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SUPPORT PART, DISPLAY MODULE, AND ELECTRONIC DEVICE

Abstract

A support part includes a bending region and a plane region. The bending region includes a first arc-shaped region, a transition region, and a second arc-shaped region. The first arc-shaped region is provided with a plurality of first through holes. The transition region is provided with a plurality of second through holes. The second arc-shaped region is provided with a plurality of third through holes. Lengths of the first through holes decrease in the width direction. Lengths of a portion of the second through holes decrease in the width direction, and lengths of another portion of the second through holes are the same in the width direction. Lengths of the plurality of third through holes are the same in the width direction.

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Background/Summary

CROSS-REFERENCE TO RELATED APPLICATIONS [0001] This application is a continuation of International Application No. PCT/CN2023/129391, filed on Nov. 2, 2023, which claims priority to Chinese Patent Application No. 202211379080.7, filed on Nov. 4, 2022. The disclosures of the aforementioned applications are hereby incorporated by reference in their entireties.

TECHNICAL FIELD
[0002] This application relates to the field of electronic device technologies, and in particular, to a support part, a display module, and an electronic device.
BACKGROUND
[0003] A support part in a display module is a key component in the entire display module. To achieve a bendable effect, a plurality of through holes are usually provided on the support part. Position distribution of the through holes is closely related to a bending radius, a rebound force, and the like, and an arrangement of the through holes is strongly related to a light-shadow crease.
[0004] A common support part usually includes three portions: a first arc-shaped region, an adhesive region, and a second arc-shaped region. Through holes are provided in the first arc-shaped region and the second arc-shaped region, and the support part is bonded to a hinge by disposing an adhesive in the adhesive region. However, because the adhesive may creep, a problem of the light-shadow crease existing after the display module is folded is prominent. In addition, a rebound force of the first arc-shaped region is large, resulting in a large rebound force of the display module.
SUMMARY
[0005] This application provides a support part, a display module, and an electronic device, to reduce a rebound force generated after a display module is folded, and alleviate a problem of a light-shadow crease on the display module.
[0006] According to a first aspect of embodiments of this application, a support part is provided and used in a foldable electronic device. The support part includes a bending region and a plane region. The bending region includes a first arc-shaped region, a transition region, and a second arc-shaped region that are sequentially connected. A side edge that is of the second arc-shaped region and that is away from the first arc-shaped region is connected to the plane region. The transition region corresponds to a support portion of a hinge in the electronic device, and is capable of moving relative to the support portion. The first arc-shaped region is provided with a plurality of first through holes. The transition region is provided with a plurality of second through holes. The second arc-shaped region is provided with a plurality of third through holes. A direction in which the first arc-shaped region faces the second arc-shaped region is a width direction, and a direction perpendicular to the width direction is a length direction. Lengths of the plurality of first through holes gradually decrease in the width direction. Lengths of a portion of the plurality of second through holes gradually decrease in the width direction, and lengths of another portion of the plurality of second through holes are the same in the width direction. Lengths of the plurality of third through holes are the same in the width direction.
[0007] In this support part, the first arc-shaped region is provided with the plurality of first through holes. In this way, a material volume of the first arc-shaped region is reduced, and a rebound force of the first arc-shaped region is reduced, so that bending is easier. In addition, a length of the first

arc-shaped region gradually decreases in the width direction, so that strength of the first arc-shaped region can be increased when the first arc-shaped region gets closer to the second arc-shaped region. When the support part is bent, the transition region between the first arc-shaped region and the second arc-shaped region is provided with the plurality of second through holes, so that a through hole design exists throughout the bending region. A tensile stress and a compressive stress generated in the bending region are approximately the same. When the tensile stress and the compressive stress can roughly offset each other, the support portion of the hinge does not need to support the bending region. When no force is applied to the bending region by the support portion, a problem of a light-shadow crease on the display module can be alleviated.
[0008] According to the first aspect, in a possible implementation, the plurality of first through holes are in several columns in the length direction, and first through holes in two adjacent columns are staggered in the width direction.
[0009] In this possible implementation, the plurality of first through holes are in the plurality of columns, and the plurality of first through holes are staggered in the width direction. In this way, the first arc-shaped region is arranged evenly as a whole. When the support part is bent, the rebound force generated in the first arc-shaped region is also even. This is more conducive to bending of the first arc-shaped region.
[0010] According to the first aspect, in a possible implementation, the plurality of second through holes are in several columns in the length direction. The portion of second through holes whose lengths gradually decrease are staggered in the width direction. Another portion of second through holes whose lengths are the same are provided abreast in the width direction.
[0011] In this possible implementation, the portion of second through holes are staggered in the width direction, so that a portion that is of the transition region and that is close to the first arc-shaped region generates a smaller rebound force, and a portion that is of the transition region and that is close to the first arc-shaped region can be bent more easily. In addition, another portion of second through holes are provided abreast in the width direction, so that a portion that is of the bending region and that is away from the first arc-shaped region has higher strength than a portion that is of the bending region and that is close to the first arc-shaped region.
[0012] According to the first aspect, in a possible implementation, the plurality of third through holes are in several rows in the width direction, and third through holes in two adjacent rows are staggered.
[0013] In this possible implementation, in the width direction, third through holes in two adjacent rows are staggered. The third through holes are provided more regularly than the first through holes. For example, third through holes in each row are provided equidistantly, and a region between two second through holes in a row exactly corresponds to a third through hole in a next row. In this way, strength of the second arc-shaped region is higher than strength of the first arc-shaped region. The first arc-shaped region can be bent more easily, and a support force of the second arc-shaped region for supporting a display panel in the display module can be increased.
[0014] According to the first aspect, in a possible implementation, in the width direction, hole widths of the first through hole, the second through hole, and the third through hole are all W, and 0.01 mm≤W≤50 mm.
[0015] In this possible implementation, the hole width W of the first through hole, the second through hole, or the third through hole is set to the range of 0.01 mm to 50 mm. In combination with arrangement manners of the first through holes, the second through holes, and the third through holes, this can reduce mass of the first arc-shaped region in the support part, so that the first arc-shaped region can generate a smaller rebound force. Compared with those of the first arc-shaped region, more materials of the second arc-shaped region can be reserved, to maintain the strength of the second arc-shaped region, so that the second arc-shaped region can support the display panel in the display module. The transition region is disposed between the first arc-shaped region and the second arc-shaped region, so that the transition region implements gradual transition

from a structure generating a smaller rebound force to a structure with specific strength. In this way, the first arc-shaped region and the second arc-shaped region are better obliquely connected, to avoid a possible fracture occurring when the first arc-shaped region directly reaches the second arc-shaped region.

[0016] According to the first aspect, in a possible implementation, in the width direction, hole spacings between any two adjacent first through holes, between any two adjacent second through holes, between any two adjacent third through holes, between any adjacent first through hole and second through hole, and between any adjacent second through hole and third through hole are all D**1**, and 0.01 mm≤D**1**≤50 mm.

[0017] In this possible implementation, the hole spacing D**1** between any two adjacent first through holes, between any two adjacent second through holes, between any two adjacent third through holes, between any adjacent first through hole and second through hole, or between any adjacent second through hole and third through hole is set to the range of 0.01 mm to 50 mm. In one aspect, the hole spacing D**1** between two adjacent first through holes, between two adjacent second through holes, or between adjacent first through hole and second through hole is set to be smaller. This can reduce a rebound force generated in the first arc-shaped region and a portion of the transition region. In another aspect, the hole spacing D**1** between two adjacent second through holes, between two adjacent third through holes, or between adjacent second through hole and third through hole is set to be larger. This can increase the strength of the second arc-shaped region and a portion of the bending region.

