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

(11) **EP 2 422 032 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
17.09.2014 Bulletin 2014/38

(21) Application number: **09789606.2**

(22) Date of filing: **20.04.2009**

(51) Int Cl.:
E05F 15/04 *(2006.01)* ***E05C 17/30*** *(2006.01)*

(86) International application number:
PCT/US2009/041073

(87) International publication number:
WO 2010/123486 (28.10.2010 Gazette 2010/43)

(54) **PNEUMATIC DOOR ASSIST SYSTEM WITH LOCK**

PNEUMATISCHES TÜRUNTERSTÜTZUNGSSYSTEM MIT SCHLOSS

SYSTÈME PNEUMATIQUE D'ASSISTANCE POUR PORTE AVEC VERROU

(84) Designated Contracting States:
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 SE SI SK TR

(43) Date of publication of application:
29.02.2012 Bulletin 2012/09

(73) Proprietor: **International Truck Intellectual Property Company, LLC**
Warrenville, IL 60555 (US)

(72) Inventor: **CASSADAY, Nicholas, M.**
Woodburn, IN 46797 (US)

(74) Representative: **Kuhnen & Wacker**
Patent- und Rechtsanwaltsbüro
Prinz-Ludwig-Straße 40A
85354 Freising (DE)

(56) References cited:
FR-A- 1 280 627
GB-A- 2 450 980
US-A- 2 800 324
US-A- 3 002 581
US-A- 4 689 849

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).

EP 2 422 032 B1

Printed by Jouve, 75001 PARIS (FR)

Description

BACKGROUND

[0001] Embodiments disclosed herein relate to automotive doors, and more particularly, to door opening assist devices for use on automobile doors that lock the position of the door in an open position.

[0002] Doors in trucks and other vehicles, particularly military or other armored vehicles, can be very heavy. Depending on the angle that the vehicle is at, these heavy doors can move from an open position to a closed position without the operator pushing or pulling the door closed. With the tendency of these heavy doors to close on their own, the operator can experience difficulties with ingress and egress of the vehicle. Additionally, the operator may not have both hands available to support the door in the open position during ingress and egress.

[0003] Door assist systems are used to open and close doors without the need for the operator to exert significant effort in holding or supporting the door. Door assist systems also avoid the possibility of the door closing on its own and striking the operator passing through the door frame. Further, door assist systems avoid or lessen impacts upon closing, and minimize damage to the hinges and the latches. Typically, door assist systems use electrically operated solenoids and linear actuators that require electrical power to operate.

From FR 1 280 627 A a door assist system with a hydraulic actuator is know. The hydraulic actuator comprises an actuator rod acting on a pivotal lever linking the door with the actuator rod. When the actuator rod is extracted form the hydraulic actuator the door is opened while the door is closed when the actuator rod is retracted. Shortly before the door arrives at the fully opened position the actuator rod of the hydraulic actuator closes an opening of a pipe. This stops air flow between chambers of the actuator rod. As a result, the movement of the actuator rod is slowed down. However, with the system of

FR 1 280 627 A it is not possible to lock the door at an arbitrary intermediate position.

US 4 689 849 A discloses a control mechanism for a vehicle door with which it is possible to lock the door at any arbitrary intermediate position. This is achieved by a damper cylinder having a locking valve which locks fluid flow between the two chambers of the damper cylinder when a door handle is in a released position.

An assist system for lifting a hood of an engine compartment of an automobile is known from US 2 800 324 A. The hood is opened (lifted) and closed by a hydraulic actuator having an actuator rod which is connected to pivotal lever. When a handle is in its released position movement of the hood is locked while the hood may be opened or closed when the handle is in a respective first or second position.

SUMMARY

[0004] A door assist system for use on a vehicle door being connected to a vehicle to lock the door into an open position includes a door handle having a first operable position, a second operable position and a released position. The door assist system also includes a pneumatic actuator having an actuator rod, where the actuator rod is extendable when the door handle is in the first operable position and the actuator rod is retractable when the door handle is in the second operable position. A slide block is displaceable by the actuator rod of the pneumatic actuator. A lock includes a door link connecting the slide block to the vehicle frame. As the slide block is displaced away from the pneumatic actuator, the door link opens the door with respect to the vehicle. The lock also includes a hydraulic locking actuator with a hydraulic rod extendable and retractable with the slide block. When the door handle is in the released position, the actuator rod is prevented from extension and retraction and locks the slide block at the current location, preventing opening or closing of the door.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005]

FIG. 1 is a perspective view of a vehicle door having the pneumatic door assist system and a hydraulic locking actuator.

FIG. 2 is a perspective view of the pneumatic door assist system and the hydraulic locking actuator of FIG. 1.

FIG. 3 is a schematic of the pneumatic door assist system and the hydraulic locking actuator in an extended position.

