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(54) Title: DUAL RELEASE HOOD LATCH AND HANDLE AND SYSTEM FOR OPERATION		
(57) Abstract A system for releasing a hood that includes three principal components: a latch assembly, a latch release assembly, and a cable connecting the latch assembly to the latch release assembly. More particularly, the invention contains a design and placement of a release handle in the passenger compartment of the automobile in such a manner that it cannot be easily activated during driving, and an improved latching mechanism in the engine compartment of the automobile. The release handle mechanism includes a locking feature to hold the release mechanism open and also several convenience and other features. These features include a secondary catch in the locking mechanism, a handle hold open feature that is released upon closing of the vehicle door or hood, and lock out features designed to make the operator fully conscious of hood release.		

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DUAL RELEASE HOOD LATCH AND HANDLE
AND SYSTEM FOR OPERATION

FIELD OF THE INVENTION

5 The present invention relates to automotive components. In particular, the invention comprises a dual release hood latch and handle, and system of operation for this dual release operation. It also includes additional locking and other mechanisms associated with the system.

10 BACKGROUND

 There are two types of hood releases in widespread use in automobiles today. The first type comprises a two stage release mechanism located beneath the hood. In the first stage, a release pops the hood up where it is held only by a secondary catch. A second stage release allows the release of the secondary catch
15 and opening of the hood.

 The second typical release mechanism comprises a similar system, but with the first stage release located remotely, in the vehicle compartment. As with the first type of release, these latches operate in two stages. The operator releases the first stage latch remotely and then releases the secondary latch from beneath
20 the hood.

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One purpose of the second stage latch is to prevent accidental opening of the hood during driving, either from failure to fully shut the hood or from accidental remote release of the first catch. To prevent accidental hood opening after first stage release from the car interior, the second stage latch must be released by the operator from beneath the hood.

The differences between the two typical prior art designs reflect another aspect of hood release design -- the need to address packaging and styling issues. The first design requires a grill design that allows an operator access to the primary release from the front of the car; thus, small grills or no grills make this design difficult to implement. However, an advantage of the first design is that no release handle is apparent within the driving compartment of the vehicle, and thus the first stage release cannot be accidentally engaged during driving.

The second design requires placement of a release handle within the driving compartment, thus presenting a style and placement issue for the automobile interior. The remote release feature (in the car's interior) allows more flexibility in grill design and styling for the front of the car, since no release handle need be placed there, except for second stage release. Further, placement of the release within the car's interior discourages theft of parts from the engine compartment since access to the car's interior is required to release the hood.

However, the remote release can typically be accidentally activated by the operator during driving since it is placed in the passenger compartment.

SUMMARY OF THE INVENTION

5 The present invention pertains generally to a system that includes three principal components: a latch assembly, a latch release assembly, and a cable connecting the latch assembly to the latch release assembly. The present invention pertains more particularly to improvements in two of these components, namely, 1) a new design and placement of a release handle in the passenger
10 compartment of the automobile in such a manner that it cannot be easily activated during driving; and 2) an improved latching mechanism in the engine compartment of the automobile. The release handle mechanism includes a locking feature to hold the release mechanism open and also several convenience and other features. These features include a secondary catch in the locking
15 mechanism, a handle hold open feature that is released upon closing of the vehicle door, lock out features designed to make the operator fully conscious of hood release, and an additional feature of linking the release handle to the shift lever such that the hood may be opened only when the automatic transmission is in park or the manual transmission is in a preselected gear.

Another advantage over prior art of this system is that it addresses the issue of packaging and styling in many new vehicles, which require a release device to extend from the secondary to allow access to secondary after primary release. As a result of the remote extension, there are cost and weight penalties associated with existing designs.

One objective of the present invention is to allow full release from the inside of the vehicle.

The system allows full release from inside the vehicle and includes a lock-out element for the release handle. Primary and secondary release are made via a standard release cable. Because of this dual release capability, the operator may use only one hand to open the hood.

In a preferred embodiment, the release handle is exposed only after the door has been opened. In this embodiment, the release handle is located inside the door opening in the space at the end of the instrument panel. The operator may pull the release handle only when the door is open. The release handle, by means of an attached cable, transmits a reaction to the latch. This reaction causes the primary latch to release in a manner similar to a conventional latch, but as the operator continues to pull, the release handle also releases a secondary catch.

In another preferred embodiment the release handle is linked to the shift lever such that hood release may only be actuated when the shift lever is in the

park position for an automatic transmission or an equivalent preselected position for a manual transmission.

BRIEF DESCRIPTION OF THE DRAWINGS

5 FIG. 1a is an overhead view of an automobile indicating the location of the release handle and hood latch mechanisms in a preferred embodiment.

 FIG. 1b is a side view of an automobile indicating the location of the release handle in a preferred embodiment.

 FIG. 2 is a preferred embodiment of the dual release handle in the closed
10 position.

 FIG. 3 is a preferred embodiment of the dual release handle in the maximum travel position.

 FIG. 4 is a preferred embodiment of the dual release handle in the release position showing the door activated handle release.

15 FIG. 5 is a preferred embodiment of the dual release handle utilizing twist and release.

 FIG. 6a is a preferred embodiment of the latch mechanism in the latched position.

 FIG. 6b is a preferred embodiment of the latch mechanism in the latched
20 position, from the reverse angle.

FIG. 7a is a preferred embodiment of the latch mechanism showing release of the primary latch.

FIG. 7b is a preferred embodiment of the latch mechanism showing release of the primary latch, from the reverse angle.

5 FIG. 8a is a preferred embodiment of the latch mechanism showing release of both the primary latch and the secondary catch.

FIG. 8b is a preferred embodiment of the latch mechanism showing release of both the primary latch and the secondary catch, from the reverse angle.

10 FIG. 9 is a second preferred embodiment of the latch mechanism in the latched position.

FIG. 10 is a second preferred embodiment of the latch mechanism showing release of the primary latch.

FIG. 11 is a second preferred embodiment of the latch mechanism showing release of both the primary latch and the secondary catch.

15 FIG. 12 is a second preferred embodiment of the latch mechanism showing the fully released position.

FIG. 13a is a side view of a preferred embodiment of the hold open feature of the dual release handle.

20 FIG. 13b is an end view of a preferred embodiment of the hold open feature of the dual release handle.

FIG. 14a is a preferred embodiment of a lock out feature of the dual release handle in the closed position.

FIG. 14b is a preferred embodiment of a lock out feature of the dual release handle after release of the primary latch.

5 FIG. 14c is a preferred embodiment of a lock out feature of the dual release handle after release of both the primary latch and the secondary catch.

FIG. 15a is a second preferred embodiment of a lock out feature of the dual release handle in the closed position.

10 FIG. 15b is a second preferred embodiment of a lock out feature of the dual release handle after release of the primary latch.

FIG. 15c is a second preferred embodiment of a lock out feature of the dual release handle after release of both the primary latch and the secondary catch.

FIG. 16a is a third preferred embodiment of a lock out feature of the dual release handle in the closed position.

15 FIG. 16b is a closeup of the lock handle and slot of the dual release handle with a lock out feature.

FIG. 16c is a third preferred embodiment of a lock out feature of the dual release handle after release of the primary latch.

20 FIG. 16d is a third preferred embodiment of a lock out feature of the dual release handle after release of both the primary latch and the secondary catch.

FIG. 17a is a preferred embodiment of an ignition activated locking mechanism.

FIG. 17b is a second preferred embodiment of an ignition activated locking mechanism.

5 FIG. 17c is a preferred embodiment of the locking device associated with the ignition activated locking mechanism.

FIG. 18a is a preferred embodiment of a manually activated locking device using a tumbler.

10 FIG. 18b is a second preferred embodiment of a manually activated locking device using alignment tabs.

FIG. 19 is a preferred embodiment of an interlocking device engaged by the shift mechanism of an automobile.

FIG. 20a is a closeup of a preferred embodiment of an interlocking device engaged by the shift mechanism of an automobile.

15 FIG. 20b is a second closeup of a preferred embodiment of an interlocking device engaged by the shift mechanism of an automobile.

FIG. 20c is a closeup of the overcenter lever feature of a preferred embodiment of an interlocking device engaged by the shift mechanism of an automobile.

FIG. 21 is a preferred embodiment of a release handle and interlocking device engaged by the shift mechanism of an automobile.

DETAILED DESCRIPTION

5 The present invention pertains generally to a system that includes three principal components: a latch assembly, a latch release assembly, and a cable connecting the latch assembly to the latch release assembly. The present invention pertains more particularly to improvements in two of these components, namely, 1) a new design and placement of a release handle in the passenger
10 compartment of the automobile in such a manner that it cannot be easily activated during driving; and 2) an improved latching mechanism in the engine compartment of the automobile. As described in connection with Figures 2-5, several forms of dual release handle mechanisms are contemplated. In each instance, the dual release handle mechanism includes a detent feature to hold the
15 release mechanism open and also several convenience and other features. These features include a catch in the locking mechanism, a handle hold open feature that is released upon closing of the vehicle door or upon closing of the hood (the latch forces closed the handle), and lock out features designed to make the operator fully conscious of hood release.

Figures 1a and 1b show the positioning of the major components of a preferred embodiment of the invention within the vehicle. In particular, Figure 1a shows an overhead view of an automobile 1 with a hood 2 and a door 3. The release handle 4 is located within the door 3 area of the passenger compartment 6.

5 The latch mechanism 5 is located beneath the hood 2.

Figure 1b shows a side view of an automobile 1. The release handle 4 is located inside a compartment 7 that is within the end of the dashboard of the automobile 1.

Various latch and handle assemblies will now be described in connection with the drawings. For simplicity, the handle and latch assemblies are shown and described separately since they are physically remote from one another (as is evident from Figures 1a and 1b). It should be understood, however, that handle and latch assemblies operate together via the cable. More specifically, the handle assembly controls movement of the cable and movement of the cable controls operation of the latch assembly. It should be further noted that the various handle assemblies described herein can be used in combination with any of the various latch assemblies described herein since, regardless of the specific construction of the handle assembly, the output of the handle assembly is movement of the control cable, which is the only necessary input to the various latch assemblies described herein.

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One currently preferred form of dual release latch is shown in Figures 2-4.

As shown therein, the dual release handle activates the hood release through a single motion. In particular, Figure 2 shows the handle 11 of the dual release hood latch for this preferred embodiment in the fully closed position. The handle
5 11 is mounted on a mounting bracket 12 that is attached to the body of the automobile inside the end of the instrument panel 13 (see handle device 4 in Figure 1b). The handle 11 is located between the instrument panel 13 and the door 15. A release cable 16, is attached to the handle 11 so that motion of the handle 11 causes the release cable to move. A spring loaded detent 18 is fully
10 retracted in the closed position of the handle 11. Note that, as can be seen from Figure 1b, in this position, with the door of the automobile closed, the handle 11 is completely hidden from the operator between the instrument panel 13 and the door 15. With the handle 11 in this position, both the primary and secondary latches are enabled to be fully latched.

15 In Figure 3, the handle 11 is shown in the maximum travel position. In this position, this handle motion has caused the primary latch to be released and the secondary latch to be rotated clear of the striker (see, e.g., Figures 8a and 8b, described below). The spring loaded detent 18 has snapped out ready to hold the handle at the released position.

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Figure 4 shows the handle 11 in the release position. In this position, the hood latch has been completely released and the handle 11 is held open by the spring loaded detent 18. Once the door 15 is closed, the door 15 contacts the release handle 11 and causes the detent 18 to snap in, allowing the release handle
5 11 to return to the closed position (see Figure 2 for view of handle in closed position).

The release handle 11 may also be closed by latching of the hood latch. When the hood is closed, motion on the latch causes the cable 16 to pull the latch 11, resulting in release of the detent 18, and movement of the handle 11 into the
10 closed position. (See Figure 2 for view of handle in closed position.)

Another currently preferred form of dual release handle is shown in Figure 5. As shown therein, the dual release handle is a pull and twist hood release that activates the hood release through two motions, a pull and twist. The handle 20, is slidably received in a sleeve 21 and is connected to the release cable 22. The
15 release cable 22 is connected to the latching mechanism. An extension 23 from the handle 20 rides in a slot 24 in the sleeve 21. In the unreleased position, the extension 23 rests in the slot 24, where indicated. To release the hood, the handle 20 is first pulled, releasing the primary latch. Upon being pulled, the extension 23 moves to the first stop location 25, where it is stopped by the sleeve 24. The
20 handle is then turned and pulled a second time. This twist and pull causes the

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extension 23 to travel to the second stop 26. The second pulling motion releases the secondary latch. At this point, the handle 20 rests in the new position 27.

A first currently preferred form of dual release latch is shown in Figures 6a-8b. To begin with, Figure 6a shows a preferred embodiment of a dual release latch assembly in the fully latched position for all elements of the latch mechanism. The latch assembly includes a primary latch 32, a secondary latch 39, and a striker 30 connected to the hood. The striker 30 is captured by a pocket 31 in the primary latch 32. The primary latch 32 is held in a latched position through engagement with a catch point 33 of the detent lever 34. A “pop-up” spring 35 (shown schematically) maintains tension on the primary latch 32, which can rotate on a pivot 36. A detent lever spring 37 (shown schematically) maintains tension on the detent lever 34, which can rotate on a pivot 38. The secondary catch 39, which can rotate on the pivot 40, is held in position by a spring 46 on the reverse side of the catch (not shown in Figure 6a; shown in Figure 6b). A cam pin 41 extends from the rear of the detent lever 34 into an opening 44 in the secondary catch 39. A cable 42 is secured by the detent lever 34 so that the detent lever 34 may be moved about the pivot 38 (in a counterclockwise direction as seen in Figure 6a) against the bias of the spring 37. Upon sufficient travel, the cam pin 41 in the detent lever 34 will contact the wall of the opening 44 in the secondary catch 39.

The detent lever 34 is connected to a remote handle via the cable 42 so that movement of the handle causes movement of the detent lever 34 about the pivot point 38. The elements of the latch mechanism are connected to a housing 43, which is mounted beneath the hood of an automobile. In the position shown in Figure 6a, the hood release handle is in the closed position, allowing the cable 42 to be slack so that the spring 37 biases the detent lever 34 into the position shown.

Figure 6b shows the reverse side of the latch mechanism in the latched position as shown in Figure 6a. The latch assembly includes a primary latch 32, a secondary latch 39, and a striker 30. The secondary catch 39, which can rotate on the pivot 40, is held in position by a spring 46 biased to rotate the secondary catch 39 in the clockwise direction, as shown in figure 6b. A cam pin 41 extends from the rear of the detent lever (not shown in Figure 6b; shown in Figure 6a) into an opening 44 in the secondary catch 39. A cable 42 is secured by the detent lever so that the detent lever may be moved about the pivot 38 (in a clockwise direction as seen in Figure 6b). Upon sufficient travel, the cam pin 41 in the detent lever will contact the wall of the opening 44 in the secondary catch 39.

The detent lever 34 connected to a remote handle via the cable 42 so that movement of the handle causes movement of the detent lever about the pivot point 38. The elements of the latch mechanism are connected to a housing 43,

which is mounted beneath the hood of an automobile. In the position shown in Figure 6b, the hood release handle is in the closed position.

As an alternative within this preferred embodiment, the cam pin 41 shown in Figure 6a could be attached to the secondary catch 39, causing travel upon
5 contact by motion of the detent lever, resulting in travel of the secondary catch 39.

Figure 7a shows the latch mechanism in the position of release of the primary latch 32, but prior to release of the secondary catch 39. Once the remote hood release handle is pulled it causes tension in the cable 42, resulting in travel of the detent lever 34. Upon disengagement of the catch point 33 on the detent
10 lever 34, which had held the primary latch 32 in place, the pop-up spring 35 causes the primary latch 32 to rotate on the pivot point 36 thereby lifting the striker 30 out of the pocket 31 but remaining below the secondary catch 39. Further rotation by the primary latch 32 is prevented by contact with a flange extension 45 on the housing 43.

15 Figure 7b shows the latch mechanism in the position of release of the primary latch 32, but prior to release of the secondary catch 39, from the reverse angle. Once the remote hood release handle is pulled it causes tension in the cable 42, resulting in travel of the detent lever (not shown in Figure 7b; shown in Figure 7a).

Figure 8a shows the release of the secondary catch 39. As the operator continues to pull the remote release handle, the detent lever 34 continues to travel until the cam pin 41 on the detent lever 34 contacts the secondary catch 39 within the opening 44 of the catch 39. The travel of the detent lever 34 then causes travel
5 of the secondary catch 39, thereby resulting in the secondary catch 39 pivoting away from the striker 30. Once the striker 30 is fully disengaged, the striker 30 is free of both the primary latch 32 and the secondary catch 39.

Figure 8b shows the release of the secondary catch 39 from the reverse angle. As the operator continues to pull the remote release handle, the detent
10 lever (not shown in Figure 8b; shown in Figure 8a) continues to travel until the cam pin 41 on the detent lever contacts the secondary catch 39 within the opening 44 of the catch 39. The travel of the detent lever then causes travel of the secondary catch 39, thereby resulting in the secondary catch 39 pivoting away from the striker 30. Once the striker 30 is fully disengaged, the striker 30 is free
15 of both the primary latch 32 and the secondary catch 39.

As shown in figure 8b, reengagement of the secondary catch 39 may occur upon return of the striker 30 into the slot 47 within the hooked section of the secondary catch 39, as occurs when the hood is closed. As the hood is closed, the striker 30 contacts the sloped section 48 of the secondary catch 39, causing the
20 secondary catch to rotate on the pivot 40 in a clockwise direction, as shown in

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Figure 8b. This motion causes the secondary latch 39 and detent lever 34 to return to the latched position by action between the cam pin 41 and the opening 44 on the catch 39, as shown in Figures 7a and 7b.

The position shown in Figures 7a and 7b may also be reached absent
5 motion of the striker 30 against the sloped area 48 of the secondary catch 39 by placing the striker 30 in the position shown in Figure 8b, above the primary latch 32 and near the hooked portion 47 of the secondary catch and then closing the release handle, as occurs when the door is shut with the release handle extended. Once the positioning of the striker 30 and secondary catch 39 shown in Figure 7b
10 has been reached, the hood is ready to be fully latched.

