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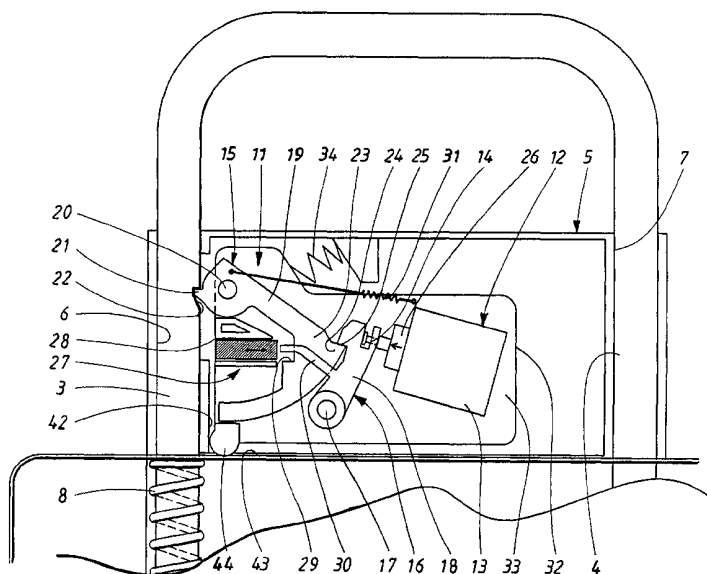
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(54) Title: HEAD REST DEVICE FOR MOTOR VEHICLES



(57) **Abstract:** Device in a head rest which is adjustable between a first position and a second position. A coil mechanism (8) applies an adjustment force which attempts to adjust the head rest from the first to the second position. A locking mechanism (11) retains the head rest in the first position. An activation mechanism (12) adjusts the holding mechanism to a release position. The locking mechanism (11) exhibits a locking part (15) which absorbs the adjustment force. A locking catch (16) interacts both with the locking part and with the activation mechanism. The locking catch is, by means of the activation mechanism, adjustable between a holding position in which the locking part is held in a locked position and a position which releases the locking part.



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## Head rest device for motor vehicles.

### TECHNICAL FIELD

The present invention relates to a device in head rests for motor vehicles,  
5 according to the preamble of appended claim 1.

### BACKGROUND OF THE INVENTION

Head rests in motor vehicles are usually attached to the seat of a vehicle so that they are vertically adjustable. There are several reasons for the possibility of adjustment. The head rest can, for example, be adjustable  
10 between a raised use position, and a lowered stowed away position which affords better visibility rearwards. The primary function of head rests is to afford protection in the case of collisions so that the driver or the passenger is protected against for example whip-lash injuries. The adjustment can either  
15 be manual or, in certain vehicles, and especially for the rear seat, there can be a need for a remotely controllable adjustment for at least one of the adjustment movements.

### SUMMARY OF THE INVENTION

20 The purpose of the present invention is to obtain, with relatively simple means, a head rest which can be remotely activated with simple means without the need of costly drive means.

The said purpose is obtained by means of a device in head rests, the  
25 characteristics of which will be apparent in the appended claim 1.

### DESCRIPTION OF THE FIGURES

The invention will in the following be described by means of an example of an embodiment with reference to the appended drawings in which  
30

Fig. 1 shows a head rest from the side,

- Fig. 2 shows the head rest in perspective, equipped with a device according to the invention,
- Fig. 3 shows an exploded view of the device in a head rest according to the invention, with the head rest in an upper position,
- 5 Fig. 4 shows the device activated, with the head rest adjusted to an upper position, and
- Fig. 5 shows the device in a position affected by g-forces.

### PREFERRED EMBODIMENT

- 10 As is apparent from Figs. 1 and 2, the head rest consists of an upholstered head cushion 1 which is arranged on a guide device 2 in the shape of two poles 3, 4 which protrude downwards into a holder 5 which is fixedly attached to the frame of the back of the seat 6, or to a fixed part of the vehicle in connection to the upper part of the back of the seat. As is shown with a solid
- 15 line, the head rest is positioned in an upper use position, while the dotted line of Fig. 1 shows the head rest in a lower stowed away position. The adjustment between the two positions can take place due to the fact that the guiding poles 3, 4 are arranged to run through fixed guide poles 6, 7 in the holder 5. The holder is designed as a casing of, for example, metal.

