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(54) Title: HINGE ASSEMBLY

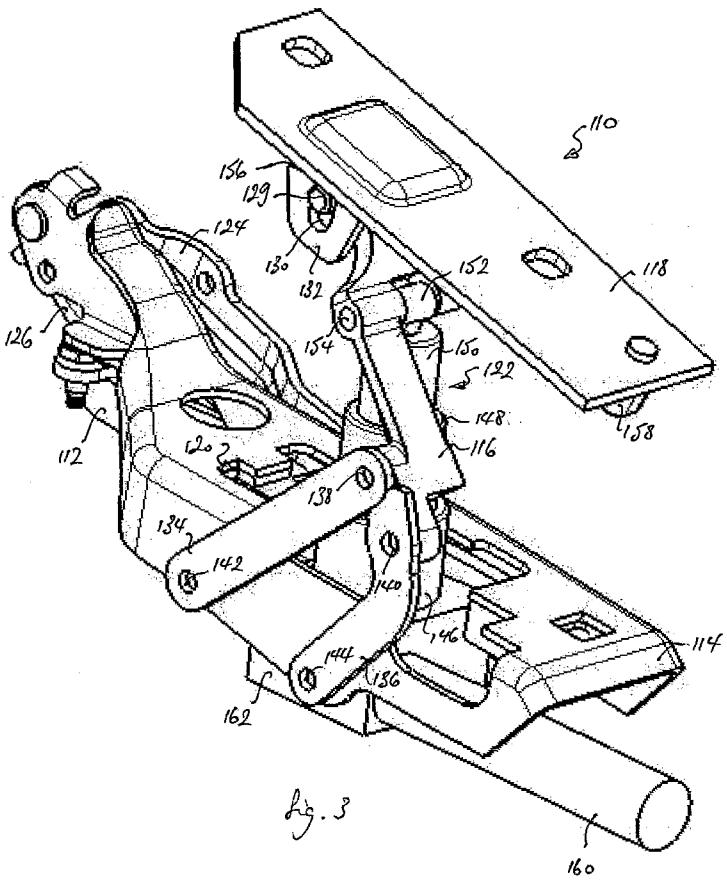

Fig. 3

(57) Abstract: A hinge assembly (10, 110) comprises first (12, 112), second (14,114), third (16, 116) and fourth (18, 118) links and a locking mechanism (20, 120). The first link (12, 112) is pivotally connected to the second link (14, 114). The third link (16, 116) is pivotally connected between the second (14, 114) and fourth (18, 118) links. The locking mechanism (20, 120) is engageable with, and releasable from, a lockable link (14, 118), which is one of the second (14, 114) and fourth (18, 118) links, so as to prevent and allow, respectively, relative movement between the second (14, 114) and fourth (18, 118) links. The third link (16, 116) is pivotally connected to one of the second (14, 114) and fourth (18, 118) links by a moveable pivot (29, 129), which allows the third link (16, 116) to be rotated relative to the second (14, 114) and fourth (18, 118) is links. The third link (16, 116) or the pivot (29, 129) is engageable with the locking mechanism (20, 120) such that when the locking mechanism (20, 120) is engaged with the lockable link, rotation of the third link (16, 116) relative to the second (14, 114) and fourth (18, 118) links releases the locking mechanism (20, 120) from the lockable link (14, 118).

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TITLE: HINGE ASSEMBLY

Field of the Invention

This invention relates to a hinge assembly for connecting a bonnet to a body of a vehicle, the hinge assembly allowing a front portion of the bonnet to be raised to give access to an engine of the vehicle, and allowing a rear portion of the bonnet to be raised in the event of a collision with a pedestrian so as to provide a cushion between the pedestrian and the engine.

Background to the Invention

It has been found that, in the event of a collision between a vehicle and a pedestrian, the head and torso of the pedestrian will often be thrown against the bonnet of the vehicle, causing the bonnet to deform into the engine compartment of the vehicle until the bonnet meets the engine, whereupon the head and/or torso of the pedestrian suffer a deceleration of sufficient magnitude to injure or kill the pedestrian.

It has therefore been proposed to connect the bonnet to the body of the vehicle by a hinge that allows a front portion of the bonnet to be raised, in a conventional manner, to give access to an engine of the vehicle, but that also allows a rear portion of the bonnet to be raised in the event of a collision with a pedestrian so as to provide a cushion between the pedestrian and the engine that reduces the magnitude of the deceleration suffered by the head and/or torso of the pedestrian.

WO 2004/094204 discloses a safety device that is effective to lift a rear portion of a bonnet of a vehicle. The rear portion of the bonnet is connected to a body of the vehicle by a hinge arrangement to permit a front portion of the bonnet to be opened. The hinge arrangement comprises a mounting arm having one end thereof pivotally connected to the body of the vehicle and having part thereof releasably connected to the bonnet. A release mechanism is provided that is effective to release the connection. The hinge arrangement is associated with a gas spring that is located so as to raise the rear portion of the bonnet when the connection is released.

The safety device of WO 2004/094204 is relatively difficult to operate because it requires the connection between the mounting arm and the bonnet to be released before the gas spring can raise the rear portion of the bonnet. This is achieved by a relatively complex release mechanism that either vents some of the gas from the gas spring to move a piston element, or that fires an explosive charge to move the piston element.

Summary of the Invention

According to a first aspect of the invention there is provided a hinge assembly comprising first, second, third and fourth links and a locking mechanism, the first link being pivotally connected to the second link and being integrally formed with, or adapted to be attached to, one of a vehicle body and a vehicle bonnet, the third link being pivotally connected between the second and fourth links, the fourth link being integrally formed with, or adapted to be attached to, the other of a vehicle body and a vehicle bonnet, and the locking mechanism being engageable with, and releasable from, a lockable link, the lockable link being one of the second and fourth links, so as to prevent and allow, respectively, relative movement between the second and fourth links, wherein the third link is pivotally connected to one of the second and fourth links by a moveable pivot, which allows the third link to be rotated relative to the second and fourth links from a first position to a second position in which the pivot or the third link engages the lockable link, the third link being engageable with the locking mechanism such that when the locking mechanism is engaged with the lockable link, rotation of the third link from the first to the second position releases the locking mechanism from the lockable link.

The invention can provide a hinge assembly that is easier to operate than known hinge assemblies, because a rear portion of a bonnet connected to a body of a vehicle by the hinge assembly can be raised simply by applying a force of sufficient magnitude to the third link in the direction required to rotate the third link from the first to the second position.

The first link may advantageously be pivotally connected to the second link by a single pivot.

Alternatively the first link may advantageously be pivotally connected to the second link by an intermediate link, a first portion of the intermediate link being pivotally connected to the first link by a single pivot, and a second portion of the intermediate link being pivotally connected to the second link by a single pivot.

The first link may advantageously be integrally formed with, or adapted for attachment to, a vehicle bonnet.

With this construction of the hinge assembly, in order to raise a rear portion of a bonnet connected to a body of a vehicle by the hinge assembly, the first, second and third links must be raised as well as the rear portion of the bonnet.

Preferably, therefore, the first link is integrally formed with, or adapted for attachment to, a vehicle body.

With this construction of the hinge assembly, in order to raise a rear portion of a bonnet connected to a body of a vehicle by the hinge assembly, only the third and fourth links must be raised as well as the rear portion of the bonnet.

With this construction of the hinge assembly, therefore, for a given magnitude of force applied to raise the rear portion of the bonnet, the rear portion of the bonnet can be raised more quickly, because the inertia of the third and fourth links is less than the inertia of the first, second and third links.

The third link may advantageously be pivotally connected between the second and fourth links with a first portion of the third link pivotally connected to one of the second and fourth links by the moveable pivot, and a second portion of the third link pivotally connected to the other of the second and fourth links by a single pivot.

This gives rise to a hinge assembly of relatively simple construction.

Alternatively the third link may advantageously be pivotally connected between the second and fourth links with a first portion of the third link pivotally connected to one of the second and fourth links by the moveable pivot, and a second portion of the third link pivotally connected to the other of the second and fourth links by an intermediate link, a first portion of the intermediate link being pivotally connected to the third link by a single pivot, and a second portion of the intermediate link being pivotally connected to the other of the second and fourth links by a single pivot.

This gives rise to a hinge of relatively compact construction without restricting a distance by which the fourth link can be moved relative to the second link.

Where the third link is so pivotally connected between the second and fourth links, the hinge assembly may advantageously further comprise a control link, a first portion of the control link being pivotally connected to the third link by a single pivot, and a second portion of the control link being pivotally connected to the other of the second and fourth links by a single pivot.

This gives rise to a hinge of which a path followed by the fourth link when moved relative to the second link is determined by the relative lengths of the intermediate and control links connecting the third link to the other of the second and fourth links.

Thus by selecting appropriate relative lengths of the intermediate and control links, the hinge assembly can be arranged such that, when used to connect a bonnet to a body of a vehicle, movement of the fourth link relative to the second link causes the bonnet to be moved towards the rear of the vehicle, as well as raising a rear portion of the bonnet, so as to prevent a front portion of the bonnet from colliding with a front portion of the body, which would otherwise damage the bonnet and/or the body.

