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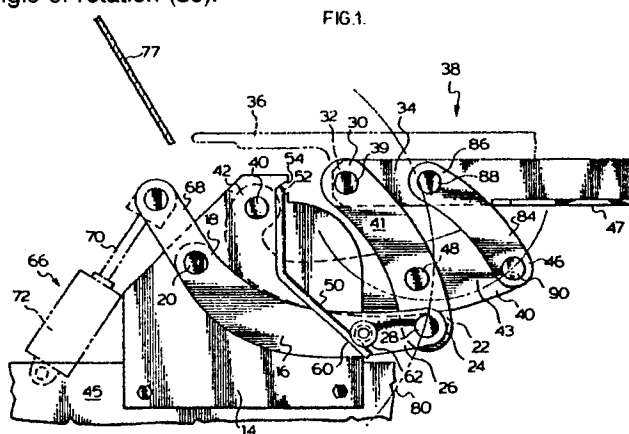
Applicant: **TECHFORM PRODUCTS LTD.**
14 Centennial Drive P.O. Box 359
Penetanguishene Ontario L0K 1P0(CA)

Inventor: **VandenHeuvel, Marinus T.**
14 Centennial Drive, P.O. Box 359
Penetanguishene Ontario(CA)
Inventor: **Weber, Reinhart**
14 Centennial Drive, P.O. Box 359
Penetanguishene Ontario(CA)
Inventor: **Wolda, Tiete O.**
14 Centennial Drive, P.O. Box 359
Penetanguishene Ontario(CA)

Representative: **Lemke, Jörg-Michael,**
Dipl.-Ing.
Wolframstrasse 9
D-8900 Augsburg(DE)

Dual motion closure deck lid hinge.

A hinge mechanism for mounting a decklid (38) of motor vehicles such as a trunk lid for pivoting the decklid upwardly and away from the adjacent wall or window (77) of the vehicle. The hinge mechanism comprises a pair of inter-connected compounded four-bar linkages wherein the primary four-bar linkage (10) partially pivots the decklid upwardly and away from the vehicle body and the secondary four-bar linkage (12) completes pivotal movement of the decklid through a desired angle of rotation (80).



BACKGROUND OF THE INVENTION

This invention relates to a hinge system and, more particularly, relates to a hinge system for use with decklids of motor vehicles.

Most passenger motor vehicles are equipped with a luggage compartment which is closed by a trunk lid or decklid. The decklid is generally pivoted at or in the vicinity of its forward or inner edge.

When the decklid is open there are certain dimensional specifications pertaining to the clearance between a person's head and the rearward edge of the decklid on one hand and the body of the vehicle and the forward edge on the other.

The styling of the vehicle body and particularly the angle and the amount of curvature of the rear glass in the horizontal plane together with the aforementioned dimensional specifications, often pose a problem in the hinge design which problem cannot be solved satisfactorily by a simple hinge without adding an additional stationary panel between the glass and the forward edge of the decklid, or other equally undesirable compromises.

It is a principal object of this invention to overcome this problem by providing a rotating as well as a translating motion of the decklid away from the rear window glass of a vehicle. The hinge support mechanism thus can be located below and behind the rear window shelf of the vehicle without interfering with or extending up into the window shelf.

A secondary problem common to many conventional hinge systems of vehicles is the space they occupy inside the luggage compartment, thus reducing the actual volume of luggage that may be carried.

It is another object of the hinge system of the present invention to minimise the amount of luggage space taken up by the said hinge system by virtue of its small size and its location, i.e. close to the perimeter of the luggage compartment, making it easier to meet luggage volume specifications.

Due to the location of the effective pivot point of the hinge system, the moment exerted by the weight of the decklid times the effective arm at the pivot point is reduced, compared to conventional systems, since the effective arm is shorter. This in turn allows a reduction in the size of the counter balance springs and any optional mechanical actuators. In effect, the total lift height of the centre of gravity of the decklid is reduced, thereby reducing the required amount of energy stored in the counterbalance system.

The reduced amount also means that the load on the stationary support system is reduced resulting in less deflection or lighter components. The small size of this hinge also allows its application in

the most advantageous manner from the perspective of strength and rigidity.

