(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 916 148 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
01.12.2021 Bulletin 2021/48

(51) Int Cl.:
D06F 73/00 *(2006.01)*

(21) Application number: **20217950.3**

(22) Date of filing: **31.12.2020**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(30) Priority: **31.05.2020 CN 202010481047**

(71) Applicant: **Ningbo Kaibo Intelligent Ironing Electric Appliance Manufacturing Co., Ltd.**
Ningbo, Zhejiang 315324 (CN)

(72) Inventors:
- **YAN, Jiebo**
  Ningbo Zhejiang 315324 (CN)
- **LIN, Huomu**
  Ningbo, Zhejiang 315324 (CN)

(74) Representative: **Proi World Intellectual Property GmbH**
Obermattweg 12
6052 Hergiswil, Kanton Nidwalden (CH)

(54) IRONING MACHINE WITH ADJUSTABLE IRONING ANGLE

(57) The invention discloses an ironing machine with an adjustable ironing angle, and belongs to ironing equipment. Existing ironing machines with a variable-posture panel have the defects of being complicated in structure and a limited angle for posture variation. According to the ironing machine with an adjustable ironing angle, a handle and an ironing head are rotatably connected around a horizontal axis so that an angle between the handle and an ironing surface can be changed after the handle and the ironing head rotate relatively. A locking structure is arranged at a joint of the handle and the ironing head and is provided with an unlocking part. The unlocking part can be operated to unlock the locking structure to allow the handle and the ironing head to rotate around the horizontal axis, and can be released to lock the handle and the ironing head by the locking structure so as to prevent the handle and the ironing head from rotating around the horizontal axis. In this way, the angle of the ironing surface with respect to the handle can be adjusted within a wide range as required during use to facilitate ironing and to allow the handle to be held comfortably during ironing.

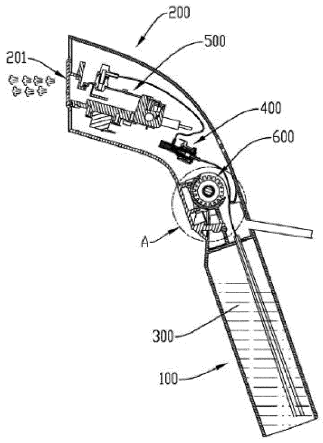

FIG. 1

EP 3 916 148 A1

Description

Field of the Invention

[0001] The invention belongs to ironing equipment, and particularly relates to an ironing machine with an adjustable ironing angle.

Background of the Invention

[0002] Existing handheld ironing equipment, such as steam brushes and garment steamers, typically has a fixed ironing surface, and thus cannot satisfy the requirement of users for a variable angle during use.

[0003] Chinese Design Patent Publication No. 302931586S and Chinese Invention Patent Publication No. 204676349U disclose a "Foldable Garment Steamer", which is provided with a handle and a spray head which can rotate so that the overall size of the foldable garment steamer is greatly reduced. Users can carry the foldable garment steamer easily when going out, the space utilization rate of a packaging box of the garment steamer is increased, the cost of the packaging box is reduced, and the transport cost is reduced. In addition, the foldable garment steamer is extremely convenient to use, the users can use the foldable garment steamer only by unfolding the folded handle and the folded spray head, and assembly is not needed. However, when such garment steamer is used, the angle of the spray head (especially the ironing surface thereof) with respect to the handle cannot be adjusted, and the spray head may rotate with respect to the handle during use and deviate from its working position.

[0004] Chinese Invention Patent Publication No. 106758096A discloses a "Head Posture-adjustable Steam Brush Suitable for Comfortable Ironing", which is designed in the following manner: the posture of a panel on the head of the steam brush can be changed; the panel contacts with a to-be-ironed garment during use, and the posture of the panel can be changed by means of the force fed back from the garment, ensuring that the steam brush can be adjusted to an appropriate posture without being excessively inclined. In this way, the steam brush can be used more conveniently, the operation stress of the arms and wrists is reduced, and fatigue is relieved. No matter whether the steam brush is used for vertical ironing or horizontal ironing, the angle can be adjusted automatically according to the ironing surface to reduce the rotating frequency of the arms and wrists of users, and the purpose of reducing the stress of the users is realized. However, by adoption of the variable-posture panel, the structure of the steam brush is limited, the structure of the panel is complicated, and the angle for changing the posture of the panel with respect to the handheld part is limited.

Summary of the Invention

[0005] The technical issue and technical task to be settled by the invention are to provide an ironing machine with an adjustable ironing angle to overcome the defects of a complicated structure and a limited angle for posture variation of existing ironing machines with a variable-posture panel.

[0006] To fulfill the aforesaid objective, the invention provides an ironing machine with an adjustable ironing angle, comprising a handle and an ironing head with an ironing surface, wherein the handle and the ironing head are rotatably connected around a horizontal axis so that an angle between the handle and the ironing surface will be changed after the handle and the ironing head rotate relatively, a locking structure is arranged at a joint of the handle and the ironing head and is provided with an unlocking part, and the unlocking part can be operated to unlock the locking structure to allow the handle and the ironing head to rotate around the horizontal axis, and can be released to lock the handle and the ironing head by the locking structure so as to prevent the handle and the ironing head from rotating around the horizontal axis.

[0007] Preferably, the locking structure comprises an outer gear and an inner socket which are separately disposed on the handle and the ironing head, and the outer gear and the inner socket are coaxial with the horizontal axis and are able to move relatively in an axial direction of the horizontal axis to be engaged or disengaged; when the outer gear and the inner socket are engaged, the handle and the ironing head are locked by the locking structure; and when the outer gear and the inner socket are disengaged, the handle and the ironing head are able to rotate around the horizontal axis.

[0008] Preferably, the outer gear and the inner socket are engaged by means of an elastic force of a spring, and when the unlocking part is operated, the elastic force of the spring will be overcome to allow the outer gear and the inner socket to be disengaged.

[0009] Preferably, the handle and the ironing head are assembled through the cooperation of a shaft and a shaft hole.

[0010] Preferably, one of the outer gear and the inner socket are fixed in the axial direction of the horizontal axis, and the other one of the outer gear and the inner socket is able to move in the axial direction of the horizontal axis.

[0011] Preferably, a shaft section extending outwards in the axial direction of the horizontal axis is disposed on the outer gear and is assembled on a fixed anti-rotation shaft sleeve in an axially moving manner.

[0012] Preferably, the unlocking part is a portion or a component, extending outwards in the axial direction of the horizontal axis, of the outer gear or the inner socket.

[0013] Preferably, the outer gear and the inner socket are in shapes of matching isosceles trapezoids, so that the outer gear and the inner socket can be mutually guided when switched to an engaged state from a disengaged

state.

[0014] Preferably, a guide shaft for guiding the outer gear and the inner socket to be engaged is disposed in the axial direction of the horizontal axis.

[0015] Preferably, two pairs of outer gears and inner sockets are symmetrically arranged left and right, and two unlocking parts are symmetrically arranged left and right.

[0016] Preferably, the spring is a spiral compression spring having two ends separately supported on the left-right symmetrical outer gears, and the outer gears are driven to be engaged with the corresponding inner sockets by means of an elastic force of the spiral compression spring.

[0017] Preferably, the left-right symmetrical outer gears are disposed around the guide shaft and are able to move along the guide shaft.

[0018] Preferably, two pairs of outer gears and inner sockets are arranged, and one unlocking part is arranged at one end of the locking structure.

[0019] Preferably, the two outer gears are nested together in the axial direction to form an outer gear set.