20

- The adjustment force in one of the directions, the direction of the lower stowed away position is accomplished by means of a retracting spring 8 which extends around one of the poles 3, and which in the example shown is a pressure spring attached between an attachment console 9 or a
- 25 downwards facing surface of the holder 5 and a stop organ 10 at the lower end of one of the pipes 3. The stop organ can simply be a through-going support pin in the tube, or a fixed support plate.

- In order to maintain the head rest in its upper position, i.e. the use position
- 30 there is arranged a locking mechanism 11 which is adjustable between a locking position shown in Fig. 3, in which the head rest thus is in its upper use position, and a release position shown in Fig. 4, in which the head rest is

allowed to, by means of the retracting spring 8, be adjusted to its lower stowed away position.

- In order to activate the locking mechanism 11, there is arranged a remotely  
5 controllable activation mechanism 12, which in the example shown comprises a solenoid 13 which forms a linear activation organ or power supply organ with a linearly adjustable outward axis 14 which is coupled to the locking mechanism.
- 10 The locking mechanism 11 consists of a locking part 15, which directly interacts with the moving part of the guide device, i.e. one of the pipes 3 and a holding catch 16 which is adjustable between a retaining position for the locking part 15, and a position which releases it. The locking catch 16 consists of a pivotable holding arm 18, which pivots about a pivot pin 17, the  
15 holding arm being coupled to the outgoing axis 14 of the activation organ 13. This coupling is chosen so that the outgoing axis is arranged with a play in the holding arm 18, which causes the activation organ to obtain kinetic energy before it is engaged by the load of the holding catch 18. This means that the activation organ 13 can be dimensioned for smaller forces or energy.
- 20 Apart from maintaining a play, the coupling allows flexibility between the holding arm 18 and the axis 14. These two functions are maintained by both the holding arm 18 and the axis 14 exhibiting two changing organs 36, 37, 38, 39 in which the one pair of changing organs 36, 37 exhibit a space between them which exceeds the distance between the changing organs 38,  
25 39 in the other pair, i.e. those which belong to the axis. In the example shown, the changing organs 36-39 are arranged as stop surfaces in the form of a recess 40 in the holding arm 18. In the recess, an abutment 41 of the axis 14 protrudes into the recess, while the rest of the axis is arranged so that it does not have any contact with the holding arm 18, for example it  
30 passes through a fork in it or extends at the side of the arm. The recess 40 forms said play by being wider in the longitudinal direction of the axis than

the thickness of the abutment 41 in the same direction, for example exceeding twice the thickness.

5 The force absorbing locking part 15 consists of a locking arm 19 which is pivotably fixed about an axis 20, and exhibits a locking catch 21 which has a relatively short torque arm, i.e. it is attached at a relatively short distance from its axis 20. The locking catch is arranged to, in the locking position, i.e. in the raised or use position of the head rest, engage into a locking recess 22 of the moving part of the head rest, i.e. in the example shown the one pipe 3.

10 The locking arm 19 of the force-absorbing locking part 15 is a two-armed lever with a lock arm part 23 which has a locking catch 24 arranged to cooperate with a holding catch 25 on the holding arm 18.

All the components have a certain dead weight, for example the activation organ 13 aside from a fixed part also has a linearly moving part 26 which can move back and forth, on which the outgoing axis 14 is attached. The moving part is usually a core with a mass which is biased by means of a not shown coil with a relatively small coil force, which strives to keep the solenoid 13 and thereby the holding catch 16 in the locking position, as shown in Fig. 3.