This invention allows one to utilize different methods of counter balancing the weight of the decklid since the mechanism is open and accessible to make suitable connection for torsion bar springs, coil springs or other energy storage devices.

It is also suited to operation by a mechanical, remote controlled actuator. To limit the movement of the decklid, a stop can be built integrally with the hinge mechanism.

SUMMARY OF THE INVENTION

In its broad aspect, the hinge assembly of the invention for pivotally mounting a decklid to a vehicle body comprises a first compounded four-bar linkage having a hinge base link for securement to the vehicle body and a second compounded four-bar linkage having two links common to said first compounded linkage and including link for securement to an inner end of the decklid for pivoting the decklid upwardly and away from the vehicle body and for pivoting distal end of the decklid upwardly relative to its inner end.

More specifically, the hinge assembly of the invention for pivotally mounting a decklid to a vehicle body comprises a hinge base link for securement to the vehicle body, a second link pivotally connected at an inner end to said base link; a third link pivotally connected at one end to the opposite distal end of said second link and pivotally connected at the other end to an end of a fixed link for securement to the inner end of the decklid; a fourth link pivotally connected at an inner end to the base link at a point spaced from the pivotal connection of the second link thereto, said fourth link being pivotally connected at an intermediate point of the third link, whereby pivotal movement of the second link or the fourth link about the base link causes the fourth link in combination with the third link to pivot the said inner end of the decklid upwardly and away from the vehicle body and a fifth link pivotally connected at one end to the opposite end of the fourth link and pivotally connected at the opposite end to the fixed link for securement to the decklid a spaced distance outboard from the said inner end of the said fixed link, whereby the distal end of the decklid is pivoted upwardly relative to the inner end of the decklid by pivotal movement of the said opposite end of the fourth link in combination with the third and fifth links and the said fixed link.

The second link or fourth link may have an extension of the inner end and means which may comprise one of a double-acting fluid cylinder and rod assembly, rod actuated by a screw gear assembly or a rack and pinion gear assembly pivotally secured to said link extension and to the vehicle body preferably are provided to pivot said second or fourth link.

BRIEF DESCRIPTION OF THE DRAWINGS

The apparatus of the invention will now be described in reference to the accompanying drawings, in which:

Figure 1 is a side elevation of the mechanism of the hinge mechanism of the present invention in a fully closed position;

Figure 2 is a side elevation of the hinge mechanism shown in Figure 1 in a fully opened position;

Figure 3 is a perspective view of the embodiment of the hinge mechanism of the present invention in an almost opened position; and

Figure 4 is an exploded perspective view of the components of the hinge mechanism shown in Figure 3.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The mechanism of the invention, described with reference to Figures 1 - 4 of the drawings, comprises in principle two compounded, four-bar linkages 10, 12 usually formed of steel. The primary compounded linkage 10 consists of the combination of a fixed hinge base link 14 and a linkage forming a quadrilateral with the hinge base link 14 consisting of a second link 16 pivotally connected at its inner end 18 by rivet 20 to hinge base link 14, a third link 22 pivotally connected at one end 24 to the opposite end 26 of second link 16 by rivet 28 and at the opposite end 30 to the inner end 32 of link 34 secured to the inner end 36 of decklid 38 by rivet 39, and a fourth link 40 connected at its inner end 42 to hinge base link 14 a spaced distance from rivet 20 by rivet 44 and at a point intermediate inner end 42 and distal end 46 indicated by rivet 48 intermediate the ends 24, 30 of link 22. With reference to Figure 2, link flange 47 is shown attached to the decklid inner liner 49.

Hinge base link 14 is secured to the vehicle main support frame, i.e. the vehicle body depicted by numeral 45, by bolts or the like securing means. This first or primary compounded linkage has a torsion rod 50 having a substantially right-angle bend 52 seated adjacent notch 54 of hinge base

plate 14 with the inner end 56 extending across the vehicle body and secured thereto. The opposite end 60 of torsion rod 56 is biased against and abuts roller 62 secured to link 16 in proximity to its distal end 26 to urge distal end 26 and associated linkage upwardly and to counter-balance the weight of decklid 38.

