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(54) **Device comprising a body, a closure and a hinge**

Vorrichtung mit einem Korpus, einem Verschluss und einem Scharnier

Dispositif avec un corps, une fermeture et une charnière

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Description

[0001] This invention relates to a hinge assembly and more particularly but not solely to a hinge for a closure of a vacuum cleaner or other device.

[0002] Vacuum cleaners generally comprise an external housing, which is often provided with one or more closures that can be opened to reveal dust separation devices, such as dust bags, filters or cyclone units. The closure must be easy and convenient to open and close, in order to facilitate replacement or emptying of the dust separation device. The closure must also be capable of wide opening, so that a voluminous full dust bag can be easily removed from the cleaner.

[0003] It is also known to provide vacuum cleaners having closures, which can be opened to reveal storage compartments for cleaning tools and the like. It is desirable, for aesthetic reasons, for any such closures to be mounted flush with the housing of the cleaner, with their side edges being located in close proximity to the side edges of the surrounding portion of the housing.

[0004] The need for the closure to conform to the shape of the cleaner housing and to open widely has led to adoption of complex double-axis hinges, whereby the closure is pivotally mounted to a pair of hinge arms, the hinge arms themselves being a pivotally mounted to the body of the cleaner. A hinge arrangement of this type is disclosed in European Patent EP 0116870. It will be appreciated that the need to accommodate the hinge arms within the cleaner body makes demands on space within the body and can impose restrictions on the form and location of the bag chamber closure.

[0005] German Patent DE 4419064 discloses an alternative to double-pivot hinges, which comprises a pair of arcuate arms, rigidly attached to the bag chamber closure. The arms are a sliding fit within a pair of arcuate cavities formed in the body of the cleaner. It will be appreciated that such an arrangement imposes restrictions similar to those associated with the double-pivot arms disclosed in European Patent EP 0116870.

[0006] GB2343915 discloses a hinge assembly comprising a first hinge portion pivotally interconnected to a displaceable second hinge portion for rotation about a rotational axis, a cam on said first portion having a cam surface disposed radially outwardly of said rotational axis, and a fixed abutment surface disposed remote from said hinge portions, wherein the cam surface is biased against said abutment surface, the assembly being arranged such that rotation of the first hinge portion about said rotational axis causes said cam to ride over said abutment causing translatory movement of the rotational axis.

[0007] EP0124410 and FR2741845 disclose hinge assemblies for fuel filler flaps, comprising a first hinge portion pivotally interconnected to a displaceable second hinge portion for rotation about a rotational axis, a cam projecting axially from said first portion and having a cam surface disposed radially outwardly of said rotational axis,

is, and a fixed abutment surface disposed remote from said hinge portions, wherein the cam surface is biased against said abutment surface to apply a rotational bias between said first and second hinge portions, the assembly being arranged such that rotation of the first hinge portion about said rotational axis causes said cam to ride over said abutment surface under the applied bias allowing translatory movement of the rotational axis.

[0008] We have now devised a hinge assembly which alleviates the above-mentioned problems.

[0009] In accordance with the present invention, there is provided a hinge assembly of the kind disclosed in EP0124410 and FR2741845 which is **characterised in that** the cam is biased outwardly of the body against the abutment surface in an opening direction.

[0010] In a vacuum cleaner, the first and second hinge portions are respectively connected to the closure and chassis thereof. As one side of the closure is opened outwardly, the axis of rotation moves away from the body of the cleaner in a controlled manner by the action of the cam, thereby allowing space for the opposite side of the closure to move inwardly without fouling the body of the cleaner.

[0011] The hinge assembly of the device is simple in construction and only makes small demands on space within the vacuum cleaner body. The assembly provides the functional attributes of the prior art whilst enabling the rotational axis to be located close to the extremity of the cleaner body, for example at the extreme front of a canister cleaner, without the hinge mechanism encroaching on the internal space of the cleaner.

[0012] Preferably means are provided for holding the hinge portions against said rotational bias, such that when the holding means is released the rotational bias causes rotation of the first hinge portion about said rotational axis and causes said cam to ride over said abutment surface under the aforementioned applied bias allowing said translatory movement of the rotational axis.

[0013] Preferably the cam surface is biased against said abutment surface by bias means acting on said displaceable second hinge portion.

