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

(11) EP 3 025 002 B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
06.06.2018 Bulletin 2018/23

(21) Application number: **13889867.1**

(22) Date of filing: **24.07.2013**

(51) Int Cl.:
B64C 1/14 *(2006.01)* ***B64D 29/08*** *(2006.01)*
E05C 3/12 *(2006.01)* ***E05C 3/16*** *(2006.01)*
E05C 17/36 *(2006.01)* ***E05C 19/12*** *(2006.01)*
E05B 15/02 *(2006.01)* ***E05B 65/10*** *(2006.01)*

(86) International application number:
PCT/CN2013/079996

(87) International publication number:
WO 2015/010271 (29.01.2015 Gazette 2015/04)

(54) **ENGINE DOOR AND LATCH ASSEMBLY**

MOTORKLAPPE UND VERRIEGELUNGSANORDNUNG

PORTE DE MOTEUR ET ENSEMBLE DE VERROUILLAGE

(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

(43) Date of publication of application:
01.06.2016 Bulletin 2016/22

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Description

BACKGROUND OF THE INVENTION

[0001] Contemporary aircraft may include engines with pressure relief systems. For example, a sudden pressure rise may occur in a nacelle compartment of the engine and this may cause stresses in the compartment which may result in failure of nacelle components or unacceptable deformation of the nacelle. Accordingly, the engine typically features some means for pressure relief to prevent damage to nacelle components. EP 2 586 707 A1 relates to a security locking device for the cowl of an engine pod and discloses features generally corresponding to the preamble of claims 1 and 10.

BRIEF DESCRIPTION OF THE INVENTION

[0002] In one aspect, the invention relates to a latch assembly for a door pivotally mounted to a surrounding structure for pivotal movement between an opened position and a closed position, the latch assembly includes a latch keep carried by one of the door and the structure and having a removable strike located within a strike seat, a latch carried by the other of the door and the structure and having a catch configured to engage the strike, and a cable having a first portion secured to the other of the door and structure and a second portion carrying the strike. The strike is located within the strike seat and the catch will engage the strike and latch the door in the closed position thereby ensuring a coupling of the cable between the door and the structure.

In another aspect, the invention relates to an aircraft engine comprising a door and latch assembly, the door and latch assembly comprising: a door pivotally mounted to a portion of the engine and moveable between a closed position and an opened position; and a latch assembly operable between a latch position, where the door is held in the closed position, and a release position, where the door may be pivoted to the opened position, the latch comprising: a latch keep carried by one of the door and the portion of the engine and having a strike seat in which a strike may be removably received; a latch carried by the other of the door and the portion of the engine and having a catch configured to engage the strike; and a cable having a first portion secured to the other of the door and the portion of the engine and a second portion carrying the strike; wherein when the strike is located within the strike seat, the catch will engage the strike and latch the door in the closed position thereby ensuring a coupling of the cable between the door and the portion of the engine.

BRIEF DESCRIPTION OF THE DRAWINGS

[0003] In the drawings:

Figure 1 is a bottom view of a door and a latch assembly according to an embodiment of the invention with the door in a closed position.

Figure 2 is a perspective view of the door of Figure 1 in an opened position.

Figures 3A and 3B illustrate perspective views of portions of the latch assembly of Figure 1.

Figure 4 is a partial perspective view of a pin before it is mounted in a strike seat of the latch assembly of Figure 1.

Figures 5A-5D are views of the door of Figure 1 in a closed position.

Figures 6A-6B are views of the door of Figure 1 in an opened position and acting as a pressure relief door.

DESCRIPTION OF EMBODIMENTS OF THE INVENTION

[0004] Figure 1 illustrates a latch assembly 10 for a door 12, which is pivotally mounted to a surrounding structure 14. It will be understood that the door 12 may be pivotally mounted to any suitable surrounding structure in any suitable manner including through use of hinges 16. For example, the door 12 may be pivotally mounted to a portion of a nacelle 18 of an aircraft engine, which forms the surrounding structure 14. In such an instance the door 12 may provide access to an oil tank and may be pivoted 90° to a fully open position so that a user may have access to an oil tank on the engine. The door 12 may be pivotally mounted for pivotal movement between a closed position as shown in Figure 1 and an opened position as shown in Figure 2.

[0005] Figure 3A illustrates a latch keep 20 that may form a portion of the latch assembly 10 and may be carried by one of the door 12 and the surrounding structure 14. A strike seat 22 of the latch keep 20 may be formed to retain a strike 24 (Figure 3B) that may be removably received in the strike seat 22. In the illustrated example, the latch keep 20 is operably coupled with the surrounding structure 14. The latch keep 20 and its strike seat 22 may be formed in any suitable manner. For example, the strike seat 22 may include a hook 26 for receiving the strike 24. In the illustrated example, the strike seat 22 has been shown as including a pair of spaced hooks 26. The hooks 26 are oriented such that each hook 26 opens non-aligned from a pivoting direction of the door 12 from the closed position to the opened position.

[0006] Figure 3B illustrates a latch 30 that may form another portion of the latch assembly 10 and may be carried by the other of the door 12 and the surrounding structure 14. In the illustrated example, the latch 30 is carried by the door 12. A catch 32 is included in the latch 30 and is configured to engage the strike 24. The catch 32 may be any suitable catch capable of engaging and retaining the strike 24.

[0007] A cable 34 having a first portion 36, which is also secured to the other of the door 12 and surrounding structure 14 and in the illustrated example, is coupled

with the door 12. A second portion 38 of the cable 34 carries the strike 24 of the latch assembly 10. The strike 24 may take any suitable form, including that the strike 24 may include a pin 44. It is contemplated that the second portion 38 of the cable 34 may have first and second spaced strands 40 and 42 with the pin 44 spanning the first and second spaced strands 40 and 42. As illustrated, the first and second spaced strands 40 and 42 may extend the length of the cable 34 and each of the first and second spaced strands 40 and 42 has a second end connected to the pin 44 and a first end connected to the door 12. More specifically, the first end of the first and second spaced strands 40 and 42, corresponding to the first portion 36, is connected to an inner surface of the door 12.

[0008] When beginning to close the door 12, as is shown in Figure 4, a user may place the strike 24 into the strike seat 22. When the strike 24 is located within the strike seat 22, the user may shut the door, which moves the catch 32 to engage the strike 24 and latch the door 12 in the closed position, as shown in Figure 5A. If the strike 24 is not retained by the latch keep 20, the latch assembly 10 cannot be locked. This ensures the user must couple the cable 34 between the door 12 and the surrounding structure 14 in order to latch the door. Figures 5B and 5C show additional views of the strike 24 retained by the latch keep 20 and the catch 32 engaging the strike 24. Further, the hook 26 of the strike seat 22 may be oriented such that contacting of the pin 44 with the catch 32 presses the pin 44 into the strike seat 22 as more clearly seen in Figure 5D.

[0009] After the pin 44 has been retained by the strike seat 22 and the door 12 has presumably been closed, the door 12 may be moved to an opened position and may act as pressure relief door. As illustrated in Figure 6A, the latch keep 20 retains the pin 44 when the door 12 is moved to the opened position. Figure 6B illustrates that the hooks 26 continue to retain the strike 24 when the door 12 is moved to the opened position. In this manner, the latch assembly 10 may be operable between a latch position, where the door 12 is held in the closed position, and a release position, where the door 12 may be pivoted to the opened position.

