SPLASH GUARD AND VEHICLE

[0001] This application claims priority to Chinese Patent Application No. 202410990947.5, filed with the Chinese Patent Office on July 23, 2024 and entitled “SPLASH GUARD AND VEHICLE”, which is incorporated herein by reference in its entirety.

TECHNICAL FIELD

[0002] This application relates to the field of vehicles, and specifically, to a splash guard and a vehicle.

BACKGROUND

[0003] When a vehicle is driven on rainy days or dirty road surfaces, contaminants such as muddy water may splash into the vehicle's engine compartment, causing the compartment to become dirty and affecting the vehicle's aesthetics and the functional reliability of components within the engine compartment.

[0004] In the prior art, an underbody guard is typically installed at the bottom of the vehicle, and wheel housings may also be provided on the sides of the vehicle to protect the vehicle from contaminants like muddy water splashed up or flung by the wheels on various driving surfaces. However, due to the complexity of the vehicle structure, the underbody guard and wheel housings also have certain limitations in providing protection for the vehicle and cannot provide a sufficient shielding area.

SUMMARY

[0005] Embodiments of the present application provide a splash guard and a vehicle. Various aspects involved in the embodiments of the present application are introduced below.

[0006] In a first aspect, an embodiment of the present application provides a splash guard for a vehicle. The splash guard includes a side plate body and a lower plate body. The side plate body has a first end and a second end that are opposite each other along a first direction. The lower plate body is bent and connected to the second end of the side plate body. The lower plate body includes a first connecting plate, a surrounding plate, and a second connecting plate. The first connecting plate and the second connecting plate are spaced apart along a second direction. The surrounding plate is connected between the first connecting plate and the second connecting plate and is recessed inwardly toward the first end along the first direction to define a clearance

passage. The clearance passage is configured to allow an object member of the vehicle to pass through. The second direction is perpendicular to or obliquely intersects the first direction. The first connecting plate and the second connecting plate are configured to be connected to a chassis of the vehicle, and the first end of the side plate body is configured to be connected to a vehicle body of the vehicle.

[0007] In one embodiment of the present application, the first connecting plate is provided with a first connecting portion, and the first connecting portion is configured to be connected to a subframe of the chassis. The second connecting plate is provided with a second connecting portion, and the second connecting portion is configured to be connected to a front suspension lower control arm assembly of the chassis. The first end of the side plate body is provided with a third connecting portion, and the third connecting portion is configured to be connected to a vehicle body side member of the vehicle body. In the second direction, the third connecting portion is located between the first connecting portion and the second connecting portion.

[0008] In one embodiment of the present application, the first connecting portion includes a first connecting hole provided in the first connecting plate. The second connecting portion includes a second connecting hole provided in the second connecting plate, where the second connecting hole is a strip-shaped hole extending along the second direction. The third connecting portion includes a third connecting hole provided at the first end of the side plate body.

[0009] In one embodiment of the present application, the splash guard further includes a plurality of first reinforcing ribs. The plurality of first reinforcing ribs are spaced apart in sequence along an intersection line of the lower plate body and the side plate body, and each of the first reinforcing ribs is connected between a portion of the side plate body close to the lower plate body and the lower plate body.

[0010] In one embodiment of the present application, the side plate body includes a base plate region, a first branch plate region, and a second branch plate region. The first branch plate region and the second branch plate region are connected to a side of the base plate region close to the second end, and are located at two sides of the clearance passage along the second direction. The first branch plate region is bent and connected to the first connecting plate, and the second branch plate region is bent and connected to the second connecting plate.

[0011] In one embodiment of the present application, the splash guard further includes a bent plate body. An edge of the first branch plate region away from the second branch plate region is a first edge, and an edge of the first connecting plate away from the second connecting plate is a second edge. The bent plate body is bent and connected between the first edge and the second edge. The splash guard further includes a plurality of first reinforcing ribs. The plurality of first

reinforcing ribs are spaced apart in sequence along the intersection line of the lower plate body and the side plate body, and each of the first reinforcing ribs is connected between a portion of the side plate body close to the lower plate body and the lower plate body. At least one second reinforcing rib is connected at a corner between the bent plate body and the first branch plate region; and/or, at least one third reinforcing rib is connected at a corner between the bent plate body and the first connecting plate; and/or,

[0012] the splash guard further includes a first folded edge and a second folded edge. The first folded edge is formed by folding from a first side edge line in a same bending direction as the lower plate body, where the first side edge line includes an edge line of the first branch plate region on a side away from the first connecting plate and an edge line of the bent plate body on a side away from the surrounding plate. At least part of the first reinforcing ribs and the second reinforcing ribs extend to be connected to the first folded edge. The second folded edge is formed by folding from a second side edge line in a same bending direction as the lower plate body, where the second side edge line includes an edge line of the second branch plate region on a side away from the surrounding plate and an edge line of the second connecting plate on a side away from the surrounding plate. At least part of the first reinforcing ribs extend to be connected to the second folded edge; and/or,

[0013] the splash guard further includes an auxiliary reinforcement structure. The auxiliary reinforcement structure includes a reinforcing raised ring and a plurality of connecting ribs. The reinforcing raised ring protrudes from a surface of the first branch plate region. A part of the connecting ribs is connected between the reinforcing raised ring and the first reinforcing rib, a part of the connecting ribs is connected between the reinforcing raised ring and the second reinforcing rib, and another part of the connecting ribs is connected between the reinforcing raised ring and the first folded edge.

[0014] In one embodiment of the present application, in a direction approaching the first end along the first direction, a width of the base plate region along the second direction gradually decreases.

