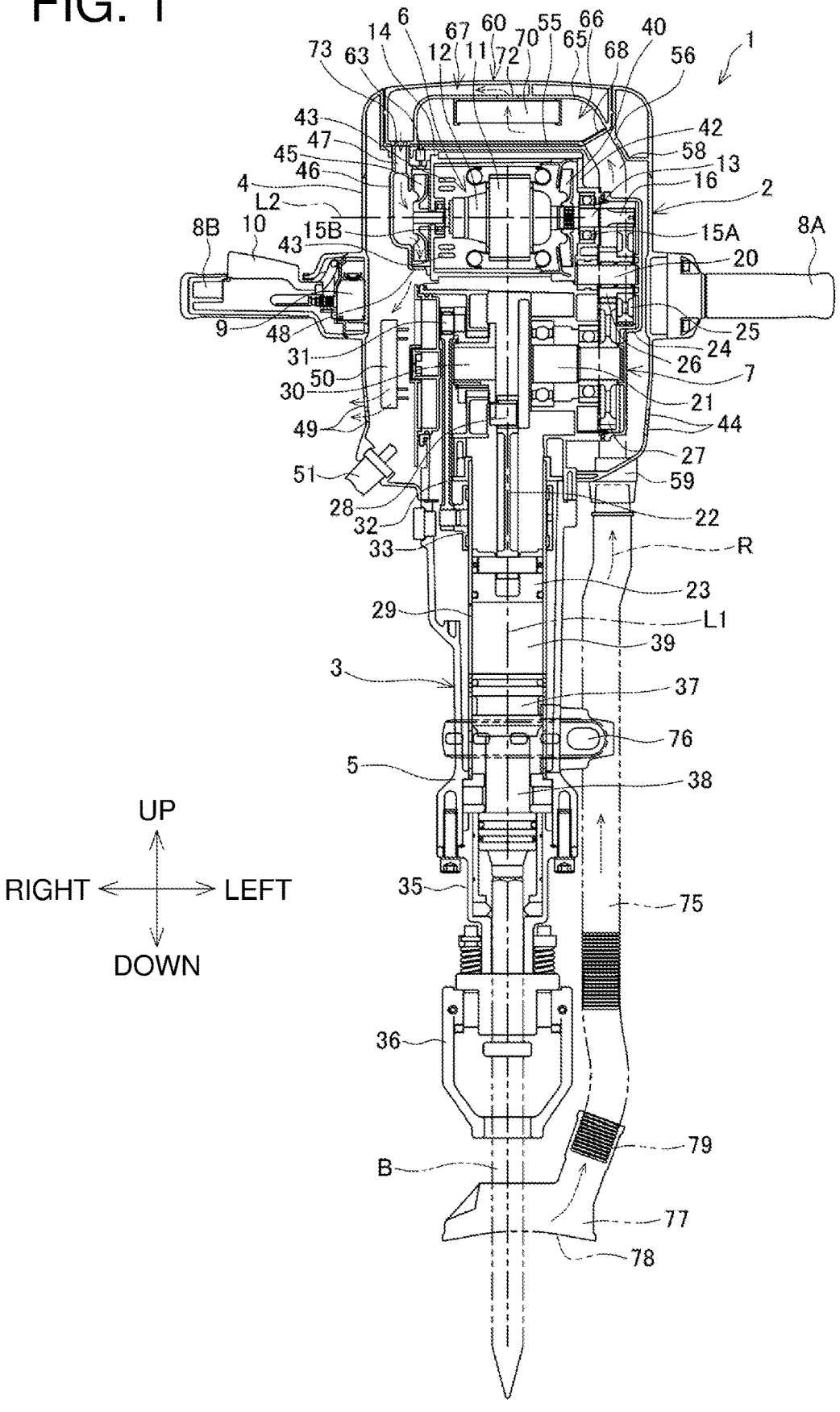
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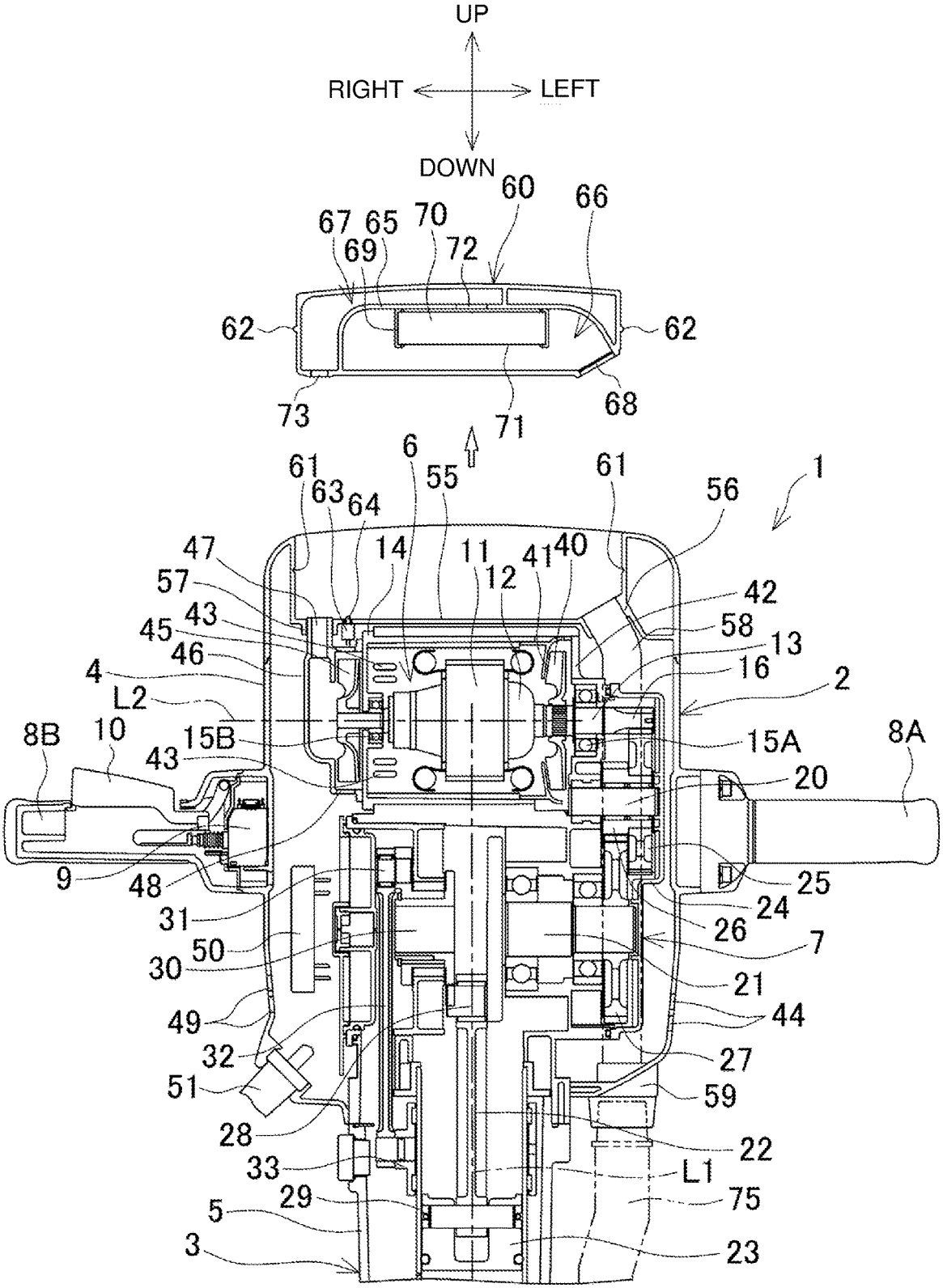
FIG. 2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8B
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15B
15A
8A