Figures 9 through 13 show a second currently preferred embodiment of a dual release latch. This embodiment is similar to the embodiment of Figures 6a-8b in many respects. As shown in Figure 9, in the fully latched position of the latch mechanism, the striker 50 is captured by a pocket 51 in the primary latch 52.
15 The primary latch 52 is held in a latched position through engagement with a catch point 53 of the detent lever 54. A "pop-up" spring 55 (illustrated schematically) maintains tension on the primary latch 52, which can rotate on the pivot 56. A detent lever spring 57 maintains tension on the detent lever 54, which can rotate on the pivot 58. The secondary catch 59, which can rotate on the pivot
20 60, is held in position by a spring on the reverse side of the catch (not shown) in

contact with the striker 50. A cam pin 61 allows motion by the detent lever 54, upon sufficient travel, to contact the secondary catch 59. It should be noted that the cam pin 61 may also be attached to the detent lever 54, and extend into an opening in the secondary catch 59, as shown in figures 6a-8b above; the cam pin
5 61 placement position shown in figures 9-11 is noted as a second preferred embodiment in figures 6a-8b. The detent lever 54 is connected to a remote handle via the cable 62, so that movement of the remote handle results in travel of the cable 62, which causes movement of the detent lever 54. The elements of the latch are connected to a housing 63, which is mounted beneath the hood of an
10 automobile. In the position shown in Figure 9, the hood release handle is in the closed position, allowing the cable 62 to be slack.

Figure 10 shows the latch mechanism in the position of release of the primary latch 52, but prior to release of the secondary catch 59. Once the remote hood release handle is pulled it causes tension in the cable 62, resulting in travel
15 of the detent lever 54 about the pivot point 58 against the bias of the spring 57. Upon disengagement of the catch point 53 on the detent lever 54, which had held the primary latch 52 in place, the "pop-up" spring 55 causes the primary latch 52 to rotate on the pivot point 56 thereby lifting the striker 50 out of the pocket 51 and causing the striker 50 to contact the secondary catch 59. Further pivoting of

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the primary latch 52 is prevented by contact with the striker 50, which is held by contact with the secondary catch 59.

Figure 11 shows the release of the secondary catch 59. As the operator continues to pull the remote release handle, the detent lever 54 continues to travel and comes into contact with cam pin 61 attached to the secondary catch 59. The travel of the detent lever 54 then causes travel of the secondary catch 59, thereby resulting in the secondary catch 59 pivoting away from the striker 50. Once the striker 50 is fully disengaged, the primary latch 52 continues to pivot on the pivot point 56 because of tension by the pop-up spring 55, causing pop-up of the striker 50, which is driven to a height that prevents catching by the secondary catch 59.

Figure 12 shows the fully released position of the latch mechanism. Once tension on the secondary catch 59 caused by contact between the detent lever 54 and the cam pin 61 on the secondary catch 59 is released, after the operator returns the hood release handle to the closed position, the detent lever spring 57 pulls the cable 62 in a direction opposite to the release handle (to the left as shown in Figure 12). The primary latch 52 rotates fully on the pivot point 56, until it contacts a flange extension 64 on the housing 63.

When the detent lever 54 returns, the cam pin 61 thus becomes disengaged from contact with the secondary catch 59, thereby allowing the secondary catch 59 to return to a point where the tip 59a of the secondary catch 59 is at rest against

the striker 50. Once in this position, the operator can raise the hood without any other release actions.

Figure 13a shows a currently preferred embodiment of the dual release handle “hold open” feature. This feature detents the handle open upon full travel of the handle. In Figure 13a, the handle 65 is connected to the cable 66 for releasing the hood latch remotely. The handle is located within the car door area within the end of the instrument panel (see location of handle 4 in Figure 1b). The handle 65 rotates on a hinge point 68. External to the handle 65 is a detent clip 69 biased toward contact with the handle 65. The detent clip 69 includes a detent 70 that slides along a slot 71 as the handle travels. At the full extent of the travel of the handle 65, the detent 70 of the detent clip 69 engages a larger impression 72 in the handle 65 at the end of the slot 71.

Figure 13b shows the preferred embodiment of the “hold open” feature from a side view. When the handle 65 is not extended, the detent clips 69a and 73a remain unengaged; when the handle 65 is fully extended, the detent clips 69b and 73b engage the larger impressions 72 and 74, respectively.

Figures 14a-c show a currently preferred embodiment of a single position “lock out” feature for a hood release according to the present invention. This feature requires the operator to disengage a lock in order to prevent release of the secondary catch of the latch mechanism. In Figure 14a, the handle 80 is in the

closed position, corresponding to a fully latched hood. The handle 80 is connected to a cable 81, which in turn is connected to the latch mechanism. A
lockout lever 82 is attached to the handle 80. The lockout lever 82 includes a
lockout catch 83 that rides in a slot 84 in the base 85 for the handle 80. The
5 handle 80 rotates about a pivot point 86 on the base 85. The lockout lever 82
rotates on a pivot point 87 on the handle 80. In a preferred embodiment, a spring
(not shown) may be included within the pivot point 87 to bias the lockout lever 82
away from the handle 80.

Figure 14b shows the handle 80 at the primary latch release point. Handle
10 80 travel about pivot point 86 causes the catch 83, after riding in the slot 84, to
stop because of contact with the base 85. At this point, continued travel of the
handle 80 is prevented absent release of the lockout catch 83 which occurs when
the operator depresses the lockout lever 82 thus rotating the lockout 82 about the
pivot point 87.

15 Figure 14c shows disengagement of the lockout catch 83 after the operator
has depressed the lockout lever 82, thus rotating the lockout 82 about the pivot
point 87. Release of the lockout catch 83 allows the lockout catch 83 to continue
moving along the slot 84. This release allows the handle 80 to continue to travel,
in turn allowing release of the secondary catch of the latching mechanism.

Figures 15a-c show a currently preferred embodiment of a handle with a two position lockout feature. This feature requires the operator to disengage a first lock in order to release the primary latch of the latching mechanism and to disengage a second lock in order to then release the secondary catch of the locking mechanism. In Figure 15a, the handle 90 is in the closed position, corresponding to a fully latched hood. The handle 90 is connected to a cable 91, which in turn is connected to the latch mechanism. Attached to the handle 90 is a lockout lever 92. The lockout lever 92 includes a first lockout catch 93 and a second lockout catch 94; the lockout lever rides in a slot 95 in the base 96 for the handle 90. In Figure 15a, the first lockout catch 93 prevents travel of the handle 90 by rotation about a pivot point 97, thus preventing release of the primary latch. The operator, by depressing the lockout 92, rotates the lockout 92 about a pivot point 98 in a counterclockwise direction as shown in Figure 15a, allowing the first lockout catch 93 to travel past the slot 95, thereby allowing release of the primary latch by travel of the handle 80 in a counterclockwise direction about pivot point 97 as shown in Figure 15a.

Figure 15b shows the handle 90 after primary latch release. Handle 90 travel has occurred about pivot point 97 past the first lockout catch 93, but further travel is prevented by the second lockout catch 94. The operator releases the lockout 92 by rotating the lockout 92 about the pivot point 98 in the opposite

direction of the first lockout catch 93 release (clockwise direction as shown in Figure 15b), thereby allowing the second lockout catch 94 to travel past the slot 95, thus allowing release of the secondary catch by continued travel of the handle 90 about pivot point 97 in a counterclockwise direction as shown in Figure 15a.

5 Figure 15c shows full disengagement of the first lockout catch 93 and the second lockout catch 94, which have both traveled past the slot 95. The handle 90 has reached full travel by rotation about the pivot point 97 in the counterclockwise direction as shown in Figure 15c, thereby releasing both the primary latch and the secondary catch of the latching mechanism.

10 Figures 16a-d show a currently preferred embodiment of a handle with a push button lockout feature. This feature requires the operator to disengage a push button lockout in order to release the secondary catch of the locking mechanism. In Figure 16a, the handle 100 is in the closed position, corresponding to a fully latched hood. The handle 100 is connected to a cable 101, which in turn
15 is connected to the latch mechanism. Attached to the handle 100 is a push button lockout 102. The push button lockout 102 rides in a two-part slot, containing a wide slot section 103 and a narrow slot section 104. The stem 105 of the push button lockout 102 has both a thick section and a narrow section. (See further description of push button mechanism for Figure 16b below.) In the unpressed
20 position, the thick section of the stem 105 travels in the wide section of the slot

103, driven by the edge of the handle 106 contacting the push button lockout 102 as the handle 100 travels in the counterclockwise direction, as shown in Figure 16a, about the pivot point 106. Handle 100 travel thus may only occur until stopped by the thick section of the stem 105 reaching the thin section of the slot 104. This limited travel of the handle 100 allows the operator to release the primary latch of the latching device without engaging the push button lockout 102.

Figure 16b shows a closeup of the lock handle and slot feature of the preferred embodiment with dual release handle and lock out feature. The push button lockout 102 has a wide section of the stem 105 that rides in the wide section of the slot 103. At the narrow section of the slot 104, further travel by the handle (106 in Figure 16a) riding against the stem 105 is prevented by contact with the narrow section of the slot 104. The operator must depress the lockout 102 so that the narrow section of the stem 105 may travel within the narrow section of the slot 104. In a preferred embodiment, a spring (not shown) is included within the stem 105 to bias the lockout 102 to be extended, thus providing an additional feature by preventing disengagement of the secondary catch absent the operator depressing the lockout 102.

Figure 16c shows the handle 100 after primary latch release. Handle 100 travel has occurred in the counterclockwise direction as shown in Figure 16c

- 25 -

about the pivot point 106 as the thick part of the stem 105 has traveled the length of the wide section of the slot 103. Further travel is prevented by the narrow section of the slot 104. The operator must now rotate the oblong-shaped push button lockout 102 so as to align with the oblong section of the handle 107 and then press in the lockout 102, thereby allowing the thin part of the stem 105 to travel within the narrow section of the slot 104. This continued travel of the handle 100 in the counterclockwise direction as shown in Figure 16c about the pivot point 106 thereby allows release of the secondary catch.

Figure 16d shows the handle 100 after full travel of the push button lockout catch 102 along both the wide section of the slot 103 and the narrow section of the slot 104. The handle 100 has also thus fully traveled in the counterclockwise direction as shown in Figure 16d about the pivot point 106, thereby releasing both the primary latch and the secondary catch of the latching mechanism.

Figures 17a, 17b, and 17c show aspects of two currently preferred embodiments of a cable locking mechanism to prevent hood release absent insertion of the ignition key. This locking mechanism helps prevent theft and inadvertent release. Figure 17a shows a preferred embodiment of the locking mechanism attached to a sleeve 110 on the cable 111 between the hood release handle and hood latch previously described. The locking mechanism comprises a

sleeve 110 around the cable 111 with a locking component 112 connected 113 to the ignition switch. The locking component 112 can comprise either a mechanically activated lock triggered by the motion of the ignition switch or an electrical or electronically activated lock (e.g., triggered by a solenoid). As indicated with the description for Figure 17c below, activation of the lock causes movement of a pin into a gap in the cable, preventing travel of the cable and thus preventing release of the latch mechanism.

Figure 17b shows a second preferred embodiment of the locking mechanism. The locking component 115 is attached to the sleeve 116 for the handle 117. The locking component 115 is connected 118 to the ignition switch and is either electrically or mechanically activated.

Figure 17c shows the locking mechanism. A housing 120 contains a switch that engages a pin 121 into a gap in the cable 122 between the hood release handle and the hood latch within a sleeve 123. The pin 121 is connected 124 to the ignition and is activated either mechanically or electrically upon turning of the key. Thus, the hood cannot be released while the key is engaged in the ignition, preventing release while the car is operating.

Figures 18a and 18b show two preferred embodiments of manually activated locking mechanisms. These mechanisms help prevent theft and inadvertent opening of the hood by preventing hood release absent manual

deactivation of the locking mechanism. In Figure 18a, a tumbling device 125 is attached to the sleeve 126 for the hood release 127 that surrounds the cable 128 attached to the hood latch. The correct combination for the tumbling device 125 must be entered to allow release of the cable 128 from the locking mechanism contained within the tumbling device 125. The tumbling device 125 typically contains a series of gaps such that a pin attached to the cable 128 cannot pass by the tumbling device 125 unless the gaps are properly aligned.

Figure 18b shows a second preferred embodiment of the manually activated locking mechanism. A series of tabs 130 are attached to the sleeve 131 for the hood release 132 that surrounds the cable 133 attached to the hood latch. The tabs 130 must be correctly aligned in order to allow release of the cable 133 from the sleeve 131. Similar to the tumbling mechanism, a pin attached to the cable 133 prevents movement of the cable 133 past the tabs 130 unless the tabs 130 are aligned such that a gap through them allows passage of the pin.

Figure 19 shows a first preferred embodiment of another feature of the system, an interlocking device using the shift mechanism for an automatic transmission for the automobile. In a second preferred embodiment (not shown), a similar device is installed for a manually shifted transmission. In the first preferred embodiment, an additional feature is added to the handle 140, connecting cable 141, and latch system (not shown in this figure; connected to

connecting cable 141 at point 142). This additional feature comprises an interlock cable 143 connecting the release handle 140 and an overcenter lever 144 located in the proximity of the shift lever 146. When the shift lever 146 is in the park (P) position 147, the overcenter lever 144 remains in an untraveled position, leaving
5 slack in the interlock cable 143 between the overcenter lever 144 and the handle 140. This slack allows the handle 140 to be operated so as to release the hood via the hood latch. When the shift lever 146 is moved to a position other than park (P) 147 by rotation in the counterclockwise direction as shown in Figure 19 about a pivot point 148, travel of the shift lever 146 causes travel of the overcenter lever
10 144 via engagement of a pin 149 extending from the shift lever 146. This travel of the overcenter lever 144 results in removal of slack in the interlock cable 143. This removal of slack in the interlock cable 143 prevents the release handle 140 from being operated, thus preventing release of the hood via the hood latch. Thus, the hood may only be released while the car's transmission is in the parked
15 position.

Figures 20a-c show a closeup of features of a preferred embodiment of the overcenter lever and cable device described in Figure 19. This device comprises an overcenter lever 150 located in proximity to the shift lever 151. When the shift lever 151 is in the untraveled position shown, as when the car is in park (P), the
20 overcenter lever 150 remains in an untraveled position, leaving slack in the

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interlock cable 152 that connects the overcenter lever 150 and the release handle (not shown; see description for Figure 19).

As shown in Figure 20b, when the shift lever 151 is moved to a position other than park (P), travel of the shift lever 151 in the counterclockwise direction as shown in Figure 20b about a pivot point 153 causes travel of the overcenter lever 150 via engagement of a pin 154 extending from the shift lever 151. The overcenter lever 150 rotates in the counterclockwise direction as shown in Figure 20b around a fixed point 155, comprising a pin attached to a fixed point in the vicinity of the shift lever 151, such travel of the overcenter lever 150 resulting in removal of slack in the interlock cable 152, which prevents the release handle (not shown in this figure; but see description for Figure 19) from being operated, thus preventing release of the hood via the hood latch.

Figure 20c presents a closeup of a preferred embodiment of the overcenter lever feature of the embodiment described in Figures 20a and 20b. The interlock cable 152 passes through an opening 156 in the body of the overcenter lever 150. An anchor 157 attached to the end of the interlock cable 152 prevents travel of the interlock cable 152 through the opening 155 in the overcenter lever 150. Engagement of the anchor 157 with the opening 156 in the overcenter lever 150 occurs when the overcenter lever 150 rotates in the counterclockwise direction as shown in Figure 20c about a fixed point 155.

Figure 21 shows a preferred embodiment of a release handle device incorporated with the shifting mechanism of an automobile. In this embodiment, the release handle 160 is located within the automobile's interior so as to interact with the shift lever 162; in one preferred embodiment, the release handle 160 location is the automobile's dashboard 161; in another preferred embodiment the release handle 160 location is the shift lever 162 housing near the automobile's floorboard. The release handle 160 could also be located elsewhere within the automobile's interior. A linkage rod 163 is connected to the shift lever 162. The release handle 160 has an extension 164, attached to the release handle 160 at a pivot point 165. The extension 164 extends through an opening 166 in the dashboard 161. When the shift lever 162 is in the park (P) position 167, the extension 164 is free to move on the pivot point 165 and thus the release handle 160 and extension 164 may travel in the counterclockwise direction as shown in Figure 21 when the operator moves the release handle 160. When the shift lever 162 is moved to a position other than park (P) position 167 in the counterclockwise direction as shown in Figure 21 about a fixed point 168, travel of the shift lever 162 produces corresponding travel in the linkage rod 163. This travel of the linkage rod 163 prevents travel of the extension 164, thus preventing travel of the release handle 160 from the unextended position. Thus the linkage

rod 163 prevents release of the hood when the car's transmission is in any position other than the park (P) position 167.

In Figure 21, if the release handle 160 is already in the released position as shown, with the shift lever 162 in the park (P) position 167, such that the
5 extension 164 has already traveled in the counterclockwise direction as shown in Figure 21 about the pivot point 165, the extension 164 will lie in the path of the linkage rod 163 travel. If the shift lever 162 is now moved to a position other than the park (P) position 167, corresponding travel of the linkage rod 163 will result in the linkage rod 163 engaging the extension 164 relative to the pivot point 165
10 and the opening 166. This engagement of the extension 164 with the linkage rod 163 results in return of the release handle 160 to the unreleased position, thus causing a corresponding return of the hood latch (not shown) to the latched position, similar to the effect of closing the door when the handle is located in the end of the instrument panel, as described above with regard to Figure 4.