DETAILED DESCRIPTION

[0006] Referring to FIGs. 1-3, a vehicle door is indicated generally at 10, and includes a door assist system 12 that opens and closes the door with limited operator effort, and maintains the door in any open position without the need for the operator to hold or support the door in the open position. While the present door assist system 12 will be described with respect to a military or armored vehicle door, it is contemplated that the present door assist system can be incorporated in any door that has a tendency to close or needs to maintain an open position.

[0007] The door 10 has hinges 14 located at an inside edge 16 of the door that attach the door to the vehicle frame (not shown). The hinges 14 connect to the vehicle door frame. A latching system 18 is located on the door 10 at an outside edge 20 of the door, opposite from the hinges 14. The door 10 may also include a window portion 22 and a component portion 24, the portion of the door

where the components of the door assist system 12 are located. The door 10 also includes a panel 26 upon which the components of the door assist system 12 are mounted.

[0008] The door assist system 12 has two pneumatic actuators 28 that are operated by the vehicle's on-board air system 30, for example the compressor or air tanks. In this configuration, the door assist system 12 is actuated pneumatically and without the need for electronic actuation. Since the door assist system 12 is mechanically operated, if there is a failure of the vehicle's electronic system, or if the electronic system of the vehicle is turned off, such as after parking the vehicle, the pneumatic door assist system 12 remains operable.

[0009] Each pneumatic actuator 28 is mounted to the door 10 and has an actuator rod 32 that extends and retracts. The actuator rod 32 is attached to a slide block 34 that is moveable with respect to the door 10. The slide block 34 is generally elongate and oriented to be generally perpendicular to the actuator rods 32. The slide block 34 is configured to slide on two positioning rods 36 that extend through the slide block 34 from a location at or near the inside edge 16 of the door 10, to a slide block receiving structure 38 adjacent the pneumatic actuators 28. When the actuator rod 32 is extended, the actuator rod displaces the slide block 34 away from the pneumatic actuator 28, and when the actuator rod is retracted, the actuator rod displaces the slide block towards the pneumatic actuator. Displacement of the slide block 34 is limited by the length of the actuator rods 32 in the extended position, and the slide block receiving structure 38 in the retracted position.

[0010] A door handle 40 has a first operable position and a second operable position. For purposes of this application, the positions will be referred to as a "push position" and a "pull position", although other positions for varying types of door handles 40 are contemplated. During all opening and closing movements of the door 10, the door handle 40 is either in a push position or a pull position operational state. When the door handle 40 is released by the operator, in neither the push position nor the pull position, no movement of the door 10 is permitted, due to the lock and the hydraulic locking actuator which will be discussed below.

[0011] The door handle 40 is attached to the door 10 and mechanically operates an air valve 42. The air valve 42 has at least two output ports 44, 46 and at least one exhaust port 48. Operation of the door handle 40 into the push position opens an air valve 42 which allows air (or other gaseous fluids) to travel from the air system 30, such as the compressor or air tanks, through first air delivery lines 50, through the air valve 42 and out the first output port 44. From the first output port 44, the air flows through first air input lines 52 to the pneumatic actuator(s) 28. Air received in the pneumatic actuator(s) 28 extends the actuator rod 32 away from the pneumatic actuator and towards the door hinges 14. Thus, extension of the actuator rod 32 occurs when the door handle 40 is in the push position, although it is contemplated that extension of the actuator rod 32 can occur when the door handle is moved to any first operable position.

[0012] A door link 54 provides a linkage between the slide block 34 located on the door 10 and the vehicle frame (not shown). When the slide block 34 is extended away from the pneumatic actuator 28, the door link 54 acts against the vehicle frame (not shown) to pivot the door 10 open. Thus, the pneumatic actuator 28, with air supplied by the air supply 30 and triggered by the door handle 40, allows the door 10 to be opened with limited human effort.

[0013] The pneumatic actuator 28 also allows the door 10 to be closed with limited human effort. When the door handle 40 is moved to the second operational position or pull position, the air valve 42 opens and allows air to flow from the air supply 30 to the air valve. The air valve 42 has bi-directional control to its first output port 44 and its second output port 46. In contrast to the push position of the door handle where air flows through the first output port 44, in the pull position air travels from the air valve 42 through the second output port 46 and the second input lines 56 to the rod side of the pneumatic actuator 28.

[0014] Air received at the rod side retracts the actuator rod 34 and pulls the slide block 34 towards the pneumatic actuator 28. Air on the opposite side in the pneumatic actuator 28 is vented through the exhaust port 48 in the air valve 42. When the slide block 34 is retracted towards the pneumatic actuator 28, the door link 54 pivots the door 10 to a closed position.

[0015] A lock 57 includes a hydraulic locking actuator 58 that is located on the door 10 and which is generally parallel with the pneumatic actuators 28. The hydraulic locking actuator 58 locks the door 10 at any open, stopped position by locking the slide block 34 in place with respect to the door 10 to prevent the door closing on the operator during ingress and egress.