It may be desired for certain applications that link 16 or link 40 be assisted by an additional power source capable of pivoting said links in both directions for opening and closing the decklid. For example, a power source such as a double-acting fluid cylinder rod assembly 66 shown by ghost lines in Figure 1 having a rod 70 actuated by a pressure cylinder 72, a rod actuated by a screw gear (not shown) or a rack and pinion gear (not shown), may be pivotally connected to extension 68 of link 16 or to a similar extension of link 40, to raise and lower the lid under the control of an electrical circuit actuated by a dash-board switch or by the vehicle decklid key and lock mechanism (not shown).

Link 16 provides a circular trajectory 80 for the connection between links 16 and 22 which contributes to the motion pattern of inner end of output link 34 and, the decklid 38 secured thereto through link 40, the roll lever. Thus decklid 38 can be pivoted upwardly and away from the adjacent wall or window 77 of the vehicle body by opening and extension of the hinge linkage as shown in Figure 2. The secondary compounded linkage 12 consists of the combination of the extension 41 of third link 22 and the extension 43 of fourth link 40 pivotally connected to each other at rivet 48, the extension 41 of third link 22 being pivotally connected to the inner end 32 of link 34 which is rigidly connected to the inner end of decklid 38, and fifth link 84 pivotally connected at one end 86 to link 34 by rivet 88 outboard of the connection of the extension 41 of third link 22 and pivotally connected at its opposite end to the distal end of link 40 by rivet 90.

Links 22, 40 and 84 with link 34 thus form a second four-bar linkage i.e., form a secondary quadrilateral, which is actuated by extension and closure of the primary four-bar linkage to complete pivotal movement of decklid 38 through about 90° as illustrated.

The present invention provides a number of important advantages. A hinge mechanism secured to each side of a decklid for mounting the decklid on a vehicle body is compact in size and occupies little space in a vehicle trunk. The lengths and shapes of the levers can be varied to design an output curve to match a particular situation.

Pivotal movement of a decklid upwards and away from the vehicle body for angular rotation of as much as 90° or more allows ready access to a

vehicle trunk.

It will be understood, of course that modifications can be made in the embodiment of the invention illustrated and described herein without departing from the scope and purview of the invention as defined by the appended claims.

Claims

1. A hinge assembly for pivotally mounting a decklid to a vehicle body comprising, in combination: a first compounded four-bar linkage having a hinge base link for securement to the vehicle body and a second compounded four-bar linkage having two links common to said first compounded linkage and including link for securement to an inner end of the decklid for pivoting the decklid upwardly and away from the vehicle body and for pivoting distal end of the decklid upwardly relative to its inner end.

2. A hinge assembly as claimed in claim 1 in which power means are provided to pivot said first compounded four-bar linkage.

3. A hinge assembly as claimed in claim 1 in which said means to pivot said first compounded four-bar linkage is one of a double acting fluid cylinder and rod assembly, a rod actuated by a screw gear assembly or a rack and pinion gear assembly.

4. A hinge assembly for pivotally mounting a decklid to a vehicle body comprising in combination: a hinge base link for securement to the vehicle body; a second link pivotally connected at an inner end to said base link; a third link pivotally connected at one end to the opposite distal end of said second link and pivotally connected at the other end to an end of a fixed link for securement to the inner end of the decklid; a fourth link pivotally connected at an inner end to the base link at a point spaced from the pivotal connection of the second link thereto, said fourth link being pivotally connected at an intermediate point of the third link, whereby pivotal movement of the second link or the fourth link about the base link causes the fourth link in combination with the third link to pivot the said inner end of the decklid upwardly and away from the vehicle body; and a fifth link pivotally connected at one end to the opposite end of the fourth link and pivotally connected at the opposite end to the fixed link for securement to the decklid a spaced distance outboard from the said inner end of the said fixed link, whereby the distal end of the decklid is pivotted upwardly relative to the inner end of the decklid by pivotal movement of the said opposite end of the fourth link in combination with the third and fifth links and the said fixed link.

5. A hinge assembly as claimed in claim 4 in

which means are provided to pivot said second or fourth link about the base link to open and close the decklid.

6. A hinge assembly as claimed in claim 5 in which one of said second and fourth link has an extension of the inner end and said means to pivot said second or fourth link comprises one of a double-acting fluid cylinder and rod assembly, rod actuated by a screw gear assembly or a rack and pinion gear assembly pivotally secured to said link extension and to the vehicle body and energizing means adapted to be user actuated operatively connected to said means to pivot the second link.