WHAT IS CLAIMED IS:

- 1 1. A remote hood release system for use in a vehicle having a vehicle
2 body, a hood that is movable with respect to the vehicle body between an open
3 position and a closed position, a striker secured to the hood, a passenger
4 compartment that is remote from the hood, and a transmission shift lever located
5 within the passenger compartment of the vehicle, the hood release comprising:
6 a latching assembly secured to the vehicle body adjacent to the striker
7 when the hood is in the closed position, the latching assembly being adapted to
8 selectively latch the striker so as to secure the hood in the closed position and
9 release the striker so as to permit the hood to be moved to the open position, the
10 latching assembly comprising:
11 a primary latch that is movable between a latched and
12 unlatched position, the primary latch comprising a striker
13 engagement portion for latching the striker when the primary latch
14 is in the latched position;
15 a first spring for biasing the primary latch into the
16 unlatched position;
17 a detent that is movable between a first position and a
18 second position and between the second position and a third

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19 position, the detent being arranged with respect to the primary latch
20 such that the detent prevents movement of the primary latch from
21 the latched to the unlatched position when the detent is in the first
22 position and such that the detent permits movement of the primary
23 latch from the latched to the unlatched position when the detent is
24 in the second position;

25 a secondary latch that is movable between a latched and
26 unlatched position, the secondary latch comprising a striker
27 engagement portion for limiting movement of the striker when the
28 secondary latch is in the latched position so as to prevent the hood
29 from being moved from the closed position to the open position,
30 the secondary latch further comprising a portion adapted for
31 engagement with the detent, the detent being arranged with respect
32 to said portion of the secondary latch such that the detent engages
33 and moves the secondary latch from the latched position to the
34 unlatched position when the detent is moved from the second
35 position to the third position;

36 a release handle assembly, the release handle assembly comprising: a
37 control arm, the control arm being movable between a first position and a second
38 position and between the second position and a third position; and

39 a control cable having one end secured to the control arm and another end
40 secured to the detent of the latch assembly such that movement of the control arm
41 from the first position to the second position and between the second position and
42 the third position causes corresponding movement of the detent from the first
43 position to the second position and between the second position and the third
44 position.

45

46 2. The remote hood release system of claim 1 further comprising a
47 portion of the secondary latch adapted for engagement by the striker, the striker
48 being arranged with respect to said portion of the secondary latch such that the
49 striker engages and moves the secondary latch from the unlatched to the latched
50 position when the hood is moved from the open position to the closed position,
51 and the portion of the detent arranged for engagement with the secondary latch so
52 arranged such that the movement of the secondary latch from the unlatched to the
53 latched position engages and moves the detent from the third position to the first
54 position and moves, by virtue of corresponding movement of the cable, the
55 control arm of the release handle assembly from the third position to the first
56 position.

1 3. The remote hood release system of claim 1, further comprising a
2 detent biasing spring for biasing the detent into the first position.

1 4. The remote hood release system of claim 1, further comprising a
2 secondary latch biasing spring for biasing the secondary latch into the released
3 position.

1 5. The remote hood release system of claim 1, wherein the hood
2 release assembly is located within the passenger compartment.

1 6. The remote hood release system of claim 1, wherein the primary
2 latch that is pivotally movable between the latched and unlatched positions.

1 7. The remote hood release system of claim 1, wherein the detent is
2 pivotally mounted for movement between the first position and the second
3 position and between the second position and the third position.

1 8. The remote hood release system of claim 1, wherein the detent is
2 pivotally mounted for movement along an arcuate path between the first position
3 and the second position and between the second position and the third position
4 and the secondary latch is pivotally mounted for movement between the latched
5 and unlatched positions and wherein the portion adapted for engagement with the

6 detent comprises a cam pin extending outwardly from the detent into an opening
7 in the secondary latch.

1 9. The remote hood release system of claim 1, wherein the control
2 arm comprises an arm that is constrained to move in a single direction such that a
3 single unidirectional pull of the arm effects movement of the control arm between
4 the first position and the second position and between the second position and the
5 third position and wherein the control arm is mounted within the vehicle body at a
6 location that is concealed upon closing of the automobile door.

1 10. The remote hood release system of claim 9, wherein the control
2 arm comprises an arm that is pivotally mounted within the vehicle body at a
3 location that is concealed upon closing of the automobile door.

1 11. The remote hood release system of claim 1 wherein the moving of
2 the lever comprises a pull and twist of the lever.

1 12. The remote hood release system of claim 1 further comprising:
2 a position holding mechanism such that the lever is held in place upon
3 motion to maximum travel.

1 13. The remote hood release system of claim 12 wherein the position
2 holding mechanism is released upon closing of the automobile door.

1 14. The remote hood release system of claim 12 wherein the lever
2 returns to its unextended position upon closing of the automobile door.

1 15. The remote hood release system of claim 1 further comprising:
2 a handle locking feature that prevents release of the primary latch absent
3 deactivation of the locking feature by the operator.

1 16. The remote hood release system of claim 15 in which the locking
2 feature comprises a handle release trigger.

1 17. The remote hood release system of claim 15 in which the locking
2 feature comprises a locking switch activated by the automobile ignition.

1 18. The remote hood release system of claim 15 in which the locking
2 feature comprises a manually operated tumbler.

1 19. The remote hood release system of claim 15 in which the locking
2 feature comprises a manually operated series of alignment tabs.

1 20. The remote hood release system of claim 1 further comprising:
2 an overcenter lever movable between a first overcenter lever position and a
3 second overcenter lever position;
4 an interlock cable having one end secured to the overcenter lever and the
5 other end secured to the control arm of the release handle assembly; and
6 a portion of the transmission shift lever adapted for engagement of the
7 overcenter lever, the overcenter lever being arranged with respect to said portion
8 of the transmission shift lever such that placement of the transmission shift lever
9 in one shift position moves the overcenter lever to the first overcenter lever
10 position, and placement of the transmission shift lever in any other shift position
11 moves the overcenter lever to the second overcenter lever position, such that in
12 the first overcenter lever position the interlock cable freely moves with the
13 movement of the control arm from the control arm's first position to the control
14 arm's second and third positions and in the second overcenter lever position the
15 interlock cable prevents movement of the control arm from the control arm's first
16 position to the control arm's second and third positions.

1 21. The remote hood release system of claim 1 further comprising:

2 a linkage device having one end secured to the transmission shift lever;
3 and
4 a portion of the release handle control arm adapted for engagement of the
5 linkage device such that placement of the transmission shift lever in one shift
6 position causes movement of the linkage device to a position allowing movement
7 of the control arm from the control arm's first position to the control arm's second
8 and third position and placement of the transmission shift lever in any other shift
9 position causes movement of the linkage device such that the linkage device
10 engages the extension such that the control arm is prevented from moving from
11 the control arm's first position to the control arm's second and third positions.

1 22. The remote hood release system of claim 1 further comprising:
2 a handle locking feature that prevents release of the secondary catch absent
3 deactivation of the locking feature by the operator.

1 23. The remote hood release system of claim 1 wherein the remote
2 handle is located within the instrument panel.

1 24. The remote hood release system of claim 1 wherein the coupling
2 comprises a cable.

1 25. A remotely controlled latching assembly for use in a vehicle having
2 a vehicle body, a hood that is movable with respect to the vehicle body between
3 an open position and a closed position and a striker secured to the hood, the
4 latching assembly being adapted to selectively latch the striker so as to secure the
5 hood in the closed position and release the striker so as to permit the hood to be
6 moved to the open position, the latching assembly comprising:
7 a primary latch that is movable between a latched and unlatched position,
8 the primary latch comprising a striker engagement portion for latching the striker
9 when the primary latch is in the latched position;
10 a first spring for biasing the primary latch into the unlatched position;
11 a detent that is movable between a first position and a second position and
12 between the second position and a third position, the detent being arranged with
13 respect to the primary latch such that the detent prevents movement of the primary
14 latch from the latched to the unlatched position when the detent is in the first
15 position and such that the detent permits movement of the primary latch from the
16 latched to the unlatched position when the detent is in the second position;
17 a secondary latch that is movable between a latched and unlatched
18 position, the secondary latch comprising a striker engagement portion for limiting
19 movement of the striker when the secondary latch is in the latched position so as
20 to prevent the hood from being moved from the closed position to the open

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21 position, the secondary latch further comprising a portion adapted for engagement
22 with the detent, the detent being arranged with respect to said portion of the
23 secondary latch such that the detent engages and moves the secondary latch from
24 the latched position to the unlatched position when the detent is moved from the
25 second position to the third position; and
26 means for remotely controlling movement of the detent from the first
27 position to the second position and between the second position and the third
28 position so as to remotely unlatch the latching assembly from the striker.

1 26. The remotely controlled latching assembly of claim 25, further
2 comprising a portion of the secondary latch adapted for engagement by the striker,
3 the striker being arranged with respect to said portion of the secondary latch such
4 that the striker engages and moves the secondary latch from the unlatched to the
5 latched position when the hood is moved from the open position to the closed
6 position, and the portion of the detent arranged for engagement with the secondary
7 latch so arranged such that the movement of the secondary latch from the
8 unlatched to the latched position engages and moves the detent from the third
9 position to the first position and moves, by virtue of the means for remotely
10 controlling movement of the detent between the first position and the third
11 position, the control arm of the release handle assembly from the third position to
12 the first position.

1 27. The remotely controlled latching assembly of claim 25, wherein the
2 means for remotely controlling movement of the detent from the first position to
3 the second position and between the second position and the third position
4 comprises a single control cable.

1 28. The remotely controlled latching system of claim 25, further
2 comprising a detent biasing spring for biasing the detent into the first position.

1 29. The remotely controlled latching system of claim 25, further
2 comprising a secondary latch biasing spring for biasing the secondary latch into
3 the latched position.

1 30. The remotely controlled latching system of claim 25, wherein the
2 primary latch is pivotally movable between the latched and unlatched positions.

1 31. The remotely controlled latching system of claim 25, wherein the
2 detent is pivotally mounted for movement between the first position and the
3 second position and between the second position and the third position.

1 32. The remotely controlled latching system of claim 25, wherein the
2 detent is pivotally mounted for movement along an arcuate path between the first
3 position and the second position and between the second position and the third
4 position and the secondary latch is pivotally mounted for movement between the
5 latched and unlatched positions and wherein the portion adapted for engagement
6 with the detent comprises a cam pin extending outwardly from the detent into an
7 opening in the secondary latch.

1 33. A remotely controlled latching assembly for use in a vehicle having
2 a vehicle body, a hood that is movable with respect to the vehicle body between
3 an open position and a closed position and a striker secured to the hood, the
4 latching assembly being adapted to selectively latch the striker so as to secure the
5 hood in the closed position and release the striker so as to permit the hood to be
6 moved to the open position, the latching assembly comprising:

7 a primary latch comprising a striker engagement portion for latching the
8 striker when the primary latch is in the latched position;

9 a secondary latch that is movable between a latched and unlatched
10 position, the secondary latch comprising a striker engagement portion for limiting
11 movement of the striker when the secondary latch is in the latched position so as

12 to prevent the hood from being moved from the closed position to the open
13 position;
14 means for remotely controlling movement of the primary latch and
15 secondary latch so as to remotely unlatch the latching assembly from the striker;
16 and
17 a portion of the secondary latch adapted for engagement by the striker, the
18 striker being arranged with respect to said portion of the secondary latch such that
19 the striker engages and moves the secondary latch from the unlatched to the
20 latched position when the hood is moved from the open position to the closed
21 position, and the portion of the detent arranged for engagement with the secondary
22 latch so arranged such that the movement of the secondary latch from the
23 unlatched to the latched position engages and moves, by virtue of corresponding
24 movement of the cable, the control arm of the release handle assembly from the
25 third position to the first position.

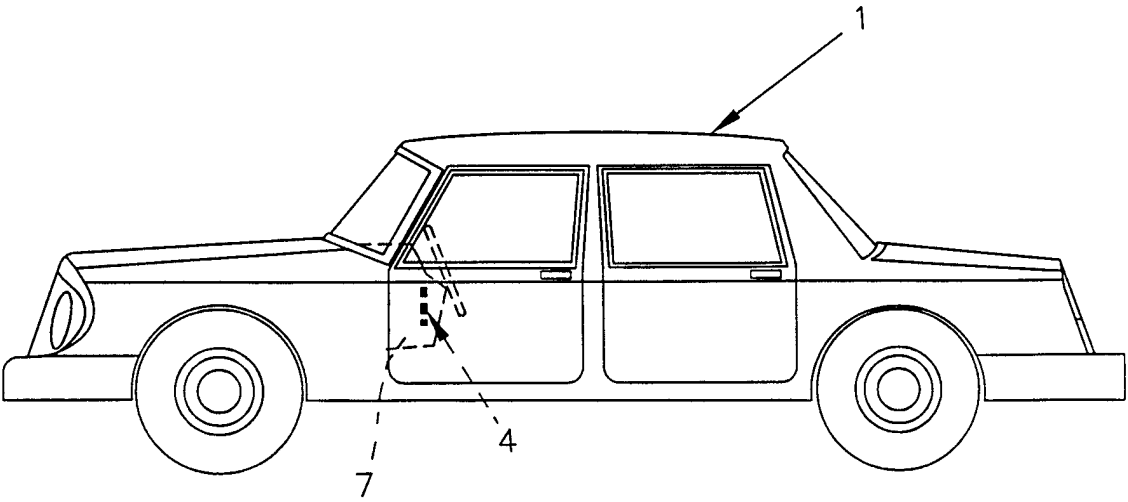
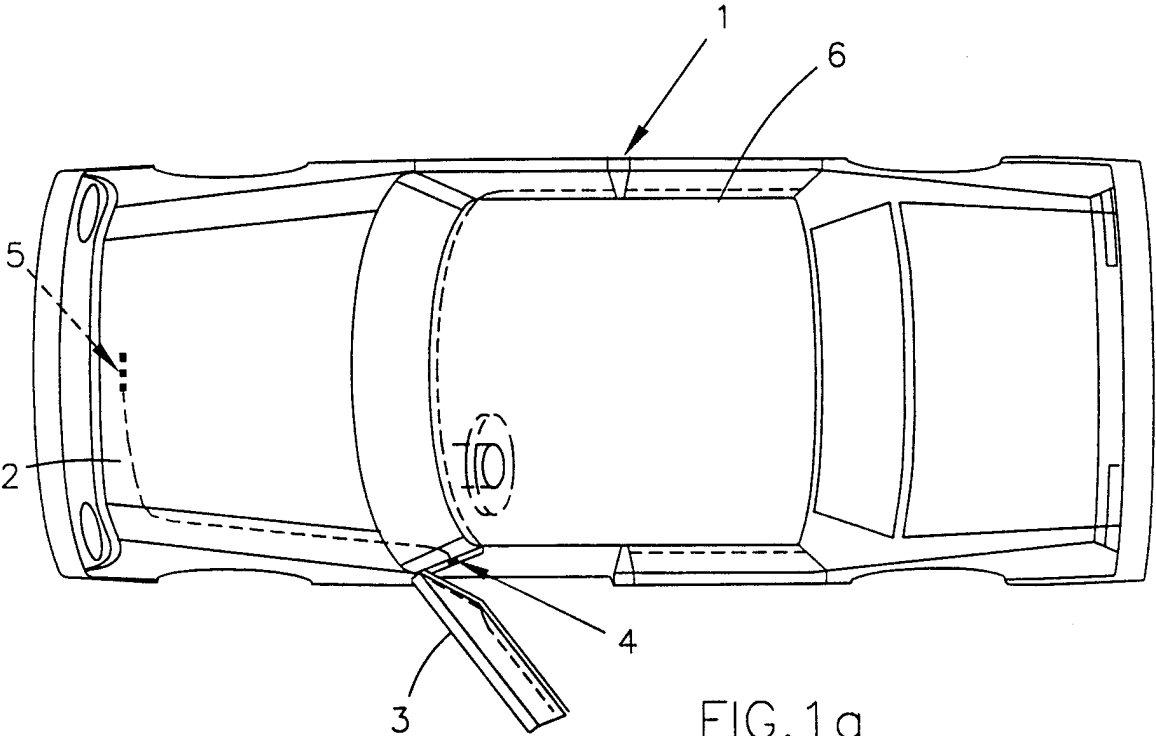