[0015] In one embodiment of the present application, the surrounding plate is U-shaped with an opening towards the second end. The first connecting plate and the second connecting plate are respectively bent and connected to two opposite edges of the surrounding plate along the second direction. Moreover, the surrounding plate, the first branch plate region, and the first connecting plate are pairwise bent and connected, and the surrounding plate, the second branch plate region, and the second connecting plate are pairwise bent and connected.

[0016] In one embodiment of the present application, the first connecting plate includes a

first base plate section and a first lowered plate section. The first base plate section is bent and connected to the side plate body. The first lowered plate section is connected to the first base plate section and is lowered relative to the first base plate section in a direction away from the first end, such that a first surface of the first lowered plate section away from the first end and a second surface of the first base plate section away from the first end form a step shape. The first connecting plate further includes a first reinforcement structure. The first reinforcement structure includes a first raised flange, a second raised flange, and a plurality of fourth reinforcing ribs. The first connecting hole is provided in the first lowered plate section. The first raised flange and the second raised flange protrude from the first surface, and are spaced apart in inner and outer positions around the first connecting hole. The plurality of fourth reinforcing ribs are arranged in a radial pattern centered on the first connecting hole, and one end of each fourth reinforcing rib extends from a first surface to a second surface, and the other end extends within the first surface, passes through the second raised flange, and connects to the first raised flange. Surfaces of the first raised flange, the second raised flange, and the plurality of fourth reinforcing ribs facing away from the first surface jointly define a first connecting plane for cooperatively supporting against the chassis.

[0017] In one embodiment of the present application, the second connecting plate includes a second base plate section and a second lowered plate section. The second base plate section is bent and connected to the side plate body. The second lowered plate section is connected to the second base plate section and is lowered relative to the second base plate section in a direction away from the first end, such that a third surface of the second lowered plate section away from the first end and a fourth surface of the second base plate section away from the first end form a step shape. The second connecting plate further includes a second reinforcement structure. The second reinforcement structure includes a third raised flange, a fourth raised flange, and a plurality of fifth reinforcing ribs. The second connecting hole is provided in the second lowered plate section. The third raised flange and the fourth raised flange protrude from the third surface, and are spaced apart in inner and outer positions around the second connecting hole. The plurality of fifth reinforcing ribs are arranged in a radial pattern centered on the second connecting hole, and one end of each fifth reinforcing rib extends from a third surface to a fourth surface, and the other end extends within the third surface, passes through the fourth raised flange, and connects to the third raised flange. Surfaces of the third raised flange, the fourth raised flange, and the plurality of fifth reinforcing ribs facing away from the third surface jointly define a second connecting plane for cooperatively supporting against the chassis.

[0018] In one embodiment of the present application, the first end of the side plate body is

provided with a guide structure formed by bending and extending to a side away from the lower plate body along a third direction, where the third direction is perpendicular to or obliquely intersects the first direction, and the third direction is perpendicular to or obliquely intersects the second direction.

[0019] In a second aspect, an embodiment of the present application provides a vehicle, including a chassis, a vehicle body, and the aforementioned splash guard. The vehicle body is connected to the chassis. In the splash guard, the first direction is parallel to a height direction of the vehicle, the first connecting plate and the second connecting plate of the splash guard are connected to the chassis, and the first end of the side plate body of the splash guard is connected to the vehicle body.

[0020] In the splash guard of the embodiment of the present application, the side plate body in the vehicle width direction and the lower plate body in the vehicle height direction can jointly provide splash protection for the vehicle, while the clearance passage of the lower plate body can also satisfy the need for clearance for an object member of the vehicle (such as a steering tie rod). The splash guard, as an independent component, is designed separately from the wheel housing of the vehicle, offering greater design freedom and being less affected by assembly processes. Moreover, this splash guard can increase the shielding area for the vehicle's engine compartment in a width direction and a height direction as much as possible, remedying the problem that the existing underbody guard at the bottom of the vehicle 100 and the wheel housing at the side of the vehicle are unable to provide sufficient shielding area due to constraints such as suspension swing arm motion envelope, wiring harness layout, and steering gear layout.

BRIEF DESCRIPTION OF DRAWINGS

[0021] To more clearly illustrate the technical solutions in the embodiments of the present application, the accompanying drawings required in the embodiments will be briefly introduced below. It should be understood that the following drawings only show some embodiments of the present application and therefore should not be considered as limiting the scope. For those of ordinary skill in the art, other relevant drawings can be obtained based on these drawings without exerting creative efforts.

[0022] FIG. 1 is a side view of a vehicle according to an embodiment of the present application, where partial structures of a chassis and a vehicle body are shown in dashed lines;

[0023] FIG. 2 is a top view of the vehicle shown in FIG. 1, where partial structures of the chassis and the vehicle body are shown in dashed lines;

[0024] FIG. 3 is a perspective view of partial structures of the chassis and the vehicle body of the vehicle shown in FIG. 1;

[0025] FIG. 4 is a perspective view of a splash guard according to an embodiment of the present application;

[0026] FIG. 5 is a perspective view of the splash guard shown in FIG. 4 from another viewing angle;

[0027] FIG. 6 is an enlarged view of part A in FIG. 3;

[0028] FIG. 7 is a perspective view of the splash guard shown in FIG. 4 from yet another viewing angle;

[0029] FIG. 8 is an enlarged view of part B of the splash guard shown in FIG. 7;

[0030] FIG. 9 is an enlarged view of part C of the splash guard shown in FIG. 7.