[0010] The embodiments described above provide for a variety of benefits including that the embodiments ensure a coupling of the cable between the door and the structure such that when the door works as pressure relief door the cable may limit the open angle of the door and make sure during the pressure relief process that the no damage will occur. In contemporary aircraft there is a potential risk of maintenance personnel forgetting to load the pressure relief function of the door and the above described embodiments may prevent such oversight because the embodiments ensure the cable is connected between the door and the structure.

Claims

1. A latch assembly (10), a door (12) and a surrounding structure (14), the door pivotally mounted to the surrounding structure (14) for pivotal movement between an opened position and a closed position, the latch assembly comprising:
   a latch keep (20) carried by one of the door and the structure and having a strike seat (22) in which a strike (24) may be removably received;
   characterized in that the latch assembly further comprises:

   a latch (30) carried by the other of the door and the structure and having a catch (32) configured to engage the strike; and
   a cable (34) having a first portion (36) secured to the other of the door and structure and a second portion (38) carrying the strike;
   wherein when the strike is located within the strike seat, the catch will engage the strike and latch the door in the closed position thereby ensuring a coupling of the cable between the door and the structure.

2. The latch assembly (10) of claim 1 wherein the strike (24) comprises a pin (44) removably mounted in the strike seat (22).

3. The latch assembly (10) of claim 2 wherein the strike seat (22) comprises a hook (26) receiving the pin (44).

4. The latch assembly (10) of claim 3 wherein the hook (26) is oriented such that the hook opens non-aligned from a pivoting direction of the door (12) from the closed position to the opened position.

5. The latch assembly (10) of claim 4 wherein the hook (26) is oriented such that contacting of the pin (44) with the catch (32) presses the pin into the strike seat (22).

6. The latch assembly (10) of claim 2 wherein the second portion (38) of the cable (34) has first and second spaced strands (40, 42) with the pin (44) spanning the first and second spaced strands.

7. The latch assembly (10) of claim 6 wherein the first and second spaced strands (40, 42) extend the length of the cable (34) and each strand has a second end connected to the pin (44) and a first end connected to the door (12).

8. The latch assembly (10) of claim 7 wherein the first end of each strand (40, 42) is connected to an inner surface of the door (12).

9. The latch assembly (10) of claim 2 wherein the latch keep (20) retains the pin (44) when the door (12) is moved to the opened position.

10. An aircraft engine comprising a door and a latch assembly, the door and the latch assembly comprising:

a door (12) pivotally mounted to a portion (18) of the engine and moveable between a closed position and an opened position; and
a latch assembly (10) operable between a latch position, where the door is held in the closed position, and a release position, where the door may be pivoted to the opened position, the latch assembly comprising:

a latch keep (20) carried by one of the door (12) and the portion (18) of the engine and having a strike seat (22) in which a strike (24) may be removably received; **characterised in that** the latch assembly further comprises:

a latch (30) carried by the other of the door and the portion of the engine and having a catch (32) configured to engage the strike; and
a cable (34) having a first portion (36) secured to the other of the door and the portion of the engine and a second portion (38) carrying the strike;

wherein when the strike is located within the strike seat, the catch will engage the strike and latch the door in the closed position thereby ensuring a coupling of the cable between the door and the portion of the engine.

11. The aircraft engine of claim 10 wherein the strike (24) comprises a pin (44) removably mounted in the strike seat (22).

12. The aircraft engine of claim 11 wherein the latch keep (20) is operably coupled to the portion (18) of the engine.

Patentansprüche

1. Verriegelungsanordnung (10), eine Tür (12) und eine umgebende Struktur (14), wobei die Tür schwenkbar an der umgebenden Struktur (14) für eine Schwenkbewegung zwischen einer geöffneten Position und einer geschlossenen Position befestigt ist, wobei die Verriegelungsanordnung umfasst:

eine Verriegelungshalterung (20), die durch eine von der Tür und der Struktur getragen ist und einen Anschlagsitz (22) aufweist, in dem ein Anschlag (24) entfernbar aufgenommen werden kann;
dadurch gekennzeichnet, dass die Verriegelungsanordnung weiter umfasst:

eine Verriegelung (30), die von der anderen von der Tür und der Struktur getragen ist und eine Sperre (32) aufweist, die dazu konfiguriert ist, am Anschlag anzugreifen; und ein Kabel (34), das einen ersten Abschnitt (36) aufweist, der an der anderen von der Tür und der Struktur gesichert ist, und einen zweiten Abschnitt (38), der den Anschlag trägt;
wobei, wenn der Anschlag innerhalb des Anschlagsitzes angeordnet ist, die Sperre am Anschlag angreift und die Tür in der geschlossenen Position verriegelt, wodurch eine Verbindung des Kabels zwischen der Tür und der Struktur sichergestellt ist.

2. Verriegelungsanordnung (10) nach Anspruch 1, wobei der Anschlag (24) einen Stift (44) umfasst, der entfernbar in dem Anschlagsitz (22) befestigt ist.

3. Verriegelungsanordnung (10) nach Anspruch 2, wobei der Anschlagsitz (22) einen Haken (26) umfasst, der den Stift (44) aufnimmt.

4. Verriegelungsanordnung (10) nach Anspruch 3, wobei der Haken (26) so ausgerichtet ist, dass der Haken nicht-fluchtend mit einer Schwenkrichtung der Tür (12) von der geschlossenen Position in die geöffnete Position öffnet.

5. Verriegelungsanordnung (10) nach Anspruch 4, wobei der Haken (26) so ausgerichtet ist, dass das Kontaktieren des Stiftes (44) mit der Sperre (32) den Stift in den Anschlagsitz (22) drückt.

6. Verriegelungsanordnung (10) nach Anspruch 2, wobei der zweite Abschnitt (38) des Kabels (34) erste und zweite beabstandete Stränge (40, 42) aufweist, wobei der Stift (44) die ersten und zweiten beabstandeten Stränge überspannt.

7. Verriegelungsanordnung (10) nach Anspruch 6, wobei die ersten und zweiten beabstandeten Stränge (40, 42) die Länge des Kabels (34) verlängern und jeder Strang ein zweites Ende aufweist, das mit dem Stift (44) verbunden ist, und ein erstes Ende, das mit der Tür (12) verbunden ist.

8. Verriegelungsanordnung (10) nach Anspruch 7, wobei das erste Ende jedes Strangs (40, 42) mit einer Innenfläche der Tür (12) verbunden ist.

9. Verriegelungsanordnung (10) nach Anspruch 2, wobei die Verriegelungshalterung (20) den Stift (44) festhält, wenn die Tür (12) in die geöffnete Position bewegt wird.

10. Flugzeugtriebwerk, umfassend eine Tür und eine Verriegelungsanordnung, wobei die Tür und die Verriegelungsanordnung umfassen:

eine Tür (12), die schwenkbar an einem Abschnitt (18) des Triebwerks angebracht ist und zwischen einer geschlossenen Position und einer geöffneten Position bewegbar ist; und
eine Verriegelungsanordnung (10), die zwischen einer Verriegelungsposition, in der die Tür in der geschlossenen Position gehalten wird, und einer Freigabeposition betreibbar ist, in der die Tür in die geöffnete Position geschwenkt werden kann, wobei die Verriegelungsanordnung umfasst:
eine Verriegelungshalterung (20), die von einem von der Tür (12) und dem Abschnitt (18) des Triebwerks getragen wird und einen Anschlagsitz (22) aufweist, in dem ein Anschlag (24) entfernbar aufgenommen werden kann;

dadurch gekennzeichnet, dass die Verriegelungsanordnung weiter umfasst:

eine Verriegelung (30), die von dem anderen von der Tür und dem Abschnitt des Triebwerks getragen wird und eine Sperre (32) aufweist, das dazu konfiguriert ist, am Anschlag anzugreifen; und
ein Kabel (34), das einen ersten Abschnitt (36) aufweist, der an dem anderen von der Tür und dem Abschnitt des Triebwerks befestigt ist, und einen zweiten Abschnitt (38), der den Anschlag trägt;
wobei, wenn der Anschlag innerhalb des Anschlagsitzes angeordnet ist, die Sperre am Anschlag angreift und die Tür in der geschlossenen Position verriegelt, wodurch eine Kopplung des Kabels zwischen der Tür und dem Abschnitt des Triebwerks sichergestellt ist.