[0020] Preferably, each of two ends of the outer gear set is assembled on one anti-rotation shaft sleeve through one shaft section, and the unlocking part is located on an outer side of one anti-rotation shaft sleeve, is connected to the outer gear set, and can be axially pressed to allow the outer gears to be disengaged from the inner sockets.

[0021] Preferably, the spring is a spiral compression spring disposed around the outer gear set, two ends of the spiral compression spring are separately supported on the outer gear set and a side wall of one inner socket, and the outer gears are driven to be engaged with the corresponding inner sockets by means of an elastic force of the spiral compression spring.

[0022] Preferably, a gear structure is disposed on the ironing head and the handle, and the outer gear and the inner socket can be aligned by means of the gear structure so as to be smoothly switched to the engaged state from the disengaged state.

[0023] Preferably, the gear structure comprises a gear component and a gear setting part which are separately disposed on the ironing head and the handle, the gear component has at least two gears, and when the gears match the gear setting part, the outer gear and the inner socket are aligned to be smoothly switched to the engaged state from the disengaged state.

[0024] Preferably, the ironing head is able to rotate around the horizontal axis to be folded with respect to the handle.

[0025] According to the invention, the handle and the ironing head are rotatably connected around the horizontal axis so that the angle between the handle and the ironing surface can be changed after the handle and the ironing head rotate relatively; the locking structure is arranged at the joint of the handle and the ironing head and is provided with the unlocking part; and the unlocking part can be operated to unlock the locking structure to allow the handle and the ironing head to rotate around the horizontal axis, and can be released to lock the handle and the ironing head by the locking structure so as to prevent the handle and the ironing head from rotating around the horizontal axis. In this way, the angle of the ironing surface with respect to the handle can be adjusted within a wide range as required during use to facilitate ironing and to allow the handle to be held more comfortably during ironing.

[0026] Furthermore, the handle and the ironing head can be folded through the locking structure, so that the length of the ironing machine is reduced, and packaging and storage are facilitated.

Brief Description of the Drawings

[0027]

FIG. 1 is a sectional view of Embodiment 1 of an ironing machine of the invention;

FIG. 2 is an exploded view of FIG. 1;

FIG. 3 is an enlarged view of part A in FIG. 1;

FIG. 4 is a schematic diagram of the assembly relation of an outer gear, an inner socket, and an anti-rotation shaft sleeve in Embodiment 1;

FIG. 5 is a schematic diagram of a state where the outer gear and the inner socket are engaged to lock a handle and an ironing head in Embodiment 1;

FIG. 6 is a sectional view in the state shown in FIG. 5;

FIG. 7 is a schematic diagram of a state where the outer gear and the inner socket are disengaged to allow the handle and the ironing head to rotate around a horizontal axis in Embodiment 1;

FIG. 8 is a sectional view in the state shown in FIG. 7;

FIG. 9 is a schematic diagram of the shape of the outer gear and the shape of the inner socket in Embodiment 1;

FIG. 10 is a schematic diagram of the ironing machine used for horizontal ironing of the invention;

FIG. 11 is a schematic diagram of the ironing machine used for vertical ironing of the invention;

FIG. 12 is an exploded view of Embodiment 2 of the ironing machine of the invention;

FIG. 13 is a sectional view of Embodiment 2 of the ironing machine of the invention in a state where an

outer gear is engaged with an inner socket to lock a handle and an ironing head;

FIG. 14 is a sectional diagram of Embodiment 2 of the ironing machine of the invention in a state where the outer gear is disengaged from the inner socket to allow the handle and the ironing head to rotate around a horizontal axis;

Reference Signs:

[0028] 100, handle;200, ironing head; 201, ironing surface; 202, shell;300, water tank;400, water pump;500, steam generator;600, locking structure; 601, unlocking part; 602, outer gear; 603, inner socket; 604, anti-rotation shaft sleeve; 606, spring; 607, guide shaft; 608, shaft section; 609, anti-rotation plane; 610, shaft hole; 611, shaft; 612, axial through hole; 613, anti-rotation surface; 624, flange; 625, screw;700, gear structure; 701, elastic gear component; 702, gear setting part; 704, protrusion; x, horizontal axis.

Detailed Description of the Invention

[0029] The invention will be further explained below in conjunction with the accompanying drawings in the specification.

Embodiment 1

[0030] As shown in FIG 1-FIG 3, an ironing machine with an adjustable ironing angle comprises a handle 100, an ironing head 200, a water tank 300, a water pump 400, and a steam generator 500, wherein the ironing head 200 has an ironing surface 201. When the ironing machine operates, the water pump delivers water to the steam generator, the water is heated in the steam generator to turn into steam, and the steam is released via steam outlets in the ironing surface to be used for ironing.

[0031] To ensure that the angle of the ironing surface with respect to the handle can be adjusted, the handle and the ironing head are rotatably connected around a horizontal axis x shown in FIG 3 so that the angle between the handle and the ironing surface will be changed after the handle and the ironing head rotate relative to each other. As shown in FIG 3, the horizontal axis is an axis perpendicular to the principal plane. The horizontal axis x is also shown in FIG 6, FIG 8, and FIG 13-FIG 14. In addition, to locate the ironing surface at a selected position, a locking structure 600 is arranged at a joint of the handle and the ironing head, and is provided with exposed unlocking parts 601, the unlocking parts can be operated to unlock the locking structure to allow the handle and the ironing head to rotate around the horizontal axis, and can be released to lock the handle and the ironing head by the locking structure so as to prevent the handle and the ironing head from rotating around the horizontal axis. In this way, the angle of the ironing surface with respect to the handle can be adjusted as required during use to facilitate ironing and to allow the handle to be comfortably held during ironing. As shown in FIG 10, when the ironing machine is used for horizontal ironing, the angle of the handle with respect to the ironing head can be adjusted to allow the handle to be held more comfortably under the precondition that the ironing surface exactly faces a garment. Similarly, as shown in FIG 11, when the ironing machine is used for vertical ironing, the angle of the handle with respect to the ironing head can also be adjusted to allow the handle to be held more comfortably under the precondition that the ironing surface exactly faces a garment.

[0032] The locking structure is clearly shown in FIG 2-FIG 9 and will be detailed below.

[0033] As shown, the locking structure 600 comprises two pairs of outer gears 602 and inner sockets 603 which are symmetrically arranged left and right, and anti-rotation shaft sleeves 604, buttons used as the unlocking parts 601, a spring 606, and a guide shaft 607 are configured for the outer gears.

[0034] Each outer gear 602 is an independent part and has a shaft section 608 extending outwards in an axial direction of the horizontal axis, wherein the shaft section has an anti-rotation plane 609. Teeth of the outer gears are of an isosceles trapezoid shape and each have an outer end smaller than an inner end, and this structure is manifested by an angle β in FIG 9.

[0035] The inner sockets 603 are formed on inner edges of through holes in a front end of the handle, slots of the inner sockets are of an isosceles trapezoid shape and each have an outer end smaller than an inner end, so that the outer gears and the inner sockets can be engaged and can be manually guided when switched from a disengaged state to an engaged state. For the purpose of locking the handle and the ironing head by means of the engagement of the outer gears and the inner sockets to prevent the handle and the ironing head from rotating around the horizontal axis, the inclination angles of side edges of the outer gears and the inner sockets (equivalent to the side edges of the isosceles trapezoids) shall meet the requirement for automatic locking when the outer gears and the inner sockets are engaged. Shaft holes 610 are formed outside the inner sockets in the through holes in the front end of the handle and allow shafts 611, mentioned below, on the anti-rotation shaft sleeves to be assembled therein. In addition, the inner diameter of the shaft holes is smaller than the outer diameter of the outer gears, so that the outer gears can be limited, that is, the outer gears will be blocked by side faces of the shaft holes when moving outwards.