The third link may advantageously be provided with a roller, the roller being engageable with the locking mechanism such that when the locking mechanism is engaged with the lockable link, rotation of the third link from the first to the second position releases the locking mechanism from the lockable link.

The roller reduces the friction that would otherwise have to be overcome between the third link and the locking mechanism in order to release the locking mechanism from the lockable link.

Where the hinge assembly is used to connect a bonnet to a body of a vehicle, the locking mechanism may advantageously be attached to the bonnet or the body of the vehicle.

Preferably, however, the locking mechanism is attached to the other of the second and fourth links from the lockable link.

In this way the need for adjustment of the hinge assembly when used to connect a bonnet to a body of a vehicle during manufacture of the vehicle to ensure correct alignment of the locking mechanism with the lockable link is avoided.

The locking mechanism may advantageously be engageable with a single portion of the lockable link.

Preferably, however, the locking mechanism is engageable with a plurality of portions of the lockable link.

In this way, play between the second and fourth links when the locking mechanism is engaged with the lockable link can be reduced.

Preferably the hinge further comprises biasing means arranged to urge the locking mechanism into engagement with the lockable link.

In this way, play between the second and fourth links when the locking mechanism is engaged with the lockable link can be further reduced.

The locking mechanism preferably comprises first and second locking members engageable with, and releasable from, respective first and second portions of the lockable link, the first

locking member being engageable with the third link and the second locking member, the first and second locking members being arranged such that when the locking members are engaged with the lockable link, rotation of the third link from the first to the second position moves the first locking member from a first position, through an intermediate position, to a second position to release the first locking member from the first portion of the lockable link, and movement of the first locking member from the intermediate position to the second position causes the first locking member to engage the second locking member and to release the second locking member from the second portion of the lockable link.

Where the locking mechanism is so constructed, the hinge assembly preferably further comprises first and second biasing means arranged to urge the first and second locking members into engagement with the first and second portions of the lockable link.

In this way, play between the second and fourth links when the locking mechanism is engaged with the lockable link is substantially eliminated, whilst reducing the likelihood of the locking mechanism being released accidentally from the lockable link, for example by vibration.

The hinge assembly may advantageously further comprise an actuator operable to urge the third link from the first position to the second position, in which the moveable pivot or the third link engages the lockable link, so as to release the locking mechanism from the lockable link and to move the lockable link relative to the other of the second and fourth links.

Although it is envisaged that the actuator can include a solenoid or a combination of a piston and an explosive charge, the actuator preferably includes a combination of a piston and a supply of compressed gas.

Preferably the piston is constituted by a telescopic ram that can be extended so as to urge the third link from the first position to the second position by release of gas into the ram from the supply of compressed gas.

Where the hinge includes an actuator, the actuator may advantageously include a portion that is pivotally connected to the third link.

Where the actuator includes a telescopic ram, that end of the ram which extends so as to urge the third link from the first position to the second position may advantageously be formed with an eye pivotally connected to the third link.

Where the hinge assembly is used to connect a bonnet to a body of a vehicle, the actuator may advantageously be attached to the bonnet or the body of the vehicle.

If the actuator were to be attached to the bonnet, the inertia of the rear portion of the bonnet and that part of the hinge which must be raised with the rear portion of the bonnet would be increased, thereby reducing the speed with which the actuator is able to raise the rear portion of the bonnet. The actuator is therefore preferably attached to the body of the vehicle.

More preferably still, however, the actuator is attached to the other of the second and fourth links to which the third link is connected by the moveable pivot.

In this way the need for adjustment of the hinge assembly when used to connect a bonnet to a body of a vehicle during manufacture of the vehicle to ensure correct alignment of the actuator with the third link is avoided.

According to a second aspect of the invention there is provided a vehicle comprising a bonnet and a body, wherein the bonnet is attached to the body by a hinge assembly in accordance with the first aspect of the invention.

Brief Description of the Drawings

The invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of a first embodiment of a hinge assembly in accordance with the invention in an extended condition so as to raise a rear portion of a bonnet connected to a body of a vehicle by the hinge assembly;

Figure 2 is a perspective view of the hinge assembly of Figure 1 in an unextended condition;

Figure 3 is a perspective view of a second embodiment of a hinge assembly in accordance with the invention in an extended condition;

Figure 4 is a side view of the hinge assembly of Figure 3 in the extended condition;

Figure 5 is a side view of the hinge assembly of Figures 3 and 4 in an unextended condition;

Figure 6 is a sectional view of the hinge assembly of Figures 3 to 5 showing a locking mechanism of the hinge assembly;

Figures 7 and 8 are partial sectional views of the hinge assembly of Figures 3 to 6, showing the interaction of a third link with the locking mechanism of the hinge assembly;

Figures 9 and 10 are partial sectional views of the hinge assembly of Figures 3 to 6, showing the interaction of the third link, locking mechanism and a link to which the third link is connected by a moveable pivot; and

Figures 11 to 13 are partial sectional views of the hinge assembly of Figures 3 to 6, showing the interaction of the locking mechanism and the link to which the third link is connected by the moveable pivot.

Detailed Description of Embodiments

The hinge assembly 10 of Figures 1 and 2 comprises first, second, third and fourth links 12, 14, 16 and 18, respectively, a locking mechanism denoted generally by reference numeral 20 and an actuator including a telescopic ram denoted generally by reference numeral 22.

The first link 12 is provided with screw holes 24 and 26 to enable a rear portion of a vehicle bonnet (not shown) to be attached to the first link. The first link 12 is connected to the second link 14 by a pivot 28. The second link 14 is connected to the third link 16 by a moveable pivot 29, which is slidable in two parallel slots, one slot being formed in each of two lugs, which project from the second link 14. In Figure 1 one of the slots and one of the lugs are visible, denoted, respectively, by reference numerals 30 and 32.

The third link 16 is connected to the fourth link 18 by an intermediate link 34 and a control link 36. First ends of the intermediate and control links 34 and 36 are connected to the third link 16 by pivots 38 and 40, respectively, and second ends of the intermediate and control links 34 and 36 are connected to the fourth link 18 by pivots 42 and 44, respectively.

A wide portion 46 of the telescopic ram 22 is attached to the fourth link 18, which is provided with screw holes (not shown) to enable the fourth link to be attached to a vehicle body (not shown). A medium portion 48 of the telescopic ram 22 forms a sliding fit inside the wide portion 46. A narrow portion 50 of the telescopic ram 22 forms a sliding fit inside the medium portion 48. The actuator includes a reservoir (not shown) of compressed gas and a valve-controlled connection (not shown) from the reservoir to the wide portion 46, such that gas can be released from the reservoir into the wide portion 46 of the ram 22, so as to drive the medium portion 48 out of the wide portion 46 towards the second link 14 and the narrow portion 50 out of the medium portion 48 towards the second link 14. The end of the narrow portion 50 is formed with an eye 52 for receiving a pivot 54 by which the eye 52 is connected to the third link 16.

In normal use of the hinge assembly 10 the second link 14 abuts the fourth link 18 and the third link 16 lies substantially parallel to the second and fourth links 14 and 18, as shown in Figure 2. The lugs 32 of the second link 14 are each formed with a notch, one of which is visible in Figure 1, denoted by reference numeral 56. A peg 58 projects from the second link 14, the peg being formed with a notch (not visible in Figure 1). When the second link 14 abuts the fourth link 18, the locking mechanism engages the notches 56 of the lugs 32 and the notch of the peg 58, so as to prevent relative movement of the second and fourth links 14 and 18.

The hinge assembly 10 would be used to connect a rear portion of a bonnet to a body of a vehicle, with the lugs 32 nearer to a rear edge of the bonnet and the peg 58 nearer to a front edge of the bonnet. The first link 12 is freely rotatable relative to the second link 14 by virtue of the pivot 28, so that a front portion of the bonnet can be raised to give access to an engine of the vehicle.

In the event of a collision with a pedestrian, the locking mechanism 20 is released from the notches of the lugs 32 and peg 58 to allow relative movement between the second and fourth links 14 and 18. The telescopic ram 22 urges the third link 16 away from the fourth link 18 and, by virtue of the engagement of the moveable pivot 29 with the second link 14, urges the second link 14 away from the fourth link 18, so as to place the hinge assembly into the extended condition shown in Figure 1, and raise the rear portion of the bonnet from the engine of the vehicle.

It will be appreciated that the relative positions of the pivots 38 and 40 about which the third link 16 rotates, the pivot 54 through which the force exerted by the telescopic ram 22 acts, and the moveable pivot 29 that raises the second link 14 have a magnifying effect on the distance through which the rear portion of the bonnet is raised, as compared with the extension of the telescopic ram 22. Using a prototype of the hinge assembly it has been found that the rear portion of the bonnet can be raised by some 120 mm as a result of only approximately 70 mm of extension of the telescopic ram 22.

