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(54) **Hinge structure for collapsible portable phone**

Scharnieranordnung für ein tragbares Klapptelefon

Structure de charnière pour un téléphone portable et pliable

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(73) Proprietor: **Kabushiki Kaisha Strawberry**
Corporation
Kawagoe-shi, Saitama-ken (JP)

(72) Inventor: **Ona, Masaaki**
c/o K.K.Strawberry Corporation
Kawagoe-shi, Saitama-ken (JP)

(74) Representative: **Kitzhofer, Thomas, Dipl.-Ing.**
Patentanwälte Prinz & Partner GbR
Manzingerweg 7
81241 München (DE)

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Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to a hinge structure for a collapsible portable phone according to the preamble of claim 1.

[0002] Recently, a variety of kinds and a variety of specifications of portable phones have been proposed in order to meet the consumers' needs under the circumstances that portable phones have been used more and more.

[0003] Under such circumstances, there has been proposed a collapsible portable phone composed of an operating body provided with a phone operating portion on its surface and a display body pivotally and collapsibly coupled with the operating body and provided with a liquid crystal display image field that may display Arabic numerals or letters such as names or phone numbers on its surface. Not only may this type portable phone be collapsed to be superior in portability and a malfunction of the phone operating portion may be prevented when the phone operating portion is protected or concealed in the case where the portable phone is put into a pocket in the collapsed condition. On the other hand, this structure has an advantage that the user may enjoy the conversation comfortably because the overall length is elongated when opened. In some cases, the user would feel uncomfortable unless a microphone portion is close to his or her mouth.

[0004] EP-A-0 535 912 shows a collapsible mobile phone. Its hinge portion is designed such that a biasing force in closing direction is generated when a display portion is pivoted in closing direction, urging the display portion into its fully closed position when the display portion has an angular position between a predetermined angle and the fully closed position. A corresponding opening biasing force is generated when the display portion is pivoted in opening direction, urging the display portion into its fully opened position.

SUMMARY OF THE INVENTION

[0005] The present inventors have paid his attention to this type collapsible portable phone and have invented a hinge structure for a novel collapsible portable phone that is extremely convenient in use, extremely high in commercial applicability, and may cultivate or motivate the consumers' heart to buy.

[0006] In order to attain this and other objects of the present invention, there is provided a hinge structure for a collapsible portable phone, comprising the features of claim 1.

[0007] According to another aspect of the invention, it is preferable that a biasing member for depressing and biasing the bearing member to the rotary shaft is provided, and the depressing and biasing force of the biasing member causes a damping effect due to a contact

resistance between the rotary shaft and the bearing member when the display member is rotated relative to the operating member between the predetermined rotational positions to serve as a holding force for holding the opened condition of the display member to the operating member.

[0008] Further, it is preferred that an engagement portion that engages with the bearing member in the rotary shaft and the bearing member are made of suitable synthetic resin.

[0009] The embodiments of the present invention will now be summarized.

[0010] According to the present invention, for instance, the display member is rotated in the opening direction until the display member is biased by the opening biasing force of the biasing mechanism up to the maximum opening state when the display member is rotated in the opening direction up to a predetermined rotational position from the collapsed condition. In this case, since the opening biasing force of the biasing mechanism is applied always to the display member, for instance, there is no fear that the display member is accidentally closed when the user enjoys the conversation, and the opened condition of the display member may be held always.

[0011] Also, when the display member is rotated in the closing direction to the operating member to the predetermined position A from the fully opened condition, the display member is biased by the closing biasing force of the biasing mechanism and rotated in the closing direction to the closed condition. In this case, since the closing biasing force of the biasing mechanism is always applied to the display member, for instance, there is no fear that the display member is accidentally opened, and the display member is always kept under the closed condition.

[0012] Accordingly, when the display member is opened to the operating member, it is possible to hold the opened condition without fail, and when the display member is closed to the operating member, it is possible to hold the closed condition without fail. Accordingly, it is possible to provide a handy phone that is very convenient and easy to use.

[0013] Also, in the embodiment, the rotational biasing force of the biasing mechanism S, which will become the closing biasing force for biasing the display member to the operating member in the closing direction and the opening biasing force for biasing the display member to the operating member in the opening direction, is composed of a force for engaging the recess portion or the elongate portion provided in the rotary shaft with the elongate portion or the recess portion provided in the bearing member from the disengaged condition. Accordingly, even with a miniaturized size, it is possible to exhibit the good rotational biasing force without fail, and hence it is possible to attain the miniaturization and reduction of weight of the portable phone as a whole.

[0014] Namely, in the case where a semi-spherical

convex portion and a semi-spherical concave portion are provided to the rotational shaft and the bearing member so as to generate the rotational biasing force, the contact between the convex portion and the concave portion is a point contact. Accordingly, it is necessary to provide the contact between the convex portion and the concave portion away from the axis of the rotary shaft by increasing the size of the projection (the diameter) or the like in order to obtain the sufficient biasing force by the cam effect. As a result the hinge portion provided with the biasing mechanism composed of this rotary shaft and the bearing member is enlarged in size, and hence, the weight of the portable phone as a whole is increased and the size thereof is also enlarged. In this connection, according to the present invention, the contact between the recess portion and the elongate portion of the rotary shaft and the bearing member is the line contact (or the area contact). Accordingly, it is possible to obtain the wide surface area even with the small size projection and to exhibit the sufficient rotational biasing force even if the projection is provided in the vicinity of the axis of the rotary shaft. It is therefore possible to make very compact the hinge portion provided with the biasing mechanism composed of the rotary shaft and the bearing member. Thus, it goes without saying that it is possible to produce the phones in low cost in a mass-production fashion. In addition, it is possible to attain the miniaturization and the reduction in weight of the portable phones as a whole.

[0015] Also, according to an aspect of the invention, because of the simple structure, it goes without saying that it is possible to provide the portable phones in low cost in excellent productivity. In addition, it is possible to provide the collapsible portable phones that are easy to use.