[0016] The door handle 40 also operates a hydraulic valve 60. When the door handle 40 is in either the push or the pull operational state, the hydraulic valve 60 is opened to permit the extension and retraction of the hydraulic locking actuator 58. The hydraulic valve 60 is fluidly connected to the hydraulic locking actuator 58 with a first fluid input line 62 and a second fluid input line 64. No separate input system is needed for operation of the hydraulic locking actuator 58.

[0017] The slide block 34, which is displaced by the pneumatic actuators 28, in turn operates the hydraulic locking actuator 58. As long as the door handle 40 is in either the push or the pull operational state, the hydraulic valve 60 is opened, and a hydraulic rod 66 is extendable and retractable. The slide block 34 extends or retracts the hydraulic rod 66 as long as the hydraulic valve 60 is open.

[0018] When the door handle 40 is released, the hydraulic valve 60 closes, which locks the hydraulic locking actuator 58. When the hydraulic valve 60 closes, the hydraulic fluid cannot pass through the hydraulic valve to

allow the extension and retraction of the hydraulic rod 66. In this state, the hydraulic rod 66 is static, thus the slide block 34 is also static. Since the slide block 34 is not movable, the door link 54 is also static and locks the door 10 into the position that the door is in when the door handle 40 is released.

[0019] In the event that there is a failure of the pneumatic actuators 28, the air supply 30 or any other portion of the pneumatic system, the hydraulic locking actuator 58 is still operable. That is, even if pushing or pulling on the door handle 40 does not result in the pneumatic actuators 28 assisting in the opening and closing motion of the door 10, the pushing position or the pulling position on the door handle 40 will open the hydraulic valve 60 to allow the hydraulic locking actuator 58 to operate.

[0020] In the event of failure of the pneumatic system, the door 10 can be manually opened or closed by the operator without pneumatic assist, manually moving the door handle 40 which will then open the air valve 40, and the hydraulic valve 60 which unlocks the slide block 34, allowing the door to be manually opened. Concurrently or soon after the door handle 40 is released, the hydraulic valve 60 will close, and the hydraulic locking actuator 58 will lock the door 10 into the current position, irrespective of the functioning of the pneumatic system.

[0021] The pneumatic actuators 28, the hydraulic locking actuator 58 and the slide block 34 are mounted on a door assist plate 68 that is attached to the door panel 26 at the component portion 24 of the door 10. It is contemplated that different numbers of pneumatic actuators 28 and hydraulic actuators 58 can be used.

Claims

1. A door assist system (12) for use on a vehicle door (10) and connected to a vehicle to provide assisted opening, closing and locking of the door, the door assist system (12) comprising:

a door handle (40) having a first operable position, a second operable position and a released position;
at least one pneumatic actuator (28) having an actuator rod (32), wherein the actuator rod (32) is extendable when the door handle (40) is in the first operable position, and the actuator rod (32) is retractable when the door handle (40) is in the second operable position;
a slide block (34) displaceable by the actuator rod (32) of the pneumatic actuator (28);
a door link (54) connecting the slide block (34) to the vehicle frame, wherein as the slide block (34) is displaced away from the pneumatic actuator (28), the door link (54) opens the door (10) with respect to the vehicle; and
a lock (57) having a hydraulic rod (66) extendable and retractable with the slide block (34), wherein when the door handle (40) is in the released position, the hydraulic rod (66) is prevented from extension and retraction and locks the slide block (34),
wherein the lock is a hydraulic actuator (58).

2. The door assist system (12) of claim 1 wherein the door handle (40) opens an air valve (42) in the first operable position and in the second operable position, which permits flow of air or other fluid from an on-board air supply to the at least one pneumatic actuator (28).

3. The door assist system (12) of claim 1 wherein the door handle (40) closes an air valve (42) in the released position, which prevents the flow of air or other fluid from an on-board air supply to the at least one pneumatic actuator (28).

4. The door assist system (12) of claim 1 wherein the door handle (40) opens a hydraulic valve (60) in the first operable position and in the second operable position, which permits the flow of fluid through the hydraulic valve to the hydraulic actuator (58).

5. A door assist system (12) of any of the claims 1 to 4 to provide assisted opening, closing and locking of the door (10) into an open position, wherein:

the door handle (40) opens an air valve (42) and a hydraulic valve (60) when the door handle (40) is in the first operable position and the second operable position; the slide block (34) is disposed generally transversely to the actuator rod (32);
the hydraulic locking actuator (58) having the hydraulic rod (66) extendable and retractable with the slide block (34) when the hydraulic valve (60) is open, and wherein the hydraulic rod (66) is prevented from extending and retracting when the hydraulic valve (60) is closed.