The lengths of the intermediate and control links 34 and 36 are chosen such that, as the rear portion of the bonnet is raised, the bonnet at the same time moves towards the rear of the vehicle. This prevents the front edge of the bonnet from colliding with the body of the vehicle, which would otherwise occur, thereby damaging the bonnet and/or the body of the vehicle. This is desirable because, although, in the event of a collision with a pedestrian, it is likely that the bonnet and/or the body of the vehicle will be damaged, it is conceivable that the hinge assembly might be placed in the extended condition in other circumstances, such as to give access to an inaccessible portion of the body and/or bonnet of the vehicle during painting of the vehicle, or as a result of unintended operation of the actuator. In these

circumstances it would be undesirable for the bonnet and/or body of the vehicle to be damaged.

The locking mechanism 20 is identical with that of the hinge assembly shown in Figures 3 to 5, the structure and operation of the locking mechanism of which is described in detail below with reference to Figures 6 to 13.

Turning to Figure 3, the hinge assembly 110 comprises first, second, third and fourth links 112, 114, 116 and 118, respectively, a locking mechanism denoted generally by reference numeral 120 and an actuator including a telescopic ram denoted generally by reference numeral 122.

The first link 112 is provided with screw holes, which are not visible in Figure 3, to enable the first link 112 to be attached to a vehicle body (not shown). The first link 112 is connected to the second link 114 by long and short links 124 and 126, respectively, pivotally connected between the first and second links 112 and 114 such that the first, second, long and short links 112, 114, 124 and 126 form a four-link hinge of the type well known in the automotive industry.

The second link 114 is connected to the third link 116 by intermediate and control links 134 and 136, respectively. First ends of the intermediate and control links 134 and 136 are connected to the third link 116 by pivots 138 and 140, respectively, and second ends of the intermediate and control links 134 and 136 are connected to the second link 114 by pivots 142 and 144, respectively.

The third link 116 is connected to the fourth link 118 by a moveable pivot 129, which is slidable in two parallel slots, one slot being formed in each of two lugs, which project from the fourth link 118 towards the second link 114. In Figure 3 one of the slots and one of the lugs are visible, denoted, respectively, by reference numerals 130 and 132.

A wide portion 146 of the telescopic ram 122 is attached to the second link 114. A medium portion 148 of the telescopic ram 122 forms a sliding fit inside the wide portion 146. A

narrow portion 150 of the telescopic ram 22 forms a sliding fit inside the medium portion 148. The actuator includes a reservoir 160 of compressed gas and a valve-controlled connection 162 from the reservoir 160 to the wide portion 146, such that gas can be released from the reservoir 160 into the wide portion 146 of the ram 122, so as to drive the medium portion 148 out of the wide portion 146 towards the fourth link 118 and the narrow portion 150 out of the medium portion 148 towards the second link 14. The end of the narrow portion 150 is formed with an eye 152 for receiving a pivot 154 by which the eye 152 is connected to the third link 116.

In normal use of the hinge assembly 110 the fourth link 118 abuts the second link 114 and the third link 116 lies substantially parallel to the second and fourth links 114 and 118. The lugs 132 of the fourth link 118 are each formed with a notch, one of which is visible in Figure 3, denoted by reference numeral 156. A peg 158 projects from the fourth link 118 towards the second link 114, the peg 158 being formed with a notch (not visible in Figure 3). When the fourth link 118 abuts the second link 114, the locking mechanism engages the notches 156 of the lugs 132 and the notch of the peg 158, so as to prevent relative movement of the second and fourth links 114 and 118.

The hinge assembly 110 would also be used to connect a rear portion of a bonnet to a body of a vehicle, with the lugs 132 nearer to a rear edge of the bonnet and the peg 158 nearer to a front edge of the bonnet. The second link 114 is freely rotatable relative to the first link 112 by virtue of the pivotable connections of the long and short links 124 and 126 to the first and second links, so that a front portion of the bonnet can be raised to give access to an engine of the vehicle.

In the event of a collision with a pedestrian, the locking mechanism 120 is released from the notches of the lugs 132 and peg 158 to allow relative movement between the second and fourth links 114 and 118. The telescopic ram 122 urges the third link 116 away from the second link 114 and, by virtue of the engagement of the pivot 129 with the fourth link 118, urges the fourth link 118 away from the second link 114, so as to place the hinge assembly into the extended condition shown in Figure 3, and raise the rear portion of the bonnet from the engine of the vehicle.

Figure 4 corresponds to Figure 3 and Figure 5 shows the hinge assembly in a partially extended condition, in which the locking mechanism has been released from the notches of the lugs 132 and peg 158 and a small movement of the fourth link 118 away from the second link 114 has occurred.

Figure 6 shows the locking mechanism 122, which comprises a plate 200 attached to the second link 114 so as to be slideable along the second link 114, an arm 202 attached to the plate and received in a shoe 204 attached to the second link 114 so as to be slideable along the second link, and biasing means in the form of first and second wire springs 206 and 208, the first spring 206 being arranged to urge the shoe 204 towards the end of the hinge that, in use would be nearer to the front end of the vehicle, and the second spring 208 being arranged to urge the plate 200 in the same direction.

When the fourth link 118 abuts the second link 114, the lugs 132 and the peg 158 are received into openings formed in the second link 114. The plate 200 is urged by the second spring 208 into the notches 156 of the lugs 132 and the shoe 204 is urged by the first spring 206 into the notch of the peg 158. The engagement of the shoe and plate with the notches of the lugs and peg prevents relative movement of the second and fourth links 114 and 118.

The shoe 204 has a slot (not shown) in its underside for receiving the arm 202. The width of the slot and the length of the arm are selected so that slight movement of the arm is possible before the arm engages the shoe, so as to disengage the shoe from the notch of the peg 158. This is advantageous because it means that the shoe and plate can move independently of one another, such that if vibration causes one of the shoe and plate to disengage from its respective notch or notches, the other will not necessarily disengage from its respective notch or notches. The independent movement of the shoe and plate also mean that slight misalignments of the second and fourth links due to manufacturing tolerances will not significantly affect the engagement of the plate and shoe with the notches.

The moveable pivot 129 of the third link 116 has a roller 210 mounted on it between the lugs 132. The plate 200 is formed with a tongue 212. The tongue 212 is so located, and the

diameter of the roller 210 is such, that movement of the moveable pivot 129, and hence the roller 210, in the slot 130 from a first position to the second position shown in Figures 3 and 4 causes the roller to engage the tongue and to move the tongue, against the action of the second spring 208, away from the peg 158, thereby disengaging the plate 200 from the notches of the lugs 132. The movement of the tongue due to the engagement with the roller both disengages the plate from the notches of the lugs and causes the arm 202 to engage the shoe 204, the engagement of the arm 202 and movement of the tongue 212 disengaging the shoe 204 from the notch of the peg 158.

The operation of the locking mechanism is particularly advantageous, in that the springs 206 and 208 cause the plate and shoe to engage the notches of the lugs 132 and peg 158 when the fourth link 118 is pushed into abutment with the second link 114. This means that, following operation of the actuator to lift the rear portion of the bonnet, the rear portion can be pushed down again and will lock into place, so that the vehicle can be driven. This is not possible with known hinge assemblies.

In the event of a false triggering of the actuator, the rear portion of the bonnet will be raised but there will be no damage to the bonnet or body. The rear portion of the bonnet can then simply be pushed down into place and the vehicle driven to a garage, where the exhausted reservoir 160 of compressed gas can be replaced.

Figure 7 shows the roller 210 and tongue 212 of the plate 200 in the same relative positions as shown in Figure 6. The roller 210 is engaged with the tongue 212, which prevents rotation of the third link 116 away from the second link 114 towards the fourth link 118.

In Figure 8 a force has been applied to the third link 116 by the telescopic ram (not shown) in the direction of the fourth link 118 from the second link 114 of sufficient magnitude to cause the roller 210 to displace the tongue 212, thereby releasing the plate 200 and the shoe 204 from the notches of the lugs 132 and peg 158.

Figure 9 shows the moveable pivot 129 in the slot 130 of a lug 132, and corresponds to Figure 7. The engagement of the tongue 212 with the roller 210 urges the moveable pivot 129 to the end of the slot 130 further from the fourth link 118.

In Figure 10 the force has been applied to the third link 116 by the telescopic ram (not shown) through the pivot 154 and has urged the moveable pivot 129 to the end of the slot 130 nearer to the fourth link 118, at the same time releasing the plate 200 and the shoe 204 from the notches of the lugs 132 and peg 158, so as to permit relative movement of the fourth and second links 118 and 114, and a small amount of such relative movement has taken place.

Figures 11, 12 and 13 show the arm 202, shoe 204 and the notch of the peg 158. Figure 11 corresponds to Figures 7 and 9 and shows the shoe 204 engaged with the notch of the peg 158 so as to prevent relative movement of the second and fourth links 114 and 118. As can be seen from Figure 11, there is a gap between the portion of the arm 202 that engages the shoe 204 and the shoe 204 before the force is applied to the third link 116. As explained above, this allows slight independent movement of the plate and the shoe, so that movement of one of the plate and the shoe due to vibration of the hinge assembly does not necessarily result in movement of the other of the plate and the shoe, thereby reducing a risk of unintentional release of the locking mechanism.