7. A hinge assembly as claimed in claim 4 in which a torsion rod is operatively connected to the second link in proximity to its distal end for counter balancing the weight of the decklid.

8. A hinge assembly as claimed in claim 5 in which a torsion rod is operatively connected to the second link in proximity to its distal end for counter balancing the weight of the decklid.

9. A hinge assembly as claimed in claim 6 in which a torsion rod is operatively connected to the second link in proximity to its distal end for counter balancing the weight of the decklid.

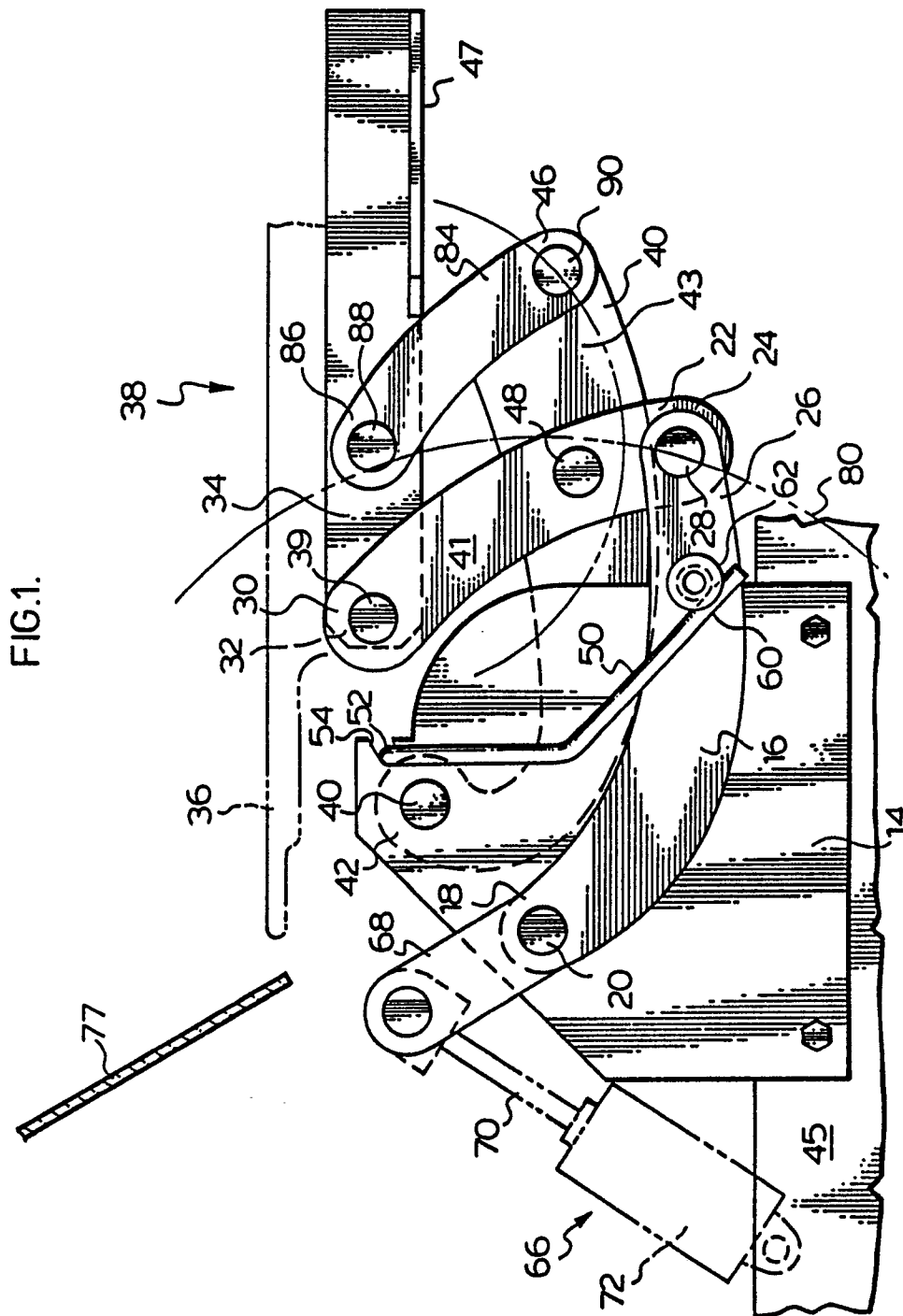


FIG.2.