6. The door assist system (12) of claim 5 further comprising an air delivery line for delivering air to the air valve (42), and a first air input line (52) from the air valve (42) to the pneumatic actuator (28), and a second air input line (56) from the air valve (42) to the pneumatic actuator (28).

7. The door assist system (12) of claim 6 wherein when the door handle (40) is in the first operable position, the air valve (42) allows air through the first air input line (52), and when the door handle (40) is in the second operable position, the air valve (42) allows air through the second air input line (56).

8. The door assist system (12) of claim 1 or 5 wherein the air is supplied from an on-board air supply of the

vehicle.

9. The door assist system (12) of claim 1 or 5 wherein when the air valve (42) is opened, air is exhausted from the pneumatic actuator.

10. The door assist system (12) of claim 1 or 5 wherein the slide block (34) is disposed generally transverse to the at least one pneumatic actuator (28) and is configured to slide on a positioning rod that is attached to the door panel.

11. The door assist system (12) of claim 1 or 5 wherein the hydraulic locking actuator (58) is disposed between and parallel to two pneumatic air actuators (28).

12. The door assist system (12) of claim 1 or 5 wherein the door link (54) is pivotable on the slide block (34).

Patentansprüche

1. Türhilfssystem (12) zum Verwenden an einer Fahrzeugtür (10), das mit einem Fahrzeug verbunden ist, um ein unterstütztes Öffnen, Schließen und Verriegeln der Tür zu ermöglichen, wobei das Türhilfssystem (12) aufweist:

einen Türgriff (40), der eine erste Betriebsposition, eine zweite Betriebsposition und eine Freigabeposition aufweist;
zumindest einen pneumatischen Aktuator (28) mit einer Aktuatorstange (32),
wobei die Aktuatorstange (32) ausfahrbar ist, wenn sich der Türgriff (40) in der ersten Betriebsposition befindet, und wobei die Aktuatorstange (32) einziehbar ist,
wenn sich der Türgriff (40) in der zweiten Betriebsposition befindet;
einen Gleitklotz (34), der durch die Aktuatorstange (32) des pneumatischen Aktuators (28) verschiebbar ist;
eine Türverbindung (54), die den Gleitklotz (34) mit dem Fahrzeugrahmen verbindet, wobei die Türverbindung (54) die Tür (10) im Verhältnis zu dem Fahrzeug öffnet, wenn der Gleitklotz (34) von dem pneumatischen Aktuator (28) weg verschoben wird; und
eine Verriegelung (57) mit einer hydraulischen Stange (66), die mit dem Gleitklotz (34) ausfahrbar und einziehbar ist, wobei verhindert wird, dass die hydraulische Stange (66) ausgefahren und eingezogen wird und der Gleitklotz (34) verriegelt wird, wenn sich der Türgriff (40) in der Freigabeposition befindet, wobei die Verriegelung ein hydraulischer Aktuator (58) ist.

2. Türhilfssystem (12) nach Anspruch 1, wobei der Türgriff (40) ein Luftventil (42) in der ersten Betriebsposition oder der zweiten Betriebsposition öffnet, die ein Strömen von Luft oder einer anderen Flüssigkeit von einem bordseitigen Luftspeicher aus zu dem zumindest einen pneumatischen Aktuator (28) hin ermöglicht.

3. Türhilfssystem (12) nach Anspruch 1, wobei der Türgriff (40) ein Luftventil (42) in der Freigabeposition schließt, wodurch das Strömen von Luft oder einer anderen Flüssigkeit von einem bordseitigen Luftspeicher aus zu dem zumindest einen pneumatischen Aktuator (28) hin verhindert wird.

4. Türhilfssystem (12) nach Anspruch 1, wobei der Türgriff (40) ein hydraulisches Ventil (60) in der ersten Betriebsposition und in der zweiten Betriebsposition öffnet, die das Strömen von Flüssigkeit durch das hydraulische Ventil zu dem hydraulischen Aktuator (58) ermöglicht.

5. Türhilfssystem (12) nach einem der Ansprüche 1 bis 4, um ein unterstütztes Öffnen, Schließen und Verriegeln der Tür (10) in einer offenen Position zu ermöglichen, wobei:

der Türgriff (40) ein Luftventil (42) und ein hydraulisches Ventil (60) öffnet,
wenn sich der Türgriff (40) in der ersten Betriebsposition und der zweiten Betriebsposition befindet;
sich der Gleitklotz (34) generell transversal zu der Aktuatorstange (32) befindet;
der hydraulische Verriegelungsaktuator (58) die hydraulische Stange (66) aufweist, die mit dem Gleitklotz (34) ausfahrbar und einziehbar ist, wenn das hydraulische Ventil (60) offen ist, und wobei verhindert wird, dass die hydraulische Stange (66) ausgefahren und eingezogen wird, wenn das hydraulische Ventil (60) geschlossen ist.