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59
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L1
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75
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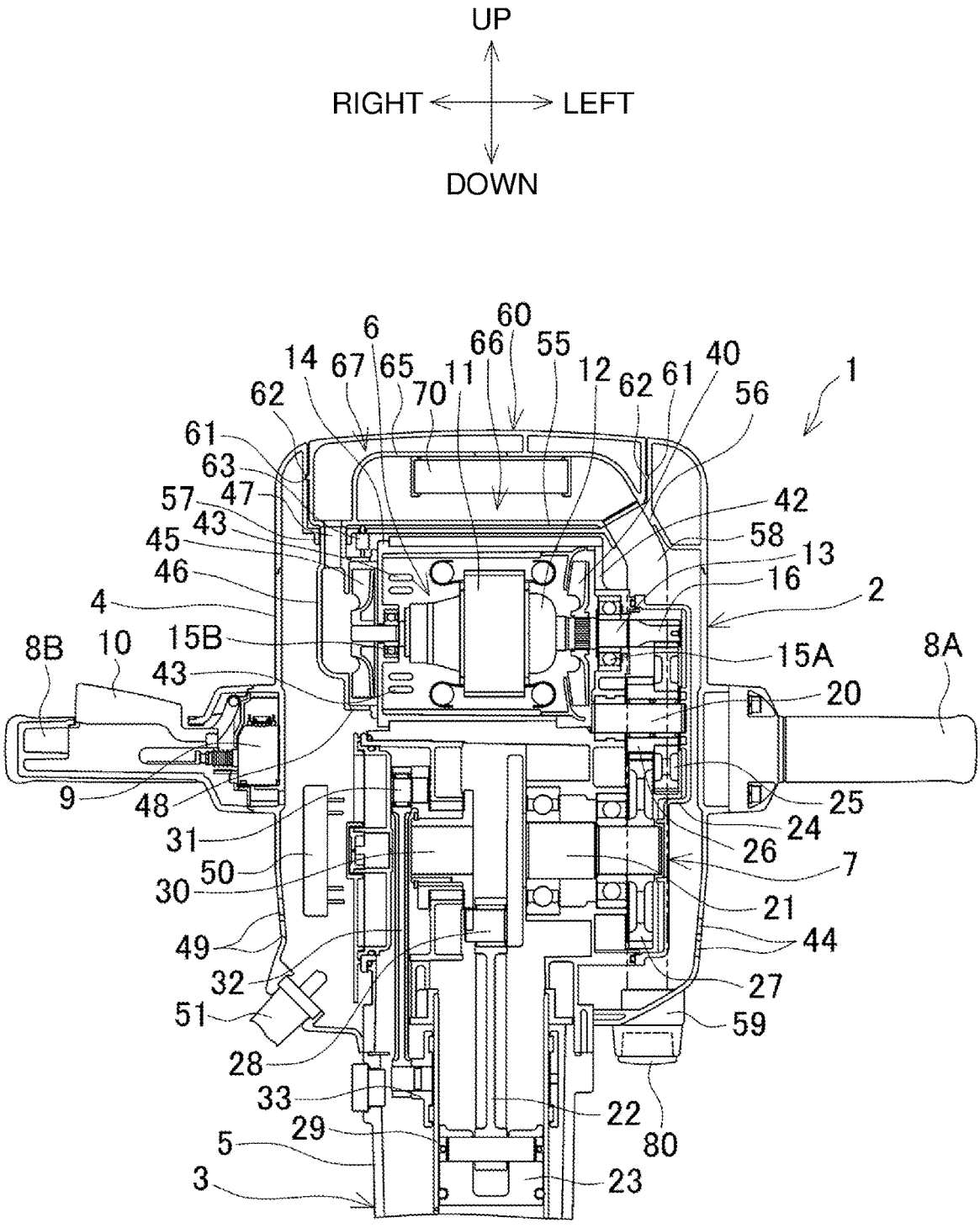
3