[0018] According to the first aspect, in a possible implementation, in the length direction, hole spacings between two adjacent first through holes, between two adjacent second through holes, and between two adjacent third through holes are all D**2**, and 0.01 mm≤D**2**≤10 mm.

[0019] In this possible implementation, in the length direction, the hole spacing D**2** between two first through holes, between two second through holes, or between two third through holes is set to the range of **0.01** mm to **10** mm, and the hole spacing D**2** may be set as required, so that generation of the rebound force in the first arc-shaped region and the portion of the transition region of the support part can be reduced. In this way, structural strength of the second arc-shaped region and the portion of the transition region can be increased, to support the display panel in the display module.

[0020] According to the first aspect, in a possible implementation, in the length direction, hole lengths of the first through hole, the second through hole, and the third through hole are all L, and 0.01 mm≤L≤10 mm.

[0021] In this possible implementation, in the length direction, the hole length L of the first through hole, the second through hole, or the third through hole is set to the range of 0.01 mm to 10 mm, and the hole spacing L may be set as required, so that generation of the rebound force in the first arc-shaped region and the portion of the transition region of the support part can be reduced. In this way, structural strength of the second arc-shaped region and the portion of the transition region can be increased, to support the display panel in the display module.

[0022] According to the first aspect, in a possible implementation, when observed in a direction perpendicular to the support part, the first through hole, the second through hole, and the third through hole are circular, elliptical, runway-shaped, or rectangular.

[0023] In this possible implementation, the first through hole, the second through hole, and the third through hole are set to be circular, elliptical, runway-shaped, or rectangular. Shapes of the first through hole, the second through hole, and the third through hole may be changed with reference to a force applied to the display module in a bent state or an unfolded state, to reduce a force applied to the support part.

[0024] According to a second aspect of embodiments of this application, a display module is provided, applied to a foldable electronic device, including a display panel, a protective layer, and the support part according to any implementation of the first aspect. The support part, the display panel, and the protective layer are stacked. The support part is disposed on a first surface of the

display panel. The protective layer is disposed on a second surface that is of the display panel and that is away from the first surface.
[0025] In this display module, the support part whose transition region is provided with the plurality of second through holes is used, to reduce a rebound force of the display panel and alleviate a problem of a light-shadow crease on the display panel. This can protect the display panel from being scratched. In addition, the protective layer may also be used as a surface in the display module for human-computer interaction, so that a user can directly perform an operation on the protective layer.
[0026] According to a third aspect of embodiments of this application, an electronic device is provided, including two housings, a hinge, and the display module according to any implementation of the second aspect. The two housings may be rotatably connected, and two opposite sides of the hinge are respectively fastened to the two housings. The display module includes two plane regions connected to the bending region. The two plane regions are symmetrically disposed on two sides of the bending region, and each plane region is connected to one of the housings.
[0027] The electronic device controls rotation by using the hinge, so that the two housings can have different rotation angles. The two housings rotate to drive the display module to be bent. The support part in the foregoing implementation is used in the display module, to reduce a rebound force of the display module generated after the two housings are bent, so that the display module is bent. In addition, the plurality of second through holes instead of an adhesive are provided in the transition region. This can alleviate a light-shadow crease of the display module, and a bending position of the display module is smoother.
[0028] According to the second aspect, in a possible implementation, the hinge includes a fastener, a connecting part, and a rotary arm. The fastener is rotatably connected to the connecting part. The connecting part is fastened to the rotary arm. The rotary arm is fastened to the housing.
[0029] In this possible implementation, the fastener is rotatably connected to the connecting part, so that the housing connected to the rotary arm can rotate, to implement folding of the two housings.
[0030] According to the second aspect, in a possible implementation, the fastener includes an arc-shaped block. The connecting part includes a support portion and a connecting portion connected to the support portion. The connecting portion is provided with an arc-shaped groove. The arc-shaped block is slidably disposed in the arc-shaped groove, and the connecting part is fastened to the rotary arm through the support portion.
[0031] In this possible implementation, the hinge can implement a rotatable connection between the rotary arm and the housings through sliding cooperation between the arc-shaped block and the arc-shaped groove, to facilitate folding of the electronic device.

Description

BRIEF DESCRIPTION OF THE DRAWINGS
[0032] FIG. **1** is a diagram of a structure of an electronic device according to an embodiment of this application, in which two housings are in a folded state;
[0033] FIG. **2** is a diagram in which the two housings of the electronic device shown in FIG. **1** are in an unfolded state, and surfaces of the two housings are located on a same plane;
[0034] FIG. **3** is an exploded view of the electronic device shown in FIG. **2**;
[0035] FIG. **4** is a diagram of a partial cross-sectional structure in which the electronic device shown in FIG. **1** is in a folded state and a display module is also in the folded state;
[0036] FIG. **5** is a diagram of a structure of a display module according to an embodiment of this application;

[0037] FIG. **6** is a schematic top view of a partial structure of a support part in the display module shown in FIG. **5**;
[0038] FIG. **7** is a diagram of an enlarged part corresponding to VII in the support part shown in FIG. **6**;
[0039] FIG. **8** shows a light-shadow crease presented after a support part in a display module is folded when a transition region is provided without a second through hole;
[0040] FIG. **9** shows a light-shadow crease presented after a support part in a display module provided in an embodiment of this application is folded when a transition region is provided with a second through hole.
[0041] FIG. **10** is a diagram of a local stress on a bending region of a support part obtained when a display module is in a folded state;
[0042] FIG. **11** is a diagram of a structure of a hinge according to an embodiment of this application, in which a rotary arm is in a folded state; and
[0043] FIG. **12** shows the hinge shown in FIG. **11**, in which a rotary arm of the hinge is in an unfolded state.

DESCRIPTION OF REFERENCE SIGNS OF MAIN COMPONENTS

TABLE-US-00001 Electronic device 001 Display module 100 Display panel 10 Support part 20 Bending region 21 First arc-shaped region 211 First through hole 2111 Transition region 212 Second through hole 2121 Second arc-shaped region 213 Third through hole 2131 Plane region 22 Protective layer 30 Adhesive 35 Hole width W Hole spacing D1 Hole spacing D2 Hole length L Center line O Radius R Included angle θ Width direction X Length direction Y Housing 400 First housing 400a Second housing 400b Housing 40 First housing 40a Second housing 40b Middle frame 42 First middle frame 42a Second middle frame 42b Rotary shaft 44 Hinge 500 Fastener 50 Arc-shaped block 51 Connecting part 60 Connecting portion 61 Arc-shaped groove 611 Support portion 62 Rotary arm 70

[0044] In the following specific implementations, the present invention is further described with reference to the accompanying drawings.

DETAILED DESCRIPTION OF ILLUSTRATIVE EMBODIMENTS

[0045] The following describes implementations of this application by using specific embodiments. A person skilled in the art may easily learn of other advantages and effects of this application based on content disclosed in this specification. Although descriptions of this application are provided with reference to preferred embodiments, this does not mean that features of this application are limited to this implementation. On the contrary, a purpose of describing this application with reference to an implementation is to cover another option or modification that may be derived based on claims of this application. To provide an in-depth understanding of this application, the following descriptions include a plurality of specific details. This application may be alternatively implemented without using these details. In addition, to avoid confusion or blurring a focus of this application, some specific details are omitted from the descriptions. It should be noted that embodiments of this application and features in the embodiments may be mutually combined in the case of no conflict.
[0046] The following terms “first”, “second”, and the like are merely used for description, and shall not be understood as an indication or implication of relative importance or implicit indication of a quantity of indicated technical features. Therefore, a feature limited by “first”, “second”, or the like may explicitly or implicitly include one or more features. In the descriptions of this application, unless otherwise stated, “a plurality of” means two or more than two. Orientation terms such as “up”, “down”, “left”, and “right” are defined relative to an orientation of schematic placement of components in the accompanying drawings. It should be understood that these directional terms are relative concepts and are used for relative description and clarification. These directional terms may vary accordingly depending on an orientation in which the components are placed in the accompanying drawings.