20 The coil force is overcome by the activation organs own driving force. In the case of the solenoid, a magnetic field is formed by means of applying a voltage to a fixed coil in the solenoid which creates a traction force on the core. By means of the dead weight of the moving parts, there is a risk of the following: When the vehicle, which normally moves in a perpendicular direction to the plane of the paper as shown in Fig. 3-5, is exposed to abnormal gravitational forces in particular side forces, i.e. to the right or left in Fig. 3-5 in, for example, the case of a side collision, this can mean that the locking mechanism is inadvertently triggered, and moves the head rest from its use position in the very moment that the head rest is necessary to protect

30 people. For this purpose, there is arranged a gravitational force lock, which can best be seen in Figs. 3-5. This consists of a locking element 28 which is movable, in the example shown linearly sideways, i.e. perpendicular to the

longitudinal direction of the tube 3 along a guide between a normal release position as shown in Figs. 3 and 4, and a locking position, see Fig. 5, in which the force absorbing locking arm 19 is retained by interaction with a locking recess 29. In order to reset the locking element 28, there is arranged  
5 a reset organ 30 in the shape of an abutment or a finger from the holding arm 18. The abutment 30 simply moves the locking element 28 to the original position when the locking catch 16 again resumes the locking function due to the g-forces being reduced to a certain value.

10 The locking part 15 is continually biased with a small coil force by means of a coil 31 which strives to rotate the locking part 15 clockwise, i.e. towards its locking position when it has been adjusted to the release position.

Both the locking mechanism 11 and the activation mechanism 12 are built  
15 into a module or cassette 32 which can be arranged in the holder 5 by means of a simple movement. The cassette can be designed as an essentially closed box, or at least exhibit a wall 33 with support surfaces, so that the cassette is maintained sideways, i.e. against movements perpendicular to the plane of the paper as seen in Fig. 1. The cassette is maintained in the plane  
20 of the paper by means of a spring mechanism 34, which strives to hold the cassette in the direction of the locking recess 22. This ensures that there is no play between the locking catch 21 and the locking recess, i.e. the arrangement is "tolerance absorbing". In this context, a certain movability can also be allowed around the one corner 44 of the cassette which is rounded  
25 and forms a pivot point in the holder for minor movements during the adjustment movement of the locking mechanism 11. In more detail, the corner 44 in the example shown is shaped as a cylindrical casing surface 35 which can be rotated towards fixed contacting surfaces 42, 43 in the holder 5. The contacting surfaces 42, 43 are in the example shown plane, but could for  
30 example be a concave cylindrical storage surface for the corner 44.

The practical function of the device will now be summarized. When somebody is to sit down in the seat of a motor vehicle, for example a convertible, the head rest is raised from its lower position which is maintained by means of the spring mechanism 8 to its in Fig. 1 (by means of solid lines) 2 and 3 shown upper position, i.e. the use position. This is done completely manually, by means of the person using his hand to grip the lower edge of the support cushion of the head rest and lifting the head rest until the locking position is assumed, which can usually be perceived by means of a clicking sound. The locking position is assumed by means of the locking mechanism 11 and the activation mechanism 12 holding the pipe 3 in its upper position by means of the engagement of the locking catch 21 in the locking recess 22. The solenoid of the activation mechanism, more precisely its moving part 26, is held in its outward position by means of a not shown spring, whereby the holding catch 16 holds the locking mechanism 11 locked.

When the head rest is to be adjusted to a stowed away, i.e. a lower position, a current circuit is closed, i.e. an electrical voltage is applied to the solenoid 13. This is done by, for example, the driver activating a switch from an opened to a closed position on the dashboard. This causes the retraction of the moving part 26 of the solenoid and the corresponding axis 14. As will be apparent, and as has been described above, a play is obtained due to the fact that the two contact surfaces 38, 39 of the axis 14 change between contact against the two contact surfaces 36, 37 on the holding arm 18. Since the contact surfaces 36, 37 of the holding arm 18 exhibit a larger distance between them than the contact surfaces 38, 39 of the axis 14, said play is obtained. The moving part of the solenoid thus obtains a starting distance or acceleration distance with a minimal initial resistance, which necessitates a lower manoeuvring force than in the case of a direct coupling without a play. When the cooperating contact surfaces for the adjustment movement have reached each other, see Fig. 4, the holding arm 18 is adjusted, i.e. brought along by the axis and rotated clockwise about its pivoting pin 17, causing the holding arm 18 to activate the locking part 15, i.e. to release the locking arm

part 23 by moving the holding catch 23 away from the locking catch 24, which means that the locking arm part is rotated about its axis 20 counterclockwise under the influence of the spring force from the spring mechanism 8. This thus causes the holding catch 21 to be moved out of the  
5 holding recess 22, and the head rest moves from its use position, which can be seen as a first position, to its stowed away position, which can be seen as a second position, see Fig. 4.