[0016] Also, according to an aspect of the invention, it goes without saying that it is possible to provide the portable phones in low cost in excellent productivity. In addition, it is possible to attain the miniaturization and reduction in weight of the portable phones as a whole in a more effective way.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017]

Fig. 1 is a schematic view showing an operation of a handy phone according to an embodiment of the invention.

Fig. 2 is an exploded perspective view showing a hinge structure according to the embodiment of the invention.

Fig. 3 is an exploded perspective view showing a primary part of the hinge structure according to the embodiment of the invention.

Figs. 4A to 4E are schematic illustrations of the primary part of the hinge structure according to the embodiment of the invention.

Fig. 5 is a schematic illustration of the operation of the primary part of the hinge structure according to embodiment of the invention.

Fig. 6 is a schematic illustration of the operation of the primary part of the hinge structure according to embodiment of the invention.

Fig. 7 is a schematic illustration of the operation of the primary part of the hinge structure according to embodiment of the invention.

Fig. 8 is a schematic illustration of the operation of the primary part of the hinge structure according to embodiment of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0018] The accompanied drawings show an embodiment of the present invention which will now be described.

[0019] In this embodiment, a collapsible portable phone is composed of an operating member 2 provided at its surface with a phone operating portion 1, and a display member 3 pivotally and collapsibly mounted on the operating member 2 and provided with a display surface 6 that may display Arabic numerals or letters such as phone numbers or names on its surface. A biasing mechanism S is interposed in a hinge portion 4 between the operating member 2 and the display member 3, which biasing mechanism may exhibit a closing biasing force for biasing the display member 3 in a closing direction between a closed condition in which the display member 3 is collapsed relative to the operating member 2 and a predetermined angular position A in which the display member 3 is angularly moved in an opening direction, and may exhibit an opening biasing force for biasing the display member 3 in an opening direction between the opened condition in which the display member 3 is fully opened relative to the operating member 2 and a predetermined angular position B in which the display member 3 is angularly moved in the closing direction.

[0020] The biasing mechanism S according to this embodiment will now be described.

[0021] The biasing mechanism S is composed of a biasing member 11 composed of a rotary shaft 5 and a bearing member 7 formed together with the rotary member 5.

[0022] As shown in Figs. 2 to 4, the rotary shaft 5 of the biasing member 11 is formed of a rod-like member made of suitable metal. This rotary shaft 5 is fitted in a ring member 10 made of suitable synthetic resin at its end portion in a rotation-preventing manner through a retainer pin 12. A pair of elongated projections 9 are formed radially in a position, facing an opening of a through-hole 10a through which the rotary shaft 5 passes, of the inner surface of this ring member 10. Incidentally, in some cases, a member obtained by pressing a member made of suitable metal or by die-casting may

be used as the ring member 10. In particular, the latter is extremely superior in durability. This has been confirmed experimentally by the present applicant.

[0023] The elongate projections 9 are formed so as to fit elongate recesses 8 formed in the bearing member 7 to be described later in detail. Each corner portion forming the elongate projections 9 are rounded or beveled.

[0024] Also, elongate projections 10b are formed on right and left side wall cut into flat surfaces for the circumferential surfaces of the ring member 10. The elongate projections 10b are used to couple the rotary shaft 5 with the operating member 2 or the display member 3 in a rotation preventing manner. This ring member 10 may also be referred to as an engagement portion of the rotary shaft 5.

[0025] Also, a circumferential flange 13 is formed at a proximal end portion of the rotary shaft 5. This circumferential flange 13 is used to couple the rotary shaft 5 to be rotatable relative to a receptacle 15 for receiving the bearing member 7 to be described later in detail.

[0026] As shown in Figs. 2 to 4, the bearing member 7 is formed of a member made of suitable synthetic resin. When the bearing member 7 is received in the receptacle 15 to be described later in detail, the bearing member 7 is composed of a bearing portion 7a having a substantially square shape as viewed from the front side so as to be fit in a rotation preventing fashion and a cylindrical portion 7b formed integrally with the bearing portion 7a and that may fit in the rotary shaft 5. Incidentally, in some cases, one obtained by die-casting or one obtained by pressing a member made of suitable metal may be used as the bearing member 7 in conformity with the above-described ring member 10. In particular, the latter is extremely superior in durability. This has been confirmed experimentally by the present applicant.

[0027] Also, an axial hole 7a' is formed in the bearing portion 7a. This axial hole 7a' is formed so that the rotary shaft 5 may pass through the axial hole 7a'.

[0028] A pair of annular projections 14 are formed on an opening circumferential edge of the tip end face of the axial hole 7a' of the bearing portion 7a. The annular projections 14 define the pair of recess portions 8 by being cut at two diametrically opposite positions.

[0029] The recess portions 8 are formed so as to be fitted with the elongate projections 9 formed on the ring member 7a engaged with the rotary shaft 5 when the bearing member 7 and the rotary shaft 5 are coupled with each other. Each corner portion forming the recess portions 8 are rounded or beveled.

[0030] Also, the bearing member 7 is received in the receptacle 15 made of metal and having a substantially square-shape as viewed from the front side. The bearing member 7 is coupled with the rotary member 5 to form the above-described biasing member 11.

[0031] More specifically, as shown in Figs. 2 and 4, a leaf spring 16 is disposed within the receptacle 15, and a coiled spring 17 is fitted around the cylindrical portion 7b of the bearing member 7. Subsequently, under this

condition, the rotary shaft 5 is caused to pass through the receptacle 15 and the bearing member 7 via a washer 18. Subsequently, the ring member 10 is fitted and coupled at the tip end portion of the rotary shaft 5. In this case, the rotary shaft 5 is rotatable relative to the bearing member 7 and the receptacle 15. The bearing member 7 is movable in the axial direction (direction indicated by character a in Fig. 4E) against the leaf spring 16 and the coiled spring 17 within the receptacle 15 in a rotation preventing manner. Accordingly, when the rotary shaft 5 is rotated around the axis, the recess portions 8 of the bearing member 7 and the elongate projections 9 of the rotary shaft 5 are rotated around the axis while kept from the engaged condition to the disengaged condition or the disengaged condition to the engaged condition alternatively.