6. Türhilfssystem (12) nach Anspruch 5, ferner aufweisend eine Luftzuführleitung, um dem Luftventil (42) Luft zuzuführen, und eine erste Lufteingangsleitung (52) von dem Luftventil (42) zu dem pneumatischen Aktuator (28), und eine zweite Lufteingangsleitung (56) von dem Luftventil (42) zu dem pneumatischen Aktuator (28).

7. Türhilfssystem (12) nach Anspruch 6, wobei es das Luftventil (42) ermöglicht, dass Luft durch die erste Lufteingangsleitung (52) strömt, wenn sich der Türgriff (40) in der ersten Betriebsposition befindet, und wobei es das Luftventil (42) ermöglicht, dass Luft durch die zweite Lufteingangsleitung (56) strömt, wenn sich der Türgriff (40) in der zweiten Betriebs-

position befindet.

8. Türhilfssystem (12) nach Anspruch 1 oder 5, wobei die Luft aus einem borseitigen Luftspeicher des Fahrzeugs zugeführt wird.

9. Türhilfssystem (12) nach Anspruch 1 oder 5, wobei Luft von dem pneumatischen Aktuator abgelassen wird, wenn das Luftventil (42) geöffnet wird.

10. Türhilfssystem (12) nach Anspruch 1 oder 5, wobei der Gleitklotz (34) generell transversal zu dem zumindest einen pneumatischen Aktuator (28) angeordnet und so konfiguriert ist, dass er auf einer Positionierstange gleitet, die an der Türverkleidung befestigt ist.

11. Türhilfssystem (12) nach Anspruch 1 oder 5, wobei sich der hydraulische Verriegelungsaktuator (58) zwischen und parallel zu den zwei pneumatischen Luftaktuatoren (28) befindet.

12. Türhilfssystem (12) nach Anspruch 1 oder 5, wobei die Türverbindung (54) auf dem Gleitklotz (34) schwenkbar ist.

Revendications

1. Système (12) d'assistance à une portière à utiliser sur une portière (10) de véhicule et relié à un véhicule pour procurer une ouverture, une fermeture et un verrouillage assistés de la portière, le système (12) d'assistance à une portière comprenant :

une poignée (40) de portière ayant une première position de fonctionnement, une deuxième position de fonctionnement et une position de libération ;
au moins un actionneur (28) pneumatique ayant une barre (32), la barre (32) de l'actionneur étant déployable lorsque la poignée (40) de la portière est dans la première position de fonctionnement et la barre (32) de l'actionneur étant rétractable lorsque la poignée (40) de la portière est dans la deuxième position de fonctionnement ;
un bloc (34) coulissant déplaçable par la barre (32) de l'actionneur (28) pneumatique ;
une liaison (54) de portière reliant le bloc (34) coulissant au châssis du véhicule, dans lequel, lorsque le bloc (34) coulissant est éloigné de l'actionneur (28) pneumatique, la liaison (54) de la portière ouvre la portière (10) par rapport au véhicule ; et
un verrou (57) ayant une barre (66) hydraulique déployable et rétractable avec le bloc (34) coulissant, dans lequel, lorsque la poignée (40) de la portière est dans la position libérée, la barre (66) hydraulique empêche le déploiement et le retrait et verrouille le bloc (34) coulissant ;
dans lequel le verrou est un actionneur (58) hydraulique.

2. Système (12) d'assistance à une portière suivant la revendication 1, dans lequel la poignée (40) de la portière ouvre une vanne (42) pneumatique dans la première position de fonctionnement et dans la deuxième position de fonctionnement, ce qui permet à un courant d'air ou d'un autre fluide d'aller d'une alimentation en air à bord au au moins un actionneur (28) pneumatique.

3. Système (12) d'assistance à une portière suivant la revendication 1, dans lequel la poignée (40) de la portière ferme une vanne (42) pneumatique dans la position libérée, ce qui empêche le courant d'air ou d'un autre fluide d'aller d'une alimentation en air à bord au au moins un actionneur (28) pneumatique.

4. Système (12) d'assistance à une portière suivant la revendication 1, dans lequel la poignée (40) de la portière ouvre une vanne (60) hydraulique dans la première position de fonctionnement à la deuxième position de fonctionnement, ce qui permet au courant de fluide passant dans la vanne hydraulique d'aller à l'actionneur (58) hydraulique.