[0036] As shown, the anti-rotation shaft sleeves 604 are independent parts, which is beneficial to fabrication and assembly; and the anti-rotation shaft sleeves 604 can be made of a material different from an ironing head shell to be better matched with the gears. In specific implementation, the anti-rotation shaft sleeves and the ironing head shell can be integrally manufactured. Even if

the anti-rotation shaft sleeves and the ironing head shell are separated as shown, the anti-rotation shaft sleeves are assembled on the ironing head shell through fasteners, thus actually being constituent parts of the ironing head. As shown, each anti-rotation shaft sleeve 604 has an axial through hole 612, and the axial through hole has an anti-rotation surface 613. In this way, when the shaft sections of the outer gears are assembled in the axial through holes of the anti-rotation shaft sleeves, the anti-rotation planes 609 of the shaft sections match the anti-rotation surfaces 613 of the axial through holes to prevent the shaft sections from rotating in the axial through holes and allow the shaft sections to move axially. In addition, the shafts 611 are formed on the anti-rotation shaft sleeves and are to be assembled in the shaft holes mentioned above.

[0037] To keep the outer gears and the inner sockets in the engaged state, a spiral compression spring is disposed between the two outer gears, two ends of the spiral compression spring are separately supported on the left-right symmetrical outer gears, and the outer gears at the two ends of the spring are kept engaged with the inner sockets by means of the elastic force of the spring.

[0038] To prevent the outer gears from swinging with respect to the horizontal axis when moving axially, which may otherwise disturb the engagement of the outer gears and the inner sockets, the left-right symmetrical outer gears are disposed around the guide shaft and are both able to move axially along the guide shaft 607. In this way, the outer gears can move from disengagement positions to engagement positions along the guide shaft to be smoothly engaged with the inner sockets without swinging. To make the structure compact, the spring is disposed around the guide shaft.

[0039] The number of the unlocking parts 601 is two, and the two unlocking parts 601 are symmetrically arranged left and right. In the figures, the unlocking parts are buttons beneficial to operation, and the buttons are located on outer sides of the anti-rotation shaft sleeves and can be pressed inwards to push the shaft sections of the outer gears to drive the outer gears to move inwards to be disengaged from the inner sockets. Flanges 624 are disposed on the unlocking parts 601, and in an assembled state, the flanges 624 are blocked by the ironing head shell or a handle shell to be maintained at the assembled position. In specific implementation, the unlocking parts may directly extend from the shaft sections of the outer gears.

[0040] The locking structure shown in FIG 2-FIG 9 is assembled according to the assembly relation shown in FIG 2: the outer gears 602, the spring 606, and the guide shaft 607 are assembled at the front end of the handle, then the outer gears are engaged with the inner sockets by means of the elastic force of the spring, as shown in FIG 5-FIG. 6, and the outer gears and the inner sockets are coaxial with the horizontal axis. Afterwards, the anti-rotation shaft sleeves 604 are disposed around the shaft sections 608 of the outer gears, and the shafts 611 on the anti-rotation shaft sleeves 604 are matched with the shaft holes 610 in the handle so that the handle and the ironing head can rotate by means of the cooperation of the shafts and the shaft holes. After that, the anti-rotation shaft sleeves are fixed on the ironing head through fasteners. Finally, the unlocking parts are assembled on the outer sides of the anti-rotation shaft sleeves, the ironing head shell is assembled, and the flanges on the unlocking parts are blocked by the ironing head shell.

[0041] According to the ironing machine mentioned above, in a natural state, the outer gears 602 and the inner sockets 603 are kept in the engaged state by means of the elastic force of the spring, as shown in FIG 5-FIG 6, and at this moment, the ironing head and the handle are locked and cannot rotate relatively. When the position of the ironing head with respect to the handle needs to be adjusted, the unlocking parts 601 are pressed to force the two outer gears to move inwards to compress the spring, the outer gears are disengaged from the inner sockets, as shown in FIG 7-FIG 8, to allow the handle and the ironing head to rotate around the horizontal axis, at this moment, the ironing head and the handle can rotate relatively to be adjusted to expected positions, then the unlocking parts are released to reset the outer gears, and the ironing head and the handle are locked again. Wherein, the minimum rotation angle of the ironing head with respect to the handle depends on the number, size, and distribution density of the teeth of the gears and the number, size, and distribution density of the slots of the inner sockets.

[0042] Furthermore, a gear structure 700 is disposed on the ironing head and the handle, as shown in FIG 3, and comprises an elastic gear component 701 and a gear setting part 702 which are separately arranged on the ironing head and the handle, wherein the gear component has two gears 703 formed on two sides of a protrusion, the protrusion 704 can slide over the gear setting part 702 by means of the elastic force of the gear component to be located on two sides of the gear setting part and matches the gear setting part to determine the two gears, and at this moment, the outer gears and the inner sockets can be aligned to be smoothly switched to the engaged state from the disengaged state.

[0043] Wherein, each outer gear and the inner socket engaged with the outer gear form one pair.

Embodiment 2

[0044] Compared with Embodiment 1, the ironing machine in this embodiment omits the gear structure in Embodiment 1, so that the ironing head and the handle can rotate within a wider range, and the rotation angle of the ironing head around the horizontal axis is large enough to allow the ironing head to be folded with respect to the handle.

Embodiment 3

[0045] In Embodiment 1, the outer gears move axially. In this embodiment, the outer gears are fixed, and the inner sockets are made to move axially, that is, the outer gears and the inner sockets in Embodiment 1 are interchanged.

Embodiment 4

[0046] In embodiment 1, the inner sockets are disposed on the handle, and the outer gears are disposed on the ironing head. In this embodiment, the outer gears are disposed on the handle, the inner sockets are disposed on the ironing head, and either the outer gears or the inner sockets move axially, that is, the ironing head and the handle in Embodiment 1 are interchanged.

Embodiment 5

[0047] In embodiment 1, two pairs of inner sockets and outer gears are arranged. In this embodiment, only one pair of inner socket and outer gear is arranged, and one unlocking part is configured, that is, the inner socket, the outer gear, and the unlocking part on one side of the ironing machine in Embodiment 1 are omitted, and only the inner socket, the outer gear, and the unlocking part on the other side of the ironing machine work.

Embodiment 6

[0048] As shown in FIG 12-FIG 14, this embodiment differs from Embodiment 1 only in the locking structure. In this embodiment, the locking structure comprises two pairs of outer gears 602 and inner sockets 603 which are arranged left and right in the same direction, and anti-rotation shaft sleeves 604, a button used as an unlocking part 601, and a spring 606 are configure for the outer gears.

[0049] To facilitate assembly, the two outer gears 602 are nested together in an axial direction to form an outer gear set. Each of two ends of the outer gear set (outer ends of the two outer gears) extends outwards to form a shaft section 608 having an anti-rotation plane 609, and teeth of the outer gears are of an isosceles trapezoid shape and each have a right end smaller than a left end. Since the two outer gears are nested together, to make the structure compact and facilitate assembly, a spiral compression spring 606 is arranged between the two outer gears of the outer gear set, two ends of the spiral compression spring are separately supported on one outer gear and a side wall of one inner socket, and the outer gears are driven to be engaged with the corresponding inner sockets by means of the elastic force of the spiral compression spring.