Figure 2

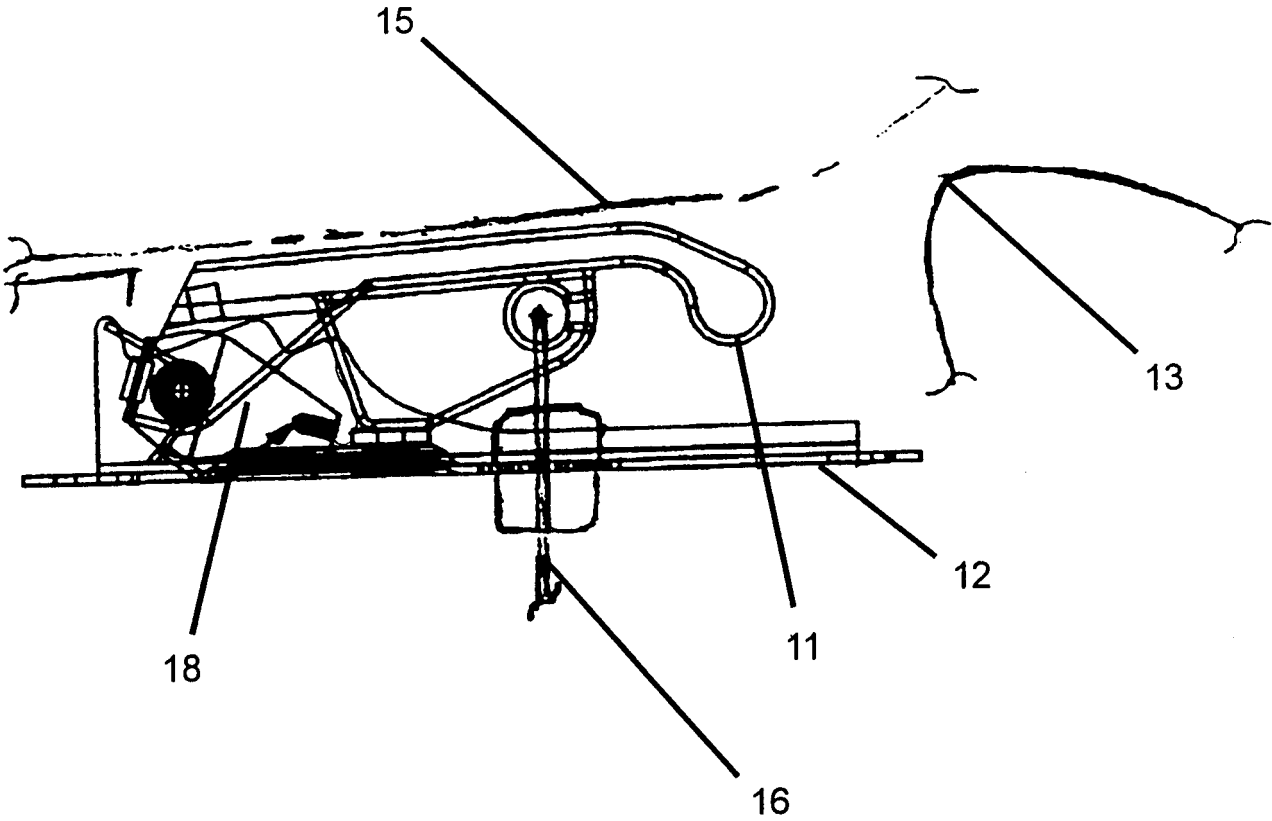
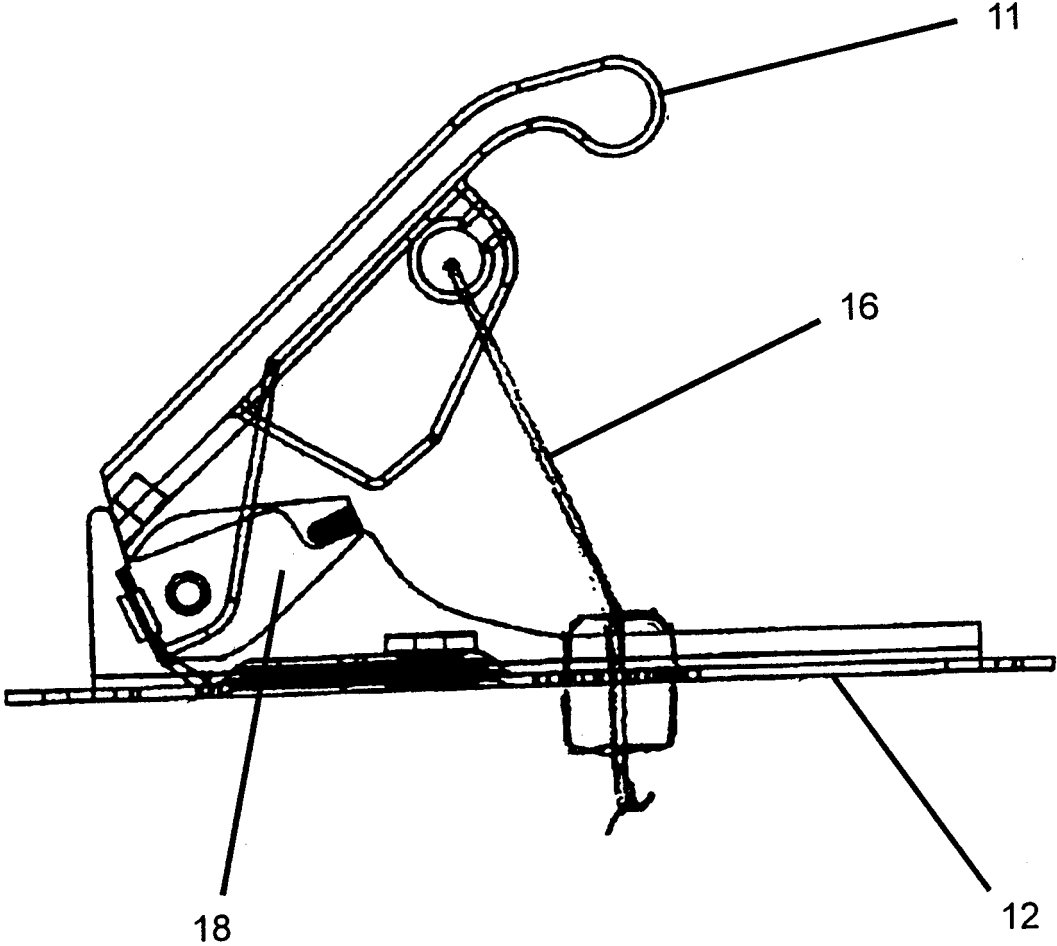


Figure 3



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Figure 4

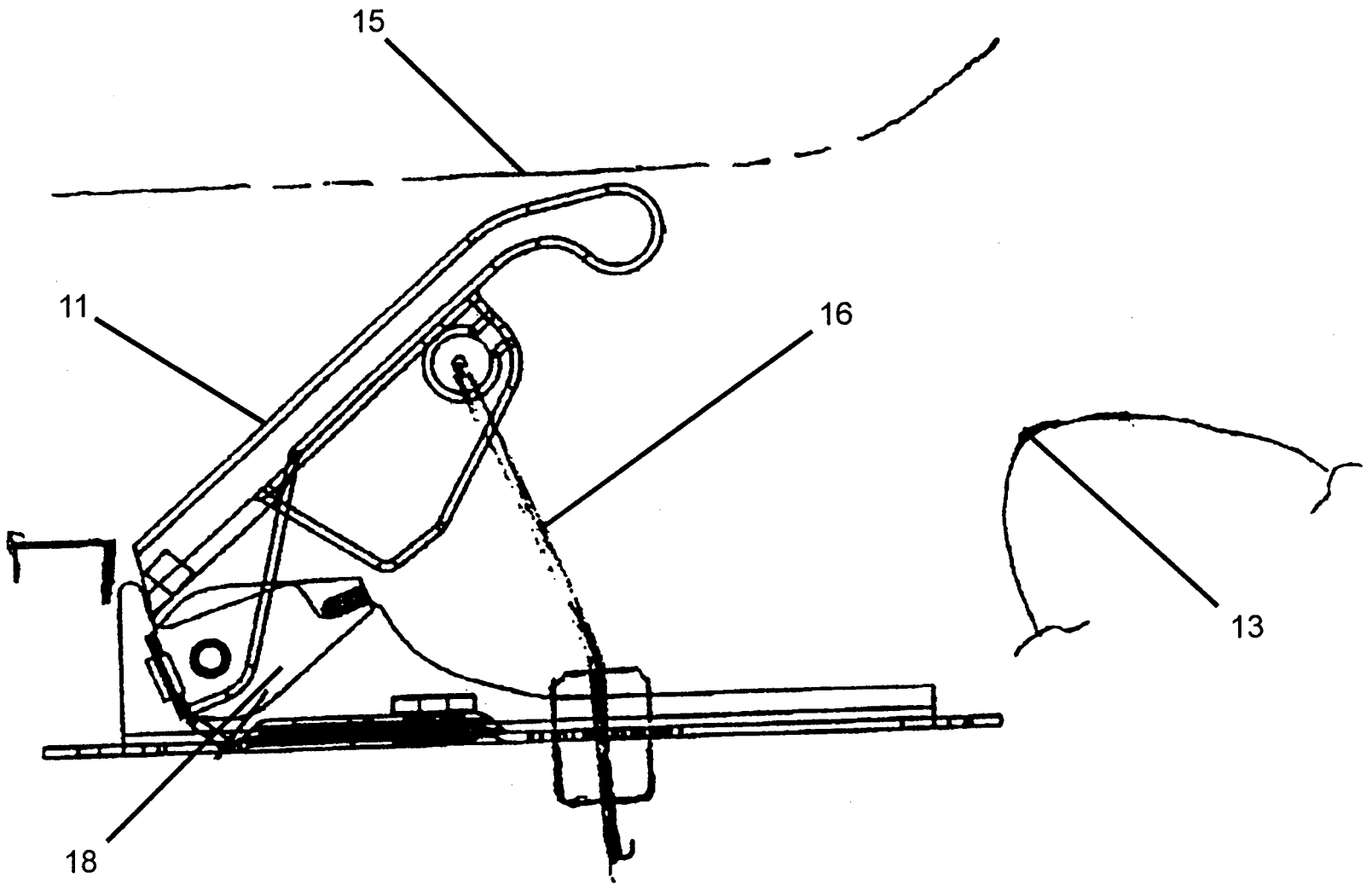


Figure 5

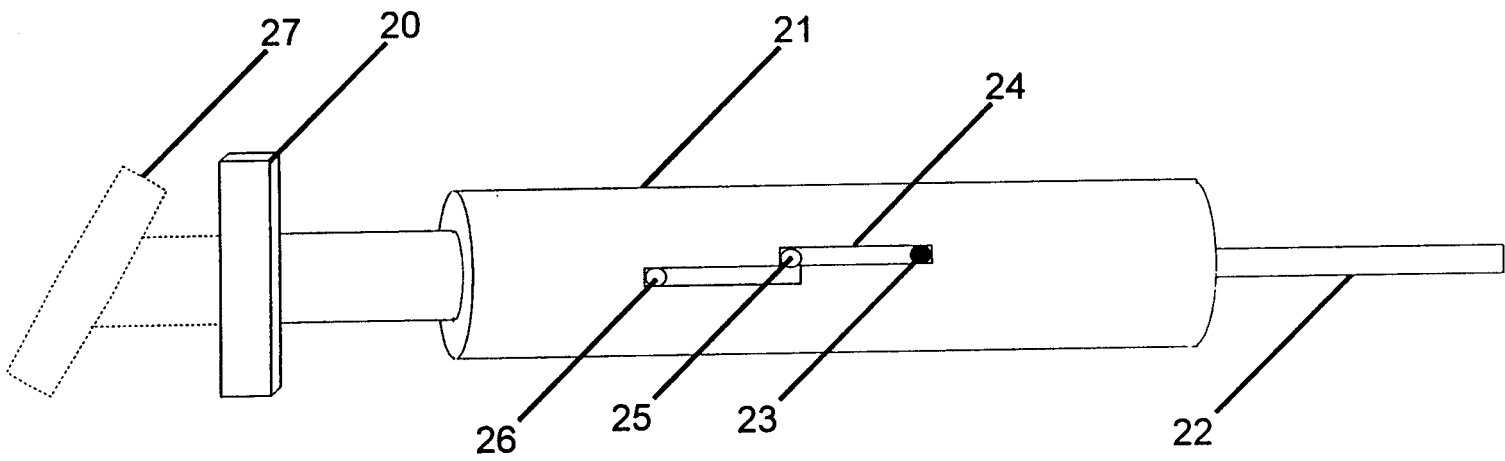


Figure 6a

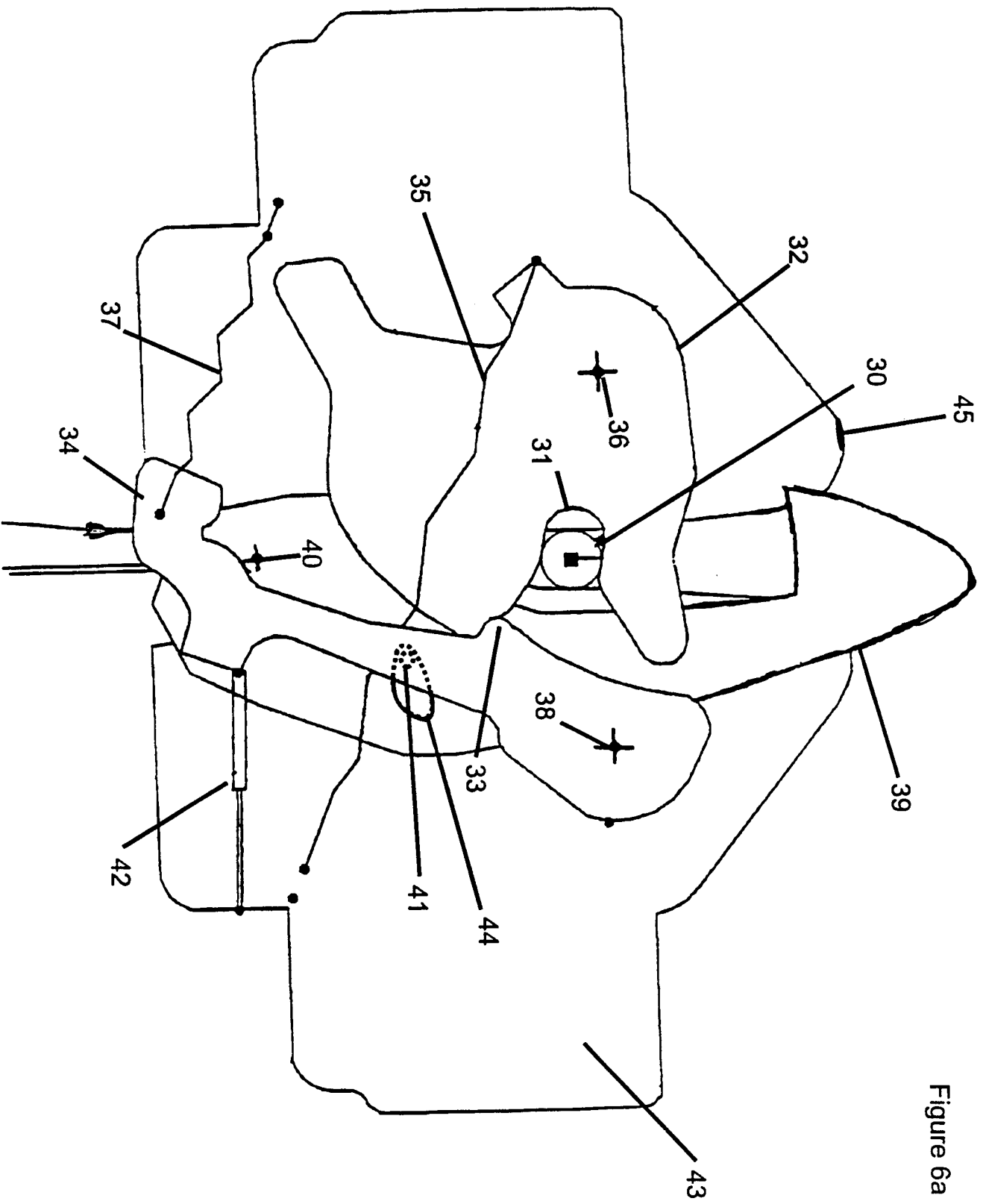
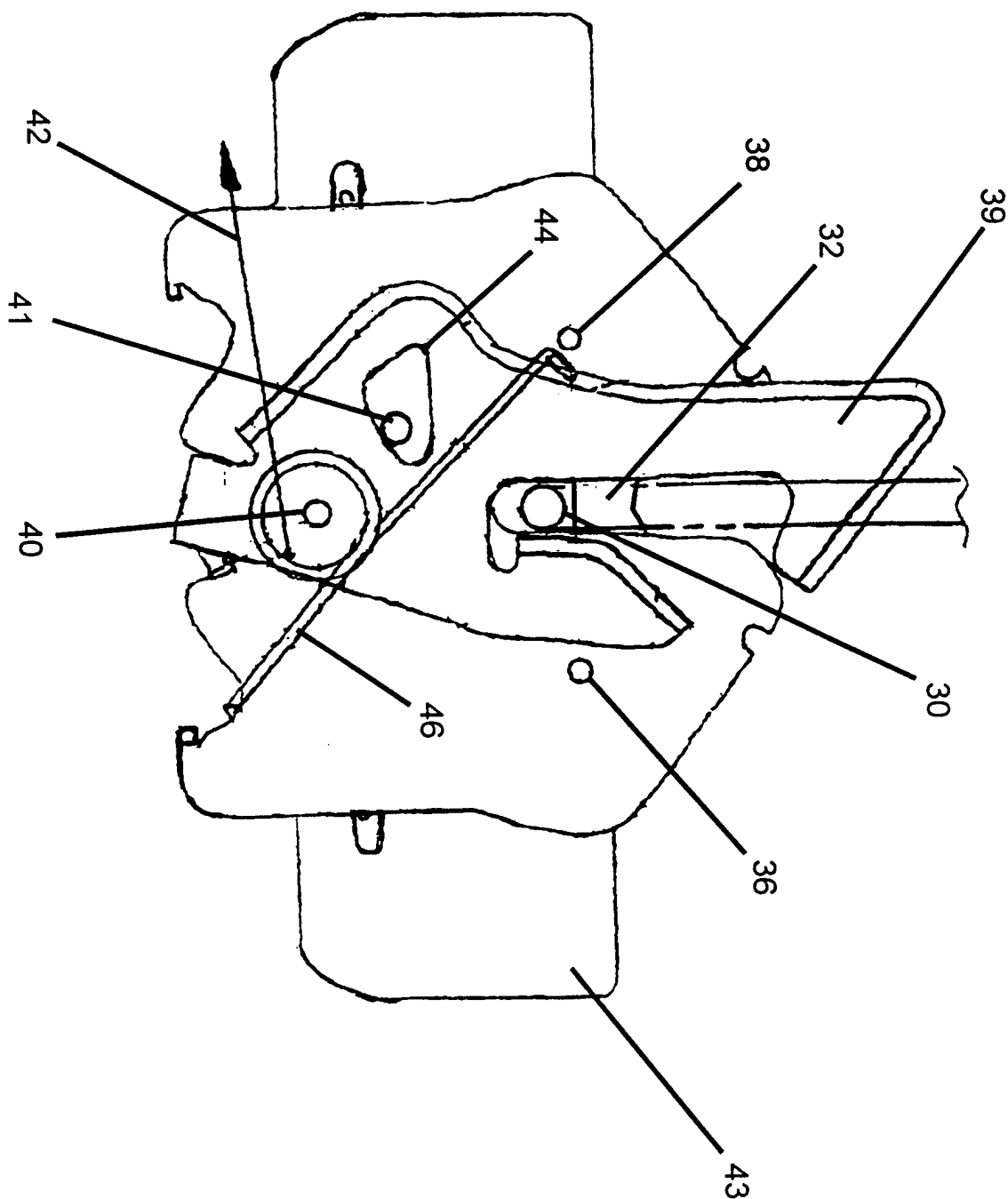


