



(11) **EP 4 308 343 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention
of the grant of the patent:

18.09.2024 Bulletin 2024/38

(21) Application number: **22716107.2**

(22) Date of filing: **16.03.2022**

(51) International Patent Classification (IPC):

B24B 41/047 ^(2006.01) **B24B 23/03** ^(2006.01)

(52) Cooperative Patent Classification (CPC):

B24B 41/047; B24B 23/03

(86) International application number:

PCT/IB2022/052358

(87) International publication number:

WO 2022/195493 (22.09.2022 Gazette 2022/38)

(54) **POLISHING AND/OR SANDING HEAD FOR TREATING SURFACES**

POLIER- UND/ODER SCHLEIFKOPF FÜR DIE OBERFLÄCHENBEHANDLUNG

TÊTE DE POLISSAGE ET/OU DE PONÇAGE POUR LE TRAITEMENT DES SURFACES

(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**

(30) Priority: **17.03.2021 IT 202100006359**

(43) Date of publication of application:

24.01.2024 Bulletin 2024/04

(73) Proprietor: **Rupes S.p.A.**

20071 Vermezzo con Zelo (MI) (IT)

(72) Inventor: **CASTIGLION, Riccardo**

10023 Chieri (TO) (IT)

(74) Representative: **Wörz, Volker Alfred**

Wörz Patentanwälte PartG mbB

Gablenberger Hauptstraße 32

70186 Stuttgart (DE)

(56) References cited:

EP-A2- 1 586 416 CN-A- 103 862 351

US-A- 6 007 412

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

Description

Technical field

[0001] This invention generally lies within the field of apparatuses for treating surfaces; in particular, the invention relates to a polishing and/or sanding head for treating surfaces.

Prior art

[0002] Known apparatuses suitable for polishing or sanding surfaces, for example car bodies, typically comprise a power tool which may be operated manually by an operator and is provided with a rotating shaft that has, on its tip, a discoid element made of a more or less abrasive material suitable for treating the surface when rotated by the tool. The rotating element generally comprises or supports a cloth which, when the apparatus is operated by the operator, distributes a polishing or abrasive paste onto the surface to be treated.

[0003] Examples of apparatuses of this kind are known, for example, from CN 103 862 351 A, EP 1 586 416 A2, and US 6 007 412 A.

[0004] However, one problem of these apparatuses is that they are not able to homogeneously treat the surface, for example by uniformly spreading the polishing paste, and therefore the final quality of the treated surface may not be satisfactory on account of having aesthetically different regions (presence of marks, opaqueness, etc.).

[0005] Understandably, this defect limits the usability of the apparatus and the quality of the treatment.

Summary of the invention

[0006] The object of this invention is to overcome the aforementioned problems.

[0007] In order to achieve this, a processing head is provided which is designed to allow the simultaneous use of two abrasive or polished surfaces, made of identical or different materials, which are simultaneously operated (rotated) in opposing directions.

[0008] The aim in operational terms is to obtain more homogeneous processing that has a higher finishing level by comparison with using conventional systems for these operations, which only have one type of material that may rotate in only one direction.

[0009] The device is particularly suitable for treating painted surfaces of cars, but its use may be extended to any context in which a surface is prepared by means of sanding and/or a surface is finished by means of polishing.

[0010] The head is advantageously designed to be connected to a rotary power tool, for example those normally used in the bodywork field. Another possible field of use may be, for example, that of polishing floors that are made of wood or other materials (marble, other stones, or ceramics).

[0011] The concurrent rotation of the treatment surfaces, supported by the head, is achieved by means of a planetary speed reducer which comprises a central "sun" gear, one or more "planet" gears and an internally toothed gear known as a "ring gear". This reducer is characterized by the fact that, in a head according to this invention, the system of "planets" is kept stationary and constrained, instead of keeping the "ring gear" stationary.

[0012] The rotary motion is applied to a shaft which is integrally connected to the sun gear. The one or more planets are kept in a fixed position with respect to the axis of the head and are only free to rotate about their own axis. The planets engage with a toothed gear comprising internal toothing (the ring gear), which toothed gear is free to rotate on account of the motion transmitted thereto by these planets. In a head according to this invention, both the sun gear and the ring gear are rotatable with respect to the planet holder.

[0013] If a cylindrical surface is mounted on the sun gear, this surface will rotate in the same direction of the source of the motion; however, if a planar circular annulus is mounted on the external ring gear, this ring will rotate in an opposite direction to the surface mounted on the sun gear. The two surfaces, i.e. the cylindrical surface and annular surface, advantageously lie with the exposed surface on the same plane; the processing means (abrasive surface or polishing surface) is applied to these exposed surfaces.