[0050] The inner sockets 603 are formed on inner edges of through holes in a front end of the handle, and slots of the inner sockets are of an isosceles trapezoid shape and each have a right end smaller than a left end, so that the outer gears and the inner sockets can be engaged and can be mutually guided when switched from a disengaged state to an engaged state. Shaft holes 610 are formed outside the inner sockets in the through holes in the front end of the handle and allow shafts 611, mentioned below, on the anti-rotation shaft sleeves to be assembled therein. In addition, the inner diameter of the shaft holes is smaller than the outer diameter of the outer gears, so that the outer gears can be limited, that is, the outer gears will be blocked by side faces of the shaft holes when moving outwards.

[0051] As shown, the anti-rotation shaft sleeves 604 are independent parts, which is beneficial to fabrication and assembly; and the anti-rotation shaft sleeves 604 can be made of a material different from an ironing head shell to be better matched with the gears. As shown, each anti-rotation shaft sleeve has an axial through hole 612, and the axial through hole has an anti-rotation surface 613. In this way, when the shaft sections of the outer gears are assembled in the axial through holes of the anti-rotation shaft sleeves, the anti-rotation planes 609 of the shaft sections match the anti-rotation surfaces 613 of the axial through holes to prevent the shaft sections from rotating in the axial through holes and allow the shaft sections to move axially. In addition, the shafts 611 are formed on the anti-rotation shaft sleeves and are to be assembled in the shaft holes 610 mentioned above.

[0052] The unlocking part is disposed at a right end of the outer gear set.

[0053] The locking structure shown in FIG 12-FIG 14 is assembled according to the relation shown in FIG 12: First of all, the outer gear on the right side in FIG 12 is assembled in the corresponding inner socket between the two inner sockets, then the other outer gear on the left side is sleeved with the spring 606 and is assembled in the other inner socket between the two inner sockets, the two outer gears are axially nested together to form the outer gear set as shown in FIG 12, the two shaft sections 608 respectively penetrate through the corresponding shaft holes 601 to extend outwards, and the two ends of the spring are separately supported on the outer gear on the right side and the side wall of the inner socket on the left side.

[0054] Then, the anti-rotation shaft sleeves 604 are disposed around the shaft sections 608 of the corresponding outer gears, and the shafts 611 on the anti-rotation shaft sleeves 604 are matched with the shaft holes 610 in the handle, so that the handle and the ironing head can rotate by means of the cooperation of the shafts and the shaft holes. Then, the anti-rotation shaft sleeves are fixed on the ironing head through fasteners.

[0055] Afterwards, the unlocking part 601 is assembled on the outer side of the anti-rotation shaft sleeve on the right side and is connected to the outer gears 602 through a screw 625.

[0056] Finally, the ironing head shell is assembled, the locking structure is shielded, and only the unlocking part

is exposed.

[0057] According to the locking structure, in a natural state, the outer gears 602 and the inner sockets 603 are kept in the engaged state by means of the elastic force of the spring 606, as shown in FIG 13, and at this moment, the ironing head and the handle are locked and cannot rotate relatively. When the position of the ironing head with respect to the handle needs to be adjusted, the unlocking part 601 in a state shown in FIG 13 is pressed to force the two outer gears to move leftwards from the state shown in FIG. 13 to compress the spring 606, the outer gears 602 are disengaged from the inner sockets 603 to allow the handle and the ironing head to rotate around the horizontal axis, at this moment, the ironing head and the handle can rotate relatively to be adjusted to their expected positions, then the unlocking part is released to reset the outer gears, and the ironing head and the handle are locked again.

Embodiment 7

[0058] In Embodiment 6, two pairs of inner sockets and outer gears are arranged. In this embodiment, only one pair of inner socket and outer gear is arranged, that is, the inner socket and the outer gear on the left side of the ironing machine in Embodiment 1 are omitted, and only the inner socket and the outer gear on the right side of the ironing machine work in cooperation with the unlocking part.

Claims

1. An ironing machine with an adjustable ironing angle, comprising a handle and an ironing head with an ironing surface, wherein the handle and the ironing head are rotatably connected around a horizontal axis so that an angle between the handle and the ironing surface will be changed after the handle and the ironing head rotate relatively, a locking structure is arranged at a joint of the handle and the ironing head and is provided with an unlocking part, and the unlocking part can be operated to unlock the locking structure to allow the handle and the ironing head to rotate around the horizontal axis, and can be released to lock the handle and the ironing head by the locking structure so as to prevent the handle and the ironing head from rotating around the horizontal axis.

2. The ironing machine with an adjustable ironing angle according to claim 1, wherein the locking structure comprises an outer gear and an inner socket which are separately disposed on the handle and the ironing head, and the outer gear and the inner socket are coaxial with the horizontal axis and are able to move relatively in an axial direction of the horizontal axis to be engaged or disengaged; when the outer gear and the inner socket are engaged, the handle and the ironing head are locked by the locking structure; and when the outer gear and the inner socket are disengaged, the handle and the ironing head are able to rotate around the horizontal axis.

3. The ironing machine with an adjustable ironing angle according to claim 2, wherein the outer gear and the inner socket are configured in any of the following ways:

   1) the outer gear and the inner socket are engaged by means of an elastic force of a spring, and when the unlocking part is operated, the elastic force of the spring will be overcome to allow the outer gear and the inner socket to be disengaged;
   2) one of the outer gear and the inner socket are fixed in the axial direction of the horizontal axis, and the other one of the outer gear and the inner socket is able to move in the axial direction of the horizontal axis;
   3) a guide shaft for guiding the outer gear and the inner socket to be engaged is disposed in the axial direction of the horizontal axis;
   4) two pairs of outer gears and inner sockets are symmetrically arranged left and right, and two said unlocking parts are symmetrically arranged left and right;
   5) two pairs of outer gears and inner sockets are arranged, and one said unlocking part is arranged at one end of the locking structure.

4. The ironing machine with an adjustable ironing angle according to claim 2, wherein the handle and the ironing head are assembled through the cooperation of a shaft and a shaft hole.

5. The ironing machine with an adjustable ironing angle according to claim 2, wherein one of the outer gear and the inner socket are fixed in the axial direction of the horizontal axis, and the other one of the outer gear and the inner socket is able to move in the axial direction of the horizontal axis; a shaft section extending outwards in the axial direction of the horizontal axis is disposed on the outer gear and is assembled on a fixed anti-rotation shaft sleeve in an axially moving manner.

6. The ironing machine with an adjustable ironing angle according to claim 2, wherein the unlocking part is a portion or a component, extending outwards in the axial direction of the horizontal axis, of the outer gear or the inner socket.

7. The ironing machine with an adjustable ironing angle according to claim 2, wherein the outer gear and the inner socket are in shapes of matching isosceles

trapezoids, so that the outer gear and the inner socket can be mutually guided when switched from a disengaged state to an engaged state.

8. The ironing machine with an adjustable ironing angle according to claim 2, wherein:

the outer gear and the inner socket are engaged by means of an elastic force of a spring, and when the unlocking part is operated, the elastic force of the spring will be overcome to allow the outer gear and the inner socket to be disengaged;
two pairs of outer gears and inner sockets are symmetrically arranged left and right, and two said unlocking parts are symmetrically arranged left and right;
the spring is a spiral compression spring having two ends separately supported on the left-right symmetrical outer gears, and the outer gears are driven to be engaged with the corresponding inner sockets by means of an elastic force of the spiral compression spring.

9. The ironing machine with an adjustable ironing angle according to claim 2, wherein:

a guide shaft for guiding the outer gear and the inner socket to be engaged is disposed in the axial direction of the horizontal axis;
two pairs of outer gears and inner sockets are symmetrically arranged left and right, and two said unlocking parts are symmetrically arranged left and right;
the left-right symmetrical outer gears are disposed around the guide shaft and are able to move along the guide shaft.