In Figure 12 the arm 202 has been moved sufficiently far as a result of movement of the third link 116 towards the fourth link 118 to cause the arm 202 to engage the shoe 204 and disengage the shoe 204 from the slot of the peg 158, so as to allow relative movement between the second and fourth links 114 and 118.

In Figure 13 relative movement of the second and fourth links 114 and 118 has taken place, so as partially to raise the rear portion of the bonnet.

Claims

1. A hinge assembly comprising first, second, third and fourth links and a locking mechanism, the first link being pivotally connected to the second link and being integrally formed with, or adapted to be attached to, one of a vehicle body and a vehicle bonnet, the third link being pivotally connected between the second and fourth links, the fourth link being integrally formed with, or adapted to be attached to, the other of a vehicle body and a vehicle bonnet, and the locking mechanism being engageable with, and releasable from, a lockable link, the lockable link being one of the second and fourth links, so as to prevent and allow, respectively, relative movement between the second and fourth links, wherein the third link is pivotally connected to one of the second and fourth links by a moveable pivot, which allows the third link to be rotated relative to the second and fourth links from a first position to a second position in which the pivot or the third link engages the lockable link, the third link being engageable with the locking mechanism such that when the locking mechanism is engaged with the lockable link, rotation of the third link from the first to the second position releases the locking mechanism from the lockable link.

2. A hinge assembly according to claim 1, wherein the first link is pivotally connected to the second link by a single pivot.

3. A hinge assembly according to claim 1, wherein the first link is pivotally connected to the second link by an intermediate link, a first portion of the intermediate link being pivotally connected to the first link by a single pivot, and a second portion of the intermediate link being pivotally connected to the second link by a single pivot.

4. A hinge assembly according to any preceding claim, wherein the first link is integrally formed with, or adapted for attachment to, a vehicle body.

5. A hinge assembly according to any preceding claim, wherein the third link is pivotally connected between the second and fourth links with a first portion of the third link pivotally connected to one of the second and fourth links by the moveable pivot, and a second portion of the third link pivotally connected to the other of the second and fourth links by an intermediate link, a first portion of the intermediate link being pivotally

connected to the third link by a single pivot, and a second portion of the intermediate link being pivotally connected to the other of the second and fourth links by a single pivot.

6. A hinge assembly according to claim 5, wherein the hinge assembly further comprises a control link, a first portion of the control link being pivotally connected to the third link by a single pivot, and a second portion of the control link being pivotally connected to the other of the second and fourth links by a single pivot.

7. A hinge assembly according to any preceding claim, wherein the third link is provided with a roller, the roller being engageable with the locking mechanism such that when the locking mechanism is engaged with the lockable link, rotation of the third link from the first to the second position releases the locking mechanism from the lockable link.

8. A hinge assembly according to any preceding claim, wherein the locking mechanism is attached to the other of the second and fourth links from the lockable link.

9. A hinge assembly according to any preceding claim, wherein the locking mechanism is engageable with a plurality of portions of the lockable link.

10. A hinge assembly according to any preceding claim, wherein the hinge further comprises biasing means arranged to urge the locking mechanism into engagement with the lockable link.

11. A hinge assembly according to any preceding claim, wherein the locking mechanism comprises first and second locking members engageable with, and releasable from, respective first and second portions of the lockable link, the first locking member being engageable with the third link and the second locking member, the first and second locking members being arranged such that when the locking members are engaged with the lockable link, rotation of the third link from the first to the second position moves the first locking member from a first position, through an intermediate position, to a second position to release the first locking member from the first portion of the lockable link, and movement of the first locking member from the intermediate position to the

second position causes the first locking member to engage the second locking member and to release the second locking member from the second portion of the lockable link.

12. A hinge assembly according to claim 11, wherein the hinge assembly further comprises first and second biasing means arranged to urge the first and second locking members into engagement with the first and second portions of the lockable link.

13. A hinge assembly according to any preceding claim, wherein the hinge assembly further comprises an actuator operable to urge the third link from the first position to the second position, in which the moveable pivot or the third link engages the lockable link, so as to release the locking mechanism from the lockable link and to move the lockable link relative to the other of the second and fourth links.

14. A hinge assembly according to claim 13, wherein the actuator includes a combination of a piston and a supply of compressed gas.

15. A hinge assembly according to claim 14, wherein the piston is constituted by a telescopic ram that can be extended so as to urge the third link from the first position to the second position by release of gas into the ram from the supply of compressed gas.

16. A hinge assembly according to claim 13, 14 or 15, wherein the actuator includes a portion that is pivotally connected to the third link.

17. A hinge assembly according to claim 15, wherein that end of the ram which extends so as to urge the third link from the first position to the second position is formed with an eye pivotally connected to the third link.

18. A hinge assembly according to any of claims 13 to 17, wherein the actuator is attached to the other of the second and fourth links to which the third link is connected by the moveable pivot.

19. A vehicle comprising a bonnet and a body, wherein the bonnet is attached to the body by a hinge assembly according to any preceding claim.

20. A hinge assembly substantially as herein described with reference to the accompanying drawings.

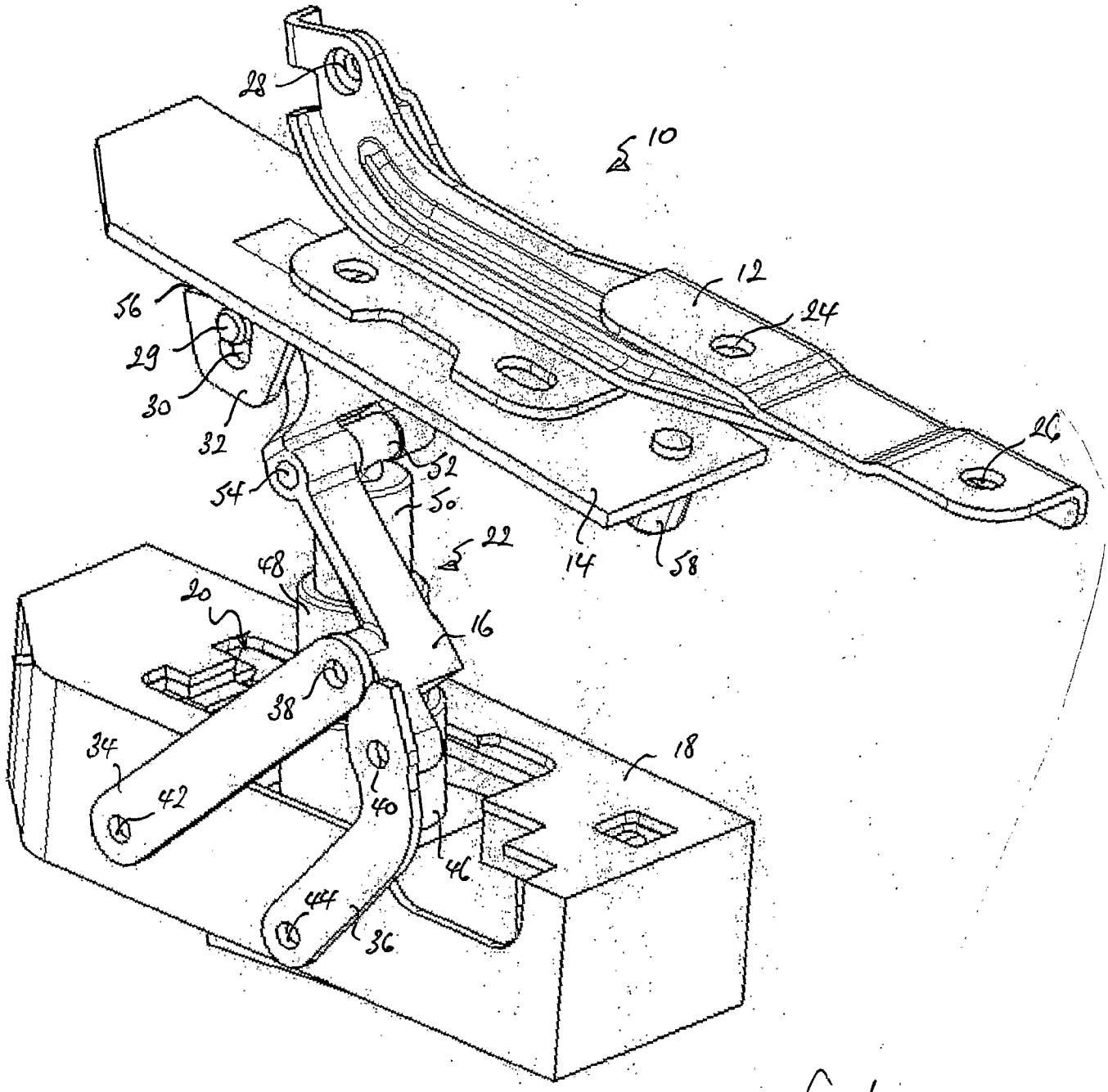
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Fig. 1