[0032] When the rotary shaft 5 is rotated by about half a turn (180° rotation), the thus constructed biasing member 11 is constructed so that the condition where the rotary shaft 5 and the bearing member 7 are disengaged from each other is likely to come to the condition where these components are engaged with each other, whereby a rotational biasing force for forcibly rotating the rotary shaft 5 is generated twice.

[0033] The explanation of this rotational biasing force will now be described more specifically referring to the schematic operational views of Figs. 5 to 8.

[0034] First of all, as shown in Fig. 5, when the rotary shaft 5 is rotated around the axis from the condition that the elongate projections 9 provided in the rotary shaft 5 and the recess portions 8 provided in the bearing member 7 are engaged with each other, the bearing member 7 is moved in the direction indicated by character a in Fig. 6 against the depression biasing force of the leaf spring 16 and the coiled spring 17 within the receptacle 15 by the force for urging the elongate projections 9 of the rotary shaft 5 to be slid and disengaged away from the recess portions 8 of the bearing member 7. As a result, the elongate projections 9 of the rotary shaft 5 is disengaged from the recess portion 8 of the bearing member 7. In this case, the elongate projections 9 are likely to be slid in a direction indicated by an arrow c in Fig. 6 and engaged with the recess portions 8 from the condition that the elongate projections 9 are disengaged from the recess portions 8 by a contact relationship between the rounded surfaces of the elongate projections 9 and the recess portions 8 and the depression biasing force of the leaf spring 16 and the coiled spring 17, so that a first rotational biasing force is effected in the rotary shaft 5.

[0035] Subsequently, thereafter the elongate projections 9 of the rotary shaft 5 are completely disengaged away from the recess portions 8 of the bearing member 7. When the rotary shaft 5 is rotated through about half a turn (180° rotation), as shown in Fig. 7, the elongate projections 9 rotate while sliding on the end face of the annular projections 14 of the bearing member 7. In this case, a damping effect is generated by the contact re-

sistance of the depression biasing force of the leaf spring 16 and the coiled spring 17 between the end faces of the annular projections 14 and the end faces of the elongate projections 9. Then, as shown in Fig. 8, when the elongate projections 9 are again close to the recess portions 8, in the same manner as described above, the elongate projections 9 are likely to be slid in a direction indicated by an arrow d in Fig. 8 and engaged with the recess portions 8 from the condition that the elongate projections 9 are disengaged from the recess portions 8 by a contact relationship between the rounded surfaces of the elongate projections 9 and the recess portions 8 and the depression biasing force of the leaf spring 16 and the coiled spring 17, so that a second rotational biasing force is effected in the rotary shaft 5. Incidentally, in this embodiment, the elongate projections 9 are provided on the rotary shaft 5 and the recess portions 8 are provided in the bearing member 7. However, it is possible to provide the elongate projections 9 to the bearing member 7 and to provide the recess portion 8 to the rotary shaft 5.

[0036] In the biasing member 11 according to this embodiment, the respective ring members 10 of the shaft 5 are fitted in the rotation preventing condition with installation portions 2a provided at right and left positions on the tip end sides of the operating member 2, whereas the respective receptacles 15 receiving the bearing members 7 are fitted in the rotation preventing condition with installation portions 3a provided at right and left positions on the proximal end side of the display member 3. Accordingly, the display member 3 is pivoted to the operating member 2 through the biasing member 11. Incidentally, it is possible to provide the rotary shaft 5 to the display member 3 and to provide the bearing member 7 to the operating member 2.

[0037] In this case, in this embodiment, one of the rotational biasing forces generated whenever the rotary shaft 5 is rotated around the axis by 180° is applied as the closing biasing force for biasing the display member 3 in the closing direction, and the other is applied as the opening biasing force for biasing the display member 3 in the opening direction.

[0038] Namely, as described above, the biasing mechanism may exhibit a closing biasing force for biasing the display member 3 in a closing direction between a closed condition in which the display member 3 is collapsed relative to the operating member 2 and a predetermined angular position A in which the display member 3 is angularly moved in an opening direction, and may exhibit an opening biasing force for biasing the display member 3 in an opening direction between the opened condition in which the display member 3 is fully opened relative to the operating member 2 and a predetermined angular position B in which the display member 3 is angularly moved in the closing direction.

[0039] Accordingly, when the display member 3 is kept in the collapsed condition, the closing biasing force is applied so as to prevent the display member 3 from

being opened accidentally, and on the other hand, when the display member 3 is kept in the fully opened condition, the opening biasing force is applied so as to prevent the display member 3 from being closed in case of, for example, conversation.

[0040] In this embodiment, the elongate projections 9 provided on the rotary shaft 5 and the recess portions 8 provided in the bearing member 7 are set so as to be disengaged from each other so that any rotational biasing force is not applied and the end faces of the annular projections 14 of the bearing member 7 are always depressed against the elongate projections 9 of the rotary shaft 5 by the leaf spring 16 and the coiled spring 17 used as the biasing members when the display member 3 is rotated relative to the above-described operating member 2 between the above-described predetermined rotational position A and the above-described predetermined rotational position B. Accordingly, when the display member 3 is rotated relative to the above-described operating member 2 between the above-described predetermined rotational position A and the above-described predetermined rotational position B, the damping effect is caused by the contact resistance is generated, so that the depression biasing force of the leaf spring 16 and the coiled spring 17 is used as the holding force for holding the opened condition of the display member 3 relative to the operating member 2. Accordingly, the display member 3 is held in the stop condition (slanted condition) at a desired position relative to the operating member 2 by the above-described damping effect when the display member 3 is rotated between this predetermined rotational position A and the above-described predetermined rotational position B.

[0041] Also, in this embodiment, when the biasing member 11 is assembled with the hinge portion 4 between the operating member 2 and the display member 3, the rotational biasing force (closing biasing force) of the biasing mechanism S further works in the closing direction even in the collapsed closed condition of the display member 3 to the operating member 2.