If the head rest in the use position according to Fig. 3 is exposed to the  
10 above-mentioned g-forces, the moving locking element 28 of the g-force catch 27 moves in its guide from the release position shown in Fig. 3 to the locking position shown in Fig. 4, with a part in the way of the locking recess 29 and the locking arm 19. This causes the locking arm 19, and thus also the  
15 locking catch 21 to be retained in the locking position even if the holding mechanism due to g-forces is adjusted to the release position, i.e. its holding catch 25 is moved from the locking catch 24, for example by means of the moving part 26 of the solenoid 13 with the axis 14 is adjusted for inadvertent activation by the holding catch. It will be realized, also by means of Fig. 5,  
20 that the finger 30 of the holding arm 18 "shoves" the locking element 28 back when the g-forces have been overcome by the return force of the solenoid.

The invention is not limited to the example of an embodiment described above and shown in the drawings. It is for example possible to let the spring mechanism 8 work reversely, and strive to adjust the head rest to an upper  
25 position, in which case the locking mechanism is rotated so that it locks in the lower position. The pivot point 44 of the cassette is formed by means of an abutment which alternatively can be arranged some distance away from the corner of one of the sides of the cassette, preferably the side facing the locking recess 22, and oriented towards the middle of the side. In so doing, a  
30 torque on the cassette caused by g-forces will be avoided.



## CLAIMS

1. Device in a head rest which is adjustable between a first position and a second position, comprising a coil mechanism (8) for applying an adjustment  
5 force which strives to adjust the head rest from the first to the second position, and a locking mechanism (11) for retaining the head rest in the first position, and an activation mechanism (12) for adjusting the locking mechanism to a release position characterized in that the locking  
10 mechanism (11) exhibits a locking part (15) for absorbing said adjustment force and a holding catch (16) which interacts both with the locking part and with the activation mechanism, and in that the holding catch by means of the activation mechanism, can be adjusted between a holding position in which the locking part is held in a locking position and a position which releases the  
15 locking part.

2. Device according to claim 1, in which said adjustment is accomplished by a linear movement of a moving part (3, 4) of the head rest relative to a fixed guide (6, 7) characterized in that the locking part (15) consists  
20 of a locking arm (19) with two arms, which is pivotally arranged about an axis (20), with one of the arms forming a locking lever (21) arranged to, in a locked position for the head rest, attach into a locking recess (22) of the moving part (3, 4) of the head rest and in that the holding catch (16) consists of a pivoting holding arm (18) with a holding catch (25), the holding arm pivoting about a pivot pin, with the holding catch arranged to, in the holding  
25 position, hold the locking part in the locking position and to, in the release position, release the locking part by activating the activation mechanism.

3. Device according to claim 1, characterized in that the activation mechanism (12) is coupled to the holding catch (16) by means of a  
30 linearly adjustable axis (14) with a delay, so that the activation mechanism (12) moves a little before its movement is transferred to the holding catch.

4. Device according to claim 2, characterized in that said coupling exhibits a play.

5. Device according to claim 4, characterized in that the  
5 activation mechanism (12) consists of a solenoid (13), the adjustable axis of which (14) exhibits an abutment (41) with two stop surfaces (38, 39) which face away from each other, and which are arranged to alternately, with a play, interact with two stop surfaces (36, 37) facing each other and being arranged on the holding arm.

10

6. Device according to claim 1, characterized in that a  
gravitation catch (28) adjustable by gravitational forces is also adjustable  
between a normal release position for the locking part and a locking position  
in which the locking part is held locked even in the case where the holding  
15 catch is adjusted to the release position, due to the holding catch and/or the  
activation mechanism being exposed to gravitational forces which exceed a  
certain threshold.