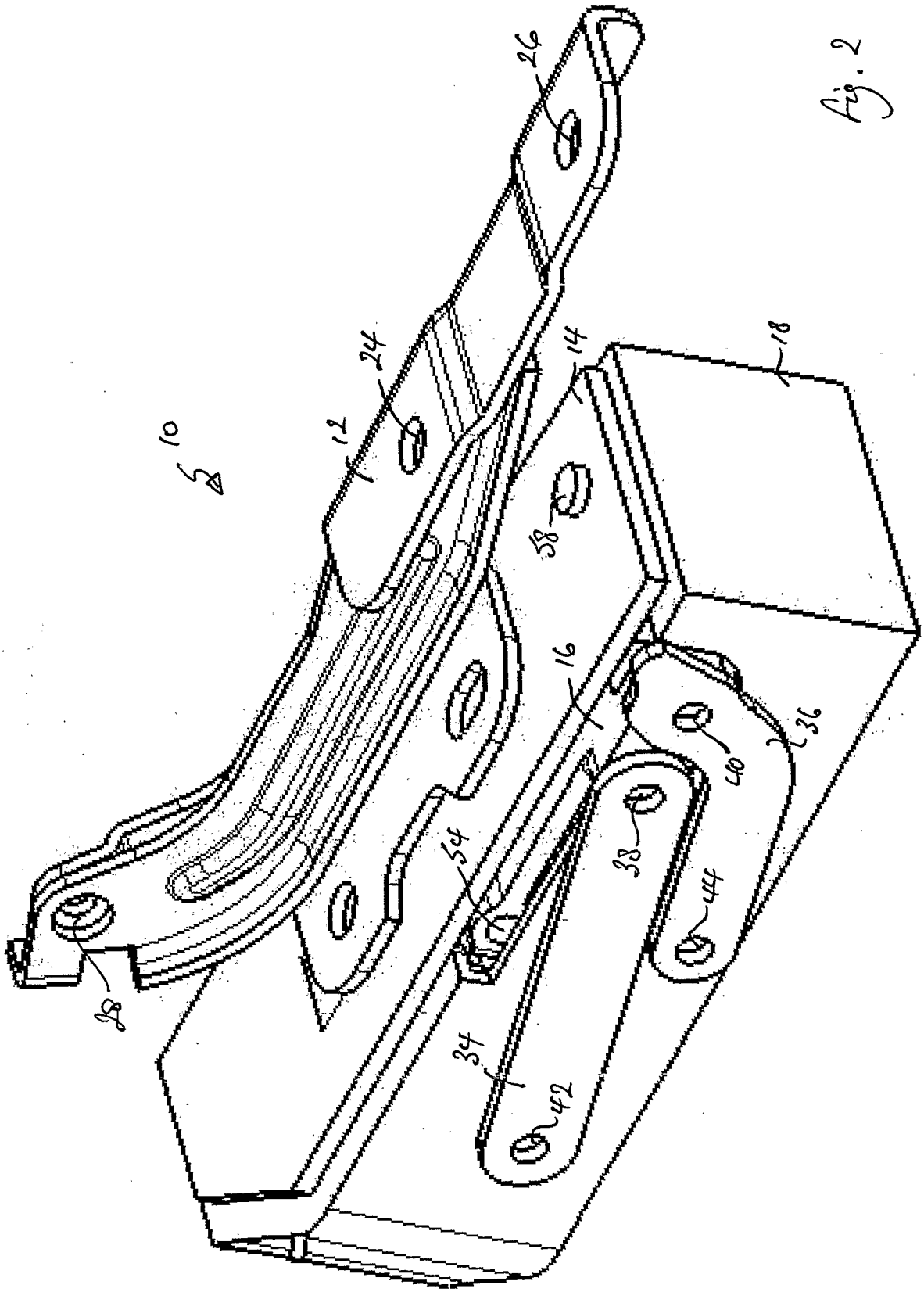

Fig. 2

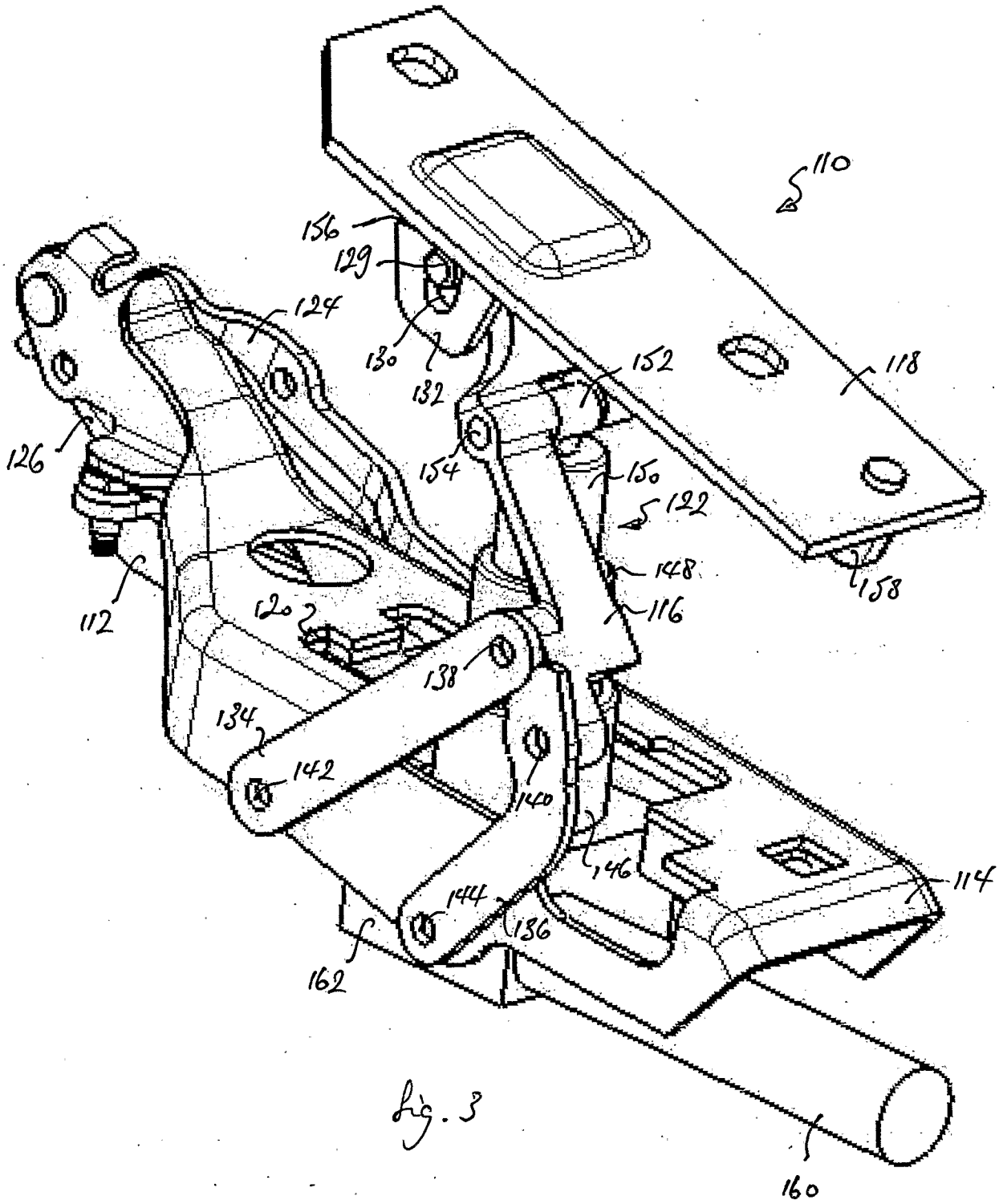
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fig. 3