[0042] Namely, the present embodiment is set so that the opened condition (condition shown in Fig. 1) where the display member 3 is fully opened is obtained when the display member 3 is rotated by about 150° to 160° relative to the operating member 2. Accordingly, when the biasing member 11 is assembled with the hinge portion 4, the components are assembled so that the rotational biasing force is left in a predetermined range such that the closing biasing force is further applied even if the display member 3 is kept in the collapsed closed condition relative to the operating member 2 out of the range where the rotational biasing force generated by rotating the rotary shaft 5 about the axis is applied. Namely, when the display member 3 is kept in the collapsed closed condition relative to the operating member 2, the elongate projections 9 of the rotary shaft 5 are stopped while the rotational biasing force is applied thereto under the condition that the elongate projection

9 are not completely engaged with the recess portions 8 of the bearing member 7. Accordingly, even when the display member 3 is kept in the collapsed closed condition relative to the operating member 2, it should be noted that the closing biasing force for rotating the display member 3 in the closing direction is further applied to the display member 3.

[0043] With such a structure according to the above-described embodiment, for instance, when the display member 3 is rotated in the opening direction from the collapsed closed condition to the predetermined rotational position B relative to the operating member 2, the display member 3 is biased by the opening biasing force of the biasing mechanism S and rotated in the opening direction until it is fully opened. In this case, since the opening biasing force of the biasing mechanism S is always applied to the display member 3. Accordingly, there is no trouble such as a case, for example, where the display member 3 is closed when the user enjoys his or her conversation and so on. The display member 3 is always kept in the opened condition.

[0044] Also, when the display member 3 is rotated in the closing direction from the fully opened condition of the display member 3 to the predetermined rotational position A relative to the operating member 2, the display member 3 is biased by the closing biasing force of the biasing mechanism S and rotated in the closing direction until it is fully closed. In this case, since the closing biasing force of the biasing mechanism S is always applied to the display member 3. Accordingly, there is no trouble such as a case, for example, where the display member 3 is opened accidentally. The display member 3 is always kept in the closed condition.

[0045] Accordingly, in the embodiment, it is possible to hold the opened condition without fail when the display member 3 is opened relative to the operating member 2, and to hold the closed condition without fail when the display member 3 is closed relative to the operating member 2. Thus, it is possible to provide a portable phone that is very convenient to use.

[0046] Also, in the embodiment, the rotational biasing force of the biasing mechanism S, which will become the closing biasing force for biasing the display member 3 to the operating member 2 in the closing direction and the opening biasing force for biasing the display member 3 to the operating member 2 in the opening direction, is composed of a force for engaging the recess portion 8 or the elongate portion 9 provided in the rotary shaft 5 with the elongate portion 9 or the recess portion 8 provided in the bearing member 7 from the disengaged condition. Accordingly, even with a miniaturized size, it is possible to exhibit the good rotational biasing force without fail, and hence it is possible to attain the miniaturization and reduction of weight of the portable phone as a whole.

[0047] Also, in the embodiment, the leaf spring 16 (coiled spring 17) for depressingly biasing the bearing member 7 to the rotary shaft 5 is provided so that the

depression biasing force of this leaf spring 16 (coiled spring 17) causes a damping effect by the contact resistance between the rotary shaft 5 and the bearing member 7 when the display member 3 is rotated to the operating member 2 between the predetermined rotational position A and the predetermined rotational position B and is served as a holding force for holding the opened condition of the display member 3 to the operating member 2. It goes without saying that it is easy to simplify the structure in low cost with a high mass-productivity. In addition, it is possible to hold the slanted condition as desired by the user (for example, the condition that the user is comfortable for conversation) without fail. It is thus possible to provide the collapsible portable handy phone that is easier to use.

[0048] Also, in the embodiment, the ring member 10 and the bearing member 7 of the rotary shaft 5 are made of suitable synthetic resin. Accordingly, it is possible to provide the handy portable phone that is superior in mass-productivity in low cost and in addition to more effectively attain the miniaturization and reduction in weight of the portable phone as a whole.

[0049] With such an arrangement according to the present invention, it is possible to hold the opened condition without fail when the display member is opened to the operating member, and it is possible to hold the closed condition without fail when the display member is closed to the operating member. It is therefore possible to provide the handy phone that is easy and convenient to use. In addition, due to its structural characteristics, it is possible to exhibit the good rotational biasing force without fail even with the miniaturized size. It is therefore possible to provide the miniaturization and reduction in weight of the portable handy phone as a whole. Thus, it is possible to provide the hinge structure for the collapsible handy phone that is novel and much superior in marketability.

[0050] Also, according to a second aspect of the present invention, in addition to the advantage of the first aspect, the biasing member for biasing the bearing member to the rotational shaft is provided, so that the depression biasing force of this biasing member causes the damping effect to the above-described operating member due to the contact resistance between the rotary shaft and the bearing member when the display member is rotated between the above-described predetermined rotational positions to thereby serve it as the holding force for holding the display member to the operating member in the opened condition. Accordingly, it goes without saying that it is easy to simplify the structure in low cost with a high mass-productivity. In addition, it is possible to provide the hinge structure for the collapsible handy phone that is novel and much superior in marketability. For example, it is possible to provide the collapsible portable phone that is much easier to use.

[0051] Also, according to an aspect of the present invention, in addition to the previous advantages, the

bearing member in the rotational shaft and the engagement portion engaging the bearing member are made of suitable synthetic resin. Accordingly, it goes without saying that it is easy to simplify the structure in low cost with a high mass-productivity. In addition, it is possible to provide the hinge structure for the collapsible handy phone that is novel and much superior in marketability. For example, it is possible to provide the collapsible portable phone that is much easier to use.