11. Flugzeugtriebwerk nach Anspruch 10, wobei der Anschlag (24) einen Stift (44) aufweist, der entfernbar in dem Anschlagsitz (22) befestigt ist.

12. Flugzeugtriebwerk nach Anspruch 11, wobei die Verriegelungshalterung (20) betriebsbereit mit dem Abschnitt (18) des Triebwerks gekoppelt ist.

Revendications

1. Ensemble de verrouillage (10), porte (12) et structure d'encadrement (14), la porte étant montée de manière pivotante sur la structure d'encadrement (14) pour un mouvement pivotant entre une position ouverte et une position fermée, l'ensemble de verrouillage comprenant :

un maintien de verrouillage (20) porté par un élément parmi la porte et la structure et possédant un support de gâche (22) dans lequel une gâche (24) peut être reçue de manière amovible ;
caractérisé en ce que l'ensemble de verrouillage comprend en outre :

un verrou (30) porté par l'autre élément parmi la porte et la structure et possédant un cliquet (32) conçu pour venir en prise avec la gâche ; et
un câble (34) possédant une première partie (36) fixée à l'autre élément parmi la porte et la structure et une seconde partie (38) portant la gâche ;
dans lequel lorsque la gâche se trouve à l'intérieur du support de gâche, le cliquet vient en prise avec la gâche et verrouille la porte dans la position fermée assurant ainsi un couplage du câble entre la porte et la structure.

2. Ensemble de verrouillage (10) selon la revendication 1 dans lequel la gâche (24) comprend une goupille (44) montée de manière amovible dans le support de gâche (22).

3. Ensemble de verrouillage (10) selon la revendication 2 dans lequel le support de gâche (22) comprend un crochet (26) recevant la goupille (44).

4. Ensemble de verrouillage (10) selon la revendication 3 dans lequel le crochet (26) est orienté de telle sorte que le crochet s'ouvre non aligné à partir d'une direction de pivotement de la porte (12) de la position fermée vers la position ouverte.

5. Ensemble de verrouillage (10) selon la revendication 4 dans lequel le crochet (26) est orienté de telle sorte que la mise en contact de la goupille (44) avec le cliquet (32) enfonce la goupille dans le support de gâche (22).

6. Ensemble de verrouillage (10) selon la revendication 2 dans lequel la seconde partie (38) du câble (34) possède des premier et second torons espacés (40, 42), la goupille (44) traversant les premier et second torons espacés.

7. Ensemble de verrouillage (10) selon la revendication 6 dans lequel les premier et second torons espacés

(40, 42) s'étendent sur la longueur du câble (34) et chaque toron possède une seconde extrémité reliée à la goupille (44) et une première extrémité reliée à la porte (12).

8. Ensemble de verrouillage (10) selon la revendication 7 dans lequel la première extrémité de chaque toron (40, 42) est reliée à une surface interne de la porte (12).

9. Ensemble de verrouillage (10) selon la revendication 2 dans lequel le maintien de verrouillage (20) retient la goupille (44) lorsque la porte (12) est déplacée vers la position ouverte.

10. Moteur d'avion comprenant une porte et un ensemble de verrouillage, la porte et l'ensemble de verrouillage comprenant :

une porte (12) montée de manière pivotante sur une partie (18) du moteur et mobile entre une position fermée et une position ouverte ; et
un ensemble de verrouillage (10) pouvant fonctionner entre une position de verrouillage, où la porte est maintenue dans la position fermée, et une position de libération, où la porte peut pivoter jusqu'à la position ouverte, l'ensemble de verrouillage comprenant :

un maintien de verrouillage (20) porté par un élément parmi la porte (12) et la partie (18) du moteur et possédant un support de gâche (22) dans lequel une gâche (24) peut être reçue de manière amovible ;
caractérisé en ce que l'ensemble de verrouillage comprend en outre :

un verrou (30) porté par l'autre élément parmi la porte et la partie du moteur et possédant un cliquet (32) conçu pour venir en prise avec la gâche ; et
un câble (34) possédant une première partie (36) fixée à l'autre élément parmi la porte et la partie du moteur et une seconde partie (38) portant la gâche ;
dans lequel lorsque la gâche se trouve à l'intérieur du support de gâche, le cliquet vient en prise avec la gâche et verrouille la porte dans la position fermée assurant ainsi un couplage du câble entre la porte et la partie du moteur.

11. Moteur d'avion selon la revendication 10 dans lequel la gâche (24) comprend une goupille (44) montée de manière amovible dans le support de gâche (22).

12. Moteur d'avion selon la revendication 11 dans lequel le maintien de verrouillage (20) est couplé fonctionnellement à la partie (18) du moteur.