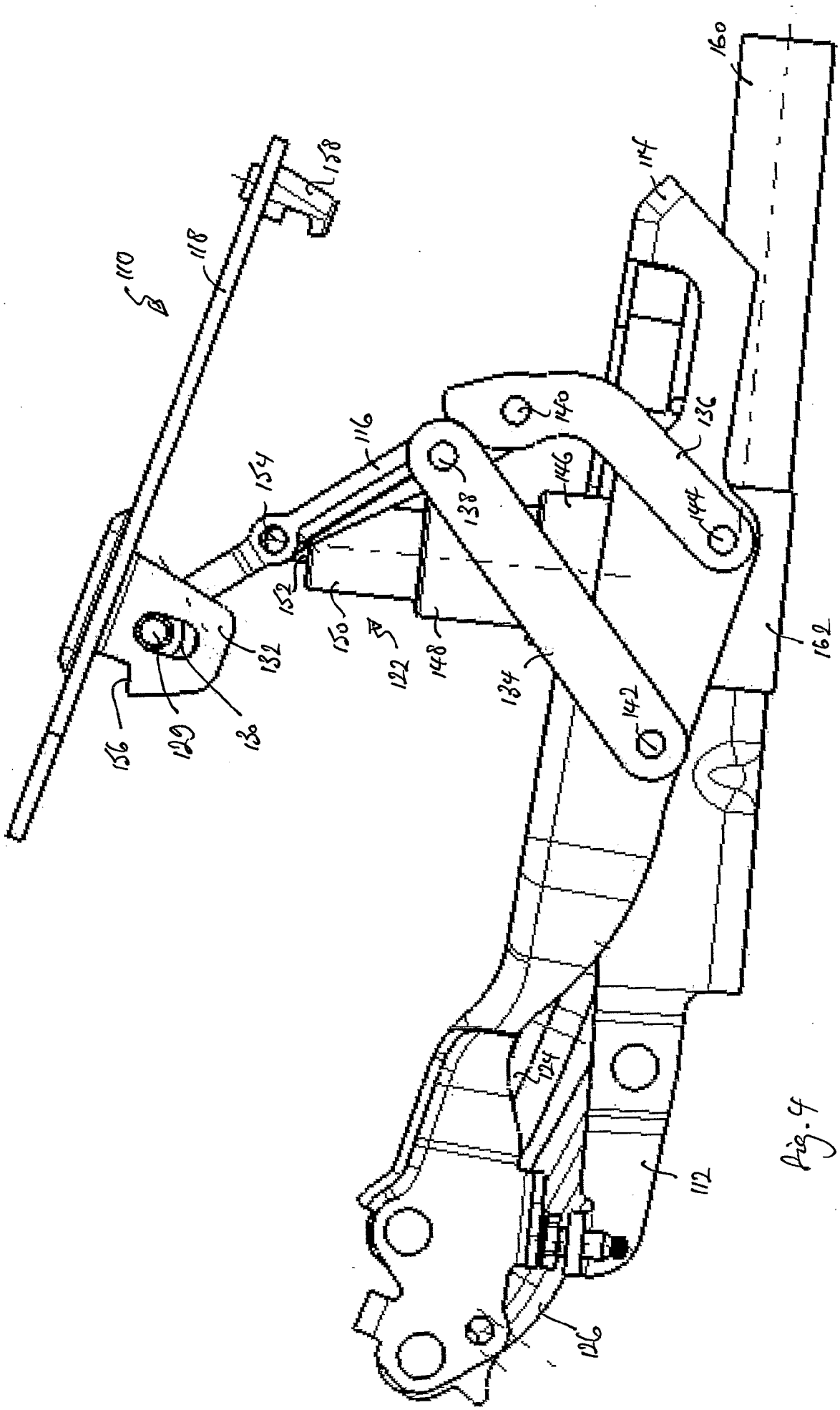
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Fig. 4