Claims

1. A hinge structure for a collapsible portable phone, comprising:

an operating member (2) provided with a phone operating portion (1) on its surface;

a display member (3), pivotally and collapsibly coupled with the operating member (2) and provided with a display image field (6) in which numerals and/or letters for phone numbers and/or names may be displayed on its surface;

a biasing mechanism

generating a closing biasing force for biasing the display member (3) in a closing direction between a closed condition in which the display member (3) is collapsed to the operating member (2) and between a first predetermined rotational position (A), when the display member (3) is rotated relative to the operating member (2) in an opening direction and

generating an opening biasing force for biasing the display member (3) in the opening direction between a fully opened condition in which the display member (3) is fully opened relative to the operating member (2) and between a second predetermined rotational position (B), when the display member (3) is rotated in a closing direction,

the biasing mechanism being provided at a hinge portion (4) between the operating member (2) and the display member (3),

a rotary shaft (5, 10) and a bearing member (7),

the rotary shaft (5, 10) being coupled with the operating member (2) or with the display member (3) and being rotatable relative to said bearing member (7) about an axis,

at least one recess portion (8) able to engage in a convex/concave engagement manner with at least one elongate projection (9) from a disengaged condition when the rotary shaft (5, 10) is rotated relative to the bearing member (7) about the axis,

the recess portion (8) being provided on the rotary shaft (5) or on the bearing member (7) and the elongated projection (9) being provided on the bearing member (7) or on the rotary shaft (5), respectively,

a rotational biasing force being able to be generated between the rotary shaft (5) and the bearing member (7), when the elongate projection (9) engages the recess portion (8),

the closing rotational biasing force being generated when the display member (3) is positioned between the closed condition and the first predetermined rotational position (A), and

the opening rotational biasing force being generated when the display member (3) is positioned between the fully opened condition and the second predetermined rotational position (B),

the elongate projection (9) and the recess portion (8) being disengaged from each other when the display member (3) is being rotated relative to the operating member (2) between the first and second predetermined rotational positions (A, B), so that no rotational biasing force is generated,

characterized in that

in the closed and/or in the fully opened condition the elongate projection (9) does not completely engage the recess portion (8), so that in the closed condition the closing biasing force and/or in the fully opened condition the opening biasing force is applied.

2. The hinge structure according to claim 1, wherein a biasing member (16, 17) for depressing and biasing said bearing member (7) to said rotary shaft (5) is provided, and the depressing and biasing force of said biasing member (16, 17) causes a damping effect due to a contact resistance between said rotary shaft (5, 10) and said bearing member (7) when said display member (3) is rotated relative to said operating member (2) between said first and second predetermined rotational positions (A, B) to serve as a holding force for holding the opened condition of said display member (3) to said operating member (2).

3. The hinge structure according to one of the preceding claims, wherein an engagement portion (10b) that engages with the bearing member (7) in said rotary shaft (5) and the bearing member (7) are made of suitable synthetic resin.

Patentansprüche

1. Scharnierstruktur für ein zusammenklappbares tragbares Telefon, mit:

einem mit einem Telefonbedienabschnitt (1) auf seiner Oberfläche versehenen Bedienteil (2);

einem Anzeigeteil (3), das verschwenkbar und zusammenklappbar mit dem Bedienteil (2) verbunden und mit einem Bildanzeigefeld (6) versehen ist, auf dessen Oberfläche numerische Zeichen und/oder Buchstaben für Telefonnummern und/oder Namen angezeigt werden können;

einem Vorspannmechanismus,

der eine schließende Vorspannkraft erzeugt, um das Anzeigeteil (3) in einer Schließrichtung vorzuspannen, zwischen einem geschlossenen Zustand, in dem das Anzeigeteil (3) auf das Bedienteil (2) geklappt ist und einer ersten vorbestimmten Drehstellung (A), wenn das Anzeigeteil (3) relativ zum Bedienteil (2) in einer Öffnungsrichtung verschwenkt wird und

der eine öffnende Vorspannkraft erzeugt, um das Anzeigeteil (3) in der Öffnungsrichtung vorzuspannen, zwischen einem vollständig geöffneten Zustand, in dem das Anzeigeteil (3) in Beziehung zum Bedienteil (2) vollständig geöffnet ist, und einer zweiten vorbestimmten Drehstellung (B), wenn das Anzeigeteil (3) in einer Schließrichtung verschwenkt wird,

wobei der Vorspannmechanismus an einem Scharnierabschnitt (4) zwischen dem Bedienteil (2) und dem Anzeigeteil (3) vorgesehen ist,

einer drehbaren Welle (5, 10) und einem Lagerglied (7),

wobei die drehbare Welle (5, 10) mit dem Bedienteil (2) oder mit dem Anzeigeteil (3) verbunden ist und um eine Achse relativ zum Lagerteil (7) drehbar ist,

wenigstens einem vertieften Abschnitt (8), der aus einem ausgerückten Zustand in einer konvex-konkaven Beziehung in Eingriff mit wenigstens einem langgestreckten Vorsprung (9) kommen kann, wenn die drehbare Welle (5, 10) relativ zum Lager-

glied (6) um die Achse verdreht wird,

wobei der vertiefte Abschnitt (8) an der drehbaren Welle (5) oder am Lagerglied (7) und der langgestreckte Vorsprung (9) am Lagerglied (7) oder an der drehbaren Welle (5) angeordnet sind,

wobei eine Rotations-Vorspannkraft zwischen der drehbaren Welle (5) und dem Lagerglied (7) erzeugt werden kann, wenn der langgestreckte Vorsprung (9) in den vertieften Abschnitt (8) eingreift

und wobei die schließende Vorspannkraft erzeugt wird, wenn das Anzeigeteil (3) sich zwischen dem geschlossenen Zustand und der ersten vorbestimmten Drehstellung (A) befindet und

die öffnende Vorspannkraft erzeugt wird, wenn sich das Anzeigeteil (3) zwischen dem vollständig geöffneten Zustand und der zweiten vorbestimmten Drehstellung (B) befindet,

wobei der langgestreckte Vorsprung (9) und der vertiefte Abschnitt (8) voneinander getrennt sind, wenn das Anzeigeteil (3) relativ zum Bedienteil (2) zwischen der ersten und der zweiten vorbestimmten Drehstellung (A, B) verdreht wird, so daß keine Rotations-Vorspannkraft erzeugt wird,

dadurch gekennzeichnet, daß

im geschlossenen und/oder vollständig geöffneten Zustand der langgestreckte Vorsprung (9) nicht vollständig in den vertieften Abschnitt (8) eingreift, so daß im geschlossenen Zustand die schließende Vorspannkraft und/oder im vollständig geöffneten Zustand die öffnende Vorspannkraft wirkt.