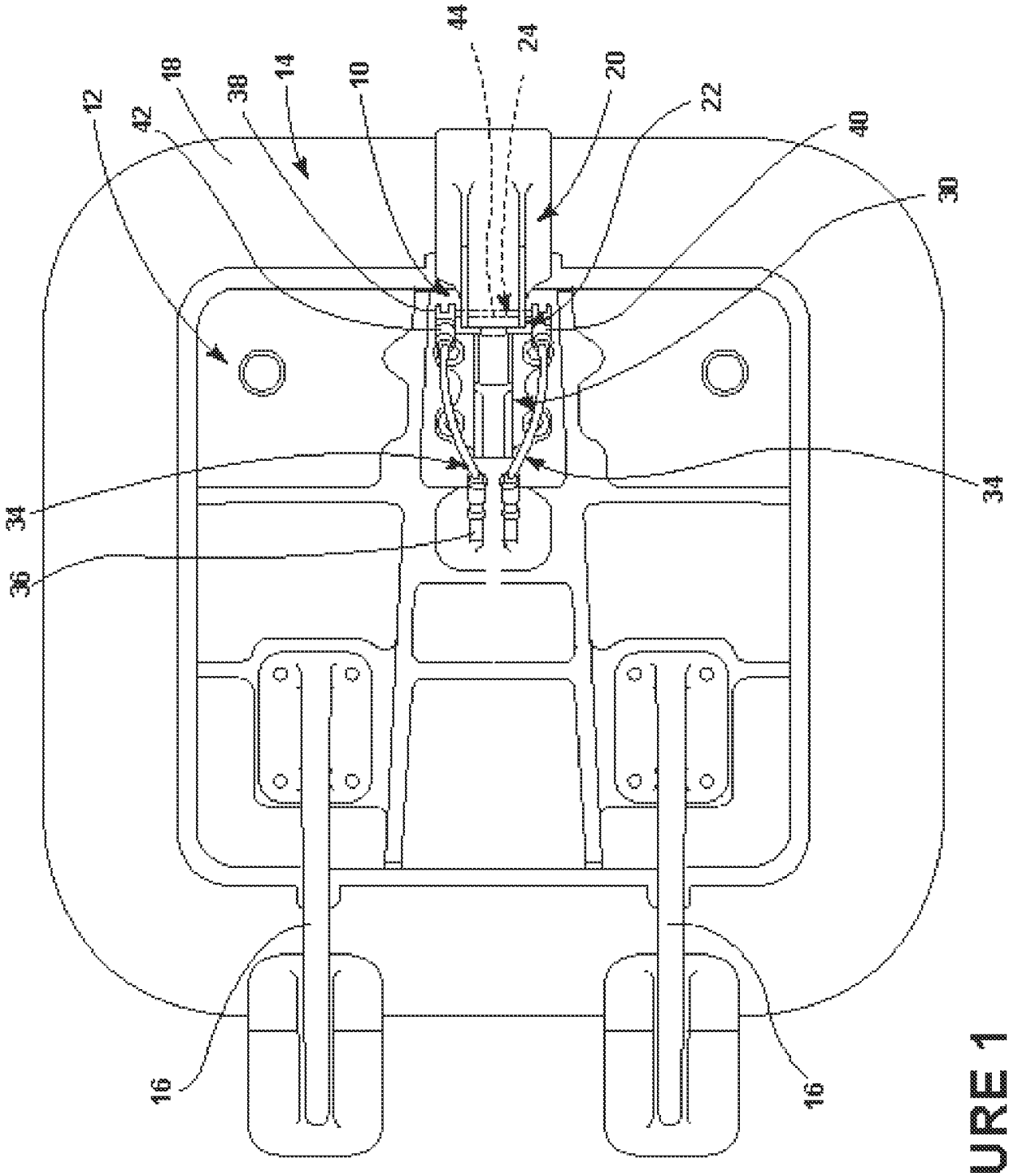

FIGURE 1

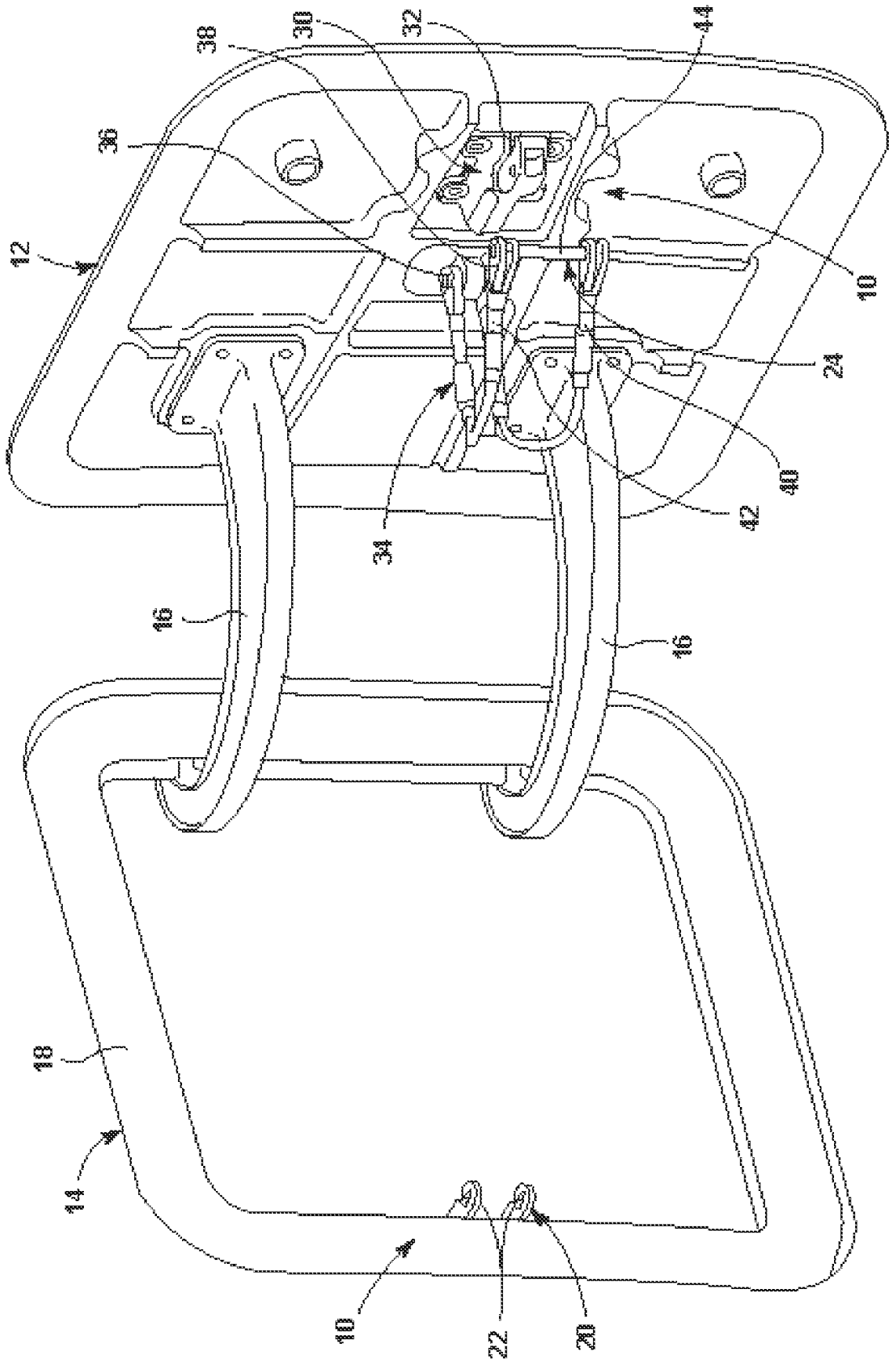

FIGURE 2

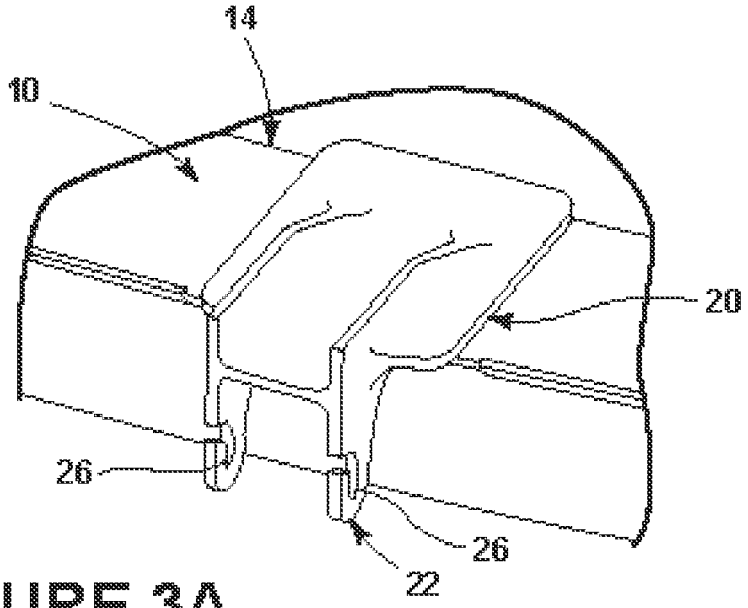