[0031] Description of main element reference numerals:

vehicle 100;

chassis 110;

subframe 111;

steering system 112;

front suspension lower control arm assembly 113;

object member 114;

steering tie rod 114a;

vehicle body 120;

vehicle body side member 121;

first connecting member 141;

second connecting member 142;

third connecting member 143;

splash guard 130;

side plate body 10;

first branch plate region 11;

second branch plate region 12;

base plate region 13;

third connecting portion 14;

guide structure 15;

lower plate body 20;

first connecting plate 21;

first base plate section 211;

first lowered plate section 212;
first connecting portion 213;
second connecting plate 22;
second base plate section 221;
second lowered plate section 222;
second connecting portion 223;
surrounding plate 23;
Bent plate body 30;
first reinforcing rib 41;
second reinforcing rib 42;
third reinforcing rib 43;
first folded edge 44;
second folded edge 45;
auxiliary reinforcement structure 46;
reinforcing raised ring 46a;
connecting rib 46b;
first reinforcement structure 50;
first raised flange 51;
second raised flange 52;
fourth reinforcing rib 53;
second reinforcement structure 60;
third raised flange 61;
fourth raised flange 62;
fifth reinforcing rib 63;
first end D1;
second end D2;
first direction A1;
second direction A2;
third direction A3;
width direction Y;
length direction X;
height direction Z;
clearance passage T1;
first edge L1;

second edge L2;

first side edge line L3;

second side edge line L4;

first connecting hole K1;

second connecting hole K2;

third connecting hole K3;

first surface P1;

second surface P2;

third surface P3; and

fourth surface P4.

DESCRIPTION OF EMBODIMENTS

[0032] The technical solutions in the embodiments of the present application will be described clearly and completely below with reference to the accompanying drawings in the embodiments of the present application. Obviously, the described embodiments are only a part of the embodiments of the present application, not all of them.

[0033] It should be noted that when an element is referred to as being "fixed to" another element, it may be directly on the other element or intervening elements may also be present. When an element is considered to be "connected to" another element, it may be directly connected to the other element or intervening elements may be present simultaneously. When an element is considered to be "disposed on" another element, it may be directly disposed on the other element or intervening elements may be present simultaneously. The terms "vertical," "horizontal," "left," "right," and similar expressions used herein are for illustrative purposes only.

[0034] Unless otherwise defined, all technical and scientific terms used herein have the same meaning as commonly understood by those skilled in the art to which this application belongs. The terms used herein in the specification of the present application are only for the purpose of describing specific implementations and are not intended to limit the present application.

[0035] If no conflict arises, the following embodiments and features in the embodiments may be combined with each other.

[0036] As the vehicle currently develops towards greater integration, the front engine compartment of the vehicle is becoming increasingly empty, especially the open area under the engine compartment, resulting in a lack of effective shielding at the bottom. Therefore, when the vehicle is driven on a rainy day or a dirty road, contaminants such as muddy water may easily be flung into the engine compartment, causing the compartment to become dirty and affecting

the vehicle's aesthetics and the functional reliability of components within the engine compartment.

[0037] In the prior art, an underbody guard is typically installed at the bottom of the vehicle, and wheel housings may also be provided on the sides of the vehicle to protect the vehicle from contaminants like muddy water splashed up or flung by the wheels on various driving surfaces. However, due to the complexity of the vehicle structure, the underbody guard and wheel housings also have certain limitations in providing protection for the vehicle and cannot provide a sufficient shielding area. For example, limitations imposed by factors such as the movement range of the vehicle's suspension swing arms, the layout of wiring harnesses, and the position of the steering gear prevent the wheel housings and underbody guard from providing sufficient shielding areas. This means that in certain areas of the vehicle, these protective components may not completely shield against muddy water or other contaminants, potentially leaving some parts of the vehicle exposed and subject to contamination.

[0038] For the foregoing problem, an embodiment of the present invention provides a splash guard and a vehicle. Referring to FIG. 1 to FIG. 9, an embodiment of the present application is specifically described.

Embodiment

[0039] FIG. 1 and FIG. 2 show a vehicle 100 according to an embodiment of the present application.

[0040] The vehicle 100 may be, for example, a fuel vehicle (such as a gasoline vehicle, a diesel vehicle), an electric vehicle (such as a pure electric vehicle, a fuel cell vehicle), or a hybrid electric vehicle.

[0041] The vehicle 100 includes a chassis 110 and a vehicle body 120, and the vehicle body 120 is connected to the chassis 110. It should be noted that FIG. 1 and FIG. 2 only show partial structures of the chassis 110 and the vehicle body 120 in dashed lines.

[0042] With reference to FIG. 3, the chassis 110 mainly includes structures such as a subframe 111 and a steering system 112. The vehicle body 120 includes a vehicle body side member 121.

[0043] The vehicle 100 is further provided with a splash guard 130. The splash guard 130 is connected between the chassis 110 and the vehicle body 120, and is used to solve the problem that contaminants, such as muddy water splashed up by the vehicle 100 driving or flung by its wheels, contaminates the engine compartment of the vehicle 100, thereby ensuring the aesthetics of the vehicle 100 and the functional reliability of components within the engine compartment of the vehicle 100.

[0044] The splash guard 130 in this embodiment is exemplarily introduced below with reference to FIG. 4 to FIG. 9.

[0045] Referring to FIG. 4 and FIG. 5, the splash guard 130 in this embodiment includes a side plate body 10 and a lower plate body 20.