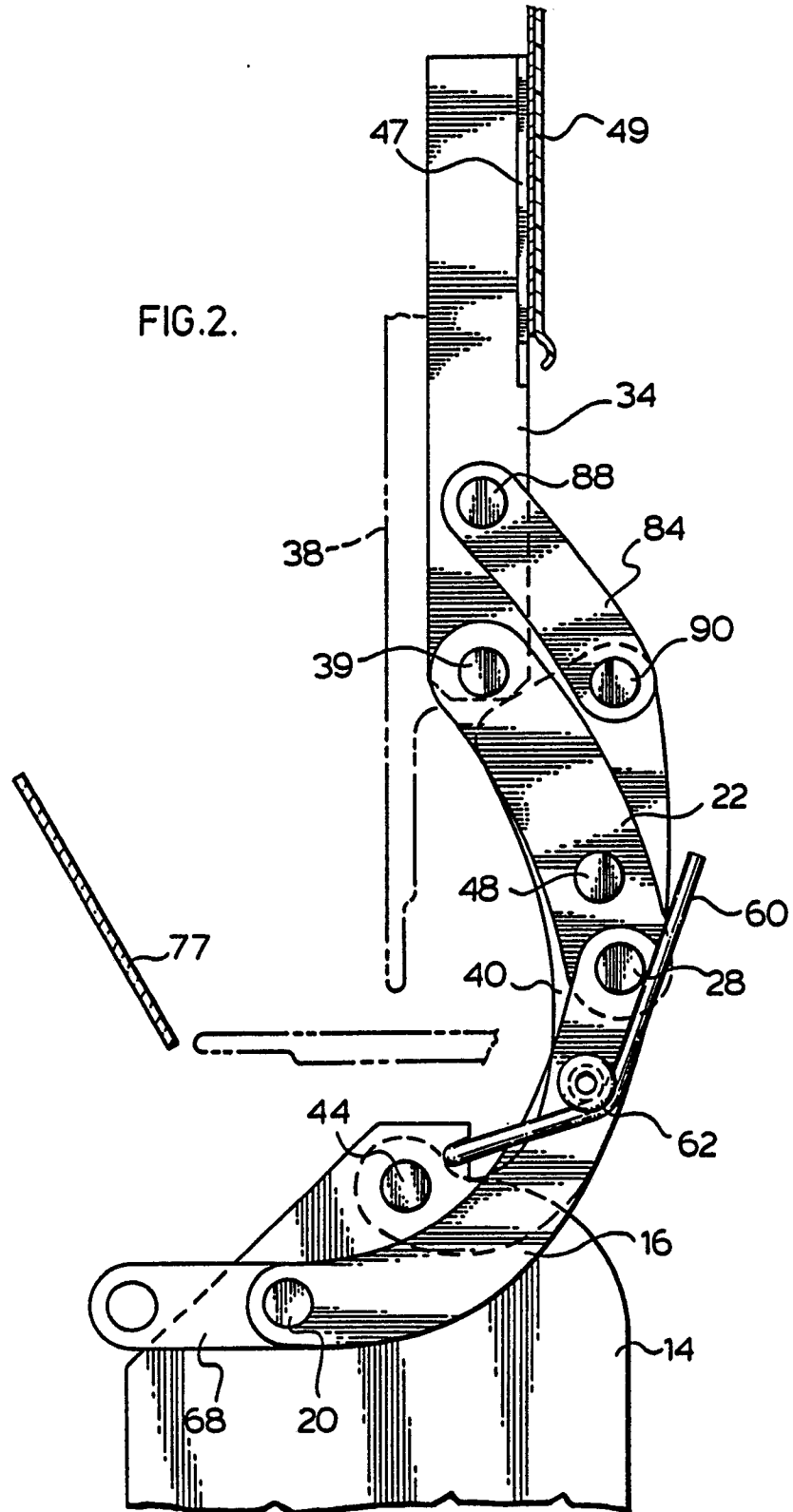


FIG. 3.