[0047] In this application, unless otherwise explicitly specified and limited, the term “connection” should be understood in a broad sense. For example, the “connection” may be a fastened connection, a detachable connection, or an integrated connection; and may be a direct connection or an indirect connection by using an intermediate medium. The term “and/or” used in this specification includes any and all combinations of one or more related listed items.
[0048] When the following embodiments are described in detail with reference to diagrams, for ease of description, a diagram indicating a partial structure of a component is partially enlarged not based on a general scale. In addition, the diagrams are merely examples, and should not limit the protection scope of this application herein.
[0049] To make the objectives, technical solutions, and advantages of this application clearer, the following further describes the implementations of this application in detail with reference to the accompanying drawings.
[0050] To facilitate understanding of a display module **100** provided in embodiments of this application, an application scenario is first described.
[0051] FIG. **1** is a diagram of a structure of an electronic device **001** according to an embodiment of this application, in which two housings **400** are in a folded state.
[0052] Refer to FIG. **1**. The electronic device **001** provided in embodiments of this application is an electronic device that may be folded. A display module **100** provided in embodiments of this application may be used in the foldable electronic device **001**. Specifically, “foldable” includes two parts that may rotate relative to each other, and a final form of the electronic device **001** may be changed through rotation, folding, or the like of the two parts. In different use conditions, a user may fold or unfold the electronic device **001** to meet different use requirements. For example, when the user needs to carry the electronic device **001**, the user may fold the electronic device **001** to reduce space occupied by the electronic device **001**, thereby improving portability. When the user needs to use the electronic device **001**, the user may unfold the electronic device **001**, so that a larger display area and a larger operation region can be presented for the user to view and interact with, thereby improving use convenience.
[0053] The electronic device **001** may be classified into a plurality of types. For example, the electronic device **001** may be a mobile phone, a tablet computer, a notebook computer, a wearable device, or an ebook. For example, the electronic device **001** in embodiments of this application is described by using a mobile phone as an example.
[0054] FIG. **2** is a diagram in which the two housings **400** of the electronic device **001** shown in FIG. **1** are in an unfolded state, and surfaces of the two housings **400** are located on a same plane. FIG. **3** is an exploded view of the electronic device **001** shown in FIG. **2**.
[0055] Refer to FIG. **2** and FIG. **3**. The electronic device **001** includes the display module **100**, the two housings **400**, and a hinge **500**. The two housings **400** may be rotatably connected, and two opposite sides of the hinge **500** are respectively fastened to the two housings **400**. Under an action of the hinge **500**, motions such as rotation and movement relative to each other may occur between the two housings **400**. The display module **100** is connected to the housings **400**, and is disposed on the surfaces of the housings **400**. When the electronic device **001** is unfolded, the surfaces of the two housings **400** on which the display module is disposed are approximately flush with each other, and the display module **100** is tiled on the surfaces of the housings **400**, to provide a larger display area and a larger operation region, thereby improving use performance. When the electronic device **001** is folded, one housing **400** rotates relative to the other housing **400**, and the display module **100** disposed on the housings **400** is driven by the housings **400** to bend. In the folded electronic device **001**, the display module **100** may be wrapped between the two housings **400** and the hinge **500** to protect the display module **100**. This prevents the display module **100** from being damaged by an external force, and can improve safety performance of the electronic device **001**.
[0056] If the display module **100** and the two housings **400** move synchronously, when the two housings **400** move relative to each other by 180° from the unfolded state to the folded state, parts

that are of the display module **100** and that correspond to the two housings **400** also move relative to each other by 180°. However, in a moving process of the display module **100** corresponding to the housings **400**, there is a bent portion. There is an arc-shaped protrusion on the bent portion, and an obvious light-shadow crease is formed on the display module **100** due to repeated folding. In addition, because the display module **100** is driven by the housings **400** to bend, there is a rebound force at a bending position inside the display module **100**. As a result, there is a small gap between the two housings **400**, so that the two housings **400** cannot completely overlap each other.

[0057] FIG. **4** is a diagram of a partial cross-sectional structure in which the electronic device **001** shown in FIG. **1** is in the folded state and the display module **100** is also in the folded state.

[0058] Refer to FIG. **4**. When the housings **400** are operated to fold from the unfolded state, the housings **400** also drive the display module **100** to fold.

[0059] FIG. **5** is a diagram of a structure of the display module **100** according to an embodiment of this application. FIG. **6** is a schematic top view of a structure of a support part **20** in the display module **100** shown in FIG. **5**. FIG. **7** is a diagram of an enlarged part of the support part **20** shown in FIG. **6**.

[0060] Refer to FIG. **5**, FIG. **6**, and FIG. **7**. Embodiments of this application provide the display module **100**. The display module **100** may be used in the electronic device **001** in the foregoing embodiments.

[0061] The display module **100** includes a display panel **10**, the support part **20**, and a protective layer **30**. The display panel **10**, the support part **20**, and the protective layer **30** are stacked. The support part **20** is disposed on a first surface of the display panel **10**, and the protective layer **30** is disposed on a second surface that is of the display panel **10** and that is away from the first surface. With reference to an example in FIG. **5**, the support part **20** is disposed on a lower surface of the display panel **10**, and the protective layer **30** is disposed on an upper surface of the display panel **10**. The support part **20** is mainly configured to support the display panel **10** stacked with the support part **20**, so that the display panel **10** has specific strength, to facilitate an interactive operation of the user. The display module **100** may be an OLED (Organic Light-Emitting Diode) display, or may be a display of a type like an LCD (Liquid Crystal Display) or a micro-LED (Micro Light-Emitting Diode) display. Alternatively, the display module **100** may be a display like a QLED (Quantum Dot Light-Emitting Diode) display. For example, in this embodiment of this application, an OLED display is used as the display module **100** for description.

[0062] The display panel **10** may be mainly configured to display a picture, and may be used as an interaction interface that indicates to perform a series of interaction actions, for example, touch operations such as tapping, sliding, and pressing. To display the picture, the display panel **10** may include an organic electroluminescence layer and a pixel drive circuit.

[0063] The support part **20** includes a bending region **21** and a plane region **22**. The bending region **21** is connected to the plane region **22**. When the display panel **10** and the support part **20** are stacked, the display panel **10** is in contact with the bending region **21** and the plane region **22**. The display panel **10** and the support part **20** may be bonded and fastened to each other by using an adhesive **35**. For example, the display panel **10** and the support part **20** may be bonded to each other by using an OCA (Optically Clear Adhesive). The bending region **21** corresponds to a bending position of the display panel **10**.

[0064] Refer to FIG. **5**. The bending region **21** is a region in which the support part **20** can be bent when the display module **100** is folded. After the display module **100** is in the unfolded state, the support part **20** is unfolded accordingly, and the bending region **21** changes from a bent state to a planar state. The plane region **22** is a region other than a bent region of the support part **20** existing when the display module **100** is folded. After the display module **100** is in the unfolded state, and the support part **20** is unfolded accordingly, the plane region **22** still remains in an original state.

[0065] The support part **20** is a symmetrical structure. The support part **20** is symmetrically disposed by using a center line O of the bending region **21** as a symmetry axis. It may be understood that this means that the support part **20** includes two plane regions **22**, and the two plane regions **22** are respectively connected to two opposite sides of the bending region **21**. An overall contour formed by the bending region **21** and the two plane regions **22** is approximately the same as that of the display panel **10**, so that each position of the display panel **10** can be fully supported. This increases strength of the display panel **10**.