7. Device in a head rest which is adjustable between a first position and a  
20 second position, comprising a coil mechanism (8) for applying an adjustment  
force which strives to move the head rest from the first to the second  
position, and a locking mechanism (11) for retaining the head rest in the first  
position, and an activation mechanism (12) for adjusting the locking  
mechanism to a release position, characterized in that the locking  
25 mechanism (11) consists of one part attached to the moving position of the  
head rest, and one part arranged in a fixed casing (5), and in that the  
activation mechanism (12) and the part of the holding mechanism which is  
arranged in the housing are arranged in a cassette (32) which is movably  
arranged but biased by means of a coil in the casing essentially in the  
30 direction of the moving part of the locking mechanism.

8. Device according to claim 7, characterized in that the cassette (32) is arranged in the casing (5) with a slight ability to pivot about a pivoting organ formed by an abutment (44) in the cassette, and in that the coil bias creates a tolerance absorbing torque which is arranged to eliminate  
5 play in the locking mechanism.

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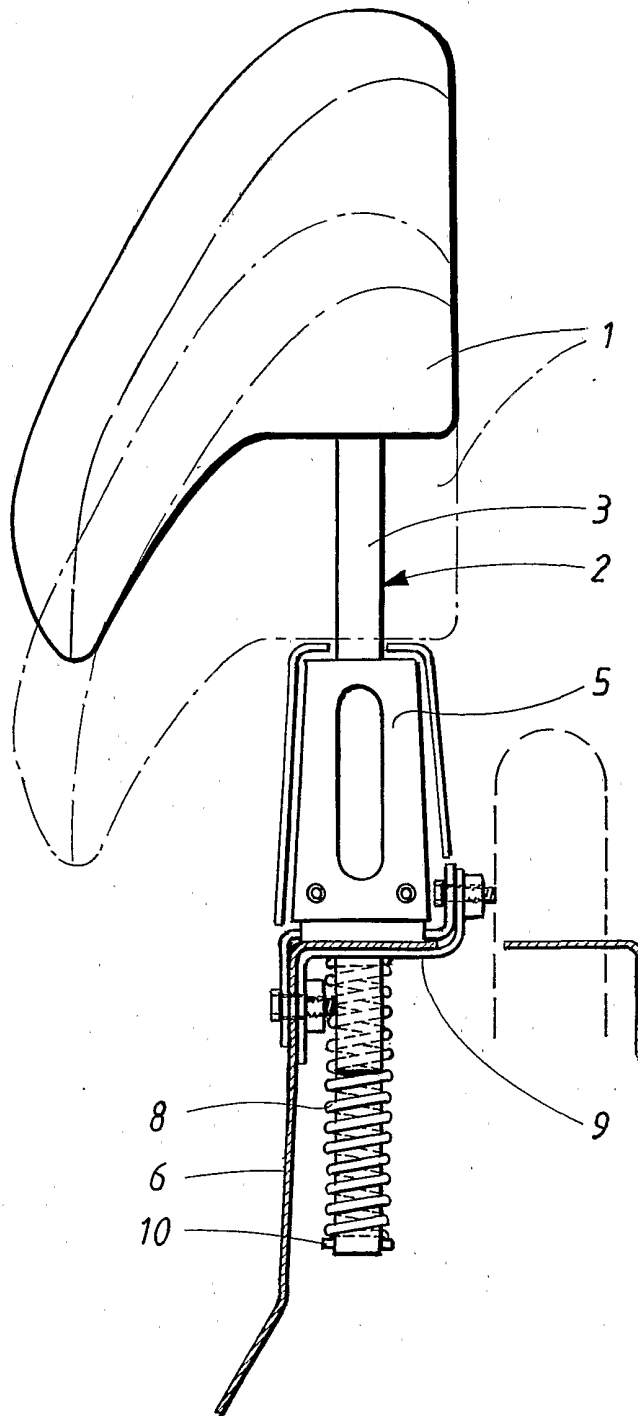
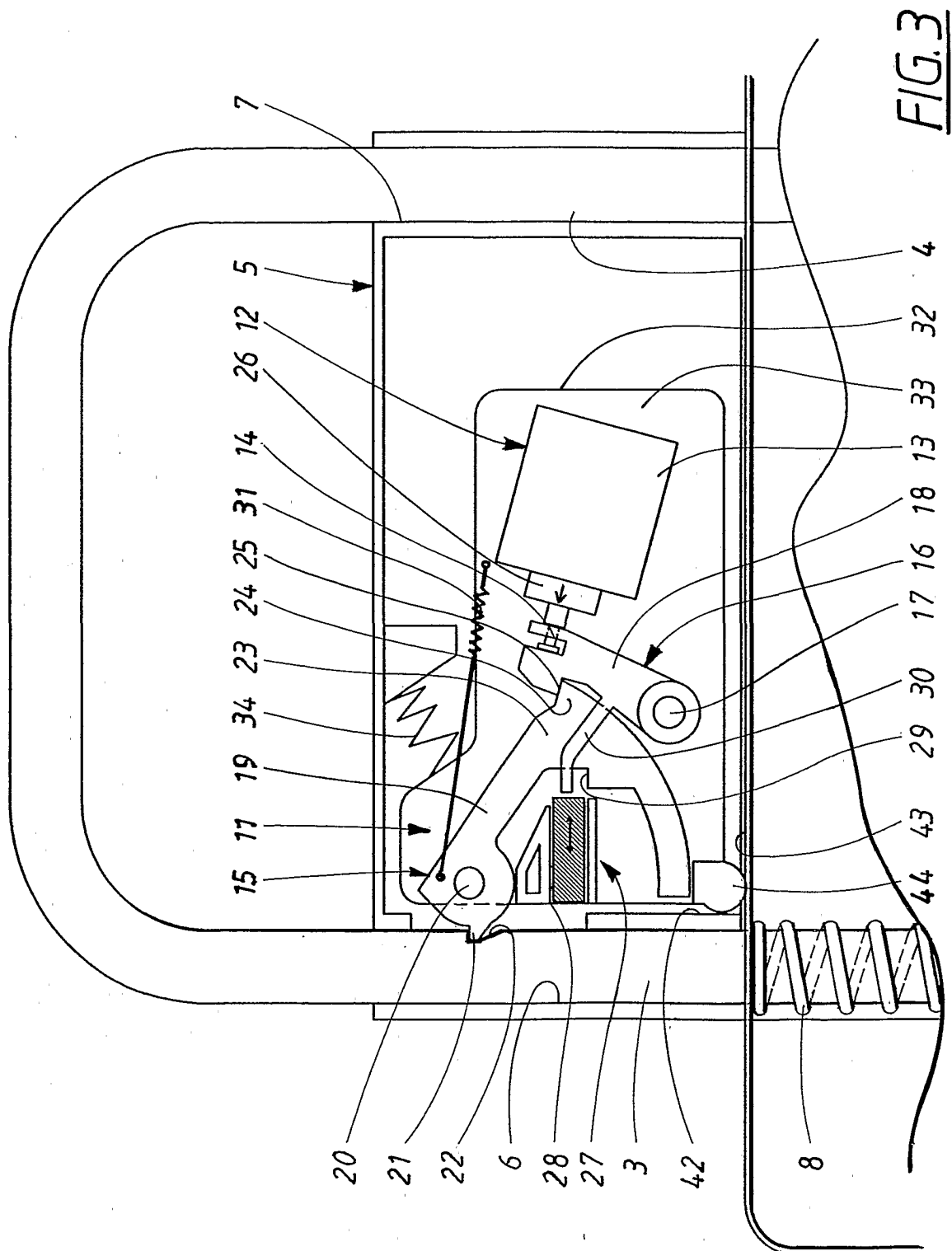