FIG. 3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ELECTRIC HAMMER

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of priority to Japanese Patent Application No. 2023-066607, filed on Apr. 14, 2023, the entire contents of which are hereby incorporated by reference.

BACKGROUND

1. Technical Field

[0002] The present disclosure relates to an electric hammer.

2. Description of the Background

[0003] An electric hammer uses a dust collection attachment described in Japanese Patent No. 6379004 for collecting dust generated during, for example, a crushing operation using a bit. The dust collection attachment, through which the bit extends, is open downward. A hose connected to an external dust collection device is held by a hose holder attached to a housing of the electric hammer to connect the lower end of the hose to the dust collection attachment. When the dust collection device starts operating, the dust collection attachment receives a suction force in its opening, sucks generated dust, and collects the dust into the dust collection device through the hose.

BRIEF SUMMARY

[0004] A known electric hammer uses a dust collection attachment with a separate dust collection device to be connected, involving time and effort.

[0005] One or more aspects of the present disclosure are directed to an electric hammer that can collect dust without using an external dust collection device.

[0006] A first aspect of the present disclosure provides an electric hammer, including:

[0007] a motor;

[0008] a body incorporating the motor;

[0009] a striker assembly operable in response to the motor being driven, the striker assembly being configured to strike a bit attached along a striking axis;

[0010] a dust collection fan rotatable in response to the motor being driven;

[0011] a dust collection channel having a suction port being open toward a tip of the bit, the dust collection channel being configured to generate a suction force in the suction port in response to rotation of the dust collection fan; and

[0012] a dust collector located on the dust collection channel, the dust collector being configured to collect dust sucked through the suction port.

[0013] The electric hammer according to the above aspect of the present disclosure can collect dust without using an external dust collection device.

BRIEF DESCRIPTION OF DRAWINGS

[0014] FIG. **1** is a longitudinal central sectional view of an electric hammer.

[0015] FIG. **2** is an enlarged view of a body from which a dust box is detached.

[0016] FIG. **3** is an enlarged view of the body with a connection port closed with a cap.

DETAILED DESCRIPTION

[0017] Embodiments of the present disclosure will now be described with reference to the drawings.

[0018] FIG. **1** is a longitudinal central sectional view of an example electric hammer. FIG. **2** is an enlarged view of a body from which a dust box is detached.