[0046] The side plate body 10 has a first end D1 and a second end D2 opposite to each other along a first direction A1. When the splash guard 130 is installed on the vehicle 100, the first direction A1 of the splash guard 130 is parallel to the height direction Z of the vehicle 100 (a certain deviation is allowed, such as an angle between the first direction A1 and the height direction Z of the vehicle 100 being within 10°). The first end D1 is an upper side in the height direction Z of the vehicle 100, and the second end D2 is a lower side in the height direction Z of the vehicle 100 (see FIG. 1).

[0047] The first end D1 of the side plate body 10 is configured to be connected to the vehicle body 120 of the vehicle 100, for example, connected to the vehicle body side member 121 of the vehicle body 120. The lower plate body 20 is bent and connected to the second end D2 of the side plate body 10, and is configured to connect to the chassis 110 of the vehicle 100.

[0048] In this embodiment, the phrase "the lower plate body 20 is bent and connected to the side plate body 10" may mean that both the side plate body 10 and the lower plate body 20 are formed from the same sheet material through a stamping bending or other bending process, and the side plate body 10 and the lower plate body 20 are portions located on two sides of a bending line, respectively. The expression 'bent and connected' appearing hereinafter may be understood accordingly.

[0049] When the splash guard 130 is installed on the vehicle 100, an outer surface of the side plate body 10 faces or generally faces an outer side in a width direction Y of the vehicle 100, and an outer surface of the lower plate body 20 generally faces downward (i.e., toward the ground) along the first direction A1. Thus, the splash guard 130 can simultaneously achieve a mudguard effect on the side and bottom, reducing contamination of the vehicle body by contaminants such as muddy water splashed from the bottom or side of the vehicle 100.

[0050] Continuing to refer to FIG. 4 and FIG. 5, in this embodiment, the lower plate body 20 includes a first connecting plate 21, a surrounding plate 23, and a second connecting plate 22. The first connecting plate 21 and the second connecting plate 22 are spaced apart along a second direction A2. The surrounding plate 23 is connected between the first connecting plate 21 and the second connecting plate 22, and is recessed inwardly toward the first end D1 along the first direction A1 to define a clearance passage T1. The clearance passage T1 extends along a third direction A3, and is configured to allow an object member 114 of the vehicle 100 (such as the

steering tie rod 114a or the wiring harness of the vehicle 100) to pass through, and to provide clearance for the motion envelope of components such as the front suspension lower swing arm of the vehicle 100. Various structures of the chassis 110 of the vehicle 100 can be seen in FIG. 3.

[0051] The second direction A2 is perpendicular to or obliquely intersects the first direction A1. In this embodiment, the second direction A2 is parallel to the length direction X (or the front-rear direction) of the vehicle 100. The third direction A3 is parallel to the width direction Y of the vehicle 100.

[0052] In the lower plate body 20, the first connecting plate 21 and the second connecting plate 22 are configured to be respectively connected to two positions spaced apart along the second direction A2 on a chassis 110 of the vehicle 100, for example, the first connecting plate 21 is connected to a subframe 111 of the chassis 110, and the second connecting plate 22 is connected to a front suspension lower control arm assembly 113 of the chassis 110, which may be specifically referred to FIG. 3.

[0053] Continuing to refer to FIG. 4 and FIG. 5, the side plate body 10 includes a first branch plate region 11, a second branch plate region 12 and a base plate region 13. The first branch plate region 11 and the second branch plate region 12 are connected to a side of the base plate region 13 close to the second end D2, and are ocated at two sides of the clearance passage T1 along the second direction A2. The first branch plate region 11 is bent and connected to the first connecting plate 21, and the second branch plate region 12 is bent and connected to the second connecting plate 22.

[0054] Optionally, the base plate region 13 extends substantially along the first direction A1, the extension directions of the first branch plate region 11 and the second branch plate region 12 are inclined relative to the first direction A1, and a spacing between the first branch plate region 11 and the second branch plate region 12 gradually increases in a direction away from the base plate region 13 along the first direction A1, so that the first branch plate region 11, the second branch plate region 12 and the base plate region 13 of the side plate body 10 are connected into an inverted "Y" shape structure. In addition, with the reinforcement of a lower part of the side plate body 10 by the lower plate body 20, a lower half part of the splash guard 130 with higher strength can be reliably connected to the chassis 110, ensuring reliable installation of the splash guard 130 on the vehicle 100. Meanwhile, an upper half part of the splash guard 130 with lower strength (mainly a part of the base plate region 13 close to the first end D1) is connected to a vehicle body 120, which is beneficial for absorbing a stroke difference of the vehicle body 120 relative to the chassis 110 moving along a height direction Z (such as undulating movement of the vehicle body 120 relative to the chassis 110 when the vehicle 100 traverses water over a pit).

[0055] Referring primarily to FIG. 5, the splash guard 130 further includes a plurality of first reinforcing ribs 41, the plurality of first reinforcing ribs 41 are sequentially spaced apart along an intersection line (i.e., a bend line) of the lower plate body 20 and the side plate body 10, and each of the first reinforcing ribs 41 is connected between a part of the side plate body 10 close to the lower plate body 20 and the lower plate body 20. By reinforcing the connection between the lower part of the side plate body 10 and the lower plate body 20 through the first reinforcing ribs 41, a lower half part structure of the splash guard 130 near the chassis 110 can have greater rigidity, while an upper half part structure near the vehicle body 120 maintains smaller rigidity, thus ensuring that the splash guard 130 has sufficient structural strength when subjected to external impact without being damaged or excessively deformed, and at the same time, when relative movement occurs between the vehicle body 120 and the chassis 110, the splash guard 130 can absorb a stroke difference generated by the relative movement through its softer (i.e., smaller rigidity) upper half part structure.