[0014] The aforesaid and other aims and advantages are achieved, according to the invention, by a polishing and/or sanding head for treating surfaces that has the features defined in claim 1. Preferred embodiments of the invention are defined in the dependent claims.

Brief description of the drawings

[0015] The functional and structural features of some preferred embodiments of a polishing and/or sanding head for treating surfaces according to the invention will now be described. Reference is made to the accompanying drawings, in which:

- Fig. 1 is a perspective view, in diametral cross section, of a polishing and/or sanding head for treating surfaces, according to one embodiment of this invention;
- Fig. 2 is a perspective view, from below, of the head in Fig. 1, with the treatment surfaces removed in order to show the planetary transmission inside the head; and
- Fig. 3 is the perspective view, from below, of the head in Fig. 2, with the treatment surfaces reinstated.

Detailed description

[0016] Before describing in detail a plurality of embodiments of the invention, it should be clarified that the invention is not limited in its application to the design details

and configuration of the components presented in the following description or illustrated in the drawings. The invention is able to assume other embodiments and to be implemented or constructed in practice in different ways. It should also be understood that the phraseology and terminology have a descriptive purpose and should not be construed as limiting.

[0017] With reference, by way of example, to Fig. 1, a polishing and/or sanding head 9 comprises a primary disc 10 which is axially hollow, and a rotating shaft 12 which is received in the internal cavity of the primary disc 10 and rotatably supported by the latter.

[0018] The rotating shaft 12 is designed in such a way as to receive a rotary motion about an axis coincident to the axis of the primary disc 10 (axis x) by means of a power take-off external to the head 9.

[0019] There is also a body 14 present, which body is radially external and coaxial with respect to the rotating shaft 12, said body 14 being rotatably supported by said primary disc 10.

[0020] The head 9 also comprises a planetary gear transmission which is adapted to transmit the rotational motion of the rotating shaft 12 to the body 14, the transmission comprising: a sun gear 18 which is integral in rotation with the rotating shaft 12 and has an external toothing facing the body 14; a ring gear 20 which is integral in rotation with the body 14 and has an internal toothing facing the axis x of the primary disc 10; and at least one planet gear 22 which is supported by the primary disc 10 so as to be rotatable about a secondary axis y which is parallel and not coincident with the axis x of the primary disc 10.

[0021] The planet gear 22 is placed in an intermediate position between the sun gear 18 and the ring gear 20 in such a way as to engage both and transmit a rotary motion from the former to the latter.

[0022] The head 9 also comprises a first support for a treatment means 24 which is integral in rotation with the rotating shaft 12 and has an exposed surface adapted to form or support a means suitable for polishing or sanding a surface to be treated, and a second support for a treatment means 26 which is integral in rotation with the body 14 and has an exposed surface adapted to form or support a means suitable for polishing or sanding said surface to be treated. These first and second supports for a treatment means 24, 26 are designed, respectively, as a circular element and an annular element that are concentric to each other, and the second support for a treatment means 26 counter-rotates around the outside of the first support for a treatment means 24 (i.e. is able to rotate in an opposite direction with respect to the direction of rotation of the latter, which is set by the rotating shaft 12).

[0023] The first and second supports for treatment means 24, 26 are preferably designed to form or support a means suitable for polishing and/or sanding a surface to be treated that is made of painted metal (for example a car body) or wood or stone or marble or ceramic.

[0024] The exposed surface of the first and/or the second support for a treatment means 24, 26 is advantageously formed at least partially from a felt cloth of a kind known per se or is designed to support a treatment means formed at least partially from a felt cloth.

[0025] According to a preferred embodiment, the exposed surface of the first and/or the second support for a treatment means 24, 26 is formed at least partially from an expanded polymer cloth or is designed to support a treatment means formed at least partially from an expanded polymer cloth.

[0026] The exposed surfaces of said first and second supports for a treatment means 24, 26 are preferably mutually coplanar.

[0027] According to one embodiment, the rotating shaft 12 comprises a flange rotatably supported by the primary disc 10 by means of a rolling bearing.

[0028] The at least one planet gear 22 is preferably supported by the primary disc 10 so as to be rotatable about a relevant secondary axis y by means of a pin 23 fixed to said primary disc 10, such that the secondary axis y is fixed in rotation with respect to the axis x of the primary disc 10.

[0029] According to one embodiment, the head 9 comprises three planet gears 22 circumferentially equidistant along the primary disc 10.

[0030] The primary disc 10 may advantageously be designed to couple to a portable apparatus equipped with a power take-off that may be coupled to the rotating shaft 12.

[0031] For example, the primary disc 10 may be designed to couple to a traditional handheld power tool for polishing and/or sanding car bodies.