[0019] An electric hammer **1** includes a body **2** and a striker assembly **3**. The body **2** is located in an upper portion of the electric hammer **1**. The striker assembly **3** is located in a lower portion of the electric hammer **1**. The body **2** includes a box-shaped upper housing **4**. The striker assembly **3** includes a lower housing **5**. The lower housing **5** is connected to the upper housing **4**. The upper housing **4** accommodates a motor **6** and a motion converter **7**. The lower housing **5** is cylindrical and holds the striker assembly **3**. The striker assembly **3** has a striking axis L**1** extending vertically.

[0020] A pair of handles **8**A and **8**B are located on the right and left side surfaces of the upper housing **4**. The handles **8**A and **8**B each protrude laterally outward. The right handle **8**B incorporates a switch **9**. A switch lever **10** facing upward is located on an upper portion of the handle **8**B. The switch lever **10** is pressed to turn on the switch **9**.

[0021] The motor **6** is located in an upper portion of the upper housing **4**. The motor **6** includes a stator **11** and a rotor **12**. The rotor **12** includes a rotational shaft **13** with an axis L**2** extending in the lateral direction orthogonal to the striking axis L**1**. The rotational shaft **13** is supported by right and left bearings **15**A and **15**B. The right and left bearings **15**A and **15**B are located in a motor housing **14** partitioned inside the upper housing **4**. The rotational shaft **13** protruding from the left bearing **15**A has a left end receiving a pinion **16**.

[0022] The motion converter **7** includes a countershaft **20**, a crankshaft **21**, a connecting rod **22**, and a piston **23**. The countershaft **20** is supported parallel to the rotational shaft **13** below and to the left of the motor **6** inside a gear housing **24** connected to a lower portion of the motor housing **14**. The countershaft **20** receives a first gear **25**. The first gear **25** meshes with the pinion **16** on the rotational shaft **13**. The countershaft **20** receives a second gear **26** on the right of the first gear **25**.

[0023] The crankshaft **21** is supported parallel to the countershaft **20** inside the gear housing **24** below the countershaft **20**. The crankshaft **21** includes a third gear **27**. The third gear **27** meshes with the second gear **26**. The crankshaft **21** includes an eccentric pin **28** at a decentered position on its right end face. The connecting rod **22** has its upper end connected to the eccentric pin **28** and its lower end connected to the piston **23**. The piston **23** is accommodated in a vertically movable manner inside a cylinder **29** vertically supported in the lower housing **5**.

[0024] A second crankshaft **30** is supported coaxially with the crankshaft **21** on the right of the crankshaft **21**. The second crankshaft **30** engages with the eccentric pin **28** and is thus rotatable as the eccentric pin **28** moves eccentrically. The second crankshaft **30** includes a second eccentric pin **31** at a rotational position opposite to the eccentric pin **28** on the crankshaft **21**. A second connecting rod **32** is located on the right of the cylinder **29**. The second connecting rod **32** has its upper end connected to the second eccentric pin **31**. A

counterweight **33** is externally mounted on the cylinder **29** in a vertically movable manner. The second connecting rod **32** has its lower end connected to the counterweight **33**.

[0025] A cylindrical tool holder **35** is connected coaxially to a lower portion of the lower housing **5**. The tool holder **35** can receive a bit B from below. A tool retainer **36** is located below the tool holder **35**. The tool retainer **36** engages with the bit B received in the tool holder **35** to prevent the bit B from slipping off.

[0026] The striker assembly **3** includes a striker **37** and an impact bolt **38**. The striker **37** is accommodated in a lower portion of the cylinder **29**. The striker **37** is movable vertically across an air chamber **39** below the piston **23**. The impact bolt **38** is accommodated in the tool holder **35** below the striker **37** in a vertically movable manner. At the uppermost position at which the bit B is received, the upper end of the impact bolt **38** protrudes into the cylinder **29**.

[0027] The cylinder **29**, the piston **23**, the striker **37**, the tool holder **35**, and the impact bolt **38** are arranged coaxially on the striking axis L**1**.

[0028] In the upper housing **4**, a cooling fan **40** for the motor **6** is located rightward from the bearing **15**A on the rotational shaft **13**. A baffle **41** is located in the motor housing **14**. The baffle **41** covers the outer periphery of the cooling fan **40** from the right. The motor housing **14** has, in its left end face, multiple vents **42** surrounding the bearing **15**A. The upper housing **4** has, in its rear surface, multiple inlet ports **43** being open in the motor housing **14**. The upper housing **4** has, in its left side surface, multiple first outlet ports **44** below the motor housing **14**.