[0056] Optionally, in a direction approaching the first end D1 along the first direction A1, a width of the base plate region 13 along the second direction A2 gradually decreases. In this way, the width of the lower part of the base plate region 13 is greater than the width of the upper part, thereby further ensuring the large rigidity of the lower part and the small rigidity of the upper part of the splash guard 130.

[0057] Continuing to refer to FIG. 4 and FIG. 5, in this embodiment, the surrounding plate 23 is U-shaped with an opening toward the second end D2, and the first connecting plate 21 and the second connecting plate 22 are respectively bent and connected to two opposite sides of the surrounding plate 23 along the second direction A2. The surrounding plate 23, the first branch plate region 11 and the first connecting plate 21 are pairwise bent and connected to form one leg structure of the splash guard 130. The surrounding plate 23, the second branch plate region 12 and the second connecting plate 22 are pairwise bent and connected to form another leg structure of the splash guard 130. The two leg structures are each formed by bending connection of plate portions in three different directions, having sufficiently high structural rigidity. The two leg structures are connected to the chassis 110 in a relatively diverging manner, so that the splash guard 130 can be reliably and fixedly connected to the chassis 110.

[0058] Among the aforementioned plurality of first reinforcing ribs 41, at least part of the first reinforcing ribs are connected between the base plate region 13 and the surrounding plate 23, at least part of the first reinforcing ribs are connected between the first branch plate region 11 and the first connecting plate 21, and at least part of the first reinforcing ribs are connected between the second branch plate region 12 and the second connecting plate 22, so as to reinforce

the connection rigidity between the lower half part of the side plate body 10 and the lower plate body 20 at various positions along the bending line.

[0059] Continuing to refer to FIG. 4 and FIG. 5, in this embodiment, the splash guard 130 further includes a bent plate body 30, and the bent plate body 30 is bent and connected between the first branch plate region 11 and the first connecting plate 21. Specifically, an edge of the first branch plate region 11 away from the second branch plate region 12 is a first edge L1, an edge of the first connecting plate 21 away from the second connecting plate 22 is a second edge L2, and the bent plate body 30 is bent and connected between the first edge L1 and the second edge L2. By connecting the first branch plate region 11 and the first connecting plate 21 through the bent plate body 30, the structural rigidity of the first branch plate region 11 and the first connecting plate 21 can be further reinforced.

[0060] The orientation of the bent plate body 30 is different from that of the side plate body 10, and can also provide a supplementary splash guarding effect. For example, in this embodiment, a plate surface of the side plate body 10 faces the third direction A3 (i.e., the width direction Y of the vehicle 100), and mainly provides a lateral splash guarding function. A plate surface of the lower plate body 20 faces the first direction A1 (i.e., the height direction Z of the vehicle 100), and mainly achieves a bottom splash guarding function. A plate surface of the bent plate body 30 obliquely intersects both the first direction A1 and the third direction A3, and the bent plate body 30 substantially faces an obliquely downward direction, so as to provide splash guarding against contaminants from obliquely below.

[0061] Optionally, at least one second reinforcing rib 42 is connected at a corner between the bent plate body 30 and the first branch plate region 11, so as to reinforce the connection rigidity between the bent plate body 30 and the first branch plate region 11. Similarly, at least one third reinforcing rib 43 is connected at a corner between the bent plate body 30 and the first connecting plate 21, so as to reinforce the connection rigidity between the bent plate body 30 and the first connecting plate 21. In this way, the first branch plate region 11, the first connecting plate 21 and the bent plate body 30 are bent and connected pairwise and have reinforcing ribs reinforcing the connections between each pair, so that the structure formed by the three has very high rigidity, which is beneficial for the reliable connection of the first connecting plate 21 to the chassis 110 of the vehicle 100.

[0062] Referring primarily to FIG. 5, in this embodiment, optionally, the splash guard 130 further includes a first folded edge 44 and a second folded edge 45.

[0063] The first folded edge 44 is formed by folding from a first side edge line L3 in the same bending direction as the lower plate body 20. The first side edge line L3 includes an edge

line of the first branch plate region 11 on a side away from the first connecting plate 21 and an edge line of the bent plate body 30 on a side away from the surrounding plate 23. At least part of the first reinforcing ribs 41 and the second reinforcing rib 42 extend to be connected to the first folded edge 44, so as to further reinforce the structural strength of a connection region of the first branch plate region 11, the first connecting plate 21 and the bent plate body 30.

[0064] Similarly, the second folded edge 45 is formed by folding from a second side edge line L4 in a same bending direction as the lower plate body 20. The second side edge line L4 includes an edge line of the second branch plate region 12 on a side away from the surrounding plate 23 and an edge line of the second connecting plate 22 on a side away from the surrounding plate 23. At least part of the first reinforcing ribs 41 extend to be connected to the second folded edge 45, so as to further reinforce the structural strength of a connection region of the second branch plate region 12, the second connecting plate 22 and the surrounding plate 23.

[0065] Referring primarily to FIG. 5, the splash guard 130 of this embodiment further includes an auxiliary reinforcement structure 46. The auxiliary reinforcement structure 46 includes a reinforcing raised ring 46a and a plurality of connecting ribs 46b. The reinforcing raised ring 46a protrudes from a surface of the first branch plate region 11, a part of the connecting ribs 46b is connected between the reinforcing raised ring 46a and the first reinforcing ribs 41, a part of the connecting ribs 46b is connected between the reinforcing raised ring 46a and the second reinforcing ribs 42, and another part of the connecting ribs 46b is connected between the reinforcing raised ring 46a and the first folded edge 44. The auxiliary reinforcement structure 46 can play a role of auxiliary reinforcement.