[0032] Various aspects and embodiments of a polishing and/or sanding head according to the invention have been described. It is understood that each embodiment may be combined with any other embodiment. Moreover, the invention is not limited to the embodiments described, but may be varied within the scope defined by the appended claims.

Claims

1. Polishing and/or sanding head (9), comprising:

- a primary disc (10) which is axially hollow;
- a rotating shaft (12) which is received in the internal cavity of the primary disc (10) and rotatably supported by the latter, said rotating shaft (12) being configured in such a way as to receive a rotary motion about an axis coincident to the axis of the primary disc (10) by means of a power take-off external to the head (9); and
- a body (14) which is radially external and coaxial with respect to the rotating shaft (12), said body (14) being rotatably supported by said primary disc (10); **characterized by** also compris-

- ing a planetary gear transmission which is adapted to transmit the rotational motion of the rotating shaft (12) to the body (14), said transmission comprising:
- a sun gear (18) which is integral in rotation with the rotating shaft (12) and has an external toothing facing the body (14);
 - a ring gear (20) which is integral in rotation with the body (14) and has an internal toothing facing the axis of the primary disc (10); and
 - at least one planet gear (22) which is supported by the primary disc (10) so as to be rotatable about a secondary axis (y) which is parallel and not coincident with the axis of the primary disc (10), said planet gear (22) being placed in an intermediate position between the sun gear (18) and the ring gear (20) in such a way as to engage both and transmit a rotary motion from said sun gear (18) to said ring gear (20); the head (9) further comprising a first support for a treatment means (24) which is integral in rotation with the rotating shaft (12) and has an exposed surface adapted to form or support a means suitable for polishing or sanding a surface to be treated, and a second support for a treatment means (26) which is integral in rotation with the body (14) and has an exposed surface adapted to form or support a means suitable for polishing or sanding said surface to be treated, said first and second supports for a treatment means (24, 26) being configured, respectively, as a circular element and an annular element that are concentric to each other, the second support for a treatment means (26) being designed to rotate in the opposite direction with respect to the direction of rotation of the first support for a treatment means (24).
2. Head (9) according to claim 1, wherein said first and second supports for a treatment means (24, 26) are configured to form or support a means suitable for polishing and/or sanding a surface to be treated that is made of painted metal or wood or stone or marble or ceramic.
 3. Head (9) according to claim 1 or 2, wherein the exposed surface of the first and/or the second support for a treatment means (24, 26) is formed at least partially from a felt cloth or is configured to support a treatment means formed at least partially from a felt cloth.
 4. Head (9) according to any one of the preceding claims, wherein the exposed surface of the first and/or the second support for a treatment means (24, 26) is formed at least partially from an expanded polymer cloth or is configured to support a treatment means formed at least partially from an expanded polymer cloth.
 5. Head (9) according to any one of the preceding claims, wherein the exposed surfaces of said first and second supports for a treatment means (24, 26) are mutually coplanar.
 6. Head (9) according to any one of the preceding claims, wherein the rotating shaft (12) comprises a flange rotatably supported by the primary disc (10) by means of a rolling bearing.
 7. Head (9) according to any one of the preceding claims, wherein the at least one planet gear (22) is supported by the primary disc (10) so as to be rotatable about a secondary axis (y) by means of a pin (23) fixed to said primary disc (10), such that the secondary axis (y) is fixed in rotation with respect to the axis of the primary disc (10).
 8. Head (9) according to any one of the preceding claims, comprising three planet gears (22) circumferentially equidistant along the primary disc (10).
 9. Head (9) according to any one of the preceding claims, wherein the primary disc (10) is configured to couple to a portable apparatus equipped with a power take-off that may be coupled to the rotating shaft (12).
 10. Head (9) according to claim 9, wherein the primary disc (10) is configured to couple to a handheld power tool for polishing and/or sanding car bodies.
 11. Portable apparatus equipped with a power take-off, the portable apparatus comprising a head (9) according to one of the preceding claims, wherein the primary disc (10) of the head (9) is coupled to the portable apparatus and the rotating shaft (12) of the head (9) is coupled to the power take-off of the portable apparatus.
 12. Portable apparatus according to claim 11, wherein the portable apparatus is embodied as a handheld power tool for treating painted surfaces of cars, in particular for polishing and/or sanding car bodies.