Figure 6b



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Figure 7a

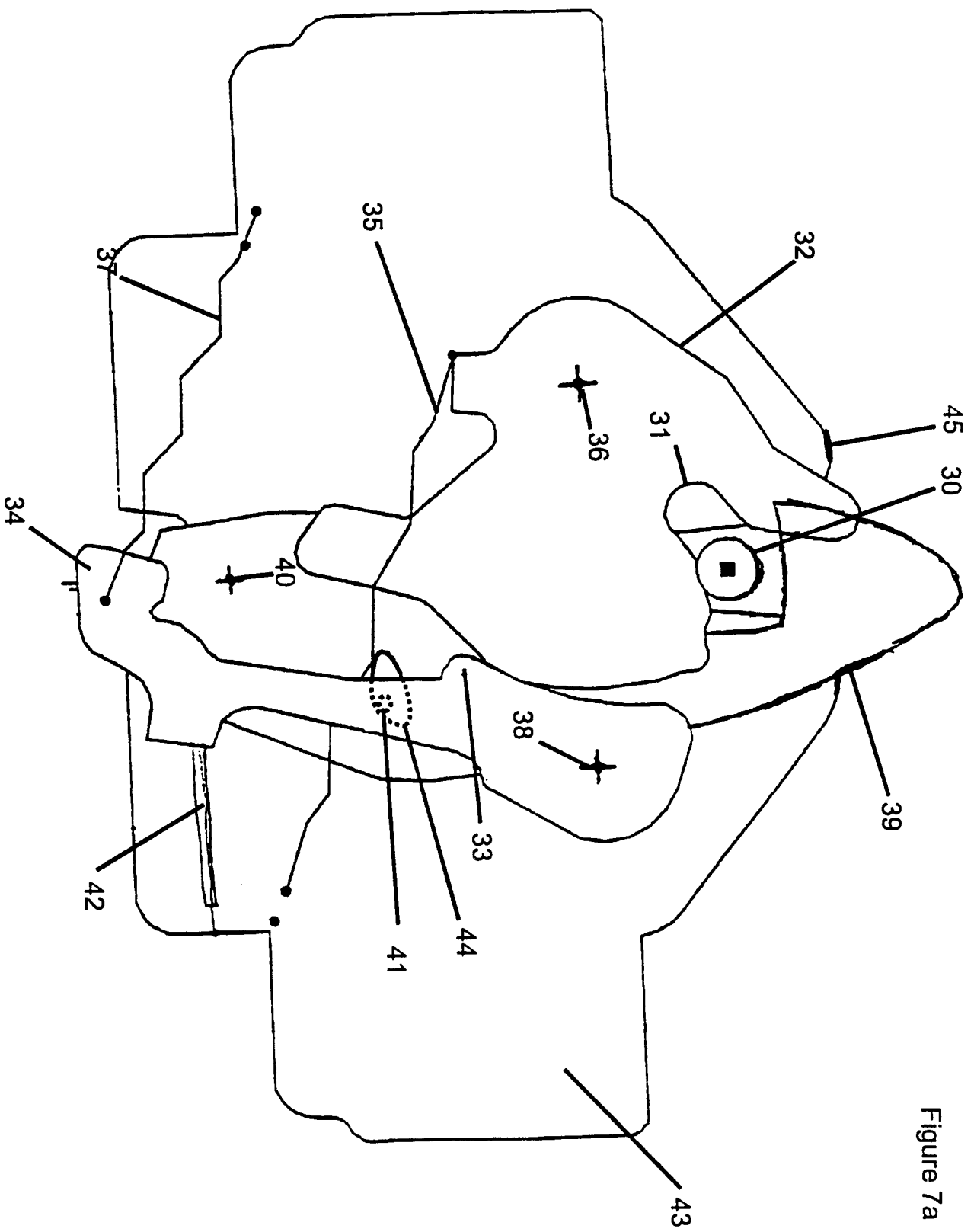


Figure 7b

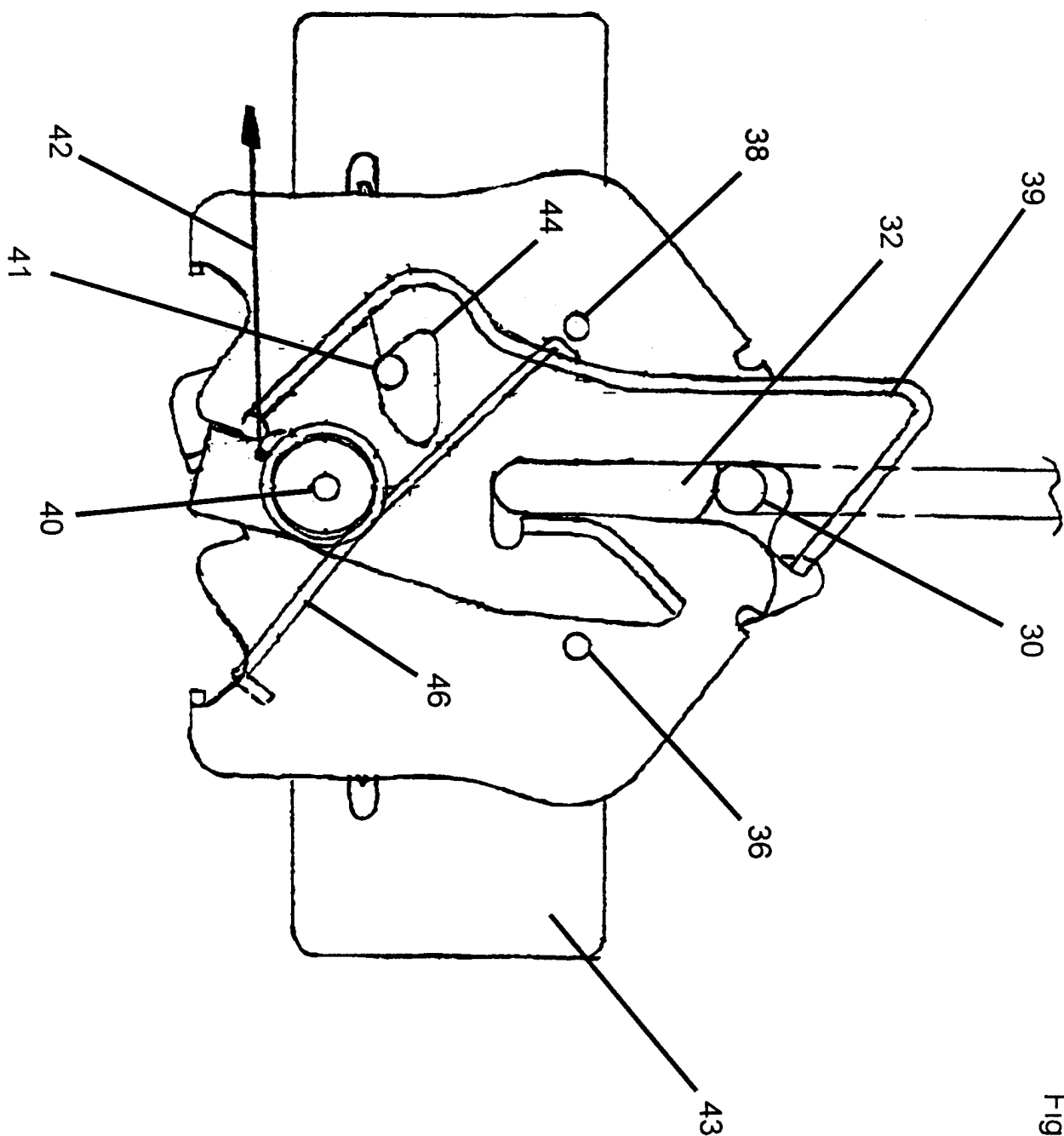
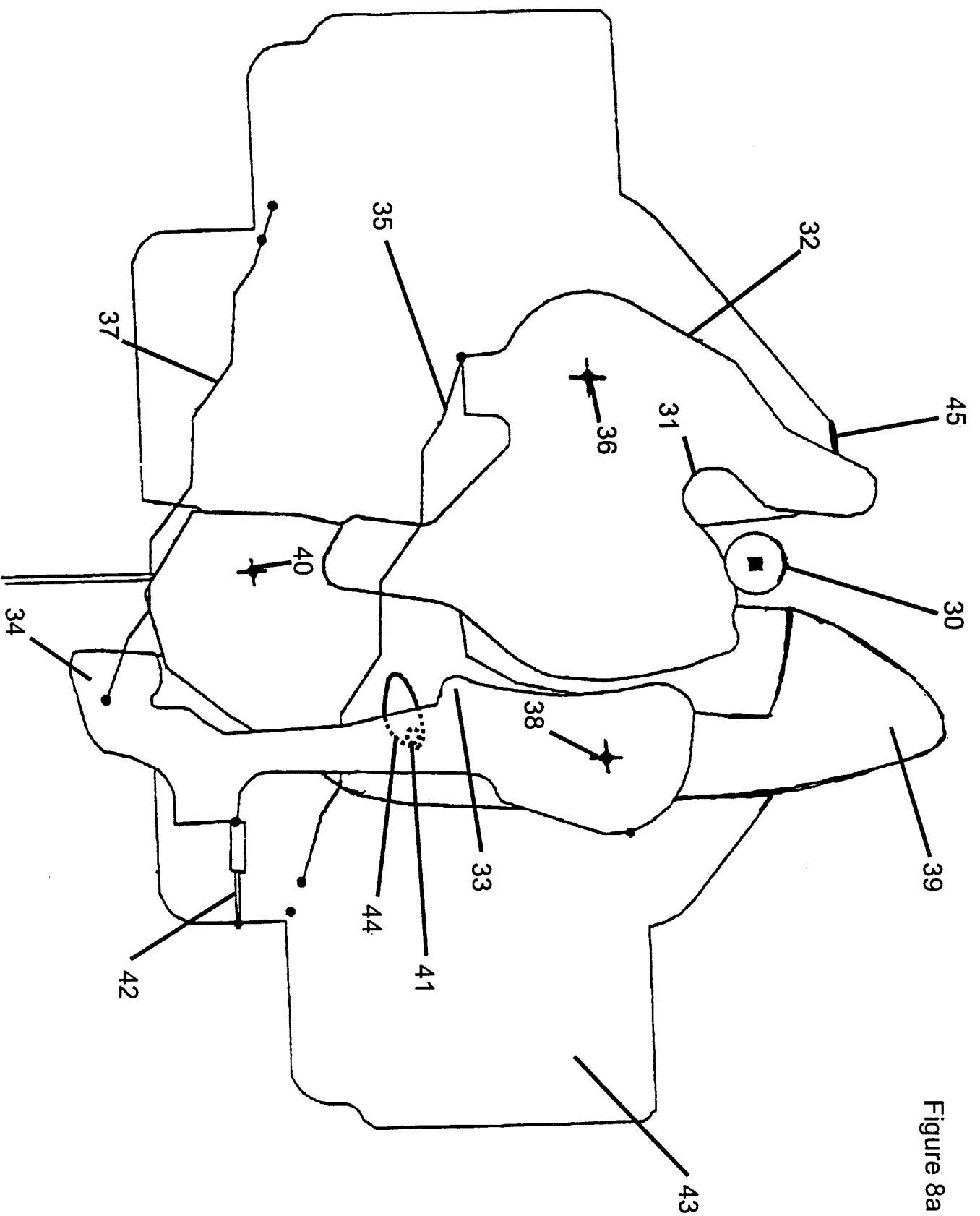


Figure 8a



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Figure 8b

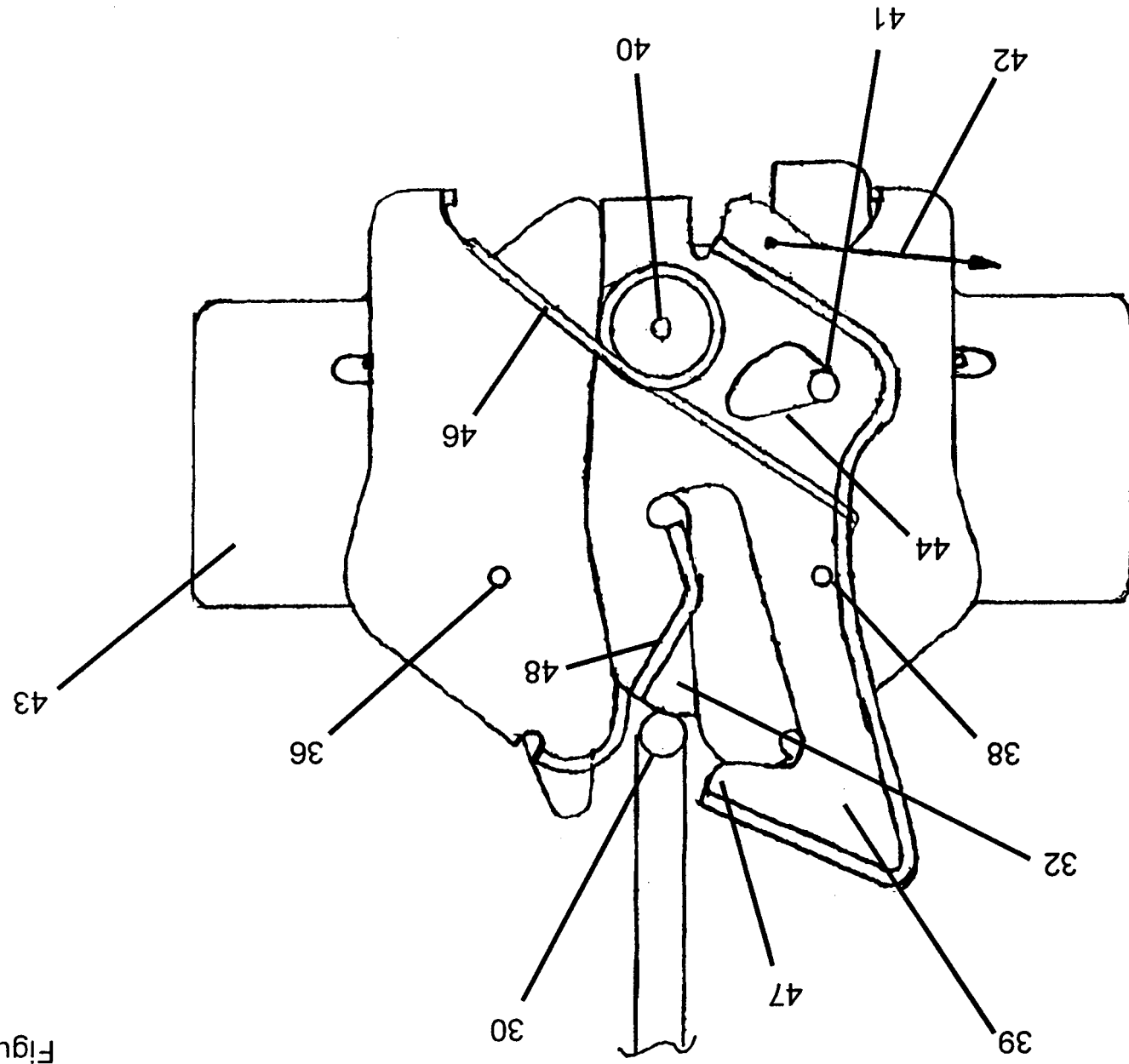
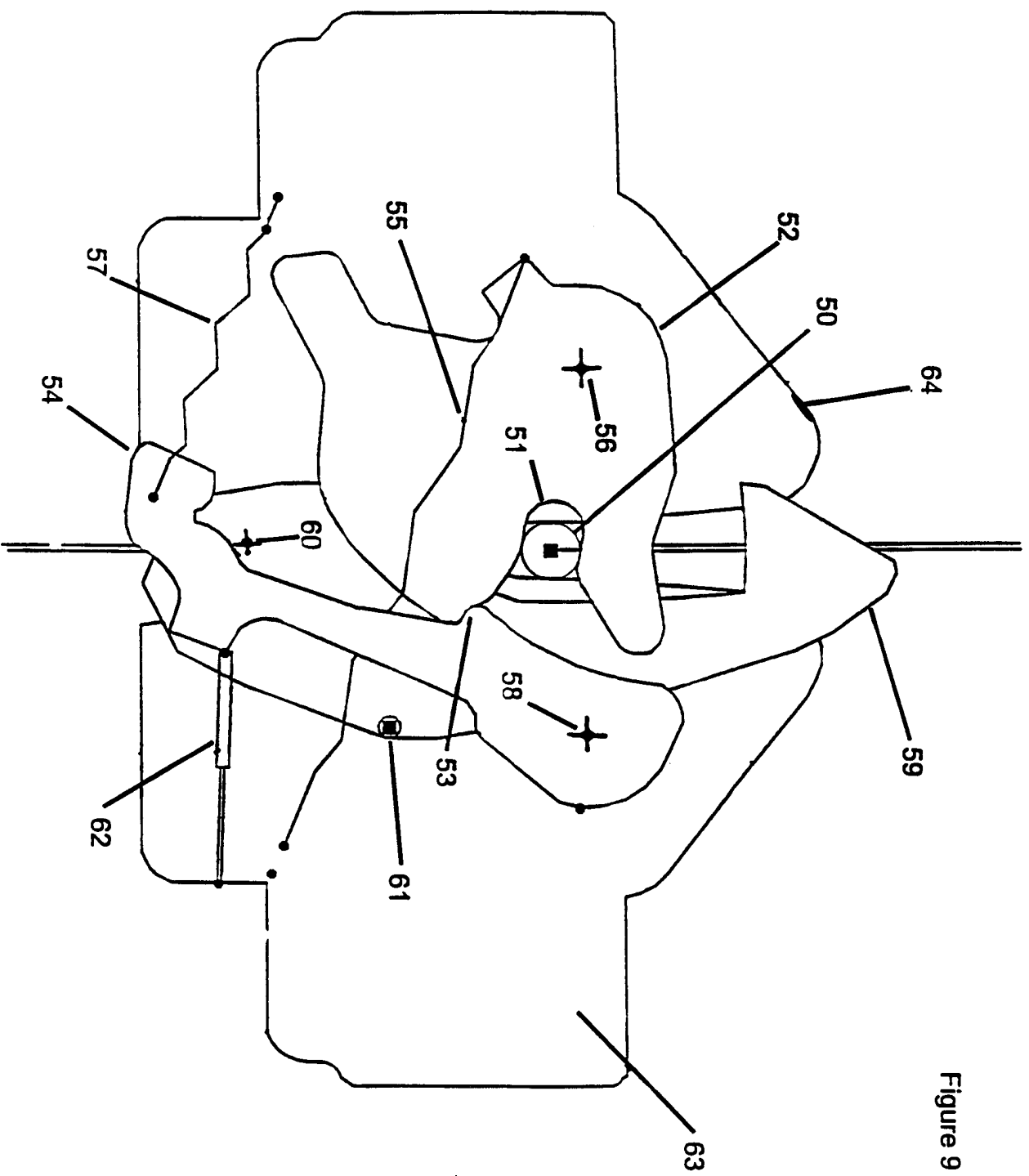