[0066] Refer to FIG. **4**, FIG. **6**, and FIG. **7**. In the bending region **21** included in the support part **20**, the bending region **21** includes a first arc-shaped region **211**, a transition region **212**, and a second arc-shaped region **213** that are sequentially connected. A side edge that is of the second arc-shaped region **213** and that is away from the first arc-shaped region **211** is connected to the plane region **22**. The transition region **212** corresponds to a support portion **62** of the hinge **500** in the electronic device **001**, and the transition region **212** is capable of moving relative to the support portion **62**. To clearly show the first arc-shaped region **211**, the transition region **212**, and the second arc-shaped region **213**, the first arc-shaped region **211**, the transition region **212**, and the second arc-shaped region **213** are separated by dashed lines. It may be understood that the bending region **21** is symmetrically disposed by using the center line O of the first arc-shaped region **211** as the symmetry axis. In other words, the two opposite sides of the bending region **21** are separately connected to the transition region **212**. A side edge that is of each transition region **212** and that is away from the first arc-shaped region **211** is connected to one second arc-shaped region **213**, and a side edge that is of each second arc-shaped region **213** and that is away from the first arc-shaped region **211** is connected to one plane region **22**.

[0067] Refer to FIG. **6** and FIG. **7**. To better describe the structure of the display module **100**, a direction in which the first arc-shaped region **211** faces the second arc-shaped region **213** is considered as a width direction X, and a direction that is perpendicular to the width direction X and parallel to the center line O of the bending region **21** is considered as a length direction Y. The first arc-shaped region **211** is provided with a plurality of first through holes **2111**. The transition region **212** is provided with a plurality of second through holes **2121**. The second arc-shaped region **213** is provided with a plurality of third through holes **2131**. Lengths of the plurality of first through holes **2111** gradually decrease in the width direction X. Lengths of a portion of the plurality of second through holes **2121** gradually decrease in the width direction X, and lengths of another portion of the plurality of second through holes **2121** are the same in the width direction X. Lengths of the plurality of third through holes **2131** are the same in the width direction.

[0068] In an embodiment, the plurality of first through holes **2111** are in several columns in the length direction Y, and first through holes **2111** in two adjacent columns are staggered in the width direction X. A partial region from the center line O of the first arc-shaped region **211** to a side edge that is of the transition region **212** and that is close to the first arc-shaped region **211** is used for description. In the length direction Y, the plurality of first through holes **2111** are in a plurality of columns, and several first through holes **2111** in each column are provided approximately equidistantly. The several first through holes **2111** in the column and several first through holes **2111** in an adjacent column are staggered.

[0069] For example, in a staggered arrangement, a column that is close to the center line O of the first arc-shaped region **211** is a first column. There is a spacing between several first through holes **2111** in the first column. In the width direction X, in a second column adjacent to the first column, a first through hole **2111** is provided at a position that is in the second column and that corresponds to the spacing. In other words, a region between two adjacent first through holes **2111** in the first column corresponds to the first through hole **2111** in the second column. In addition, because the two transition regions **212** are symmetrically disposed along the center line O of the first arc-shaped region **211**, in a region from the center line O of the first arc-shaped region **211** to another side edge that is of the other transition region **212** and that is close to the first arc-shaped region **211**, an arrangement manner of a plurality of first through holes **2111** is the same as that described in the foregoing content.

[0070] The plurality of first through holes **2111** are in several columns, and a first through hole **2111** in each column and a first through hole **2111** in an adjacent column are staggered. In this way, the plurality of first through holes **2111** in the first arc-shaped region **211** are evenly arranged as a whole. In addition, after the plurality of first through holes **2111** are provided, a material volume of the first arc-shaped region **211** is reduced, and a tensile stress and a compressive stress generated around the first through holes **2111** are reduced. Therefore, a rebound force is reduced, so that the first arc-shaped region **211** is bent more easily.

[0071] Lengths of the plurality of first through holes **2111** that are staggered gradually decrease in the width direction. In this way, when the display module **100** is folded, a central position of the first arc-shaped region **211** is bent more easily. For example, the lengths of the several first through holes **2111** in the first column are longer than the lengths of the first through holes **2111** in the second column, and a rebound force generated in the first column is smaller than that generated in the second column. In this way, bending can be easier. However, when the support part **20** is easy to bend, the support part **20** also supports the display panel **10**. Therefore, specific strength is required to support the display panel **10**. In the width direction X, the lengths of the first through holes **2111** gradually decrease. In this case, an area that is of the first arc-shaped region **211** and that corresponds to the display panel **10** gradually increases, so that strength for supporting the display panel **10** can be gradually increased. The lengths of the plurality of first through holes **2111** gradually decrease in the width direction X, so that a rebound force difference between first through holes **2111** in columns is small, and a force applied to the display panel **10** corresponding to the first arc-shaped region **211** is even. This can improve a case in which a position that is of the display panel **10** and that corresponds to the first arc-shaped region **211** is detached from the first arc-shaped region **211**, thereby avoiding a problem of a light-shadow crease caused by the display panel **10** being not supported by the support part **20** at a bending position.

[0072] Refer to FIG. **7**. In an embodiment, the plurality of second through holes **2121** are in several columns in the length direction Y. A portion of second through holes **2121** whose lengths gradually decrease are staggered in the width direction X, and another portion of second through holes **2121** whose lengths are the same are provided abreast in the width direction X. The transition region **212** may be roughly divided into a first region and a second region. The first region is a portion close to the bending region **21**, and the second region is a portion close to the second arc-shaped region **213**. In the first region, in the length direction, a portion of second through holes **2121** are in a plurality of columns, and several second through holes **2121** in each column are provided approximately equidistantly. The several second through holes **2121** in the column and several second through holes **2121** in an adjacent column are staggered.

[0073] For example, in the first region, in a staggered arrangement, a column of second through holes **2121** that is close to the first arc-shaped region **211** is a first column, and there is a spacing between several second through holes **2121** in the first column. In a second column adjacent to the first column, a second through hole **2121** is provided at a position that is in the second column and that corresponds to the spacing. In other words, a region between two adjacent second through holes **2121** in the first column corresponds to the second through hole **2121** in the second column. The portion of second through holes **2121** are staggered, so that the portion of second through holes **2121** in the first region are evenly arranged as a whole. In addition, after the portion of second through holes **2121** are provided in the first region, a material volume of the transition region **212** is reduced, and a tensile stress and a compressive stress generated around the second through holes **2121** are reduced. Therefore, a rebound force is reduced, so that the transition region **212** is bent, and there is a good process of connection between the transition region **212** and the first arc-shaped region **211**. In addition, the lengths of the portion of second through holes **2121** in the first region gradually decrease in the width direction X, so that an area that is of the transition region **212** and that corresponds to the display panel **10** can be increased. In this way, the strength for supporting the display panel **10** can be gradually increased.