FIGURE 3A

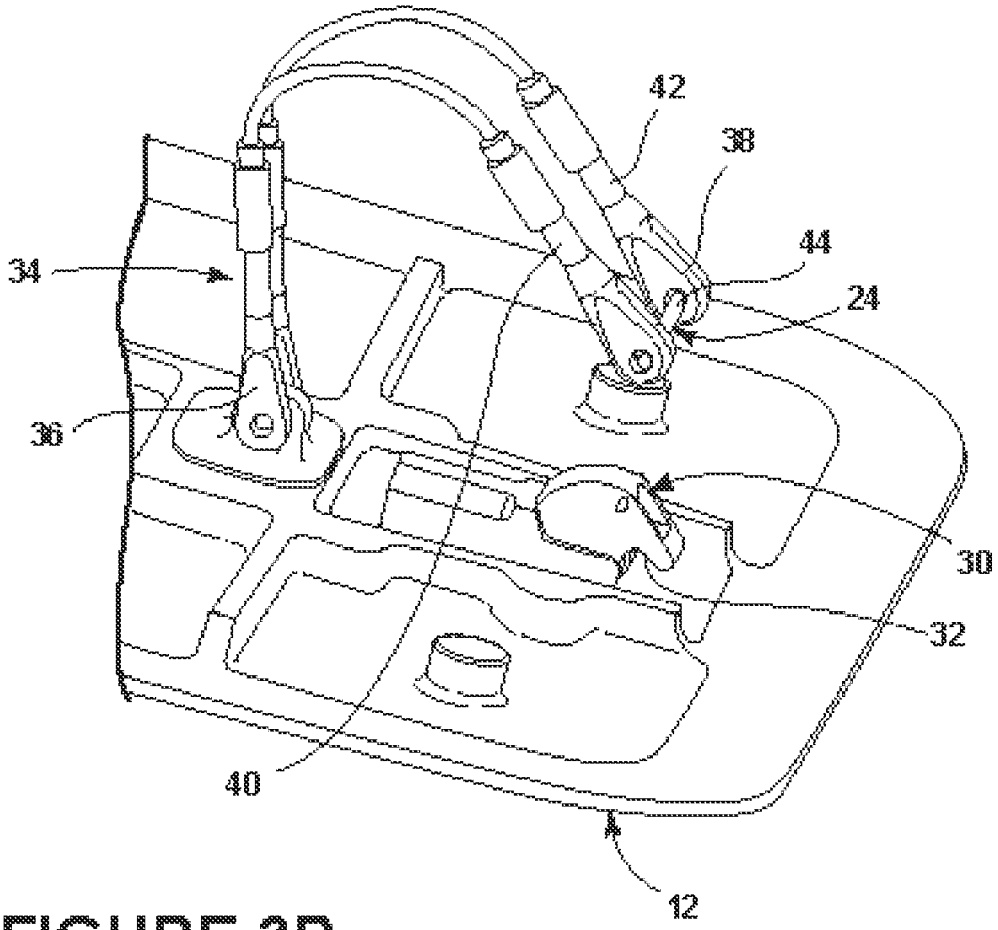

FIGURE 3B

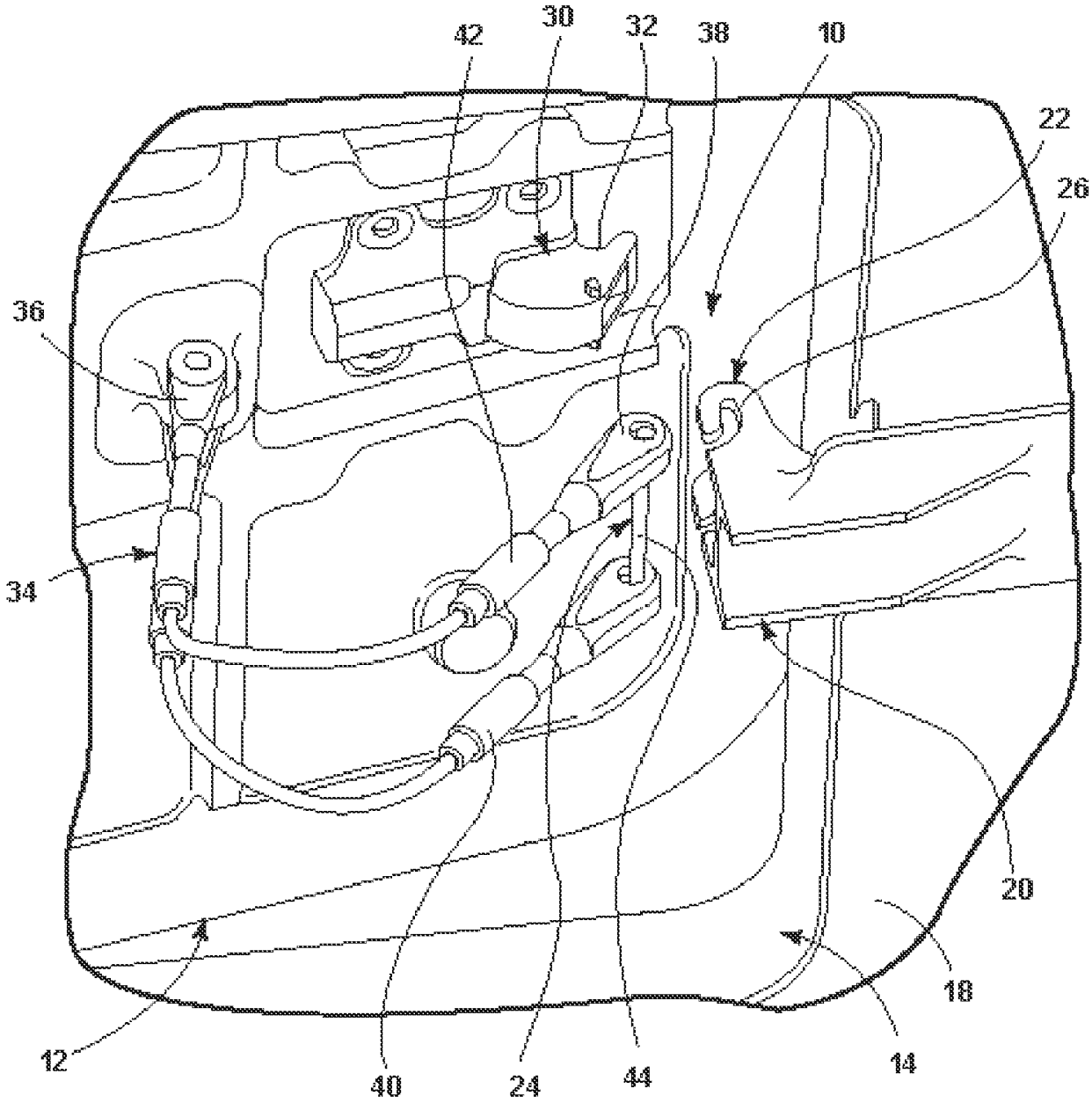

FIGURE 4