[0029] A dust collection fan **45** is located on the right end of the rotational shaft **13** protruding from the motor housing **14**. The motor housing **14** has a fan cover **46** on its right side surface. The fan cover **46** covers the dust collection fan **45** from the right. The fan cover **46** has a cylindrical air inlet **47** in its upper portion. The air inlet **47** extends upward. The fan cover **46** has multiple air outlets **48** in its lower portion radially outward from the dust collection fan **45**. The upper housing **4** has multiple second outlet ports **49** in its right side surface below the handle **8**B. The upper housing **4** accommodates a controller **50** on the right of the gear housing **24**. The controller **50** extends vertically between the air outlets **48** and the second outlet ports **49**. A power cable **51** is connected to, below the controller **50**, a lower right portion of the upper housing **4**. The controller **50** is operable with power supplied from the power cable **51**. The controller **50** controls driving of the motor **6** in response to the switch **9** being turned on or off.

[0030] The upper housing **4** has a holding recess **55** on its upper surface. The holding recess **55** holds a dust box (dust collector) **60** described later. The holding recess **55** is a bottomed recess having a rectangular opening in a plan view at the top. A left cylinder **56** extends downward to the left from the bottom left surface of the holding recess **55**. A right cylinder **57** extends downward from the bottom right surface of the holding recess **55**. The left cylinder **56** is connected to the upper end of an internal hose **58**. The right cylinder **57** receives the air inlet **47** in the fan cover **46** from below.

[0031] The upper housing **4** accommodates, in its left portion, the internal hose (a part of a dust collection channel) **58** extending behind the gear housing **24** in the vertical direction. The upper housing **4** has a cylindrical connection port **59** on its lower left surface. The internal hose **58** has its lower end connected to the connection port **59**. The connection port **59** has its lower portion protruding downward from the lower surface of the upper housing **4**.

[0032] The dust box **60** is a rectangular box having a shape in conformance with the inner shape of the holding recess **55** in a plan view. The holding recess **55** has engagement grooves **61** on its right and left inner side surfaces. The engagement grooves **61** extend in the front-rear direction. The dust box **60** has ridges **62** on its right and left outer side surfaces. The ridges **62** extend in the front-rear direction. The ridges **62** engage with the engagement grooves **61**.

[0033] When the dust box **60** is fitted into the holding recess **55** from above, the ridges **62** engage with the engagement grooves **61**. The dust box **60** is thus held in the holding recess **55**. When the dust box **60** is pulled upward using a finger hold (not shown) on its upper surface, the ridges **62** are disengaged from the engagement grooves **61**. This allows the dust box **60** to be detached from the holding recess **55**.

[0034] A detection switch (detector) **63** is located below a right portion of the holding recess **55**. The detection switch **63** includes a plunger **64** protruding upward from the bottom surface of the holding recess **55**. The plunger **64** is depressed when the dust box **60** is attached to the holding recess **55**. This turns on the detection switch **63**. An on-signal is input into the controller **50**.

[0035] The dust box **60** includes a partition **65** dividing the dust box **60** into a lower dust collection compartment **66** and an upper air passage **67**. The dust collection compartment **66** has an inlet **68** in its lower left surface. With the dust box **60** attached to the holding recess **55**, the inlet **68** connects with the left cylinder **56**. A filter holder **69** is located below the partition **65**. The filter holder **69** holds a filter **70**. The filter **70** is a paper filter folded laterally or in the front-rear direction. The filter **70** is held laterally with a filter surface **71** facing downward. The partition **65** has a communication port **72** above the filter **70**. The communication port **72** connects with the air passage **67**. The air passage **67** extends to the right of the dust collection compartment **66**, reaching the bottom surface of the dust box **60**. The air passage **67** has an outlet **73** in its lower end. With the dust box **60** attached to the holding recess **55**, the outlet **73** connects with the air inlet **47** in the fan cover **46**.

[0036] The connection port **59** protruding from the upper housing **4** is connectable with a flexible hose (external hose) **75** by receiving the upper end of the flexible hose **75**. The flexible hose **75** is held vertically along the lower housing **5** by a hose holder **76** externally mounted on a lower portion of the lower housing **5**. The flexible hose **75** has its lower end connected to a dust collection attachment **77**. The dust collection attachment **77** has a suction port **78** in its lower end. The suction port **78** is an open cup. The bit B is placeable through the suction port **78**. The dust collection attachment **77** includes a cylindrical hose connector **79** protruding upward from the upper left surface of the dust collection attachment **77**.

[0037] The dust collection attachment **77** is attachable by placing the bit B attached to the tool holder **35** through the dust collection attachment **77** from above, and connecting the hose connector **79** to the lower end of the flexible hose **75**.