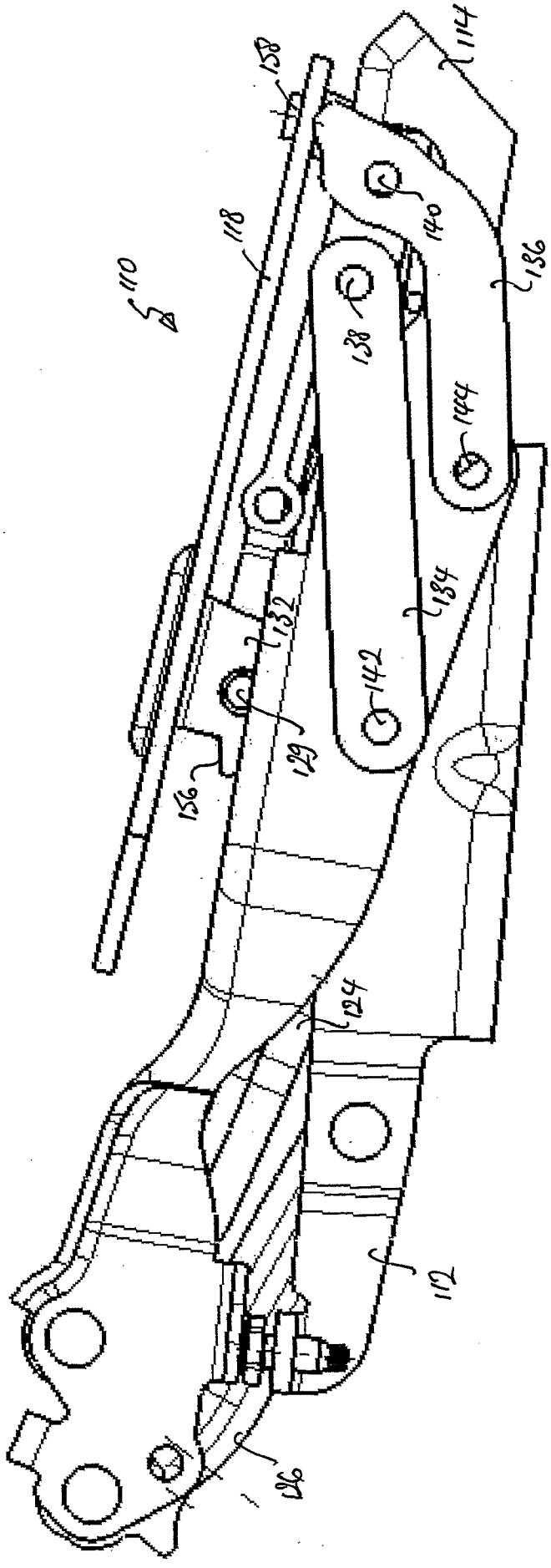

Fig. 5

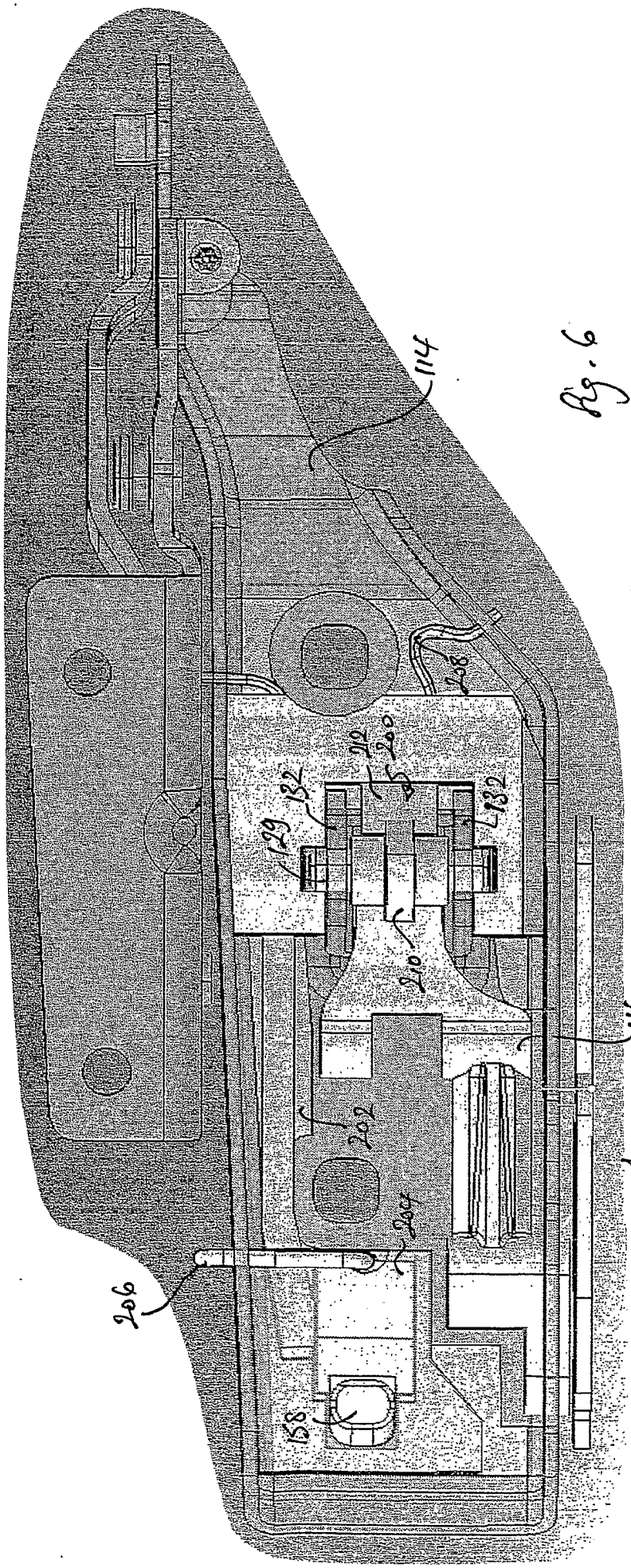

Fig. 6

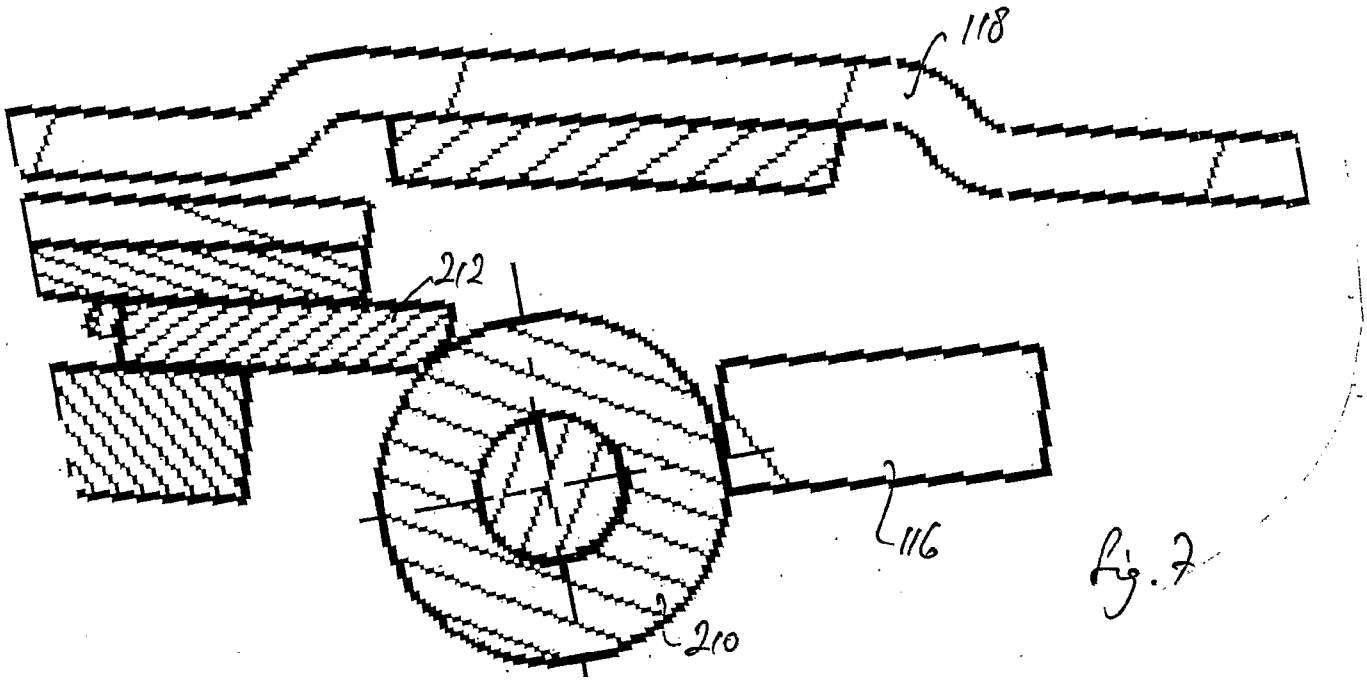

Fig. 7

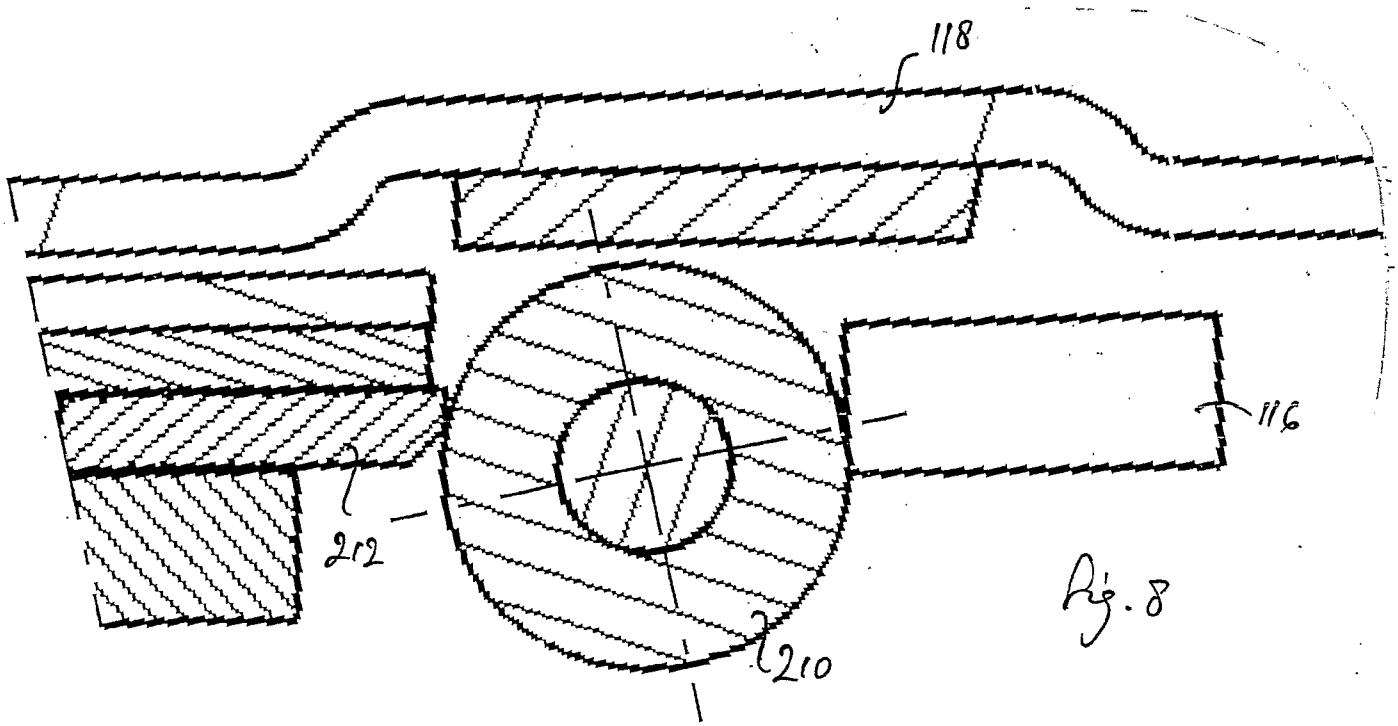

Fig. 8

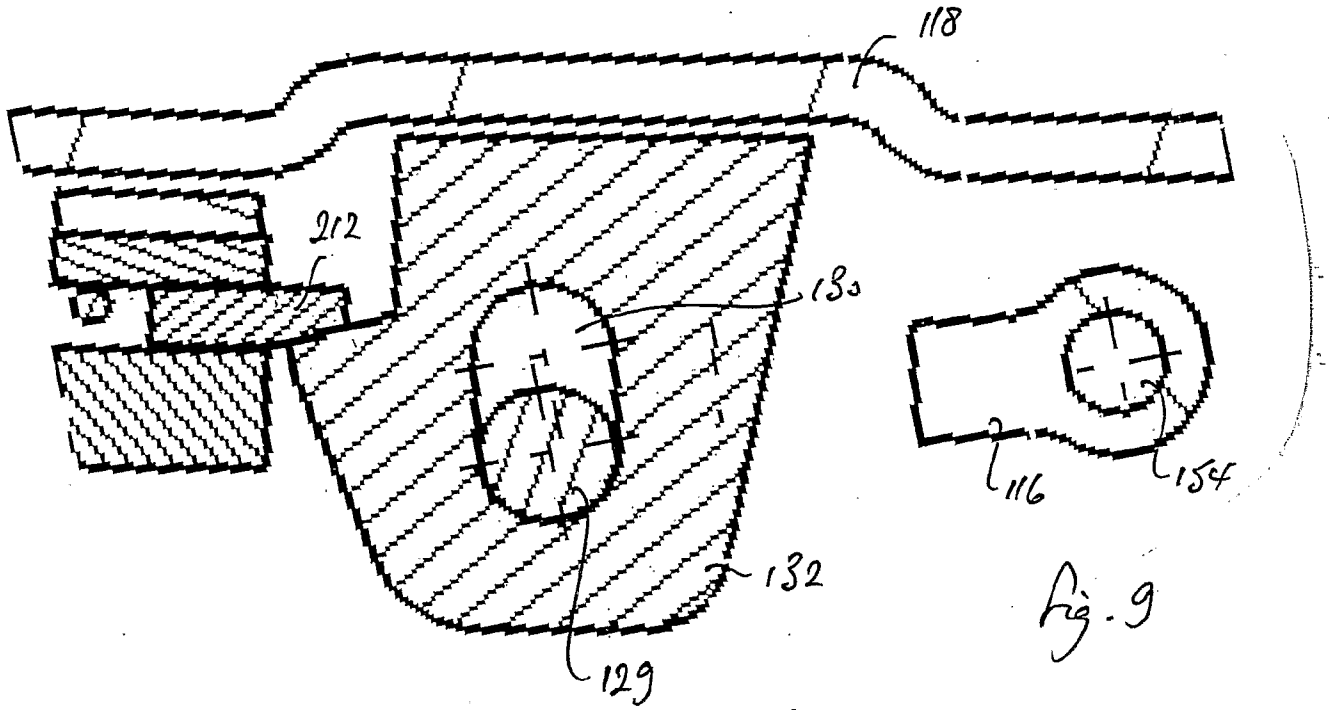