[0074] For another example, in the second region in the width direction X, another portion of second through holes **2121** are in a plurality of columns, and several second through holes **2121** in each column are provided approximately equidistantly; and another portion of second through holes **2121** are in a plurality of rows, and two adjacent second through holes **2121** in each row are provided approximately equidistantly. In addition, in the length direction Y, second through holes **2121** in two adjacent rows are staggered.
[0075] In a staggered arrangement in the second region, a second through hole **2121** in a first row is provided between two adjacent second through holes **2121** in a second row. In other words, a portion of second through holes **2121** in the second region are arranged according to an abreast and staggered rule. Because the two transition regions **212** are symmetrically disposed along the center line O of the first arc-shaped region **211**, an arrangement manner of a first region and a second region in the other transition region **212** is the same as that described in the foregoing content. The another portion of second through holes **2121** are arranged regularly, so that the transition region **212** can be better transitionally connected to the second arc-shaped region **213** through the second region.
[0076] In the second region, the portion of second through holes **2121** that are staggered are regularly arranged abreast in the width direction X. Compared with that in the first region in which the second through holes **2121** are staggered in the width direction X, no through hole is provided between second through holes **2121** in two rows in the second region, so that structural strength of the second region is increased. In this way, the strength for supporting the display panel **10** can be increased.
[0077] Both detachment of the display panel **10** in the display module **100** from the support part **20** in the display module **100** and a force applied by the support portion **62** in the housing **400** to the display panel **10** may cause a light-shadow crease on the display module **100**.
[0078] After the display module **100** is bent, the second through holes **2121** in the transition region **212** are deformed under an action of the tensile stress and the compressive stress. For example, when the display module **100** is unfolded, a projection area of the second through holes **2121** on the housing **400** is A. When the display module **100** is bent, a projection area of the second through holes **2121** on the housing **400** is B. During bending, a connection portion between the second through holes **2121** is subject to a pulling force. Therefore, the second through holes **2121** in the transition region **212** are capable of moving relative to the support portion **62**, and consequently the area B is slightly larger than the area A. After the display module **100** is bent, the tensile stress and the compressive stress generated in the transition region **212** are balanced, and the support portion **62** does not need to support the display module **100**. This can reduce the force applied by the support portion **62** to the display panel **10** through the transition region **212**, thereby alleviating the problem of the light-shadow crease on the display module **100**. In addition, because the force applied to the transition region **212** is balanced, the force applied to the display panel **10** corresponding to the transition region **212** is more even. This can avoid a case in which the display panel **10** is detached from the support part **20**, thereby alleviating the problem of the light-shadow crease on the display module **100**.
[0079] Refer to FIG. **7**. In an embodiment, the plurality of third through holes **2131** are in several rows in the width direction X, and third through holes **2131** in two adjacent rows are provided abreast. In the length direction Y, the plurality of third through holes **2131** are in a plurality of columns, and several third through holes **2131** in each column are provided approximately equidistantly. In the width direction X, the plurality of third through holes **2131** are in a plurality of rows, and two adjacent third through holes **2131** in each row are provided approximately equidistantly. In addition, in the length direction Y, third through holes **2131** in two adjacent rows are staggered.
[0080] An arrangement manner of the another portion of second through holes **2121** in the second region in the transition region **212** is approximately the same as an arrangement manner of the

plurality of third through holes **2131** in the second arc-shaped region **213**. It may be understood that an arrangement manner of the other second arc-shaped regions **213** is the same as that described in the foregoing content. The plurality of third through holes **2131** in the second arc-shaped region **213** are provided abreast in the width direction X and staggered in the length direction Y, so that the second arc-shaped region **213** can function for bending transition. In this way, the bending region **21** can be freely bent, and it is ensured that the bending region **21** has specific strength at a position of the second arc-shaped region **213**. The transition region **212** is connected to the second arc-shaped region **213** through the second region. This can ensure that a connection position between the transition region **212** and the second arc-shaped region **213** can be freely bent and has specific strength.

[0081] The first through holes **2111**, the second through holes **2121**, and the third through holes **2131** in the bending region **21** are staggered. This can avoid a problem of a possible fracture occurring when the plurality of first through holes **2111**, the plurality of second through holes **2121**, and the plurality of third through holes **2131** are arranged in rows or columns.

[0082] Refer to FIG. **7** again. In an embodiment, when observed in a direction in which the support part **20** stacks with the display panel **10**, that is, in a direction perpendicular to the support part **20**, the first through hole **2111**, the second through hole **2121**, and the third through hole **2131** are circular, elliptical, runway-shaped, or rectangular. For example, the first through hole **2111**, the second through hole **2121**, and the third through hole **2131** in this application may be in a runway shape. The runway shape is a shape formed by two ends which are approximately semicircles and a rectangle between the two semicircles in the length direction Y. It may be understood that, in another embodiment, the first through hole **2111** may be in the runway shape, and the second through hole **2121** may be elliptical. In other words, the first through hole **2111**, the second through hole **2121**, and the third through hole **2131** may be in different shapes.

[0083] Refer to FIG. **7**. In an embodiment, in the width direction X, hole widths of the first through hole **2111**, the second through hole **2121**, and the third through hole **2131** are all W, and a range of W is 0.01 mm≤W<50 mm. The hole width W is a width of the hole in the width direction X. The hole width W may be 1 mm, 5 mm, 10 mm, 15 mm, 20 mm, 25 mm, 30 mm, 35 mm, 40 mm, 45 mm, 50 mm, or the like.

[0084] The hole width W is set to the range of 0.01 mm to 50 mm. In combination with the arrangement manners of the first through holes **2111**, the second through holes **2121**, and the third through holes **2131**, this can reduce mass of the first arc-shaped region **211** in the support part **20**, so that the first arc-shaped region **211** can generate a smaller rebound force. Compared with those of the first arc-shaped region **211**, more materials of the second arc-shaped region **213** can be reserved, to maintain strength of the second arc-shaped region **213**, so that the second arc-shaped region **213** can support the display panel **10** in the display module **100**. The transition region **212** is disposed between the first arc-shaped region **211** and the second arc-shaped region **213**, so that the transition region **212** implements gradual transition from a structure generating a smaller rebound force to a structure with specific strength. In this way, the first arc-shaped region **211** and the second arc-shaped region **213** are better obliquely connected, to avoid a possible fracture occurring when the first arc-shaped region **211** directly reaches the second arc-shaped region **213**.

[0085] For example, the hole width W of the first through hole **2111** is set to 15 mm; the hole width W of the second through hole is set to 10 mm or 6 mm in the width direction; and the hole width W of the third through hole **2131** is set to 5 mm. The hole width W of the first through hole **2111** is larger, so that the first arc-shaped region **211** is easier to bend. The hole width W of the third through hole **2131** is smaller, so that structural strength of the second arc-shaped region **213** is higher than that of the first arc-shaped region **211**, to increase a support force of the support part **20** for the display panel **10**. The hole width W of the transition region **212** gradually decreases in the width direction, so that a position that is in the transition region **212** and that is close to the first arc-shaped region **211** is easier to bend, and structural strength of a position that is in the transition