5. Système (12) d'assistance à une portière suivant l'une quelconque des revendications 1 à 4, pour procurer une ouverture, une fermeture et un verrouillage assistés de la portière (10) dans une position d'ouverture, dans lequel :

la poignée (40) de la portière ouvre une vanne (42) pneumatique et une vanne (60) hydraulique, lorsque la poignée (40) de la portière est dans la première position de fonctionnement et dans la deuxième position de fonctionnement ;
le bloc (34) coulissant est disposé, d'une manière générale, transversalement à la barre (32) de l'actionneur ;
l'actionneur (58) hydraulique de verrouillage ayant la barre (66) hydraulique déployable et rétractable avec le bloc (34) coulissant, lorsque la vanne (60) hydraulique est ouverte, et dans lequel la barre (66) hydraulique est empêchée de se déployer et de se rétracter, lorsque la vanne (60) hydraulique est fermée.

6. Système (12) d'assistance à une portière suivant la revendication 5, comprenant, en outre, une ligne d'envoi d'air pour envoyer de l'air à la vanne (42) pneumatique et une première ligne (52) d'entrée d'air allant de la vanne (42) pneumatique à l'actionneur (28) pneumatique et une deuxième ligne (56) d'entrée d'air allant de la vanne (42) pneumatique à

l'actionneur (28) pneumatique.

7. Système (12) d'assistance à une portière suivant la revendication 6, dans lequel, lorsque la poignée (40) de la portière est dans la première position de fonctionnement, la vanne (42) pneumatique permet à de l'air de passer dans la ligne (52) d'entrée d'air et, lorsque la poignée (40) de la portière est dans la deuxième position de fonctionnement, la vanne (42) pneumatique permet à de l'air de passer dans la deuxième ligne (56) d'entrée d'air.

8. Système (12) d'assistance à une portière suivant la revendication 1 ou 5, dans lequel l'air est fourni à partir d'une alimentation en air à bord du véhicule.

9. Système (12) d'assistance à une portière suivant la revendication 1 ou 5, dans lequel, lorsque la vanne (42) pneumatique est ouverte, de l'air est évacué de l'actionneur pneumatique.

10. Système (12) d'assistance à une portière suivant la revendication 1 ou 5, dans lequel le bloc (34) coulissant est disposé, d'une manière générale, transversalement au au moins un actionneur (28) pneumatique et est configuré pour coulisser sur une barre de mise en position, qui est fixée au panneau de la portière.

11. Système (12) d'assistance à une portière suivant la revendication 1 ou 5, dans lequel l'actionneur (58) hydraulique de verrouillage est disposé entre deux actionneurs (28) pneumatiques à air et parallèlement à ceux-ci.

12. Système (12) d'assistance à une portière suivant la revendication 1 ou 5, dans lequel la liaison (54) de la portière peut pivoter sur le bloc (34) coulissant.