[0038] A dust collection channel R indicated by the dotted arrows in FIG. **1** is thus defined in the electric hammer **1**. In the dust collection channel R, air sucked through the suction port **78** of the dust collection attachment **77** flows through

the flexible hose **75** and the internal hose **58** to the dust box **60** through the inlet **68**. In the dust box **60**, the air passes through the dust collection compartment **66**, the filter **70**, and the air passage **67** in this order, and reaches the fan cover **46** through the outlet **73**. The air then passes through the air outlets **48** into the upper housing **4** and is discharged through the second outlet ports **49**.

[0039] To perform, for example, a crushing operation on concrete, with the suction port **78** at the lower end of the dust collection attachment **77** being in contact with or adjacent to a work surface, the switch lever **10** is pressed to turn on the switch **9**. The controller **50** then determines whether an on-signal is received from the detection switch **63**, or more specifically, whether the dust box **60** is attached to the holding recess **55**.

[0040] With no on-signal received from the detection switch **63**, the controller **50** does not drive the motor **6**. With an on-signal received from the detection switch **63**, the controller **50** drives the motor **6** and rotates the rotational shaft **13** together with the rotor **12**. The rotation of the rotational shaft **13** is transmitted from the pinion **16** to the crankshaft **21** as reduced through the first gear **25**, the second gear **26**, and the third gear **27**, causing the eccentric pin **28** to move eccentrically. This causes the connecting rod **22** to move the piston **23** vertically and the striker **37** to operate in response to the vertical movement of the piston **23** under a force from the air chamber **39** acting as an air spring. The vertically moving striker **37** then strikes the bit B through the impact bolt **38**.

[0041] At the same time, the second crankshaft **30** engaging with the eccentric pin **28** rotates to cause the second eccentric pin **31** to move eccentrically. The counterweight **33** then vertically moves, through the second connecting rod **32**, along the cylinder **29** in a direction opposite to the vertical motion of the piston **23**. This reduces vibrations during striking.

[0042] As the rotational shaft **13** rotates, the cooling fan **40** and the dust collection fan **45** rotate.

[0043] The rotation of the cooling fan **40** causes the outside air to be sucked through the inlet ports **43** in the upper housing **4** and to pass through the motor **6**, thus cooling the motor **6**. After passing through the motor **6**, the air enters the upper housing **4** through the vents **42** in the motor housing **14**, flows downward, and is discharged outside through the first outlet ports **44**.

[0044] The rotation of the dust collection fan **45** causes the fan cover **46** to have a negative internal pressure, generating a suction force through the suction port **78** of the dust collection attachment **77**. The air sucked into the dust collection attachment **77** through the suction port **78** then passes through the dust collection channel R and is discharged out of the upper housing **4** through the second outlet ports **49**. The dust sucked with the air passing through the dust box **60** is caught on the filter surface **71** of the filter **70**, accumulating in the dust collection compartment **66**. At this time, the air passes through the filter **70** upward from below the filter **70**, causing the dust caught on the filter surface **71** to be easily released in the dust collection compartment **66**. In particular, vibrations during striking facilitate release of the dust, thus reducing clogging of the filter surface **71**.

[0045] The controller **50** is located in the dust collection channel R, through which the air flows from the air outlets **48** in the fan cover **46** to the second outlet ports **49** in the upper housing **4**. This airflow cools the controller **50**.

[0046] To discard the dust, the dust box **60** is detached from the holding recess **55** as shown in FIG. **2**, allowing the dust inside the dust collection compartment **66** to be discarded through the inlet **68**.

[0047] When an operation without dust collection is performed, neither the dust collection attachment **77** nor the flexible hose **75** is attached. In this case, the lower end of the connection port **59** may be closed with a cap **80** as shown in FIG. **3**. This prevents foreign objects from being sucked through the connection port **59** when the dust collection fan **45** rotates.

[0048] As described above, the electric hammer **1** according to the embodiment includes the motor **6**, the body **2** incorporating the motor **6**, and the striker assembly **3** operable in response to the motor **6** being driven. The striker assembly **3** strikes the bit B attached along the striking axis L**1**.

[0049] The electric hammer **1** includes the dust collection fan **45** rotatable in response to the motor **6** being driven, the dust collection channel R having the suction port **78** being open toward the tip of the bit B to generate a suction force in the suction port **78** in response to rotation of the dust collection fan **45**, and the dust box **60** located on the dust collection channel R to collect dust sucked through the suction port **78**.

[0050] This structure allows dust collection using the dust box **60** without using an external dust collection device. This improves the workability.

[0051] The dust collection channel R is partially located in the body **2** as the internal hose **58**.

[0052] A smaller portion of the dust collection channel R is thus exposed outside the electric hammer **1** and is less likely to interfere with operation.

[0053] The motor **6** is located along the striking axis L**1**.

[0054] This reduces deviation of the center of gravity from the striking axis L**1**, thus maintaining the overall balance.