region **212** and that is close to the second arc-shaped region **213** is increased.
[0086] Refer to FIG. **7**. In an embodiment, in the width direction X, hole spacings between any two adjacent first through holes **2111**, between any two adjacent second through holes **2121**, between any two adjacent third through holes **2131**, between any adjacent first through hole **2111** and second through hole **2121**, and between any adjacent second through hole **2121** and third through hole **2131** are all D**1**, and 0.01 mm≤D**1**≤50 mm. The hole spacing D**1** is a distance between two adjacent through holes in the width direction X. The two adjacent through holes may be two adjacent first through holes **2111**, two adjacent second through holes **2121**, two adjacent third through holes **2131**, adjacent first through hole **2111** and second through hole **2121**, or adjacent second through hole **2121** and third through hole **2131**.
[0087] The hole spacing D**1** may be 1 mm, 5 mm, 10 mm, 15 mm, 20 mm, 25 mm, 30 mm, 35 mm, 40 mm, 45 mm, 50 mm, or the like.
[0088] The hole spacing D**1** is set to the range of 0.01 mm to 50 mm. In one aspect, the hole spacing D**1** between two adjacent first through holes **2111**, between two adjacent second through holes **2121**, or between adjacent first through hole **2111** and second through hole **2121** is set to be smaller. This can reduce a rebound force generated in the first arc-shaped region **211** and a portion of the transition region **212**. In another aspect, the hole spacing D**1** between two adjacent second through holes **2121**, between two adjacent third through holes **2131**, or between adjacent second through hole **2121** and third through hole **2131** is set to be larger. This can increase strength of the second arc-shaped region **213** and a portion of the transition region **212**.
[0089] For example, the hole spacing D**1** between two first through holes **2111** is set to 3 mm; the hole spacing D**1** between two second through holes **2121** is set to 5 mm; and the hole spacing D**1** between two third through holes **2131** is set to 8 mm. The hole spacing Di between two first through holes **2111** is set to be less than the hole spacing D**1** between two second through holes **2121** and less than the hole spacing D**1** between two third through holes **2131**. This can reduce the rebound force generated in the first arc-shaped region **211**, so that the support part **20** can be bent. The hole spacing D**1** of the second arc-shaped region **213** is set to be larger. This can increase an area that is of the second arc-shaped region **213** and that corresponds to the display panel **10** and increase the strength of the second arc-shaped region **213**, thereby increasing the support force for the display panel **10**.
[0090] Refer to FIG. **7**. In an embodiment, in the length direction Y, hole spacings between two adjacent first through holes **2111**, between two adjacent second through holes **2121**, and between two adjacent third through holes **2131** are all D**2**, and 0.01 mm≤D**2**≤10 mm. The hole spacing D**2** is a distance in the length direction Y, for example, a distance between two adjacent first through holes **2111**, namely, a spacing between two adjacent first through holes **2111** in several first through holes **2111** in each column.
[0091] The hole spacing D**2** may be 0.05 mm, 0.1 mm, 0.15 mm, 0.2 mm, 0.25 mm, 0.3 mm, 0.35 mm, 0.4 mm, 0.45 mm, 0.5 mm, 0.55 mm, 0.6 mm, 0.65 mm, 0.7 mm, 0.75 mm, 0.8 mm, 0.85 mm, 0.9 mm, 0.95 mm, or the like.
[0092] The hole spacing D**2** is set to the range of 0.01 mm to 10 mm, and the hole spacing D**2** may be set as required, so that the support part **20** can reduce generation of the rebound force in the first arc-shaped region **211** and the portion of the transition region **212**. In this way, structural strength of the second arc-shaped region **213** and the portion of the transition region **212** can be increased, to support the display panel **10** in the display module **100**.
[0093] For example, the hole spacing D**2** between two adjacent first through holes **2111** is set to 3 mm; the hole spacing D**2** between two adjacent second through holes **2121** is set to 6 mm; and the hole spacing D**2** between two adjacent third through holes **2131** is set to 8 mm. In the width direction X, the hole spacing D**2** gradually increases, so that the bending region **21** can be easily bent and has specific strength. In this way, the bending region **21** can meet a requirement of a preset force. The preset force means that the bending region **21** can be easily bent while supporting

the display panel **10**.

[0094] Refer to FIG. **7**. In an embodiment, in the length direction Y, hole lengths of the first through hole **2111**, the second through hole **2121**, and the third through hole **2131** are all L, and 0.01 mm≤L≤10 mm. The first through hole **2111** is used as an example. The hole length Lis a distance between two opposite ends of the first through hole **2111** in the length direction Y. It may be understood that the same applies to the second through hole **2121** and the third through hole **2131**.

[0095] The hole length L may be 0.05 mm, 0.1 mm, 0.15 mm, 0.2 mm, 0.25 mm, 0.3 mm, 0.35 mm, 0.4 mm, 0.45 mm, 0.5 mm, 0.55 mm, 0.6 mm, 0.65 mm, 0.7 mm, 0.75 mm, 0.8 mm, 0.85 mm, 0.9 mm, 0.95 mm, or the like.

[0096] The hole length L is set to the range of 0.01 mm to 10 mm, and the hole spacing L may be set as required, so that the support part **20** can reduce generation of the rebound force in the first arc-shaped region **211** and the portion of the transition region **212**. In this way, structural strength of the second arc-shaped region **213** and the portion of the transition region **212** can be increased, to support the display panel **10** in the display module **100**.

[0097] For example, the hole length L of the first through hole **2111** is 8 mm, and the hole lengths L of the first through holes **2111** gradually decrease when the first through holes **2111** get closer to the transition region **212**. The hole lengths L of a portion of second through holes **2121** in the second through holes **2121** are 6 mm. When the portion of second through holes **2121** get closer to the second arc-shaped region **213**, the hole lengths L of the second through holes **2121** gradually decrease. The hole lengths L of another portion of second through holes **2121** are 4 mm. When the portion of second through holes **2121** get closer to the second arc-shaped region **213**, the hole lengths L of the second through holes **2121** remain unchanged. The hole length L of the third through hole **2131** is set to 3 mm. The hole length L of the first through hole is set to be greater than the hole lengths L of the second through hole **2121** and the third through hole **2131**. This can reduce the rebound force of the first arc-shaped region **211**, thereby facilitating bending of the support part **20**. The hole length L of the third through hole **2131** is smaller, so that an area in which the second arc-shaped region **213** can support the display panel **10** is increased. In this way, the strength for supporting the display panel **10** is increased.

[0098] It may be understood that the hole width W, the hole spacing D**1**, the hole spacing D**2**, and the hole length L may alternatively be sizes that are not listed one by one in respective ranges. For example, the hole width W may alternatively be 0.08 mm, 0.12 mm, or the like.

[0099] When the display module **100** is folded, sizes of the first through holes **2111**, the second through holes **2121**, and the third through holes **2131** are set to be within these value ranges based on the foregoing content. In this way, when the bending region **21** is bent, a bending radius and a bending included angle of the bending region **21** can meet a design requirement. In addition, the force applied to the display panel **10** disposed on the support part **20** is more even.

[0100] FIG. **8** shows a light-shadow crease presented after the support part **20** in the display module **100** is folded when the transition region **212** is provided without the second through hole **2121**. FIG. **9** shows a light-shadow crease presented after the support part **20** in the display module **100** provided in an embodiment of this application is folded when the transition region **212** is provided with the second through hole **2121**.

[0101] A common support part **20** is mainly applicable to an application scenario in which a bending radius R is large and a bending arc-shaped length is long, for example, a notebook computer. However, in an application scenario in which a bending radius is less than 2 mm and a bending arc-shaped length is less than 20 mm, if the common support part **20** is used, a rebound force of the support part **20** increases, and a light-shadow crease in the bending region **21** is serious, as shown in FIG. **8**. In addition, in a process of folding, a compressive stress originally generated in the bending region **21** is high and is concentrated in the first arc-shaped region **211**. Therefore, the first arc-shaped region **211** is a key part that reflects the rebound force and the light-shadow crease. When the compressive stress is higher than a tensile stress, the support part **20** generates the rebound force, and consequently the display module **100** may not be completely folded.

[0102] In this application, the transition region **212** is provided with the plurality of second through holes **2121**, instead of being bonded to the hinge **500** by using the adhesive **35**. In this way, the entire bending region **21** is an openwork structure formed by the plurality of first through holes **2111**, the plurality of second through holes **2121**, and the plurality of third through holes **2131**. After the second through holes **2121** are provided in the transition region **212**, the compressive stress of the first arc-shaped region **211** is reduced. When the compressive stress basically remains unchanged, the compressive stress and the tensile stress are balanced. This can reduce the rebound force generated in the first arc-shaped region **211**. In addition, when the tensile stress and the compressive stress of the first arc-shaped region **211** are balanced, the support force applied by the bending region **21** to the display panel **10** is also balanced.

[0103] In addition, after the plurality of second through holes **2121** are provided in the transition region **212**, no adhesive is used to bond the transition region **212** to the support portion **62** of the hinge **500**. When the force applied to the first arc-shaped region **211** is balanced, no force is generated on the support portion **62** of the hinge **500**. Therefore, the support portion **62** of the hinge **500** does not generate any force in the first arc-shaped region **211**. The display panel **10** can be prevented from being detached from the bending region **21**, and the force generated by the hinge **500** on the display panel **10** through the support part **20** can be eliminated. This alleviates the problem of the light-shadow crease on the display panel **10** shown in FIG. **9**.