[0014] Preferably the cam is disposed at a radial distance of 5 to 15 mm away from the axis of rotation.

[0015] Preferably the cam is able to move away from the abutment surface against the spring bias in order to help avoid jamming of the assembly, for example when the closure is closed.

[0016] Preferably, at least a portion of the abutment surface is inclined relative to a plane which extends normal to the direction of the applied bias, so as to control, amplify or otherwise vary the ratio of translatory movement of the rotational axis to the angle of rotation.

[0017] Preferably, the cam comprises a projection which extends outwardly from said first hinge portion, preferably in a direction which extends axially of the axis of rotation.

[0018] Preferably, a detent is provided on the cam to retain the hinge in a particular angular configuration. The

detent may comprise a planar region formed in an arcuate camming surface of the cam.

[0019] Preferably means are provided for holding the hinge portions in a relative position in which a rotational bias is applied, such that when the holding means is released the rotational bias causes rotation of the first hinge portion about said rotational axis and causes said cam to ride over said abutment surface under the aforementioned applied bias allowing said translatory movement of the rotational axis.

[0020] Preferably the holding means comprises a catch which retains the closure in a closed on the body, the rotational bias being applied to the closure in an opening direction such that the translatory movement occurs as the closure opens under the applied rotational bias.

[0021] Preferably the second portion is slidably mounted to the body of the cleaner.

[0022] Preferably the cam surface is biased against said abutment surface in a direction which extends substantially normal to the plane of the closure when the latter is in its closed position.

[0023] Preferably the cam is arranged to rotate away from said closure when the closure is opened.

[0024] An embodiment of the present invention will now be described by way of an example only and with reference to the accompanying drawings, in which:

Figure 1 is a sectional view through a canister vacuum cleaner incorporating a hinge in accordance with the present invention;

Figure 2 is an exploded view of the hinge in accordance with the present invention of the vacuum cleaner of Figure 1; and

Figures 3A - 3C are schematic views illustrating the principle of operation of the hinge of Figure 2.

[0025] Referring to the drawings, there is shown the body portion 10 of a vacuum cleaner comprising an external housing of plastics material. A compartment 11 is formed inside the body 10 for receiving a dust bag (not shown) or other dust collection device, such as a porous dust box or cyclone unit. A closure 12 is provided in the upper surface of the body 10 and can be opened to allow the user to access the compartment 11, for example when changing or emptying the dust bag or other dust separation device. In order to improve the aesthetic appearance of the cleaner, the closure 12 is a flush fit with the housing of the body and the side edges thereof conform to the shape of the surrounding portions of the housing. The closure 12 is hinged to the body 10 of the cleaner, adjacent the front edge thereof, for rotation about a horizontal axis P. A spring (not shown) biases the closure 12 about the axis P into its open position. A catch (not shown) is provided for retaining the closure 12 in its closed position against the rotational bias.

[0026] Referring to Figure 2 of the drawings, the clo-

sure 12 is hinged to the body 10 of the cleaner by way of two depending arms e.g. 13, which extend from respective opposite ends of the lower front edge of the closure 12. The lower end of each arm 13 is turned forwardly through 90° and carries an axle 14, which projects outwardly from one side of the arm 13 in a direction which extends transversely of the cleaner and parallel to the plane of the closure 12. The axles 14 of the two arms 13 lie on a common axis A-A and are directed in respective opposite directions, transversely of the body 10 of the cleaner.

[0027] The axles 14 engage into apertures formed in respective upstanding posts 15. The lower ends of the posts 15 are captively mounted in sockets 19 formed in a chassis of the cleaner, for movement in a direction D, which extends longitudinally of the posts 15. The posts 15 are biased upwardly by respective compression springs 16.

[0028] Each arm 13 of the hinge comprises a projecting cam 17, which extends outwardly therefrom in the opposite direction to the axle 14. The cams 17 extend along an axis B-B, which extends parallel to the axis A-A of the axles 14, in a position which is offset therefrom by a distance X of between 5 and 15mm. The cams 17 are disposed on the forward side of the rotational axis A-A, whereas the closure 12 is disposed substantially on the rearward side of the rotational axis. The cams 17 are also positioned at a point which is arranged such that when the closure 12 is closed, their position with respect to the rotational axis A-A is disposed in a direction which extends substantially normal to the direction of movement of the posts 15. The axially extending sides of the cams 17 comprise arcuate camming surfaces, which face upwardly and rearwardly of the cleaner. An upwardly facing portion of the camming surfaces are generally planar.