[0066] FIG. 6 is an enlarged view of part A in FIG. 3, and FIG. 7 is a perspective view of the splash guard 130 of this embodiment from another viewing angle. The connection structure of the splash guard 130 with the chassis 110 and the vehicle body 120 will be introduced below in conjunction with FIG. 6 and FIG. 7.

[0067] Referring to FIG. 6 and FIG. 7, in this embodiment, the first connecting plate 21 is provided with a first connecting portion 213, and the first connecting portion 213 is configured to be connected to the subframe 111 of the chassis 110. The second connecting plate 22 is provided with a second connecting portion 223, and the second connecting portion 223 is configured to be connected to the front suspension lower control arm assembly 113 of the chassis 110. The base plate region 13 of the side plate body 10 is provided with a third connecting portion 14 near the first end D1, and the third connecting portion 14 is configured to be connected to a vehicle body side member 121 of the vehicle body 120.

[0068] Optionally, the first connecting portion 213 includes a first connecting hole K1

provided in the first connecting plate 21, the second connecting portion 223 includes a second connecting hole K2 provided in the second connecting plate 22, and the third connecting portion 14 includes a third connecting hole K3 provided in the base plate region 13. During connection, a first connecting member 141 (such as a bolt) can pass through the first connecting hole K1 to fixedly connect the first connecting plate 21 onto the chassis 110, a second connecting member 142 (such as a bolt) can pass through the second connecting hole K2 to fixedly connect the second connecting plate 22 onto the chassis 110, and a third connecting member 143 (such as a bolt) can fixedly connect the base plate region 13 to an outer side of the vehicle body side member 121.

[0069] In this embodiment, in the second direction A2, the third connecting portion 14 is located between the first connecting portion 213 and the second connecting portion 223, and the first connecting portion 213, the second connecting portion 223 and the third connecting portion 14 are substantially distributed in an isosceles triangle with the third connecting portion 14 as a vertex. In this way, when the vehicle body 120 generates undulating movement relative to the chassis 110, a force applied by the vehicle body 120 to the third connecting portion 14 of the splash guard 130 can be respectively transmitted to the first connecting portion 213 and the second connecting portion 223 on both sides, the force on the splash guard 130 is relatively balanced, and it is beneficial for the splash guard 130 to elastically deform along the first direction A1 to absorb a stroke difference generated by the relative movement between the chassis 110 and the vehicle body 120.

[0070] Optionally, the second connecting hole K2 is a strip-shaped hole extending along the second direction A2, so as to adapt to a deviation between a spacing between the first connecting hole K1 and the second connecting hole K2 and a spacing between two connection points on the chassis 110, thereby reducing structural accuracy requirements and assembly difficulty.

[0071] Continuing to refer to FIG. 6 and FIG. 7, in this embodiment, the first end D1 of the side plate body 10 of the splash guard 130 is provided with a guide structure 15 formed by bending and extending toward a side away from the lower plate body 20 along the third direction A3 (parallel to the width direction Y of the vehicle 100). Specifically, the guide structure 15 is formed by bending and extending from the base plate region 13 of the side plate body 10 near the first end D1, so that the guide structure 15 is substantially an arc-shaped flange.

[0072] In a connected state, the base plate region 13 of the side plate body 10 is overlapped on an outer side surface of the vehicle body side member 121, and the guide structure 15 bends and extends toward a side away from the outer side surface of the vehicle body side member 121.

[0073] When installing the splash guard 130 in this embodiment, the first connecting plate

21 and the second connecting plate 22 of the splash guard 130 are fixedly connected to the chassis 110, and after the vehicle body 120 is assembled to the chassis 110, the base plate region 13 of the splash guard 130 is fixedly connected to the vehicle body side member 121. This assembly connection manner can greatly facilitate the assembly of the splash guard 130, and can meet a durability requirement of the vehicle 100 after assembly.

[0074] During the process of assembling the vehicle body 120 to the chassis 110, the outwardly bent guide structure 15 can meet a guiding requirement for assembly with the vehicle body side member 121. In addition, when the vehicle body 120 is assembled to the chassis 110, the guide structure 15 can absorb an accumulated tolerance in the width direction Y of the vehicle 100 during the assembly process. In other words, in the process of assembling the vehicle body 120 to the chassis 110, under the guidance of the guide structure 15, an upper part of the side plate body 10 of the splash guard 130 (mainly the base plate region 13) can undergo a certain elastic deformation to adapt to a position tolerance between the vehicle body 120 and the splash guard 130 in the width direction Y of the vehicle 100, ensuring that after the vehicle body 120 is assembled, the base plate region 13 of the splash guard 130 can fit on the outer side surface of the vehicle body side member 121, so that the base plate region 13 is fixedly connected to the vehicle body side member 121.

[0075] Optionally, the first connecting hole K1 is located at an end of the first connecting plate 21 away from the side plate body 10, and the second connecting hole K2 is located at an end of the second connecting plate 22 away from the side plate body 10. In this way, the deformability of the side plate body 10 along the width direction Y of the vehicle 100 can be improved.

[0076] FIG. 8 is an enlarged view of part B in FIG. 7, and FIG. 9 is an enlarged view of part C in FIG. 7. FIG. 8 and FIG. 9 are respectively used to show structures of lower surfaces (i.e., surfaces facing a side of the chassis 110) of the first connecting plate 21 and the second connecting plate 22.