[0104] FIG. **10** is a diagram of a local stress on the bending region **21** of the support part **20** obtained when the display module **100** is in the folded state.

[0105] Refer to FIG. **4** and FIG. **10**. The transition region **212** is no longer bonded to the support portion **62** of the hinge **500**, and the plurality of second through holes **2121** are provided in the transition region **212**. The first arc-shaped region **211** can directly extend to the second arc-shaped region **213** through the transition region **212**, so that the first arc-shaped region **211** and the second arc-shaped region **213** are no longer separated. When the display module **100** is bent, the bending region **21** of the support part **20** may be roughly in a free-water droplet shape. “Roughly” may be understood as “look like”. The bending region **21** roughly in the free-water droplet shape has a small bending radius R and a small tilt included angle θ, and is applicable to the display module **100** whose bending radius R is less than 2 mm, whose total arc-shaped length is less than 20 mm, and whose bending included angle θ is small.

[0106] The bending region **21** and the plane region **22** may be an integrally formed structure. It may be understood that the bending region **21** and the plane region **22** may alternatively be disposed as a detachable structure. When the bending region **21** and the plane region **22** are a detachable structure, the bending region **21** may be disposed as a structure similar to a “bracket”. The bending region **21** of the “bracket” structure may be bent. The support part **20** may be made of a metal part or a fiber composite part. The first through holes **2111**, the second through holes **2121**, and the third through holes **2131** on the support part **20** may be formed through etching.

[0107] Refer to FIG. **5** again. The protective layer **30** is disposed on a side that is of the display panel **10** and that is away from the support part **20**. The protective layer **30** is mainly configured to protect the display panel **10**, and the protective layer **30** may be further used as an outer surface of the display module **100** for the user to perform a touch operation. The protective layer **30** may be made of ultra-thin glass (UTG), so that the protective layer **30** can also implement functions such as being bent and folded.

[0108] It may be understood that the protective layer **30** may alternatively be made of another material having an equivalent effect or function, for example, may alternatively be made of polyimide (PI).

[0109] The protective layer **30** may alternatively be bonded and fastened to the display panel **10** by using the adhesive **35**, for example, bonded by using an OCA (Optically Clear Adhesive). When the support part **20** is bonded to the display panel **10** by using the OCA, the OCA does not flow into the third through hole **2131** because the OCA has a specific modulus.

[0110] Refer to FIG. **3** again. The two housings **400** are symmetrically disposed on two sides of the hinge **500**, and the hinge **500** drives the two housings **400** to rotate relative to each other.

[0111] Each housing **400** includes a housing **40** and a middle frame **42** (the middle frame **42** in FIG. **3** is processed to be transparent). The housing **40** has an accommodating cavity, and the middle frame **42** is disposed in the accommodating cavity and may be exposed from the housing **40**. The housing **400** further includes a rotary shaft **44**. A guide groove is provided at an end that is of the housing **40** and that is away from the hinge **500**. The rotary shaft **44** rotatably cooperates with the housing **40** through the guide groove, and the middle frame **42** is rotatably connected to the rotary shaft **44**. The rotary shaft **44** enables the housing **40** to rotatably cooperate with the middle frame **42**. As the middle frame **42** and the housing **40** rotate relative to each other, a side that is of the middle frame **42** and that is close to the hinge **500** can be accommodated in the accommodating cavity.

[0112] For ease of description, the two housings **400** are named a first housing **400***a* and a second housing **400***b*. Correspondingly, a housing of the first housing **400***a* is a first housing **40***a*, and the middle frame of the first housing **400***a* is a first middle frame **42***a*. A housing of the second housing **400***b* is a second housing **40***b*, and the middle frame of the second housing **400***b* is a second middle frame **42***b*. The display module **100** is fastened to a surface that is of the middle frame **42** and that is away from the accommodating cavity. The display module **100** is fastened to the first middle frame **42***a* and the second middle frame **42***b* through the two plane regions **22** in the support part **20**. The two plane regions **22** may be bonded and fastened to the first middle frame **42***a* and the second middle frame **42***b* by using the adhesive **35**.

[0113] It may be understood that the two plane regions **22** may alternatively be fastened to the first middle frame **42***a* and the second middle frame **42***b* in another manner, for example, may alternatively be fastened through clamping.

[0114] The first housing **400***a* and the second housing **400***b* rotate relative to each other, so that the display module **100** can be switched between the unfolded state and the bent state. The guide groove further has a specific extension from being close to the hinge **500** to being away from the hinge **500**, and the rotary shaft **44** may slide in the guide groove, so that the middle frame **42** can further be close to or away from the hinge **500**. The middle frame **42** may be close to or away from the hinge **500**. This can facilitate mounting of the display module **100**, so that the display module **100** can be flatly unfolded.

[0115] A battery, a camera module, an antenna module, and the like may be disposed between the middle frame **42** and the display module **100**, so that the electronic device **001** can implement a specific function, to meet a user requirement. FIG. **11** is a diagram of a structure of a hinge **500** according to an embodiment of this application, in which a rotary arm **70** is in a folded state. FIG. **12** shows the hinge **500** shown in FIG. **11**, in which the rotary arm **70** of the hinge **500** is in an unfolded state.

[0116] Refer to FIG. **11** and FIG. **12**. In an embodiment, the hinge **500** includes a fastener **50**, a connecting part **60**, and the rotary arm **70** that are rotatably connected. The fastener **50** is rotatably connected to the connecting part **60**. The connecting part **60** is fastened to the rotary arm **70**. The rotary arm **70** is fastened to the housing **400**. The connecting part **60** is rotatably connected to the fastener **50**, so that the rotary arm **70** connected to the connecting part **60** can rotate relative to the fastener **50**, and the housing **400** can rotate relative to the fastener **50**. When one housing **400** is operated, the two housings **400** can rotate relative to each other by using the hinge **500**, so that the electronic device **001** can be folded.

[0117] Refer to FIG. **11** and FIG. **12** again. In an embodiment, the fastener **50** includes an arc-shaped block **51**. The connecting part **60** includes the support portion **62** and a connecting portion

61 connected to the support portion **62**, and the connecting portion **61** is provided with an arc-shaped groove **611**. The arc-shaped block **51** may be rotatably disposed in the arc-shaped groove **611**, and the connecting part **60** is fastened to the rotary arm **70** through the support portion **62**. The fastener **50** and the connecting part **60** are rotatably connected through sliding of the arc-shaped block **51** in the arc-shaped groove **611**. When the electronic device **001** is in the unfolded state, the arc-shaped block **51** may be accommodated in the arc-shaped groove **611**. Compared with a manner of connecting the fastener **50** to the connecting part **60** by using a cylindrical shaft, a manner of cooperation between the arc-shaped block **51** and the arc-shaped groove **611** can avoid a problem of interference between the display module **100** and the cylindrical shaft.
[0118] The support portion **62** may be fastened to the rotary arm **70** through welding. The rotary arm **70** may be fastened to the housing **400** by using a bolt.
[0119] When the display module **100** is connected to the housing **400**, a side that is of the hinge **500** and that faces the display module **100** is also covered. When the common support part **20** corresponds to the hinge **500**, the transition region **212** directly faces the support portion **62** of the hinge **500**. To connect the support part **20** to the hinge **500**, the OCA is disposed in the transition region **212**, so that the transition region **212** can be bonded to the support portion **62** of the hinge **500**. However, when the electronic device **001** is folded, to overcome the rebound force of the support part **20**, the support portion **62** provides a support force for the transition region **212**. The force provided by the support portion **62** is transferred to the display panel **10** through the transition region **212**, resulting in a light-shadow crease on the display panel **10**. In addition, the OCA may creep, which further aggravates the light-shadow crease.
[0120] In this application, the adhesive **35** is not disposed in the transition region **212**, and the plurality of second through holes **2121** are provided in the transition region **212**, so that the rebound force of the bending region **21** can be reduced, and the force applied to the bending region **21** is balanced. There is no need to apply a force to the support part **20** by using the support portion **62**, so that the force originally transmitted by the support portion **62** to the display panel **10** through the bending region **21** disappears. This alleviates the problem of the light-shadow crease on the display panel **10**.
[0121] The two housings **400** of the electronic device **001** rotate by using the hinge **500**, so that the housings **400** have different rotation angles. The housings **400** are connected to the display module **100**. When the two housings **400** rotate to the folded state, the display module **100** may be driven to fold. For the support part **20** used in the display module **100**, the plurality of second through holes **2121** are provided in the transition region **212**, so that the entire bending region **21** can be in the water droplet shape after folding. Compared with a common case in which a bonding part like the OCA is disposed in the transition region **212**, this can reduce the rebound force of the support part **20** by 30%, and an effect of alleviating the light-shadow crease can be improved by 30%. In addition, the display module **100** using the support part **20** can be applied to an application scenario in which a bending radius is small, a bending arc-shaped length is small, and a tilt included angle is small.