Figure 9



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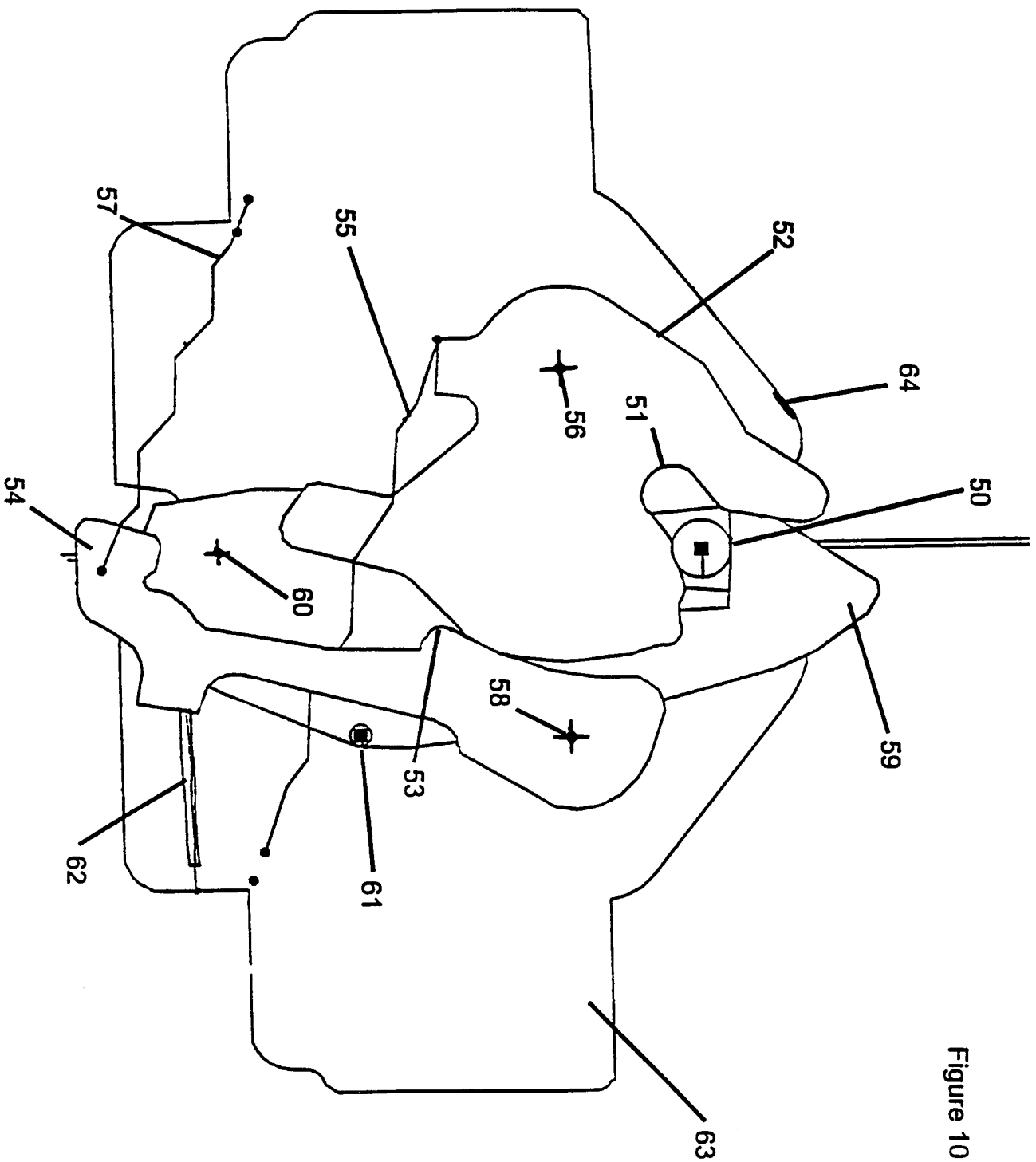


Figure 10

Figure 13a

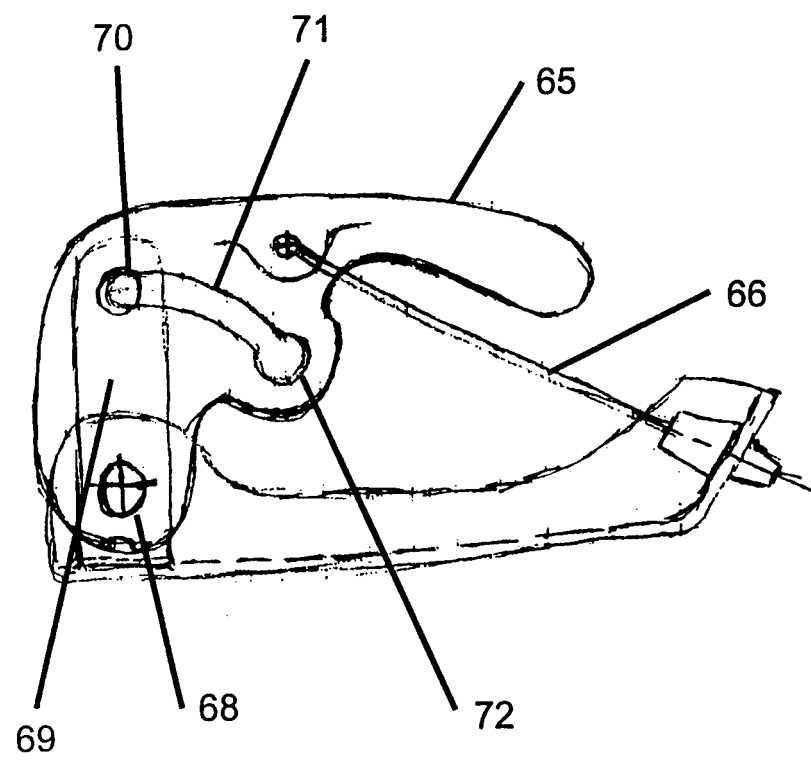
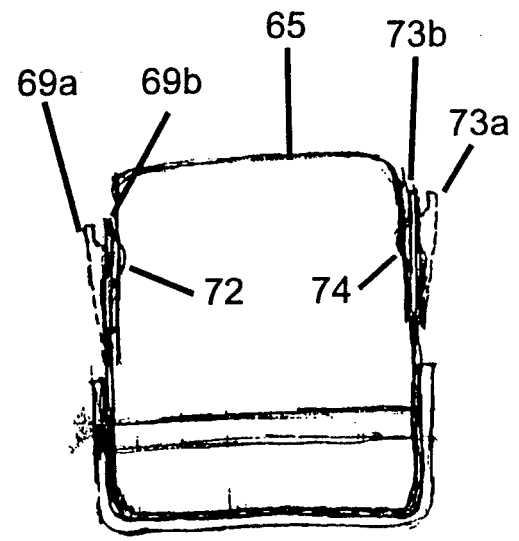


Figure 13b



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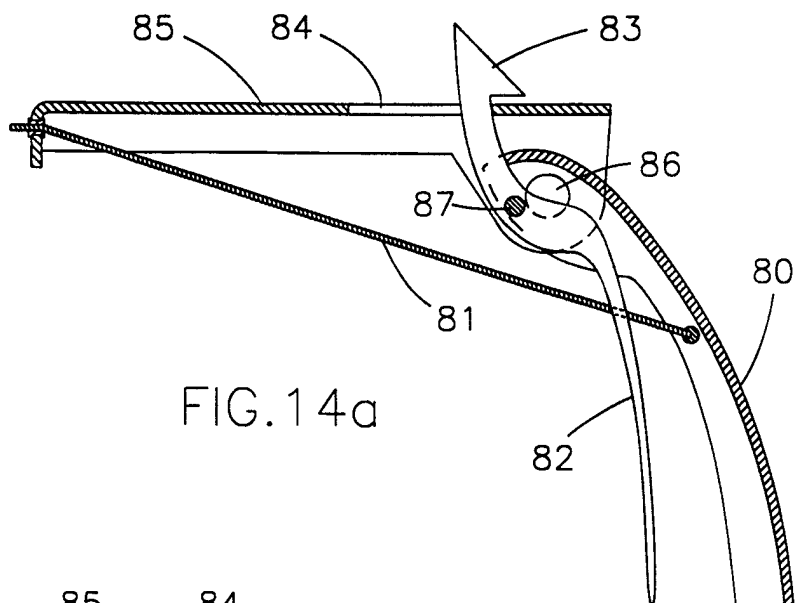


FIG. 14a

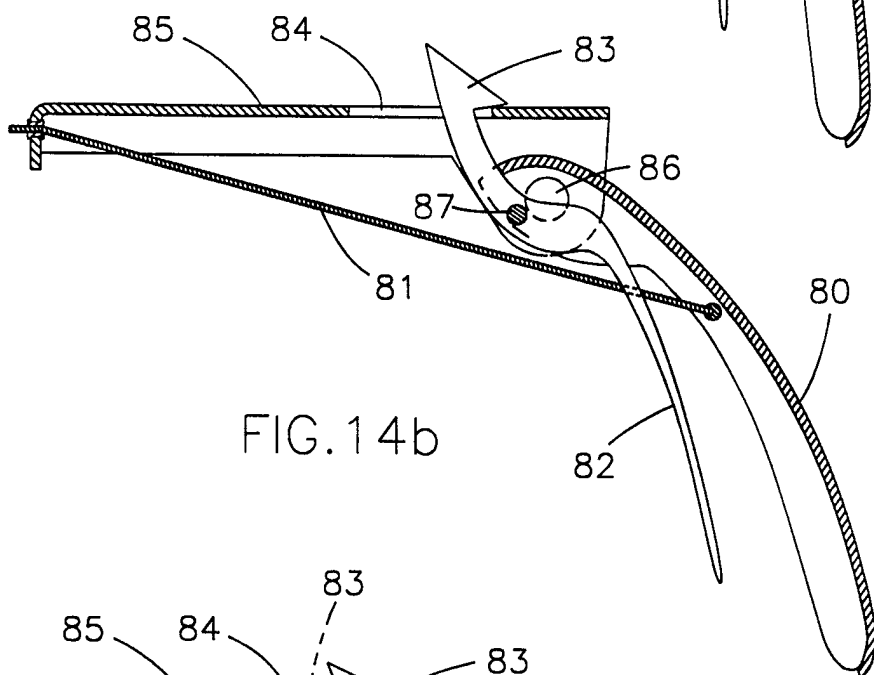


FIG. 14b

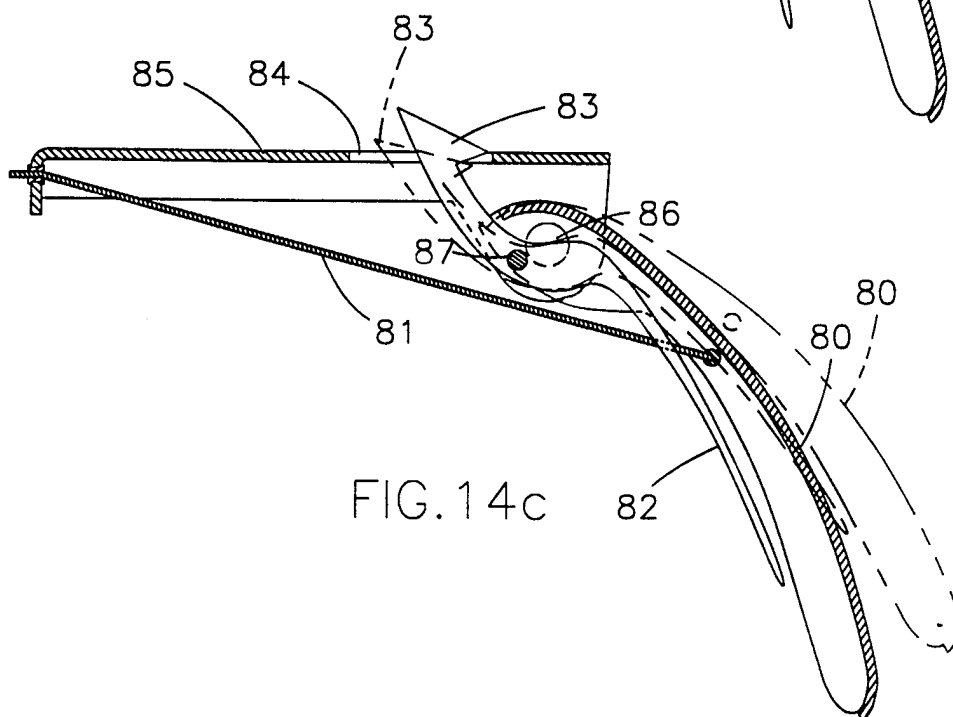
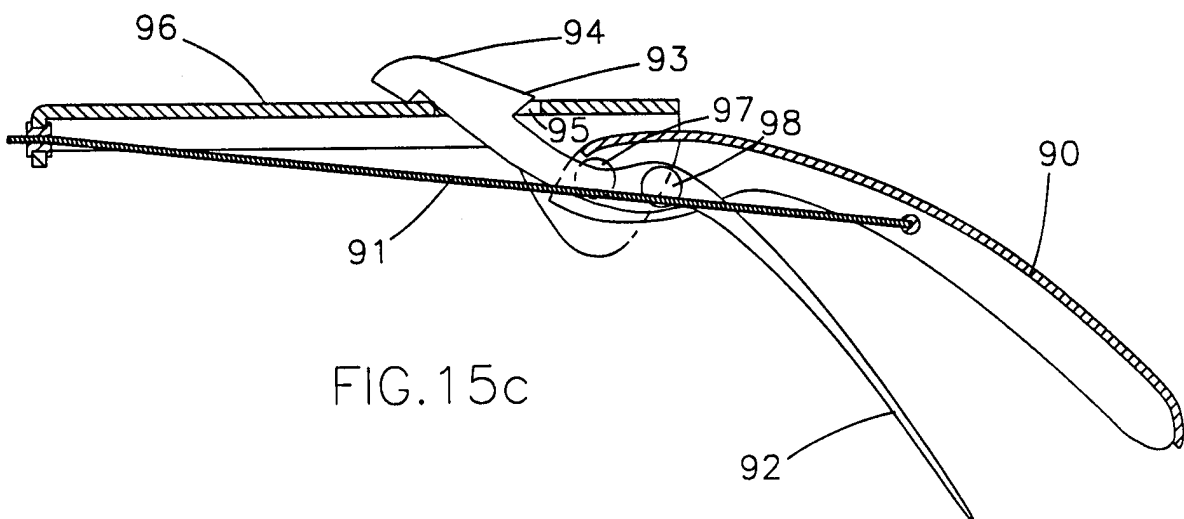
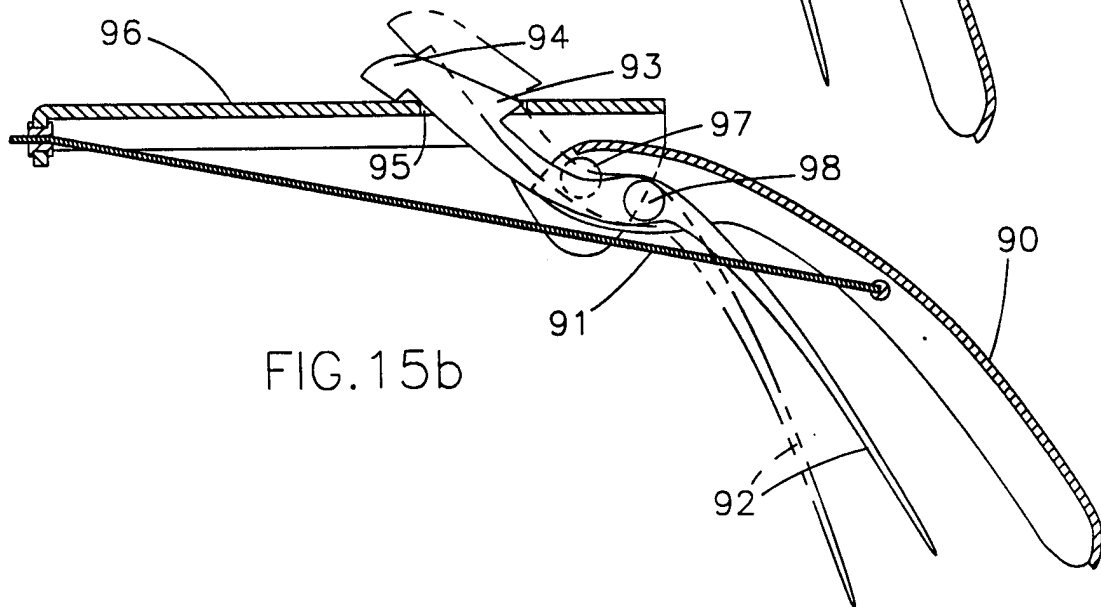
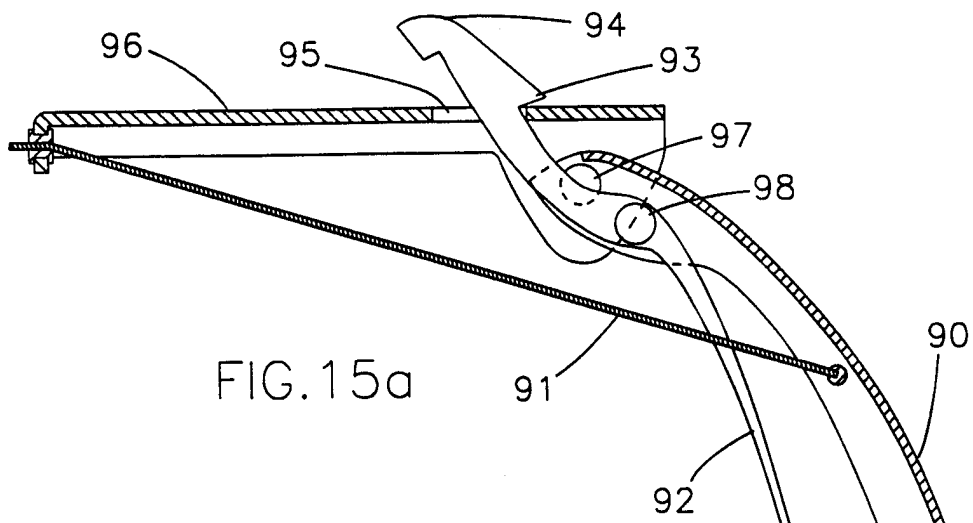
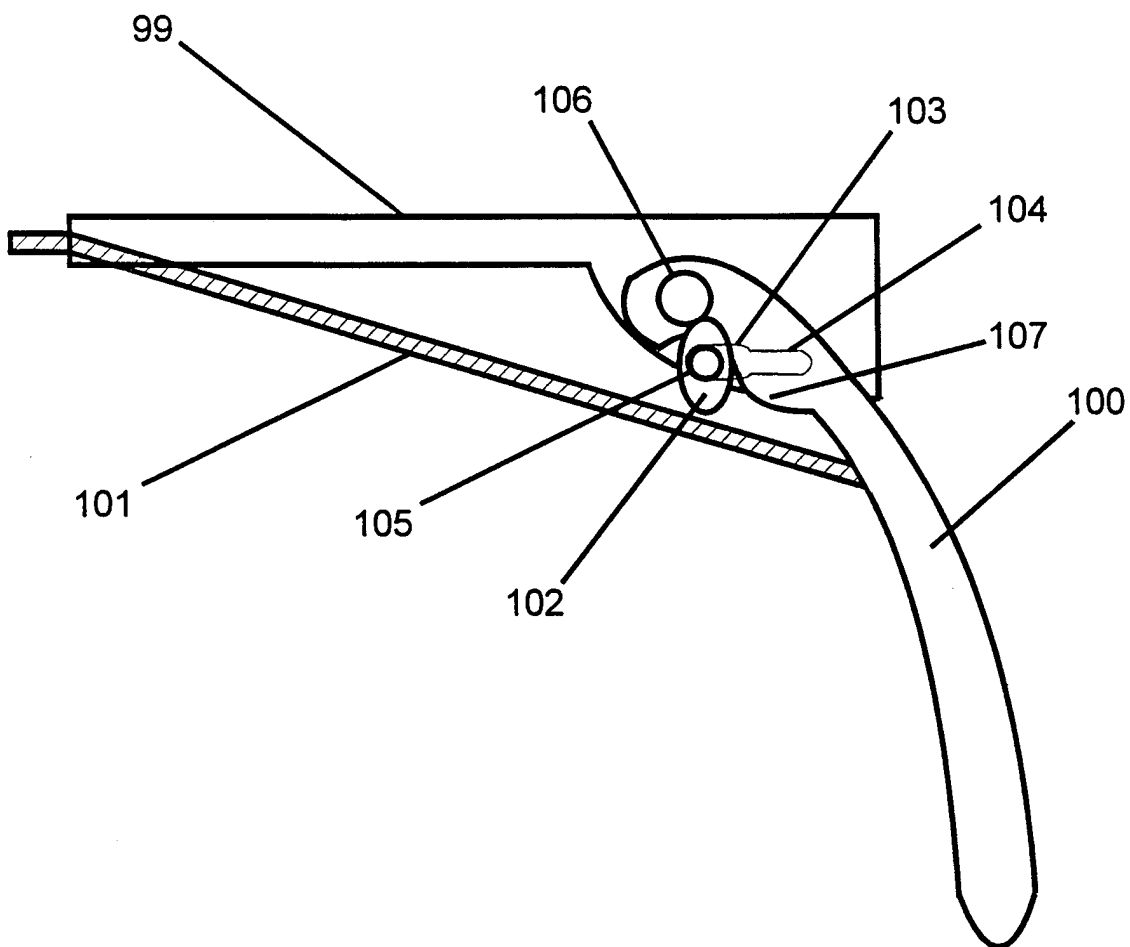