Patentansprüche

1. Polier- und/oder Schleifkopf (9), umfassend:

- eine Primärscheibe (10), die axial hohl ist;
- eine Drehwelle (12), die in dem inneren Hohlraum der Primärscheibe (10) aufgenommen ist und von dieser drehbar gelagert ist, wobei die Drehwelle (12) so ausgebildet ist, dass sie eine Drehbewegung um eine mit der Achse der Pri-

märscheibe (10) zusammenfallende Achse mittels eines außerhalb des Kopfes (9) befindlichen Leistungsabtriebs aufnimmt; und
 - einen Körper (14), der radial außerhalb und koaxial in Bezug auf die Drehwelle (12) ist, wobei der Körper (14) von der Primärscheibe (10) drehbar gelagert ist,

dadurch gekennzeichnet, dass er auch ein Planetengetriebe aufweist, das ausgebildet ist, die Drehbewegung der Drehwelle (12) auf den Körper (14) zu übertragen, wobei das Getriebe umfasst:

- ein Sonnenrad (18), das drehfest mit der Drehwelle (12) verbunden ist und eine dem Körper (14) zugewandte Außenverzahnung aufweist;
- ein Hohlrad (20), das drehfest mit dem Körper (14) verbunden ist und eine Innenverzahnung aufweist, die der Achse der Primärscheibe (10) zugewandt ist, und
- mindestens ein Planetenrad (22), das von der Primärscheibe (10) so getragen ist, dass es um eine Sekundärachse (y) drehbar ist, die parallel zu der Achse der Primärscheibe (10) verläuft und nicht mit ihr zusammenfällt, wobei das Planetenrad (22) in einer Zwischenposition zwischen dem Sonnenrad (18) und dem Hohlrad (20) so angeordnet ist, dass es in beide eingreift und eine Drehbewegung von dem Sonnenrad (18) auf das Hohlrad (20) überträgt; der Kopf (9) ferner einen ersten Träger für ein Behandlungsmittel (24) umfasst, der drehfest mit der Drehwelle (12) verbunden ist und eine freiliegende Oberfläche aufweist, die dazu ausgebildet ist, ein Mittel zu bilden oder zu tragen, das zum Polieren oder Schleifen einer zu behandelnden Oberfläche geeignet ist, und einen zweiten Träger für ein Behandlungsmittel (26), der drehfest mit dem Körper (14) verbunden ist und eine freiliegende Oberfläche aufweist, die dazu ausgebildet ist, ein Mittel zu bilden oder zu tragen, das zum Polieren oder Schleifen der zu behandelnden Oberfläche geeignet ist, wobei der erste und der zweite Träger für ein Behandlungsmittel (24, 26) als ein kreisförmiges Element bzw. als ein ringförmiges Element ausgebildet sind, die zueinander konzentrisch sind, wobei der zweite Träger für ein Behandlungsmittel (26) ausgebildet ist, in der entgegengesetzten Richtung in Bezug auf die Drehrichtung des ersten Trägers für ein Behandlungsmittel (24) zu drehen.

2. Kopf (9) nach Anspruch 1, wobei der erste und der zweite Träger für ein Behandlungsmittel (24, 26) ausgebildet sind, ein Mittel zu bilden oder zu tragen, das zum Polieren und/oder Schleifen einer zu behandelnden Oberfläche geeignet ist, die aus lackiertem Metall oder Holz oder Stein oder Marmor oder

Keramik besteht.

3. Kopf (9) nach Anspruch 1 oder 2, wobei die freiliegende Oberfläche des ersten und/oder des zweiten Trägers für ein Behandlungsmittel (24, 26) zumindest teilweise aus einem Filzgewebe gebildet ist oder ausgebildet ist, ein Behandlungsmittel zu tragen, das zumindest teilweise aus einem Filzgewebe gebildet ist.
4. Kopf (9) nach einem der vorhergehenden Ansprüche, wobei die freiliegende Oberfläche des ersten und/oder des zweiten Trägers für ein Behandlungsmittel (24, 26) zumindest teilweise aus einem expandierten Polymergewebe gebildet ist oder zum Tragen eines zumindest teilweise aus einem expandierten Polymergewebe gebildeten Behandlungsmittels konfiguriert ist.
5. Kopf (9) nach einem der vorhergehenden Ansprüche, wobei die freiliegenden Oberflächen des ersten und des zweiten Trägers für ein Behandlungsmittel (24, 26) zueinander koplanar sind.
6. Kopf (9) nach einem der vorangehenden Ansprüche, wobei die Drehwelle (12) einen Flansch aufweist, der mittels eines Wälzlagers drehbar an der Primärscheibe (10) gelagert ist.
7. Kopf (9) nach einem der vorhergehenden Ansprüche, wobei das mindestens eine Planetenrad (22) mittels eines an der Primärscheibe (10) befestigten Stifts (23) um eine Sekundärachse (y) drehbar gelagert ist, so dass die Sekundärachse (y) in Bezug auf die Achse der Primärscheibe (10) drehfest ist.
8. Kopf (9) nach einem der vorhergehenden Ansprüche, mit drei Planetenrädern (22), die in Umfangsrichtung äquidistant entlang der Primärscheibe (10) angeordnet sind.
9. Kopf (9) nach einem der vorhergehenden Ansprüche, wobei die Primärscheibe (10) ausgebildet ist, an ein tragbares Gerät gekoppelt zu werden, das mit einem Leistungsabtrieb ausgestattet ist, der mit der Drehwelle (12) gekoppelt werden kann.
10. Kopf (9) nach Anspruch 9, wobei die Primärscheibe (10) ausgebildet ist, mit einem handgehaltenen motorbetriebenen Werkzeug zum Polieren und/oder Schleifen von Autokarosserien gekoppelt zu werden.
11. Tragbares Gerät mit einem Leistungsabtrieb, wobei das tragbare Gerät einen Kopf (9) nach einem der vorhergehenden Ansprüche umfasst, wobei die Primärscheibe (10) des Kopfes (9) mit dem tragbaren Gerät gekoppelt ist und die Drehwelle (12) des Kopfes