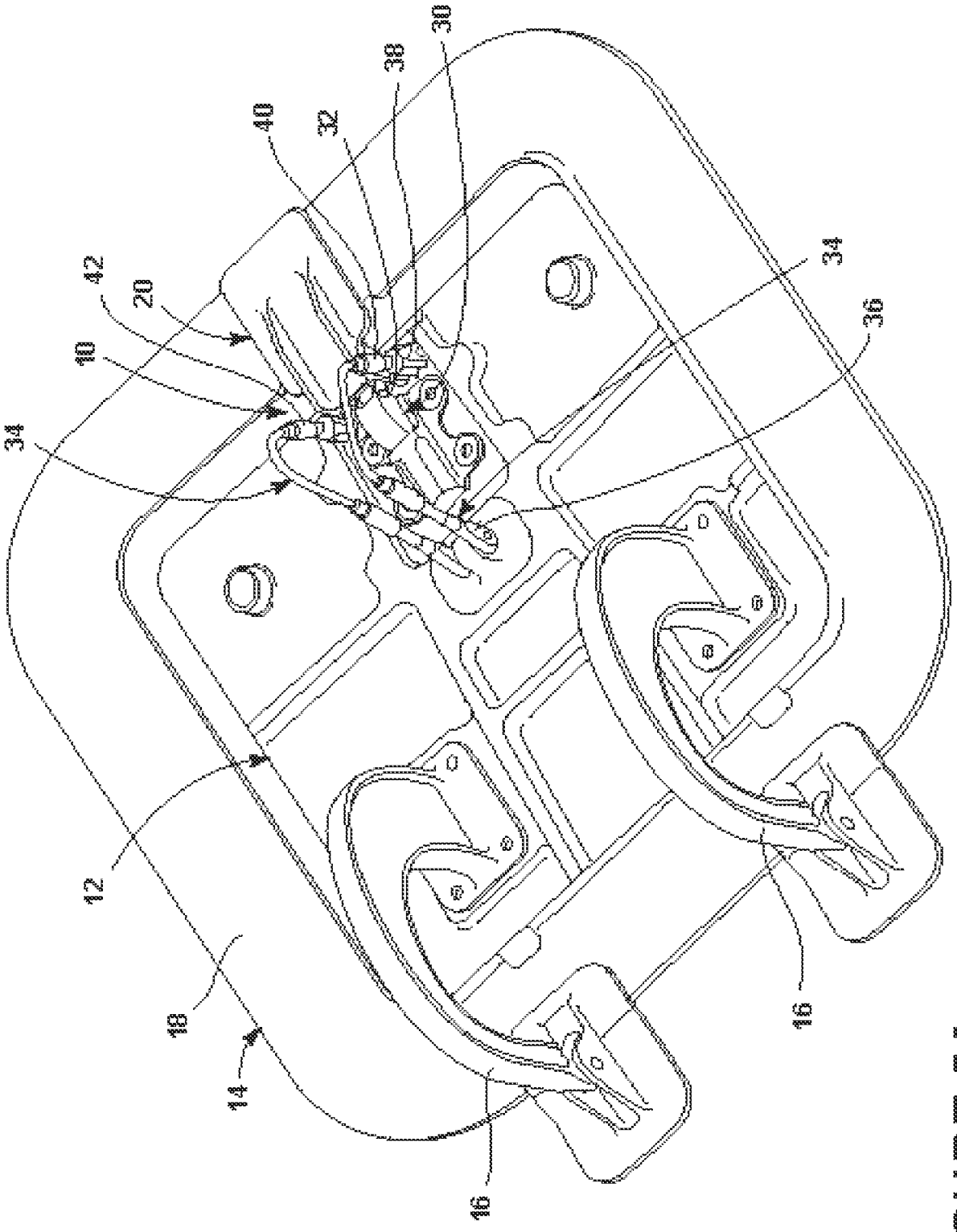

FIGURE 5A

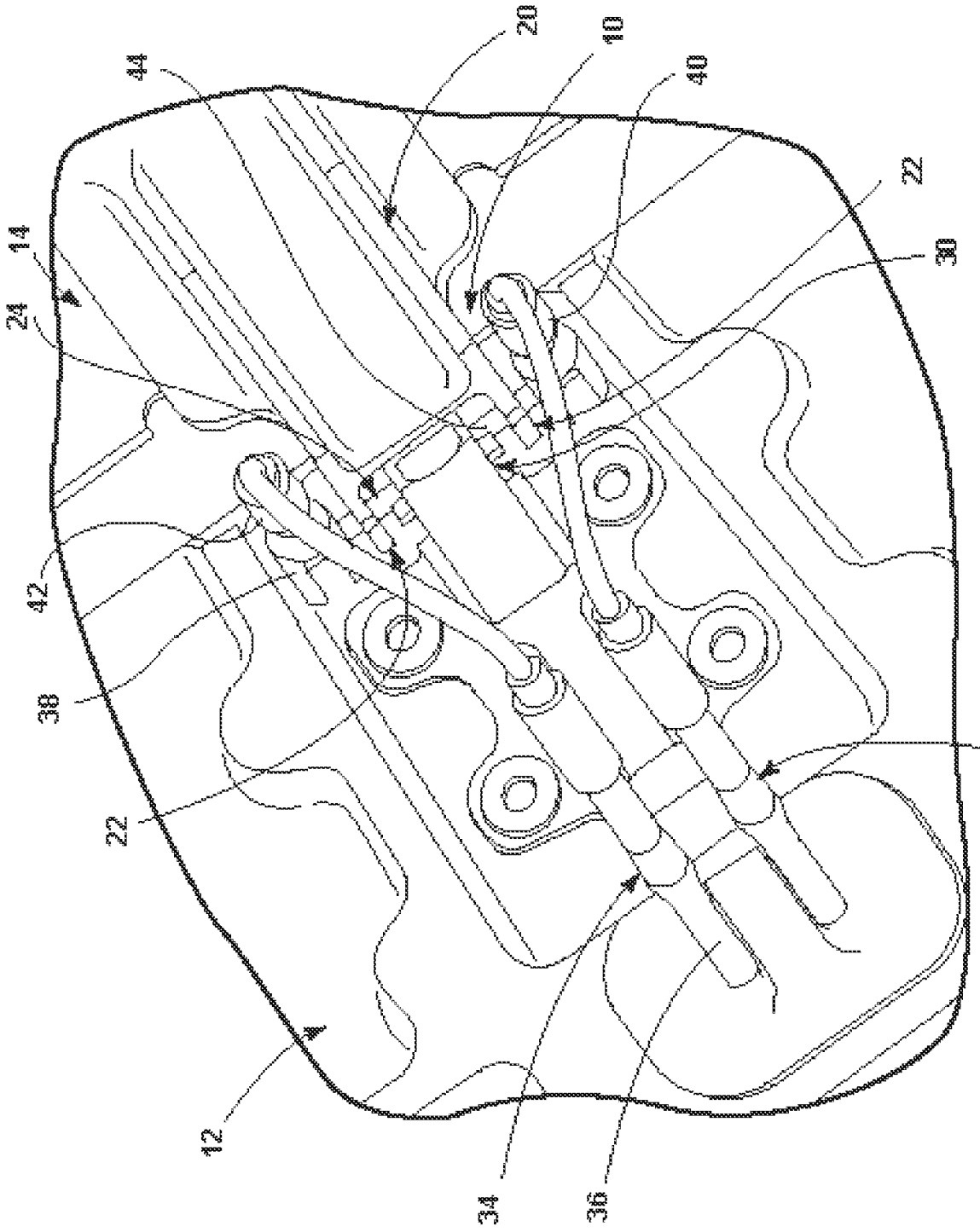

FIGURE 6B

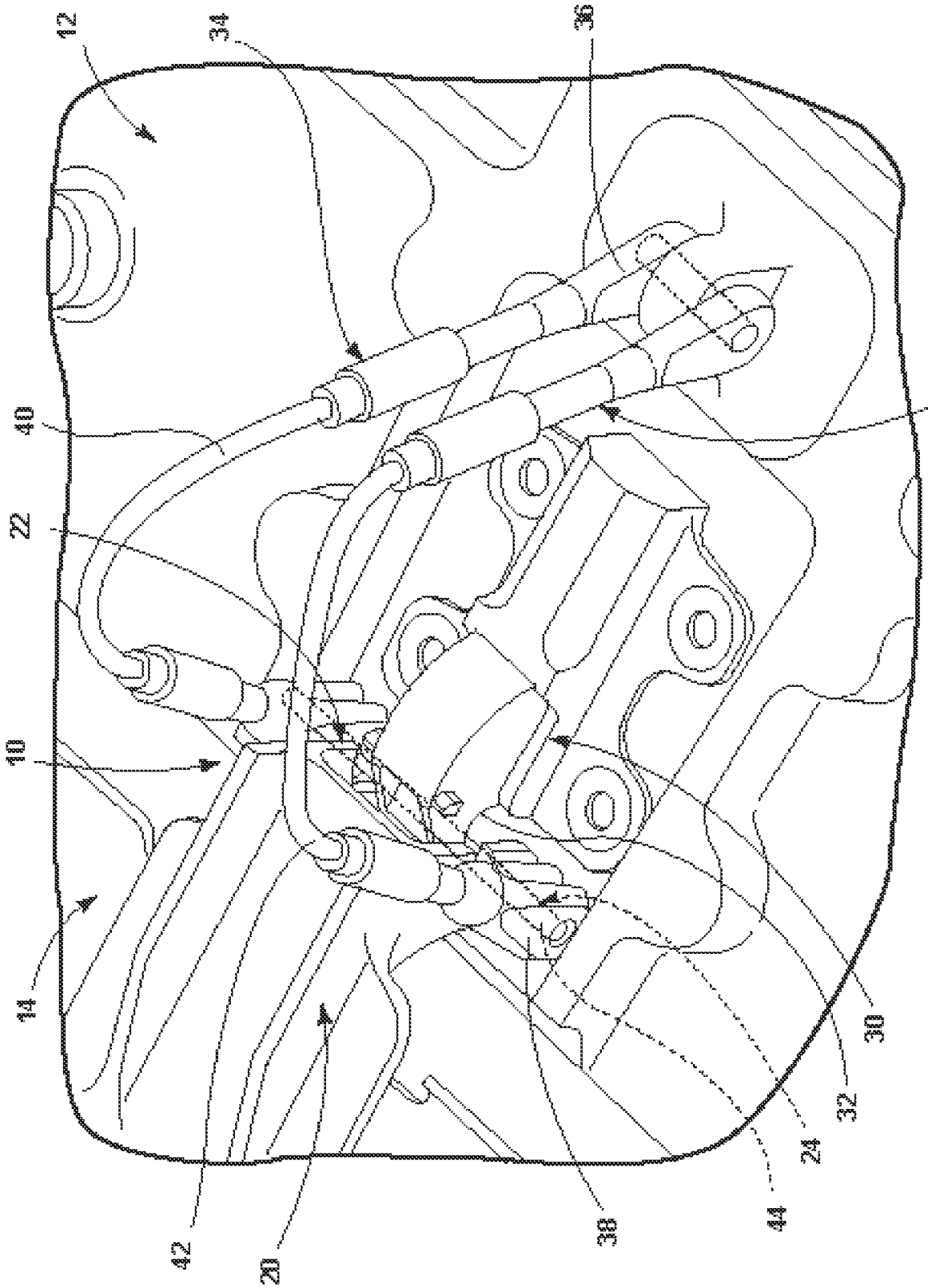