10. The ironing machine with an adjustable ironing angle according to claim 2, wherein:

two pairs of outer gears and inner sockets are arranged, and one said unlocking part is arranged at one end of the locking structure;
the two outer gears are nested together in the axial direction to form an outer gear set.

11. The ironing machine with an adjustable ironing angle according to claim 10, wherein:

one of the outer gear and the inner socket are fixed in the axial direction of the horizontal axis, and the other one of the outer gear and the inner socket is able to move in the axial direction of the horizontal axis;
a shaft section extending outwards in the axial direction of the horizontal axis is disposed on the outer gear and is assembled on a fixed anti-rotation shaft sleeve in an axially moving manner;
each of two ends of the outer gear set is assembled on one said anti-rotation shaft sleeve through one said shaft section, and the unlocking part is located on an outer side of one said anti-rotation shaft sleeve, is connected to the outer gear set, and can be axially pressed to allow the outer gears to be disengaged from the inner sockets.

12. The ironing machine with an adjustable ironing angle according to Claim 10, wherein:

the outer gear and the inner socket are engaged by means of an elastic force of a spring, and when the unlocking part is operated, the elastic force of the spring will be overcome to allow the outer gear and the inner socket to be disengaged;
the spring is a spiral compression spring disposed around the outer gear set, two ends of the spiral compression spring are separately supported on the outer gear set and a side wall of one said inner socket, and the outer gears are driven to be engaged with the corresponding inner sockets by means of an elastic force of the spiral compression spring.

13. The ironing machine with an adjustable ironing angle according to Claim 2, wherein a gear structure is disposed on the ironing head and the handle, and the outer gear and the inner socket can be aligned by means of the gear structure so as to be smoothly switched to an engaged state from a disengaged state.

14. The ironing machine with an adjustable ironing angle according to Claim 13, wherein the gear structure comprises a gear component and a gear setting part which are separately disposed on the ironing head and the handle, the gear component has at least two gears, and when the gears match the gear setting part, the outer gear and the inner socket are aligned to be smoothly switched to the engaged state from the disengaged state.

15. The ironing machine with an adjustable ironing angle according to Claim 1, wherein the ironing head is able to rotate around the horizontal axis to be folded with respect to the handle.