[0077] Referring to FIG. 8, in this embodiment, the first connecting plate 21 includes a first base plate section 211 and a first lowered plate section 212. The first base plate section 211 is bent and connected to the side plate body 10. The first lowered plate section 212 is connected to the first base plate section 211, and is lowered relative to the first base plate section 211 in a direction away from the first end D1, so that a first surface P1 of the first lowered plate section 212 away from the first end D1 and a second surface P2 of the first base plate section 211 away from the first end D1 are in a step shape staggered along the first direction A1. The first connecting plate 21 further includes a first reinforcement structure 50, and the first reinforcement

structure 50 includes a first raised flange 51, a second raised flange 52 and a plurality of fourth reinforcing ribs 53. The first connecting hole K1 is provided in the first lowered plate section 212. The first raised flange 51 and the second raised flange 52 protrude from the first surface P1, and spaced apart in inner and outer positions around the first connecting hole K1. The plurality of fourth reinforcing ribs 53 are arranged in a radial pattern centered on the first connecting hole K1, some of the fourth reinforcing ribs 53 have one end extending from the first surface P1 to the second surface P2, and the other end extending in the first surface P1 past the second raised flange 52 and connected to the first raised flange 51. There are also some fourth reinforcing ribs 53 reinforcingly connected between the first raised flange 51 and the second raised flange 52. The first raised flange 51, the second raised flange 52 and the plurality of fourth reinforcing ribs 53 are connected into an integral structure, and surfaces of the three on a side opposite to the first surface P1 are coplanar, for cooperating with a support surface supported on the chassis 110. This structure can increase the thickness and structural strength of a structure around the first connecting hole K1 of the first connecting plate 21, and prevent or mitigate force damage to a place where the first connecting plate 21 is connected to the chassis 110.

[0078] Referring to FIG. 9, the second connecting plate 22 includes a second base plate section 221 and a second lowered plate section 222. The second base plate section 221 is bent and connected to the side plate body 10. The second lowered plate section 222 is connected to the second base plate section 221, and is lowered relative to the second base plate section 221 in a direction away from the first end D1, so that a third surface P3 of the second lowered plate section 222 away from the first end D1 and a fourth surface P4 of the second base plate section 221 away from the first end D1 are in a step shape staggered along the first direction A1. The second connecting plate 22 further includes a second reinforcement structure 60, and the second reinforcement structure 60 includes a third raised flange 61, a fourth raised flange 62 and a plurality of fifth reinforcing ribs 63. The second connecting hole K2 is provided in the second lowered plate section 222, the third raised flange 61 and the fourth raised flange 62 protrude from the third surface P3, and spaced apart in inner and outer positions around the second connecting hole K2. The plurality of fifth reinforcing ribs 63 are arranged in a radial pattern centered on the second connecting hole K2, and some of the fifth reinforcing ribs 63 have one end extending from the third surface P3 to the fourth surface P4, and the other end extending in the third surface P3 past the fourth raised flange 62 and connected to the third raised flange 61. There are also some fifth reinforcing ribs 63 reinforcingly connected between the third raised flange 61 and the fourth raised flange 62. The third raised flange 61, the fourth raised flange 62 and the plurality of fifth reinforcing ribs 63 are connected into an integral structure, and surfaces

of the three on a side opposite to the third surface P3 are coplanar, for cooperating with a support surface supported on the chassis 110. This structure can increase the thickness and structural strength of a structure around the second connecting hole K2 of the second connecting plate 22, and prevent or mitigate force damage to a place where the second connecting plate 22 is connected to the chassis 110.

[0079] Based on the above description, the splash guard 130 in this embodiment generally has a structure in which the lower half has higher structural rigidity and the upper half has lower structural rigidity, thereby ensuring that it has sufficient strength to withstand external impacts and can absorb the stroke difference of the relative motion between the vehicle body 120 and the chassis 110.

[0080] Moreover, in the splash guard 130, the side plate body 10 located on the outer side of the vehicle body side member 121 of the vehicle body 120 in the width direction Y of the vehicle 100, and the lower plate body 20 located between the chassis 110 of the vehicle 100 and the vehicle body side member 121 in the height direction Z of the vehicle 100, can provide splash protection effects in both the width direction Y and the height direction Z of the vehicle 100. The clearance passage T1 of the lower plate body 20 can also meet the relief requirement for the object member 114 (such as the steering tie rod 114a, etc.) of the vehicle 100.

[0081] Meanwhile, the guide structure 15 of the splash guard 130 is conducive to guiding the splash guard 130 to deform and yield when the vehicle body 120 is assembled to the chassis 110, and to absorbing an accumulated tolerance in the width direction Y of the vehicle 100 during the assembly process.

[0082] In addition, the splash guard 130 is designed as a separate component from the wheel housing of the vehicle 100, allowing for more freedom in design and being less affected by the assembly process. Moreover, the splash guard 130 can maximize the shielding area in the width direction Y and height direction Z of the engine compartment of the vehicle 100, remedying the problem that the existing underbody guard at the bottom of the vehicle 100 and the wheel housing at the side of the vehicle are unable to provide sufficient shielding area due to constraints such as suspension swing arm motion envelope, wiring harness layout, and steering gear layout.

[0083] Finally, it should be noted that the installation position of the splash guard 130 in this embodiment is not limited to a position near the front wheel as illustrated; it can also be arranged near the rear wheel of the vehicle 100 or other suitable positions. For splash guards 130 arranged at different positions, adaptive modifications may be made by referring to the aforementioned technical concept.

[0084] The above embodiments are only used to illustrate the technical solutions of the

present application and are not limiting. Although the present application has been described in detail with reference to the above preferred embodiments, those of ordinary skill in the art ordinary technicians in this field should understand that modifications or equivalent substitutions to the technical solutions of the present application should not depart from the spirit and scope of the technical solutions of the present application.