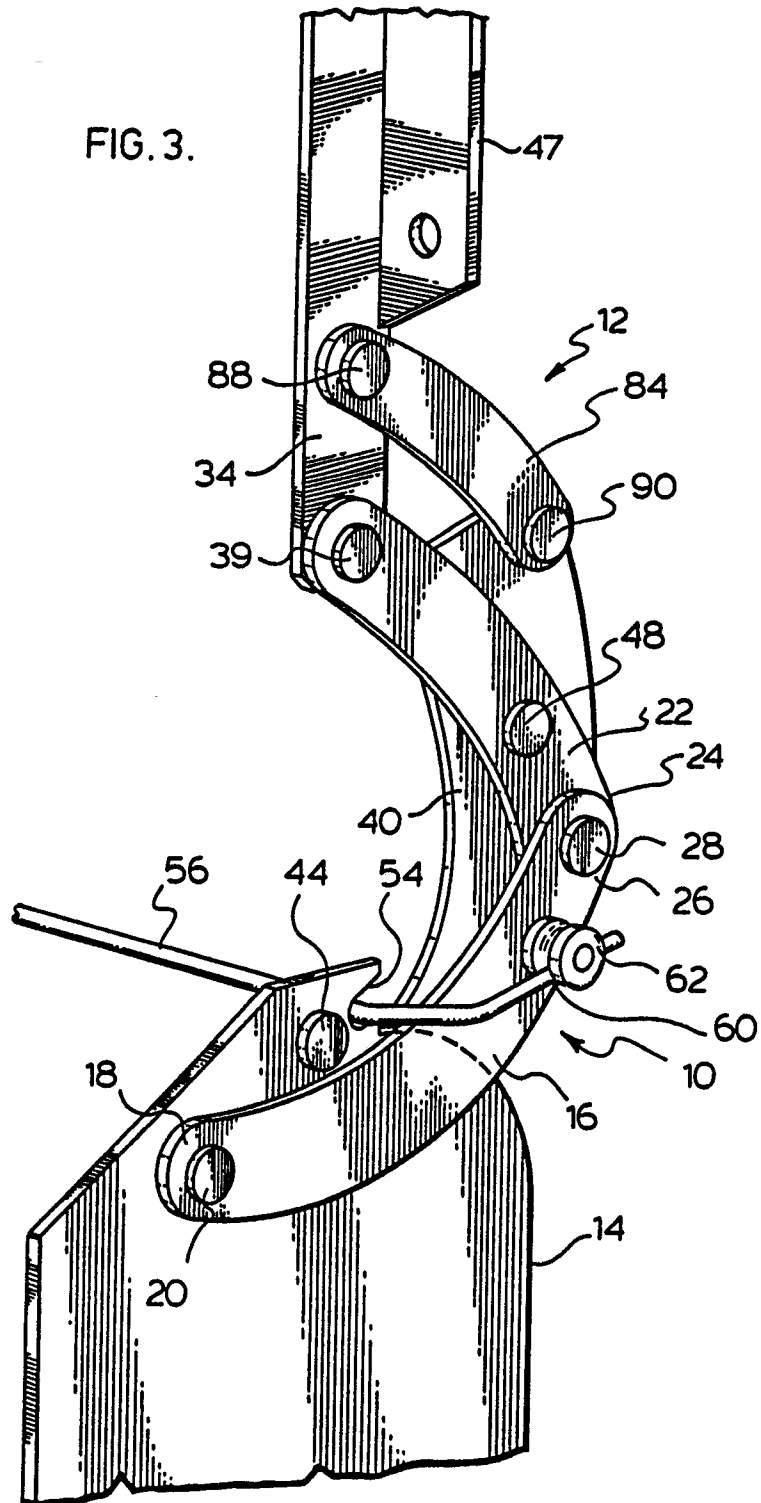
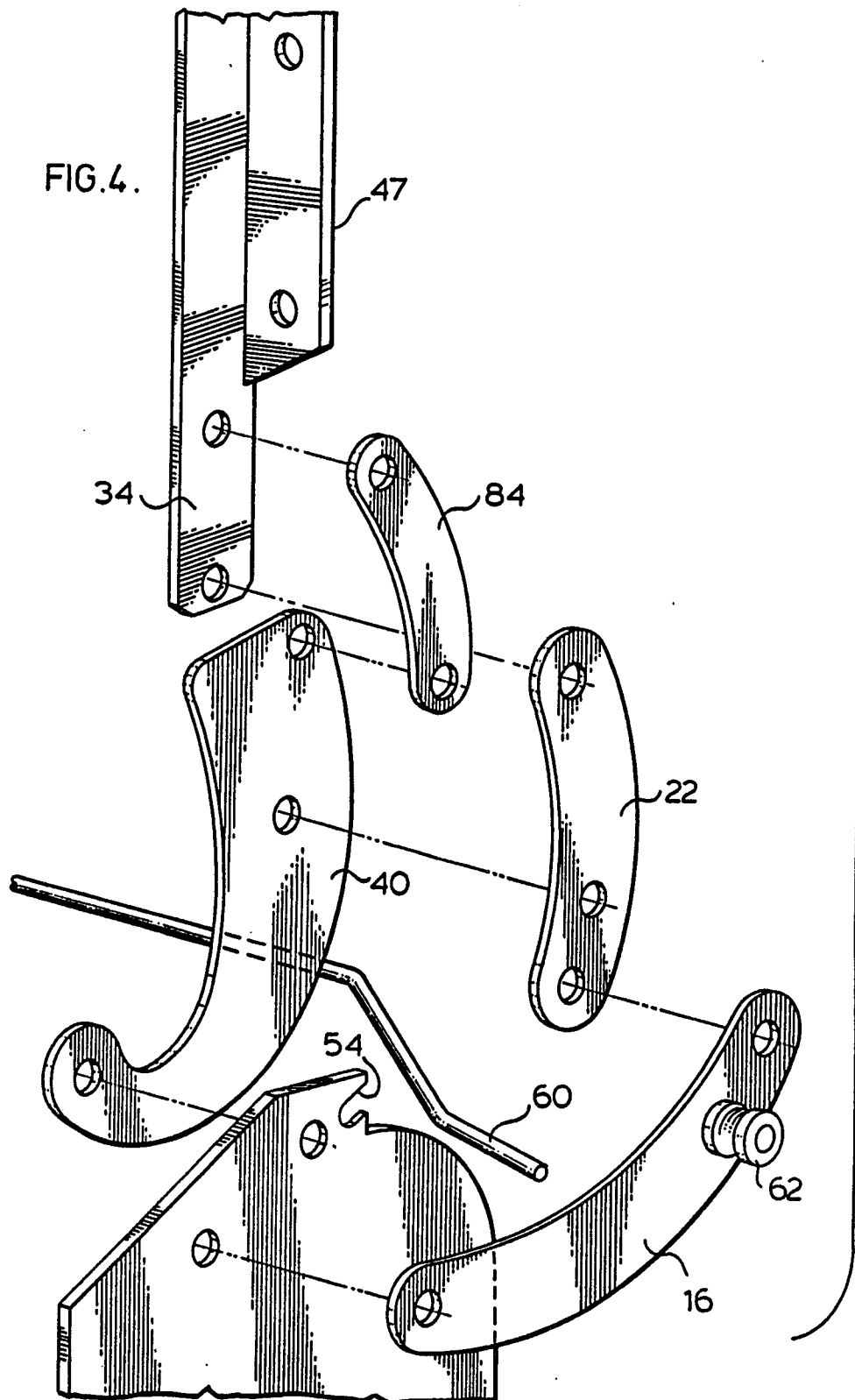


FIG. 4.





DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	US-A-2 122 301 (J. SOSS et al.) * Page 2, column 1, lines 64-69; page 4, column 2, lines 6-15; figure 1 *	1,4	E 05 D 3/06
Y	---	2,3,5,6 ,7,	
Y	US-A-2 811 348 (A.D. BRUNDAGE) * Column 1, lines 15-24; column 2, lines 33-43; figure 2 *	2,3,5,6	
Y	---		
Y	US-A-4 291 501 (BAYERISCHE MOTOREN WERKE) * Column 2, lines 43-47; figure 1 *	7	
A	---	8,9	
A	GB-A- 673 279 (BRIGGS) * Page 1, lines 20-23,36-41; page 3, lines 111-113; figure 5 *	2,5,7,8	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			E 05 D E 05 F
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 01-12-1989	Examiner GUILLAUME G.E.P.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	