Claims

1. A foldable electronic device, comprising a support part, wherein the support part comprises: a plane region; and a bending region, comprising a first arc-shaped region, a transition region, and a second arc-shaped region that are sequentially connected, wherein: a side edge of the second arc-shaped region that is distal from the first arc-shaped region is connected to the plane region, and the transition region corresponds to a support portion of a hinge in the electronic device and is capable of moving relative to the support portion; the first arc-shaped region is provided with a plurality of first through holes, the transition region is provided with a plurality of second through holes, and the second arc-shaped region is provided with a plurality of third through holes; a direction in

which the first arc-shaped region faces the second arc-shaped region is a width direction, and a direction perpendicular to the width direction is a length direction; lengths of each of the plurality of first through holes gradually decrease in the width direction across the first arc-shaped region towards the transition region; lengths of each of a portion of the plurality of second through holes gradually decrease in the width direction across the transition region towards the second arc-shaped region, and lengths of each of another portion of the plurality of second through holes are the same across the transition region in the width direction; and lengths of the plurality of third through holes are the same across the second arc-shaped region in the width direction.
2. The foldable electronic device according to claim 1, wherein the plurality of first through holes are arranged in a plurality of columns along the length direction, and first through holes in two adjacent columns are arranged so that ends of each first through hole in one column of the plurality of columns are staggered in the width direction with respect to the ends of each first through hole in an adjacent column.
3. The foldable electronic device according to claim 1, wherein the plurality of second through holes are arranged in a plurality of columns along the length direction; the portion of second through holes whose lengths gradually decrease are arranged so that ends of each second through hole in one column of the plurality of columns are staggered in the width direction with respect to the ends of each second through hole in an adjacent column; and the another portion of second through holes whose lengths are the same are arranged abreast in the width direction.
4. The foldable electronic device according to claim 1, wherein the plurality of third through holes are arranged in a plurality of rows along the width direction, and ends of each third through hole in one row of the plurality of rows are staggered with respect to the ends of each third through hole in an adjacent row.
5. The foldable electronic device according to claim 1, wherein in the width direction, hole widths of each of the plurality of first through holes, each of the plurality of second through holes, and each of the plurality of third through holes are all W, and 0.01 mm≤W≤50 mm.
6. The foldable electronic device according to claim 1, wherein in the width direction, hole spacings between: any two adjacent first through holes, any two adjacent second through holes, any two adjacent third through holes, any adjacent first through hole and second through hole, and any adjacent second through hole and third through hole, are all D**1**, and 0.01 mm≤D**1**≤50 mm.
7. The foldable electronic device according to claim 1, wherein in the length direction, hole spacings between: two adjacent first through holes, two adjacent second through holes, and two adjacent third through holes, are all D**2**, and 0.01 mm≤D**2**≤10 mm.
8. The foldable electronic device according to claim 1, wherein in the length direction, hole lengths of each of the plurality of first through holes, each of the plurality of second through holes, and each of the plurality of third through holes are all L, and 0.01 mm≤L≤10 mm.
9. The foldable electronic device according to claim 1, wherein when observed in a direction perpendicular to the support part, each of the plurality of first through holes, each of the plurality of second through holes, and each of the plurality of third through holes are circular, elliptical, runway-shaped, or rectangular.
10. The foldable electronic device according to claim 1, further comprising: a display panel; and a protective layer, wherein the support part, the display panel, and the protective layer are stacked, such that the support part is disposed on a first surface of the display panel, and the protective layer is disposed on a second surface of the display panel that is opposite from the first surface.
11. The foldable electronic device according to claim 10, further comprising: two housings and a hinge, wherein: one of the two housings is rotatably connected to the other of the two housings, a first side of the hinge is fastened to one of the two housings, and a second side of the hinge opposite from the first side of the hinge is fastened to the other of the two housings; and two plane regions connected to the bending region, wherein the one of the two plane regions is disposed on a first side of the bending region and the other of the two plane regions is symmetrically disposed on

a second side of the bending region, the first side of the bending region opposite to the second side of the bending region along the width direction, and each plane region is connected to one of the housings.

12. The electronic device according to claim 11, wherein the hinge comprises a fastener, a connecting part, and a rotary arm; and the fastener is rotatably connected to the connecting part, the connecting part is fastened to the rotary arm, and the rotary arm is fastened to one of the two housings.

13. The electronic device according to claim 12, wherein the fastener comprises an arc-shaped block, the connecting part comprises a support portion and a connecting portion connected to the support portion, and the connecting portion is provided with an arc-shaped groove; and the arc-shaped block is slidably disposed in the arc-shaped groove, and the connecting part is fastened to the rotary arm through the support portion.

14. The foldable electronic device according to claim 2, wherein in the width direction, hole widths of each of the plurality of first through holes, each of the plurality of second through holes, and each of the plurality of third through holes are all W, and 0.01 mm≤W≤50 mm.

15. The foldable electronic device according to claim 3, wherein in the width direction, hole widths of each of the plurality of first through holes, each of the plurality of second through holes, and each of the plurality of third through holes are all W, and 0.01 mm≤W≤50 mm.

16. The foldable electronic device according to claim 2, wherein in the width direction, hole spacings between: any two adjacent first through holes, any two adjacent second through holes, any two adjacent third through holes, any adjacent first through hole and second through hole, and any adjacent second through hole and third through hole are all D**1**, and 0.01 mm≤D**1**≤50 mm.

17. The foldable electronic device according to claim 3, wherein in the width direction, hole spacings between: any two adjacent first through holes, any two adjacent second through holes, any two adjacent third through holes, any adjacent first through hole and second through hole, and any adjacent second through hole and third through hole are all D**1**, and 0.01 mm≤D**1**≤50 mm.

18. The foldable electronic device according to claim 2, wherein in the length direction, hole spacings between: two adjacent first through holes, two adjacent second through holes, and two adjacent third through holes are all D**2**, and 0.01 mm≤D**2**≤10 mm.

19. The foldable electronic device according to claim 3, wherein in the length direction, hole spacings between: two adjacent first through holes, two adjacent second through holes, and two adjacent third through holes are all D**2**, and 0.01 mm≤D**2**≤10 mm.

20. The foldable electronic device according to claim 2, wherein in the length direction, hole lengths of each of the plurality of first through holes, each of the plurality of second through holes, and each of the plurality of third through holes are all L, and 0.01 mm≤L≤10 mm.