[0029] The cams 17 each extend under an inclined abutment surface 18 formed along the underside of respective side members of the chassis of the vacuum cleaner. The abutment surfaces 18 are upwardly inclined from the front to the rear of the cleaner. The camming surfaces of the cam 17 are biased upwardly against the abutment surfaces 18 by the action of the springs 16 on the posts 15.

[0030] Referring to Figure 3A of the drawings, when the closure 12 is in its closed position, the cams 17 are biased against the lower front end of their respective abutment surfaces 18. In this position, the generally planar portions of the camming surfaces are in contact with the respective abutment surfaces 18: these portions act as detents to help keep the closure closed and to provide some feedback feeling to the user that the closure is moving into or out of its closed position.

[0031] However, referring to Figures 3B and 3C of the drawings, when catch is released and the closure 12 moves to its open position under the applied bias, the cams 17 rotate downwardly and rearwardly in a counter clockwise direction, allowing the arms 13 of the hinge to rise under the applied spring bias. During opening, the

cams 17 move upwardly along the inclined abutment surfaces 18, thereby increasing the height by which the arms 13 can rise.

[0032] It will be appreciated that the rotational axis A-A of the hinge thus rises during opening by a distance L. This height rise allows the closure 12 to open through almost 90°, yet avoids fouling of the lower front edge of the closure 12 with the body 10 of the cleaner. Accordingly, the hinge of the present invention avoids the need for an unsightly gap to be provided between the closure 12 and the body 10 of the cleaner.

Claims

1. A device comprising:

a closure (12) having a first hinge portion (13);
and
a body (10) having a second hinge portion (15) displaceably mounted thereon, the first hinge portion (13) being pivotally connected to the second hinge portion (15) for rotation about a rotational axis (A), a cam (17) projecting axially from the first portion (13) and having a cam surface disposed radially outwardly of said rotational axis (A), and a fixed abutment surface (18) on said body (10) disposed remote from said hinge portions (13,15), wherein the cam surface is biased against said abutment surface (18) to apply a rotational bias between said first and second hinge portions (13,15), the assembly being arranged such that rotation of the first hinge portion (13) about said rotational axis (A) causes said cam (17) to ride over said abutment surface (18) under the applied bias allowing translatory movement of the rotational axis (A) of the closure (12), **characterised in that** the cam (17) is biased outwardly of the body (10) against the abutment surface (18) in an opening direction.

2. A device as claimed in claim 1, **characterised in that** means are provided for holding the hinge portions (13,15) against said rotational bias, such that when the holding means is released the rotational bias causes rotation of the first hinge portion (13) about said rotational axis (A) and causes said cam (17) to ride over said abutment surface (18) under the aforementioned applied outward bias allowing said translatory movement of the rotational axis (A).

3. A device as claimed in claims 1 or 2, **characterised in that** the cam surface is biased against said abutment surface (18) by bias means (16) acting on said displaceable second hinge portion (15).

4. A device as claimed in any preceding claim, **characterised in that** the cam (17) is disposed at a radial

distance of 5 to 15 mm away from the axis (A) of rotation.

5. A device as claimed in any preceding claim, **characterised in that** the cam (17) is able to move away from the abutment surface (18) against the applied bias.
6. A device as claimed in any preceding claim, **characterised in that** at least a portion of the abutment surface (18) is inclined relative to a plane which extends normal to the direction of the applied bias.
7. A device as claimed in any preceding claim, **characterised in that** the cam (17) comprises a projection which extends outwardly from said first hinge portion (13), in a direction which extends axially of the axis (A) of rotation.
8. A device as claimed in claim 2, **characterised in that** the holding means comprises a catch which retains the closure (12) in a closed position on the body (10), the bias being applied to the closure (12) in an opening direction such that the translatory movement occurs as the closure opens under the applied bias.
9. A device as claimed in any preceding claim, **characterised in that** the second portion (15) is slidably mounted to the body (10) of the device.
10. A device as claimed in any preceding claim, **characterised in that** the cam surface is biased against said abutment surface (18) in a direction which extends substantially normal to the plane of the closure (12) when the latter is in its closed position.
11. A device as claimed in any preceding claim, **characterised in that** the cam (17) is arranged to rotate inwardly of the body (10) of the device when the closure (12) is opened.
12. A device as claimed in any preceding claim, **characterised in that** the body (10) comprises dust collection means for filtering dirt and dust from an airflow and means for creating an airflow through the dust collection means.