Fig. 9

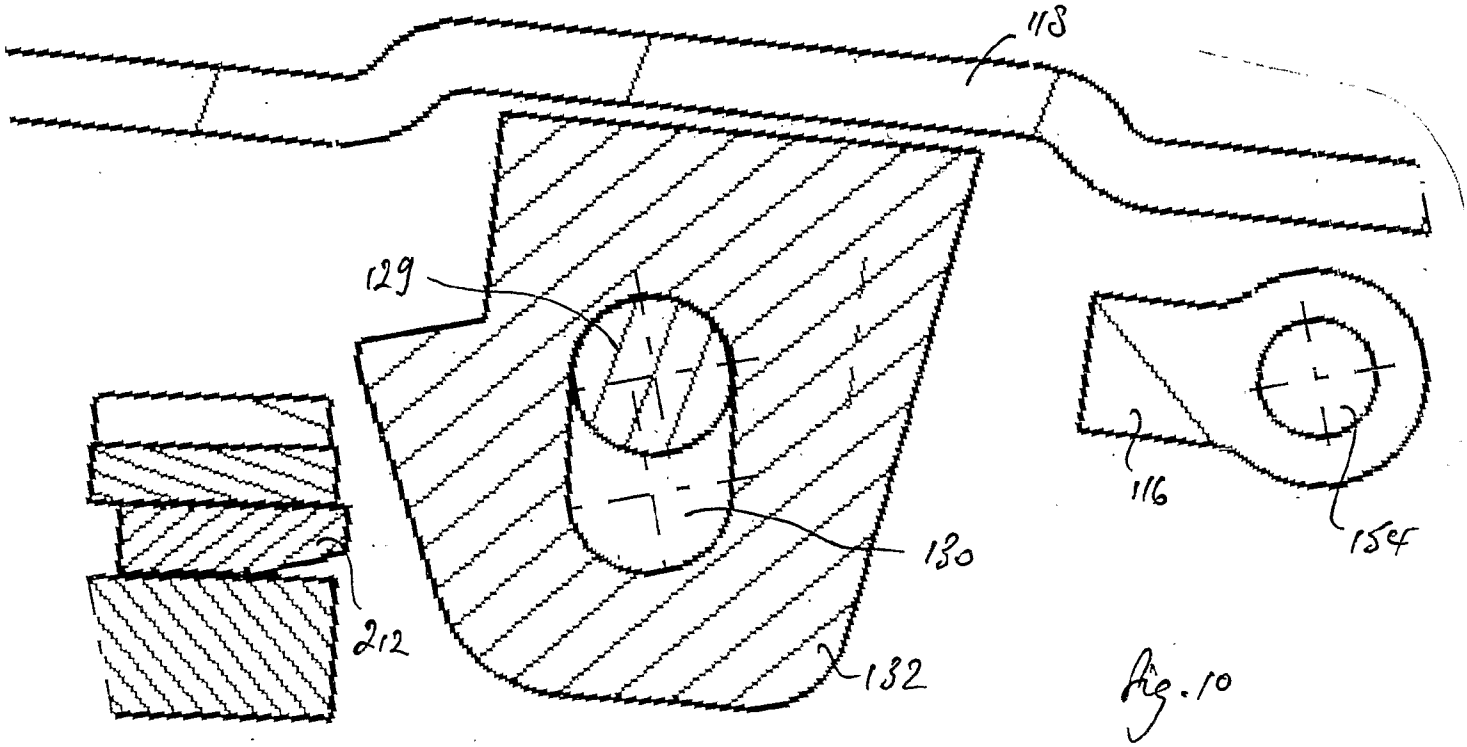

Fig. 10

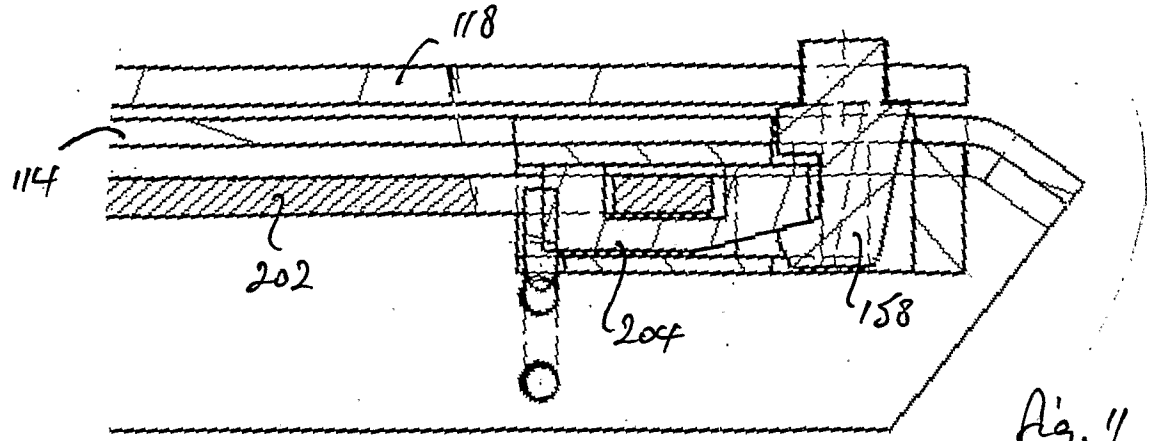

Fig. 11

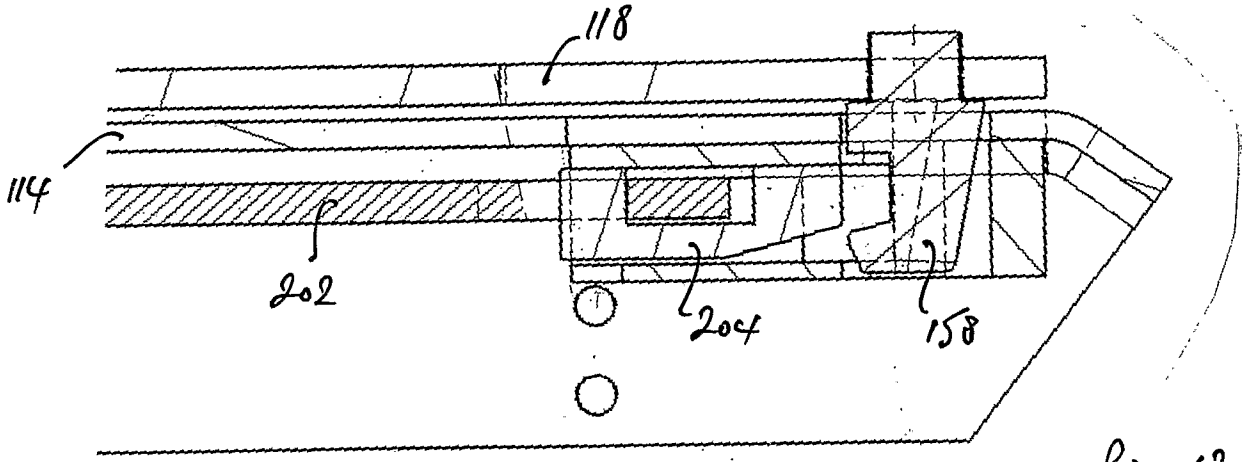

Fig. 12

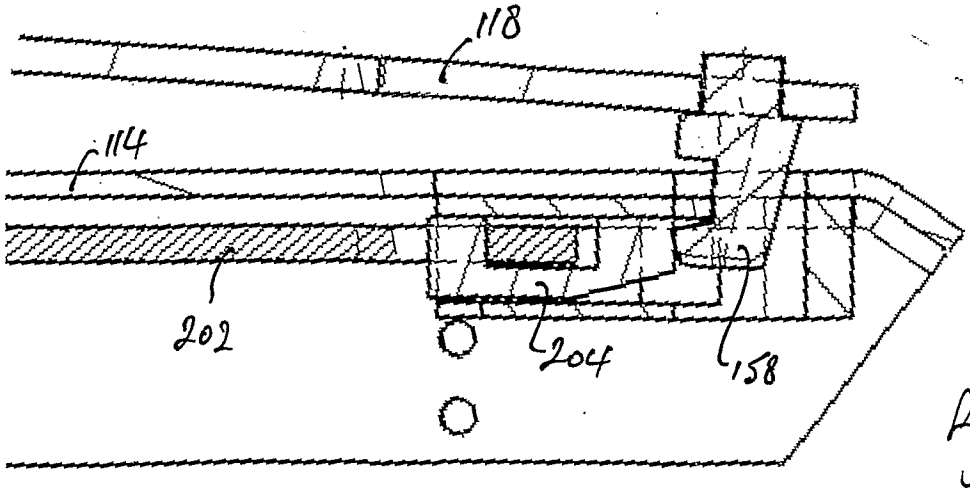

Fig. 13