FIG. 1



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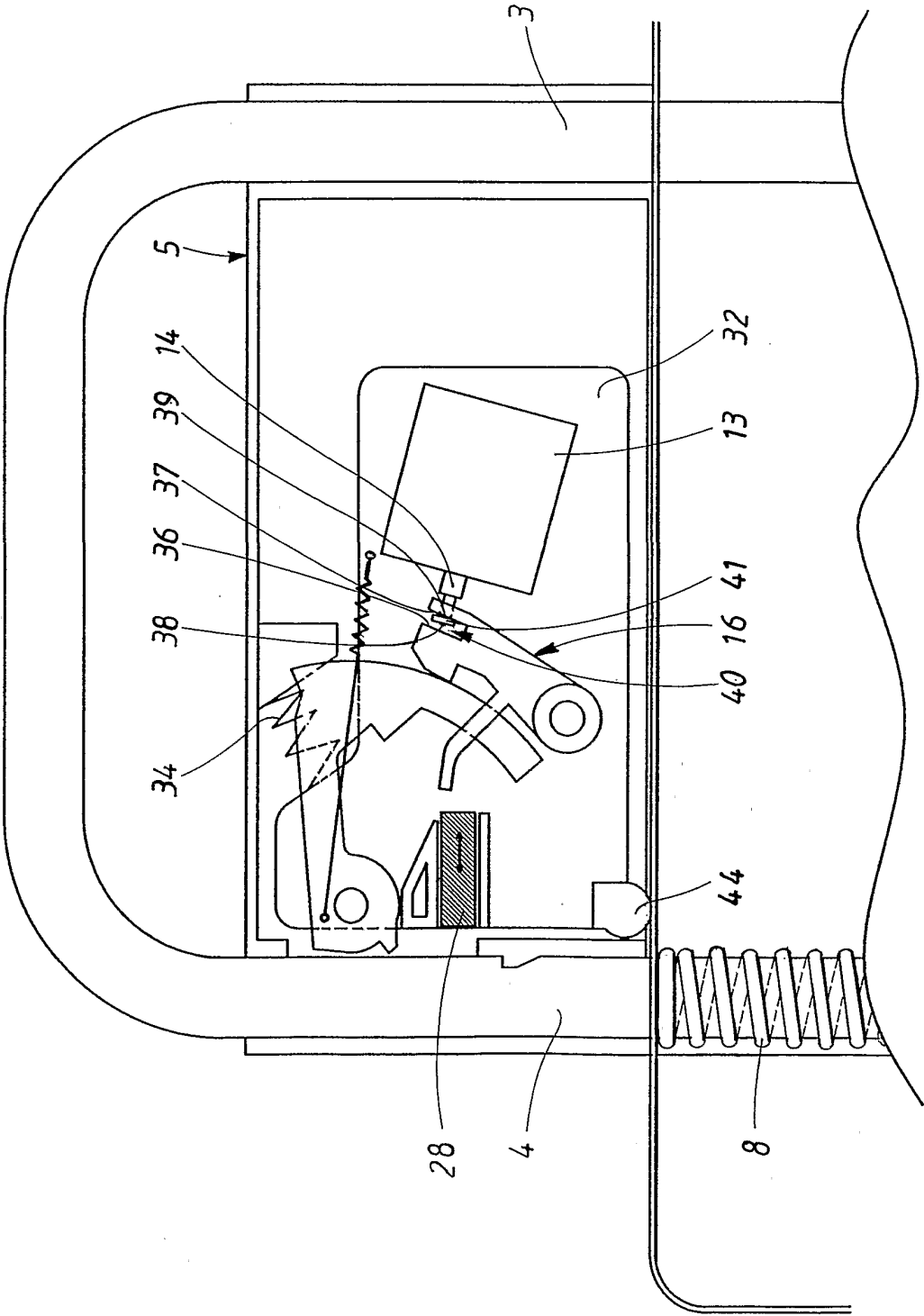
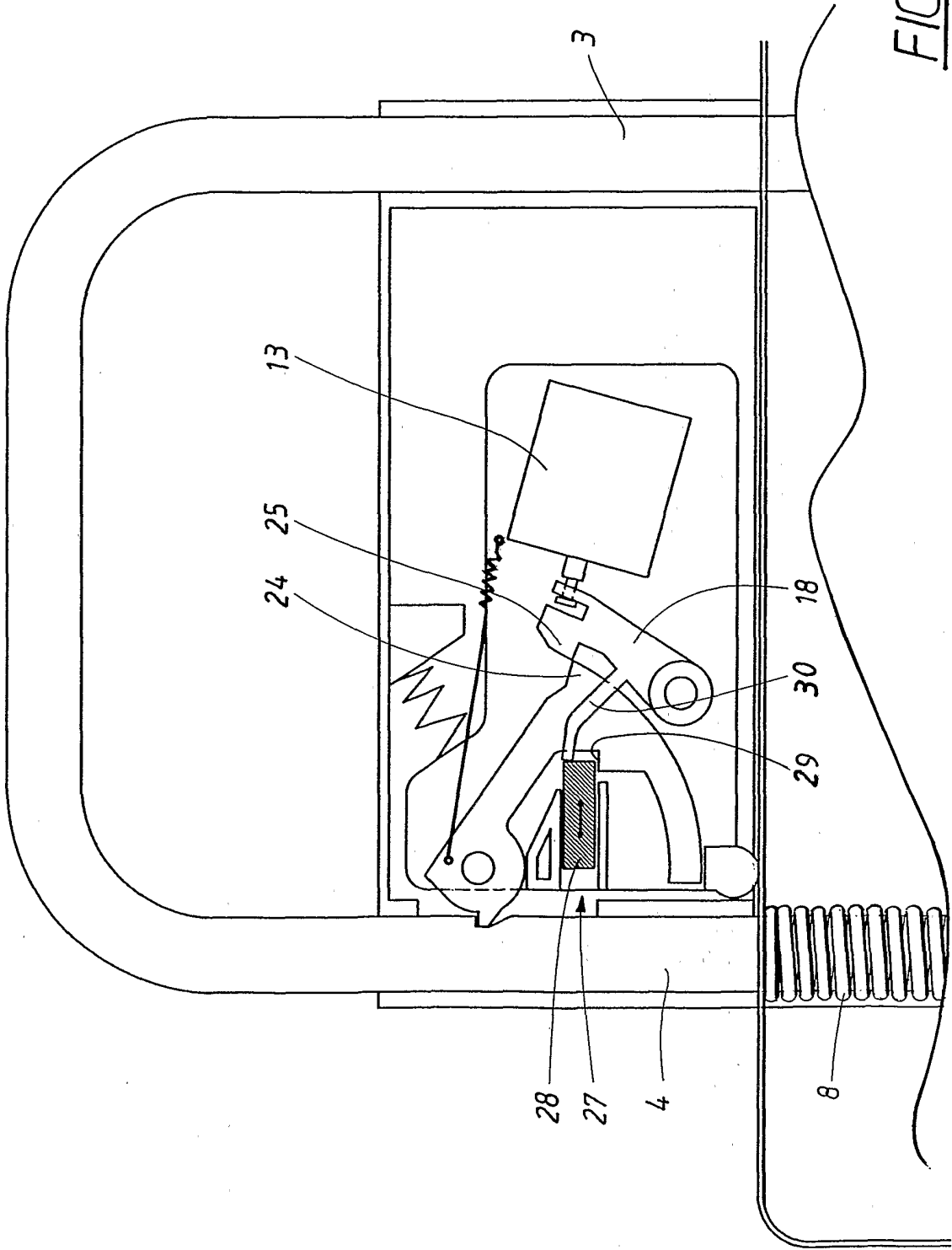


FIG. 4





## INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 01/01060

## A. CLASSIFICATION OF SUBJECT MATTER

IPC7: B60N 2/48

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)

IPC7: B60N

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

SE,DK,FI,NO classes as above

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

EPODOC, WPI

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4711494 A (DUVENKAMP), 8 December 1987 (08.12.87), column 4, line 56 - column 5, line 12; column 7, line 18 - line 27, figures 1-8, abstract	1
A	column 6, line 20 - line 25 --	5
A	DE 19803182 A1 (GRAMMER AG), 29 July 1999 (29.07.99), column 3, line 26 - line 41, figures 1-3, abstract --	1
A	US 4545618 A (KITAMURA), 8 October 1985 (08.10.85), figures 1-3, abstract -- -----	1

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

## \* Special categories of cited documents:

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**INTERNATIONAL SEARCH REPORT**

Information on patent family members

02/07/01

International application No.

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Patent document cited in search report			Publication date	Patent family member(s)		Publication date
US	4711494	A	08/12/87	DE	3605774 A,C	17/09/87
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