Patentansprüche

1. Vorrichtung, umfassend:

einen Verschluss (12) mit einem ersten Scharnierteil (13); und
einem Körper (10) mit einem zweiten Scharnierteil (15), das verstellbar hieran angebracht ist, wobei das erste Scharnierteil (13) drehbar mit

- dem zweiten Scharnierteil (15) verbunden ist, damit es um eine Rotationsachse A rotieren kann, einem Nocken (17), der axial vom ersten Teil (13) hervorstecht, mit einer Nockenoberfläche, die zur Rotationsachse A radial außen angeordnet ist, und einer fixierten Widerlagerfläche (18) auf dem Körper (10), entfernt von den Scharnierteilen (13, 15) angeordnet, wobei die Nockenoberfläche gegen die Widerlagerfläche (18) verschoben ist, um eine Rotationsverschiebung zwischen dem ersten und dem zweiten Scharnierteil (13, 15) zu erzeugen, wobei die Anordnung so ist, dass die Drehung des ersten Scharnierteils (13) um die Rotationsachse (A) dafür sorgt, dass der Nocken (17) sich unter dem Einfluss der angewandten Verschiebung über die Widerlagerfläche (18) bewegt, was eine translatorische Bewegung der Rotationsachse (A) des Verschlusses (12) erlaubt, **dadurch gekennzeichnet, dass** der Nocken (17) zur Außenseite des Körpers (10) gegen die Widerlagerfläche (18) in der Öffnungsrichtung verschoben wird.
2. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** Mittel vorgesehen werden, um die Scharnierteile (13, 15) gegen die Rotationsverschiebung zu halten, so dass, wenn die Haltemittel gelöst werden, die Rotationsverschiebung eine Drehung des ersten Scharnierteils (13) um die Rotationsachse (A) bewirkt und den Nocken (17) unter dem Einfluss der vorher erwähnten nach außen gerichteten Verschiebung über die Widerlagerfläche (18) gleiten lässt, was die translatorische Bewegung der Rotationsachse (A) erlaubt.
 3. Vorrichtung nach den Ansprüchen 1 oder 2, **dadurch gekennzeichnet, dass** die Nockenoberfläche gegen die Widerlagerfläche (18) verschoben wird durch Verschiebemittel (16), die auf das einstellbare zweite Scharnierteil (15) einwirken.
 4. Vorrichtung nach irgendeinem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Nocken (17) in einer radialen Entfernung von 5 bis 15 mm von der Rotationsachse (A) angeordnet ist.
 5. Vorrichtung nach irgendeinem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Nocken (17) in der Lage ist, sich von der Widerlagerfläche (18) unter der angewandten Verschiebung wegzubewegen.
 6. Vorrichtung nach irgendeinem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** mindestens ein Teil der Widerlageroberfläche (18) relativ zu einer Fläche geneigt ist, die sich senkrecht zur Richtung der angewandten Verschiebung erstreckt.
 7. Vorrichtung nach irgendeinem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Nocken (17) einen Vorsprung umfasst, der sich von dem ersten Scharnierteil nach Außen erstreckt, in einer Richtung, die sich axial von der Rotationsachse (A) erstreckt.
 8. Vorrichtung nach Anspruch 2, **dadurch gekennzeichnet, dass** die Haltemittel eine Arretierung aufweisen, die den Verschluss (12) auf dem Körper (10) in einer geschlossenen Position hält, wobei die Verschiebung auf den Verschluss (12) in Öffnungsrichtung angewandt wird, so dass die Drehbewegung eintritt, wenn sich der Verschluss unter der angewandten Verschiebung öffnet.
 9. Vorrichtung nach irgendeinem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** das zweite Scharnierteil (15) verschiebbar am Körper (10) der Vorrichtung angebracht ist.
 10. Vorrichtung nach irgendeinem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Nockenoberfläche gegen die Widerlagerfläche (18) in einer Richtung, die sich im Wesentlichen senkrecht zu der Ebene des Verschlusses (12), wenn dieser sich in geschlossener Position befindet, verschoben wird.
 11. Vorrichtung nach irgendeinem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Nocken (17) so angeordnet ist, dass er sich zum Inneren des Körpers (10) der Vorrichtung dreht, wenn der Verschluss (12) geöffnet wird.
 12. Vorrichtung nach irgendeinem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Körper (10) Staubsammelmittel zum Filtern von Staub und Schmutz aus einem Luftstrom und Mittel zur Erzeugung eines Luftstroms durch die Staubsammelmittel aufweist.