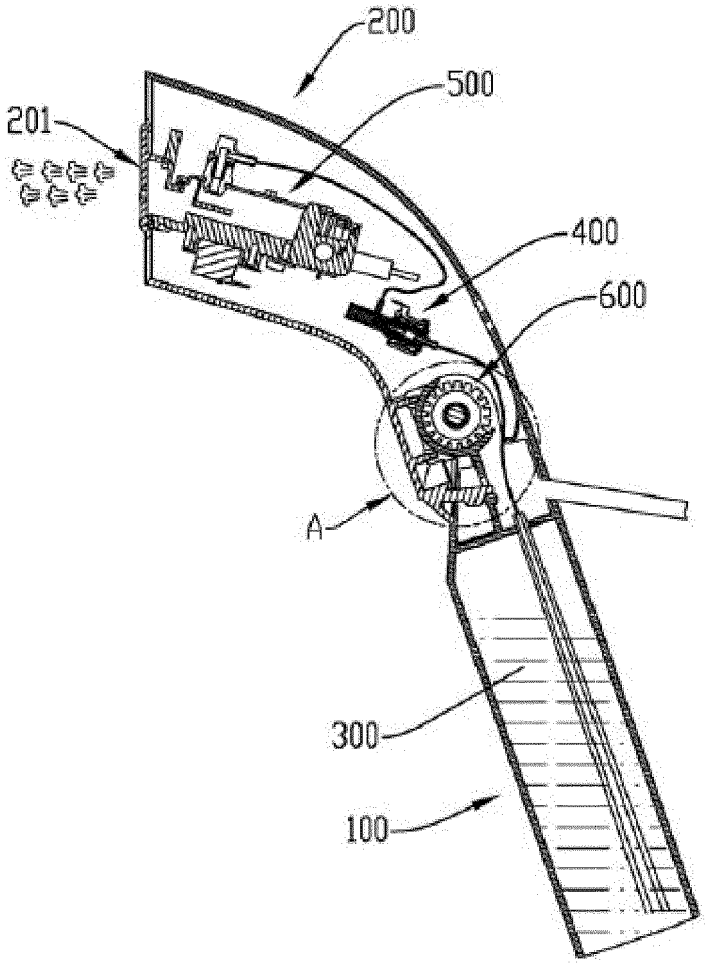

FIG. 1

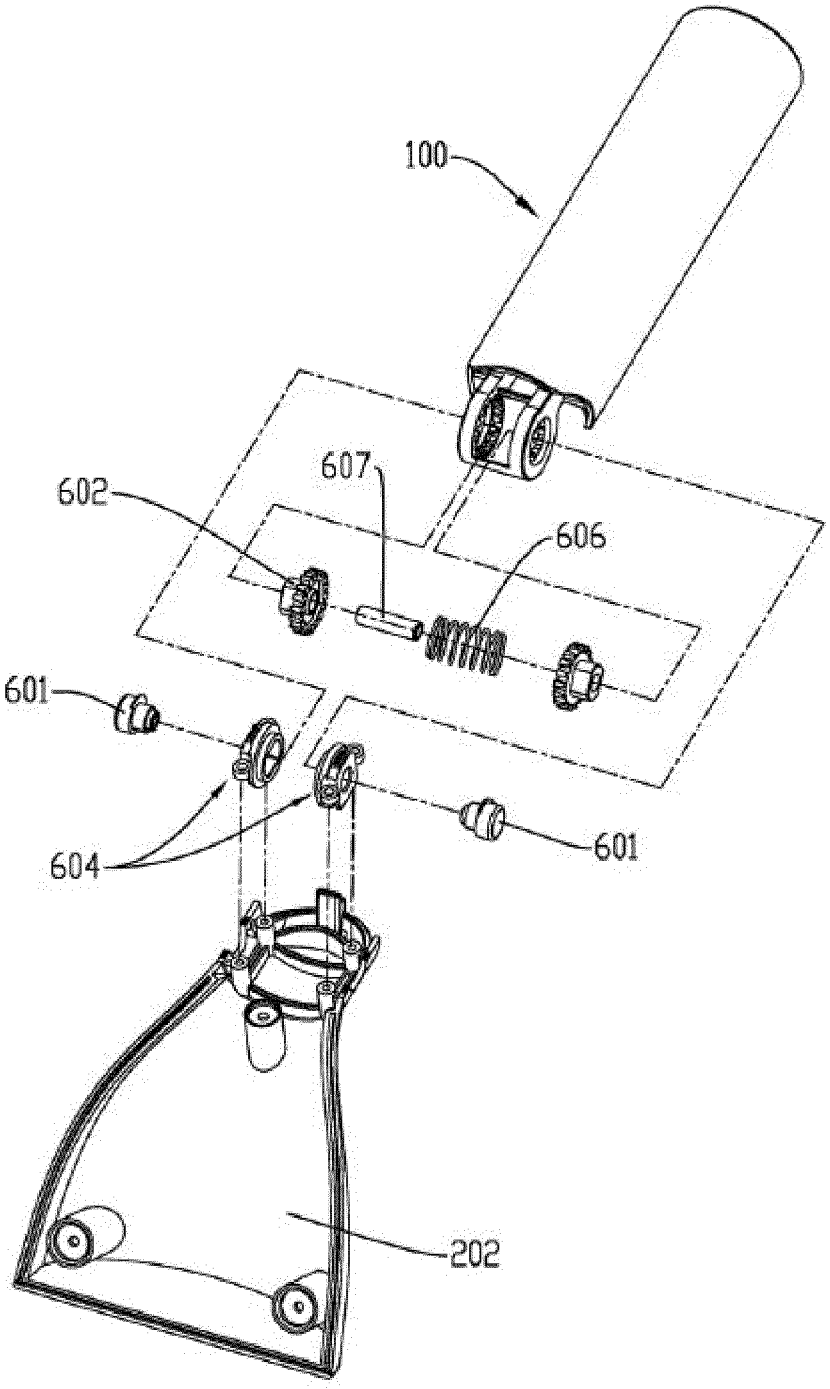

FIG. 2

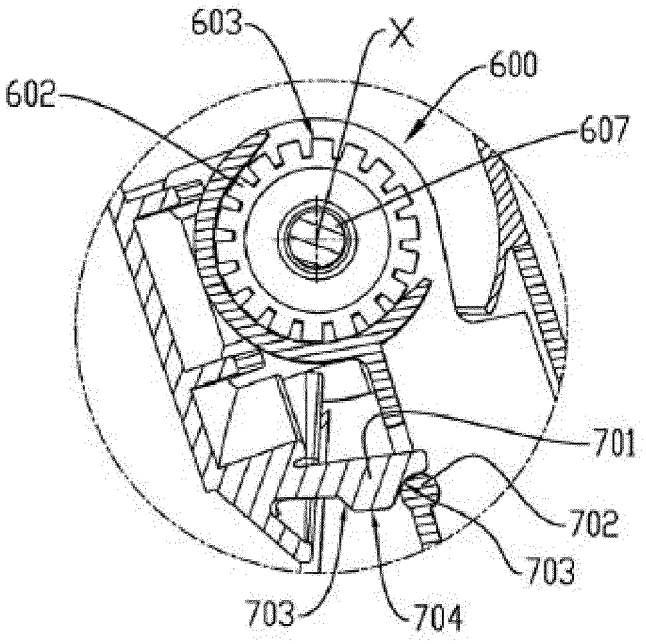
603
X
600
602
607
701
702
703
703
704

FIG. 3

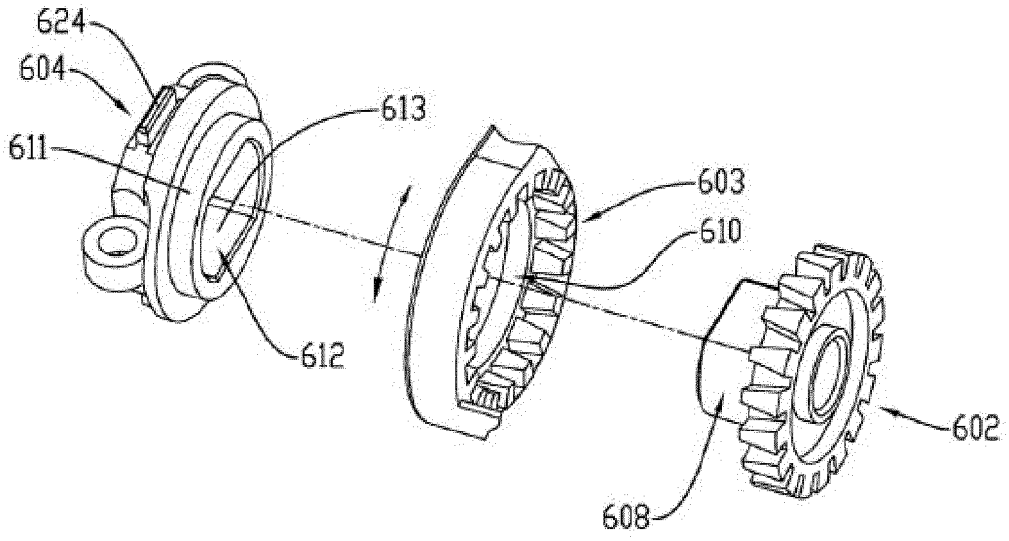
624
604
613
611
603
610
612
602
608

FIG. 4

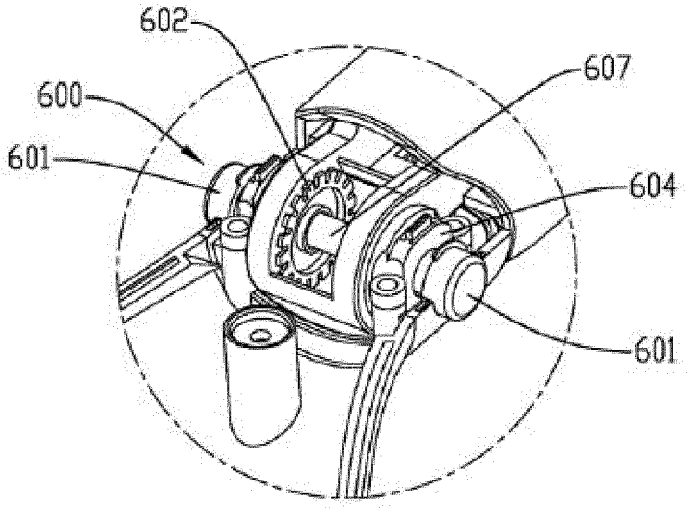

FIG. 5

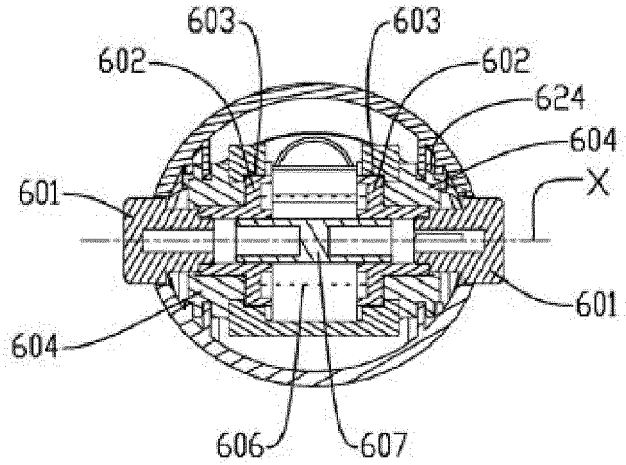

FIG. 6

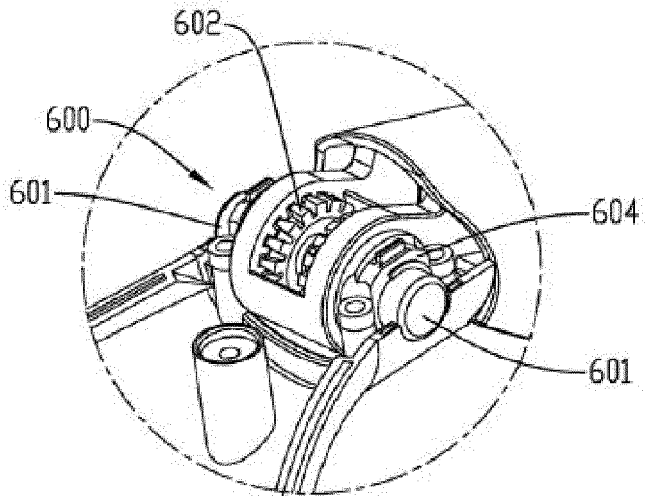

FIG. 7

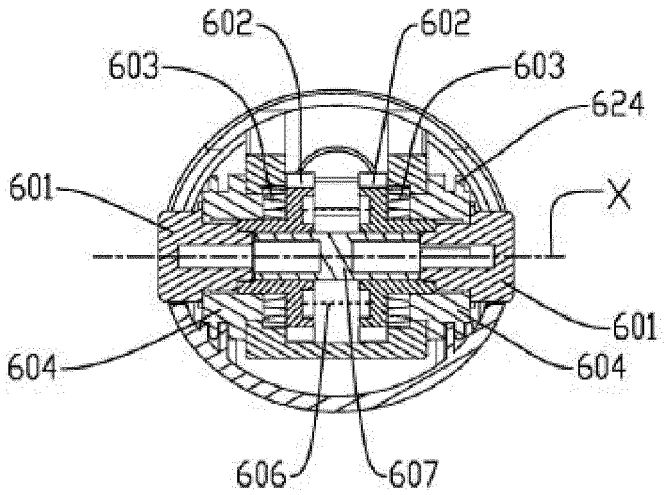
602
602
603
603
624
601
X
601
604
604
606
607