CLAIMS

1. A splash guard for a vehicle, characterized in that the splash guard comprises:

a side plate body, wherein the side plate body has a first end and a second end that are opposite each other along a first direction; and

a lower plate body, wherein the lower plate body is bent and connected to the second end of the side plate body; the lower plate body comprises a first connecting plate, a surrounding plate and a second connecting plate; the first connecting plate and the second connecting plate are spaced apart along a second direction, the surrounding plate is connected between the first connecting plate and the second connecting plate and is recessed inwardly toward the first end along the first direction to define a clearance passage; the clearance passage is configured to allow an object member of the vehicle to pass through; and the second direction is perpendicular to or obliquely intersects the first direction,

wherein the first connecting plate and the second connecting plate are configured to be connected to a chassis of the vehicle, and the first end of the side plate body is configured to be connected to a vehicle body of the vehicle.

2. The splash guard according to claim 1, wherein

the first connecting plate is provided with a first connecting portion, and the first connecting portion is configured to be connected to a subframe of the chassis;

the second connecting plate is provided with a second connecting portion, and the second connecting portion is configured to be connected to a front suspension lower control arm assembly of the chassis;

the first end of the side plate body is provided with a third connecting portion, and the third connecting portion is configured to be connected to a vehicle body side member of the vehicle body; and

in the second direction, the third connecting portion is located between the first connecting portion and the second connecting portion.

3. The splash guard according to claim 2, wherein

the first connecting portion comprises a first connecting hole provided in the first connecting plate; and the second connecting portion comprises a second connecting hole provided in the second connecting plate, wherein the second connecting hole is a strip-shaped hole extending along the second direction; and

the third connecting portion comprises a third connecting hole provided at the first end of the side plate body.

4. The splash guard according to any one of claims 1 to 3, wherein

the splash guard further comprises a plurality of first reinforcing ribs;

the plurality of first reinforcing ribs are spaced apart in sequence along an intersection line of the lower plate body and the side plate body, and each of the first reinforcing ribs is connected between a portion of the side plate body close to the lower plate body and the lower plate body.

5. The splash guard according to any one of claims 1 to 3, wherein

the side plate body comprises a base plate region, a first branch plate region and a second branch plate region,

wherein the first branch plate region and the second branch plate region are connected to a side of the base plate region close to the second end, and are located at two sides of the clearance passage along the second direction; and

the first branch plate region is bent and connected to the first connecting plate, and the second branch plate region is bent and connected to the second connecting plate.

6. The splash guard according to claim 5, wherein

the splash guard further comprises a bent plate body; an edge of the first branch plate region away from the second branch plate region is a first edge, and an edge of the first connecting plate away from the second connecting plate is a second edge; and the bent plate body is bent and connected between the first edge and the second edge;

the splash guard further comprises a plurality of first reinforcing ribs; the plurality of first reinforcing ribs are spaced apart in sequence along the intersection line of the lower plate body and the side plate body, and each of the first reinforcing ribs is connected between a portion of the side plate body close to the lower plate body and the lower plate body;

at least one second reinforcing rib is connected at a corner between the bent plate body and the first branch plate region; and/or at least one third reinforcing rib is connected at a corner between the bent plate body and the first connecting plate; and/or,

the splash guard further comprises a first folded edge and a second folded edge; the first folded edge is formed by folding from a first side edge line in a same bending direction as the lower plate body, wherein the first side edge line comprises an edge line of the first branch plate region on a side away from the first connecting plate and an edge line of the bent plate body on a side away from the surrounding plate; at least part of the first reinforcing ribs and the second reinforcing rib extend to be connected to the first folded edge; the second folded edge is formed by folding from a second side edge line in a same bending direction as the lower plate body, wherein the second side edge line comprises an edge line of the second branch plate region on a side away from the surrounding plate and an edge line of the second connecting plate on a side

away from the surrounding plate; and at least part of the first reinforcing ribs extend to be connected to the second folded edge; and/or,

the splash guard further comprises an auxiliary reinforcement structure; the auxiliary reinforcement structure comprises a reinforcing raised ring and a plurality of connecting ribs, the reinforcing raised ring protrudes from a surface of the first branch plate region, a part of the connecting ribs is connected between the reinforcing raised ring and the first reinforcing rib, a part of the connecting ribs is connected between the reinforcing raised ring and the second reinforcing rib, and another part of the connecting ribs is connected between the reinforcing raised ring and the first folded edge.

7. The splash guard according to claim 5, wherein

in a direction approaching the first end along the first direction, a width of the base plate region along the second direction gradually decreases.

8. The splash guard according to claim 5, wherein

the surrounding plate is U-shaped with an opening toward the second end, and the first connecting plate and the second connecting plate are respectively bent and connected to two opposite sides of the surrounding plate along the second direction; and

the surrounding plate, the first branch plate region and the first connecting plate are pairwise bent and connected, and the surrounding plate, the second branch plate region and the second connecting plate are pairwise bent and connected.

9. The splash guard according to claim 1, wherein

the first end of the side plate body is provided with a guide structure formed by bending and extending to a side away from the lower plate body along a third direction, wherein the third direction is perpendicular to or obliquely intersects the first direction, and the third direction is perpendicular to or obliquely intersects the second direction.

10. A vehicle, characterized by comprising:

a chassis;

a vehicle body connected to the chassis; and

the splash guard according to any one of claims 1 to 9,

wherein the first direction is parallel to the height direction of the vehicle, the first connecting plate and the second connecting plate of the splash guard are connected to the chassis, and the first end of the side plate body of the splash guard is connected to the vehicle body.