Revendications

1. Dispositif comprenant :

une fermeture (12) ayant une première partie d'articulation (13) ; et
un corps (10) ayant une seconde partie d'articulation (15) montée de manière déplaçable sur ce dernier, la première partie d'articulation (13) étant raccordée de manière pivotante à la seconde partie d'articulation (15) pour la rotation autour d'un axe de rotation (A), une came (17) faisant saillie de manière axiale à partir de la première partie (13) et ayant une surface de came disposée radialement vers l'extérieur dudit

- axe de rotation (A), et une surface de butée fixe (18) sur ledit corps (10) disposé à distance desdites parties d'articulation (13, 15), dans lequel la surface de came est sollicitée contre ladite surface de butée (18) afin d'appliquer une sollicitation rotative entre lesdites première et seconde parties d'articulation (13, 15), l'ensemble étant agencé de sorte que la rotation de la première partie d'articulation (13) autour dudit axe de rotation (A) amène ladite came (17) à neutraliser ladite surface de butée (18) sous la sollicitation appliquée permettant le mouvement de translation de l'axe de rotation (A) de la fermeture (12), **caractérisé en ce que** la came (17) est sollicitée vers l'extérieur du corps (10) contre la surface de butée (18) dans une direction d'ouverture.
2. Dispositif selon la revendication 1, **caractérisé en ce que** l'on prévoit des moyens pour maintenir les parties d'articulation (13, 15) contre ladite sollicitation de rotation, de sorte que lorsque les moyens de support sont libérés, la sollicitation de rotation provoque la rotation de la première partie d'articulation (13) autour dudit axe de rotation (A), et amène ladite came (17) à neutraliser ladite surface de butée (18) sous la sollicitation appliquée vers l'extérieur mentionnée précédemment permettant ledit mouvement de translation dudit axe de rotation (A).
 3. Dispositif selon la revendication 1 ou 2, **caractérisé en ce que** la surface de came est sollicitée contre ladite surface de butée (18) par des moyens de sollicitation (16) agissant sur ladite seconde partie d'articulation (15) déplaçable.
 4. Dispositif selon l'une quelconque des revendications précédentes, **caractérisé en ce que** la came (17) est disposée à une distance radiale de 5 à 15 mm à distance de l'axe (A) de rotation.
 5. Dispositif selon l'une quelconque des revendications précédentes, **caractérisé en ce que** la came (17) peut s'éloigner de la surface de butée (18) contre la sollicitation appliquée.
 6. Dispositif selon l'une quelconque des revendications précédentes, **caractérisé en ce qu'**au moins une partie de la surface de butée (18) est inclinée par rapport à un plan qui s'étend normalement par rapport à la direction de la sollicitation appliquée.
 7. Dispositif selon l'une quelconque des revendications précédentes, **caractérisé en ce que** la came (17) comprend une saillie qui s'étend vers l'extérieur à partir de ladite première partie d'articulation (13), dans une direction qui s'étend de manière axiale par rapport à l'axe (A) de rotation.
 8. Dispositif selon la revendication 2, **caractérisé en ce que** les moyens de support comprennent un crochet de verrouillage qui retient la fermeture (12) dans une position fermée sur le corps (10), la sollicitation étant appliquée sur la fermeture (12) dans une direction d'ouverture de sorte que le mouvement de translation se produit lorsque la fermeture s'ouvre sous la sollicitation appliquée.
 9. Dispositif selon l'une quelconque des revendications précédentes, **caractérisé en ce que** la seconde partie (15) est montée de manière coulissante sur le corps (10) du dispositif.
 10. Dispositif selon l'une quelconque des revendications précédentes, **caractérisé en ce que** la surface de came est sollicitée contre ladite surface de butée (18) dans une direction qui s'étend sensiblement normalement par rapport au plan de la fermeture (12), lorsque cette dernière est dans sa position fermée.
 11. Dispositif selon l'une quelconque des revendications précédentes, **caractérisé en ce que** la came (17) est agencée pour tourner vers l'intérieur du corps (10) du dispositif lorsque la fermeture (12) est ouverte.
 12. Dispositif selon l'une quelconque des revendications précédentes, **caractérisé en ce que** le corps (10) comprend des moyens de collecte de poussière pour filtrer la saleté et la poussière d'un écoulement d'air et des moyens pour créer un écoulement d'air à travers les moyens de collecte de poussière.