[0055] The dust box **60** is located along the striking axis L**1** opposite to the striker assembly **3** with the motor **6** in between (above the striker assembly **3** in the embodiment).

[0056] Thus, with or without the dust box **60** attached, the structure reduces deviation of the center of gravity from the striking axis L**1**, thus maintaining the overall balance.

[0057] The dust box **60** includes the filter **70** having the filter surface **71** facing downward. The dust box **60** allows air to pass through the filter **70** upward from below the filter **70**.

[0058] This reduces accumulation of dust caught on the filter surface **71**, thus prolonging clogging of the filter **70**.

[0059] The electric hammer **1** includes the cooling fan **40** that cools the motor **6**. The dust collection fan **45** and the cooling fan **40** are located on the opposite ends of the rotational shaft **13** of the motor **6** in the axial direction of the rotational shaft **13**.

[0060] This facilitates the formation of the dust collection channel R and the airflow channel for cooling the motor **6**.

[0061] The dust collection channel R includes the flexible hose **75** extending from the suction port **78** to the body **2**. The body **2** includes the connection port **59** connecting with the internal hose **58** located in the body **2**.

[0062] This facilitates connection between the internal hose **58** and the flexible hose **75**.

[0063] The striking axis L**1** extends vertically. The bit B is attached to a lower portion of the striker assembly **3**. The connection port **59** is open downward.

[0064] The flexible hose **75** connecting with the connection port **59** can be routed vertically along the striker assembly **3**, and is thus less likely to interfere with operation.

[0065] The dust box **60** is detachable from the body **2**.

[0066] This facilitates discarding of collected dust and maintenance such as replacement or cleaning of the filter **70**.

[0067] The electric hammer **1** includes the detection switch **63** that detects the dust box **60** being attached to the body **2**, and the controller **50** that controls driving of the motor **6**. The controller **50** does not drive the motor **6** when the detection switch **63** detects the dust box **60** being not attached.

[0068] Any operation without the dust box **60** being attached is thus restricted, allowing dust to be collected reliably into the dust box **60**.

[0069] Modifications of the present disclosure will now be described.

[0070] The dust collection channel may be in a form modified as appropriate. For example, the internal hose and the flexible hose may be reversed in the lateral direction from the positions in the embodiment, or may be located frontward or rearward. The dust collection attachment may also be in a form modified as appropriate.

[0071] The internal hose may further extend into the lower housing, rather than into the upper housing. In this case, the connection port is also located in the lower housing, thus shortening the flexible hose.

[0072] The dust collection channel may be partially defined by a component other than the internal hose. For example, the dust collection channel may be partially defined by a wall in the upper housing. The wall and the internal hose may be used in combination.

[0073] The dust collection channel may be partially located outside the body, rather than being located inside the body. For example, the flexible hose may extend further upward and be routed outside the body to connect directly to the dust box.

[0074] The dust box may have a structure other than the structure allowing the dust box to be detached vertically. The dust box may be detachable from the body in the front-rear direction or in the lateral direction. The dust box may be located in a left or right portion, or in a front or rear portion of the body, rather than being located in an upper portion of the body.

[0075] The detector for the dust box can be changed based on the position of the dust box. The detector may be a contactless sensor. The detector may be eliminated. The switch may be turned on to drive the motor independently of whether the dust box is attached.

[0076] The filter in the dust box may be held vertically, rather than being held laterally. The filter may have a different thickness or shape as appropriate. The dust collection compartment and the air passage may be arranged laterally or in the front-rear direction.

[0077] The dust collector may be integral with the body, rather than being detachable. In this case, the dust collector may have a lid to be open or closed for discarding dust.

[0078] The motor may be oriented to have its rotational shaft extending in the front-rear direction or in the vertical direction, rather than in the lateral direction. The motor may not be located along the striking axis.

[0079] The cooling fan and the dust collection fan may be adjacent to each other on one end of the rotational shaft, rather than being separated on opposite ends of the rotational shaft. In this case, blades for the cooling fan may be located on one of the front and back surfaces of a disk, and blades for the dust collection fan may be located on the other of the front and back surfaces of the disk.

[0080] The motion converter is not limited to the structure in the above embodiment. The motion converter may include two or more countershafts or no countershaft. Vibration isolators such as the second crankshaft and the counterweight may be eliminated.

[0081] The power source may be a battery, rather than utility power as in the above embodiment. A detachable battery or a built-in battery may be used.

[0082] Although the electric hammer according to the above embodiment includes the striker assembly located below the body and having the striking axis extending vertically, the electric hammer may have another structure. The technique according to one or more embodiments of the present disclosure is applicable to, for example, a structure including the striker assembly located above the body to have its striking axis extending in the front-rear direction, or a structure including the striker assembly located in front of the body to have its striking axis extending in the front-rear direction.