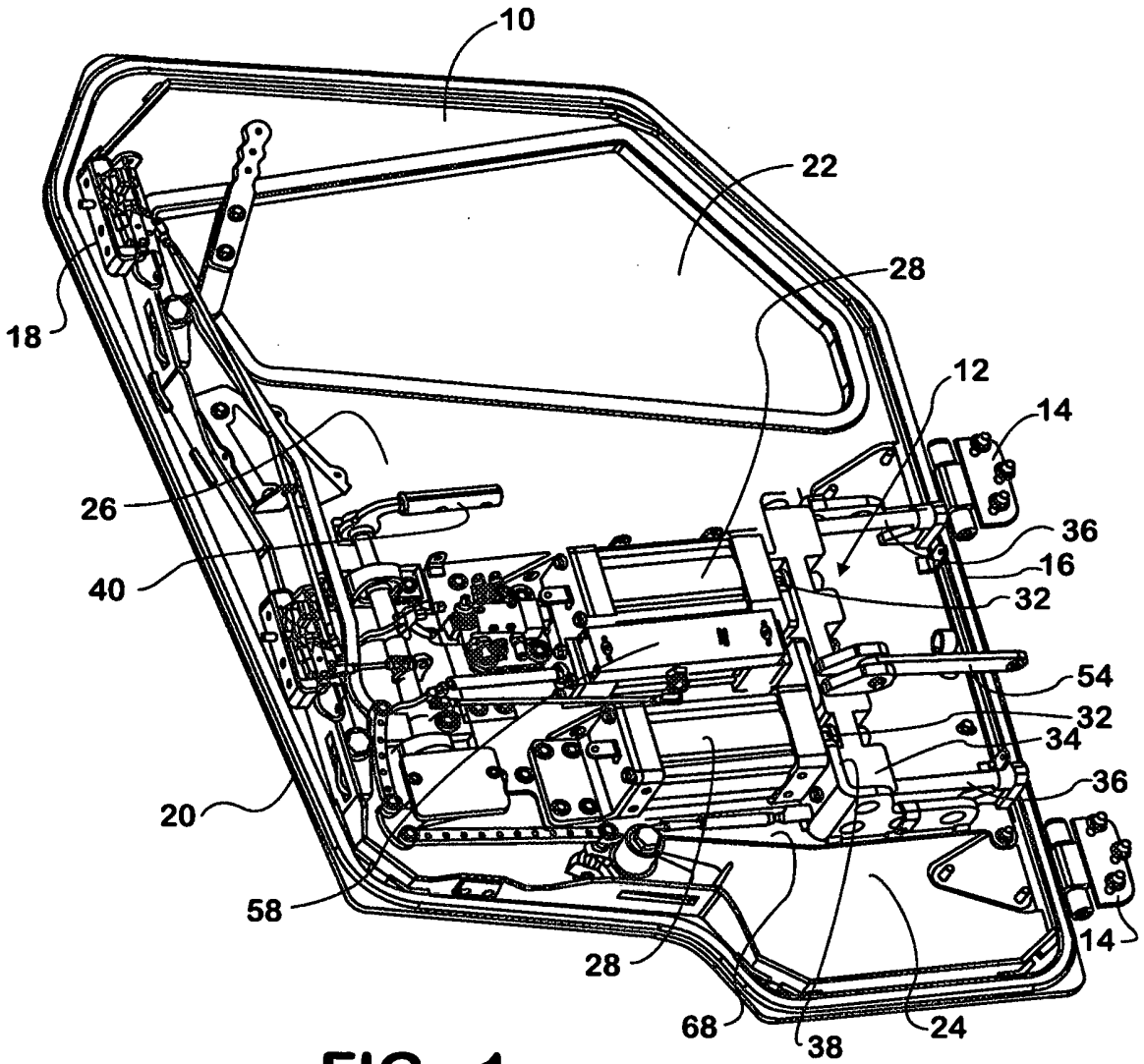


FIG. 1

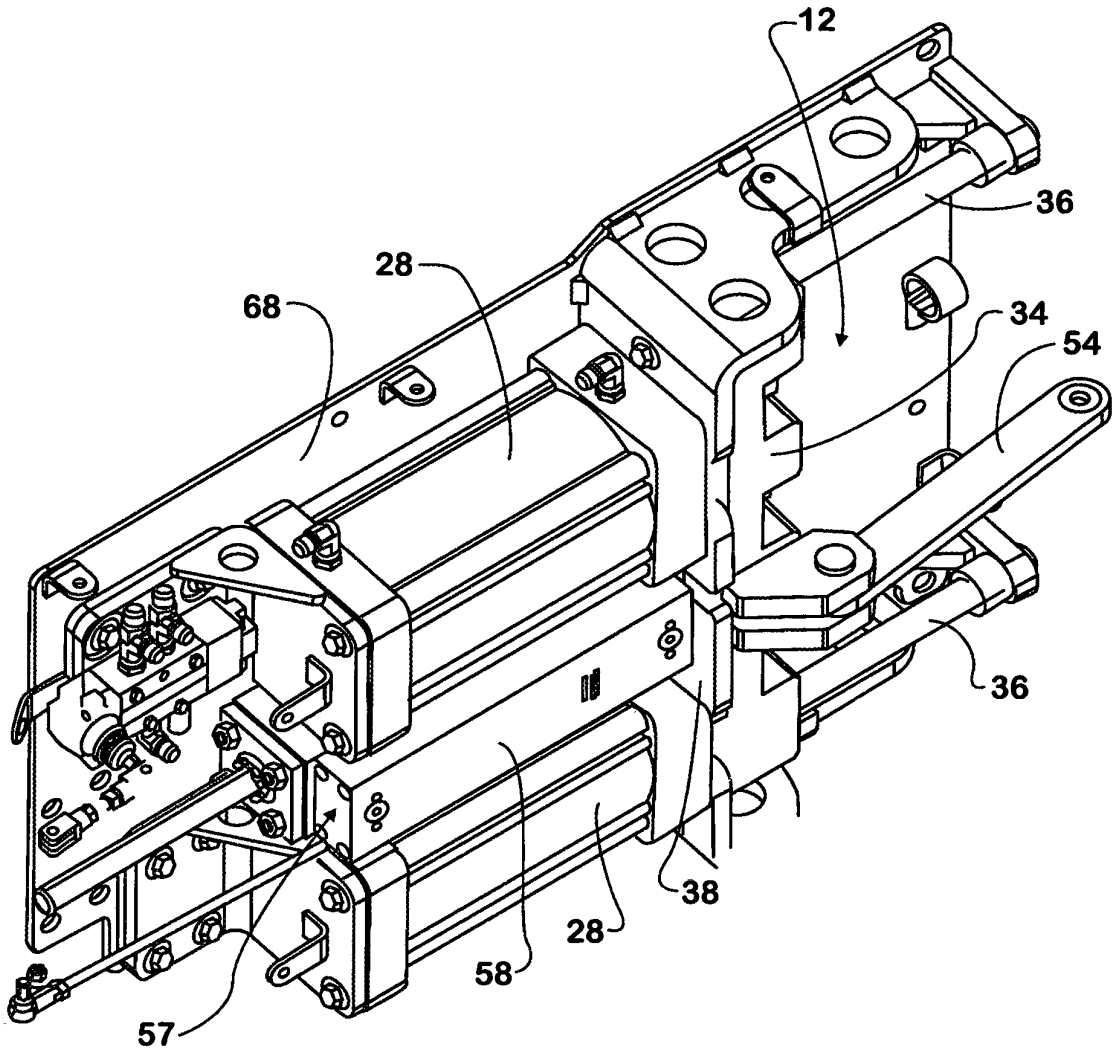


FIG. 2

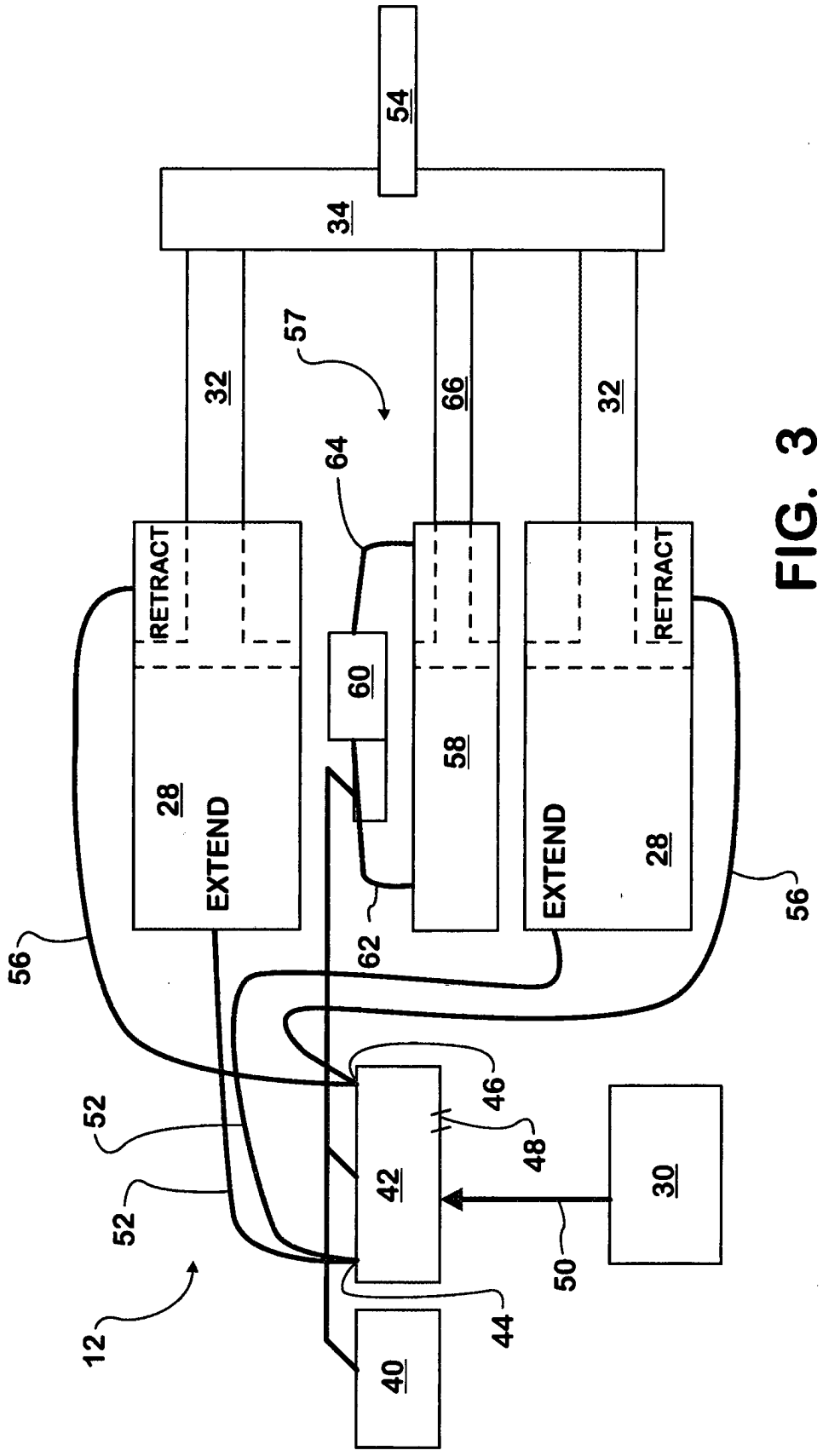

54
34
32
57
66
32
64
RETRACT
RETRACT
60
58
28
EXTEND
EXTEND
28
56
56
62
46
52
52
48
42
30
50
12
44
40

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

- FR 1280627 A **[0003]**
- US 4689849 A **[0003]**
- US 2800324 A **[0003]**