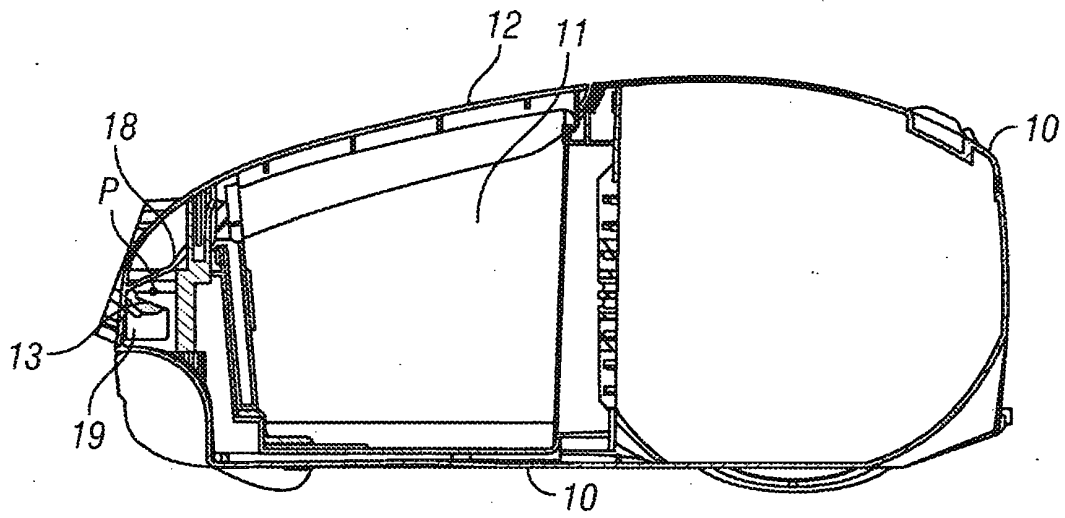


FIG. 1

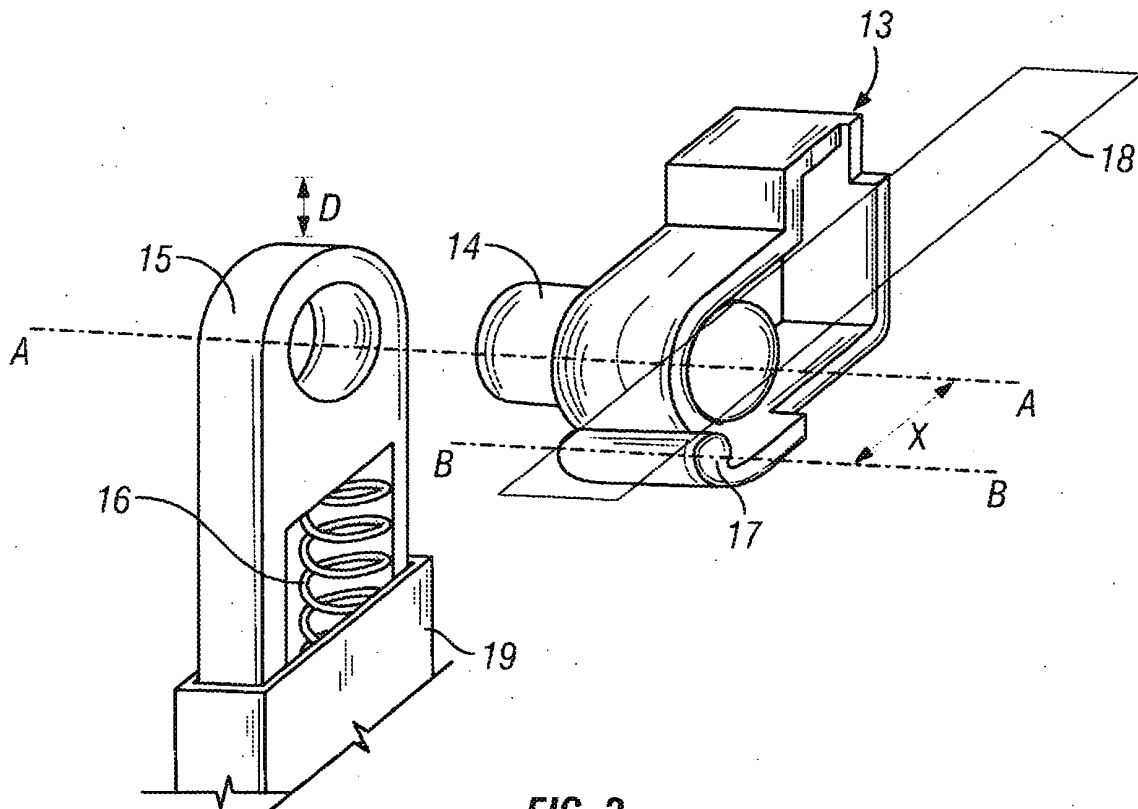


FIG. 2

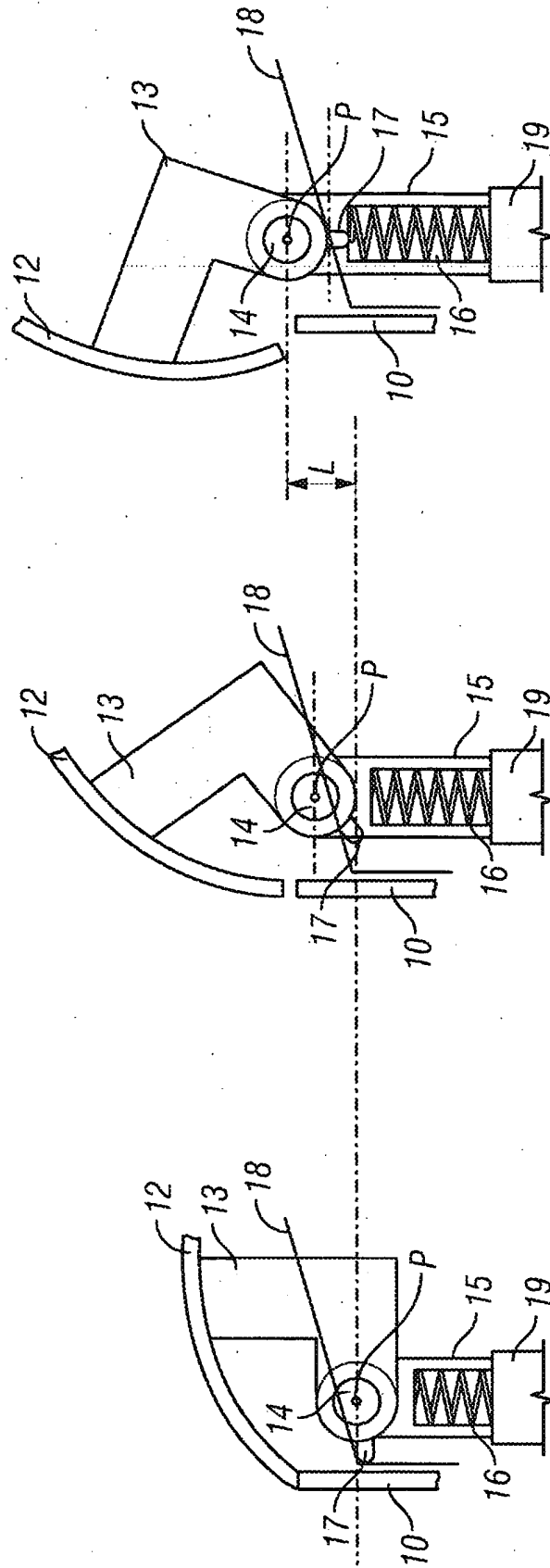


FIG. 3C

FIG. 3B

FIG. 3A

REFERENCES CITED IN THE DESCRIPTION

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