FIG. 8

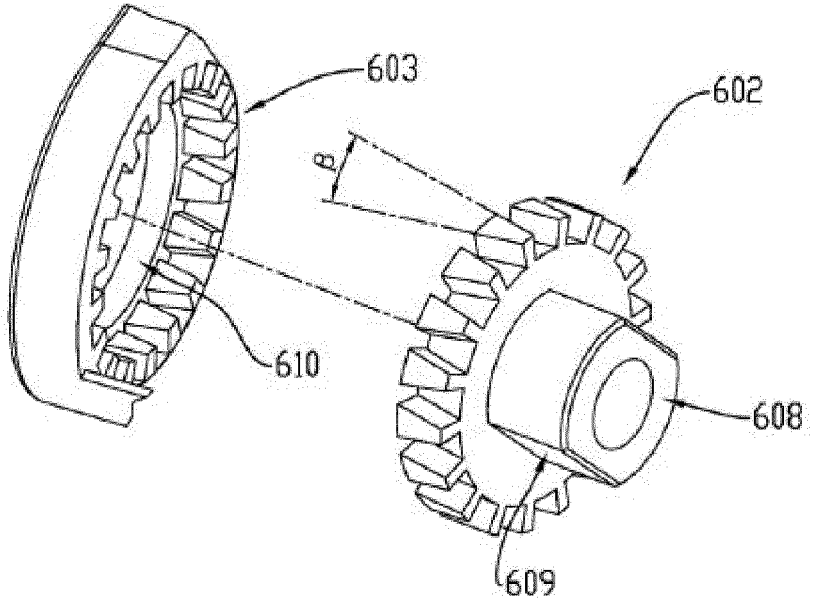
603
602
β
610
608
609

FIG. 9

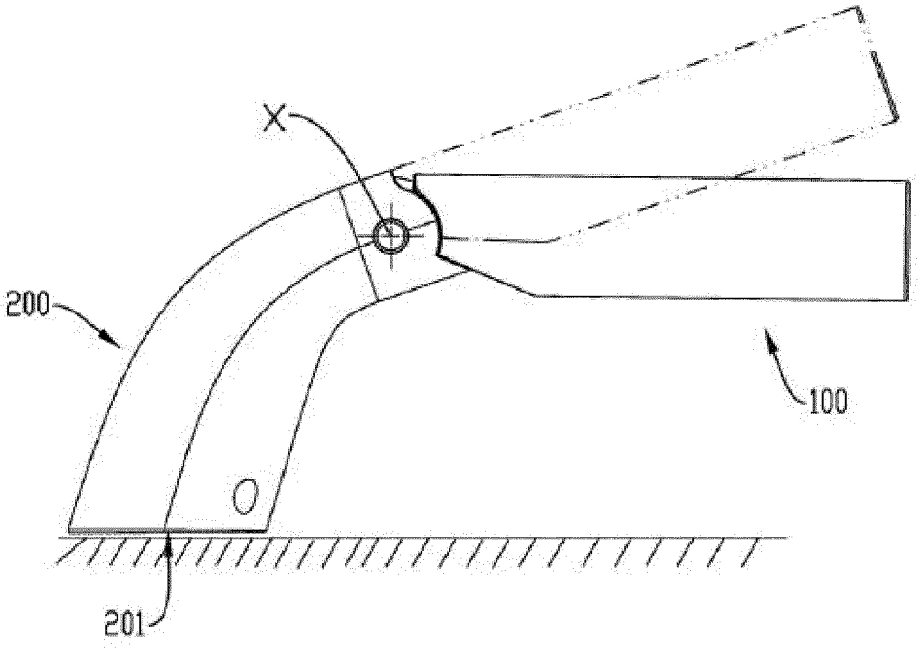

FIG. 10

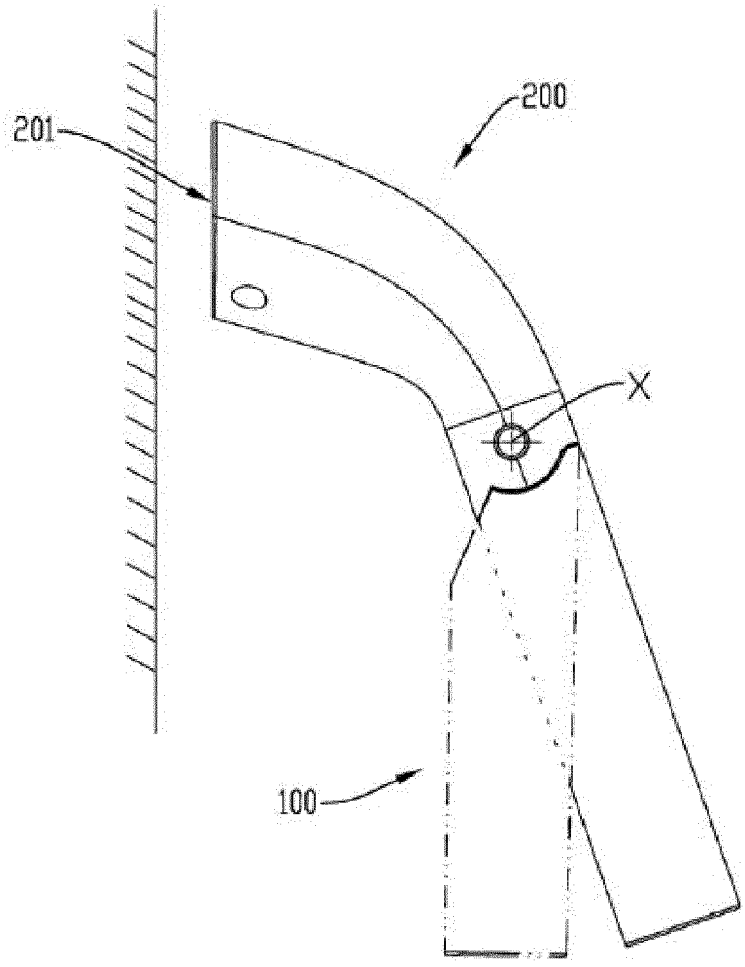

FIG. 11

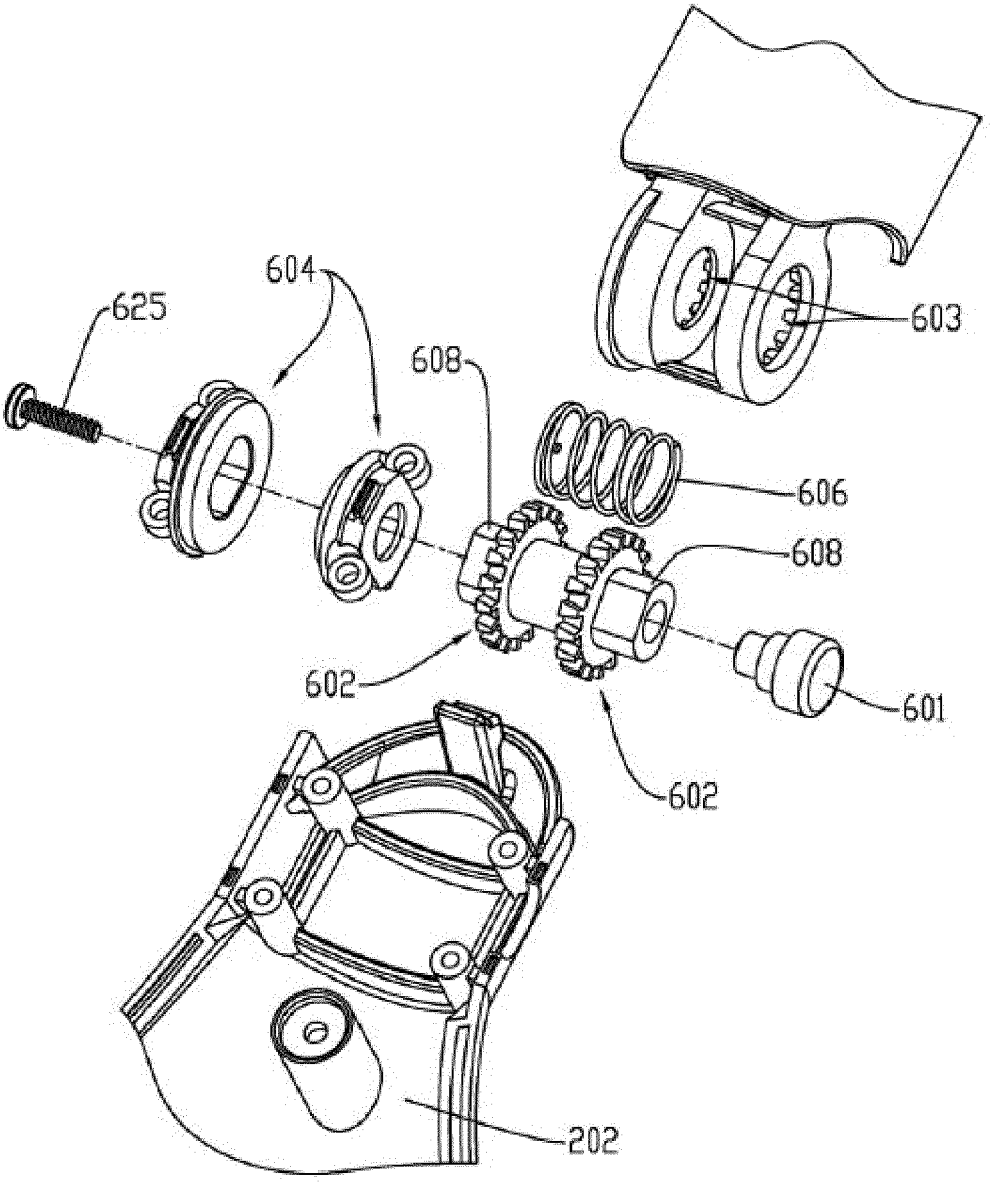

FIG. 12

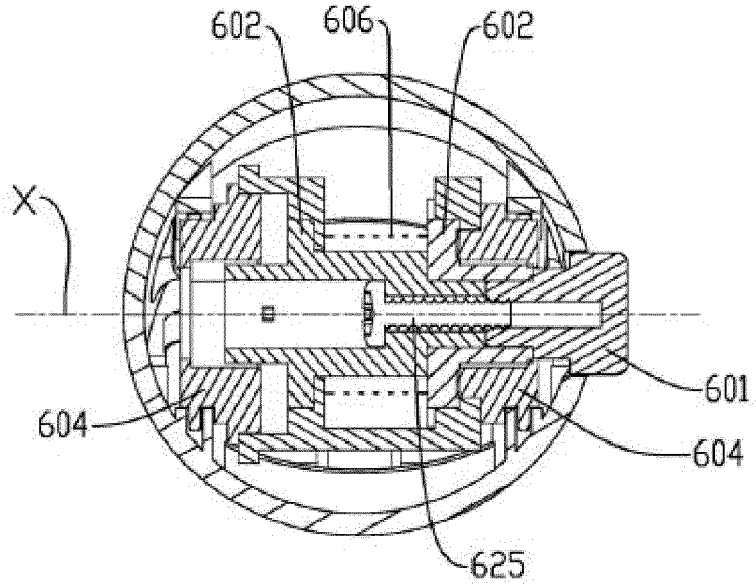
602
606
602
X
601
604
604
625

FIG. 13

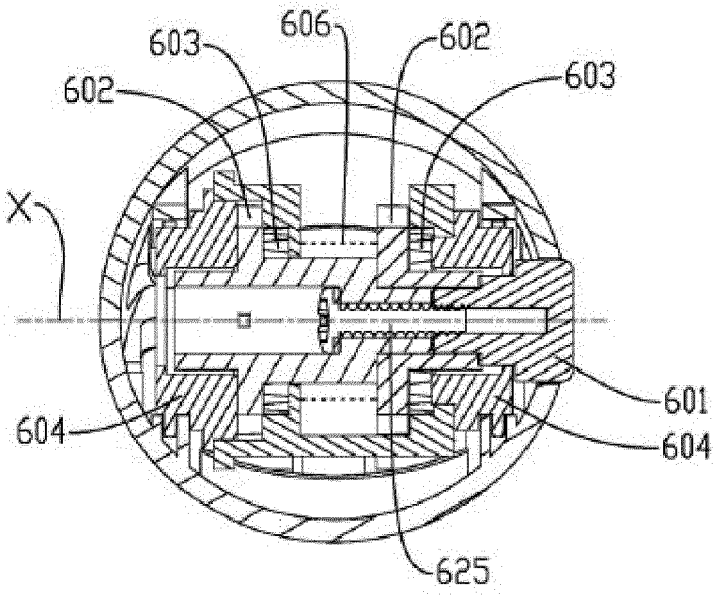
603
606
602
602
603
X
601
604
604
625

FIG. 14

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 20 21 7950

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	CN 207 537 789 U (XIONG GUOQUAN) 26 June 2018 (2018-06-26) * claims 4-6; figures *	1-4, 13-15	INV. D06F73/00
X	DE 20 2019 103400 U1 (NINGBO KAIBO GROUP CO LTD [CN]) 9 July 2019 (2019-07-09) * paragraphs [0030] - [0032]; figures 1, 17 *	1-4,13, 15	
A	FR 3 067 366 A3 (KONINKLIJKE PHILIPS NV [NL]) 14 December 2018 (2018-12-14) * claim 6; figures *	1-15	

TECHNICAL FIELDS SEARCHED (IPC)

D06F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	20 May 2021	Diaz y Diaz-Caneja

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 20 21 7950

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

20-05-2021

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
CN 207537789 U	26-06-2018	NONE	
DE 202019103400 U1	09-07-2019	DE 202019103400 U1	09-07-2019
		FR 3089526 A3	12-06-2020
		JP 3223061 U	12-09-2019
		KR 20190001781 U	10-07-2019
FR 3067366 A3	14-12-2018	CN 207419103 U	29-05-2018
		FR 3067366 A3	14-12-2018
		KR 20180003544 U	18-12-2018
		PL 127403 U1	17-12-2018
		RU 188451 U1	15-04-2019

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- CN 302931586 S **[0003]**
- CN 204676349 U **[0003]**
- CN 106758096 A **[0004]**