fes (9) mit dem Leistungsabtrieb des tragbaren Geräts gekoppelt ist.

12. Tragbares Gerät nach Anspruch 11, wobei das tragbare Gerät als handgehaltenes motorbetriebenes Werkzeug zur Bearbeitung von lackierten Oberflächen von Autos, insbesondere zum Polieren und/oder Schleifen von Autokarosserien, ausgebildet ist.

Revendications

1. Tête de polissage et/ou de ponçage (9), comprenant :
 - un disque primaire (10) axialement creux ;
 - un arbre rotatif (12) reçu dans la cavité interne du disque primaire (10) et supporté en rotation par ce dernier, ledit arbre rotatif (12) étant configuré de manière à recevoir un mouvement de rotation autour d'un axe coïncidant avec l'axe du disque primaire (10) au moyen d'une prise de force externe à la tête (9) ; et
 - un corps (14) qui est radialement externe et coaxial par rapport à l'arbre rotatif (12), ledit corps (14) étant supporté de manière rotative par le disque primaire (10) ; **caractérisé en ce qu'il** comprend également une transmission à engrenages planétaires qui est adaptée pour transmettre le mouvement de rotation de l'arbre rotatif (12) au corps (14), ladite transmission comprenant :
 - une roue solaire (18) solidaire en rotation de l'arbre rotatif (12) et qui présente une denture extérieure tournée vers le corps (14) ;
 - une couronne (20) solidaire en rotation du corps (14) et qui présente une denture interne tournée vers l'axe du disque primaire (10) ; et
 - au moins un planétaire (22) supporté par le disque primaire (10) de manière à pouvoir tourner autour d'un axe secondaire (y) qui est parallèle et ne coïncide pas avec l'axe du disque primaire (10), ledit planétaire (22) étant placé dans une position intermédiaire entre la roue solaire (18) et la couronne (20) de manière à les engager tous les deux et à transmettre un mouvement de rotation du dit roue solaire (18) à ladite couronne (20) ;
- la tête (9) comprend en outre un premier support pour un moyen de traitement (24) qui est solidaire en rotation de l'arbre rotatif (12) et présente une surface exposée adaptée pour former ou supporter un moyen adapté au polissage ou au ponçage d'une surface à traiter, et un second support pour un moyen de traitement (26) qui est solidaire en rotation du corps (14) et présente une surface exposée adaptée pour former ou supporter un moyen adapté au polissage ou au ponçage de ladite surface à traiter, lesdits premier et second supports pour un moyen de traitement (24, 26) étant configurés respectivement comme un élément circulaire et un élément annulaire concentriques l'un par rapport à l'autre, le second support pour un moyen de traitement (26) étant conçu pour tourner dans le sens opposé par rapport au sens de rotation du premier support pour un moyen de traitement (24).
2. Tête (9) selon la revendication 1, dans laquelle ces premier et second supports pour un moyen de traitement (24, 26) sont configurés pour former ou supporter un moyen approprié pour polir et/ou poncer une surface à traiter qui est faite de métal peint ou de bois ou de pierre ou de marbre ou de céramique.
3. Tête (9) selon la revendication 1 ou 2, dans laquelle la surface exposée du premier et/ou du second support pour un moyen de traitement (24, 26) est formée au moins partiellement d'un tissu de feutre ou est configurée pour supporter un moyen de traitement formé au moins partiellement d'un tissu de feutre.
4. Tête (9) selon l'une quelconque des revendications précédentes, dans laquelle la surface exposée du premier et/ou du second support pour un moyen de traitement (24, 26) est formée au moins partiellement d'un tissu polymère expansé ou est configurée pour supporter un moyen de traitement formé au moins partiellement d'un tissu polymère expansé.
5. Tête (9) selon l'une quelconque des revendications précédentes, dans laquelle les surfaces exposées de ces premier et second supports pour un moyen de traitement (24, 26) sont mutuellement coplanaires.
6. Tête (9) selon l'une quelconque des revendications précédentes, dans laquelle l'arbre rotatif (12) comprend une bride supportée en rotation par le disque primaire (10) au moyen d'un roulement.
7. Tête (9) selon l'une quelconque des revendications précédentes, dans laquelle le au moins un planétaire (22) est supporté par le disque primaire (10) de manière à pouvoir tourner autour d'un axe secondaire (y) au moyen d'une épingle (23) fixée audit disque primaire (10), de sorte que l'axe secondaire (y) est fixe en rotation par rapport à l'axe du disque primaire (10).