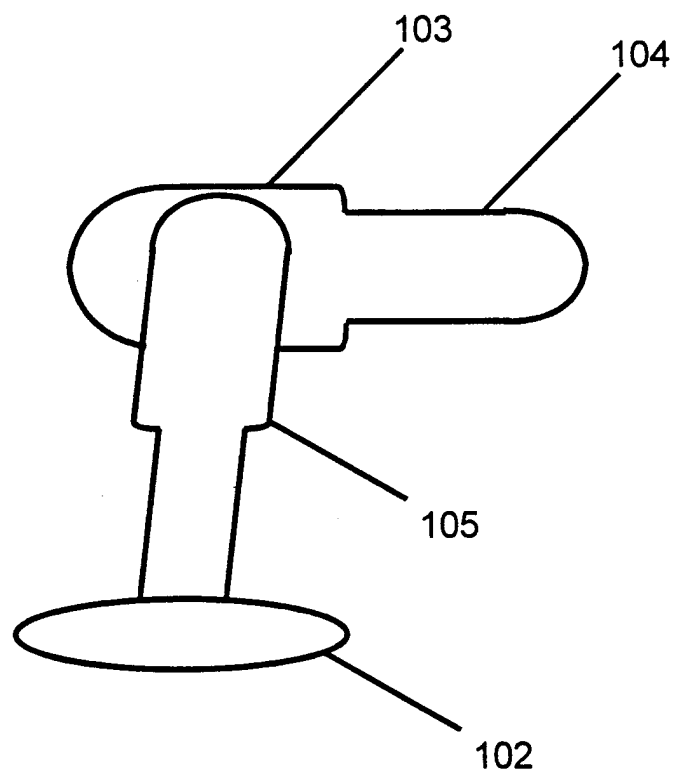
FIG. 14c



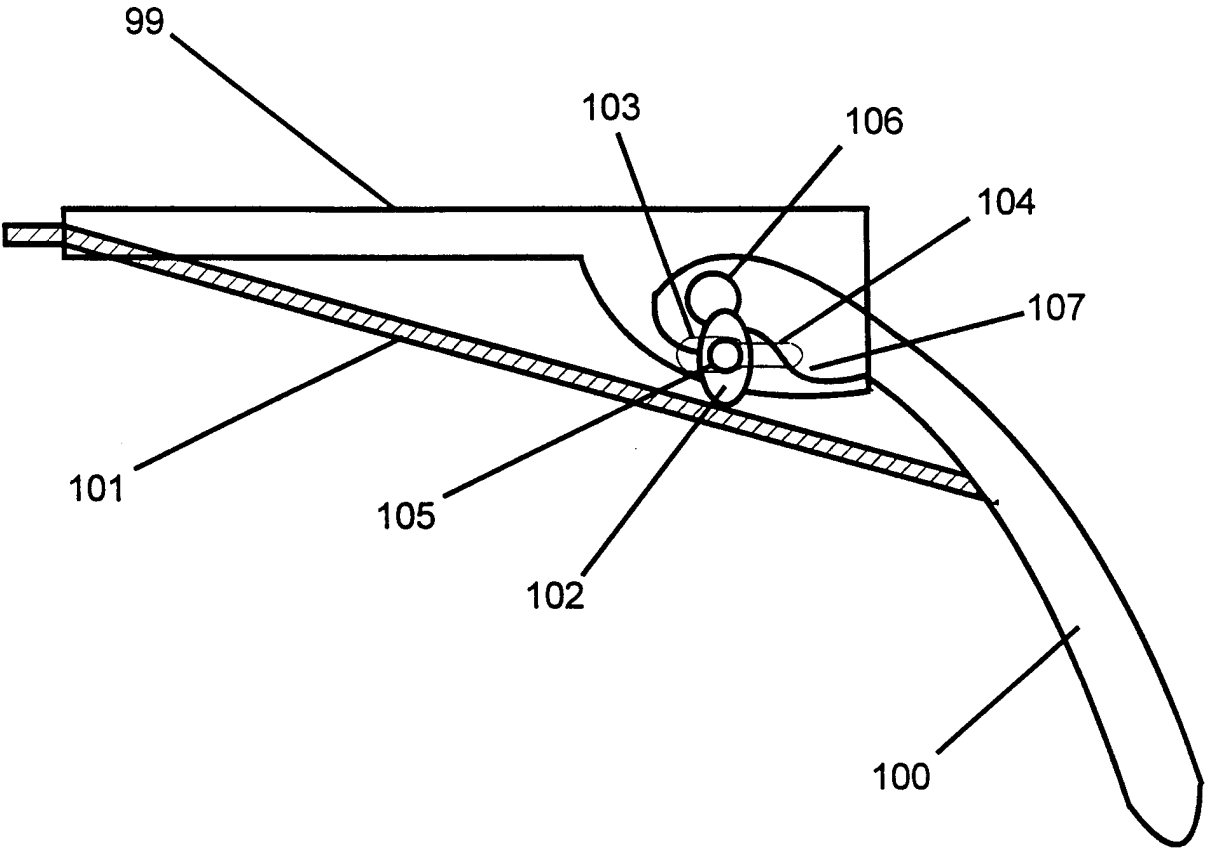
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Figure 16a



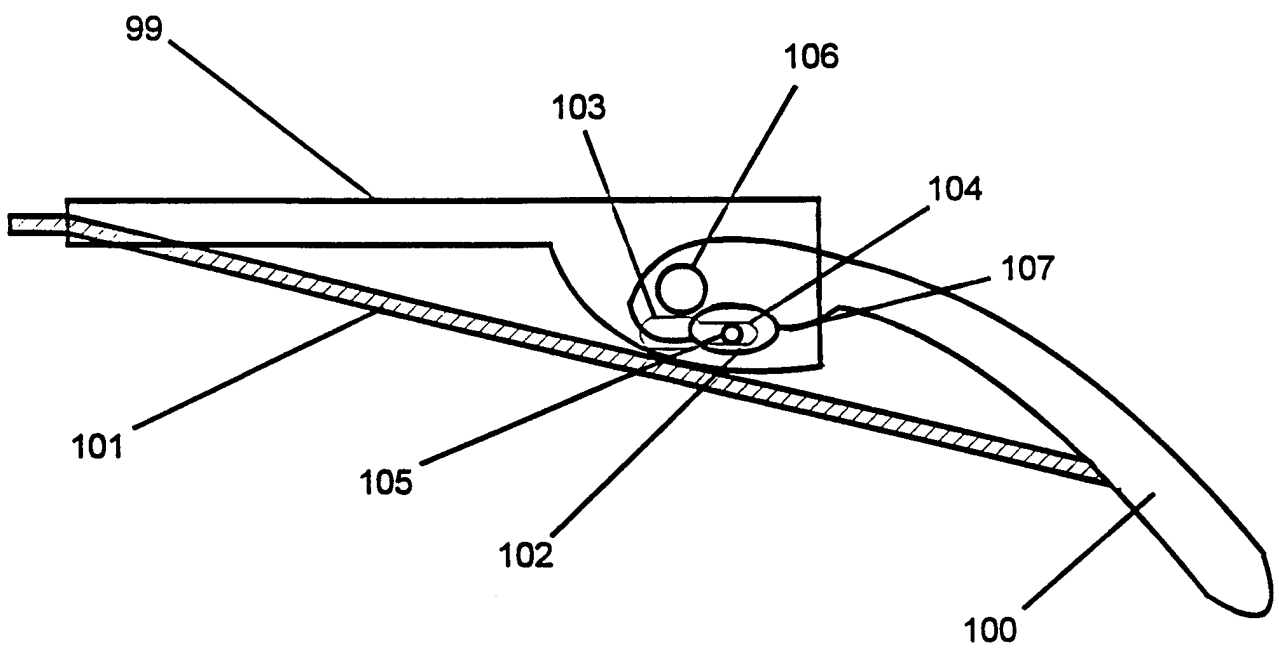
19/28
Figure 16b



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Figure 16c



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Figure 16d



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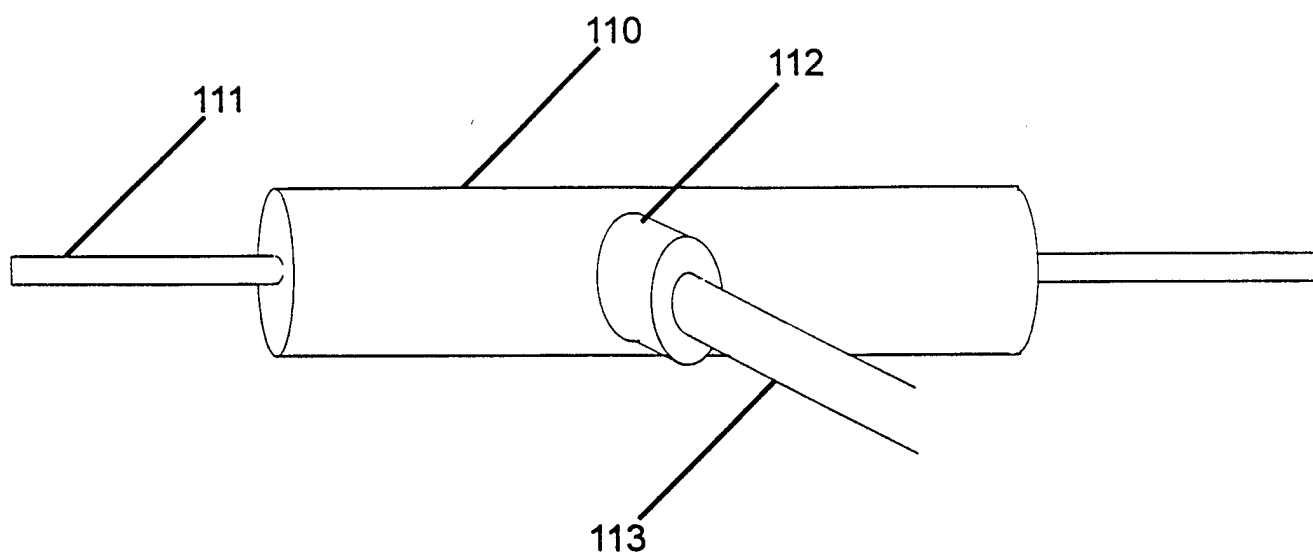