2. Scharnierstruktur nach Anspruch 1, **dadurch gekennzeichnet, daß** ein Vorspannmitglied (16, 17) vorgesehen ist, um das Lagerglied (7) an die drehbare Welle (5) anzudrücken und vorzuspannen und wobei die andrückende und vorspannende Kraft des Vorspannmitglieds (16, 17) aufgrund eines Kontaktwiderstands zwischen der drehbaren Welle (5, 10) und dem Lagerglied (7) einen Dämpfungseffekt hervorruft, wenn das Anzeigeteil (3) gegenüber dem Bedienteil (2) zwischen der ersten und der zweiten vorbestimmten Drehstellung (A, B) verdreht wird, der als Haltekraft dient, um das Anzeigeteil (3) relativ zum Bedienteil (2) im geöffneten Zustand zu halten.
3. Scharnierstruktur nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, daß** ein Eingriffsabschnitt (10b), der in der drehbaren Welle (5) in Eingriff mit dem Lagerglied (7) kommt sowie das Lagerglied (7) aus einem geeigneten Kunststoff gefertigt sind.

Revendications

1. Structure à charnière pour un téléphone portable

pliable, comprenant :

un élément de commande (2) pourvu sur sa surface d'une portion (1) de commande de téléphone ;

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un élément d'affichage (3) relié de manière pivotable et pliable à l'élément de commande (2) et pourvu d'une zone (6) d'affichage d'images dans laquelle des numéros et/ou des lettres pour des numéros de téléphone et/ou des noms peuvent être affichés sur sa surface ;

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un mécanisme de précontrainte

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produisant une force de précontrainte de fermeture, afin de précontraindre l'élément d'affichage (3) dans une direction de fermeture entre un état fermé, dans lequel l'élément d'affichage (3) est replié sur l'élément de commande (2), et une première position (A) prédéterminée de rotation lorsque l'élément d'affichage (3) pivote par rapport à l'élément de commande (2) dans une direction d'ouverture et

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produisant une force de précontrainte d'ouverture, afin de précontraindre l'élément d'affichage (3) dans la direction d'ouverture entre un état entièrement ouvert, dans lequel l'élément d'affichage (3) est entièrement ouvert par rapport à l'élément de commande (2), et une deuxième position (B) prédéterminée de rotation lorsque l'élément d'affichage (3) pivote dans une direction de fermeture,

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le mécanisme de précontrainte étant prévu sur une portion de charnière (4) entre l'élément de commande (2) et l'élément d'affichage (3),

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un arbre rotatif (5, 10) et un élément de palier (7),

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l'arbre rotatif (5, 10) étant relié à l'élément de commande (2) ou à l'élément d'affichage (3) et étant mobile en rotation autour d'un axe par rapport à l'élément de palier (7),

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au moins une portion en retrait (8) pouvant s'engager de manière convexe/concave avec au moins une saillie allongée (9) à partir d'un état désengagé lorsque l'arbre rotatif (5, 10) tourne autour de l'axe par rapport à l'élément de palier (7),

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la portion en retrait (8) étant prévue sur l'arbre

rotatif (5) ou sur l'élément de palier (7), et la saillie allongée (9) étant prévue sur l'élément de palier (7) ou sur l'arbre rotatif (5), respectivement,

une force rotative de précontrainte pouvant être produite entre l'arbre rotatif (5) et l'élément de palier (7) lorsque la saillie allongée (9) engage la portion en retrait (8),

la force rotative de précontrainte de fermeture étant produite lorsque l'élément d'affichage (3) se trouve entre l'état fermé et la première position (A) prédéterminée de rotation, et

la force rotative de précontrainte d'ouverture étant produite lorsque l'élément d'affichage (3) se trouve entre l'état entièrement ouvert et la deuxième position (B) prédéterminée de rotation,

la saillie allongée (9) et la portion en retrait (8) étant désengagées l'une de l'autre lorsque l'élément d'affichage (3) pivote par rapport à l'élément de commande (2) entre la première et la deuxième position (A, B) prédéterminée de rotation de telle sorte qu'aucune force rotative de précontrainte n'est produite,

caractérisée en ce que

dans l'état fermé et/ou entièrement ouvert, la saillie allongée (9) n'engage pas complètement la portion en retrait (8) de telle sorte que dans l'état fermé la force de précontrainte de fermeture, et/ou dans l'état entièrement ouvert la force de précontrainte d'ouverture est appliquée.

2. Structure à charnière selon la revendication 1, dans laquelle un élément de précontrainte (16, 17) est prévu pour presser et précontraindre l'élément de palier (7) sur l'arbre rotatif (5), la force de pression et de précontrainte de l'élément de précontrainte (16, 17) causant en raison d'une résistance de contact entre l'arbre rotatif (5, 10) et l'élément de palier (7) un effet d'amortissement, lorsque l'élément d'affichage (3) pivote par rapport à l'élément de commande (2) entre la première et la deuxième position (A, B) prédéterminée de rotation, qui sert de force de maintien pour maintenir l'élément d'affichage (3) dans un état ouvert par rapport à l'élément de commande (2).
3. Structure à charnière selon l'une des revendications précédentes, dans laquelle une portion d'engagement (10b) qui s'engage avec l'élément de palier (7) dans l'arbre rotatif (5) et l'élément de palier (7) sont en matière synthétique appropriée.