FIGURE 5C

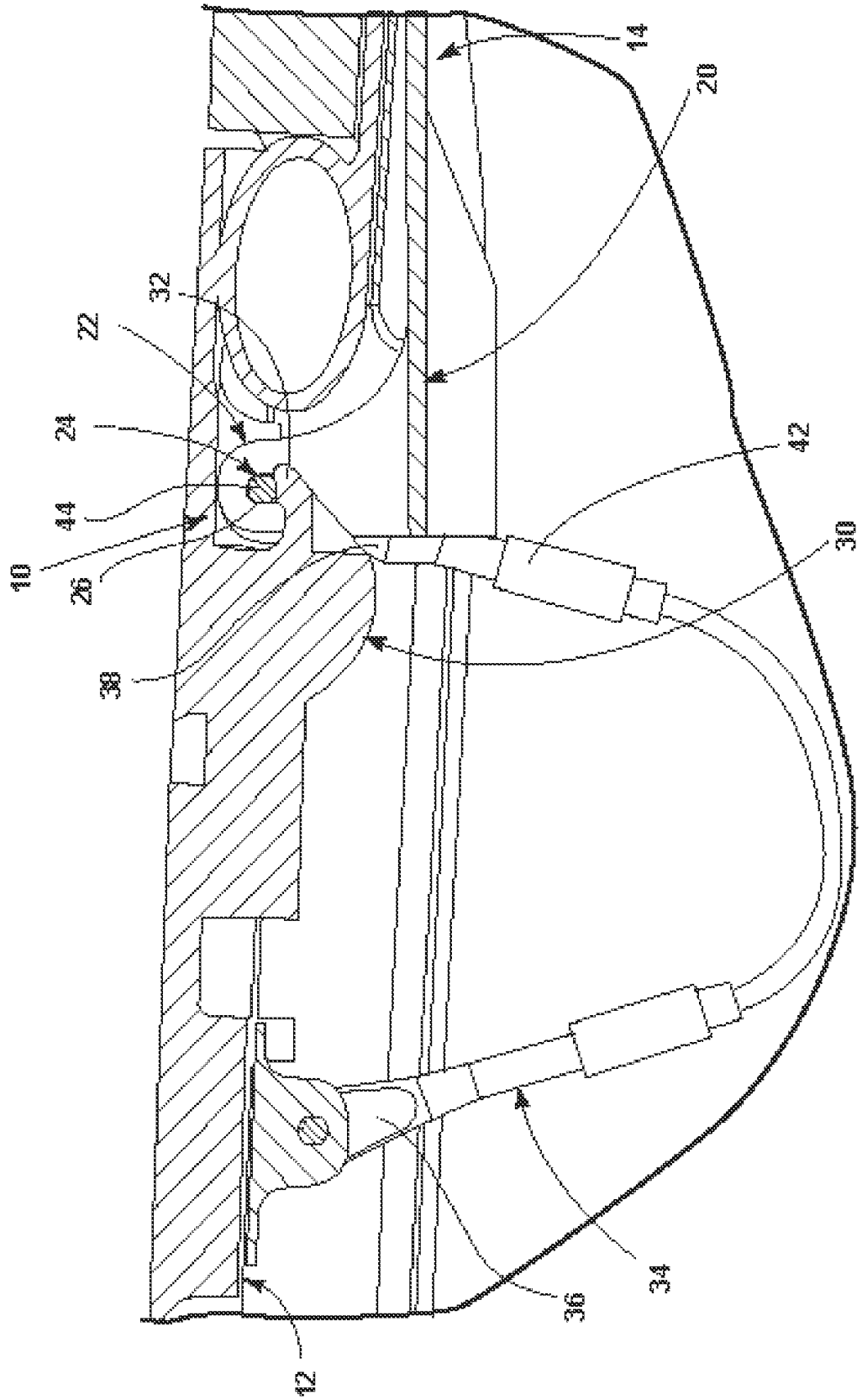

FIGURE 5D

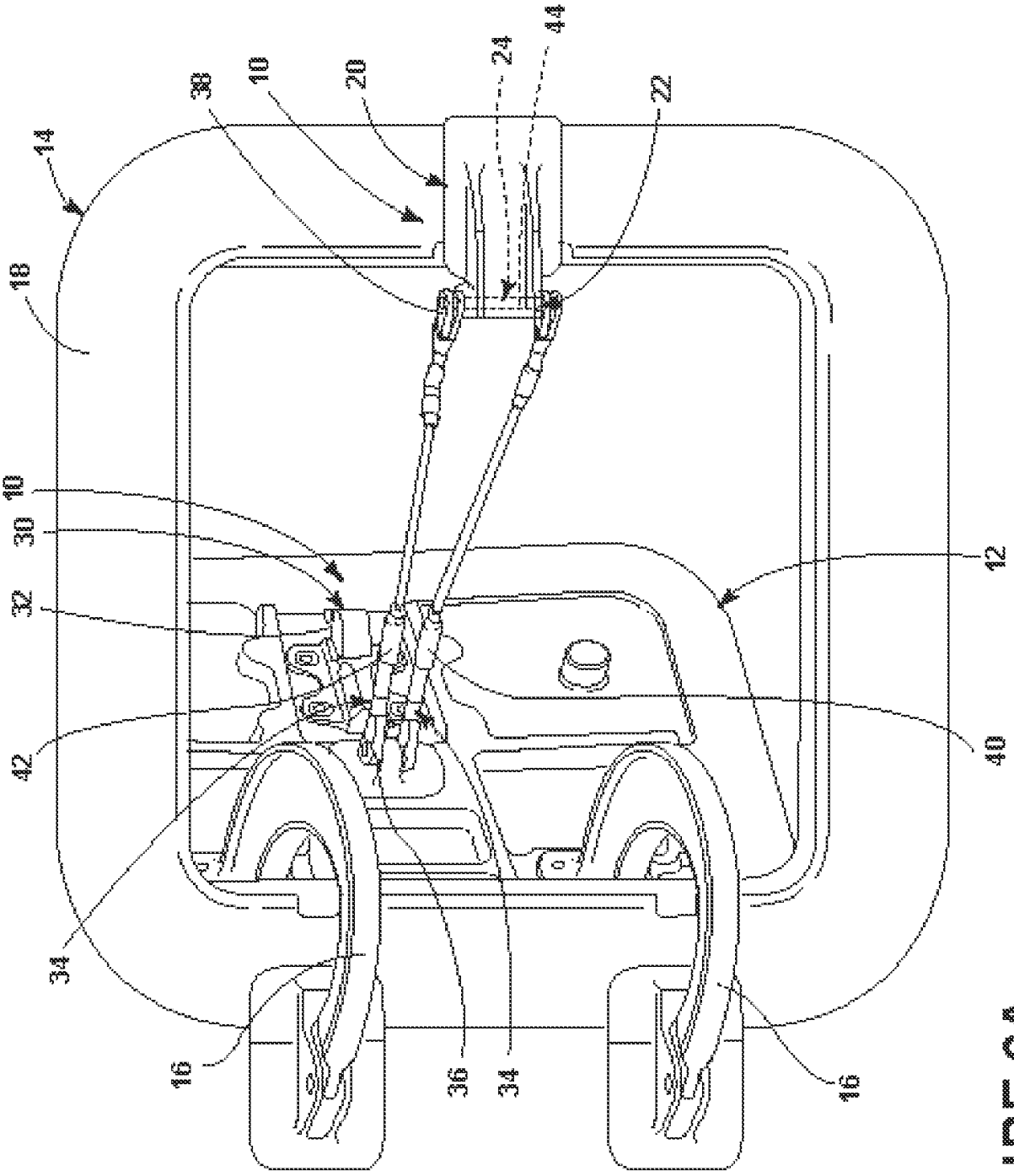

FIGURE 6A