8. Tête (9) selon l'une quelconque des revendications précédentes, comprenant trois planétaires (22) circonférentiellement équidistants le long du disque primaire (10). 5
9. Tête (9) selon l'une quelconque des revendications précédentes, dans laquelle le disque primaire (10) est configuré pour s'accoupler à un appareil portatif équipé d'une prise de force qui peut être accouplée à l'arbre rotatif (12). 10
10. Tête (9) selon la revendication 9, dans laquelle le disque primaire (10) est configuré pour s'accoupler à un outil motorisé portatif pour le polissage et/ou le ponçage des carrosseries de voitures. 15
11. Appareil portatif équipé d'une prise de force, l'appareil portatif comprenant une tête (9) selon l'une des revendications précédentes, dans laquelle le disque primaire (10) de la tête (9) est couplé à l'appareil portatif et l'arbre rotatif (12) de la tête (9) est couplé à la prise de force de l'appareil portatif. 20
12. Appareil portatif selon la revendication 11, dans lequel l'appareil portatif se présente sous la forme d'un outil motorisé portatif pour le traitement des surfaces peintes de voitures, en particulier pour le polissage et/ou le ponçage des carrosseries de voitures. 25

30

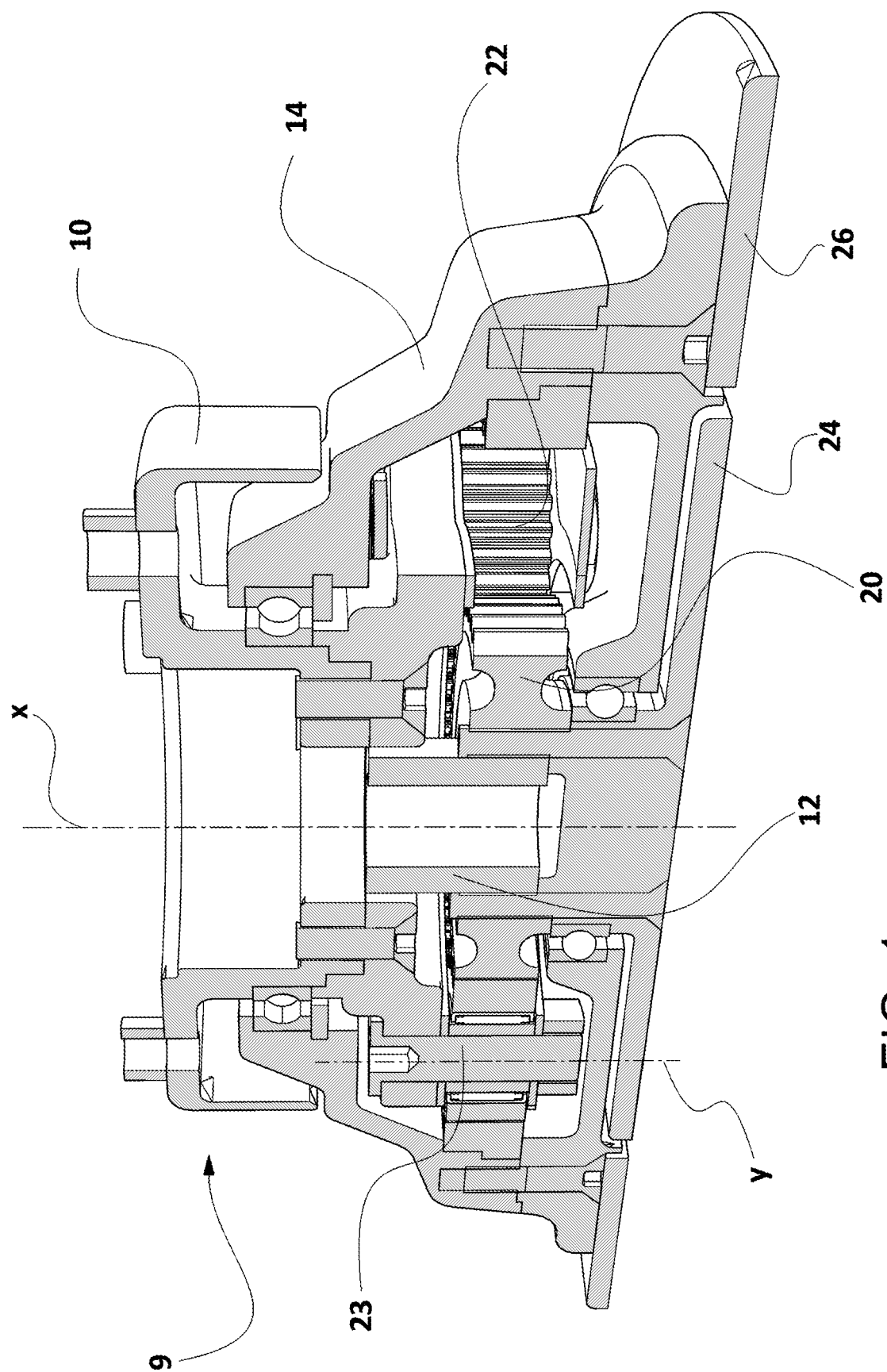
35

40

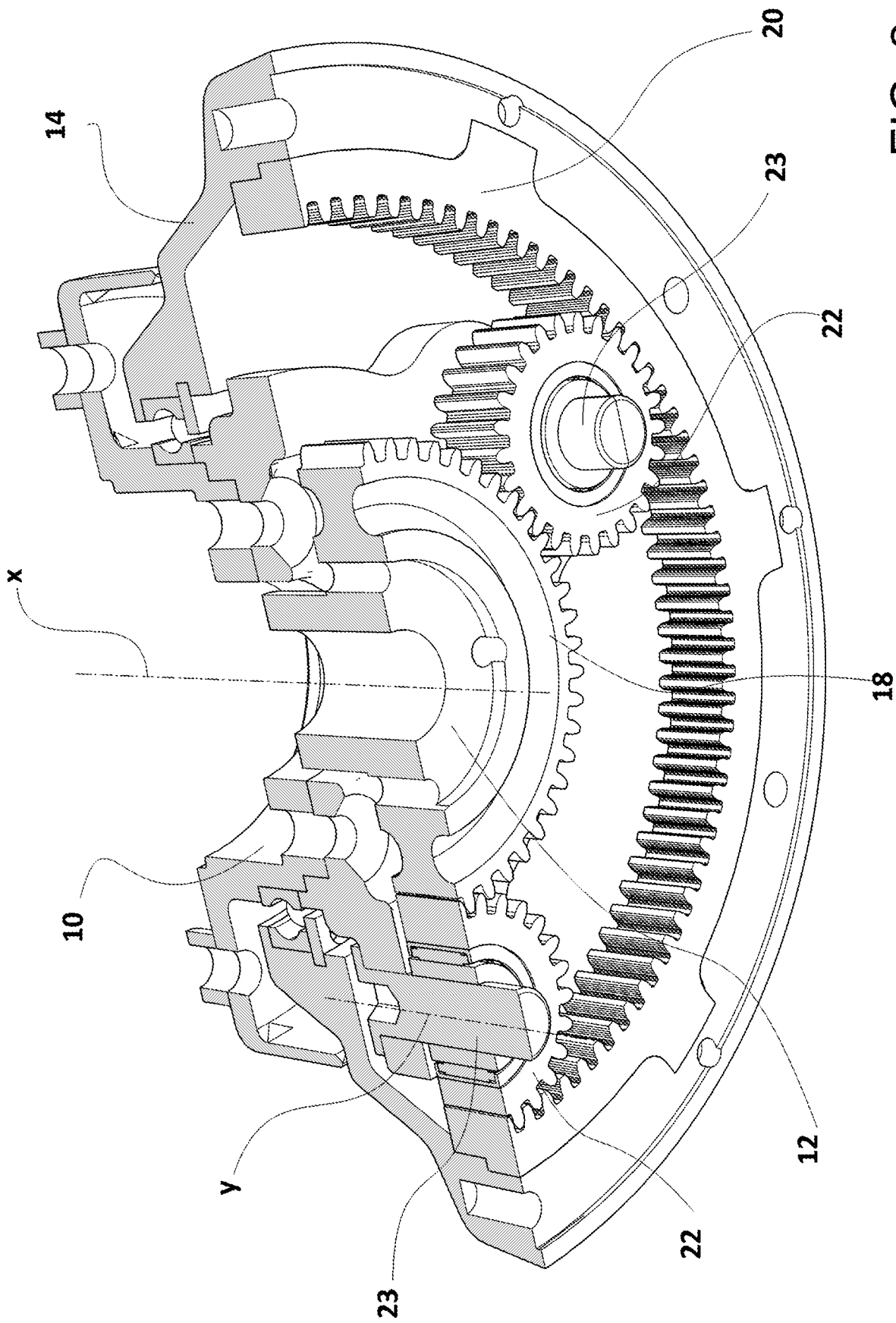
45

50

55



76



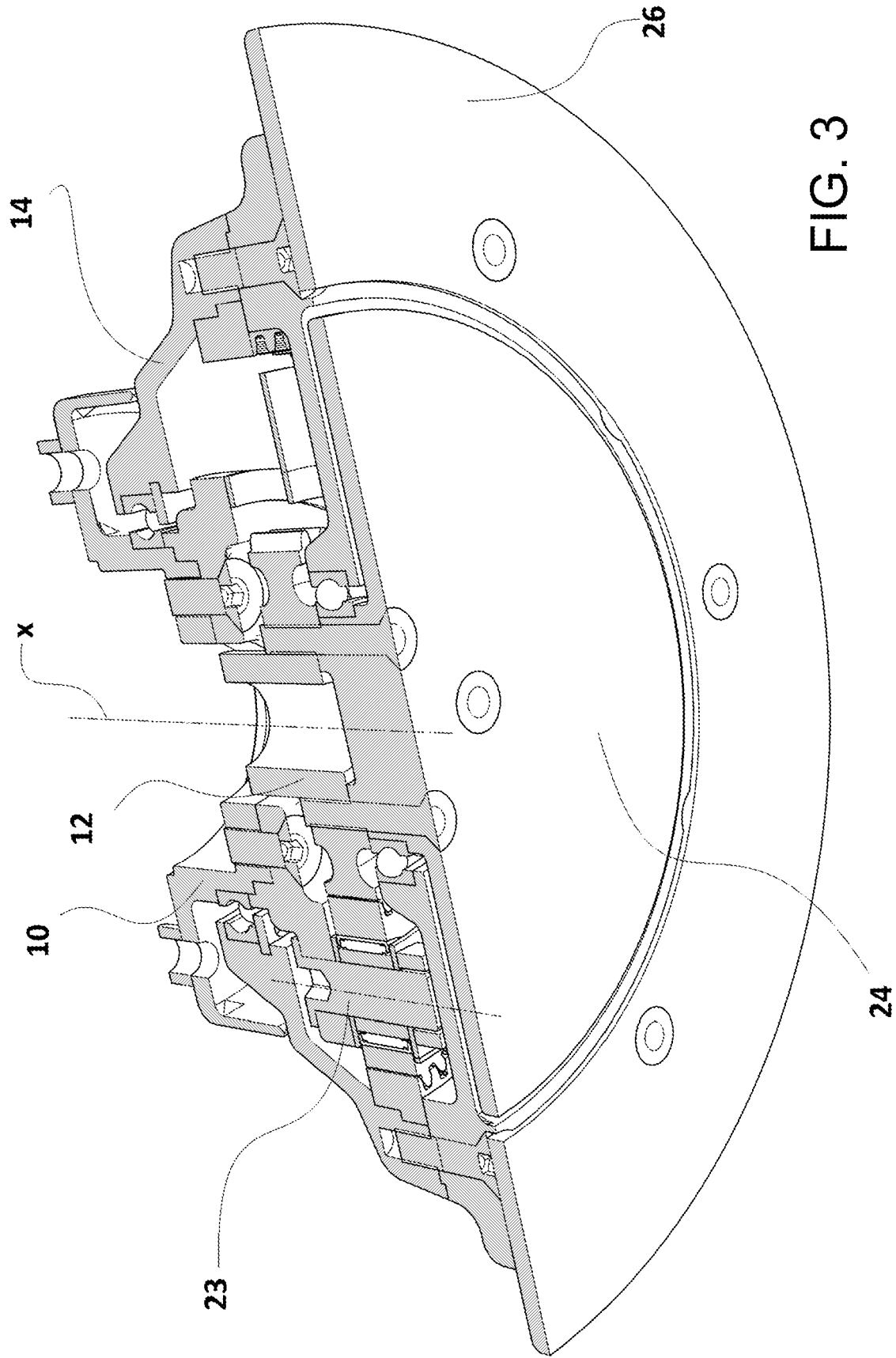


FIG. 3

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 103862351 A [0003]
- EP 1586416 A2 [0003]
- US 6007412 A [0003]