FIG. 1

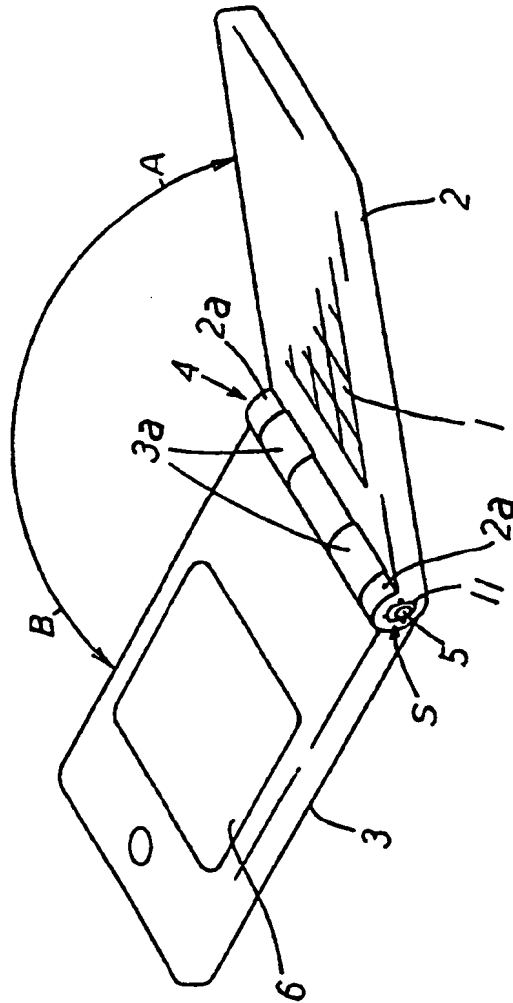


FIG. 2

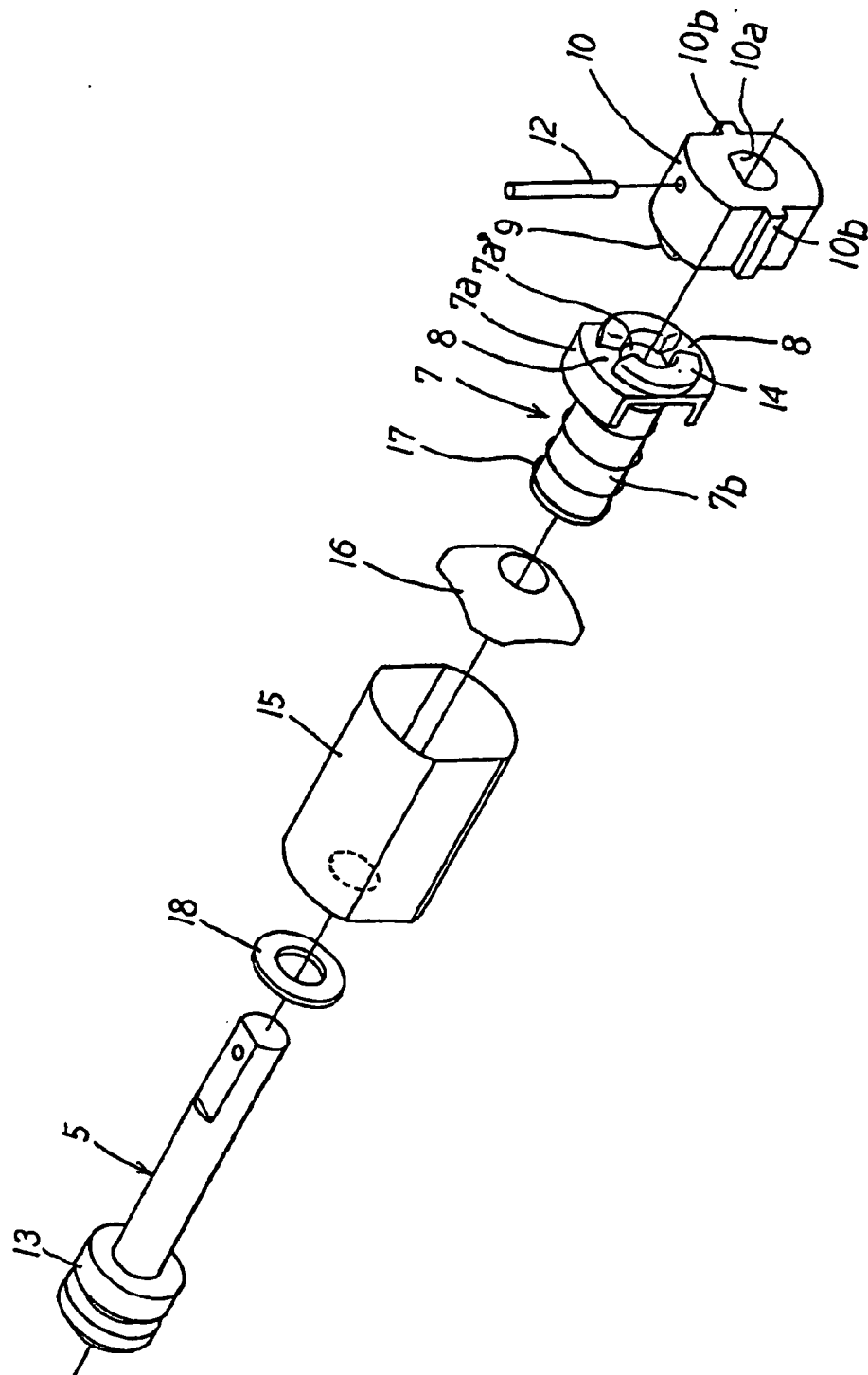


FIG. 3

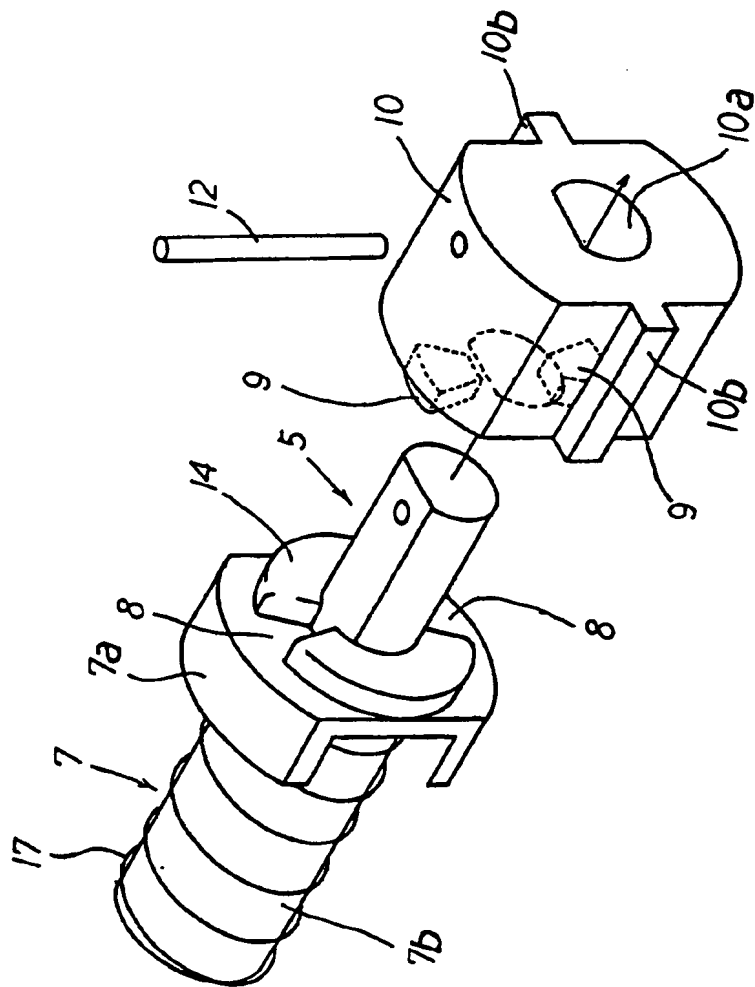


FIG. 4A

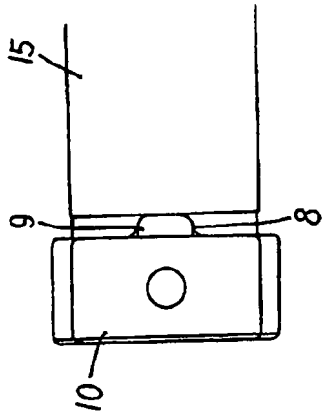


FIG. 4B

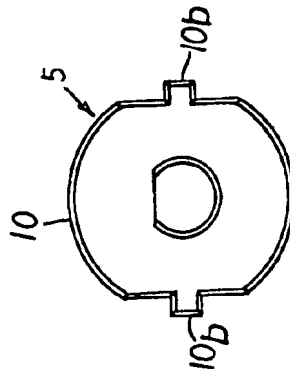


FIG. 4C