REFERENCE SIGNS LIST

[0083] **1** electric hammer
[0084] **2** body
[0085] **3** striker assembly
[0086] **4** upper housing
[0087] **5** lower housing
[0088] **6** motor
[0089] **7** motion converter
[0090] **9** switch
[0091] **13** rotational shaft
[0092] **23** piston
[0093] **29** cylinder
[0094] **35** tool holder
[0095] **37** striker
[0096] **38** impact bolt
[0097] **40** cooling fan
[0098] **43** inlet port
[0099] **45** dust collection fan
[0100] **50** controller
[0101] **55** holding recess
[0102] **58** internal hose
[0103] **59** connection port
[0104] **60** dust box
[0105] **63** detection switch
[0106] **66** dust collection compartment
[0107] **70** filter
[0108] **71** filter surface
[0109] **75** flexible hose
[0110] **77** dust collection attachment
[0111] **78** suction port
[0112] L**1** striking axis
[0113] L**2** axis of rotational shaft
[0114] R dust collection channel

What is claimed is:

1. An electric hammer, comprising:
a motor,
a body incorporating the motor;
a striker assembly operable in response to the motor being driven, the striker assembly being configured to strike a bit attached along a striking axis;

a dust collection fan rotatable in response to the motor being driven;

a dust collection channel having a suction port being open toward a tip of the bit, the dust collection channel being configured to generate a suction force in the suction port in response to rotation of the dust collection fan; and

a dust collector located on the dust collection channel, the dust collector being configured to collect dust sucked through the suction port.

2. The electric hammer according to claim **1**, wherein

the dust collection channel is partially located in the body.

3. The electric hammer according to claim **1**, wherein

the motor is located along the striking axis.

4. The electric hammer according to claim **1**, wherein

the dust collector is located along the striking axis opposite to the striker assembly with the motor in between.

5. The electric hammer according to claim **1**, wherein

the dust collector includes a filter having a filter surface facing downward, and

the dust collector allows air to pass through the filter upward from below the filter.

6. The electric hammer according to claim **1**, further comprising:

a cooling fan configured to cool the motor,

wherein the dust collection fan and the cooling fan are located on opposite ends of a rotational shaft of the motor in an axial direction of the rotational shaft.

7. The electric hammer according to claim **2**, wherein

the dust collection channel includes an external hose extending from the suction port to the body, and

the body includes a connection port connecting with a part of the dust collection channel located in the body.

8. The electric hammer according to claim **7**, wherein

the striking axis extends vertically,

the bit is attachable to a lower portion of the striker assembly, and

the connection port is open downward.

9. The electric hammer according to claim **1**, wherein

the dust collector is detachable from the body.

10. The electric hammer according to claim **9**, further comprising:

a detector configured to detect the dust collector being attached to the body; and

a controller configured to control driving of the motor,

wherein the controller does not drive the motor when the detector detects the dust collector being not attached.

11. The electric hammer according to claim **2**, wherein

the motor is located along the striking axis.

12. The electric hammer according to claim **2**, wherein

the dust collector is located along the striking axis opposite to the striker assembly with the motor in between.

13. The electric hammer according to claim **3**, wherein

the dust collector is located along the striking axis opposite to the striker assembly with the motor in between.

14. The electric hammer according to claim **2**, wherein

the dust collector includes a filter having a filter surface facing downward, and

the dust collector allows air to pass through the filter upward from below the filter.

15. The electric hammer according to claim **3**, wherein

the dust collector includes a filter having a filter surface facing downward, and

the dust collector allows air to pass through the filter upward from below the filter.

16. The electric hammer according to claim **4**, wherein

the dust collector includes a filter having a filter surface facing downward, and

the dust collector allows air to pass through the filter upward from below the filter.

17. The electric hammer according to claim **2**, further comprising:

a cooling fan configured to cool the motor,

wherein the dust collection fan and the cooling fan are located on opposite ends of a rotational shaft of the motor in an axial direction of the rotational shaft.

18. The electric hammer according to claim **3**, further comprising:

a cooling fan configured to cool the motor,

wherein the dust collection fan and the cooling fan are located on opposite ends of a rotational shaft of the motor in an axial direction of the rotational shaft.

19. The electric hammer according to claim **4**, further comprising:

a cooling fan configured to cool the motor,

wherein the dust collection fan and the cooling fan are located on opposite ends of a rotational shaft of the motor in an axial direction of the rotational shaft.

20. The electric hammer according to claim **5**, further comprising:

a cooling fan configured to cool the motor,

wherein the dust collection fan and the cooling fan are located on opposite ends of a rotational shaft of the motor in an axial direction of the rotational shaft.

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