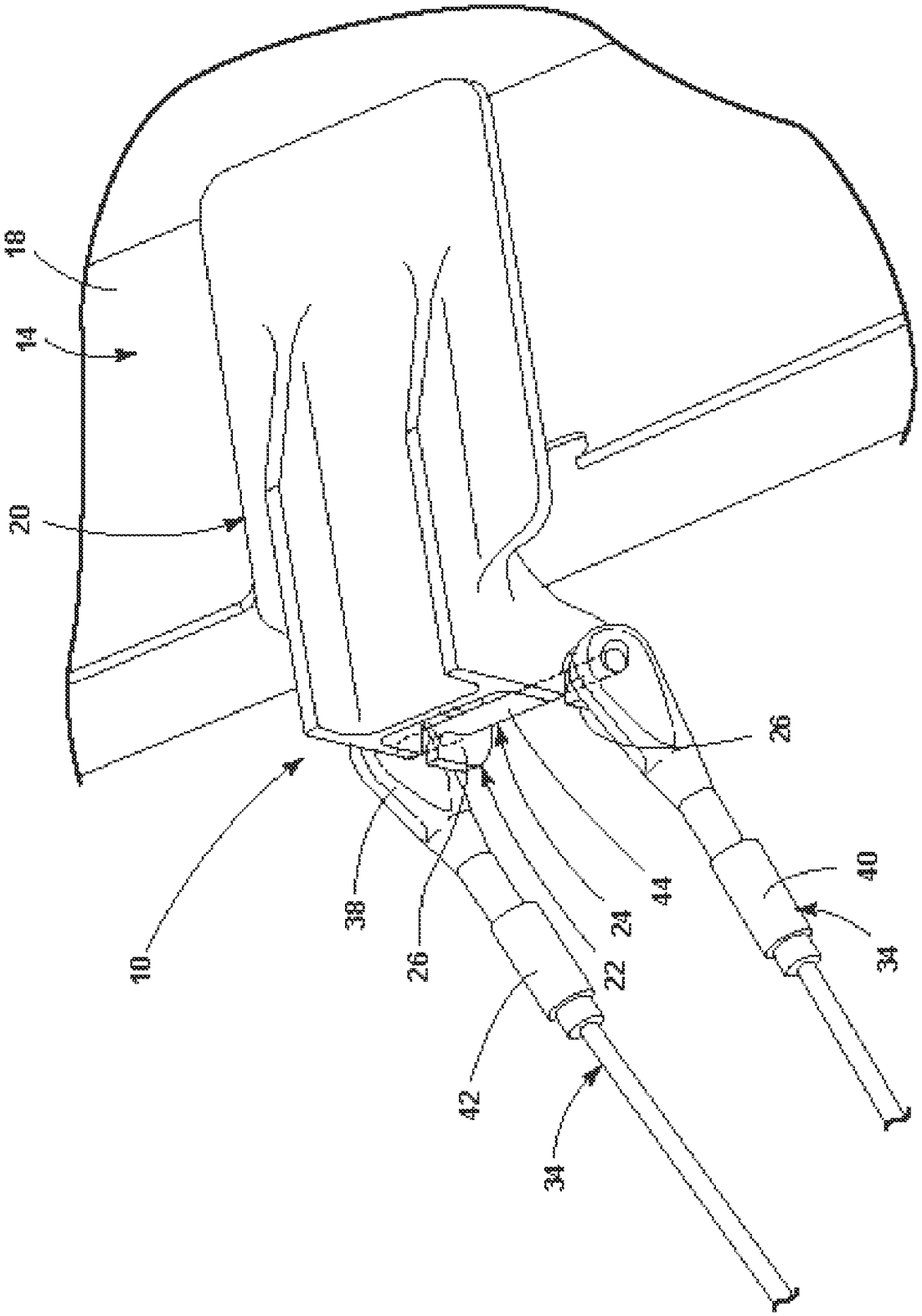

FIGURE 6B

REFERENCES CITED IN THE DESCRIPTION

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