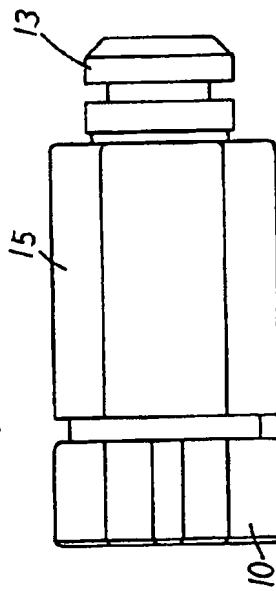


FIG. 4D

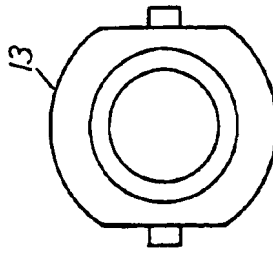


FIG. 4E

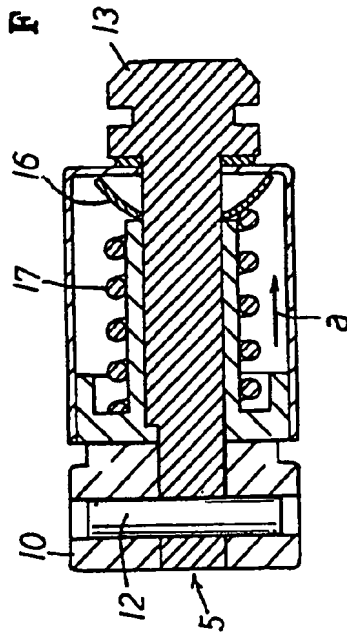


FIG. 5

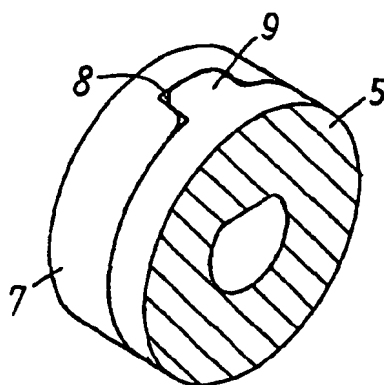


FIG. 6

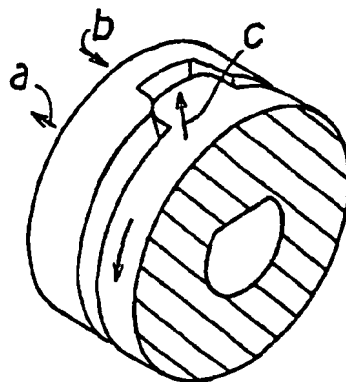


FIG. 7

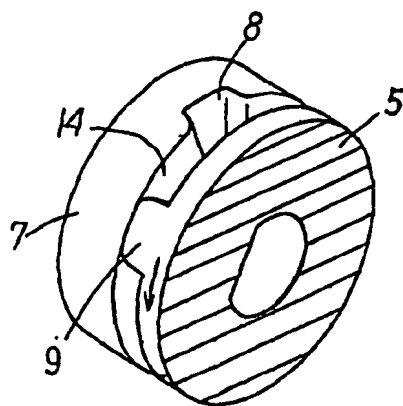


FIG. 8