Figure 17a

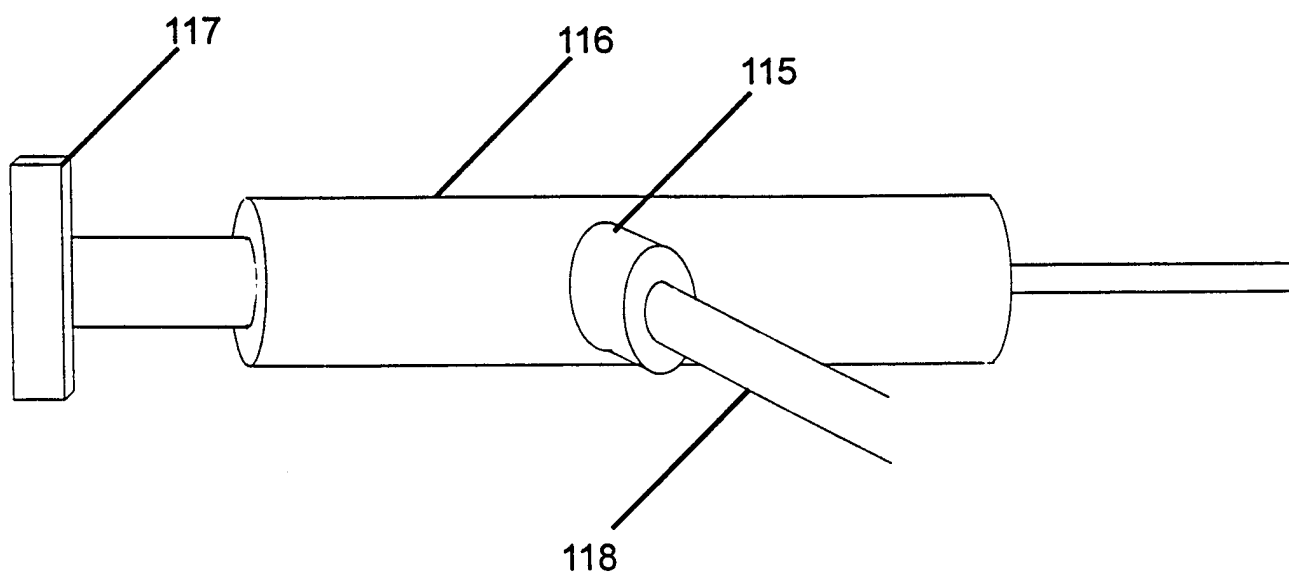
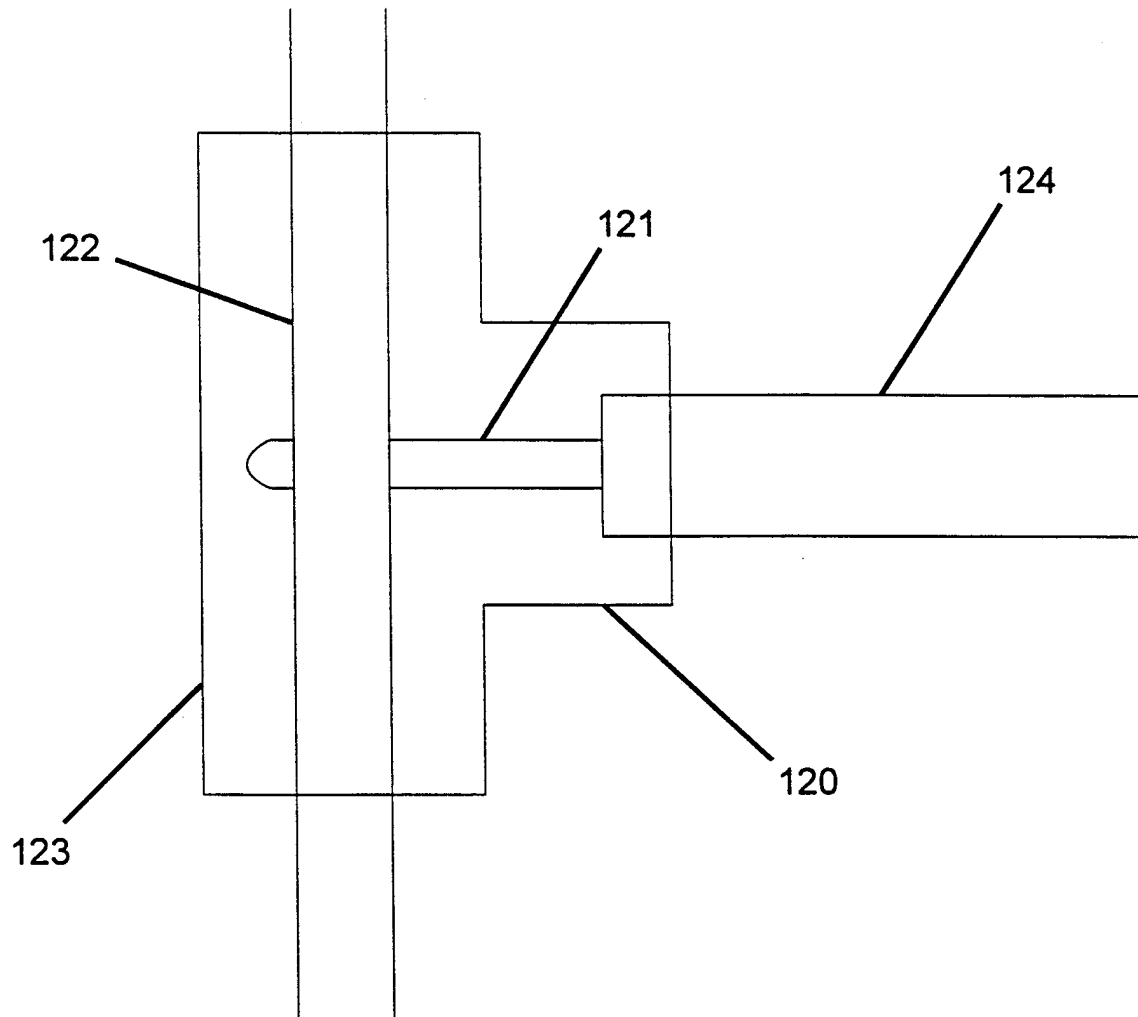
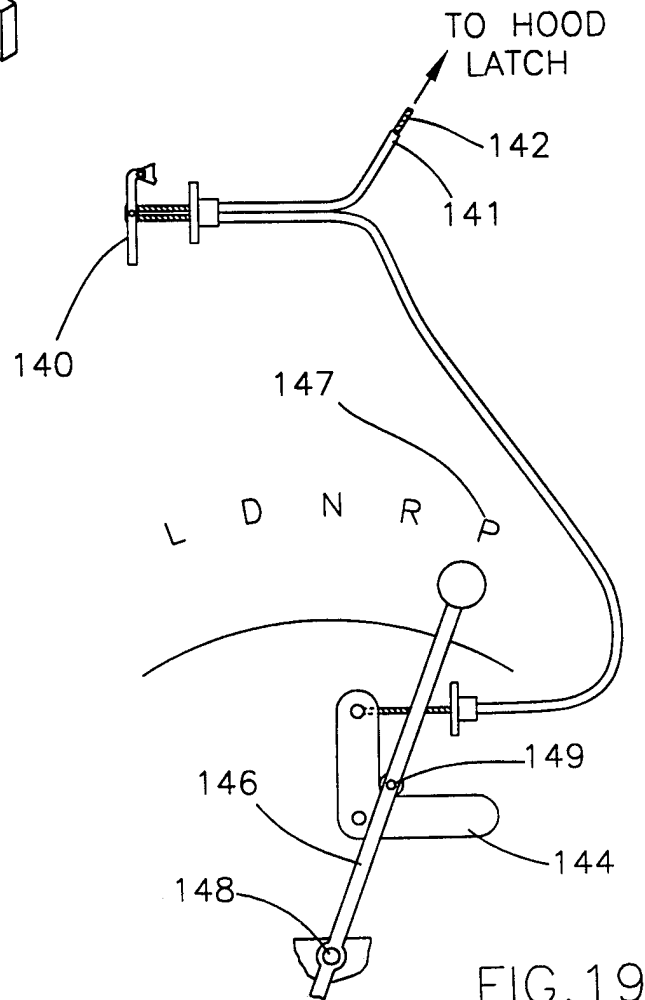
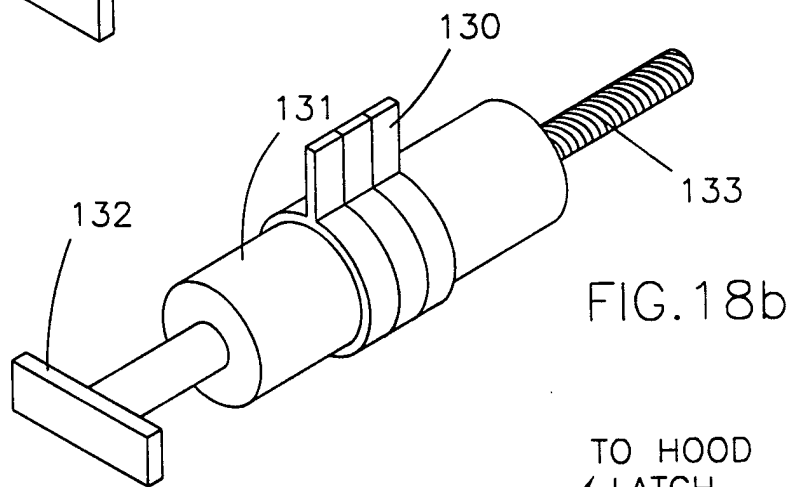
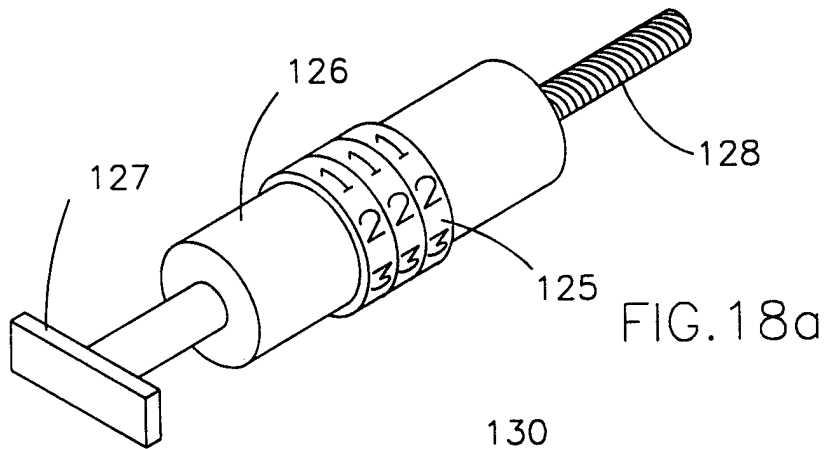


Figure 17b

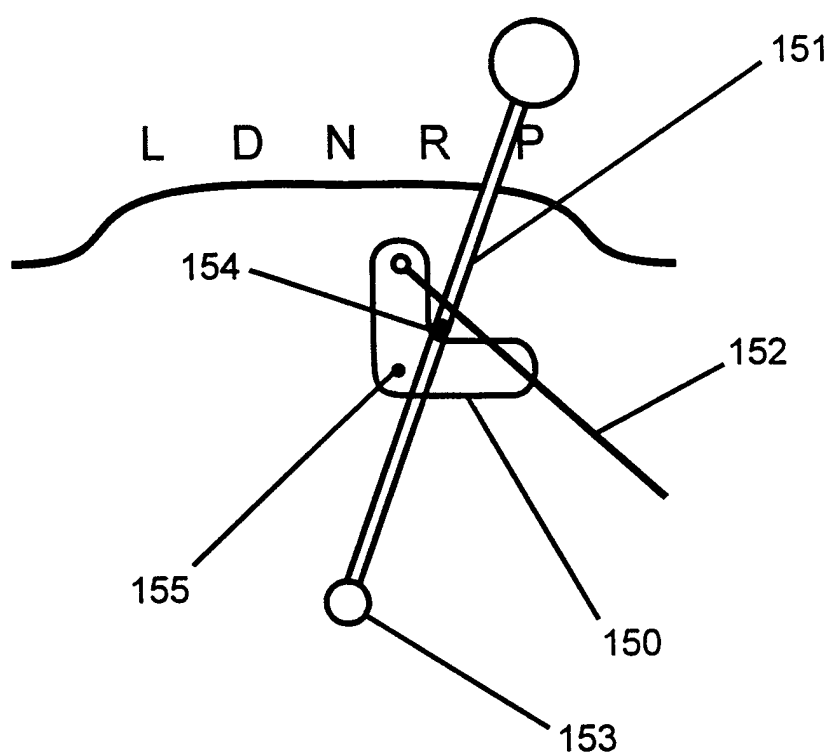
Figure 17c



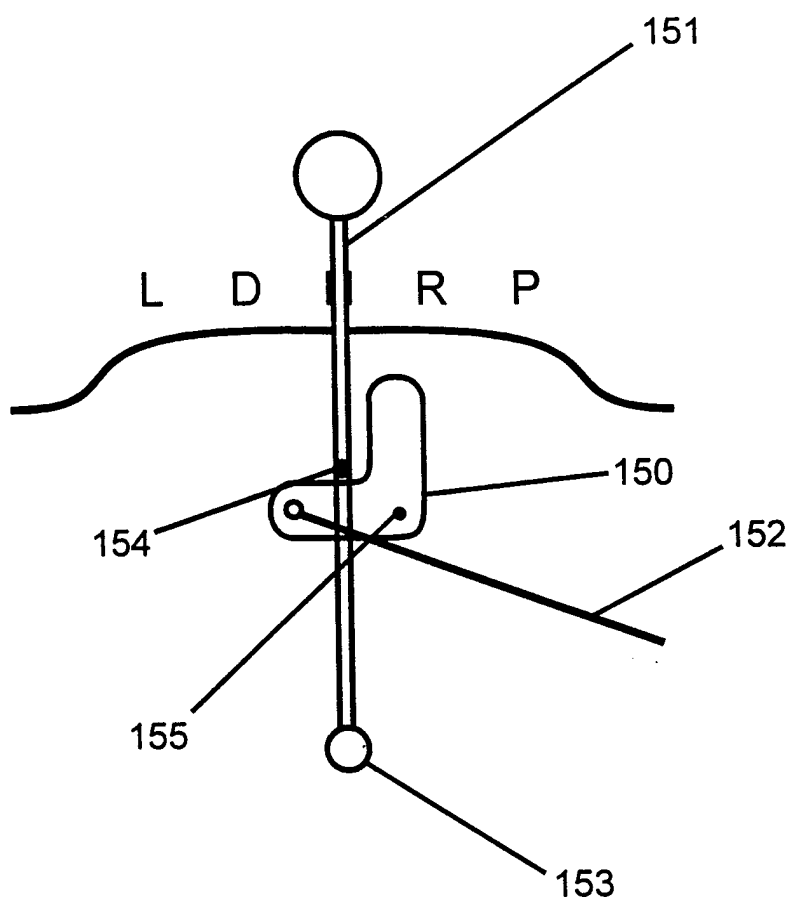
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Figure 20a



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Figure 20b



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Figure 20c

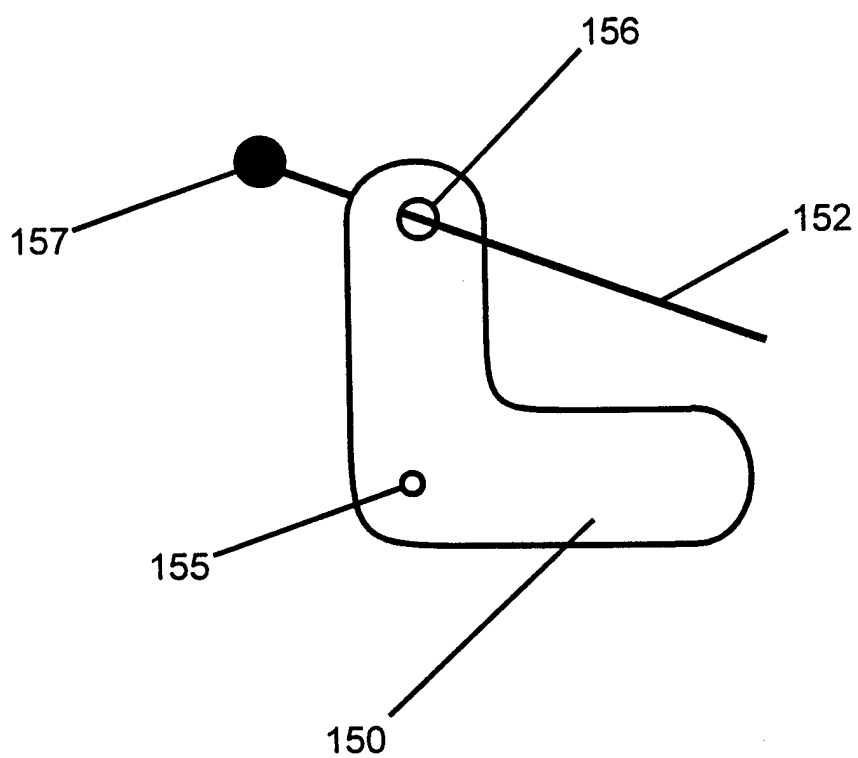
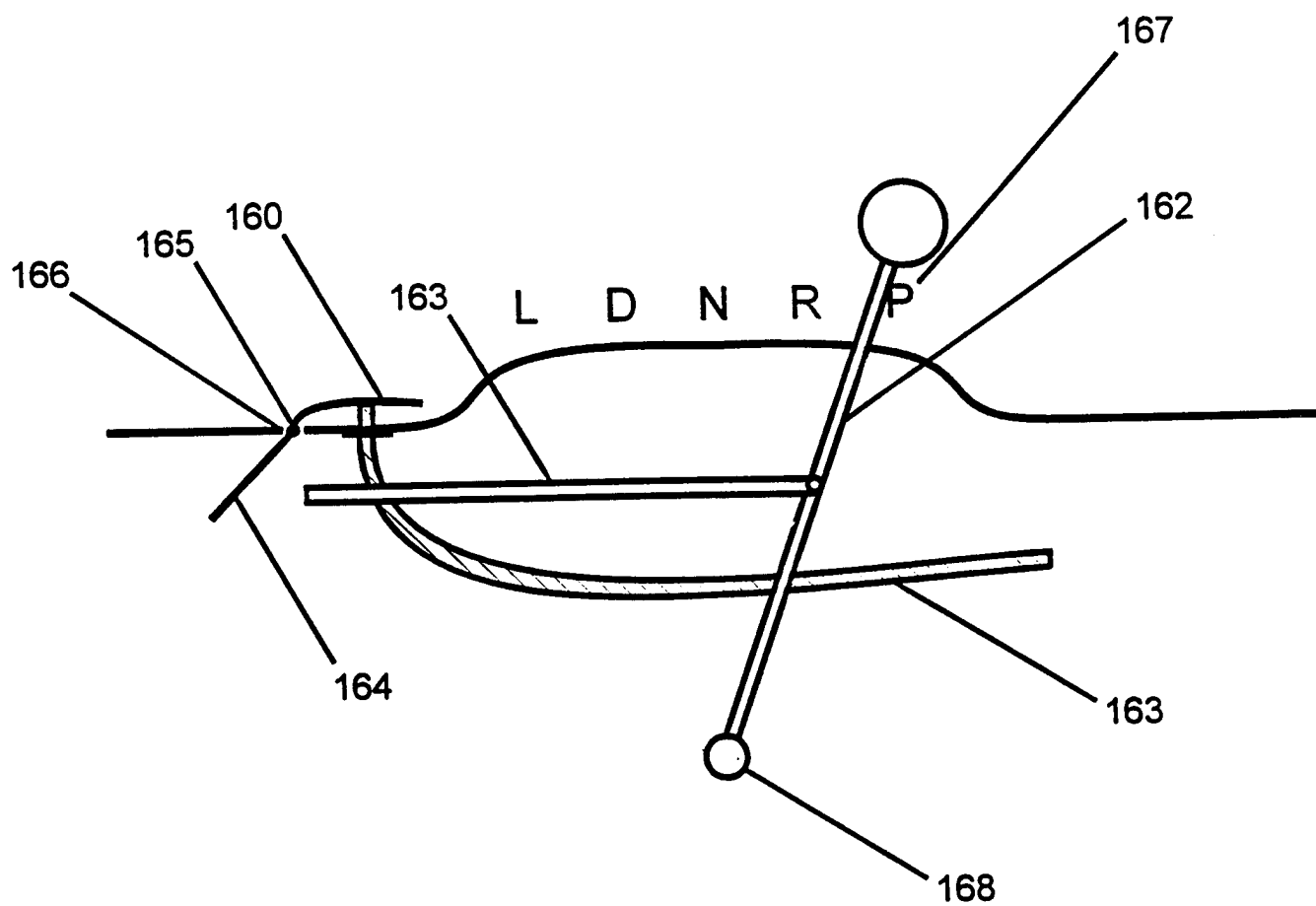


Figure 21



INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 98/05566

A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 E05B65/19

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 E05B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2 256 465 A (BRUBAKER) 23 September 1941	1-7, 12, 23-33
Y	see page 1, right-hand column, line 3 - page 2, right-hand column, line 64; figures	9, 10, 13-22

X	US 4 382 482 A (BRANDL MICHAEL C ET AL) 10 May 1983	1-3, 6, 8, 12, 24-30, 32, 33
	see column 2, line 9 - column 4, line 68; figures	

X	DE 44 43 034 A (BOCKLENBERG & MOTTE BOMORO) 26 October 1995	25, 33
	see column 2, line 50 - column 3, line 68; figures	

	-/--	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

14 July 1998

Date of mailing of the international search report

21/07/1998

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Henkes, R

INTERNATIONAL SEARCH REPORT

I. International Application No

PCT/US 98/05566

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5 535 608 A (BRIN CONSTANTIN) 16 July 1996 see column 2, line 15 - column 4, line 21; figures ----	9,10,13, 14
Y	WO 97 10976 A (MUL T LOCK TECHNOLOGIES LTD ;MATYKO ADALBERT (IL)) 27 March 1997 see page 3, line 11 - page 7, line 15; figures ----	15-22
P,A	EP 0 778 386 A (PORSCHE AG) 11 June 1997 see column 2, line 46 - column 5, line 4; figures ----	1,9-14, 23-25,33
A	DE 28 38 354 A (DAIMLER BENZ AG) 20 March 1980 see the whole document -----	1,9,10, 25,33

INTERNATIONAL SEARCH REPORT

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International Application No

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